1898.

NEW ZEALAND.

THE GOLDFIELDS OF NEW ZEALAND:

REPORT ON ROADS, WATER-RACES, MINING MACHINERY, AND OTHER WORKS IN CONNECTION WITH MINING.

Presented to both Houses of the General Assembly by Command of His Excellency.

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REPORT ON ROADS, WATER-RACES, MINING MACHINERY, AND OTHER WORKS IN CONNECTION WITH MINING.

Presented to both Houses of the General Assembly by Command of His Excellency.

Mr. GEORGE WILSON, Inspecting Engineer, to the Hon. A. J. CADMAN, Minister of Mines.

SIR,— Mines Department, Wellington, 12th May, 1898.

I have the honour to submit my annual report, for the year ending the 31st March last, on the progress of the mining industry, and on different works in connection with the same having a tendency to promote a further development of the mineral wealth of the colony.

SUBSIDISED ROADS AND TRACKS.

The following statement will show the expenditure on subsidy principle authorised for the construction of roads and tracks in the different counties for the year ending the 31st March last, and the liabilities on outstanding authorities on that date:—

Name of Local Body.	Expenditure for the Year ending 31st March, 1898.	Liabilities on Authorities on 31st March, 1898.
	£ s. d.	£ s. d.
Piako County	145 0 0	125 0 0
Coromandel County	1,325 0 0	600 0 0
Te Aroha Town Board	43 15 0	31 5 0
Thames County	104 4 6	466 15 6
Thames Borough	600 0 0	588 0 0
Ohinemuri County	516 7 2	1,773 4 7
Katikati Highway Board	88 6 8	100 0 0
Picton Road Board	...	50 0 0
Collingwood County...	100 0 0	100 0 0
Pelorus Road Board...	...	30 0 0
Buller County	516 13 4	983 6 8
Inangahua County	80 9 0	19 11 0
Grey County	1,850 0 0	1,971 10 0
Westland County	36 13 3	57 12 0
Tuapeka County	5,348 7 3	1,331 9 3
Lake County	500 0 0	1,000 0 0
Southland County	...	450 0 0
Vincent County	850 0 0	...
Contingencies	53 10 5	...
Totals	12,158 6 7	9,677 14 0

ROADS CONSTRUCTED BY DIRECT GRANTS.

The following statement will show the expenditure and liabilities on authorities issued on roads from direct grants to the several local bodies during the year ending the 31st March, 1898:—

Name of Local Body.	Expenditure for the Year ending 31st March, 1898.	Liabilities on Authorities on 31st March, 1898.
	£ s. d.	£ s. d.
Te Puke Road Board	250 0 0	...
Matamata Road Board	...	100 0 0
Bay of Islands County	500 0 0	...
Whangarei County	350 0 0	200 0 0
Tauranga County	680 0 0	730 0 0
Coromandel County	100 0 0	150 0 0
Thames County	3,503 14 2	3,360 5 3
Ohinemuri County	1,621 11 11	2,649 13 7
Piako County	1,764 16 10	...
Pelorus Road Board	786 5 3	402 14 9
Collingwood County	1,040 0 0	1,975 0 0
Wairau Road Board	360 1 0	673 3 8
Waimea County	...	250 0 0
Buller County	2,495 0 0	4,700 0 0
Inangahua County	2,434 6 5	2,459 16 0
Grey County	2,395 6 11	3,580 0 0
Westland County	4,792 18 2	2,285 5 3
Ross Borough Council	100 0 0	150 0 0
Wallace County	250 0 0	250 0 0
Taieri County	...	500 0 0
Lake County	550 0 0	400 0 0
Southland County	200 0 0	...
Tuapeka County	1,659 2 1	1,922 19 3
Vincent County	950 0 0	800 0 0
Land and Survey Department	9,241 0 8	6,368 19 7
Public Works Department	1,386 10 10	...
Totals	37,410 14 3	33,907 17 4

PROSPECTING FOR GOLD.

The following statement will show the expenditure and liabilities on authorities issued in subsidies to prospecting associations and parties of miners recommended by the local bodies in the different counties for the year ending the 31st March last:—

Name of County.	Expenditure for Year ending 31st March, 1898.	Liabilities on Authorities on 31st March, 1898.
	£ s. d.	£ s. d.
Piako County	5 12 6	12 2 6
Bay of Islands County	212 7 0	110 3 0
Manukau County	55 2 3	14 2 3
Coromandel County	515 6 11	255 15 11
Tauranga County	10 0 0	6 0 0
Marlborough County	34 6 6	...
Grey County	7 10 0	80 0 0
Inangahua County	11 11 0	153 4 9
Westland County	1,240 3 2	754 16 4
Selwyn County	2 5 0	17 15 0
Tuapeka County	118 14 0	104 16 0
Lake County	10 0 0	13 0 0
Southland County	13 3 0	17 7 0
Vincent County	42 9 9	15 0 3
Maniototo County	...	20 0 0
Wallace County	79 4 0	7 10 0
Totals	2,357 15 1	1,581 13 0

SCHOOLS OF MINES.

The average attendance of students at the Thames School, although there is a slight decrease compared with last year, shows that the interest evinced is still well maintained, and that the

opportunity to avail themselves of the higher education afforded is still considered of the highest importance by the students.

The number of students attending the classes is regulated in a great measure by the facilities for obtaining employment in mines situated within a reasonable distance from the class-rooms; and the attendance both at the Thames and at Reefton schools has fallen off through the mines in their vicinity being not so fully in a position to furnish employment as formerly.

The opening of schools at Coromandel and at Waihi has also induced students to attend the classes in those schools, and the number attending at both places shows that the desire on the part of the miners to acquire all the higher branches of knowledge is still maintained. Therefore the number of students throughout the Hauraki District has been increased in a marked degree.

The schools at Waipori and at Miller's Flat, to which assistance has been furnished by the Government, are not yet in the position to afford students an opportunity of attending classes.

The school in connection with the Otago University continues to steadily advance, the attendance for the year being greater than in any previous year.

The attendance at the school at Nelson shows that the same amount of interest is taken by the students as formerly. The classes are presided over by Mr. W. F. Worley, who devotes his spare time to the advancement of the students.

The following reports have been furnished by Mr. F. B. Allen, M.A., B.Sc., the Director of the Thames School; Mr. R. M. Aitken, Director of the Reefton School; Mr. P. G. Morgan, M.A., Instructor of the Waihi School; Mr. James M. Maclaren, M.A., Instructor of the Coromandel School; Professor George H. F. Ulrich, F.G.S., Director of the Otago School; and Mr. W. F. Worley, of the Nelson School, and show the results of the annual class-examinations, the subjects taught, the number of ore-samples that have been assayed, and the returns from the larger parcels treated at the different reduction plants at the schools. It is thus apparent that the public are greatly benefited by the institution of the schools, where, for a reasonable charge, the full value of any ore or mineral subtance can be readily determined, and the most approved process for treatment in order to recover the different metals ascertained.

THAMES SCHOOL.

Mr. F. B. Allen, M.A., B.Sc., Director of the Thames School of Mines, reports as follows:—

I have the honour to furnish the following annual report of the Thames School of Mines for the twelve months ending the 31st March, 1898:—

The twelve months just ended has been an extremely busy period for the school, which has been taxed to its utmost capacity to cope with the large increase in work. The attendance at the classes, which has steadily increased since the end of 1895, reached its maximum in the middle term of 1897, and the experimental plant was kept in constant employment testing trial parcels of ore by various processes, until, at the end of the year, it was closed down for alterations and repairs.

Two changes have been made in the teaching staff. At the end of June, Mr. P. G. Morgan, M.A., relinquished his duties as assistant, which for close on twelve months, during a very busy period, he had discharged with untiring energy and zeal. On the 1st August, 1897, Mr. W. A. MacLeod, B.A., B.Sc., was appointed to fill the vacancy, and has carried out his arduous duties in an entirely satisfactory manner. At the end of 1897 Mr. John Parr, B.Sc., M.E., terminated his engagement as drawing-master, in order to go to Australia. Mr. Parr proved an excellent teacher, with a thorough knowledge of his subject, and under his guidance the drawing-class made rapid progress. His successor, Mr. E. J. Williams, commenced duty at the beginning of 1898. He has shown himself to be thoroughly competent, and has gained the confidence of the students under his charge. Mechanical drawing is a very essential portion of the work of a mining school, and to insure proper attention being paid to this important branch requires the constant attention of a capable instructor.

The average number of individuals attending the school during 1897–98 is 136. The average attendance of registered students has been 98, a slight falling-off from the previous year, although at one time (viz., during the second term of 1897) the roll of registered students included the large number of 128. Since that time the number of students attending classes has been decreasing. The attendance at the school is of necessity regulated partly by the state of the mining industry in the district. Latterly active mining has been largely superseded by development work, the erection of plants and batteries, and in the meantime comparatively little gold has been won on the Thames field. Men have had to journey to the up-country districts in search of employment, while new-comers to the Thames have been fewer than in former years. The effect on the school has been to lower the attendance from the abnormal height it had reached during the first two terms of 1897 to something more like an average number. The attendance, however, is still in excess of that of two years ago. Moreover, the majority of the present students are in active employment, and it is partly because of the smaller number this year of that section of the students who are not working in the mines or elsewhere that the attendance has decreased. The school has been designed and the course of study arranged for the advantage and instruction of men employed in the mine or battery, and each student, if he could so arrange matters, would find it to his advantage to obtain outside employment either in the direction of mining or of metallurgy during the time that he is studying, so as to combine the practical with the theoretical.

During the last twelve months two new schools of mines have been started, for the purpose of giving regular instruction in mining and kindred subjects. The Waihi School is under the leadership of Mr. P. G. Morgan, M.A., the late assistant at the Thames School, the one at Coromandel being under Mr. J. M. Maclaren, formerly a pupil of the Thames School, and the winner of a School

of Mines scholarship. The inception of these two schools, and the greater ease with which employment can be obtained in their vicinity, will, no doubt, militate to a certain extent against overcrowding at this school.

An important alteration has been made this year in the conduct of public assay-work. A commodious wooden building has been built round the large chimney of the old assay-room, and is fitted with furnace, muffles, grinding-plate rolls, fume-chamber, sink, benches, &c., and all the necessary apparatus, while adjoining it is a compact well-lighted balance-room, for which a new and expensive bullion-balance has been imported from London. This separate assay department supplies a long-felt want, and the public will have the satisfaction of knowing that their assays are performed by a competent assayer in a building entirely distinct and separate from that used by the students. It will also materially aid the teaching staff in the efficient control of both the public assay-work and the teaching department. The following table shows the number of public assays performed during the last twelve months :—

Number of public assays	487
Number of assays in connection with ton parcels of ore	413
Total	900

The great majority of samples for assay are sent from districts outside of the Thames, and many come from various parts of New Zealand other than Auckland.

Extensive alterations have been made in the experimental plant. As the old battery could not cope with the large increase in the number of test parcels, and was, besides, constantly needing repair, it was decided to shut down, and make the necessary improvements. First of all, with a view to giving the necessary increase in motive-power, a new 9 in. main, a quarter of a mile long, was laid down so as to connect the battery in a straight line with the county's large supply-pipe. A new valve and all necessary connections were fitted to the main, and this portion of the work completed before Christmas, 1897. The plant was then shut down in December, new foundations for the mortar-block, three new stamps, cams and cam-shaft were placed in position, and special housing round the box was built up to prevent the escape of dust in dry-crushing.

The mortar-box has been placed in a lower position, and the stages and platforms altered. The ore now passes through a Dodge rock-breaker near the furnace, and is fed into the stamps automatically by a Challenge self-feeder. Bucket elevators, fastened on belting, convey the dry-crushed ore from the front of the stamper-box into a large sheet-iron hopper, whence it is distributed by means of shoots to the amalgamating-pans and cyanide-vats as required.

A trial run of the new machinery was made in the middle of March, 1898, and, after a few alterations, the work of crushing test parcels was resumed. The new battery has been kept busy ever since, and several parcels are now on hand awaiting treatment.

There has been no lack of test parcels during the last twelve months, and although, owing to an enforced idleness of three months while the above-mentioned alterations were in progress, the total number of parcels treated is less, still the plant, while in repair, was in constant work, and the average for the nine months is well up to that of the previous twelve months. During the nine months the plant was working sixty-two parcels, aggregating 89,211 lb., were treated, of which thirty-seven were pan-amalgamated, thirteen treated by potassium-cyanide, and twelve were miscellaneous, as shown by the accompanying tables. It was found necessary to subject four of the parcels to a chloridizing roast before treatment. The average percentage of saving by amalgamation amounted to 83·8 per cent., and by cyanide to 61·6 per cent., much the same as during the previous year.

In the list of the experimental treatment of the various parcels of ore several poor extractions are noticeable. In considering these, and in fact all the figures of percentages, it should be remembered that the plant has been erected for experimental purposes, and is worked accordingly. It is not a works for reduction and extraction purposes, but rather one to which the owner of a parcel may bring his ore, have it tested by some process he himself decides upon, or, leaving the matter to the discretion of the Director, has the parcel treated by perhaps several different methods, all of which cannot result equally well. The poor extractions have in many cases resulted from treating the ore according to the instructions of the owner, who has probably, however, obtained thereby just as much valuable information concerning the ore as he would have had the parcel been treated successfully by some other process. Low extractions in experimental treatment teach valuable lessons only less in importance to those afforded by the discovery of the most successful mode of treatment.

In many instances my instructions have been to test the ore by cyanide, and demonstrate by experiment whether or not the ore is suited to this process. Where, however, the process named by the owner as the one to be adopted has yielded poor results the test has in most cases been supplemented by treating the parcel by a second or even a third method, and generally a satisfactory extraction has been obtained. Amalgamation and the cyanide process are the most common processes adopted. Chlorination tests are made on certain ores, and tailings are usually cyanided. Latterly a new process, the permanganate (chlorination) process, has been added to the above list.

Dr. Black carried out various experiments in connection with his patent in the Thames School of Mines plant, and on his departure donated a set of his apparatus to the school. As I am thoroughly acquainted with the working details and the chemistry of the process, the school is now in a position to treat small parcels of ore by this method.

The school is gradually gathering together a representative collection of minerals, and thanks are due to the Under-Secretary and the Inspectors of Mines for donations of mineral specimens.

Two samples of telluride-ore from West Australia, forwarded by the Hon. A. J. Cadman, Minister of Mines, are of especial interest. The Council hope to be able in course of time to form a mineral museum in connection with the school, and to devote a separate room or building to the collection. Many specimens, especially samples of fossils, are still required before this laudable object can be accomplished.

During the year a large number of journeys were made into the surrounding district in connection with field geology, and the students have had opportunities of visiting the mines and studying mining geology and surveying underground. The practical illustrations thus afforded have been invaluable as an aid to the class-work.

My thanks are due to the Council, who have manifested their untiring interest in the welfare of the school; to Messrs. Morgan and MacLeod, who have in turn discharged their duties in a highly creditable manner; and to Mr. P. Callan, who, with Mr. John Parr, ably carried on the work of the assistant for one month before Mr. MacLeod's appointment. I have much pleasure in acknowledging the willing assistance of Mr. D. Finn, who has filled the position of laboratory assistant throughout the year; and, in connection with the experimental test plant, Mr. R. Vercoe has discharged his arduous and responsible duties to my entire satisfaction.

The following is a table of the attendances at the several classes:—

TABLE of ATTENDANCES for Year ending 31st March, 1898.

Name of Subject.	1897.			1898.
	First Term.	Second Term.	Third Term.	First Term.
Registered Students.				
General and mining geology	15	15	15	12
Mineralogy and blowpipe	15	16	15	13
Land- and mine-surveying	53	54	40	31
Mathematics	17	14	12	11
Mining and applied mechanics	50	50	40	29
Metallurgy of gold and silver	...	23	20	...
Practical chemistry	42	49	32	22
Theoretical chemistry	40	43	30	20
Practical assaying	62	65	48	40
Mechanical drawing	22	23	19	21
Mineralogy and geology (combined course)	...	...	...	14
Total	316	352	271	213
Saturday science class	29	24	27	65
Total attendance at classes	345	376	298	278
Individual registered students	117	128	94	72
Total individual students	146	152	121	137

The annual examinations were held in December, 1897, the papers being set by examiners in Wellington, appointed by the Government—viz., Mr. George Wilson, Inspecting Engineer; Mr. William Skey, Government Analyst; Mr. Alexander McKay, F.G.S.; Mr. C. H. Pierard; and the Surveyor-General.

A large number of candidates presented themselves, and they showed a higher proficiency than usual. Sixty per cent. of the candidates obtained first-class certificates, and 25 per cent. second class.

Two President's medals were awarded for the highest aggregate, one each to Messrs. Donovan and Metcalfe, who were bracketed equal, with the high average of 87 per cent. Mr. Barrance, whose average was 90 per cent., was ineligible, as he won the medal last year.

At the end of 1897 I held a practical examination in mineralogy and geology, the result of which, combined with those of the theoretical papers set by the Wellington examiners, showed that Mr. H. E. Metcalfe obtained the high average of 86 per cent., and he was consequently awarded the Director's prize, a clinometer and compass, given for the highest aggregate in the above subjects.

The following table shows the results of the late examinations:—

RESULTS OF ANNUAL EXAMINATIONS, 1897.

Subject of Examination.	First Class.	Second Class.	Third Class.	Failed.	Total.
General and mining geology	2	2	...	2	6
Pumping and winding	4	1	...	...	5
Ventilation and explosives	4	2	...	...	6
Mining and applied mechanics	7	...	...	...	7
Theoretical chemistry (senior)	4	2	...	...	6
Theoretical chemistry (junior)	...	...	1	...	1
Practical chemistry (senior)	3	2	...	...	5
Practical chemistry (junior)	...	2	...	...	2
Practical assaying, dry (senior)	9	7	4	3	23
Practical assaying, dry (junior)	...	...	...	...	...
Practical assaying, wet (senior)	4	1	...	4	9
Practical assaying, wet (junior)	2	1	...	...	3
Surveying (land and mine)	3	2	1	...	6
Map-drawing	6	1	1	...	8
Mineralogy and blowpipe	2	2	...	...	4
Metallurgy	6	...	...	...	6
Mechanical drawing	4	...	...	...	4
Totals	60	25	7	9	101

Three students competed for the scholarship, obtaining the following average percentages K. M. Barrance, 89·6 per cent.; W. Donovan, 86·6 per cent.; H. E. Metcalfe, 84·6 per cent. No award was made.

The following tables show the separate parcels of ore treated during nine months of the past year, and the returns therefrom. The value of the bullion recovered amounts to £280, a somewhat higher average per month than for the preceding twelve months. The great majority of the ores received at the Thames School for treatment are not suited to the cyanide process. Amalgamation of the tailings after a previous cyanide treatment is not satisfactory in practice, but with many of the ores cyanide can be used to recover from the tailings the bullion that has escaped amalgamation. This would point towards wet-crushing and amalgamation as the most suitable process for the field generally, followed by cyanide on the tailings.

Subject to permission granted by the Director, students are allowed to obtain practical experience in the metallurgical plant, and several—viz., Messrs. Croucher, Banks, Finn, Campbell, and others—have rendered valuable assistance from time to time.

TABULATED STATEMENT showing PARCELS of ORE treated at Thames School of Mines Experimental Plant during 1897–98.

Name of Mine or Owner and District.	Description of Ore	Dry Weight of Ore.	Assay-value of Ore per Ton.			Bullion saved.	Value per Ounce.	Percentage saved.		
			Gold.	Silver.	Value.			Gold.	Silver.	Value.
BY PAN-AMALGAMATION.										
		Lb.	Oz. dwt. gr.	Oz. dwt. gr.	£ s. d.	Oz. dwt. gr.	£ s. d.			
Great Barrier	Grey quartz, with sulphides	1,800	2 10 10	53 13 18	15 9 0	38 12 12	0 4 4½	86·2	79·3	83·8
Hihi, Kauaeranga	Greenish-brown and earthy	875	6 5 1	3 6 19	25 6 0	3 7 22	2 12 6	91·6	89·3	91·6
Hihi, Kauaeranga	Light brown and clayey	920	0 8 19	0 12 14	1 16 5	0 8 12	1 11 9	90·1	90·1	90·1
Cecil Kemp, Bay of Islands ...	Grey splintery quartz	560	0 3 18	0 12 13	0 16 1	0 3 12	1 0 4	89·2	78·6	88·4
F. Audley, Coromandel	Grey mullocky quartz	224	0 7 13	0 8 19	1 10 11	0 1 10	1 17 6	85·8	85·4	85·8
W. Scott, Tairua	Black sand	900	0 0 15	0 0 3	0 2 6	*	*	*	*	*
Karori, Wellington	Country-rock containing quartz stringers	2,500	0 6 7	0 5 1	1 5 7	0 11 16	2 4 9	91·8	88·2	91·7
Hauraki Golden Age, Thames ...	Bluish quartz	1,600	0 1 6	0 1 18	0 5 2	0 1 18	1 16 0	85·8	76·9	85·6
Hauraki Golden Age, Thames ...	Splintery quartz, mineralised ...	1,300	0 1 18	0 1 13	0 7 2	0 1 16	2 3 1	86·6	85·9	86·4
Alpha, Waitekauri	Crystalline, with blue veins	1,120	0 12 13	5 5 21	3 0 9	2 3 13	0 11 4½	84·7	67·2	81·4
Vulcan, Tararu	Hard rusty-coloured quartz	2,250	2 18 14	1 15 7	11 17 10	4 7 14	2 11 0	93·6	89·6	93·4
Waitangi, Thames	Glassy quartz, with patches of mineral	640	1 0 7	10 16 18	5 2 1	0 10 0	1 6 6	56·8	3·0	45·3
Hihi, Kauaeranga	Rubble, with quartz stringers ...	2,000	10 13 19	2 17 9	43 0 2	11 16 14	3 3 3	97·4	95·3	97·4
Golden Point, Tapu	Glassy quartz and blue mullock ...	1,500	0 0 22	0 0 14	0 3 9	0 0 20	2 11 5	86·5	77·6	85·5
Golden Point, Tapu	Glassy quartz and blue mullock ...	3,000	0 2 12	0 1 6	0 10 1	0 4 4	2 15 3	85·5	79·1	85·5
Kawakawa	Light-brown and flinty	600	0 2 12	0 1 9	0 10 1	0 0 18	2 13 5	74·1	64·1	74·0
Jessie, Tapu	Veins of white quartz in slate ...	1,800	4 5 17	1 3 7	17 4 10	4 2 18	3 2 3	94·4	91·3	94·4
Ake-ake, Puru	Heavily mineralised	2,000	0 5 1	0 2 12	1 0 5	0 4 12	2 17 7	71·3	57·3	71·1
Chicago, Tararu	Clean white quartz	2,000	0 5 1	0 6 7	1 0 9½	0 8 6	0 17 3½	83·4	75·6	83·2
J. Smythe, Union Beach ...	Tailings and shells	500	0 4 0	0 5 1	0 16 6	0 1 16	1 18 1	86·2	79·5	85·8
W. H. Argall, Coromandel ...	Densely mineralised	2,000	†	†	†	†	†	†	†	†
W. H. Argall, Coromandel ...	Semi-transparent quartz with much FeS_2 ...	2,240								
W. H. Argall, Coromandel ...	Mullocky and heavily mineralised ...	1,120								
W. H. Argall, Coromandel ...	Very mullocky, with much FeS_2 ...	1,120								
Ohui	White quartz, with blue veins ...	2,560	1 11 18	7 6 5	7 1 7	7 14 0	0 18 3	89·9	61·3	86·9
Great Barrier	Grey quartz, with sulphides ...	1,220	1 16 13	11 6 20	8 8 10	4 17 12	0 14 8	80·3	60·2	77·6
J. A. Marshall, Coromandel ...	Reddish-brown and mullocky ...	2,100	0 5 16	0 9 11	1 3 7½	0 12 0	1 11 10	86·5	78·0	85·4
Union Beach	Blue mud and shells	1,500	0 2 2	0 6 7	0 8 11½	0 5 0	0 19 9	81·7	89·6	82·1
Argosy, Thames	Blue quartz, with calcite veins ...	360	37 5 22	18 0 10	150 19 8	8 13 8	2 14 9	97·8	96·2	97·8
Great Barrier	Grey quartz, with sulphides ...	1,050	1 7 17	12 10 19	6 15 11	4 18 18	0 10 2	80·9	74·0	79·7
Great Barrier	Grey quartz, with sulphides ...	300	1 7 17	12 10 19	6 15 11	1 0 10	0 13 4	81·6	44·9	74·8
Mahara Royal, Tapu	Clean tailings	2,240	0 5 1	0 5 1	1 0 8	0 7 12	2 4 5½	81·0	66·7	80·0
H. P. Rawson, Wellington ...	Clean bluish quartz	495	0 2 6	0 0 6	0 9 0	0 1 6	3 11 7	81·5	78·9	81·4
H. P. Rawson, Wellington ...	Clean bluish quartz	560	0 2 0	0 0 6	0 8 0					
H. P. Rawson, Wellington ...	Clean bluish quartz	510	0 1 15	0 0 5	0 6 6					

* Not estimated. † Too poor to estimate.

TABULATED STATEMENT showing PARCELS OF ORE treated at Thames School of Mines Experimental Plant during 1897–98—*continued.*

Name of Mine or Owner and District.	Description of Ore.	Dry Weight of Ore.	Assay-value of Ore per Ton.			Bullion saved.	Value per Ounce.	Percentage saved.		
			Gold.	Silver.	Value.			Gold.	Silver.	Value.
			BY CYANIDE.							
		Lb.	Oz. dwt. gr.	Oz. dwt. gr.	£ s. d.	Oz. dwt. gr.	£ s. d.			
E. J. Banks, Maratoto	Glassy quartz, with iron-oxides ...	2,250	0 10 22	2 19 14	2 8 7	1 16 19	0 17 3½	66·9	57·6	65·8
Waitekauri King	Splintery, and containing iron and manganese	4,000	1 11 4	1 5 12	6 7 2	4 12 15	2 3 2	88·0	87·8	88·0
Alpha, Waitekauri	Crystalline, with blue veins... ...	2,000	0 12 13	5 5 21	3 0 9	2 14 16	0 9 4	46·1	51·5	47·0
Alpha, Waitekauri	Tailings	2,100	0 5 1	3 10 14	1 7 3	1 16 16	0 11 0	89·9	48·3	79·1
Waitangi, Thames	Glassy quartz, mineralised	1,750	0 10 2	2 10 10	2 5 4	1 11 20	0 16 6	75·3	62·9	74·0
Kawakawa	Light-brown and flinty quartz ...	1,400	0 2 12	0 1 9	0 10 1	0 0 17	1 13 2	18·2	49·3	18·2
Royal Standard, Wharekiraupunga	Clean white quartz	7,500	1 3 22	2 12 22	5 1 0	12 3 0	1 5 9	92·9	87·4	92·6
Royal Standard, Wharekiraupunga	Clean white quartz	800	2 1 14	8 18 21	9 4 2	2 16 6	0 16 2	70·2	60·4	69·3
Union Beach	Black mud and shells	1,300	0 4 0	0 5 1	0 16 6	0 0 20	1 6 10	11·3	19·1	11·5
Ohui	White quartz, with blue veins ...	2,880	2 7 22	8 1 8	10 7 9	6 3 18	0 16 3	37·4	42·2	37·7
Mahara Royal, Tapu	Coarse tailings, clean	4,480	0 5 13	0 5 16	1 2 9	0 18 12	1 19 4½	80·0	81·0	80·1
Sheridan, Tapu	Tailings	2,520	0 2 18	0 3 0	0 11 3½	0 5 0	1 18 2½	75·0	77·4	75·0
Golden Point, Tapu	Glassy quartz, mullocky	1,500	0 0 22	0 0 14	0 3 9	0 0 15	2 10 5	63·1	60·8	63·0

The tailings from two of the above parcels treated by cyanide were pan-amalgamated, and an extra percentage of bullion recovered thereby:—

			Percentage Saving of Original Assay-value.		
			Gold.	Silver.	Value.
Royal Standard	Lb. 800	By cyanide ...	70·2	60·4	69·3
		By pan	10·5	4·1	9·9
		Total extraction ...	80·7	64·5	79·2
Ohui	2,880	By cyanide ...	37·4	42·2	37·7
		By pan	30·9	25·8	30·5
		Total extraction ...	68·3	68·0	68·2

Besides the above parcels which passed through the complete battery process, various others, on account of their small size and richness, were subjected to berdan treatment alone. They were as follows:—

Name of Owner.	Weight. Lb.	Bullion extracted. Oz. dwt. gr.
R. Kelly, Tapu	22½	0 0 2
R. Kelly, Tapu	20½	0 0 1½
Argosy, Thames	45	14 13 0
H. P. Stark, Thames	120	3 10 0
Preece's Freehold, Coromandel	20	18 10 0
L. Wilson, Auckland	29	0 6 10
W. Marris, Thames	50	12 0 0*

* Amalgam.

The following passed through the battery, but were not subjected to any treatment for the recovery of bullion beyond being assayed:—

J. R. Robinson, New South Wales: 250 lb. of sand, screened down to four grades, and each grade valued.

H. Lowe, Thames: 500 lb. of quartz in ten separate parcels. Separately crushed and sampled.

Hauraki Development Syndicate, Coromandel: (1) 600 lb., crushed, sampled, and assayed; (2) 550 lb., crushed, sampled, and assayed.

Union Beach: 1,500 lb. tailings, ground fine, concentrated, and assayed.

During 1897 ten Thames School of Mines students gained first-class mine-managers' certificates, and two gained battery superintendents' certificates. In January, 1898, I supervised another mine-managers' examination, for which there were twenty-three candidates. Fourteen of these were students at the Thames School, seven sitting for the mine-manager's and seven for the battery superintendent's certificate. The results of this examination are not yet published.

Positions held by Former Students.

The following table, showing the positions and salaries now held by former students of this school, will illustrate the practical benefit to be derived by following a course of mining instruction:—

Appointments held by Students at the Thames School of Mines from its Inception to the 31st March, 1898.

—	Name.	Position.	Present Address (31st March, 1898).	Approximate Salary (per Annum).
				£
1	B. Adams ..	Mine-manager, Imperial Gold-mining Company (London), Karangahake	Karangahake ..	200
2	J. D. Colebrook ..	Mine-manager, Scotty's Extended, Coromandel	(Deceased) ..	250
3	M. Fleming ..	Mine-manager, Kirikiri Gold-mining Company, Thames ..	Auckland ..	..
4	W. Harris ..	Mine-manager, Mahakirau Gold-mining Company	Mercury Bay ..	250
5	M. Bruce ..	Mine-manager, Occidental Gold-mining Company, Thames ..	Thames	200
6	G. Violeau ..	Mine-manager	Coromandel ..	200
7	A. McNiel ..	Mine-manager, Matarangi Gold-mining Company	Coromandel ..	200
8	A. E. Argall ..	Mine-manager, Blagrove's Freehold (London)	Coromandel ..	250
9	T. Snow ..	Coal-mine manager, Ralph's Taupiri	Taupiri	250
10	W. Climo ..	Metallurgist	Wyalong	300
11	B. Hogg ..	Cyanide manager, New South Wales	New South Wales ..	350
12	H. Paltridge ..	Mine-manager	Port Darwin, Australia	250
13	E. J. Banks ..	Cyanide manager, Waihi Gold-mining Company (London) ..	Waihi	500
14	A. T. Day ..	Cyanide manager, Komata Reefs (London)	Komata, Thames ..	150
15	G. Heard ..	Cyanide manager, Victoria	Victoria	300
16	J. McPeake ..	Mine-manager, Barrier Reefs Gold-mining Company ..	Great Barrier ..	200
17	W. Eddowes ..	Mining engineer, New Zealand Exploring Syndicate (Limited) (London)	Thames	500
18	G. Peel ..	Metallurgist (chlorination-works)	Victoria	300
19	F. W. Linck ..	Mine-manager, New Zealand Exploration Company (Limited) (London)	Auckland ..	250
20	J. R. Robinson ..	Metallurgist, Royal Standard Gold-mining Company (London)	Wharekiraupunga ..	250
21	G. Truscott ..	Mine-manager, Charleston	Charleston ..	250
22	G. Warne ..	Mine-manager, Adelaide Gold-mining Company	Thames	250
23	J. McDermott ..	Mine Supervisor, Western Australia	Western Australia ..	500
24	M. Paul ..	Mine-manager, Kuranui-Caledonia (London)	Thames	350
25	J. A. Agnew ..	Mine-manager, Victoria Gold-mining Company, Thames ..	Thames	300
26	A. Carnie ..	Analyst, alcoholic liquors, Auckland	Auckland	150
27	W. Carpenter ..	Bank assayer, Paeroa	Paeroa	120
28	M. von Bernewitz	Assayer, Waihi Gold-mining Company (London)	Waihi	150
29	C. Ansley ..	Battery-manager, Big River Company, Reefton	Reefton	250
30	R. Mellett ..	Cyanide manager, Victoria	Victoria	350
31	T. K. Wilson ..	Cyanide manager, New South Wales	New South Wales ..	300
32	J. M. Maclaren ..	Instructor, Coromandel School of Mines	Coromandel ..	200
33	H. F. Shepherd ..	Mine-manager, Hauraki Associated Reefs Company (London)	Coromandel ..	350
34	W. Baker ..	Mine-manager, Thames Exploration Syndicate (London) ..	Thames	350
35	G. Steadman ..	Mine-manager, Britannia Gold-mining Company (London) ..	Coromandel ..	400
36	R. Tierney ..	Mine-manager, Sheridan Gold-mining Company	Tapu	250

APPOINTMENTS held by Students at the Thames School of Mines—*continued.*

—	Name.	Position.	Present Address (31st March, 1898).	Approximate Salary (per Annum).
				£
37	T. Mangan ..	Mine-manager, Four-in-hand Gold-mining Company ..	Coromandel ..	200
38	T. Callan ..	Assayer, Waihi-Silverton Gold-mining Company (London) ..	Waihi	120
39	C. Taylor ..	Battery-manager, Talisman Gold-mining Company (London)	Karangahake ..	350
40	I. Thomas ..	Mine-manager, Thames Exploration Company (London) ..	Thames	250
41	A. Thomas ..	Mine-manager, Mahara Royal Gold-mining Company (London)	Tapu	250
42	T. James ..	Mine-manager, Waitekauri Company (London)	Waitekauri ..	250
43	F. Creighton ..	Mine-manager, North Island Exploration Company (London)	Great Barrier ..	250
44	F. Woolcock ..	Assayer, Waitekauri Union (London)	Waitekauri ..	150
45	J. Carter ..	Mine-manager, Bunker's Hill, Coromandel..	(Deceased) ..	250
46	D. Laurie ..	Assayer, Te Aroha Gold-mining Company (London).. ..	Te Aroha ..	150
47	F. Horne ..	Mine-manager, Phœnix Gold-mining Company, Whangamata	Coromandel ..	200
48	J. Banks ..	Cyanider, Waihi Gold-mining Company (London) ..	Waihi	150
49	G. Doveton ..	Assayer, Moanataiari Gold-mining Company (London) ..	Thames	150
50	G. Nicks ..	Bank assayer, Coromandel	Coromandel ..	150
51	A. Adams ..	Assayer, Tararu Gold-mining Company (London)	Thames	150
52	E. Cartwright ..	Mine-manager, Nonpareil Gold-mining Company	Thames	200
53	W. McGregor ..	Mine-manager, Chicago Gold-mining Company	Thames	250
54	G. Horne ..	Cyanide manager, Mariposa Gold-mining Company (London)	Kuaotunu ..	250
55	W. Horne ..	Mine-manager, Waitekauri	Waitekauri ..	250
56	J. H. Hodge ..	(Mine-manager) Water-race inspector, Thames	Thames	200
57	L. Wilson ..	Assayer	Auckland ..	150
58	J. H. McKenzie ..	(Mine-manager) Engineer for Marototo Company	Thames	200
59	G. H. White ..	Mine manager, Golden Point Company	Tapu	250
60	A. H. Thorpe ..	(Battery Superintendent) Cyanider, Waitekauri Cross (London)	Waitekauri ..	150
61	R. Clarke ..	Cyanider, Waitekauri Cross Gold-mining Company (London)	Waitekauri ..	150
62	A. Jones ..	Assayer, Mines Corporation (London)	Auckland ..	150
63	R. Ross ..	Mine-manager, Waitekauri	Waitekauri ..	200
64	J. H. Jackson ..	Assayer, Woodstock Gold-mining Company (London) ..	Karangahake ..	150
65	P. Callan ..	Assayer	Auckland (now at Thames)	..

DISTRIBUTION OF PRIZES AND CERTIFICATES.

The annual distribution of prizes and certificates was conducted by Mr. James McGowan, M.H.R., in the school-building, a large number of students being present.

GOVERNING BODY.

At the annual general meeting, held on the 8th February, 1898, the following officers and members of the Council were elected for the ensuing year: President, Mr. James McGowan, M.H.R.; Vice-president, Mr. T. A. Dunlop; members, Messrs. G. S. Clark, J. H. Smith, E. F. Adams, W. Burch, L. Melhose, M. Paul, G. Denby, R. James; Treasurer, Mr. J. H. Smith; Secretary, Mr. A. Bruce.

WORK PERFORMED BY STUDENTS.

The following are some of the analyses performed by senior students in the laboratory:—

Valuation of Specimen Stone. (H. E. Metcalfe.)

Weight in air, 348 gr.; weight in water, 253 gr. Specific gravity of specimen = 3·66. Valuation: 5⅓ oz. of bullion per pound of stone. This was a rich sample of quartz from the Nonpariel, containing calcite.

Analysis of Waihi Ore. (H. Metcalfe and W. Donovan.)

SiO_2, 68·9 per cent.; FeS_2, 14·5 per cent.; CuS, 3·2 per cent.; PbS, 0·8 per cent.; FeS_2FeAs_2, 4·7 per cent.; Al_2O_3, 6·4 per cent.; Ag_2S, 2·6 per cent.: 100·5 per cent. The stone was black in colour, and contained 760 oz. of silver and 24 oz. of gold per ton.

Analysis of Sylvia Ore. (H. E. Metcalfe.)

Pb, 66·5 per cent.; Cu, 3·4 per cent.; Fe, 8·7 per cent.; Zu, 1·3 per cent.; S, 20·4 per cent.: 100.3 per cent.

Analysis of Coal. (H. E. Metcalfe.)

Fixed carbon, 41·6 per cent.; volatile hydrocarbon, 6·4 per cent.; moisture, 3 per cent.; ash (reddish), 49 per cent.: 100 per cent. This was a sample of coaly matter found in the deep levels of the Kapanga Mine, Coromandel.

Copper-ore, Hen and Chickens. (E. J. Banks.)

Copper, 3·2 per cent.; iron, 38·2 per cent. This sample was chiefly sulphide of iron. It contained 3½ dwt. of gold and 4¾ oz. of silver per ton.

Analysis of Coal, Taranaki. (E. J. Banks.)

Fixed carbon, 50·16 per cent.; hydrocarbon, 33·64 per cent.; moisture, 10·20 per cent.; ash, 6 per cent.: 100 per cent. Evaporative-power, 6·5; coke, 11·23 cwt. per ton. Remarks: Black

friable coal, lustrous; does not soil the hands; does not swell up on heating; dark-brown streak; ash white. Sulphur, 0·5 per cent.

Analysis of Hikutaia Rock. (E. J. Banks and H. Croucher.)

SiO_2, 64·20 per cent.; FeO, 7·46 per cent.; Al_2O_3, 10·69 per cent.; MgO, 6·21 per cent.; CaO 2 per cent.; MuO_2, 0·56 per cent.; Na_2O, 3·93 per cent.; K_2O, 1·47 per cent.; moisture, at 100° C. 0·84 per cent.; loss on ignition, 2·66 per cent.: 100·02 per cent. The rock was black in colour' partly decomposed, and greasy to the touch.

Analysis of Rock from Thames at Depth of 400 ft., in Deep Sinker. (W. A. MacLeod.)

SiO_2, 54·12 per cent.; Al_2O_3, 3·36 per cent.; FeO, 13·57 per cent.; CaO, 6·53 per cent.; MgO, 1·56 per cent.; K_2O and Na_2O, 2·74 per cent.; moisture, 10·74 per cent.; loss on ignition, 7·44 per cent.: 100·06 per cent. The sample was brown-red in colour, showed slickensided faces, was greasy to the touch, and appears to be a crushed andesite.

Syllabus of Instruction.

The following is the syllabus of instruction followed during 1897–98 :—

General and Mining Geology.—(Lecturer, the Director, Mr. F. B. Allen, M.A., B.Sc.)

Physical Geology.—The earth as a planet, its form and motions; geological climate; the atmosphere; ocean; solid crust; the interior of the earth.

Dynamical Geology.—Metamorphism; agencies modifying the crust of the earth—atmospheric, aqueous, chemical; weathering; sedimentation; classification of deposits—mechanical, aqueous, organic, and chemical; denudation and erosion.

Structural Geology.—Stratification; jointage; contortion; faults; conformity; unconformity; dip and strike; cleavage; metamorphic rocks; intrusive sheets, bosses, dykes, fissures; formation of quartz veins, lodes, and metallic deposits; dynamics of lodes; recovery of lost lodes.

Geological Surveying.—The practice of running natural sections; noting dip, strike, and inclination of strata and lodes; mapping geological formations; collection of mineral and rock specimens.

Stratigraphical Geology.—Classification of plants and animals; fossils; blending of species; geological record; the study of characteristic life, and distribution of formations from archæan to recent times, with special reference to the geology of New Zealand.

Mineralogy and Blowpipe Determination.—(Lecturer and Instructor, the Director.)

Systematic Mineralogy.—(1.) Physical properties of minerals, their hardness, specific gravity, &c. (2.) Optical properties—refraction, reflection, polarisation, lustre, phosphorescence. (3.) Chemical properties. (4.) The application of the blowpipe, colour-tests, &c. (5.) Isomorphism, pseudomorphism, and allotropy. (6.) Distribution and paragenesis of minerals. (7.) Classification of minerals—chemical, economic.

Descriptive Mineralogy.—(1.) Non-metallic division—carbon group, &c. (2.) Metallic division —a description of the principal ores of the common metals, and their New Zealand localities and modes of occurrence.

Crystallography.—(1.) The six systems, their axes, typical forms, modified forms, &c. (2.) Holohedral and hemihedral forms. (3.) Reading of faces.

Mathematics.—(Lecturer and Instructor, Mr. W. A. MacLeod, B.A., B.Sc.)

Arithmetic (including the simple rules).—Weights and measures (those bearing on mining and assaying), greatest common measure, least common multiple, vulgar fractions, decimal fractions, proportion, problems.

Algebra (Hall and Knight's Algebra).—The meaning and use of the various signs and symbols, the simple rules, greatest common measure, least common multiple, fractions, factors, symmetry, problems containing one unknown, simultaneous equations, quadratic equations, simultaneous equations with more than one unknown, problems involving quadratics and the use of several unknowns, practice in the use of formulæ and their transposition.

Euclid.—The first four books (Todhunter), including the definitions and axioms.

Land- and Mine-surveying.—(Lecturer and Instructor, the Director.)

Adjustments of theodolite, dial, level; chain and steel tapes; traversing with theodolite and dial; connecting survey with standard meridian; ranging lines; division of land; computation of areas by latitudes and departures; reduction of slope measurements; off-sets; chaining, computation of co-ordinates; balancing survey; plotting survey and off-sets; obstacles to alignment.

Mine-surveying.—Different methods of connecting underground with surface meridian; magnetic variation; to reduce magnetic meridian to true meridian; conducting underground traverse with theodolite and dial; correcting magnetic survey by method of back- and fore-sights; holing.

Mathematics.—Equations; logarithms; plane trigonometry; solution of triangles; calculation of last or connecting line; of distance from working-face to nearest point on boundary of lease.

Levelling.—Recording levels; practice with level and staff; grading roads, tramways, and water-races; plotting and striking grades; calculation of contents of earthworks by prismoidal formula; grading with Abney or reflecting level.

Mining, Applied Mechanics, and Hydraulics.—(Lecturer, the Director.)

Mining.—Shafts—selection of site, size; modes of excavation in dry and wet rock, wet sand, and swamp; timbering of shafts; ladders; chambers—size, excavation, timbering; levels and drives—size, excavation, timbering; securing sets on inclines; modes of stoping, height, and timbering of stopes; main passes—size, timbering, division; mullock passes—size, timbering, distance apart.

Pumping and Pit-work.—Pumps and engines used in metal-mining, force-pumps, plunger-pump, draw-lift, fixing pump-pieces, bearers, friction-rollers, V-bobs, balance-bobs, main rods, flat rods, clacks, buckets, bucket-rod, catches, staples, and glands; thickness of pipes; capacity of pumps.

Ventilation.—Atmospheric pressure, vapour density; ventilation of drives and underground workings by natural and artificial means; furnaces, water-blasts, fans; division of air-courses; noxious gases met with in metal- and coal-mines, their composition and detection.

Explosives.—Their use in quarries and mines, relative strengths, action, gases evolved, composition; charging bore-holes; firing explosives; quantity to be used.

Hauling and Winding.—Safety-cages; man-engines; strength of rope; strength of timbers.

Water-power.—Turbines, Pelton wheels, calculation of horse-power and flow of water from boxes and nozzles.

Text-book used: Gordon's "Mining and Engineering," 10s., Government Printer.

Practical Assaying.—(Lecturers and Instructors, the Director and Assistant.)

Dry Assaying.—(1.) The furnaces and appliances used in fire-assaying, with sketches. (2.) The fluxes, their properties and uses. (3.) The reducers and their reducing-powers. (4.) Fuels and other reagents, as salt, iron, sheet and granulated lead, glass-powder, &c. (5.) Preparation of pure silver for parting gold and silver. (6.) Preparation of nitric-acid solutions for parting. (7.) Preliminary assays of ores and bullion, their use and application. (8.) Volatility of gold and silver—the influence of different temperatures in different parts of muffle; also of time in muffle. (9.) The operation in fire-assaying—*a*, powdering the ore; *b*, sampling the dry pulp; *c*, preparing the charge; *d*, fusing the charge, and extracting the lead-button; *e*, cupelling the lead-button; *f*, weighing the bullion; *g*, parting and calculating the value of the bullion. (10.) Probable sources of error in fire-assaying. (11.) Keeping note-books and proper record of results. (12.) The assay of litharge and red-lead. (13.) The assay of gold- and silver-ores—*a*, in clean quartz; *b*, in pyritous quartz; *c*, in concentrates and tailings; *d*, in roasted ores; *e*, by amalgamation assay; *f*, by scorification assay. (14.) The retorting and melting of bullion. (15.) The refining of base bullion. (16.) The assay of bullion—*a*, weighing the assay; *b*, cupelling for base; *c*, adding pure silver for parting; *d*, rolling the "cornet"; *e*, parting the "cornet"; *f*, calculating the value. (17.) The calculation of results obtained in batteries from treatment of gold- and silver-ores. (18.) The assay of galena and cerussite; the valuation of lead, gold, and silver. (19.) The valuation of lead bullion. (20.) The assay of tin-ore (cassiterite).

Text-book: Park's "Laboratory Instructions in Assaying and Practical Chemistry," 7s. 6d.

Wet Assaying.—(21.) Operations—*a*, solution; *b*, crystallization; *c*, precipitation; *d*, filtration; *e*, decantation; *f*, washing; *g*, evaporation; *h*, distillation; *i*, ignition; *j*, sublimation; *k*, fusion; *l*, use of blowpipe; *m*, the use of spirit- and gas-lamps; *n*, the preparation of reagents and tests of purity, &c.; *o*, the preparation of fluxes; *p*, test-papers; *q*, the balance, weights, operations of weighing; *r*, preservation of platinum crucibles. (22.) The assay of iron-ores—*a*, gravimetric; *b*, volumetric. (23.) The assay of copper-ores—*a*, as oxide; *b*, as metal by electrolysis; *c*, volumetric; *d*, colorimetric. (24.) The assay of antimonite. (25.) The assay of bismuth glance. (26.) The assay of cinnabar. (27.) The assay of galena. (28.) The assay of zinc-ores. (29.) The assay of manganese-ores. (30.) The assay of nickel-ores. (31.) The assay of cobalt-ores. (32.) The assay of chromite of iron. (33.) The assay of arsenic-ores. (34.) The assay of silver-ores—*a*, volumetric; *b*, gravimetric. (35.) The valuation of specimens.

Text-book: Park's "Assaying and Practical Chemistry," 7s. 6d.

Practical Chemistry.—(Lecturer and Instructor, Mr. W. A. MacLeod, B.A., B.Sc.)

Junior Class.—(1.) Operations (these are the same as for wet assaying). (2.) The separation of the metals into groups. (3.) Qualitative tests for the different metals. (4.) The separation of silver, lead, mercury. (5.) The separation of copper, bismuth, arsenic, and antimony. (6.) The separation of iron and alumina, iron and zinc, iron and manganese, iron and chromium. (7.) The separation of calcium and magnesium. (8.) The separation of barium, strontium, and calcium. (9.) The separation of potassium and sodium. (10.) Qualitative tests for the acid-radicals (inorganic)—*a*, H_2S, HCl, HBr, HI; *b*, HNO_3, $HClO_3$,; *c*, HBO_2, H_2CO_3, H_2CrO_4, HF, H_3PO_4, H_4SiO_4, H_2SO_4, H_3AsO_4.

(Lecturer and Instructor, the Director.)

Senior Class.—(1.) The estimation of chlorine. (2.) The estimation of sulphuric acid and sulphur. (3.) The estimation of phosphoric acid. (4.) The analysis of limestones and calcareous freestone. (5.) The analysis of coals, coke, charcoal, and shales. (6.) The analysis of barytes. (7.) The analysis of fluor-spar. (8.) The analysis of scheelite and wolfram. (9.) The analysis of rocks (including estimation of K_2O and Na_2O). (10.) The analysis of fireclays. (11.) The analysis of soils. (12.) The analysis of complex sulphide ores. (13.) The analysis of milk. (14.) The analysis of waters. (15.) The analysis of bone-dust and bone-ash, with estimation of nitrogen. (16.) The analysis of guanos and apatite. (17.) The analysis of superphosphates. (18.) The estimation of alcohol—*a*, by weight; *b*, by volume. (19.) Volumetric analysis: The estimation of—

alkaline hydrates; alkaline carbonates, acids, HCl, H_2SO_4, HNO_3, $HC_2H_3O_2$, $H_2C_4H_4O_6$; haloid salts, HCN, KCN, I, As_2O_3,SO_2. ($Na_2S_2O_3+5H_2O$).

Text-book: Park's "Laboratory Instructions in Assaying and Practical Chemistry," 7s. 6d.

Theoretical Chemistry.—(Lecturer, Mr. W. A. MacLeod, B.A., B.Sc.)

Principles of Chemistry and Chemical Philosophy.—Atoms, molecules, vapour-density, quantivalence, chemical formulæ.

The Elements.—(1.) Their history, occurrence, preparation, properties, uses. (2.) Compounds of the elements, their history, preparation, properties, uses, &c.

Metallurgy of Gold and Silver.—(Lecturer, the Director.)

(1.) Ore-crushing and -pulverising machinery—*a*, rock-breakers; *b*, stamps; *c*, mills, rolls, &c. (2.) Metallurgy of gold—*a*, amalgamation on copper-plates, in pans, &c.; *b*, chlorination processes and operations; *c*, leaching processes (Cassels's, &c.). (3.) Metallurgy of silver—*a*, smelting and amalgamating ores; *b*, smelting—reduction with lead and fluxes; *c*, amalgamation in pans with mercury — use of chemicals; *d*, leaching with solvents—sea-water or brine, ammonia, sodium hyposulphite, alkaline cyanides; *e*, oxidizing and chloridizing roasting.

Text-books: Eissler's "Metallurgy of Gold and Silver"; Gordon's "Mining and Engineering."

Physics.—(Lecturer, the Director.)

Fundamental ideas of matter and energy; conditions of matter; gravitation; mechanical powers; sound; light; heat; magnetism; electricity; chemistry; physiology and health.

Practical Astronomy.—(Lecturer and Instructor, the Director.)

The ecliptic; equinoxes; meridians; longitude; latitude; altitude; declination; right ascension; azimuth; use of Nautical Almanac; polar distance; zenith distance; hour-angle; sidereal time; mean time; solar time; parallax; refraction; retardation; acceleration; convergency of meridian; determination of meridian by star and sun observations, by single altitudes and greatest elongation of circumpolar stars; use of star charts; calculation of hour-angle, azimuth, and altitude of celestial bodies for any time and place; determination of latitude by meridian altitudes; determination of time by star transits and sun observations.

Mechanical Drawing.—(Instructor, Mr. E. J. Williams.)

Use of scales; printing and lettering; outline drawing; shading; colouring; drawing to scale from copies and objects portions of machinery and woodwork, showing plans, elevation, and sections.

Special Classes are held for the instruction of candidates for the Government mine-managers', battery superintendents', and engine-drivers' certificates. First term—First Monday in February to 30th April; second term—9th May to 20th August; third term—9th September to 20th December. Registration of membership—10s. per annum; class fees—5s. per term for each subject taken up.

Scale of Charges for Public Assays and Analyses.

	£	s.	d.
Bullion assays	0	5	0
Assays of quartz, tailings, or concentrates	0	5	0
Examination and determination of rocks and minerals	0	5	0
Assay of lead- and tin-ores, each	0	5	0
" iron- and manganese-ores	0	10	0
" copper- and antimony-ores	0	10	0
" zinc-, mercury-, and bismuth-ores	0	10	0
" gold- and silver-ores, with parting assay	0	5	0
Analysis of limestone and calcareous freestone, complete	1	0	0
Analysis of limestone and calcareous freestone, partial	0	10	0
" coals and fuels, each	0	10	0
" rocks and soils, complete	2	0	0
" rocks and soils, partial	1	0	0
" fireclays and slags	1	0	0
" manures	2	0	0
" waters, complete	3	0	0
" waters, partial	2	0	0
" nickel-, cobalt-, and chrome-ores	0	10	0
" concentrates	1	10	0
" complex sulphide ores, &c.	1	10	0

Experimental Plant.

Reports of working tests of parcels of gold- and silver-ores, concentrates, and tailings, from 1 to 3 tons:—

(1.) By Cassel cyanide process: Wet- or dry-crushing—*a*, by percolation; *b*, by agitation. (2.) By amalgamated copper-plates. (3.) By amalgamation in pans: Wet- or dry-crushing—*a*, by raw amalgamation in charges; *b*, by Washoe process with chemicals (*a*, hot pan-amalgamation; *b*, after chloridizing roasting). (4.) Chlorination: Small barrel tests.

Cost of treatment (minimum charge): £5 per parcel not exceeding 1 ton; £3 per ton for tailings.

WAIHI SCHOOL.

Mr. P. G. Morgan, M.A., Director of the Waihi School of Mines, reports as follows:—

I have the honour to state that I took charge of the newly organized School of Mines at Waihi on the 1st July, 1897. Classes were at once formed in the following subjects: Mining, surveying, mathematics, theoretical chemistry, practical chemistry, assaying, and mineralogy and blowpipe analysis, to which later on was added geology.

The following is a syllabus of the work done from the beginning of July to the end of the year:—

Mining.—(*a.*) Methods of breaking down mineral and rock. (*b.*) Explosives, how used: their composition and relative strengths. (*c.*) Opening out mineral deposits by means of quarries, adit-levels, and shafts. (*d.*) Exploitation of mineral deposits. (*e.*) Transportation of mineral—hauling and winding machinery.

Surveying.—Nature and use of logarithms; the trigonometrical ratios; solution of triangles.

Mathematics.—(*a.*) Arithmetic—the whole subject. (*b.*) Elementary algebra.

Theoretical Chemistry.—The non-metallic elements.

Practical Chemistry.—(*a.*) Qualitative tests for metals and acids. (*b.*) Separation of the metals.

Assaying.—(*a.*) Furnaces, materials, and appliances used. (*b.*) Assay of gold, silver, tin, lead, copper, and antimony ores. (*c.*) Problems and calculations.

Mineralogy and Blowpipe Analysis.—(*a.*) The six crystallographic systems. (*b.*) Physical, chemical, and optical properties of minerals. (*c.*) The blowpipe, how used: tests for simple minerals. (*d.*) Classification of minerals.

Geology.—(*a.*) Physical and dynamical geology. (*b.*) Classification and mode of formation of rocks. (*c.*) The geological periods.

The numbers attending each class were as follows: Mining, 30 students; surveying, 14; mathematics, 32; theoretical chemistry, 9; practical chemistry, 16; assaying, 28; mineralogy and blowpipe analysis, 11; geology, 13: total attendance at classes, 153.

The number of individual students was sixty, and the average attendance between forty-five and fifty. This number severely taxed our accommodation, especially in the assaying class, which was overcrowded.

Since the beginning of the present year forty-two students have enrolled, a number which is quite sufficient to keep me fully employed, especially seeing that the more important classes are held both morning and evening for the benefit of those students who work on three shifts. I am also giving those students who wish it an opportunity of working in the laboratory out of class hours. The necessity of supervision is taking up more and more of my spare time as the number of such students increases.

The school is now fairly well furnished with chemicals and apparatus, a considerable sum having been spent in this direction. The committee are procuring a theodolite, and when this arrives we shall be able to start a class in practical surveying.

Though our present accommodation is in a way sufficient, the erection of a second class-room and the enlargement of the assay-room would be a great boon to the school, as I could probably obtain sufficient assistance locally to enable me to arrange for extra instruction in the various classes, and a room would always be available in which the more advanced students could work by themselves.

Since the opening of the school a considerable number of assays and determinations of minerals has been made by me for the public. A beginning has been made in getting together a collection of minerals, a number of specimens having been collected by myself, whilst others have been donated by students and friends of the school. Several good specimens of gold-bearing quartz and other minerals have been received from the Mines Department, for which, on behalf of the school, I now express my thanks.

In conclusion, I may state my belief that the Waihi School of Mines has so far fully justified its existence, and is doing good work towards the technical education of those connected with mining and battery work in this district.

COROMANDEL SCHOOL.

The following is the report of Mr. J. M. Maclaren, M.A., Director of the Coromandel School of Mines:—

I have the honour to report as follows on the work and progress of the Coromandel School of Mines during the first term of the year 1898:—

The formal opening of the school took place on Monday, the 20th February. In the unavoidable absence of Captain Hodge, the Vice-president, Mr. A. T. Kenrick took the chair. There were about a hundred and fifty students and subscribers present. The chairman expressed the gratification he felt at the successful termination of their labours as a committee, and felt confident that the school would prove itself of great value to the community. He hoped full advantage would be taken of it, and mentioned that there would be a total membership of fifty at the opening of the various classes. Mr. W. Thomas, the secretary, read the financial statement, showing a healthy state of affairs. The total amount expended was £313, whilst there was a credit balance in hand of £113. The estimated expenses yearly would be at least £250, towards which the Government would contribute £100 a year. The committee had confidence that this amount would be raised locally. The Director then gave a succinct synopsis of the proposed work of the school. A special vote of thanks was accorded to Mr. A. T. Kenrick for the active interest he had taken in the school in the past, and more especially for his lengthened gratuitous services as instructor.

Classes.—The attendance has been gratifying in the extreme, the number of individual students having been sixty-three, divided among the various classes as follows: Mining, 32; field- and mine-

surveying, 30; mathematics, 30; geology, 14; mineralogy and blowpipe, 14; assaying, 21; theoretical chemistry, 16; practical chemistry, 16; mechanical drawing, 4: total attendances, 177. Number of individual students, 63.

Mining and Surveying.—These are the most popular of the subjects taught at the school, and are taken up by students who intend to qualify for a first-class mine-manager's certificate. Field classes in surveying are held every week. Finding that students working on the Tokatea were unable to attend these classes, I have made arrangements to hold the field-surveying class there every alternate Tuesday. Several of these supplementary classes have been held, with very satisfactory attendances.

Mathematics.—This class is conducted by Mr. A. J. Litten, who reports satisfactory progress. Mining students who are deficient in mathematical knowledge avail themselves largely of this class, which is arranged to meet their particular requirements.

Assaying.—This is generally the largest class in a school of mines, and the comparative paucity of members is evidence of the good work done in the class formerly carried on by Mr. A. T. Kenrick, of the Bank of New Zealand. The assay plant in connection with this class leaves nothing to be desired, and double the number of students could, on an emergency, be accommodated.

Theoretical Chemistry.—In this important subject, the basis of metallurgical science, considerable attention is paid to the principles underlying the science. Instruction is imparted by meams of lectures, illustrated where possible by numerous experiments.

Practical Chemistry and Laboratory Practice.—This class is composed entirely of beginners in the subject, who have made very satisfactory progress indeed. So far, only the reactions of metals and acids and the separation of the metals into groups have been treated of.

Geology.—There are fourteen members of this class, which is the best attended of any of the classes, the average for each student for the whole term being nineteen attendances in twenty lectures. The lectures are illustrated by a splendid series of coloured lecture diagrams, the work of Mr. A. R. Hyatt, who has kindly placed them at my disposal. In future the lectures will also be illustrated by means of an optical lantern and some two hundred slides dealing with geological subjects. The first extended geological excursion for the year was held on the 23rd April. The s.s. "Falcon" was chartered, and the Cretaceo-tertiary series of rocks at Torehine visited and thoroughly examined. A collection of fossils was made, including *Ostrea wullerstorfii*, *Turritetla*, sp., *Fusus*, sp., *Cucullæa*, sp., crinoids (*Pentacrinus stellatus* and others), and *Hemipatagus tuberculatus*. In addition to the foregoing, which have already been recorded, *Scalaria*, sp., and sharks' teeth (probably *Lamna huttoni*, Davis), were collected. I propose to hold similar excursions to places of geological interest at intervals throughout the year.

Mineralogy and Blowpipe Determination.—Instruction in this class is considerably facilitated by the use of the valuable mineral collection in the possession of the school, containing, as it does, over two hundred specimens of minerals and rocks.

Petrology.—This important branch of geology will be entered on as soon as students have acquired a fair rudimentary knowledge of geology and mineralogy. This class will treat of the preparation of mineral sections, their examination under the polarising microscope, the determination of the component minerals, nomenclature of volcanic rocks, and the photographing of sections, &c.

Metallurgy.—This class has been deferred to the second and third terms of the year for various reasons, the most important being that a knowledge of chemistry is essential to enable students to understand the chemical processes, and this knowledge can be partly gained during the first term.

Mechanical Drawing.—This class was commenced very late in the term under the supervision of the Rev. C. F. R. Harrison, M.A. The attendance, so far, has been somewhat disappointing, but I understand there are several intending students, who prefer to wait until the commencement of the second term.

In the foregoing classes, where not otherwise specified, the syllabus of lectures and instruction is precisely as at the Thames School of Mines.

No Saturday classes for school-children are held, and all students are adults except three. Of these three one only is under seventeen years of age.

Laboratory.—During the term several assays and analyses have been performed for the public, notably one for the Public Works Department, of water from Cadman's Creek, Coromandel. I append a copy of the report furnished.

Analysis of Water from Cadman's Creek, Coromandel.—This is a clear, colourless, tasteless water, depositing only a very minute quantity of sediment on standing. After boiling for some time it has a feebly alkaline reaction. The fixed salts or solids are very low, amounting to 7·28 gr. per gallon, made up of alkaline chlorides (principally sodic chloride or common salt), 4·6 gr. per gallon, and carbonate of lime, 2·4 gr. per gallon. It must be termed a very soft water, and is therefore eminently suitable for steam or manufacturing purposes. With regard to its suitability for domestic purposes, I find it requires 0·149 gr. of oxygen to oxidize the organic matter in 1 gallon of water. This is a somewhat high factor, and the water is therefore of only ordinary purity. It must, however. be remembered that the sample was taken towards the close of a long period of drought, and that water is then not so pure as at any other time of the year. This percentage of organic matter, though large, will not invalidate it as a potable water; the more so as I failed to discover any traces of albuminoid ammonia or other nitrogenous compounds, the presence of which in any quantity would have infallibly indicated contamination.

Governing Body.—The committee for the current year are as follows: President, Mr. J. McGowan, M.H.R.; Vice-presidents, Captain W. H. Argall, Captain Hodge; members, Messrs. A. T. Kenrick, And. Jamieson, J. B. Rockliff, A. E. Argall, A. W. Attwater, T. W. Rhodes; Hon. Secretary, Mr. William Thomas.

In conclusion, I have to express my appreciation of the ready support and co-operation the committee have always afforded me in forwarding the interests of the school.

NELSON SCHOOL.

This is a school where pupils are taught mineralogy, assaying, and elementary chemistry by Mr. W. F. Worley, who reports as follows:—

I have to report as follows upon the work done in the Nelson School of Mines from the 31st March, 1897, to the 31st March, 1898:—

Blowpipe Analysis Class.

Thirty-three boys joined this class early in April, 1897, and most of them continued to work steadily and perseveringly till the end of March of the present year. For convenience in management the class was divided into two sections, an upper and a lower. Those boys who had had previous experience were placed in the upper section, whilst the new-comers were put into the lower section. The boys in the lower section met every Wednesday afternoon, those in the upper section meeting in the dinner-hour on Friday. The work attempted was similar to that of past years—namely, the testing by means of the blowpipe of the ordinary ores of commerce. By the end of the year those boys who had a two-years' course were able to identify with tolerable certainty ores of arsenic, antimony, bismuth, lead, tin, copper, chrome, iron, nickel, cobalt, manganese, zinc, and silver. They could also detect gold by panning.

Mr. John Tinlin, having offered £1 to provide two prizes for the two best boys in the upper section, that class was examined at the end of March last. Eleven boys were present at the examination. Six test substances were given to each boy, and one hour was allowed for testing. Harold Hounsell named them all ten minutes within the hour. Arthur Krahagen and Cecil Palmer tied, each naming correctly. To avoid the trouble of a further examination of these two boys a third prize was given by myself. The first prize was a blowpipe cabinet, the second prize (two of them) "The Prospector's Handbook." The interest shown by the boys in this work is very encouraging, and for their years they do well.

Last Christmas time seventeen of the boys were taken to the Champion Copper-mines. We stayed there three days, camping out, and made collections of all the important minerals in the neighbourhood. The iron, copper, and chrome collected at that time have since been tested in the blowpipe class.

Assaying.

There has been a steady run of assay work, but not so much as in the previous year. For the year ending the 31st March, 1898, twenty-seven assays were made, some of them being bulk-tests of 12 lb. or 14 lb. samples. The Weatherhead crusher, which was purchased by means of the Government grant, has proved extremely useful in testing these larger samples. It is not much good for coarse crushing, but does the fine grinding exceedingly well. By putting stone first through a Taylor's crusher and then through the Weatherhead crusher I am able to reduce 5 lb. of the hardest quartz to fine powder in a little less than an hour.

Only one of the above-mentioned assays calls for special mention, and that is the so-called platinum-ore from Takaka. For several years past some of this stone has come to me at intervals for assay, but the results have always been negative. Some time ago, however, Mr. Jacobsen, the owner of this ore, brought over to Nelson some bars of white metal which he declared to be chloride of gold. The metal was brought to me to be tested, and proved to be lead, with traces of iron in it. Mr. Jacobsen discredited my tests, and by promising large rewards succeeded in getting eighty persons to subscribe £1 each for the purpose of putting up a small furnace for reducing the chloride of gold. Feeling that the public were being misled by one much self-deceived, and knowing that he was using litharge freely in the treatment of his ore, I made it publicly known that the metal was lead, and that it came not from the ore, but from the litharge which was put in as a flux. The public generally accepted this view of it, but some still continued to believe in the untold wealth of the ore. As Mr. Jacobsen was unable to fulfil his promises of large sums of money to those who assisted him, the whole affair seemed to have died out, when a person visiting Nelson got some of the metal, sent it to Melbourne to be assayed, and reported 60 per cent. of platinum. Many persons immediately thought that Jacobsen was right. £1 shares went up to £10, and changed hands at that price. In the interests of the public I got some of the ore from one of the shareholders, tested it most thoroughly, published the tests in one of our newspapers (the *Colonist*), and reasserted most emphatically the impossibility of a precious metal being found in that ore. This prompt action had its effect, and for some time nothing has been heard of the mountain of platinum.

Conclusion.

Owing to slight indisposition through overwork no lecture-work was undertaken last year, but arrangements have been made for the delivery of three lectures during the coming winter. Considerable attention has been given to agricultural chemistry, and the results of some experiments in that direction have been forwarded to the Agricultural Department. Three young men are also studying agricultural chemistry under my direction.

REEFTON SCHOOL.

The Director of this school (Mr. R. M. Aitken) reports as follows:—

I have the honour to report on the work done at the Reefton School of Mines during the past year ending the 31st March, 1898, which, I regret to say, is not so good as that of the previous year.

At the beginning of the year there was a very good attendance to the classes, and the assaying department was kept very busy with outside work. This, however, did not last, and it gradually went down, so as to bring our average for the year rather low.

The classes were kept going regularly throughout the year, but in the latter part were very

poorly attended; hence none of our students competed at the annual examinations. The irregularity in the attendance is, of course, largely due to the distance the mines are from the school, and the different shifts allowing some to attend only every other week.

Up to the end of 1897 no less than thirty-two students from the school have successfully passed the Government examinations for first-class mine-managers, twenty-four under the Mining Act and eight under the Coal-mines Act. Besides these, a great many have been successfully prepared for the engine-drivers' and other examinations. Five candidates sat at the last examinations for mine-managers, held in January, the results of which are not yet known.

In the laboratory 430 assays and analyses have been performed, which shows a decrease compared with the previous year. Besides these, a large amount of experimenting has been done with the cyanide process on the tailings from the different batteries on the field, and, as a result of these experiments, the process is now being successfully used at two different places. The decrease in the number of assays performed at the school is owing to some of the large companies here employing assayers at their mines. The want of a small testing plant as described in my last report has been very much felt, and I am quite sure it would be largely used, and would greatly increase the utility of the school. As I have been doing all the laboratory work and experimenting myself, this, together with the classes, has kept me fairly busy throughout the year. The smaller schools, such as at Brunnerton, Denniston, and Boatman's, were not visited.

The number of individuals attending the classes would be about thirty, and the following tabulated statement will show the attendance at the different classes:—

Subject.	Members.	Average Attendance.
Mining and mathematics	15	10
Surveying	14	10
Assaying and metallurgy	18	12
Theoretical chemistry	10	6
Practical chemistry	10	6

The work done at the classes is similar to that of previous years, as follows:—

Practical Assaying and Metallurgy.—This has been our principal class, and has been fairly well attended throughout the year. The instruction given is of great importance to those who wish to qualify as assayers or battery superintendents, and the class should be even better attended than it is. The students are instructed in the wet and dry methods of assaying; use and composition of fluxes, fuels, reagents, &c.; smelting; valuing and refining of gold and silver bullion; amalgamation, retorting, &c.; also in the various methods of extracting gold and silver from their ores, such as battery-work, amalgamation, concentration, cyaniding, and chlorination. Some of the students from this class intended to sit for the battery superintendents' examination, but were unable to do so, not having the practical experience at a battery with cyanide plant attached.

Practical and Theoretical Chemistry.—The two subjects are taken together, and the attendance has not been good. In theoretical chemistry the non-metallic elements were taken generally, together with the chemistry of gold, silver, and mercury. This class does not seem popular, although a knowledge of the subject is very necessary to all mining men. In practical chemistry instruction was given in the preparation of reagents and salts, testing for acids and metals, separation and detection of metals and mineral substances, besides assays and analyses by gravimetric and volumetric methods.

Land- and Mine-surveying.—The work in this class was nearly all theoretical. Very little practice could be given to students, owing to want of instruments. Instruction was given in chaining, tabulation of traverses, calculations of areas, heights, distances, plotting, levelling, and laying out roads and races. This class, I am afraid, will soon get smaller unless more practical work is done; but I hope to have the necessary instruments early this year. It is a subject of great importance to mining students, and has always been a popular class at the school.

Mining and Mathematics.—The instruction given in this class includes mining geology, strength of materials, timbering, pumping and pitwork, hauling and winding, ventilation, explosives, water-power, &c.; also logarithms and plane trigonometry. These two latter subjects are of great importance to the mining student, and are the first things taught to a new member. Those attending are mostly miners and those wishing to qualify as mine-managers or engine-drivers. The attendance is rather irregular, which retards the class greatly, and prevents a large amount of work from being done.

Reefton School.—There has been nothing done in the way of adding improvements to the school, as the necessary funds were not available. The preparation of all assay samples has to be done with pestle and mortar, and finely pulverised on the bucking-plate and muller. With large samples this work is very laborious, and takes up a great deal of time. I have had to refuse many large samples on account of not having the necessary appliances to reduce them. The school is still urgently in need of a good assay balance, as a great deal of careful work has to be done, and should inaccurate returns be given it would greatly injure the school. I trust that during the coming year the committee may be enabled to equip the school a little better, and to add a few of the most necessary improvements.

The Laboratory.—In this department 430 assays and analyses have been performed during the year, besides a large number of experiments with cyanide and chlorine. A large number of samples have been sent for qualitative analysis, the most of which is done free of charge. The tests are made up as follows: Fire-assays, 361; amalgamation tests, 14 (weight of stone, 280 lb.); bullion assays and smeltings, 23; analyses, 5; cyanide tests, 20; tin assays, 2; copper assays, 5. The fire-assays made at the school are never less than 1,000 gr. tests, except in the case of concentrates where the sample is rich. The following is a copy of a 1,000 gr. assay-table made out by myself for use in the school; it may be of some use to others:—

Weight in 1,000gr.	Assay per Ton. Oz.	dwt.	gr.	Weight in 1,000gr.	Assay per Ton. Oz.	dwt.	gr.	Weight in 1,000gr.	Assay per Ton. Oz.	dwt.	gr.	Weight in 1,000gr.	Assay per Ton. Oz.	dwt.	gr.	Weight in 1,000gr.	Assay per Ton. Oz.	dwt.	gr.	Weight in 1,000gr.	Assay per Ton. Oz.	dwt.	gr.
0·001	0	0	16	0·037	1	4	4	0·073	2	7	17	0·109	3	11	4	0·145	4	14	17	0·181	5	18	6
0·002	0	1	7	0·038	1	4	20	0·074	2	8	9	0·110	3	11	20	0·146	4	15	8	0·182	5	18	21
0·003	0	1	23	0·039	1	5	11	0·075	2	9	0	0·111	3	12	11	0·147	4	16	1	0·183	5	19	13
0·004	0	2	15	0·040	1	6	3	0·076	2	19	16	0·112	3	13	4	0·148	4	16	17	0·184	6	0	5
0·005	0	3	6	0·041	1	6	19	0·077	2	10	7	0·113	3	13	20	0·149	4	17	8	0·185	6	0	20
0·006	0	3	22	0·042	1	7	10	0·078	2	10	23	0·114	3	14	11	0·150	4	18	0	0·186	6	1	12
0·007	0	4	14	0·043	1	8	2	0·079	2	11	15	0·115	3	15	3	0·151	4	18	16	0·187	6	2	4
0·008	0	5	6	0·044	1	8	18	0·080	2	12	6	0·116	3	15	19	0·152	4	19	7	0·188	6	2	20
0·009	0	5	21	0·045	1	9	9	0·081	2	12	22	0·117	3	16	10	0·153	4	19	23	0·189	6	3	11
0·010	0	6	12	0·046	1	10	1	0·082	2	13	14	0·118	3	17	2	0·154	5	0	15	0·190	6	4	3
0·011	0	7	4	0·047	1	10	17	0·083	2	14	5	0·119	3	17	17	0·155	5	1	6	0·191	6	4	18
0·012	0	7	20	0·048	1	11	9	0·084	2	14	21	0·120	3	18	9	0·156	5	1	22	0·192	6	5	10
0·013	0	8	12	0·049	1	12	0	0·085	2	15	12	0·121	3	19	1	0·157	5	2	13	0·193	6	6	2
0·014	0	9	3	0·050	1	12	16	0·086	2	16	4	0·122	3	19	17	0·158	5	3	5	0·194	6	6	18
0·015	0	9	19	0·051	1	13	8	0·087	2	16	20	0·123	4	0	9	0·159	5	3	21	0·195	6	7	9
0·016	0	10	11	0·052	1	13	23	0·088	2	17	12	0·124	4	1	1	0·160	5	4	12	0·196	6	8	1
0·017	0	11	2	0·053	1	14	15	0·089	2	18	3	0·125	4	1	16	0·161	5	5	4	0·197	6	8	6
0·018	0	11	18	0·054	1	15	7	0·090	2	18	19	0·126	4	2	8	0·162	5	5	19	0·198	6	9	8
0·019	0	12	10	0·055	1	15	22	0·091	2	19	11	0·127	4	2	23	0·163	5	6	11	0·199	6	10	0
0·020	0	13	1	0·056	1	16	14	0·092	3	0	2	0·128	4	3	15	0·164	5	7	3	0·200	6	10	16
0·021	0	13	17	0·057	1	17	6	0·093	3	0	18	0·129	4	4	7	0·165	5	7	19	0·300	9	16	0
0·022	0	14	9	0·058	1	17	21	0·094	3	1	10	0·130	4	4	22	0·166	5	8	11	0·400	13	1	8
0·023	0	15	0	0·059	1	18	13	0·095	3	2	1	0·131	4	5	14	0·167	5	9	2	0·500	16	6	16
0·024	0	15	16	0·060	1	19	4	0·096	3	2	17	0·132	4	6	5	0·168	5	9	18	0·600	19	12	0
0·025	0	16	8	0·061	1	19	20	0·097	3	3	9	0·133	4	6	21	0·169	5	10	10	0·700	22	17	8
0·026	0	17	0	0·062	2	0	12	0·098	3	4	1	0·134	4	7	12	0·170	5	11	1	0·800	26	2	16
0·027	0	17	15	0·063	2	1	4	0·099	3	4	16	0·135	4	8	4	0·171	5	11	17	0·900	29	8	0
0·028	0	18	7	0·064	2	1	19	0·100	3	5	8	0·136	4	8	20	0·172	5	12	9	1·000	32	13	8
0·029	0	18	23	0·065	2	2	11	0·101	3	5	23	0·137	4	9	11	0·173	5	13	1	2·000	65	6	16
0·030	0	19	14	0·066	2	3	3	0·102	3	6	15	0·138	4	10	3	0·174	5	13	16	3·000	98	0	0
0·031	1	0	6	0·067	2	3	18	0·103	3	7	7	0·139	4	10	19	0·175	5	14	8	4·000	130	13	8
0·032	1	0	22	0·068	2	4	10	0·104	3	7	21	0·140	4	11	11	0·176	5	15	0	5·000	163	6	16
0·033	1	1	13	0·069	2	5	2	0·105	3	8	14	0·141	4	12	3	0·177	5	15	15	6·000	196	0	0
0·034	1	2	5	0·070	2	5	17	0·106	3	9	6	0·142	4	12	18	0·178	5	16	7	7·000	228	13	8
0·035	1	2	20	0·071	2	6	9	0·107	3	9	21	0·143	4	13	10	0·179	5	16	23	8·000	261	6	16
0·036	1	3	12	0·072	2	7	1	0·108	3	10	13	0·144	4	14	2	0·180	5	17	14	9·000	294	0	0

The amalgamation tests are only made on quartz containing free gold, and an assay of the tailings saved is made, so as to arrive at the true value of the stone. For good practical battery tests on quartz the method used is first to crush and amalgamate out the free gold, then concentrate down and make fire-assay of concentrates, and finally assay the tailings. The test on the concentrates will show if they are worth saving and treating by chlorination, and cyanide may be tried on the tailings if they contain sufficient gold. The cyanide process has been twice tried on this field without success; but, after a good deal of experimenting, I brought out a method of treatment and applied the same successfully on the Cumberland tailings, which are now being worked. Two students from the school are working this plant, and I am sure, with proper treatment, most of the tailings on the field can be worked by cyanide.

Most of the fire-assays made were on quartz samples and tailings from all parts of the district, principally from Reefton, Westport, Paparoa and Victoria Ranges.

Annual Examinations.—No students from this school sat for the annual examinations at the end of the year. This was partly owing to the irregularity of the classes at the latter part of the year.

The school is governed by a president, secretary, treasurer, and a committee of four. For classes the year is divided into two terms. The membership fee is 10s. per annum, and 5s. per term is charged to students for each class attended.

Scale of Charges for Assays, &c.

	£	s.	d.
Assay of gold- and silver-ores	0	5	0
" tailings and concentrates	0	5	0
Bullion assays	0	5	0
Meltings, bullion	0	10	0
Amalgamation tests under 10 lb.	0	5	0
" under 20 lb.	0	10	0
" over 20 lb.	1	0	0
Cyanide tests, small	1	0	0
Assays of lead- and tin-ores	0	5	0
" copper, iron, antimony, zinc, &c.	0	10	0
Analysis of limestones, coal, &c.	1	0	0
" concentrates	1	10	0

In conclusion, I must thank all those who have assisted in carrying on the school in the past, and trust that the institution may receive more outside support during the next year.

OTAGO SCHOOL.

The following is the report of Professor G. H. F. Ulrich, F.G.S., the Director of the Otago School of Mines:—

I have the honour to submit the following report on the School of Mines regarding attendance of students, results of the annual examinations, of work done during the past session, and future requirements.

The attendance number of students was fifty—the largest since the establishment of the school. Forty-six of this number were regular students for the full course, while the other four only attended classes in one or more of the three special subjects—general geology, metallurgy, and assaying. The number of old students returning for continuing or completing their studies was twenty, and that of the new entries twenty-six. Amongst the old students returned were two who had devoted the previous year to practical mining-work, and one of the old students stayed away for the same purpose, though with the intention of returning next session. Of three other old students who did not come back, two have left the country, and one has given up the intention of going through the course. Two of the eight students who left last year on the completion of their studies—viz., W. A. MacLeod, B.A., and H. E. Stephens—had not been engaged for the stipulated twelve months' practical work in mines, but since submitted certificates of having fulfilled this condition, and became thus entitled to, and were on application each granted, the diploma of Associate in Mining.

The attendance of the different classes throughout the session by the forty-six regular students was very satisfactory, only a few having missed lectures. One of the old students was, unfortunately, compelled, through serious illness, to miss all the lectures after the midwinter vacation. As he is now getting restored to health he will, no doubt, continue his studies next session.

The present status of the forty-six regular students is as follows: Of the twenty-six new students, sixteen passed successfully through the first year's course, including three—one an M.A.—who, on account of previous passing in general university subjects, were enabled to attend the classes and pass in several special subjects of the second and third years' courses. The other ten new students failed in or did not attend mathematics, two failed besides in theoretical chemistry, and three in mining geology, and one did not attend general geology.

Nine students completed the second year's course, with the exception of two who failed in mineralogy, and one of these failed also in mathematics, the other in theoretical mechanics and practical physics.

Nine students—one of five, one of four, and seven of three years' standing—finished their studies during the past session and are leaving the school, having been successful in passing the examinations in all the subjects prescribed for two of the divisions—viz, of mining and assaying.

The following table shows the numerical attendance at all the classes and the results of the recent annual examination:—

Subjects.	Attendance.	Entered for Examination.	Result of Examinations.			
			First Class.	Second Class.	Third Class.	Failures.
General (University)—						
Mathematics	24	20	1	1	14	4
Theoretical mechanics	12	11	1	3	6	1
Theoretical physics	9	9	1	2	6	...
Practical physics	6	6	...	3	2	1
Theoretical chemistry	25	25	2	7	14	2
Practical chemistry	22	22	4	5	13	...
Quantitative chemical analysis ...	6	6	2	2	2	...
Theoretical biology	1	...	...	...	...	...
Special (School of Mines)—						
Mining, second course	20	20	3	12	5	...
Mining geology...	26	26	3	8	12	3
General geology	26	26	8	13	5	...
Mineralogy	14	13	...	2	9	2
Petrography	7	7	...	3	4	...
General metallurgy	13	13	3	1	9	...
Special metallurgy	12	12	3	3	6	...
Assaying, first course	8	8	3	4	1	...
Assaying, second course	9	9	7	2	...	...
Blowpipe analysis	12	12	4	6	2	...
Applied mechanics	5	5	1	3	1	...
Surveying, first course	8	8	2	2	4	...
Surveying, second course ...	7	7	...	7	...	...
Model drawing	25	25	8	9	6	2
Practical plane geometry ...	25	25	13	8	2	2
Solid geometry	12	12	1	5	4	2
Machine drawing	12	12	12	...	...	...
Totals	...	...	80	111	127	19

On account of the large number of new students who required to take the evening class for "First aid," increased by several older students who had not taken this class before, the honorary secretary of the St. John Ambulance Association, Mr. W. L. Logie, very considerately arranged a special class for mining students, which was held in the large lecture-room of the Mining School. The attendance of this class was twenty-seven, and twenty-two of these passed the examination entitling them to receive certificates of "First aid."

The number of students who have to engage in practical work in mines during the vacation is forty-five, comprising nineteen second and third years' students and the twenty-six new ones who entered this year. Owing to this large increase as compared with former years, combined with the great depression in mining in the Hauraki Goldfields, where a considerable number found remunerative and instructive employment last year, it will be rather difficult for many to quickly secure working-places in this colony. Several have, to my knowledge, already departed for previously fixed places in mines in the Coromandel and Waihi districts, a number of others have found work in the Westport, Kaitangata, and Shag Point coal-mines, and two or three have promises of early employment in the quartz-mines of Preservation Inlet, but there are still a good number without any definite prospects, and I am afraid that, in order to secure work here, they will have to be satisfied with lower daily wages than those generally earned by students in former years. They would, in my opinion—as I told several—have better chances of obtaining remunerative work, and gain thereby more varied and extended mining experience, in the Australian Colonies, especially Tasmania, where at the present time a large number of copper, lead, and other ore mines are in a stage of active development, and miners not over-plentiful. A good example was set in this respect a few years ago by several students, who tried their luck in that colony, and easily found work in tin and other mines.

Grateful acknowledgments are due to the Union Steamship Company for granting this year, the same as the last, a liberal reduction in the price of return steamer-fares to students travelling for working purposes.

Regarding the number of students likely to attend the school next year a reliable forecast is scarcely possible, considering that, as our experience shows, but little reliance can be placed upon applications for entry long in advance of the session. For the bygone session, for instance, there were forty applicants on the list, but only twenty-six of these actually attended. As up to the present nine new intending students have sent in applications for admission to the Registrar, while, on the other hand, nine students who have finished their studies are leaving the school, and eleven old students (requiring to attend only one more session) and the twenty-six who have gone through the first year's course may with tolerable certainty be expected to return, the prospective attendance number for next year's session would turn out the same as for the past session—*i.e.*, forty-six—not counting upon any additional applications for entry or the possible staying-away of any of those who have already applied. Without any increase in the attendance, however, the resources of the school regarding space, apparatus, collections, &c., will during next session not only be taxed to the utmost in the assaying, surveying, mineralogy, and petrography classes, but some additions as well as assistance will be necessary. Regarding the assaying classes, the two new furnaces erected during the midwinter vacation and the converting of one of the little rooms off the furnace-room into a small laboratory have enabled the lecturer, Mr. Stephens, to get through the session without the two assaying classes (first and second course), which have to go on concurrently, seriously interfering with each other. For next year's session, however, the number of students entitled to take these classes will be so much larger that more new furnaces, together with certain alterations in the arrangement of the working benches, as sketched out by Mr. Stephens and the Registrar, are indispensable. Mr. Stephens will also require an assistant demonstrator for properly carrying on the two classes, which together may count from twenty to twenty-five students. Another serious deficiency Mr. Stephens has for some time been labouring under in both the assaying and metallurgy classes is a lack of a variety of larger samples of raw ores of the principal metals, as silver, copper, lead, zinc, &c., as well as of such metallurgical products as matte, speiss, slags, &c. Mr. Wilkinson, from one of his journeys through the Australian Colonies some years ago, brought back with him a considerable supply of these necessaries, and subsequently—during Mr. Fitzgerald's time—Mr. James Park, then Director of the Thames School of Mines, kindly presented us for the assay laboratory with a number of samples of refractory auriferous ores from the Hauraki Goldfields; but, owing to the larger number of students since, all this stock is now nearly exhausted, and the assaying classes cannot be efficiently carried on during next session without a further supply. As Mr. Stephens, on his present journey through Victoria, South Australia, and perhaps Tasmania, will have excellent opportunities of selecting and bespeaking the required samples, he intends availing himself of them, trusting in the Council authorising the purchase of the samples on his return. The expense to be incurred in this way would certainly be less, and the selection far more satisfactory, than if the supply were obtained from Europe or Australia on merely a written order.

With regard to the surveying classes, the lecturer (Mr. Begg) informed me that he thought he might be able to accommodate a theoretical class (first course) of not over fourteen to sixteen students in his present lecture-room. For a larger number the room would, however, be too small—so far as drawing and plotting surveys was concerned—and, as there was no other lecture-room suitable, the only way out of the difficulty would be the temporary use of the library. As to the practical class (second course), Mr. Begg considered that if its attendance exceeded seven or eight students the provision of another levelling instrument and theodolite could hardly be done without for efficient instruction in outdoor work. In my own classes of mineralogy and petrography, which will both have a larger attendance than last session, I could not possibly carry on without the assistance of a demonstrator, in the same way and at the same expense as the Council sanctioned for the past session. For the class in mineralogy a long-felt want is the provision of a good systematic collection of specimens of the principal metallic and earthy minerals, permitting easy

access and close examination to the students at any time between lectures, which is not well possible with the large collection in the Museum, to which they have hitherto had to take inadequate recourse. In the petrography class the students were during the past session much troubled not only with the rock-section grinding-machine—now nineteen years in use—frequently becoming unworkable on account of worn-out bearings, but proving also quite insufficient for the use of all. The provision of a new machine and a thorough repairing of the old one—which is practicable and could be done at moderate expense—are therefore necessary requirements.

The class in general geology was during the past session conducted by the lecturer, Dr. Don, with the same if not greater enthusiasm than in former years, and afforded the students both excellent instruction and pleasure, owing to Dr. Don having, at his own expense, provided the necessary gas apparatus and fittings, room-darkening arrangements, &c., for the use of limelight in connection with his fine optical lantern, arranged for illustration on the screen of some five hundred photographic slides of interesting geological features and phenomena in various parts of the world. His private outlay on all these appliances and apparatus has so far been over £80, and I feel it a duty to him to state that, owing to his fine illustrative mode of teaching general geology, students are greatly aided in a clearer understanding of many somewhat difficult parts of my much drier subject of mining geology. As in former sessions, Dr. Don made with his students three excursions for field instruction during the recent session, the first of which was to the Harbour Cone and Sandymount for the purpose of studying the volcanic rocks of these districts. During the second excursion of one day a visit was made to the Wairongoa mineral springs, and the highly interesting deposit of auriferous greensand in the vicinity of these springs underwent close examination; while on the return journey the party were conducted through Freeman's coal-mine, in the Green Island coal-measures. The third excursion of the class was to the Oamaru district, and extended over three days. During the first day, on the way to Oamaru, the Hampden beds, enclosing the celebrated Moeraki boulders, were visited; whilst the second day was devoted to an inspection of the recently discovered auriferous quartz reefs on the Balruddery Estate, about fifteen miles from Oamaru; and on the third day the party went out exploring the fossiliferous beds of the Devil's Bridge and the pitchstone and bedded volcanic tuffs of the Oamaru Cape. It needs scarcely to be pointed out that, whilst affording the students great enjoyment, these excursions are of special value to them on account of the interest created in and the practical instruction received by ocular demonstration of geological features and occurrences. Dr. Don, on behalf of himself and the students, expresses thanks to Mr. and Mrs. Reid, of Elderslie, for hospitality shown to them on the visit to Balruddery; to Mr. A. Thomson, proprietor of the Wairongoa springs; to Mr. J. Green, manager of Freeman's coal-mine, for kindly conducting them through his mine; and to Mr. Crombie, Stationmaster at Dunedin, for seeing their large party comfortably settled for the journey to Oamaru.

Through the appointment of Mr. F. B. Stephens, one of our distinguished past students, as lecturer in metallurgy and assaying, this department of the school has been well kept up to its past high level of efficiency, as Mr. Stephens, through practice for several years as metallurgical chemist and assayer for some of the largest gold-mining companies in the Transvaal, proved to be an excellent instructor in these branches; and, owing to the intimate connection of the positions he there occupied with the management of crushing and cyanide establishments—the latter, perhaps, the largest and most perfect at present extant—he not only thoroughly understands their construction, but is also specially qualified for instructing students in the best modes and ways of working the cyanide process under varying conditions regarding the nature of ores to be treated. In the construction of our testing plant he finds defects, and recommends improvements and alterations in several parts, as detailed in a letter to me as follows: "(1.) The battery as at present arranged is not by any means a good amalgamator. I should recommend the addition of amalgamated apron-plates and deep-drop ripples as you yourself suggested. (2.) The speeds of the pulleys have all been miscalculated, and will have to be altered. This is the most important matter, as the pump will not work at the low speed, and the engine is very much strained. (3.) A connection should be made from the top cyanide-solution vat to the pump for the purpose of priming it. (4.) The overflow from the berdan should be enlarged, as it runs on to the floor at present. (5.) The pipe-connections on the cyanide plant want altering to make the affair at all workable. (6.) A covering for the gas-engine is necessary, as the building is very dusty, and the bearings will soon become ruined."

With the exception of a small lot of tailings treated by the cyanide process and the berdan close towards the end of the past session, the testing plant was not in request by the public for many months—quite in contrast to its nearly continuous employment during the previous year. The chief cause of this unsatisfactory state of affairs is, doubtless, the boom in gold-dredging enterprises, in consequence of which quartz-mining and prospecting for auriferous quartz reefs, for which testing of samples is nearly exclusively required, have suffered to a great extent. There is, however, another circumstance that certainly contributed to it—viz., the general opinion amongst Otago mining men that our charges for treatment are much too high. Mr. Stephens has, indeed, evidence that several parties, after ascertaining our charges (which are on a par with the Thames School of Mines), send their test samples to Sydney, New South Wales, where there is a Government testing plant, and that the treatment charges per ton there made, together with all expenses for transport, &c., came to less than our charges for treatment only would have come to for the same samples. It is therefore a matter for consideration by the mining committee of the Council whether our charges per ton might not, without loss, be so far reduced as to equalise them with the total expenses entailed by having samples tested in Sydney.

EXPENDITURE ON SCHOOLS OF MINES.

The following table shows the expenditure by the Government on Schools of Mines since their inauguration, exclusive of subsidies paid to the University of Otago towards the School of Mines in connection with that institution:—

Financial Years.	Subsidies towards the Erection of Schools of Mines, and Maintenance.	Chemicals and Apparatus, also Mineralogical Specimens supplied to Schools of Mines.	Scholarships.	Salaries of Teachers, and Travelling-expenses, &c.	Total Sums paid by the Department towards the Schools of Mines.
	£ s. d.	£ s. d.	£	£ s. d.	£ s. d.
1885–86 ...	...	36 19 9	...	1,223 9 10	1,260 9 7
1886–87 ...	257 16 6	409 1 4	...	2,716 9 3	3,383 7 1
1887–88 ...	253 15 9	253 14 1	...	1,714 9 6	2,221 19 4
1888–89 ...	42 10 0	6 12 9	...	1,139 4 1	1,188 6 10
1889–90 ...	142 2 0	181 14 10	...	716 3 10	1,040 0 8
1890–91 ...	217 6 6	54 8 0	...	620 9 9	892 4 3
1891–92 ...	181 14 0	...	...	689 5 9	870 19 9
1892–93 ...	312 3 4	...	...	670 1 0	982 4 4
1893–94 ...	197 0 5	...	...	858 19 4	1,055 19 9
1894–95 ...	390 0 0	45 10 10	...	773 17 8	1,209 8 6
1895–96 ...	820 0 0	...	50	849 3 0	1,719 3 0
1896–97 ...	352 14 11	58 18 6	100	834 12 8	1,346 6 1
1897–98 ...	1,089 18 6	29 19 9	100	780 19 0	2,000 17 3
Totals ...	4,257 1 11	1,076 19 10	250	13,587 4 8	19,171 6 5

The above statement shows the amount expended on the different Schools of Mines throughout the colony; but, in addition to this, the sum of £6,750 has to be added, as that has been paid to the School of Mines attached to the University of Otago, £500 being paid last year towards maintaining the school, which makes the total expenditure up to the 31st March last to be £25,721 6s. 5d. This expenditure has extended over a period of thirteen years.

WATER-RACES.

Waimea Water-race.

This race is now in good order, and water is supplied to this district and Callaghan's, but, as the Waimea channel is now completed, the connection with the middle branch claims is now being carried on. At Kelly's Terrace the drainage-tunnel is now 2,602 ft. in length, but, as the total length before this work can be utilised is 6,600 ft., it will be some time hence before the water-race can be used.

The following statement will show the receipts and cost of maintenance of the Waimea Race for the year ended 31st March last, together with the approximate quantity of gold obtained by those using water for working claims from that supply:—

Month.	Sales of Water.	Cash received for Sales of Water.	Expenditure.	Outstanding Moneys at the End of each Month.	Number of Men employed.	Approximate Quantity of Gold obtained.	Value of Gold obtained.
1897.	£ s. d.	£ s. d.	£ s. d.	£ s. d.		Oz.	£ s. d.
April	59 1 3	77 15 3	48 11 8	10 17 3	61	185	721 10 0
May	84 2 6	82 12 9	60 4 2	10 17 3	50	240	936 0 0
June	68 10 10	59 19 0	46 14 2	10 16 0	54	205	799 10 0
July	71 11 3	82 8 6	57 8 2	10 16 0	52	220	858 0 0
August	73 14 7	70 17 6	49 4 2	10 16 0	51	222	865 16 0
September	78 3 7	67 5 0	54 19 2	10 16 0	72	234	912 12 0
October	61 9 7	55 7 9	55 19 2	10 16 1	45	198	772 4 0
November	83 17 6	75 12 6	54 4 2	11 7 8	46	252	982 16 0
December..	56 8 9	37 18 6	64 4 2	12 7 7	45	175	682 10 0
1898.							
January	34 1 3	50 16 3	71 19 2	12 4 3	40	115	448 10 0
February	55 12 6	60 17 0	48 4 2	11 19 3	37	173	674 14 0
March	61 5 0	48 7 6	65 9 2	11 19 3	41	190	741 0 0
Totals	787 18 7	769 17 6	677 1 6	..	49.5 (average)	2,409	9,395 2 0

It will be seen from the foregoing statement that the value of the sales of water for the year amounted to £787 18s. 7d., as against £776 19s. 5d. for the previous year, while the cost of maintenance amounted to £677 1s. 6d., as against £669 6s. 3d. for the former year; thus showing an increase in the cost of maintenance of £7 15s. 3d., and also an increase in the value of the sales of water of £10 19s. 2d. from the previous year.

The average number of men employed in claims worked with water from this supply last year was 49·5, and the approximate quantity of gold obtained by them was 2,409 oz., representing a value of £9,395 2s. Deducting the value of the sales of water from the value of the gold obtained, it leaves the average earnings of the men to be £173 17s. 11d. per man per annum, or £3 6s. 10d.

per man per week. This cannot be taken as their net earnings, as the cost of pipes, tools, and timber required in working the claims has also to be taken into consideration. The value of free water given to open up claims and for working poor ground during the year was £100. This free water, however, is necessary, as the ground is becoming more expensive to work every year. The total cost of this water-race and branches up to the end of March last was £136,988 8s. 8d.

Callaghan's Branch Water-race.

This race, since its completion, has been a great boon to the miners in this district, and has enabled them to work claims hitherto unprofitably worked through want of a proper supply of water. The following statement shows the receipts and cost of maintenance of this race, and also the quantity and value of gold obtained by those using the water:—

Month.	Sales of Water.	Cash received for Sales of Water.	Expenditure.	Outstanding Moneys at the End of each Month.	Number of Men employed.	Approximate Quantity of Gold obtained.	Value of Gold obtained.
1897.	£ s. d.	£ s. d.	£ s. d.			Oz.	£ s. d.
April	11 0 0	11 0 0	11 10 0	..	5	20	78 0 0
May	11 15 0	11 15 0	10 0 0	..	5	21	81 18 0
June	22 0 0	22 0 0	10 0 0	..	6	45	175 10 0
July	..	..	10 0 0	..	..	..	..
August	6 5 0	6 5 0	10 0 0	..	6	20	78 0 0
September	36 15 0	36 15 0	10 10 0	..	6	43	167 14 0
October	..	..	10 0 0	..	..	..	..
November	13 15 0	13 15 0	11 10 0	..	10	42	163 16 0
December	..	..	10 0 0	..	..	..	..
1898.							
January	28 10 0	28 10 0	10 0 0	..	10	49	191 2 0
February	..	..	10 0 0	..	..	..	..
March	42 0 0	42 0 0	11 15 0	..	11	75	292 10 0
Totals	172 0 0	172 0 0	125 5 0	..	7·37 (average)	315	1,228 10 0

It will be seen from the foregoing statement that the value of the sales of water for the year amounted to £172, and that the cost of maintenance was £125 5s. The average number of men employed was 7·37, and the gold obtained by them 315 oz., of the value of £1,228 10s. Deducting the value of the sales of water from the value of the gold will show the average earnings to have been £143 4s. 7d. per man for the year, or £2 15s. per week.

The total cost of this race up to the 31st March last was £6,027 15s. 6d.

Kumara Water-race.

This race still continues to supply water to a number of men, notwithstanding the area of rich ground is getting less every year. The known area of gold-bearing terraces that can only be worked with increased water-supply must be dealt with on a large scale, and, until a much greater supply of water is available, returns cannot be expected to continue in such a satisfactory manner as hitherto.

The Loop-line Dam is now raised, and capable of storing a considerable additional quantity of water. The No. 5 main tail-race is not yet completed, the difficulties met with in having wet and running ground to contend with has caused such lengthy delay in furthering the work. The amount paid in subsidising this work up to date has been £3,316 6s. 5d.

The amount expended on the race was—Loop-line Dam, £493 14s. 2d.; moving siphons, £208 12s. 6d.

The following statement shows the revenue derived from sales of water, and also the cost of maintenance, for the year ended 31st March, 1897:—

Month.	Sales of Water.	Cash received for Sales of Water.	Expenditure.	Outstanding Moneys at the End of each Month.	Number of Men employed.	Approximate Quantity of Gold obtained.	Value of Gold obtained.
1897.	£ s. d.	£ s. d.	£ s. d.	£ s. d.		Oz.	£ s. d.
April	243 11 2	314 1 6	183 5 4	157 15 9	77	405	1,579 10 0
May	240 5 1	277 14 0	134 4 3	134 4 6	73	390	1,521 0 0
June	204 19 1	155 1 2	167 17 10	171 14 3	66	265	1,033 10 0
July	210 11 1	150 0 0	152 2 7	219 3 6	62	345	1,345 10 0
August	266 15 6	215 12 6	160 11 6	240 5 1	71	445	1,735 10 0
September	147 4 8	246 10 0	138 8 2	153 10 8	70	245	955 10 0
October	296 9 10	318 18 4	175 14 1	138 0 3	76	505	1,969 10 0
November	213 1 9	377 5 6	175 8 6	112 16 8	76	374	1,458 12 0
December ..	255 19 11	66 0 0	133 9 7	154 3 7	76	470	1,833 0 0
1898.							
January	208 16 2	190 0 10	128 19 7	171 1 9	74	375	1,462 10 0
February	415 13 9	199 0 0	139 7 10	389 11 1	70	556	2,168 8 0
March	185 15 3	252 0 0	151 10 9	321 14 3	71	345	1,345 10 0
Totals	2,889 3 3	2,762 3 10	1,841 0 0	..	71·83 (average)	4,720	18,408 0 0

It will be seen from the foregoing statement that the value of the sales of water for the past year amounted to £2,889 3s. 3d., as against £3,502 17s. for the former year, and that the cost of maintenance was £1,841, as against £1,786 15s. 9d. for the previous year. This shows a decrease in the revenue last year of £613 13s. 9d., and an increase in the cost of maintenance of £54 4s. 3d. In addition to the sales of water, the value of free water supplied to the claims which did not prove payable to work during the year amounted to £613 0s. 6d. The average number of men employed in claims worked with water from this supply was 71·83, and the approximate quantity of gold obtained by them was 4,720 oz., representing a value of £18,408. Deducting the value of the sales of water from the approximate value of gold obtained, it leaves £15,518 16s. 9d. as the earnings of the miners, which is equal to an average of £216 0s. 11d. a man per annum, or £4 3s. 0¾d. per man per week. The total cost of this work up to the end of March last amounts to £42,166 2s. 8d., and, deducting the cost of maintenance from the value of the sales of water for the year, it leaves a profit on the working of £1,048 3s. 3d., which is equal to 2·485 per cent. on the total cost of the works.

[For table showing result of working Kumara Water-race for fifteen years, see page 25.]

Waimea-Kumara Water-races.

The Waimea and Kumara Water-races have been considered as separate races, though this is not the case. The object of showing each separately is to give an idea of the value of each in proportion to the capital expended on the different works in connection with each branch. They may be termed separate water-races, but the supply of water to the Kumara branch is dependent to a great extent on the Waimea branch. If these races were held by different individuals there would be a far greater scarcity of water at Kumara than now occurs, and at the same time there would be more water in the Waimea Race than could be disposed of. However, when the deviation of the Waimea Water-race is completed, and the branch constructed to Goldsborough, the whole of the water in that supply will be utilised at Callaghan's and the middle branch, and it will only be when there is surplus water in the Kawhaka Creek that there will be a full supply in the Kawhaka Race feeding the Loop-line Dam, which stores the water for the Kumara field. The whole of these water-races are under one management, and worked as one concern. The following statement will show the revenue and expenditure on the whole of these works for the year ending the 31st March last:—

Month.	Sales of Water.	Cash received for Sales of Water.	Expenditure.	Outstanding Moneys at the End of each Month.	Number of Men employed.	Approximate Quantity of Gold obtained.	Value of Gold obtained.
1897.	£ s. d.	£ s. d.	£ s. d.	£ s. d.		Oz.	£ s. d.
April	313 12 5	402 16 9	243 7 0	168 13 0	143	610	2,379 0 0
May	336 2 7	372 1 9	204 8 5	145 1 9	128	651	2,538 18 0
June	295 9 11	237 0 2	224 12 0	182 10 3	126	515	2,008 10 0
July	282 2 4	232 8 6	219 10 9	229 19 6	114	565	2,203 10 0
August	346 15 1	292 15 0	219 15 8	251 1 1	128	687	2,679 6 0
September	262 3 3	350 10 0	203 17 4	164 6 8	148	522	2,035 16 0
October	357 19 5	374 6 1	241 13 3	148 16 4	121	703	2,741 14 0
November	310 14 3	466 13 0	241 2 8	124 4 4	132	668	2,605 4 0
December	312 8 8	103 18 6	207 13 9	166 11 2	121	645	2,515 10 0
1898.							
January	271 7 5	269 7 1	210 18 9	183 6 0	124	539	2,102 2 0
February..	471 6 3	259 17 0	197 12 0	401 10 4	107	729	2,843 2 0
March	289 0 3	342 7 6	228 14 11	333 13 6	123	610	2,379 0 0
Totals	3,849 1 10	3,704 1 4	2,643 6 6	..	126·25 (average)	7,444	29,031 12 0

It will be seen from the foregoing statement that the value of the sales of water for the year amounted to £3,849 1s. 10d., while the expenditure for maintenance for the same period was £2,643 6s. 6d. For the previous year the value of the sales of water was £4,322 11s. 5d., and the expenditure £2,481 17s. This shows that there was a decrease in the revenue last year to the extent of £473 9s. 7d., while the cost of maintenance has increased to the extent of £161 9s. 6d.

The total value of free water given to the miners to open up new ground and construct new tail-races, and also for working claims which did not prove payable, amounted for the past year to £448 2s. 5d. The number of men employed in claims worked with water from these supplies was 126·25. Deducting the value of the sales of water from the approximate value of the gold obtained from claims worked with water from these supplies, which amounted to 7,444 oz., representing a value of £29,031 12s., it leaves £25,182 10s. 2d. as the average earnings of the miners, which is equal to about £199 9s. 3d. per man per annum.

The total cost of the whole of these works, including the cost of acquiring Wylde's Water-race —£790 9s. 4d.—up to the 31st March last was £186,825 9s. 3d.

SUMMARY showing the RESULT of WORKING the KUMARA WATER-RACE for Fifteen Years, from 1st April, 1883, to 31st March, 1898.

Water supplied.	Year.	Rate per Sluice-head per Week.	April.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	Total Value of Water sold.	Total Value Free for Assistance.	Total Value Free for Deviations.	Total for Construction of No. 3 Channel.	Total Value Water supplied.	Average Number of Sluice-heads supplied Daily.	Expenditure.
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.		£ s. d.
Water sold ..	1883–84	3 0 0	371 16 5	465 2 1	700 2 6	583 9 7	702 7 6	626 16 3	808 10 5	777 3 9	774 17 11	698 2 6	1,064 0 0	774 6 0	8,346 14 11	..	..	..	..	..	..
Free	1883–84	..	46 2 6	44 5 0	183 11 8	108 19 2	108 0 0	85 7 6	244 7 6	172 18 9	63 12 6	103 9 2	86 5 0	139 3 4	..	1,386 2 1	..	..	..	..	..
			417 18 11	509 7 1	883 14 2	692 8 9	810 7 6	712 3 9	1,052 17 11	950 2 6	838 10 5	801 11 8	1,150 5 0	913 9 4	..	..	..	..	9,732 17 0	46·35	2,153 5 5
Water sold ..	1884–85	3 0 0	580 4 4	937 19 4	667 3 11	906 16 10	882 6 10	997 1 5	919 12 3	1,126 11 10	819 17 3	289 4 2	756 9 2	821 0 10	9,704 8 2	..	..	..	..	..	..
Free	1884–85	..	92 5 0	56 19 7	78 18 9	55 13 9	149 0 10	18 11 3	145 13 4	69 3 9	39 15 0	26 12 6	45 3 9	2 16 8	..	780 14 2	..	..	..	..	..
			672 9 4	994 18 11	746 2 8	962 10 7	1,031 7 8	1,015 12 8	1,065 5 7	1,195 15 7	859 12 3	315 16 8	801 12 11	823 17 6	..	..	..	..	10,485 2 4	49·92	1,656 0 1
Water sold ..	1885–86	2 10 0	665 16 0	796 6 9	893 5 3	745 19 7	773 19 10	943 13 5	953 15 6	997 7 8	697 13 5	686 4 0	708 15 8	935 19 7	9,788 16 8	..	..	..	..	..	..
Free	1885–86	..	24 13 9	9 2 0	..	..	23 15 0	31 3 4	22 1 3	18 11 10	18 7 2	49 1 4	1 5 0	13 2 6	..	221 3 2	..	..	..	..	..
			690 9 9	805 8 9	893 5 3	745 19 7	797 14 10	974 16 9	975 16 9	1,015 19 6	716 0 7	735 5 4	710 0 8	949 2 1	..	..	..	..	10,009 19 10	57·20	1,454 19 5
Water sold ..	1886–87	2 10 0	758 0 4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Water sold ..	1886–87	2 0 0	..	19 10 8	488 3 9	315 7 11	599 5 0	643 7 11	682 8 9	686 7 5	562 0 10	345 12 7	673 0 0	747 9 2	6,470 14 4	..	..	..	..	..	..
Free	1886–87	..	..	776 0 11	242 0 11	40 13 9	120 9 7	83 15 10	74 5 0	45 9 2	32 15 0	46 8 9	49 16 8	36 3 4	..	1,547 18 11	..	..	..	..	..
			758 0 4	795 11 7	730 4 8	356 1 8	719 14 7	727 3 9	706 13 9	731 16 7	594 15 10	392 1 4	722 16 8	783 12 6	..	..	..	..	8,018 13 3	56·19	1,398 18 10
Water sold ..	1887–88	2 0 0	535 5 10	679 7 8	167 10 10	656 4 7	684 16 1	694 5 0	591 12 1	710 0 0	535 10 10	519 15 5	670 17 6	734 4 5	7,169 10 3	..	..	..	..	..	..
Free	1887–88	..	26 11 8	40 19 2	15 13 9	23 10 0	47 7 11	4 11 8	34 16 8	42 10 0	27 10 0	28 6 8	19 11 8	15 17 3	..	347 6 5	..	..	..	..	..
			561 17 6	720 6 10	183 4 7	679 14 7	732 4 0	698 16 8	626 8 9	752 10 0	553 0 10	548 2 1	690 9 2	750 1 8	..	..	..	..	7,516 16 8	53·68	982 12 0
Water sold ..	1888–89	2 0 0	490 6 8	338 7 7	532 1 1	626 19 10	667 8 3	542 8 4	702 12 6	664 1 7	395 12 3	465 2 1	623 18 4	667 8 4	6,716 6 10	..	..	..	..	..	..
Free	1888–89	..	107 17 3	90 18 0	87 1 4	75 1 10	32 10 0	16 9 5	38 1 4	13 0 0	34 9 2	58 6 8	90 10 10	74 13 4	..	492 0 0	227 0 0	..	..	..	..
			598 3 11	429 5 7	619 2 5	702 1 8	699 18 3	558 17 9	740 13 10	667 1 7	430 1 5	523 9 7	714 9 2	742 1 8	..	..	..	..	7,435 6 10	53·10	1,024 1 9
Water sold ..	1889–90	2 0 0	401 13 4	495 16 4	256 16 8	377 16 3	353 4 2	237 7 11	318 10 10	293 8 4	159 18 9	219 15 10	248 19 7	186 16 8	3,550 4 8	..	..	..	..	..	..
Free	1889–90	..	45 15 0	55 3 4	43 0 0	92 15 0	105 15 0	93 1 8	41 10 0	103 18 4	165 13 4	48 17 6	54 8 4	71 5 0	..	396 2 6	465 0 0	..	..	..	..
Free, No. 3 Channel	1889–90	..	..	..	..	..	122 19 1	335 1 3	330 11 8	275 8 0	97 13 4	6 0 0	221 18 1	102 11 5	..	..	..	1,492 2 10	..	..	..
			447 8 4	550 19 8	299 16 8	470 11 3	581 18 3	665 10 10	690 12 6	672 14 8	363 5 5	274 13 4	525 6 0	360 13 1	..	..	..	..	5,903 10 0	42·16	1,424 13 3
Water sold ..	1890–91	2 0 0	300 12 6	355 11 11	368 3 2	423 9 0	622 17 11	666 7 1	720 16 1	701 5 10	578 1 8	546 17 11	691 17 11	689 11 8	6,665 12 8	..	..	..	..	..	..
Free	1890–91	..	113 5 0	119 14 2	70 7 11	71 17 6	82 9 7	110 16 8	93 13 9	106 0 10	57 5 5	113 6 8	133 2 6	130 5 10	..	409 5 5	793 0 5	..	..	..	..
Free, No. 3 Channel	1890–91	..	272 11 11	247 3 6	246 17 10	115 2 11	32 2 2	..	..	..	..	..	..	..	..	..	..	913 18 4	..	..	..
			686 9 5	722 9 7	685 8 11	610 9 5	737 9 8	777 3 9	814 9 10	807 6 8	635 7 1	660 4 7	825 0 5	819 17 6	..	..	..	..	8,781 16 10	62·72	1,766 4 3
Water sold ..	1891–92	2 0 0	616 5 10	655 4 11	542 9 1	179 11 11	426 16 1	769 15 5	784 13 8	642 4 2	469 10 0	291 3 9	543 7 6	724 8 8	6,645 11 0	..	..	..	..	..	..
Free	1891–92	..	143 11 5	191 16 8	44 3 6	..	82 16 11	151 14 7	118 10 1	233 1 8	213 11 3	137 0 10	64 11 8	28 9 2	..	996 4 5	413 3 4	..	..	..	..
			759 17 3	847 1 7	586 12 7	179 11 11	509 13 0	921 10 0	903 3 9	875 5 10	683 1 3	428 4 7	607 19 2	752 17 10	..	..	..	..	8,054 18 9	57·53	1,584 10 11
Water sold ..	1892–93	2 0 0	495 17 1	505 12 11	493 5 10	495 13 6	602 2 8	635 1 3	571 1 8	458 7 1	382 2 1	390 19 2	450 7 6	308 10 0	5,789 0 9	..	..	..	..	..	..
Free	1892–93	..	44 18 9	80 2 6	72 4 2	61 2 1	43 5 10	38 2 6	44 0 10	66 2 6	157 6 8	94 4 2	77 10 10	64 2 6	..	444 15 8	398 7 8	..	..	..	..
			540 15 10	585 15 5	565 10 0	556 15 7	645 8 6	673 3 9	615 2 6	524 9 7	539 8 9	485 3 4	527 18 4	372 12 6	..	..	..	..	6,632 4 1	47·35	1,782 11 0
Water sold ..	1893–94	2 0 0	451 16 5	480 13 7	541 11 11	542 9 6	575 10 5	486 9 2	539 8 4	402 11 11	451 5 5	303 0 10	415 5 5	392 1 8	5,582 4 7	..	..	..	..	..	..
Free	1893–94	..	101 5 2	119 5 7	99 4 6	110 7 1	92 9 10	147 16 2	112 11 0	164 18 5	82 0 4	112 3 10	132 15 10	70 6 10	..	1,306 0 3	39 4 4	..	..	..	..
			553 1 7	599 19 2	640 16 5	652 16 7	668 0 3	634 5 4	651 19 4	567 10 4	533 5 9	415 4 8	548 1 3	462 8 6	..	..	..	..	6,927 9 2	49·48	1,917 8 5
Water sold ..	1894–95	2 0 0	477 1 8	437 17 4	501 3 4	482 1 3	513 7 11	413 0 5	213 19 2	375 7 6	428 8 9	298 2 5	198 7 1	308 2 11	4,646 19 9	..	..	..	..	..	..
Free	1894–95	..	76 11 8	98 12 8	103 1 3	92 17 11	83 5 0	122 17 6	96 4 2	105 6 8	81 11 8	74 14 2	72 17 6	86 12 6	..	1,054 12 8	40 0 0	..	5,741 12 5	41·01	1,976 17 7
			553 13 4	536 10 0	604 4 7	574 19 2	596 12 11	535 17 11	310 3 4	480 14 2	510 0 5	372 16 7	271 4 7	394 15 5	..	..	..	..	..	..	..
Water sold ..	1895–96	2 0 0	277 5 10	379 15 0	349 12 1	322 15 10	345 1 8	354 1 8	351 16 6	336 5 5	331 0 0	315 15 5	336 3 4	406 18 4	4,106 11 3	..	..	..	..	..	..
Free	1895–96	..	95 3 4	96 1 8	139 19 2	81 16 3	76 19 7	77 10 10	110 9 7	114 12 1	67 3 4	92 8 4	90 18 11	86 16 3	..	1,129 19 4	..	..	..	..	..
Free, No. 4 Channel	1895–96	..	..	..	..	..	5 12 6	39 14 2	62 7 6	56 9 2	65 4 7	32 10 0	36 1 3	34 15 10	..	..	..	332 15 0	5,569 5 7	39·78	1,943 8 7
			372 9 2	475 16 8	489 11 3	404 12 1	427 13 9	471 6 8	524 13 9	507 6 8	463 7 11	440 13 9	463 3 6	528 10 5	..	..	..	..	..	..	..
Water sold ..	1896–97	{2 0 0 / 1 10 0}	286 13 4	307 0 0	166 9 6	387 13 8	318 10 7	310 7 4	356 16 4	222 8 10	144 13 3	319 1 3	284 1 3	299 1 8	3,502 17 0	..	..	..	..	..	..
Free	1896–97	..	100 5 0	99 4 10	22 18 2	31 1 10	12 19 4	22 16 10	13 18 4	12 11 3	12 18 9	51 18 9	58 16 2	39 19 9	..	479 9 0	..	..	..	..	..
Free, No 4 Channel	1896–97	..	15 0 0	14 16 8	4 0 10	18 0 0	7 0 0	18 0 0	9 0 0	12 0 0	7 0 0	6 0 0	10 0 0	13 0 0	..	..	..	133 17 6	4,116 3 6	40·41	1,786 15 9
			401 18 4	421 1 6	193 8 6	436 15 6	338 9 11	351 4 2	379 14 8	347 0 1	164 12 0	377 0 0	352 17 5	352 1 5	..	..	..	..	..	..	..
Water Sold ..	1897–98	..	243 11 2	240 5 1	204 19 1	210 11 1	266 15 6	147 4 8	296 9 10	213 1 9	255 19 11	208 16 2	415 13 9	185 15 3	2,889 3 3	..	..	..	..	..	..
Free	1897–98	..	29 1 3	39 16 3	18 1 10	29 5 0	29 0 0	51 5 0	49 14 4	52 10 0	38 2 6	29 1 3	..	48 15 0	..	414 12 5	..	..	..	..	..
Free, No. 4 Channel	1897–98	..	..	..	..	..	..	..	..	..	2 10 0	14 0 0	17 0 0	..	..	33 10 0	..	..	3,337 5 8	..	1,841 0 0
			272 12 5	280 1 4	223 0 11	239 16 1	295 15 6	198 9 8	346 4 2	265 11 9	296 12 5	251 17 5	432 13 9	234 10 3	91,574 16 1	11,439 16 5	2,375 15 9	2,872 13 8	108,263 1 11	38·24	24,693 7 3

The following statement will show the receipts and expenditure for the last thirteen years ending the end of March last of the Waimea and Kumara Water-races:—

Year.	Waimea Race. Sales of Water.	Waimea Race. Expenditure on Maintenance.	Waimea Race. Net Profit.	Kumara Race. Sales of Water.	Kumara Race. Expenditure on Maintenance.	Kumara Race. Net Profit.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1886	1,790 16 0	1,131 18 1	+ 658 17 11	9,788 16 8	1,459 19 5	8,328 17 3
1887	1,675 19 4	1,116 10 0	+ 559 9 4	6,470 14 4	1,398 18 10	5,071 15 6
1888	1,612 11 3	1,027 17 11	+ 584 13 4	7,169 10 3	982 12 0	6,186 18 3
1889	1,416 6 8	860 2 5	+ 556 4 3	6,716 6 10	1,024 1 9	5,692 5 1
1890	1,240 9 7	795 7 7	+ 445 2 0	3,550 4 8	1,424 13 3	2,125 11 5
1891	1,388 17 5	933 3 3	+ 455 14 2	6,665 12 8	1,766 4 3	4,899 8 5
1892	1,121 16 2	784 13 10	+ 337 2 4	6,645 11 0	1,584 10 11	5,061 0 1
1893	1,015 12 3	858 0 4	+ 157 11 11	5,789 0 9	1,782 11 0	4,006 9 9
1894	828 15 8	919 9 4	− 90 13 8	5,582 4 7	1,919 8 5	3,662 16 2
1895	988 0 7	1,061 9 4	− 73 8 9	4,646 19 9	1,976 17 7	2,670 2 2
1896	795 13 6	770 3 8	+ 25 9 10	4,106 11 3	1,943 8 7	2,163 2 8
1897	776 19 5	669 6 3	+ 107 13 2	3,502 17 0	1,786 15 9	1,716 1 3
1898	787 18 7	677 1 6	+ 110 17 1	2,889 3 3	1,841 0 0	1,048 3 3
Totals ..	15,439 16 5	11,605 3 6	3,834 12 11	73,523 13 0	20,891 1 9	52,632 11 3

This table shows that there has been a net profit derived from the working of the Waimea Race of £3,834 12s. 11d., and £52,632 11s. 3d. from the Kumara Race, for the above period.

Mount Ida Water-race.

This race continues to furnish water sufficient to employ a large number of men. The usual work in maintaining the race has to be carried on in order that it may be kept open, as landslips and falls from the sides frequently fill it up. During the early part of the year three dams had to be refaced with sods, and a short pipe was introduced to replace a flume that was worn out, the timber becoming too weak for the weight to be sustained. This, with the cleaning-out of the race and widening four miles from Home Gully to Coal-pit Gully, entailed considerable expense, and added to the cost of maintenance.

The very dry summer, combined with the early disappearance of the snow, reduced the quantity of water to such an extent that only one sluice-head and a half was running in the race at the middle of March.

Four new elevating claims have been added to the number, and there are eight elevating plants now in use. The increased need of an extra supply is apparent, and the only known source of supply is that from the proposed reservoir at Eweburn, which has been ascertained to be practicable.

The following statement will show the revenue derived from sales of water, the cost of maintenance, and the approximate quantity and value of gold obtained by the miners using water from this race for the year ending 31st March last:—

Date.	Sales of Water.	Cash received.	Maintenance.	Number of Men employed.	Approximate Quantity of Gold obtained.	Value.
1897.	£ s. d.	£ s. d.	£ s. d.		Oz.	£ s. d.
April	134 3 5	134 3 5	116 12 8	78	280	..
May	104 7 7	107 1 8	89 8 8	72	273	..
June	115 9 2	119 9 2	84 14 8	60	220	..
July	49 3 11	49 3 11	87 10 5	55	150	..
August	14 12 6	20 16 9	334 7 8	20	45	..
September	195 9 1	196 10 7	136 8 8	69	306	..
October	232 14 10	244 14 10	91 14 8	70	345	..
November	214 1 0	214 11 4	96 2 8	71	406	..
December	149 6 1	149 6 1	87 3 8	67	400	..
1898.						..
January	74 4 4	74 4 4	88 14 8	64	210	..
February	48 3 0	48 3 0	79 12 8	54	120	..
March	64 4 0	67 7 1	92 7 8	51	130	..
Totals	1,395 18 11	1,425 12 2	1,384 18 9	61	2,885	11,107 5 0

It will be seen from the foregoing statement that the value of the sales of water last year amounted to £1,395 18s. 11d., as against £1,333 11s. 6d. for the previous year, which is an increase of £62 7s. 5d., while the expenditure on maintenance was £1,384 18s. 9d., as against £1,316 15s. 6d. for the previous year. The gain on the working last year was £11 0s. 2d. The approximate quantity of gold obtained from claims worked with water from this supply was 2,885 oz., representing a value of £11,107 5s.; and the number of men employed in these claims averages about 61. Deducting the value of the gold obtained from the value of the sales of water, it leaves £9,711 6s. 1d. as the earnings of the miners, which is equal to about £159 4s. a man per annum, or about £3 1s. 2d. a man per week.

Blackstone Hill Race.

This race is still used by a few men, and, although they cannot be said to be doing well, they manage to recover a considerable quantity of gold. During the year the race was repaired and side-trimmed. The tunnel on Johnstone's tail-race was also repaired where it crosses the road. The

usual clearing-out of the race was done in February, whilst the water was low, and it is now in good order.

The following statement will show revenue derived from sales of water, the cost of maintenance, the number of men employed, and the approximate quantity of gold obtained from those claims which are worked by the aid of this race :—

Month.	Sales of Water.	Cash received.	Maintenance.	Number of Men employed.	Approximate Quantity of Gold obtained.	Value.
1897.	£ s. d.	£ s. d.	£ s. d.		Oz.	£ s. d.
April	10 15 10	10 15 10	0 3 0	9	..	..
May	10 15 10	10 15 10	4 3 0	9	..	..
June	10 15 10	10 15 10	0 3 0	7	..	..
July	10 15 10	10 15 10	0 3 0	8	..	..
August	10 15 10	10 15 10	0 3 0	9	..	..
September	10 15 10	10 15 10	2 3 0	9	..	..
October	10 15 10	10 15 10	0 3 0	9	..	..
November	10 15 10	10 15 10	0 3 0	9	..	..
December	10 15 10	10 15 10	0 3 0	9	..	..
1898.						
January	10 15 10	10 15 10	0 3 0	9	..	..
February	8 1 11	8 1 11	19 13 0	9	..	..
March	10 15 10	10 15 10	3 7 0	9	..	..
Totals	126 16 1	126 16 1	30 10 0	8·75	160	616 0 0

It will be seen from the foregoing statement that the sales of water for the last year amounted to £126 16s. 1d., as against £115 19s. 3d. for the previous year, while the cost of maintenance was £30 10s., thus leaving a net profit of £96 6s. 1d. on the working of this water-race. The average number of miners employed in claims worked by the aid of this water-race was 8·75, and the approximate quantity of gold obtained by them was 160 oz., representing a value of £616. Deducting the value of the sales of water from the value of the gold obtained, it leaves £489 3s. 11d. as the earnings of the miners, which is equal to about £56 per man per annum. The total cost of this water-race was £1,036 16s. The net profit on the workings last year gave about 9·6 per cent. interest on the capital invested.

Summary of Water-races.

The following statement will show the profits and losses of working the different water-races constructed and maintained by the Government for the last twenty years, and also the collateral advantages derived by the utilisation of the water from these races :—

Name of Water-race.	Value of Sales of Water, including Value of Gold obtained in Sludge-channel.	Expenditure.	Profit or Loss on Working.	Average Number employed.	Approximate Quantity of Gold obtained.	Value of Gold obtained.	Duty received on Gold obtained.	Total Profit or Loss, with Value of Gold Duty added.	Total Cost of Construction.
Waimea-Kumara Water-race and Sludge-channel.	£ s. d.	£ s. d.	£ s. d.	Men.	Oz.	£ s. d.	£ s.	£ s. d.	£ s. d.
Nineteen years ended 31st March, 1897	147,680 2 7	88,779 5 6	58,900 17 1	..	266,760	1,005,718 4 3	20,728 0	79,628 17 1	..
Year ended 31st March, 1898	3,849 1 10	2,643 6 6	1,205 15 4	126	7,444	29,031 12 0	..	1,205 15 4	..
Totals	151,529 4 5	91,422 12 0	60,106 12 5	..	274,204	1,034,749 16 3	20,728 0	80,834 12 5	*208,790 7 5
Nelson Creek.									
Thirteen years four months ended 31st July, 1892 ..	17,577 0 7	15,415 7 1	2,161 13 6	52	32,943	126,049 17 0	3,269 16	5,431 9 6	90,722 10 8
Argyle.									
Thirteen years ended 31st March, 1895	5,530 16 10	5,455 7 7	75 9 3	17	8,040	30,738 12 0	804 0	879 9 3	15,151 15 3
Mount Ida.									
Nineteen years ended 31st March, 1897	25,194 1 0	28,522 6 9	†3,328 5 9	..	50,322½	191,854 2 6	3,176 2	†152 3 9	68,607 8 9
Year ended 31st March, 1898	1,395 18 11	1,384 18 9	11 0 2	61	2,885	11,107 5 0	..	11 0 2	..
Totals	26,589 19 11	29,907 5 6	†3,317 5 7	..	53,207½	202,961 7 6	3,176 2	†141 3 7	68,607 8 9
Blackstone Hill.									
Four years ended 31st March, 1897	492 8 11	41 15 0	445 13 11	7	872	3,382 19 6	..	445 13 11	1,036 16 0
Year ended 31st March, 1898	126 16 1	30 10 0	96 6 1	8¾	160	616 0 0	..	96 6 1	..
Totals	619 5 0	72 5 0	542 0 0	..	1,032	3,998 19 6	..	542 0 0	1,036 16 0
Grand totals ..	201,846 6 9	142,272 17 2	59,573 9 7	..	369,426½	1,398,498 12 3	27,977 18	87,551 7 7	383,808 18 1

* Including £6,027 15s. 6d. cost of constructing extension to Callaghan's. † Loss on working.

GOLD- AND SILVER-MINING.

The great increase in the number of claims taken up during the year 1896–97 led to the flotation of many companies, both in New Zealand and in London. In consequence, many of those companies that attempted to open up new mines with insufficient capital have expended all their funds, and in a large number of instances the claims and holdings have been abandoned.

This has caused a considerable falling-off in the prosecution of mining operations during the past year, and the work done has not proved of the great advantage to the industry that was expected. Large amounts have been expended in prospecting and searching for reefs in places where the indication of the existence of gold-bearing quartz was absent. In other parts, where reefs were discovered with fair prospects of yielding payable quartz, works were carried on in development in a half-hearted manner, and in many instances of such questionable utility, that claims have been abandoned at a time when, had the expenditure been carried out in a more judicious manner, the results would probably have proved the existence of payable mines. The desire to erect machinery to test quartz before the mine developments warrant such expenditure, is a failing frequently attendant on gold-mining in different parts of the world, and it must be admitted that instances of this kind have tended to disappointment in the New Zealand goldfields during the past year.

The good work carried on by many of the mining companies in conducting operations on a sound and practical basis, with skilled and careful management, will, however, lead to the steady expansion of the industry, and to an increase in the number of payable mines.

The following statement of the quantity and value of gold entered for exportation during 1897–98 shows the continued importance attached to the industry:—

Name of District.	Year ended 31st March, 1897.		Year ended 31st March, 1898.		Increase for 1898.
	Oz.	£	Oz.	£	Oz.
Auckland	93,876	358,231	108,490	401,602	14,614
Marlborough	789	3,070	619	2,400	..
Nelson	2,534	9,544	758	2,853	..
West Coast	71,548	286,261	66,121	264,481	..
Otago	88,166	358,636	75,504	304,862	..
Totals	256,913	1,015,742	251,492	976,198	..

In the Auckland District there was an increase of 14,614 oz. of gold—from the Thames County, 73 oz., and from the Ohinemuri County, 26,617 oz. Coromandel County shows a decrease of 10,692 oz.; Piako County, 35 oz.; and Borough of Thames, 1,349 oz.

In the South Island, Marlborough showed a decrease of 170 oz.; Nelson, 1,776 oz.; West Coast, 5,427 oz.; and Otago, 5,421 oz.

The yield of gold is nearly equal to that of last year, the difference being a slight decrease compared with the returns for 1897. Most hopeful anticipations must be formed of a substantial increase in the value of the yield of gold for next year, consequent on the addition to quartz-crushing machinery and to the number of dredges and improved hydraulic appliances in the alluvial fields.

QUARTZ-MINING.

The great impetus given to quartz-mining by the judicious expenditure of capital in the development of mines and erection of machinery, will show that many companies are now established on a sound basis, and the properties are most valuable investments. The profits to be derived will not probably be in some instances such as shareholders would wish, but it must be borne in mind that over-capitalisation is responsible to a large extent for a smaller rate of dividend than would have otherwise obtained.

The following list of companies outside the colony connected with New Zealand mining shows the vast interest taken in developing the industry:—

Name.	Locality in which Operations are being carried on.	Share Capital.	British Office.
		£	
Anglo-Continental Gold Syndicate (Limited) ..	General	100,000	Austinfriars, London.
Anglo-New Zealand Mines Investment	"	100,000	54 and 55, London Wall.
Apakura Syndicate	"	1,800	10, Bloomfield Street.
Aroha Gold-mines	Aroha	100,000	30 and 31, St. Swithin's Lane.
Achilles Goldfields	Otago	100,000	11, Poultry, E.C.
Blagrove's Freehold Gold-mining Company ..	Coromandel ..	62,500	97, Dashwood House, E.C.
Blue Spur and Gabriel's Gully Consolidated Gold Company	Otago	130,000	6, Great St. Helen's.
Britannia (Hauraki) Gold-mining Company ..	Coromandel ..	100,000	34 and 36, Gresham Street, E.C.
Collingwood Goldfields	Collingwood, Golden Bay	150,000	46, Queen Victoria Street, E.C.
Colville Company	Coromandel ..	7,500	7, Drapers' Gardens, E.C.
Consolidated Goldfields of New Zealand	Reefton	225,000	30, St. Swithin's Lane.
Coromandel Exploration Syndicate	General	2,000	6, Great St. Helen's.
Cromwell Gold Company	"	100,000	54, Old Broad Street, E.C.
Dolcoath Gold-mining Company (Hauraki Peninsula, New Zealand)	Coromandel ..	150,000	142 and 143, Palmerston Buildings, E.C.
Dual Syndicate	General ..	10,000	3, Clement's Lane, E.C.
East Hauraki Gold-mining	Coromandel ..	100,000	Finsbury House.
Ethel Reef Gold-mining Company	Te Aroha ..	120,000	Dashwood House E.C.

Name.	Locality in which Operations are being carried on.	Share Capital.	British Office.
		£	
Fame and Fortune	Thames	50,000	110, Cannon Street.
Glenrock Consolidated (Limited)	General	225,000	3, Queen Street, E.C.
Gloucester Gold-mining Company	Thames	120,000	Throgmorton House, E.C.
Golden Lead of Hauraki	Coromandel	100,000	Moorgate Court, E.C.
Golden Pah (Hauraki)	"	62,500	97, Dashwood House, E.C.
Goldfields of Hauraki Prospecting Syndicate	General	3,000	53, New Broad Street, E.C.
Goldfields of New Zealand	"	100,000	13, St. Helen's Place, E.C.
Gold Trust of New Zealand	"	100	4, Great Winchester Street, E.C.
Grey Consolidated	Grey	200,000	15 and 16, George Street, S.W.
Hauraki Gold-mining Company	Coromandel	40,000	97, Dashwood House, E.C.
Hauraki Associated Gold Reefs	"	100,000	Winchester House.
Hauraki South Gold-mining Company	"	90,000	7, Great Winchester Street.
Hauraki (Auckland) Goldfields Syndicate	General	10,000	30, Basinghall Street, E.C.
Hauraki East	"	150,000	6 and 7, Grocer's Hall Court, E.C.
Hauraki Golden Bay Mines	"	150,000	8, Old Jewry, E.C.
Hauraki New	Coromandel	150,000	3, Princes Street.
Hikutaia Gold Syndicate	Ohinemuri	15,000	Suffolk House, E.C.
Inkerman Combined Gold-mines	General	200,000	15 and 16, George Street, S.W.
Irene (Hauraki) Gold-mine	Kuaotunu	80,000	Dashwood House.
Island Block Gold-mining Company	Otago	60,000	4, Lombard Court, E.C.
Kapai-Vermont Gold-mining Company	Kuaotunu	150,000	1, St. Helen's Place, E.C.
Kapanga Gold-mining Company	Coromandel	250,000	97, Dashwood House.
Kathleen Crown	"	75,000	Dashwood House.
Kathleen Gold-mine	"	75,000	"
Kauri Freehold Gold Estates	General	250,000	6, Drapers' Gardens.
Key of Komata	Ohinemuri	100,000	34 and 36, Gresham Street, E.C.
Komata Queen	"	75,000	Dashwood House.
Komata Reefs Gold-mining Company	"	50,000	97, Dashwood House.
Kuranui-Caledonian Gold-mining Company	Thames	175,000	20, Great Winchester Street.
London and New Zealand Exploration	General	100,000	Broad Street House.
London and New Zealand Finance Corporation	"	102,000	139, Cannon Street, E.C.
London and West Australian Exploration	"	270,000	1, Great Winchester Street.
London and West Australian Investment	"	100,000	Broad Street House.
Mahikirau Syndicate		20,000	3, Crown Court.
Mahara Royal		150,000	54, Old Broad Street.
Maori Dream Gold-mines, Tairua	Tairua	130,000	8, Old Broad Street.
Mariposa Gold-mines		100,000	3, Crown Court.
Maori Gold	Tairua	130,000	8, Old Jewry.
Maori Syndicate	General	10,000	Austinfriars Passage, E.C.
Maoriland Gold-mines	"	95,000	Dashwood House.
May Queen (Hauraki)	Thames	200,000	22, Austinfriars.
Melville's New Zealand Corporation	General	100,000	20, Great Winchester Street, E.C.
Mines Corporation of New Zealand	"	250,000	3, Princes Street.
Mines Corporation of New Zealand Deferred		5,000	
Moanataiari Gold-mining Company	Thames	200,000	110, Cannon Street.
Monowai Gold-mines	Waiomo	150,000	28, Renfield Street, Glasgow.
Montezuma Gold-mines	Te Aroha	30,000	15, Sergeant's Inn.
New Alburnia Gold-mining Company	Ohinemuri	180,000	Finsbury House, E.C.
New Hauraki Gold Properties	Thames and Coromandel	100,000	Dashwood House.
New Zealand and General Mining Syndicate	General	25,000	19A, Coleman Street.
New Zealand Crown Mines Company	Ohinemuri	200,000	30, St. Swithin's Lane, E.C.
New Zealand Exploration Company	General	125,200	30, St. Swithin's Lane.
New Zealand Goldfields	"	50,500	23, College Hill, E.C.
New Zealand Gold Share and Finance Company	"	..	3, Newman's Court, Cornhill.
New Zealand Gold Share and Finance Company	"	..	
New Zealand Jubilee Gold-mines	Waitekauri	125,000	20, Great Winchester Street, E.C.
New Zealand Consolidated	General	50,000	15, George Street.
New Zealand Mines Trust	"	200,000	11, Abchurch Lane.
New Zealand and Western Australia Syndicate	"	50,000	Portland House.
New Zealand Gold Investment	"	5,000	11, Abchurch Lane.
New Zealand Talisman	Karangahake	150,000	65, New Broad Street.
New Zealand Venture Syndicate	General	5,000	11, Abchurch Lane.
New Zealand and Globe Exploration	"	10,050	4, Great Winchester Street, E.C.
New Zealand Broken Hills Gold-mining Company	"	300,000	13, St. Helen's Place, E.C.
New Zealand Corporation	"	100,000	3, Laurence Pountney Hill, E.C.
New Zealand Finance Syndicate	"	10,000	32, Old Jewry, E.C.
New Zealand Joint-stock and General Corporation	"	150,000	Finsbury House.
New Zealand Minerals Company	"	250,000	3, Laurence Pountney Hill, E.C.
New Zealand Pioneers	"	10,000	46, Queen Victoria Street.
North Island New Zealand Prospecting Syndicate	"	50,000	9, St. Mildred's Court.
Norman Proprietary Gold-mines	Waitekauri	75,000	Bloomfield House, E.C.
North Kapanga Gold-mining Company	Coromandel	60,000	54, Old Broad Street, E.C.
Ohinemuri Syndicate	Owharoa	60,000	11, Abchurch Lane.
Otago Syndicate	General	20,025	30, St. Swithin's Lane.
O.P.Q. Waipori Gold-mines	Otago	150,000	3, Laurence Pountney Hill.
Peveril Gold-mines	Coromandel	80,000	27, Old Jewry.
Phœnix	General	200,000	3, Queen Street.
Preece's Point Proprietary (Hauraki)	Coromandel	100,000	Dashwood House.
Ravenscliff Mining Company	General	60,000	Winchester House.
Royal Oak of Hauraki	Coromandel	100,000	63 and 64, New Broad Street.
Scandinavian Gold-mines	Hauraki	110,000	3, Newman's Court.
Royal Standard Gold-mines	Wharekiraupunga	200,000	43, Threadneedle Street.
Scotty's Hauraki Gold-mining Company	Coromandel	100,000	63 and 64, New Broad Street
Southern Star Gold-mines	"	75,000	63 and 64, New Broad Street.
Success Gold-mines	"	50,000	Dashwood House.
Taitapu Gold Estates	Nelson	175,000	9, St. Mildred's Court.
Tararu Creek Gold-mining Company	Thames	95,000	Dashwood House.
Thames Hauraki Goldfields	"	300,000	54, Old Broad Street.

Name.	Locality in which Operations are being carried on.	Share Capital.	British Office.
		£	
Tokatea Consols	Coromandel ..	100,000	45 and 46, Broad Street Avenue.
Tokatea of Hauraki	" ..	150,000	63 and 64, New Broad Street.
Triumph Hauraki Gold-mines	" ..	100,000	Finsbury House.
Tui Gold-mines	Tui Creek ..	100,000	8, Old Jewry.
Union Waihi Gold-mining Company	Waihi	200,000	11, Abchurch Lane.
United New Zealand Exploration	General	250,000	22, Austinfriars.
Victor Waihou Gold-mining Company	Karangahake ..	170,000	63 and 64, New Broad Street.
Waihi Consolidated Gold-mines	Waihi	200,000	39, Lombard Street.
Waihi Gold-mining Company	"	160,000	11, Abchurch Lane.
Waihi Grand Junction	"	150,000	18, Finsbury Circus.
Waihi Proprietary Company	General	175,000	Bishopsgate Street House, E.C.
Waihi Silverton Extended	Waihi	60,000	23, College Hill, E.C.
Waihi Gladstone	"	100,000	8, Old Jewry.
Waihi New	Thames	160,000	11, Abchurch Lane.
Waitaia Gold-mines	General	100,000	82, Gordon Street, Glasgow.
Waitekauri Consolidated Gold-mines	Waitekauri ..	120,000	Swan Chambers, E.C.
Waitekauri Central	" ..	65,000	63, New Broad Street.
Waitekauri Cross	" ..	100,000	19A, Coleman Street.
Waitekauri Extended	" ..	130,000	63 and 64, New Broad Street.
Waitekauri Gold	" ..	150,000	11, Abchurch Lane.
Waitekauri United	" ..	150,000	Finsbury House, E.C.
Waitekauri Union Claims	Hauraki ..	300,000	College Hill Chambers.
Whangamata Proprietary	Whangamata ..	200,000	College Hill Chambers.
Woodstock	Karangahake ..	150,000	6, Drapers' Gardens.

NORTH ISLAND.

Puhipuhi Mining District.

Operations in this district have not been carried on with much vigour, although attention is still directed to the quartz-workings. The following special claims are now held for mining purposes :—

Abstract of Licenses for Special Claims issued from the Warden's Office at Whangarei, in the Puhipuhi Mining District, and registered on or before the 31st March, 1898, in the Books of the Mining Registrar at Whangarei :—

Date of License	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A. R. P.					
12/2/96	94 2 12	Puhipuhi ..	III.	Hukerenui	Plymouth Rock ..	British Gold- and Silver-mining Co. (N.L.).
8/7/96	100 0 0	" ..	III.	"	New Puhipuhi ..	New Puhipuhi Gold-mining Co. (N.L.).
8/7/96	100 0 0	" ..	III.	"	Mikado	British Gold- and Silver-mining Co. (N.L.).
8/7/96	100 0 0	" ..	III.	"	Success	J. Harrison.
8/7/96	100 0 0	" ..	III.	"	Waimarie	Waimarie Gold-mining Co. (N.L.).
11/9/96	100 0 0	" ..	III.	"	Dr. Jim	Dr. Jim Gold-mining Co. (N.L.).
11/9/96	100 0 0	" ..	III.	"	Success Extended ..	J. Harrison.
23/12/96	100 0 0	" ..	III.	"	Uitlander	George E. Alderton.
9/9/97	100 0 0	Puhipuhi State Forest	III.	"	Great Northern No. 1	David Nairn Shaw (Glasgow, Scotland).
9/9/97	100 0 0	Ditto ..	III.	"	Great Northern No. 2	Ditto.
9/9/97	96 0 0	" ..	III.	"	Great Northern No. 3	"
17/2/98	100 0 0	" ..	III.	"	Star of England ..	Montezuma Gold-mining Co.
17/2/98	100 0 0	" ..	III.	"	Star of England Ext.	Montezuma Gold-mining Co., Te Aroha.

Operations in this field have been almost nil during the past year. The owners of the British Company's Mine failed to induce any of the mining syndicates to advance funds to further work their claims, and two of them were surrendered. Another party has taken up the ground, but has not yet made a commencement towards carrying on further works, although two men have lately been prospecting near the surface. Several other claims that had been surrendered were again taken up by fresh owners, and from two of these areas—the Star of England Nos. 1 and 2—it is intended to send parcel of 100 tons of silver-bearing ore to be treated at the Montezuma thermo-hyperphoric plant at Te Aroha.

At Kauri Mountain matters have remained at a standstill, and, as far as can be learned, the prospects met with have not been of much importance.

Ohaeawai.

No further operations have been carried on in working the cinnabar and free mercury deposits near the hot springs.

Great Barrier Island.

Mining operations have not been vigorously carried on. Many of the claims taken up have been entirely neglected, and the results from the chief mines so far have not proved of very great importance.

The following list shows the whole of the claims registered, and for which titles were in existence, at the end of the year :—

ABSTRACT of LICENSES for SPECIAL CLAIMS issued from the Warden's Office at Thames, in the Great Barrier Island, and registered on or before the 31st March, 1898, in the Books of the Mining Registrar, Thames.

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
30/11/96	100	0	0	Great Barrier	VII.	Fitzroy ..	Aotea	Aotea Gold- and Silver-mines Co. (N.L.).
30/11/96	100	0	0	"	VII.	" ..	Aotea No. 2 ..	"
30/11/96	100	0	0	"	III. VII.	Tryphena Fitzroy	Argyle ..	Iona Gold- and Silver-mining Co. (N.L.).
23/12/96	62	0	36	"	VI.	Fitzroy ..	Egerton ..	Alexander D. Robertson.
30/11/96	100	0	0	"	VI.	" ..	Fitzroy ..	Great Barrier Gold-mining Co. (N.L.).
30/11/96	100	0	0	"	VI.	" ..	Great Barrier Extended	Great Barrier Gold- and Silver-mining Co. (N.L.).
30/11/96	100	0	0	"	VII.	" ..	Great Barrier Excelsior	William Ernest Cossar.
30/11/96	100	0	0	"	VII.	" ..	Great Barrier Proprietary	Original Great Barrier Gold- and Silver-mining Co.
30/11/96	100	0	0	"	VII.	" ..	Iona	Iona Gold- and Silver-mining Co. (N.L.).
30/11/96	100	0	0	"	VI.	" ..	Kaitoke ..	Kaitoke Gold- and Silver-mining Co. (N.L.).
30/11/96	100	0	0	"	VI.	" ..	Kaitoke No. 2 ..	Kaitoke Gold- and Silver-mining Co. (N.L.).
30/11/96	100	0	0	"	VII.	" ..	Mount Argentum	Mount Argentum Gold- and Silver-mining Co.
30/11/96	100	0	0	"	VII.	" ..	Mount Argentum Extended	Mount Argentum Gold- and Silver-mining Co.
30/11/96	100	0	0	"	VII.	" ..	Premier of Great Barrier	Original Great Barrier Gold- and Silver-mining Co. (N.L.).

Egerton.

This mine is now being worked on option by the New Zealand Mines Trust. Several reefs are being opened up, but the operations so far have not been sufficient to prove the value of the property. The No. 4 drive, on what is called the "14 by 6" reef, has been extended 179 ft. The 2 ft. cross-reef is also being exploited, but at present it is smaller than usual. Paul's reef has been trenched on, and it maintains its size and looks well. The drive is being extended to cut the junction of the 6 ft. and other reefs, and it is expected that the reef at this point will show an improvement. Driving on a small leader in the hanging-wall is also being proceeded with, the operations being conducted under the superintendence of Mr. Richard Newdick.

White Cliffs.

The cross-cut has been extended a further distance of 11 ft., making 83 ft. in all, and the ree cut through. It shows a thickness of 2 ft., being well defined, and carrying good-looking mineral. Work has now been started on the western boundary of the original Great Barrier and White Cliffs property by means of trenching, with a view of intersecting a reef that has been worked by the former company with good results.

On the Barrier Gold and Silver Company's property the reef in the low level has been stripped 14 ft. in a westerly direction—that is, towards the Barrier Reefs boundary. Operations here have been suspended for the present, and the men are now working on the eastern end. Just at the boundary of the Fitzroy and Barrier Extended sections a reef 3 ft. wide is outcropping, and it is intended to put in a low level to intersect this lode, which, it is thought, may possibly prove to be the continuation of Lee's reef.

On the adjoining claim, the Barrier Reefs, the work of sinking the shaft is progressing satisfactorily, a depth of 137 ft. having been attained. The rock at the bottom is hard, and progress is somewhat slower in consequence. The low level is now in 39 ft., and the face is in harder country than that previously penetrated.

The Iona low level has been extended a total distance of 360 ft., 31 ft. having been driven during the last fortnight. The country is showing an improvement, the face now being in a nice grey sandstone.

On the Staffa ground operations have been temporarily suspended, absolute protection having been obtained. The future operations of this company will to a great extent depend upon the result of the development work in the Iona property, which should give a good indication to the Staffa company as to what work they should undertake.

On the Kaitoke property the number of men employed has been reduced, and the shareholders are to be called together to decide as to future operations. The point at which the reef should have been intersected in the low level has been passed, and the directors, before deciding as to the nature of future operations, have decided to consult with shareholders.

The Aotea and Original Great Barrier properties are being worked by the New Zealand and Johannesburg Syndicate, and the work previously described is being continued. The same remarks apply to the Great Barrier Gold and Silver Estates (over which the Melville Corporation have the option).

COROMANDEL DISTRICT.

This district, which comprises the most northerly portion of the Cape Colville Peninsula, includes the different goldfields from Port Charles to Manaia, as well as the Kuaotunu and Mercury Bay fields. Many of the claims taken up during the past two years have been surrendered and abandoned. The licenses consequently lapsed, or were forfeited for non-compliance with the condi-

tions under which they were held; whilst some of those claims in which prospecting operations were carried on in a practical manner continue to afford hopes of ultimate success. In other mines continued development work has been the means of discovering gold-bearing quartz, in the production of which the mining operations and after treatment furnished profitable employment for a large number of men.

The subjoined list of claims will show that the area of ground occupied is much less than formerly, although a considerable number have been taken up during the past year:—

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Coromandel, in the Hauraki Mining District, and registered on or before the 31st March, 1898, in the Books of the Mining Registrar at Coromandel.

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
8/11/97	95	2	32	Waikanae ..	V., VI.	Harataunga	Ackbar	Ackbar Gold-mining Co. (N.L.).
18/5/96	32	0	22	Matamata-harakeke	VI.	"	Ada	Enoch Richards.
18/5/96	100	0	0	Kennedy Bay	IX.	"	A.J.C.	A.J.C. Gold-mining Co.
10/7/97	100	0	0	"	II.	Coromandel	Akarana	Golden Butterfly Gold-mining Co. (N.L.).
25/6/96	86	0	0	Coromandel	VI.	"	Alameda	F. Swindley and H. C. Bell
5/11/96	20	0	0	"	V.	"	Albion	Hauraki Main Lodes (Ltd.).
20/11/95	78	3	37	"	"	"	Albion Extended ..	Hauraki Main Lodes (Ltd.).
29/10/95	30	0	0	Tiki ..	VI.	"	Alert	Alert Gold-mining Co. (N.L.).
10/7/97	100	0	0	Waikawau ..	IV.	Moehau ..	Antipodes	Adolph Kohn
10/7/97	95	3	27	" ..	"	" ..	Antipodes No. 2 ..	"
10/7/97	94	0	5	" ..	"	" ..	Antipodes No. 3 ..	"
18/5/96	99	3	20	Tokatea ..	II.	Coromandel	Arawa	S. W. Bedlington.
24/4/96	98	3	24	Manaia ..	XIV.	"	Ballarat	James Edwards.
8/11/97	83	2	0	Kennedy Bay	IV.	Harataunga	Bay View	Bay View Gold-mining Co. (N.L.).
23/12/96	63	2	0	Matamata-harakeke	VI.	"	"	"
18/2/96	100	0	0	Coromandel	"	Coromandel	Beatrice	Hauraki Golden Bay Mine (Ltd.).
2/7/95	18	0	30	Tokatea ..	II.	"	Bismark Extended ..	J. H. Witherford.
21/8/95	38	1	8	" ..	"	"	Britannia	Britannia Hauraki Gold-mining Co. (Ltd.).
21/7/97	99	0	0	Manaia ..	XIII.	"	British Fleet ..	George Houghton and Robert McShane.
5/8/97	98	0	0	Kikowhakarere	I.	"	British Kapanga Freehold Proprietary	James Halley.
5/8/97	60	0	0	"	"	"	Ditto Extended ..	"
27/8/95	2	0	12	Coromandel	V.	"	Bunker's Hill ..	Bunker's Hill Gold-mining Co. (Ltd.).
27/8/95	1	0	0	"	"	"	Bunker's Hill Extd.	"
24/4/96	96	0	0	Kennedy Bay	IX.	Harataunga	Cabbage Bay ..	Queen Victoria of Hauraki Gold-mining Co.
30/11/96	85	0	0	Coromandel	VI.	Coromandel	Cadman's Gully No. 1	W. H. Cooper.
11/10/97	40	2	0	Kennedy Bay	IX.	Harataunga	Cadman Extended ..	William McFarlane.
21/2/98	90	0	0	"	VII.	Coromandel	Castle Rock Consolidated No. 1	Kauri Freehold Gold Estates (Ltd.).
21/2/98	90	0	0	"	"	"	Ditto No. 2 ..	"
21/2/98	90	0	0	"	"	"	" No. 3 ..	"
21/2/98	90	0	0	"	XI., VI.	"	" No. 4 ..	"
21/2/98	90	0	0	"	VII., XI.	"	" No. 5 ..	"
21/2/98	90	0	0	"	"	"	" No. 6 ..	"
21/2/98	90	0	0	"	XI.	"	" No. 7 ..	"
21/2/98	90	0	0	"	"	"	" No. 8 ..	"
21/2/98	90	0	0	"	"	"	" No. 9 ..	"
10/7/97	100	0	0	Tiki ..	X.	"	Charley Beresford ..	Hugh Arthur Bishop.
6/2/97	74	0	0	Manaia ..	XIII.	"	Chidwell Hall ..	John McNeil.
23/3/97	6	1	9	" ..	"	"	City of Lucknow Surplus	Percy A. Vaile.
23/3/97	12	0	0	Tiki ..	VI.	"	Colleen Bawn ..	John Fitzgerald.
2/3/98	28	3	3	..	XII.	"	Colorado	William Whitaker.
10/7/97	52	2	16	Tiki ..	X.	"	Condor	Jackson Palmer.
12/1/98	14	3	22	..	II.	"	Conquering Hero ..	Conquering Hero Gold-mining Co. (N.L.).
7/10/96	36	0	0	Tokatea ..	"	"	Coronet	Coronet Gold-mining Co. (N.L.).
2/11/96	63	2	24	Coromandel	VI.	"	Coromandel Queen ..	Coromandel Queen Gold-mining Co.
15/12/97	63	3	2	"	II.	"	Cornubia	William Brentnall.
7/6/97	73	0	0	Waikawau ..	III.	Harataunga	Cousin Jack ..	Ernest Brothers Dufaur.
25/5/97	70	0	24	Waikanae ..	V.	"	Crown's Hill ..	Ackbar Gold-mining Co. (N.L.).
14/4/96	30	0	0	Tokatea ..	II.	Coromandel	Cuirassier	Cuirassier Gold-mining Co. (N.L.).
1/9/96	14	3	21	" ..	"	"	Cuirassier Surplus ..	"
11/8/96	52	2	9	Matamata-harakeke	VI.	Harataunga	Cuvier Light ..	Cuvier Light Gold-mining Co. (N.L.).
13/7/96	100	0	0	Port Charles	I.	"	Defender	William Bourke.
10/5/97	41	3	20	Waikawau ..	VI.	"	Darwin	William Oliver Lamb.
29/4/97	98	2	16	Cape Colville	II.	Cape Colville	Donald McKinnon ..	Port Jackson Gold-mining Co. (N.L.).
23/12/96	57	1	16	Tokatea ..	I.	Coromandel	Duke of Wellington No. 1	William H. Davies.
25/5/97	95	0	11	Waikawau ..	IV.	Moehau ..	Echo	Francis Charles Stubbs.
21/2/98	100	0	0	..	II.	Coromandel	Edinburgh Hauraki	Edwin H. Hardy.
27/2/96	69	2	8	Matamata-harakeke	VI.	Harataunga	Evening Star ..	Evening Star Gold-mining Co. (N.L.).
25/6/96	100	0	0	Coromandel	"	Coromandel	Exchequer ..	F. Swindley and H. C. Bell.
23/7/96	34	3	0	"	"	"	Exchequer Extended	"
22/10/96	100	0	0	Tokatea ..	II.	"	Fabulous	Fabulous Gold-mining Co. (N.L.).
21/7/97	50	0	0	Coromandel	"	"	Forest Queen ..	Frederick Charles Ring Horne.
10/3/96	30	0	0	Tokatea ..	"	"	Four-in-Hand ..	Four-in-Hand Gold-mining Co. (N.L.).
27/8/95	30	0	0	"	"	"	Gay City of Auckland	Napier Gold-mining Co. (N.L.).
17/2/96	100	0	0	Matamata-harakeke	VI.	Harataunga	Gisborne	City of Gisborne Gold-mining Co. (N.L.).

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office, at Coromandel—*continued.*

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
23/12/96	99	0	0	Tokatea ..	II.	Coromandel	Golden Butterfly ..	Golden Butterfly Gold-mining Co. (N.L.).
29/4/97	87	0	0	Tokara ..	"	"	Golden Lead ..	Golden Lead Gold-mining Co. (N.L.).
21/12/95	70	0	0	Manaia ..	"	"	Golden Hill ..	Golden Hill Gold-mining Co. (N.L.).
6/10/96	18	2	0	Coromandel	V.	"	Golden Pah ..	Golden Pah Hauraki (Limited).
23/12/96	100	0	0	Tokatea ..	III.	"	Golden Pheasant ..	Henry Culpan.
22/9/96	58	2	0	" ..	II., III.	"	Golden Plover No. 2	"
30/11/95	100	0	0	" ..	II.	"	Golden Shore ..	Hugh Davis.
19/8/96	37	0	0	Coromandel	V.	"	Golden Shore Ext. ..	James Davis.
27/8/95	9	2	12	Tokatea ..	II.	"	Golden Spark ..	Golden Spark Gold-mining Co. (N.L.).
15/9/95	30	0	0	" ..	"	"	Golden Tokatea ..	Golden Tokatea Gold-mining Co. (N.L.).
3/5/95	13	3	35	" ..	"	"	Good Enough ..	Good Enough Gold-mining Co. (N.L.).
28/8/95	28	1	0	" ..	"	"	Good Luck ..	James B. H. Cohen.
23/7/96	99	2	31	" ..	VI.	"	Gordon	F. Swindley and H. C. Bell.
22/3/97	100	0	0	Port Charles	II.	Moehau ..	Grand Moehau Freehold Syndicate	Fitzgibbon Lough.
22/3/97	93	1	28	"	"	" ..	Grand Moehau Freehold Syndicate No. 1	"
12/5/97	7	2	0	Kennedy Bay	II.	Coromandel	Grange	John Middleton.
14/9/95	94	0	8	Tokatea ..	"	"	Great Kapanga ..	Great Kapanga Gold-mining Co. (N.L.).
29/10/95	30	0	0	Tiki ..	VI.	"	Great Pukewhau ..	Miowera United Gold-mining Co. (N.L.).
25/5/97	100	0	0	Cabbage Bay	VIII.	Harataunga	Great Sapphire ..	John Bollard.
7/4/96	49	3	0	Manaia ..	XIV.	Coromandel	Great Success ..	George Dunnett.
5/8/97	63	0	37	Tokatea ..	II.	Coromandel	Harbour View ..	Harbour View Gold-mining Co. (N.L.).
21/2/98	54	2	6	..	"	"	Hauraki Gem ..	Matthew Dyer.
6/10/96	29	0	11	Coromandel	V.	"	Hauraki	Hauraki Gold-mining Co. (Ltd.).
28/5/95	6	0	8	"	"	"	Hauraki No. 2 ..	The Hauraki No. 2 Gold-mining Co. (N.L.)
13/1/97	80	2	32	Cape Colville	II.	Cape Colville	Hauraki Peninsula ..	W. White and G. Linnet.
9/6/96	14	1	25	Coromandel	V.	Coromandel	Hauraki South ..	Hauraki South Gold-mining Co. (Ltd.).
11/12/96	30	0	0	Tokatea ..	II.	"	Hinton	Hinton Gold-mining Co. (N.L.).
13/1/97	100	0	0	Manaia ..	III.	Hastings ..	Hunt's Golden Ridge Extended	Thomas McLoughlan.
30/6/97	13	0	0	Coromandel	VI.	Coromandel	Ida	Joseph Howard Witheford.
18/5/96	38	1	0	Tokatea ..	II.	"	Jatinga	Adolph Kohn.
25/5/97	53	1	18	Cabbage Bay	VI.	Harataunga	Jersey	Jersey Gold-mining Co. (N.L.).
10/3/96	30	0	0	Tokatea ..	III.	Coromandel	Jocelyn	Jocelyn Gold-mining Co. (N.L.).
7/4/96	39	0	38	Matamata-harakeke	VI.	Harataunga	Just for Luck ..	Morning Star Gold-mining Co. (N.L.).
28/8/95	92	2	35	Coromandel	V.	Coromandel	Kaka	Hauraki Golden Bay Mines (Ltd.).
4/10/94	99	3	27	"	I., II.	"	Kapanga	The Kapanga Gold-mining Co. (Ltd.).
15/12/97	29	1	7	Kapanga ..	VI.	Coromandel	Kapanga Township	Hugh Campbell and J. J. Duross.
7/6/97	56	0	6	Kennedy Bay	"	Harataunga	Kennedy	Kennedy Gold-mining Co. (N.L.).
27/2/96	60	1	0	Matamata-harakeke	VI.	"	Kennedy Bay ..	Evening Star Gold-mining Co. (N.L.).
30/11/96	65	1	0	Ditto ..	"	"	Killarney	J. W. Barker.
24/1/96	22	3	36	" ..	"	"	King of the Ranges	Henry Brett.
29/4/97	54	2	20	Kennedy Bay	IX.	"	King David ..	H. Tuterangi, Alexander Keys, and Agnes Preece.
25/5/97	96	2	0	Manaia ..	XIV.	Coromandel	King of Delhi ..	William Over.
8/11/97	60	0	0	Tokatea ..	II.	"	Klondyke	Samuel Cohen.
19/9/96	87	0	0	Cabbage Bay	V.	Harataunga	Ladas	Ladas Gold-mining Co. (N.L.).
6/2/97	100	0	0	Manaia ..	XIV.	Coromandel	Leading Wind Extd.	William Over.
29/4/97	99	0	0	Cape Colville	II.	Cape Colville	Liberator	Port Jackson Gold-mining Co. (N.L.).
5/4/97	51	2	0	Kennedy Bay	III., IX.	Harataunga	London	H. Tuterangi and Agnes Preece.
10/7/97	96	0	0	Kennedy Bay	X.	"	Madeline	Lindsay Crompton Lanford.
15/9/97	9	1	37	Coromandel	II.	Coromandel	Maud	Thomas Meehan.
29/4/97	40	2	18	Kennedy Bay	II., III. IX., X.	" Harataunga	Maximum ..	Hugh Lionel Noakes.
27/2/96	50	0	0	Matamata-harakeke	VI.	"	Madge	Madge Gold-mining Co. (N.L.).
12/5/96	30	0	0	Coromandel	"	Coromandel	Magnet	Magnet Gold-mining Co. (N.L.).
23/3/97	11	3	13	Kennedy Bay	IX.	Harataunga	Maioro No. 2 ..	William O. Lamb.
1/9/96	30	0	0	Tokatea ..	II.	Coromandel	Marble Arch ..	W. H. Thompson.
23/2/97	24	2	0	Manaia ..	XIV.	"	Marlborough ..	J. D. Colebrook.
3/2/97	100	0	0	Kennedy Bay	IX.	Harataunga	Mascotte	A. H. Keesing.
25/5/97	96	2	0	Waikawau ..	IV.	Moehau ..	Mercantile ..	Francis Charles Stubbs.
27/2/96	82	1	20	Coromandel	VI.	Coromandel	Miowera	Miowera United Gold-mining Co. (N.L.).
29/4/97	60	0	0	Waikoromiko	II.	"	Monarch	John Wiseman.
29/4/97	56	3	0	Kennedy Bay	IX.	Harataunga	Moonstone ..	Stewart Frederick Bates.
24/1/96	15	3	14	Manaia ..	XIV.	Coromandel	Native	Ernest C. Daldy.
18/5/96	82	2	18	Tiki ..	VI., VII., X., XI.	"	Native Chief ..	Native Chief Gold-mining Co. (N.L.).
11/2/96	14	2	28	Coromandel	VI.	"	New Hauraki ..	New Hauraki Gold Properties (Ltd.).
5/8/97	94	1	24	"	"	"	New Hauraki Gold Properties (Limited) No. 1	"
5/8/97	66	0	0	"	"	"	New Hauraki Gold Properties (Limited) No. 2	"
15/12/96	8	2	0	Tiki ..	XI.	"	Newhaven ..	William J. Smith.
2/7/95	26	0	32	Tokatea ..	II.	"	New Hero	John Mayn.
28/5/95	16	1	28	Coromandel	"	"	New Tokatea ..	Tokatea Consols Gold-mining Co. (Ltd.).
27/8/95	14	0	0	Tokatea ..	"	"	New Tokatea Extd.	"
7/6/97	58	1	0	" ..	"	"	New Triumph ..	Charles Malcolm McFarlane.
24/7/97	82	0	0	Kennedy Bay	X.	Harataunga	Noko	Arthur Frederick Witty.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office, at Coromandel—*continued.*

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
30/6/97	25	3	16	Preece's Point	V.	Coromandel	Nora	Henry Thomas Gorrie.
24/7/97	99	2	0	Kennedy Bay	VI.	Harataunga	North Star ..	Flossie Gold-mining Co. (N.Z.).
24/1/96	14	0	0	Tiki ..	X.	Coromandel	Old Pukewhau ..	The Nestor Gold-mining Co. (N.L.).
7/6/97	48	2	10	Tokatea ..	II.	"	Orina	Hauraki (N.Z.) Associated Gold-mines (Ltd.).
12/5/97	0	1	0	Coromandel	VI.	"	Pai Hauraki ..	Thames Exploration Syndicate of London and New Zealand.
23/11/95	36	0	32	Tokatea ..	II.	"	Paul's Creek ..	William James Allen.
15/9/97	8	3	0	Coromandel	VI.	"	Peeblean	Matthew Dyer.
19/5/96	7	1	6	"	V.	"	Pegasus	Frederick Swindley.
25/6/96	36	0	0	"	VI.	"	Pegasus Extended ..	"
23/2/97	14	2	0	Manaia ..	XIV.	"	Picton	W. H. J. Ridley.
23/12/96	32	0	32	Tokatea ..	II.	"	Pigmy	The Pigmy Gold-mining Co. (N.L.).
10/5/97	100	0	0	Kennedy Bay	VI.	Harataunga	Pinafore	William Oliver Lamb.
11/8/96	100	0	0	Tokatea ..	"	Coromandel	Plunger	Plunger Gold-mining Co. (N.L.).
15/12/97	100	0	0	Pukewhau ..	X.	"	Pohutu	Hauraki Development Syndicate (Ltd.).
27/2/96	100	0	0	Tokatea ..	II.	"	Poneke No. 1 ..	Henry C. Bell.
8/7/96	53	1	8	Coromandel	VI.	"	Poneke No. 2 ..	F. Swindley and H. C. Bell.
24/1/96	15	3	5	"	II., VI.	"	Poneke No. 3 ..	Henry C. Bell.
7/6/97	38	0	18	Tokatea ..	II.	"	Pride of Tokatea ..	Hauraki (N.Z.) Associated Gold-mines Ltd.).
7/6/97	48	1	0	Kennedy Bay	X.	Harataunga	Prince of Wales No. 2	Tobias Henry Keesing.
21/12/95	100	0	0	Manaia ..	II., III.	Hastings ..	Princess May ..	Princess May Gold-mining Co. (N.L.).
21/12/95	82	2	0	" ..	II.	" ..	Princess May South	Hugh and Arthur Bishop.
23/7/96	60	0	0	Tiki ..	X.	Coromandel	Progress Castle Rock	Progress Castle Rock Gold-mining Co. (N.L.).
23/2/97	25	3	0	Manaia ..	XIV.	"	Prophecy	John Hague Smith.
1/12/96	17	0	10	Tiki ..	X.	"	Pukewhau.. ..	Pukewhau Gold-mining Co. (N.L.).
25/5/97	97	2	0	Waikanae ..	V.	Harataunga	Queen of Waikanae	Thomas James McIvor.
25/5/97	36	1	0	" ..	"	"	Queen of Waikanae Extended	"
3/2/97	100	0	0	..	VIII.	Harataunga	Rainbow	Thomas Handley.
24/4/96	100	0	0	Tokatea ..	II. / IX.	Coromandel / Harataunga	Rangatira ..	Arawata Gold-mining Co. (N.L.).
25/5/97	40	3	6	Kennedy Bay	VI.	"	Rangipuhi ..	Rangipuhi Gold-mining Co. (N.L.).
25/5/97	100	0	0	Manaia ..	XIV.	Coromandel	Ridley	William Henry Jones Ridley.
29/4/97	99	0	36	Cabbage Bay	VIII.	Harataunga	Rothesay Castle ..	Henry J. Ross.
10/5/97	60	0	0	Kennedy Bay	II. / IX.	Coromandel / Harataunga	Royal Standard ..	John McIsaac.
11/2/96	9	2	10	Tiki ..	X.	Coromandel	Royal Mint ..	Rickley F. Gerdes.
27/2/96	39	1	9	Tokatea ..	II.	"	Royal Oak of Hauraki	Royal Oak of Hauraki (Ltd.).
6/2/97	21	0	0	Manaia ..	XIV.	"	Royal Victor Extd ..	Robert S. Collier.
7/6/97	65	0	0	Kennedy Bay	X.	Harataunga	Sandhurst ..	Alexander Alison.
23/12/96	100	0	0	Te Papaki ..	VIII.	"	Scottish Chief ..	Henry James Ross.
21/2/98	68	0	17	..	II.	Coromandel	Scotty's	Scotty's Gold-mine (Ltd.).
15/12/96	2	3	9	Coromandel	VI.	"	Shotover No. 2 ..	T. J. Goldsmith.
1/9/95	13	2	10	Tokatea ..	II.	"	Southern Star ..	Southern Star Gold-mining Co. (Ltd.).
12/1/98	12	2	28	..	"	"	Southern Star Extd.	Herbert C. Woolmer.
10/3/96	30	0	0	Tokatea ..	"	"	Speedwell	James Buchanan and Angus McNeil.
25/6/96	99	2	0	Coromandel	VI.	"	Standard	F. Swindley and H. C. Bell.
2/7/95	30	0	0	Tokatea ..	II.	"	"	Edward Claude Randle.
9/6/96	17	1	33	Coromandel	VI.	"	Standard Extended..	Frederick Swindley.
28/8/95	88	0	0	"	V.	"	Stanley	Hauraki Golden Bay Mine (Ltd.).
4/8/96	7	0	22	Tokatea ..	I.	"	Star	Montgomery Davis.
21/12/95	51	0	20	" ..	II.	"	Star of the East ..	G. Harper and Carlo Blasch.
19/9/96	60	0	0	" ..	"	"	Star of Tokatea ..	Star of Tokatea Gold-mining Co. (N.L.).
15/12/97	100	0	0	Coromandel	V.	"	Stirling	William Thompson McGregor.
5/8/97	40	2	0	Manaia ..	X.	"	Streak of Luck ..	Roderick S. Macauley.
10/3/96	15	2	6	Coromandel	II., VI.	"	Success	Success Gold-mines (Ltd.).
5/2/95	5	0	25	"	II.	"	Suez Extended ..	New Golconda Gold-mining Co. (N.L.).
18/5/96	100	0	0	Tokatea ..	"	"	Tainui	S. W. Bedlington.
19/9/96	42	0	38	" ..	"	"	Tainui Extended ..	J. M. Brigham, jun.
10/3/96	30	0	0	" ..	"	"	Tandem	Tandem Gold-mining Co. (N.L.).
24/7/97	71	0	0	Kennedy Bay	X.	Harataunga	Tawera	Arthur Frederick Witty.
1/2/96	75	2	2	Tokatea ..	II.	Coromandel	Tokatea of Hauraki	Tokatea of Hauraki (Ltd.).
23/12/96	91	2	11	" ..	III.	"	Tokatea Hinemoa ..	Tokatea Hinemoa Gold-mining Co. (N.L.).
10/7/97	80	3	25	" ..	II.	"	Tokatea Provident ..	William Morris.
23/3/97	30	0	0	" ..	"	"	Tongariro ..	Charles M. McFarlane.
15/9/97	15	1	20	Coromandel	VI.	"	Trig Hill	T. Morrin, S. T. George, J. Russell, and J. W. Lennox.
21/2/98	100	0	0	..	II.	"	Trilby	Trilby Gold-mining Co. (N.L.).
30/4/95	30	0	0	..	"	"	Triumph	Triumph Gold-mining Co. (Ltd.).
25/6/96	98	2	25	Kennedy Bay	" / IX.	Coromandel / Harataunga	Vanderbilt ..	Vanderbilt Gold-mining Co. (N.L.).
14/3/93	20	0	10	Tiki ..	X.	Coromandel	Vaughan	The Matawai Gold-mining Co. (N.L.).
12/1/98	20	3	0	..	II., VI.	"	Vigilant	Henry C. Bell.
6/10/96	2	0	0	Kennedy Bay	IX.	Harataunga	Vizards	James J. Craig.
29/4/97	100	0	0	Puraemauku	III. / IV.	" / Moehau ..	Waiaro Proprietary	Robert T. Graham.
15/12/97	36	3	0	Pukewhau ..	X.	Coromandel	Waikiti	Hauraki Development Syndicate (Ltd.).
8/7/96	68	1	21	Tokatea ..	II.	"	Waikoromiko ..	Waikoromiko Gold-mining Co. (N.L.).
15/12/97	100	0	0	Pukewhau ..	X.	"	Wairaki	Hauraki Development Syndicate (Ltd.).
24/10/96	86	1	0	Coromandel	VI.	"	Watchman ..	Hugh A. Bishop.
7/4/96	47	1	25	Manaia ..	XIV.	"	Waterfall	Albert Goldwater.
5/2/95	8	1	8	Coromandel	V.	"	Welcome Find ..	Welcome Find Gold-mining Co. (Ltd.).

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office, at Coromandel —*continued.*

Date of License.	Area.			Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A.	B.	P.					
23/12/96	97	3	8	Matamata-harakeke	XI.	Harataunga	West Derby ..	West Derby Gold-mining Co. (N.L.).
2/7/95	29	3	32	Tokatea ..	II.	Coromandel	West Tokatea ..	Harold John Morrisey.
10/5/97	99	1	0	Kennedy Bay	IX.	Harataunga	Whareroa Reef ..	Frederick Rollett.
14/7/97	15	0	0	"	"	"	Wilga	"
2/4/97	24	0	17	Coromandel	V.	Coromandel	Zealandia	Zealandia Gold-mining Co. (N.L.).
					Kuaotunu District.			
4/8/96	30	0	0	Kuaotunu ..	V.	Otama ..	Alpine Fluke ..	Alpine Fluke Gold-mining Co.
4/8/96	16	2	23	" ..	"	" ..	Alpine Fluke ..	Alpine Fluke Gold-mining Co. (N.L.).
7/4/96	100	0	0	" ..	II.	" ..	Aorere	Aorere Gold-mining Co. (N.L.).
14/9/95	99	0	0	" ..	V.	" ..	Aorere No. 2 ..	Midas Gold-mining Co. (N.L.).
18/5/96	42	0	0	" ..	"	" ..	Argentine	Ajax Gold-mining Co.
12/11/95	30	0	0	" ..	"	" ..	Balfour	Balfour Gold-mining Co. (N.L.).
21/12/95	50	0	0	" ..	II.	" ..	Geraldine	William H. Cooper.
6/12/95	71	2	10	" ..	V.	" ..	Golden Anchor ..	Golden Anchor Gold-mining Co. (N.L.).
29/5/96	100	0	0	" ..	II.	" ..	Golden King ..	Golden King Gold-mining Co. (N.L.).
10/3/96	30	0	0	Whitianga ..	XII.	Coromandel	Great Britain ..	William Jones Smith.
12/3/96	72	2	0	Mercury Bay	III., VI.	Otama ..	Great Consols ..	John Drew Colebrook.
19/11/89	28	0	12	Kuaotunu ..	V.	" ..	Great Mercury ..	Great Mercury Gold-mining Co. (Ltd.).
12/5/96	5	2	1	" ..	II.	" ..	Handsworth ..	Louis Woodcock.
29/10/95	21	1	16	" ..	V.	" ..	Hosie	Robert Workman.
22/9/96	57	2	0	" ..	"	" ..	Irene	Irene Hauraki.
11/10/97	47	1	25	" ..	II.	" ..	Invicta	Invicta Gold-mining Co. (N.L.).
24/1/96	21	2	0	Whangapoua	I.	" ..	Jumpers	Donald Watson.
25/2/98	99	2	0	Kuaotunu ..	IV., V.	" ..	Jupiter No. 1 ..	Sir T. S. Tancred and John Whittaker.
25/2/98	94	0	0	" ..	IV.	" ..	Jupiter No. 2 ..	"
25/2/98	84	3	0	" ..	"	" ..	Jupiter No. 3 ..	"
25/2/98	66	1	0	" ..	"	" ..	Jupiter No. 4 ..	"
1/10/95	4	0	0	" ..	V.	" ..	Kapai-Vermont ..	Kapai-Vermont Gold-mining Co. (Ltd.).
15/5/95	31	3	19	" ..	"	" ..	" ..	"
12/5/96	9	2	0	" ..	II.	" ..	Kuaotunu Extended	Kuaotunu Gold-mining Co. (N.L.).
24/7/97	100	0	0	Kaimarama	V.	Hastings ..	Little Marlow ..	Ernest John Nankivell.
13/11/95	100	0	0	Kuaotunu ..	II.	Otama ..	Lucky Hit	Kuaotunu Gold-mining Co. (Ltd.).
13/9/95	100	0	0	" ..	"	" ..	Maori Dream ..	Maori Dream Gold-mining Co. (N.L.).
13/11/95	100	0	0	" ..	"	" ..	Maoriland	Maoriland Gold-mining Co. (Ltd.).
24/4/96	93	0	0	" ..	III.	" ..	Mount Margaret ..	Frederick E. Baume.
7/6/97	100	0	0	Matarangi ..	IV.	" ..	Murphy's Hill ..	Kauri Freehold Gold Estates (Ltd.).
4/8/96	23	3	0	Kuaotunu ..	V.	" ..	New Mint	Robert Edward Workman.
29/4/97	68	1	30	Mahakirau ..	XV., XVI.	Coromandel	Nina	Lionel Nathaniel Benjamin.
11/10/97	83	3	18	Kuaotunu ..	V.	Otama ..	Norena	Norena Gold-mining Co. (N.L.).
24/10/93	29	1	35	Matarangi ..	I.	" ..	Ocean View Extended	Matarangi Gold-mining Co. (Ltd.).
24/7/97	100	0	0	Kuaotunu ..	II.	" ..	Otama	Juno Gold-mining Co. (N.L.).
24/7/97	100	0	0	Mercury Bay	XII.	Coromandel	Owera	Kauri Freehold Gold Estates (Ltd.).
8/11/97	98	0	0	Kuaotunu ..	IV.	Otama ..	Phœnix	Phœnix Gold-mining Co. (N.L.).
7/10/96	94	1	35	Mahakirau ..	XIV.	Coromandel	Peru	James McGregor.
6/2/96	69	0	15	Kuaotunu ..	V.	Otama ..	Prospect	Prospect Gold-mining Co. (N.L.).
5/8/97	58	0	0	Kaimarama	IV.	Hastings ..	Sapphire	Frederick A. Clarke.
1/10/95	6	1	12	Kuaotunu ..	V.	Otama ..	Try Fluke Extended	Mariposa Gold-mining Co. (Ltd.).
18/5/96	100	0	0	" ..	"	" ..	Try Fluke	"
24/4/96	85	2	0	" ..	"	" ..	Waitaia	Waitaia Gold-mines (Ltd.).

Port Charles District.

In this district very little work has been carried on during the year. In February last there were only three parties working their claims, &c.

The Eva Claim, one man's ground, is worked by the McNeil Brothers—two men. They have had a crushing of 1 ton 4 cwt. 2 qr. of stone, which yielded 391 oz. 19 dwt. of gold, valued at £1,058 5s. 4d., which they say was taken from small stringers near the surface. There is a large reef outcropping on the crown of the hill, which they are driving on in a level at a depth of 35 ft.

Prospecting has also been carried on in ground owned by the Hauraki Peninsula Gold-mining Company, which lies between Big Stony Bay and Cape Colville.

Cabbage Bay District.

White Star Consolidated Mine.—During the year a considerable amount of work has been done driving on different levels, but no discovery of any importance has been made. At one time sixteen men were employed.

Prospecting work has also been carried on in the Canopus, Cuvier Light, Antipodes, and City of Gisborne Claims.

In the Queen Victoria Mine work was for a time carried on, and a parcel of quartz weighing 42 lb. yielded a return of 2 oz. 14 dwt. 7 gr., valued at £7 12s. 5d.

In the Jersey Claim, in which prospecting was carried on for a considerable time, a parcel of 8 tons 2½ cwt. of stone was crushed, for a return of 70 oz. 6 dwt., valued at £205 12s. 6d.

Kennedy Bay District.

The Bay View Mine was worked by a party of tributers, who have driven a level to connect with the winze, from which a small return was obtained last year.

The Flossie Claim was also worked for a time by a party of tributers.
In the Evening Star Mine prospecting was for a time carried on by two men.
The Morning Star Claim was also prospected by a party of two men.
Other claims were also prospected for a short time.

Paul's Creek District.

In the Golden Lead Claim prospecting operations were carried on for a short time, a crushing of 10 tons yielding 4 oz. 14 dwt. of gold, valued at £13 12s. 11d.

Waikoromiko District.

Forest Queen Mine (Area, 50 acres).—This mine is owned by Messrs. F. Horne and P. Johnson. The work so far is principally of a prospecting nature, and a number of leaders and reefs have been located on this property. The principal development work has been carried out on the Forest Queen reef. This reef varies in size from a few inches to 2 ft. 6 in. A level has been put in for about 200 ft., giving 30 ft. of backs. One ton of ore from this gave a return of 15 oz. melted gold. Another cross-cut has been driven about 70 ft. below, and cuts the reef at 190 ft. in from the mouth. It is then driven on for 140 ft. to the north-west. A crushing from this portion at the Thames School of Mines gave a return of 7 oz. 12 dwt. melted gold from half a ton of ore. The general run of the reefs in this property is north-west and south-east, varying in size from 3 ft. in width to small veins. The Forest Queen reef traverses a kindly class of country, being decomposed andesite or propolite. It is found to carry gold for over 100 ft., some of the stone yielding 1 oz. to the pound. Another old level which was cleaned out showed eleven reefs and leaders mostly running parallel to and dipping the same way as the Forest Queen reef—to the southward. As it is a pack-track which leads to the mine it is only the richest of the ore that can be taken to the battery. The gold won from this mine is valued at £2 17s. 6d. per ounce, and, with a crushing plant, the owners are confident that the mine would soon become remunerative.

Four-in-Hand Mine (Area, 30 acres).—Work has been carried on on the reef opened in this mine, seven men being for some time employed.

Work has also been done in the Tandem, Fabulous, Waikoromiko, Cuirassier, and other claims, but in most instances the claims in this district have been abandoned.

Tokatea District.

Royal Oak Mine (Owners, Royal Oak of Hauraki, Limited).—This company is getting good returns between the No. 5 and above that level and to the No. 6 level on No. 1 tribute leader, while a cross-cut is being constructed to cut the same reef at the No. 7 level, which will give a further 160 ft. vertical. At the same time a winze is being constructed to go down at the end of the cross-cut. Also, a large section of fair-grade ore is being opened up between the No. 9 and No. 8 levels, on the main Tokatea reef. This is a considerable depth, being over 1,000 ft. below the crown of the hill. This section of ground is very valuable also to the development of No. 1 tribute leader, as it is proposed to construct another cross-cut from the bottom of this shaft (which is 160 ft. below No. 7) to again intersect that reef. A new ten-head battery, all complete, with stone-breaker, is being erected at the battery-site, to be got in readiness by such time as the reserves from the Tokatea reef are laid open. The whole developments are concentrated, so that all the ore shall be delivered from the No. 7 level to the battery. A considerable amount of work is being done to concentrate all the water available in the locality, in order to pump from the shaft, to work the battery, and to work rock-drills. This is now well in hand, the machinery being ordered. The cost of this scheme to the company will be not less than £7,000. With this completed, the mines, which are extensive, will have every facility for working on an economical scale. The total quantity of quartz crushed by the company is 200 tons of general ore and 10,590 lb. of picked stone, which gave a result of 9,702 oz. 4 dwt., of a value of £24,441 10s. 2d. This company has recently declared a dividend on a million shares at 3d., which has been won since August last; and it is hoped, by the large scheme in hand, and the way in which the mines are being worked, to well pay the shareholders for their perseverance and outlay.

West Tokatea Mine (Area, 30 acres; owners, the East Hauraki Company).—This mine has been fairly opened up in the past. The main adit or low level is driven 460 ft., which now gives 250 ft. of backs. There are two other levels opened above, giving respectively 80 ft. and 130 ft. of backs. The reefs principally run north-east and south-west, and vary in size from 4 in. to 2 ft. The quartz is of a hard and flinty nature. During the past year the mine has been closed under protection, awaiting further capital, until last February, when a small capital was promised for further development. Since then four men have been employed in the upper levels driving on a reef that has not yet been intersected in the low level, with a view to obtain sufficient ore for a trial crushing; and, if it proves satisfactory, no doubt further capital will be available for systematic development. At present no machinery is employed.

Harbour View Mine (Area, 65 acres; Harbour View Gold-mining Company, owners).—Operations have been carried on in a desultory manner, and during a considerable part of the year the claim was under protection. At the present time two wages-men and six tributers are employed.

Hauraki Associated Mine (Area, 68 acres; owners, Hauraki Associated Gold-mines, Limited, an English company).—The mine is well opened by three levels, the nature of the country being very favourable for working from tunnels. No. 1, 500 ft. in length, is 200 ft. below the top of the range; No. 2, 600 ft., 100 ft. below No. 1; and No. 3, 150 ft., is 100 ft. lower than No. 2. Two lodes—the Rainbow and Foot-wall leaders—are being worked at No. 1 and No. 2 levels, the principal portion of the quartz treated having been derived from those reefs. There are other reefs and veins of various width. The gold obtained is chiefly derived from the smaller veins, about 2 in. wide. There is no machinery required at the mine, but a battery consisting of one stone-breaker, twelve

head of stamps, and four berdans has been erected at the foot of the hills on the Kennedy Bay side of the ranges. The battery is driven by either steam- or water-power. A steam-engine, 20-horse power, is being used to drive the mill when water gets scarce. The water-race is 60 chains in length, and made to carry five sluice-heads, the pressure being 50ft. A Smith and Vaile turbine is used for motive-power. The quantity of quartz crushed was 370 tons, the treatment being solely by amalgamation, and 1,345 oz. of gold, value £3,800, was obtained, showing the return—£10·27 per ton—to be of a high standard. Forty men were employed.

Tokatea Consols Mine (Area, 30 acres; owners, the Tokatea Consols Gold-mines, Limited).—Operations have been carried on on the leaders formerly opened up, and 63 tons 13 cwt. crushed yielded a return of 267 oz. 3 dwt., valued at £774 11s. 10d. Nine men were employed.

Triumph Mine.—Very little work was done at this mine, and 162 tons of stone yielded 11 oz. 14 dwt. of bullion, valued at £33 11s. 9d. Four men were employed.

Queen of the North Mine.—Prospecting operations were carried on during the year, only a few men being employed.

Southern Star Mine (Area, 13 acres 2 roods 10 perches; owners, Southern Star Gold-mines, Limited).—Operations were for a time carried on, and a crushing of 38 tons 15 cwt. returned 15 oz. 10 dwt. of bullion, valued at £40 7s. 3d.

In the Golden Spark Mine a crushing of 2 tons of stone returned 12 oz. 10 dwt. of gold; value, £42.

Prospecting was also carried on in the Buffalo Claim; 7½ tons of stone was crushed, for a return of 126 oz. 16 dwt., valued at £369 18s. 9d.

Prospecting operations were also carried on in other mines, but no returns are recorded.

Success Gold-mines (Limited.)—The greatest depth of workings in this mine below surface is 275 ft. In the deepest level the Company is driving to come under and in line with the No. 2 Success reef, that yielded the rich gold in the upper workings. A winze is sunk to that depth, so that once a communication is effected the mine will be thoroughly well ventilated. At that point it is proposed to cut a chamber, and with the aid of an air-compressor and an air-winch to sink a trial shaft in line of the run of gold, to test its value in depth. In the upper series of workings prospecting will be continued on the blocks of ground, in the hope of meeting similar rich patches of gold to those got in the early days. The property is also being well prospected on the surface. The company is thoroughly developing the property, and it is hoped they will meet with the success they so richly deserve.

New Hauraki Gold Properties (Limited).—This company is engaged testing the various large reefs discovered on the property. Very recently a large reef was discovered, from which samples were obtained carrying gold-ore worth £2 14s. per ton. The average of the reef, however, makes the ore of too low grade to pay. The object of the company in following up these large reefs is to try and discover a payable section in any one of them. Should this be accomplished the success of the company would be immediately assured, as the bodies of ore would be enormous. Considerable prospecting is being carried on throughout the property, which is of large extent, and ultimately it is hoped to make this company a success. Twenty-six men were employed.

Kapanga District.

Kapanga Mine (Owners, the Kapanga Gold-mining Company, Limited).—1,000 ft. level: This level has been driven west 654 ft. The Kapanga reef was intersected near the forebreast, and proved to be of no value. The object of driving this level was to intersect the two main reefs on the property—the Scotty's and Kapanga—in junction. In the upper levels they were inclined to junction, but at this level they are apparently as far apart as they were where intersected in the 300 ft. cross-cut east. The Scotty's reef, where cut through, was also poor. In this level we extended south-easterly on a reef 79 ft. We sunk a winze below the level 11 ft., and put up a rise 36 ft. The vein was small, but both in the rise and winze strong dabs of gold were met with. The reef is known as the Anniversary reef. The reef known as Cadman's, in the south-east drive, also showed colours occasionally. The width of this reef varied from 15 in. to 6 in. of solid quartz. 940 ft. level: At this level 339 ft. were driven west and 56 ft. east. A cross-cut was developed 22 ft., a rise extended 77 ft., and a winze sunk 66 ft. These developments were mostly on what is known as Hartridge's reef, a fine body of stone of very promising appearance, showing colours, and at times some nice picked stone. This is presumably the same reef that was intersected in sinking the shaft, at which point it yielded a good patch of rich stone. 900 ft. level: At this level 109 ft. were driven east and 71 ft. north. A rise was put up 27 ft., and a winze sunk 21 ft. This reef was supposed to be Hartridge's, and has produced low-grade ore. 700 ft. level: At this level the only point of development has been the extension of the cross-cut 217 ft. where it communicated with the level below for ventilation purposes. 500 ft. level: At this level 90 ft. were driven on the Kapanga reef north. 420 ft. level: 96 ft. have been driven on the Kapanga at this level, and a rise put up 17 ft. On Scotty's, at the intermediate, we have driven 105 ft. and risen 29 ft. In these developments fair- and poor-grade ore was obtained, but in small quantities. 300 ft. level: 147 ft. were driven on the hanging-wall of Scotty's at this level and 150 ft. on the Kapanga. A winze was sunk on Scotty's 17 ft. and a rise put up 30 ft. Corby section: A considerable amount of work has been done in this section of the property. 181 ft. were developed in cross-cutting and drives, and a rise put up for 21 ft. The water was a great hindrance to development in this section. It is now suspended. Thirty-six tributes were let, seven being on the surface sections of the property and twenty-nine below ground—at the 200 ft., 300 ft., and 420 ft. levels. Most of these tributes have since been surrendered. There are now being worked three on the surface and nine below ground. Only eleven of these tributes got any returns, and of these two have been very successful. By the aid of the Government the company have been enabled to test the country-rock about 230 ft. below the 1,000 ft. level by means of the diamond drill, an exhaustive report upon which was forwarded to you at the end of 1897. Operations at the lower levels are for the moment suspended, the financial

resources of the company being scarcely sufficient to continue the development of lower levels at the present time. All efforts are now being concentrated to work the various blocks of ground both on the Kapanga and Scotty's above the 420 ft. level, and I see no reason why these developments should not open up valuable returns, and, with the capital in hand, give results to enable the shareholders at some future time to resume operations at the deeper levels, and also recoup their outlay.

Scotty's Gold-mine (Limited).—The main shaft of this company has now reached a depth of 400 ft. At this level a cross-reef has been intersected near the shaft, and driven on, intersecting Breuer's reef. We are now engaged driving north, to come under the winze which yielded the rich patch of gold. The winze is the same depth as this level, and we hope in a few weeks to effect communication for ventilation. We shall then proceed to drive north for the winze, in which direction we have reason to believe we may pick up a run of gold at this level. At the 300 ft. level we are rising, stoping, and driving intermediate levels through large bodies of quartz, which at any time may disclose rich discoveries. The whole of these works may be termed prospecting. At the 157 ft. level we are developing Scotty's reef. The reef is very similar in character to where rich gold has been found in this reef, but a fault detrimental to its yielding gold is the fact that it is running almost horizontal. We are trying to locate its uniform strike, which is westerly, and at a grade of 2 in 1. We feel confident if we can effect this we shall be successful. The property is being very vigorously developed with forty men, and I hope with the developments in hand to make the mine a success.

[The foregoing two reports are furnished by Capt. Hodge, the manager of the mines.]

The Manola Claim also crushed 130 lb. of stone, for a yield of 100 oz. 6 dwt. 16 gr., valued at £284 11s. 1d. Two men were employed.

Kauri Block.

Hauraki Mine (Owners, Hauraki Gold-mining Company, Limited).—This company, for thirteen lunar months, ending 11th December, 1897, by the development of, I may say, twenty reefs and small veins, obtained fair results. The development works are summarised as follows: Shafts sunk, 52 ft.; cross-cuts driven, 403 ft.; drives on lodes, &c., 1,286 ft.; rises, 183 ft.; winzes, 162 ft.; stoping, 4,805 ft. (stoping is in lineal feet, 6 ft. high, the width of the reef); levels cleared, &c., 217 ft.: giving a grand total of 7,108 ft. The old Union Beach section has also been equipped with machinery, cleared of water, and to-day the mine is in active operation. In the Hauraki a permanent pumping plant has been erected, and is at work. We have very nearly completed our second plunger-lift 13 in. to the 400 ft. level. Developments at this level will be resumed in a few days. In this mine we have now two plunger-lifts, and the shaft is in fair order to resume sinking at any moment. The company's returns have been (ending 11th December, 1897) £35,710 5s. 3d. Total gold won for the year, 11,793 oz. 3 dwt.; total quartz crushed, 4,275 tons; total picked stone treated, 4,778 lb. (or 2 tons 2 cwt. 2 qr. 18 lb.): making total amount of ore treated, 4,277 tons 2 cwt. 2 qr. 18 lb. The average price of gold per ounce was £3 0s. 6·73d.; average yield of gold per ton of ore, 2 oz. 15 dwt. 3·48 gr. At the present time the mine is a little more than paying costs. The importance of this mine in the future developments rests with the development of the 400 ft. level and below. There is practically nothing done below the 300 ft. level. We have a reef dipping west through our entire property and towards the Union Beach section (known as Ross's No. 6), and, taking the line of bearing, we have reason to believe it to be the cross-reef worked on in that mine which gave such fabulous results. This in the coming year will be proved, and if it yields as it promises to do to-day it will be a valuable development for the company. This is now yielding at times rich ore. The outlay of the company has been considerable in the way of machinery and laying off the mines on a permanent basis to be carried on in a miner-like manner. This is now overcome, so that we have now a free hand to put all efforts in the vigorous development of the property without any extraordinary outlay in extraneous costs, and I trust the future of the company will be a good one for the shareholders. [The foregoing is extracted from a report by the manager, Captain Hodge.]

Welcome Find Mine (Area, 8 acres 1 rood 8 perches).—This mine has been kept working during the year. The engine-shaft has been sunk 36 ft.: total depth, 236 ft. No. 3 level: After forming a good chamber, a cross-cut was started at this, our lowest, level (230 ft. from the surface), and extended 210 ft. Two promising lodes were exposed here, one averaging about 5 in. in width, the other about 18 in. No. 2 level (170 ft. below the surface): A great deal of prospecting work has been done at this level, and on four different bodies of crystallized quartz varying from small veins 2 in. to reefs 6 ft. in width. No. 1 level (110 ft. from the surface): Much work has been done here in the form of driving and rising during the past year, the principal operations being confined to the development of a fine body of oxidized ore from 15 in. to 4 ft. in width, and the country in which it is encased is of a favourable nature for gold. There has been 579 ft. of cross-cutting, 603 ft. of driving on the line of reef, 56 ft. of winze-sinking, 34 ft. of driving, and about 56 fathoms stoped. A crushing of 58 tons of general stuff and 140 lb. of picked stone produced 235½ oz. of bullion; value, £682 19s. It was treated at the Thames at a cost of 6s. per ton. There have not been any additions to the machinery in the past year. The 40-horse-power pumping- and winding-engine combined is all that is required at the present time. Fifteen men were employed.

New Golconda Mine (Area, 5 acres; owners, New Golconda Gold-mining Company, Limited).—During the early part of the year this mine was protected, but operations were resumed on the 1st November last. New buildings were erected, and a steam-winch for winding provided. The low level was extended, and is now in 320 ft. In this drive, which is in a north-easterly direction, several leaders have been cut. On No. 1 leader 40 ft. has been driven and a rise put up to No. 1 level. Gold was got in the leader half-way between the two levels, and an intermediate drive put in to the Welcome Find boundary. This block was stoped out up to No. 1 level, and twelve loads of general quartz and 60 lb. of specimens yielded gold—60 oz.; value, £180. A drive was put in from

the shaft to reach the top of the rise, and driving and stoping are being carried on in favourable-looking country. Five men were employed.

Zealandia Mine.—Very little work was done during the year, and the claim is now under protection.

Bunker's Hill Mine (Area, 3 acres and 12 perches; owners, the Bunker's Hill Gold-mining Company).—Driving and stoping have been carried on at the different levels on various reefs and leaders, averaging from 2 in. to 2 ft. in width; and 21 tons of quartz was crushed, for a yield of 139 oz. 5 dwt., valued at £410 2s. 4d. Fourteen men were employed.

Hauraki North Mine (Area, 25 acres; owners, Hauraki North Gold-mining Company, Limited).—During the year the main shaft was sunk a further distance of 64 ft., and is now 223 ft. in depth. Two levels are opened, and the two reefs worked on those levels are from 1 ft. 6 in. to 2 ft. in width. The quantity of quartz mined and sent to the battery was 241 tons, which yielded 173 oz. 3 dwt. of gold; value, £360 15s. The number of men employed was seventeen in mine and battery.

Kathleen Crown Mine (Area, 95 acres).—The freehold of this mine is owned by the Kathleen Crown (Limited), an English company. During the year a considerable amount of work has been accomplished in the mine. Argall's reef has been developed by driving the north and south levels, and, though traversing country favourable for gold, no payable returns have been obtained. The reef has been risen on also in two places where it appeared, 10 in. in width, encased in a congenial class of andesite, with a good hanging-wall. The ore, however, was only low grade. No. 1 reef at bottom level has been driven on for a distance of 381 ft. in a southerly direction, at times passing through very indifferent country, and not long since through a hard belt of diorite rock. The reef has varied in size from 3 ft. to 10 in., and, although not unpromising in appearance, tests have only disclosed traces of gold in the quartz. A drive to the northward on this reef is now in 254 ft. Sandstone and mineral veins have been met with, and considerable disturbance in the country. Though the reef has averaged 2 ft., it is now split up into small stringers largely consisting of calcite. A rise was made on this reef, with a twofold object in view—viz., fetching the old workings known as Quail's drive and prospecting the reef, and to secure better ventilation, as well as to be a second means of exit from the workings. This is now accomplished, and thorough ventilation provided. Several small leaders are here running parallel to the reef, and will probably drop into it. In the month of July operations were started in what is known as Thompson's section, where a drive was put in and two small leaders intersected, carrying prospects of gold. These have been driven on almost to the boundary of the property, and are evidently the same veins that have been developed in the Blagrove's Mine adjoining, from which a fair crushing was obtained. In this mine they give good dish prospects, as well as small pieces of stone showing gold, which is coarse in quality. Two crushings of general stuff were treated at the Kapanga battery, for returns of 7 oz. retorted gold from 6 tons and 5 oz. 9 dwt. from a similar quantity. This section of the company's property adjoining Blagrove's is looked upon with much favour, though the two reefs or leaders referred to are dipping into that ground. The company, with the assistance of the County Council, has improved the approaches to the mine, by forming and metalling a dray-road, and the mine is well equipped with all appliances. The shaft has been continued to a depth of 280 ft., and two levels opened, named the 60 ft. and 200 ft. The pumping-engine is an 80-horse power, with two 7-ton Cornish boilers. The draw-lift working-barrel is 13 in., and the plunger-pole 12 in., in diameter. The value of the gold obtained was £35 3s. 6d. Forty-one men were employed.

Britannia Mine (Area, 40 acres; owners, Britannia Hauraki Company, Limited).—Operations in this mine were continuing the level opened at the 220 ft. level of the shaft. A reef 1 ft. in width was cut about 280 ft. from the shaft, and driven on for 100 ft. A level was then opened 90 ft. from the surface, and the same reef cut and worked on. The reef, which is gold-bearing, is of sufficient importance to warrant further exploration-work being carried on at this and the low level. Twenty-three men were employed.

Hauraki South Mine (Area, 17 acres 1 rood 35 perches; owners, Hauraki South Gold-mining Company).—The shaft commenced last year was sunk to a depth of 150 ft. At that level a chamber was opened out, and a drive commenced which will be continued to the westward to cut the Auckland, Nelson, and Magazine reefs, which are known to run through the ground. The quantity of water was too great for the Worthington pump, and prevented the management from sinking to a greater depth. Fifteen men were employed.

Blagrove's Freehold Gold-mining Company.—This company have thirty-eight men employed. The principal works are carried out on the eastern section of the ground, where a small shaft has been sunk to a depth of 125 ft. This shaft is worked by steam-winch where driving, stoping, and rising operations are being carried out on the No. 1 leader, which averages about 6 in., and promises very well. Four tons from this leader were treated some time ago, for a return of 32 oz. of gold. In the main shaft there are only six men employed underground, driving south from the main cross-cut at the 200 ft. level to connect with the eastern shaft. The main cross-cut is in a distance of 540 ft., there being 120 ft. to drive south to make the connection between the two shafts. There has also been a considerable amount of work done on the No. 2 reef, which averages 20 in., and from which fair prospects have been obtained.

Kathleen Gold-mine (Limited).—This company has done a considerable amount of work and discovered a number of reefs from their 200 ft. level cross-cuts driven north and south. The objects of this company are, by prospecting with the available capital in hand, to expose as many reefs as possible, and ultimately to give them a thorough development. Having this in view, the company should eventually turn out a success. It is adjacent to the famous Hauraki Mine, and in line of the belt. The mine is well equipped with permanent plant, so that on this account no more large expenditure will be necessary. The reefs already discovered on the property are some nine in number.

Golden Pah, Hauraki (Limited).—This company is engaged developing the 193 ft. level, which is the present depth of the shaft. A new reef is being developed, which promises well. A cross-cut is being driven to communicate with the 180 ft. level from the old Union Beach Mine. In making that intersection it will well ventilate the mine, and also prove two reefs which are ahead of the present forebreast. In the 130 ft., 80 ft., and adit levels, considerable development work is now being pushed ahead, and, from present indications, is likely to yield well. The value of gold sold by this company from 48 tons has been 148 oz., worth £453. The mine is equipped both for pumping and winding on a permanent basis. This company has every prospect of success.

Hauraki Main Lodes Mine (Area, 98 acres; owners, Hauraki Main Lodes, Limited).—This mine is situated on the foreshore at Kauri Block, and adjoins the ground owned by the Hauraki Gold-mining Company. The whole of the workings are carried on below high-water mark, and in compliance with the conditions imposed for mining under the sea. Operations have been energetically pursued. Twenty-five men were employed, and the following works carried out:—

Main shaft: The shaft, which measures 11 ft. by 7 ft. within timbers, was sunk an additional distance of 40 ft., making total depth 180 ft., water being lifted by a Tangye pump of vertical type, and capable of raising 7,000 gallons per hour. This pump was substituted in place of a smaller one which we found inadequate to cope with inflow of water. A main chamber has been formed at 180 ft. level, size 10 ft. wide, 9 ft. high, and 13 ft. long. On completing chamber main cross-cuts Nos. 1, 2, and 3 were started, and up to the 31st March measured respectively 264 ft., 240 ft., and 71 ft. In driving No. 1 at 214 ft. a large broken quartz lode was met with, bearing north-west and south-east, dip north-east. Drives 4 and 5 were at once commenced on this lode, and up to the 31st March had been driven 51 ft. and 120 ft. respectively, the reef varying in size, being much broken, and not bearing the character of a true reef. The rock encasing this lode is rotten andesite, while beyond it to the south, north-west, and west we have met very hard black rock in each cross-cut. A roadway to ladders a length of 25 ft. has also been driven. Permanent ladders with sollars have been placed the entire depth of the shaft. Cage compartments have been securely divided from pumping-shaft, and the main shaft made a thoroughly secure and permanent work.

Surface: The portable winding plant has been removed, and a 10-ton Tangye boiler of Cornish type, with a pair of Tangye's horizontal winding-engines, 16-horse power nominal, together with a pair of Howard's patent safety-cages, with patent safety detaching-hooks, have been supplied and erected. The cages have been fitted with winding-ropes of best crucible steel. Main poppet-heads 60 ft. in height have been erected on a concrete base, and fitted with a pair of 8 ft. pit-head pulleys, to suit winding-rope. Large corrugated-iron shed has been erected over machinery. Shed over temporary winding plant has been converted into a miners' change-room, which, with carpenter's shop, office, and blacksmith's shop and engine-shed, form an efficient working plant. In order to insure the thorough drainage of old workings around the foreshore, our small Tangye pump has been swung into the old Golden Pah shaft, and is working periodically. All the old workings are thoroughly drained.

Preece's Point District.

Preece's Point Mine (Area, 200 acres, freehold; owners, Preece's Point Proprietary, Limited).—During the year the operations in this mine have been of a somewhat limited nature, in consequence of the finances of the company being at rather a low ebb. The mine has been kept free from water, and efforts made to reach the old workings by means of the drainage drive, which is about 30 ft. above sea-level. It was thought that in these old workings the leader might be picked up from which it was reported the former tributers obtained some rich ore. On the 23rd July these workings were reached, but, the air being so bad, it was necessary to procure thorough ventilation before any examination could be made. This was eventually accomplished, and it was found that, while the main reef runs close by these workings, very little work has been done on it, the former tributers confining their work to the small specimen leader. This leader and also the main reef have been driven on for a considerable distance, also a winze has been sunk on the reef, and although strong colours and dabs of gold have been seen nothing of a payable nature has come to hand. A few pieces of stone were found showing strong leafy gold. Several other reefs have been found and prospected by means of shallow workings on the surface, and colours of gold often seen. The country is of a good class, heavily charged with arsenical and iron pyrites. An average of sixteen men were employed.

Golden Shore Special Foreshore Claim (Area, 137 acres; owners, Golden Shore Gold-mining Company).—A shaft was commenced near high-water mark, and sunk to a depth of 12 ft., of the full size of 16 ft. by 6 ft., but from this depth it has been reduced in size to 6 ft. by 4 ft., and continued to 85 ft., where it is opened out for the purpose of driving a level to cut the reef.

Karaka and Pukemaukuku Blocks.

Mining operations have not been very energetically carried on in Aitken's Freehold or the adjoining claims.

In the Karaka Block a discovery of rich quartz was made by the company who now own the claims lying between the Success Mine and the Pukemaukuku. The manager, Mr. A. J. Prescott, gives the following account of the work done:—

"The title under which this mine is worked is the Karaka Block Syndicate. It is situated on the western watershed of the main Tokatea Range, being bounded on the north by the Success Mine and on the south by Aitken's Freehold. The name of owner or owners is the Karaka Block Syndicate, and the name of the mine-manager Arthur Joseph Prescott. The area of land held is 450 acres, or thereabouts, comprising Poneke Nos. 1, 2, and 3, Exchequer, Alameda, Standard, and Gordon. Description of mine: Quartz reefs. I may state that during the year the description of the work carried on has been of a prospecting nature, as a result of which several reefs have been discovered, some of which are of a promising nature. The following is a detailed account of the

work which has been done: No. 1 reef (Standard): Portion of the block has been driven on at No. 1 level a distance of 108 ft. The reef averages from 6 in. to 2 ft. in thickness, and gives fair dish prospects. A winze was also sunk on this reef to a depth of 30 ft. No. 2 level on this reef has been driven a distance of 123 ft. The reef varies in size from a few inches to over 2 ft., and assays taken from here have yielded high value per ton. No. 3 level, on same reef, has been driven a distance of 68 ft.; the reef here also gives fair results. The depth between Nos. 1 and 3 levels is approximately 120 ft. The course of the above reef is north-west and south-east and underlying west. No. 2, or cross-reef, has been driven on about 70 ft., and is running east and west, and averages about 1 ft. in width. This reef gives prospects by dish-washing. Poneke No. 3 section: No. 1 reef has been driven on from No. 1 level a distance of 49 ft. The reef here is merely a few inches thick, but gives a fair prospect. No. 2 level on this reef has been driven north a distance of 100 ft., more or less. The country-rock being of a very hard nature, but favourable for gold, the reef here averages about 6 in. in size, and gives occasional good prospects of loose gold. Further driving has taken place southward on the reef at this level for a distance of 25 ft., with similar results. The depth between Nos. 1 and 2 levels at this point is about 60 ft. A winze was sunk from this level to a depth of 20 ft., the country being of a very hard nature. The reef here gives fair prospects. No. 3, or low level: This level is about 50 ft. below No. 2 level, and has been driven a distance of about 130 ft., the country-rock being of a very hard nature. The reef here gives occasional dish prospects. No. 2 reef: This reef is situated on the north-east portion of the section, and was intersected after driving a distance of 60 ft., and has also been driven on in a northerly direction 80 ft. A winze has been sunk on it to a depth of 60 ft., and a rise put up 25 ft. This reef averages about 6 in. in width, and gives prospects of gold by dish-washing, also by pounding the stone. Poneke No. 2 section—No. 1 reef, or Big reef: This is one of the latest discoveries. The reef is running about north and south, and underlying west. At No. 1 cross-cut this reef was intersected after driving a distance of 40 ft., and giving about 35 ft. of backs. The reef here averages from 4 ft. to 8 ft. in width, the ore being of an auriferous nature. A trial crushing of 5 tons from this level by ordinary wet process yielded 36 oz. 14 dwt. melted gold, valued at about £110. Assays of tailings and slimes made from same yielded as high as £6 per ton. A level was driven north on this reef from cross-cut a distance of 40 ft., and a rise put up 30 ft., the reef maintaining its size throughout. A level was also driven south from cross-cut 28 ft., and a rise put up 25 ft. No. 2, or low-level cross-cut, is about 35 ft. below No. 1 cross-cut. The reef was intersected at this point after driving a distance of 140 ft. through fair shooting rock, and, according to the underlie of the reef, about 98 ft. of backs are available, and increase as driving proceeds north. The reef here is about 3 ft. thick, and is encased in a first-class description of andesite. I may also state that this reef has been cut by surface trenches at intervals for a distance of 15 chains, with very fair results. No. 2 reef on this section is running north-west and south-east, and is nearly vertical, averaging in size from a few inches to 1 ft. I have sunk on this reef a distance of 36 ft., the ore obtained from same showing gold occasionally very freely. No. 3 reef, also in this section, is running north and south. This reef has been driven on in No. 1 level a distance of 50 ft., the amount of backs available from present face being about 30 ft. As driving proceeds north the backs increase. This reef averages here about 18 in. in width, and the prospects obtained are of an encouraging nature. No. 2 level is about 40 ft. below No. 1 level, and after cross-cutting a distance of 50 ft. the reef was intersected. From the point of intersection the reef has been driven on in a northerly direction a distance of 60 ft. The reef here averages from 6 in. to 2 ft. I have also driven south on this reef 30 ft. At this point a rise has been put up about 35 ft. The reef here maintains its size, and ore of good quality is coming to hand. The average number of men employed since starting operations was twelve. I may also state the whole of the above workings have been securely timbered where required."

Matawai District.

Progress Castle Rock Mine (Area, 60 acres).—There has not been much work done in this ground during the year. Four levels are now open on a reef about 18 in. in width. Crushing is recorded as 10 cwt. of stone for 1 oz. 17 dwt. of gold; value, £4 3s. 6d.

Manaia District.

A limited amount of prospecting has been carried on in this district, but no returns are recorded.

Tiki District.

Coromandel Freehold Mine.—In this mine a considerable amount of work has been done. Ten men were employed, and a trial crushing of 23 tons of stone gave a return of 53 oz. 6 dwt. of gold, valued at £155 18s. 3d.

Specimen Hill Mine.—The owners have directed their attention to working the specimen leaders for which this locality has been famous, and 32½ lb. of stone was crushed for a return of 48 oz. 15 dwt. of gold, valued at £144 16s. 6d. Two men were employed.

Kauri Gold Estates Company.

Kauri Freehold Gold Estates.—This company has carried on extensive works during the year. A tramway has been laid from Whangapoua to the mine at Opitonui, and a locomotive engine is employed in conveying material from the landing to the mine. A branch line is also in course of construction up the Owera Valley. There is also a considerable amount of work being carried on at the mines on the different sections of the property. Several levels are being put in, and two shafts are sunk, on one of which a pumping and winding plant has been erected. The other shaft is being put down for the purpose of connecting the St. Hilda level with this shaft, which has been driven a distance of 520 ft. on a large body of stone which contains a fair percentage of the precious metal. From the

tests made of the different reefs on the property, the superintendent is sanguine that when the works are all completed, and battery working, there will be no doubt as to its ultimate success. Two hundred men are employed.

Matarangi District.

Very little work has been done in this locality, and no returns have been published.

Kuaotunu District.

Mariposa Mine (Area, 101 acres; owners, Mariposa Gold-mining Company, Limited).—A considerable amount of work has been done in this mine during the year—2,382 ft. of driving, 660 ft. of rising work, sinking winzes 200 ft., and sinking main shaft 6 ft. A new reef, called the East lode, has been discovered in a cross-cut driven from No. 2 level, and 300 ft. has been driven on the quartz, which has all proved payable. A cross-cut is being driven at No. 3 level to intersect this reef at a depth of 150 ft. below where it is now worked. During the year the battery has not been continuously employed on account of scarcity of water for the tables and sumps. This has naturally lessened the output from the mine. The quantity of quartz crushed was 4,740 tons, for a yield, by amalgamation, of 834 oz. 8 dwt. of gold, value £1,876 10s. 2d.; and, by the cyanide process, 895 oz. 2 dwt., value £1,901 3s. 6d.: total value, £3,777 13s. 8d. Forty-seven men were employed. It is now imperative to sink a shaft for the purpose of opening the reefs at a greater depth, as the shallower levels will shortly be exhausted. On this matter the mine-manager, Mr. John Goldsworthy, has afforded the following information: "Deep-sinking: From indications at present low level (No. 4) we have every reason to hope that our deep-sinking scheme will be a success. A petition has been forwarded to Government by the townsfolk here praying for a subsidy to assist us to carry out this deep-sinking scheme with greater facility; we have also made formal application for the same. Mine machinery: Of this we have none at present, but there is on the way from Home a consignment of machinery consisting of steam pumping and winding plant for use in our deep-sinking scheme. We can at this juncture give no plans or particulars; we are not in possession of same. We are making preparations for the deep-sinking. A large chamber has been cut out at No. 4 level and timbered; the main shaft sunk to a depth of 6 ft.; smoke-passage, rope-passage, and rise for poppet-heads are all but completed. The steam plant will be underground, in this chamber." The Jupiter Mine is now owned by this company.

Irene Mine (Area, 57 acres; owners, Irene (Hauraki) Gold-mines, Limited).—A considerable amount of work was carried on during the year. 1,050 ft. was driven on the strike of the Try Fluke reef, and 300 ft. of cross-cutting. A hundred tons of quartz crushed at the Great Mercury Mine yielded, by amalgamation, 27 oz. 10 dwt., value £58 1s. 10d.; and, by the cyanide process, 15 oz. 13 dwt., value £23 13s. 5d.: total value, £81 15s. 3d. An average of ten men were employed.

Kapai-Vermont Mine (Area, 35 acres 2 roods 30 perches; owners Kapai-Vermont Gold-mining Company, Limited).—This mine is the most southerly of the gold-producing mines on the line of the Try Fluke reef, and hitherto has been worked from levels. During the past year the development works have been somewhat limited. The main low level (No. 3), at a depth of 308 ft., is now in a distance of 790 ft., the reef averaging about 2½ ft., but during the extension of the last 300 ft. the ore obtained has not been payable. A cross-cut going east was commenced at a point 360 ft. along the line of reef in the low level, with the object of intersecting any lodes that might traverse the property in that direction, but after a distance of 132 ft. had been penetrated this was discontinued, nothing of an encouraging nature having been met with. With the exception of the works above mentioned, the operations have been almost entirely confined to stoping out the block between No. 2 and No. 3 levels. This has been exhausted, and further development by sinking is now necessary. The manager is awaiting the instruction of the Board of Directors to proceed with the sinking of a shaft on the underlie of the reef to a depth of 300 ft. When this work is carried out there is every hope that the mine will again take a prominent place among the bullion-producers. The quantity of quartz crushed during the year amounted to 3,027 tons, for 2,048 oz. of gold; value, £4,668 8s. This was all recovered by the cyanide process. The cost of mining the quartz was 8s. 11d., and the cost of milling and treatment 15s. 9d., per ton. The number of men employed was twenty-nine in mine and mill.

Waitaia Mine (Area, 85 acres 2 roods; owners, Waitaia Gold-mines, Limited).—A large amount of work has been done in mine development during the year—1,807 ft. of driving on reefs, 341 ft. of cross-cutting, and 192 ft. sinking and rising. No bulk of quartz has been crushed pending the erection of a mill on the company's own account, but a parcel of specimens gave a return of 14 oz. 19 dwt. of gold; value, £40 14s. 9d. Twenty men were employed.

Juno Mine (Area, 28 acres; owners, Juno Gold-mining Company).—Two men were employed during the year. Twenty-five tons of quartz was crushed, for a yield of 19 oz. 5 dwt.; value, £55 16s. 6d.

Prospecting work was also done in the Invicta, Handsworth, Golden Anchor, Aorere, and other mines, but no yield of gold has been recorded.

Great Mercury Mine.—Operations are confined to the Red Mercury section of the mine. The lodes under development are three in number—viz., Just in Time, Red Mercury, and Foot-wall Reef. The ore-bodies vary from 6 in. up to 2 ft. in thickness, and are very patchy in character; and, as a result, the stone has to be selected. The ore is free-milling, and in consequence there is no trouble with the cyanide process. The extraction is from 85 to 90 per cent., and the cost of treatment is 4s. 10d. per ton. 470 tons of quartz and 433 tons of tailings have lately been treated, for 332 oz. of gold. Sixteen men have been employed in the mine and battery.

Mercury Bay District.

Prospecting operations have been carried on in the Moehau and Mahakirau districts, and, in order to enable the miners to test any quartz, the Government is about to erect a small crushing plant for that purpose.

Boat Harbour District.

The claims which were taken up in this part have not been worked during the year.

General Remarks.

The Royal Oak, Hauraki Associated Reefs, Kapanga, and the Hauraki Mine have been the chief gold-producers, and have been vigorously worked.

At Kuaotunu the Try Fluke (now Mariposa), Great Mercury, and Kapai-Vermont Mines did not yield rich returns, and deeper working must be resorted to in this district.

The Kauri Gold Estates Company have carried on extensive works, with fair prospects of success.

THAMES DISTRICT.

The mining operations in this district have been of a developmental character, and large amounts have been expended on the erection of machinery, especially for mining at deep levels.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Thames, in the Hauraki Mining District, and registered on or before the 31st March, 1898, in the Books of the Mining Registrar at Thames.

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
21/11/95	21	3	32	Thames ..	IV., V.	Thames ..	Adelaide	The Adelaide Gold-mining Co. (N.L.).
23/12/96	99	0	0	Waiomo ..	II.	" ..	Adeline	Simon Fraser.
1/3/96	58	2	10	Tairua ..	IX.	Tairua ..	Ajax	Finlay McLiver.
14/12/96	61	3	5	Waiomo ..	II.	Thames ..	Ake Ake	Ake Ake Gold-mining Co. (N.L.).
14/12/96	100	0	0	Whangamata	VIII., XII.	Tairua ..	Alameda	Henry James Ross.
3/2/97	100	0	0	Gum Town..	IV.	Whitianga	Albion	Walter Calloway.
6/4/96	71	2	18	Thames ..	"	Thames ..	Alburnia East ..	The Alburnia East Gold-mining Co.
27/2/96	68	1	0	" ..	"	" ..	" ..	The Seven Reefs Gold-mining Co.
27/2/96	68	1	0	Punga Flat..	"	" ..	Alburnia Extended..	John William Ryan.
6/7/97	27	0	0	Tararu ..	I.	" ..	Alexander	Alexander McLeod Cowie.
27/2/96	82	0	3	" ..	V.	" ..	Alpine	Francis Angus White.
25/6/96	98	2	7	Puriri ..	XIII.	" ..	Amazon	Golden Centre Gold-mining Co.
13/11/95	96	2	0	Thames ..	V.	..	Anchor	Adolph Kohn.
24/4/96	99	0	24	Puriri ..	XIII.	Tairua ..	Apakura	W. J. Nevill.
21/12/95	100	0	0	Waiomo ..	I.	Thames ..	Argosy	Argosy Gold-mining Co. (N.L.).
26/2/96	77	2	0	Thames ..	"	" ..	Argosy Extended ...	"
18/2/98	31	2	32	Tairua ..	V.	Tairua ..	Argentine	Charles McLean.
5/5/97	90	3	25	Puriri ..	XIII.	Thames ..	Auckland Brokers ..	Henry Culpan.
11/9/97	99	2	22	" ..	"	" ..	Aurarius	Robert Worth.
24/7/97	92	2	0	" ..	"	" ..	Averna	A. H. Wylde and R. Leary.
3/2/97	64	2	0	Waiomo ..	XIV.	Hastings ..	Athens	Charles White Cave.
23/12/96	100	0	0	Whangamata	XIV., XV.	Tairua ..	Aztec	John Morrison.
24/8/97	26	0	12	Waiomo ..	XI.	Hastings ..	Ballade	Hugh Owen.
10/5/97	90	0	3	Tararu ..	I.	Thames ..	Balmoral	Ernest Clifton Beale.
15/2/97	54	2	0	Tapu ..	XI.	Hastings ..	Band	John Ward.
19/9/96	100	0	0	Tararu ..	II.	Thames ..	Bankers	Simon Fraser.
18/2/97	16	1	23	" ..	"	" ..	Beehive	John Hague Smith.
6/12/95	79	3	0	Thames ..	V.	" ..	Bell Rock	The Bell Rock Gold-mining Co. (N.L.).
29/4/97	100	0	0	Waiomo ..	XIV.	Hastings ..	Belterbet	George Samuel Graham.
29/4/97	99	2	0	Tairua ..	XIII.	Tairua ..	Bernice	Joseph William Day.
24/4/96	98	3	2	Waiomo ..	XV.	Hastings ..	Big Reef	Arthur Wright.
18/2/97	20	1	10	Whangamata	II.	Ohinemuri	Black Bess ..	Frederick Shaw.
8/4/97	10	1	0	Waiomo ..	XIV.	Hastings ..	Black Douglas ..	Andrew Dewar Douglas.
22/9/96	76	0	0	Ohui ..	IV.	Tairua ..	Bonanza No. 1 ..	George Bigg Withers.
18/5/96	51	1	20	Waiomo ..	XV.	Hastings ..	Boss	Ernest Mansfield.
22/11/97	49	0	0	Tairua ..	II., VI.	Tairua ..	Bourbon	James Welman.
11/3/96	100	0	0	" ..	VI.	" ..	Broken Hills ..	Broken Hills Gold-mining Co. (Ltd.)
25/4/96	98	2	0	" ..	"	" ..	Broken Hills Ext. ..	Charles Rhodes and others.
29/5/96	100	0	0	" ..	"	" ..	Broken Hills No. 2..	Broken Hills No. 2 Gold-mining Co.
29/5/96	69	3	24	" ..	"	" ..	Broken Hills No. 3..	Broken Hills Gold-mining Co. (Ltd.).
29/5/96	70	3	26	" ..	"	" ..	Broken Hills No. 4..	"
23/3/97	100	0	0	Tapu ..	XIV.	Hastings ..	Broken Hill ..	Broken Hill Gold-mining Co. (Ltd.).
24/7/97	100	0	0	Hape Creek..	V.	Thames ..	Caledonian No. 2 ..	John Childerhouse.
9/8/88	15	2	17	Thames ..	IV.	" ..	Cambria	Anglo-Continental Gold Syndicate (Limited).
23/3/97	100	0	0	Tararu ..	I., II.	" ..	Cameron	James George Wilson.
29/4/97	99	3	30	Te Mata ..	VII.	Hastings ..	Canadian	Thomas Morrin and Robert Kelly.
5/8/97	92	0	0	Tairua ..	IX.	Tairua ..	Captain Argall ..	Percy Adolphus Vaile.
6/7/97	8	3	16	" ..	IX. / "	Thames / Tairua	Captain Argall Extended	"
16/11/97	3	2	0	Thames ..	IV.	Thames ..	Cardigan Extended..	David Cole Gash.
3/5/95	64	2	0	" ..	"	" ..	Cardigan	The Cardigan Gold-mining Co. (Ltd.).
6/2/96	8	1	0	Ohui ..	"	Tairua ..	Carnation	Henry Becker.
7/6/97	78	0	0¼	Tairua ..	XIII.	Thames ..	Carnival	John C. Webster.
23/7/96	100	0	0	Whangamata	III.	Ohinemuri	Cascade	Henry William Moore.
19/12/95	20	1	16	Thames ..	IV.	Thames ..	Caspian	Caspian Gold-mining Co. (N.L.).
31/3/98	100	0	0	Tapu ..	XI.	Hastings ..	Chamberlain ..	Frederick Earl.
3/3/96	69	0	0	Kirikiri ..	IX.	Tairua ..	Chester	Malcom Fleming.
6/2/96	11	2	20	Tararu ..	II.	Thames ..	Chicago	William Duncan Pearce.
16/3/98	100	0	0	" ..	"	" ..	" ..	William Nicol Macbeth.
14/9/95	99	2	23	" ..	I.	" ..	City of Auckland ..	City of Auckland Gold-mining Co. (Ltd.).
14/11/96	67	0	27	Thames ..	V.	" ..	City of London ..	City of London Gold-mining Co. (N.L.).
15/12/97	43	1	39	Punga Flat..	IV.	" ..	Clarence Berry ..	Charles Short.
22/9/96	50	0	0	Tapu ..	XI.	Hastings ..	Club	Club Gold-mining Co. (N.L.).
11/4/95	16	0	0	Thames ..	IV.	Thames ..	Clunes	The Clunes Gold-mining Co. (N.L.).

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Thames—*continued.*

Date of License.	Area.			Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A.	R.	P.					
4/3/96	98	2	14	Tairua ..	IX., X.	Tairua ..	Colossus	George S. Budge.
23/3/97	100	0	0	Whangamata	XIII.	" ..	Collegian	Richard Jabez Dunn.
10/5/97	45	2	0	Tairua ..	IV.	" ..	Columbine ..	Thomas Pelly Pockerage Seaver.
29/4/97	97	2	32	" ..	XIV.	" ..	Commodore ..	Percy Adolphus Vaile.
2/11/96	45	2	15	Tapu ..	XI.	Hastings ..	Comet	Comet Gold-mining Co. (N.L.).
13/11/95	96	3	9	Waiomo ..	XV.	" ..	Comstock	The Comstock Gold-mining Co. (Ltd.).
8/2/96	100	0	0	Thames ..	IV.	Thames ..	Conservative ..	The Conservative Gold-mining Co.
12/3/96	86	3	12	Tairua ..	IX.	Tairua ..	Consolation ..	John Morrow.
23/3/97	85	2	10	Whangamata	XIII.	" ..	Coolreagh	George Crosby.
6/4/96	69	1	7	Thames ..	IV.	Thames ..	Creek	Tararu Creek Gold-mining Co.
24/7/97	77	0	16	Tairua	IX., XIII. IX.	" Tairua	Criterion No. 1 ..	Harmood Arthur Banner.
11/9/97	92	3	37	" ..	" "	Thames Tairua	Criterion No. 2 ..	"
24/7/97	78	1	16	" ..	XIII.	Thames ..	Criterion	"
4/6/97	91	0	0	" ..	VIII.	Tairua ..	Crompton	Robert Crompton Speer.
4/10/95	64	2	10	Thames ..	IV., V.	Thames ..	Cumberland ..	John Bowler.
1/2/96	28	0	0	" ..	"	" ..	Cumberland Ext. ..	Karaka Queen Gold-mining Co.
27/2/96	100	0	0	Waiomo ..	II.	" ..	Daphne	Joseph Barber and T. Millett.
21/1/97	7	3	15	Thames ..	IV., V.	" ..	Darwin	Darwin Gold-mining Co. (N.L.).
29/4/97	99	3	0	Te Mata ..	VII.	Hastings ..	Darwin No. 1 ..	Thomas Morrin and Robert Kelly.
22/11/97	25	3	10	Tairua ..	"	Tairua ..	Dawn of Hope ..	Robert Worth.
27/9/97	97	2	0	" ..	IX.	" ..	Dawn of Light ..	Alfred H. Wylde and Richard Leary.
16/1/96	20	2	32	Tairua ..	"	Tairua ..	Day Dawn ..	The Day Dawn Gold-mining Co. (N.L.).
14/9/95	90	0	0	Thames ..	IV.	Thames ..	Deep Levels Consolidated	Thames Hauraki Goldfields (Ltd.).
14/8/95	67	1	0	Thames ..	XXVII.	Thames ..	Deep Sinker ..	Thames Hauraki Goldfields (Ltd.).
16/7/96	3	0	50	Tairua ..	II.	Tairua ..	Despised	William Bloomfield.
27/2/96	62	0	0	Whangamata	III.	Ohinemuri	Dictator	Robert Comar.
11/3/96	31	3	11	Waiomo ..	XV.	Hastings ..	Digger's Dream ..	Jeffrey Murdock.
8/11/97	97	0	0	Tararu ..	IV.	Thames ..	Dixon's Consolidated	Arthur Wright and James B. Blaikie.
24/6/97	76	2	0	" ..	I.	" ..	Don Giovanni ..	Ewen William Allison.
24/6/97	48	0	0	" ..	"	" ..	Don Juan	"
24/7/97	100	0	0	Matatoki ..	XIII.	" ..	Dover Castle ..	Dover Castle Gold-mining Co.
24/4/96	46	0	20	Thames ..	V.	" ..	Duplex Extended ..	Robert Orr Young.
2/11/96	96	3	12	Waiomo ..	I.	" ..	Eaglehawk ..	Eaglehawk Gold-mining Co. (N.L.).
27/8/96	12	0	26	" ..	II.	" ..	Eclipse	W. H. Buckley and James Onion.
23/12/96	98	2	0	Puriri ..	XIII.	" ..	Eclipse No. 1 ..	John Manners Morran.
14/12/97	16	0	0	Tararu ..	II.	" ..	Eclipse Extended ..	Harry Sidney Smith.
8/11/97	62	2	0	Whangamata	III.	Tairua ..	Eileen	Hauraki Peninsula Exploration Co. (Ltd.).
20/3/96	27	1	3	Thames ..	IV.	Thames ..	Ellerslie	John Churton.
11/9/97	59	2	0	Puriri ..	XIII.	Tairua ..	Empress	London and New Zealand Exploration Co. (Ltd.).
23/3/97	85	0	37	" ..	V.	Ohinemuri	Empress of India ..	Alfred Rhodes.
12/8/96	100	0	0	" ..	XIII. " IV. I.	Thames Tairua Waihou Ohinemuri	Energetic	Thomas Scanlan.
4/3/97	24	2	0	Whangamata	VIII.	Tairua ..	Engagement ..	Henry David Abbott.
22/11/97	32	0	5	Tararu ..	I.	Thames ..	Essie	William Henry Thompson.
6/4/96	50	0	0	Thames ..	V.	" ..	European	The European Gold-mining Co.
18/6/96	30	0	0	Puriri ..	XIII.	Tairua ..	Fair Alice	The Apakura Syndicate (Ltd.).
25/10/95	100	0	0	Thames ..	IV.	Thames ..	Favourite	John Watson Walker.
3/3/96	45	0	0	Kirikiri ..	IX.	Tairua ..	Filly	Malcolm Fleming.
11/9/97	68	1	0	Hape Creek..	IV., V.	Thames ..	Fortuna	Fortuna (Hauraki) Gold-mines (Ltd.).
28/2/95	6	1	10	Thames ..	IV.	" ..	Freedom	The Freedom Gold-mining Co. (N.L.).
29/5/96	92	0	0	Puriri ..	XIII.	" ..	Frenchman ..	John Hague Smith.
23/12/96	98	0	35	The Wires ..	I., II.	Ohinemuri	Gagool	Christopher G. Walker.
23/12/96	74	2	0	Tairua ..	II.	Tairua ..	Galatea	R. Ross McGregor and Henry Culpan.
22/11/97	29	3	12	" ..	V., VI.	" ..	Gem	William Gorrie.
6/2/96	30	0	0	Tapu ..	XI.	Hastings ..	Gem and Crown ..	The Monowai Gold-mines (L'd.).
6/7/97	15	3	23	Te Mata ..	VII.	" ..	Gentle Lizzie ..	Elizabeth Brain.
18/2/98	93	2	25	Tairua ..	VI.	Tairua ..	Glencoe	Herbert Gordon and Albert Bruce.
2/9/97	7	1	22	" ..	"	" ..	Glentanner ..	Montague H. Wynyard.
23/3/97	97	0	0	Karaka ..	V.	Thames ..	Gloucester ..	Gloucester Gold-mining Co.
16/3/98	88	2	6	" ..	"	" ..	Gloucester Extended	" (Ltd.).
10/5/97	42	0	20	Tapu ..	XI.	Hastings ..	Golden Age ..	Andrew Dewar Douglas.
24/4/96	5	2	18	Waiomo ..	I.	Thames ..	Golden Argosy ..	The Argosy Gold-mining Co.
20/3/96	2	2	20	Tairua ..	IX.	Tairua ..	Golden Arrow ..	Lachlan McLiver.
28/7/96	100	0	0	Tapu ..	XI.	Hastings ..	Golden Band ..	The Golden Band Gold-mining Co.
21/1/97	30	0	0	Tairua ..	IX.	Tairua ..	Golden Belt ..	Finlay McLiver.
29/5/96	100	0	0	Puriri ..	XIII.	Thames ..	Golden Centre ..	Golden Centre Gold-mining Co.
25/4/96	97	1	20	Whangamata	III.	Ohinemuri	Golden Falls ..	Henry W. Moore.
18/2/98	34	2	6	Tairua ..	VI.	Tairua ..	Golden Hill ..	Robt. Worth, W. D. Tilsey, and Thos. Davy.
21/12/95	100	0	0	Ohui ..	IV.	" ..	" ..	J. C. P Seaver.
5/9/95	21	0	20	Tapu ..	XII.	Hastings ..	Golden Horn ..	Golden Horn Gold-Mining Co. (Ltd.).
8/2/96	100	0	0	Whangamata	III.	Ohinemuri	Golden Mount ..	James Reid and others.
25/6/96	43	0	32	"	XV. III.	Tairua Ohinemuri	Golden Mount Ext.	Robert Butler Lusk.
27/8/96	100	0	0	Tairua ..	II.	Tairua ..	Golden Planet ..	Golden Planet Gold-mining Co. (N.L.
8/11/97	29	0	0	" ..	VI.	"	Golden Point ..	Herbert Gordon.
15/2/97	100	0	0	Tapu ..	XI.	Hastings ..	Golden Reef ..	George H. McMahon.
19/8/96	46	3	35	Whangamata	XV.	Tairua ..	Golden Three Reefs	Thomas Percy Vulgar.
2/11/96	37	0	35	"	III.	Ohinemuri	Golden Wave No. 2	George Millar Cameron.
10/9/96	7	3	0	"	"	"	Golden Wave No. 3	"

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at THAMES—*continued.*

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim	Name of Registered Owner.
11/9/97	64	2	0	Puriri ..	XIII.	Thames ..	Goldfield	Robert Worth.
29/4/97	58	3	8	Tairua ..	XIV., XV.	Tairua ..	Goth	James Welman.
19/9/96	71	2	29	Whangamata	III.	Ohinemuri	Grand Coup ..	Tamihana Gold-mining Co. (N.L.)
2/11/96	50	3	15	Tararu ..	II.	Thames ..	Grosvenor ..	Earnest C. Beale.
22/9/96	84	2	9	Tapu ..	XI.	Hastings ..	Guiding Star ..	Peter Norbury.
19/9/96	100	0	0	Waiomo ..	I.	Thames ..	Happy Thought ..	Golden Opportunity Gold-mining Co.
21/11/95	30	0	0	Ohui ..	IV.	Tairua ..	Harp of Tara ..	Harp of Tara Gold-mining Co.
24/7/97	71	3	29	Waitohi ..	"	Thames ..	Hauraki Golden Age	Hauraki Golden Age Mines (Ltd.).
4/6/97	47	2	35	Tapu ..	XI.	Hastings ..	Hector	Andrew Dewar Douglas.
22/11/97	25	2	24	Tairua ..	VI.	Tairua ..	Hidden Treasure ..	William Armstrong.
5/8/97	100	0	0	Kauaeranga	I.	" ..	Hihi	Balfour, Nixon, and others.
7/6/97	70	0	0	Tararu ..	"	Thames ..	Hillside	Allan Cameron Stewart.
25/4/96	100	0	0	Thames ..	V.	" ..	Hilton ..	Earnest C. Beale.
3/3/96	82	0	0	Kirikiri ..	IX.	Tairua ..	Horseshoe ..	Malcolm Fleming.
11/3/96	87	3	35	Whangamata	XV.	" ..	Inca No. 1 ..	Inca Gold-mining Co. (N.L.).
15/2/97	100	0	0	Puriri ..	XIII.	Thames ..	Inverness ..	E. Thomas Dufaur and James Russell.
8/11/97	97	0	0	Whangamata	III.	Tairua ..	Ivy	Hauraki Peninsula Exploration Co. (Ltd.).
4/10/95	99	1	0	Puriri ..	XIII.	Thames ..	Joker	Jules George Wilson.
24/7/97	52	0	0	Tapu ..	XI.	Hastings ..	Jessie	Robert Patterson.
5/8/97	79	2	1	Kauaeranga	I.	Tairua ..	Joselyn Davis ..	Balfour, Nixon, and others.
23/3/97	100	0	0	Whangamata	XIII.	" ..	Julius Cæsar ..	Ernest Mansfield.
27/8/96	35	3	36	"	II., III.	Ohinemuri	Junction Whangamata No. 1	Joseph Bishop.
11/7/95	49	3	25	Tararu ..	I., IV.	Thames ..	Kaiser	The Kaiser Gold-mining Co. (N.L.).
23/12/96	34	0	0	Tairua ..	VI.	Tairua ..	Kathleen	New Year Gold-mining Co. (N.L.).
13/11/95	84	3	20	Thames ..	IV.	Thames ..	Karaka Mines ..	C. A. Harris.
2/9/97	4	0	8	Tairua ..	VI.	Tairua ..	Kauri	John Alexander Robertson.
25/6/96	100	0	0	Thames ..	V.	Thames ..	Kedge	Adolph Kohn.
5/8/97	100	0	0	Waiomo ..	XI., XIV.	Hastings ..	Kensington ..	Hugh Owen.
10/5/97	100	0	0	Tararu ..	I.	Tararu ..	" ..	Ernest Clifton Beale.
23/3/97	64	0	0	Thames ..	V.	Waiomo ..	Kent	William Shaw.
4/3/97	12	0	30	Tapu ..	XI.	Hastings ..	Key of Tapu ..	Joseph Barber.
23/3/97	90	0	0	Whangamata	XIII.	Tairua ..	King Dick ..	Percy Spencer.
27/2/96	66	3	0	"	III.	Ohinemuri	King of Whangamata	The King of Whangamata Gold-mining Co.
15/2/97	100	0	0	Whangamata	III., VII.	Tairua ..	King of Tairua ..	Edward J. Smith.
6/7/97	29	3	32	Thames ..	..	Thames ..	Kuranui Caledonian	Kuranui Caledonian Gold-mining Co. (Ltd.).
16/5/89	14	3	10	" ..	IV.	" ..	Kuranui No. 3 ..	Kuranui Gold-mining Co. (Ltd.).
29/5/96	100	0	0	Waiomo ..	XV.	Hastings ..	Kuvera	Eric Manley Clark.
2/11/96	39	0	0	" ..	"	" ..	Kuvera Extended ..	Edward Weston Andrews.
21/12/95	30	0	0	Ohui ..	IV.	Tairua ..	Last Chance ..	J. C. B. P. Seaver.
4/3/96	94	0	23	Tairua ..	IX.	" ..	Light of Asia ..	George S. Budge.
21/12/95	50	0	0	Thames ..	V.	Thames ..	Limerick	John Childerhouse.
23/3/97	100	0	0	Tairua ..	IV., VI.	Ohinemuri	Lindauer	John Jesse Oldham.
21/9/97	4	2	13	Shellback Creek	IV.	Thames ..	Little Mabel ..	Charles Longhurst.
24/7/97	79	3	35	Puriri ..	XIII.	" ..	Little Mary ..	William Cornes.
24/7/97	46	2	20	" ..	XIII.	" ..	Little Nell ..	Albert Kummert.
8/4/97	8	1	18	Waiomo ..	XIV.	Hastings ..	Little Wonder ..	Richard Leary.
25/9/96	86	0	20	" ..	II.	Thames ..	Lomas	James Darrow.
14/6/89	27	3	35	Thames ..	IV.	" ..	Lone Hand ..	The May Queen Hauraki (Ltd.).
26/2/96	100	0	0	Whangamata	XV.	Tairua ..	Luck at Last ..	Whangamata Proprietary (Ltd.).
26/2/96	100	0	0	" ..	"	" ..	Luck at Last Ext. ..	"
3/2/97	100	0	0	Waiomo ..	I.	Thames ..	Lysander	William Shaw
20/3/96	16	3	17.6/10	Thames ..	IV.	" ..	Magazine	Magazine Gold-mining Co.
31/7/96	27	0	16	" ..	"	" ..	Magazine West ..	"
19/6/95	100	0	0	Tapu ..	XI.	Hastings ..	Mahara	Mahara Royal (Ltd.).
3/3/96	26	2	22	Tairua ..	XX.	Tairua ..	Main Lead Extended	Frederick John Tiffin.
21/12/95	100	0	0	Thames ..	V.	Thames ..	Manchester ..	William McCullough.
2/8/94	15	0	0	Ohui ..	IV.	Tairua ..	Maori Land ..	T. P. P. Seaver.
21/11/95	20	0	24	Waiomo ..	I.	Thames ..	Mararoa	The Golden Opportunity Gold-mining Co.
2/7/96	30	0	0	" ..	"	" ..	Mararoa No. 2 ..	"
25/6/96	100	0	0	Whangamata	III.	Ohinemuri	Marco Polo ..	Marco Polo Gold-mining Co.
2/11/96	100	0	0	" ..	"	" ..	Marquita	George Dunnett.
6/2/96	5	0	36	Ohui ..	IV.	Tairua ..	Marigold	Arthur O. Field.
6/12/95	57	3	32	Thames ..	V.	Thames ..	Mascotte	John Childerhouse.
19/8/96	36	1	14	Mata ..	VII.	Hastings ..	Mata Prospectors ..	Daniel McCafferty.
23/7/96	100	0	0	Tairua ..	II.	Tairua ..	Mataura	Tairua Prospecting Gold-mining Co. (N.L.).
5/5/97	49	1	30	Karaka ..	IV.	Thames ..	May Queen ..	May Queen Extended Gold-mining Co.
27/8/94	73	1	18	Thames ..	IV.	" ..	" ..	May Queen Hauraki (Ltd.)
8/11/97	55	0	26	Ohui ..	IV.	Tairua ..	Maori Dream ..	Maori Dream Gold-mines (Ltd.).
8/11/97	100	0	0	Tairua ..	XIII. / "	Thames / Tairua	Mar Saba	George Greenaway.
8/11/97	100	0	0	Whangamata	III.	" ..	Marguerite ..	Hauraki Peninsula Exploration Co. (Ltd.).
4/6/97	50	0	0	Puru ..	XIV., XV.	Hastings ..	Matakana	William James Pearce.
22/11/97	100	0	0	Tairua ..	II., VI.	Tairua ..	Mauritius	James Welman.
22/11/97	38	0	0	" ..	I., II., V., VI.	" ..	Mauritius Extended	"
27/9/97	58	1	29	Karaka ..	V.	Thames ..	McIsaacs	McIsaacs Gold-mining Co.
6/4/96	100	0	0	Gum Town..	XIV.	Whitianga	Merry England ..	George McNeil.
23/12/96	97	0	0	Tairua ..	II.	Tairua ..	Micawber	Joseph Barber and Robert Kelly.
29/5/96	86	3	28	Whangamata	XV.	" ..	Mikado	Benjamin H. Bishop.
23/12/96	59	0	0	"	III.	Ohinemuri	Minnesota.. ..	Wentworth Gold-mining Co. (N.L.
2/11/97	4	0	0	Tairua ..	II.	Tairua ..	Missing Link ..	Albert Gold-mining Co.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Thames—*continued.*

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
4/2/97	9	1	4	Waiomo ..	"	Tham ..	Mistletoe	John Wigmore.
27/2/96	77	0	29	Whangamata	XV.	Tairua ..	Moa	Moa Gold-mining Co. (Ltd.).
10/11/96	94	3	26	Thames ..	IV.	Thames ..	Moanataiari ..	Moanataiari Gold-mining Co. (Ltd.).
24/10/95	12	0	39	" ..	IX.	" ..	Moanataiari North ..	Moanataiari North Gold-mining Co.
5/3/96	27	2	0	" ..	IV.	" ..	Moanataiari Ext. ..	Moanataiari Ext. Gold-mining Co.
7/6/97	96	0	0	Tararu ..	I., II.	" ..	Moir	Allan Cameron Stewart.
7/6/97	41	1	0	" ..	I.	Tararu ..	Moonbeam ..	Reubens Kerry.
4/5/97	22	2	10	" ..	"	Thames ..	Moonlight	Thomas Cottle.
4/6/97	54	3	0	" ..	II.	" ..	Moor of Venice ..	Grosvener United Gold-mining Co. (Ltd.).
9/3/95	57	3	39	Waiomo ..	XV.	Hastings ..	Monowai	Monowai Gold-mines (Ltd.).
19/8/96	74	0	31	" ..	III.	Thames ..	Morion	Morion Puru Gold-mining Co.
23/4/97	10	1	19	Tararu ..	II.	" ..	Morion Extended ..	Morion Puru Gold-mining Co. (Ltd.).
22/6/96	80	0	0	" ..	I., II.	" ..	Mount Taylor ..	Thomas Millet and Ernest C. Beale.
23/3/97	85	0	0	" ..	"	" ..	Mount Taylor Ext. ..	Mount Taylor Gold-mining Co.
21/11/95	11	3	0	Ohui ..	IV.	Tairua ..	My Daisy	John Patrick Ward.
2/9/97	21	2	10	Tairua ..	I., VI.	" ..	Myosotis	Benjamin M. Myers.
29/10/96	16	3	25	Whangamata	XV.	" ..	Nellie	The Nellie Gold-mining Co. (N.L.).
7/6/97	70	0	16	Puriri ..	XIII.	Thames ..	Never Despair ..	George Bedford.
27/9/97	98	0	0	Waiomo ..	XIV. / I.	Hastings / Thames	New Alma	Edward Byers Sealy.
4/10/95	54	2	0	Thames ..	IV.	" ..	New Alburnia ..	New Alburnia Gold-mining Co. (Ltd.).
3/2/97	91	2	20	Waiomo ..	XV.	Hastings ..	New Boss	Boss Gold-mining Co. (N.L.).
5/8/97	73	0	8	Tairua ..	XIII.	Tairua ..	New Chicago ..	Charles Foster Wigley.
16/11/97	9	1	20	Punga Flat ..	IV.	Thames ..	New Eileen ..	New Alburnia Gold-mining Co. (Ltd.).
18/5/97	22	0	0	Karaka ..	"	" ..	New Hauraki No. 1	James McNeil Agnew.
24/7/97	73	0	0	Whangamata	XV.	Tairua ..	New Leap Year ..	William Prebble.
10/5/97	100	0	0	Waiomo ..	XIV.	Hastings ..	New Mount Zechan	William Read Bloomfield.
10/5/97	100	0	0	Whangamata	II., III.	Ohinemuri	New Oceola ..	Henry William Moore.
26/4/97	100	0	0	Puru ..	I.	Thames ..	New Olive	Rowland Campion Long.
28/7/96	97	3	7	Boat Harbour	VI.	Tairua ..	New Tairua ..	Thomas P. Seaver.
27/8/96	100	0	0	Whangamata	III.	Ohinemuri	New Wentworth ..	Wentworth Gold-mining Co. (N.L.).
6/4/96	52	0	5	Thames ..	IV.	Thames ..	New Whau ..	The New Whau Gold-mining Co.
19/2/97	59	0	27	Puriri ..	XIII. / "	" / Tairua	Never Miss ..	Robert Worth.
23/3/97	85	3	24	Whangamata	IV.	" ..	Nil Desperandum ..	Nil Desperandum Gold-mining Co.
1/10/96	21	0	0	Thames ..	"	Thames ..	Nonpariel	Nonpariel Gold-mining Co. (N.L.).
2/11/96	59	0	0	" ..	IV., V.	" ..	Occidental	Occidental Gold-mining Co. (N.L.).
27/9/97	100	0	0	Whangamata	XV.	Tairua ..	Old Newton ..	John Cunningham.
11/3/96	36	3	28	Thames ..	V.	Thames ..	Only Chance ..	Thomas Boyle.
21/3/89	15	0	0	" ..	IV.	" ..	Orlando	The Orlando Gold-mining Co. (Ltd.).
4/6/97	52	0	0	Tararu ..	I.	" ..	Oruba	George Bertram Hutton.
17/8/95	100	0	0	Tairua ..	IX.	Tairua ..	Pakirarahi ..	James McKay, jun.
21/12/95	97	1	11	" ..	IX.	" ..	Pakirarahi No. 1 South	George Frederick Bell.
21/12/95	91	0	0	" ..	"	" ..	Pakirarahi No. 2 South	"
5/3/96	10	1	0	Waiomo ..	XV.	Hastings ..	Park	T. A. Dunlop.
11/3/96	62	3	37	Tairua ..	IX.	Tairua ..	Perseverance ..	John Moore.
6/2/96	25	0	20	" ..	"	" ..	Perseverance Ext. ..	John Morrow.
29/5/96	36	2	26	Whangamata	III.	Ohinemuri	Phœnix Extended ..	Newell Butler Lusk.
23/12/96	99	3	14	Puriri ..	XIII.	Tairua ..	President	Albert Spencer.
17/10/95	100	0	0	Tairua ..	III.	" ..	Prince Charlie ..	Charles McLean.
24/7/97	50	3	0	Whangamata	XV.	Tairua ..	Princess of Wales ..	Patrick E. Ryan.
29/5/96	30	0	2	The Wires ..	II., III.	Ohinemuri	Pukewhau Ext. ..	Benjamin Anderson.
27/2/96	100	0	0	Puriri ..	XIII. / "	Tairua / Thames	Puriri	The Puriri Gold-mining Co. (N.L.).
27/2/96	42	1	0	Waiomo ..	XV.	Hastings ..	Puru	William Clark.
23/3/97	100	0	0	Puru ..	"	" ..	Puru Main Lodes ..	Edward McWilliams.
23/3/97	100	0	0	" ..	"	" ..	Puru Main Lodes Ext.	"
22/3/88	47	0	0	Thames ..	IV.	Thames ..	Queen of Beauty Ext.	Thames Hauraki Goldfields (Ltd.).
14/12/96	100	0	0	Whangamata	XI.	Tairua ..	Queen Eva ..	E. C. Martin.
5/8/97	84	0	12	Tapu ..	"	Hastings ..	Queen's Jubilee ..	Alfred Sculthorpe Minett.
2/11/97	12	0	18	Tairua ..	III.	Tairua ..	Ranfurly	David Clarkson.
26/2/96	53	3	20	Waiomo ..	XIV.	Hastings ..	Rangatira	William Jones Smith.
23/7/96	90	0	0	Whangamata	III.	Ohinemuri	Rapid	Henry William Moore.
19/8/96	100	0	0	Waiomo ..	XIV.	Hastings ..	Renown	Renown Gold-mining Co. (N.L).
4/6/97	84	3	5	Tairua ..	IX., XIII.	Tairua ..	Rise and Shine ..	Patrick Claffy.
19/9/96	100	0	0	The Wires ..	II.	Ohinemuri	Rita	Henry Fletcher.
23/12/96	74	0	4	Tapu ..	XV.	Hastings ..	Royal	Christopher Atwell Harris.
28/7/96	100	0	0	Waiomo ..	I.	Thames ..	Rupert	James George Wilson.
13/11/95	93	2	0	" ..	II.	" ..	Russell	Puru Consolidated Gold-mining Co.
6/12/95	100	0	0	" ..	"	" ..	Russell Extended ..	"
6/12/95	98	2	0	" ..	"	Hastings ..	Salisbury	"
19/9/96	54	0	6	Tararu ..	"	Thames ..	Scandinavian ..	Scandinavian Gold-mining Co.
23/12/96	31	0	0	Ohui ..	IV.	Tairua ..	Sea View	William Henry Cooper.
14/9/97	94	2	0	Tapu ..	XI.	Hastings ..	Shannon	Frederick Earl.
2/11/96	99	0	0	" ..	"	" ..	Sheridan	Sheridan Gold-mining Co.
6/4/96	58	3	20	Thames ..	V.	Thames ..	Shotover No. 2 ..	Henry Brett.
18/5/96	100	0	0	Waiomo ..	I.	" ..	Silas	Robert Compton Speer.
2/11/96	73	3	0	" ..	"	" ..	Silas Extended ..	James George Wilson.
14/12/96	92	2	6	Puriri ..	IX., XIII.	Tairua ..	Sir George ..	Charles R. Thorne.
13/8/96	0	1	10	Thames ..	IV.	Thames ..	Southern Reefs ..	William Burton.
21/11/95	12	2	34	Waiomo ..	XI.	Hastings ..	Square and Compass	The Crown Royal Gold-mining Co.
25/6/96	100	0	0	Whangamata	XIV., XV.	Tairua ..	St. Albans Ext. ..	J. C. McKinney.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Thames—*continued.*

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
23/7/96	100	0	0	"	XV.	"	Standard	Arthur W. Smith.
3/2/97	51	1	31	Ohui	XIV.	Whitianga	Stars and Stripes	John Kneebone.
13/1/97	40	2	0	Tairua	VI.	Tairua	Star of Tairua	Benjamin Anderson.
23/12/96	58	3	0	Tararu	I.	Tararu	Star of Tararu	Frederick Bennett, sen.
4/6/97	24	0	0	"	"	Thames	St. Gregory Extended	Percy Adolphus Vaile.
4/10/95	75	0	0	Thames	IV.	"	St. Hippo	The May Queen Hauraki (Ltd.).
22/9/96	100	0	0	Waiomo	I.	"	Sunlight	Sunlight Gold-mining Co. (N.L.).
18/5/96	90	0	11	Whangamata	XV.	Tairua	Sybil	Sybil Gold-mining Co. (N.L.).
10/5/97	100	0	0	Tararu	..	Thames	Straight Tip	Thomas Scanlon and Thomas Dunbar.
19/6/95	90	0	12	Thames	IV.	Thames	Tararu	Tararu Creek Gold-mining Co. (Ltd.).
8/11/97	88	2	0	Tararu	"	"	Tararu Big Reefs	Arthur Wright and James B. Blaikie.
24/7/97	70	1	20	"	"	"	Tararu Extended	Tararu Extended Gold-mining Co.
2/11/97	2	2	18	"	I.	"	Temple	Temple Bar Gold-mining Co.
27/2/96	65	0	5 6/10	Waiomo	"	"	Temple Bar	"
6/4/96	51	0	0	Thames	IV.	"	Thames	Samuel S. Mackay.
23/7/96	56	2	0	"	"	"	Thames Hauraki Extended	Queen of Beauty Gold-mining Co.
28/9/97	93	2	0	Tararu	IV.	"	Thames Reefs	James Joseph Macky.
18/2/98	21	3	20	Tairua	VI.	Tairua	Treasury	Charles McLean.
19/8/96	100	0	0	Whangamata	XV. / III.	" / Ohinemuri	Three Star	Three Star Gold-mining Co. (N.L.).
29/5/96	100	0	0	Waiomo	XIV.	Hastings	Toulouse	Thomas Francis Cahill.
2/11/96	84	0	0	"	"	"	Toulouse Extended	"
24/4/96	12	0	30	Whangamata	XV.	Tairua	Triangle	Frederick W. Abbott.
18/5/96	94	0	0	Waiomo	"	Hastings	Trojan	James Mays.
4/3/96	68	2	27	Tairua	IX., X.	Tairua	True Ring	George Symons Budge.
3/2/97	100	0	0	Whangamata	XIV., XV.	"	Trump	William Benjamin Jackson.
26/2/96	48	2	20	Waiomo	XV.	Hastings	Ulysses No. 3 Ext.	Percy Spencer.
10/5/97	49	1	5	"	XIV.	"	Unicorn	Frederick Ernest Shera.
25/6/96	56	2	36	Whangamata	XV.	Tairua	Union	Wairoa Gold-mining Co. (N.L.).
13/11/95	74	2	0	Waiomo	II.	Hastings	Uranus	Puru Consolidated Gold-mining Co.
3/3/96	100	0	0	"	"	Thames	Uranus Extended	" (Ltd.).
5/2/95	7	0	0	Tairua	IX.	Tairua	Venus	James Mackay, jun.
24/7/97	100	0	0	Puriri	XIII.	Thames	Vernon	Richard Leary.
19/9/95	41	3	10	Thames	IV.	"	Victoria	The Victoria Gold-mining Co.
29/1/98	33	3	1	Tairua	VI.	Tairua	"	Herbert Gordon.
23/3/96	96	3	0	The Wires	"	Ohinemuri	Volunteer	J. P. P. Seaver.
27/2/96	100	0	0	Tararu	II.	Thames	Vulcan Extended	Henry Lomas Smith.
14/9/97	34	0	30	"	"	"	Vulcan Cheers	John Thomas Julian.
6/2/96	100	0	0	Waiomo	XV. / II.	Hastings / Thames	Waimea	Thomas Morrin.
20/3/96	17	1	0	"	XV. / II.	Hastings / Thames	Waimea Extended	John Hague Smith.
2/11/96	100	0	0	"	XIV.	Hastings	Waingohia	John Murphy and J. B. Fairs.
10/5/97	100	0	0	"	XIV., XII.	"	Waiomo Extended	William Read Bloomfield.
5/9/95	22	3	30	Thames	IV.	Thames	Waiotahi	The Waiotahi Gold-mining Co. (Ltd.).
27/8/96	27	2	29	Waiomo	XIV.	Hastings	Waipuru Extended	James Kernick.
19/8/96	100	0	0	Whangamata	XV.	Tairua	Wairoa	Wairoa Gold-mining Co. (N.L.).
21/11/95	30	0	0	Thames	IV.	Thames	Waitangi	Arthur Pittar.
15/2/97	96	0	0	Puriri	XIII.	"	Wandoline	Edmond T Dufaur and James Russell.
5/8/97	100	0	0	Tararu	IV., V.	"	Waratah	Chas. Kingswell and John Thomas Baker.
2/11/96	100	0	0	Whangamata	III.	Ohinemuri	Waterwitch	George Dunnett.
19/9/96	100	0	0	Waiomo	II.	Thames	Wenona	Wenona Gold-mining Co. (N.L.).
6/12/88	6	1	0	Thames	IV.	"	West Coast	John Northey.
8/6/97	7	3	15	..	VII., XI.	Hastings	Weymouth Extended	Hugh Thomas Torrens.
19/9/96	92	2	28	Whangamata	XII.	Tairua	Whangamata Peninsula	Claude Lorraine Kerry.
6/4/96	94	0	17	"	XV.	"	Wharekawa	Frederick W. Abbott.
29/10/96	9	0	15	Puriri	XIII.	"	Why Not	Robert Worth.
29/5/96	100	0	0	Tairua	II.	"	Winder	Andrew M. McMahon.
23/12/96	50	1	28	"	"	"	Winder Extended	Albert Gold-mining Co. (N.L.).
8/6/96	100	0	0	Waiomo	XIV.	Hastings	Windsor Castle	T. Millitt and E. J. G. F. Greville.
27/8/96	16	2	30	"	"	"	Windsor Castle No. 3	Ernest C. Beale.
19/8/96	60	3	1	The Wires	III.	Ohinemuri	Wires	M. J. Gannon and J Barber.

Mata District.

In this district, with the exception of desultory prospecting, very little work has been done in the claims taken up during the past two years.

Tapu District.

Sheridan Mine (Area, 100 acres; owners, Sheridan Gold-mining Company).—The chief work carried on during the year was in extending the low-level adit and driving a cross-cut to the reef. A drive was put in to the northward 75 ft. on the reef, which averages 2 ft. 6 in. in width, and it is intended to drive to the southward a distance of 120 ft. at this point. A rise will be put up to connect with a winze sunk on the reef from No. 3 level for 50 ft. This work will open up the mine, giving backs of 152 ft. between the No. 3 and the low level. Prospecting is also carried on at No. 2 level. A parcel of 443 tons of quartz taken from various parts of the mine was crushed, for a moderate yield of 40 oz. 1 dwt., valued at £118 5s. 3d.

Jessie.—This claim, which is situated on the northern side of Tapu Creek, was worked for a short time, and 15 cwt. of quartz was crushed, for 4 oz. 2 dwt. of gold.

Golden Point Mine (Area, 120 acres; owner, Golden Point Gold-mining Company).—Operations on the leaders cut in the shaft-workings were carried on for a time, but only a small parcel of 2½ tons of quartz was crushed, for 1 oz. 6 dwt. of gold.

Mahara Royal (Limited), Tapu.—In June, 1896, an option was taken over the Mahara and the Royal Special Claims by the Austinfriars Finance Syndicate, of London, and shortly afterwards it was floated into an English company with a subscribed capital of £30,000. This property is managed by the Thames Exploration Syndicate. When the property was taken over, the Royal reef had been cut in the surface level with only a few feet of backs. It was decided, for the future development of the property, to open up a lower level at a perpendicular depth of 80 ft., which, with the underlie, gave about 140 ft. of backs. When the reef was cut at this lower level, driving north and south on the course of the reef was proceeded with, and very fair prospects obtained. Reports were forwarded to London recommending a certain course of action for further developing and opening up the property. When some 300 ft. had been driven on the main reef the construction of a water-race was commenced, capable of driving a thirty-head battery even in the summer. A ten-head stamper battery was also erected, to test the reef for a period of twelve months prior to putting up a larger plant. The water-race and erection of battery were completed about October, 1897, since which time crushing has been continuously carried on. The reef averages about 6 ft., varying from 2 ft. to 10 ft. About 2,200 tons of ore have been treated, for a yield of about 1,000 oz. of bullion, at £3 1s. 6d. per oz. This has not only paid the working-expenses, but has also paid for further development of the property.

A drive has been made in the Fluke section of the property with 250 ft. of backs. The reef has been cut, but the value of it has not yet been ascertained. Another new adit has been commenced to cut the Royal reef at a lower level, which will give another 150 ft. of backs on the same reef under the present workings. Some 600 ft. of driving will be required to cut the reef. About 800 tons of tailings have been saved for treatment by cyanide. Various tests made show the value to be about £1 per ton. It is the company's intention to increase the size of the plant, and also to erect cyanide plant, in October or November next. Five tons of ore are now being shipped to London for experimental purposes.

Waiomo District.

Monowai Mine (Area, 89 acres; owners, Monowai Gold-mines, Limited).—A large amount of work has been done in opening up the levels on the reef: At the No. 3B level 500 ft. have been driven on a large reef 30 ft. in width; on No. 3A level 300 ft. of driving has been done on the reef; on No. 2 level a winze is being sunk on the reef to connect with No. 3B level; and winzes are also in progress to connect and ventilate the different levels. Large blocks of reef will be available for stoping as soon as the mill is in order and water for power can be had. A ground tramway 100 chains in length is being constructed for the purpose of conveying the quartz to the battery. Two incline sections are on this line, one 6 chains and the other 14 chains in length. The Gem reef, which has been well opened in the section to the westward of the Monowai, is connected with the mill by a ground tramway 60 chains in length. On this line there is an incline of 18 chains, the trucks being lowered and raised by the use of a brake-wheel and wire-rope. The mill, which consists of one rock-breaker of ten stamps, one berdan, two Brown and Stamford's concentrators, five cyanide-vats, and two zinc filters, is driven by a Pelton wheel for the stamps and a portable steam-engine for the concentrators. The treatment to be adopted is wet-crushing and amalgamation, then concentration, the concentrates to be shipped to England for treatment, and the tailings treated by the cyanide process. The ore in the Monowai reef is highly charged with copper, and has not hitherto been successfully dealt with for the extraction of gold and silver in other than an experimental manner, but the methods now to be adopted give promise of successful application. Forty-five men are employed.

Prospecting operations were for a short time carried on in the Comstock, Broken Hill, and other mines in this district.

Puru District.

Puru Consolidated Mine (Area, 392 acres; owners, Puru Consolidated Gold-mining Company).—The chief work done during the year was the erection of a battery of ten stamps and two amalgamating-pans. This will be driven by water-power. A race has been cut 40 chains in length, and a fall of 28 ft. is had at the battery. An aerial tramway, 33 chains in length, conveys the quartz to the battery. The mine is well opened up, the reef being about 3 ft. in thickness, and, as gold is visible in the quartz, there is a hopeful outlook for success when sufficient water is available to drive the machinery.

Prospecting has been carried on in some other claims, but not to any great extent. In the Alma Claim, situated between the Puru and Tararu Creeks, prospecting work has been carried on for a few months.

Tararu District.

Tararu Mine (Area, 160 acres; owners, Tararu Creek Gold-mining Company).—Operations have been carried on in extending the low level, which has now reached a distance of 2,350 ft. from the entrance, and at the end is 638 ft. below the surface. Driving and stoping was also carried on on Nos. 3 and 4 levels, and 1,970 tons of quartz was brought to the mill and crushed, for 426 oz. of gold saved by amalgamation, value £1,288 12s. 8d., and 1,995 oz. by the cyanide process, value £1,057 7s. 11d. Forty-seven men were employed. On the 25th March the mill was entirely destroyed by fire, and a new plant, consisting of thirty head of modern stampers, with stone-breaker and ore-feeder and six cyanide vats, is to be erected. In place of the old overshot water-wheel a Pelton will be used.

Kaiser Mine (Area, 49 acres; owners, Kaiser Gold-mining Company).—The drive on the new reef was continued to a distance of 104 ft., the quartz being from 1 ft. to 3 ft. in width. A low

level was also driven 146 ft., and the reef cut, on which driving was continued for 124 ft. A winze was also sunk from No. 1 to the low level. The quartz, which is of a highly mineralised character generally, was crushed, and treated by the ordinary process. 112 tons yielded 88 oz. 10 dwt. of gold; value, £286 7s. Six men were employed.

City of Auckland Mine (Area, 100 acres; owners, City of Auckland Company).—The shaft commenced the previous year was sunk to a depth of 170 ft., and 600 ft. of driving was done. The development of the reef, which is here about 15 ft. in width, did not disclose quartz of a valuable character. One ton of picked quartz yielded 2 oz. of gold; value, £3 10s. 8d. Seven men were employed.

Scandinavian Mine (Area, 54 acres; Arthur Molyneaux, owner).—This mine was idle for six months, and only a very limited amount of work has been carried on during the latter half of the year. Twelve tons of quartz yielded 16 oz. 5 dwt. of gold; value, £41 17s. Two men were employed. The mine-manager, Mr. Alexander Whitley, furnished the following account of the mine and ownership during the past year: "The mine and plant were taken over in March, 1897, by Mr. Arthur Molyneaux, on behalf of an English syndicate, who undertook to float a company to provide capital to open up and thoroughly develop the mine. They still hold this option over the property. The mine was protected from March to September, 1897, and since that time has been working by permit with two men. The work done since September has been mostly surface prospecting, trenching, and shallow drives on some of the undeveloped reefs. Fair prospects were obtained in the different reefs, all of which are worthy of further development. A little stoping was done on a small reef at the lowest level, 100 ft. from the surface. Twelve tons of ore was broken out and treated at the company's mill, for the return of 16 oz. 5 dwt. bullion, valued at £41 17s., which left a small profit after paying expenses of breaking and treating. This latter work is being continued at the present time, with encouraging results."

Sunlight Mine (Owners, Sunlight Gold-mining Company).—Driving has been carried on in the No. 2 leader, which varies from 2 in. to 2 ft. in thickness. Four men are employed.

Argosy Mine.—This mine is situated on the range to the northward of Tararu Creek. Several large gold-bearing reefs are known to exist in the ground, and occasional small patches of rich stone have been obtained; 4 cwt. of quartz yielded 23 oz. 6 dwt. of gold; value, £77.

Chicago Mine.—Prospecting work was carried on in this mine, and from a parcel of 3 tons of quartz a yield of 7 oz. 2 dwt. of gold, value £18 19s., was obtained during the latter end of 1897, when two men were employed. Since that time a larger staff of twelve men was employed in developing the different reefs in the ground, and in preparing for the erection of a battery of ten stamps; also in constructing a water-race and a tramway. The water-race will be 49 chains in length, and give a fall of 260 ft., which, it is expected, will supply ample power to drive the battery.

Vulcan Extended.—This property has an area of 100 acres, and is situated in the Upper Tararu district. The Thames Exploration Syndicate has a working option over it at the present time. A cross-cut was commenced about 40 ft. from the surface to cut what is known as the old Vulcan reef, which has a north-east and south-west course. This drive is known as the intermediate level. Some very fair gold and picked stone were obtained at this point, and the reef averaged about 7 ft. in thickness. The prospects being so encouraging, it was decided to put in another drive to cut the reef at a lower level. This was started from the creek-level, which gave 100 ft. more backs. The reef was cut after driving 120 ft., and driving was then continued with the object of cutting other reefs which are known to exist in this property. The whole length now driven is 360 ft. A battery-site and water-race rights have been obtained, and it is the intention of the syndicate to proceed with their erection and construction during the present year. A parcel of 5 tons of ore is being shipped to London for experimental purposes. The mine is opening up well as development work proceeds, and there appears every probability that it will turn out a paying concern. Very good prospects were met with during the whole length of the driving of the 360 ft., and several trial lots were taken out and treated by the ordinary wet process with very satisfactory results. The last $1\frac{3}{4}$ tons treated at May Queen Extended battery yielded at the rate of £2 12s. 2d. per ton.

Temple Bar Mine (Owners, Temple Bar Gold-mining Company).—Driving in the low level has been carried on during the year, the reef averaging about 1 ft. in thickness. Two men are employed.

Lylas, Mount Taylor, Eaglehawk, and Ake Ake Mines have been worked during the year, but are at present under protection.

Shellback District.

Waitangi Mine (Owners, Waitangi Gold-mining Company).—Since the expiration of protection in the early part of the year developing operations have been carried out in Nos. 3 and 4 reefs, top level, which is some 4 ft. in width. A parcel of quartz has been sent to the battery for crushing, but as yet no returns are to hand.

Thames Special (Area, 51 acres; owner, Samuel C. Macky).—In this claim very little work was done during the year. Nineteen tons of quartz was crushed, for 18 oz. 14 dwt. of gold.

Prospecting was also carried on in the Magazine and other claims.

Kuranui District.

Kuranui Mine (Area, 15 acres; owners, the Kuranui Gold-mining Company, Limited).—The shaft is 150 ft. in depth, and from the level at this depth a winze was sunk 46 ft. The reef is 2 ft. 6 in. in width. A drive has been put in on this reef for 60 ft. The Oddfellows reef has also been driven on for 75 ft. No crushing has been done at the battery during the year; therefore no returns of gold. A party of tributers crushed thirty-seven loads from the surface, for 5 oz. 15 dwt. of gold; value, £14 13s. 3d. Three wages-men and two tributers were employed.

Kuranui Caledonian Mine (Area, 29 acres 3 roods 20 perches; owners, Kuranui Caledonian Gold-mine, Limited).—The chief works carried on during the year were driving on No. 1 reef and

cross-cutting at No. 4 level; stoping, driving, and sinking on the cross-reef and Darby's and Kelly's leaders at Nos. 1, 2, and 3 levels. In prosecuting those works winzes were sunk 196 ft., driving cross-cuts 752 ft., driving on reefs 1,726 ft., and repairing old levels 1,950 ft. The quantity of quartz crushed was 223 tons, which yielded, by amalgamation, 1,174 oz. 9 dwt. of gold, valued at £3,139 5s. 7d. Thirty-seven men were employed.

Moanataiari District.

Moanataiari Mine.—This company has, during the past twelve months, done a very large amount of development work in the mine, and still has a considerable amount to do before the mine can be said to be fully opened up. The mine is divided into two distinct sections—namely, the eastern and western sections. Eastern section: The eastern section is the portion of the property on the east side of the main Moanataiari slide. The work in this portion of the mine has been extending the Point Russell level to the boundary of the property on the Golden Age reef, and also extending the intermediate and 100 ft. levels on the Golden Age and Reuben Parr reefs. The main-adit level, known as the Moanataiari Tunnel, has been extended for a distance of 600 ft., making a total length that this adit level goes back into the range of 3,700 ft. In extending the main-adit level a deviation from the straight line was made at 3,200 ft. in from the mouth, in order to get clear of a hard bar of rock, and also to intercept and follow the course of the Golden Age lode on that level. An uprise has been constructed from the end of the main adit for a height of 120 ft., and a drive is now in course of construction to cut the Reuben Parr lode underneath the place where a chute of good ore was found on the 100 ft. level. At the main-tunnel level the Golden Age reef is broken up to a large extent, and is not nearly so well defined as it is on the upper levels. On the Point Russell level it has an average of fully 6 ft. in width, and in some places it widens out to a width of 12 ft., whereas in the main-adit level it is only from 18 in. to 3 ft. in width. Nests of specimen stone are occasionally found above the Point Russell level, although the general body of the ore is comparatively of low grade. It is expected that the Reuben Parr and Golden Age reefs will junction between the 100 ft. level and the main-adit level, but the junction of these reefs has not yet been met with. Western section: The western section of the mine is that portion which lies on the seaward side of the Moanataiari slide. Previous to the present company taking over the mine all the known payable ore was taken out of this section to a depth of about 150 ft. below the main adit level, which was worked from a shaft constructed in a chamber a little to the northward of the main-adit level, and at a distance of about 1,400 ft. in from its mouth. This shaft has now been abandoned, and the whole of the workings in this section are carried on from a new shaft, which has been sunk on the south side of the Moanataiari Creek to a depth of about 500 ft., or about 400 ft. below the level of the main adit. Four different levels have been opened out from this shaft, and stoping is now being done on the No. 1 and No. 2 Caledonian reefs, on No. 2 and No. 3 levels, and also on the No. 9 Moanataiari reef on No. 1 level. A level was opened out at the bottom of the shaft, and the No. 1 and No. 2 Caledonian reefs were cut and driven on for some distance; but the general body of the ore in the reefs at this level, so far as the working has advanced, is of comparatively low grade. The No. 1 reef has a thickness of about 24 ft., and carries a great deal of mineral, and from its appearance one would think that it should contain good ore. The impression is, however, that a good chute of ore is not far distant. All working on this level is suspended for the present, until the development on the Cambria reef is further advanced. A cross-cut of nearly 1,000 ft. in length has been constructed from the shaft on the No. 3 level to the Cambria reef, which is now being driven on, and several veins and stringers of highly auriferous quartz are met with, coming in from the country-rock into the hanging-wall side of the lode. The reef itself is enclosed in a splendid class of country-rock, where one would expect to find a body of good ore in the reefs, but, so far as yet opened out, the best portion of the reef is on the hanging-wall side. In driving eastward from the cross-cut towards the main slide a slight break has recently been met with, and it is expected that as soon as this break has been gone through, good ore will be found in the general body of the lode. A cross-lode was met with in constructing the cross-cut from the shaft, but the juncture of the cross-lode and the main Cambria reef has not yet been reached, and it is now apparent that this cross-lode has something to do with the break that has been met with. A large amount of development work had to be done in this portion of the mine to get connections for ventilation with the old drives in the Kuranui Caledonian Mine, and an uprise will have yet to be constructed to the old workings in the Cambria Mine, which now belongs to the Moanataiari Company, before good ventilation is secured. Crushing battery: A new crushing battery has been erected, consisting of sixty stamps of 1,100 lb. each, two Blake-Marsden 16 in. by 10 in. rock-breakers, twelve Challenge automatic ore-feeders, twenty-four vanners—twelve of each are of the Union pattern and twelve of the Frue—twenty-one berdans, and a cyanide plant, consisting of three iron percolating-vats each 20 ft. in diameter and 3 ft. in depth, along with solution- and mixing-vats, and also two concrete sumps; and a vacuum boiler and pump. Owing to the main adit being at so low a level—only some 20 ft. above the level of the flat—and the street passing close in alongside the range, the grizzly and rock-breakers had to be constructed at a lower level than the bins or hoppers for holding ore to feed the stamps. The ore, as it comes out of the mine, is dumped on to the grizzly, and the fine material passes through the bars into a hopper, while the large pieces of ore are landed on a flat sheet, and fed into the rock-breakers, and after passing through these fall into the same hopper where the fine material lands after passing through the bars of the grizzly. The broken ore from this hopper is taken up by trucks on two cages worked by two hydraulic lifts to such a height as enables the trucks to be run along on the top of the storage-hoppers, from which the ore passes into the automatic ore-feeders, and is fed into the mortar-boxes. The stamping battery is constructed in two sections, each section consisting of thirty heads, having about 30 ft. between them. Each thirty heads is driven by a separate Pelton water-wheel, while another Pelton wheel drives the stone-breakers. The battery is so arranged that a steam-engine is erected on a concrete and brick foundation between the two

sections of the stamps. This engine was considered necessary in order to insure the mill being continuously worked in dry weather when water was not available for motive-power. There are tables fitted to each battery of five stamps, each table being 6 ft. in width and 10 ft. in length, covered with Muntz-metal plates, and silvered. From each of these tables the crushed pulp is led in a chute on to two vanners, which concentrate the ore, the concentrates being collected in a box at or near the head of each vanner, while the tailings pass into a main chute, and are carried away with water into nine sets of Cornish buddles. Each set of twelve vanners is driven by a Pelton wheel; the berdans are also driven in two divisions, with a Pelton wheel for each division. A tram-line is laid down all the length of the battery building, and the concentrates from the vanners are filled into trucks, which are run along this line and lifted in a cage worked by a hydraulic lift to the level of the top of the percolating-vats, where there are two lines of rails, and the concentrates are dumped into the vats, to be treated with cyanide solution. A Pelton wheel is also used to work the vacuum pump, and for pumping the solution from the sumps into the mixing-tank, where it is again made up to the proper strength required to use again. The steam-engine is of the compressed condensing tandem type, manufactured by Davey, Paxman, and Co., the high-pressure cylinder being 17½ in. in diameter and the low-pressure cylinder 34 in. in diameter, provided with automatic expansion gear, special governor, and jet-condenser, with air-pump fitted with indiarubber valves. The engine travels at a piston speed of 400 ft. per minute, and is capable of developing 240-horse power. Steam is supplied by two of Babcock and Wilcox's boilers, which are tested up to a pressure of 300 lb. per square inch each. It is found that this class of boiler is far more economical in the consumption of fuel than either the Lancashire or multitubular boilers, while the cost in the first instance is less. Care, however, has to be taken that water charged with mineral substances is not used. Attached to the battery building is a retort and assay-room, and every convenience for the working of the mill, while the whole building is lighted with electric light, produced by a 200 incandescent lamp dynamo, each lamp being 16-candle power. The dynamo is erected in the engine-room with switchboard, so that any light can be turned out when not required, and it is driven by a separate Pelton wheel. The foundations of the battery are very massive and strong. The mortar-logs were each 18 ft. in length, 5 ft. 3 in. by 2 ft. 6in., all in one piece. These are set on a cross-log resting on a solid concrete foundation. It was difficult to get down to solid rock in one of the sections of the battery, and the contractor got the option of either sinking down to the solid rock or driving two rows of piles, and placing a thick bed of concrete on the top of these before laying down the bed-log for the mortar-blocks to rest on. The latter system was adopted, and the foundations are of so stable a character that there is very little vibration to be felt when the stamps are running at their full speed—namely, 95 drops per minute. The whole of the mill is of the most approved American design, and it may be said to be the most complete wet-crushing mill in the district. It was erected under contract by Messrs. Price Brothers, of the Thames, on designs approved by H. A. Gordon, the general manager of the company, and the electrical insulation was done by Messrs. Chambers and Sons, of Auckland. The mill commenced crushing, with thirty heads of stamps, in February last, and up to the end of April 2,220 tons of ore was crushed out of the mine, which yielded on the plates only gold to the value of £2,500 9s. 9d. The other thirty heads of stamps were only completed in April. The contractor could not complete his contract until the County Council laid down a new water-main to supply water for motive-power and for the tables of this section of the mill. In addition to the gold obtained from the plates, there is 190 tons of concentrates on hand, having an assay-value of £694. The concentrates have not yet been treated. It has been found that the gold the concentrates contain cannot be extracted until subjected to a roasting operation. The large quantity of sulphurous acid generated by a rapid decomposition of the concentrates and the particles of pyrites enclosing the gold is not acted on to any extent when in a raw state. This acid, although neutralised considerably by the use of caustic soda, prevents the cyanide acting on the gold. Mr. Park, who has charge of this part of the process, had to take 100 tons of concentrates out of the vat, after it had been subjected to cyanide solutions for one month, without extracting but very little of the bullion. The whole of the concentrates are now being stacked, awaiting the erection of a reverberatory furnace.

New Alburnia Mine (Area, 63 acres 3 roods 20 perches; owners, New Alburnia Gold-mining Company, Limited).—The chief work carried on during the year was further sinking of the shaft, which is now 550 ft. in depth; opening chambers, and cross-cutting to the reef, which varies from 2 ft. to 12 ft. in width; driving on the reefs, and stoping out quartz. 3,744 tons of quartz was crushed, for a yield of 1,771 oz. of gold, valued at £4,717 12s. 9d. Forty-five men were employed.

Darwin Mine.—Two men were employed working on a reef 10 in. in thickness. Seven tons and a half of quartz yielded 4 oz. 2 dwt.; value, £11 10s.

Fearnaught Claim.—A party of two men are driving the surface prospecting levels, but as yet no good results have been met with. Two tons of quartz was crushed, for a yield of 1 oz. 14 dwt. of gold.

Tudor Mine.—A winze has been sunk on the Bendigo Reef. The reef is some 18 in. in thickness, and 14 tons of stone yielded 32 oz. 3 dwt. of gold.

Operations were also carried on in the New Whau, Orlando, Moanataiari North, and Alburnia East Claims.

Grahamstown.

Victoria Mine (Area, 41 acres 3 roods 10 perches; owned by the Victoria Gold-mining Company).—The work carried on during the year was on the Victoria leader, between No. 1 and No. 2 levels. The quantity of quartz mined and treated was 604 tons, for a yield of 653 oz. of gold, valued at £1,764 9s. Nineteen men were employed.

Cardigan Mine (Area, 64 acres 2 roods).—The work engaged in at this mine has been altogether of a prospecting nature, and the five men employed are now driving on the Cardigan reef. No returns are recorded.

Drainage.

The deep levels at the Thames continue to be drained by the machinery and pump in the Big Pump shaft, the whole being under the control of the Thames Drainage Board, the members of which are elected by the contributing companies and the Thames Borough and County Councils. The business is conducted in Auckland, at which place the meetings of the Board are held. The following extract from the annual statement of accounts shows the financial position of the Board, and also the contributions from the different companies assessed :—

Company.	Arrears.	Assessment.	Rebate.	Cash received.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
May Queen Gold-mining Company ...	...	1,000 0 0	125 0 0	875 0 0
Waiotahi " ...	...	645 0 0	80 12 0	564 8 0
Victoria " ...	...	600 0 0	75 0 0	525 0 0
Kuranui-Caledonian " ...	...	427 0 0	53 8 0	373 12 0
Moanataiari " ...	...	354 0 0	44 5 0	309 15 0
Cardigan " ...	...	300 0 0	37 10 0	262 10 0
Cambria " ...	...	250 0 0	31 5 0	218 15 0
Thames-Hauraki " ...	...	240 0 0	30 0 0	210 0 0
Kuranui " ...	...	90 0 0	11 5 0	78 15 0
		3,906 0 0	488 5 0	3,417 15 0
Thames Borough Council	10 0 0	120 0 0	..	100 0 0
Thames County Council	20 0 0	150 0 0	...	157 10 0
	30 0 0	£4,176 0 0	£488 5 0	£3,675 5 0

The Big Pump has worked very satisfactorily for the last four months. The quantity of coal used has been, on an average, 197 tons per month, which has been chiefly Hikurangi coal, and has been delivered in the yard at 12s. 8d. per ton; and the total cost of working the plant has been £257 per month. It was found necessary to employ two watchmen to look after the water that was put down the Tookey shaft for the purpose of ventilating the Pump shaft, so as to prevent any accident through the stoppage of the water, thereby causing the current of air to cease, and allowing the gas to accumulate in the Big Pump shaft, and getting distributed into the surrounding mines and endangering the lives of men working in them. The appointment of the men has been found to work admirably, as there has not been the slightest appearance of any gas to do any harm since they were appointed. The manager, Mr. J. Brokenshire, reports as follows: "I have the honour to inform you that the pumping operations have been carried on continuously during the past twelve months, with the following exceptions: After the annual clean-out of the water-race, pumping was resumed at the beginning of January. On the 19th January the strapping-plates on the main rods between the 300 ft. and 400 ft. levels gave way, and were replaced with stronger ones. On the 20th March the glands of the main rod at the 100 ft. level were found to be broken, and two new ones were at once obtained and placed in position. In April and May last advantage was taken of the Kuranui Caledonian Company carrying on operations through the Big Pump shaft to clean out and repair the main drive at the 400 ft. level, in order to keep the ventilation open. The balance-bobs at the surface and the 300 ft. level were getting out of repair, and had to be overhauled, repairs being completed in June last. On the 30th June the main strapping-plates connecting the surface balance-bobs with the main rod suddenly parted, and pumping had to be discontinued until the necessary repairs were effected. On the 8th July we stopped pumping to make ready for the annual boiler inspection, which took place on the 13th, pumping being resumed on the 15th. The Inspector remarked that the main boilers looked remarkably well for their age, but recommended great care be exercised in their use. He condemned the cylinder of the winding-engine, and a new one was supplied by Mr. Judd. On going down the shaft in August last to repair the guides, to enable me to get to the 500 ft. level and make preparations for fixing the new working-barrel in position, we found that several sets of timber in the main shaft had given way. These were replaced as expeditiously as possible. Another two days' stoppage occurred on the 20th and 22nd August, through an accident to the water-race. On the 18th November pumping was discontinued, in order to place the new working-barrel, clack, and seating in position. The old ones were found to be in a very bad state, and the wind-bore almost choked with broken metal. The county water was shut off on the 26th December for the annual clean-out of the water-race. Pumping was resumed this morning, advantage being taken of the stoppage to overhaul the machinery, which is now in very fair condition, considering the length of time it has been in use. The buildings are in very fair condition, with the exception of the flooring in the winding-engine house, which is very rotten, and will shortly require renewing. The working-expenses last month were £231; extra expenses for repairs, £5. The consumption of coal for the past year was 2,358 tons.

Waiotahi Creek District.

Waiotahi Mine (Area, 22 acres 3 roods 30 perches).—This mine still continues to be worked on the same lines as for the past twenty years. The veins worked on are from ¼ in. to 6 ft. in width, and the mine is kept so well opened up that payable crushing is continuous. 1,360 tons crushed yielded 1,931 oz. 9 dwt. of gold, valued at £5,227 17s. 3d. Sixteen men are employed.

Nonpareil Mine (Area, 21 acres).—Work has been carried on in this mine. The two reefs

worked are the Liverpool reef, 1 ft. wide, and the Wade reef, 9 in. The quantity of quartz sent to battery was 294 tons, which yielded 361 oz. 10 dwt. of gold, valued at £1,008 9s. 9d.

West Coast Mine.—This claim is still worked by the owner, Mr. John Northey. Forty-nine tons of quartz yielded 47 oz. 7 dwt; value, £122 3s. 6d.

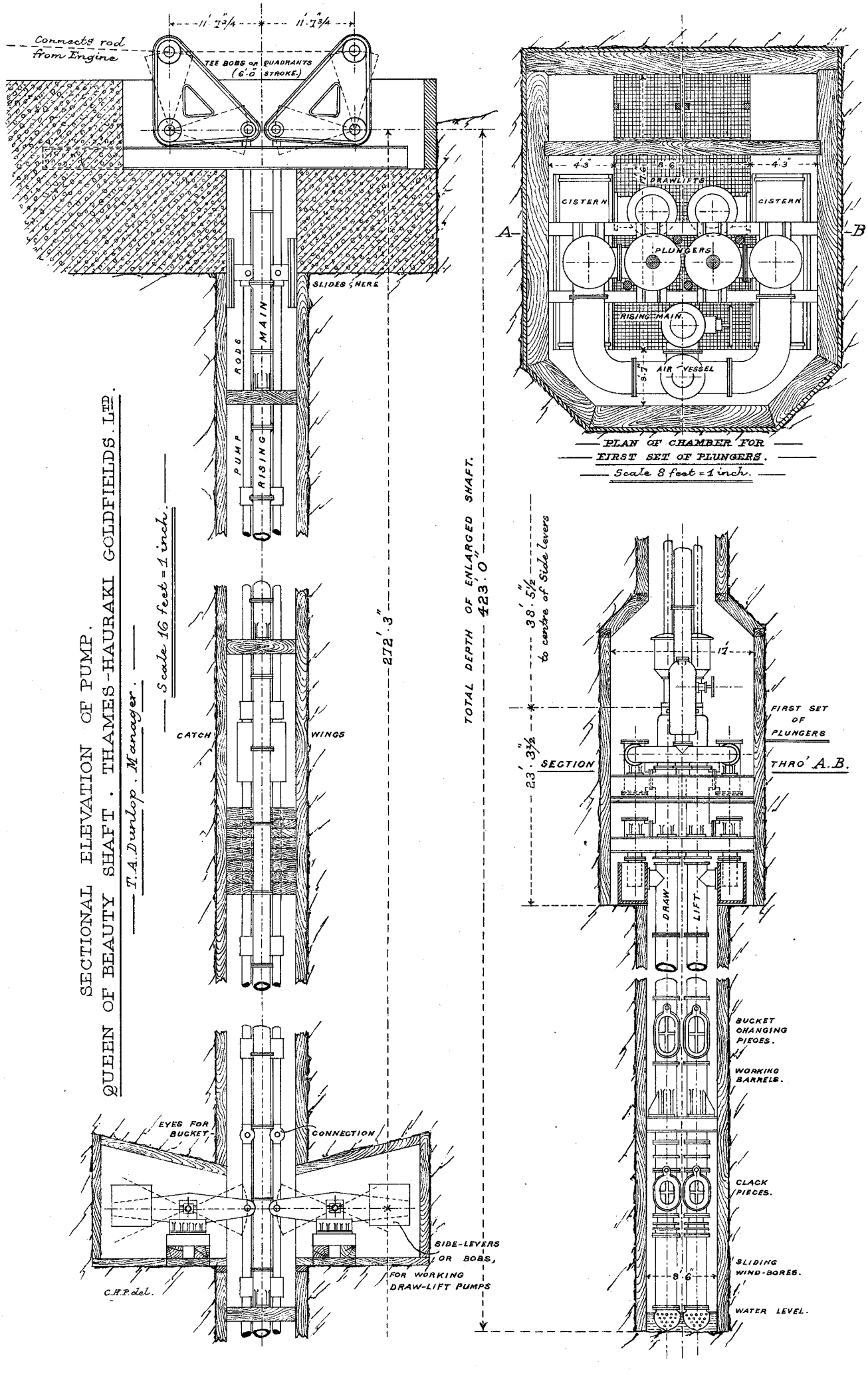
Little Maggie Mine.—This claim adjoins the Nonpareil. William Bright, the owner, has been engaged in driving and stoping on small leaders and stringers. Fifteen tons of stone has yielded a return of 16 oz. 2 dwt. of gold.

Infant Claim.—This is worked by the owner, J. Johnson. Eight tons of stone from small leaders and stringers gave a return of 8 oz. 17 dwt. of gold.

Hauraki Golden Age Special Claim (Area, 71 acres 3 roods 29 perches; owners, Hauraki Golden Age Mines, Limited).—The main reef, the Golden Age, is very mullocky, and varies from 4 ft. to 30 ft. in width. The work carried on in 1897 comprised cleaning up the adits and relaying roads, cleaning out old levels and winzes and driving prospecting levels, sinking winzes, and generally prospecting and developing the property. No mine machinery is employed at present, but £1,712 has been spent on an aerial tramway. The mill machinery comprises one 220 brake horse-power steam-engine for driving new forty-stamp mill, &c. Pelton wheel—one driving old twenty-one-stamp mill and thirteen berdans; rock-breakers—two Blake-Marsdens, for new mill; sixty-one stamps for wet-crushing (forty new and twenty-one old); thirteen berdans; two concentrators (not erected). Capital expended on mill machinery, &c., in 1897, £7,962. Average number of men employed, thirty.

Waiokaraka District.

Thames-Hauraki Company.—The erection of this company's pumping plant has proceeded very slowly during the past year, owing to the machinery coming out piecemeal from the contractors, the Sandycroft Company in England, and, strange to say, the parts that were shipped first were those that were not required until the whole of the other portions were put together; indeed, it was a long time before the bed-plate for the pumping-engine came to hand. The same thing took place with the pump-pipes; they were the first shipment that arrived, but no girders or bed-plates arrived for twelve months after the arrival of the first shipment of pipes. A cablegram has been received from London that the whole of the machinery was shipped on the 15th April last, so that it is expected here in the beginning of June. The position at the present time is as follows: Ten steel Lancashire boilers, 30 ft. long and 7 ft. in diameter, have been put together and riveted up by Messrs. Price Brothers, of the Thames. These have been erected in position, and fitted with Howl's patent furnaces for burning slack coal. Each of the boilers was tested up to a pressure of 300 lb. per square inch, by hydraulic pressure, before leaving Messrs. Price Brothers' establishment. The Howl's furnaces, which are fitted into the internal flues of these boilers, will effect a great saving in the consumption of fuel. Everything has to be burnt to ashes sufficiently small to come through a hole or slot about $\frac{1}{8}$ in. wide. Although none of these furnaces have been actually tested in this plant, similar furnaces are fixed to some of the boilers in Auckland, which burn any rubbish in the shape of fuel, and give the greatest satisfaction. The principle of these patent furnaces is that the fuel is charged on to plates having narrow slots instead of fire-bars, and there is a jet of steam brought from the boiler and introduced underneath the plates. The steam, passing through the hot fire, is relieved of its oxygen, and the hydrogen is set free, and burns. This jet not only carries a draught, but also increases the heat of the flame from the fuel. The boilers are all built in side by side, having flues on sides and underneath. These lead into a large flue 3f t. in width and 7 ft. in height, which goes along the back end of the rows of boilers, and leads to the chimney-stack. The flame, after passing through the internal tubes, passes into the flue underneath the boilers, and returns to the flues at each side. The back end of each side-flue is fitted with a damper to regulate the draught in each boiler. A feed-pump of the Worthington pattern is provided to supply the boilers with feed-water. On the front end a large concrete floor is constructed to hold a supply of fuel, and the whole is covered in by a substantial building of wood and corrugated galvanised iron. Pumping-engine: The bed-plates are laid down and fixed in position, and both the high- and low-pressure cylinders are bolted on the beds, with the girders and pillow-blocks for the crank- and pumping-shafts; but none of these shafts are yet in position, the engine crank-shaft and fly-wheel, with spur- and pinion-wheels, not having yet come to hand. A large travelling crane is erected across the building overhead to lift the different portions of the machinery into position. This crane, although only guaranteed to lift 12 tons, has lifted the heaviest portions of the machinery into their places, some of these being 17 tons weight. A small steam starting-engine has yet to be erected alongside the pumping-engine. Concrete foundations were made at each side of the pumping-shaft connected with the main concrete block on which the pumping-engine rests, and on the top of this foundation two heavy wrought-iron girders have been placed across the shaft, and also over the whole length of the concrete on each side of the shaft. These girders are all riveted together and joined at each end with cross-girders, and firmly bolted down to the concrete foundations. Pillow-blocks are bolted on to the top of the girders to receive the axles of the quadrants. On the side next the pumping-engine two large diagonal wrought-iron girders are butted at the ends against the pillow-blocks on the girders for the quadrants, and at the other end, against the foundation for the pumping-engine, to act as struts, and to prevent any movement of the quadrant pillow-blocks or bed-girders. These struts are secured to engine foundation and girders at each end with strong bolts. The quadrants are made of wrought-iron and strongly riveted together. These are on the ground alongside the shaft ready to be lifted into position. The side connecting-rods for the quadrants are of wrought iron, and are on the ground, but the main connecting-rod has not yet come to hand. A capstan-engine, with two 6 in. cylinders, is erected, with screw-wheels, and also spur-wheels and pinions, having helical teeth, with winding-drum for capstan-rope, which is what is termed a 6 in. steel


SECTIONAL ELEVATION OF PUMP.
QUEEN OF BEAUTY SHAFT . THAMES-HAURAKI GOLDFIELDS. LTD.
T.A. Dunlop. Manager.
Scale 16 feet = 1 inch.
Connects rod from Engine
11'7¾"
11'7¾"
TEE BOBS on QUADRANTS (6'0" STROKE.)
SLIDES HERE
RODS
MAIN
PUMP
RISING
CATCH
WINGS
EYES FOR BUCKET
CONNECTION
SIDE-LEVERS OR BOBS, FOR WORKING DRAW-LIFT PUMPS
C.H.P. del.
272'.3"
TOTAL DEPTH OF ENLARGED SHAFT. 423'.0"
PLAN OF CHAMBER FOR FIRST SET OF PLUNGERS.
Scale 8 feet = 1 inch.
4'3"
8'6"
4'3"
DRAWLIFTS
CISTERN
CISTERN
A
B
PLUNGERS
RISING MAIN
3'1"
AIR VESSEL
38'.5½" to centre of Side levers
23'.3½"
17'
FIRST SET OF PLUNGERS
SECTION
THRO' A.B.
DRAW
LIFT
BUCKET CHANGING PIECES.
WORKING BARRELS.
CLACK PIECES.
SLIDING WIND-BORES.
8'6"
WATER LEVEL.

rope, being about 2 in. in diameter, and capable of lifting 20 tons. This capstan is provided with a powerful screw conical brake. The engine being of such small dimensions, the piston speed is very high, and is reduced down by the gearing described, so as to lift 20 tons at a moderate speed. Two sets of plungers have been fixed in position in the shaft at 327 ft. below the surface, and above the plunger-poles there is a large chamber cut out, where balance-bobs are placed to take the weight off the rods, and above this, directly below the end of the first rod, two beams are being placed across the shaft, each 9 ft. deep by 12 in. wide, to prevent the rods from going down in case of any accident or breakage occurring. Each of the plunger-rods is 10 in. in diameter, of solid steel, and are jointed every 30 ft. On each end of every rod there are two heavy collars about 13 in. in diameter. The ends of the rods are butted together, and a heavy cast-iron coupling bored out in the centre to admit the collars on the rods, which are made in two pieces. This coupling is slipped on each joint, and bolted together. In order to keep the rods firm at the joints, a cotter about 3 in. wide is driven through the coupling, and through the key-ways, cut in the ends of each collar on the rods, which wedges the collars on the rods hard up against the recess in the coupling, and keeps them firm. It is fixed below the lowest coupling, where the beams are placed across the shaft to prevent the rods going down. Both plungers discharge into one uprise column of pipes, and this column is now fixed in position to the surface. Notwithstanding the large size of the shaft where the pumps are placed—namely, 17 ft. 6 in. by 8 ft. 6 in. in the clear inside the timber—there is very little room in it when the pumps and rods are placed in position. Guides for the rods working in are also to be placed about 60 ft. apart, to prevent vibration on the downward stroke of the plunger-poles. Sinking-pumps: There are two draw-lift pumps on the ground, the uprise columns of which are 26 in. in diameter, to admit of the bucket being hauled up inside the column in the event of the water rising too fast to get the bucket taken out and replaced at the door-piece, directly above the working-barrel. The working-barrels of these draw-lifts are made with three heavy wings, which project beyond the outside of the pipe for about 18 in., and form a solid base to bear the whole weight of the column full of water. These large projecting wings were never anticipated, and when these pumps have to be put down, the centres dividing the winding from the pumping compartment will have to be taken out before they can be got into place. The wind-bores at the end of the suction-pipes for these two draw-lifts have holes in them to a height of 3 ft., so that there would always have to be a depth of 3 ft. of water before they would commence to lift any, and this would make the sinking of the shaft very expensive, as the men would always be working in water. It has now been decided not to put down these draw-lift pumps until the shaft is sunk to the desired depth, and, instead of these, two double-action Cameron steam sinking-pumps will be got, and used in sinking the shaft. As these pumps have a very short stroke they will keep the bottom of the shaft comparatively dry during the sinking operations. The manager has not yet got authority to order these sinking-pumps, which the Union Ironworks require ninety days to deliver at Auckland; so that it is a difficult matter to state at what date pumping operations will commence. Judging from what can be seen at the present time, there is no likelihood of commencing to pump any water from this shaft before December. One of the most complete air-compressors there is in the Australasian Colonies is erected on the foundation where the second pumping-engine is intended to be placed, if it is ever required. It is of the compound type, the cylinders being 19¼ in. and 31 in. in diameter respectively, having water-jackets around the cylinders. It was intended to work this air-compressor with a separate steam-engine, but the engine was eliminated from the contract, with the view of working the compressor with a Pelton water-wheel; but the power required to drive this compressor is more than was anticipated by the manager, and it is now considered out of the question to get sufficient water from the county race to work this machine. This is to be regretted, as this air-compressor is required to supply compressed air to work the Cameron sinking-pumps, instead of steam, and in all likelihood a steam-engine will yet have to be procured to drive this compressor. The exhaust of compressed air instead of steam will always have the effect of drawing the noxious gases from the bottom of the shaft, and producing good ventilation. One of Tangyes winding-engines is erected, and everything is ready to commence sinking as soon as the pumps are in position and the erection of the pumping-engine completed. The winding-engine has double cylinders, with the winding-drums fitted with heavy brakes, worked by screw-lever. This engine and the capstan-engine, with all gearing, is erected in a separate building from the pumping-engine and air-compressor. A very compact compound-wound dynamo for lighting purposes is fixed in the same building as the pumping-engine and the compressor, but none of the lamps are yet fitted up. The whole of the workmanship in connection with the manufacture of this plant, and erection, are of the best class, and when once completed it will not only be the largest pumping plant in Australasia, but it will also be equal, if not superior, to any machinery yet manufactured in, or imported to, these colonies. It reflects the highest credit on the manufacturers, and all those who have charge of its erection. The manager, Mr. T. A. Dunlop, who has displayed marked ability in constructing the foundations, shafts, poppet-heads, and buildings in connection with it, has furnished the following report on the mine, which may afford additional information:—

"The object of the undertaking is to test the deep levels of the Thames Goldfield to a depth of 2,000 ft. To assist this object the Government granted a subsidy of £25,000, at the rate of pound for pound. The property consists of 250 acres, and is divided into three sections, known as the Queen of Beauty (47 acres), Deep Sinker (93 acres), and Deep Levels Consolidated (110 acres). The old Queen of Beauty shaft was down to a depth of 750 ft. The present company commenced operations by stripping, enlarging, and retimbering the shaft, the present size being 17 ft. 6 in. by 8 ft. 6 in. clear of timber. This was done down to the 327 ft. level, where a chamber 17 ft. 6 in. by 16 ft. 6 in. and 48 ft. deep was opened out, after which the sinking of the shaft at its former dimensions was resumed, and carried to a depth of 423 ft., at which point the water-level was reached, and thus prevented further sinking operations until such time as the new pumping machinery is erected and in working-order. The work of dismantling and removing the old machinery and buildings was then

taken in hand, the necessary excavations made, and the ground tested to obtain the most suitable site for the foundations of the new machinery. After carefully testing the ground by pile-driving, the site for the foundation of the new pumping-engines was fixed on the west side of the shaft. The area of this foundation was 70 ft. by 60 ft., and in this area forty piles, 12 in. by 12 in., were driven; but, as the solid formation had an underlie to the west, some piles were driven deeper than others before the solid formation was reached. The piles were then cut about 4 ft. from the ground, and the whole bound together by a layer of concrete 2 ft. in thickness, which was allowed to set firmly. On this smooth surface boxes were laid in various directions, of sufficient size to allow a man to enter, and upon these sixty-four perpendicular boxes, 6 in. by 4 in., and 18 ft. long, were placed. These were stayed and braced to keep them in position, so that the holding-down bolts from the engine-bed could be placed in position and secured below. Concrete was then placed to a depth of 18 ft., securing these boxes, and it was extended on the east and west side of the shaft to a depth of 12 ft., for the support of the pump quadrants, and thus on three sides of the shaft there is one massive concrete block fully 6,000 tons in weight. As this was required to carry such heavy machinery, it was decided by the Government Inspector and by the manager for the company that the very best Portland cement only should be used in its construction. One part of this cement to five parts of gravel and broken metal were thus used. The metal was broken on the ground by a rock-breaker of the Blake-Marsden type, the motive-power being obtained from a Pelton wheel. The amount of material excavated for the various foundations is estimated at 13,000 yards. The site for the capstan- and winding-engines was fixed on the south side of the shaft. Both these engines are in the same building, and are erected on concrete foundations, which are joined together. The foundation for the capstan-engine is 22 ft. 9 in. long, 11 ft. wide, and 7 ft. deep; and that of the winding-engine 15 ft. 3 in. long, 15 ft. 3 in. wide, and 8 ft. 9 in. deep. The necessary holding-down bolts were arranged in these foundations by providing boxes, in the same manner as described above in the case of the pumping-engine. The building in which the capstan- and winding-engines are situated is lofty and well lighted, and both engines are working smoothly and giving entire satisfaction. The present steam-power is provided by a portable boiler, with which the necessary connections are made. The winding-engines consist of a pair of what are known as first-motion engines, the cylinder of which is 14½ in., and having a stroke of 28 in. The winding-drums are of the latest design, fitted with clutch and steam-reversing gear. The rope is of steel wire, 1⅛ in. diameter. The man in charge occupies a central raised platform, from which he has a good view of the brace at the shaft. The capstan-engine is situated in front of and a little below the winding-engine. Its weight is 26 tons, and it is fitted with a wire-rope 2 in. in diameter, capable of lifting 25 tons. This is used for lowering or raising the heavy parts of the pumping machinery required in the shaft. The boiler-house is a fine building, 100 ft. long, 75 ft wide, with side-studs 20 ft. high, and contains ten Lancashire double-flue boilers, each weighing about 19 tons. These are all placed in a line, and are set in fire-bricks bedded in fire-clay. The main flue with which they are connected consists of a passage 10 ft. high, 5 ft. wide, and leads to a chimney-stack which is 7 ft. 6 in. square at the base and a little over 100 ft. high. Each boiler is 30 ft. long and 7 ft. in diameter, and constructed so as to carry a daily working-pressure of 120 lb. to the square inch. The material of which they are constructed is Siemen's-Martin steel. The holes were drilled and the plates bent ready to be put together on arrival here. This work was accomplished by the firm of A. and G. Price, at the Thames, and each boiler was tested to withstand a pressure of 240 lb. per square inch before being delivered at the mine. Each boiler is fitted with a Lee-Howl's patent hot-blast forced-draught furnace for economising the consumption of fuel. A new set of poppet-legs has been erected, with cap-pieces capable of bearing a transverse working-strain of 400 tons. The legs are about 65 ft. in length, 2 ft. 6 in. square at the bottom, and tapering uniformly to 1 ft. 6 in. at the top. These are set into sole-pieces, which are firmly embedded in concrete. To further strengthen them they are well braced and stayed, and capable of resisting the greatest strain that they can ever be subjected to, even if a whole column of pipes were slung from the top. The pumping-engines, the whole of which have not yet arrived, consist of a pair of compound condensing engines, the high-pressure cylinder being 30 in. in diameter and the low-pressure 60 in., having a 5 ft. stroke. Both these have been placed in position. The compound air-compressors have also been erected, and are to be driven by water-power. They are capable of driving twelve 3½ in. rock-drills. The fly-wheel, which is rope-driven, is 18 ft. in diameter. The building in which the pumping-engine and air-compressing plant are erected is 70 ft. long, 60 ft. wide, and side-studs 28 ft. high. There is also erected in this building a travelling crane, with a capacity of 12 tons, and having a longitudinal and transverse motion. This is absolutely necessary for lifting the heavy pieces of machinery during erection, and also in case of repairs being afterwards required. For several weeks past work has been practically at a standstill, awaiting the arrival of further shipments of machinery. Three vessels are already on the way, and contain fully 200 tons more of the machinery required, some of which is expected to arrive almost daily, and the remainder by the end of June. As soon as all the machinery has come to hand and the pumps are in working-order the stripping, enlarging, and retimbering of the shaft will be continued to the No. 8 level, where a cross-cut has intersected a large ore-body known as the Vanguard reef. Simultaneous with operations on this reef, which will be the first ore-body worked, sinking will be continued down to the No. 11 level, where our three main ore-bodies will be operated upon. While ore is being won from the two levels above referred to, sinking will be continued down to 1,100 ft., and the No. 12 level will be opened out at a depth of 1,000 ft., thus leaving 100 ft. of a well. The electric-lighting plant has been completed in the various buildings by the suspension of numerous 16-candle-power incandescent lamps; and two large arc-lamps of 2,000-candle power are arranged about the poppet-heads, which serve to illuminate the brace and the top of the shaft. At the 327 ft. level a chamber has been opened out on the south, east, and west sides of the shaft for a depth of 48 ft. This chamber is for the reception of the first set of plunger gear, and large steel girders are fixed to carry two cisterns 10 ft. by 4½ ft. by

5 ft.; windbore for first set of plungers; top and bottom clack-piece; T piece to receive the rising main and air-vessel. The two 25 in. plungers are in position, and the necessary connections made with the rising main, which is completed up to the surface. 180 ft. of the 10 in. pump-rods have been connected. At the 270 ft. level two chambers, one on the east and the other on the west side of the shaft, have been excavated. These are for the side-levers to work the draw- or bucket-lifts, and are already in position."

May Queen, Hauraki.—The operations of this company for the past year have been confined to opening up the No. 1 and No. 2 Cardigan reefs on the No. 6 level from the shaft in the Saxon section of the property. The entire property consists of four sections of reefs—namely, the Saxon, May Queen, St. Hippo, and Lone Hand. A good deal of prospecting has been carried on near the surface in the two latter sections of the property, and recently a double-cylinder steam-engine and two Lancashire boilers have been provided, to be used for winding and pumping in a shaft proposed to be sunk near the boundary of the St. Hippo and Lone Hand sections.

The whole of the known payable ore was taken out of the lodes in the May Queen and Saxon sections down to the present water-level prior to the present company taking over the property, and, as there was no hope of being able to sink to a greater depth until the new drainage plant is erected at the Thames-Hauraki Company's shaft, the present company decided to construct a cross-cut from the lowest level in the Saxon workings, to prospect a portion of the mine in which no work had been done. This resulted in two new reefs being found, which are now called the Cardigan Nos. 1 and 2. Both these reefs are small, varying from 4 in. to 18 in., and so far as workings have been carried on the ore from the No. 2 reef has averaged 1 oz. gold to the ton. Where the No. 1 reef was cut the ore only contained about 5 dwt. of gold per ton, consequently no work was done on this for some time; but after stoping was commenced on the No. 2 reef, and it was found to be payable for working, the No. 1 reef was driven on in an easterly direction, and recently specimen stone has been met with, and a level is now being constructed to work it. The May Queen shaft has been enlarged to 12 ft. by 5 ft. in the clear down to a depth of 520 ft., which is the present drainage-level at this shaft, and no further progress can be made in this section until drainage is effected at deeper levels. This company in particular is very anxious that the drainage appliances of the Thames-Hauraki Company be completed, as there is a rich chute of ore to be seen all along the floor of the lowest level in the Saxon, May Queen, and Cardigan lodes. Since the company commenced crushing in June last from the Cardigan No. 2 lode the yield of gold up to the end of April was 1,326 oz. 5 dwt. from 1,296 tons of ore, the value of the gold being £3,576 10s. 1d., which is equal to a value of £2 15s. 2d. per ton of ore.

Block XXVII. District.

Deep Sinker Section.—Work in the Deep Sinker Section of the Thames-Hauraki Goldfields' property was commenced in July, 1896, by sinking a main pumping- and winding-shaft. The size of the shaft is 12 ft. by 5 ft., and the first 105 ft. of sinking was through alluvial drift, and no machinery was required up to this point. At this depth, however, water was met with, and arrangements were made for the purchase of a winding-engine and a 4 in. Tangye pump, which was considered capable of coping with the water in the shaft at that time. The winding plant erected was a most complete one of its kind, and is capable of winding to a depth of 1,000 ft. The engine is of the horizontal type, with cylinders 16 in. diameter and 30 in. stroke. It is powerfully geared, and has two winding-drums 9 ft. in diameter. Sinking was continued until December, 1896, when it was found that the Tangye was not suitable for further sinking, partly owing to the nature of the country being passed through containing gritty material, which had a deleterious effect upon the numerous valves connected with the pump. This was therefore discarded, and a 10 in. plunger and draw-lift pump erected, which has continued to work satisfactorily to the present time. Two sets of plunger gear in connection with the pump are already fixed, one at the 200 ft. level and the other at the 400 ft. level. The shaft has been sunk to a depth of 460 ft., and a chamber opened out at the 450 ft., leaving 10 ft. for a well. From this chamber a cross-cut has been started in a northerly direction to cut the Una and Vanguard reefs, which were cut at the surface level in the South British tunnel, and another cross-cut in a southern direction, to cut other well-known reefs. The northern cross-cut has been extended a distance of 250 ft. Hitherto the hauling has been done in buckets, but since commencing to open out at the 450 ft. level two patent safety-cages have been fitted in the shaft, so that the material is now brought to the surface in trucks. This section of the company's property is situated in the heart of the Thames Goldfield, and consists of virgin ground which has hitherto been unworked for want of capital to sink through the alluvial drift, and for the difficulty in securing a freehold for the shaft-site. The shaft is situated 2,200 ft. south of the Queen of Beauty shaft, and it is intended to drive from each shaft towards the other to effect a junction.

Shortland District.

Deep Levels Consolidated Section.—The work carried on in this section of the Thames-Hauraki Goldfields' property has been the driving of an adit tunnel. This has been driven into the hill known as Mount Pleasant for a total distance of 1,136 ft., at a depth of 150 ft. below the surface. The size of the drive is 5 ft. 6 in. at the bottom, 4 ft. 6 in. at the top, and 6 ft. 6 in. high. It is closely timbered the whole way, and steel rails are laid the whole length to remove the *débris* from the face. A drain in the centre, under the sleepers, is made to carry away the water. The object of this drive was to drain off the surface-water and to locate the main country-rock formation, which, so far, has for the most part been of a broken and disturbed character. A fair channel of country was penetrated in the first 400 ft., after which the ground again became very much broken, and the present face is penetrating a formation resembling the old bed of a river, from the presence of gravel and boulders.

Karaka District.

Adelaide Mine (Area, 22 acres; owners, Adelaide Gold-mining Company, No Liability).—The shaft is now 410 ft. in depth, and work has been carried on driving and stoping the reef, which is from 6 in. to 3 ft. in width. 458 tons was crushed, for 163 oz. 17 dwt. of gold; value, £478 2s. 6d. Twelve men were employed.

May Queen Extended Mine (Area, 49 acres; owners, May Queen Extended Gold-mining Company, No Liability).—Extensive prospecting works have been carried on at this mine—100 ft. of driving in the cross-cut and 400 ft. in the line of reef at the low level. A winze has also been sunk to a depth of 75 ft. to connect with the low level. Thirty-nine tons of quartz yielded a return of 44 oz. 19 dwt., valued at £121 7s. 4d. Three men were employed.

The *Claremont Claim*, owned by Mr. G. Bryant, has again produced a considerable quantity of gold, obtained from working on the junction of flinties with small leaders. Two hundredweight of specimens was crushed, for a yield of 181 oz. 11 dwt., valued at £482 2s. 4d. One man was employed.

Gloucester Mine (Area, 87 acres; owners, Gloucester Gold-mining Company).—This company's property is being vigorously prospected. A considerable amount of trenching and driving has been done, and a shaft sunk to a depth of 140 ft. It is intended shortly to erect a pumping- and winding-engine capable of sinking to a depth of 400 ft. In the course of development works, under the supervision of Mr. Thomas McCullough, a fair quantity of gold has been obtained from leaders and reefs in surface drives. The company has also secured the Lincoln Special Claim, and intends, if possible, to purchase the Manchester Claim, which should be of value, as the tributers discovered a body of quartz which gave good results under a test. Twelve men employed.

Karaka Mines, Limited (Area, 84 acres 3 roods 20 perches).—A large amount of work has been done in this claim in stoping and driving on No. 1 reef, and 170 ft. has been driven east and 215 ft. west. The reef, which is about 2 ft. wide, looks promising, good gold being occasionally seen in the stone. The mine is well timbered, and the ventilation is good. Seven men employed. Mr. Dunlop, who has the supervision of the mine, reports as follows: "It was purchased from the original shareholders by the Austinfriars Finance Syndicate, of London. The management is in the hands of the Thames Exploration Syndicate. During past twelve months a staff of men has been employed opening up several of the reefs. The principal work has been confined to two reefs cut in the adit level, and known as No. 1 and No. 2. A total distance of 650 ft. has been driven on the No. 1 reef, which averages 4 ft. in thickness, until it junctions with the No. 2, after which its average width is from 7 ft. to 8 ft. Several test lots have been crushed by the ordinary wet process, and have given an average yield of about £2 per ton. The No. 2 reef is 5 ft. in thickness. The height of backs available at various points is 290 ft., 270 ft., and 320 ft. A battery-site close to the county water-race and a water-race in the Karaka Creek have been secured. The company is now considering the erection of a ten-head battery to test the reefs regularly, and to help to pay the working-expenses of opening up the mine. The Hague Smith reef has also been opened up from the creek-level. A 5-ton parcel has been shipped to London for experimental purposes."

Una Hill and Te Papa District.

Occidental Mine (Area, 50 acres; owners, Occidental Gold-mining Company).—Prospecting work has not been carried on to any great extent during the year. Six men were employed earlier in the year, but the claim is now protected.

Fortuna Mine (Area, 61 acres; owners, Fortuna-Hauraki Gold-mining Company).—The work carried on in this mine has been clearing out old workings, and No. 1 level has been driven from the cross-cut for a distance of 175 ft. The reef, which is from 8 ft. to 10 ft. in width, is known as the Gibraltar reef. The Magnolia No. 3 reef has also been opened at No. 2 level. The quartz is about 9 ft. in width where it was cut through, and, as this reef is well opened up, large blocks of quartz can be readily stoped out. A temporary pumping and winding plant has been erected at the Old Consols shaft, and the water lowered to the No. 3 level, 200 ft. from the surface. A drive is to be extended from this level to cut the Gibraltar and the other reefs at this depth. A battery of ten stamps is to be erected for the purpose of thoroughly ascertaining the value of the many reefs and leaders in this ground. The reefs are well worthy of the expenditure needful for opening them up. The Hague Smith reef, which runs parallel with Te Papa Gully, will cross the strike of the other reefs, and probably will be the means of causing deposits of gold at the junctions. Thirty-three men were employed.

Hape Creek District.

Anchor Mine (Area, 100 acres; owners, Ethel Reef Gold-mining Company).—The operations on the ground have been chiefly clearing old levels and obtaining parcels of quartz from the different reefs. 180 tons was crushed, for 90 oz. of gold; value, £234. Fifteen men were employed. A party of four tributers crushed 23 tons, for a yield of 42 oz. 10 dwt. of gold; value, £110 10s.

Mascotte Limerick Mine.—Some prospecting work was done in the earlier part of the year, but the claim has now been abandoned.

Puriri District.

Puriri Mine (Area, 100 acres; owners, Puriri Gold-mining Company).—Two men were employed in prospecting operations for nine months in the year, but no returns of gold have been obtained.

The London and New Zealand Exploration Company have carried an extensive prospecting works in the Hit-or-Miss Claim. One low-level cross-cut has been driven 564 ft. through hard rock, and two drives along reefs, one 345 ft. and the other 305 ft., those veins being from 6 in.

to 18 in. in width. Two other cross-cuts, 20 ft. and 55 ft. in length, were also driven. No return of gold has been made; therefore it would appear that no crushing took place. Thirteen men were employed.

Empress of India Mine (Area, 85 acres and 37 perches).—A large amount of work has been done in this mine, in which forty men are employed. 4,170 ft. of driving has been done, the greater part being on the reefs. Winzes have been sunk, and other prospecting work done. The reefs and leaders traversing the property vary from 3 in. to 4 ft. in width. An option is held over the property by an English company.

Otunui District.

Very little prospecting was done in this district during the year.

Mangakirikiri District.

A discovery of cinnabar was made by the Lowrie Brothers on the western side of Otunui Creek, about midway between the Kauaeranga Creek and the Otunui Mines. Several outcrops are seen on the range from 200 ft. to 500 ft. above the creek-level, in which small pockets of cinnabar are to be found. The rock formation is apparently due to thermal agency, and the matrix consists of this rock and bunches of quartzite. The vermilion colour is clearly visible in the quartz and in the overlying surface. Prospects washed in the dish show a tail of cinnabar. The same is also got by pounding the solid quartz and panning off small parcels.

The quantity of work done is insufficient to enable a fair opinion to be given as to the extent of the matrix, and whether it occurs in the form of a reef or lode. The appearance of the places where the cinnabar is to be seen gives encouragement for further exploration, when possibly a deposit of value may be met with.

Mr. Alexander McKay, the Geologist for the Mines Department, who visited the place subsequent to my seeing the outcrops, has furnished the following report:—

"I have the honour to report that, on the 26th April, I visited the cinnabar lode occurring in the Kauaeranga Valley, about six miles from where the river enters the Firth of Thames at Shortland. The mercury deposits occur within the valley of Mangakirikiri Creek, about a mile from where that joins the Kauaeranga, and are more particularly located along the south-west side of Otunui Creek, a tributary of the Mangakirikiri. Mercury-ore as cinnabar is found along the hill-slopes on the right bank of the creek over a distance east and west of about 6 chains, and from the crest of the ridge 500 ft. to the level of the creek, which may be some 200 ft. above sea-level. The exact location is about a mile north-west of the Kauaeranga River, and the most westward and highest of the outcrops examined appears near the crest of the ridge, at the height indicated, as a series of sinter blocks so arranged that they appear to dip to the east, and indicate the occurrence of a solid lode in the near neighbourhood, but as yet this has not been traced at this the highest outcrop. Distinct traces of cinnabar are to be found here both in the quartz blocks and in the country-rock upon which they rest, and to all appearances there is here the outcrop of a band or stratum of highly silicious country, carrying a percentage of mercury-ore. Two or three chains to the eastward, at a slightly lower level, another outcrop of quartz-carrying cinnabar occurs. This also strikes north and south, and dips to the east, at angles varying from 40° to 48°. The stone varies from 3 ft. to 4 ft. in thickness, and at various horizons, principally in the middle of the lode, carries ore that itself varies from medium to rich. Some work has been done at this place to expose the lode along its strike, and this work shows that both this and the higher outcrop is underlain by a grey rock, consisting mainly of feldspar corresponding to the kindly sandstone of the miner, while in both cases the more silicious deposit is overlain by breccias and tufaceous sandstone that evidently are of younger dates. Descending the slope eastward towards the Mangakirikiri Creek, some 6 chains, a third exposure of quartz-rock carrying cinnabar is seen, which has been bared at three places sufficiently to show that its extent is considerable. The ore at this place is more generally distributed throughout the stone than at either of the two localities mentioned as occurring higher up the slope of the hill, and from stone which at first sight shows little trace of the presence of cinnabar a fair prospect can be obtained by the rudest method of crushing and panning off. Passing to the south-east along the middle slope of the hill a constant exposure of quartz-rock is met with, which at several places shows the presence of cinnabar; and at one place there is a very considerable development of quartz-rock, forming a line of cliffs which, though not closely examined, seemed likely to carry the ore of mercury, being similar to the outcrops already mentioned. More to the east, masses of quartz are met with on the slope of the hill, and as loose boulders in the hollow forming the source of a small creek descending to the Mangakirikiri, and here also it was said prospects of cinnabar could be obtained from the soil and near the surface. Finally, near the crest of the ridge, the most easterly of the various prospecting holes is situated. Here but little work has been done—not more than to prove the presence of the ore, and the quartz matrix seems to be but feebly developed. I was informed that some 12 chains to the westward of this area good prospects of cinnabar could be washed from the soil, and that masses of quartz there occurred similar to what appears within the area more particularly prospected, and which is here reported on. Numbers of analyses have been made of the stone at the School of Mines, Thames, and I am informed that the results have been from 2 to 25 per cent. as from the least promising that showed cinnabar to the best that could be found. I obtained samples which, I think, should exceed 25 per cent., but such rich ore is limited in amount; while, so far as I could judge, there is a considerable amount of medium richness. As to the nature of the deposit, I conclude that the ore matrix is the deposit of a thermal spring which seems to have been active at different periods, during the intervals between which activity deposits of another kind—ash and tufa beds—were accumulated over the first-formed sinter deposits. The character of the deposit as above indicated is demonstrated by the occurrence of numerous dicotyledonous leaves in the upper part of the sinter deposits or in

the coarser matrix of the overlying tuffs. The deposit is thus likely to be confined to the limits of the property within which it occurs, there being little evidence of the occurrence of similar deposits to the west and south, while more to the north and north-north-west similar quartz deposits, so far as known, contain gold only. Far too little work has been done on the property to enable an estimate of the extent and true value of the ore, but from what could be seen, and as far as I could judge, there is warrantry for the further opening-up and developing of the property. The stone already tested proves to be at places of a paying character, and, while the whole of the deposit may not be so rich, it has still to be considered that much richer stone may be discovered than any yet found. Mercury and the ore of mercury (cinnabar) occurs in connection with thermal springs at Ohaeawai, in the Bay of Islands district of Auckland. There the thermal conditions interfere with the working of the deposit to any considerable depth from the surface. Here, within the watershed of Otunui Creek, thermal action has long since ceased, and no such difficulties are likely to be experienced in working the ore. The ore-bodies are favourably placed for working, and, as thermal deposits, are at or near the surface, while yet, as in the Karangahake and Waihi districts, there is the possibility of thick deposits having considerable linear extension descending to considerable depth, and forming reef-like masses under the more superficial deposits. I forward samples taken by myself, so that if desired the returns here given may be checked at Wellington. Of the samples sent, Nos. 1 and 2 are from the second highest outcrop, as above described; No. 3, the largest sample, is from the outcrop 5 or 6 chains further down the slope of the hill towards the Mangakirikiri Creek.

Hihi District (Upper Kauaeranga).

A new discovery was made during the early part of the year. Several parcels of rich stone were crushed, yielding 48 oz. 16 dwt. of gold; value, £3 3s. per ounce.

Matatoki and Kirikiri Districts.

The mines held in these localities have been idle during the greater part of the year.

Neavesville District.

Very little work of any importance has been carried on in this district during the year.

Tairua River District.

Broken Hill Mine (Area, 340 acres).—A considerable amount of money has been expended on this property, but subsequent to the purchase of the battery, all arrangements having been made for its erection, and the acquisition of a water-race and tramway to connect with same, it was discovered that no stone of a payable character had been found to warrant the outlay. Work has consequently been stopped, pending instructions from the London directorate. Thirty men employed.

Albert Mine (Area, 130 acres).—A large amount of prospecting work has been done in this mine, and the management is sanguine as to the ultimate results, though at present nothing of importance has been discovered.

Anglo-Continental Company.—A large amount of prospecting was done, but, in consequence of the poor prospects met with, work on the properties held by the company was for a time stopped, though it is probable operations will be resumed shortly.

Ohui District.

The *Last Chance* (30 acres) and the *Golden Hill* (100 acres); owners, J. H. Harrison and Herbert Gentles.—Prospecting work to a limited extent was carried on by Seaver Brothers, who held an option to purchase the ground. Since they ceased operations the mine has been let on tribute to Mr. George Clarkson for a term of four years. A stamp-mill capable of crushing 50 tons per week is to be erected.

A large number of men were employed in prospecting operations in this district during the early part of the year, but most of the claims are now under protection. A six-stamp battery has been erected, but no returns have yet been received.

Whangamata District.

Whangamata Proprietary Mine (Area, 306 acres; owners, Whangamata Proprietary, Limited, London).—The principal work carried on during the year was in driving No. 1 level, which is 760 ft. on the reef, and No. 2 level 809 ft. The main reef varies in width from 3 ft. to 17 ft. The richest ore averages about 5 ft. The other portions of the quartz, although gold-bearing, are of much less value. The lode matter consists of a whitish quartz generally exhibiting a banded structure of wavy laminæ, frequently coloured with sulphide of silver. Above No. 1 level the backs vary from 20 ft. to 177 ft. at the greatest height. The distance from No. 1 to No. 2 level is 77 ft., and a cross-cut has been driven for a distance of 610 ft., which will cut the reef 100 ft. below No. 2 level. A dry-crushing plant, consisting of two stone-breakers of Blake type, one revolving ore-dryer, one Krupp mill, twelve wooden cyanide-vats each 20 ft. in diameter, six berdans, with all the ordinary accessories, is now being erected. The machinery is to be driven by a 6 ft. Pelton wheel. Thirty men were employed.

Wentworth Mine.—In this mine two reefs, about 2 ft. in thickness, and believed to contain payable gold, have been driven on. Nine men were employed in the mine and seven in constructing a water-race. It is the intention of the company to erect a battery.

In the Phœnix, Golden Mine, Golden Fall, and several other mines extensive prospecting operations have been carried on, but owing to poor results work was discontinued throughout the district, with the exception of the Whangamata and Wentworth Mines.

Ohinemuri District.

This district comprises the County of Ohinemuri, which lies between the Thames, Piako, and Tauranga Counties. Some of the most extensive mining plants to be found in Australasia are situated in the district, and consequently mining operations are carried on with great energy.

The following list of claims will show the large number of areas occupied for mining purposes:—

Abstract of Licenses for Special Claims and Licensed Holdings issued from the Warden's Office at Ohinemuri in the Hauraki Mining District, and registered on or before the 31st March, 1898, in the Books of the Mining Registrar at Ohinemuri.

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
22/4/88	10	0	25	Karangahake	I.	Aroha ..	Abbey	New Zealand Crown Mines.
2/6/96	19	2	12	"	II., VI.	" ..	Acorn	The Oakley Gold-mining Co. (Ltd.).
17/2/96	100	0	0	Waihi ..	XV.	Ohinemuri	Aladdin's Lamp ..	Waihi Reefs Gold-mining Co. (N.L.).
4/10/95	100	0	0	Komata ..	X.	"	Alfred	Omega Gold-mining Co. (N.L.).
17/2/96	86	2	0	Waitekauri ..	X., XIV.	"	Alfred Extended ..	Exchange Gold-mining Co. (N.L.).
1/2/96	99	2	9	" ..	XIV.	"	Alhambra ..	Belmont Gold-mining Co. (N.L.).
31/12/95	26	1	32	" ..	X.	"	Alpha Extended ..	Waitekauri Consolidated Gold-mining Co. (Ltd.).
31/12/95	50	0	0	Waihi ..	XVI.	"	Amaranth ..	Union Waihi Gold-mining Co. (Ltd.).
27/2/96	100	0	0	Waitekauri ..	X.	"	Anglian	Waitekauri Union Claims (Ltd.).
19/2/97	100	0	0	" ..	XIII., XIV.	"	Arcadia	Gregory B. Ormond.
23/7/96	57	1	16	Karangahake	II.	Aroha ..	Aster	The N.Z. Crown Mines (Ltd.).
25/4/96	100	0	0	Whangamata	VII.	Ohinemuri	Atlas	Atlas Gold-mining Co. (N.L.).
19/2/97	77	3	0	" ..	"	"	Auckland Chief ..	Edward Joseph Smith.
19/2/97	99	0	31	" ..	"	"	Auckland Prince ..	"
19/2/97	100	0	0	" ..	III., VII.	"	Auckland Princess	"
19/2/97	100	0	0	" ..	VII.	"	Auckland Queen ..	James D. Foley.
3/9/96	71	0	1	Owharoa ..	XIV.	"	Augusta	Thomas Ussher.
23/3/96	100	0	0	Waitekauri ..	X.	"	Australia ..	Waitekauri Union Claims (Ltd.).
24/3/96	99	2	16	Owharoa ..	XIV.	"	Bain .. .	Ohinemuri Syndicate.
8/8/96	100	0	0	Waihi ..	XVI.	"	Beacon Hill ..	Beacon Hill Gold-mining Co.
1/2/96	98	0	6	Owharoa ..	XIV.	"	Belmont ..	Belmont Gold-mining Co. (N.L.).
3/5/97	97	1	4	Whangamata	VII., XI.	"	Belvoir	H. A. Banner.
2/10/97	100	0	0	..	V.	Te Puke ..	Ben Lomond ..	John Cameron Galbraith.
25/3/96	100	0	0	Maratoto ..	VI.	Ohinemuri	Black Star ..	William Horne.
23/12/96	47	1	35	Karangahake	"	Aroha ..	Blarney Stone ..	Charles W. Cave.
9/9/97	50	3	34	Maratoto ..	"	Ohinemuri	Boogum ..	Daniel Allen.
20/8/96	50	3	34	" ..	"	"	Boojum	Maurice Kelly.
2/6/96	18	1	35	" ..	"	"	Boomerang ..	A. P. H. Cashel.
23/4/97	93	0	0	" ..	V., IX.	"	Bradford ..	Alfred William Sergeant.
2/6/96	14	3	0	Karangahake	II.	Aroha ..	Braemar ..	James William Shaw.
31/12/95	97	2	0	Waihi ..	XV., XVI.	Ohinemuri	Bright Smile ..	Waihi Reefs Gold-mining Co. (N.L.).
30/11/96	100	0	0	" ..	IV.	Aroha ..	Bright Star ..	Don of Waihi Gold-mining Co. (N.L.).
19/6/95	100	0	0	" ..	XVI.	Ohinemuri	Brilliant ..	Waihi Consolidated Gold-mines (Ltd.).
27/2/96	100	0	0	" ..	XV., XVI.	"	Britannia ..	The Waihi Gold-mining Co. (Ltd.).
17/10/95	80	2	5	Waitekauri ..	X.	"	Burbank ..	Waitekauri Consolidated Gold-mines (Ltd.).
16/1/96	16	2	20	Whangamata	III.	"	Burleigh ..	Robert Kelly.
7/5/95	30	0	0	Komata ..	X.	"	Byron Bay ..	Byron Bay Gold-mining Co. (N.L.).
5/5/96	6	3	20	Waitekauri ..	X., XI.	"	California ..	Waitekauri Union Claims (Ltd.).
10/4/97	93	2	0	Whangamata	VII.	"	Captain	John Mason Sharp.
8/10/95	29	3	0	Waitekauri ..	X.	"	Central	Waitekauri Union Claims (Ltd.).
14/6/97	89	3	0	" ..	"	"	"	Waitekauri Union Claims.
14/7/96	4	1	20	" ..	"	"	Central Consuls ..	Waitekauri Junction Gold-mining Co. (N.L.).
8/10/95	25	0	16	" ..	"	"	Central Extended	Waitekauri Union Claims (Ltd.).
17/9/95	14	2	20	Owharoa ..	II. / IV.	Aroha / Ohinemuri	Charles Victor ..	Owharoa United Gold-mining Co.
4/10/95	100	0	0	Waitekauri ..	X.	"	Christina ..	Omega Gold-mining Co. (N.L.).
8/8/96	60	0	0	Waihi ..	XV.	"	Christmas Box ..	Waihi South Gold-mining Co. (Ltd.).
23/4/97	35	0	0	Waitekauri ..	XIV.	"	Clansman ..	Charles Collins.
9/9/97.	80	0	0	" ..	"	"	Colewinser ..	Frederick Butcher.
10/12/95	94	2	0	Karangahake	II.	Aroha ..	Crescent ..	Crescent Gold-mining Co. (N.L.).
16/3/96	100	0	0	Waitekauri ..	X.	Ohinemuri	Crœsus ..	The Waitekauri Gold-mining Co.
8/5/96	100	0	0	" ..	"	"	Crosscut ..	"
5/5/97	50	0	0	" ..	"	"	Crosscut Extended	"
16/6/96	30	0	0	Karangahake	I.	Aroha ..	Crown Imperial ..	Crown Imperial Gold-mining Co.
2/6/93	98	0	31	"	I., II.	" ..	Crown Mines ..	The New Zealand Crown Mines Co. (Ltd.).
16/11/97	53	1	0	Waitekauri ..	III.	Ohinemuri	Crown Nimrod ..	Joseph Barber.
24/10/96	100	0	0	Maratoto ..	VI.	"	Daniel Boone ..	Robert Kelly.
30/5/96	100	0	0	Waihi ..	XV.	"	Dauntless ..	Edward Mann Corbett.
25/3/96	100	0	0	Owharoa ..	XIV.	"	Dawn of Hope ..	Edward Bain.
8/8/96	89	3	32	" ..	"	"	Dawn of Hope Surplus	James Smyth.
1/2/96	100	0	0	Waihi ..	XIV.	"	Day Dawn ..	Thomas Mace Humphreys.
19/2/97	100	0	0	Maratoto ..	VII.	"	Day Spring ..	John Edward Banks.
23/3/96	100	0	0	Waihi ..	XIV.	"	Deep Lead ..	Deep Lead Gold-mining Co. (N.L.).
28/7/96	3	0	0	Waitekauri ..	"	"	Diamond ..	Peter Prudence.
10/12/95	75	0	8	Waihi ..	I., XIII.	Aroha ..	" ..	W. H. Pearce and W. Hellaby.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Ohinemuri—*continued.*

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
30/5/96	67	0	0	Waihi ..	VII.	Ohinemuri	Dixon No. 1 ..	Mataura Gold-mining Co. (N.L.).
23/3/96	100	0	0	" ..	XI.	"	Dublin ..	James Corbett.
13/9/95	87	0	11	Karangahake	I., II.	Aroha ..	Earl of Glasgow ..	New Zealand Crown Mines (Ltd.).
8/8/96	89	0	26	Waitekauri ..	X., XIV.	Ohinemuri	Edward Norman ..	Norman Proprietary Gold-mine (Ltd.).
25/4/96	94	1	12	Owharoa ..	XIV.	"	Elliot ..	Ohinemuri Syndicate.
19/11/95	30	0	0	Waitekauri ..	X.	"	E.M.C. ..	The Waitekauri Union Claims (Ltd.).
18/2/96	30	0	0	" ..	"	"	E.M.C. Extended ..	"
23/4/95	9	0	26	Karangahake	I.	Aroha ..	Emerald ..	Woodstock North Gold-mining Co.
19/2/97	100	0	0	Waitekauri ..	III.	Ohinemuri	Emerald Isle ..	Robert C. Speer.
23/12/96	80	0	0	" ..	III., VII.	"	Emerald Isle Ext.	Samuel Draffin.
13/1/97	36	2	25	Maratoto ..	VI.	"	Emperor ..	George Loram.
30/4/96	100	0	0	" ..	"	"	Excellent ..	Wilfred Rathbone.
24/3/96	38	0	9	Karangahake	II.	Aroha ..	Excelsior ..	Excelsior Gold-mining Co. (N.L.).
14/9/96	97	2	35	Waitawheta	VI.	Ohinemuri	Express ..	Guy Fosberry Reynolds.
19/6/95	100	0	0	Waihi ..	XVI.	"	Favona ..	Waihi Consolidated Gold-mining Co. (Ltd.).
28/8/95	100	0	0	Owharoa ..	II.	Aroha ..	Fern Spur ..	Waihi Gold-mining Co. (Ltd.).
23/7/96	100	0	0	Wharekirau-punga	XIV.	Ohinemuri	Fiery Cross ..	Fiery Cross Gold-mining Co. (N.L.).
5/5/97	100	0	0	Whangamata	VIII.	"	" ..	"
23/7/96	100	0	0	Maratoto ..	..	..	Florence ..	Hikutaia Gold Syndicate (Ltd.).
28/7/96	6	1	0	Waitekauri ..	XIV.	Ohinemuri	Fortunatus ..	Waitekauri King Gold-mining Co. (N.L.).
23/4/97	48	1	0	Waihi ..	XV.	"	Gem of Waihi ..	James George Wilson.
7/11/95	20	2	32	Waitekauri ..	VI.	"	Globe	Waitekauri United Gold-mining Co. (Ltd.).
27/2/96	90	0	0	" ..	XIV.	"	Golconda ..	Sovereign Gold-mining Co. (N.L.).
23/12/96	70	0	0	Karangahake	II.	Aroha ..	Golden Age ..	Frederick Richard Quinton.
23/12/96	93	2	30	"	II., VI.	" ..	Golden Age Ext. ..	"
24/3/96	27	3	0	"	I.	" ..	Golden Crown No. 2	Golden Crown No. 2 Gold-mining Co. (N.L.).
16/3/96	100	0	0	Waitekauri ..	X., XI.	Ohinemuri	Golden Cross ..	Waitekauri Gold-mining Co. (Ltd.).
3/9/96	56	2	37	Karangahake	I.	Aroha ..	Golden Fleece ..	Golden Fleece Gold-mining Co. (N.L.).
19/2/97	40	2	20	Waihi ..	XV.	Ohinemuri	Golden Lure ..	Norman F. J. Hazard.
3/6/96	67	2	25	Karangahake	I.	Aroha ..	Golden Reefs Ext.	Robert Stackpole, jun.
27/2/96	96	0	0	Waihi ..	XV., XVI.	Ohinemuri	Golden Run ..	Waihi Gold-mining Co. (Ltd.).
13/11/95	100	0	0	Waitekauri ..	X., XIV.	"	Golden Spur ..	Golden Spur Gold-mining Co. (N.L.).
20/5/97	25	3	10	Waihi ..	XV.	"	Goldenton ..	William H. Potter.
28/8/96	100	0	0	Wharekirau-punga	VII.	"	Goldstream ..	The Goldstream Gold-mining Co. (N.L.).
2/9/96	100	0	0	Waitekauri ..	XI.	"	Gothic	Joseph Thorne.
30/11/96	89	3	7	" ..	X.	"	Grace Darling ..	Grace Darling Gold-mining Co.
22/10/95	30	0	0	" ..	"	"	Grafton	Grafton United Gold-mining Co. (N.L.).
17/2/96	100	0	0	" ..	"	"	Grafton No. 2 ..	"
27/2/96	96	0	0	" ..	"	"	Grafton No. 3 ..	"
23/3/96	90	0	0	Waihi ..	XVI.	"	Grand Junction ..	Waihi Grand Junction Gold-mining Co. (Ltd.).
7/10/96	91	1	0	" ..	XII.	"	Great Central ..	John Murdoch Ross.
12/10/96	90	2	8	Maratoto ..	VI.	"	Great London ..	William Henry Aitken.
12/10/96	87	0	0	" ..	"	"	Great London Ext.	"
22/7/95	98	2	30	Waihi ..	XV.	"	Haines Morrin ..	Waihi Consols Gold-mining Co.
25/6/96	100	0	0	Karangahake	XIII., XIV.	"	Hercules ..	The Hercules Gold-mining Co. (N.L.).
22/10/95	23	0	32	Waitekauri ..	XIV.	"	Heroic	William J. Cornes.
27/10/96	23	0	32	" ..	"	"	"	Lionel McLellan.
13/11/95	48	3	25	" ..	X.	"	Huanui	The Huanui Gold-mining Co. (N.L.).
3/9/96	100	0	0	Owharoa ..	XIV.	"	Huntley	John F. Andrew.
27/2/96	62	0	15	Karangahake	II.	Te Aroha ..	Imperial ..	Imperial Gold-mining Co. (N.L.).
3/6/96	100	0	0	Komata ..	X.	Ohinemuri	Ingall	Godefroi Drew Ingall.
13/11/95	49	0	12	Waitekauri ..	XIV.	"	Iota	Golden Waitekauri Gold-mining Co. (N.L.).
3/6/96	100	0	0	" ..	"	"	Iota Extended ..	Ditto.
8/7/97	29	1	10	" ..	X., XIV.	"	Iolanthe	Daniel Allen.
8/8/96	100	0	0	Maratoto ..	VI.	"	Irving	Irving Gold-mining Co. (N.L.).
25/4/96	72	0	12	Karangahake	XIV. I., II.	" Aroha	Ivanhoe	Ivanhoe Gold-mining Co. (N.L.).
18/12/96	30	0	0	Waitekauri ..	XIV.	Ohinemuri	Jewel	Jewel Gold-mining Co. (Ltd.).
27/9/97	54	3	10	" ..	"	"	"	Jewel Gold mining Co. (N.L.).
5/5/96	24	3	10	" ..	"	"	Jewel Extended ..	Jewel Gold-mining Co. (Ltd.).
10/11/87	103	0	15	" ..	"	"	Jubilee	The New Zealand Jubilee Gold-mining Co. (Ltd.).
25/4/96	78	3	35	Maratoto ..	VI.	"	Kapai Kaiser ..	William Horne.
6/8/95	30	0	0	Karangahake	II.	Aroha ..	Karangahake ..	Karangahake Gold-mining Co. (N.L.).
27/10/96	30	0	0	"	"	" ..	Karangahake Reef	Lawrence McNamara.
27/2/96	59	0	15	"	I., II.	" ..	Karangahake South	Charles Frederick Reid.
30/11/96	56	0	0	Katikati ..	IV.	Aongatete	Katikati Prospectors Ext. No. 1	Edward F. Buckworth.
18/2/96	5	1	32	Waitekauri ..	XIV.	Ohinemuri	Keep-it-Dark ..	New Zealand Jubilee Gold-mining Co. (Ltd.).
27/10/96	10	3	19	Owharoa ..	"	"	Kenilworth ..	Ohinemuri Syndicate (Ltd.).
23/12/96	94	0	6	Maratoto ..	VI.	"	King	John Morrissy.
8/8/96	44	0	0	Komata ..	X.	"	Komata Chief ..	Komata Chief Gold-mining Co. (N.L.).
14/9/95	100	0	0	" ..	"	"	Komata Consolidated	Komata Queen (Ltd.).
23/4/97	47	3	10	" ..	V., IX.	"	Komata Eldorado	Peter MacFarlane.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Ohinemuri—*continued.*

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
21/5/95	29	1	0	Komata ..	X.	Ohinemuri	Komata Extended	Komata Queen (Ltd.).
1/3/97	100	0	0	" ..	IX., X.	"	Komata Gem ..	Alfred William Sergeant.
25/6/96	100	0	0	" ..	X.	"	Komata King ..	Komata King Gold-mining Co. (N.L.).
23/7/96	98	1	37	" ..	"	"	Komata Queen ..	Komata Royal Gold-mining Co. (N.L.).
17/8/95	79	1	24	" ..	"	"	Komata Reefs ..	Komata Reefs Gold-mining Co. (Ltd.).
13/11/95	100	0	0	" ..	"	"	Komata Reefs Ext.	John Mason Sharp.
23/2/98	100	0	0	" ..	"	"	"	James Bowen Pain.
7/5/97	19	0	11	" ..	"	"	Komata Union ..	Alfred T. Thorp.
3/6/96	100	0	0	" ..	"	"	Komata West ..	George Burgess.
16/10/96	14	2	10	Karangahake	I.	Aroha ..	Lioness	Thomas Herbert Biggs.
23/7/96	86	2	13	Maratoto ..	VI.	Ohinemuri	Liverpool ..	Newell B. Lusk.
7/4/96	64	2	0	Waitekauri ..	XIV.	"	Londonderry ..	Waitekauri No.2 Gold-mining Co.(N.L.).
25/6/96	100	0	0	Maratoto ..	VI.	"	Long Drive ..	Edward M. Corbett.
29/6/96	100	0	0	" ..	"	"	Lord Rosebery ..	Nathaniel Dunlop.
7/10/96	46	1	5	" ..	"	"	Lord Rosebery Ext.	"
3/6/96	100	0	0	" ..	"	"	Lord Salisbury ..	Henry M. Shepherd.
29/11/97	100	0	0	" ..	"	"	"	Arthur Parkinson.
6/8/95	30	0	0	" ..	VI., X.	"	Lydia	Hikutaia Gold Syndicate (Ltd.).
19/2/97	50	0	8	" ..	VI.	"	MacGregor ..	Walter Thorp.
5/9/89	14	3	25	Owharoa ..	XIV.	"	Madden's Folly ..	Ohinemuri Syndicate (Ltd.).
14/9/96	100	0	0	Waihi ..	III.	Aroha ..	Maid of Erin ..	Andrew Cunningham.
10/12/95	100	0	0	" ..	"	" ..	Maid of Honour ..	Queen of Waihi Gold-mining Co. (N.L.).
23/7/96	100	0	0	" ..	XIII., XIV.	Ohinemuri	Mammoth ..	Hercules Gold-mining Co.
28/7/96	25	2	0	" ..	XIII.	"	Mammoth Ext. ..	Hercules Gold-mining Co. (N.L.).
19/2/97	36	1	12	Waitekauri ..	XIV.	"	Mangakara United No. 1	The Mangakara United Gold-mining Co. (N.L.).
24/10/96	98	1	32	" ..	"	"	Mangakara United No. 2	The Mangakara United Gold-mining Co. (N.L.).
23/3/96	100	0	0	Komata ..	X.	"	Marburg ..	Waitekauri Union Claims (Ltd.).
25/3/96	100	0	0	Maratoto ..	VI.	"	Marguerite ..	Herbert Gentles.
17/2/96	100	0	0	Karangahake	II.	Aroha ..	Maritana ..	Maritana Gold-mining Co. (N.L.).
15/5/96	82	1	20	Maratoto ..	V.	Ohinemuri	Maratoto United ..	Hikutaia Gold Syndicate (Ltd.).
27/2/96	100	0	0	Waihi ..	XV., XVI.	"	Martha	Waihi Gold-mining Co. (Ltd.).
27/2/96	100	0	0	" ..	XI.	"	Martha Extended	Martha Ext. Gold-mining Co. (N.L.).
23/7/96	38	1	0	" ..	"	"	Matawai ..	"
20/5/97	29	3	4	Maratoto ..	VI.	"	Melbourne Cup ..	Thomas Kneebone.
18/2/96	29	3	4	" ..	"	"	" ..	James Nicholls.
8/5/96	100	0	0	" ..	"	"	Mexico	Herbert Gentles.
14/9/96	100	0	0	Komata ..	VI., X.	"	Microphone ..	William Thorne.
23/4/97	85	0	33	Whangamata	VII., VIII.	"	Militia	George Sievwright.
17/9/95	12	0	22	Waitekauri ..	X.	"	Missing Link ..	Waitekauri Extended Gold-mining Co. (Ltd.).
3/6/96	34	0	6	" ..	XI.	"	Monarch Extended	Waitekauri Monarch Gold-mining Co. (N.L.).
23/7/96	75	2	30	Owharoa ..	XIV.	"	Morgan	Ohinemuri Syndicate (Ltd.).
23/3/96	95	2	32	Waitekauri ..	X.	"	Nebraska ..	Waitekauri Union Claims (Ltd.).
23/7/96	100	0	0	" ..	XIV.	"	Nelson	Mangakara United Gold-mining Co. (N.L.).
27/2/96	52	2	0	Karangahake	II.	Aroha ..	Nevada	David Snodgrass.
27/2/96	46	0	0	"	"	" ..	New Tariff ..	The Owharoa United Gold-mining Co. (N.L.).
18/2/96	25	2	0	Waitekauri ..	XIV.	Ohinemuri	New Waitekauri ..	Star of Waitekauri Gold-mining Co. (N.L.).
8/8/96	66	3	9	Waihi ..	XV.	"	New Year ..	Waihi South Gold-mining Co. (N.L.).
14/9/96	82	1	0	Waitekauri ..	XIV.	"	New-Zealander ..	New Zealand Gold-mining Co. (N.L.).
24/3/96	82	1	4	Waihi ..	XVI.	"	Ngapuhi ..	Waihi Eldorado Gold-mining Co. (N.L.).
24/10/96	96	2	16	" ..	XIII.	"	Nimmo	Henry Fletcher.
20/5/97	11	2	22	Owharoa ..	II.	Aroha ..	Noonday ..	William Charles Kennedy.
14/9/96	45	0	0	Waitekauri ..	VI., XX.	Ohinemuri	North Waitekauri	William Horne.
24/10/96	97	0	0	Wharekirau-punga	VII.	"	Nova Scotia ..	John Murdoch Ross.
19/9/95	100	0	0	Komata ..	X.	"	Oceania	Oceania Gold-mining Co. (N.L.).
9/9/97	100	0	0	Waihi ..	I., II.	Waihi North	Ocean Beach ..	Waihi Beach Gold-mining Co. (N.L.).
9/9/97	99	0	0	" ..	"	"	Ocean Beach Ext.	"
10/12/95	100	0	0	Owharoa ..	XVI.	Ohinemuri	Ohinemuri ..	Ohinemuri Gold-mining Co. (N.L.).
31/5/97	76	0	0	Whangamata	VII.	"	O.H.M.S. ..	John William Darron.
19/5/96	30	0	0	Waitekauri ..	X.	"	Ohinemuri Star ..	John W. Ryan.
27/2/96	34	3	0	Waihi ..	XV., XVI.	"	Ophir	Waihi Gold-mining Co. (N.L.).
3/12/95	30	0	0	Karangahake	II.	Aroha ..	Orient	Orient Gold-mining Co. (N.L.).
24/8/95	90	0	0	Owharoa ..	"	" ..	Owharoa ..	The Ohinemuri Syndicate (Ltd.).
13/11/95	100	0	0	Maratoto ..	X.	Ohinemuri	Pakirarahi ..	Hikutaia Gold Syndicate (Ltd.).
23/12/96	100	0	0	" ..	"	"	" ..	Edwin G. Banks.
21/1/96	16	1	0	" ..	"	"	" Ext. ..	Hikutaia Gold Syndicate (Ltd.).
25/6/96	99	3	10	Karangahake	II.	Aroha ..	Pandora ..	Pandora Gold-mining Co. (N.L.).
2/9/96	100	0	0	"	"	" ..	Pandora Extended	"
23/12/96	72	2	15	Wharekirau-punga ..	VII.	Ohinemuri	Parnassus ..	Auckland Prospecting Association (Ltd.).
6/8/95	30	0	0	Maratoto ..	VI.	"	Pay Rock ..	Hikutaia Gold Syndicate (Ltd.).
27/9/97	79	1	8	Waitekauri ..	X., XIV.	"	Pearl	Robert C. Speer.
30/6/96	4	0	11	" ..	XIV.	"	Perseverance ..	The Waitekauri United Gold-mining Co. (Ltd.).
10/6/97	2	3	0	" ..	X.	"	Pilot Extended ..	Waitekauri Union Claims.
31/12/95	100	0	0	" ..	"	"	Pilot	Waitekauri Union Claims (Ltd.).
5/9/93	15	0	0	" ..	"	"	Portsea	Portsea Gold-mining Co. (Ltd.).

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Ohinemuri—*continued.*

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
9/2/97	17	0	0	Waihi ..	XVI.	Ohinemuri	Prince of Waihi Extended	Arthur Edward Langley.
2/9/96	100	0	0	Wharekirau-punga	VII.	"	Prince of Wales ..	Prince of Wales Gold-mining Co. (N.L.).
3/6/96	100	0	0	Waitekauri ..	VI., X.	"	Queen Anne of Waitekauri	The Queen Anne Gold-mining Co. (N.L.).
8/8/96	76	1	8	Komata ..	X.	"	Queen Anne Ext.	Annie Sergeant.
23/12/96	100	0	0	Maratoto ..	VI., X.	"	Queen of Maratoto	William H. Cooper.
4/10/95	67	3	37	Komata ..	X.	"	Rainbow ..	Alfred Kidd.
3/5/95	90	0	0	Karangahake	XIII. I.	" Aroha	Ravenswood ..	Woodstock Main Reef (Ltd.).
24/3/96	97	2	6	Owharoa ..	XIV.	Ohinemuri	Remuera ..	Ohinemuri Syndicate (Ltd.).
19/9/96	100	0	0	Waihi ..	II.	Waihi North	Rhodes	Charles W. Cave.
23/12/96	58	1	21	Waitekauri ..	XIV.	Ohinemuri	Rising Sun ..	Rising Sun Gold-mining Co. (N.L.).
31/12/95	100	0	0	Waihi ..	XVI.	"	Rosemont ..	Union Waihi Gold-mining Co. (Ltd.).
3/6/96	100	0	0	Karangahake	I.	Aroha ..	Rothschild ..	Rothschild Gold-mining Co. (N.L.).
23/12/96	86	3	3	"	"	" ..	Rotokohu ..	Edward Ryan.
14/9/96	99	0	0	Waitekauri ..	XIV.	Ohinemuri	Royal Arms ..	The Devon Gold-mining Co. (N.L.).
13/1/97	100	0	0	Komata ..	IX., X.	"	Royal Mail ..	Charles F. Wrigley and D. Allen.
10/11/96	12	0	0	Wharekirau-punga	VII.	"	Royal Shield ..	The Royal Shield Gold-mining Co. (N.L.).
7/4/96	100	0	0	Ditto ..	"	"	Royal Standard ..	John Guest Ralph.
25/3/96	100	0	0	" ..	"	"	Royal Standard Extended	Thomas D'Arcy O'Toole.
22/10/95	26	0	0	Karangahake	I.	Aroha ..	Ruby	Joseph Barber.
14/5/97	100	0	0	Te Aroha ..	VI.	" ..	Rotorua Lake ..	Maika Keepa.
16/11/97	92	0	0	Whangamata	III.	Ohinemuri	Royal Reefs ..	John Mason Sharp.
16/11/97	89	0	0	"	"	"	Royal Reefs Ext.	"
23/7/96	100	0	0	Wharekirau-punga	VII.	"	Sceptre	Auckland Prospecting Association (Ltd.).
19/2/97	96	3	8	Waitekauri ..	XIV.	"	Scotia	John Henry Porter.
25/3/96	76	2	10	Te Aroha ..	X.	Aroha ..	Silver Star ..	Edwin C. Martin.
25/6/96	82	2	38	Waihi ..	XVI.	Ohinemuri	Silverton ..	Waihi-Silverton Extended Gold-mining Co. (Ltd.).
23/12/96	91	1	7	" ..	"	"	Silverton No. 2 ..	Ditto.
3/9/96	64	0	27	" ..	XV.	"	Sink to Rise ..	Edward Mann Corbett.
8/5/96	99	2	6	Waitekauri ..	X.	"	Socket	Waitekauri Gold-mining Co. (Ltd.).
13/9/95	62	2	5	" ..	XIV.	"	Sophia	British Empire Gold-mining Co. (N.L.).
23/7/95	30	0	0	Karangahake	II.	Aroha ..	South British ..	South British Gold-mining Co. (N.L.).
31/3/96	30	0	0	Komata ..	X.	Ohinemuri	Southern Cross ..	Southern Cross Gold-mining Co. (N.L.).
17/2/96	61	2	37	Karangahake	I.	Aroha ..	Stanley	Stanley Gold-mining Co. (N.L.).
23/7/96	91	3	32	" ..	II.	" ..	Sterling	Sterling Gold-mining Co. (N.L.).
3/6/96	90	1	36	Maratoto ..	VI., VII.	Ohinemuri	Takapuna ..	Robert Wynyard.
3/9/96	60	0	0	Karangahake	I.	Aroha ..	Talisman ..	New Zealand Talisman Gold-mining Co. (Ltd.).
29/6/96	79	2	15	"	"	" ..	Talisman Extended	Talisman Extended Gold-mining Co. (Ltd.).
30/11/96	77	2	19	Wharekirau-punga	VII.	Ohinemuri	Tavistock Central	Henry Hughes.
14/11/95	97	3	36	Komata ..	X.	"	Te Ao Marama ..	Waitekauri Gold-mining Co. (Ltd.).
3/9/96	100	0	0	Waitekauri ..	XIV.	"	Te Awamutu ..	Isaac Jones and others.
23/7/97	100	0	0	Karangahake	I., II.	Aroha ..	Tenilba	Deep Lead Gold-mining Co. (N.L.).
13/1/97	99	0	15	Waitekauri ..	XIV.	Ohinemuri	Teutonic Amalgamated	Teutonic Gold-mining Co. (N.L.).
3/6/96	73	3	4	Owharoa ..	XIV.	"	Thorpe	The Ohinemuri Syndicate (Ltd.).
27/8/97	30	0	0	Waihi ..	XVI.	"	Three Cheers ..	William L. Hunter.
27/10/96	2	3	13	Waitawheta	VI.	Aroha ..	Tit Bit	Edwin Charles Martin.
25/4/96	100	0	0	Maratoto ..	"	Ohinemuri	Tomoana ..	William Horne.
29/11/97	100	0	0	Waitekauri ..	XIV.	"	Torpedo.. ..	Waitekauri No. 2 Gold-mining Co. (N.L.).
17/10/95	100	0	0	Komata ..	X.	"	Triumph ..	Komata Triumph Gold-mining Co. (N.L.).
25/4/96	51	2	8	" ..	"	"	Triumph Extended	Ditto.
14/6/97	100	0	0	Waihi ..	III.	Waihi North	Truro	William Tregoweth.
27/9/95	27	1	24	Owharoa ..	XIV.	Ohinemuri	Tunnel	Ohinemuri Syndicate (Ltd.).
14/2/98	100	0	0	Maratoto ..	X.	"	Tunnel	Waitekauri Gold-mining Co. (Ltd.).
21/5/95	14	1	36	Waitekauri ..	VI.	"	Two-and-Two-makes-Four	Waitekauri Central Gold-mining Co. (Ltd.).
31/12/95	100	0	0	Waihi ..	XVI.	Aroha ..	Union	Union Waihi Gold-mining Co. (Ltd.).
31/5/97	97	3	20	Karangahake	I., V.	" ..	Victory	Charles David Wright.
11/5/96	99	1	10	"	I.	Ohinemuri	Victor Waihou ..	Victor Waihou Gold-mining Co.
1/2/96	100	0	0	Waihi ..	XVI.	"	Waihi Eldorado ..	The Waihi Eldorado Gold-mining Co. (N.L.).
14/8/95	100	0	0	" ..	"	"	Waihi Extended ..	Waihi Extended Gold-mining Co. (Ltd.).
1/3/97	66	2	8	" ..	"	"	Waihi Gladstone ..	Waihi Gladstone Gold-mining Co. (Ltd.).
10/12/95	91	2	0	" ..	II.	Waihi North	Waihi Monument	Waihi Monument Gold-mining Co. (N.L.).
1/2/96	100	0	0	" ..	VII.	Ohinemuri	Waihi Monument Extended	Ditto.
13/11/95	98	1	0	" ..	XV., XVI.	"	Waihi North ..	Waihi Consols Gold-mining Co.
8/10/95	14	0	16	" ..	XV.	"	Waihi South ..	Star of Waihi Gold-mining Co. (N.L.).
23/3/96	90	0	0	" ..	"	"	Waihi West ..	Waihi Grand Junction Gold-mining Co. (Ltd.).
9/9/97	97	1	16	" ..	I., II.	Waihi North	Waihi Beach ..	Waihi Beach Gold-mining Co. (N.L.).

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Ohinemuri—*continued.*

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
26/8/97	6	2	30	Waihi ..	III.	Waihi North	Waihi Beach No. 1	Frederick Moore.
26/8/97	16	2	30	" ..	"	"	Waihi Beach No. 2	E. B. Grey.
29/11/97	87	3	3	" ..	"	"	Waihi Beach No. 3	John Hanna Grey.
29/11/97	100	0	0	" ..	IV.	"	Waihi Beach No. 4	Charles E. McCormick.
29/11/97	77	1	8	" ..	III.	"	Waihi Beach No. 5	David Sheehan Grey.
29/11/97	96	2	0	" ..	"	"	Waihi Beach No. 6	Arthur Frank Moginie.
29/11/97	82	0	24	" ..	"	"	Waihi Beach No. 8	Ernest B. Dufaur.
29/11/97	92	0	25	" ..	"	"	Waihi Beach No. 9	Sydney Codicutt.
26/8/97	6	2	28	" ..	"	"	Waihi Beach No. 11	John Scarlet.
3/2/98	95	0	0	" ..	"	"	Waihi Beach No. 12	John Rowley Miller Stewart.
7/8/97	56	0	0	" ..	"	"	Waihi Foreshore ..	George Carrick and James W. Shaw.
14/5/97	68	2	7	" ..	II.	"	Waihi North Ext.	Peter MacFarlane.
3/5/97	96	0	0	" ..	"	"	Waihi North No. 1	Henry Fletcher.
31/5/97	99	0	0	" ..	XV.	Ohinemuri	Waihi South Ext.	John Prescott.
31/5/97	91	0	0	Whangamata	VII.	"	Waipaheke ..	George Sievwright.
20/9/88	9	2	23	Waitekauri ..	XIV.	"	Waitekauri ..	Waitekauri Gold-mining Co. (Ltd.).
3/3/96	28	3	36	" ..	X.	"	Waitekauri Central No. 1	Waitekauri Junction Gold-mining Co. (N.L.).
23/7/96	100	0	0	" ..	VI., VII.	"	Waitekauri Consols	Thomas Henderson.
27/10/96	10	1	0	" ..	XXV.	"	"	Mangakara United Gold-mining Co. (N.L.).
17/8/95	100	0	0	" ..	VI., VII., X., XI.	"	Waitekauri Cross	Waitekauri Cross Gold-mining Co. (Ltd.).
23/3/96	95	2	19	" ..	VI.	"	Waitekauri Ext. ..	Waitekauri Extended Gold-mining Co. (Ltd.).
18/2/96	30	0	0	" ..	XIV.	"	"	Waitekauri South Gold-mining Co. (N.L.).
18/2/96	30	0	0	" ..	"	"	Waitekauri Golden Gem	James Henry Porter.
21/10/97	30	0	0	" ..	XIV.	"	Waitekauri Grand Junction	George Thomas Weston.
19/6/95	100	0	0	" ..	X., XIV.	"	Waitekauri Jubilee Extended	The New Zealand Jubilee Gold-mines (Ltd.).
5/5/96	30	0	0	" ..	XIV.	"	Waitekauri Junction	John Guest Ralph.
27/9/97	33	1	16	" ..	X.	"	Waitekauri Junction	Waitekauri Junction Gold-mining Co. (N.L.).
26/8/96	30	0	0	" ..	XIV.	"	Waitekauri Junction Extended	Joseph T. Armitage.
20/8/96	32	0	0	" ..	X.	"	Waitekauri Kathleen	Nathan Alfred Nathan.
17/2/96	40	0	0	" ..	XIV.	"	Waitekauri King ..	Waitekauri King Gold-mining Co. (N.L.).
17/2/96	100	0	0	" ..	XI.	"	Waitekauri Monarch	Waitekauri Monarch Gold-mining Co.
31/5/97	85	2	38	" ..	VIII., IX.	"	Waitekauri Monument	Thomas Graham.
14/9/96	100	0	0	" ..	X.	"	Waitekauri Queen	Waitekauri Queen Gold-mining Co. (N.L.).
19/2/97	41	1	26	" ..	XI.	"	Waitekauri Reefs Extended	William McCormick.
27/9/97	99	0	0	" ..	XIV.	"	Waitekauri United	Waitekauri United Gold-mining Co. (Ltd.).
27/8/97	10	2	24	" ..	"	"	Waitekauri United No. 2	Waitekauri United Gold-mining Co. (Ltd.).
27/2/96	100	0	0	" ..	VI., X.	"	Waitekauri West Cross	William Horne.
17/2/96	100	0	0	Waihi ..	XVI.	"	Waitete	Henry Gilfillan, jun.
25/6/96	100	0	0	" ..	"	"	Waitete Extended	"
19/6/95	100	0	0	" ..	"	"	Waka	Grand Junction Gold-mining Co. (Ltd.).
19/9/96	80	2	2	Maratoto ..	VI.	"	Walker's Maratoto	John Watson Walker.
30/11/96	46	0	0	Waihi ..	XVI.	"	Watchman ..	William H. Churton.
13/11/95	63	2	35	Karangahake	I.	Aroha ..	Waverley ..	Waverley Gold-mining Co. (N.L.).
3/6/96	85	0	29	"	I., II.	Ohinemuri	Wealth of Nations	Wealth of Nations Gold-mining Co. (N.L.).
27/2/96	100	0	0	Waitekauri ..	VI., X.	"	West Waitekauri	William Horne.
11/12/94	15	0	0	"	X.	"	We Three ..	Alpha Gold-mining Co. (N.L.).
11/5/96	100	0	0	Wharekirau-punga	VII.	"	Wharekiraupunga	Royal Shield Gold-mining Co. (N.L.).
3/6/96	100	0	0	Maratoto ..	VI.	"	Winn	Wilfrid Rathbone.
18/1/94	72	1	18	Karangahake	I.	Aroha ..	Woodstock United	Woodstock Gold-mining Co. (Ltd.).
24/3/96	109	0	0	Owharoa ..	XIV.	Ohinemuri	Wright	Ohinemuri Syndicate.
17/4/94	14	3	12	Waitekauri ..	"	"	Young New Zealand	The New Zealand Gold-mining Co. (N.L.).
14/5/97	100	0	0	" ..	XV.	"	Zephyr	William Henry Potter.
14/5/97	100	0	0	" ..	"	"	Zephyr Extended	William John Downie.
13/11/95	72	2	0	" ..	XIV.	"	Zion	Zion Gold-mining Co. (N.L.).

Maratoto District.

Hikutaia Gold Syndicate's Mine (Area, 350 acres).—The mine has been well opened up. The reef, which varies in thickness from 6 ft. to 14 ft., has been driven on at No. 5 level 1,250 ft. and 600 ft. at the bottom level. Winzes have been sunk from one level to another, giving good ventilation. Prospecting has been done at the surface levels, and the ore, though of low grade, is considered payable. A considerable quantity of quartz is now in sight. Thirteen men are employed.

Walker's Maratoto Mine (Area, 80 acres 2 roods 2 perches).—Prospecting has been energetically carried on in this property, but the results have not been sufficiently good to justify the erection of a battery. From five to sixteen men were employed.

In the Volunteer, Lord Salisbury, Retreat, and several other claims in the district prospecting operations have been suspended.

Komata District.

Komata Reefs Mine (Area, 79 acres).—This has lately been joined with the Komata Queen Mine, with an area of 130 acres, making a total area of 209 acres. The owners are the Komata Reefs Gold-mines (Limited). A considerable amount of development work was carried on in the Komata Reefs section. There are three levels opened—No. 1, 60 ft.; No. 2, 140 ft.; and No. 3, 240 ft., below the surface. Argall's reef, the main ore-producer, has an average width of from 3 ft. to 4 ft., and is composed of loose friable quartz containing a large quantity of manganese-oxide. The vein stuff is well oxidized on the levels at present opened, there being very little iron-pyrites through the quartz. Hartridge leader is a small vein varying from 6 in. to 8 in. in width, carrying high-grade ore. The quartz is similar in character to that of Argall's reef, only harder and more compact. Lavington reef is a large low-grade reef about 20 ft. wide, the quartz being similar in appearance to that of the Argall reef; very little work, so far, has been done on this reef. The nature of development work carried out during the year consists of driving cross-cut, No. 3 level, and driving along the strike of the various reefs on the different levels, and rising and sinking to make connections. The chief work has been on Argall reef, and consists of—No. 1 level, driving north 80 ft., south 40 ft.; No. 2 level, driving north 428 ft., south 150 ft.; No. 3 level, driving north 260 ft., south 160 ft. The total amount of work done in the mine is—Rising and sinking, 720 ft.; cross-cutting, 1,450 ft.; driving on reefs, 1,500 ft.

Mine machinery: One small ventilating-fan, driven by small Pelton wheel. Mill machinery: Steam-engines—One small semi-portable engine used as auxiliary power for driving the stamp battery. Water-wheels—One 6 ft. Pelton wheel for main motive-power, and one 3 ft. Pelton wheel for driving vacuum pumps, berdan, and dynamo for electric light. Stamps—One battery of twenty head, square frame, with horizontal driving-belts; weight of stamps, 700 lb.; five stamps working in each mortar-box and a Challenge ore-feeder to each box. (The battery was erected for dry-crushing but has recently been changed to the wet process.) Rock-breakers—One Gates No. 2, style D. Berdans—One, used for blanketings. Concentrators—Blanket strakes. Ore-drying furnaces—One rotary furnace. Cyanide-vats—Twelve circular vats, 22 ft. diameter, 4 ft. sides, made of steel, and each supplied with a revolving distributor for spreading the tailings from the battery evenly. Zinc-boxes—Two, with twelve compartments in each. The capital expended on mill machinery is £9,216 10s.

The process employed up to February, 1898, was dry-crushing and cyanide leaching, the tailings from the vats being run over amalgamated copper-plates and blankets, there being a fair quantity of coarse gold in the ore. The process at present in use is wet-crushing, amalgamation on copper-plates, and leaching of the tailings by cyanide solution. About 70 per cent. of the total gold is obtained as amalgam on the plates in front of the battery, and a further 75 per cent. is extracted from the tailings by cyanide. The *modus operandi* is as follows: The tailings from the plates are run through a revolving distributor (this revolves automatically by the flow of the tailings from its curved pipes), and evenly spread in the vat. The excess of water, charged with fine slime, discharges into a circular launder placed around the inside of the vat, from which it runs into a tank, to be pumped back to a tank above the battery, and reused as battery water. The percolation by this method is good and comparatively easy, the percentage of extraction being very fair.

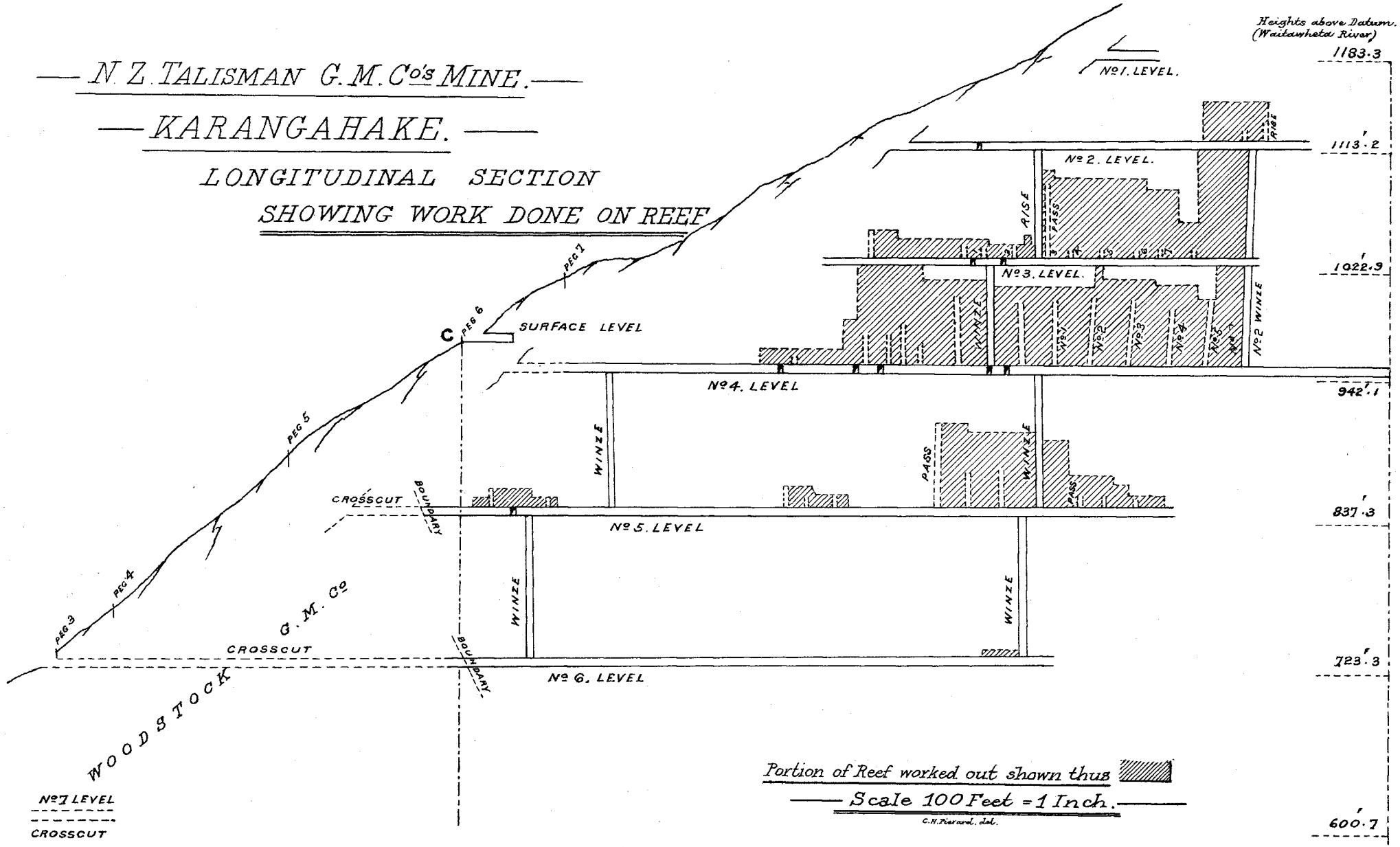
Length and capacity of water-races: Main race, two miles long; capacity, four sluice-heads. Besides the main race there is half a mile of branch race. The capital expended on water-races is £1,460 13s. 4d. Aërial tram-line: 44 chains in length, of the single-rope system, carrying thirty-three buckets of 150 lb. capacity each, worked by gravitation, assisted by a 3 ft. Pelton wheel, using the water from the mine. The ground tramway is one mile in length, operated by a small locomotive. The capital expended on tramway construction is £4,818 5s.; and on road-making, £385 18s. Milling operations, &c.: Average quantity of quartz crushed per stamp daily, 16 cwt.; average number of stamps employed daily, 17; number of days during the year on which the mill was worked, 177; total quantity of quartz crushed, 2,375 tons, of 2,240 lb. each; total yield of bullion, 12,303 oz., value £9,532 12s. 2d.; total bullion recovered by cyanide process—Gold, 1,759·85 oz.; silver, 8,864·5 oz.; total value, £8,486 2s. 2d. Total bullion recovered by amalgamation—Gold, 249·57 oz.; silver, 142·78 oz.; total value, £1,046 10s. Total value of bullion for owners, £9,532 12s. 2d.; cost of mining per ton, 19s. 9d.; cost of carriage per ton, 1s. 10d.; cost of milling and treatment, £1 0s. 4d. Average number of men employed during the year: Mine, forty-eight, on wages and contract; tramway construction, forty, for six months; erection of and running of battery, twenty-six during the year.

The following account applies to the work carried on in the Komata Queen section previous to amalgamation:—Top level: Average depth below surface, 50 ft. Lavington reef driven on a distance of 100 ft. in a northerly direction. This is a very large reef, containing low-grade quartz. Smithy level: Average depth below surface, 250 ft. Lavington reef driven on a distance of 281 ft. in a northerly direction. The reef is very wide in places, and carries a soft friable quartz. Argall reef: Driven on a distance of 286 ft. The reef shows small, and pinched, with small patches of

N.Z. TALISMAN G.M. Co's MINE.

KARANGAHAKE.

LONGITUDINAL SECTION SHOWING WORK DONE ON REEF



quartz. Cross-cut to east driven 450 ft., and cuts several reefs, none of which have yet been driven on. Level 50 ft. below Smithy level: A cross-cut has been driven east 206 ft. Level 130 ft. below Smithy level: A cross-cut has been driven east 386 ft. There is no machinery in connection with this mine. The average number of men employed during the eight months previous to amalgamation with the Komata Reefs Company was fifteen.

Woodstock Mine (Area, 72 acres 1 rood 18 perches).—Since last annual report 1,974 fathoms of stoping have been done on the Maria lode, and the development work carried out may be summarised as follows: Driving on the lode, 2,379 ft.; rising on the lode, 601 ft.; sinking on the lode, 190 ft. The mine is opened up by six different levels, and the total lengths of same are as follows: No. 1 level, 693 ft.; intermediate level, 798 ft.; No. 2 level, 826 ft.; No. 3 level, 1,036 ft.; No. 4 level, 989 ft.; No. 5 level, 831 ft. These levels have all been connected one with the other, partly by rising and partly by sinking, and the whole of the mine-workings are now splendidly ventilated. The No. 5 is the lowest level obtainable, bar sinking, and the backs available range from 80 ft. on the left-hand bank of the Waitawheta River to 900 ft. at the southern boundary, which is the highest point in the property. A cross-cut 500 ft. in length has been driven west of No. 5 level, and several gold- and silver-bearing lodes have been intersected during its progress. Within the next 20 ft. of driving the Woodstock lode should be met with, and upon this the cross-cut will afford 360 ft. of backs beneath the old workings. The total amount of cross-cutting accomplished throughout the mine is 1,860 ft., and this work has revealed numerous veins and lodes, varying in size and value, and running west of and parallel with the Maria lode. The total quantity of ore treated from all parts of the workings on the Maria lode during the year ending the 31st March, 1898, was 10,923 tons, for a bullion return of 50,400·27 oz.; value, £35,955 1s. Of this, the bullion recovered by the cyanide process amounted to £32,899 11s. 9d., and the value redeemed by amalgamation was £3,055 9s. 3d. Owing to its refractory character, considerable difficulty has always been experienced in the treatment of Woodstock ore, and many processes have been tried with varying success. Dry-crushing with subsequent cyanide treatment, followed up by concentration and amalgamation, gave the best results, but even then the extraction was comparatively low, and the consumption of cyanide made milling operations costly. Early in the present year a start was made to crush wet with a dilute solution of cyanide in the mortar-boxes, as an experiment, and the bullion results were so highly satisfactory that it was decided to adopt wet-crushing. Dry-crushing was then stopped, and wet-crushing started, with twenty head of stampers. For some unaccountable reason the high bullion extraction obtained from the experimental wet-crushing was not borne out by subsequent results with the same treatment on a large scale, and experiments are now being made with a view to ascertaining the cause. Mr. H. H. Adams, who has successfully established a new departure in the treatment of ore by wet-crushing at the Komata Reefs mill, is now trying the same process in the Woodstock mill, and, so far as operations have gone, it looks as if his expectations would be realised. An average of 174 men were employed.

Crown Mine (Area, 135 acres 1 rood 31 perches; owners, the New Zealand Crown Mines Company, Limited).—This mine is situated on the Waitawheta River, distant about a mile from the battery and works, which are built on the left bank of the Ohinemuri River, a short distance below the Township of Karangahake. The workings are very extensive, the levels reaching from the Waitawheta River to a point past the trig. station, which is about 1,600 ft. above the level of the adit. The average height of the available backs would thus be about 800 ft., and the reefs will produce great quantities of ore from the portion of the mine opened from the adit, irrespective of the downward extension of the reefs, which, so far as already prospected, are of a highly valuable character. The general manager, Mr. R. H. Daw, has furnished the following account of the operations during the year ended 31st March last:—

"Mining has been confined exclusively, for the year above-mentioned, to the Crown Mines section of the property, and the Welcome Reef south of the Waitawheta River has produced all the quartz milled during that period. The supplies have been drawn principally from the stopes over Nos. 3, 4, and 6 adit levels (the latter being the main level through which the quartz is delivered in the Waitawheta Gorge, its mouth being about 10 ft. above the normal level of the river), the balance of ore having come from the underhand stope in the floor of this level, and in comparatively small quantities from other workings under river-level. Little, however, has been done to develop the resources below river-level pending the further sinking of the main incline shaft, now being pushed down with all possible speed, in order to attack systematically the excellent quartz proved to exist in this section of the property." The main features in the development for the year consist in the extension southwards on the course of the Welcome Reef of Nos. 4 and 6 adit levels, in the putting up of two main rises from No. 4 level to Coward's No. 3 level (old workings), and in the setting-off, stripping, and timbering the main incline shaft now being sunk on the underlie of the reef 100 ft. in from the mouth of No. 6 level. Since my last report, No. 4 level has been extended 630 ft., making its total length 2,300 ft., and No. 6 level has been driven a further distance of 540 ft., to a total length from its mouth of 2,200 ft. During the year the reef has, generally speaking, maintained its average thickness and value, the whole of the quartz mined from the main levels having been sent to the mill. The two main rises previously mentioned have been completed to Coward's No. 3 level, a total height of about 480 ft., opening up in their course immense blocks of low-grade ore for stoping, besides proving thoroughly efficient in ventilating the main workings below. With the completion of the Upper Waitawheta Water-race, the erection of the air-compressor, and winding-engines, we have been enabled to continue the sinking of the main incline shaft. This shaft measures 29 ft. by 6 ft., inside timbers, and has now reached the No. 7 level, a depth of 60 ft. on the underlie of the reef. When a further depth of 60 ft. has been reached, No. 8 level will be put out from the shaft north and south, and stoping actively commenced. The winding-gear is now complete with double line of rails, incline, cages, &c. For the year, 17,960 tons of ore were mined and sent to the mill. Milling has been carried on continuously during the year with forty heads of stamps. From April to August

last these were gradually converted from dry to wet crushing, with a gratifying increase in the quantities milled and in bullion produced. The following are the quantities of ore milled and value of bullion recovered:—

——	Tons.	Value.	Remarks.
1897.		£	
April	1,180	3,106	Forty heads crushing, dry.
May	1,301	3,567	
June	1,202	3,296	Gradual conversion from dry to wet crushing.
July	1,473	4,081	
August	1,567	4,163	
September	1,788	4,069	All wet.
October	1,964	4,232	
November	2,034	4,443	
December	1,490	3,220	Three weeks.
1898.			
January	1,480	3,041	Three weeks.
February	1,511	3,985	
March	1,764	3,976	
	18,755	45,179	

The wet-crushing adopted is a system of crushing with a full-strength solution of cyanide of potassium supplied to the mortar-boxes. The details of the process have not yet been made public. The fall in quantity of ore crushed since January is due to the closing of the mills on Sundays. New Mill: Foundations and mortar-blocks have been laid down for another forty heads of stamps, twenty of which are in course of erection, and are expected to be at work in July, the necessary cyanide plant in conjunction with same having been completed. The stamps are 1,000 lb. each, single discharge boxes, and were supplied by Messrs. Fraser and Chalmers, Limited, London. The average number of men employed up to December was 240, and for this year 188."

Talisman Extended Mine (Area, 72 acres 2 roods 15 perches).—The chief work carried on during the year was driving on the low level to intersect the Talisman reef. This drive is in a distance of 780 ft. Surface prospecting has also been done, but as yet nothing payable has been discovered. Four men were employed.

Imperial Mine (Area, 60 acres).—At Nos. 1 and 2 levels a large amount of work has been done, and the low level has recently been started to cut the reef. Five men are employed.

Woodstock Main Reefs.—No. 6 level has been driven a distance of 628 ft. The reef varies from 3 ft. to 14 ft. in width, the quartz there being of a low grade. The No. 3 Ivanhoe has been driven 600 ft., but nothing payable has been discovered, and the company have ceased operations.

In the Stanley, Stirling, Waverley, Golden Fleece, St. Patrick, and Crown Imperial Mines extensive prospecting has been carried out, but, in consequence of the failure to discover payable stone, most of them have been recently under protection.

Owharoa District.

Ohinemuri Syndicate (Area, 700 acres).—The pumping and winding machinery has been erected in this company's shaft between the road and the river. A shaft 12 ft. by 6 ft. has been sunk a depth of 143 ft. At 120 ft. a chamber has been opened out, from which cross-cut drives are being put in, that to the north being in 100 ft., and that to the north-west 115 ft. It is expected that the Radical reef may be cut at any time. Twenty-one men are employed.

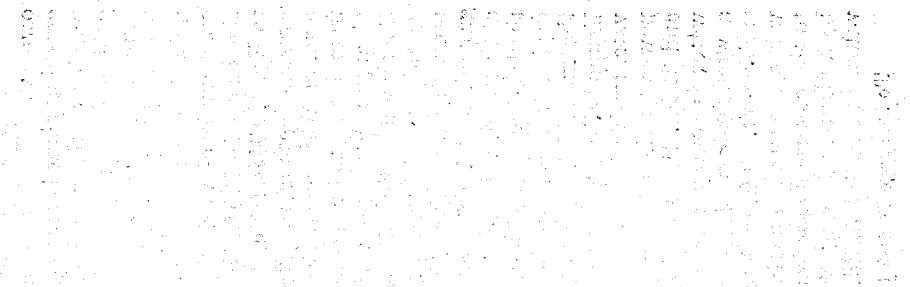
Waihi District.

Waihi Mine (Area, 346 acres; owners, Waihi Gold- and Silver-mining Company).—Extensive operations have been carried on during the year, principally driving and stoping in the Martha, Welcome, and Victoria lodes, the supply of quartz being ample to keep the mill constantly at work. The stone from the Martha lode over No. 2 level is of good quality. From the Victoria lode, on No. 2 level, the ore is of medium quality, the width of the lode being 6 ft. From the Welcome lode, which is 14 ft. in thickness on No. 2 level, the stone is of good quality. On No. 1 level of the Welcome lode, at the western end, the quality of the quartz is improved, the lode being 5 ft. in thickness. The cross-cut has been started from the south-eastern side of the level to connect with No. 3 shaft. The Surprise lode, on No. 1 level, has been driven on a distance of 132 ft. No. 3 shaft has attained a depth of 100 ft. below the surface. A number of small lodes have been cut through while sinking this shaft, varying from 15 in. to 2 ft. in width, all containing a fair percentage of gold. The Victoria battery, at Waikino, recently commenced crushing, fifty stamps being employed. 37,164 tons of quartz has been treated, for a yield of 126,801 oz. of bullion; value, £143,533. There are five hundred men employed by the company, 310 being engaged in the mine and the others employed at the batteries and on surface-works.

Union Mine (Area, 250 acres).—Operations in this mine have chiefly been confined to development works. The main shaft, 14 ft. by 6 ft., has been sunk to a depth of 300 ft., and three levels have been opened out, entailing a large amount of work in driving on the Union reef, which varies from 3 ft. to 6 ft. in width. A large amount of work has also been done on the Amaranth reef, which varies in thickness from 12 ft. to 30 ft. In the Winner section of the mine a cross-cut has been made from the whim-shaft to intersect the Winner reef.

New Zealand Talisman Mine (New Zealand Talisman Gold-mining Company, Limited, owners).—The land occupied consists of a special claim of 60 acres, a machine-site on which the crushing plant is erected, and a special site on which a building has been erected containing a number of the vats used for the cyanide process. The reef, which hitherto has yielded the chief gold-producing quartz, has been well developed; six different levels have been driven, and communication effected by winzes and uprises, which open up the various blocks of reef between No. 6 level and No. 1 level, and a fresh adit is being driven 120 ft. below No. 6. The situation of the claim is most favourable for economical working, the precipitous character of the country affording the opportunity of working from the surface by a succession of adit levels. The No. 7 level, which is the deepest, is 120 ft. below No. 6, the height of the others being—from No. 6 to No. 5, 115 ft.; No. 5 to No. 4, 104 ft.; No. 4 to No. 3, 80 ft.; No. 3 to No. 2, 290 ft.; No. 2 to No. 1, 70 ft.; and the average depth of the No. 1 level is 215 ft. from the surface. The height of No. 7 level above the level of Waitawheta Stream is about 600 ft., and there is therefore a total height of nearly 1,400 ft. from datum to the surface above No. 1 level. The reef, which averages 3 ft. 6 in. in width, consists of quartz having a wavy appearance, flinty and crystalline in character, and of a hard nature. Considerable difficulty was at first experieneed in obtaining a satisfactory extraction of the gold contained. There is every indication of the reef extending downwards, and this will shortly be proved as far as No. 7 level is concerned. The entrance to No. 7 is in the Woodstock Company's ground, and 750 ft. must be driven before the boundary of the Talisman is reached; this, it is anticipated, will take 200 ft. further driving to complete. The quartz is conveyed from the mine to the battery by a wire tramway across the Waitawheta Gorge. At the mill a new revolving ore-drying furnace, capable of drying 40 tons per day, has been erected, and is now used in place of the kilns. The crushing plant consists of two stone-breakers, twenty head of stamps, and a No. 5 Krupp ball-mill, and six berdans and amalgamating-tables. The cyanide plant includes fourteen vats, twelve 22 ft. and two 18 ft. in diameter, with vacuum pumps, zinc filters, &c. The motive-power for the machinery is furnished by two Victor turbines of the respective diameters of 21 in. and 12 in., the latter being used for driving a dynamo for lighting and power purposes. The water is conveyed from the Waitawheta Stream through a tunnel 95 ft. in length, connecting with a wrought-iron pipe 4 ft. in diameter and 925 ft. in length, and delivered into the concrete-walled turbine-pit, 28 ft. in depth. In the building on the special site water necessary for sluicing out the vats is conveyed in a 3 in. pipe from the Hauraki Creek, and the power for the pumps is transmitted to the electric motor from the dynamo at the machine-site, which also produces electric light for both plants. During the year 4,194 tons of quartz was crushed and treated for a yield of gold valued at £13,681 7s. 3d. Seventy-five men were employed in the mine and at the mill.

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Waihi-Silverton Mine (Area, 174 acres).—Driving and stoping at Nos. 1 and 2 levels have been vigorously carried on, and the shaft sunk to a depth of 250 ft., where a chamber was opened out and a cross-cut driven to intersect the reef. Driving is now proceeding north and south, the reef being about 7 ft. in width. The ore, though of low grade, is payable. The shaft is also being sunk below No. 3 level, for the purpose of opening up another level as early as possible. The forty-stamp mill has been continuously employed, and 11,253 tons of quartz, yielding 8,456 oz., valued at £16,452, has been crushed. Seventy men are employed.

Waihi Grand Junction Mine (Area, 280 acres; owners, Waihi Grand Junction Gold Company, Limited).—Work was carried on in an energetic manner for a considerable part of the year. In consequence of financial difficulties, the old company was reconstructed, and sufficient capital is now available for the development of the mine. A difficulty of no small importance attends initiatory work to open a mine in this part of the district. The land is situated both to the eastward and southward of the celebrated Waihi Mine, but, unlike the Waihi Mine, where the Martha Hill rises to over 200 ft. above the level of the surrounding country, the land at both ends of this hill is covered to a more or less depth with a deposit of later volcanic matter in the form of hard rhyolite rock interspersed with clays, mud, and fragments of the harder rock overlaying the decomposed andesite or bed-rock. In this andesite rock the reefs exist. Therefore, until the overlying strata has been pierced, no exploration can be carried on in country favourable for the presence of quartz lodes. This company, however, succeeded during last year in sinking their shaft at the eastern end to a depth of 507 ft., the first 250 ft. being through the superimposed later volcanic ejecta. At a depth of 494 ft. chambers were formed and prospecting drives made both in a northerly and southerly direction, 167 ft. in the first and 199 ft. in the latter direction. At the western end the shaft, 170 ft. in depth, was opened, and a level driven northerly 601 ft., and in the opposite direction the drive at 430 ft. from the shaft intersected a large body of quartz identified with the Martha reef worked in the Waihi Mine. This drive was then further extended 350 ft., with a view of discovering the Welcome reef, also worked by the Waihi Company. Such was the extent of work done during the year 1896–97.

During the past year the north drive, at the low level in the eastern shaft, was extended to 411 ft. from the shaft. A large reef was here intersected, but, on account of the great flow of water attendant on the quartz being cut into, the pump in use was not sufficiently powerful to cope with it. It was then decided to stay operations until such time as more powerful pumping machinery was obtained, and, taking advantage of a hard bar of andesite, a dam built of cement 5 ft. in thickness was constructed, and the flow of water thereby controlled. It was found at this time that the water was lowered in the workings on the reefs in the Martha section of the Waihi Mine, and thus showing that the quartz cut, and from which there was such a flow of water in this mine, must be identical with the Waihi reefs line. In consequence of the advantage the Waihi Company received from the drainage effected by the use of the Grand Junction pumps, an arrangement was entered into, the two companies combining to bear the cost of keeping the pumps going, which up to date they have continued. This arrangement was satisfactory, as both mines are benefited through the water being kept under to the extent of the capacity of the pumps, thus tending to gradually assist in the unwatering of this part of the district. A new shaft has been sunk at the eastern end, with a view of cutting the reef discovered at the low level. This shaft, which is named No. 2 shaft, has reached a depth of 200 ft.; and a cross-cut driven to the north 40 ft., and another to the south 27 ft., have both, at the 200 ft. level, failed to lead to any discovery of quartz so far. The shaft was then continued to a further depth of 250 ft., and cross-cuts are to be driven both ways at this level. In the workings at the western end, the northern cross-cut which reached 611 ft., was further continued to a distance of 823 ft., the latter portion having been done by the Waihi Consols Company for the purpose of prospecting the adjacent ground, which is their property. No reef was discovered in this direction. The drive in the other direction, which had attained a distance of 780 ft., was continued to 827 ft. The reef which had been cut through in this cross-cut was driven on for 92 ft. A winze was sunk 16 ft. on the lode, and payable quartz was discovered 7 ft. from the top. The winze was then carried down vertical, and enlarged to answer the purposes of a shaft. The quartz obtained from the sinking to a depth of 24 ft., at which point the underlay of the reef carried it clear of the vertical shaft, was of a similar character to that first discovered 7 ft. from the top. Assays of samples of quartz taken from this place were as follows: 9th March—Gold, 1 oz. 15 dwt. 2 gr.; silver, 2 oz. 15 dwt. 12 gr.; value, £7 8s. 6d. per ton. 14th March—Gold, 19 dwt. 9 gr; silver, 1 oz. 19 dwt. 2 gr; value, £2 16s. 2d. per ton. In order to advantageously develop this part of the mine, a No. 2 shaft was commenced on the surface at a point immediately over the winze, and at a depth of 160 ft. communication was effected with the winze portion already mentioned, and sinking is now being continued with the intention of opening out as soon as a full depth of 260 ft. from the surface is attained. The reef when cut through was found to have a width of 18 ft., and there is every reason to assume that the famous Martha reef will continue to prove of great value in this the adjacent property.

The machinery used consists of a winding-engine, 7 in. by 12 in.; a 14-horse-power Tangye at No. 1 shaft, and at No. 2 shaft a portable winch and boiler, 10-horse power; at the new shaft, western end, an Otis pair 6 in. by 8 in. cylinders, single drum, 34 in. by 12 in., 6-horse power. The pumping machinery consists of a Worthington compound steam-pump, 16 in. by 25 in. by 15 in., rams 8½ in., duplex, capacity 20,040 to 25,000 gallons an hour, 600 ft. series; one Tangye, 10 in. by 6 in. by 12 in.; one 10 in. by 5 in. by 12 in.; one 8 in. by 4 in. by 12 in.; one 6 in. by 4 in. by 12 in.; one 6 in. by 3 in. by 10 in.; and one duplex, 6 in. by 4 in. by 6 in.; one 4¾ in. by 3 in. by 5 in. boiler-feed pump; a 14-in. air-compressor, with rock-drills; also two 138-horse-power water-tube boilers of the Babcock-Wilcox type. Thirty-seven men were employed.

Waihi Consolidated Mine (Area, 200 acres; owners, Waihi Consolidated Gold-mine, Limited).—The shaft in this mine, which had been sunk to a depth of 210 ft., was continued to a depth of 280 ft. Driving on the large reef was continued at the 80 ft. level, and also at the 200 ft. level.

Waihi Consols Mine (Area, 200 acres; owners, Waihi Consols Gold-mining Company).—Work was carried on in driving at continuation of the northern cross-cut in the Waihi West shaft, owned by the Grand Junction Company, but no quartz was cut. It was then decided to sink a new shaft, 9 ft. by 5 ft., near the boundary of that claim, but, after reaching a depth of 120 ft., a large body of water was struck, and operations were then suspended, pending negotiations for obtaining a 30-horse-power boiler and pump capable of throwing 10,000 gallons per hour. Nine men were employed.

Waihi Gladstone Mine (Area, 66 acres 2 roods 8 perches; owners, Waihi Gladstone Gold-mining Company).—During the year a shaft 6 ft. by 3 ft. was sunk to a depth of 175 ft., a level was opened at 100 ft. down, and 200 ft. of driving was done on a reef 6 ft. in width; a winze was also sunk on this reef, the quartz improving in quality as sinking progressed. Nine men were employed.

Waihi Extended Mine.—Very little work has been carried on in this mine. In the month of January only four men were employed in a drive from an adit level 300 ft. in length.

Waihi South Mine (Area, 262 acres; owners, Waihi South Gold-mining Company).—During the year the shaft was sunk to a further depth of 70 ft., making a total depth of 220 ft. The rock was hard blue andesite, containing water, and giving off about 7,000 gallons per hour. At the bottom a drive was put in for a water lodgment, and 6 ft. higher up in the shaft a drive was put in to the northward, in the direction of the Waihi Consols ground, with the expectation of cutting the strike of the Welcome lode at about 350 ft. from the shaft. The first 100 ft. was through hard blue rock, then through soft andesite. At a further distance of 130 ft. some quartz stringers were cut 2 in. or 3 in. in width at the bottom, but running out before they reached the top of the drive. Continuing the drive to a total length of 400 ft., alternate hard and soft rock was pierced, but no signs of quartz were seen. Endeavour was then made to sink at the place where the veins of quartz were cut, but, the flow of water proving too great, this work was abandoned, and the claim protected for six months, in order to give the shareholders time to enable further capital to be called up. One 3-horse-power engine was used to drive the winding-gear, and two Tangye special pumps (one 10 in. by 6 in. by 18 in. and the other 8 in. by 4 in. by 12 in.) were used for pumping.

Prospecting operations during the early part of the year were carried on in the Waihi Monument, Great Northern, King of Waihi, Mataura, Waihi Pinnacle, Waitati, Waitati Extended, Waihi Proprietary, and Queen of Waihi Mines in this locality, and at Waihi Beach an amalgamation of interests has been effected, and a strong company formed to prospect the ground.

Wharekiraupunga District.

Royal Standard Mine.—A large amount of money has been expended in laying the tramway, preparations for the foundation of the battery, the construction of a water-race, the manager's house, and necessary buildings, but the manager, who recently arrived from Home, has recommended the directors to stop all works for the present. Mr. T. Pascoe, the manager, reports: "The Royal Standard Gold-mines (Limited) is at present under protection. The number of men that have been regularly employed during the fifteen months the company has been operating has been sixty. The area of land held is 100 acres. The mine is a quartz-mine, and is situated in the Wharekiraupunga district. The reefs, as stated, are composed of quartz, and vary in thickness from 3 in. to 6 ft. The deepest shaft is 50 ft., and the longest adit level about 300 ft. A distance of 685 ft. has been driven on the various reefs at present exploited on the property. The work done to date can be described as prospecting, making surface tramways, water-race, and excavation for machine-site. There is no machinery on the ground, nor has any ore been crushed, with the exception of small test parcels at the Thames School of Mines."

Waitekauri District.

Waitekauri Mine (Owners, Waitekauri Gold-mining Company, Limited).—The mine comprises the following claims: Golden Cross section—Golden Cross Special Claim, 100 acres; Crœsus Special Claim, 100 acres; Tunnel Special Claim, 100 acres; Socket Special Claim, 99 acres 2 roods 6 perches: total, 399 acres 2 roods 6 perches. Komata section—Te Ao Marama Special Claim, 97 acres 3 roods 36 perches; Cross-cut Special Claim, 100 acres; Cross-cut Extended Special Claim, 50 acres: total, 247 acres 3 roods 36 perches. Waitekauri Licensed Holding, 9 acres 2 roods 23 perches. Total of the three sections, 657 acres and 25 perches.

Golden Cross section: There are two shafts in this section of the mine—No. 1 shaft, 317 ft. below the surface, and No. 2 shaft, 195 ft. below the surface. The greatest depth of the workings below the sill of No. 1 shaft is 230 ft. and below the sill of No. 2 shaft 180 ft. There are five levels —(1.) Corbett's level, a drive in the side of the hill 22 ft. below the level of the sill of No. 1 shaft: this is not connected or worked from the shaft. (2.) No. 1 level, north and south of No. 1 shaft. (3.) No. 2 level, north and south of No. 1 shaft. These two levels are connected with No. 1 shaft by cross-cuts. (4.) No. 1 level, north and south of No. 2 shaft. (5.) No. 2 level, north and south of No. 2 shaft. These two levels are connected with No. 2 shaft by cross-cuts. The reef consists of a dark-coloured quartz carrying a large quantity of manganese, and impregnated more or less with very fine iron-pyrites. Its width varies considerably (from 6 ft. to 20 ft., and portions are even wider than this). The greater portion, however, so far opened up is at least from 10 ft. to 15 ft. in width. Development work carried on in this section of the mine is as follows: Sinking Nos. 1 and 2 shafts, driving the western cross-cut (Corbett's level) to prospect the ground to the west of the reef, driving No. 1 level, opening up and driving No. 2 level from No. 1 shaft, opening up and driving No. 2 level from No. 2 shaft, and driving the low-level tunnel. In addition to this, several rises have been carried through between the various levels to open up the reef.

Komata section: The sinking of a shaft, 10 ft. by 4 ft. inside measurements, has been commenced, and it has been sunk to a depth of 40 ft. below surface. The greatest depth of workings in this section of the mine is 200 ft. There are four principal levels—(1) The Gully drive, a drive in the side of the hill; (2) the Hopper level, a drive in the side of the hill at the same level as the

sill of the shaft; (3) No. 1 level, 100 ft. below the level of the sill of the shaft; (4) No. 2 level, 190 ft. below the level of the sill of the shaft. Development work has been carried out during the year as follows: Extending the Hopper level, extending Magazine cross-cut (No. 1 level), cross-cutting at No. 1 level to the east and west, sinking a winze from No. 1 level on a shoot of ore, sinking the shaft, and extending the eastern cross-cut or adit level from the eastern side of the hill.

Waitekauri Licensed Holding: The work done in this section during the year consists of the extension of the Queen level on the line of reef, cross-cutting to the westward to prospect the ground, putting up a rise, and sinking a winze on a rich shoot of ore. The Queen level is a drive in the side of the Waitekauri Hill.

Mine Machinery.—At the Golden Cross section we have the following machinery at work: No. 1 shaft—One Hirnant air-compressor, worked by steam, 12 in. cylinder, with 2 ft. stroke, nominal horse-power=15: this compressor is used for working the Tangye pumps, and for ventilation purposes. One Tangye winding-engine, double drum, 25 nominal horse-power; one horizontal high-pressure engine, 18 in. cylinder, 3 ft. stroke, and 30 nominal horse-power, for working the pumps. The pumps are of the Cornish type, and consist of one 14 in. forcing set, 175 ft. of column, discharging at the adit level, 130 ft. below the surface. The sinking is carried on by a 6 in. Tangye pump, which lifts the water from the bottom of the shaft to the cistern of the forcing set. There are also two 4 in. Tangye pumps at this shaft, which can be used as auxiliaries to the other pumps, if required. The engines at this shaft are worked from one multitubular boiler, of 30 nominal horse-power, and one Babcock and Wilcox boiler, with Scott's patent furnace, of 30 nominal horse-power. No. 2 shaft: One Fowler winding-engine, double drum, of 25 nominal horse-power; one horizontal tandem compound non-condensing engine, with 13 in. high-pressure cylinder and 20 in. low-pressure cylinder, 3 ft. 6 in. stroke, 35 nominal horse-power. The pumps are of the Cornish type, and consist of one 14 in. draw-lift, with 115 ft. of column, discharging at the adit level, 80 ft. below surface. There is also at the shaft one 4 in. Tangye pump, which can be used as an auxiliary, if required. The engines are worked from one Babcock and Wilcox boiler, similar to the one at No. 1 shaft. Low-level tunnel: At this tunnel there is one Hirnant air-compressor, 10 in. air-cylinder, with 18 in. stroke, belt driven from 5 ft. 10 in. Pelton wheel. This is used for working two rock-drills in the tunnel. These drills are of the Slugger make. Tram-roads: There are four miles and a half of tram-road connecting the mine with the forty-stamp mill. Milling machinery (dry-crushing): One forty-stamp mill, of 1,000 lb. weight each stamper, and a crushing-capacity of 1·60 tons per stamp-head per twenty-four hours; the full forty head of stamps were employed daily; the number of days during the year on which this mill worked was 342. One ten-stamp mill, of 600 lb. weight each stamper, and a crushing-capacity of 0·70 ton per stamp-head per twenty-four hours; the full ten head of stamps were employed daily; the number of days during the year on which this mill worked was 300. One No. 5 Krupp mill; but this is not in use. There are also two stone-breakers, one a Wheeler, with 12 in. jaw, and one from Price, of Thames, with 9 in. jaw; eleven kilns of 250 tons capacity each, and two of 200 tons capacity each; nineteen wooden cyanide-vats of 30 tons capacity each; ten steel cyanide-vats of the same capacity; and three wooden cyanide-vats of 25 tons capacity each; five sumps (four of wood and one of iron), three wooden mixing-tanks, and five zinc filter precipitating-boxes. The power for the milling plant is water, with an auxiliary steam-power. Water-power: Two 6 ft. 8 in. Pelton wheels to work the forty-stamp mill; head of water 195 ft.; length of wrought-iron pipe, 2,000 ft. 28 in. diameter: one 6 ft. Pelton wheel to work the ten-stamp mill; head of water, 162 ft.; length of wrought-iron pipe, 835 ft., of 10 in. diameter: one 4 ft. Pelton, for working the vacuum pump of the cyanide-vats: and one 3 ft. Pelton wheel for working the dynamo for electric light: also one water-wheel, 36 ft. in diameter, 9 ft. wide, high breast driven, for working lathes, &c., in the machine-shop. Auxiliary steam-power: One tandem compound condensing engine by Yates and Thom, of 40 nominal horse-power, worked from two Babcock and Wilcox boilers, of 30 nominal horse-power each, for the forty-stamp mill; and one high-pressure horizontal engine (double cylinder), of 14 nominal horse-power, worked from one multitubular boiler of 14 nominal horse-power, for the ten-stamp mill. Water-races: One for forty-stamp mill, 3¼ miles long, of ten sluice-heads capacity; one for ten-stamp mill, 123 chains long, of five sluice-heads capacity; one for low-level tunnel, 63 chains long, of five sluice-heads capacity.

The total quantity of quartz crushed for the twelve months was 23,383 tons, yielding 51,202 oz. of bullion; value, £55,258 8s. 8d., extracted by the cyanide process. Cost of mining per ton, 11s. 1d.; cost of milling and treatment per ton, 18s. 11¼d. Average number of men employed during the year 368, all wages-men.

Alpha Mine (Area, 97 acres; owners, Alpha Gold-mining Company, No Liability).—This mine is being well opened up preparatory to the commencement of crushing operations. A site was cleared about 8 chains from the low level, and the battery is now fast approaching completion. It is to consist of twenty stamps, to be driven by steam-power, and wet-crushing and cyanide process is to be adopted. The mill is to be fitted with up-to-date stamps, rock-breaker, berdans, and complete cyanide plant. The mine is opened on the main reef at five different levels. No. 5 level is 100 ft. over the low level, No. 4 level 100 ft. over No. 5. From No. 4, which is 274 ft. on reef, there is a rise through to the surface, a distance of 98 ft. Communication will shortly be effected with the low level, and on the commencement of crushing operations sufficient ground will be available to keep the stamps at work. Seventeen men were employed.

Waitekauri United Mine (Area, 109 acres).—This mine is owned by a company of the same name. Development work to a considerable extent has been carried on. The reef, which is from 3 ft. to 4 ft. in width, has been driven on in three levels 80 ft. apart. The quartz is of low value (15s. per ton), and consequently no machinery has been erected. Thirty-seven men were employed.

New Zealand Jubilee Mine (Area, 292 acres 2 roods 2 perches).—In No. 2 level, 78 ft. below No. 1, driving and sinking operations have been carried on. The shaft is being sunk from this level at a distance of 600 ft. from the level of the tunnel, which is now 1,000 ft. This level is being driven to intersect the Waitekauri reef.

Young New Zealand Mine (Area, 14 acres 1 rood 12 perches).—Cleaning and retimbering the low level, which is now a distance of 460 ft., has been carried on by five men. It is proposed to extend this level, with a view of cutting a series of reefs worked at the higher levels, and 200 ft. more will have to be driven to reach the desired point, and this will give 100 ft. of backs on the reef to the next level. A rise is being put in No. 6 level to the surface, for ventilation purposes.

The *Waitekauri Union* claims are owned by the Waitekauri Union Claims (Limited), an English company, of which Mr. P. M. Hansen is the local secretary and attorney. They consist of two groups, comprising the Central, E.M.C. Extended, Pilot, and Pilot Extended Claims, in the western property, and the Anglian, Nebraska, Australia, California, and Marburg in eastern section, a total area of 625 acres. At the latter group, after the road (three-quarters of a mile in length) from the county road to the proposed shaft site was completed and made fit for the conveyance of heavy machinery, poppet-heads were erected, a small coupled winding-engine and Tangye pump were fitted up, and sinking proceeded with. The object of operations was to sink to a depth of from 300 ft. to 500 ft. according to developments, and then open out and cross-cut from both sides of the shaft to intersect the Golden Cross lode, which at present is the chief gold-producer in the district. Sinking was continued to a depth of 190 ft. employing eighteen men, in three shifts, but at that depth the water increased beyond the capacity of the pump, compelling temporary suspension of operations. The question of the installation of a heavy pumping plant is being considered. In the meantime an adit which will be 300 ft. in length is being driven to connect with the shaft, which should drain much of the water, and allow further sinking to be gone on with. At the western group of claims a number of prospecting tunnels have been driven and various reefs cut and partly opened out, but work is now concentrated on the low level. To this point a road has been made to allow the machinery to be taken up, and an air-compressing plant erected for working the rock-drills. The engine is a coupled one, with 10 in. diameter cylinders and boiler of 65-horse power. The air-pistons are also 10 in. in diameter, and the air is led from the receiver to the drills in 3 in. pipes. The country driven through has been hard bars of andesite alternating with more or less decomposed flows of the same rock, and at least one bed of volcanic breccia. The latter has not been met with for some time, and the country is now a decomposed andesite. The face of the level is in over 800 ft., and, in addition to the compressed air, it is ventilated by pipes exhausting by water-jet, and a third line supplies a spray jet at the drills. Several known lines of reef will be cut as the tunnel is extended, and it is on the grade of the ore to be met with that much of the success of the company will depend. Mr. N. D. Cochrane is the mining engineer and general manager, and Mr. J. Coombe is mine-manager. Throughout the year over forty men have been employed, but at present the number is reduced to twenty-four. Fully two miles of roads and tracks have been constructed, and up to the 1st May, 1898, altogether over £16,000 has been expended by the company.

Grace Darling Mine (Area, 90 acres).—The reef, which averages 5 ft. in thickness, has been driven on a distance of 400 ft. in a southerly direction, and to the north a distance of 300 ft. Fifty tons of stone yielded 58 oz. 12 dwt. of gold.

Waitekauri Junction Mine (Area, 60 acres).—Driving at a low level to intersect a reef trenched on the surface is now being carried on, the level being in a distance of 60 ft. Four men are employed.

Waitekauri Extended Mine (Area, 95 acres 2 roods 19 perches).—The principal work at present is the driving of the low level, which is in 820 ft. A further distance of 300 ft. must be driven to cut the reef, which in No. 2 level has been driven on 500 ft. Cross-cuts have been put in at intervals of 50 ft. along the reef, which runs north and south, 250 ft. of backs being available between the low level and No. 2 level, where sinking operations are to be proceeded with on the reef, in order to establish a connection with the point at which the low level will intersect the reef. Twenty heads of stamps for the battery are already erected, and further twenty heads will complete it. The ore is of a low grade, but is considered payable.

Grafton United Gold-mining Company's Mine.—The chief work carried on in this company's mine is driving the low level to intersect the Golden Cross reef. It is in a distance of 550 ft., through a somewhat tight class of country. Twenty-eight men are employed.

Waitekauri Reefs Company.—The chief work undertaken in this company's mine has been the cleaning out and retimbering the Stephens No. 2 level in order to intersect the Waitekauri South No. 2 reef in the low level. Driving on the reef, which is some 2 ft. 6 in. in width, has been carried on. The ore at present is of a very low grade, and not considered payable.

Waitekauri Cross Mine (Area, 100 acres; owner, Waitekauri Cross Gold-mining Company).—A large reef, varying from 14 ft. to 60 ft., runs through the ground, of an appearance similar to the Golden Cross reef in the Waitekauri Company's ground adjoining. The main cross-cut was driven 300 ft., and the drive on the Taranaki reef at the adit level advanced 324 ft., and the reef cross-cut through from wall to wall at every 50 ft. A winze has also been sunk on this reef to a depth of 88 ft., where a second level was driven for a distance of 60 ft., and two cross-cuts were put through the reef, the average thickness being 24 ft. A prospecting shaft was sunk on the eastern portion of the property, which had to be abandoned at 80 ft., through an influx of water, which was too much for the power which was then available—viz., a horse-whip. There are two water-races belonging to the company, one of which, the Maratoto, is 65 chains long, and has a carrying-capacity of five sluice-heads. The construction of this race is complete. The second, or Whakamoehau, is 55 chains long, and has a carrying-capacity of six sluice-heads. Men are now busy with this race-construction, the benching being almost complete. These two races converge at the same level, and have a vertical fall of 210 ft. About £800 has been

spent on these races. A contract has been let to Seager Brothers for fixing a line of 24 in. wrought-iron pipes from the receiving-tank at the end of the water-races to the machine-site, it being the intention of the company to generate power by means of electrical dynamos, which will be driven by a Pelton wheel. This power will be transmitted to the mine, a distance of two miles, where it will be used for sinking the shaft on the reef, as power for hauling, pumping, and crushing when required. The electrical machinery for the above is now on the road to New Zealand from England and America. The average number of men employed during the year is twenty-nine, wages and contract.

Te Aroha District.

This district is situated to the southward of Ohinemuri County, and includes portions of the Tauranga and Ohinemuri Counties, but the largest area lies in the Piako County. Operations are being conducted with a view to the treatment of the refractory ores with which the district abounds. The following list shows the claims in this district:—

Abstract of Licenses for Special Claims and Licensed Holdings issued from the Warden's Office at Te Aroha, in the Hauraki Mining District, and registered on or before the 31st March, 1898, in the Books of the Mining Registrar at Te Aroha.

Date of License.	Area.			Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A.	R.	P.					
1/6/95	26	2	32	Waiorongomai	X.	Aroha ..	New Find No. 1 ..	Aroha Gold-mines (Ltd.).
1/6/95	10	1	2	"	"	" ..	New Find No. 2 ..	"
13/9/95	60	0	0	"	"	" ..	Sceptre	"
13/9/95	99	0	0	"	XII. / II.	" / Katikati	Sceptre Extended	"
28/6/95	28	1	25	"	X.	Aroha ..	Loyalty Palace ..	P. Snewin.
26/9/95	20	0	0	Te Aroha ..	IX.	" ..	Mount Morgan ..	J. Williams.
25/10/95	10	2	34	Waiorongomai	XII.	" ..	Welcome ..	R. Burke.
13/11/95	100	0	0	"	X. / XI.	" / Katikati	Empire	Aroha Gold-mines (Ltd.).
28/11/95	29	3	10	Te Aroha ..	IX.	Aroha ..	Golden Crown ..	J. Williams.
10/1/96	49	1	20	" ..	"	" ..	Montezuma ..	"
1/2/96	43	2	23	Tui ..	X.	" ..	Day Dawn ..	J. A. Pond.
1/2/96	50	0	0	" ..	"	" ..	Grand Junction ..	E. Griffith.
27/1/96	29	3	11	Te Aroha ..	"	" ..	Plutus (L.H.) ..	W. T. J. Bell.
30/4/96	99	0	0	Waiorongomai	"	" ..	Gentle Annie ..	W. Steele.
30/4/96	99	0	30	"	"	" ..	Great Western ..	T. Gavin.
30/4/96	50	0	0	Tui ..	IX.	" ..	Plutus	C. F. Bell.
19/5/96	17	0	0	" ..	X.	" ..	Plutus No. 2 ..	W. T. J. Bell.
29/6/96	94	0	0	Waiorongomai	"	" ..	New Munster ..	New Munster Gold-mining Co. (Ltd.).
16/7/96	100	0	0	..	XII.	" ..	Trident	Aroha Gold-mining Co. (Ltd.).
16/7/96	50	2	16	Tui ..	X.	" ..	Silver King ..	G. B. Osmond.
29/4/96	94	0	9	" ..	IX.	" ..	Waitara.. ..	J. Wallace.
16/10/96	100	0	0	" ..	IX., X.	" ..	Merchant of Venice	R. Kelly.
16/10/96	100	0	0	" ..	"	" ..	Gipsy King ..	A. E. Langley.
20/10/96	99	1	21	" ..	IX.	" ..	Te Aroha ..	R. Dovell.
24/10/96	99	0	17	" ..	X.	" ..	Grand Result ..	T. McIndoe.
30/11/96	46	3	32	" ..	V., IX.	" ..	Te Aroha Extended	R. Dovell.
30/11/96	99	0	0	..	X.	" ..	Mount Ryan ..	W. Shaw.
11/12/96	27	2	0	..	"	" ..	Manchester ..	A. A. Lockwood.
13/1/97	100	0	0	Tui ..	"	" ..	Waitara Extended	A. B. Millar.
13/1/97	96	0	4	..	IX., X.	" ..	Ethel Reef ..	Ethel Reefs Gold-mining Co.
21/1/97	19	1	0	..	X.	" ..	Ballarat.. ..	C. J. Sanderson.
22/3/97	79	2	0	..	"	" ..	Ajax	R. Lohest.
22/3/97	99	2	16	..	"	" ..	Ajax Extended ..	"
22/3/97	98	1	6	Tui ..	"	" ..	Tui	Tui Gold-mines (Ltd.).
24/3/97	93	0	0	Waiorongomai	XI.	Katikati ..	Loyalty Extended	W. Newsham.
10/5/97	27	0	15	..	..	..	Edendale ..	J. Campbell.
26/6/97	99	0	0	Tui ..	X.	Aroha ..	Mount Ryan Ext.	W. Shaw.
7/10/97	96	1	12	Te Aroha ..	IX., X.	" ..	Hot Springs ..	Inland Reefs Gold-mining Co.
29/12/97	98	2	32	..	..	..	Wallaby.. ..	John Phillips, jun.
24/3/98	78	1	34	Waiorongomai	XII.	Aroha ..	Cadman.. ..	J. Mills.
24/3/98	30	2	0	..	..	..	Montezuma Ext.	J. Campbell.

Piako.

Aroha Gold-mines (Limited).—The following work was done on the Aroha Gold-mines property for the period commencing the 1st April, 1897, and ending the 31st March, 1898. The principal work carried on was the driving of the main low tunnel. This tunnel is now in 1,230 ft. The size has been reduced from 12 ft. by 8 ft. to 8 ft. by 8 ft. It is being driven along the western wall of the main reef, the course being about due north. Up to the present it has been driven on contract by hand-labour. The tunnel is closely timbered with 10 in. by 8 in. sawn rimu, with split slabs. A 20 in. by 9 in. rimu box-drain is carried along the centre of the drive underneath the tram-line, which is a single line with pass loops, laid of 14 lb. steel rails on 6 in. by 4 in. sleepers. The cost of the tunnel per foot when completed will be about £3. Three cross-cuts have been put through the reef, and a fourth is being put through at present in the face, where there is a strong reef. It has been broken into 4 ft., but so far, while carrying a little gold and silver, is not payable. The air is good, though a little warm, and is being kept cool by means of a water-blast and fire-draft, which are both temporary, being connected with the 2 in. and 7 in. pipes laid for the rock-drills which it

is intended to use in driving the tunnel later on. The water-blast is sending the air along the 2 in. pipe, while a small furnace connected with the 7 in. pipe is drawing out the smoke and warm air. This keeps the face cool and clear of fumes from the explosives. Blasting gelatine is used. This is found to be very effective, as the amount used per month is only 150 lb., while the distance driven is 80 ft., and the ground taken out is 10 ft. by 10 ft. The tunnel is fairly dry, the largest stream of water met with being in the face at present. In connection with and for the purpose of driving this tunnel a large air-compressor has been erected close to the mouth. This is to be driven by water-power, to be supplied from a new high-level water-race, which was constructed for this purpose. This race is connected with the 10 ft. Pelton wheel by 1,300 ft. of 14 in. steel pipes, giving an effective fall of 640 ft., which will enable the Pelton to be driven 190 revolutions per minute, developing 104-horse power. The compressor has a capacity of 820 ft. of free air per minute, at a pressure of 75 lb. to the square inch, with eighty-six revolutions. All this work is just about completed, and with the aid of the drills the tunnel should be carried on much faster and cheaper than at present. Besides this tunnel there have been two other drives driven—one in the Colonist Creek section of the property, driven on the course of the main reef a distance of 400 ft., at a cost of £795; and the other on a cross-lode known as the Silver King, on which 278 ft. was driven, at a cost of £486. The ore in both places is of a low grade. The average number of men employed for the period mentioned was forty-four, and the total amount of money spent in the same time is about £9,500. There has been no ore crushed, the battery being idle all the time.

Tui Gold-mines, Limited (Area, 100 acres; owners, Tui Gold-mining Company).—These claims are at present protected, but previously seventeen men were employed. Five levels have been opened, varying in depth from 30 ft. to 270 ft. The main reef, originally termed the Champion lode, is the only one yet worked on, and runs north-east and south-west, averaging a width of about 6 ft. The ore is fully charged with minerals, making it difficult to treat. Operations in the mine have been partially stopped, pending the completion of Campbell's works at Te Aroha for the treatment of ore by the thermo-hyperphoric process. On the completion of the works a quantity of ore will be immediately forwarded from the mine. Should the process prove a success the mine will at once be fully manned. Five men are at present employed.

Great Western Mine.—A small crushing plant has been erected in this company's mine, which was formerly known as No. 2 New Find, Waiorongomai. It varies from 2 ft. to 12 ft. in thickness. Thirty-four men were employed.

Loyalty Mine.—Fifty tons of quartz is ready for crushing. Two men are employed.

Great Result Mine.—A trial crushing of quartz from this mine will be sent to the Montezuma battery when the tramway is in repair.

Montezuma Mine (Area, 70 acres).—Driving has been carried on in the No. 2 level of the Waterfall reef, some 2 ft. 6 in. wide. The drive is in a distance of 250 ft. The stone is of poor quality. Operations are also being carried on in the Waitara and Plutus sections of the mine.

In the month of January last I visited Te Aroha, where the thermo-hyperphoric reduction plant was approaching completion, under the superintendence of the Rev. Joseph Campbell. The building, in which there are three floors, is 100 ft. by 80 ft. In the upper floor a 9-horse-power boiler, heated by Waikato coal, will generate the steam to work the Dowson gas, for which purpose a gasometer, 12 ft. in diameter, a generator, and purifier, have been erected. This gas will be used for driving a 75-horse-power gas-engine. The plant for the thermo-hyperphoric treatment (which has not yet arrived) will consist of three generators, to be worked on the intermittent system. These will be on the second floor. The producer gas, which is first made, is used for heating the furnace, and the water gas for the thermo-hyperphoric treatment. A stone-breaker will reduce the ore to ½ in. mesh, and it will then pass on to an Askam Brothers' Tiger-mill, capable of pulverising it to any degree of fineness required, the present intention being to reduce it to the size of grains of wheat. The ore will then be elevated to large hoppers, erected over the furnace, from which three small hoppers are to be fed. These will immediately discharge into the furnace, which is to be heated up to 2,000° Fahr. by the producer gas, and will consist of a bed of eight retorts, with a capacity of 40 tons per day. Whilst in the retorts the ore will be subjected to the action of the water gas, which it is claimed has the effect of eliminating all the base materials, or reducing them to such a condition that it does not interfere with amalgamation. The ore is then conveyed to a Merrill's Tension mill of 40 tons a day capacity, with a mesh of about 40 to the inch. This mill, in which mercury is to be used, both grinds and amalgamates, and it is anticipated that a saving of 80 per cent. of the gold will thus be effected. From the mill the ore is conveyed by launders to three "Gold King Amalgamators," which it is expected will save the greater portion of the residue, or in all about 95 per cent. Work is at present being carried on in the Montezuma and five other properties, in which the lodes are being systematically opened up. A self-acting wire tram is on the ground, and will be erected as soon as the most suitable place has been determined. The cost of treatment of the ore, from the time it is delivered at the mill, is estimated by Mr. Campbell at not more than 8s. per ton, and, as it is anticipated that 95 per cent. of the bullion will be saved by the thermo-hyperphoric process, it should prove a cheap method of treatment for the large bodies of low-grade ores at Te Aroha, Waiorongomai, and other places, and be the means of affording employment to a large number of miners.

Tauranga District.

This district comprises the northern part of the County of Tauranga. Mining operations have not yet been conducted to a very great extent. The lands occupied are in some instances freehold. The following list, however, shows the claims held under goldfields titles:—

ABSTRACT of LICENSES for SPECIAL CLAIMS issued from the Warden's Office at Tauranga, in the Hauraki Mining District, and registered on or before the 31st March, 1898, in the books of the Mining Registrar at Tauranga.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A. R. P.					
7/10/96	100 0 0	Aongatete	IV.	Aongatete ..	Eliza	Henry M. Shepherd.
14/6/97	100 0 0	Te Puke	IX.	Maketu ..	Bay of Plenty No. 2	Joshua Wright.
28/10/97	100 0 0	"	V.	" ..	The Sisters ..	K. te Atirau and M. te Atirau.
21/7/97	100 0 0	"	"	" ..	The Rata ..	J. G. Vercoe.
15/10/97	100 0 0	"	Waitaha No. 1	" ..	The Patiria ..	D. Lundon.
28/10/97	100 0 0	"	V.	" ..	The Pukekura ..	W. C. Piggott.
28/10/97	100 0 0	"	"	" ..	The Pukerima ..	J. S. Jameson.
28/10/97	100 0 0	"	"	" ..	The Puke Pai ..	F. N. Challis.
28/10/97	100 0 0	"	"	" ..	The Pukehina ..	W. Norton.
28/10/97	100 0 0	"	"	" ..	The Pukema ..	M. Dockerill.
28/10/97	100 0 0	"	"	" ..	The Puketora ..	E. E. Vaile.
22/4/98	97 2 29	"	"	" ..	The Problem ..	C. McLean.

Tauranga and Katikati District.

In this district a number of claims have been taken up, but no important discoveries have been made, and only four men are employed in prospecting.

Te Puke District.

The Government Geologist (Mr. Alexander McKay, F.G.S.) and the Inspector of Mines (Mr. James Coutts) visited Te Puke Goldfield last month, and examined the various mine-workings on and adjacent to Fleming's Freehold. The following extracts give the main points of the report furnished to the department by Mr. McKay:—

"The country forming the lower grounds between Tauranga Harbour and the main range to the westward from near Captain Stewart's and Hikurangi at first is rhyolite *débris*, from the area of rhyolite of which Hikurangi is the culminating peak. Further south pumiceous sands and clays form the country along the seaboard back to the mountain range, composed of andesic materials; but until reaching about half-way from Katikati to Tauranga the material is not coarser than sand, and gives clear evidence of having been stratified under water—probably an extension of the Bay of Plenty. Three miles south of Katikati a considerable stream flows from the mountain range north-east into the Katikati arm of Tauranga Harbour, and the gravels of this divide the stratified pumiceous sands and clays to the north from the larger area of the same rocks that lies to the south. The main range south of Thompson's Track, after forming a massive mountain, descends to lower heights, and to the south and south-east forms hills separated by deep gullies, constituting a country not high but somewhat broken. The western border of this forms a steep scarp descending to the level of the plain along which flows the Waihou or Thames River. The pumiceous deposits seen along the road from Katikati to Tauranga evidently reach on to this hilly area, and as followed south towards Tauranga become coarser in character, and pieces of pumice and fine gravel of pumice are seen in most of the road-cuttings that reach to a moderate depth from the surface. This state of things continues to Tauranga, when andesic rocks appear on the north side of this part of the harbour, and in the high hill on the east side of the entrance thereto. To the south-west from Tauranga the country is comparatively low for a considerable distance, and in this direction the pumiceous rocks continue further than was determinable, and divide the block of mountains lying towards Te Puke from the southern continuation of the Cape Colville Peninsula Ranges and the high levels west of the Tauranga–Rotorua Road, which have already been mentioned. There is thus a complete separation of the two areas of auriferous rock, and the popular idea that the Te Puke Goldfield is connected with, and forms but the southern continuation of, the Hauraki Goldfields is not supported by the facts above stated.

"Leaving Tauranga, the stratified pumiceous rocks continue to a distance of six or seven miles on the road to Te Puke, beyond which they give place to brecciated rocks of a dark colour and more distinctly rhyolitic type. These are seen at various points along the road, and, becoming massive developments, form rounded hills of considerable height, and the northern part of the mountainous country that continues to and beyond the Te Puke Goldfield. East of the goldfield these rocks form the eastern lower slopes of the mountain range, and are deeply cut into by the stream surrounding Fleming's Hill to the south and east, and continue in a south direction beyond the limits of the auriferous rocks terminating near Gibraltar Rocks, which (though not visited) are evidently rhyolite. The rocks containing the auriferous reefs are decomposed andesites that are not only highly decomposed along the walls of the lodes in Fleming's Hill, but everywhere where openings have been made. Less than a mile to the north the creeks draining from this part show the presence of dark andesites undecomposed, although at the Sisters Claim the rocks showing in the banks of the stream are highly decomposed. To the south and south-west there is every appearance of these rocks being cut off by rhyolites within a distance of two miles. To the north the auriferous rocks apparently extend fully three miles, while to the westward they reach the water-divide of the higher range, and descend some distance the western side of the range; how far has not been ascertained. Reefs of quartz form at least two or three distinct lines in Fleming's Hill, and where opened out, show a very considerable thickness of quartz, usually exceeding 20 ft. The quartz is of a light-grey colour generally, but at one place it is dark from the presence of sulphide of iron. Near the surface it has the appearance of having been deposited by the agency of hot water, and in the lower levels of the eastern lode banded spongy and solid grey or creamy quartz is met with in

different parts of the same intersection of the lode. Highly mineralised stone was only seen at one place on the western slope of the hill, and apparently away from the main outcrop on this side of the hill. The stone generally resembles that of the Waihi Mine, Waihi, and, like it, is undoubtedly due to hydrothermal agencies, but, as on Martha Hill so here, there is no evidence of sinter deposited at the surface. This, if it ever existed, has been removed by denudation, and only the channels filled with quartz, by way of which such reached the surface, together with the highly decomposed surrounding country, testify to the nature of the action by which the ore-bodies were formed. The curly, twisted, agate-like quartz of the higher levels of the Waihi Mine does not appear abundant on the Te Puke field; and this, on consideration, seems to be the main difference in a mere comparison of the quartz. As regards the amount of gold present in the stone, the analysis made by the owners is the only source of information. A large number of samples would be required to determine the average yield per ton, and the time at my disposal did not suffice for the making of such a collection of specimens. The return of samples tested seem to indicate that in different parts the stone varies in value, but is scarcely ever wanting in gold; and it is confidently expected that larger parcels, when treated, will prove the paying character of the ore. On the Sisters Claim there has not been sufficient work done to prove the size of the lode or the value of the ore, but the indications clearly pointed to the presence of a lode of at least moderate size, and a sample analysed, taken from a lode cut in one of the drives, is reported to us as having afforded what may be considered an excellent return. This, however, does not seem to have been verified by the obtaining and testing of further samples. I was shown a sample of alluvial gold which was obtained on the slope of the range north of the Sisters Claim. This was in the possession of Mr. Griffiths, of Tauranga. It consisted of a few pieces of coarse nuggety gold, of apparently considerably greater purity than the reef gold of the neighbourhood; and, from the position pointed out as that from whence it came, it would appear that it cannot be referred to any alluvial deposit covering the low grounds and belonging to the recent period, or from a modern wash in the bed of a mountain creek. It is said to come from a bed of pipeclay exposed in the spur of the range about two miles north of Fleming's Hill, and future examination will be required to determine the true nature of the deposit in which the gold is found."

Machinery.

Mr. John Chambers, of Auckland, who supplies most of the mining machinery, has afforded the following information, and also gives a list of plants erected by his firm during the year:—

Mining machinery: The demand for the year ending the 31st March shows a falling-off from previous year, caused by the stoppage of nearly all the local companies, the mines now being worked energetically being supplied with funds from foreign sources. We have supplied a good many of the mines with the Tangye steam-pumps; in fact, nearly all the mines are now using them, sometimes for all purposes, but in others as auxiliary. This department has done well.

Centrifugal pumps: There has been a good demand for these; for instance, we sold twelve 8 in., ten 10 in., and three 12 in., besides other sizes; these were mostly for Otago dredging; we have now many on order.

Winding-engines: We supplied the Thames-Hauraki with a fine pair of direct-acting, cylinders 14¼ in. by 28 in. stroke, with indicators to indicate position of cage in shaft.

We have also sold to the Kauri Freehold Gold Estates (Limited), Maiden Mine, Opitonui, a substantial winding and pumping plant, consisting of a pair of Tangye's 10 in. by 20 in. winding-engines, geared forward, with a steam-pump to throw 10,000 gallons per hour, a 25-horse-power Tangye's Cornish boiler, pit-head poppets, and other gear.

Jubilee Gold-mining Company: This company has put down a small winding and pumping plant, two Tangye's colonial boilers, &c.

Fortuna Gold-mining Company, Thames: A small temporary winding plant, consisting of hauling-engine, with a pair of 5 in. cylinders, Tangye's vertical special pump, and colonial tubular boiler.

Waitekauri Union Mine, Nebraska Section: One Tangye's coupled geared winding-engine, with pair of 6 in. by 12 in. cylinders, 10-horse-power colonial tubular boiler and steam-pump complete.

Hauraki Main Lodes, Coromandel: One pair of Tangye's winding-engines, geared forward, with cylinders 10 in. diameter by 20 in. stroke, 5 ft. drums, 25-horse-power boiler, pump, &c., complete.

Hauraki South, Coromandel: Small pumping and winding plant.

Electric-light installations: The following batteries have been fitted up during the year:—Waihi Gold-mining Company's Waikino battery, Waikino; Moanataiari Gold-mining Company's works, Thames; Woodstock Gold-mining Company, Karangahake; Talisman Gold-mining Company, Karangahake; Crown Gold-mining Company (Limited), battery and mine; and Komata Reefs battery, Komata.

RETURN OF STONE, ETC., CRUSHED—AUCKLAND DISTRICT.

District.	Quartz and Mullock crushed or sold.	Yield of Gold or Bullion.	Average Yield of Gold or Bullion per Ton.
	Tons.	Oz.	Oz. dwt. gr.
Coromandel—			
Output for 10 years previous to 1st April, 1890	15,101	56,232	3 14 11
1st April, 1890, to 31st March, 1891 ...	5,650	9,838	1 14 19
" 1891, " 1892 ...	13,029	12,191	0 18 17
" 1892, " 1893 ...	15,163	12,954	0 17 2
" 1893, " 1894 ...	12,629	9,969	0 15 18
" 1894, " 1895 ...	15,451	22,632	1 9 18
" 1895, " 1896 ...	27,439	48,378	1 15 6
" 1896, " 1897 ...	18,848	35,886	1 18 2
" 1897, " 1898 ...	13,666	27,428	2 0 3
Totals	136,976	235,508	1 14 9
Thames—			
Output for 12 years previous to 1st April, 1890	441,388	556,878	1 5 6
1st April, 1890, to 31st March, 1891 ..	61,756	38,113	0 12 8
" 1891, " 1892 ...	86,150	45,735	0 10 15
" 1892, " 1893 ...	78,547	31,336	0 7 23
" 1893, " 1894 ...	62,444	34,637	0 11 2
" 1894, " 1895 ...	48,464	22,810	0 9 10
" 1895, " 1896 ...	44,342	26,332	0 11 21
" 1896, " 1897 ...	27,061	13,440	0 9 22
" 1897, " 1898 ...	20,850	13,482	0 12 22
Totals	871,002	782,763	0 17 23
Ohinemuri—			
1st April, 1887, to 31st March, 1888 ...	2,388	3,406	1 8 13
" 1888, " 1889 ...	3,795	3,679	0 19 9
" 1889, " 1890 ...	4,773	8,564	1 15 21
" 1890, " 1891 ..	9,902	12,914	1 6 2
" 1891, " 1892 ...	13,865	23,659	1 14 2
" 1892, " 1893 ...	22,771	43,405	1 18 3
" 1893, " 1894 ...	31,281	35,666	1 2 18
" 1894, " 1895 ...	51,058	110,628	2 3 8
" 1895, " 1896 ...	57,008	147,499	2 11 18
" 1896, " 1897 ...	66,985	148,626	2 4 9
" 1897, " 1898 ...	105,126	280,708	2 13 9
Totals	368,952	818,754	2 4 9
Te Aroha—			
1st April, 1883, to 31st March, 1884 ...	4,262	4,629	1 1 17
" 1884, " 1885 ...	11,042	9,506	0 17 5
" 1885, " 1886 ...	6,552	4,489	0 13 17
" 1886, " 1887 ...	4,743	3,658	0 15 10
" 1887, " 1888 ...	7,166	2,918	0 8 3
" 1888, " 1889 ...	1,381	1,113	0 16 3
" 1889, " 1890 ...	4,894	20,416	4 3 10
" 1890, " 1891 ...	280	557	1 19 18
" 1891, " 1892 ...	2,722	979	0 7 5
" 1892, " 1893 ...	3,169	1,178	0 7 2
" 1893, " 1894 ...	2,270	833	0 7 8
" 1894, " 1895 ...	1,121	628	0 11 5
" 1895, " 1896 ...	172	168	0 19 12
" 1896, " 1897 ...	934	376	0 8 1
" 1897, " 1898 ...	...	...	...
Totals	50,708	51,448	1 0 7
Great Barrier—			
1st April, 1896, to 31st March, 1897 ...	3	219	73 0 0
" 1897, " 1898 ...	2	45	22 10 0
Totals	5	264	52 16 0
Grand totals from North Island ...	1,427,643	1,888,737	1 6 11

STATEMENT SHOWING THE WHOLE OF THE QUARTZ-CRUSHING MACHINES AND APPLIANCES FOR TREATING AURIFEROUS AND ARGENTIFEROUS ORES IN THE HAURAKI MINING DISTRICT FOR THE YEAR 1897–98.

Locality where Machine is situated.	Name of Machine.	Name of Owners.	Number of Rock-breakers.	Number of Stamps.	Number of Ore-crushers and Lamberton Mills.	Number of Berdans.	Number of Pans.	Number of Settlers.	Number of Mortars.	Number of Retorts.	Number of Furnaces for Gold-melting.	Number of Furnaces for Assay Purposes.	Number of Plants for Cyanide Process.	Concentrating Plant.	Driven by Steam-power.	Driven by Water-power or Hand-power.
Coromandel County.																W. H.
Coromandel ..	Kapanga ..	Kapanga Gold-mining Company	..	10	..	2	..	..	1	2	..	..	..	..	1	..
" ..	Telephone ..	Hauraki Gold-mining Company	..	15	..	8	..	..	2	3	..	..	..	..	1	..
" ..	Corby ..	Scotty's Gold-mining Company	..	9	..	8	..	..	1	2	..	..	..	..	..	1 0
" ..	*Hauraki North ..	Hauraki North Gold-mining Company	..	..	1	1	..	..	1	1	..	..	..	..	1	..
" ..	Success ..	Success	..	10	..	4	..	..	1	1	..	..	..	..	1	..
" ..	Hauraki ..	Associated.. ..	..	12	..	4	..	..	2	2	2	..	..	..	1	1 0
" ..	Tokatea ..	Tokatea Company ..	..	15	..	2	..	..	1	1	..	..	..	..	1	..
" ..	Triumph ..	Triumph Company ..	..	10	..	2	..	..	1	1	..	..	..	..	1	..
Opitonui ..	Lanigan's ..	J. Thompson and party	1	10	..	2	..	..	1	2	..	..	..	..	..	1 0
Owera ..	Owera ..	..	1	10	..	4	..	..	1	2	..	..	..	..	..	1 0
Kuaotunu ..	Try Fluke ..	Mariposa Gold-mining Company	..	16	..	3	..	..	2	2	1	1	1	..	1	..
" ..	Great Mercury ..	Great Mercury Gold-mining Company	..	10	..	1	4	2	4	1	..	1	1	..	1	..
" ..	Irene ..	Irene Gold-mining Company	..	10	..	2	4	..	2	2	1	1	1	..	1	..
" ..	Kapai-Vermont ..	Kapai-Vermont Gold-mining Company	1	..	1†	1	..	..	2	2	1	1	1	..	1	..
" ..	Matarangi ..	Matarangi Syndicate	..	10	..	2	2	1	2	1	..	..	..	..	1	..
Manaia ..	Golden Hill Extended	Golden Hill Extended Company	..	2	..	1	..	..	1	1	..	..	..	..	1	..
Thames County.																
Tapu	Sheridan ..	Sheridan Gold-mining Company	..	15	..	4	..	..	3	3	..	..	..	..	..	1 0
Mahara	Royal	Mahara Royal Gold-mining Company	..	10	..	4	..	..	..	..	..	..	..	..	..	1 0
Waiomo	Monowai ..	Monowai Amalgamated Gold-mining Company	1	10	..	1	..	..	1	1	1	1	1	..	..	1 0
Tararu	Scandinavian ..	Scandinavian Gold-mining Company	..	8	..	4	..	..	1	1	..	..	..	..	1	..
"	New Alburnia ..	New Alburnia Gold-mining Company	..	20	..	7	2	..	1	3	1	..	..	..	..	1 0
"	Norfolk ..	Tararu Mines Gold-mining Company	..	30	..	6	..	..	3	2	..	..	1	1	..	1 0
"	Berry's ..	Charles Berry ..	..	1	..	3	..	..	1	2	1		..	..	..	1 0
Karaka	Claremont ..	George Bryant ..	..	1	..	1	..	..	1	3	..	..	..	..	..	1 0
"	Karaka ..	J. C. Smith ..	..	5	..	2	1	..	1	3	..	..	..	..	..	1 0
Hape Creek ..	Anchor ..	Hauraki Anchor Company	..	4	..	1	..	..	1	1	..	..	..	..	..	1 0
Puriri	Puriri ..	Puriri Gold-mining Company	..	6	..	2	..	..	1	1	..	..	..	..	..	1 0
Tairua	Bonnie Scotland..	McLiver	..	20	..	6	..	..	2	1	..	..	..	..	1	..
"	Ajax ..	McLiver	..	12	..	4	..	..	1	1	..	..	..	..	1	1 0
"	Cannon's ..	Richard Cannon ..	..	4	..	1	..	..	1	1	..	..	..	..	1	..
Thames Borough ..	Brown's ..	James Brown ..	..	..	..	4	8	4	..	2	..	..	..	..	..	1 0
" ..	Kuranui ..	Kuranui Gold-mining Company	..	20	..	10	..	..	1	1	1	1	..	..	..	1 0
" ..	Moanataiari ..	Moanataiari Gold-mining Company	..	60	..	21	4	..	2	6	3	1	1	1	..	2 0
" ..	Judd's ..	Charles Judd ..	..	..	..	2	9	..	..	..	1	..	..	..	..	1 0
" ..	Comer's ..	Kuranui - Caledonian Company	..	20	..	5	..	1	2	..	..	..	..	..	..	1 0
" ..	Bowden's ..	..	..	..	..	2	13	..	..	1	1	1	..	..	..	1 0
" ..	May Queen ..	May Queen Gold-mining Company.	..	33	..	8	3	..	2	3	2	..	..	..	..	1 0
" ..	Cambria ..	Moanataiari Gold-mining Company	..	21	..	13	1	..	2	5	1	..	..	..	..	1 0
" ..	Waiotahi ..	Waiotahi Gold-mining Company	..	21	..	5	..	..	2	2	1	..	..	..	..	1 0
" ..	Fame and Fortune	Hauraki Golden Age Mines (Limited)	2	40	..	13	..	..	1	1	..	..	..	..	..	1 0
" ..	School of Mines ..	F. B. Allen ..	..	2	..	1	1	1	3	3	1	4	1	..	..	1 0
" ..	Bank of New South Wales, H. P. Stark	H. P. Stark ..	..	..	..	..	..	..	1	..	1	1	..	..	..	0 1
" ..	Bank of New Zealand	A. Smith ..	..	..	..	..	..	..	2	..	1	3	..	..	..	0 1
" ..	May Queen Extended	May Queen Exten Company	..	23	..	14	..	..	2	4	1		..	..	..	1 0
" ..	Fairmile ..	W. Manning ..	..	..	..	1	..	..	1	1	1	..	..	..	..	1 0

* Robinson ore-crusher, equal to five stamps. † Otis mill.

STATEMENT SHOWING THE WHOLE OF THE QUARTZ-CRUSHING MACHINES, ETC., IN THE HAURAKI MINING DISTRICT FOR THE YEAR 1897–98—*continued.*

Locality where Machine is situated.	Name of Machine.	Name of Owners.	Number of Rock-breakers.	Number of Stamps.	Number of Ore-crushers and Lamberton Mills.	Number of Berdans.	Number of Pans.	Number of Settlers.	Number of Mortars.	Number of Retorts.	Number of Furnaces for Gold-melting.	Number of Furnaces for Assay Purposes.	Number of Plants for Cyanide Process.	Concentrating Plant.	Driven by Steam-power.	Driven by Water-power or Hand-power. W. H.
Ohinemuri County.																
Paeroa ..	Bank of New Zealand	G. Burgess ..	1	..	..	..	..	..	2	1	1	1	..	..	..	0 1
Karangahake ..	Crown ..	Crown Gold-mining Company	2	40	..	1	..	..	2	2	1	1	1	..	..	1 0
" ..	Woodstock ..	Woodstock Gold-mining Company	2	40	..	1	..	..	2	2	1	1	1	..	..	1 0
" ..	Talisman ..	Talisman Gold-mining Company	1	20	..	2	..	..	2	2	1	1	1	..	..	1 0
Owharoa ..	Smile of Fortune	Ohinemuri Syndicate	..	15	..	2	..	..	1	2	1	..	..	..	..	1 0
Komata ..	Komata Reefs ..	Komata Reefs Gold-mining Company (Limited)	2	20	..	4	..	..	2	..	1	1	1	..	1	1 0
Waitekauri ..	Waitekauri ..	Waitekauri Gold-mining Company	2	40	..	6	3	1	4	2	1	1	1	..	..	1 0
" ..	Jubilee ..	Jubilee Syndicate ..	..	10	..	5	2	1	1	2	1	1	1	..	1	..
" ..	Golden Cross ..	Waitekauri Gold-mining Company	1	10	..	2	..	..	2	2	1	1	1	..	..	..
" ..	Grace Darling ..	Grace Darling Gold-mining Company	..	10	..	3	..	..	1	2	1	1	1	..	..	1 0
" ..	Mangakara ..	Reginald Smith ..	..	9	..	3	..	..	1	2	..	..	..	..	..	1 0
" ..	Waitekauri Extended	Waitekauri Extended Gold-mining Company	1	20	..	3	..	..	2	..	1	1	1	..	1	1 0
Waihi ..	Waihi ..	Waihi Gold-mining Company	2	90	..	1	..	..	3	6	1	1	2	..	1	1 0
Waikino ..	Victoria ..	Waihi Gold-mining Company	2	100	..	6	..	..	..	..	2	..	1	..	1	1 0
Waihi ..	Silverton ..	Silverton Gold-mining Company	2	40	..	2	..	..	2	2	1	1	1	..	..	1 0
Piako County.																
Waiorongomai ..	Te Aroha ..	New Zealand Exploration Company	1	10	..	2	..	..	..	1	1	1	1	..	..	1 0
City of Auckland ..	Bank of New Zealand	..	1	..	..	..	1	1	2	6	4	2	..	..	..	1 0
" ..	Stanley Street ..	George Fraser ..	..	..	1	1	2	2	2	2	1	1	..	..	1	..

STATEMENT SHOWING QUANTITY OF QUARTZ CRUSHED AND GOLD OBTAINED FOR THE YEAR ENDED 31ST MARCH, 1898.

Locality and Name of Mine.	Average Number of Men employed — Wages-men or Owners.	For Owners. Quartz crushed.	Gold obtained. Amalgamation.	Gold obtained. Cyanide.	Estimated Value of Gold and Bullion.
GREAT BARRIER, AND COROMANDEL COUNTY.					
Great Barrier Island—		Tons cwt. lb.	Oz. dwt.	Oz. dwt.	£ s. d.
Great Barrier	6	1 16 108	45 8	..	122 11 7
Port Charles—					
Eva	2	1 4 97	391 19	..	1,058 5 4
Cabbage Bay—					
Queen Victoria	2	0 0 42	2 14	..	7 12 0
Jersey	3	8 0 20	70 6	..	205 12 6
Sundries	4	4 0 0	10 0	..	28 0 0
	9	12 0 60	83 0	..	241 4 6
Kennedy Bay—					
Sundries	16	5 0 23	53 0	..	153 14 0
Waikoromiko	2	4 10 56	25 19	..	75 5 0

STATEMENT SHOWING QUANTITY OF QUARTZ CRUSHED AND GOLD OBTAINED FOR THE YEAR ENDED 31ST MARCH, 1898—*continued*.

Locality and Name of Mine.	Average Number of Men employed—Wages-men or Owners.	For Owners.			Estimated Value of Gold and Bullion.
		Quartz crushed.	Gold obtained.		
			Amalgamation.	Cyanide.	
COROMANDEL COUNTY—*continued*.					
		Tons cwt. lb.	Oz. dwt.	Oz. dwt.	£ s. d.
Tokatea—					
Royal Oak	80	204 15 0	9,702 4	..	24,441 10 2
Hauraki Associated	40	370 0 0	1,345 0	..	3,800 0 0
Tokatea Consols	9	63 13 0	267 2	..	774 11 10
Triumph	4	162 0 0	11 14	..	33 12 9
Southern Star	6	38 15 0	15 10	..	40 7 3
Success	30	72 0 91	391 11	..	1,120 4 5
Buffalo	2	3 0 10	9 19	..	29 2 2
Buffalo Tributers	4	4 0 60	116 17	..	340 16 7
	175	918 4 49	11,859 17	..	30,580 5 2
Kapanga—					
Kapanga	65	240 0 0	1,930 16	..	2,367 10 10
" Tributers	15	21 12 0			3,328 1 11
Manola	2	0 1 0	100 6	..	284 11 1
Sundries	3	0 0 20	18 10	..	53 13 0
	85	261 13 20	2,049 12	..	6,033 16 10
Kauri Block—					
Hauraki	116	3,686 10 0	7,842 15	..	23,343 17 3
Welcome Find	15	58 1 8	239 15	..	660 1 3
New Golconda	5	18 0 0	60 0	..	180 0 0
Hauraki North	17	240 17 0	173 3	..	360 15 0
Blagrove's	38	20 2 56	44 5	..	97 10 0
Bunker's Hill	14	21 0 0	139 5	..	410 2 4
Golden Pah	50	48 0 30	148 1	..	453 11 9
Kathleen Crown	41	12 0 0	12 9	..	35 3 6
Hauraki South	15	10 0 0	9 8	..	28 0 0
	311	4,114 10 94	8,668 1	..	25,569 1 1
Tiki—					
Coromandel Freehold	10	23 0 80	53 6	..	155 18 3
Specimen Hill	1	0 0 32	48 15	..	144 16 6
	11	23 1 0	102 1	..	300 14 9
Kuaotunu—					
Mariposa	47	4,740 0 0	834 8	895 2	3,777 13 8
Kapai-Vermont	29	3,027 0 0	..	2,048 0	4,668 8 0
Great Mercury	16	433 0 0	..	332 2	679 0 0
Irene	10	100 0 0	27 10	15 13	81 15 3
Juno	2	25 0 0	19 5	..	55 16 6
Waitaia	20	0 0 95	14 19	..	40 14 9
	124	8,325 0 95	896 2	3,290 17	9,303 8 2
Mercury Bay—					
Moana	6	0 10 0	7 10	..	21 15 2
Totals	741	13,665 16 46	24,188 17	3,290 17	73,337 10 0
THAMES COUNTY.					
Tapu—					
Sheridan	20	443 10 0	40 1	..	118 5 3
Mahara Royal	41	1,380 0 0	823 16	..	2,517 19 4
	61	1,823 10 0	863 17	..	2,636 4 7
Tararu—					
Tararu Creek	25	1,970 0 0	426 0	1,995 0	2,346 0 6
Kaiser	4	112 0 0	88 10	..	286 7 0
Scandinavian	3	12 0 0	16 5	..	44 13 9
Argosy	6	0 4 0	23 6	..	77 0 0
Chicago	4	3 0 0	7 2	..	20 0 0
	42	2,097 4 0	561 3	1,995 0	2,774 1 3
Kuranui—					
Kuranui-Caledonian	37	2,988 0 0	1,174 9	..	3,139 5 7
Moanataiari—					
Moanataiari	123	1,233 6 0	602 0	..	1,638 15 3
" Tributers	15	101 0 0	139 14	..	377 3 10
New Alburnia	45	3,744 0 0	1,771 0	..	4,717 12 9
	183	5,078 6 0	2,512 14	..	6,733 11 10

STATEMENT SHOWING QUANTITY OF QUARTZ CRUSHED AND GOLD OBTAINED FOR THE YEAR ENDED 31ST MARCH, 1898—*continued.*

Locality and Name of Mine.	Average Number of Men employed—Wages-men or Owners.	For Owners.			Estimated Value of Gold and Bullion.
		Quartz crushed.	Gold obtained.		
			Amalgamation.	Cyanide.	
THAMES COUNTY—*continued.*					
Grahamstown—		Tons cwt. lb.	Oz. dwt.	Oz. dwt.	£ s. d.
Victoria	19	604 0 0	653 0	..	1,764 9 0
Judd's (tailings)	4	4,305 0 0	896 5	..	2,322 11 2
Sundries	20	200 0 0	300 0	..	785 0 0
	43	5,109 0 0	1,849 5	..	4,872 0 2
Waiotahi—					
Waiotahi	16	1,360 0 0	1,931 9	..	5,227 17 3
Nonpariel	10	294 0 0	361 10	..	1,008 9 9
West Coast	2	49 0 0	47 7	..	122 3 6
Little Maggie	2	15 0 0	16 2	..	43 9 5
	30	1,718 0 0	2,356 8	..	6,401 19 11
Waiokaraka—					
May Queen	52	859 0 0	924 1	..	2,495 7 1
" Tributers	6	42 0 0	85 10	..	228 0 4
	58	901 0 0	1,009 11	..	2,723 7 5
Karaka—					
Adelaide	12	358 10 0	163 17	..	478 2 6
May Queen Extended	8	39 0 0	44 19	..	121 7 4
Claremont	1	0 1 101	181 11	..	482 2 4
Sundries	10	220 0 0	210 0	..	541 10 0
	31	617 11 101	600 7	..	1,623 2 2
Una Hill—					
Occidental	6	36 0 0	34 0	..	68 19 8
Thames Special	4	19 0 0	18 14	..	31 17 2
	10	55 0 0	52 14	..	100 16 10
Hape Creek—					
Anchor	15	180 0 0	90 0	..	234 0 0
Anchor Tributers	4	23 0 26	42 10	..	113 6 8
Sundries	10	254 0 0	325 14	..	680 17 7
	29	457 0 26	458 4	..	1,028 4 3
Hihi—					
Hihi	4	5 14 0	48 16	..	145 0 0
Totals	528	20,850 6 15	13,482 8	..	32,177 14 0
OHINEMURI COUNTY.					
Komata—					
Komata Reefs	104	2,380 0 0	..	10,628 4	8,018 13 1
Karangahake—					
Crown	210	16,989 0 0	..	20,792 10	41,120 2 2
Woodstock	201	11,358 15 0	216 16	52,454 0	35,656 7 0
New Zealand Talisman	70	4,194 0 0	..	15,225 2	13,681 7 3
	481	32,541 15 0	216 16	88,471 12	90,457 16 5
Waitekauri—					
Waitekauri	320	21,708 0 0	..	46,076 0	50,528 8 11
Grace Darling	5	80 0 0	31 18	27 4	97 6 6
	325	21,788 0 0	31 18	46,103 4	50,625 15 5
Waihi—					
Waihi	500	37,164 0 0	..	126,801 0	134,553 8 9
Waihi-Silverton	70	11,253 0 0	..	8,456 0	16,452 4 0
	570	48,417 0 0	..	135,257 0	151,005 12 9
Totals	1,480	105,126 15 0	248 14	280,460 0	300,107 17 8

COMPARATIVE STATEMENT SHOWING INCREASE OR DECREASE OF RETURNS FOR YEARS 1896-97 AND 1897-98.

Locality.	1896-97. Number of Wagesmen and Tributers employed.	1896-97. Quantity of Quartz and Mullock crushed and Tailings treated.	1896-97. Yield of Gold or Bullion.	1896-97. Estimated Value of Gold or Bullion.	1897-98. Number of Wagesmen and Tributers employed.	1897-98. Quantity of Quartz and Mullock crushed and Tailings treated.	1897-98. Yield of Gold or Bullion.	1897-98. Estimated Value of Gold or Bullion.	Gold or Bullion—Increase or Decrease.	Estimated Increase or Decrease in Value.
		Tons.	Oz. dwt.	£ s. d.		Tons cwt. lb.	Oz. dwt.	£ s. d.	Oz. dwt.	£ s. d.
Great Barrier Is.	6	3¼	219 0	36 14 6	6	1 16 108	45 8	122 11 7	−173 12	+85 17 1
SUB-DISTRICTS OF COROMANDEL COUNTY.										
Port Charles ..	..	..	..	..	2	1 4 97	391 19	1,058 5 4	+391 19	+1,058 5 4
Kennedy Bay ..	..	..	..	..	16	5 0 23	53 0	153 14 0	+53 0	+153 14 0
Tokatea ..	139	590	1,090 17	2,991 9 0	175	918 4 49	11,859 17	30,580 5 2	+10,769 0	+27,588 16 2
Cabbage Bay ..	15	22	136 5	377 12 2	9	12 0 60	83 0	241 4 6	−53 5	−136 7 8
Waikoromiko ..	19	9	1,053 3	3,114 15 0	2	4 10 56	25 19	75 5 0	−1,027 4	−3,039 10 0
Kapanga ..	136	965	787 17	2,258 9 5	85	261 13 20	2,049 12	6,033 16 10	+1,261 15	+3,775 7 5
Pukemaukuku ..	8	50	33 15	94 10 0	..	..	..	..	−33 15	−94 10 0
Kauri Block ..	275	4,617	25,487 5	78,309 10 3	311	4,114 10 94	8,668 1	25,569 1 1	−16,819 4	−52,740 9 2
Tiki	5	1	35 0	94 11 11	11	23 1 0	102 1	300 14 9	+67 1	+206 2 10
Manaia ..	4	17	3 3	11 2 7	..	..	..	..	−3 3	−11 2 7
Whangapoua ..	6	53	16 11	46 4 0	..	..	..	..	−16 11	−46 4 0
Kuaotunu ..	143	12,524	7,242 14	13,612 16 6	124	8,325 0 95	4,186 19	9,303 8 2	−3,055 15	−4,309 8 4
Mercury Bay ..	..	..	..	..	6	0 10 0	7 10	21 15 2	+7 10	+21 15 2
Totals ..	750	18,848	35,886 10	100,911 0 10	741	13,665 16 46	27,427 18	73,337 10 0	−8,458 12	−27,573 10 10
SUB-DISTRICTS OF THAMES COUNTY.										
Mata	..	..	..	..	..	..	..	..	..	..
Tapu	31	238	211 12	634 16 0	61	1,823 10 0	863 17	2,636 4 7	+652 5	+2,001 8 7
Waiomo ..	4	50	29 12	95 14 4	..	..	..	..	−29 12	−95 14 4
Puru	11	12	6 14	19 7 0	..	..	..	..	−6 14	−19 7 0
Tararu ..	86	5,485	2,271 17	3,877 10 3	42	2,097 4 0	2,556 3	2,774 1 3	+284 6	−1,103 9 0
Kuranui ..	74	399	601 15	1,634 8 7	37	2,988 0 0	1,174 9	3,139 5 7	+572 14	+1,504 17 0
Moanataiari ..	154	7,616	3,071 11	8,094 0 11	183	5,078 6 0	2,512 14	6,733 11 10	−558 17	−1,360 9 1
Grahamstown ..	70	6,989	3,059 11	8,515 8 6	43	5,109 0 0	1,849 5	4,872 0 2	−1,219 6	−3,643 8 4
Waiotahi ..	69	5,206	2,759 18	7,489 1 3	30	1,718 0 0	2,356 8	6,401 19 11	−403 10	−1,087 1 4
Waiokaraka ..	36	638	578 12	1,533 5 6	58	901 0 0	1,009 11	2,723 7 5	+430 19	+1,190 1 11
Karaka ..	33	230	565 6	1,592 3 10	31	617 11 101	600 7	1,623 2 2	+35 1	+30 18 4
Una Hill and Te Papa	14	159	257 5	693 12 4	10	55 0 0	52 14	100 16 10	−204 11	−592 15 6
Hape Creek ..	6	27	22 12	63 5 7	29	457 0 26	458 4	1,028 4 3	+435 12	+964 18 8
Puriri ..	6	11	4 2	10 19 11	..	..	..	..	−4 2	−10 19 11
Hihi	..	..	..	..	4	5 14 0	48 16	145 0 0	+48 16	+145 0 0
Totals ..	594	27,060	13,440 7	34,253 14 0	528	20,850 6 15	13,482 8	32,177 14 0	+42 1	−2,076 0 0
SUB-DISTRICTS OF OHINEMURI COUNTY.										
Maratoto ..	6	1	79 0	23 0 9	..	..	..	..	−79 0	−23 0 9
Karangahake ..	244	10,717	18,091 0	34,878 19 0	481	32,541 15 0	88,688 8	90,457 16 5	+76,597 8	+55,578 17 5
Owharoa ..	..	..	..	..	..	..	..	..	..	..
Waitekauri ..	357	11,413	30,244 0	32,676 3 6	325	21,788 0 0	46,135 2	50,625 15 5	+15,891 2	+17,949 11 11
Komata ..	..	..	..	..	104	2,380 0 0	10,628 4	8,018 13 1	+10,628 4	+8,018 13 1
Waihi ..	411	44,854	100,212 0	150,489 16 6	570	48,417 0 0	135,257 0	151,005 12 9	+35,045 0	+515 16 3
Totals ..	1,018	66,985	148,626 0	218,067 19 9	1,480	105,126 15 0	280,708 14	300,107 17 8	+132082 14	+82,039 17 11

COMPARATIVE STATEMENT of RETURN for HAURAKI DISTRICT for the Years ended 31st March, 1897 and 1898, respectively.

1897.

Name of County.	Average Number of Men employed.		For Owners.				For Tributers.				Tailings.			Estimated Value of Gold and Bullion.
	Wages-men or Owners.	Tributers.	Quartz crushed.	Mullock crushed.	Gold obtained.		Quartz crushed.	Mullock or Gravel.	Gold obtained.		Quantity treated.	Gold obtained.		
					Amalgamation.	Cyanide.			Amalgamation.	Cyanide.		Amalgamation.	Cyanide.	
			Tons cwt. lb.	Tons.	Oz. dwt.	Oz. dwt.	Tons cwt. lb.	Tons.	Oz. dwt.	Oz. dwt.	Tons cwt.	Oz. dwt.	Oz. dwt.	£ s. d
Coromandel	750	..	18,748 5 48	..	31,698 19	4,147 11	..	..	..	..	100 0	..	40 0	100,911 0 10
Thames	572	22	15,012 15 50	..	10,219 5	29 12	681 0 0	..	579 18	..	11,367 0	1,396 2	1,215 10	34,253 14 0
Ohinemuri	1,018	..	64,463 4 0	..	90 19	148,535 9	..	..	..	..	2,522 0	..	..	218,067 19 9
Piako	32	..	934 0 0	..	28 0	348 0	..	..	..	..	..	..	..	986 10 0
Great Barrier	6	..	3 5 0	..	219 0	..	..	..	..	..	..	..	..	36 14 6
Totals	*2,378	22	99,161 9 98	..	42,256 3	153,060 12	681 0 0	..	579 18	..	13,889 0	1,396 2	1,255 10	354,255 19 1

1898.

Name of County.	Average Number of Men employed: Wages-men or Owners.	For Owners.			Estimated Value of Gold and Bullion.
		Quartz crushed.	Gold obtained.		
			Amalgamation.	Cyanide.	
		Tons cwt. lb.	Oz. dwt.	Oz. dwt.	£ s. d.
Great Barrier	6	1 16 108	45 8	..	122 11 7
Coromandel	741	13,665 16 46	24,137 1	3,290 17	73,337 10 0
Thames	528	20,850 6 15	11,487 8	1,995 0	32,177 14 0
Ohinemuri	1,480	105,126 15 0	248 14	280,460 0	300,107 17 8
Totals	*2,755	139,644 14 57	35,918 11	285,745 17	405,745 13 3

	Gold or Bullion.		
	£ s. d.		Oz. dwt.
Value for 1898	405,745 13 3†	..	321,664 8
„ 1897	354,255 19 1	..	198,548 5
Increase for 1898	£51,489 14 2	..	123,116 3

	£ s. d.
Increase, Great Barrier	85 17 1
Decrease, Coromandel	27,573 10 10
„ Thames	2,076 0 0
Increase, Ohinemuri	82,039 17 11
Decrease, Piako	986 10 0

NOTE.—In the above return, gold to the value of £4,387 9s. 4d. was obtained by tributers, upwards of fifty men being employed.

* Number employed in gold-producing mines. † Of this, £305,863 has been obtained by the cyanide process.

Waihi Gold-mining Company.

The following table shows the returns from this famous mine since 1890 :—

	Tons.	£	s.	d.
1890	...	21,112	13	6
1891	...	23,935	5	11
1892	18,236	44,888	2	4
1893	19,805	61,900	10	11
1894	24,864	82,827	2	2
1895	35,765	120,334	2	2
1896	36,937	137,321	8	2
1897	40,768	144,040	9	7
Period ending 31st January, 1898	...	...		
Period ending 28th February, 1898 ...	3,930	14,688	5	6
Period ending 31st March, 1898	2,880	11,241	3	5
	183,185	£662,289	3	8

Twenty dividends, seven of 1s. and thirteen of 2s. per share, have been declared by the company on 160,000 shares, and the total amount of dividends paid has been £260,500.

It will be seen from the foregoing returns and comparative results that in the Coromandel County the decrease in the yield of gold has been considerable. The Hauraki Mine has not turned out rich gold in such quantities as were obtained during the past two years.

In the Kuaotunu district the falling-off in the returns from the chief mines has also been very great.

In the Thames County and Borough there has been a general decrease throughout.

In the Ohinemuri district the Waihi and Waihi-Silverton have maintained returns equal to those of last year, whilst the Waitekauri Mine returns show an increase. The Komata Reefs Mine has become an important factor in gold-production, and has added considerably to the returns. At Karangahake the New Zealand Talisman and Crown Mines show a decided increase, and the Woodstock Mine, which did not give any returns the previous year, has furnished a large addition to the yield of the present period.

Notwithstanding the falling-off in Coromandel district, and the many disappointments that have been experienced in those claims more recently taken up, there are still hopes of ultimate success and recurrence of rich yields. In the Tokatea district the Royal Oak Mine shows substantial returns, and other claims are so far developed as to be assured of future profitable crushings. The extensive works undertaken in Whangapoua district by the Kauri Freehold Gold Estates Company and the prosecution of deep-level mining at Kuaotunu both point to future success in those parts of the district.

In the Thames district the Mahara Royal Mine, at Tapu Creek, is furnishing steady yields of a profitable character. At Tararu the Tararu Creek Company intend to restore their crushing plant, and hope to be in a better position to deal with the ores found in their mines. Within the Borough of Thames the prospecting works at the deep levels in the Kuranui-Caledonian and Moanataiari Mines will still further open up the reefs in those claims. This locality is famous for rich deposits, and whilst work is being done in favourable country there is always a strong probability of one of those bonanzas being discovered. The owners of the May Queen Mine will shortly be in a position to operate on the low levels, to which access can be had as soon as the drainage of the ground is effected by the pumps in the Queen of Beauty shaft. There are promising reefs in the Thames-Hauraki Goldfields property, running through country that can be drained shortly after a commencement is made to pump water. One of the most valuable portions of this mine will probably be found to exist in the blocks hitherto untried, and lying at no great depth from the surface, which may be worked during the time that the shaft is being extended to reach a level deeper than any of those dealt with.

In the Ohinemuri district operations in the chief mines have shown that the runs of payable quartz continue to the deepest levels opened, and fully warrant the expectation of increased yields of gold in the future. The lowest levels in the three mines at Karangahake—the Crown, Woodstock, and Talisman—contain quartz of high quality. At Waitekauri and Komata the levels opened show blocks of payable stone, and at Waihi the progressive works in the low levels show that large and rich reefs extend downwards. The Waihi Grand Junction Mine, which adjoins the Waihi, promises at an early date to become a gold-producing property, the well-known reefs of the Waihi Mine having been explored in the ground, and found to contain quartz of a valuable character.

On the whole, it may be said that, although the "boom" in quartz-mining has passed away and many claims have been abandoned, the prospects in the mines that have been legitimately worked are such as to warrant hopes of a large increase in the yield of gold from the Hauraki district.

MIDDLE ISLAND.

Nelson and West Coast Districts.

The following list of claims taken up will show the great interest taken in quartz-mining. Prospecting work has been carried on in some of the claims, but the greater number have been neglected. The new machinery erected during the year will permit of a large tonnage of quartz being dealt with by the owners of the Reefton claims.

ABSTRACT of LICENSES for SPECIAL CLAIMS, MINERAL LEASES, and LICENSED HOLDINGS issued from the Wardens' Offices, and registered on or before the 31st March, 1898, in the Books of the Mining Registrar.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A. R. P.					
		Havelock.				
6/8/88	225 2 0	Endeavour Inlet	..	..	Star	Star Antimony Co. (Ltd.).
6/8/88	287 0 0	"	..	..	"	"
6/8/88	300 0 0	"	..	..	"	"
1/1/92	30 0 0	Waikakaho ..	..	..	Southern Cross ..	David Girdwood.
1/10/94	30 0 0	" ..	..	..	Captain Cook No. 1	Robert Ewing.
30/6/94	30 0 0	Wakamarina ..	..	Wakamarina	Empire City ..	Golden Bar Gold-mining Co.
13/11/95	8 2 15	" ..	..	"	Federation Extd. ..	Walter J. Hunt.
13/11/95	24 2 21	" ..	..	"	Great Yorkshire ..	"
1/10/95	2 0 0	" ..	..	"	(Machine-site) ..	Robert Ewing.
30/7/96	20 1 0	Waikakaho ..	..	..	Captain Cook No. 2	"
28/9/96	30 0 0	" ..	..	..	Mahakipawa ..	Ravenscliff Quartz-mining Co.
28/9/96	30 0 0	" ..	..	..	Jubilee	"
28/9/96	30 0 0	" ..	..	..	Kapai	"
28/9/96	30 0 0	" ..	..	..	Lucky Hit ..	"
28/9/96	30 0 0	" ..	..	..	Waikakaho ..	"
25/11/96	18 1 8	Wakamarina ..	..	..	Golden Bar ..	Golden Bar Gold-mining Co.
31/12/96	25 3 0	Waikakaho ..	..	..	Silence	M. B. Elder.
		Collingwood.				
3/3/87	16 2 0	Bedstead Gully	VIII.	Aorere ..	..	Johnston's United Mining Co.
5/7/88	6 3 34	"	"	" ..	..	"
28/10/95	28 3 29	Cole's Gully ..	"	" ..	..	John Tyler.
6/10/96	16 0 0	Onakaka ..	II.	Waitapu ..	..	I. S. M. Jacobsen.
11/1/97	30 0 0	Cole's Gully ..	VIII.	Aorere ..	..	Charles Pilliet.
12/8/97	19 0 0	Boulder River..	X.	" ..	..	J. Taylor and others.
1/3/97	95 2 0	Cole's Gully ..	VIII.	" ..	..	James B. Gilberd.
29/3/97	100 0 0	" ..	"	" ..	..	D. C. Tana.
21/7/97	38 3 18	" ..	"	" ..	..	Josiah Corby.
17/2/98	62 3 0	Richmond Hill	IV.	" ..	..	Graham Fisher.
		Lyell.				
16/1/96	57 3 2	Lyell Creek ..	XIII.	Lyell ..	Alpine Extended ..	Alpine Extended Gold-mining Co. (Ltd.).
7/7/96	100 0 0	Alpine Range..	"	" ..	Kent Quartz-mining Co. (Ltd.).	Nicola Cacase.
7/7/96	100 0 0	" ..	"	" ..	Middlesex ..	Middlesex Gold-mining Co.
7/7/96	100 0 0	New Creek ..	"	" ..	Surrey Quartz-mining Co.	James Welman.
25/7/92	76 0 4	Alpine Range..	"	" ..	Alpine Extended ..	Alpine Extended Gold-mining Co. (Ltd.).
17/2/97	50 0 0	Lyell Creek ..	I.	Maruia ..	Golden Crown ..	James Grieve.
19/8/97	49 1 0	Alpine Range..	XIII.	Lyell ..	Irishman's Creek ..	Charles Jacobs and William Green.
22/5/96	8 1 24	" ..	"	" ..	Alpine Extended ..	Alpine Extended Gold-mining Co. (Ltd.).
17/2/97	12 2 0	" ..	"	" ..	..	Ditto.
17/2/97	30 0 0	Lyell Creek ..	I.	Maruia ..	No. 2 Alpine Quartz-mining Co.	Charles H. Junker and Edward Morris.
14/3/92	16 0 20	" ..	"	" ..	Crœsus Quartz-mining Co.	John Kelly, James Edge, and William P. Smith.
13/11/93	28 2 16	Eight-mile ..	XIII.	Lyell ..	United Italy ..	United Italy Quartz-mining Co. (Ltd.).
13/11/93	22 1 28	" ..	"	" ..	Tyrconnel Quartz-mining Co.	James Edge and John Kelly.
		Westport.				
13/7/96	99 3 39	Stony Creek, Waimangaroa	X.	Ngakawau..	Britannia Gold-mining Co.	James Gardner and party.
13/7/96	100 0 0	Ditto ..	"	" ..	Welcome Co. ..	Walter Williams and S. Roche.
23/12/96	100 0 0	Seatonville ..	XIII.	Maruia ..	Lady Agnes Gold-mining Co.	George Walker and party.
4/1/97	97 1 10	Waimangaroa..	VI.	Kawatiri ..	Beaconsfield Gold-mining Co.	Charles Lempfert.
15/1/95	30 0 0	Seatonville ..	IX.	Maruia ..	Swanston ..	The Swanston Gold-mining Co. (Ltd.).
		Reefton.				
28/6/93	73 0 19	Merrijigs ..	VI.	Waitahu ..	Golden Lead ..	Golden Lead Mining Co.
23/5/95	89 1 16	Devil's Creek ..	II.	" ..	Progress	Progress Gold-mining Co.
19/8/95	31 0 23	" ..	"	" ..	Progressive ..	Consolidated Goldfields of New Zealand (Ltd.).
1/11/95	100 0 0	Murray Creek..	XIV.	Reefton ..	Gladstone ..	Ditto.
1/11/95	100 0 0	" ..	"	" ..	Beaconsfield ..	"
1/11/95	100 0 0	Devil's Creek ..	II.	Waitahu ..	Larnach	"
1/11/95	100 0 0	Rainy Creek ..	"	" ..	Carbine	Inkerman Combined Gold-mines(Ltd.).
1/11/95	57 2 0	" ..	"	" ..	Revival	"
16/9/95	39 0 24	Crushington ..	XIV.	" ..	Lankey's Creek ..	James Scarlett.
6/1/96	33 0 0	Rainy Creek ..	II.	" ..	Revival	Inkerman Combined Gold-mines(Ltd.).
25/11/95	100 0 0	Larry's Creek..	VII.	Reefton ..	Caledonia ..	Consolidated Goldfields of New Zealand (Ltd.).
25/11/95	100 0 0	" ..	"	" ..	Rosebery ..	Ditto.

ABSTRACT of LICENSES for SPECIAL CLAIMS, MINERAL LEASES, and LICENSED HOLDINGS issued from the Wardens' Offices—*continued.*

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
		Reefton—continued.				
	A. R. P.					
6/1/96	100 0 0	Boatman's ..	XI.	Reefton ..	Seddon	Consolidated Goldfields of New Zealand (Ltd.).
25/11/95	100 0 0	" ..	"	" ..	Cadman	Ditto.
25/11/95	96 1 10	Big River ..	VI.	Waitahu ..	Pactolus	Bernard P. McMahon.
19/8/95	30 0 0	" ..	X.	" ..	Canterbury ..	George J. Black.
6/1/96	100 0 0	Boatman's ..	XI.	Reefton ..	Carnot	W. McArthur.
6/1/96	33 2 2	" ..	"	" ..	Pasteur	T. Hubert Lee.
1/5/96	100 0 0	" ..	"	" ..	Trial	Alexander McKenzie.
20/3/96	100 0 0	Painkiller ..	X.	" ..	Tasmania ..	Matthew Wynn.
1/5/96	100 0 0	Devil's Creek ..	II.	Waitahu ..	Carroll	G. H. Boyd.
1/5/96	50 0 0	Painkiller ..	XIV.	Reefton ..	Munster	Joseph McHugh.
6/3/96	60 3 20	Crushington ..	"	" ..	Empire	J. Scarlett.
1/5/96	99 3 26	Devil's Creek ..	II.	Waitahu ..	African	M. J. Hughes.
1/5/96	100 0 0	Painkiller ..	"	" ..	Jamieson	William Fisk.
2/6/96	100 0 0	Devil's Creek ..	"	" ..	Ballance	G. H. Boyd.
2/6/96	100 0 0	Murray Creek ..	XIV.	Reefton ..	Salisbury	Consolidated Goldfields of New Zealand (Ltd.).
2/6/96	49 2 0	" ..	"	" ..	Juno	George H. Boyd.
2/6/96	100 0 0	Boatman's ..	XI.	" ..	Blake	"
2/6/96	100 0 0	Devil's Creek ..	II.	Waitahu ..	Rose	David Ziman.
2/6/96	100 0 0	Rainy Creek ..	"	" ..	Radiometer ..	William McArthur.
2/6/96	100 0 0	Snowy River ..	X.	" ..	Matthias	H. F. Doogan.
2/6/96	100 0 0	" ..	"	" ..	Wolseley	"
2/6/96	36 0 10	" ..	"	" ..	Nelson	"
2/6/96	50 0 21	" ..	"	" ..	Leighton	Morris Levy.
2/6/96	100 0 0	Merrijigs ..	VI.	" ..	Waterloo	Thomas H. Lee.
2/6/96	100 0 0	Devil's Creek ..	XIII.	" ..	Delta	H. G. Hankin.
2/6/96	100 0 0	Boatman's ..	XI.	Reefton ..	Messena	T. Hubert Lee.
2/6/96	100 0 0	Devil's Creek ..	II.	Waitahu ..	Lady Mary ..	W. Irving.
2/6/96	99 3 11	Murray Creek ..	XIV.	Reefton ..	Ajax	John Trennery.
2/6/96	100 0 0	Crushington ..	"	" ..	Crushington ..	G. B. Shepherd.
2/6/96	59 3 30	Big River ..	VI.	Waitahu ..	Alert	James F. Clark.
2/6/96	99 3 16	Painkiller ..	XI.	Reefton ..	Connaught ..	Edward Black.
3/8/96	46 3 6	Boatman's ..	"	" ..	Chamberlain ..	William Fisk.
20/7/96	65 0 0	Larry's Creek ..	VII.	" ..	Kismet	R. S. Hindmarsh.
20/7/96	50 0 0	" ..	"	" ..	Broadway ..	G. J. Willis.
20/7/96	100 0 0	Crushington ..	XIV.	" ..	Dunedin	T. Hubert Lee.
20/7/96	64 3 0	Black's Point ..	"	" ..	London	"
21/9/96	58 0 0	Merrijigs ..	VI.	Waitahu ..	A1	A1 Gold-mining Co.
21/9/96	67 0 0	Murray Creek	XIV.	Reefton ..	Golden Treasure Extd.	Golden Treasure Extended Co.
7/9/96	50 0 0	"	XV.	" ..	Union Jack ..	John Knight.
7/9/96	100 0 0	Burke's Creek	XIV.	" ..	Jupiter	Patrick Butler.
21/9/96	85 3 24	Devil's Creek ..	XIII.	" ..	Revival	Peter McHugh.
21/9/96	51 0 0	Rainy Creek ..	II.	Waitahu ..	Clarence	C. Kirkpatrick.
7/9/96	99 3 0	Boatman's ..	VII.	Reefton ..	Transvaal ..	T. Hubert Lee.
21/9/96	46 1 35	Big River ..	X.	Waitahu ..	Prima Donna ..	B. P. McMahon.
7/9/96	96 2 7	Boatman's ..	VII.	Reefton ..	Holyhead ..	"
21/9/96	100 0 0	" ..	"	" ..	Anthony Gibbs ..	John Williams.
5/11/96	98 3 6	Devil's Creek ..	II.	Waitahu ..	Deep	Consolidated Goldfields of New Zealand (Ltd.).
21/9/96	99 2 0	Murray Creek	XIV.	Reefton ..	Royal	Ditto.
21/9/96	54 0 0	"	"	" ..	Energetic ..	"
21/9/96	95 0 0	"	"	" ..	Golden Fleece ..	"
16/11/96	100 0 0	Big River ..	VI.	Waitahu ..	Mount Aurum ..	A. McCloy.
10/12/96	49 3 15	Merrijigs ..	II.	" ..	Louisa	Walter Irving.
10/12/96	99 0 9	Rainy Creek ..	"	" ..	Wilson	George G. Dixon.
26/11/96	100 0 0	Snowy River ..	XIII.	" ..	Snowy River ..	J. Scarlett.
26/11/96	100 0 0	" ..	"	" ..	Rob Roy	J. Cohen.
6/7/96	100 0 0	Merrijigs ..	II.	" ..	Sir F. Drake ..	T. Hubert Lee.
5/11/96	34 2 15	Murray Creek	XIV.	Reefton ..	North Ajax ..	James Stevenson.
15/10/96	62 3 15	Big River ..	X.	Waitahu ..	No. 2 Big River ..	J. S. Wilson.
5/11/96	87 2 37	" ..	"	" ..	Mawhera ..	H. F. Doogan.
10/12/96	77 1 25	Murray Creek	XIV.	Reefton ..	North Star ..	A. Campbell.
26/11/96	100 0 0	Landing Creek	XIII.	Inangahua	Magnolia	J. G. Willis.
26/11/96	99 2 0	Boatman's ..	XI.	Reefton ..	Sheba	J. McTaggart.
7/1/97	100 0 0	Snowy River ..	XIII.	Waitahu ..	Kiwi	Bernard Duffy.
19/3/97	29 3 22	Victoria Range	XVI.	Reefton ..	Big Reef	G. J. Willis.
4/2/97	29 3 20	"	XII.	" ..	Earl Brassey ..	Percy N. Kingswell.
4/2/97	29 3 20	"	XVI.	" ..	Kirwan's Reward ..	"
4/2/97	29 3 31	"	XII.	" ..	Lady Brassey ..	"
4/2/97	93 2 4	"	XVI.	" ..	Lord Brassey ..	"
19/3/97	30 0 0	"	"	" ..	Luck's Way ..	George Walker.
15/4/97	53 0 0	Boatman's ..	XI.	" ..	Paris	T. Hubert Lee.
4/6/97	60 0 0	" ..	"	" ..	Fiery Cross ..	Consolidated Goldfields of New Zealand.
4/6/97	86 0 0	Larry's ..	VII.	" ..	Duffy	Charles Clifford.
23/10/97	100 0 0	Painkiller ..	X.	" ..	Ulster	George Black.
19/11/97	100 0 0	" ..	XIV.	" ..	Lord Ranfurly ..	Timothy O'Neil.
5/11/97	100 0 0	Murray Creek	"	" ..	Mountaineer ..	James Osborne.
5/11/97	100 0 0	"	"	" ..	City of Belfast ..	William Patterson.
23/12/97	63 1 13	Crushington ..	"	" ..	Wealth of Nations	David Ziman.
7/1/98	99 1 0	Boatman's ..	XI.	" ..	Golden Apple ..	Thomas Naysmith.
17/12/97	98 0 0	Larry's Creek ..	VII.	" ..	Lord Rosebery Extd.	Charles Clifford.
7/1/98	100 0 0	Crushington ..	II.	Waitahu ..	New Globe	"

ABSTRACT of LICENSES for SPECIAL CLAIMS, MINERAL LEASES, and LICENSED HOLDINGS issued from the Wardens' Offices—*continued.*

Date of License.	Area.			Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A.	R.	P.					
				Reefton—continued.				
				Under "Mines Act, 1877."				
4/7/84	34	3	38	Crushington ..	XIV.	Reefton ..	Keep-it-Dark ..	Keep-it-Dark Gold-mining Co.
6/6/84	102	2	38	Black's Point..	"	" ..	New Low-level Tunnel	Consolidated Goldfields of New Zealand (Ltd.).
7/9/87	37	3	0	Big River ..	X.	Waitahu ..	Big River ..	Big River Gold-mining Co.
17/10/83	23	0	36	Boatman's ..	XI.	Reefton ..	Eureka	Welcome Gold-mining Co.
5/12/82	52	2	12	Devil's Creek ..	II.	Waitahu ..	Globe	David Ziman.
26/11/96	36	3	0	Landing Creek	IX.	Inangahua	Coal Creek ..	W. Duffy.
				Gold-mining Leases (Quartz).				
6/7/86	13	2	30	Devil's Creek ..	II.	Waitahu ..	Globe Co. ..	David Ziman.
28/9/86	15	3	33	" ..	"	" ..	" ..	"
4/10/86	5	0	0	" ..	"	" ..	" ..	"
1/11/86	16	1	37	Crushington ..	XIV.	Reefton ..	Hercules	Hercules Gold-mining Co.
1/7/83	2	2	20	" ..	"	" ..	No. 2 South Keep-it-Dark	Keep-it-Dark Gold-Mining Co.
1/2/83	16	1	27	" ..	"	" ..	Ditto	"
				Gold-mining Leases (Alluvial).				
1/7/84	9	2	25	..	VI.	Waitahu ..	Merrijigs Sluicing..	William King.
				Reefton (Inangahua District).				
18/4/88	30	0	0	Merrijigs ..	VI.	Waitahu ..	Cumberland ..	W. Irving.
29/5/90	30	0	0	Painkiller ..	X.	Reefton ..	Dillon Extended ..	Dillon Extended Gold-mining Co.
28/10/91	10	0	0	Merrijigs ..	VI.	Waitahu ..	Cumberland ..	Cumberland Gold-mining Co.
1/6/92	28	2	25	Crushington ..	XIV.	Reefton ..	No. 2 South Keep-it-Dark	Keep-it-Dark Gold-mining Co.
27/9/93	13	1	1	Merrijigs ..	VI.	Waitahu ..	Central	James Thorburn.
25/1/93	16	0	26	Boatman's ..	XI.	Reefton ..	Welcome ..	Welcome Gold-mining Co.
17/8/94	21	1	36	Crushington ..	XIV.	" ..	Keep-it-Dark ..	Keep-it-Dark Gold-mining Co.
17/8/94	16	2	0	" ..	"	" ..	Hercules	Hercules Gold-mining Co.
5/10/94	28	2	8	Boatman's ..	XI.	" ..	Welcome ..	Welcome Gold-mining Co.
17/6/95	30	0	0	Big River ..	X.	Waitahu ..	St. George ..	St. George Gold-mining Co.
29/6/95	16	2	6	" ..	"	" ..	Lord Edward ..	Lord Edward Gold-mining Co.
19/8/95	30	0	0	Merrijigs ..	VI.	" ..	Durham II. ..	Matthew Wynn.
16/9/95	30	0	0	Big River ..	X.	" ..	Star	John Trennery.
4/10/95	28	3	0	Merrijigs ..	VI.	" ..	Cumberland ..	Cumberland Gold-mining Co.
4/10/95	29	3	36	" ..	"	" ..	" ..	"
1/11/95	15	3	21	" ..	"	" ..	Mariners	Walter Irving.
25/11/95	16	2	0	Boatman's ..	VII.	Reefton ..	Golden Arch ..	Francis Rogers.
25/11/95	16	2	4	" ..	"	" ..	Golden Crown ..	John Williams.
1/11/95	16	0	21	Rainy Creek ..	II.	Waitahu ..	Carbine	Inkerman Combined Gold-mines (Ltd.).
27/1/96	16	2	4	Merrijigs ..	VI.	" ..	Exchange ..	Exchange Gold-mining Co.
19/2/96	30	0	0	Painkiller ..	X.	Reefton ..	Dillon Extended ..	Dillon Extended Gold-mining Co.
10/4/96	29	2	25	" ..	"	" ..	Painkiller ..	Thomas McGrath.
10/4/96	16	2	0	Boatman's ..	VII.	" ..	Ziman	Bernard Rogers.
2/6/96	22	1	7	Painkiller ..	X.	" ..	Killarney ..	Anton C. Kater.
2/6/96	29	1	11	Murray Creek..	XIV.	" ..	Percival	David Ziman.
2/6/96	14	3	29	" ..	XV.	" ..	Southern Cross ..	John G. Willis.
2/6/96	6	3	22	Rainy Creek ..	II.	Waitahu ..	Zenith	George J. Willis.
2/6/96	30	0	0	Murray Creek..	XIV.	Reefton ..	Victoria Extended..	William J. Collins.
2/6/96	5	3	32	Painkiller ..	"	" ..	Micawber ..	Joseph Walsh.
2/6/96	30	0	0	Big River ..	X.	Waitahu ..	Break o' Day ..	Harman J. Reeves.
20/7/96	30	0	0	Crushington ..	XIV.	Reefton ..	Mariner	John S. Treloar.
17/8/96	16	2	0	Boatman's ..	VII.	" ..	Westralian ..	Charles W. Martin.
21/9/96	30	0	0	Big River ..	X.	Waitahu ..	New Alexander ..	Thomes J. Malloy.
15/10/96	16	3	0	Painkiller ..	"	Reefton ..	Triangle	George J. Willis.
5/11/96	24	1	30	Merrijigs ..	II.	Waitahu ..	Maritana.. ..	Charles Anderson.
5/11/96	22	3	20	Devil's Creek ..	"	" ..	Wedge	Consolidated Goldfields of New Zealand (Ltd.).
26/11/96	9	2	8	Merrijigs ..	"	" ..	Elliston	Thomas H. Lee.
18/2/96	29	3	35	" ..	VI.	Reefton ..	Primrose ..	James F. Clark.
19/3/96	29	3	11	Victoria Range	..	" ..	Young New Zealand	Henry Smith.
19/3/96	29	3	37	"	..	" ..	Lord Nelson ..	Frederick A. G. Archer.
19/3/97	30	0	0	"	..	" ..	Morgan	James Woolhouse.
19/3/97	28	3	26	"	..	" ..	Lady Agnes ..	George J. Willis.
19/3/97	30	0	0	"	.	" ..	Lucky	Edward Silcock.
19/3/97	30	0	0	"	..	" ..	El Dorado ..	Kenneth B. McIver.
19/3/97	30	0	0	"	..	" ..	Mutual	"
19/3/97	30	0	0	"	XII.	" ..	Holy Terror ..	William G. Collings.
19/3/97	29	3	30	"	"	" ..	Golden Pebble ..	Charles Williams.
19/3/97	29	3	30	"	XVI.	" ..	Aide-de-camp ..	Boatman's Exploration Gold-mining Co.
19/3/97	30	0	0	"	XII.	" ..	Hidden Mystery ..	Edward Silcock.
19/3/97	29	3	30	"	"	" ..	Governor	Boatman's Exploration Gold-min Co.
19/3/97	15	3	0	"	XVI.	" ..	City of Derry ..	John McLaughlin.
19/3/97	29	3	37	"	"	" ..	Napier	George G. Dixon.
19/3/97	17	0	31	"	"	" ..	Lady Antrim ..	George J. Black.
19/3/97	29	3	37	"	"	" ..	Waitahu	Morris Levy.
19/3/97	29	3	22	"	XII.	" ..	Newhaven ..	Michael J. Hughes.
15/4/97	26	1	17	"	XVI.	" ..	Ivanhoe	Walter Irving.

ABSTRACT of LICENSES for SPECIAL CLAIMS, MINERAL LICENSES, and LICENSED HOLDINGS issued from the Wardens' Offices—*continued.*

Date of License.	Area.			Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
				Reefton (Inangahua District)—continued.				
	A.	R.	P.					
23/4/97	5	3	10	Victoria Range	XII.	Reefton ..	Surplus	Boatman's Exploration Gold-mining Co.
7/5/97	28	2	24	"	"	" ..	Colonial Company ..	John H. Howell.
21/5/97	30	0	0	"	"	" ..	Mark Twain ..	George Walker.
21/5/97	14	1	21	"	XVI.	" ..	Mount Victoria ..	George Wells.
18/6/97	6	3	35	"	XII.	" ..	Bret Harte ..	George Walker.
18/6/97	30	0	0	"	"	" ..	Emancipator ..	Frank Payne.
18/6/97	27	2	20	"	"	" ..	Lord Glasgow ..	Boatman's Exploration Gold-mining Co.
9/7/97	29	3	36	"	"	" ..	Ben Tillett ..	William McArthur.
8/10/97	27	0	30	Devil's Creek ..	II.	Waitahu ..	Prince	John Dick.
5/11/97	19	1	0	Victoria Range	XII.	Reefton ..	Artemus Ward ..	William R. Free.
23/10/97	9	2	10	"	"	" ..	Sam Slick ..	George Walker.
23/10/97	16	1	0	Boatman's ..	XI.	" ..	West Welcome ..	Charles Clifford.
19/11/97	15	0	0	Victoria Range	XII.	" ..	Pilgrim	William R. Free.
19/11/97	29	3	20	"	"	" ..	Joker	George Walker.
10/12/97	29	3	0	Devil's Creek ..	II.	Waitahu ..	Queen	John Dick.
10/12/97	30	0	0	" ..	"	" ..	Record	Patrick Cunningham.
18/2/98	30	0	0	Merrijigs ..	VI.	" ..	Last Chance ..	James Morris.
				Alluvial.				
3/8/96	29	2	21	Boatman's ..	VI.	Reefton ..	A1 Sluicing Co. ..	James Cornwall.
21/9/96	12	0	0	" ..	"	" ..	Flowers Creek ..	Tong Shay.
10/12/96	30	0	0	" ..	"	" ..	A1 Sluicing Co. ..	Walter Irving.
				Ahaura.				
27/4/96	100	0	0	..	X.	Waiwhero ..	Moonlight Gold-mining Co.	Richard Devereux, Hugh Magill, Robert Mitchell, and ten others.
22/6/96	100	0	0	..	"	" ..	Ballarat Gold-mining Co.	Thomas Williams.
22/6/96	100	0	0	..	XIV.	" ..	Crœsus	Henry Neilson and twelve others.
27/7/96	100	0	0	..	X.	" ..	Moonlight ..	John Hubertson and eight others.
22/6/96	95	3	17	..	XIV.	" ..	Minerva	Gerald Perotti.
28/9/96	100	0	0	..	"	" ..	Triple Alliance ..	William Dunn.
28/9/96	100	0	0	..	"	" ..	Imperial	Hubert Boustridge.
28/9/96	98	2	36	..	X.	" ..	Premier	James Marshall.
28/9/96	98	2	32	..	"	" ..	Golden Crown ..	John Caples.
26/10/96	93	2	0	..	XIV.	" ..	Victoria	James Armstrong.
26/10/96	100	0	0	..	"	" ..	Corrie's Reward ..	James McMeekin and three others.
26/10/96	97	1	24	..	"	" ..	Napoleon ..	William Fraser.
19/11/96	100	0	0	..	"	" ..	Sunlight	Henry Dearing.
7/12/96	97	0	0	..	IX.	" ..	Trilby	Joseph Billingham.
25/1/97	100	0	0	..	"	" ..	Alpha	John T. Tidd.
7/12/96	100	0	0	..	X.	" ..	Comstock ..	Henry Watterson and Edward Carton.
25/1/97	98	1	4	..	"	" ..	Sunbeam ..	Donald MacGregor.
7/12/96	97	1	26	..	"	" ..	Paparoa	Joseph Mandel.
25/1/97	97	3	18	..	"	" ..	Tawhau	William Williams.
25/1/97	100	0	0	..	XIV.	" ..	Taffy	James Hargreaves.
25/1/97	99	1	10	..	"	" ..	South Pole ..	Thomas Jolliffe.
25/1/97	99	0	0	..	"	" ..	Nil Desperandum ..	John Leitch.
25/1/97	100	0	0	..	II.	Mawheranui	Mount Sewell ..	Frederick Henry Kells.
22/2/97	100	0	0	..	IX.	Waiwhero ..	Golden Lead ..	Thomas George Davies.
22/2/97	95	0	13	..	X.	" ..	Golden Gully ..	Gerald Perotti.
22/2/97	100	0	0	..	IX.	" ..	Midland Consolidated	James Brimble.
22/2/97	98	1	32	..	"	" ..	Red Lion ..	George Brown.
26/4/97	100	0	0	..	"	" ..	Utunui	Joseph McLean.
26/4/97	96	2	7	..	X.	" ..	Princess	George Brown.
26/4/97	100	0	0	..	XI.	Mawheranui	Orleans	Joseph Scott.
26/4/97	99	2	16	..	X.	Waiwhero ..	Prophet	Gardiner Wilson.
21/3/98	99	2	38	..	XIV.	" ..	Lord Harris ..	Thomas H. Garth.
21/3/98	100	0	0	..	IX.	" ..	Mawhera ..	Thomas Watson Wilson.
21/3/98	99	3	26	..	X.	" ..	Mount Cashel ..	Patrick O'Boyle.
21/3/98	100	0	0	..	XIV.	" ..	Klondyke ..	Edward Carton.
21/3/98	100	0	0	..	X.	" ..	Kumara	Gardiner Wilson.
21/3/98	99	3	7	..	XIII.	" ..	El Dorado ..	Thomas Jolliffe.
22/6/96	30	0	0	..	XIV.	" ..	Roaring Meg ..	Gerald Perotti and five others.
24/8/96	20	0	17	..	"	" ..	Aurora Gold-mining Co.	Gerald Perotti.
28/9/96	29	1	7	..	IV.	" ..	Lady Wylde Gold-mining Co.	John O'Brien and four others.
				Greymouth.				
22/11/94	16	2	1	..	V.	Mawheranui	..	Walter E. Church.
22/11/94	30	0	0	..	"	"	..	John McGain and others.
24/1/95	15	0	28	..	"	"	..	Charles Curtis.
24/1/95	15	0	28	..	"	"	..	Harry Feary.
24/1/95	16	0	3	..	"	"	..	Henry Dearing.
24/1/95	16	0	1	..	"	"	..	Richard Green.
24/10/95	8	3	24	..	"	"	..	Thomas Jones.
9/1/96	16	2	33	..	"	"	..	Thomas Bland.
22/10/96	16	0	36	..	"	"	..	John McGain.

ABSTRACT of LICENSES for SPECIAL CLAIMS, MINERAL LEASES, and LICENSED HOLDINGS issued from the Wardens' Offices—*continued*.

Date of License.	Area.			Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
					Greymouth—continued.			
	A.	R.	P.					
1/9/94	32	0	0	..	V.	Mawheranui	Julian Gold-mining Co. (Ltd.)	Walter E. Church.
9/9/96	88	2	27	..	"	"	Paparoa Gold-mining Co. (Ltd.)	The Paparoa Gold-mining Co. (Ltd.).
21/12/96	99	0	0	..	"	"	Ditto	James Creagh.
21/12/96	99	0	0	..	"	"	..	T. W. Tymons.
1/3/97	100	0	0	..	"	"	..	Jeremiah O'Donnell, jun.
1/3/97	99	0	0	..	"	"	..	W. H. Kells.
1/3/97	100	0	0	..	"	..	..	James L. Doogan.
					Ross.			
21/10/95	40	0	0	Bald Hill ..	VII.	Totara ..	United Helvetia ..	Antonio Zala.
25/4/96	100	0	0	Farmer's Creek	"	" ..	Helvetia	"
25/4/96	100	0	0	Cedar Creek ..	"	" ..	Alpha	William D. Verschoyle.
23/12/96	50	0	0	Donnelly's Creek	II.	" ..	Captain Russell ..	Antonio Zala.
23/12/96	100	0	0	Cedar Creek ..	VI.	" ..	Cedar Creek ..	W. D. Verschoyle and party.
2/10/89	10	0	0	Between German and Sailor's Gullies	II.	Totara ..	Mount Greenland ..	Mont D'Or Gold-mining Co.
2/10/89	21	1	32	Ditto ..	"	" ..	Mont D'Or Extd. ..	"
14/2/91	7	0	0	Mt. Greenland	"	" ..	Mont D'Or ..	"
7/10/93	10	0	0	Lake Ianthe ..	XV.	Waitahu ..	Benford and Co. ..	Ernest Denia and party.
3/12/94	6	0	0	Redman's Creek	I.	Totara ..	Chamberlain's ..	Robert G. Chamberlain.
1/3/83	60	0	0	Donoghue's ..	"	" ..	..	Ross United Gold-mining Co.
1/3/84	25	0	0	Head of Sailor's and Blockade Gullies	II.	" ..	..	Mont D'Or Gold-mining Co.
1/5/84	43	0	3	Jones's Flat ..	"	" ..	..	Ross United Gold-mining Co.
23/12/96	100	0	0	" ..	"	" ..	Mont D'Or No. 2..	Mont D'Or Gold-mining Co.
23/12/96	50	0	0	Redman's ..	I.	" ..	Star of the South ..	E. Harris.
2/8/97	60	0	0	Mikonui River	..	" ..	Kohinoor.. ..	Charles Holley and W. Thomson.

MARLBOROUGH.

Mining in the Marlborough District, so far as quartz is concerned, is practically at a standstill. The Ravenscliff Company at Waikakaho, and the Golden Bar Mine, at Wakamarina, not having been worked for some considerable time.

COLLINGWOOD DISTRICT.

West Wanganui.

Golden Ridge Mine (Owners, Taitapu Gold Estates, Limited).—Mining operations were vigorously carried on. The battery of one Blake stone-breaker, twenty stamps, four berdans, and one pan was erected. The machinery is driven by a 6 ft. Pelton wheel, with a head of 450 ft. pressure, the water-race being one mile in length, including a tunnel of 1,000 ft. The amount of capital expended on mill and machinery was £10,000, and on the water-race £4,000. A parcel of quartz crushed yielded 49 oz. of gold; value, £160; but, as a considerable tonnage was treated, the result was not profitable, consequently no great amount of work is now being carried on, and no other return has been made. Sixty men were employed.

Red Hill (Area, 100 acres, situated about six miles from Collingwood; owned by a syndicate).—A tunnel about 680 ft. in length had been driven some time ago, but no work has been done during the year.

Messrs. Washbourne have hæmatite-works on the Parapara Stream; there is a crushing-mill of six stamps and four berdans used in reducing the ore. The yield is 80 tons a year. It is put up in canvas bags containing 28 lb. or 56 lb., and is worth £12 per ton in Nelson, where it finds a ready sale. Preparations are being made to produce a knife-polishing powder.

Taitapu.

The Australasian Gold Trust Company and the New Zealand Pioneers Company, both of London, hold prospecting rights from the Taitapu Gold Estates (Limited), which enable them to prospect for gold and other metals and peg off and lease certain-sized areas of lands within that company's freehold of 88,350 acres. These companies commenced operations in May, 1896, and have continuously since then been engaged in prospecting and proving reefs. Two areas of ground, each of 50 acres, were pegged off immediately south of the Golden Ridge (the proprietary claim), in each of which the reef was found to outcrop. On the area next to the Golden Ridge, named Block II., a shaft was put down on the reef for a distance of 150 ft.; then a drive was put in 200 ft. south to cut the lode on level of bottom of winze. This drive cut the reef at 180 ft., and was then connected with the shaft by driving along the reef. The reef was also followed 200 ft. south of drive, making, in all, 400 ft. driven along the reef. Operations then ceased for a time, and work was concentrated on the next area, Block III. The country here is precipitous, varying from 45° to 60° in an easterly direction. A drive was put in at 70 ft. below outcrop, cutting the reef at 115 ft., the underlie being west, at an angle of 49°. Drives were then put in north 130 ft. and south 200 ft., disclosing a large quantity of quartz, a parcel of which of

20 tons was recently packed over to the Taitapu Company's battery and crushed, with a result of 65 oz. smelted gold, or an average of 3¼ oz. per ton of 2,240 lb. A winze was then started on the reef, but water soon stopped operations there. Another level to drain the reef was put in 102 ft. lower than No. 1, which cut the reef at 300 ft. Drives on the reef are now being carried on from this level. North 130 ft. has been driven, and south 50 ft. A rise has also been put up and connected with No. 1 level, carrying the reef the whole way. The reef varies in No. 1 level from 1 ft. to 6 ft. in width, and is about the same size in No. 2 level. Blocks II. and III. each comprise 50 acres, and it is the intention of the owners to fully prospect them before erecting machinery or connecting the mine with machinery already erected. During the year from twelve to sixteen men have been constantly employed, and, in addition to the work here described, a large amount of trenching and other surface workings has been done.

The Golden Gully property belongs to the Collingwood Goldfields Company, but they are developing their Quartz Ranges property.

Work has also been carried on in the Louisa and Southern Waihi properties.

Science Defeated Claim, Waitapu.—(I. S. M. Jacobsen, owner; area, 16 acres.)—This claim has been prospected during the year by the owner, who has erected a small plant for the treatment of the ore, which is considered by him to be refractory. A battery of four stamps and a furnace has been used in the treatment of the stone, but the results have not come up to the expectations of those interested. During the year reports were in circulation that a large deposit of platinum had been discovered on this ground, and that the results of an assay made in Australia for a syndicate who were interested showed the deposit to be phenomenally rich. Assays made at the Colonial Laboratory, however, did not disclose any trace of platina, and declared the stone to be a hæmatite of small commercial value. The owner has devoted much time and a considerable amount of money in endeavouring to demonstrate the value of his property, but so far without result.

Motueka.

Steps are being taken to mine the asbestos which was found on the land taken up under mineral licenses. A party of men were employed in opening up a pack-track from the ground to the Mount Arthur Track, in order to admit of a parcel of 20 tons being conveyed to a seaport.

Prospecting for copper has been carried on in the Wangamoa district, about four miles from the accommodation-house on the Havelock–Nelson Road, and also in other parts of the Nelson District.

WESTPORT.

Mokihinui.

Fairly good patches, or small chutes, of auriferous quartz have been found from time to time in the Mokihinui district, at what was known as the "Mokihinui Reefs," which is on the north side of the river, and in the Red Queen Claim, on the south side of river. All mining operations are suspended at this place now; but at the commencement of the late mining boom a new reef was discovered about a mile lower down the river than the Red Queen and Mokihinui reefs. Gold was seen visibly in the outcrops, and two special claims were taken up, termed the Lady Agnes and Carson's Reward. An option of this property was taken up by the Anglo-Continental Syndicate, who constructed an adit level on the line of reef from the side of the range facing the Mokihinui. This adit was constructed so as to be about 80 ft. below the place where gold was seen on the surface. The lode in the adit level is from 4 ft. to 6 ft. in width, having well-defined walls, and carrying a little gold, but not nearly sufficient to pay for the expense of working. After the adit was constructed for about 250 ft., and a good way past the place where there was apparently a chute of payable ore on the surface, without any auriferous quartz of a payable character being found, the option was abandoned.

Waimangaroa.—The property known as the Beaconsfield has been recently taken up by an English company or syndicate, and operations have been commenced to bail out the water from the shaft, and also to trace the reef into the range on the south side of the river. Several years ago some good stone was found here, but nothing has been done for some time to prove whether it is a payable property or not. Now that the English capital is forthcoming it is likely to be well prospected and proved.

Republic and Britannia.—These are separate claims, about a mile and a half further north than the Beaconsfield, and apparently on a belt of country further to the eastward. Very rich auriferous quartz has been found in both these claims from time to time, but the reef has never been found in a well-defined and solid state. Gold to the value of about £12,000 has been obtained from the Republic Claim, which is at an elevation of 1,700 ft. above sea-level. A crushing battery of ten heads of stamps, driven by a Pelton water-wheel, and also an aërial tramway a mile and a half in length, have been erected by the Republic Company. About two years ago the Republic property was taken over by Mr. Jesse King, of Auckland, on behalf of an Auckland syndicate, who has expended a good deal of money on the property without meeting with success. The character of the reefs met with here is merely lenticular veins and leaders, lying at a very low angle from the horizon. These lenticular bodies of quartz occur in bunches all the way down the side of the range. In some of these bunches the lenticles of quartz will be 3 ft. in width, and taper out to a mere thread, which can be seen in some of the workings in the Britannia Claim, going up vertically for a certain height at the end of a bunch, and will form another lenticular body at a higher level.

In driving levels in these lenticular veins they go into the hill for a certain distance as flat as a coal-seam, and then take a jump, almost vertically, either up or down as the case may be, according to the height the adit levels are constructed, into the range. The quartz in these lenticular masses is broken up like so much road-metal. The only quartz that is yet found in this locality occurs in a succession of ledges from the top of the range downwards. Highly auriferous quartz is found in places, but there is not a sufficient quantity available to pay a company to work it.

Lady Agnes Claim.—Prospecting work was being done on the surface, and a tunnel driven 250 ft. on the line of reef.

Red Queen and *Swanson Claims.*—Very little work has been done.

Lyell District.

United Italy Mine.—Operations to a limited extent were carried on, but there is no record of any gold returns from this mine, although gold to the value of £11,018 was obtained from the ground since it was first occupied by the present owners in 1882 up to the 31st March, 1897.

Tyrconnel Mine.—This ground has been worked on tribute. Rodgers and party had a return of 34 oz. 14 dwt. of gold from 24 tons of quartz, and Smith and party 63 oz. from 37 tons.

Cræsus Mine (Area, 16 acres 2 roods).—This mine is owned by a party of three—Kelly, Edge, and Smith. The tunnel where the work is carried on is 800 ft. in length. A small reef from 1 ft. to 2 ft. in width had been worked from this level to the surface some years ago. The present party have only started to prospect this mine since January last, and there are four men now at work driving this tunnel to the northward on a well-defined track of reef with occasional boulders of quartz carrying gold. In connection with the mine there is a ten-head battery (wet process) and two berdans, driven by a turbine wheel which cost about £1,000. The length of water-race is 13 chains, it carries ten heads of water, and cost £300. There have been no returns from this mine for the last twelve months. The battery crushed 37 tons of quartz for the Tyrconnel party, which yielded 63 oz. of retorted gold, and that was the only parcel crushed during the year.

Alpine Extended Mine (Area, 154 acres 3 roods 26 perches; owners, the Alpine Extended Gold-mining Company, Limited).—This company was formed by the amalgamation of the United Alpine Quartz-mining Company (Limited) with the Lyell Creek Extended Quartz-mining Company (Limited), which companies had for a number of years been working the same reef on adjoining claims. Immediately prior to the amalgamation neither of the companies were prosecuting with any degree of vigour the works in connection with their mine. Since the amalgamation was agreed upon, in the early part of August, a considerable amount of work has been undertaken by the new company. The Lyell Creek Company's main level, now known as No. 10, became the principal seat of operations. This level took fourteen years to drive, and required to be put in a distance of over 3,500 ft. before the lode or reef was struck. The first work undertaken was to connect this level by a tramway with the United Alpine Company's battery. The No. 10 level was then driven south on the reef, and stone has been carried along for a distance of 366 ft., while only two small breaks have been met with. The reef has varied from 3 ft. to 23 ft. in width, and the quality all through has been payable. Stoping has been carried on above this level, and the weekly output is about 220 tons. A prospecting drive has also been put in to the north on No. 10 level for a distance of 189 ft. Several small bodies of gold-bearing quartz were met, but no solid reef was struck. The prospects in this portion of the mine are encouraging, and the company intend to resume the extension of the prospecting drive as soon as circumstances will permit. Below No. 10 level the main shaft, 10 ft. by 4 ft. 6 in., is sunk for a depth of 100 ft., and the company have an apparently payable block of stone proved for a distance of 112 ft. by an average width of 6 ft. In the upper levels a small amount of prospecting has been carried on, and the No. 4 has been driven north for a distance of 100 ft. without striking any stone of importance. Since the amalgamation in August the company have crushed 3,382 tons of stone, for a return of 1,521 oz. 4 dwt. of retorted gold. Of this, 186 tons, yielding 148 oz. and 12 gr., was crushed for tributers. The total depth from No. 1 to adit is 1,168 ft., and from adit to No. 11 level in the shaft 100 ft. The mine machinery consists of one air-winch, two 10-horse-power air-compressors, one Tangye pump, and the mill machinery (twenty stamps, 8 cwt. each, and four berdans). Two Pelton wheels drive the whole. These are driven by water derived from Lyell Creek, the race being 35 chains in length, carrying fifteen sluice-heads of water; from Irishman's Creek, 15 chains, five-eighths of a head; from Brown's Creek, 27 chains, one head—the whole giving 60-horse power. The total value of gold won since August last was—for owners, £5,379 1s. 2d.; for tributers, £592 19s. 1d.; value per ounce, £3 18s. Total number of men employed, fifty.

Prospecting operations were carried on in the Golden Crown Claim and other claims in the district, but so far without success.

REEFTON DISTRICT.

Crushington.

Keep-it-Dark Mine (Area, 56 acres 1 rood 13 perches; owners, Keep-it-Dark Gold-mining Company).—This mine still continues to yield profitable returns, and the exploration work carried on during the year has resulted in the discovery of a fresh block of quartz at No. 1 level, which promises to be remunerative, as a crushing of 100 tons yielded 1,340 oz. of amalgam. Development in the lower workings at No. 7 level has not been so successful. The reef was driven on for 100 ft., and, although of large width, it only yields 4 dwt. of gold per ton. The continuation of stoping on the blocks of reef over No. 5 level produced the bulk of the quartz crushed during the year. The total output from this mine since the first discovery of gold is 125,512 tons of quartz, which yielded 66,719 oz. of gold, valued at £259,793 5s. 8d., out of which dividends to the amount of £113,416 13s. 4d. have been paid. The returns for the past year were 3,281 tons crushed, which yielded 1,024 oz. 2 dwt. 16 gr.; value, £4,096 4s. 3d. Thirty-three men were employed.

Hercules Mine.—Work was carried on in a cross-cut at the 470 ft. level, and in extending the north level on the track of the reef. Four men were employed.

Keep-it-Dark No. 2 Mine.—The cross-cut at No. 3 level was extended 290 ft. Four men employed.

Progress Mines of New Zealand (Limited).—The work of opening up the different sections of the ground, the construction of water-race, and the erection of the new battery has been energeti-

cally carried on during the year, and the treatment of quartz will shortly be commenced. The equipment of the mine is practically complete, and comprises the following works:—

Hoisting-works: Hoisting-engine, with two cylinders, 48 in. by 16 in., Corliss valves, two reels each, carrying 1,700 ft. of 3½ in. by ½ in. flat steel rope, post brakes and foot brakes; the engine is set on a concrete foundation 10 ft. deep; two horizontal tubular boilers, 16 ft. by 66 in., arranged to run together or separately; common stack, 90 ft. high by 3 ft. diameter; Rand air-compressor, class B type, of a six 3½ drill capacity. The poppet-heads are 50 ft. high, and sheave-wheels 7 ft. in diameter. The entire plant is housed under two buildings, 90 ft. by 28 ft. by 63 ft. high, and boiler-house 56 ft. by 34 ft. by 32 ft. high. Ore-bin, 45 ft. by 15 ft. by 16 ft., distant 250 ft. from shaft B. The ore passes from this bin into the aërial tramway buckets. Blacksmith's shop and change room are now under construction. Total cost of improvements to date, £7,432. The aërial tramway connecting the mine ore-bin with mill is of the Otto type, the fixed bearing-ropes being 30 mm. on the loaded and 24 mm. diameter on the light side. The buckets, sixty-six in number, each hold 550 lb. of ore. Total length between terminals, 6,796 ft. The capacity has been tested up to 30 tons per hour. The two longest spans are 1,900 ft. and 1,243 ft., and the highest standard, 100 ft. There is a tension station midway on the line, and nineteen intermediate supports in all. The tramway runs by gravity. There is a fall from the loading to the unloading station of 883 ft., and the line passes over a summit 200 ft. higher than the loading terminal.

The mill has forty stamps, with sixteen Frue vanners, two 9 in. by 15 in. Blake rock-crushers, and eight suspended ore-feeders of the Challenge type. The plates are 10 ft. in length. Power is furnished by Pelton water-wheels. The battery is driven by a 6 ft. diameter wheel, water being delivered under an effective head of 168 ft. The vanners are driven by a 3 ft. wheel, with a 166 ft. effective head; and the crushers by a 3 ft. wheel, under 140 ft. pressure. Nine Government heads of water supply the power and feed for the plant. The mill building is 80 ft. by 115 ft., and 83 ft. high. The chlorination plant is in course of construction. The building is 142 ft. in length and 43 ft. wide. The reverberatory furnace is 80 ft. by 14 ft. Three chlorinating-tanks, 9 ft. diameter and 3 ft. deep, and eight precipitating-tanks, 6 ft. diameter and 3 ft. deep.

Work in the mine: No. 4 level—Driving, 556 ft.; cross-cutting, 89 ft.; rise to battery level, 35 ft. In the east ground a large block of low-grade ore is being opened, which appears to be part of the old Union ore-chute. No. 5 level—Driving, 623 ft.; cross-cutting, 87 ft.; rise to No. 4 level, 177 ft. Both east and west large bodies of ore have been developed. Intermediate level—Driving, 110 ft.; cross-cutting, 47 ft.; rise to No. 5 level, 183 ft. No. 6 level—Driving, 258 ft.; cross-cutting, 560 ft.; rise to intermediate, 106 ft.; rise to No. 5, 244 ft.; south-east winze, 21 ft.; winze to No. 7, 119 ft. No. 7 level—Driving, 738 ft.; cross-cutting, 582 ft.; rise to bottom level of old Progress workings, 17 ft. Nearly the entire distance driven on this level has been in ore, the cross-cutting being from shaft B to the ore-chutes of the old Globe and Progress Mines. Totals—Driving, 2,285 ft.; cross-cutting, 1,365 ft.; rises, 762 ft.; winzes, 140 ft. Shaft B has been sunk an additional 320 ft., making the total depth 945 ft. This is a three-compartment shaft, and the actual time occupied in sinking was nine months. Total cost, including half the mine-manager's salary, £4,848 6s. 2d., or £5 2s. 7d. per foot. Two stations, 25 ft. by 12 ft. by 10 ft., have been cut at the No. 6 and No. 7 levels. The water-race furnishes power and feed-water to the forty-stamp mill. The length of the race is 10 miles 34 chains. Iron pipes are used—2,850·5 ft. of 20 in., 2,844 ft. of 18 in., 350 ft. of 12 in., and 60 ft. of 6 in., and has a working-capacity of fifteen heads; cost, £15,285.

Wealth of Nations Mine.—The works done in the mine during the last year are as follows: The incline-shaft has been sunk 280 ft., making a total of 624 ft. It has been furnished throughout with ladders, stages, rails, guides, and a skip with safety gear made ready for work. A large chamber has been cut out of the rock, and timbered up for winding machinery and chamber at brace of shaft; also, two uprises for rope-pulleys. In connection with the latter, ore- and waste-bins have been cut in the rock and secured with timber. New rails have been laid in the level for a distance of 1,100 ft. Considerable repairs have also been done in renewing the level timber. On the 200 ft. level a distance of 150 ft. has been retimbered. On the 350 ft. level 320 ft. has been driven north on the track of the lode. The drive is well timbered, and air-pipes fixed for ventilation. On the 500 ft. level 64 ft. of driving has been done northwards on the track of the lode, a chamber formed and timbered at incline shaft, and 40 ft. of the drive timbered up. The leading stope on the east lode has been timbered, and passes formed ready for work. On the south block, on the same level, an uprise of 30 ft. has been made on the lode to form a connection with the old stope, and leave it open to commence work. In the old stopes, between the 350 ft. and 500 ft. levels, considerable work had to be done to secure the lode and leave it in working-order. 930 tons of ore had to be taken out and the space timbered afresh. On the Energetic side of the hill, the old level, having collapsed, had to be redriven and timbered a distance of 300 ft., and in the 200 ft. level a drain had to be cut and formed under the timber to take the main-shaft water away. About 20 chains of the water-race had to be enlarged, partly rock-cutting, timbering, and fluming. Wages, £180; timber, £10; caretaker's wages, one year, £124: total, approximate, £314.

Golden Fleece Group.—This group includes the Low-level Tunnel and adjoining leases. The tunnel has been driven 1,485 ft., cross-cut 610 ft., and a rise of 88 ft. to connect with winze from Golden Fleece. This winze has been sunk a distance of 380 ft. for the year, and is now connected with the tunnel workings. The work for the last twelve months has been confined to making this connection.

Boatman's Group.—The cross-cut from the Eureka level was driven a distance of 312 ft., but, having failed to develop anything of value, has been discontinued. No. 5 level in the Welcome has been driven north a distance of 453 ft. There is about 220 ft. of stone, small and broken. A rise was put up 167 ft. on the southern end of the block and cross-cut 21 ft. A cross-cut was put in about 50 ft. down the main rise, 13 ft. to the west, and a track driven on 38 ft.

Caledonian Group, Larry's Creek.—Work has been confined to opening up the old workings.

Merrijigs District.

Inkerman Combined Mine (Area, 456 acres; owners, Inkerman Combined Gold-mines, Limited).—The amount of development work carried on during the year has been very extensive, and suitable mine equipment is provided. A 10-horse-power engine is used for winding, a 30-horse-power engine to work the air-compressor, and a Tangye pump. A No. 2B Little Giant rock-drill is also used. The mill machinery consists of a 40-horse-power steam-engine for driving the 30-stamp mill, but this has not been used, as no quartz was crushed during the year. The development work carried out for the year ending 31st March, 1898, was as follows: At the New Inkerman workings, on the western slope of the main ridge between Rainy Creek and Devil's Creek, sinking the main shaft was proceeded with in February, 1897, and 87 ft. sunk by the 16th April, making the total depth of the shaft at that date 423 ft. At this depth a chamber, measuring 16 ft. by 11 ft. by 8 ft. was constructed, and No. 4 level driven eastward a distance of 605 ft. From this No. 4 level a drive north on a reef track was produced for 126 ft., with a cross-cut to west of 87 ft. To facilitate driving in the No. 4 level (which level will ultimately connect with the low-level tunnel coming in from the other side of the range) a dam was constructed in the No. 3 level, and all water accumulating from the old stopes and from surface percolation was stored behind this dam, a Tangye's pump being employed to lift the dammed water some 319 ft. to the surface. In the surface tunnel north and works (to the eastward of the main shaft), for the year ending the 31st March, 1898, 504½ ft. of new country has been opened up, represented by 383½ ft. driving, 104 ft. sinking, and 17 ft. uprising. Of the above-named distances a winze 104 ft., stopes 53½ ft., and a cross-cut 34 ft. have been opening on ore. At the surface winze (north of Revival Gully) 46½ ft. has been sunk, 23 ft. driven, and 16½ ft. stoped. Of the distance opened, 63 ft. has been on ore. The work carried out at the old Inkerman Mine for the year ending the 31st March, 1898, consists of driving in new country for 818½ ft., and sinking and uprising 212½ ft. Of the above distances, 314 ft. has been opening on ore. To ventilate this portion of the mine it was found necessary to sink an air-shaft 102 ft., and connect this with an old uprise. This air-shaft will be serviceable as a filling-in shaft when the connection between the No. 3 Inkerman ore-bodies and the Low-level Tunnel is completed. The No. 2 Inkerman Block has been driven on for 75 ft., and a winze sunk 6 ft., the whole 81 ft. being on ore. At the Supreme Mine the work carried out for the year ending the 31st March, 1898, has been the opening of 970 ft. of new country, representing 147½ ft. sinking and 822 ft. driving. Of this distance, 514½ ft. has been opening up on ore. The low-level tunnel from Rainy Creek was commenced in February, 1897, and on the 25th March, 1898, had been driven a distance of 2,089 ft. The tunnel was commenced with hand-drills, which were superseded on the 1st May by rock-drills, driven with compressed air. By the first method 221 ft. was driven, representing twelve weeks' work; and by the latter method 1,868 ft., representing forty-six weeks' work; the respective weekly averages being 18·41 ft. and 40·6 ft. The greatest distance driven in the tunnel for any one week has been 64 ft., and the greatest distance driven in any four consecutive weeks has been 199½ ft. Air-boxes (for ventilating purposes) have been laid throughout the tunnel, and are worked by an exhaust, with compressed air obtained from the receiver at the mouth of the tunnel. The power is obtained from a Cornish boiler situated at the battery, which drives a Class C Rand air-compressor, from which the air is conveyed by 1,000 ft. of 3 in. pipes to the receiver at the mouth of the tunnel, and from there to the face. In the construction of the tunnel the principal material used has been: Mining timber—sawn timber, 12,000 ft., 792 props, 412 sills, 1,692 sleepers, 396 caps, 2,342 laths, 822 stays, 5,200 ft. of rails, also 3,100 ft. of 3 in. air-pipes; explosives, &c.—6,050 lb. of gelignite, 6,100 detonators, 26,100 ft. fuse; also 9,960 candles. The work carried out at the Rainy Creek coal-pit has exposed two years' supply of coal, which will be won as required. The seam is from 4 ft. to 4½ ft. in thickness, and is of excellent quality. Since the opening of this working, in May, 1897, the tonnage of coal won and used at the boiler driving the air-compressor has been 365 tons. For the year ending the 25th March, 1898, the country opened up represents 6,157 ft., and the average number of men employed over the same period was sixty-five. The amount of wages paid to the workmen on the mines for the fifteen months ending the 25th March, 1898, was £11,324. (This is exclusive of amounts paid to a number of men employed getting timber by contract, and for driving by contract, and does not include official salaries.)

Sir Francis Drake Mine.—The reef in the surface block has been exhausted, and the owners are again making a commencement to further sink the main shaft.

Golden Lead.—The owners of this claim continue to carry on work to a limited extent. The battery was used to crush 480 tons of quartz, which yielded 196 oz. 7 dwt. of gold.

Revival Mine, Devil's Creek (Area, 86 acres).—This property was bought by Mr. G. Perotti in June, 1897, and since that time four men have been at work prospecting it. Seven months ago a leader 1 ft. in width, giving fair prospects, was discovered, and followed 30 ft. at surface. The men are now driving a tunnel in order to get the stone to the battery. There is a battery of ten heads, driven by water-power, which is now ready to start crushing. Mr. Perotti says, "This mine was formerly known as the Golden Point. A company before me spent £10,000 developing it between 1879 and 1885." In 1885 the whole property was bought by Mr. G. Perotti, who worked it until 1894, at a cost of £9,000, and met with no success. Some very rich stone was found in this claim, and it is possible that the property may yet prove good.

Painkiller District.

Dillon Extended Mine (Area, 60 acres).—Work in this mine consisted chiefly in driving and stoping on the reef, which is from 1 ft. 6 in. to 5 ft. in width. The aërial tramway was also put in working-order, and a parcel of 60 tons of quartz sent to the mill. Five men were employed.

Big River Mine (Area, 38 acres; owners, Big River Gold-mining Company, Limited).—The development work commenced last year in driving at the low level was continued to intersect the line of reef at a distance of 270 ft. from the shaft, which at this level reaches a depth of 930 ft. from the surface. A rise was put up from the low level to meet a winze sunk from the level above.

Several hundred feet of driving was done at the low level, without favourable results. Prospecting was also carried on at the higher levels, and occasional blocks of payable stone were obtained. 480 tons of quartz was crushed, for a return of 390 oz. 11 dwt. of gold; value, £1,582 6s. 1d. A large parcel of accumulated tailings treated by the cyanide process yielded 860 oz. 17 dwt.; value, from £2 10s. to £2 15s. per ounce. Twenty-five men were employed.

Victoria Range.

An important discovery of auriferous quartz was referred to in my last report, but at that time no prospecting of any consequence had been done to prove whether the large deposit of auriferous stone lying on the surface would be found *in situ*. The prospector, Mr. William Kirwan, and those connected with him, had not sufficient means to carry on large development works, and they entered into an arrangement to give the Anglo-Continental Gold Syndicate (Limited), of London, an option of the property, on certain terms, on condition that it would expend a sum up to £200 per month in developing the property, when the range was not covered with snow. This syndicate commenced operations on the property, which consists of one special claim—namely, the Lord Brassey—and three licensed holdings—the Lady Brassey, Earl Brassey, and Kirwan's Reward—in the end of last year, and have already expended a large amount in carrying on development works without meeting with success in locating the lode from which the rich deposit of auriferous stone on the surface came. Several mining men of good repute have visited and inspected this property, amongst whom may be mentioned Mr. A. McKay, Government Geologist; Mr. Park, formerly Assistant Government Geologist, and also late Director of the School of Mines, Thames; and Mr. H. A. Gordon, the late Inspecting Engineer of the Mines Department, and they all agree that the deposit of auriferous stone on the surface could not come from any other place than the Lord Brassey Claim, where the deposit is lying. The configuration of the country, and the line of the different formations bounding the belt of country-rock in the Lord Brassey Claim, shows that it could not have been brought there from any great distance, and there is little doubt but that the lode *in situ* will yet be found. This range, although it goes under the name of Victoria, is not entitled to be designated by that name. It is several miles distant from the Victoria Range proper, and it is now better known as Kirwan's Hill, the highest point of which is on the Lady Brassey Licensed Holding, being 4,200 ft. above sea-level, and the place where the rich auriferous stone is lying on the surface is about 3,770 ft. above sea-level. There are evidences of a slip having taken place at some remote period from the Lady Brassey Licensed Holding in the direction where the stone is lying, and the sinking of shafts near that particular place shows broken ground to a depth of 30 ft. Two adit levels have been driven into the eastern side of the range for a distance of 250 ft., one of which is 205 ft. under the top of the range and the other 130 ft. In constructing the southernmost adit 30 ft. of loose material, mixed with highly auriferous blocks of quartz, was passed through before the country-rock was met with, which was for a further distance found in a loose broken state. Several leaders of quartz were met with in this adit level, one of which has a width of 18 in., but the quartz has a different structure to that found on the surface, and does not contain gold—at least, not in payable quantities for working. No quartz has yet been found in the northernmost adit level, but none of these adits are sufficiently far ahead at present to prove whether the lode the prospectors are in search of exists in the range or not. Recently the construction of these adit levels has been suspended in order that all the workmen may be employed in prospecting on and near the surface before the bad weather sets in. These surface operations have been so far successful in finding a large deposit of the auriferous quartz to the eastward of where the adit levels commenced, which indicates that the lode from which the rich stone came has been running in a northerly and southerly direction, and underlying eastward at a comparatively low angle to the horizon. This is the direction of the whole of the lodes *in situ* on this range, and their underlie is also in the same direction. Prospecting operations are now being energetically carried on near the place where the deposit of stone below the surface was found, and in all likelihood an adit level will shortly be commenced lower down the east side of the range, to prove whether the lode will be found as indicated. The aim at the present time is to get all the information that can be got from surface indications so long as the good weather continues, as adit levels can be constructed during the time the snow is on the ground.

On the Earl Brassey Licensed Holding there are several lodes, one of which can be traced for a long distance, and a considerable amount of prospecting work has been done on the lode, and also on parallel lodes in the Mark Twain Licensed Holding, but so far no quartz of a payable character for working has been found in any of the claims in this locality. A little gold could be seen in the outcrop in a lode in the Earl Brassey Claim, and an adit level is being constructed on the lode from the north side of the range, which is very steep, and this will soon prove whether payable ore exists in this claim or not. It may be mentioned that the present value of the Kirwan's Syndicate Company's property is considerably exaggerated. It may be termed a first-class prospecting venture, and beyond this nothing is known as to whether the lode being searched for *in situ* will be found or not.

The following is the report of Mr. A. McKay, the Government Geologist, on the auriferous rocks of the western slopes of the Victoria Mountains:—

"As directed, I visited and partly explored the western slopes of the Victoria Mountains, and made an examination of the area of loose auriferous quartz on Kirwan's Hill, and of several lodes in the same vicinity, on which I have the honour to report as follows:—

"The discovery on the northern slope of Kirwan's Hill of a considerable area over which are strewed a covering of loose blocks of auriferous quartz has led during the past season to a great amount of prospecting there, in the vicinity and surrounding district. The result has been the discovery of numerous reefs of quartz within the area lying between the upper part of Larry's Creek and the upper part of the Waitahu or north branch of the Inangahua River. Of the reefs found, none of them as yet afford prospects of gold equal to what are to be obtained from the loose quartz on the northern slopes of Kirwan's Hill. This loose quartz occurs in blocks of all

sizes up to masses 2 to 3 tons in weight, and thickly covers the surface over an area of 10 or 12 chains in length, with an average breadth of 4 to 5 chains. The quartz is chiefly, if not wholly, confined to the surface, although masses of the wrecked hill-slope do here and there show portions of reefs held within walls of sandstone and slate rocks identical with the general formation of Kirwan's Hill and the country eastward to Capleston. Towards the lower end of the quartz-covered area, and where the stone was richest in gold, a tunnel has been driven west into the hill, in the hope that by this means solid ground might be entered, and the lode from which the richer quartz has been derived thus discovered. At a distance of 150 ft. from where started the tunnel driven west into the hill failed to reach solid rock, and no reef was discovered; yet, more remarkable, scarcely a fragment of quartz was found more than 3 ft. below the surface in the tunnel workings. At the present time, at the opposite northern end of the field of quartz, a shaft is being sunk to prove the depth to the solid rock, and this shows the same remarkable absence of quartz from all but the very surface of the *débris*-covered mountain-slope. This shaft, when visited, had reached a depth of 35 ft., and had not passed through the broken angular material met with in the tunnel lower down the spur. On the north-eastern part of Kirwan's Hill, and in the ridge thence going east and north-east to connect with Trig Hill there are numerous reefs that strike south-south-east and dip east-north-east at high angles, and thus should pass but a little to the eastward of the field of loose quartz on the northern slope of Kirwan's Hill. It must, however, be noted that on the north and north-north-west higher part of the hill no notable discovery of quartz has been made (none were reported to me), and westward, along the road leading to the upper part of Boatman's Creek and Capleston, in the side-cuttings of the road rarely is a piece of quartz to be seen. All the lodes of quartz found are poor in gold compared with the richer of the loose blocks of the quartz-covered surface on Kirwan's Hill, and some would seek to refer the latter to a distant source, and consider that the lodes and the field of loose quartz on the surface are only in accidental juxtaposition. After due consideration of this matter, I have come to the conclusion that the loose quartz is derived from lodes in the immediate vicinity; and the evidence in support of this conclusion fully bears out the decision arrived at. Wherever matrix adheres to the quartz, this, as forming part of the foot- or hanging-wall of the original lode, is of the same character as the foot- and hanging-walls of the lodes that have been discovered. The quartz also closely agrees with that of the lodes found, and the correspondence is complete in all except the amount of gold which is contained in the loose and solid stone.

"All the rocks of Kirwan's Hill and the adjacent ranges to the north and north-east are slates and sandstones belonging to the Maitai series of the New Zealand Geological Survey classification. Outside there are the Victoria Mountains to the east. The rocks are granites and crystalline schists, and, from the absence of a trace of these on Kirwan's Hill, it is not possible that the loose quartz of the northern slope of Kirwan's Hill could have come from these mountains, nor from an eastward direction; nor could the material of the quartz-field have come from the west without at the same time being accompanied by granite from the lower beds of the coal-measures and dark hornblendic diorite from a heavy band of that rock that outcrops on the slope from the higher part of Kirwan's Hill to the source of Boatman's Creek. The rich quartz that is found on the surface of the Lord Brassey Claim has, therefore, in all probability, been derived from a lode not now seen at the surface, and which probably will be found running along the western part of the claim mentioned. More to the westward for a considerable distance there is little indication of the presence of quartz reefs. The whole belongs to the eastern system of quartz lodes found in connection with the Maitai slates that stretch along the east side of the Inangahua and Little Grey Valleys, from the source of the Blackwater in the south to the gorge of Larry's Creek in the north. The slate between the Waitahu and Larry's Creek extends considerably east of the boundary hitherto assigned it, and towards the upper part of Larry's Creek there is a large area over which prospecting might be carried on with a fair show of success."

The following report was made to the Under-Secretary, Mines Department, by the Government Geologist (Mr. A. McKay) on the auriferous character of Boatman's Creek, below Capleston, Inangahua:—

"In accordance with your instructions, dated the 17th December last, in which I was directed to report on the geological features of the valley of Boatman's Creek, between Cronadon and Capleston, I have made the examinations required, and have the honour to submit the following report relating to the district above referred to:—

"Boatman's Creek has been worked for gold from Capleston upwards to the junction of the two main branches of the principal stream, and Little Boatman's Creek has been worked to its source in Specimen Hill. The amount of alluvial gold thus obtained was considerable. The gorge of the creek has been cut many hundred feet into rocks traversed by auriferous quartz lodes, from which much gold has been liberated and carried to various distances down stream. At Capleston the slates and sandstones carrying quartz lodes are overlain by the coal-bearing series, at the base of which are grit and conglomerate beds that are to some extent gold-bearing. At the lower end of the township the coal series is followed by heavy deposits of conglomerate and coarse gravel, locally known as 'Old-man bottom.' These gravels form hills on both sides of the valley to within a short distance of Cronadon, and over a width of from a quarter to half a mile for a depth of 300 ft. to 400 ft. they have been removed in the formation of the valley of the creek. Gold occurs in the lower beds of the 'Old-man bottom,' and again at a horizon some 60 ft. higher in the formation; and farther down the valley, on Boardman's property, a third horizon of gold-bearing wash is found. The recent alluvial deposits along the valley below Capleston should therefore contain gold derived—first, from reefs in the slates and sandstones of the Maitai series; second, from the base of the coal-bearing formation; and third, from two or three horizons in the 'Old-man bottom'; and it is only on account of the wet character of the ground that gold workings have not been essayed in that part of the valley west of where the coal-rocks in the low grounds disappear under the gravels of the 'Old-man bottom.' The question of the auriferous character of the gravels constituting the 'Old-man bottom' has been

dealt with in the report containing the description of the blocks reserved for mining purposes (Mines Reports, 1896, C.–9), and Block LIII., within which is situated the part of Boatman's Creek forming the subject of this report, is described at page 4 of the report in question (*q.v.*).

"That portion of the valley of Boatman's Creek which is under consideration has a creek-channel of moderate width, in and along which lies a considerable amount of drift timber. The immediate banks are bare, while the flat ground intervening between the water-course and the hill-slopes are covered by standing timber or tree-stumps, and the presence of these will compel the adoption of special methods of working the auriferous deposits that underlie.

"As bearing on the matter of this report might be raised the question of the auriferous character generally of the 'Old-man bottom.' This has been dealt with sufficiently in the introduction to the description of the blocks reserved for mining purposes above cited, and in the reports for the year 1895, for which see Mines Reports, 1895, C.–13, 'On the Geology of the South-west Part of Nelson and the Northern Part of the Westland District.'"

Grey District.

Blackball District.

Minerva Mine, Blackball, Grey Valley (Area, 96 acres).—During the past twelve months the owners took out a crushing of 90 tons, for a yield of 14 oz. of gold; value, £48. This not proving payable, the company, disheartened by losses and being £600 in debt, applied for and obtained six months' protection. When this ended, on preparing for a renewal of work, it was found that the water-wheel had collapsed and the pump was damaged. The company is now preparing for the erection of a Pelton wheel and a new pump. Meanwhile one man is prospecting a gold-bearing leader at the surface.

Garden Gully Mine.—This mine has been lately disposed of to the Garden Gully Gold-mining Company (No Liability). During the twelve months the company has not succeeded in developing any lode showing payable prospects. In a tunnel driven two years ago a drive was extended 100 ft. along a formation bearing gold, but not payable. Surface prospecting was carried on, disclosing the fact that everywhere, by washing surface, colours of reef gold are obtained. The company has had a winze sunk 50 ft. on a lode about 30 in. in width; the stone yields colours by crushing, but nothing payable. The reef was followed all the way down, and at the bottom of the winze maintains the same width of 30 in. Water is now interfering with the work of sinking at a reasonable cost. As a whole, the claim presents possibilities of fair development, and reef indications everywhere. The tracks of the quartz lodes in this claim are very long, and, although no payable gold exists just now in the tunnel driven on one lode and in the winze sunk on another lode, there is always a fair chance of getting at a chute of payable stone on a gold-bearing reef at any time.

Paparoa Ranges.

Crœsus Mine.—This property is situated at a high elevation on the range, and consequently operations in the mine are much hindered, especially in the winter months. The reef, where it outcrops at the surface, is opened by a winze sunk to a depth of 40 ft., the quartz presenting a compact body of stone 4 ft. in width. Further sinking had to be abandoned on account of water; therefore a cross-cut was driven to further open up the reef and drain off the water. This cross-cut penetrated the reef at a depth of 100 ft. from the surface, where the reef was found to be 2 ft. 6 in. in width, and in driving a level the quartz reef varies from 2 ft. to 5 ft. in width. About 60 tons of quartz from this level are stacked at the entrance to the tunnel, and, as gold is visible throughout the stone, a payable yield may be expected. Another cross-cut, 68 ft. in length, is being continued in order to intersect another reef about 2 ft. in width at a depth of 160 ft. from the outcrop. Favourable prospects are also obtained from the portions of the reef exposed on the surface. Mining timber is a very expensive item, each set costing £1 5s. A battery is now in course of erection at the left-hand branch of Blackball Creek, and the quartz is to be conveyed from the mine by an aërial tramway 120 chains in length. This is nearly completed.

Poneke Claim.—A cross-cut has been driven 250 ft., but so far no lode has been cut in the drive. This tunnel will be continued to 500 ft.

Homeward Bound Claim.—A small leader carrying gold has been cut in a cross-cut driven 60 ft.

Red Lion Claim.—Prospecting on the surface is being carried on in this, and also in the Alpha, Zealandia, Triple Alliance, and Imperial Claims.

Taffy Claim.—Several reefs and leaders have been discovered, and in one of these, 3 ft. in width, gold can be seen in the stone.

Imperial Claim.—Surface-prospecting only has been done.

Moonlight District.

Prospecting was carried on in the Paparoa and Prophet Claims. In the former nothing of importance has been found, but in the Prophet a formation of slate and quartz 6 ft. in width shows a little gold at the surface, and a tunnel is being driven to cut this at a lower level.

Daring's Wonder Claim.—A reef, 2 ft. in width, was discovered on the surface, and a tunnel will be driven to cut the reef at a lower level. Gold can be seen in the stone on the surface.

Langdon's District.

The Julian Mine and eight other claims are under option to Mr. E. C. Mills, who is now in London.

The *Victory Mine*, owned by Curtis Brothers, continues to yield payable quartz. 255 tons yielded 240 oz. 7 dwt.

Prospecting was carried on in several of the claims taken up in this district, but the expectations of those interested have not been realised.

Ross District.

Zala's Claim.—The only work carried on has been driving a tunnel to cut the reef at a deeper level. The tunnel is subsidised by Government, and is progressing very slowly, the ground being wet.

Gagliardi and Sons are also driving a tunnel in their claim by the aid of a Government subsidy.

Cedar Creek.

Alpha Claim.—Very little work was done during the year. The two men employed were lately at work in laying a tramway and repairing the battery in order to test the reefs.

Battery Returns.

The following statement, compiled from the monthly returns furnished by owners of quartz-crushing machines under section 308 of "The Mining Act, 1891," shows the quantity of stone crushed and the yield of gold from the various mines for year ending the 31st March, 1898:—

Name of Mine.	Ordinary Quartz crushed.	Gold.	Approximate Value.
	Tons cwt. qr.	Oz. dwt. gr.	£ s. d.
Progress Mine	1,285 0 0	509 19 0	
Tyrconnel	61 0 0	97 14 0	
Sir Francis Drake	1,010 0 0	349 7 5	
Sir Francis Drake, tributers	107 0 0	49 11 9	
Keep-it-Dark	3,281 0 0	1,131 7 12	
Wealth of Nations	932 0 0	189 1 8	
Globe	2,360 0 0	963 18 0	
United Alpine	4,093 0 0	1,795 2 5	
Green and party, tributers	66 0 0	39 3 0	
Rodder and party, tributers	20 0 0	20 6 0	23,505 15 0
Big River	170 0 0	263 9 0	
Golden Lead	480 0 0	196 9 22	
A1, tributers	14 0 0	58 17 0	
A1, tributers	22 10 0	58 10 0	
A1, tributers	10 0 0	21 15 0	
Victory	255 0 0	322 7 12	
	14,166 10 0	6,066 18 1	

Tailings (Cyanide Treatment).

—	Quantity.	Yield.	Value.
	Tons cwt. qr.	Oz. dwt. gr.	£ s. d.
Big River Cyanide-works	3,975 0 0	860 17 18	3,525 0 0
Cumberland Cyanide-works	1,600 0 0	483 15 1	

The foregoing returns, showing 7,411 oz. 10 dwt. 20 gr. of gold, made up of 6,066 oz. 18 dwt. 1 gr. from ordinary quartz and 1,344 oz. 12 dwt. 19 gr. by the cyanide process, is short of last year's return by 2,806 oz. This falling-off is chiefly from the mines owned by the Consolidated Goldfields Company, the Big River, Sir Francis Drake, and Keep-it-Dark Mines, whilst the United Alpine and Golden Treasure show an increase. The decrease in the first-named mines is largely due to the nature of the work carried on during the year. Extensive exploration works were in hand, and much of the quartz won from the workings was tested to ascertain the value of the different blocks opened. Next year the tonnage that is to be treated will be very much more, as the new sixty-stamp mill can be kept going. Much cannot be said about increase in other mines, although recent discoveries tend to an increase in the yield from the Keep-it-Dark.

The new battery at the Crœsus Mine will also add to the production when a fair start can be made.

A great deal of exploration work must be done to enable other mines to develop the reefs so as to have a reserve of payable stone to work on.

Otago and Southland District.

Quartz-workings are carried on in isolated parts of this extensive district from Skipper's and Macetown in the north to Preservation Inlet at the extreme south-western portion of the Middle Island. Attention is again being directed to some of the older mines, and fresh operations in mine development have been commenced.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Offices, and registered on or before the 31st March, 1898, in the Books of the Mining Registrar.

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
					Arrowtown.			
10/11/91	80	3	35	Macetown ..	XII.	Skipper's Cr'k	Farrell's ..	William John Farrell.
10/11/91	75	2	20	" ..	"	"	" ..	"
12/5/93	52	3	21	" ..	"	"	Glenrock ..	The Glenrock Consolidated (Ltd.).
13/2/94	22	3	26	" ..	XII., XIII.	Shotover ..	Tipperary ..	The Tipperary Gold-mine (Ltd.).
10/4/94	74	1	20		XII.	Skipper's Cr'k		
					XIII.	Shotover ..	" ..	"
14/5/95	34	3	26	"	XII.	Skipper's Cr'k		
					XIII.	Shotover ..	" ..	"
12/5/93	29	3	12	" ..	XII.	Skipper's Cr'k	Glenrock ..	The Glenrock Consolidated (Ltd.).
12/5/93	16	0	0	" ..	"	"	..	..
12/5/93	10	0	0	" ..	"	"	..	..
					Queenstown.			
18/6/87	93	3	12	Skipper's Cr'k	II., III.	Skipper's Cr'k	The Phœnix ..	The Achilles Goldfields (Ltd.).
30/8/90	24	0	0	"	II.	"	Achilles ..	"
10/11/91	46	1	4	"	XI.	"	Gallant Tipperary	The Gallant Tipperary Gold-mining Co. (Ltd.).
8/2/96	35	0	26	"	X.	"	Walde's ..	Joseph v. d. Walde.
8/2/96	70	3	38	"	X., XI.	"	Silk's	Austiss Dottin Silk.
24/9/96	24	1	0	"	"	"	Mackin's ..	R. H. Mackin and party.
24/9/96	25	1	0	"	XI.	"	Cotter's ..	R. J. Cotter and party.
13/8/88	6	0	0	"	III.	"	Achilles ..	The Achilles Goldfields (Ltd.).
1/1/89	2	0	0	"	"	"	" ..	"
19/6/91	2	1	30	"	"	"	" ..	"
12/11/94	30	0	0	"	VI.	"	Cornubia ..	Frederick Evans.
21/1/96	9	1	27	"	X.	"	Crystal ..	The Crystal Mining Co.
31/8/96	20	0	0	"	"	"	" ..	"
2/3/97	20	0	0	"	VI.	"	Dunker ..	Henry Dunker.
2/3/97	20	0	0	"	VI., VII.	"	Stenhouse ..	James Stenhouse.
					Cromwell.			
1/12/97	30	3	9	Upper Nevis	III., XIII.	Nevis ..	..	Williamson and Lawrence.
1/12/97	54	0	0	..	II.	Bannockburn	..	Holliday and Butler.
24/12/97	50	0	0	..	I.	"	..	John D. Matthews.
14/2/98	23	1	0	..	..	Motatapu ..	..	David Weir and party.
					Black's.			
21/1/97	30	0	0	Ophir ..	XVIII.	Tiger Hill ..	Green's Reef ..	Robert Sheppard.
21/1/97	25	0	0	" ..	"	" ..	..	"
					Alexandra.			
1/10/93	10	0	0	Old Man Range	II.	Cairnhill ..	Belle and Beaux	Robert Symes and another.
3/10/93	9	0	0	"	"	" ..	Exhibition ..	Robert Symes.
1/7/92	15	0	0	"	"	" ..	White's Reef ..	"
27/4/97	10	0	0	"	"	" ..	" ..	"
					Roxburgh.			
7/6/97	100	0	0	Upper Waikaia	III.	Whitecomb ..	Elliott and Party	D. H. Parker.
18/6/97	28	0	0	"	"	" ..	" ..	James Elliott.
18/9/97	77	0	0	Campbell's Creek	"	" ..	" ..	D. H. Parker and others.
					Lawrence.			
13/7/96	58	3	0	..	XI.	Tuapeka East	..	John Lawson.
28/7/96	28	2	0	..	IV.	Waipori ..	..	Robert Cotton.
15/2/97	100	0	0	..	XIV., XV.	Tuapeka East	Bella	Charles Todd.
15/2/97	20	2	30	..	XIX.	" ..	Diver	D. C. Simpson.
15/2/97	98	1	0	..	XI.	Table Hill ..	Quiver	William R. Wright and another.
29/3/97	26	1	30	Waitahuna ..	VII.	" ..	Burnt Creek ..	Walter Hislop.
6/5/97	28	0	20	"	VII., V.	" ..	Try Again ..	Alexander Garden.
23/9/97	54	0	11	"	V.	" ..	..	John Lawson.
23/9/97	28	3	34	Waipori ..	IV.	Hedgehope ..	Rodgers and Party	Patrick J. Rodgers and party.
12/11/97	76	1	32	" ..	"	" ..	O.P.Q.	O.P.Q. Gold-mines (Ltd.).
9/12/87	5	2	28	..	"	Waipori ..	..	Robert Cotton.
27/10/96	30	0	0	..	V.	Table Hill ..	Canada Reef ..	A. Kerridge and party.
					Naseby.			
1/1/88	20	0	0	Sutton ..	I.	Nenthorn ..	..	John Symes and others.
18/9/96	53	3	10	Nenthorn ..	V.	Budle ..	Blue Slate Junction Gold-mining Co.	James A. Sligo.
16/3/97	82	2	0	Mt. Highlay, Hyde	"	Highlay ..	Mareburn Water-race and Gold-mining Co.	Alexander Bartleman and A. Hogg.
1/9/95	30	0	0	Ditto		" ..	Mount Highlay Syndicate	"
27/10/96	30	0	0	"		" ..	El Dorado Quartz-mining Co.	John Kinney.
27/10/96	30	0	0	"		" ..	El Dorado Co. ..	Michael Prendergast.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Offices—*continued.*

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
			Naseby—continued.			
	A. R. P.					
27/10/96	30 0 0	Mt. Highlay, Hyde	VIII.	Highlay ..	El Dorado Co. ..	William Guffie.
22/4/97	30 0 0	Nenthorn ..	III.	Hummock ..	Glenken Co. ..	William Ralston Wright.
22/4/97	18 2 9	Dunback ..	V.	Dunback ..	Golden Treasure Quartz-mining Syndicate	Frederick G. Glover and A. Sutherland.
31/8/97	20 0 0	Nenthorn ..	"	Budle ..	..	H. N. Mills and others.
30/9/97	30 0 0	"	IV. IX.	" .. Dunback ..	..	Francis Phelan and others.
30/9/97	30 0 0	" ..	"	" ..	..	"
2/2/98	30 0 0	Dunback ..	VIII.	" ..	Golden Bar Quartz-mining Co.	Arnold Sturm.
			Dunedin.			
20/5/97	98 2 0	Nenthorn ..	XI.	Nenthorn ..	..	Barewood Quartz-mining Co. (Ltd.).
7/6/97	97 1 17	" ..	XII.	" ..	..	Peter Montello.
17/6/97	90 1 8	" ..	VII.	" ..	..	R. Lee.
16/8/97	100 0 0	" ..	VI., VII.	" ..	..	Barewood Quartz-mining Co. (Ltd.).
9/9/97	86 0 14	" ..	XI., VII.	" ..	..	"
9/9/97	57 3 24	" ..	VI., VII.	" ..	..	"
9/9/97	52 0 29	" ..	VII.	" ..	..	"
20/10/98	48 2 0	Mount Hyde	IV.	Mount Hyde	..	Johannesburg and New Zealand Exploration Co. (Ltd.).
10/1/96	30 0 0	Nenthorn ..	XII.	Nenthorn ..	..	Lyders, Lorie, and Isaacs.
10/1/96	30 0 0	" ..	"	" ..	..	" "
10/1/96	30 0 0	" ..	"	" ..	..	Frederick Evans.
7/2/96	30 0 0	" ..	"	" ..	..	Peter Andrew Lyders.
6/3/96	30 0 0	" ..	"	" ..	..	"
6/3/96	30 0 0	" ..	"	" ..	..	Edmund R. Smith.
6/3/96	30 0 0	" ..	"	" ..	..	Ernest Turner.
7/8/96	30 0 0	" ..	VI.	" ..	..	Duncan McDonald.
11/8/96	30 0 0	" ..	VII.	" ..	..	E. Turner and another.
2/10/96	30 0 0	" ..	XI.	" ..	..	H. Piper.
2/10/96	30 0 0	" ..	"	" ..	..	"
2/10/96	30 0 0	" ..	"	" ..	..	"
8/1/97	30 0 0	" ..	"	" ..	..	Caledonian Gold-mining Co.
8/1/97	30 0 0	" ..	"	" ..	..	"
8/1/97	16 0 2	Mount Hyde	V.	Mount Hyde	..	George Smith.
4/6/97	30 0 0	Nenthorn ..	VI.	Nenthorn ..	..	London and New Zealand Exploration Co. and Anglo-Continental Gold-mining Syndicate.
4/6/97	30 0 0	" ..	XII.	" ..	..	Montague Cradock.
2/7/97	27 2 6	Mount Hyde	V.	Mount Hyde	..	Lyders and Harrison.
2/7/97	30 0 0	"	"	"	..	"
6/8/97	26 1 10	Nenthorn ..	XI.	Nenthorn ..	..	D. C. Simpson.
6/8/97	30 0 0	" ..	VII.	" ..	..	Robert Lee.
3/9/97	30 0 0	" ..	XII.	" ..	..	Montague Cradock.
3/9/97	16 0 0	" ..	I.	" ..	..	James Hunter.
1/10/97	30 0 0	" ..	V.	" ..	..	"
4/3/98	29 1 23	Waikouaiti ..	VII.	Waikouaiti ..	..	Smith and others.
			Waikaia.			
24/8/96	79 2 12	..	VII.	Nokomai ..	Nokomai Quartz Claim	A. Meder and D. McKinnon.
29/1/98	30 0 0	..	V.	Waikaia ..	Record Reign Q.-crushing Co.	D. Ferguson and Co.
			Riverton.			
29/4/97	97 1 24	Preservation	III.	Preservation	Terewai ..	Tarawera Mining Co.
6/5/97	100 0 0	"	I.	" ..	Jessica ..	Jessie M. Ellis.
31/5/97	95 0 25	"	IV.	" ..	Geelong Extended	Radford H. Brodrick.
9/9/97	40 2 0	Waiau ..	..	Waiau ..	Auckland Gold-mining Co.	Francis Hull.
9/9/97	99 3 21	Preservation	II.	Preservation	Coorang ..	Thomas C. Ellis.
9/9/97	99 0 0	"	"	"	Aldinga ..	"
9/9/97	99 0 0	"	"	"	Te Whara ..	Richard Allen.
29/11/97	49 0 0	West Waiau	VII.	Alton ..	Rowallan ..	Philip Payne.
8/1/98	98 0 0	"	..	Takitimo ..	Sunnyside ..	Charles Hawson.
8/1/98	96 2 0	"	..	" ..	Belmont ..	Caleb Froggatt.
13/4/97	30 0 0	Preservation	I.	Preservation	Alpha	Alpha Gold-mining Co.
13/4/97	30 0 0	"	"	"	Dawn	"
13/4/97	8 3 31	Waiau ..	IX.	Alton ..	Camp	Hugh Erskine and J. H. Tresseder.
13/4/97	30 0 0	Preservation	I.	Preservation	Winnifred ..	Jessie M. Ellis.
4/5/97	24 2 34	"	IV.	"	Last Chance ..	Guy A. Whealber.
4/5/97	30 0 0	"	"	"	Dot	Richard Allen.
4/5/97	11 1 6	"	"	"	Little Dot ..	"
7/9/97	30 0 0	"	II.	"	Starlight ..	William Seater.
5/10/97	30 0 0	"	"	"	Easter Gift ..	Thomas D. Suddaby.
25/1/98	28 0 0	"	IV.	"	Comet	Caleb Froggatt.
25/1/98	29 3 15	"	..	"	Reward ..	Charles S. Longuet and H. A. Macdonald.

Macetown District.

Premier Mine (Area, 52 acres 3 roods 21 perches; owners, Glenrock Consolidated, Limited).—This mine is worked from an adit 2,000 ft. in length, from which, at a point 1,600 ft. from the entrance, an incline has been on the strike of the reef, with a grade of 1 in 4, the winding from which is done by an electric motor, the dynamo being driven at the battery, from which cables lead into the adit tunnel. Prospecting work is also being carried on at a level 180 ft. above the main working adit. Mr. W. J. Stanford, general manager and engineer, has given the following account of the works carried out and other matters in connection with the mine:—

"The past year's operations up to the present date have been most successful—in fact, it is the first year that the mine has been self-supporting. Not only has it been self-supporting, but at the present date has also remitted the sum of £3,150 to London clear of all charges. Since the golden chute was picked up again in October, 1896, it has continued steadily, on an even downwards pitch, up to the present date. The grade of the incline has never been altered from 1 in 4, and it has carried the bottom of the golden stone the whole way. A new and interesting feature in the occurrence of the chute is that, while before the fault was met with in 1895 the chute was in one continuous block of about 40 ft. wide, now below the fault the chute is apparently split in two, and there are, as it were, two separate chutes having exactly the same pitch one above the other, and separated by about 20 ft. to 25 ft. of mullock or barren-lode filling. It is an open question whether the two blocks of golden stone are not on two separate and distinct lines of reef. The foot-wall and hanging-wall in the incline are very well defined, but as we rise in the stopes they separate. The foot-wall, a hard strong wall, leads up to the upper block of "golden stone," while the lower block of "golden stone" carries the hanging-wall of the incline to form a separate pair of walls of its own. It is just as if there were two lines of reef, each with its own chute of gold, and the two lines converge and meet in the incline. Each block of stone is from 20 ft. to 25 ft. in width, but, while the lower block will only mill about 10 dwt., the upper block is good for from 1 oz. to 1¼ oz. to the ton. A crushing taken only from the upper block in May, 1897, yielded 516 oz. 17 dwt. 12 gr. from 400 tons crushed; value, £2,082 4s. 1d., or 1 oz. 5 dwt. 20 gr. to the ton. In October a similar crushing gave 434 oz. 11 dwt. 12 gr., or 1 oz. 3 dwt. 11 gr. per ton. We are now trying to equalise the returns by mixing the blocks as far as possible. The incline measured on the 26th February, two days after your visit, 724 ft., and is now about 150 ft. below (vertically) the adit level. The rate of hauling has been increased to 100 ft. a minute, and we are able to bring three trucks up at a time, each holding 12 cwt. of quartz, and, as the dynamo and motor are not now being driven anything like up to their full capacity, as we get deeper, by increasing the size of the rope, by driving the dynamo from a separate water-supply, we shall be able to haul up six trucks at a time. I think there will be no difficulty in going with the present gear to a depth of 3,000 ft., and, as it will take up fully six years to reach that depth, there is no immediate anxiety about our hauling capabilities. No other work has been done in the Premier Mine during the year outside the operations to keep the mill supplied, except repairs to main levels. There was a length of about 300 ft. close to the hauling machinery where the tunnel was fast closing in, and this has been retimbered throughout with strong timber. Again, the high level, 180 ft. above the low-level adit, having been abandoned for some years, was in a complete state of collapse, and £300 has been spent in four months' work before driving ahead to prospect the ground could be resumed. The quartz, after being hauled up the incline, is drawn by horse-power through the adit 1,600 ft. to the surface; thence about 100 yards to a quartz paddock, where the trucks are tipped, and return to the mine. A tram-line 200 yards in length connects the paddock with the mill. The trucks are filled by means of a shoot below the paddock, and run by a boy to the grizzly shoot at the mill. The grizzly is 10½ ft. long, and formed of 3 in. by ⅞ in. iron, the bars set 2½ in. apart. The whole grizzly is 3 ft. wide. The finer quartz passes through the bars, and is carried by means of side-shoots to the ore-bins behind the mill. The coarser stone goes straight on into the stone-crusher, which is a Blake-Marsden, 15 in. by 10 in. jaws. There are two ore-bins, one behind each ten head of stamps, and holding respectively 24 tons and 40 tons when full. The stone is fed into the mortar-boxes by the vibration of the mill, which works fairly well as long as the stone is quite dry, but directly the stone is sent at all wet the feeding is most irregular. Unfortunately, we are cramped for space and fall, and it is impossible to get in automatic feeders. During the past year the old shanks and tappets have been replaced by new and heavier ones, increasing the weight of each stamp from 600 lb. to 750 lb., and increasing thereby the crushing-capacity of each five head of stamps from 30 tons per week of 144 hours to 50 tons in the same time. The gratings used on the mill are punched Russia iron, 189–200 holes to the square inch, which is equivalent to wire-cloth of 725 holes to the square inch. The pulp passes from the boxes into a trough, and thence over blanket-tables. In front of each box there is first a length of 8 ft. by 6 ft. of table, divided into three strakes, and it is on these that the bulk of the gold is caught. These strakes discharge into a trough, and thence over another set of three 12 ft.-long blankets. The top blankets are washed every hour and a half, and the tail blankets every two hours and a half, and these concentrates are passed through berdans charged with 25 lb. of quicksilver. The concentrates, freed of all their loose gold, pass on in launders to the cyanide-works, where they are treated with satisfactory results. Samples of the mill tailings are taken at the tails of the blankets every hour, and these samples are assayed regularly, showing that the average total loss does not exceed 1 dwt. 7 gr. per ton. The cost of all milling charges, with only fifteen head of stamps running, averages 3s. per ton, one man and one boy being employed on each shift; and this very low cost will be considerably reduced next month when the other five head of stamps which is now being added to the mill is in running-order. The mill is driven by a 6 ft. Pelton wheel, under 560 ft. of pressure, using from 45 to 60 cubic feet a minute. In common with other companies who depend on water for their power, we suffer from the very dry months in summer and from the

frosts in winter. In the winter, however, during the severest frosts, it has been found, during the last two winters, that as long as we can keep the pipes running full there is no difficulty about crushing. We have a big boiler in the mill, and can keep the tables easily thawed with hot water, the only difficulty arises when there is not sufficient water in the creek to keep the pipes full. If the pipes are not full, ice forms during the early hours of the day round the edges of the water running in the pipes, and when the sun gets on the pipes later in the day this ice becomes detached and comes down, blocking the pipes near the mill. Then there is trouble. This has only happened once. Since then we watch the pressure-gauge during the night, and if we see the pressure falling we send up to the dam and turn the water off till 8 a.m., when it is quite safe to turn the water on again for the day. It has been observed that it is only for the few nights about the nights of greatest moonlight, in the months of June, July, and August, that any serious trouble occurs; but these observations are limited to the last two years, and it is possible that other seasons will yet give more trouble. There are at present employed by the company sixty-one men altogether, as follows: Prospecting in Sunrise Mine, 4; prospecting in high-level adit, 4; smithy (2), carpenters (2), 4; foreman (1), trucking, hauling (6), 7; mining stone for the mill, 42: total, 61.

"The cost of mining runs to about 17s. per ton—that is, stoping pure and simple. The incline costs us about £3 10s. a foot to drive and timber—the timber alone costing 10s. a foot, and candles, caps, fuse, and gelignite 5s. a foot. Good accommodation is now provided for the men in the shape of weatherboarded huts lined throughout with lining-boards. A small weekly rent is charged for the use of these.

"The following table shows result of mill crushing for 1897:—

——	Tons.	Yield.	Value.	Yield per Ton.	Value per Ounce.	Mill running.
		Oz. dwt. gr.	£ s. d.	Dwt. gr.	£ s. d.	Days hr.
January ...	248	56 17 0	574 13 7	9 14	4 0 1½	14 19
February ...	180	86 9 6		9 14		13 14
March ...	250	144 10 10	1,414 5 6	11 11	4 0 6	15 11½
April	245	206 14 12		16 20		15 4
May	400	516 17 12	2,082 4 1	25 20	4 0 6½	22 5
June	265	256 7 16	1,025 8 4	19 8	4 0 0	15 17
July	...	33 11 3	215 1 8	...	4 0 0½	13 21
August ...	500	155 18 18	629 8 3	8 5	4 0 8	21 0½
September ...	450	211 10 0	855 2 10	9 9	4 0 10	27 21
October ..	370	434 11 12	1,749 9 10	23 11	4 0 6	20 19
November ...	460	377 6 12	1,464 8 5	16 10	3 17 6	20 17½
December ...	480	321 6 12	1,298 4 10	13 9	4 0 9	26 10½
Total and averages	3,848	2,802 0 17	11,308 7 4	14 12 (average.)	4 0 1 (average.)	227 16

"Concentrates: 43 tons yielded by the cyanide process 67 oz. 12 dwt. 22 gr.; total value, £165 10s. 6d."

Sunrise Mine (Area, 55 acres 3 roods 12 perches).—This mine, situated on Advance Peak, at an altitude of 5,000 ft., is also owned by the Glenrock Consolidated (Limited), and the operations for the past year are thus described by Mr. Stanford:—

"Since last report a considerable amount of prospecting work has been done by means of cross-cuts to prospect the adjacent country. These have proved that there are two lines of reef running parallel, and about 50 ft. apart, both carrying gold wherever they have been struck, but nothing of value for milling purposes has yet been disclosed. The workings are very close to the cap of the reef, and the whole country is very much broken and disturbed. At the present time we have four men employed driving the lower level ahead westwards, and are constantly picking up patches of gold as we proceed. The former proprietors of this property—the Sunrise Lease Gold-mining Company (Limited)—succeeded in extracting 1,207 tons of golden quartz, which yielded in the mill 1,018½ oz. gold, value £3,909, and all the creeks below this reef have been sluiced with excellent results, and a great deal of the gold which was recovered in the ripples was found to be adhering to little bits of quartz. The Glenrock Company are at present considering the advisability of putting in a new low-level adit some 1,200 ft. below the present lower tunnel. The length of this proposed new tunnel will be 3,000 ft. The cost is estimated at £6,000. The line of this proposed tunnel crosses several other lines of reef, one of which, at any rate, shows gold freely on the surface."

Tipperary Mine (Area, 105 acres; owners, Westralia and New Zealand Gold Explorers, Limited).—Mr. Stanford, the general manager, gives the following account of the workings for the year ended the 31st March last:—

"An account of this company's operations during the past year will be of interest. At the date of your visit, 25th February last, there were two main works in progress—viz., driving on the line of reef westwards from the low-level adit, and the sinking of a shaft below the same level. There were also men employed driving No. 7 level westwards 66 ft. above the low-level adit, and also a few men taking a stope off a block of stone in the low-level adit. The west drive in the low-level adit measured 447 ft. on the 26th February, and the No. 7 level face is 76 ft. behind it. The shaft was down 76 ft. at that date. The result of last year's operations was most disappointing to the company's shareholders. Gold was obtained to the value of £3,689 13s. 8d. (being mill gold, 785½ oz. from 1,501 tons, and 206 oz. from 137½ tons concentrates), while the expenditure was

£5,123 7s. 4d., thus showing a deficit of £1,433 14s. 3d. The gold apparently occurs in chutes, which, unlike the chutes in the Glenrock Mine (which have a pitch of about 1 in 4), extend almost vertically up and down through the reef, and, so far as the present works extend, these chutes have been very patchy. The shaft is being sunk on one of these chutes, and so far the stone in it is very patchy, but now is showing signs of improvement. In the face also of the west drive there is now a splendid block of quartz 5 ft. in width, and apparently rich in gold—in fact, since taking charge of the mine in 1893 I have not seen anything better. No new works in connection with the mine have been executed since your last report. At the date of your visit you complained of the ventilation of the mine; you happened to strike it on a bad day. Mr. Hayes, on page 157 of the 'Mines Record,' for November, 1896, speaks of it as quite sweet, and it is only on a very odd occasion that there is any difficulty with the air. With a low glass and the wind south-west the air is often a little dull in the mine, but as our prevailing winds are north-west to north-east very little trouble is experienced, and all this past week the air has been excellent. However, immediately after your visit I took four men off other work, and have put them to push through to the surface for ventilation. This is, however, a very big job. We have to drive No. 6 level (which is 90 ft. above No. 7 level) a distance of about 500 ft. eastwards from its present position, and then rise 170 ft. to the surface. This will take time, but it will be pushed on as quickly as possible."

Victor Emmanuel Mine.—Very little work is done here, the owner, Mr. Farrell, employing two men in prospecting.

Skipper's Creek, Bullendale.

Achilles Mine (Area, 125 acres).—This mine is worked and owned by an English company. The manager, Mr. Frederick Evans, is assisted by Mr. Murray Russell, underground boss. The mine was worked from a shaft 150 ft. in depth. A cross-cut, 86 ft., at this level connects with an incline, 280 ft., leading to No. 5 level. A winze is being sunk from this level. The whole of the pumping and winding is done by compressed air. Stoping is carried on in both the north and middle lodes at No. 5 level, the reef averaging 6 ft. in width. A new underlay shaft is now nearly completed. This has been sunk to the adit level 126 ft., to No. 2 level 160 ft., to No. 3 level 86 ft., and No. 3 to No. 4 level 90 ft., and to No. 5 level 90 ft. It is impossible to use the shaft, which is only 12 ft. by 4 ft., for both pumping and winding, but it is expected that the water can be raised in trucks or tanks made for the purpose. The pump is driven by wire-rope gearing. A new Pelton has been erected, the water being supplied from a race recently constructed from Skipper's Creek, at the foot of Mount Aurum. This race is capable of carrying six sluice-heads of water, but one head and a half will be sufficient for all present requirements, the pressure being 340 ft. The quartz is delivered into a bin, holding 100 tons, constructed above the adit, and from thence is carried on a tramway to the stone-breaker, which is placed over another bin immediately behind the battery capable of holding 400 tons. The battery consists of thirty stamps, 7 cwt. each, five stamps to each of the six boxes. The ore is fed from self-feeders constructed on the manager's own plan. The tables are divided into three sections, each strake being covered with green baize, which has been found more suitable than the ordinary blankets in general use. The length of each strake is 16 ft. From 40 to 60 per cent. of the gold is found in the stamp-boxes, and no quicksilver is used either in the boxes or on the tables. The baize is washed as often as found necessary, and the concentrates are treated in an amalgamating-barrel of 1 ton capacity. Each charge requires sixteen hours' treatment, with 100 lb. of mercury in the barrel. The concentrates, after passing through the barrel, are stacked for further treatment. The tailings, after passing over the baize, are allowed to run to waste, assays made showing that only a very small percentage of gold escapes; they are of no appreciable value. The reefs in the mine are three in number, bearing east and west, and having an easterly underlay where most highly gold-producing. The electric power derived from the left-hand branch of Skipper's Creek is at present used in driving two air-compressors and as an auxiliary to the battery when water is scarce. The battery is now driven by the water used for driving the pump machinery, the fall being from that point 140 ft. A 5 ft. Pelton is used. Eighty men were employed in mine and battery, &c., at 23rd March.

Shotover.

Gallant Tipperary Mine (Area, 46 acres).—This mine has lately changed hands, the former company having gone into liquidation, and the property consequently sold. As I did not visit the place during my visit to the Shotover district, in consequence of the uncertainty of finding any one on the mine, I requested the manager to inform me what was being done, and he has written as follows:—

"In reply to your letter addressed to the mine-manager of the Gallant Tipperary Company, I beg to state that the Gallant Tipperary Company went into liquidation, the property was sold, and the purchasers floated it into a new company, called the Shotover Quartz-mining Company (No Liability). The new company commenced operations on the 1st January, 1898, and I attach herewith a report of work done, &c., to the 31st March, 1898. As I have only recently taken charge, I have not yet been able to complete the survey, and cannot, therefore, forward you a plan.

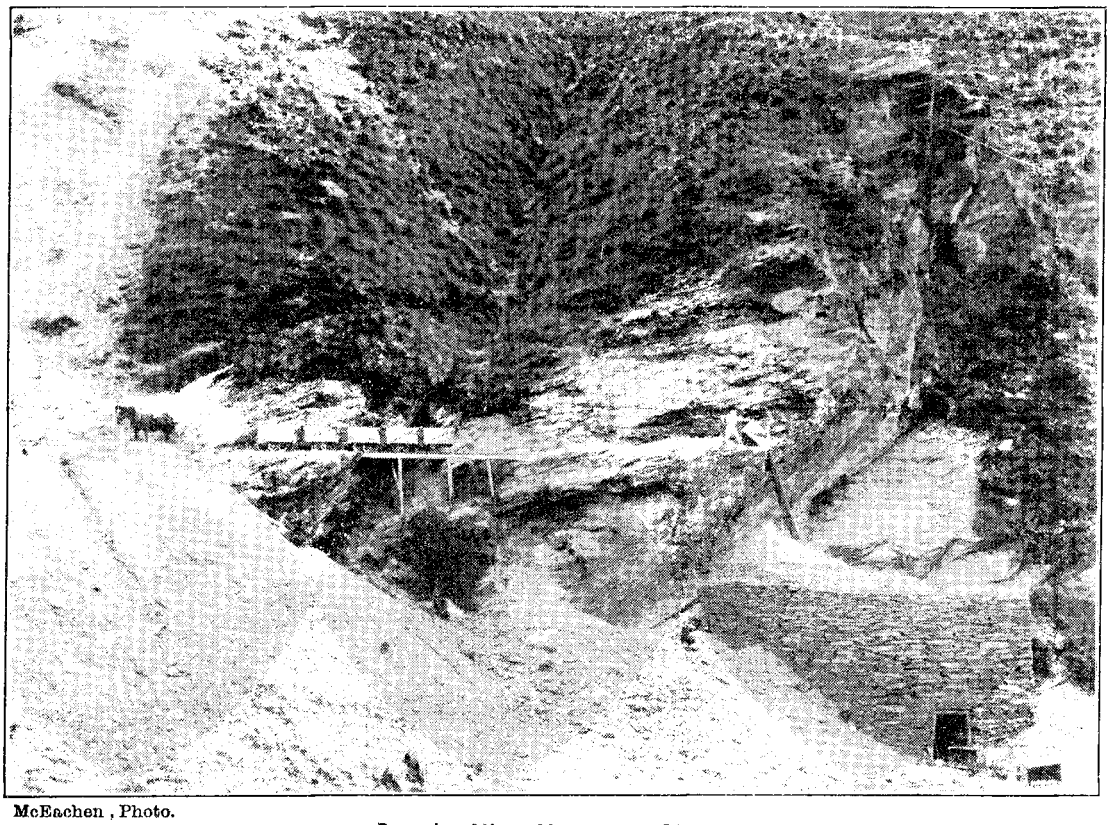
"*Shotover Quartz-mining Company (No Liability).*—This company acquired the property of the Gallant Tipperary Company, consisting of a special claim of 46 acres, situated near Skipper's Point, on the Shotover River. The machinery on the ground consists of a twelve-head battery, driven by a Pelton wheel. The water for motive-power is derived from two creeks on the opposite side of the river, carried in races two miles in length, and delivered into pipes with a head of 250 ft. The former workings were confined to the northern portion of the property, and, the levels there having fallen in, this company decided to proceed with and open up from the machine level. This level had been driven a distance of 184 ft. to connect with a pass, for the purpose of conveying stone to the battery from the upper workings. This machine level is about 50 ft. above the Shot-



McEachen, Photo.

Premier Mine, Macetown, Otago.

Entrance to Low-level Adit.



McEachen, Photo.

Premier Mine, Macetown, Otago.

Trucks emptying at Paddock. Paddock-full holds 300 tons.

over River, and on a level with the battery. It is being driven on the eastern line of reef, and will open up the country at a depth of 315 ft. below the old workings, and at the northern end of property will give a total height of unworked ground overhead of 870 ft. The new company commenced operations on the 1st January, 1898, and up to the 31st March had driven a further distance of 100 ft., making a total of 284 ft. Besides driving, the company intend cross-cutting in order to open up the other reef formations, and thus thoroughly test the property as they proceed. So far the ground opened up has not proved payable, but, as the portions worked by the old company yielded upwards of forty-eight thousand pounds' worth of gold, the new company have every confidence that their efforts will ultimately be successful."

Carrick Range.

Golden Gate Claim (Area, 100 acres).—This claim is owned by the Golden Gate Quartz-mining Company, of Bannockburn. The entrance to the mine is by a low-level adit above the left-hand branch of Pipeclay Creek. The reef consists in part of quartz highly oxidized, and also in portions of a more refractory character, the average width being about 16 in. The underlay is 1 in 3½. A trial crushing of some of the stone gave a yield of 12½ dwt. of gold per ton. A small battery of two stamps is driven by water-power. There is also another reef which was worked on several years ago from a tunnel some distance further up the creek, and it is intended to again open out on this reef, which is about 2 ft. 6 in. in width. Six men were employed.

Young Australia Claim.—This is owned by Messrs. McCabe and Sons. The low-level tunnel has been driven 380 ft., and about 300 ft. is still to be driven to cut the reef which was worked from a higher level—90 ft. higher—about twenty years ago. A shaft had been sunk to work the reef, but had to be abandoned, on account of the water proving too much for the machinery then employed. The low tunnel will drain a considerable area of the reef, which underlies 1 in 3, and is 5 ft. in width; and the owner states that former crushings gave 1½ oz. of gold to the ton. A five-stamp mill, driven by water-power, can be used for crushing. All work has been stopped from want of funds.

Lawrence's Mine, Day Dawn (Area, 8 acres; owner, James Lawrence).—This mine still continues to produce fair returns. 782 tons crushed yielded 143 oz. 1 dwt. of gold. The battery consists of four stamps.

Star of the East Mine (Area, 6 acres).—This mine is owned and worked by the Lawrence Brothers. 170 tons of quartz crushed yielded 57 oz. of gold. There is a battery of ten stamps, driven by water-power. Work in this and the Day Dawn Claim is chiefly done by the owners and three wages-men.

Bendigo.

Cromwell Goldfields Company (Limited) was, in the early part of this year and up to the present, worked by a party of ten tributers, who are working a block of stone at the 200 ft. level in the old shaft, to which access is obtained through a level driven on the line of the reef. The principal shaft is 14 chains east of the old shaft, and has been sunk to a depth of 520 ft., and the water is raised by an 8 in. pump. There are two plungers and a draw-lift required to raise the water to the surface. The reef is about 2 ft. wide in the cross-cut driven to the southward, although in some of the portions formerly worked the stone was 10 ft. in width; but the experience is that the thickness of the quartz is variable. The reef splits between the two shafts, and it is in the north part where the present tributers are working, the yields of gold exceeding 2 oz. per ton, valued at £3 15s. per ounce. A second party of tributers will start work from the main shaft. The machinery employed is not of an up-to-date kind, and great expense is incurred in pumping and hauling, and from the contour of the country it would appear that an adit from the surface could be driven to drain the mine from the 500 ft. level of the shaft. If this work is carried out the mine could be worked at much less expense, and the appearance of the stone at the workings would warrant the adoption of this method of opening up and working this mine. The present battery consists of twenty stamps, of 7 cwt. each, and four berdans, driven by water-power. Fourteen men were employed in mine and battery. Mr. F. Evans, manager of the Achilles Mine at Skipper's Creek, gives the following account of this mine:—

"This mine has been in work more or less for thirty years, the reported yield of gold being given as £500,000. The run of gold along the surface is 1,000 ft. long, going to a depth in one place of 420 ft., at which depth oxidation disappears, no gold being found below this, although the main shaft has opened the 520 ft. level, at which point the lode has been driven on 400 ft. Lode small, with rugged walls, composed of hard schist: lode matter, clay and little quartz. The lode is undermined by a slide, and until the exploration is carried below this there is not much chance of the run of gold reforming. The mine has been in the hands of a liquidator for some considerable time, but I am led to understand that a new company is in treaty to purchase, for the purpose of further developing the property. At present the mine is working on tribute with good results. The tribute received by the owners is 30 per cent. on 1 oz. per ton, and 1½ per cent. on each pennyweight above that up to 2 oz. per ton."

Old Man Range, near Bald Hill Flat.

The *Excelsior Mine*, also known as Gray's Reef, is situated on the slope of the Old Man Range, about 3,000 ft. above sea-level, and has been in operation about seven seasons. The crushing season extends from the 1st September till the 1st June, the water during the remaining three months being frost-bound. This lode was discovered by two men, one of whom still holds the property. When gold was first discovered ground-sluicing was the method of working adopted, and, although the quartz is of a most friable nature, containing a quantity of free gold, still it is estimated that at least three-fifths of the gold contained in the stone was lost by sluicing the quartz down the steep faces into the creek below. After two or three seasons of this wasteful method of working a small battery of three 300 lb. stamps was obtained, and the claim worked

by the ordinary methods of stoping out the reef and crushing the quartz. Up to the present time gold of the value of £9,800 has been taken out of the reef during the seven seasons worked, for an outlay averaging a little under four men's wages during the time worked. The gold is of high quality, being worth £3 19s. to £4 per ounce. Although the situation of the mine is such that it could be opened by a low-level adit, very little has been done in this direction to open up the mine, most of the work done being by shafts, where the lode has been followed from the surface downwards, the stone being raised by hand and afterwards sledged to the battery. A level is being driven to tap the blocks of stone known to exist at a depth of from 70 ft. to 120 ft. below old workings. This level is now within 150 ft. of the lode, and is being pushed on as circumstances will allow. Two reefs of quartz are worked, running east and west, with a southerly dip, the chutes of gold having a slight dip to the west. The two lodes vary in their distance from each other, in some parts being 50 ft. in other places 10 ft. to 12 ft. apart. Where so close as this they form one big lode. The quartz is commonly of a friable character, and the gold, although fine, is distributed generally through the stone. It takes a little more than 1 dwt. per ton to put the stone in the battery when raised to the surface, an expense which will be abolished when the level is completed. The mode of saving the gold consists of using mercury in the stamp-box and about 3 ft. of copper-plates, no blankets being used, as the plant does not include any means for the treatment of blanketings. During the twelve months ending the 31st March, 1898, which only includes nine crushing months, eight hundred pounds' worth of gold was obtained, four men and a boy being employed. Included in this was the driving of the adit level a distance of 35 ft., and the sinking of air-shaft a further 70 ft., connecting the adit with the surface; also the shifting of battery and laying down tramway, and other work of a developing nature. No explosives are required to mine the lode stuff, as it yields to pick and gad, timber, however, being a fairly heavy item of expense. The power for working the battery is obtained from a small Pelton wheel driven with a direct fall of about 100 ft. A great drawback in the working of the mine has been the want of a road from the main road to the workings. This is gradually being overcome, however, the owner spending some time on it every season, and the claim can now be reached by bullock teams halving their loads. The average number of men employed for year was four and a half.

White's Reef Claim (Area, 44 acres).—This mine continues to yield quartz of a payable kind. The workings are chiefly in shafts sunk to a moderate depth, with levels driven between the shafts. The runs of gold are, however, extending downwards. The battery consists of five stamps, and at the time I was in the district, on the 11th March, the owners were engaged in removing it further down the hill, in order to get advantage of the limited water-supply for power. 160 tons of quartz yielded 143 oz. 6 dwt. of gold.

Eureka Quartz-mining Company, Ophir.—This company was formed to undertake prospecting operations on a reef discovered in 1896 by W. Green, who had sunk to a depth of 23 ft., the reef increasing in depth as he descended. The line of reef is east and west, with little dip. Stone was taken out for a distance of 120 ft., at varying depths, and a trial crushing of 73 tons gave a return of 40 oz. 10 dwt. 11 gr. It was subsequently decided to sink a shaft on the same line of reef, and at a depth of 70 ft. it was found that the reef had widened. Sinking was carried on to a depth of 100 ft., and thence a drive of 14 ft. was put in to follow the line of reef, and a cross-cut of 28 ft. made to the north. Owing to financial difficulties, work was suspended, but the promoters entertain hopes of eventually making the property a success.

Macrae's Flat District.

Golden Point Claim (Area, 60 acres; owners, William and George Donaldson).—The workings are on the surface. A flat seam lying under alluvial drift and surface soil is denuded by hydraulic pressure. The loose material, being washed through sluice-boxes, yields alluvial gold. The quartz, which is of a firm friable nature, is conveyed by aerial tramway to the mill and crushed. The mill consists of one stone-breaker, one 5 ft. Huntington roller-mill, and two 3 ft. 6 in. Wheeler's pans, and is driven by a Pelton wheel. The water-race is four miles in length, costing £400. The mill machinery also cost £5,000, and the ore-bins and aërial tramway £200; total, £5,600. The quantity crushed was 130 tons, yielding 32 oz. 16 dwt. of gold; value, £127. Six wages-men are employed.

Barewood District.

Lyder and party, of the Golden Burn Company, have claims on the Taieri River. A battery of ten head of stamps is on the ground, and considerable prospecting and development work has been done. The lode averages about 5 ft. in width, but is impregnated with arsenical pyrites, for the elimination of which additional plant will be required.

Barewood Mine.—Prospecting operations have been energetically carried on during the past year on this property by the Anglo-Continental Gold Syndicate and the London and New Zealand Exploration Company, who are jointly interested in the venture. Three shafts have been sunk, 12 ft. by 4 ft. in the clear inside the timber, to a depth of a little over 200 ft. These shafts are on different sections of the property, along the line of reef, and are about 40 chains apart, so that the reef will be tested at different points. At Scott's Gully a level was driven on the lode from the shaft at a depth of 100 ft., and stone of a payable character for working found at that level. A cross-cut has been driven from the shaft at 200 ft., and the lode cut through, where it shows a width of 8 ft. of lode matter between the walls, but in this width there is about 5 ft. of mullock and quartz, which contains but very little gold. It is, however, satisfactory to find the width between the walls of the lode continues to be the same as it was on the 100 ft. level. A commencement is now made to drive on the line of reef on each side of the cross-cut at the 200 ft. level. One of the shafts is sunk on what is known as Ryley's Claim, and a commencement is now being made to drive a cross-cut from the shaft to cut the reef at a depth of 200 ft. The reef was said to be worked to a depth of 140 ft. by the former proprietors from an old shaft which was sunk on the underlie of the lode, but this shaft was in a very bad state of repair, and full of water, at the time the English

companies took an option of the property, and they decided to sink a new shaft on the line of tunnel laid off to cut and drain the reef to a depth of 600 ft. below the surface. This new shaft is about 5 chains to the southward of the old shaft, and about 300 ft. to the eastward of the outcrop of the reef on the surface, the position of the shaft being laid out so as to cut the lode in the shaft at a depth of about 300 ft., the underlie of the lode being about 45° to the eastward.

Another shaft is sunk on what is known as Cunningham's Section, about 40 chains south of Ryley's shaft, and a cross-cut is now being constructed from this shaft to cut the lode, which is estimated to be about 75 ft. to the westward from the shaft. Considerable difficulty was experienced in sinking this shaft, on account of the quantity of water there was in the ground, and the temporary appliances which were used to cope with it.

At the time the English companies took an option of purchase of this property there were a good many old small pumps and pipes on the property, and these have been used as far as possible to test the ground before expending any money in purchasing efficient drainage appliances.

Flat Stream.

Caledonian Mine (Area, 100 acres; owners, Caledonian Gold-mining Company, Limited).—The mine is opened by drives 300 ft. long put in during the year. The reef, which is from 2 ft. to 8 ft. in width, is of a well-defined character.

Table Hill District (Milton).

Canada Mine (Area, 47 acres; owners, Robert Andrew, T. J. Ritchie, and John Lawson).—This mine has been purchased by the present owners during 1897. They have driven an adit level now 646 ft. in length. A cross-cut has been driven from this adit a distance of 140 ft., and they expect to cut the reef within 20 ft. of further driving. A ten-head stamp-mill is now completed, and will be driven by a turbine.

The Burnt Creek Quartz-mining Company own a property about fourteen miles from Waitahuna. On the mine they have a battery of ten stamps, driven by a turbine, and, as a considerable quantity of ore is in sight, crushing operations will shortly be commenced.

Lawrence.

Gabriel's Gully.—Operations have been resumed by the Gabriel's Gully Prospecting Association to explore a reef formerly worked between the Blue Spur fault and the cross-course. A tunnel was driven at a low level, and the reef proved to be only a few inches wide. The drive was then continued, with the object of picking up the reef beyond the cross-course, but so far without success. Operations were subsequently carried on in driving alongside the cross-course. Some bunches of stone have been got, which may lead to further discoveries being made.

O.P.Q. Quartz-mine, Waipori (Area, 76½ acres; owners, O.P.Q. Waipori Gold-mines, Limited).—The work at present being undertaken includes the sinking of a new shaft 12 ft. 6 in. by 4 ft., which has now reached a depth of 150 ft., and is well timbered, and in three compartments; driving a tunnel on line of reef, now 450 ft. in; the extension of the old tunnel on lower level, which has reached a distance of 790 ft.; and also the erection of a battery, &c. The low-level tunnel is intended to form an adit for the outlet of water from the pumps. It is intended, at 250 ft. in depth, to commence a level from the shaft. The shaft will, however, be sunk until a depth of 500 ft. is reached. An order for winding plant, &c., has been placed with Messrs. Robey and Co., Lincoln, England. Twenty-six men are employed.

Longwood Mine (Owners, Longwood Quartz-mining Company).—The tunnel for which subsidy has been received has now reached a distance of 950 ft., but the reef has not yet been struck. The tunnel is in good order.

Riverton District.

A shaft, which has now reached a depth of 32 ft., is being sunk at South Riverton, with a view of proving a reef which, it is said, has been traced for a very considerable distance on the surface. The Riverton Prospecting Association is in charge of the works.

Wilson's River.

Golden Site Extended Mine (Area, 144 acres and 3 perches; owners, Golden Site Extended Gold-mining Company).—This company took over the property of the old company, and are carrying on work to search for the reef previously lost sight of. As it was out of my power to visit the district, Mr. W. Wylie, the mine-manager and engineer, has supplied the following account of the mine:—

"During the past year a shaft has been sunk on north side of river. The shaft is 210 ft. deep, divided into three compartments, 4 ft. by 4 ft., timbered throughout with 8 in. by 3 in. timber. At 200 ft. a chamber has been constructed 7 ft. high the full length of the shaft, and extending back 15 ft. From end of chamber a drive was put in 63 ft., when the hanging-wall of what is supposed to be the old Site reef was met with. The drive has been carried along the wall referred to in a southerly direction till a point was reached where the reef formation (known as the new reef at river-level) was met with. The drive has been continued along the foot-wall of the above-named formation. In driving the last 60 ft. a considerable amount of quartz has been met with. As yet it does not carry gold. In addition to the above work, sundry short cross-cuts have been put in, making about 400 ft. driven in all. Owing to the collar of the shaft being nearly 50 ft. above river-level, an adit has been driven 70 ft. long to connect with shaft. A Pelton wheel outside is used to work the pump, which is 6⅝ in. diameter, and 2 ft. 8 in. stroke. Flat rods connect with a bob fixed in chamber at site of shaft. The pump-rods are Oregon timber, 3 in. by 3 in. Permanent iron-runged ladders, in stages of 15 ft., have been fixed in shaft, tops of ladders at stages being provided with good hand-holds. Substantial poppet-heads have also been erected, the whole being covered in to protect the braceman from the weather. A battery of ten 6 cwt. stamps and two berdans is also erected, to be driven by water-power. About 40 chains of water-race are formed, carrying five sluice-heads of water. This will prove sufficient to drive the machinery for pumping, winding, and crushing. Two Pelton wheels are used. Fourteen men were employed."

Preservation Inlet.

Alpha Mine.—In January last the manager, Mr. John Wilcocks, reported that the track from the mine to the Government tram was completed, and he anticipated getting a stamp battery on to the ground in a few days, and that crushing would be started in the course of three months. The shaft, which is 10 ft. by 4 ft. in diameter, was down 80 ft., and it was proposed to sink a further depth of 50 ft. before opening out. Stone was met with at a depth of 30 ft., which gradually increased in size till it was the full length of the shaft. The stone was over the average quality. It is proposed to erect another ten head of stamps should the prospects of the mine equal anticipation.

Tarawera Claim.—This claim has a good-looking reef, 4 ft. in width, on which it is proposed to sink at the 80 ft. level.

Cuttle Cove.—Operations are being carried on here to get out a trial crushing of stone.

Prospecting has been discontinued at the Olivia Claim, as the reef was not found at a distance where it was expected, but the directors intend to start again in the course of a few weeks.

Attention is being paid to the reef situated at Cuttle Cove.

Golden Site Mine.—Driving has been carried on on the 200 ft. level, and a considerable amount of quartz met with. The walls are not well defined, but it is hoped that they may improve as the driving proceeds. An uprise will be put in from the 200 ft. level, operations on which will shortly be started.

Morning Star Gold-mining Company, Te Oneroa.—The mine-manager, Mr. J. E. Davis, reports progress in this mine to the end of 1897:—

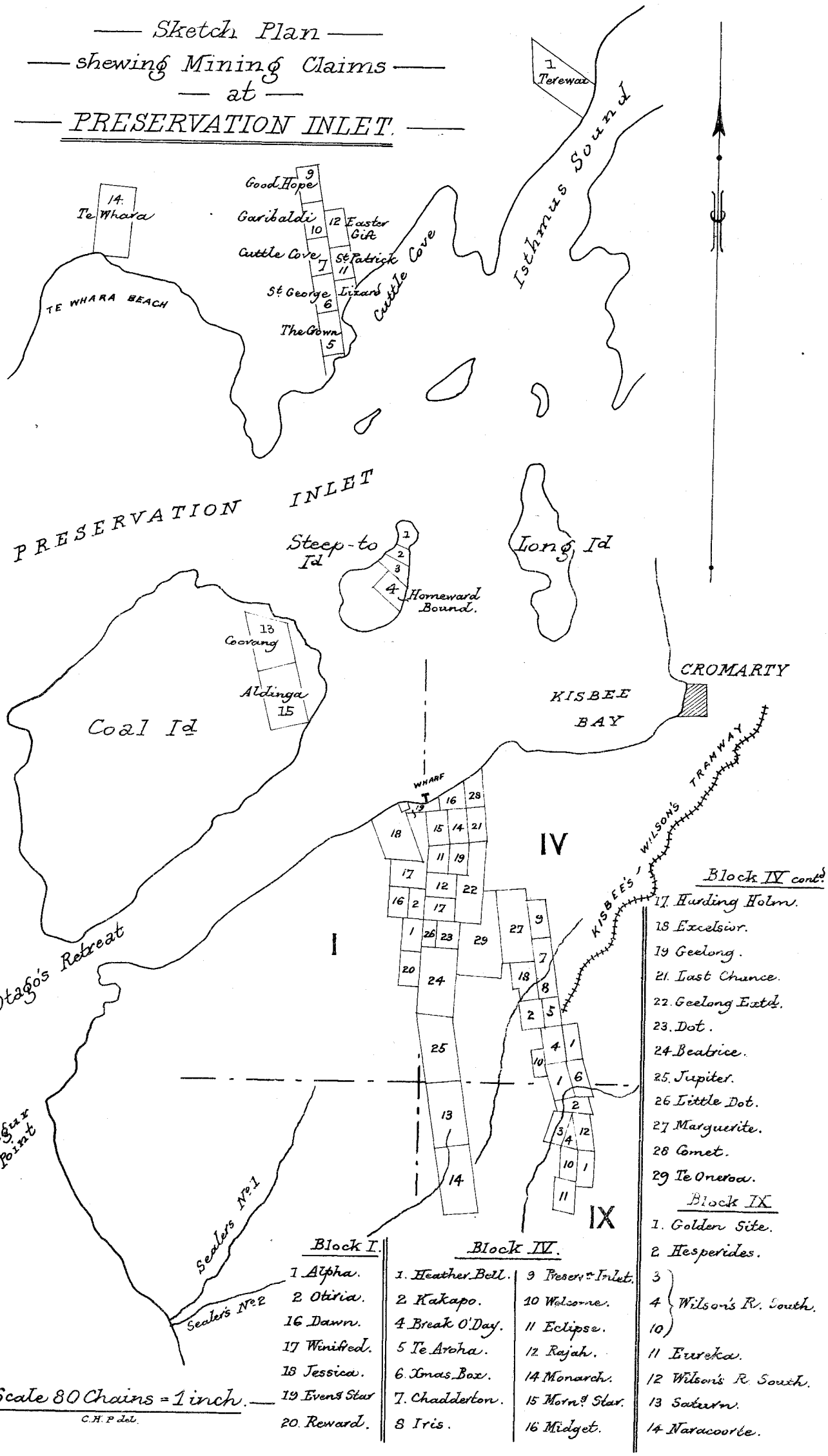
The No. 1B is a new level, and was started in September last, and is driven 121 ft. I am driving on the reef formation, but do not expect to get any stone until in past the last rise put up to this level from No. 1A, in about six weeks, when I expect to pick up the old shoot we were working on in the level below. The No. 1A level has been driven 239 ft. There has been no payable gold in this level since October, when the line of reef changed its course to the west. It has now returned to its old course to the south, and, by the appearance of the walls, everything looks as favourable as hitherto for a gold-bearing formation ahead. There have been two rises put through from this level to No. 1B, 156 ft. in height; the first one carried payable stone up to 60 ft., and the second one up to 146 ft. I have stoped out above No. 1A 36 ft. 6 in. in height, 160 ft. in length between mouth of tunnel and first rise; this is getting shorter every stope. Between first and second rises 23 ft. in height, 170 ft. in length; south of second rise, 29 ft. in height, 75 ft. in length. No. 1 level has been driven 19 ft. 10 in., and discontinued since July. It will have to be pushed forward to get at the stone overhead. I have a rise through south of the mullock-bank to No. 1A level. At 80 ft. I met with payable stone, and it has continued the same up through. This stone is looking very well, and is yet to be taken out. I have stoped in this level north of the mullock-bank to rise through to No. 1A 50 ft. in height, 170 ft. in length. This is where the most of the gold has come from this last six months. I have just finished taking out the floor of No. 1A level, which completes this stope. As the new tunnel at the entrance of this level was getting useless, a contract for a new one was let and finished—total distance, 264 ft.—and connected with old level at No. 1A rise. Nothing has been done to the No. 2 level. A winze has been started 70 ft. from south face, and is down 177 ft.; there was a little gold at starting; after that I could only find a trace. I have started to open out at the 120 ft. level to drive south. No. 3 cross-cut has been driven 32 ft., but is not in far enough to cut the Morning Star line. I have no payable stone in any of the faces of the levels, but the stopes for this last six months have turned out more stone and gold than I expected, and what I have left in the stopes will, I think, carry me on to Christmas, 1898, and may be poorer or richer, but to all appearances will go about the same, although the daily returns from the battery at present are not so good. The battery is working well, and in good order.

Jessica Mine.—A tunnel is being put in, which is intended to be 200 ft. in length.

Summary of Returns from Quartz-mines for Year ending 31st March, 1898.

Name of Company.	Ordinary Quartz crushed.			Retorted Gold.			Estimated Value.
	Tons	cwt.	qr.	Oz.	dwt.	gr.	
Achilles Goldfields (Limited), Bullendale	6,491	0	0	4,436	0	0	£67,900
Glenrock Consolidated (Limited), Macetown... ...	4,545	0	0	3,196	13	0	
Westralia and New Zealand Explorers (Limited), Macetown	1,149	0	0	507	5	0	
Morning Star Gold-mining Company, Preservation Inlet	3,654	0	0	5,384	11	0	
Cromwell Goldfields (Limited), Bendigo	1,123	10	0	2,457	0	0	
Lawrence Brothers, Bannockburn	782	0	0	143	1	0	
James Lawrence, Bannockburn	170	0	0	57	0	0	
Golden Gate Gold-mining Company, Bannockburn ...	176	0	0	95	0	0	
F. W. Gray, Bald Hill Flat	177	0	0	244	10	0	
R. T. Symes, Bald Hill Flat	160	0	0	143	6	0	
Phelan Brothers, Macrae's	60	0	0	91	0	0	
W. and G. Donaldson, Macrae's	130	0	0	32	16	0	
H. N. Mills and Sons, Nenthorn (for sundry parties) ...	370	15	0	329	13	0	
F. H. Perry, Rough Ridge	60	0	0	15	0	0	
H. F. Knight, Long Gully, *viâ* Waipori	12	0	0	3	8	0	
Mount Highlay Syndicate, near Hyde	760	0	0	165	15	16	
Totals	19,820	5	0	17,301	18	16	...

Sketch Plan
shewing Mining Claims
at
PRESERVATION INLET.



Block IV cont.d

17. Harding Holm.
18 Excelsior.
19 Geelong.
21. Last Chance.
22. Geelong Extd.
23. Dot.
24 Beatrice.
25. Jupiter.
26 Little Dot.
27 Marguerite.
28 Comet.
29 Te Oneroa.

Block IX

1. Golden Site.
2. Hesperides.
3, 4, 10 } Wilson's R. South.
11 Eureka.
12 Wilson's R. South.
13 Saturn.
14. Naracoorte.

Block I.

1 Alpha.
2. Otiria.
16 Dawn.
17 Winifred.
18 Jessica.
19 Event Star
20. Reward.

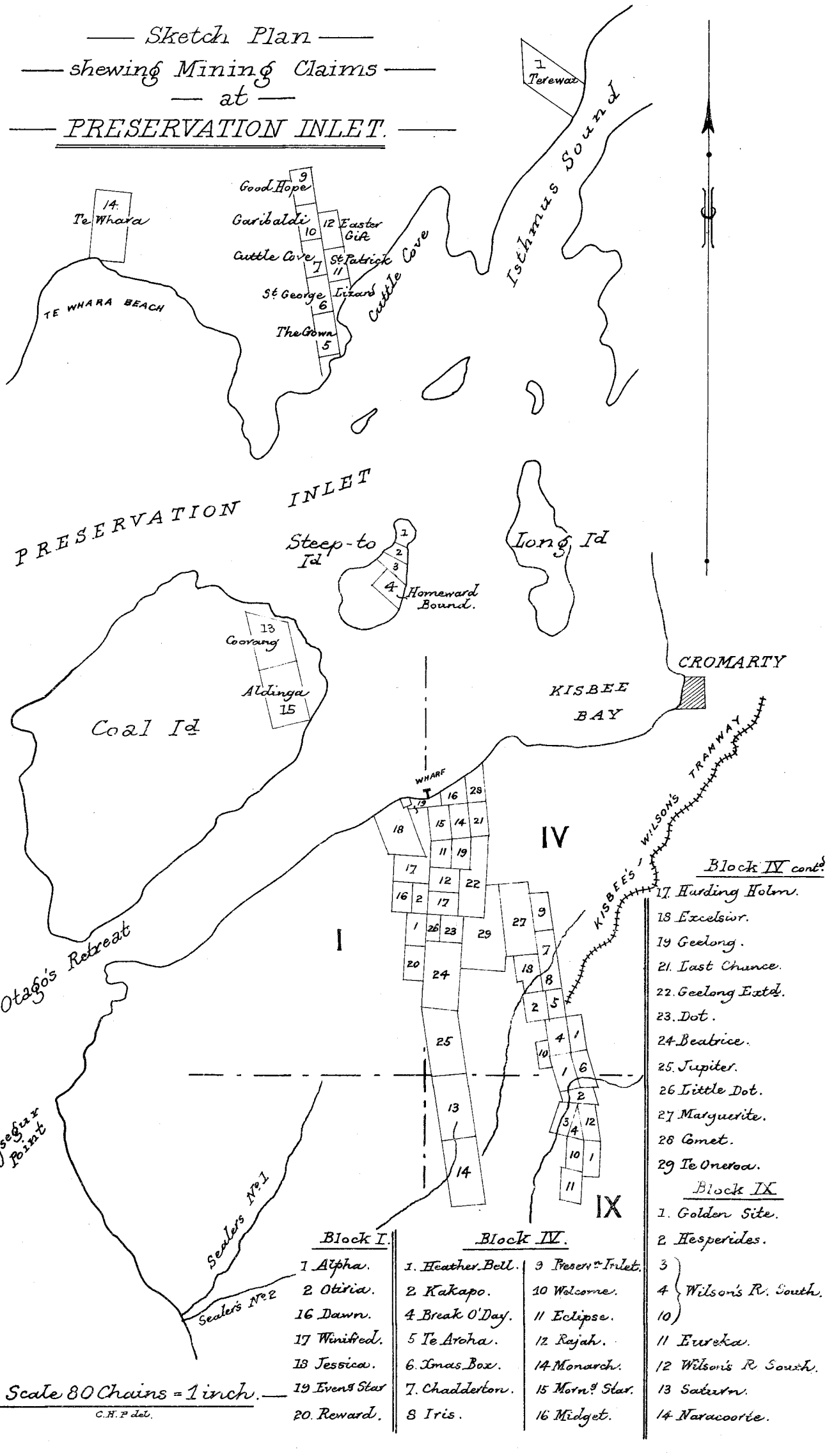
Block IV.

1. Heather Bell.
2. Kakapo.
4 Break O'Day.
5 Te Aroha.
6. Xmas Box.
7. Chadderton.
8 Iris.
9 Preserv.e Inlet.
10 Welcome.
11 Eclipse.
12 Rajah.
14 Monarch.
15 Morn.g Star.
16 Midget.

Scale 80 Chains = 1 inch.

C.H.P del.

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Tailings treated.

—	Quantity.	Yield.	Value.	Remarks.
	Tons cwt.	Oz. dwt.	£ s. d.	
Glenrock Consolidated (Limited), Macetown ...	48 0	...	563 7 3	Cyanide.
Westralia and New Zealand Gold Explorers (Limited), Macetown	135 10	...	546 14 6	Roasting and cyanide.
Morning Star Gold-mining Company, Preservation Inlet	Not stated	139 4	500 0 0	...
Cromwell Goldfields (Limited), Bendigo ...	89 0	7 0		
F. H. Perry, Rough Ridge	16 0	3 0		
	288 10	149 4	1,610 1 9	...

The foregoing summary of returns from the different mines shows that 19,820 tons of quartz were crushed for 17,301 oz. 18 dwt., valued at £67,900; and 288 tons 10 cwt. of tailings were treated for a yield of gold valued at £1,610 1s. 9d.: total value, £69,510, compared with £40,000, the estimated value for last year, showing the increase in value to be £29,510. The increased returns are chiefly from the Glenrock and Westralia Mines, at Macetown, the Cromwell Mine, at Bendigo, and the Achilles Mine, Skipper's. A continuation of payable returns is to be expected from the Macetown district, the mines being better developed each succeeding year, and probably the Achilles Mines, after the dead-work is finished, will maintain yields equal to the past. The success at the Cromwell is due to exploration on the part of the tributers. The Morning Star Mine has got payable ore in sight, but it is questionable whether exploration work is sufficiently advanced to enable returns like those mentioned to be maintained.

On the whole, the prospects of success attending mining for quartz in the Otago and Southland goldfields are very good. The exploration work at Barewood, Canada Reefs, Waipori, and Preservation Inlet is being carried on systematically, and in a way to prove the value of those reefs known to exist, some of which have already been proved to produce rich quartz.

The Old Man Range is one of the districts that is well worthy of being still further prospected.

ALLUVIAL MINING.

This description of mining comprises the various methods of recovering gold from the beds of streams and rivers by hydraulic sluicing, elevating, and dredging; also, in ground-sluicing and hydraulicking the older accumulations of auriferous gravel, the result of lacustrine, fluviatile, and estuarine deposits, or accumulations of morainic matter carried out of the mountainous regions by the action of ice; and latterly, although not to any great extent, mining for the strata of wash now superimposed by later accumulations of the younger drift gravels.

The Middle Island, in the western parts, from Collingwood in the north to Preservation Inlet at the most southerly point, and more to the eastward in central and eastern Otago, has been the theatre of vast geological changes, and many of those deposits of gold-bearing gravels exist at various horizons from below sea-level at Ross, on the West Coast, to Mount Arthur table-land in Collingwood, at an altitude of 4,000 ft., and in Otago from sea-level to elevations of 4,000 ft. at Mount Criffel, Mount Buster, and other mountain ranges. These auriferous drifts, being of so varied a character, and found in such numerous localities, afford material for the operations of the miner in such quantities that, notwithstanding the extensive appliances now used, years must elapse before they can be exhausted.

The following abstracts of claims held under licenses in the Marlborough, Collingwood, and Westland districts show the large area occupied in that way by persons interested in alluvial mining, while throughout the various mining districts a very considerable area is still held by individuals under their miners' rights.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices, and registered on or before the 31st March, 1898, in the Books of the Mining Registrar.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
		Havelock.				
	A. R. P.					
30/6/94	4 2 11	Wakamarina ..	..	Wakamarina	The Gorge ..	The Wakamarina Gorge Gold-mining Co. (Ltd.).
30/6/96	30 0 0	" ..	..	"	Quayle's Terrace ..	H. F. Thompson.
1/2/98	30 0 0	" ..	..	"	All Nations ..	All Nations Hydraulic Sluicing Co.
25/2/98	28 0 0	" ..	..	"	New Mentor ..	Thomas Todd.
25/2/98	30 0 0	" ..	..	"	New Midas ..	G. M. Mathieson.
25/3/98	30 0 0	" ..	..	"	Yukon	David Girdwood.
30/10/96	11 0 0	Wakamarina River	..	"	Golden Point ..	G. P. Hilton and C. L. Diamanti.
30/10/96	10 0 20	Ditto ..	..	"	Quayle's Terrace ..	Harry F. Thompson.
30/10/96	13 0 0	" ..	..	"	Wakamarina Dredging Co.	Henry D. McKenzie.
24/2/98	12 1 0	" ..	..	"	Cresus	Q. J. Scott.
24/2/98	13 2 0	" ..	..	"	Trafalgar	William E. Clouston.
24/2/98	0 2 0	" ..	..	"	Hamilton ..	Alfred Rogers.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—*continued.*

Date of License.	Area.			Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A.	R.	P.					
				Collingwood.				
17/2/98	60	0	0	Aorere River ..	XIV.	Pakawau ..	..	James Hargreaves.
17/2/98	37	0	0	" ..	IX.	Aorere ..	..	John W. Riley.
1/1/86	10	0	0	Richmond Hill	VIII.	" ..	Richmond ..	Parapara Hydraulic Sluicing and Mining Co.
7/6/88	7	1	9	"	"	" ..	..	Ditto.
1/1/92	9	0	0	Glen Gyle ..	IV.	" ..	..	"
4/5/92	20	0	0	Rocky River ..	XI.	" ..	..	W. Bray and another.
9/7/92	27	1	0	Parapara ..	IV.	" ..	..	Parapara Hydraulic Sluicing and Mining Co.
7/2/94	19	3	5	" ..	VIII.	" ..	..	Ditto.
4/8/96	10	0	0	Victoria Creek	III.	" ..	..	James Reddan.
1/12/96	30	0	0	Rocky River ..	XI.	" ..	..	Rocky River Hydraulic Sluicing Co.
18/6/97	9	3	9	Quartz Ranges	X.	" ..	..	Collingwood Gold Fields (Ltd.).
9/6/94	83	0	0	Parapara ..	I.	" ..	..	Parapara Hydraulic Sluicing and Mining Co.
7/4/96	100	0	0	Quartz Ranges	XIV.	" ..	..	Collingwood Gold Fields (Ltd.).
7/4/96	85	3	5	"	X.	" ..	..	"
7/4/96	68	0	31	"	VIII.	" ..	..	"
7/4/96	48	2	21	"	XIV.	" ..	..	"
7/4/96	46	3	29	"	X.	" ..	..	"
4/5/96	48	3	30	Victoria Creek	IV.	" ..	..	"
7/12/96	81	1	24	Onakaka ..	..	" ..	..	F. West and H. P. Washbourne.
1/2/97	50	0	0	Victoria Creek	III.	" ..	..	Richard Ellis.
29/3/97	100	0	0	Takaka ..	IX.	Waitapu ..	..	H. P. Washbourne.
				Motueka.				
16/3/97	30	0	0	Ba.'oon Hill ..	V.	Mount Arthur	Table-land Hydraulic Sluicing Co.	C. Lewis and H. P. Washbourne.
				Westport.				
20/8/92	31	2	33	Bradshaw's ..	II.	Steeples ..	Bradshaw's ..	Edmund Gillon.
11/3/95	66	2	0	Addison's ..	V.	Waitakere ..	Shamrock Lead ..	The Shamrock Lead Gold-mining Co. (Ltd.).
23/12/96	100	0	0	" ..	IV.	Steeples ..	Addison	The Addison Gold-sluicing Co. (Ltd.).
1/2/97	73	1	21	" ..	II.	Waitakere ..	Bendigo Gold-mining Co.	Charles Marina Pielsticker.
22/12/96	99	3	35	" ..	I.	" ..	Golden Lead Gold-mining Co.	Patrick Sullivan.
28/1/97	50	0	0	German Terrace	V.	Kawatiri ..	Rhine and Fatherland Gold-mining Co.	Frank Sontgen.
28/8/93	8	3	0	Addison's ..	II.	Waitakere ..	..	Peter Halligan and party.
21/5/94	29	3	27	Bradshaw's ..	"	Steeples ..	Catherine Gold-mining Co.	Charles Lind and party.
18/4/95	7	3	9	Addison's ..	"	Waitakere ..	Try Again Gold-mining Co.	John Brady and party.
18/4/95	15	1	14	" ..	"	" ..	..	William Gould and party.
15/5/95	7	1	19	Cascade Creek	III.	Ohika ..	Cascade Mining Co.	Robert Button and party.
16/8/95	26	3	14	Addison's ..	V.	Waitakere ..	Shamrock Lead ..	The Shamrock Lead Gold-mining Co. (Ltd.).
22/5/96	17	3	24	Bradshaw's ..	IV.	Steeples ..	South Spit Gold-mining Co.	E. Gellow and J. Collins.
22/12/96	22	0	8	Addison's ..	II.	Waitakere ..	Garryowen Gold-mining Co.	Michael Carmody and party.
28/1/97	15	3	11	Coal Creek ..	VIII.	Kaiwatere ..	Papahau Gold-mining Co.	Charles Feiedt and party.
21/7/96	100	0	0	Addison's ..	IV.	Steeples ..	Westport Cement-crushing Co.	Thomas Young.
21/7/96	100	0	0	" ..	II.	Waitakere ..	Extended Londonderry Cement Co.	Stephen Garvin.
11/12/96	98	3	36	" ..	"	" ..	Westport Cement-crushing Co.	Jesse King.
26/11/92	28	2	30	" ..	XI.	" ..	Venture	The Venture Gold-mining Co. (Ltd.).
18/10/94	9	3	37	" ..	II.	" ..	Piper's Flat Auriferous Cement Co.	John O'Dea and party.
13/5/95	4	2	10	" ..	"	" ..	Venture	The Venture Gold-mining Co. (Ltd.).
20/4/96	20	0	0	" ..	I.	" ..	Addison	Henry Warne.
20/7/96	20	0	0	" ..	II.	" ..	Londonderry Gold-mining Co.	Stephen Garvin and party.
				Charleston.				
12/4/90	12	1	0	..	VI.	Waitakere ..	Dublin City ..	W. Norris, M. and J. Towhill, and P. O'Connor.
21/11/89	5	0	34	..	"	" ..	Morning Star ..	P. Dwyer, M. Connolly, J. Gregory, and H. H ner.
1/12/90	6	0	0	..	"	" ..	Big Bonanza.. ..	P. Hanigan.
17/8/93	8	2	37	..	"	" ..	..	Edward McClatchie.
23/11/94	10	3	39	..	"	" ..	..	Thomas Shine.
12/6/95	5	3	0	..	I.	Brighton ..	..	M. and T. O'Brien.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—*continued*.

Date of License.	Area.			Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
				Charlston—continued.				
	A.	R.	P.					
20/5/95	1	0	31	..	IV.	Waitakere ..	..	S. Turner and W. Calvert.
6/7/96	8	1	13	..	VI.	" ..	..	Thomas Morris and J. Lyther.
9/8/88	8	0	0	Croninville ..	IV.	" ..	Great Extended ..	M. and J. O'Donnell.
21/10/95	68	0	17	Brown's Terrace	"	" ..	Brown's Terrace ..	William Wilson.
17/2/96	99	2	0	Four-mile ..	VI.	" ..	Aurora	Kastan and Charubin (Germany).
5/2/97	58	2	10	" ..	IX.	" ..	Four-mile Gold-mining Co.	"
5/2/97	99	1	20	" ..	"	" ..	Empress Gold-mining Co.	"
14/5/97	26	1	0	Nine-mile Beach	III.	" ..	Totara Gold-mining Co.	John M. Powell.
29/6/97	99	3	0	Charleston ..	VI.	" ..	Mount Pleasant Ext.	John C. McKerrow.
17/7/97	50	0	0	Deadman's Creek	IX.	Brighton ..	Deadman's Creek ..	George A. Hart.
29/10/97	50	0	32	Fool's Terrace..	IV.	Waitakere ..	Lucinda	A. M. Bourke.
28/10/97	38	1	18	Brown's Terrace	"	" ..	Lucy	"
				Lyell.				
17/2/97	99	1	27	Dee Creek ..	VI.	Inangahua ..	Dee Creek ..	Dee Creek Gold-mining Co. (Ltd.)
12/3/94	100	0	0	Matakitaki ..	VII.	Matakitaki ..	The Mammoth Hydraulic Sluicing Co.	Thomas George Macarthy.
19/8/97	39	2	34	Marina ..	XV.	Burnett ..	Hector	Hector Bates Walker.
19/8/97	29	3	27	" ..	"	" ..	Record	George Walker.
1/9/97	98	3	0	" ..	"	" ..	Ophir	George Von Belle and Francis John Walmsley.
17/2/97	10	0	0	Dee Creek ..	VI.	Inangahua ..	Dee Creek ..	Dee Creek Gold-mining Co.
14/3/92	5	0	0	White Point ..	XV.	Lyell ..	..	John Fennell and Robert Perkins.
16/1/96	19	0	0	Horse Terrace..	VII.	Matakitaki ..	Tyrone Sluicing Co.	William White.
18/11/97	5	3	33	Three-channel Flat	VI.	Inangahua ..	Jubilee	Matteo Della Vedova.
20/1/98	10	0	0	Dee Creek ..	"	" ..	Dee Creek ..	Dee Creek Gold-sluicing Co.
20/1/98	3	0	28	Marina ..	XV.	Burnett ..	Drover	George Walker.
22/5/96	42	2	32	Fern Flat ..	XVI.	Lyell ..	Buller	The Buller Gold-dredging Co. (Ltd.).
19/8/97	47	0	0	" ..	"	" ..	Central Buller ..	Smith Langton Patrick Free.
18/11/97	70	2	21	" ..	XIII.	Matiri ..	North Buller ..	Bernard Patrick McMahon.
				Greymouth.				
21/8/88	13	2	22	..	XVI.	Greymouth ..	..	Druce and party.
29/9/90	10	0	3	..	{XIV., XV. III., IV	" .. Waimea ..	..	John Byrne.
13/10/88	2	0	0	..	..	Hohonu ..	..	Claus H. Linz.
21/12/96	49	0	6	..	XII.	Greymouth ..	..	John Druce.
7/12/96	35	2	11	..	III.	Waimea ..	..	H. J. Wickes.
1/6/97	100	0	0	Barrytown ..	IX.	Waiwhero ..	Barrytown Flat ..	Barrytown Flat Gold-mining Co. (Ltd.).
1/6/97	92	2	12	" ..	"	" ..	" ..	Ditto.
10/7/97	37	3	18	Paroa ..	III.	Waimea ..	Golconda ..	J. D. Gilles.
1/6/97	50	0	0	Fourteen-mile North Beach	I.	Te Miko ..	Pactolus Gold-mining Co.	Peter Wilson and William Campbell.
3/8/97	100	0	0	Barrytown Flat	"	Waiwhero ..	Inverness Gold-mining Co.	Alexander MacDougall.
29/12/97	100	0	0	Barrytown ..	"	" ..	Barrytown Flat Co.	James Charles Duncan.
23/2/98	100	0	0	Stillwater ..	X.	Arnold ..	Record Find Co. ..	Alfred Yeadon.
17/2/92	16	1	0	..	IV.	Hohonu ..	..	Low Hoyd and party.
28/6/94	10	0	0	..	"	Waimea ..	..	John Byrne.
16/3/96	7	2	7	..	V.	Waiwhero ..	..	Davies and Egden.
23/4/96	20	2	0	..	IV.	Waimea ..	..	John Walsh.
9/7/96	15	0	25	..	"	" ..	..	E. A. Wickes.
12/11/96	7	3	6	..	I.	Hohonu ..	..	C. H. Linz.
28/1/97	20	0	0	..	V.	Cobden ..	..	Gifford and Will.
14/4/97	25	0	0	Barrytown ..	I.	Waiwhero ..	Lawson's Creek Hydraulic Sluicing Co.	Evan Henry Lewis.
26/5/97	30	0	0	Paparoa Range	V.	" ..	Kahnui Extended ..	Cornelius R. Skelly.
				Kumara.				
4/3/87	30	0	0	..	XII.	Waimea ..	Enterprise ..	James Conaghan and party.
17/2/93	9	0	0	..	IX.	Hohonu ..	..	Elizabeth Burr and party.
18/8/93	10	0	0	..	"	" ..	..	The Greenstone Sluicing Co.
15/12/93	10	0	0	..	XII.	Waimea ..	Deep Level Claim..	A. J. Williamson and party.
8/5/95	8	0	0	..	"	" ..	..	Jane Bowden and party.
28/10/96	22	3	4	..	"	" ..	..	Jeremiah O'Sullivan.
14/6/97	32	1	2	..	..	" ..	Larrikin's ..	Thomas Moynihan.
14/4/97	16	0	0	..	..	" ..	Shamrock Lead ..	John Cullen and party.
28/7/97	30	0	0	Greenstone ..	..	Hohonu ..	Maori Point ..	William O'Grady and party.
1/7/83	10	0	0	..	XII.	Waimea ..	Long Tunnel ..	The Kumara Long Tunnel Gold-mining Co.
1/1/83	50	0	0	..	"	" ..	" ..	Ditto.
1/7/86	30	0	0	..	IX.	Hohonu ..	..	The Greenstone Sluicing Co.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—*continued.*

Date of License.	Area.			Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
					Stafford.			
	A.	R.	P.					
23/5/90	8	0	0	..	XV.	Waimea ..	Callaghan's ..	J. Doyle and party.
1/2/97	30	0	0	..	V.	Otira ..	Taipo Sluicing Co...	H. P. Hill.
1/2/97	27	1	3	..	II.	Waimea ..	Lamplough Cement Gold Co.	James D. Gillies.
2/9/97	7	1	39	..	XV.	" ..	Goldsborough ..	J. McWhirter and party.
1/9/97	17	0	0	..	V.	Otira ..	Taipo	H. P. Hill.
1/12/85	28	0	0	..	XIV.	Waimea ..	Wheel of Fortune ..	G. F. Batchelor.
28/8/89	4	0	0	..	"	" ..	Stafford	Benjamin Lyons.
14/5/97	100	0	0	..	VIII.	Turiwhate ..	Taipo	Michael McInerney.
14/5/97	100	0	0	..	"	" ..	"	T. Stafford and another.
					Ahaura.			
10/9/92	45	0	0	..	VIII.	Mawheranui	New Bendigo Gold-mining Co. (Ltd.)	Nelson Creek Gold-mining Co.
24/4/93	5	1	5	..	"	"	Larkin and Party ..	Richard Larkin.
24/4/93	11	1	0	..	VII.	"	Donnellan and Sons	Patrick, John, Peter, and William Donnellan.
25/9/93	19	1	36	..	VIII.	"	Nelson Creek ..	Clement Parfitt, Michael Ward, Henry Brunetti, Patrick Gilligan, John Collins, and Edward Comerford.
30/3/94	49	2	23	..	I.	Kopara ..	Bell Hill	Bell Hill Gold-mining Co. (Ltd.).
18/5/96	48	2	34	..	X.	Mawheranui	No Town Gold-mining Co.	Clement Parfitt.
22/6/96	50	0	0	..	V.	Kopara ..	Bell Hill Surprise Gold-mining Co.	Henry Burger, James Malloy, David McConnor, James McConnor, Richard Clough, James Holmes.
27/7/96	42	3	30	..	II.	Ahaura ..	Perseverance ..	George Erickson and two others.
26/4/97	49	3	19	..	III.	Mawheranui	Montgomerie Terrace	Thomas Jones.
11/11/95	30	0	0	..	"	"	Republic Hydraulic Sluicing Co.	Thomas Baxter, James Baxter, Thomas Jones, William Baxter, Alfred Ford, John Walsh, Henry Bignell, John Fitzgerald, and six others.
11/11/95	28	3	3	..	VIII.	"	Nelson Creek ..	Nelson Creek Gold-mining Co. (Ltd.).
27/7/96	20	0	0	..	II.	Ahaura ..	Young Napoleon Gold-mining Co.	Lemon W. Garrod and eleven others.
28/9/96	10	0	3	..	VIII.	Mawheranui	Larkins and Party	Richard Larkins and five others.
26/4/97	30	0	0	..	"	"	German Gully ..	David Flannery.
24/1/98	5	3	28	..	I.	Ahaura ..	The Arthur Lease ..	Arthur Brooks and Arthur Dunn.

MARLBOROUGH.

Mahakipawa District.

King Solomon Mine.—The shaft, which is 120 ft. in depth, is well lined, and fitted with an efficient ladder. Power is obtained from a 30 ft. overshot water-wheel. The level at the bottom of the winding-shaft is on the run of washdirt towards the south-east some 300 ft. Small parties of miners continue working on the upper parts of the stream, and generally earn fair wages.

Wakamarina Gorge Claim.—Operations are now being actively carried on from the upper end of the gorge. The stuff is filled into trucks and taken on the incline tramway to the top of the dam, where it is emptied into sluice-boxes. Two sets of pumps, 3 ft. to 5 ft. stroke, raise the water to the surface. There are fourteen men employed, and considerable improvements have recently been made. The works are now in such forward progress that it will be possible to obtain the washdirt from the main bottom for a considerable portion of the full length of the gorge. In taking up the gravel a bar of rock was found lying across the old channel. This was cut through to a depth of about 10 ft. The length of the basin immediately above the bar is about 100 ft., and, saving accident by floods, this part will soon be worked out.

On the north of the Wairau River gold is occasionally worked in all the tributaries from Onamulutu up to and for some distance past Top Valley Stream. The returns are, on the whole, of a very moderate value.

Individual miners throughout the district appear in most instances to be doing very well, and several nice parcels of gold won by these men during the past few months, have been shown. Hydraulic sluicing on the scale in vogue in the southern districts is not practised here, though the country bears favourable indication that this form of mining would, if carried out in a systematic manner, be productive of profitable results. A very primitive form of mining is much practised during the summer months in the beds of the rivers and creeks, and is known as "blind stabbing." The miner, with a rod, on the end of which is placed some adhesive material, stirs up the auriferous wash, and, the water having cleared, secures the specs of gold on the adhesive substance, usually tallow, on the rod. By this extremely primitive method miners sometimes obtain gold that gives small wages on the Wakamarina, Quartz, Arm Chair, and Tipperary Creeks. A number of dredging claims have been applied for recently, and though only one—the Wakamarina Dredging Com-

pany's—has actually been at work, the returns from which have not been published, it is anticipated that the dredging industry will, in the near future, be largely in evidence throughout the auriferous river- and creek-beds in this district.

Nelson.

Takaka District.

Only a few men have been employed in this district during the past year. At the Bubu and Anatoki districts several parties are at work, with varying success, the scarcity of water being a drawback.

Collingwood District.

Rocky River Sluicing Company (Area, 100 acres).—Arrangements are being made for the effective working of this company's property. Water for sluicing is now obtained from Mackenzie Creek, but a race is being constructed from Rocky River. There is a large area of gold-bearing cement underlaid by limestone on the property.

Johnston's United Mine has been under protection, and in February last the prevailing bush-fires destroyed the battery and plant.

Parapara Hydraulic Sluicing Company.—Hydraulic-sluicing and elevating works have been carried on with varied success. The yield of gold up to December last was 198 oz., and no doubt this would have been largely augmented had they not been hampered for want of water during the greater part of the summer. The returns up to the end of February were 87 oz. of gold, showing a decided improvement compared with a similar period during last year. Mr. Peters, the former manager of the Roxburgh Amalgamated Claim, in Otago, took over the management in the beginning of 1898, and since that time matters have assumed a better aspect. Both the elevating and sluicing plants are in improved working-order, and there is every evidence of a continuance of satisfactory yields. The want of a sufficient water-supply throughout the year is a material drawback to this company. The present manager estimates that large areas of auriferous drift exist on the properties which will prove payable, but in order to secure interest on the capital employed greater quantities must be dealt with, and in order to effect this the present water-supply must be increased by improved water-races and by the conservation of the winter's rainfall. The manager has instructions to move the elevating plant from its present position to a block of land known as the "Maori Reserve," nearer the Parapara River, and having an easy way of getting rid of the tailings. The only reason for making this change is a difficulty in the manner of discharging the tailings from the elevator where it is now placed.

Collingwood Goldfields Company.—The following comprehensive report is taken from the *Golden Bay Argus*:—

"This company, whose headquarters are in London, holds, as we have before indicated, over 300 acres of the rich alluvial areas at the Quartz Ranges, about twenty miles from Collingwood. When some two years ago the possibilities of this locality as a legitimate mining speculation were first brought under the notice of foreign capitalists the cost and difficulties of providing the necessary water-supply for its proper development was considered a serious obstacle to the ultimate success of the scheme, and the company commenced its operations by making expensive and elaborate surveys with a view to ascertaining with some degree of scientific correctness the probable cost of connecting the alluvial deposits with an adequate supply of water, the cost being variously estimated at from £20,000 to £50,000. The result of these surveys, which were carried out under the supervision of Mr. Holdsworth, C.E., by whom a survey-line was traversed from the ranges to the Boulder Lake, over four miles distant, and levels taken, proved the feasibility of bringing a large water-supply from Boulder Lake and the Boulder River, but the expense was still considered somewhat formidable. It was then estimated that a large proportion of this race would require fluming, the quantity of timber necessary for which was put down at no less than 750,000 ft., while, owing to the rough and broken nature of the line traversed by the race (which is all through heavy bush country), the cost of cutting the race, bridging of creeks and gorges, was thought to be almost prohibitive. It was intended that the timber should be obtained from the local sawmills, and transported some miles to the race, at considerable cost, not the least of which would be the necessity for bridging the Aorere River at Salisbury's crossing. Thus it was that the development of these rich alluvial areas was considered almost beyond the region of reasonable practicability. The next step in the company's operations was the engagement as manager of Mr. F. G. Mace, a gentleman of extensive experience, both in this colony and Tasmania, in this particular class of hydraulic sluicing, and who has recently obtained his certificate as a member of the New Zealand Institute of Mining Engineers. After a careful and minute inspection of the locality, the peculiar natural advantages of the surroundings seemed to suggest to Mr. Mace an easier and less expensive method of obtaining the much needed water-supply, and accordingly an alternative scheme for the attainment of this object was laid before his superiors. In the upper reaches of the Aorere Valley the immense tracts of valuable virgin timber lands attracted the attention of the new manager, and a hasty survey of the neighbourhood confirmed the feasibility of the alternative scheme, by which this timber could be utilised for the construction of the water-race in such a manner that the obstacles which had before presented themselves could be reduced to an almost vanishing point. Acting upon these suggestions, the superior management secured large timber rights in the valley, purchased a complete sawmilling plant of their own, and entered heartily upon the carrying-out of the projected scheme, with the result that at the present moment quite an extensive industry has been established in connection with the company's operations. The sawmilling plant, which consisted of all the requisite adjuncts, was deposited at the Seventeen-mile Creek some months ago, and has been running with wonderful regularity and smoothness ever since, and is turning out timber at the rate of about 5,000 ft. per day, some 300,000 ft. now being stacked in the vicinity of the mill ready for transport to the race. Adjacent to the mill a suitable

site was found in the Aorere River for the erection of a small jetty, from which the timber is conveyed across the river in a punt, and from thence will be taken to the ranges by means of a tram-line, which is being constructed for a distance of nearly four miles, and has now almost neared completion. The site of the sawmill has been chosen with due regard to the saving of manual labour, the greatest disadvantage being its distance from a seaport and the consequent extra expense of food-supplies for the bullocks and horses employed about the mill, of which there are twelve of the former and three of the latter. From the mill the timber is taken by means of a tram-line to the river-edge, about 20 chains, where it is deposited into a large punt (constructed on the spot) capable of carrying over 10,000 ft. per day, and from thence is conveyed to the opposite bank, where also a good landing-place has been provided by Nature. From here commences the tram-line, which is constructed in the ordinary manner with sleepers, wooden rails, and well ballasted. For the first mile or so the tram-line runs through bush country, from whence it opens out into pakihi lands, over which it continues its course right to the Quartz Ranges, attaining an altitude of over 1,200 ft. in about four miles, in which the steepest grade obtained (and that for only a short distance) is 1 in 7, the average grade being 1 in 16. It is intended that the timber shall be taken over this tram-line to the race-line by means of horses and trucks, and the trucks will be run down again by brakes specially constructed for speed and safety. It is estimated that by the securing of the valuable timber lands, purchase of milling-plant, and construction of this tram-line, the cost of the necessary timber will be reduced to about one-sixth of the expected cost under the original scheme proposed, a circumstance which has removed one of the greatest obstacles in the way of ultimate success. Almost simultaneously with the carrying-out of the above preliminary works, Mr. Mace has also pushed forward the benching of the water-race, of which up to the present nearly one mile has been completed. The construction of the race will prove a work of some magnitude, traversing as it does some of the most broken and mountainous country in the district, and the continuity of the race is broken at frequent intervals by deep ravines and gorgy creeks, which will all require bridging, timber for which is being squared on the ground. The engineering difficulties are, however, not by any means insurmountable, and under efficient management the work is progressing rapidly. The dimensions of the race, which will be over four miles long, are: 6 ft. wide at top, 4 ft. 6 in. at bottom, and 3 ft. 8 in. deep; while the flume is 4 ft. wide and 3 ft. 3 in. deep. The race will have a fall of 3 in. to every 100 ft., and the flume 6 in. to every 100 ft. The carrying-capacity of this structure will be fifty Government heads of water—*i.e.*, the volume of water which can be discharged therefrom equals 19,500 gallons per minute—which magnificent supply, it is anticipated, will be obtainable in the Boulder River and Boulder Lake; and for the further conservation of the supply it is also proposed to construct a dam at the mouth of the lake—an already valuable and extensive sheet of water, of an average depth of 16 ft., and 105 acres in extent—by which the volume of the precious fluid will be almost doubled. When consummated, this water-supply scheme could be made to command thousands of acres of rich alluvial country for many miles around, which only require such a water scheme to develop them into payable ventures. In addition to the saving effected in the cost of timber as already enumerated, it has been discovered in the benching of the race that the nature of the country traversed by the race is such that in the construction much of the fluming can be dispensed with, and open race substituted: thus a considerably less quantity of timber will be required than formerly estimated. The collective advantages thus obtained have reduced the probable cost of carrying the whole project to an actual working-point to quite one-half of the lowest estimate originally ventured upon by the most sanguine, and the management now consider the work will be carried out at much less than their own estimate. The hydraulic plant required by the company in their sluicing operations, which will be considerable, is to be obtained from Dunedin, and the contract for supply is already in hand, the plans and specifications having been prepared by Mr. Mace on the ground, so that every portion of the works will go forward together. Mr. Mace anticipates that, if no great unforeseen obstacles arise, the race will be completed and the hydraulic plant erected and in full working-order early in next year; but, of course, a great deal depends on the weather in such an inhospitable locality. Although the Quartz Ranges, practically the whole of which the company holds, has long been considered one of the most promising alluvial fields in the colony, and this opinion has always been amply verified by the large yields of heavy gold which have been obtained there for over a quarter of a century by the most primitive methods of mining, the management wisely took the precaution to systematically prospect their property for themselves, which work Mr. Mace has recently had done by practical miners, who were employed in sluicing and prospecting in various portions of the property. The results of these operations are reported to have been very satisfactory, and appear to have placed the ultimate prosperity of the venture beyond the problematical stage, especially in the face of the very much reduced cost of its development. At present the company employs about sixty workmen, distributed over its several centres of operation. Mr. Mace is in full charge, and has proved himself a really practical, energetic, and capable officer."

Motueka District.

Wangapeka, Sherry, and Baton.—Some thirty men are employed in these subdistricts, and are earning fair wages. The special claims applied for in the Mount Arthur district have not been taken up.

WEST COAST.

Westport District.

Addison's Flat (Halligan and party).—Six men are employed here opening up a new face near the Charleston Road, from which a shaft is sunk connecting with the tail-race. The plant in connection with the tramway water-balance is in effective condition.

Shamrock Claim.—Considerable improvements in the appliances for working this claim have been effected during the past year, and an additional six heads of water have been obtained. Eight men are employed.

General Exploration Company.—This company has been engaged in developing the Fairdown Terrace, to the northward of the Buller River, and the Bendigo Terrace, to the southward. The high-level cement areas at Four-mile are also to receive attention, while extensive prospecting operations have been carried on throughout the company's properties. It is intended to further enlarge the water-supply for the Fairdown Claim, and surveys have also been completed for an additional water-supply for Bendigo and Addison's Flat. To date the company has constructed 25,014 ft. of water-races and 10,857 ft. of tunnelling. The average number of men employed has been 218.

Addison's Flat Golden Sand Company.—This Auckland company employs twelve men, and has a ten-head battery, and an incline tramway on which the cement is brought to the mill, the motive-power being supplied by a 12 ft. water-wheel.

Venture Claim has a twelve-stamp battery, driven by a 30 ft. diameter water-wheel, which is employed in crushing the cement, which is brought to the mill by means of a horse-tramway. Eight men are employed.

Milligan and Party's Claim (Area, 50 acres).—Eleven men are employed. A ten-head stamper battery, driven by a 6 ft. Pelton wheel, is in use.

Charleston.

Dublin City Claim (Area, 9 acres).—An eight-head battery, driven by a water-wheel 36 ft. in diameter, is being worked by the four shareholders.

Morning Star Claim.—A four-stamp battery, driven by a water-wheel 35 ft. in diameter, crushing about sixteen loads of cement a day, is at work. Four men are employed.

Dee Creek Gold-sluicing Company (Area, 99 acres).—A water-race has been constructed three miles in length, and a dam has been erected. A tunnel is being driven to enable the tailings to be discharged into Dee Creek. It is anticipated that sluicing will be commenced in June. Thirty men are employed.

At White's Point a scheme for the diversion of the Buller River is contemplated, and two special claims have been applied for, which will be drained should the diversion be successfully carried out.

At Maruia Mr. George Walker has two special claims and a licensed holding, comprising some 70 acres of alluvial ground, and water is now being brought in for use in ground-sluicing.

Inangahua District.

A 1 Sluicing Claim.—A subsidised prospecting tunnel in this claim has been put in a further distance of 728 ft., and is now in 1,317 ft. It is anticipated that the alluvial flat near Boatman's will be opened up on the completion of this drive.

Grey District.

Barrytown No. 1 Claim (Area, 92 acres).—Twenty men have been employed in development operations during the year. The water-races are in a forward state, and it is anticipated that elevating appliances will be completed at an early date.

Barrytown No. 2 Claim.—The construction of a water-race one mile in length has been energetically carried on. The wash in this claim is to be worked on the elevating principle, and, as the area is 100 acres, there is a large quantity of material to be operated on.

Waiwera Special Claim.—Fifty men are employed on this property in the construction of water-races.

The beaches between Greymouth and Barrytown furnish payable employment for a number of men.

Ahaura District.

There are a large number of individual miners working in this district, at Callaghan's Creek, Nelson's Creek, and their tributaries. In German Gully development-works are being carried out by a Christchurch syndicate preparatory to starting hydraulic sluicing.

Orwell Creek and Pennyweight Flat.—A considerable number of individual miners are engaged here, and if the water-supply were more regular their returns would be greater.

Grey Valley.—The work of constructing water-races at Sulky Gully is being pushed on, and 185 chains between the rocky tunnel and head-race has been cut.

The Montgomery Terrace Company intend to bring in water from Blackball Creek, a distance of some four miles.

Half-ounce, Duffer's, Granville, and Noble's Creeks.—Only a few miners are employed on these creeks, in consequence of want of water.

Bell Hill.—A few parties of miners are still working at Bell Hill, and water has been brought in by a Christchurch company to work their licensed holding.

Taipo.—The Taipo Sluicing Company have been carrying on operations with a fair amount of success.

No Town and Red Jack's.—A number of Chinese are working the beds of these creeks, and sluicing operations are being extensively carried on.

Roaring Meg Sluicing Claim, Upper Blackball (Area, 50 acres).—Mr. G. Perotti, of Greymouth, gives the following account of the works:—

"Last year the company bore the name of Roaring Meg Water-race and Gold-mining Company, in co-operation. In September, 1897, the company was reorganized, under the appellation of the Roaring Meg Sluicing and Hydraulic-power Company (Limited). The first company, after spending £8,000 or £9,000 in development of the property, were unable to produce the further capital required to bring the claim to an effective working-point, and in order to succeed the old shareholders had to

sell part of their interest, and the new company was floated. I am a director of the new company, and am probably in the best position to detail the work done in the past twelve months. In the report for 1896–97 I stated it was the company's intention to erect hydraulic cranes for lifting the numerous large boulders of the wash, and to instal the electric light for working twenty-four hours per day. The new company is pushing on the work of erecting machinery with as much energy as circumstances allow, but they are retarded by the difficulty of carrying heavy machinery along an inferior pack-track. This difficulty is now obviated by the construction of a tram-way-line, done by private enterprise, and the machinery can now be carried to the claim without difficulty or risk. A pipe-line was cleared for utilising 600 ft. of hydraulic pressure. A 5-ton crane has been purchased in the colony, and a 5-ton derrick, with a jib 45 ft. long, has been imported from America. The American derrick is such as is used in America for the same purposes, and is described as very effective in the quick disposal of heavy stones. The company has employed two men constantly through the year sluicing, although such work under the existing conditions did not pay. During the year the company spent a large amount in procuring machinery, and next year the operations should produce a much more favourable state of gold-production."

Healey's Gully.—The claims at Healey's Gully, though proving remunerative, are being worked under disadvantages, in consequence of the insufficient supply of water, the whole supply of the field being in the hands of the Great Republic Company, and is used by that company during the day; the other miners, whose intention it is to erect a reservoir in Roaring Meg Creek, having at present to use the water during the night.

Kumara, Waimea, and Stafford.

These districts are fairly prosperous, the past year being favourable for sluicing operations, and in consequence satisfactory returns were in most cases obtained. To the mouth of the Teremakau, and on the Greenstone, the only change worth recording is the improvement in the races and dams of the Erin-go-Bragh Company. Owing to the improvements thus made, this company now supplies a large number of claims below the Greenstone Road. P. Grady and party's special claim has been taken up by a Christchurch syndicate, and they are now busy with race and dam construction, preparatory to a more extensive way of working. First-class returns were obtained from this claim before it passed into the hands of the present owners. It will be some time before the syndicate will be in a position to prove the value of this property. Considerable improvements have been made in the methods of sluicing the ground worked during the year, but, notwithstanding this, several claims have been abandoned on account of non-payable results. Further prospecting has been done in the deep levels, and, although there are several claims now at work and paying small wages, no rich runs have been discovered.

The deviation of the Waimea Water-race at Kawaka has considerably improved the water-supply for the Waimea and Stafford districts, and the Wainihinihi Race, when completed, will still further augment it; in fact, after the race is completed the supply will be ample and constant. A survey of the race has been made, and it is anticipated the work of construction will be proceeded with forthwith. No stoppage in the supply occurred during the year. The branch race to Callaghan's has been made use of by a few parties during the year, and, as there is a considerable area of unworked ground in the locality, a more extensive use of the race-water may be looked for in the future.

The Middle Branch dams and branch race, for the supply of water to the claims intending to sluice into the Waimea Main Tail-race, have had very little done to them during the year.

The Waimea Main Tail-race has been completed, with the exception of timbering the jump-up and one or two small matters, and could, with a very small expenditure, be made use of at once. The delay in making use of this tail-race has been caused by certain financial difficulties, which it is to be hoped soon will be settled. The starting of sluicing in this main tail-race would give a great impetus to mining in the district.

The Kelly's Terrace Drainage Tunnel has been driven about 2,602 ft., but no gold has been met with. A further distance has yet to be driven before known auriferous ground will be reached.

The general supply of water for the year was ample; the dams were empty for only two days during the whole year. The increased capacity on the large dam at the Loop-line Road has been a great boon to Kumara, as, had it not been for this, water would have been short on the field on several occasions. The completion of the Wainihinihi Race will to a large extent render the supply for Kumara independent of long periods of dry weather, and make it regular and constant.

The No. 5 Channel is drawing near completion in a satisfactory manner, and before another year expires several claims should be opened out, and sluicing into it. The starting of sluicing into this channel should tend to a revival of mining in Kumara, and a much greater demand for water.

The principal claims supplied by the Government race are those of Lee and party, ten men; Shrive's, five men; Carlson, four men; Schrœder, four men; Bowden, four men; Marshall, four men; Pascoe, six men; Dillon four men; Williams, three men; Light, five men; Neame, three men; O'Connell, five men; Rochford, four men; Harris, five men; Neville, four men; Conaghan five men; Cullen, six men. The total quantity of gold obtained by the parties using water from the Government water-race during the year, was 4,720 oz., valued at £18,408.

The Wheel of Fortune Special Claim is reported to be yielding fair returns, and the owner is endeavouring to secure additional capital for its more extensive development.

Arahura District.

Prospecting operations are being carried on by Dwyer and party.

Humphrey's Hydraulic Sluicing Company (Limited).—Sluicing operations were carried on with two nozzles, for which twenty sluice-heads were used. Surveys have been completed for the

new water-race, through which a permanent supply from the Arahura River will be brought to the ground. The work of construction entails nearly eight miles of new race above the present reservoir, and a mile and a half between the Long Tunnel and Black's Tunnel. The old race is being renewed, and all structures replaced by works of a more permanent character. The Long Tunnel has been put in a good state of repair, thus making accessible the gravels lying on the McDonald's Gully side of the property. At least two faces are to be opened in Humphrey's Gully, and the water-supply thus distributed will make available for working all gravels lying between the north side of Humphrey's and the south side of McDonald's Gully.

Arahura Flat.

Boys' Claim.—Work has not been energetically carried on by this party. Dwyer and party, who are driving a tunnel for which a Government subsidy has been paid, have completed 1,627 ft. The total distance to be driven to reach German Gully is 2,373 ft., and the tunnel when completed will be 4,000 ft. in length.

Rimu, Back Creek, and Seddon's Terrace.

The claims in this district continue to afford profitable employment to a considerable number of miners. There is not a sufficient supply of water available for hydraulic sluicing to any very great extent. A number of men, however, are engaged in driving out the wash and sluicing it whenever a supply of water can be obtained. The scheme for bringing in water from Lake Kanieri has not yet been perfected, and, so far, survey work only has been carried on. Until a more extensive supply of water is brought to this field no increase in the yield of gold is probable.

Craig's Freehold and the other ground further down the river still yield satisfactory returns. A party of seven tributers are engaged on this ground.

Kanieri Forks.—The claims in this locality continue to be profitably worked, the Kanieri Lake Water-race furnishing a supply of water for hydraulicing and ground-sluicing.

Ross District.

Mont d'Or Claim.—Hydraulic-sluicing operations still continue to be profitably carried on. Twenty-two men are employed.

Ross United Gold-mining Company.—Twelve tributers are employed, with fair results, in the claim at Ross. The Prince of Wales Claim at Donoghue's Creek is also owned by this company.

Several other claims are also worked for fair returns in different parts of the district.

Donnelly's Creek.—Several parties have been working here throughout the year.

Duffer's Creek.—A tunnel, on which subsidy is being paid by the Mines Department, is being driven by Messrs. Marchesi and Scott, and has at present attained a length of 370 ft.

Okarito and Jackson's Bay.

The Waiho Hydraulic-sluicing Company is engaged in extensive operations on the terraces between the Callary and Totara Rivers, and a large amount of piping for the race is being carted to the ground. The difficulties of transport have somewhat retarded the commencement of operations, but it is anticipated that sluicing will be started in some four or five months. A considerable number of men have found employment in the preparatory works.

Most of the individual miners in this locality intend during the winter to work the beaches of the Upper Callary. The sea-beaches to the southward have furnished profitable employment to a number of men during the year.

Prospecting has been carried on with what is reported as satisfactory results in a special claim at Sardine Terrace, near the Ship and Bullock Creek, and a race to carry ten heads of water is to be brought in.

Lake Ianthe.—The works here are furnishing employment to some six men, who are apparently doing very well.

DREDGING.

Marlborough and West Coast.

Wakamarina.—Dr. McKenzie's dredge, which has been at work for a considerable portion of the year on the river, about a mile above Canvastown, yielded payable returns. The dredge was lately sold to a company, and additional ground was taken up. It is probable that a larger and stronger dredge will be built, the present one being of a description unsuitable for dealing with the heavy material of the wash in this river.

Mahakipawa.—A small dredge is to be put on to test the gravels in the flats leading to Pelorus Sound.

Buller River.—The Exchange (formerly Cocksparrow) dredge is working near Three Channel Flat. The company that first owned the dredge did not meet with success, and the dredge was disposed of to the wages-men, who are now doing well.

Buller Dredge.—This dredge has been working in the river at Fern Flat with satisfactory results. At present, operations are carried on at the junction of Husband's Creek with the Buller River, where there is a wide face of gravel to be dealt with. The owners are building another dredge in the vicinity of the present one. The new dredge, however, is meant to deal with double the quantity of gravel that can be done by the Buller dredge. Mr. R. Tennent, Inspector of Mines, who made a special examination of the Buller Company's new dredge, obtained full information, of which the following are some of the particulars:—

"The pontoons are 90 ft. long, having a square deck-floor of 75 ft. in length by 25 ft. in width, including 4ft. 6 in. for well-hole in centre. The front parts are strongly built bulkhead watertight compartments, connected with heavy overhung beams to guard against floating timber in river-flood. The timber is specially selected for their construction, being black-birch for frame-

work and totara for lining. Dimensions of timber: Studs, 6 ft. long by 6 in. by 4½ in.; cross-stays, 6in. by 4 in.; side-lining, 9 ft. by 2½ in.; bottom-lining, 12 in. by 3 in. The bottom-lining plank around the side is 12 in. by 3 in. The estimated quantity of timber in the construction of these portions is 40,000 ft. The bucket-ladder, built of heavy brattice-work, is 49 ft. long, and weighs about 8 tons. It carries twenty-seven buckets, 7 cwt. each, with a capacity of 4½ cubic feet, discharging from eight to ten buckets per minute, and capable of lifting from a depth of 35 ft. The ladder is hung from the tumbler-frame, which is 12 ft. above deck, and suspended at the bottom by means of wire rope with block and tackle from a beam supported by a strong frame of angle-iron, and can be raised and lowered as required by the steam-winches. The engines are of the compound type, supplied with steam at 120 lb. pressure, and worked to 40-horse power. Engines and boiler are supplied by Messrs. Marshall and Co., engineers, Birmingham. The material discharged from the buckets is landed on to a delivery-plate, down which it shoots into a steel-plate revolving-screen, 17 ft. long, with a fall of 20 in., and filled with ½ in. perforated holes. A 10 in. centrifugal pump supplies water to thoroughly wash the drift. The finer wash and gold falling through the perforated screen is collected into a distributing-box, from thence over a surface of gold-saving tables 160 square feet laid with plush. The waste is collected into a flume and run over the stern. The rough *débris* from the screen is lifted by a tailings-elevator carrying twenty-six buckets, and discharged over the stern end. The whole of the ironwork is of the most modern and improved construction, and was obtained from various engineering shops in Dunedin, the total weight being about 80 tons. Bolts, 16 in., and spike-nails, are imported; those over this length are made in the colony. Calculations for working-expenses are from £30 to £35 per week, £8 being the estimated cost for fuel (wood to be used). Seven men employed on board for three shifts."

This dredge, when completed, will cost about £4,500.

Murchison.—The Matakitaki Gold-dredging Company have recently built a new dredge for working the gravels in the Matakitaki River, on which they have secured a claim of 37 acres 3 roods 37 perches near Murchison. A commencement has been made, and operations give promise of success.

Mahinapua Creek.—Philips's Dredging Company launched a dredge in November last, and work of a preparatory and prospecting character has been carried on in the swamp flat about a mile from Lake Mahinapua.

Dredging has not, so far, obtained the hold on the West Coast in such proportions as have attended this method of working in the Otago District. There are, however, evidences that many of the flats containing auriferous gravel will yet be dealt with in this way. The success which has attended some of the pioneer dredges in Otago in conducting operations where no large stream or river is available has demonstrated the possibility of working large quantities of gravel with a very limited water-supply.

There is a general disinclination on the part of dredge-owners to furnish returns of gold, the result of their operations, but the following particulars have been published by the Buller Dredging Company: May, 1897, 76 oz. 10 dwt.; June, 67 oz. 10 dwt.; July, 63 oz. 15 dwt.; August, 97 oz.; September, 59 oz. 10 dwt.; and show the profitable nature of their dredging work.

Otago and Southland.

Abstract of Licenses for Special Claims and Licensed Holdings issued from the Wardens' Offices, and registered on or before the 31st March, 1898, in the Books of the Mining Registrar.

Date.	Area.			Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
					Naseby.			
	A.	R.	P.					
1/1/84	30	0	0	St. Bathan's ..	II.	St. Bathan's	..	St. Bathan's Water-race Co. (Ltd.).
1/1/84	35	0	2	" ..	VII.	"	..	Scandinavian Water-race Co. (Reg.).
31/8/92	10	0	24	" ..	I.	"	..	Thomas Hughes and J. Morgan.
1/1/93	5	0	0	Naseby ..	II.	Naseby ..	..	John Hore.
5/5/93	29	2	32	St. Bathan's ..	VII.	St. Bathan's	..	United M and E Water-race Co. (Reg.).
21/7/94	100	0	0	" ..	I.	"	..	John Ewing.
23/2/95	24	0	0	" ..	II.	"	..	United M and E Water-race Co. (Reg.).
30/11/96	39	0	30	" ..	I.	"	..	John Ewing.
15/12/96	50	0	0	Serpentine ..	XIII.	Long Valley	Laffey and Party ..	John Laffey.
15/12/96	47	3	10	" ..	"	"	"	Patrick Laffey.
25/3/97	63	0	0	Enterprise Gully, Naseby	XVIII.	Naseby ..	(Alluvial and dredging)	Thomas Jackson.
10/9/97	43	0	0	St. Bathan's ..	III.	St. Bathan's	..	William McCormochie and J. Kennedy, jun.
10/9/97	95	2	0	" ..	I.	"	..	John Ewing.
23/11/97	55	3	0	Naseby ..	III.	Naseby ..	(Alluvial and dredging)	James Sim.
21/1/98	75	3	34	St. Bathan's ..	I. IV.	St. Bathan's Blackstone	..	John Ewing.
6/8/88	15	0	0	Hamilton South	I.	Rock and Pillar	..	John Hambley and others.
9/9/90	8	0	0	Naseby ..	"	Naseby ..	..	Enterprise Water-race Co. (Reg.).
11/7/90	16	0	20	St. Bathan's ..	"	St. Bathan's	..	Bank of New South Wales.
5/5/93	7	2	37	" ..	"	"	I.X.L.	Harry Excell and another.
1/1/92	10	0	0	" ..	II.	"	..	St. Bathan's Water-race Co. (Reg.).
20/9/93	5	2	13	" ..	III.	"	..	M. Hunt, H. Mee, and Bank of New South Wales.
20/2/95	10	0	0	Mount Highlay, Hyde	Pt. VIII.	Rock and Pillar	Deep Sinking Co. ..	W. Mathewson and others.
6/2/95	16	2	17	St. Bathan's ..	VII.	St. Bathan's	St. Bathan's Water-race Co.	St. Bathan's Water-race Co. (Ltd.).
12/2/95	18	2	26	Naseby ..	Pt. I.	Mount Buster	Mount Buster Mining Co.	Mount Buster Mining Co.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—*continued.*

Date of License.	Area. £	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
				Naseby—continued.				
24/9/95	3	0	0	Naseby ..	I.	Naseby ..	Extended Water-race and Sluicing Co.	John Hore.
6/3/96	6	0	0	St. Bathan's ..	IV.	Blackstone ..	..	Robert Jones.
13/10/96	19	2	28	" ..	II.	St. Bathan's	..	John Ewing.
19/8/96	11	0	16	Hyde ..	XVI.	Maniototo ..	Hyde and Find Co.	Hyde and Find Gold Co. (Ltd.).
29/9/96	4	2	19	Naseby ..	I.	Town of Naseby	Inder Brothers Hydraulic Co.	R. S. F. Inder and F. W. Inder.
29/9/96	4	0	0	" ..	"	Naseby ..	..	Simeon Hewitt.
29/9/96	8	0	0	" ..	II.	" ..	Enterprise Water-race Co.	Enterprise Water-race Co. (Ltd.).
27/10/96	29	2	21	Taieri River, Hyde	III.	Rock and Pillar	Capburn Mining Co.	Taieri Gold-sluicing Co. (Ltd.).
27/10/96	29	2	12	Ditto ..	"	"	Capburn Sluicing Co.	"
6/11/96	17	3	0	St. Bathan's ..	II.	St. Bathan's	..	Scandinavian Water-race Co. (Reg.).
25/3/97	3	3	28	Naseby ..	I., VIII.	Town of Naseby	..	Charles Hore.
25/3/97	11	2	20	" ..	I.	Naseby ..	..	Sarah J. McLaren, Jane Paisley, and Julia Guffie.
7/9/97	5	2	0	" ..	II.	" ..	..	John Hore.
7/9/97	21	0	0	" ..	XVIII., I.	" ..	..	Richard L. Francis.
10/9/97	4	1	18	St. Bathan's ..	I.	St. Bathan's	..	William Gay and James Fordham.
21/1/98	28	3	0	" ..	III.	"	..	James Hesson and others.
14/12/97	13	0	7	Naseby ..	I.	Naseby ..	..	John W. Reed.
				Dunedin.				
14/8/96	40	0	0	Lee Stream ..	VII. "	Deep Stream Lee Stream..	..	Deep Stream Hydraulic Sluicing Co
14/8/96	40	0	0	Sutton ..	X.	Sutton	..	"
13/1/97	40	0	0	" ..	XII. VII.	" Lee Stream	..	"
13/1/97	38	0	0	" ..	XII. VII.	Sutton .. Lee Stream	..	"
29/4/97	25	3	17	Nenthorn ..	XI., XII., VII.	Nenthorn ..	..	D. C. Simpson and H. Piper.
12/10/97	41	1	0	Lee Stream ..	VII.	Lee Stream..	..	J. G. Sawell.
20/10/98	26	1	30	Nenthorn ..	"	" ..	..	Thomas A. Hunter.
3/7/96	12	3	4	Mount Hyde ..	IV.	Mount Hyde	..	Richard Sheppard.
3/7/96	16	2	0	" ..	V.	"	..	Harrison and Lyders.
7/8/96	16	2	0	" ..	"	"	..	"
2/10/96	9	2	39	" ..	VI.	"	..	John Macdonald.
8/1/97	13	2	12	Sutton ..	X.	Sutton ..	..	Deep Stream Amalgamated Hydraulic Sluicing Co.
8/1/97	20	0	0	Mount Hyde ..	IV.	Mount Hyde	..	James Garrett
7/5/97	3	3	17	Lee Stream ..	VII.	Lee Stream..	..	Deep Stream Hydraulic Sluicing Co.
				Cromwell.				
15/10/97	40	0	0	..	V.	Cromwell ..	..	John Werner and party.
9/7/97	30	0	0	Fatboy's ..	X.	Cardrona ..	..	F. G. Naumdun.
				Clyde.				
12/3/97	16	0	0	Dunstan ..	II.	Leaning Rock	Kitto and Party ..	J. Leamy and others.
				Alexandra.				
1/3/97	17	0	0	Obelisk Creek..	I.	Cairnhill ..	Carroll and Party ..	P. Carroll and another.
23/3/97	37	0	0	" ..	"	" ..	John Ewing ..	John Ewing.
1/7/96	50	0	0	Galloway Run	VI.	Tiger Hill ..	Galloway Sulicing Co.	William Hansen and others.
1/10/96	39	0	0	Poverty Beach	I.	Fraser ..	Golden Beach Co. (sluicing and dredging)	The Golden Beach Hydraulic E. and Dredging Co. (Ltd.).
18/9/97	65	0	0	"	"	" ..	Ditto	Ditto.
18/9/97	33	0	0	Dunstan Flat..	VII.	Leaning Rock	Golden Point Co. ..	The Golden Point Dredging Co. (Ltd.).
22/2/97	63	0	0	Obelisk Creek..	I.	Cairnhill ..	Last Chance Co. ..	J. Hesson and others.
18/9/97	100	0	0	Galloway Run	VI.	Tiger Hill ..	..	Otago Syndicate (Ltd.).
18/9/97	20	0	0	George Creek ..	III.	Cairnhill ..	..	R. J. Pitchers and others.
5/2/94	12	0	0	Near Alexander	VI.	" ..	Tucker Hill ..	J. Rivers and another.
6/6/93	6	0	0	Obelisk Creek..	I.	" ..	Wilkinson's ..	G. Wilkinson.
				Black's.				
4/11/96	30	0	0	Blackstone Hill	XI.	Blackstone ..	Blackstone Hill Co.	Blackstone Hill Gold-mining Co. (Ltd.).
7/8/92	82	0	0	Tinker's ..	VII.	Lauder ..	Ewing and McConnochie	J. Ewing and another.
21/7/92	30	0	0	" ..	X.	" ..	Matakanui Co. ..	Henry Duck and others.
1/7/92	25	0	0	" ..	VII.	" ..	" ..	"
18/3/96	22	0	0	" ..	"	" ..	" ..	W. Greenbank and others.
21/7/92	15	0	0	Drybread ..	X.	" ..	Mellor and Young..	C. Mellor and another.
1/7/95	25	0	0	Tinker's ..	VII.	" ..	Mountain Race Co.	Mountain Race Gold-mining Co.
1/1/92	15	0	0	" ..	"	" ..	Sims and Morgan ..	John Sims.
3/4/95	16	0	0	" ..	"	" ..	" ..	J. Sims and another.
10/12/92	31	0	0	" ..	"	" ..	Sugar-pot Co. ..	S. Read and others.
20/5/96	20	0	0	" ..	"	" ..	Undaunted Co. ..	Undaunted Gold-mining and Water-race Co. (Ltd.).

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—*continued*.

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
					Roxburgh.			
21/11/92	88	0	0	Opposite Roxburgh	I.	Teviot ..	Roxburgh ..	Roxburgh Amalgamated Mining and Sluicing Co.
2/6/93	30	0	0	Hercules Flat, Roxburgh	VII.	" ..	Ewing's	John Ewing.
7/11/93	62	0	0	Ditto ..	"	" ..	Ewing's (late Hercules No. 1)	"
22/7/93	5	0	0	Coal Creek ..	II.	" ..	Manuel's Claim ..	Moses E. Manuel.
21/11/93	9	0	0	Bank of river six miles above Roxburgh	V.	" ..	Pleasant Valley ..	Pleasant Valley Gold-mining Co. (Ltd.).
21/11/93	19	0	0	Commissioner's Flat	I.	" ..	Haughton and Party	J. Haughton and others.
1/10/95	8	0	0	Horseshoe Bend	XII.	Benger ..	Fenton Brothers ..	John Fenton and another.
26/9/96	10	0	0	"	IX.	" ..	Edie and Kirkpatrick	Edie and another.
29/3/97	92	0	0	"	"	" ..	J. Rattray ..	James Rattray.
7/6/97	29	0	0	Roxburgh East	I.	Teviot ..	Loudon and Party..	Thomas Loudon and others.
7/6/97	51	0	0	Dismal Swamp	X.	Long Valley	Stewart and Party..	P. T. Stewart and others.
7/6/97	23	0	0	Horseshoe Bend	IX.	Benger ..	..	Herbert Park.
7/6/97	23	0	0	Upper Waikaia	II.	Whitecomb	Elliott and Party ..	James Elliott.
13/5/97	7	0	0	Horseshoe Bend	IX.	Benger ..	Rattray and Party..	C. W. Rattray.
18/6/97	12	0	0	Miller's Flat ..	VIII., III.	" ..	Laffey and Party ..	Patrick Laffey.
16/8/97	100	0	0	Anderson's Flat	VII.	Teviot ..	Ewing	John Ewing.
16/7/97	69	0	0	Upper Waikaia	V.	Whitecomb ..	Elliott and Party ..	P. Reordon and others.
18/6/97	13	0	0	Horseshoe Bend	XII.	Benger ..	Fenton Brothers ..	John Fenton and another.
					Lawrence.			
7/6/97	22	1	15	German Creek	VI.	Tuapeka ..	Scott and Party ..	George Scott and party.
19/7/97	70	2	15	..	V. VII.	Waitahuna E. Table Hill ..	Sailor's Gully	Sailor's Gully Gold-mining Co. (Ltd.).
23/9/97	62	0	19	Weatherstone's	X., XIV.	Tuapeka East	Mammoth ..	J. R. Gascoigne.
4/3/98	46	1	19	Munro's Gully	XVIII., XIX.	"	Tuapeka Sluicing Co. (Ltd.)	E. Mills and E. Browne.
17/2/98	31	1	32	Waipori ..	VI.	Waipori ..	..	Lewis Pearsall and A. Munro.
4/3/98	73	1	34	Weatherstone's	X.	Tuapeka East	Golden Rise Mining Party	W. F. Smyth and party.
17/2/98	68	3	7	Waipori ..	V.	Waipori ..	Pedlow and Party ..	William Pedlow.
10/9/94	66	3	0	..	XVIII.	Tuapeka East	Blue Spur and Gabriel's Gully	The Blue Spur and Gabriel's Gully Consolidated Gold Co. (Ltd.).
27/11/94	26	0	30	..	X.	Waitahuna E.	..	Charles Thomson and party.
28/1/96	84	1	0	..	XIV.	Waipori ..	Bakery Flat ..	Bakery Flat Sluicing Co. (Ltd.).
28/7/96	47	0	32	..	IV., I.	Beaumont ..	Beaumont Local Co-operative	The Beaumont Local Co-operative Gold-mining Co. (Ltd).
10/8/96	99	1	0	..	XI.	Tuapeka East	Golden Key ..	H. H. Eaton and party.
15/2/97	34	2	0	..	V., VIII.	Waipori ..	Golden Block ..	Archibald Thomson.
15/2/97	20	2	15	..	I.	Waitahuna W.	Tuapeka Mouth Sluicing Claim	Watts Goodwin.
15/2/97	28	2	0	..	XIV.	Tuapeka East	..	James R. Gascoigne.
13/7/96	11	0	0	..	IV.	Waipori ..	..	John Lawson.
23/6/96	29	3	4	..	"	" ..	..	Lewis Pearsall.
8/12/96	28	3	5	..	XIV.	Tuapeka East	The Boom ..	Mary S. Knight.
27/4/97	20	3	28	Waitahuna ..	X.	Waitahuna E.	Grant and Party ..	John Grant.
27/7/97	16	2	17	" ..	V.	Table Hill ..	Ritchie and Party..	Thomas T. Ritchie.
27/7/97	18	2	11	Waipori ..	XIV.	Tuapeka East	Sligo and Party ..	Alexander Sligo.
23/2/98	12	2	14	Beaumont ..	VII.	Beaumont ..	Murdock and Party	Daniel Murdock.
21/10/87	10	1	36	..	V.	Waitahuna ..	Ferris and Party ..	Joseph Ferris and party.
25/7/93	8	0	3	..	XVIII.	Tuapeka East	Fidelity Co. ..	James McFarlane and party.
10/9/94	18	0	27	..	XIV.	"	Local Industry ..	Local Industry Gold-mining Co. (Ltd.).
14/1/95	16	3	26	..	XVIII.	"	Perseverance Co. ..	John Kitto and party.
26/11/95	8	3	16	..	XV.	Crookston ..	Undaunted Gold-mining Co.	John Edie and J. Kirkpatrick.
13/4/96	19	2	17	..	V.	Table Hill ..	..	David McGill.
25/3/96	11	0	21	..	X.	Waitahuna E.	Quilter and Party..	Thomas and Thomas Francis Quilter.
13/7/96	8	2	28	..	VI.	Waipori ..	Parker's Deep Lead	James Parker.
					Waikaia.			
20/4/96	31	3	33	..	I., III.	Waikaia ..	Argyle Hydraulic ..	R. T. Stewart (trustee).
15/6/96	70	1	0	..	I.	Nokomai ..	Erskine's ..	Lion Gold-mining Co.
24/8/96	30	0	0	..	V.	Wendon ..	Break-'em-All ..	Otago Syndicate (Ltd.).
24/8/96	44	2	34	..	I.	Waikaia ..	Argyle Hydraulic ..	R. T. Stewart (trustee).
24/8/96	40	0	3	..	VII.	Nokomai ..	..	W. H. Hall.
14/9/96	26	2	0	..	II.	Wendon ..	Landslip Claim ..	Albert McIvor.
14/9/96	20	0	0	..	V.	Waikaia ..	..	R. T. Stewart and T. Taylor.
16/10/96	53	1	24	..	VI.	" ..	..	J. W. Stewart and H. Hamer.
3/2/98	77	1	29	..	III.	Nokomai ..	..	Parrawa Water-supply and Gold mining Co. (Ltd.).
16/10/96	98	1	0	..	V.	" ..	Golden Terrace Hydraulic Co.	R. T. Stewart (trustee).
22/3/97	38	2	4	..	IX., XIV.	Chatton ..	..	W. McGill.
15/4/97	27	0	24	..	V.	Wendon ..	Break-'em-All ..	Otago Syndicate (Ltd.).
20/10/97	22	1	0	..	IX.	Waikaia ..	Waikaia Gold-mining Co.	R. Whittingham and party.
20/10/97	25	0	20	..	VI.	" ..	..	R. T. Stewart and T. Taylor.
3/2/98	39	3	20	..	XIV.	Chatton ..	..	John Marr.
3/2/98	27	1	2	..	"	" ..	..	William Little.
3/2/98	9	0	34	..	V.	Wendon ..	Break-'em-All ..	Otago Syndicate (Ltd.).
6/3/94	66	3	0	..	I., IV., VII.	Nokomai ..	Sew Hoy Hydraulic Sluicing Claim	Sew Hoy.
6/3/94	61	2	0	..	VII.	" ..	Kum Poy Hydraulic Sluicing Claim	Kum Poy.
26/6/97	28	3	0	..	II.	Wendon ..	Landslip Hydraulic Sluicing Claim	J. White and A. McIvor.

Maerewhenua.

A considerable number of miners find profitable employment in sluicing the terraces both in this district and at Livingstone. The stripping is heavy, and the wash of no great thickness. The whole of the available water is used for sluicing at the different claims, and in some cases the washdirt is taken out by driving.

The Mountain Hut Water-race has been completed as far as Thompson's Creek, but as the country between that point and the field is uneven, and a large creek intervenes, the gorge of which is of great depth, the cost of completing the remainder will be considerable, and some time must elapse before water can be brought on to the field.

Naseby.

Work is carried on by small parties at Speck Gully, Mulholland's Gully, Robinson's Gully, and Enterprise Gully, while in the main gully Inder Brothers, J. Hoare, Baxter and party, and several others are working their claims on the elevating system.

Guffie's claims, which are situated about a mile and a half below the township, are being worked on the elevating principle, and the owners have now erected a dredge, which will work in addition to hydraulic elevating.

At Kyeburn, Hyde, and Macrae's little improvement is shown in the condition of the industry, the scarcity of water being a great drawback. The Taieri Sluicing Company are erecting an excellent plant on their claim, and will shortly be at work. Bride and party are sinking a shaft on the old workings near the Hyde Township, and the prospects are so favourable as to induce them, if practicable, to undertake extensive development works for drainage purposes.

At Hamilton's, Upper Taieri, and Black's mining matters are much in the same condition as last year.

Welshman's Gully.

The Shamrock Elevating Company are carrying on work by elevating on their claim, which is situated about a mile from the main road to Naseby.

St. Bathan's.

Surface Hill.—The Scandinavian Hydraulic Elevating Company employ nine men.

Gallagher and party (two men) are elevating their claim, with four heads of water obtained from the Scandinavian Company's race.

The few parties who are engaged sluicing are rewarded with very fair returns.

Ewing's Claim.—At the time of my visit this claim was idle, on account of the scarcity of water, and the elevator has not yet been moved, the rock which was excavated for the foundation of the elevator having slipped, thus proving its unreliability as a foundation at that place.

Eagle and Gray's Claim.—This claim has now been worked down as deep as the tail-race will admit, and, until elevating is adopted as the mode of working, very little more can be done.

The M and E Water-race Company has recently put a powerful elevating plant on the ground, and with improved machinery and economic working a prosperous future should be in store for the company.

Mr. John Ewing has recently erected a new and improved apparatus for transporting the larger portion of the rough tailings from sluice-boxes.

Gannon and party are working their claim by elevating.

Mr. Ewing's claim at Cambrian's is also in full swing, and the yields have been satisfactory.

Other parties working in this locality—Gray and Fordham, Davis and party, and others—have had payable returns.

Matakanui.

Sims and Morgan (four men), Ewing and McConochie (nine men), Undaunted Gold-mining Company (twelve men), Sugar-pot Company (six men), Matakanui Water-race Company (eight men), and Sheenan and Barron (two men): the above parties are working in this locality, and appear to be doing very well.

The amalgamation of the Undaunted and Mountain Race Company has now been accomplished, and a strong company formed, whose prospects would appear to be satisfactory.

Ophir Deep Lead Gold-mining Company, Limited, Ophir (Area, 50 acres).—A shaft has been sunk 7 ft. 8 in. by 4 ft. 8 in., divided into two compartments, to a depth of 145 ft. Operations are to be commenced on a 4 ft. 6 in. bed of wash at 100 ft. from the surface. Steam-power is employed for winding. A puddling-machine and plant for breaking the wash, and sluice-boxes for gold-saving, are now being erected.

Cromwell.

A number of men are doing well at Quartz Reef Point.

Lowburn.

Chapman's Claim.—Two men are driving out the washdirt under the terraces to the left of the Clutha.

Tallman and party and Bethune and party are also engaged in the same locality.

A few parties are working at the Five-mile and neighbouring gullies.

Cardrona.

A few small claims are being worked about the township, and in some cases good wages are being secured. A party of tributers are working a claim near the Cardrona Hotel, with satisfactory results.

Some six men are employed at Criffel Face. The New El Dorado Company has taken up a 50-acre claim.

Bannockburn.

The water-supply being limited, only a few men are at work, and no exceptional finds are reported.

Weir and party have a 24-acre claim at Motatapu.

Kawarau.

Although a number of dredging claims have been taken up, none are at work as yet, the difficulties in obtaining the necessary machinery precluding the possibility of early operations being undertaken. The same remark will apply to the claims taken up on the Cardrona River.

Clyde and Alexandra and Molyneux.

Several parties of men are working on the shallow ground on the Dunstan Commonage between Clyde and Alexandra, the ground being worked under considerable difficulties.

At Springvale Messrs. Gartley Brothers are doing well, and several men on Tucker Hill are also reported to be profitably engaged.

Ewing's Claim, Bald Hill Flat.—The plant is now being erected above the Last Chance Claim. The water is obtained from Coal and Butcher's Creeks, and is stored in a dam 100 ft. above the claim. Ten men are employed.

Last Chance Claim (Messrs. Simmons and Hesson, owners).—Operations at this claim have been hampered by the scarcity of water, which is obtained from Shingle, Chasm, and Gorge Creeks. There are 3,000 ft. of piping in use. Ten men are employed.

Carroll and Lynch's Claim (Area, 16 acres).—A water-race seven miles long from Gorge Creek brings six Government heads of water on to the claim, with a pressure of 200 ft. There is 15 ft. of wash at the face, with an overlay of 5 ft. of clay, which is sluiced off. Six men are employed.

Bald Hill Flat.—Wilkinson's claim, of 5 acres, is immediately above that occupied by Mr. John Ewing. This claim has been at work steadily for the past twenty-seven years. The gravel is ground-sluiced. A considerable amount of work is entailed in the maintenance of the tail-race.

Manuel's Claim, Coal Creek Flat.—This claim is worked by sluicing, but a hydraulic plant is to be erected.

Wallace and Party's Claim.—This claim is situated a short distance above the last-named claim. Here a small hydraulic elevator is used, having an 80 ft. pressure. Two heads of water are supplied.

Pleasant Valley Gold-mining Company.—This company is reported to have had a very prosperous year. The claim, which is situated on the bank of the Clutha, above Coal Creek, is supplied with water from Elbow Creek. The water-race has a capacity of four to six sluice-heads, with 150 ft. pressure. The gravel here being largely intermixed with heavy stones, a 4-ton crane was erected to effect their removal. Ground-sluicing has hitherto been employed, but an elevating plant is to be erected.

Wilson and party and James and party are also engaged in sluicing operations, the water being obtained from Cross-reef Creek.

Roxburgh Amalgamated Mining and Sluicing Company.—This claim, which is on the east side of the Molyneux River, near Roxburgh, is worked by hydraulic sluicing and elevating. Two nozzles and two elevators are at work, and another elevator is used for drainage purposes. Twenty-five men are employed on claim and race.

Hercules Nos. 1 and 2.—This claim is now owned and worked by Mr. John Ewing. Two elevators are at work, one with eleven heads of water and a 480 ft. pressure and the other with thirty heads, having a 520 ft. pressure. The pipes used are 18 in., 11 in., and 9 in. in diameter. The depth of the gravel from the surface to the bed-rock is 60 ft., and it is elevated to a height of 66 ft.

Loudon and party and others, working adjacent to this claim, have done fairly well.

Ewing's Claim, Anderson's Flat.—Prospecting operations have been carried on by means of the Vincent County Council's boring-rods, but, the rods not being suitable for the class of country, work has been postponed.

Island Block Extended Claim, Miller's Flat.—This company, having purchased the Golden Run Company's claim, has been at work during the year, but the poor supply of water has resulted in a considerable loss of time. It is intended to raise the dam, and with an additional supply of water the company's returns should be materially increased.

Gunton Brothers have done fairly well on their claim at Craig's Flat, and several other parties are working the banks of the river, with varying success.

Edie and Kirkpatrick's claim, six miles above Beaumont, still continues to be steadily worked. The water-pipes in connection with the water-race give a pressure of 850 ft., the pipes being 22 in., 17 in., 15 in., 11 in., and 9 in. in diameter. The tables used are 3 ft. in width. Angle-iron riffles are laid crosswise over cocoanut-matting.

Beaumont Local Industry Co-operative Mining Company (Limited).—This company intends to work the alluvial flats up the Molyneux River by hydraulic sluicing and elevating. A race three miles and a half in length from Beaumont Creek brings twenty heads of water 450 ft. above the claim. Twelve men are employed.

Lawrence.

Blue Spur and Gabriel's Gully Consolidated Gold Company (Limited).—Mr. Howard Jackson, general manager for the company, gives the following particulars of work done, &c. :—

As the work progresses the central portion of the mine maintains its rate of productiveness, Nos. 1 and 2B paddocks are as good as in the past, while the flanking paddocks Nos. 1A and 2. which represent development and stripping, water down the total output seriously. During the

year it has been necessary to make considerable alterations in the working plant. No. 1 elevator has been raised 10 ft., lifting now a total of 68 ft.; No. 2 raised 5 ft. 6 in.; and No. 2B, which works in series, has been moved some 200 ft. nearer the working-face, and now lifts the dirt 43 ft.; No. 2 lifts 69 ft.: making a total lift of 112 ft. This readjustment of the working plant has rendered necessary extensive alterations in the position and alignment of the supply-pipes, and in each case increased efficiency was secured. The net value of the year's output of gold has proved to be £3 19s. $3\frac{1}{16}$d., but for the purpose of the subjoined tabular statements I have adopted £3 19s. as the value. Total quantity of gold won, 3,163·9 oz. = £12,497 8s. 1d. Last year I was fortunate enough to be able to show a decrease in expenditure on the preceding twelve months; this year the total expenditure in the colony has slightly increased. The cost of production represented 43·65 per cent. of the value of the gold won during last year; this year the cost has risen to 50·15 per cent.—that is to say, the expenditure is virtually the same, while the productiveness of the mine has been less for the period. The head-races have given but little trouble during the year beyond the constant attention required to keep long ditches in working-order, and owing to the prolonged and severe drought the races brought in a much-reduced supply, as shown by the following statement of the quantity of water used, expressed in hours of sluicing time: No. 1 division—1896–97, 3,985·5 hours; 1897–98, 3,207·5 hours: No. 2 division—1896–97, 3,931 hours; 1897–98, 3,954 hours. Totals—1896–97, 7,916·5 hours; 1897–98, 7,161·5 hours. The two main items of expenditure are as last year. Wages and explosives and the cost under these heads is shown below: No. 1 division—Wages, £1,586 13s. 9d.; explosives, £265 2s. 6d.: total, £1,851 16s. 3d. No. 2 division—Wages, £2,408 14s. 10d.; explosives, £247 1s. 2d.: total, £2,650 16s. Grand total—Wages, £3,990 8s. 7d.; explosives, £512 3s. 8d.—£4,502 12s. 3d. About 7,500 lb. of roburite has been used. Taking the net value of the gold at £3 19s., it has cost for labour and explosives—No. 1 division, 1,110·4 oz., cost £1 13s. 4d. per ounce, £1,851 16s. 3d.; No. 2 division, 2,053·5 oz., cost £1 5s. 9½d. per ounce, £2,650 16s.: total, 3,163·9 oz., cost £1 8s. 5½d. per ounce, £4,502 12s. 3d. This is an increase of 2s. 0¼d. per ounce over last year's results. The following is a statement of work, &c., for the year 1897–98:—

——	Hours Sluicing.	Cement.	Gold.	Value per Cubic Yard.	
		Cub. yds.	Oz.	Gr.	d.
No. 1 division	2,636	70,117·6	1,085·7	7·43	14·68
No. 1A "	571·5	10,001·2	24·7	1·19	2·34
No. 2 "	1,146·5	38,178·4	555·8	6·99	13·8
No. 2B "	2,807·5	84,225·0	1,497·7	8·53	16·86
	7,161·5	202,522·2	3,163·9	...	...

The Local Industry Gold-mining Company.—This company's plant is now being removed to Rocky Point, Gabriel's Gully. A storage-dam of large capacity has been erected. The work done during the year was satisfactory. They won 270 oz. of gold, and paid a dividend of 1s. per share.

Munro's Gully.—Mills and party are working their claim by elevating to a height of 25 ft. The party is now termed the Tuapeka Creek Gold-mining Company.

The Cornishman's Claim, to the northwards of Blue Spur, is also being worked by means of the elevators. As the pressure of the water is not strong, operations are carried on from three floors.

Weatherstone's.

Smyth, Adams, and Donlan, known as the "Golden Rise Mining Party," have increased their area during the year, and now hold a special claim of 73 acres. They have an elevating plant, and have been working steadily, with satisfactory results.

Waitahuna.

The Norwegian Claim has been working continuously during the year, and the results are said to be satisfactory. Twelve men are employed.

Ferris and party have been working on their claim for an average yield.

Sailor's Gully Gold-mining Company (Limited).—This party have gone to a considerable expense in enlarging water-races, laying down pipes, and constructing dams. For the past three months they have carried on sluicing operations, the returns being such as to induce confidence that the claim will turn out satisfactorily.

Hagan and party and Quilter and party are working old tailings in the bed of the gully, and most of the other claims in the locality have been doing fairly well.

Manuka Creek.—Stewart and party hold several claims, and have done a considerable amount of work in bringing in an additional water-supply. The claim being situated at a high altitude, very little can be done in the summer through the scarcity of water, but during the remainder of the year a great deal of ground is turned over, and it is hoped that in the present winter the yields will be satisfactory.

Waipori.

The Amalgamated (Waipori) Deep Lead Gold-mining Company's Claim.—This claim is soon to be worked; the mortgagee, having purchased the property, is preparing to work the claim in a systematic manner.

Bakery Flat Sluicing Company.—This company have got their new claim into good working order, and are said to be obtaining satisfactory returns, 71 oz. of gold having been obtained for one

month's work. This claim includes all the available river-flat above the Jutland Flat Dredging Claim. During the year an attempt was made to reach the gutter on the main bottom, which lies underneath the false bottom on which operations are at present carried on. The efforts, however, did not prove successful, for after 51 ft. had been reached sinking was abandoned, and the plant withdrawn.

Pearsall and party have a water-race four miles and a half in length, and are elevating from 7 ft. to 8 ft.

Sharp's claim is also the scene of elevating operations.

Robinson and party, Parker and party, and three or four others are driving out the washdirt in their claims.

A few Chinese are also employed in this district.

Shotover.

Lake Wakatipu, Moke Creek, and Twelve-mile.—Only a few men are engaged in alluvial mining in these districts.

The Moonlight Sluicing Company has done fairly well, and other large claims are on the same run of gold.

Arthur's Point.

Walden and party purchased the Sew Hoy Race, above the bridge, and are now making preparations to hydraulic the Big Beach, formerly worked by the Sew Hoy Company.

McCarron and party are also sluicing in this neighbourhood.

Deep Creek.—Collins and party are bringing in a race, which will be four miles in length and provide two heads of water, for hydraulicing the river terraces.

Baldwin and Murdoch are engaged in sluicing about four miles up the creek.

Maori Point.—Trainer and party (six men) are bringing in a race of four heads of water from Maori Gully to hydraulic the terraces near Maori Point.

Davis Brothers are also carrying on extensive works on their claim on the north side of the Shotover, at Maori Point.

The Pactolus and the Enterprise Claims are both being worked on the elevating principle. They are situated on the left bank of the Shotover, several miles up from Skipper's Creek.

Skipper's Point.

The claim, formerly known as the Londonderry, is now managed by Mr. W. Scott, who has brought in eight heads of water from Skipper's Creek, a distance of four miles, to sluice the Londonderry Terrace and Skipper's Terrace. A tail-race is also being driven in the rock, which is 400 ft. in length. Twelve men are employed.

Arrow River District.

Arrow Falls Claim.—This claim is now being successfully worked. The whole of the wash to a depth of about 60 ft. has been washed away through the tail-race, and the rock bottom of the river is now easily stripped. At the time of my visit, on the 25th February last, the manager was sluicing one-half of the river-bed. The main stream of water was conveyed to one of the shafts that communicate with the tail-race tunnel. In the part of the bottom thus partially dry sluice-boxes are placed with a lead to the other shaft. Sufficient water is led from the main body of the stream to sluice all the gravel that can readily be washed into the sluice-boxes. The larger boulders and stones are removed from the wash and stacked on the part of the bottom already cleaned, the smaller stones and gravel only being allowed to be carried down the shaft. When a considerable area of the bottom has been stripped on one side, the sluice-box is removed to the other side, and the water of the river diverted to the side already worked. This is also used for the stacking of stones. The place, at the time of my visit, presented the appearance of two channels separated by a large wall of stones and boulders, a stream of water flowing down one of the channels direct to a shaft, and in the other a sluice-box in full operation, the gravel being washed into it by the water diverted from the main stream further up, and passing down the other shaft. The method seems to answer well so far. The manager informed me that on the occurrence of a high flood the shaft-openings are closed, and the whole of the workings are covered with water until it rises to the level of the natural dam and flows over. When the flood is past, the gates closing the shafts are opened, and the whole place is again freed from flood-water, the *débris* that may have accumulated in the workings removed and washed away, when the usual work is again carried on without much loss of time. Mr. Millar, the manager, gives me the following account of and history of the claim :—

The Arrow Falls Mine is situated three miles and a half from Arrowtown, up the Arrow River. The reason it got the name of Arrow Falls is that a large landslip took place some years ago and filled up the bed of the river for a depth of 100 ft., causing the present falls. It must have formed a large reservoir, which has been filled during the heavy floods for a distance of a mile and a half with the gravel from the bed of the river from a higher level. This ground was taken up about twenty-five years ago by a miner named Carl Hein, who afterwards sold it to an Arrowtown company, who, failing to make it a success, sold it back again to Carl Hein, who, after working it for several years without success, sold it to a Melbourne syndicate for the sum of £350. The syndicate started driving a tunnel from the bottom of the falls, 9 ft. high and 9 ft. wide on the bottom, for a distance of 1,100 ft. in the solid rock, at a cost of £5,000; and then sinking two shafts in the bed of the river to meet the end of the tunnel at the depth of 100 ft., which they successfully completed at a cost of £3,000, including timber and machinery. The syndicate not having money to carry on the works, it was sold by the mortgagee, and bought by J. Miller for the sum of £3,000, who started sluicing, and got down within 10 ft. of the original bed of the river when the floods destroyed one shaft. Another shaft had to be sunk into the rock, which, with other drawbacks, took two years,



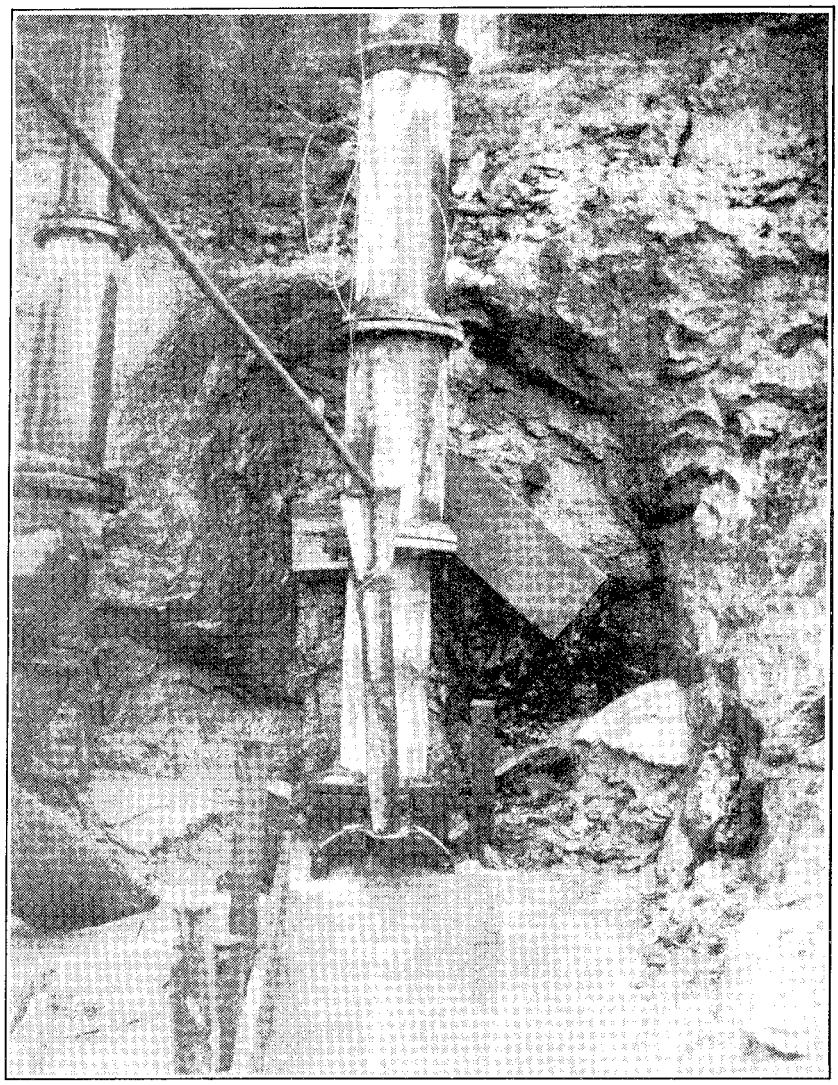
Round Hill Mining Company.

Continuation of Pipes to supply Elevators.



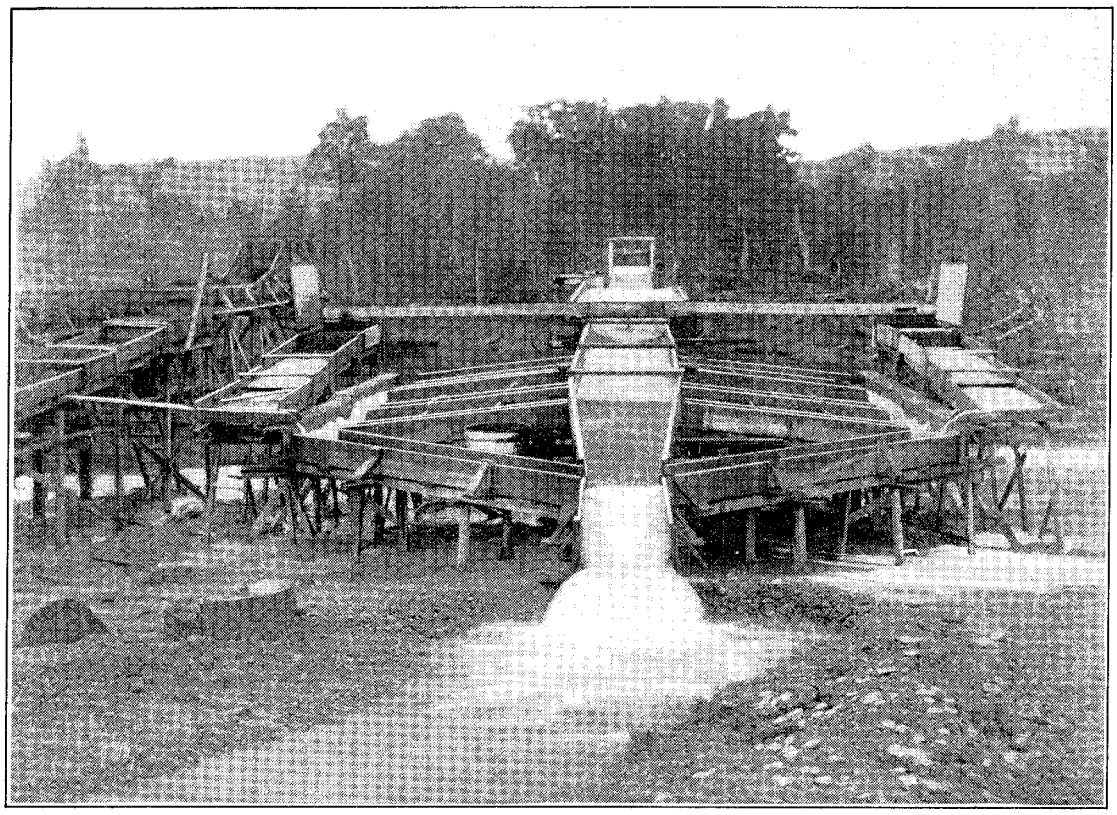
Round Hill Mining Company.

Penstock at head of Pipes.



Round Hill Mining Company.

Elevator in Position.



Round Hill Mining Company.

End of Sluice-box and Tables.

and then the Colonial Bank closed on the mortgage. It then stood in liquidation for over twelve months, and was bought by Mrs. Jessie Miller in May, 1897, for the sum of £100, and, after an outlay of another £100, got on to payable gold. Now it is formed into a company of twenty thousand shares paid up to £1 a share, and has every prospect of being a good property.

Anderson and party are working their alluvial claim, situated at Eight-mile Hill, junction of Eight-mile Creek and Arrow River, being the highest terrace workings on the Arrow. The workings are from a tunnel 350 ft. in length. The wash-gravel is intermixed with ironsand and Maori stones. This is conveyed through the tunnel in trucks, and afterwards sluiced through a rock tail-race. The returns of gold are satisfactory.

Arrowtown.

Work in hydraulic elevating and sluicing is about to be carried on in the bed of the Arrow River, near Arrowtown, by an Invercargill company, which has secured extensive water-rights. Mr. Robert Hay, of Dunedin, was on the ground for the purpose of reporting on the property at the time of my visit, on the 24th February last.

Macetown.

Mr. Lester is sluicing his claim. At the Eight-mile Hill Reid and party have a race a quarter of a mile in length, and 2,000 ft. of 7 in. piping to supply the nozzle. The stripping here is 60 ft. thick, and the washdirt from 4 ft. to 10 ft. in thickness.

Waikaia.

Argyle Hydraulic Sluicing Company.—This company hold a claim of 6 acres on the higher terrace, and a special claim of 100 acres on the Argyle Creek and flats. Ground-sluicing is carried on at the higher claim, where three men are employed; and hydraulic elevating is the process in use at the lower claim, where twelve men are employed, on three shifts. A paddock of 1½ acres has been cleared, and a fresh area of ½ acre is now being worked, where the depth is about 35 ft. It is found preferable to work to a depth of 15 ft. to 17 ft. until a considerable portion of the surface and wash-gravel has been stripped, and afterwards the remaining depth of gravel down to bed-rock. The water-race is carried to within a mile of the workings, and from thence pipes are used to convey the water; 15 in. mains are first employed, which are afterwards reduced to 13 in. size. The service-pipes to supply the elevators are 11 in., 9 in., and 7 in. capacity. The quantity of water used is nine to ten sluice-heads. The throat-piece of the elevator is a casting 7 in. in diameter, which is renewed as soon as it becomes too large for economical working. The sluice-boxes are each 12 ft. in length. Angle-iron riffles are used over cocoanut-matting in the side-tables, which are 3 ft. in width. The tail-box for 15 ft. has got perforated iron plates over the cocoanut-matting. There is a full length of boxes and tables of 102 ft., the fall given being 8 in. to 12 ft. Ten men are employed at this work, and one man on the maintenance of the water-race. The returns from this claim, the manager (Mr. John Stewart) informed me, are satisfactory, and very little time was lost through scarcity of water during the year. The water-race has a fall of 8 ft. to the mile, and is of such dimensions as will convey a much greater quantity than is at present used. The pipe branch which is used for hydraulic sluicing is of 13 in. and 11 in. size, and the length of the pipes 800 ft., with a head of 80 ft. Ten sluice-heads are used at this place. The head of water used for elevating is 350 ft. Thirteen men are employed.

Waikaia Gold-mining and Water-race Company.—Three shareholders occupy an area of 63 acres 1 rood 18 perches. They have a water-race eleven miles in length brought in from Steeple Creek. In this race there is a siphon of 14 chains in length, the pipes being 22 in. in diameter. Sixteen sluice-heads are used in ground-sluicing. There are two 5 in. nozzles for breaking up the face, which consists of clay from the surface down to the wash, which is 14 ft. in thickness. The head of water is 80 ft. This company, whose works are situated on Scrubby Terrace, obtained 206 oz. for the year, which must be considered a good return, seeing that the company were only able to work for about six months, owing to the scarcity of water.

Winding Creek Claim, formerly *Break-'em-All* Claim (Owners, Waikaia Freehold Gold-mining Company).—This claim comprises the following areas: 50 acres freehold, 30 acres leasehold, 28 acres tailings area, and ordinary claims; total, 108 acres. The ground is too deep for ordinary sluicing—*i.e.*, in respect of getting rid of tailings—and an ordinary dredge-pattern elevator was put on about the year 1880. This proved a failure, owing to the insufficient water-supply available to work it. The claim has been practically idle for fifteen or sixteen years, with the exception of intermittent hand-working on a small scale. It has recently been taken up by the Otago Syndicate (Limited), who propose working by hydraulic elevators, and are now inviting tenders for the construction of the necessary works in connection with the water-supply. It is stated that fifty heads of water are to be brought in, and that a large amount of capital is to be expended.

Kennedy's Claim, Waikaia (Area, 4 acres).—Four men are employed, and the claim is apparently doing well. The washdirt is obtained by driving. The depth of the ground from surface to bed-rock is from 60 ft. to 100 ft., and about 6 ft. or 7 ft. lying on the bottom is payable, yielding from 2½ dwt. to 3 dwt. of gold to the cubic yard.

The Lion Gold-mining Company.—Work on this company's claims, which were formerly owned by Messrs. Erskine and Thompson, has taken the form of cutting a water-race from the Roaring Lion Creek to work the property. Thirty men are employed on this work.

Parrawa.

The Parrawa Water-supply and Gold-mining Company (Limited) occupy a claim of 77 acres 1 rood 29 perches, situated on a terrace near the Mataura River, about two miles and a half from the railway-station. A water-race is brought from Fiery Creek, a distance of two miles and a half, and carried by siphon across the Mataura to the claim on the terrace. The pipes are—9 in., 400 ft., and 13 in., 3,600 ft. Three sluice-heads of water are available. A 4½ in. nozzle is used. The sluice-

boxes are 48 ft. in length, with iron riffles over cocoanut-matting. The wash is from 70 ft. to 90 ft. in height, and contains numerous boulders up to 5 or 6 tons in weight. These cause additional labour in handling, as they have to be blasted with dynamite before removal. The returns are not payable, and the claim is to be let on tribute to the men who had been employed on wages. They intend to convey the water to a place on the terrace where the wash is not so deep, and where the boulders are fewer in number.

Nokomai.

Sew Hoy Claims (Area, 130 acres).—These claims are worked by the Nokomai Hydraulic Sluicing Company, one elevator being used. The gravel-wash from surface to bed-rock is about 45 ft. in depth, large stones being in this place absent, thus allowing the gravel to be more readily passed through the elevator. Eleven sluice-heads are used for elevating to a height of 65 ft. The boxes are 100 ft. in length. Venetian riffles over cocoanut-matting are used. The boxes have a fall of 6·5 in. in 12 ft. A dynamo, driven by a small Pelton wheel, is used for producing electric light for night-working. Upwards of twenty miles of water-races have been constructed, which, with the necessary pipes, siphons, and hydraulic plant, cost £15,200. During the dry season the water-supply is insufficient to allow of work going on, and one month yearly is lost from this cause. Twelve Chinese and eight Europeans are employed.

A company has been formed at Invercargill to bring in thirty sluice-heads of water to work the Victoria Gully, which is situated some distance down the Nokomai from Sew Hoy Claim.

Colac Bay District.

Round Hill Mining Company (Limited).—This company is carrying on extensive operations by elevating and sluicing. A large area has already been worked out, but several years must elapse before the ground commanded by the present water-supply can be exhausted. The situation of the property is in a dense bush, about four miles from the railway-station, and can only be reached by a wooden tramway, the trucks and trolleys being drawn by horses. The village, which at one time was largely inhabited by Chinese, has been almost deserted by them. About forty of those people are all that is left, and these did not appear to be mining in the neighbourhood. On the 16th February, during my visit, Mr. George Lee, the manager, and Mr. Alfred Reynolds, the secretary of the company, furnished me with the following history of the company, and with particulars of the water-races and plant used in the mining operations:—

"The Round Hill Mining Company (Limited) emerged from the original company started under the style of the Round Hill Syndicate (Limited), registered in England, with Mr. George Evans as general manager in the colony, and Sir Robert Stout, the Hon. W. J. M. Larnach, C.M.G., and John White, Esq., barrister, as a local board of advice in the syndicate. The same board acts for the company, with John White, Esq., as managing director, and now also as attorney in the colony. The syndicate was floated in England by Mr. George Evans, the local promoters' company receiving a number of shares, in consideration of the expenses incurred by it in getting the various mining rights under offer, &c. Mr. George Evans retired from the management in 1895, and Mr. George Lee, the present manager, was placed in charge in the same year. The head office is now in Liverpool, and the colonial registered office at Round Hill, near Colac Bay, in the South Island. The nominal capital is £50,000, in ten thousand £5 shares, of which 5,534 shares have been allotted, and on which £2,670 has been called up. In March, 1891, the water-races originally held by various miners were taken over by the syndicate, having been previously purchased in most cases, and arrangements made for leasing and purchasing in the case of Anderson's and Erskine's race, of which the company now holds a one-third share, originally held by Mr. Martin Anderson, Robert Erskine, Esq., holding the other two-thirds still. The principal water-races purchased were Port's, Berndtson's, Turnbull's, Ward's, and Bruce's. The races purchased cost over £10,000. Additional purchases now bring the cost up to £13,119. The enlargement of Port's race in 1897 came to £2,246, and the extension along the north-east slope of the Longwood Ranges, at the end of February, 1898, comes to £1,189, bringing the total cost to this date of the water-races up to £16,554. The length of Port's race is nearly thirteen miles from the head of the pipe-line; Berndtson's, fourteen miles; Anderson and Erskine's, fifteen miles; Turnbull's, five miles; Ward's, three miles from the end of Port's to the Cascade Creek; Bruce's races, two and three miles each; the extension partly finished from the end of Port's, eleven miles, and the connecting-race, two miles: making a total of sixty-eight miles. This does not include about eight miles of branch races. The total carrying-capacity is thirty-six Government heads of water, Port's contributing twenty-six heads, carrying Ward's water, and the extension; Berndtson's, five heads; Anderson's, a head and a half; Turnbull's, two heads; Bruce's (two races), a head and a half. The water from Berndtson's, Anderson's, and Turnbull's races is taken to Port's race, near the head of the main pipe-line, by a connecting-race, and from Port's race enters a 27 in. main pipe-line at an average height or head of 300 ft. above the elevator seats and intakes. The main 27 in. pipe-line is 90 odd chains long, and is made of the best annealed steel plates, of 14 and 10 B.W.G., being joggled at each section to insure smoothness internally, and thus reduce friction. The distributing pipe-lines from the main one consist of an 18 in. line of 30 chains, lines 13 in. a mile and a quarter, 11 in. and 7 in. pipes, mains, and all making a total of two miles and a half of pipe-lines. The whole of the mains and distributing-pipes and plant has cost the company to date £6,420. The pipe-making plant and electrical appliances cost £370, making a total of £6,790 in general plant used by the company for the recovery of gold. All the main 27 in. and 18 in. pipes were made on the premises, and other plant and pipes are regularly made when required. The number of elevators working is three, and a fourth one is being set up, the gold-saving tables set up being five. These have two sets of riffles, each averaging 48 ft., with 10 ft. of riffles at the head. These have cocoa-matting beneath, and are succeeded by 24 ft. of perforated plates, allowing the light gold and sand, &c., to pass into a set of wooden side-tables, with fifty-two mats each. The fall on the upper tables covered by the riffles is 6½ in. to the 12 ft. The

lower tables, or side-tables, have a fall of 1 in. to the foot, and the perforated plates ⅜ in. to the foot. The gold on the side-tables being daily saved, while the gold on the mats under the riffles is saved periodically, according to the supply of water and nature of ground and operations. The gold recovered is very fine, and has to be amalgamated and then retorted. The elevators used are of 13 in. pipes, with patent oval seats of 16 in. by 10 in. openings, having throats of 3 ft. in height, 6 in. diameter, tapering to 7⅛ in., and jets of 2¾ in. These, with a properly regulated supply of water and dirt from the nozzle acting on the face, are capable of lifting to a height of 50 ft., and elevate from 60 to 70 tons of material per hour. An air-injector can be attached, and is generally used to cause a body of air to accompany and naturally surround the water being forced up the elevators, thus minimising the friction along the inner portions of the uptake pipes. The average number of Government heads used to each elevator is 5·434, and on each nozzle working on the face 3·66. The average height of face has been 39 ft., and the average depth of auriferous washdirt 1 ft. 6 in. The ground worked out by the syndicate and company to date is 33 acres, being 2,100,000 cubic yards of material, and has given a return of 7,751 oz. 16 dwt. 15 gr. of gold, valued at £30,425 18s. 8d., and is equal to a recovery of 1¾ gr. to the yard, valued at 3½d. per yard. The faces of the claims are usually sandy, covered with clay and heavy timber, carrying small bands of inferior and low-grade washdirt in places, on the lower portion of the field the main rich washdirt being on the false sandy bottoms, and hard fine clay bands constituting the false bottom in places. On the higher levels the rich washdirt is on a main bottom of igneous formation, which generally has been composed of various rocks, feldspathic diorites predominating on the upper field, and apparently merging into decomposed granites, &c. The wash on both bottoms generally is formed of portions of these rocks, mixed with black sands carrying gold and small quantities of platinum, and possibly other precious and rare metals. The company is now constructing a large reservoir, to be filled with the third share of their water from Anderson and Erskine's race, and which is about seven miles from their claims. This will hold when finished about 24,000,000 gallons, and will be a great assistance to their operations. They are also proceeding with an extension of Port's race, to bring in more water during dry weather. This has no other race above, and goes through wet country, which has always a good supply of water available in summer. The number of men generally employed is forty-five. This includes only those occupied about the claims and water-races regularly. When large works are undertaken from twenty to fifty more men are generally employed, and at the present time there are about thirty-five extra hands occupied about the dam and water-races being extended. The syndicate took the water-races over in March, 1891, from the various owners, and started sinking the first paddock on the 9th November, 1891, and when it merged into the present company—in July, 1892—the company carried on its operations, and has continued doing so, generally making a fair profit, and employing this profit in making new plant and improving and increasing its possessions. It has purchased various claims found unprofitable to work by individual miners, and has paid for these to date £814 odd. Most of these smaller claims are unworked, and adjoin their other claims. Their own claims consist of a 21-acre claim about worked out, a 60-acre claim with a few acres worked, the purchased claims coming to about 6 acres. Their renewable water-races number thirty-five, including the main ones. They have over fifty other rights, including the branch races, making a total of over eighty-five mining rights. Their buildings contain sawmill, pipe-making plant, dynamo and electric plant, smithy, and workshop. The machinery is driven by a Pelton water-wheel. Most of the timber they use is now cut up from logs taken off their claims."

Ourawera Claim.—The Ourawera Gold-mining Company hold a claim adjacent to the Round Hill Company's land. The ground is similar in character to that worked by that company, and is about 40 ft. in depth. Considerable difficulty is experienced in getting rid of the tailings, the elevator being set to lift 45 ft.

O'Brien's Claim.—This claim is worked by the owner, Mr. Thomas O'Brien, who employs one wages-man. The ground is further up-stream than the Ourawera Company's, and is worked by hydraulic sluicing. 400 ft. of 11 in. and 200 ft. of 10 in. steel pipes are used. The owner is satisfied with his earnings. The water used is from his own race.

Vesey and Breck's claim is worked, when water can be got, from O'Brien's race.

About six men find employment in working small claims in this district whenever water is available, and two parties are sluicing near Lake George.

The Chinese also do a little washing and sluicing when water is to be had, but to all appearance the days for individuals getting profitable employment in claims is past as far as this district is concerned.

Orepuki.

John Barry and Ohler Sorenson and two wages-men are working a claim of 9 acres in the old school-ground. This claim has been worked for seven years, but for the past two years it has not been payable, but is now being worked profitably. There is 40 ft. of stripping, consisting of clay and hard beds of sand. The wash is about 2 in. to 3 in., lying on coarse soft sandstone. The water obtained for sluicing is from a race owned by six claimholders. About twenty men are using water from this race.

A rush has taken place to a piece of land to the northward of King's claim and Wallace's freehold. A shaft has been sunk by R. Ralstone and party. This was bottomed at 42 ft., with about 2 ft. 6 in. of wash. The shaft is 7 ft. by 4 ft., and the prospects are such that they intend erecting a horse-whim for working out the claim, which is named the Klondyke.

Two men have a claim to the westward, and have driven 37 ft. from an open face.

Forbes and party (three men's ground) are ground-sluicing. There is about 20 ft. of stripping, and the wash is from 1 in. to 3 ft. in depth, lying on 20 ft. sandstone.

W. Forbes and party (four men's ground) are driving for the wash, which is about 1 ft. in thickness.

Horner's claim (one man's ground) and Currie and King's claim (two men's ground) are both sluicing.

Evans and Son (two men's ground) have brought in a water-race from the Waimeamea Creek to work their claim by ground-sluicing.

Two other claims (two men's ground each) are also worked by ground-sluicing.

Weston's claim (two men's ground) is also worked by ground-sluicing; but, as the wash on the bottom is getting below the level of the tail-race, a wooden box is used for elevating the wash for 7½ ft.

Several other parties are working in the district, and McLean's claim is being sluiced by a party of twenty Chinese.

Two or three parties are working driving for the wash in the vicinity of the coal-mine.

The wash being generally of no great thickness, and covered by from 20 ft. to 40 ft. of stripping, there is no doubt a considerable area of ground that will yet be worked in this district; but, on account of the difficulty in getting a sufficient quantity of water, a large number of men cannot be profitably employed.

Southern Beaches and Waiau.

Fortrose.—A few men are working on the beaches and sandhills north of Fortrose. The results are not likely to be promising, the stripping being too heavy and the wash poor.

Waiau River.—About twenty miles up the river, near Blackmount Station, a Dunedin company propose to build a dredge. A few prospectors are working opposite Clifden, where the new suspension-bridge will shortly be erected. North of the Waiau there are several sluicing claims taken up, and in some cases the holders are bringing in water. One of the races will be some twenty miles in length.

Waiau Beach Hydraulic Elevating Company.—Operations are being vigorously carried on in this company's mine, and the prospects appear to be extremely promising. It is hoped that the enterprise of the company will meet with its reward.

Stewart Island.

Pegasus.—Desultory prospecting operations have been carried on during the year at Pegasus. A few prospectors are searching for gold and tin.

Dredging.

The interest evinced in dredging operations continues with unabated vigour. Claims have been taken up not only in the rivers, but in the terraces and flats adjacent thereto, and also in alluvial flats where the depth of the ground had hitherto been the chief obstacle to the auriferous wash being worked by other methods.

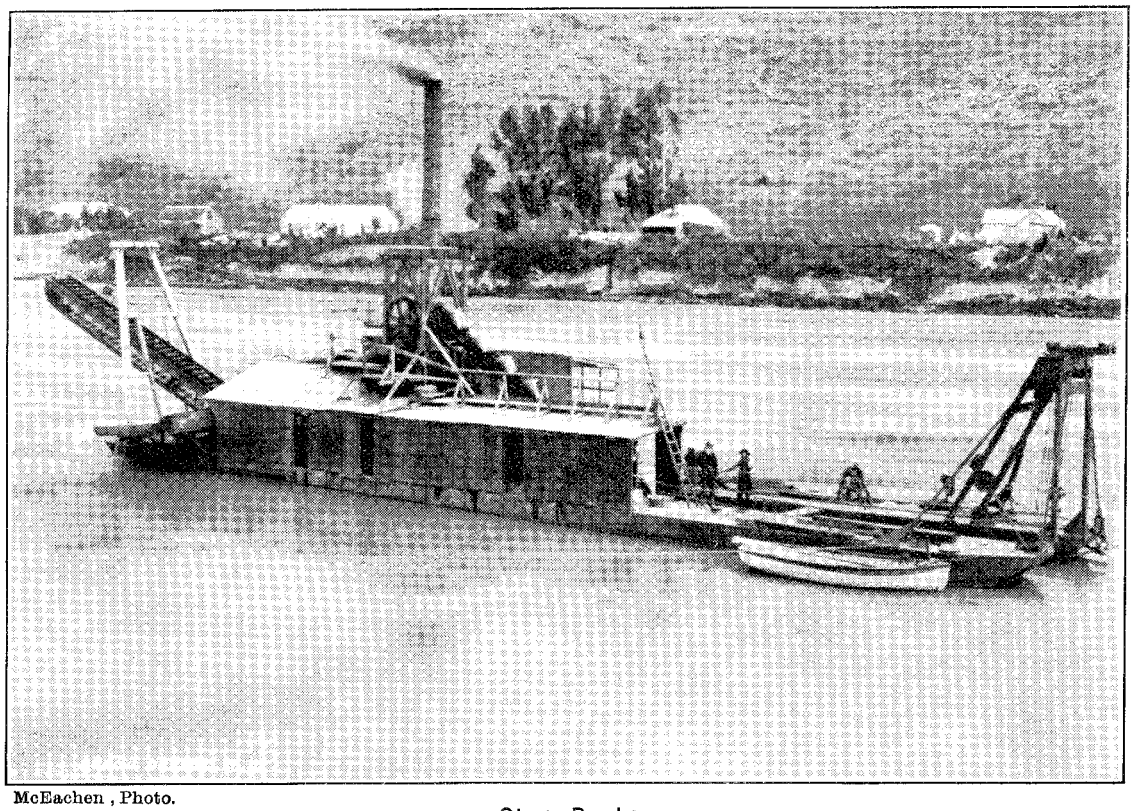
Dredging operations are now being conducted in the stream of swift-flowing rivers, such as the Clutha, Kawarau, and Molyneux; and in the lesser rivers, such as the Kyeburn, Manuherikia, Tuapeka, and Glenore; as well as in smaller streams and old river deposits. The depth from which material is elevated being from 25 ft. to 30 ft. in the rivers, and various depths from 6 ft. to 35 ft. in other places, it will be seen that dredges of differently modified construction are required for the changed circumstances that occur in different localities.

It has now been clearly demonstrated that dredges can be successfully handled in places where the water-supply is limited. A large paddock is first excavated to contain water sufficient to float the dredge. Operations are then commenced by working one side of the basin. The gravel, after being washed, is discharged behind the dredge, either by an ordinary flume, or when depth increases the larger stones are conveyed by an elevating process and stacked a considerable distance from the stern of the dredge. The finer gravel only is allowed to be discharged without being elevated. The work done enlarges the basin in which the dredge floats, thus giving more room for future movements, and should the water become thickened by continuous use there is in most places a small stream or creek within reasonable distance from which water is run into the pool in which the dredge floats. Prior to being worked by the dredge an area of 5 or 6 acres presents an ordinary level appearance, and after being worked, although perhaps not level, is in such a state that it could be harrowed and grass-sown, if necessary. It thus follows that in working gravels by this process no very great damage is done to the land, and the streams are not polluted to any extent, nor filled up with gravel, as in the case of ordinary sluicing, the whole of the material being raised, washed, and again deposited with very little eventual surface change.

The marked advantage in dredging compared with sluicing or other methods is that it enables quantities of material to be first elevated and afterwards deposited at a less cost than has so far been possible by any mechanical process in use, except in places where ample water-power can be applied.

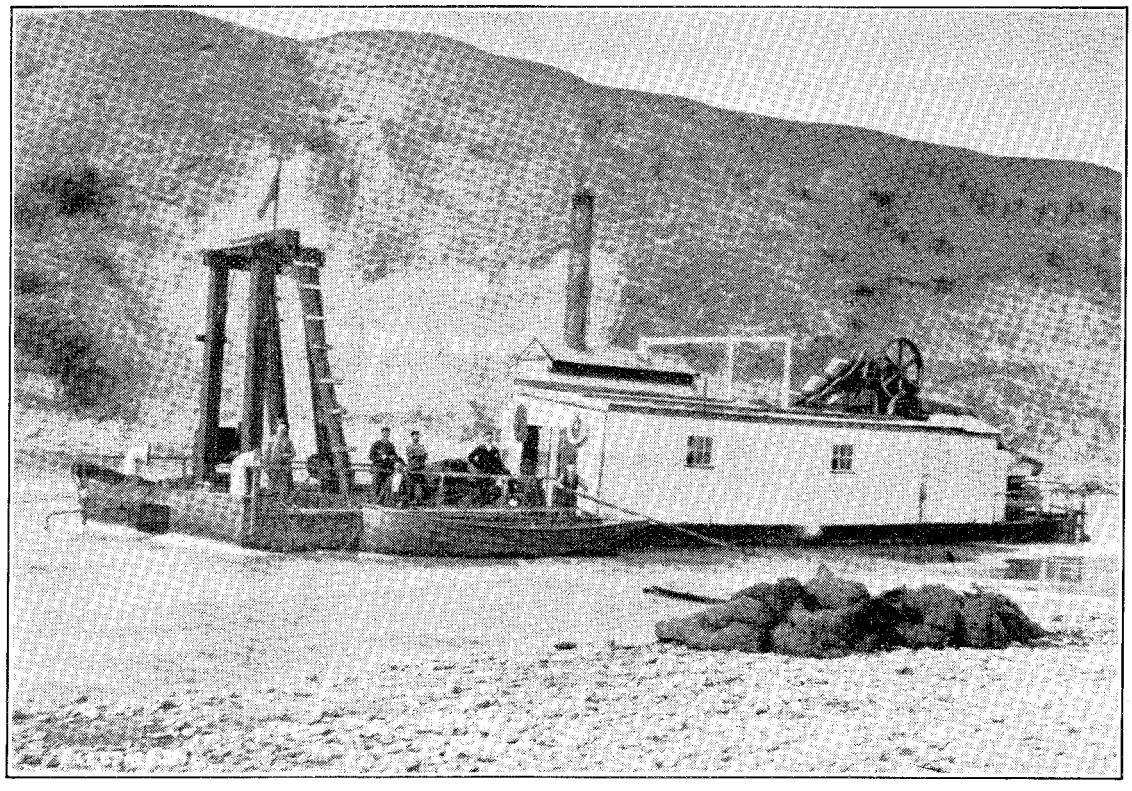
In dredging in river-beds attention is being further directed to extending operations by working the gravel in the banks above water-level. There are many claims taken up that have an apparent large quantity of material to work on, but, so far, no effort has been made to ascertain the possible quantity of gold that may exist in the gravels. In order, therefore, to enable a fair estimate of the value contained in the ground to be made the owners should cause sufficient exploring work to be done for that purpose before commencing to build expensive dredges, there being a general tendency to incur expense in providing for the treatment and handling of the material, whilst at the same time the quantity and value have not been determined in a practical way.

As much of the ground suitable for dredging is what is generally designated wet ground, a certain amount of expense must be incurred to sink prospecting-shafts, whether by hand or by the aid of steam- or water-power. It appears to me that, for the purpose of testing the gravels by sinking when the water is heavy, it would be of great advantage to use a steam-pump of the Tangye or any other suitable make, and I would point out to those interested that co-operation on the part of various claimholders would be to the best advantage. A suitable plant could be procured at a reasonable cost, conveyed to the ground, and, as very little trouble is attendant on the erection or working of the pumps, they could be in use in a day or two. The size of shaft being determined, all suitable timber should be prepared and in readiness. Work could then be gone on with in sinking, the gravel from different floors—say, every 3 ft.—being separately stacked on the surface. This gravel could be washed, and the total quantity in each section or floor ascertained, and when the



McEachen , Photo.

Otago Dredge.



Electric No. 1 Dredge.

various heaps were dealt with the total of the whole products divided by the number of cubic yards removed from the shaft would give the value per yard of the material through which the shaft was sunk. This would only give the average value of a very limited area of the claim; consequently, it would be necessary to sink further shafts in such places as would, from local indications, afford a reasonable chance of ascertaining the approximate quantity of gold that the claim would probably contain. When a shaft had been bottomed, the timber could be drawn, and the plant and material removed to a place where another prospecting-shaft was to be sunk.

If a party of men were employed in sinking in this way they would become used to the work, and be able to carry it on so that a prospecting-shaft could be completed at a much less cost than in the case of inexperienced parties of men undertaking the work for each claim. On the contents of the gravel taken from the different shafts being ascertained (and in this the utmost skill and care is required), it will be seen what quantity of material is available, and its value per yard. The dredging engineer should then be consulted as to whether the results given warrant that the gravels could be made to yield profit, and he could then determine what class of dredge would be most suitable.

The great areas of river deposit in the valleys and flats throughout the greater part of the auriferous districts in Otago and Southland that hitherto have not been explored, but which in many instances are known to contain small quantities of gold, are well worthy of being prospected in a systematic manner as above indicated. There is every reason to expect that the result of exploration would show many places to contain sufficient quantities of gold to afford remunerative employment to a large number of men in carrying on dredging-work. This is reasonably to be expected, as in the past the amount of gold required to make a payable prospect was so much more than what is now considered to be payable for dredging. Care, it is to be hoped, will be observed by those embarking in the dredging industry to profit by the hints above given as to prospecting before dredge-building is begun in the working of their claims.

One of the errors fallen into in quartz-mining, especially in the Auckland District during the late boom, consisted in the erection of very expensive machinery for treatment of the products before it was discovered whether quartz in payable quantities existed in the mines or not, and this should, if possible, be avoided. Ill-advised and precipitate action, such as has too often obtained, will tend to materially prejudice the prospects of the dredging industry, the more as it is the expressed intention of those interested to proceed with the construction of many new dredges. However, as before remarked, if due precautions are observed in the direction of securing knowledge of the prospects by preliminary work, the industry will be prosecuted on a sounder basis, and its expansion will necessarily tend to enhance the yield of gold from the alluvial deposits of the colony.

The following abstracts contain lists of claims in occupation for dredging purposes throughout Otago:—

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices, and registered on or before the 31st March, 1898, in the Books of the Mining Registrar.

Date of License.	Area.			Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
				Naseby.				
	A.	R.	P.					
6/8/96	43	0	0	Hyde ..	VII., II.	Rock and Pillar	Hyde Dredging Co.	A. D. Silk.
13/10/96	100	0	0	..	III.	Naseby ..	Hogburn Dredging Co. (steam-dredging)	The Naseby Dredging and Hydraulic Sluicing Co. (Ltd.).
29/9/96	97	3	30	Naseby ..	I. III.	" Maniototo	Guffie and Co. ..	Ditto.
29/9/96	47	0	0	Kyeburn River, Naseby	II., V.	Kyeburn ..	Kyeburn Junction Dredging Claim	Kyeburn Gold-dredging Co. (Ltd.).
29/9/96	75	0	0	Ditto ..	II.	" ..	Kyeburn Pioneer Dredging Co.	"
27/10/96	30	0	0	Kyeburn ..	"	" ..	Mount Ida Dredging Co.	Mount Ida Gold-dredging Co. (Ltd.).
27/10/96	25	0	20	" ..	II. I.	" Swinburn	Naseby Dredging Co.	Mount Ida Gold-dredging Co. (Ltd.).
5/3/97	62	2	36	Cambrian, St. Bathan's	IV.	Blackstone ..	..	Black and Beattie.
5/3/97	62	2	29	Ditto ..	I. IV., VII.	St. Bathan's Blackstone	..	W. C. Pitches.
25/3/97	100	0	0	Naseby ..	III.	Maniototo ..	..	Naseby Dredging and Hydraulic Sluicing Co. (Ltd.).
25/3/97	70	1	0	Enterprise Gully, Naseby	III., XVIII.	" ..	..	James McLaren.
20/7/97	39	2	0	Kyeburn River, Naseby	V.	Kyeburn ..	..	Agnes Wilson.
20/7/97	37	0	0	Ditto ..	"	" ..	..	Archibald Leckie.
5/11/97	59	3	24	St. Bathan's ..	II. VIII.	St Bathan's Blackstone	Hawkdun Dream Gold-dredging Co.	Patrick Hanrahan and Ulick Fahy.
21/1/98	92	2	13	Cambrian, St. Bathan's	IV.	"	New Arrival Gold-dredging Co.	John Beattie.
21/1/98	93	0	25	St. Bathan's ..	I.	St. Bathan's	..	John Ewing,
				Cromwell.				
13/10/94	80	0	0	Albertown ..	IV.	Lower Wanaka	..	Andrew Hamilton.
16/7/96	76	0	0	Kawarau ..	I., II.	Cromwell ..	Electric ..	Roy and McGeorge.
6/4/96	41	0	0	" ..	I.	" ..	Electric No. 2 ..	"
4/8/96	22	0	0	" ..	II.	Kawarau ..	..	Allan and Aitken.
20/8/96	22	3	30	" ..	I.	Cromwell ..	..	W. E. Lane.
1/10/96	55	0	0	Nevis River ..	III.	Nevis ..	..	Thomas Steel.
1/10/96	46	2	0	" ..	"	" ..	..	A. D. Silk.
1/10/96	32	0	0	Cromwell Brewery	I. VI.	Cromwell Wakefield	..	Hartley and Riley Beach Co.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—*continued*.

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
				Cromwell—continued.				
29/3/97	56	1	16	..	I., III.	Nevis ..	..	Olaf Magnus.
29/3/97	98	0	26	..	I.	" ..	..	John Mackersey and party.
29/3/97	95	1	5	..	"	" ..	..	H. W. Flint.
29/3/97	59	0	25	..	XIII.	" ..	..	Robert Ross.
17/6/97	31	0	2	Bowman Flat	XIV.	Tarras ..	..	G. A. Morris.
18/9/97	52	2	23	..	III.	Nevis ..	..	James Fotheringham.
18/9/97	99	2	16	..	III., XIII.	" ..	..	Robert Ross and party.
1/12/97	44	2	1	..	XIII., III.	" ..	..	Henry Schaumann.
12/3/97	9	3	10	Kawarau Gorge	II.	Cromwell ..	..	Magnetic Co.
1/12/97	24	1	10	Kawarau ..	I.	" ..	Electric No. 3 ..	Samuel Crow.
3/3/98	3	2	0	Cromwell ..	"	" ..	..	Benjamin McPherson.
3/3/98	7	2	0	" ..	"	" ..	..	"
17/9/96	15	0	0	Nevis Crossing	"	Nevis ..	..	Robert Ritchie.
				Clyde.				
16/3/98	100	0	0	Waikerikeri Creek	II.	Leaning Rock	..	Robert Hutton.
7/6/97	89	0	0	Ditto ..	I.	"	..	William Manghan.
9/6/97	68	0	0	Clutha River, Mutton Town	I., VII.	"	Matau Co. ..	Mata Dredging Co. (Ltd.).
28/2/98	50	0	0	Clutha River, above Clyde	III.	"	Monte Christo Co.	J. Nash and another.
7/6/97	92	0	0	Waikerikeri Creek	I., II.	"	..	Arthur H. Poole.
6/12/97	56	0	0	Clutha River, Clyde	I.	"	Unity Co. ..	P. Barnnan and others.
26/6/97	42	0	0	Ditto ..	I., II.	"	Victoria Co. ..	The Victoria Gold-dredging Co. (Ltd.).
6/12/97	45	0	0	" ..	I.	"	Vincent Co. ..	The Vincent Gold-dredging Co. (Ltd.).
				Black's.				
28/2/98	100	0	0	Ida Valley ..	XII.	Tiger Hill ..	..	Thomas P. Beck.
8/3/98	22	0	0	Black's Hill ..	II.	" ..	Leslie H. Reynolds	L. H. Reynolds.
				Alexandra.				
7/3/98	7	0	0	Manuherikia ..	XIX.	Tiger Hill ..	..	Peter Barr.
16/3/98	34	0	0	Clutha River, below Alexandra	I.	Fraser ..	..	J. Bruce.
13/1/97	50	0	0	Manuherikia River, Chatto Creek	VI.	Tiger Hill ..	Chatto Creek Co. ..	The Chatto Creek Dredging Co. (Ltd.).
13/11/95	58	0	0	Clutha River, Sandy Point	X., VII.	Leaning Rock	Chicago Co. ..	George Spencer.
18/6/96	42	0	0	Clutha River, Alexandra	VII., I.	Leaning Rock, Fraser	Clyde Dredging Co.	Clyde Dredging Co. (Ltd.).
8/2/98	6	0	0	Ditto ..	I.	Fraser ..	"	"
30/11/95	33	0	0	Sandy Hook, above Alexandra	X.	Leaning Rock	Earnscleugh No. 1..	Charles Weaver.
6/11/96	93	0	0	Ditto ..	"	"	Earnscleugh No. 2..	C. Weaver and another.
2/2/94	52	0	0	" ..	VII.	"	Enterprise Co. ..	Enterprise Gold-dredging Co. (Ltd.).
16/3/95	36	0	0	Clutha River, Alexandra	I.	"	Eureka	C. G. Leijon and others.
18/9/97	28	0	0	Ditto ..	"	Fraser ..	"	"
29/9/97	46	0	0	" ..	"	" ..	"	"
28/2/98	22	0	0	Clutha River, Fourteen-mile	III.	Cairnhill ..	Fourteen-mile Beach Co.	John Simes.
16/3/98	35	0	0	Manuherikia River, near Alexandra	VII.	Leaning Rock	Golden Link Co. ..	J. Ryan.
7/3/98	8	0	0	Poverty Beach	I.	Fraser ..	..	J. Hyde and others.
21/12/93	60	0	0	Clutha River, Mutton Town Point	VII.	Leaning Rock	Hyde and Party ..	John G. Hyde.
6/12/97	23	0	0	Clutha River, below Alexandra	II.	Fraser ..	Island Basin ..	D. Bringans and others.
16/3/98	26	0	0	Clutha River, Sixteen-mile	VIII.	Teviot ..	..	A. Kjoller.
18/9/97	100	0	0	Manuherikia River	IX., VIII.	Leaning Rock	Lion Rock Co. ..	Lion Rock Gold-dredging Co. (Ltd.).
28/2/98	36	0	0	Clutha River, below Alexandra	II.	Cairnhill ..	..	W. S. McCallum.
28/2/98	28	0	0	Ditto ..	II., XVII.	" ..	..	A. Magnus.
28/2/98	30	0	0	" ..	II.	" ..	..	J. Magnus.
16/7/97	99	0	0	Manorburn ..	IX.	Leaning Rock	Manorburn Co. ..	Manorburn Gold-dredging Co.
16/10/95	28	0	0	Clutha River, below Alexandra	I.	Fraser ..	Manuherikia Dredging Co.	O. Magnus and others.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—*continued.*

Date of License.	Area.			Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
				Alexandra—continued.				
	A.	R.	P.					
18/9/97	99	0	0	Manuherikia River	VI.	Tiger Hill ..	..	John A. Millar.
11/10/93	40	0	0	Alexandra ..	XXI.	Town of Alexandra	Molyneux Hydraulic	Molyneux Hydraulic E. and G. Mining Co. (Ltd.).
19/8/97	26	0	0	" ..	XVI., VII.	Town of Alexandra, Leaning Rock	Molyneux Hydraulic Co.	Ditto.
1/10/96	69	0	0	Clutha River, above Alexandra	VII.	Leaning Rock	Ngapara Co. ..	R. Ross and others.
18/9/97	60	0	0	Manuherikia River	VI.	Tiger Hill ..	Nil Desperandum ..	L. Gard.
18/9/97	49	0	0	Ditto ..	IX., VII.	Leaning Rock	..	Charles H. Osmond.
18/9/97	100	0	0	" ..	VI.	Tiger Hill ..	..	A. J. Park.
20/4/96	13	0	0	Poverty Beach	I.	Fraser ..	Pattison and Party	J. Pattison and others.
13/11/95	38	0	0	Clutha River, near Sandy Point	X.	Leaning Rock	Perseverance ..	R. M. Findlay and others.
12/8/96	93	0	0	Ditto ..	..	"	" ..	"
18/9/97	100	0	0	Manuherikia River	IX., VIII.	"	..	Charles E. Richardson.
18/9/97	100	0	0	Ditto ..	VIII. V.	" Tiger Hill	..	"
6/12/97	21	0	0	Clutha River, below Alexandra	II.	Fraser ..	..	James Rivers.
7/6/97	48	0	0	Manorburn ..	IX.	Leaning Rock	..	William Ryan.
28/2/98	86	0	0	Manuherikia River and Flat	VIII. VI.	" Tiger Hill	..	John Tait.
18/9/97	80	0	0	Manuherikia River	IX.	Leaning Rock	Turakina Co. ..	Turakina Gold-dredging Co. (Ltd.).
				Roxburgh.				
16/8/92	20	0	0	Clutha River, above Roxburgh	I.	Teviot ..	Dunedin Gold-dredging Co.	Robert Brownlie.
1/8/92	45	0	0	Ditto ..	I.	" ..	Ditto	Thomas Brown.
24/4/96	41	0	0	Miller's Flat ..	II., III., VI.	Benger ..	Golden Run ..	Golden Run Dredging Co. (Ltd.).
14/8/93	52	0	0	" ..	III.	" ..	" ..	"
16/3/94	59	0	0	Clutha River, Ettrick ..	VIII.	" ..	Ettrick Co. ..	Ettrick Gold Steam-dredging Co. (Ltd.).
25/8/94	57	0	0	Clutha River, Miller's Flat	III.. VI.	" ..	Pringle and Party ..	John Pringle and others.
16/3/96	62	0	0	Ditto ..	VI., III.	" ..	Golden Gate ..	Gelden Gate Dredging Co. (Ltd.).
24/4/96	66	0	0	Ditto ..	III., VI., VII.	" ..	Golden Treasure ..	Golden Treasure Dredging Co. (Ltd.).
18/6/96	62	0	0	Horseshoe Bend	II. VII.	Benger Beaumont	Golden Gate ..	Golden Gate Dredging Co. (Ltd.).
9/9/96	47	0	0	Ettrick ..	I., VI., XI.	Town of Ettrick	Bengerburn ..	Bengerburn Gold-dredging Co. (Ltd.).
18/2/97	47	0	0	Miller's Flat ..	III.	Benger ..	Otago Co. ..	Otago Gold-dredging Co. (Ltd.).
7/6/97	41	0	0	Roxburgh ..	I.	Teviot ..	Borland and another	John Borland and another.
7/6/97	62	0	0	Clutha River, Hercules Flat	VII.	" ..	Roxburgh Co. ..	Roxburgh Gold Steam Dredging Co. (Ltd.).
16/7/97	46	0	0	Clutha River, above Roxburgh	I.	" ..	Dunedin	Dunedin Gold-dredging Co.
18/9/97	100	0	0	Miller's Flat ..	VIII.	Benger ..	Laffey and Party ..	P. Laffey and others.
28/2/98	41	0	0	Clutha River ..	I.	Teviot ..	Pitchers and Party	Henry Youngman.
				Lawrence.				
13/9/89	170	2	35	..	XIV. IV. VII.	Tuapeka East Waipori .. T'wn of Waipori	Upper Waipori ..	The Upper Waipori Alluvial-gold Dredging Co. (Ltd.).
8/10/94	185	2	0	..	XIV.	Tuapeka East	Jutland Flat ..	The Jutland Flat (Waipori) Gold-mining Co. (Ltd.).
24/3/96	40	3	0	..	VII. XV.	Beaumont Crookston	..	William McLelland.
25/3/96	49	2	0	..	X.	Tuapeka East	Tuapeka Flat Dredging Co.	John Robinson and party.
9/12/95	44	0	0	..	IV.	Beaumont ..	..	Albert Boddington.
25/3/96	61	1	0	..	I.	Crookston ..	..	Edwin Pyrke.
9/12/95	67	2	0	..	"	" ..	..	Hugh Crossan.
13/7/96	99	2	0	..	V.	Waipori ..	..	Richard Pilling.
10/8/96	98	0	18	..	"	" ..	..	Archibald McKinlay.
10/8/96	30	1	20	..	III.	Tuapeka East	..	John Laffey.
30/11/96	76	3	0	..	XXI., XVIII.	Crookston ..	..	William C. McGregor.
30/11/96	40	2	0	..	XIV. XV.	Beaumont Crookston	..	John E. McClelland.
15/2/97	14	2	24	..	I.	Waitahuna W.	..	Robert McLeod and others.
15/2/97	26	1	0	..	III.	Tuapeka West	..	John Laffey.
29/3/97	27	3	13	Weatherstone's	XIX.	Tuapeka East	Robertson and Party	James W. Robertson.
29/3/97	84	2	38	Waipori ..	V.	Waipori	Success	Success Gold-dredging Co. (Ltd.).
29/3/97	72	0	0	Beaumont ..	VII.	Beaumont ..	Golden Lead ..	Golden Lead Gold-dredging Co. (Ltd.).

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—*continued.*

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
			Lawrence—continued.			
	A. R. P.					
29/3/97	96 0 15	..	IV.	Waipori ..	Excelsior.. ..	John Lawson.
29/3/97	28 1 35	Waipori ..	"	" ..	..	"
7/6/97	78 2 18	..	X. XXXIV.	Waitahuna E. Town of Havelock	Waitahuna Dredging Co.	Roger Kirby and party.
3/8/97	48 2 34	Tuapeka Flat..	VI.	Tuapeka West	Tuapeka ..	Tuapeka Dredging Co. (Ltd.).
3/8/97	58 3 19	Beaumont ..	XV.	Crookston ..	Bennet and Party..	Charles Bennet.
3/8/97	23 0 6	Waitahuna ..	XXXIV.	Town of Havelock	..	Robert McKenzie.
12/11/97	34 0 13	Tuapeka Flat..	XX.	Tuapeka East	Record Reign ..	William Murray.
17/2/98	98 3 18	Waipori ..	IV., V.	Waipori ..	McNeil and Party..	James McNeil.
4/3/98	25 3 28	Tuapeka Flat..	VI. IV.	Tuapeka W. Tuapeka E.	Fitzgerald and Party	Cornelius Fitzgerald.
11/1/98	7 1 0	Glenore ..	III.	Table Hill ..	Nil Desperandum ..	Arnold Sturm.
			Waikaia.			
23/12/96	44 1 24	..	XIV.	Chatton ..	Waikaka Dredging Claim	John R. Perry.
8/12/97	100 0 0	..	I.	Waikaia ..	Winding Creek ..	Winding Creek Dredging Co.
8/12/97	96 3 0	..	I., II.	Wendon ..	Mystery Flat Dredging Claim	G. M. Grigg.

Naseby.

The Naseby Dredging and Hydraulic-sluicing Company's Dredge is at work in this district, and is reported to be yielding good returns. The length of the dredge is 70 ft., with 25 ft. beam. The ladder is 45 ft. in length, the capacity of the buckets being 3½ cubic feet. Engine and boiler, 20-horse power nominal and 38-horse power actual.

Another dredge is at work on the upper Kyeburn, but it is not of the most modern type.

At Macrae's Flat contracts have been let for the construction of two dredges of approved type and large capacity.

Black's.—It is intended to work several special claims in this locality by means of dredging, and an up-to-date dredge is now being built.

St. Bathan's.—The Cambrian dredge, which is of the most up-to-date description, is approaching completion, and will shortly be at work.

Waikaka.

The dredges owned and worked by Mr. J. R. Perry and Messrs. William McGill and party in this district are, I hear, on payable gold. In this district mining matters are brightening. Several special claims have been granted, and a number of applications are pending.

Perry's Dredge.—This dredge is situated on a flat, within half a mile of Waikaka Township, and in a line between the township and the cemetery. The claim, which consists of an area of 44 acres, is held under a license, dated 23rd December, 1896. About 6 acres of the land has already been worked during the year. The depth of the portion worked is about 13 ft. The top layer consists of soil about 1 ft. in thickness, under which the clay varies from 2 ft. to 9 ft. This is succeeded by a layer of gravel, containing the gold. The wash which yields the most gold is of fine description, and lies on a gravel bed, which does not contain gold, probably the "Maori bottom." The dimensions of the dredge are 70 ft. by 24 ft., and the well for the ladder is 30 ft. in length, the buckets having a capacity of 2½ cubic feet. The length of the ladder is 40 ft. The tables are 40 ft. by 3 ft., partly perforated plates and partly iron riffles, with cocoanut-matting underneath. There are also three tables on each side; these are 5 ft. by 3 ft., and covered with matting. The washed gravel is discharged from a lander attached to the tables, the shallow depth worked rendering the use of an elevator for the tailings unnecessary. A paddock was first excavated to hold water sufficient to float the dredge, and a small stream of water is found sufficient to keep up a supply necessary for the dredge to float in and to prevent the water from becoming too muddy for working purposes. This is an instance of dredging being carried on successfully in a wet flat where no great quantity of water is to be found on the surface. Six men are employed, and operations are conducted by Mr. John M. Walker, the manager. The returns of gold are from 11 oz. to 12 oz. per week.

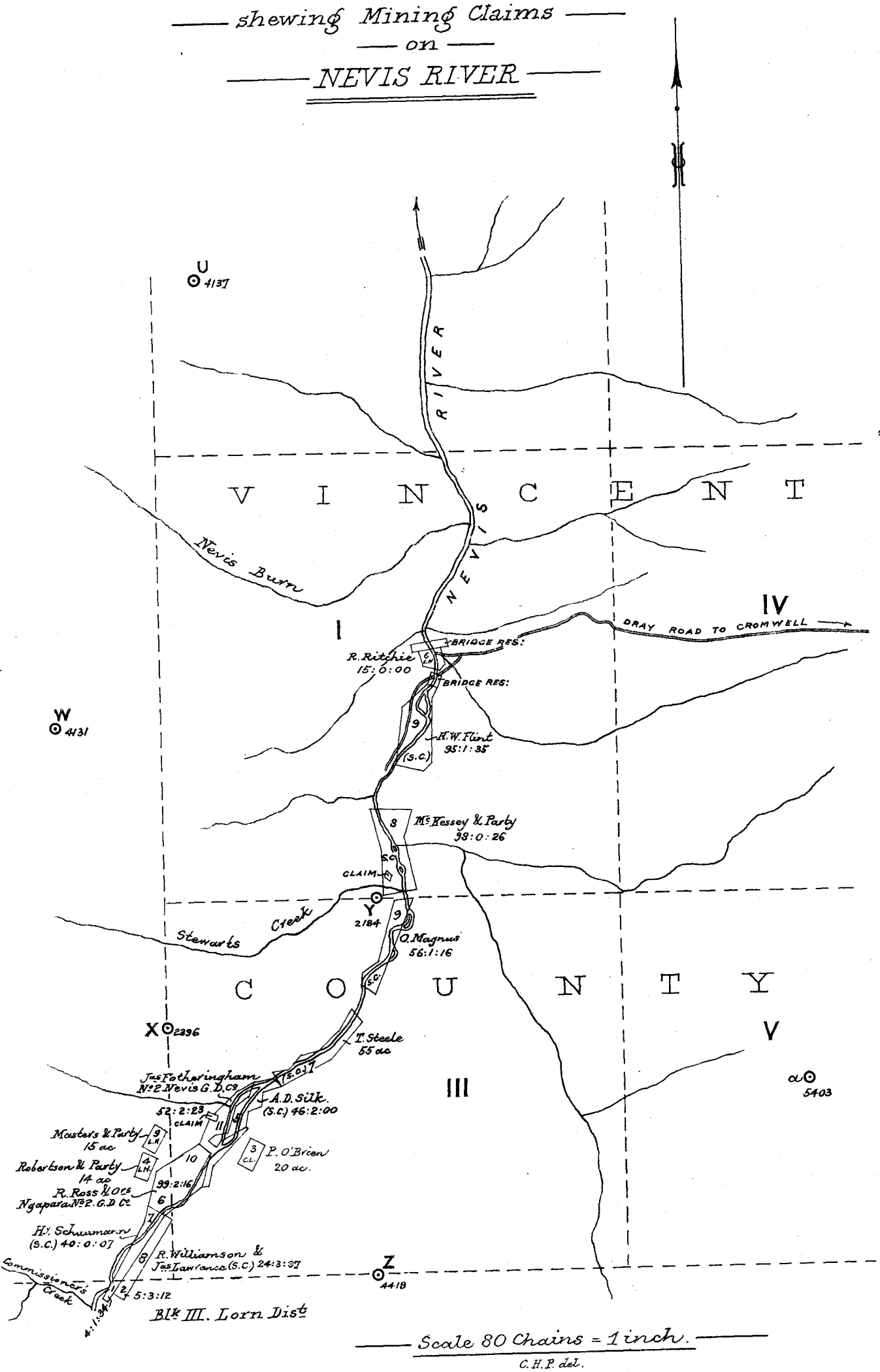
McGill's dredge is situated on the left branch of the Waikaka, and is owned and worked by a party of six men. The dredge is built on somewhat similar lines to Perry's dredge, and the wash is of a more gravelly nature, there being less clay than is found in the first-named claim. Mr. W. McGill informed me that the returns were, on the whole, satisfactory, being somewhat better than what is obtained by Mr. Perry.

The Golden Crown Dredging Company.—This company have started dredging on the Waikaia River, but up to the present time have been unable to show satisfactory results. The dredge cost £3,500.

Shotover.

The Golden Terrace No. 1 and No. 2 dredges, which formerly belonged to the Sew Hoy Big Beach Dredging Company, are working in that part of the river where the current is very rapid. Nine men are employed on each dredge.

Sketch Plan
shewing Mining Claims
on
NEVIS RIVER



Scale 80 Chains = 1 inch.

C.H.P. del.

Sketch Plan showing Mining Claims on the CLUTHA & KAWARAU RIVERS.

M ⊙ McDotterel 5580

X
IX
VIII
VII
VI
V
III
IV
XIII
XIV
II
I

RANGE PISA

DISTRICT KAWARAU

COUNTY VINCENT

MOUNTAINS DUNSTAN

Sec 1. Blk X Bing Chue 6:3:33 (S.C.)

Mitre Creek

Quartz Knoll

Tinsel Br.

Skelton Ck.

Meg

Roaring or Kirtle Br.

Five Mile Ck

1093

Jno Werner (L.H.) 5:3:16

T. Woods & Party 5:2:5

Hatter's Gully

13 Jno Werner & Ors (S.C.) 40 ac

Stratford's Gully

Gilby's Gully

Kelly's Gully

Birchall's Gully

Chinaman's Gully

Low Burn

ROAD TO WANAKA

TO MAKAROA

17 G. McLay (S.C.) 97:2:00

26:2:26 Cancelled

18 S.C.

8 S.C.

FERRY RESERVE

H 935

McLean

11a R.M. Falconer 40 ac

W Crookston 100 ac

⊙ P 2775

⊙ L 3207

⊙ G 3792

⊙ T.S.

R. Burnside

B. R. Baird & Ors (S.C.) 7:2:20

⊙ D Double Rock

FARMS

Race-course Reserve

CROMWELL T.S.

Bridge

WARNINGS

Borough of Cromwell

KAWARAU JUNCTION Cromwell Bridge

J. Towan & Ors (S.C.) 4:0:34

McDifficulty

KAWARAU GORGE

Gardens

W. Anderson 6 9:3:10

Bat area Wrightson & McGee 5 ac

ROAD & TELEGRAPH LINE

Allan & Aitken (S.C.) 22 ac

13

SCOTLAND POINT

4 20:2:00

Long Gully

Douglas & Alderson

Muter & McNatty Coal 9:1:39

21

T. McCracken 15:2:30

J. Marsh 5 ac

33

41

COAL

Electric Co 33 = 41 ac

W. E. Lane 22:3:20

40

34 T. Wilson Coal 20 ac

BRIDGE

27

Paterson & Ors 25:0:12

DAM

35

Judge's Channel

Gully

9

16

1 COAL

Pride & Moore 20 ac

Richards' Freehold 20:1:30

T. Harlett 9:1:21

Pipeclay

⊙ Q 1380

⊙ C 2014

The Hartley & Riley Beach G.D.Co Total 32 ac.

43

16

TO CLYDE

CLUTHA RIVER

Cairnmuir Creek

TRACK FROM NEVIS

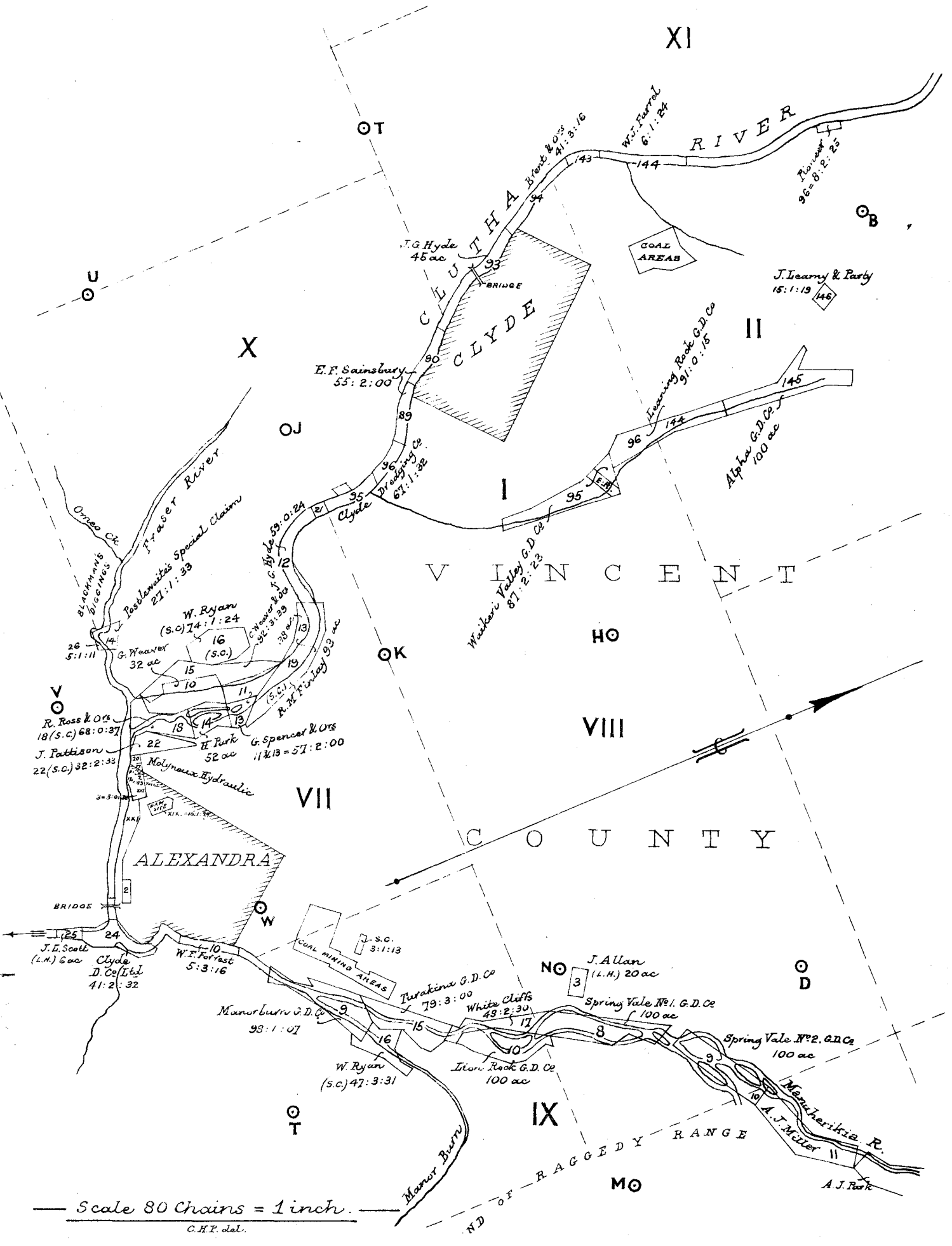
Fork Burn

Bannockburn

Scale 80 Chains = 1 inch.

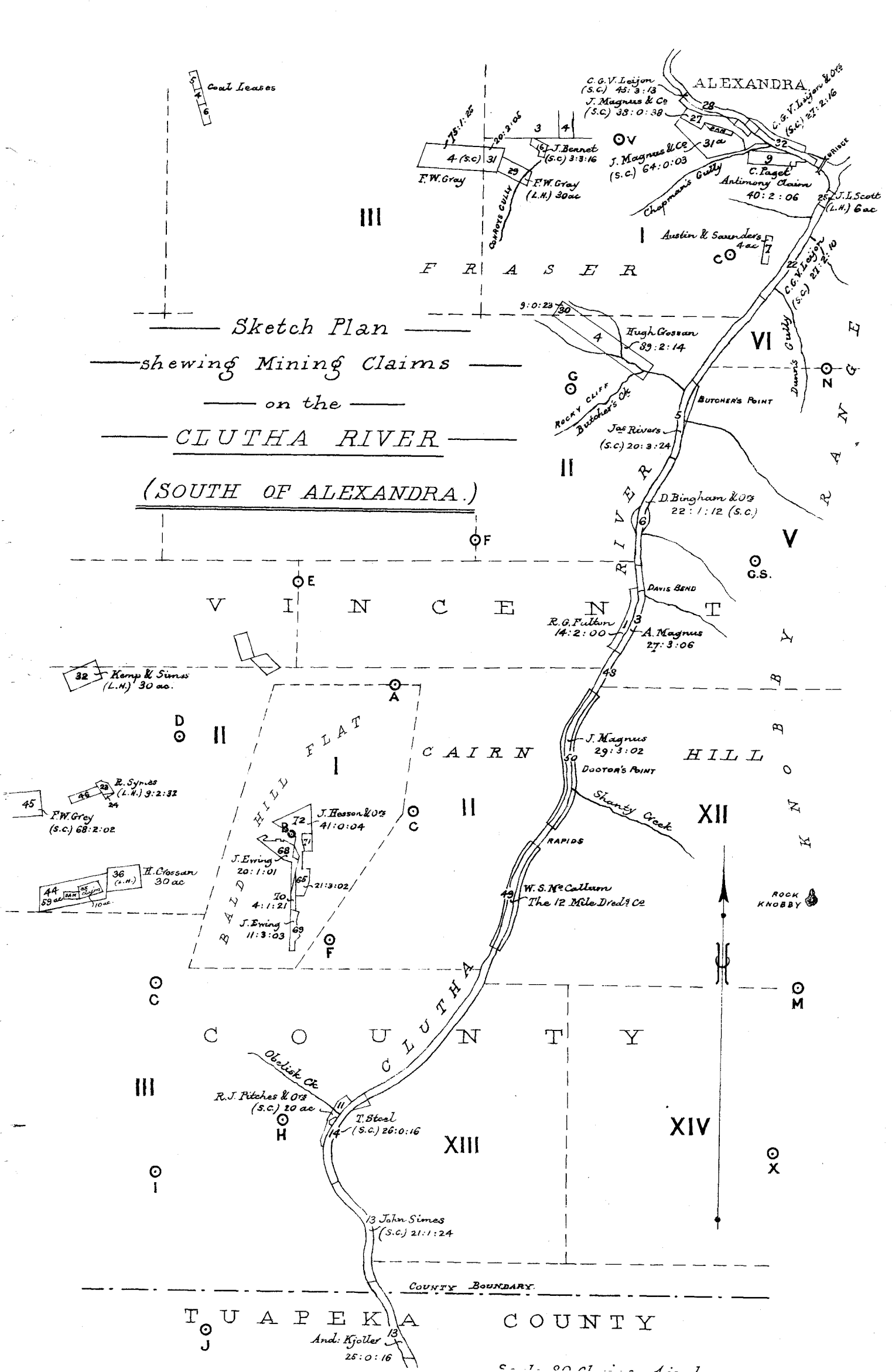
C.H.P. del.

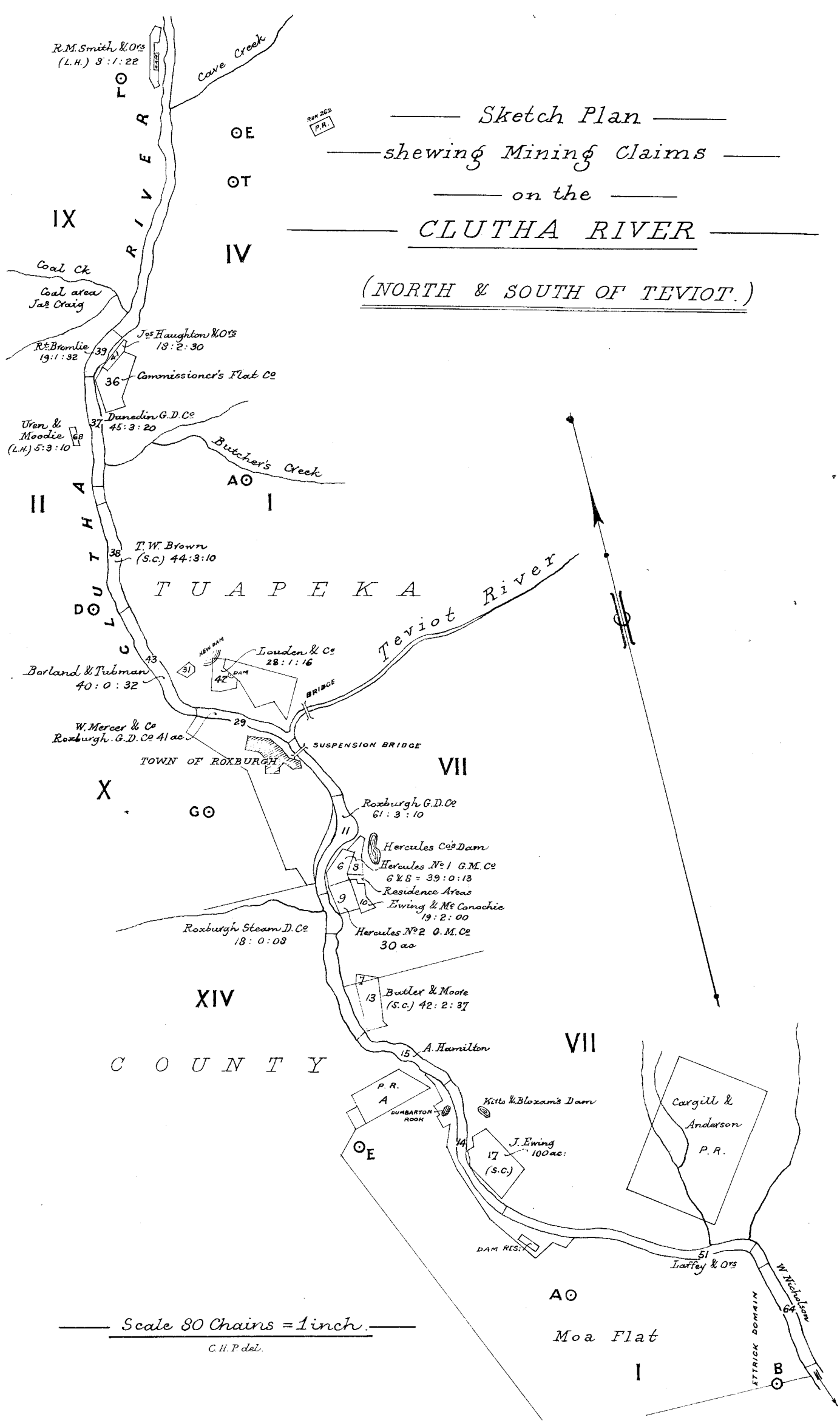
— Sketch Plan —
— shewing Mining Claims —
— on the —
— CLUTHA & MANUHERIKIA RIVERS. —



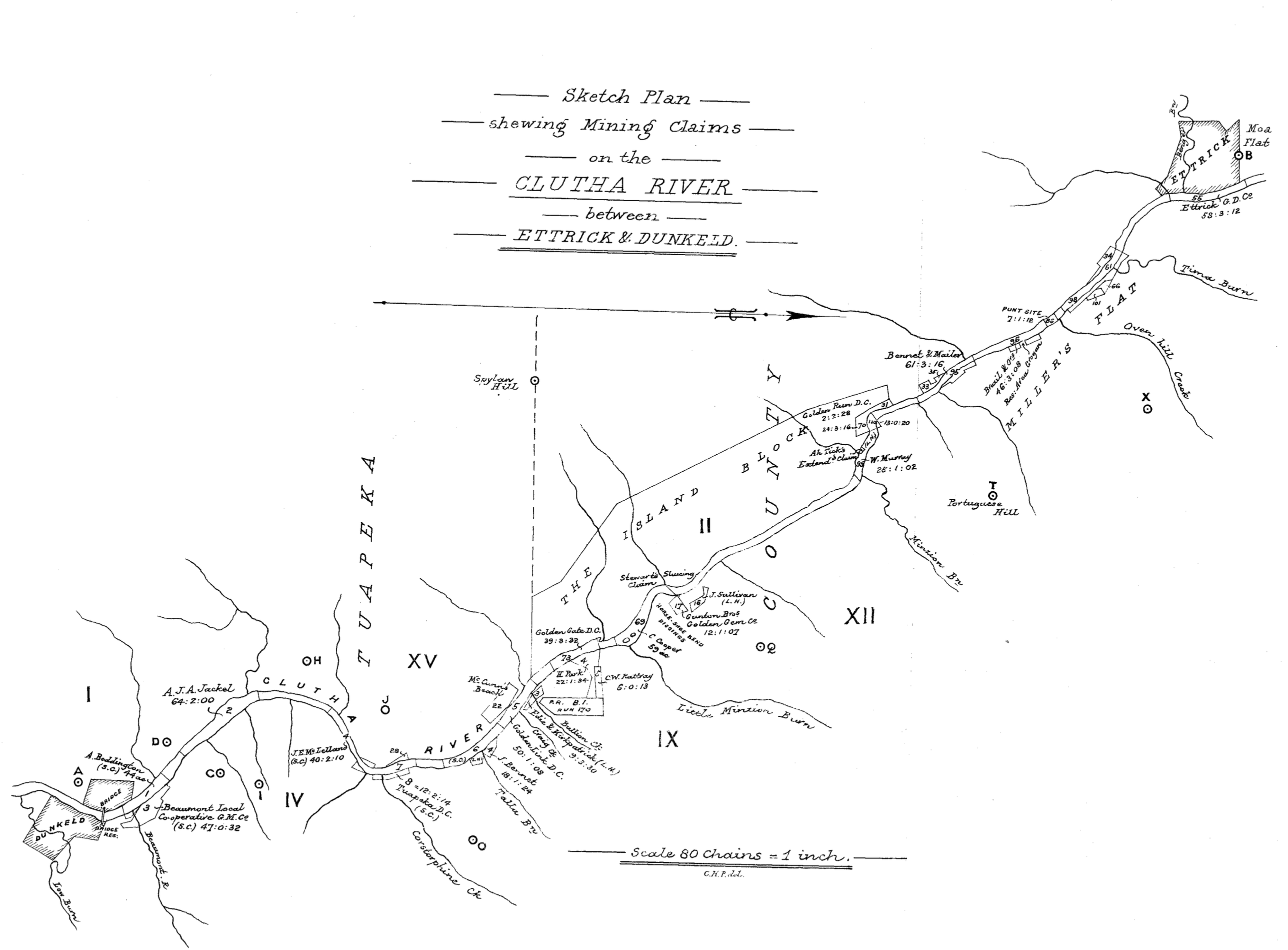
— Scale 80 Chains = 1 inch. —

C.H.P. del.


Sketch Plan
shewing Mining Claims
on the
CLUTHA RIVER
(SOUTH OF ALEXANDRA.)
Coal Leases
ALEXANDRA
C.G.V. Leijon (S.C.) 45:3:13
J. Magnus & Co (S.C.) 38:0:38
C.G.V. Leijon & Ors (S.C.) 27:2:16
J. Magnus & Co (S.C.) 64:0:03
C. Paget Antimony Claim 40:2:06
J.L. Scott (L.H.) 6ac
Austin & Saunders 4ac
F.W. Gray
F.W. Gray (L.H.) 30ac
J. Bennet (S.C.) 3:3:16
Connors Gully
Chapman's Gully
Hugh Grossan 89:2:14
Rocky Cliff
Butcher's Ck
Butcher's Point
Jas Rivers (S.C.) 20:3:24
Dunn's Gully
D. Bingham & Ors 22:1:12 (S.C.)
Davis Bend
R.G. Fulton 14:2:00
A. Magnus 27:3:06
Kemp & Sims (L.H.) 30 ac.
J. Magnus 29:3:02
Doctor's Point
Shanty Creek
Rapids
R. Symes (L.H.) 9:2:32
F.W. Grey (S.C.) 68:2:02
J. Hesson & Ors 41:0:04
J. Ewing 20:1:01
H. Grossan 30 ac
J. Ewing 4:1:21
J. Ewing 11:3:03
W.S. McCallum
The 12 Mile Dredg Co
Rock Knobby
Obelisk Ck
R.J. Pitches & Ors (S.C.) 20 ac
T. Steel (S.C.) 26:0:16
13 John Simes (S.C.) 21:1:24
And. Kjoller 25:0:16
County Boundary
TUAPEKA COUNTY
FRASER
VINCENT
CAIRN HILL
BALD HILL FLAT
CLUTHA RIVER
COUNTY
RANGE
BAY
KNOB


Sketch Plan
shewing Mining Claims
on the
CLUTHA RIVER
(NORTH & SOUTH OF TEVIOT.)
R.M. Smith & Ors (L.H.) 3:1:22
Cave Creek
RUN 262 P.R.
RIVER
Coal Ck
Coal area Jas Craig
Jos Haughton & Ors 18:2:30
Rt Bromlie 19:1:32
Commissioncr's Flat Co
Dunedin G.D.Co 45:3:20
Uren & Moodie (L.H.) 5:3:10
Butcher's Creek
CLUTHA
T.W. Brown (S.C.) 44:3:10
TUAPEKA
Teviot River
Louden & Co 28:1:16
NEW DAM
DAM
BRIDGE
Borland & Tubman 40:0:32
W. Mercer & Co Roxburgh G.D.Co 41 ac
SUSPENSION BRIDGE
TOWN OF ROXBURGH
Roxburgh G.D.Co 61:3:10
Hercules Co's Dam
Hercules No 1 G.M.Co 6 & 8 = 39:0:13
Residence Areas
Ewing & Mc Conochie 19:2:00
Roxburgh Steam D.Co 18:0:08
Hercules No 2 G.M.Co 30 ac
Butler & Moore (S.C.) 42:2:37
A. Hamilton
COUNTY
P.R. A
DUMBARTON ROCK
Kitto & Bloxam's Dam
J. Ewing 100 ac: (S.C.)
Cargill & Anderson P.R.
DAM RES:
Laffey & Ors
W. Nicholson
ETTRICK DOMAIN
Moa Flat
Scale 80 Chains = 1 inch.
C.H.P. del.

Sketch Plan
shewing Mining Claims
on the
CLUTHA RIVER
between
ETTRICK & DUNKELD.



Waipori.

Success Gold-dredging Company (Limited).—This company took over a special claim of 84 acres from W. Hanley, and built a dredge at a cost of £2,900. It has been working since January last, and the directors are well satisfied with the results so far.

Empire Gold-dredging Company (Limited).—This company took over the special claims of Messrs. McKinlay and Pilling. The claim is situated on the Waipori Flat. The dredge is now being built, and will be equipped with all the latest appliances by Messrs. Morgan and Cable, of Port Chalmers. The company expects to make a start dredging about the month of June.

Messrs. McNeil and Party.—The returns of this company are not published, it being a private company, but from what I can hear the returns are exceedingly good.

Jutland Flat (Waipori) Gold-mining Company (Limited).—This company has been working steadily during the year, and has won 1,151 oz. of gold for the twelve months, and has paid dividends amounting to £1,875.

Upper Waipori Alluvial Gold-dredging Company (Limited).—This company has also been working for the greater part of the year. The yield of gold was 1,169 oz. Dividends declared amount to £600 for the year.

Perseverance Dredge.—Messrs. McNeil and company have been at work with this dredge for the past thirteen months, with fair results. The dredge is working in practically dead-water.

New Sandhills Dredge.—Operations have been continued during the year in this dredge, which is situated on the Upper Shotover, about seven miles above Skipper's Point. The returns are said to be satisfactory.

Island Block.

The Golden Lead Company's dredge is to be moved up opposite Craig's paddock.

The Golden Gate dredge is working in the river, below Island Block.

The Golden Run Company is about to construct a new and improved dredge for working at the head of Island Block.

Miller's Flat.

The Otago Company's and Golden Gate Company's dredges have both done very well dredging from the bed of the Molyneux.

The Golden Treasure dredge has done very well near Kerr's Creek, the returns in dividends to the shareholders having been very large. This dredge is working the river-bed.

Pringle's dredge is working on the Molyneux River, about nine miles below Miller's Flat Ferry.

Roxburgh.

The Bengerburn dredge is now working on tribute at the mouth of the Benger Creek.

The Ettrick dredge has been working profitably in the river near Ettrick Township during the year.

The Edina dredge has been prospecting the river above Roxburgh, but frequent stoppages have been occasioned by breaksdown in the machinery. The owners, having purchased the Roxburgh Gold Steam-dredging Company's dredge, are now prospecting Mr. Youngman's claim, opposite Roxburgh.

The Dunedin dredge is working in the Molyneux River, near Coal Creek Flat. Eight men are employed.

The Roxburgh Dredging Company has gone into liquidation, but the dredge is now working in the river with fairly satisfactory results.

Alexandra.

The prospects of the dredging industry have never been so good as at present. Thirteen dredges are working within four miles on the Clutha River, and another three on the Manuherikia, an additional five being now under construction on the Clutha, and three on the Manuherikia.

The Manuherikia Gold-dredging Company's dredge has been working in midstream on the Molyneux River, just below the mouth of the Manuherika, but is now laid up for repairs.

The Molyneux Hydraulic Company's dredge is perhaps the most efficient at present working on the Clutha River, and it is gratifying to find that the returns have paid the cost of the construction of the dredge, and dividends will shortly be paid to the shareholders.

The Enterprise Company's dredge has been working now four years and a half on the claim opposite Sandy Point. The returns during the past year have been very satisfactory, dividends to the extent of £1,250 having been declared.

The Moa dredge, at Frenchman's Point, did exceptionally well, the return for one week being 288 oz.

The Eureka No. 1 (Leijon and party) and Ngapara (Ross and others) dredges have been at steady work, and have apparently done well.

The Eureka No. 2 dredge (Leijon and party) is working near the side of the river, and is of a modern description. Seven men are employed.

The Clyde dredge (Dr. J. C. Hyde and Co.) is working on the bank of the Molyneux River, away from the current. Six men are employed on this dredge.

The Chicago and Earnscleugh No. 1 dredges, both working at Sandy Point, have done remarkably well.

The Perseverance No. 1 Gold-dredging Company is working with three men in the bed of the river.

The Perseverance No. 2 Gold-dredging Company's dredge has been at work for some time in the bank of the river, away from the current, but is now laid up for repairs.

Manorburn Dredging Company (Limited).—The Victoria dredge is at present undergoing repairs at Alexandra, prior to being taken further down the river. The whole of the Manuherikia River and adjoining low flats from Alexandra, to the mouth of Chatto Creek, has been taken up, and it is believed that the flats will return satisfactory yields for work done.

The Manorburn dredge, which is working near the mouth of the Manorburn Creek, although of an old-fashioned type, has done very well.

The Turakina dredge and those on the adjoining claims have done excellent work. In the case of the first named a dividend has been declared to the company's shareholders, the first paid by any dredge on the Manuherikia River.

The Lion Rock dredge is now at work on the adjacent claim, with very favourable prospects.

Cromwell.

A great amount of success has not attended dredging on the Upper Clutha River.

Talboy's dredge has ceased operations.

Crookston's dredge is being removed to below the Cromwell Bridge, where it will be engaged on McPherson's claims.

Hotop's is the only dredge on the river above the Cromwell Bridge, but Hartley and Riley Beach Company's dredge is ready for machinery.

On the Kawarua the Electric No. 3 dredge is nearly completed, and the company's Nos. 1 and 2 dredges are doing very well on their claims.

The Current Wheel dredge, which is owned by Bryce, Kloogh, and Talboys, is working in the stream, but the returns have not been very satisfactory.

McLay's dredge, working in the Clutha River at Lowburn, has six men employed, but no returns have been published.

Nevis.

Four dredges have been at work in this district, a like number being in course of construction. All the dredges at work have done fairly well.

The Upper Nevis Company's dredge is now on their claim below the township.

The pontoons for Allen and Aitken's dredge are launched, and the machinery will shortly be in position.

Tuapeka.

William Murray and party, in a special claim near Chinese Camp, have done fairly well, and are said to be satisfied with the undertaking. This dredge is lighted with electric light.

J. Harris and party, known as the Tuapeka Flat Dredging Company, stopped work for a great part of the year owing to the delay in getting a new boiler out from England.

James Henley and party have only just started. The locality was a rich one in the early days, and it is very probable that it will give satisfactory returns.

The Evan's Flat Dredging Company and the Tuapeka Dredging Company are each constructing a dredge. It is expected that the latter will be in working-order about the end of May, and the former by about the month of June. These dredges are being fitted up with all the latest appliances, and lighted with electric light.

Three other special claims have been taken up on the Tuapeka River, below the above-mentioned, with the object of putting dredges on.

Weatherstone's.

J. W. Robertson's dredge has not been working satisfactorily.

Tuapeka Mouth.

Messrs. Henley and party's dredge was formerly working at the mouth of the Tuapeka River on Watts Goodwin's claim, but, owing to the difficulty in working the ground, was removed to Tuapeka Flat, and is now worked by the above party.

Messrs. McLeod and party's dredge has been brought down the river for the purpose of working the above party's claim at the mouth of the Tuapeka River. The returns are considered satisfactory.

Waitahuna.

The Waitahuna dredge, now owned by McKenzie and party, still continues to work on the river-flat below the township. The average returns are about equal to the previous year.

Glenore.

John Nelson and party have been working continuously during the year with good results, and about £400 has been spent in replacing the old boiler.

Tullock and party have been working steadily during the year, and are on payable gold.

Messrs. Robertson and party have built a new dredge during the year. It has been working for about one month on the river below the township, and is reported to be doing well.

Tapanui.

On the Pomahaka River only one dredge is now at work, and the owner reports doing fairly well.

In addition to the foregoing, a number of dredges are in course of construction throughout Otago.

Accidents in Dredging.

Five fatal accidents happened during the year—viz., Robert Falconer was drowned off McLeay' dredge, Lowburn, on the 3rd June, 1897; James Drysdale was drowned off the Roxburgh dredge on the 24th June, 1897; — Downing was drowned by falling off a plank on a dredge at Nevis on the 10th December, 1897; — Johnston was drowned by the capsizing of a boat at the Earnscleugh dredge, at Alexandra, on the 17th December, 1897; and Peter Stenhouse was killed by machinery on board the Golden Terrace dredge, at Queenstown, on the 26th January, 1898.

The estimated number of men employed about dredges is 420. The proportion of fatalities is thus 11·9 per thousand, which is very much greater than the ordinary average of mining accidents.

Some Yields from Dredging.

It is at present impossible to obtain complete returns of the gold won by dredging operations. The owners in many instances do not desire their yield of gold to be published; therefore the following list gives only some of the results which the owners have furnished for public information. The totals show that 10,909 oz. 4 dwt. of gold were recovered in this way:—

Some of the Otago Dredging Returns for Year ending 31st March, 1898.

Name of Company or Dredge.	Locality of Operations.	Yield of Gold												Total Yield of Gold.
		1897.									1898.			
		April.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	
Golden Terrace ..	Shotover	Oz. dwt. gr. ..	Oz. dwt. gr. ..	Oz. dwt. gr. ..	Oz. dwt. gr. ..	Oz. dwt. gr. ..	Oz. dwt. gr. ..	Oz. dwt. gr. ..	Oz. dwt. gr. ..	Oz. dwt. gr. 44 19 6	Oz. dwt. gr. 109 7 0	Oz. dwt. gr. 27 13 6	Oz. dwt. gr. 35 5 8	Oz. dwt. gr. 217 4 20
Otago	Miller's Flat ..	48 5 0	26 0 0	53 0 0	121 5 0	96 0 0	..	38 10 0	105 11 0	86 7 0	140 14 0	100 12 0	100 15 0	916 7 0
Golden Treasure ..	" ..	38 5 0	44 10 0	117 10 0	244 0 0	218 10 0	91 5 0	85 14 0	64 13 0	27 0 0	35 10 0	59 10 0	45 10 0	1,071 17 0
Golden Gate	" ..	28 0 0	13 5 0	53 0 0	49 0 0	66 10 0	240 0 0	120 8 0	29 13 0	21 13 0	28 19 0	69 11 0	83 18 0	803 17 0
Clyde	Alexandra	82 10 0	20 10 0	368 10 0	428 0 0	745 0 0	342 0 0	125 0 0	..	..	..	86 0 0	27 0 0	2,224 10 0
Enterprise	"	26 10 0	64 10 0	46 5 0	59 10 0	106 5 0	89 15 0	110 10 1	88 4 9	77 0 13	71 6 3	127 3 13	66 8 14	933 8 5
Jutland Flat	Waipori	70 5 0	89 10 0	78 0 0	129 10 0	20 15 0	110 0 0	70 11 0	108 10 0	155 3 21	43 8 0	90 6 0	57 6 0	1,023 4 21
Upper Waipori ..	"	150 5 0	165 0 0	133 0 0	124 5 0	157 0 0	99 5 0	36 19 0	38 14 0	99 12 0	64 2 0	62 10 0	14 15 0	1,145 7 0
Ettrick	Ettrick	46 10 0	65 10 0	70 0 0	89 15 0	93 10 0	61 0 0	30 10 0	18 9 0	24 18 0	39 18 0	37 10 0	17 1 12	594 11 12
Dunedin	Roxburgh	24 10 0	8 15 0	80 0 0	148 5 0	164 0 0	31 0 0	4 0 0	..	..	..	..	61 10 0	522 0 0
Kyeburn	Kyeburn	..	..	..	..	..	..	..	..	..	..	..	14 12 12	14 12 12
Molyneux	Alexandra	..	..	39 0 0	..	..	..	..	..	..	..	88 0 11	121 1 8	248 1 19
Edina	..	..	..	7 0 0	..	10 0 0	..	..	..	..	..	21 5 13	..	38 5 13
Golden Run	Miller's Flat ..	..	..	63 0 0	..	100 0 0	177 0 0	163 0 0	..	33 0 0	21 0 0	..	..	557 0 0
Success	..	..	..	..	..	..	..	..	..	..	14 12 0	..	..	14 12 0
Golden Crown	Waikaia	..	..	..	..	..	..	8 15 0	27 10 0	..	..	..	..	36 5 0
Roxburgh	Roxburgh	25 0 0	57 5 0	19 10 0	24 0 0	64 0 0	62 15 0	..	..	..	..	..	..	252 10 0
Sew Hoy Big Beach ..	Shotover	77 0 0	56 0 0	..	31 10 0	100 15 0	30 5 0	..	..	..	..	..	..	295 10 0
														10,909 4 6

The returns for the Electric dredge, from which very rich yields were obtained, as well as those from thirty-nine other dredges, are not included in this return.

Two Up-to-date Dredges.

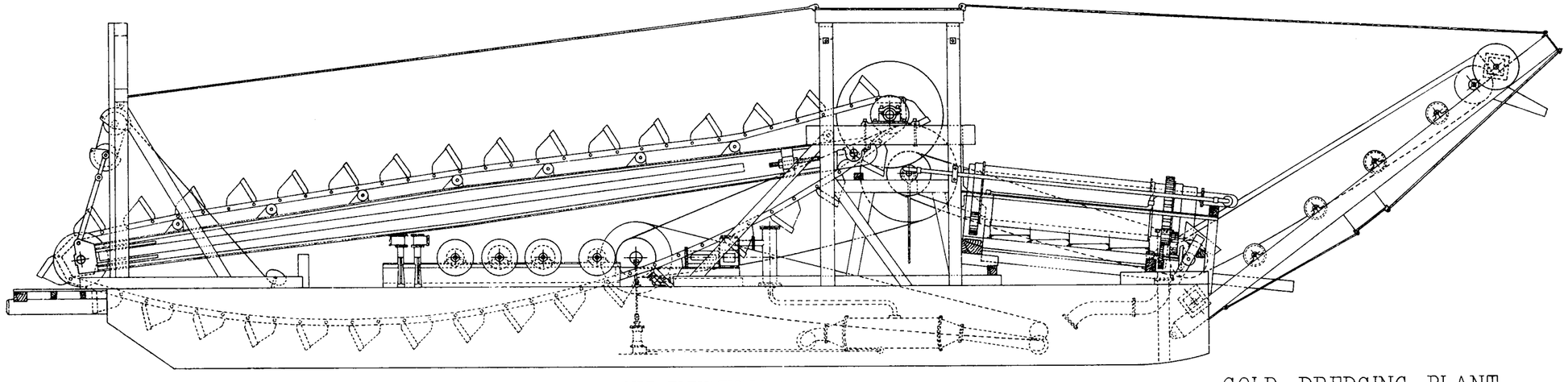
Inquiries are frequently made about dredges and dredging, and by the kindness of Mr. Payne, one of the engineers in Dunedin, who makes a specialty of dredge-construction, the following description of two dredges, of up-to-date design, have been supplied, as well as plans, which appear among the lithographs.

Magnetic Gold-dredging Company's Dredge.—The leading dimensions of dredge are as follows: Length, 109 ft.; width of beam, 25 ft. 6 in; depth, 7 ft. The ladder is 75 ft. long, designed to dredge to a depth of 50 ft. from the surface of the water. The buckets are 5½ cubic feet capacity. The engine is one of Messrs. Marshall's 16-horse power compounds, and surface condensation is effected by water raised for gold-saving purposes. The winch is driven by a pair of horizontal engines, fitted with reversing motion. The boiler is of the Cornish multitubular type, the working-pressure being 150 lb. per square inch. The ladder is raised and lowered in the usual manner from the winch B. The buckets are put in motion by the tumbler C, driven by gears and rope-drive from engine E. The material is delivered on to drop-plate, and from thence into perforated screen G, the fine stuff falling through screen on to gold-saving tables H. The material in screen is washed by perforated pipe running all through screen, and the tables are supplied with an additional supply by the branch pipes at back of screen. The water is supplied by a centrifugal pump, driven from the engine by a belt. The coarse material (stone, &c.) that will not pass through holes in screen is delivered into stone shoot and passed direct overboard into the current, or elevated by means of elevator, as shown in illustration. The dredge is being built from plans prepared by Mr. F. W. Payne, consulting engineer, Dunedin, and under his supervision, and when completed will be larger than any gold-dredge now afloat in Otago.

Unity Gold-dredging Company's Dredge. — Leading dimensions: Length, 85 ft.; width, 26 ft. 6 in.; ladder, 60 ft.; buckets, 4½ cubic feet capacity. The engine is one of Messrs. Marshall's 16-horse power compound and surface condenser. Centrifugal pump and air-pump are placed below deck. The winch is driven by worms and worm-wheels, the power being supplied by a pair of vertical engines fitted with reversing gear. The boiler is one of Messrs. Marshall's 20-horse power dredger type, the working pressure being 140 lb. per square inch. The ladder is raised and lowered in the usual manner from the winch. The material is delivered from the buckets into the revolving screen; and the fine stuff distributed over a double set of tables leading each way from the centre of screen. The coarse material that will not pass through screen is delivered to elevator and deposited astern of the vessel. This dredge is also being built from plans prepared by Mr. F. W. Payne, and under his supervision.

Improvements are constantly being made in dredge building and equipment, and the different engineers vie with one another in producing more powerful and effective machinery, and the buckets of such increased capacity as to permit of much larger quantities to be dealt with daily.

In next year's report important additions will be shown in the number of dredges employed in New Zealand.

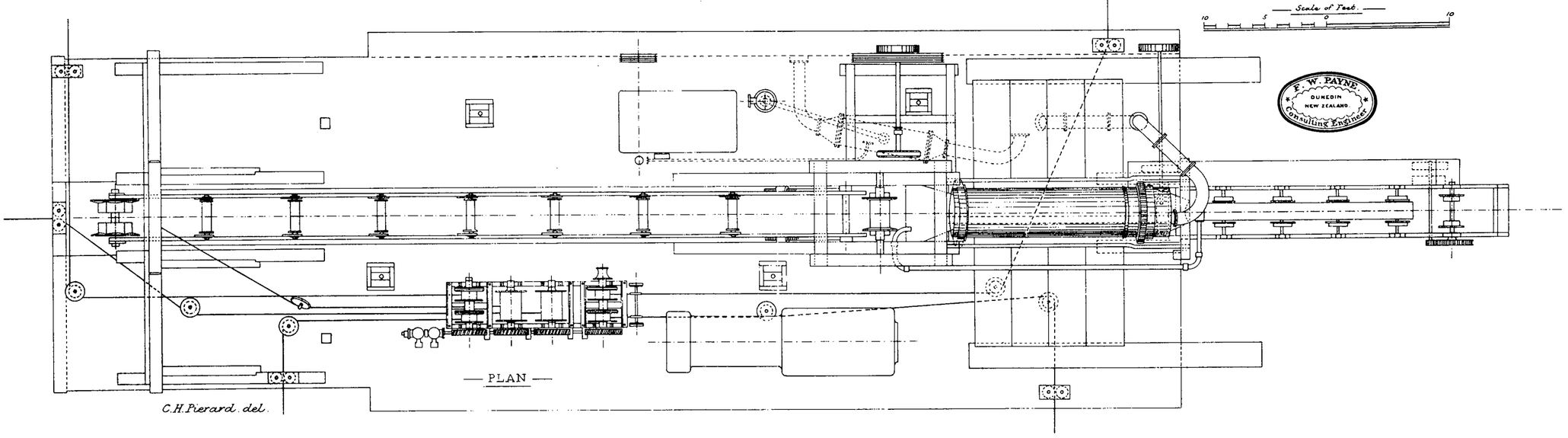


SIDE ELEVATION (Boiler removed).

GOLD-DREDGING PLANT

Length of Dredge 85 feet. Beam 26 feet 6 inches.

Bucket Ladder 60' long. Capacity of Buckets 4½ c.ft.



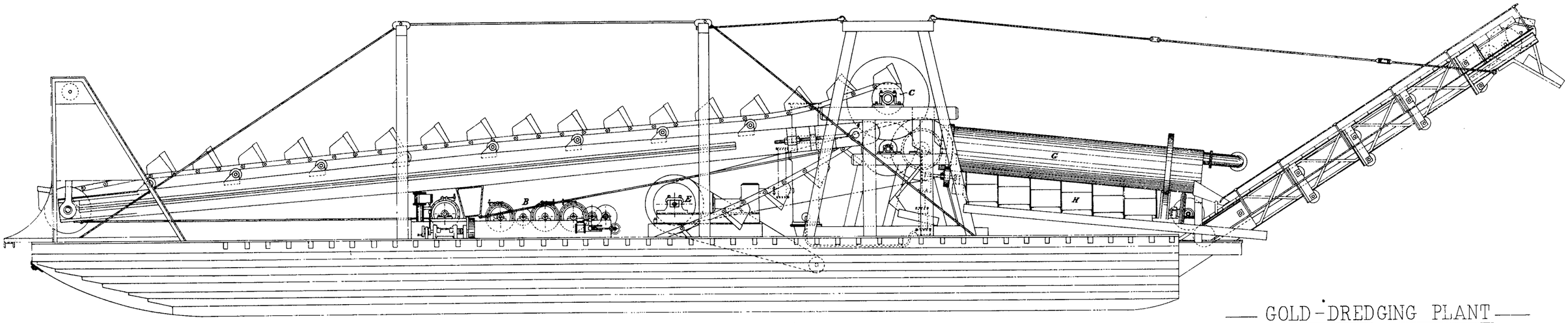
PLAN

C.H. Pierard. del.

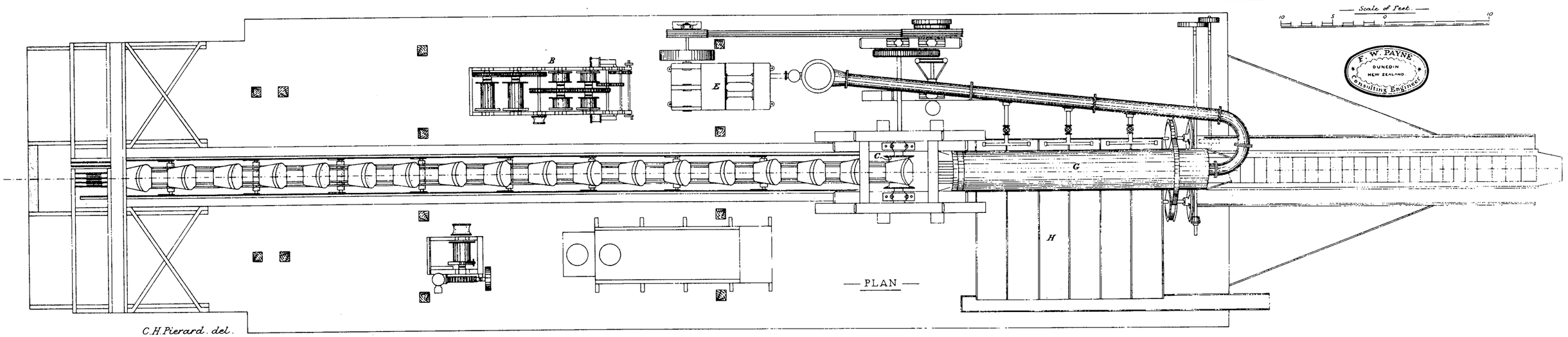
GOLD-DREDGING PLANT

Length of Dredge 109 feet. Beam 25 feet 6 inches.

Bucket Ladder 75' long. Capacity of Buckets 5½ c.ft.



SIDE ELEVATION (Boiler removed).



PLAN

Scale of Feet.

10 5 0 10

F. W. PAYNE
DUNEDIN
NEW ZEALAND
Consulting Engineer

C.H. Pierard. del.

STATEMENT of AFFAIRS of MINING COMPANIES, as published in accordance with the Mining Companies Acts, 1891 and 1894.

Name of Company.	Date of Registration.	Subscribed Capital.	Amount of Capital actually paid up.	Value of Scrip given to Shareholders on which no Cash paid.	Number of Shares allotted.	Amount paid up per Share.	Arrears of Calls.	Number of Shares forfeited.	Number of Shareholders at present.	Number of Men employed.	Quantity and Value of Gold or Silver produced since Registration.		Total Expenditure since Registration.	Total Amount of Dividends paid.
											Quantity.	Value.		
AUCKLAND DISTRICT.														
		£	£	£		£ s. d.	£ s. d.				Oz.	£	£	£
Queen Victoria of Hauraki ..	2 Sept., 1896	8,500	..	..	85,000	..	..	..	97	2	..	25	993	..
Te Puke	8 Nov., 1897	2,045	213	30,000	81,800	0 0 1	2 10 0	1,200	103	3	..	..	206	..
City of Gisborne	11 Sept., 1896	6,000	1,674	..	80,000	0 0 2½	84 6 10	39,125	95	..	..	..	1,660	..
Balfour	11 Dec., 1895	10,500	1,400	..	70,000	..	..	..	136	..	..	..	1,203	..
Alburnia East	17 Sept., 1895	8,250	2,409	..	55,000	0 0 9	..	28,232	52	5	14	38	2,382	..
Alpha	30 Mar., 1895	7,500	971	187	50,000	0 0 6	490 11 9	..	142	11	26	14	2,598	..
Tamihana	22 Oct., 1896	10,000	800	..	50,000	..	..	..	54	..	..	..	683	..
Imperial	22 Feb., 1895	10,000	3,416	416	100,000	0 0 8	..	343	282	9	2	2	4,227	..
Wealth of Nations	13 Mar., 1895	12,000	1,942	..	60,000	0 0 5	..	27,047	82	..	3	3	1,949	..
Exchange	23 July, 1896	2,500	951	..	50,000	0 0 4	..	25,194	16	..	..	..	944	..
British Empire (in Liquidation) ..	12 Oct., 1895	9,000	2,145	..	60,000	0 0 4½	..	26,050	70	..	..	..	2,146	..
Coromandel Freehold Proprietary	11 Nov., 1895	18,750	10,000	..	150,000	..	..	..	199	..	..	..	10,763	..
Omega	29 Oct., 1896	5,000	1,579	..	100,000	0 0 2¾	..	14,833	23	..	..	..	1,542	..
Rainbow (in Liquidation) ..	3 Sept., 1896	2,000	264	..	20,000	0 0 2	..	..	34	..	..	..	669	..
Waipuru	21 Aug., 1896	3,750	503	..	50,000	0 0 2	..	34,180	25	..	..	..	466	..
Queen of Beauty	24 Oct., 1896	10,000	960	..	100,000	..	..	..	20	..	..	..	864	..
Ormond	8 June, 1897	5,200	660	..	52,000	..	..	..	22	2	..	..	527	..
Welcome Find (Limited) ..	18 April, 1895	17,500	7,738	1,000	70,000	0 2 6	..	670	286	15	767	2,186	9,672	..
Nonpareil	27 Aug., 1896	6,000	1,502	..	60,000	0 0 4	247 5 10	3,700	138	2	331	922	2,414	..
New Whau	30 Mar., 1895	18,750	3,625	1,354	125,000	0 0 9½	..	2,800	213	7	40	108	4,376	..
Waitete	29 Oct., 1896	4,500	905	..	90,000	0 0 0½	..	21,550	18	..	..	..	886	..
Waihi Consols	18 Oct., 1895	16,200	5,462	50	162,000	0 0 1½	..	10,445	353	5	..	..	5,208	..
Hauraki No. 2	10 July, 1895	12,000	5,625	..	80,000	0 1 3	224 15 7	14,583	151	..	..	..	5,595	..
Express	5 Nov., 1896	18,000	1,230	..	90,000	0 0 0½	..	75,175	20	..	..	..	1,229	..
Jupiter	12 Oct., 1895	10,000	1,100	..	40,000	0 0 3	..	..	93	..	..	..	1,578	..
Adelaide	1 Nov., 1895	15,000	5,019	..	60,000	0 1 6	131 10 7	39,033	77	..	367	785	5,995	..
Barrier Reefs (Limited) ..	29 May, 1897	100,000	3,075	80,000	100,000	0 4 0	925 0 0	..	39	17	..	..	3,060	..
Ivanhoe	30 Mar., 1895	12,000	2,896	291	120,000	0 0 6	..	2,003	307	5	2	1	2,984	..
Albert	9 July, 1896	12,000	2,225	..	80,000	0 0 3	..	375	178	6	..	..	1,997	..
Renown	18 Nov., 1896	12,000	1,043	..	60,000	0 0 1	..	25,588	44	..	..	..	1,034	..
Talisman Extended (Limited) ..	29 July, 1895	17,700	2,164	..	129,888	0 0 4	152 5 11	..	302	4	..	..	2,517	..
Broken Hill (Limited)	16 Jan., 1895	13,500	1,366	..	90,000	0 0 4	3 2 9	..	205	..	..	..	2,008	..
Comstock (Limited)	30 Jan., 1895	15,000	1,269	..	100,000	0 0 3½	188 6 10	..	221	3	..	..	1,891	..
Waihi Reefs	7 May, 1896	9,000	1,408	..	45,000	..	119 0 2	10,400	58	..	..	..	1,401	..
Waihi Beach	23 Dec., 1897	6,500	485	..	130,000	..	..	..	39	3	..	..	50	..
Kennedy's Bay Township and Goldmining (Limited)	11 Aug., 1896	2,000	562	250	200	1 5 0	185 10 0	..	9	..	..	..	696	..
New Golden Point	21 April, 1897	10,000	1,335	..	100,000	..	303 9 0	..	201	6	1	3	1,315	..
Owharoa United	22 Aug., 1896	9,000	880	..	60,000	..	53 19 10	16,166	48	3	..	..	880	..
Dawn of Hope	2 Oct., 1896	6,000	705	..	60,000	..	..	..	42	..	..	..	508	..
Flemington (Limited)	1 Oct., 1896	5,000	732	..	50,000	..	48 11 8	..	24	..	..	..	737	..
Criterion	31 July, 1896	10,100	988	..	101,000	..	..	3,104	113	..	9	26	954	..
Egerton	10 Aug., 1897	3,750	187	..	75,000	..	..	..	8	..	..	..	65	..
Day Dawn	6 Sept., 1895	12,000	95	1,000	60,000	0 0 0½	..	9,060	89	2	..	..	2,253	..
Inland Reefs	14 May, 1897	4,600	251	..	77,000	..	34 3 4	36,700	29	..	..	..	245	..
Nellie	22 Oct., 1896	6,000	750	1,000	70,000	0 0 6	..	..	22	..	..	..	703	..
Mount Waihi	26 Sept., 1895	24,000	62	..	120,000	..	187 1 8	89,800	132	..	..	..	755	..
Sunlight	9 Dec., 1896	15,000	..	..	75,000	..	..	..	85	4	..	..	989	..
Waitekauri No. 2	11 Sept., 1895	16,905	1,095	..	112,700	..	..	62,115	183	..	..	..	1,852	..
Royal (Limited)	21 Mar., 1895	12,500	416	..	50,000	..	..	..	87	..	..	53	464	..
Waitekauri South	4 Sept., 1895	30,000	1,270	..	150,000	..	187 16 6	90,156	228	4	..	..	2,119	..

STATEMENT of AFFAIRS of MINING COMPANIES, as published in accordance with the Mining Companies Acts, 1891 and 1894—*continued.*

Name of Company.	Date of Registration.	Subscribed Capital.	Amount of Capital actually paid up.	Value of Scrip given to Shareholders on which no Cash paid.	Number of Shares allotted.	Amount paid up per Share.	Arrears of Calls.	Number of Shares forfeited.	Number of Shareholders at present.	Number of Men employed.	Quantity and Value of Gold or Silver produced since Registration.		Total Expenditure since Registration.	Total Amount of Dividends paid.
											Quantity.	Value.		
AUCKLAND DISTRICT—*continued.*														
		£	£	£		£ s. d.	£ s. d.				Oz.	£	£	£
Karangahake	24 Oct., 1895	12,000	416	..	60,000	..	..	19,839	101	2	..	..	1,807	..
Big Reef	2 Sept., 1896	6,000	683	..	120,000	..	66 13 5	64,004	58	..	..	..	1,029	..
Tairua Proprietary	23 July, 1896	23,112	..	..	92,450	..	..	..	124	..	..	..	1,223	..
Hauraki South (Limited)	11 June, 1896	..	..	..	..	..	..	..	..	16	..	28	4,517	..
Teutonic	26 Sept., 1895	10,200	566	..	68,000	..	..	150	82	2	..	..	1,383	..
City of Auckland	7 Aug., 1896	18,750	908	..	75,000	..	..	7,000	100	6	..	3	2,168	..
Progress Castle Rock	19 Sept., 1895	9,750	1,402	..	65,000	..	86 18 10	41,732	163	4	..	171	2,193	..
Kuranui (Limited)	12 Sept., 1895	15,000	1,250	..	60,000	..	..	..	43	4*	..	4	1,902	..
Rising Sun	16 Oct., 1895	18,000	..	600	120,000	0 0 7¼	..	..	198	5	..	..	1,825	..
Puru Junction	6 Oct., 1896	9,800	650	4,250	98,000	0 1 0½	107 3 9	51,450	70	3	..	..	685	..
Ohinemuri	6 Aug., 1896	8,000	1,200	1,200	80,000	0 0 7⅕	..	..	198	..	..	..	856	..
Sceptre	11 Feb., 1897	3,750	664	1,250	74,577	0 0 3⅕	..	..	88	..	..	..	672	..
British Gold and Silver	17 Jan., 1896	9,750	4,149	3,500	35,000	0 2 6	485 13 10	33,300	17	..	..	9	4,127	..
Puru Consolidated (Limited)	17 July, 1897	22,897	..	7,378	61,060	..	..	..	138	16	..	4	621	..
Temple Bar	2 Oct., 1896	3,250	998	..	65,000	0 0 7½	130 3 10	32,224	61	2	..	..	975	..
Alpine Fluke	25 June, 1896	7,000	1,050	..	70,000	..	..	..	96	2	..	..	1,011	..
Vulcan	31 Oct., 1896	3,225	368	8,750	64,500	†0 0 3	..	..	41	..	..	..	351	..
Waitekauri King	26 Feb., 1896	11,545	2,306	..	117,450	0 0 3½	..	19,394	163	4	..	9	2,241	..
Wentworth	23 Nov., 1896	2,825	925	..	56,500	..	..	10,550	47	10	..	..	853	..
Star of Tairua	30 Mar., 1897	400	400	..	72,500	0 1 0	..	..	34	2	..	..	228	..
Golden Falls	30 April, 1897	728	728	..	80,000	0 0 1½	0 0 0½	500	19	2	..	..	737	..
Sheridan (Limited)	9 July, 1897	130,000	6,000	80,000	130,000	0 2 4½	..	..	171	10	23	66	3,610	..
Karaka (Limited)	23 Feb., 1897	..	..	..	..	..	..	..	..	8	..	20	1,709	..
Mahara Royal (Limited)	27 Sept., 1896	..	..	1	..	..	..	..	..	30	..	941	9,316	..
Waitekauri Cross (Limited)	6 Aug., 1896	..	..	..	75,000	..	..	..	..	35	..	..	6,259	..
New Mint	3 Sept., 1896	6,000	655	900	60,000	0 0 7⅕	..	..	66	2	..	..	641	..
Bunker's Hill (Limited)	21 June, 1896	15,000	7,500	6,000	60,000	0 4 6	620 3 6	..	354	10	138	414	8,838	..
May Queen-Hauraki (Limited)	2 July, 1896	200,000	7,500	192,500	200,000	1 0 0	..	..	450	48	930	2,545	13,815	..
Waiotahi (Limited)	1 Aug., 1871	18,000	15,000	..	6,000	2 10 0	..	..	48	17	58,570	163,381	133,978	34,500
Great Kapanga	26 Oct., 1895	9,600	533	..	64,000	0 0 2	..	..	156	3	..	..	2,088	..
Young New Zealand	31 Oct., 1895	9,750	543	..	65,000	0 0 2½	133 16 10	..	129	4	..	18	2,720	..
Royal Shield	2 Oct., 1896	10,000	250	..	80,000	0 0 2	191 3 1	34,123	64	2	..	..	1,272	..
Pukewhau	20 Sept., 1895	6,000	1,500	..	60,000	0 0 6	..	500	220	2	6	19	1,438	..
West Derby	21 Oct., 1896	7,000	619	..	70,000	2·1d.	139 3 4	..	84	..	..	..	607	..
Jersey	9 Sept., 1896	4,000	466	..	80,000	1·4d.	..	30,382	46	2	51	141	533	..
Matawai	12 Sept., 1895	6,000	1,243	..	60,000	4·9d.	..	27,085	46	2	1	1	1,186	..
Martha Extended	26 Feb., 1896	9,000	1,683	..	90,000	4·4d.	..	..	82	..	..	..	1,617	..
Hinemoa-Hauraki	14 Jan., 1897	6,000	831	..	80,000	2·4d.	..	..	89	4	..	..	796	..
Invicta	11 July, 1895	11,500	1,317	..	115,000	2·7d.	..	14,028	384	..	190	370	1,773	..
Irving	17 Dec., 1896	9,950	1,185	..	99,500	2·8d.	..	..	109	..	..	..	695	..
Golden Shore	9 Sept., 1897	7,500	1,250	..	75,000	0 0 4	..	..	10	10	..	..	497	..
Fortuna No. 2	16 July, 1896	7,500	750	..	75,000	2·4d.	..	..	125	..	..	..	743	..
Harbour View	27 June, 1895	16,000	1,333	..	160,000	0 0 2	..	700	361	4	1	4	1,308	..
Nil Desperandum	20 Sept., 1895	16,000	1,529	..	160,000	2·5d.	293 4 1	7,050	263	2	4	12	2,237	..
Napier	7 Nov., 1895	12,000	1,153	..	80,000	3·4d.	117 1 5	15,706	78	2	50	145	1,276	..
Norena	17 Jan., 1896	7,300	750	..	73,000	2·4d.	..	..	95	..	..	..	740	..
Mount Aurum	31 Jan., 1896	8,000	745	..	70,000	0 0 2½	246 13 4	59,200	23	..	..	..	779	..
North	4 Sept., 1895	7,000	1,034	..	70,000	3·7d.	..	1,700	99	..	..	..	900	..
Prince Regent	8 Sept., 1896	6,800	665	..	68,000	2·3d.	..	..	68	..	..	..	665	..
Wynyardton	14 Nov., 1895	10,500	2,401	2,100	70,000	10·2d.	..	1,167	124	..	..	..	2,352	..
Star of Waihi	16 Oct., 1896	6,000	900	..	80,000	2·7d.	..	..	122	1	..	..	722	..
Southern Cross	18 Sept., 1896	8,000	1,050	..	80,000	3·2d.	..	..	62	..	..	..	948	..
Moa	2 Sept., 1896	8,000	532	..	80,000	1·6d.	134 1 3	64,350	43	..	..	..	516	..
Great United	10 Oct., 1895	6,500	1,181	..	65,000	4·3d.	39 11 8	9,500	104	..	..	..	1,175	..

Asteroid	26 Sept.,	1895	8,000	1,156	..	80,000	3·4d.	119 1 3	57,150	46	..	..	..	1,222	..
Queen of the North	2 Dec.,	1897	1,733	146	..	52,000	0·6d.	..	..	24	3	..	..	91	..
Prince of Waihi	19 July,	1896	8,000	634	..	80,000	1·9d.	..	3,516	71	2	..	..	582	..
Prospect	15 Dec.,	1896	18,000	1,662	..	120,000	3·3d.	..	5,633	124	..	..	..	1,581	..
My Sweetheart	6 July,	1896	12,500	1,000	..	100,000	2·4d.	..	..	85	..	..	..	1,000	..
Invicta North	4 Sept.,	1895	6,500	750	..	65,000	2·7d.	..	..	154	..	..	..	750	..
Look Out	22 Aug.,	1896	3,000	220	..	60,000	0·88d.	..	..	36	..	..	..	220	..
Evening Star	6 Aug.,	1896	8,000	850	..	80,000	0 0 $2\frac{1}{2}$	..	..	52	..	..	..	1,461	..
Empress	30 Oct.,	1895	4,125	660	..	82,511	1·8d.	91 12 11	5,044	202	2	..	..	1,116	..
Flossie	4 Nov.,	1897	1,925	113	..	57,750	0·44d.	..	..	37	2	..	..	107	..
Harp of Tara	16 Aug.,	1896	6,262	632	..	83,500	1·8d.	110 14 7	53,150	71	..	..	..	621	..
Sybil	16 July,	1896	8,000	735	..	80,000	2·2d.	..	33,510	103	..	..	..	730	..
Britannia	4 Sept.,	1895	8,000	1,854	..	80,000	5·5d.	..	..	117	..	..	..	3,795	..
Golden Anchor	14 Aug.,	1895	13,000	1,906	..	130,000	3·4d.	103 5 5	31,334	193	..	..	..	2,709	..
Golden Hill Extended	11 July,	1895	8,850	2,121	..	88,500	5·7d.	..	1,300	278	..	3	11	2,172	..
Goodenough	8 Oct.,	1896	5,550	365	..	74,000	1·16d.	..	..	59	..	..	..	344	..
Buffalo	2 Aug.,	1895	10,000	1,533	..	80,000	4·6d.	..	142	171	..	..	5	1,535	..
Cuvier Light	14 Aug.,	1896	7,000	700	..	70,000	2·4d.	..	..	52	..	..	..	673	..
Caspian	21 Oct.,	1896	8,000	588	..	80,000	1·7d.	98 11 11	47,326	25	2	..	..	582	..
Aorere	22 Aug.,	1895	6,000	1,457	..	60,000	5·8d.	67 13 4	1,081	145	..	..	..	1,430	..
A. J. C.	17 Oct.,	1896	6,000	520	..	80,000	1·6d.	46 12 9	39,385	28	..	..	..	499	..
Bay View	7 May,	1896	4,000	360	..	80,000	1·08d.	6 17 2	3,291	179	2	43	111	905	..
Rangipuhi	18 Sept.,	1896	3,000	240	..	60,000	0·96d.	..	..	30	..	..	..	240	..
Hit or Miss (Limited)	13 June,	1895	10,000	166	..	40,000	0 0 1	..	..	38	..	..	..	637	..
Port Jackson	25 June,	1897	3,600	470	..	72,000	0 0 $0\frac{3}{4}$	37 18 $0\frac{3}{4}$	22,613	25	..	..	..	464	..
Victoria	2 Sept.,	1890	23,436	12,432	..	117,183	0 2 6	..	..	282	4	..	11,337	22,191	..
May Queen Extended	12 Nov.,	1895	15,000	1,618	..	100,000	0 0 $6\frac{4}{5}$	214 7 0	51,444	190	4	..	66	2,234	..
Phœnix	18 Sept.,	1895	10,200	1,514	..	33,943	0 0 9	..	..	63	..	..	..	1,520	..
Golden Butterfly	7 Nov.,	1896	5,867	367	..	58,675	..	..	..	50	2	..	..	162	..
Huanui	21 Aug.,	1895	7,500	1,159	..	50,000	0 0 6	90 7 1	..	168	4	..	..	1,695	..
Oceania	3 Oct.,	1895	7,500	769	..	60,000	0 0 $3\frac{1}{2}$	..	500	62	4	..	..	1,978	..
Golden Sand	5 April,	1897	8,000	..	..	80,000	..	..	..	33	12	..	..	2,959	..
Great Republic	5 April,	1897	8,000	341	..	38,000	..	159 0 0	..	27	..	..	..	2,542	..
Argosy	25 Mar.,	1896	8,750	1,525	..	70,000	0 0 5	224 11 8	4,500	102	4	..	60	2,318	..
Fiery Cross	29 Aug.,	1896	7,336	562	..	146,725	0 0 $1\frac{1}{2}$	..	7,503	207	2	..	..	1,378	..
Occidental	3 April,	1895	7,402	2,352	937	98,700	0 0 8	..	13,430	115	5	..	764	3,272	..
St. Patrick	28 Sept.,	1895	12,000	1,392	1,000	120,000	-/6 & -/7	196 2 0	2,100	325	..	..	..	1,310	..
Moanataiari Extended	28 Sept.,	1895	7,500	1,713	825	60,000	1/6 & -/9	179 11 2	5,634	137	2	..	13	1,698	..
Kaiser	28 Sept.,	1895	15,000	2,750	3,000	100,000	1/6 & -/11	..	12,400	113	6	40	123	2,623	..
Goldstream	3 Oct.,	1896	8,000	1,200	..	80,000	0 0 7	..	..	71	..	..	..	1,022	..
Great Barrier Gold and Silver	3 Oct.,	1896	3,000	935	..	60,000	0 0 3	..	..	81	4	..	34	871	..
Conquering Hero	7 Nov.,	1895	5,700	593	..	80,000	..	0 4 2	5,400	143	2	..	..	1,333	..
Sterling	1 Oct.,	1895	8,500	1,370	..	85,000	0 0 4	..	22,950	138	..	..	..	2,447	..
Trilby	28 July,	1896	9,350	..	..	187,000	..	..	..	85	..	..	..	629	..
Moanataiari (Limited)	29 July,	1896	170,000	41,750	50,000	..	..	..	..	355	105	2,390	6,411	44,224	..
Tandem	13 April,	1896	8,250	1,435	..	55,000	0 0 10	98 15 0	6,100	122	3	..	6	1,468	..
Iona Gold and Silver	17 Oct.,	1896	3,000	1,164	..	60,000	0 0 $4\frac{1}{2}$	124 11 8	250	89	4	..	..	1,164	..
Germanic	16 July,	1896	6,000	900	..	60,000	..	..	..	129	2	..	..	837	..
Four-in-Hand	4 Sept.,	1895	6,000	2,231	..	60,000	0 0 7	3 15 0	52	157	4	..	924	2,688	747
Queen of Waihi	3 Sept.,	1895	25,000	2,000	..	100,000	..	..	..	262	..	..	..	1,857	..
Waverley	13 Dec.,	1894	6,000	2,769	..	60,000	0 0 $9\frac{1}{2}$	5 7 $3\frac{1}{2}$	2,475	124	4	..	..	2,708	..
Stanley	12 July,	1895	8,328	2,628	..	83,285	0 0 $6\frac{1}{2}$	1 14 0	1,166	154	4	..	..	2,574	..
Deep Lead	24 Aug.,	1896	5,250	688	..	70,000	0 0 $1\frac{1}{2}$	111 13 4	..	15	2	..	..	685	..
Mount Argentum Gold and Silver	23 Nov.,	1896	4,000	638	..	80,000	0 0 $1\frac{1}{2}$	..	750	89	6	..	..	1,234	..

* Tributers. † On £29,500.

STATEMENT of AFFAIRS of MINING COMPANIES, as published in accordance with the Mining Companies Acts, 1891 and 1894—*continued*.

Name of Company.	Date of Registration.	Subscribed Capital.	Amount of Capital actually paid up.	Value of Scrip given to Shareholders on which no Cash paid.	Number of Shares allotted.	Amount paid up per Share.	Arrears of Calls.	Number of Shares forfeited.	Number of Shareholders at present.	Number of Men employed.	Quantity and Value of Gold or Silver produced since Registration.		Total Expenditure since Registration.	Total Amount of Dividends paid.
											Quantity.	Value.		
AUCKLAND DISTRICT—*continued*.														
		£	£	£		£ s. d.	£ s. d.				Oz.	£	£	£
Aotea Gold and Silver	23 Nov., 1896	4,000	533	..	80,000	0 0 1	..	..	96	6	..	..	540	..
Waihi South (Limited)	18 June, 1896	18,000	5,760	..	120,000	0 2 0½	489 1 10	825	170	15	..	..	6,296	..
Portsea (Limited)	14 Mar., 1894	11,250	776	4,500	45,000	0 0 3½	..	..	119	..	..	..	770	..
Kaitoke Gold and Silver ..	23 Nov., 1896	4,000	893	..	80,000	0 0 2¼	..	2,900	103	6	..	..	893	..
New Golconda	22 Aug., 1895	10,000	4,548	..	100,000	0 0 9¼	74 13 9	1,850	233	4	..	..	3,905	..
Sovereign	11 Mar., 1896	15,000	1,500	..	100,000	..	..	..	227	4	..	..	1,322	..
Juno	3 Mar., 1896	8,889	1,552	..	71,119	0 0 3	114 2 1½	1,750	114	2	84	192	1,745	..
Excelsior	29 Aug., 1895	7,368	1,301	..	49,125	0 0 3½	97 6 10½	9,400	65	2	..	..	1,290	..
Golden Horn	25 June, 1896	6,853	656	..	68,534	0 0 1	129 3 4	..	145	3	2	7	889	..
Golden Lead	12 July, 1895	16,800	1,923	..	168,000	0 0 1¾	49 19 6¾	59,320	183	4	..	13	1,947	..
Cuirassier	18 June, 1896	6,000	1,124	..	60,000	0 0 2	0 10 5	1,600	103	3	35	97	1,209	..
Hauraki North (Limited) ..	31 July, 1895	129,028	2,270	59,657	129,028	£1 & -/10	619 17 8	4,369	255	20	559	1,573	9,415	..
Grace Darling (Limited) ..	30 Jan., 1894	30,000	5,308	..	60,000	0 7 0	0 4 3	..	207	5	129	171	8,719	..
Original Great Barrier Gold and Silver	23 Nov., 1896	6,000	816	..	80,000	0 0 1¼	..	..	31	6	..	..	995	..
Waihi Extended (Limited) ..	12 Aug., 1895	149,967	2,624	..	149,967	1/1 & -/1	..	387	362	4	..	..	2,742	..
Union Waihi (Limited)	20 Nov., 1895	141,250	375	100,000	..	0 10 0	..	..	33	45	..	..	24,565	..
Ohinemuri Syndicate (Limited) ..	4 Mar., 1896	45,904	2,072	..	60,000	1 0 0	..	..	277	30	..	..	9,573	..
Hauraki South (Limited) ..	21 Nov., 1896	75,000	..	..	18,000	1 0 0	..	..	83	21	..	..	3,180	..
Waihi Gladstone (Limited) ..	23 July, 1896	90,000	..	70,000	10,000	..	..	..	..	23	..	..	4,041	..
Monowai Gold-mines (Limited) ..	20 June, 1896	25,000	12,360	125,000	150,000	0 10 0	240 0 0	..	324	30	..	..	10,039	..
Waitekauri United (Limited) ..	1 July 1896	135,000	..	50,000	150,000	1 0 0	..	..	180	45	..	..	12,639	..
Tokatea Consols Gold-mines (Ltd.)	21 May, 1896	88,107	..	66,000	100,000	1 0 0	..	..	1	10	..	135	2,482	..
Waihi-Silverton Extended (Ltd.) ..	1 Feb., 1895	69,757	..	30,000	100,000	1 0 0	240 10 0	..	144	85	..	28,618	57,640	..
Waitekauri Union Claims (Ltd.) ..	15 Dec., 1896	24,407	..	230,007	300,000	..	..	..	1	61	..	..	3,764	..
Woodstock (Limited)	30 July, 1895	150,000	40,625	112,500	33,862	1 0 0	..	..	104	223	365,540	21,547	54,284	..
Kauri Freehold Gold Estates (Ltd.)	1 June, 1896	250,000	60,000	190,000	250,000	1 0 0	..	..	..	246	..	..	24,892	..
Gloucester (Limited)	19 Feb., 1897	92,519	..	78,500	960,000	..	..	..	..	17	..	..	6,794	..
New Zealand Crown Mines (Ltd.)	27 June, 1896	200,000	..	100,000	200,000	1 0 0	..	..	101	255	Gold, 13,262 Silver, 14,933	58,171	48,170	652
Hauraki Golden Age Mines (Ltd.)	22 Aug., 1895	..	..	..	..	..	..	..	..	30	..	..	7,650	..
Pigmy	21 Nov., 1895	10,500	1,350	..	72,200	0 0 8	..	..	149	..	..	..	1,442	..
Scandinavian	21 Nov., 1895	11,250	2,746	..	75,000	0 0 8	..	..	162	..	..	140	4,319	1,093
Atlas	23 July, 1896	9,000	1,703	..	90,000	0 0 0½	58 13 11	5,218	96	..	..	..	1,692	..
Waihi Grand Junction (Limited) ..	27 Jan., 1896	150,000	..	122,500	21,616	1 0 0	..	..	15	50	..	..	26,123	..
Tui Gold-mines (Limited) ..	22 Sept., 1896	75,625	..	20,000	20,000	1 0 0	..	..	10	8	..	..	3,571	..
Norman Proprietary Gold-mines (Limited)	17 Nov., 1896	75,000	..	52,439	11,250	1 0 0	..	..	46	7	..	..	2,086	..
Golden Spark	16 Dec., 1895	7,400	..	..	74,000	..	..	..	70	..	7	20	813	..
Waitaia (Limited)	6 June, 1890	15,000	1,325	34	58,737	..	44 12 6	..	128	..	710	2,070	4,094	559
Hauraki (Limited)	2 April, 1895	40,000	..	8,750	200	0 2 6	..	..	1	130	74,651	228,788	64,070	..
Great Mercury	10 Sept., 1897	6,288	303	..	75	0 2 0	..	..	1	13	106	259	1,796	..
Totals	..	4,203,458	432,189	2,260,392	16,476,550	..	10,612 3 5	1,784,009	21,972	2,011	Gold, 519,087 Silver, 14,933	534,137	902,889	37,551

NELSON DISTRICT (INCLUDING WEST COAST).

Rocky River Hydraulic Sluicing..	15 Jan.,	1897	3,605	885	2,500	36,050	0 0 6	71 15 0	900	50	5	..	..	968	..
New Zealand Consolidated (Ltd.)	20 Nov.,	1896	50,000	..	..	50,000	..	..	..	..	3	..	..	2,346	..
The Boatmans Exploration (Ltd.)	17 June,	1897	46,800	222	..	46,800	0 0 1½	69 15 3½	..	48	2	..	..	197	..
Mont D'Or Gold-mining and Water-race (Limited)	25 July,	1882	12,000	10,799	..	12,000	0 18 0	..	..	25	27	20,437	78,912	63,993	27,000
Alpine Extended (Limited) ..	25 Aug.,	1897	25,000	..	..	50,000	..	..	..	188	42	641	2,495	6,940	..
No. 2 South Keep-it-Dark (Ltd.)	13 June,	1887	12,000	11,635	..	24,000	0 9 9	69 9 10	..	58	5	5,998	23,838	35,962	8,600
Keep-it-Dark Quartz (Limited) ..	2 Mar.,	1874	20,000	6,208	10,000	20,000	0 16 2½	..	..	51	28	66,347	258,267	286,493	113,416
Humphreys Hydraulic Sluicing (Limited)	1 June,	1896	145,000	50,000	95,000	145,000	1 0 0	..	..	164	11	311	765	102,398	..
Waiwhero Sluicing	28 Sept.,	1897	31,000	3,058	16,000	31,000	B. 4/ A. 20/	..	..	69	16	..	..	2,595	..
Dee Creek Gold-sluicing ..	6 May,	1897	36,000	1,577	14,100	36,000	A. 20/ B. 2/ C. 1/6	..	..	53	33	..	..	1,571	..
Minerva (Limited)	24 Feb.,	1890	12,000	5,612	..	23,720	0 5 3	160 16 7	280	36	2	821	..	10,239	..
Poneke	25 Nov.,	1897	12,000	960	..	24,000	0 0 10	..	..	29	8	..	..	151	..
Big River (Limited)	11 April,	1891	12,000	600	..	24,000	0 0 6	..	..	64	20	19,743	79,488	43,194	40,500
Welcome (Limited)	24 July,	1896	100,000	15,000	85,000	100,000	1 0 0	..	..	147	21	..	..	5,612	..
Lord Edward (Limited) ..	13 Nov.,	1883	12,000	3,650	12,000	24,000	0 13 0½	..	544	47	4	33	133	3,743	..
Golden Treasure Extended (Ltd.)	4 Dec.,	1888	12,000	5,250	..	24,000	0 6 0	..	..	27	3	1,077	4,217	9,008	900
Venture (Limited)	30 April,	1895	3,750	..	..	..	..	..	..	19	10	1,211	..	4,234	968
Addisons Gold-sluicing (Limited)	11 Sept.,	1894	4,000	2,681	1,100	4,000	..	164 10 0	..	27	10	..	..	3,381	..
Progress Mines of New Zealand (Limited)	8 Dec.,	1896	250,000	50,000	200,000	250,000	1 0 0	..	..	20	309	517	2,122	46,099	..
Consolidated Goldfields of New Zealand (Limited)	22 Feb.,	1896	225,000	225,000	..	225,000	1 0 0	..	..	..	88	2,178	8,867	133,091	..
Julian (Limited)	17 June,	1893	..	..	..	24,000	..	67 10 4	..	66	3	14	60	2,449	..
Johnston's United (Limited) ..	27 June,	1881	18,837	12,655	1,668	20,000	16/5½ on 8,763 15/11½ on 1,360	6 12 6	..	49	2	10,439	37,579	49,108	1,916
Hercules Quartz (Limited) ..	22 Nov.,	1889	24,000	8,291	..	24,000	0 7 2	308 7 9	1,384	78	5	3,657	14,618	23,050	3,600
Golden Lead (Limited)	30 Oct.,	1890	12,000	9,700	..	24,000	0 8 1	53 2 9	650	37	2	2,170	8,727	16,971	..
Moonlight Sluicing (Limited) ..	14 May,	1894	2,000	1,363	450	2,000	0 17 6	..	..	26	4	697	2,685	2,876	500
Shamrock Lead (Limited) ..	29 Sept.,	1892	12,000	6,221	5,430	12,000	1 0 0	3 10 0	725	158	13	2,231	8,813	17,602	..
Wakamarina Golden Bar (Limited)	— Sept.,	1894	24,000	1,126	1,000	24,000	0 2 1½	37 11 10½	11,938	34	..	..	..	1,235	..
Kumara Long Tunnel (Limited)..	16 May,	1882	8,000	7,433	..	16,000	0 9 3½	..	3,440	21	7	4,627	18,045	25,380	6,314
Sunlight	10 July,	1897	15,000	133	..	60,000	0 0 0¾	..	..	25	1	..	..	..	43
Inkerman Combined Gold-mines (Limited)	20 Nov.,	1896	25,000	..	141,500	200,000	..	..	..	..	78	..	..	2,166	..
Matakitaki Gold-dredging (Ltd.)..	7 July,	1892	2,000	2,000	..	2,000	1 0 0	91 12 0	..	45	4	2,238	8,657	11,099	..
Parapara Hydraulic Sluicing and Mining (Limited)	18 June,	1892	49,800	26,360	19,200	302	200 0 0	30 0 0	..	44	15	1,038	3,760	26,242	..
Caledonian (Limited)	14 Oct.,	1897	40,000	166	..	40,000	..	..	..	13	5	..	..	419	..
Wakamarina Gorge and Deep Creek (Limited)	16 July,	1895	24,000	6,700	13,500	24,000	0 13 0	780 0 0	150	186	15	21	82	6,699	..
Southern Cross (Limited) ..	22 Mar.,	1889	14,000	2,019	1,400	14,000	0 2 0	..	8,916	26	..	..	..	2,033	..
Totals	..		1,294,792	477,304	619,848	1,635,872	..	1,914 13 11	28,927	1,930	801	146,546	562,130	949,544	203,757

STATEMENT of AFFAIRS of MINING COMPANIES, as published in accordance with the Mining Companies Acts, 1891 and 1894—*continued*.

Name of Company.	Date of Registration.	Subscribed Capital.	Amount of Capital actually paid up.	Value of Scrip given to Share-holders on which no Cash paid.	Number of Shares allotted.	Amount paid up per Share.	Arrears of Calls.	Number of Shares forfeited.	Number of Share-holders at present.	Number of Men employed.	Quantity and Value of Gold or Silver produced since Registration.		Total Expenditure since Registration.	Total Amount of Dividends paid.
											Quantity.	Value.		
OTAGO DISTRICT.														
		£	£	£		£ s. d.	£ s. d.				Oz.	£	£	£
Achilles Goldfields (Limited) ..	15 Mar., 1893	91,660	11,660	80,000	733,287	0 2 6	..	..	2,227	108	12,898	49,639	61,358	..
Tuapeka Dredging (Limited) ..	31 July, 1897	2,530	911	..	2,530	0 10 0	203 15 0	..	28	..	..	..	201	..
Evans Flat Dredging (Limited) ..	14 Aug., 1897	2,480	711	..	2,480	0 7 6	69 6 0	..	34	..	..	..	101	..
Success Gold-dredging (Limited)..	16 July, 1897	2,400	2,400	..	2,400	1 0 0	..	..	14	7	54	210	2,555	..
Jutland Flat (Waipori) (Limited)	2 July, 1890	15,000	4,000	3,750	15,000	8/ & 15/	..	..	40	10	6,054	23,627	16,424	5,625
Upper Waipori Alluvial Gold-dredging (Limited)	3 Sept., 1889	12,000	5,950	5,000	24,000	0 8 6	..	..	85	9	8,372	32,174	28,188	4,200
Golden Treasure Dredging (Ltd.)	19 July, 1891	1,500	1,384	1,500	3,000	1 0 0	..	124	22	6	4,186	16,119	11,103	6,399
Golden Run Dredging (Limited) ..	29 June, 1891	4,000	4,737	2,000	6 000	1 0 0	..	1,085	70	15	4,681	18,021	18,886	5,193
Ettrick Gold Steam-dredg. (Ltd.)	29 Aug., 1890	2,500	1,937	2,000	4,500	0 15 6	..	..	44	6	3,582	13,789	13,030	2,475
Roxburgh Gold Steam-dredging (Limited)	20 Aug., 1891	2,500	2,461	2,500	5,000	1 0 0	38 15 0	..	53	1	3,029	11,652	10,847	3,375
Benger Burn Gold-dredging (Ltd.)	20 Sept., 1897	1,800	1,093	..	1,635	0 13 4	..	..	20	6	55	211	327	..
Golden Gate Dredging (Limited)	13 Mar., 1895	2,500	2,500	..	2,500	1 0 0	..	..	44	7	2,101	8,102	7,651	3,000
Clyde Dredging (Limited) ..	17 May, 1895	3,850	3,850	150	4,000	1 0 0	..	..	51	7	2,991	11,537	5,285	5,800
Matau Dredging (Limited) ..	16 Oct., 1897	7,000	1,406	800	7,000	0 5 0	146 2 6	..	117	..	..	..	229	..
Rex Hill Tin-mining (Limited) ..	3 Nov., 1892	3,750	3,708	1,000	16,000	10/ & 5/	38 7 6	150	58	1	..	..	3,919	..
Sunrise	14 Oct., 1897	3,890	376	..	7,780	0 1 0	12 10 0	..	62	4	..	..	295	..
Enterprise Gold-dredging ..	24 Aug., 1891	2,000	2,000	..	2,000	1 0 0	..	..	16	7	2,959	11,393	11,292	1,721
Alpha (Preservation Inlet) ..	4 Sept., 1897	24,000	2,400	12,000	24,000	B. 4/ A. 20/	..	..	100	15	..	..	1,509	..
Deep Stream Amalgamated Hydraulic Sluicing (Limited)	4 Feb., 1897	6,500	6,488	3,500	10,000	1 0 0	11 5 0	..	67	64	..	..	8,590	..
Barewood Quartz-mining (Limited)	18 Sept., 1895	420	420	2,400	84	5 0 0	..	..	24	..	989	3,560	4,236	451
Manorburn Gold-dredging (Ltd.)..	28 Jan., 1896	3,000	3,000	..	3,000	1 0 0	..	..	7	7	965	3,729	7,080	..
*Phœnix Water-race (Registered)	12 Oct., 1867	1,500	1,500	..	1,000	1 10 0	..	..	22	..	..	..	..	6,075
Ourawera (Limited)	23 May, 1895	1,600	..	..	1,600	1 0 0	..	..	15	9	1,160	4,583	5,879	320
Turakina Gold-dredging (Limited)	27 May, 1897	4,000	2,990	1,000	4,000	1 0 0	10 0 0	..	8	7	20	78	3,368	..
Waiau Beach Hydraulic Elevating	11 Feb., 1897	4,150	815	1,500	8,320	A. 10/ B. 3/5	0 16 8	150	23	5	..	..	655	..
Morning Star	26 Jan., 1895	24,000	2,542	12,000	24,000	B. 4/9 C. 3/10	32 3 5	487	98	64	8,903	35,872	27,197	11,462
Golden Site Extended (Limited)..	11 Feb., 1897	57,828	2,865	43,750	57,828	A. 17/6 B. 7/6	70 1 9	..	120	15	2	8	3,214	..
Empire Gold-dredging (Limited)..	13 July, 1897	3,200	880	..	3,200	0 5 6	..	..	27	..	..	..	769	..
Parrawa Water-supply and Gold-mining (Limited)	9 July, 1896	1,500	1,500	..	1,500	1 0 0	..	..	31	5	..	74	1,971	..
Blue Spur and Gabriel's Gully Consolidated (Limited)	1 Feb., 1888	89,066	30,000	60,000	Ord. 82,298 Pref. 8,968	1 0 0	..	..	..	45	25,701	100,241	120,323	15,737
Sailor's Gully (Waitahuna) (Ltd.)	3 June, 1896	2,000	100	1,800	2,000	0 10 0	..	..	8	5	254	982	1,556	..
Island Block (Limited)	23 Nov., 1888	56,187	..	25,316	56,187	1 0 0	..	..	150	16	..	42,590	34,727	..
Dunedin Gold-dredging (Limited)	1 Sept., 1881	8,700	7,540	..	8,700	0 17 4	..	..	70	9	15,366	59,154	44,510	14,835
Ophir Deep Lead (Limited) ..	16 Dec., 1897	800	320	400	2,000	0 4 0	80 0 0	..	20	13	..	..	241	..

Waimumu Gold-dredging (Ltd.) ..	20 Nov.,	1897	5,000	816	1,000	6,000	0 4 0	183 10 0	..	45	..	..	..	..	..
Roxburgh Amalgamated Mining and Sluicing (Limited)	2 Mar.,	1889	29,152	12,737	15,000	29,152	18/ & £1	..	825	141	30	12,674	49,000	47,391	14,311
Lion Rock Gold-dredging (Limited)	18 Mar.,	1897	3,000	2,853	500	3,500	1 0 0	146 17 6	..	32	4	..	..	2,098	..
Bakery Flat Sluicing (Limited) ..	10 Sept.,	1896	2,500	1,762	500	3,000	0 14 6	50 0 0	..	27	12	181	694	1,949	..
Westralia and New Zealand Gold Explorers (Limited)	4 Feb.,	1896	6,383	1,595	..	63,839	0 3 0	..	..	34	15	991	3,689	8,072	..
Glenrock Consolidated (Limited)..	1 July,	1895	45,000	45,000	..	450,007	0 10 0	6,000 0 0	3,105	1,600	50	3,553	14,104	13,487	..
Golden Point Dredging (Limited)	31 Aug.,	1897	5,400	1,306	..	5,400	0 5 0	43 15 0	..	68	..	..	..	163	..
Skipper's Sluicing (Limited) ..	30 July,	1897	3,000	1,800	..	3,000	0 12 0	..	..	20	10	..	..	1,658	..
Otago Gold-dredging (Limited) ..	20 May,	1895	4,000	2,000	2,000	4,000	1 0 0	..	..	46	6	1,697	6,572	5,152	1,900
New Eldorado Sluicing Co. (Ltd.)	17 April,	1893	2,942	1,198	1,570	2,942	1 0 0	58 0 0	..	57	11	..	..	1,377	..
Golden Crown Dredging (Limited)	21 Dec.,	1896	3,300	3,300	200	3,500	1 0 0	..	..	57	7	56	216	4,370	..
O.P. 2 (Waipori Gold mines) (Ltd.)	1 April,	1897	..	..	..	150,000	..	..	..	..	38	..	..	11,536	..
Hartley and Riley Beach Dredging (Limited)	14 July,	1897	5,000	2,302	200	5,000	0 12 6	710 0 0	..	..	78	..	..	828	..
Taieri Gold-sluicing (Limited) ..	16 July,	1896	4,440	650	3,790	4,440	1 0 0	..	..	13	10	..	..	2,060	..
Golden Lead Gold-dredging (Ltd.)	— Mar.,	1896	2,600	2,600	400	300	1 0 0	..	..	24	6	370	1,477	4,759	..
Nevis Gold-dredging (Limited) ..	10 Nov.,	1896	2,000	1,445	300	2,000	1 0 0	254 10 0	..	22	6	..	962	3,003	..
Round Hill (Limited)	30 July,	1892	28,225	6,753	21,473	5,649	5 0 0	..	..	180	52	4,778	23,471	26,207	..
Magnetic Gold-dredging (Limited)	12 July,	1897	5,000	1,298	2,000	7,000	0 7 6	585 10 0	..	79	2	..	..	646	..
New Sandhills Gold-dredg. (Ltd.)	22 April,	1896	1,250	312	..	2,500	0 2 6	..	..	3	9	770	2,967	3,300	125
Golden Beach Hydraulic Elevating and Gold-dredging (Ltd.)	20 Aug.,	1897	6,000	1,739	7,000	13,000	0 7 0	322 18 0	125	140	11	18	71	250	..
Totals	..		614,003	205,970	318,299	1,902,026	..	9,068 3 4	6,051	6,263	830	129,410	550,568	595,822	103,004
Grand totals.. ..	..		6,112,253	1,115,463	3,198,539	20,014,448	..	21,595 0 8	1,818,987	30,165	3,642	809,976	1,646,835	2,448,255	344,312

* Company's property is leased.

PROSPECTING LICENSES.

Eighty-three licenses for prospecting outside mining districts for purpose of searching for gold or other minerals excepting coal have been issued in favour of the under-mentioned persons:—

Date.	License.	Locality.
30/4/97	Joseph Bryan	Sinclair, Fox, Mount Peel, Ackland, Four Peaks, Orari, Clyde, Tripp, and Heron Survey Districts.
30/4/97	Murray, Heney, Orton, and Macdonald	Ackland and Mount Peel Survey Districts.
30/4/97	" " " "	" "
30/4/97	" " " "	" "
30/4/97	" " " "	Ackland, Mount Peel, Orari, and Four Peaks.
6/5/97	F. Bay	Whitcombe, Glenrock, Clyde, Heron, Somers, Hutt, Potts, Tripp, and Alford Survey Districts.
5/5/97	W. McGrath	Shingle reserves, Shag River.
14/5/97	H. Nichols	Mount Peel, Orari, Four Peaks, and Ackland Survey Districts.
14/5/97	J. Brophy	
14/5/97	J. McIlroy	
14/5/97	T. Rae	
6/5/97	R. M. Houston and R. Bell	For copper over Omaunu No. 2 Block.
26/5/97	H. Curlett	Ackland and Mount Peel Survey Districts.
26/5/97	J. A. Robertson	Hororata and Fighting Hill Survey Districts.
26/5/97	W. Wadworth	Sections 28, 30, 31, Lindhurst Hundred.
4/6/97	H. H. Scott	Geraldine and McKenzie Counties.
4/6/97	J. J. F. Pearce	
4/6/97	J. Scott	
4/6/97	T. Anderson, J. McQuarters	Ackland, Mount Peel, Four Peaks, and Orari Survey Districts.
4/6/97	" "	" " " "
2/6/97	D. Wadsworth	Block V., Lindhurst Survey District.
1/6/97	A. Roper	Mount Peel, Orari, Four Peaks, and Ackland Survey Districts.
7/6/97	F. Rodgers	Waimea Survey District.
19/8/97	J. Drysdale and J. W. Robertson ..	Foreshore, near Clutha River.
18/6/97	E. W. Lorgelly	Mount Peel, Orari, Four Peaks, and Ackland.
17/6/97	John Maar	Alford and Tripp Survey Districts.
27/7/97	Otway and party	Hokonui Survey District.
9/7/97	J. Tarling	Hororata.
9/7/97	J. R. Brunt..	"
1/8/97	J. Newport	Maungatapu Survey District.
26/2/98	W. Dansey	Rotorua.
4/8/97	D. P. Clements	Coast Survey District.
9/9/97	T. F. King	Oxford.
22/9/97	J. Jacentho..	Omaunu No. 2 Block.
18/8/97	R. Houston..	"
15/9/97	J. Roland	"
18/9/97	K. M. McLennan	Section 271, Block II., Waipu.
30/9/97	N. H. Barr	Block XII., Whangaroa.
28/9/97	J. R. Hare	Omaunu No. 2.
28/9/97	W. Thompson	Waipawa.
28/9/97	C. H. Thompson	"
28/9/97	H. R. Thompson	"
1/10/97	Clouston and Wairata te Whaaro ..	Awarau Block.
8/10/97	E. Mace	Block XV., Woodville Survey District, Maharahara.
8/10/97	E. Foley	"
4/10/97	D. J. Price	Ackland and Mount Peel Survey Districts.
30/9/97	Inia Maru	Waipawa.
6/10/97	C. Pilliet and others	Waimea Survey District.
19/10/97	J. Thomson	Waiheke Island.
22/10/97	A. T. Jones	Maungatapu.
2/11/97	McMillan and Taylor	Takitimo.
2/11/97	Froggat and Taylor	Te Anau.
1/11/97	W. A. Teague	Taupo District.
13/11/97	Robert Hay	Port Molyneux foreshore.
29/11/97	S. Richmond	Tararua Ranges.
16/11/97	John Barry	Lindhurst Hundred.
17/11/97	J. and W. J. Barry	"
9/11/97	G. Blake	Taupo District, all Crown lands.
23/11/97	P. H. Oatway	Coast District.
16/12/97	W. Milner	Head of Raukokore River.
13/12/97	W. Hunter	Pahiatua and Oroua Counties.
21/12/97	G. Rabone	Tararua Ranges.
13/12/97	H. F. Doogan	Waimea, Maungatapu.
13/12/97	M. Sullivan	" "
13/12/97	P. F. Daniel	" "
13/12/97	T. H. Harley	" "
13/12/97	Robins and Anderson	Takitimo.
13/12/97	Houston, Harris, and Clemett ..	Omaunu No. 2.
17/12/97	E. Mallory	Ruataniwha.
22/12/97	E. P. Willcocks	Whangamoa (Nelson).
21/12/97	W. Taylor	Coast.
22/12/97	P. Laing	"
24/12/97	W. Taylor	Takitimo.
18/1/98	D. Stuart	Mount Peel.
18/1/98	A. T. Symons	Makaretu.
8/1/98	A. Barry	Lindhurst Hundred.
16/2/98	C. McLean	Napier District.
7/2/98	Curtis Moore	Omaunu No. 2.
22/4/98	J. W. Mackay	Chicken Islands.
15/2/98	A. Morton	Otepopo Survey District.
16/2/98	H. Veale	Moeraki.
14/3/98	R. Scott	Molyneux and Coast Survey District.
14/3/98	W. J. Harris	Omaunu No. 2.

PETROLEUM.

Boring operations were continued at Moturoa, near New Plymouth. No. 5 bore-hole was continued to a depth of 2,050 ft., but it was found that here it was off the oil strata, as very little oil was got, which was not by any means "payable oil," and further boring was suspended. The company are now engaged in boring at a place near Frankley Road, about four miles and a half from Moturoa and three miles from the sea-coast. The depth of 220 ft. has been attained, but boring is slow and difficult, in consequence of piercing a strata of hard boulders and coarse gravel. Mr. Oliver Samuel, who is managing director of the company, says he "hopes they will be able to bore to 1,000 ft., but unless the company's funds are strengthened their efforts must soon cease and the work be abandoned."

In the Cheviot district a prospector named Flaherty discovered traces of petroleum in February last, a sample of which was forwarded through the department to the Colonial Laboratory for test. Mr. Skey reports that the sample submitted was of first-class quality, and one distillation should be sufficient to adapt it for use in kerosene-lamps as an illuminant.

A prospector's mining lease, over 236 acres, in the Paeroa Survey District, was granted to E. A. S. Flower, for the purpose of working for petroleum, and the attention of capitalists was turned in this direction, but, owing to various circumstances, the development of the mineral-oil industry in this locality has been deferred for a time.

MANGANESE AND SULPHUR.

Mr. John Chambers, of Auckland, who for many years past has been interested in the export of those minerals, has supplied the following information: Manganese-mining has practically ceased in this district, the price in Europe being too low to warrant any one shipping. A few small lots have been shipped to Australia for chemical-works, &c., but I do not think it will reach 100 tons for the year. 2,000 tons of sulphur has been shipped to Sydney from Rotorua, but the price has been very low—about £2 5s. per ton D/D f.o.b. Auckland. This price is really below its intrinsic value. This is for 70-per-cent. ore.

OPALS.

In December last I paid a visit to the Mount Peel district, where nine leases, of a total area of 232 acres and 17 perches, have been taken up for the purpose of working for opals. Samples of the stone found there were taken for subsequent examination, when it was discovered that, although of an opaline nature, these specimens were of a different and distinct variety to the stone previously stated to have been unearthed at this place, and have no commercial value. Little capital had at that time been expended on development operations, the lease of the Record Reign Opal-mining Company being the only one on which even preparatory work had been done. It is to be feared that no importance can be attached to this discovery as an addition to the mineral wealth of the colony.

The company which was formed to work the opal deposits in the Tairua district did not carry on operations to any considerable extent, but I am informed that a party of miners intend shortly commencing to work the opals, which are of a superior quality, in this locality.

SCHEELITE, WOLFRAM, AND MOLYBDENITE.

During the year several inquiries have been received from the Australian Colonies and Europe for information as to the scheelite deposits in the colony, and details of the workings of the late Otago Scheelite Company, at Lake Wakatipu, have been furnished. Messrs. Donaldson, of Golden Point, Macrae's, have worked a deposit of this mineral, for which the demand appears, however, to be very intermittent. Inquiries have also been made with reference to molybdenite, of which mineral a discovery was reported at Cobden during the early part of the year. Wolfram-ore has also been inquired for by German merchants, who were referred to the report of the Government Geologist published some years ago. It is not considered probable that the demand for the minerals above alluded to will prove sufficient to induce any extensive operations to be undertaken in their development.

COPPER DEPOSITS AT OMAUNU No. 2 BLOCK, WHANGAROA COUNTY.

A report has been forwarded to the Hon. the Minister of Mines by Mr. Alexander McKay, F.G.S., Government Geologist, on the deposits of copper at Omaunu No. 2 Block, Kaeo Survey District, Whangaroa County. He states that at the point where copper-ore was first discovered in the bed of the creek some endeavour has been made to ascertain the size and direction of the reef, and the character of the rocks with which it is associated. A shaft was sunk on the east bank of the creek close to the outcrop of the lode as seen in the bed of the creek, but this was beyond the outcrop, and, the dip of the lode being north, the rocks on the foot-wall side of the lode were cut into, and no ore of any kind was met with in a depth of 30 ft. From the bottom of the shaft a drive was made in a north-west direction till the line of creek-channel was driven across at a point where ore showed vertically over the drive; but, the drive being nearly in the direction or strike of the

lode, this, as far as carried, continued in the foot-wall, and failed to show the presence of ore. The original outcrop in the creek-bed showed as a mass of angular blocks that crossed the creek apparently in a west-north-west direction, or nearly at right angles to its course, and which continued up and down the creek some 10 ft. or 12 ft., and constituted the bed of a miniature rapid thus formed.

The ore at the surface consisted mainly of iron-pyrites, but many of the blocks, on being broken into, showed the presence of yellow copper-ore of good quality, and the sample originally thus taken and tested at the Colonial Laboratory, Wellington, yielded over 30 per cent. of copper.

To lay bare the outcrop the loose blocks in the creek were removed, and all loose material from the foot-wall side of the lode to where it began to be confined by the hanging-wall, but no attempt was made to trace the ore underfoot where so covered in the direction of its dip. On the west side of the creek a pit was sunk close alongside the outcropping ore, but this again was in the foot-wall of the lode, and was not so disposed as to prove anything respecting the lode itself. On both sides the copper-ore has a tenacious clay of a blue colour, which must be regarded as lying between the walls proper. The lode itself is mullocky, and quartz is almost absent.

The rocks exposed in the shaft and drive, and developed on the foot-wall side of the lode, are sandstones and shales of a type such as characterizes the young Secondary rocks of the district, and are calcareous in character like the rocks of the Pu Puke Lower Valley. The nature of the hanging-wall outside the "pug band" has not yet been definitely ascertained. On this side there is, and apparently over the pug band of the hanging-wall, a thick band of iron-gossan, which, though completely oxidized, still seems to indicate a massive body of pyritous ore, which has yet to be cut into and explored. A pavement of boulders of volcanic rock is met with in the bed and banks of the creek, and for 5 or 6 chains above the outcrop of ore the nature of the rocks cannot be ascertained till some distance away from the creek. Further towards its source the banks of the creek show rocks *in situ*, which, however, are decomposed, and a little higher up, at the waterfall, pass into the serpentine. In these rocks copper-ore again appears, some large blocks occurring in the bed of the creek, and others appear in the right bank (which, however, seems at this place to be slipped ground), while at the foot of the waterfall cliff a considerable block of ore lies wedged in a fissure of the rock at that place. From the few facts that could be observed at and near the waterfall Mr. McKay concluded that the direction of the ore band must be nearly east and west, and, as boulders of ore were reported to occur in a branch of the creek east of the waterfall, he traced the east line across the intervening spurs, and—perhaps but a coincidence—this brought him to within a chain of where the ore boulders were met with in the branch creek. This determination he had to accept, there being no better means possible, short of some time and considerable labour.

Following down the branch creek (Frenchman's) to the first-described and more important outcrop with the compass, he endeavoured to follow from that a west line through the bush to the southern boundary of the claim. This resulted also in bringing him to within about 2 chains from where an outcrop of ore is reported present near the westward boundary of the claim. This seemed to confirm the supposition that the lodes strike east and west magnetic; but on returning to the main outcrop he arrived at the conclusion that probably the true bearing is more to the north, as indicated by the direction of the outcrop in the creek-bed and of the gossan outcrop on each bank of the creek. There is reason, therefore, to believe that the true course of the lode is from between west-north-west and north-west to the opposite point in a south-east direction. In the opposite direction the lodes should pass into claim No. 3, east of and adjacent to the Prospectors' and Prospectors' No. 2.

Owing to the scattered condition of the vein stuff and mullocky walls as far as seen, but yet more owing to the mistake made in sinking and driving in and along the foot-wall rocks, an impression prevails that the ore seen at the surface, and as far as proved at the principal outcrop, is only a slip from a lode *in situ* higher up the creek, which has yet to be discovered. In order to arrive at a conclusion with respect to this matter the prospectors placed men at the Government Geologist's disposal. A trench north along the bed of the creek was made, and when the ore disappeared underfoot a hole was sunk to prove its presence under the supposed hanging-wall of pug-clay, first at about 1 ft. below the level of the outcrop, and at a further distance at a greater depth of some 2 ft. 6 in. Mr. McKay then directed that the trench should be continued in the direction of the dip, and a hole sunk in a position at which some 10 ft. or 12 ft. of rock should be passed through before reaching the upper surface of the ore. So far as he could see, there seems every probability of the ore being in place, while yet it is possible it may not be. Even then, should the latter contingency be the case, the lode *in situ* cannot be far to seek, since it must be somewhere in the distance between the principal outcrop and the waterfall, some 6 chains higher up the creek. He could not estimate correctly the thickness of the ore band, but thought it must be at least 6 ft.

The quality of the ore improved as cover made on the hanging-wall side, but, as poor and high-class ore has been obtained from the very surface, it is a general improvement in the bulk of the ore that is to be looked for and expected. No samples were taken for assay, because sufficient from near the surface had already been taken and reported upon, giving returns up to 34 per cent. of copper, and it is from greater depths that a general average should be obtained.

RECORDS OF MINING OPERATIONS.

The system of recording the monthly return of operations carried on in the various portions of the mine, together with the return of gold, &c., which is adopted by Captain Hodge, the manager of the Hauraki Gold-mining Company, for presentation to the directors, is so comprehensive and worthy of general adoption that it is considered advisable to publish a copy of the statement for general information.

TUTWORK MEASUREMENTS for the Thirteen Lunar Months ending 11th December, 1897.

Four Weeks ending	9th Jan.	6th Feb.	6th Mar.	3rd April.	1st May.	29th May.	26th June.	24th July.	21st Aug.	18th Sept.	16th Oct.	13th Nov.	11th Dec.	Total.
No. 1 reef—	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.
Driven on	...	...	...	...	...	...	...	14	56	...	...	...	...	70
Rises	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Winzes	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stoping	...	...	...	...	...	...	...	...	...	...	...	...	...	...
No. 2 reef—														
Driven on	96	14	...	...	36	...	...	8	...	22	...	...	...	176
Rises	19	18	8	21	12	11	...	14	...	...	...	...	...	103
Winzes	...	34	...	...	...	...	...	...	...	...	...	...	...	34
Stoping	105	113	193	121	65	129	228	326	167	64	86	99	...	1696
No. 3 reef—														
Driven on	...	23	...	...	...	...	...	...	47	...	...	...	...	70
Rises	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Winzes	...	3	...	...	...	...	...	...	...	...	...	...	...	3
Stoping	...	...	32	50	14	26	36	40	126	51	...	...	26	401
No. 4 reef—														
Driven on	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rises	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Winzes	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stoping	...	...	...	...	...	...	...	...	...	...	...	...	...	...
No. 6 reef—														
Driven on	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rises	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Winzes	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stoping	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Iona reef No. 1—														
Driven on	...	...	...	...	...	...	30	32	...	...	...	...	...	62
Rises	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Winzes	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stoping	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Iona reef No. 2—														
Driven on	...	...	...	...	...	...	...	...	...	...	...	25	...	25
Rises	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Winzes	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stoping	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Iona reef No. 3—														
Driven on	16	...	..	...	...	30	...	...	...	...	...	...	...	46
Rises	...	...	16	...	...	...	...	...	...	...	...	...	...	16
Winzes	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stoping	88	97	112	55	174	160	130	117	34	113	110	87	52	1329
Cross reef No. 1—														
Driven on	22	28	6	...	38	18	...	...	...	...	...	...	...	112
Rises	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Winzes	18	...	12	6	...	...	...	...	...	...	...	...	...	36
Stoping	105	73	102	70	66	64	77	60	...	...	...	...	16	633
Cross reef No. 2—														
Driven on	...	...	7	...	39	...	...	...	59	...	...	38	51	194
Rises	...	...	...	...	...	14	...	...	...	...	...	...	...	14
Winzes	...	...	33	11	...	16	8	...	...	...	...	...	...	68
Stoping	...	...	...	...	...	...	48	62	26	48	71	79	87	421
Castle Rock reef No. 1—														
Driven on	38	56	...	...	26	32	10	...	...	...	...	...	...	162
Rises	...	...	...	...	...	...	11	...	...	...	...	..	...	11
Winzes	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stoping	...	...	...	...	...	...	...	..	...	...	..	...	...	..
Castle Rock reef No. 2—														
Driven on	...	...	...	...	...	...	...	...	...	...	...	20	36	56
Rises	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Winzes	...	...	...	...	...	..	...	...	...	...	...	...	...	...
Stoping	...	...	...	...	...	...	...	...	...	...	..	...	...	...
New Year's reef—														
Driven on	...	...	...	...	...	...	...	...	...	29	...	...	...	29
Rises	...	...	...	...	...	...	...	...	...	23	...	...	...	23
Winzes	...	...	...	...	...	...	...	...	...	...	10	...	...	10
Stoping	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Intermediate reef—														
Driven on	...	...	...	5	...	...	...	...	...	23	54	15	...	97
Rises	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Winzes	...	...	...	...	...	...	...	...	...	...	11	...	...	11
Stoping	...	...	...	...	...	...	...	...	...	...	...	51	28	79

TUTWORK MEASUREMENTS for the Thirteen Lunar Months ending 11th December, 1897—*continued.*

Four Weeks ending	9th Jan.	6th Feb.	6th Mar.	3rd April.	1st May.	29th May	26th June.	24th July.	21st Aug.	18th Sept.	16th Oct.	13th Nov.	11th Dec.	Total.
Veins, various—	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.
Driven on	...	14	...	...	31	...	...	30	30	12	7	...	...	124
Rises	...	6	...	...	...	..	...	...	5	5	...	...	...	16
Winzes	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stoping	...	39	...	...	...	...	...	...	9	49	...	...	90	187
Marston's reef—														
Driven on	18	13	...	...	...	...	...	...	...	...	32	...	...	63
Rises	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Winzes	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stoping	...	...	10	...	...	...	...	...	...	...	49	...	...	59
Shafts sunk	...	...	...	...	...	...	...	...	30	...	...	7	15	52
Cross-cuts driven ...	56	30	...	...	83	64	51	42	39	...	6	9	23	403
Drives, &c., cleared ...	...	75	92	...	...	...	...	...	50	...	...	...	...	217
Totals	581	636	623	339	584	564	629	745	678	439	436	430	424	7108
Summary.														
Shafts sunk	...	...	...	...	...	...	...	...	30	...	...	7	15	52
Cross-cuts driven	56	30	...	...	83	64	51	42	39	...	6	9	23	403
Drives on lodes, &c. ...	190	148	13	5	170	80	40	84	192	86	93	98	87	1286
Rises	19	24	24	21	12	25	11	14	5	28	...	...	...	183
Winzes	18	37	45	17	...	16	8	...	...	...	21	...	...	162
Stoping	298	322	449	296	319	379	519	605	362	325	316	316	299	4805
Levels, &c., cleared ...	...	75	92	...	...	...	...	...	50	...	...	...	...	217
Totals	581	636	623	339	584	564	629	745	678	439	436	430	424	7108

SUMMARY of TUTWORK MEASUREMENTS for the Thirteen Lunar Months ending 11th December, 1897.

—	Shafts. 11 ft. by 7 ft.	Drives. 7 ft. by 6 ft.	Winzes. 7 ft. by 5 ft.	Rises. 7 ft. by 5 ft.	Stopes. 6 ft. high.
	Ft.	Ft.	Ft.	Ft.	Ft.
No. 1 reef...	...	70	...	...	...
No. 2 reef...	...	176	34	103	1,696
No. 3 reef...	...	70	3	...	401
No. 4 reef...	...	...	...	...	...
No. 6 reef...	...	...	...	...	...
Iona reef No. 1	...	62	...	...	...
Iona reef No. 2	...	25	...	...	...
Iona reef No. 3	...	46	...	16	1,329
Cross reef No. 1	...	112	36	...	633
Cross reef No. 2	...	194	68	14	421
Castle Rock reef No. 1	...	162	...	11	...
Castle Rock reef No. 2	...	56	...	...	...
New Year's reef	...	29	10	23	...
Intermediate reef	...	97	11	...	79
Veins, various	...	124	...	16	187
Marston's reef	...	63	...	...	59
In country-rock	52	403	...	...	...
Levels cleared, &c.	...	217	...	...	...
Totals	52	1,906	162	183	4,805

Grand total, 7,108 ft.

GOLD RETURNS for the Thirteen Lunar Months ending 11th December, 1897.

For the Four Weeks.	Quartz.	Picked Stone.	Retorted Gold.	Melted Gold.	Price per Ounce.	Amount.	Total.
Date of period ending—	Tons.	Lb.	Oz. dwt.	Oz. dwt.	£ s. d.	£ s. d.	£ s. d.
January 9, 1897	330	727½	2,124 1	325 6	3 1 3	996 4 7	
	...	...	...	592 4	3 1 8	1,825 19 0	
	...	...	...	585 5	3 1 7	1,802 1 7	
	...	...	...	618 0	3 1 6	1,900 7 0	
							6,524 12 2
February 6, "	350	485½	1,337 18	225 7	3 1 0	687 6 4	
	...	...	...	1,100 1	3 1 1	3,359 14 8	
							4,047 1 0
March 6, "	300	484	1,343 5	267 12	3 0 11	815 1 4	
	...	...	...	449 10	3 0 2	1,352 4 11	
	...	...	...	613 2	3 0 9½	1,863 11 5	
							4,030 17 8
April 3, "	350	400	1,041 3	530 14	3 0 2	1,596 10 6	
	...	...	...	500 10	3 0 2	1,505 13 5	
							3,102 3 11
May 1, "	400	564	1,070 7	443 11	3 0 5	1,339 17 8	
	...	...	...	618 3	3 0 1	1,857 0 6	
							3,196 18 2
May 29, "	350	434	1,049 7	239 15	3 0 10	729 4 10	
	...	...	...	406 6	3 0 7	1,230 15 0	
	...	...	...	398 14	3 0 8	1,209 7 10	
							3,169 7 8
June 26, "	380	168	712 10	471 9	3 0 9	1,432 0 7	
	...	...	...	235 9	3 0 8	714 4 0	
							2,146 4 7
July 24, "	350	121	519 0	515 7	3 1 0	1,571 16 4	
							1,571 16 4
August 21, "	300	280	534 2	529 5	3 0 9	1,607 11 11	
							1,607 11 11
September 18, "	300	300	517 4	511 17	2 19 10	1,531 5 8	
							1,531 5 8
October 16, "	350	354	617 14	612 18	2 18 8	1,797 16 10	
							1,797 16 10
November 13, "	280	175	557 6	552 0	2 19 8	1,646 16 0	
							1,646 16 0
December 11, "	235	285	454 11	450 18	2 19 4	1,337 13 4	
							1,337 13 4
Totals ...	4,275	4,778	11,878 8	11,793 3	...	...	35,710 5 3

SUMMARY of GOLD RETURNS for the Thirteen Lunar Months ending 11th December, 1897.

Total gold won for the year ... ... 11,793 oz. 3 dwt.

	Tons	cwt.	qr.	lb.
Total quartz crushed	4,275	0	0	0
Total picked stone treated, 4,778 lb.	2	2	2	18
Total ore treated	4,277	2	2	18

Average price of gold per ounce ... ... £3 0s. 6·73d.
Average yield of gold per ton of ore ... ... 2 oz. 15 dwt. 3·48 gr.
Total value of gold ... ... £35,710 5s. 3d.

Expenditure, &c. — We have stamped during the year of general quartz 4,275 tons, and treated 2 tons 2 cwt. 2 qr. 18 lb. of picked ores, giving a value of £35,710 5s. 3d., a yield of 2 oz. 15 dwt. 3·48 gr. per ton of ore, realising an average price of £3 0s. 6·73d. per ounce; while our costs for the year have been £25,639 17s. 3d. It would be unnecessary for me to repeat these figures but for the fact that the expenditure includes considerable extraneous costs, which are all included in the expenditure named. We have equipped the Hauraki shaft with a permanent pumping plant, buildings, and renovated our shaft to the 300 ft. level, built a new changing-house for the miners, and made our plant equal to the development of a permanent mine. The same remark will also apply to the Union Beach shaft and section of the company's property, where we have erected a permanent pumping-engine, a pair of winding-engines, an air-compressor with all equipments, and drained the mine to the 180 ft. level, and in a short time I hope to have everything here in full swing. These large items of expenditure have been paid for from our returns, and in the coming year I trust will be a source of great benefit to the company, from the fact that we can now carry on sinking and open up the deeper levels in the Hauraki section. We are also equipped with machinery on the Union Beach to develop that section of the property, which I look upon, on fair development, as a mine in itself.

Tailings.—Our tailings from the battery I compute approximately at about 3,000 tons. I do not attach much value to all these tailings considering our ores are free milling. The cost of concentrating these for treatment will leave, I estimate, a very small margin of profit to the shareholders.

Union Beach Property.—As soon as we have completed the fixing of air-pipes, air-receiver, air-winze, and got our air Tangye pump in order, we propose to drain the Palmerston shaft, which is sunk 100 ft. below the 180 ft. level. We shall drain the mine to that depth, and commence the development of the Green Harp reef near the shaft, and the Cross reef near the old Tangye winze. Judging from the former history of the company, I think there is a great future in store for the shareholders in developing this portion of the property.

Hauraki Section.—Here we have now a permanent pumping plant, and at the 300 ft. level our No. 2 Cross reef, although small, is carrying rich ore, which is going down in the bottom of that level. Our engine-shaft has now very nearly reached a depth of 60 ft. below the 300 ft., and ere the meeting I hope to reach the 400 ft. level, to cut chamber and start cross-cutting for the reefs. The character of rock now being met with in the bottom of the shaft warrants our expectation of finding improvement in our reefs at that level. A feature of importance to the mine, also, is the Castle Rock reefs, which are dipping towards the shaft, when they enter the class rock west of our shaft that produced the enormous quantities of gold; also important are our No. 2, No. 3, and other reefs. I am looking forward to the 400 ft. level developments to show a great improvement. The rock in the shaft is all that can be desired, and the No. 2 Cross reef carrying gold below the 300 ft. augurs well for the whole of our reefs when cut at that depth. Should our reefs prove fairly productive (and speaking from indications I have no reason to doubt it), we should soon be in a position to repeat the profitable career of the company realised from above the 220 ft. level.

Machinery.—The machinery throughout the mine is working in good order, and is efficient for the development of a large and extensive property.

MINING COMPANIES ACT AMENDMENT.

During the year an Act entitled "The Mining Companies Act Amendment Act, 1897," was passed by the Legislature, with the object of amending certain of the provisions of "The Mining Companies Act, 1894," which, owing to the altered conditions under which some English and foreign companies are now operating in the colony, had been found to be practically unworkable. *Inter alia,* provision has been made in relation to foreign companies for the registration in the colony of share transfers, for a share register to be kept at the colonial office, and for the appointment of an attorney in the colony. The amending Act also deals with the sale of forfeited shares in respect to limited-liability companies and no-liability companies, and provision is made that the directors of no-liability companies shall be responsible, jointly and severally, for any debts incurred under their authority, a saving clause providing exemption in the case of directors whose protest against the expenditure has been recorded.

General.

The attention of legal managers and secretaries of companies has been directed to the fact that they are precluded, under section 24 of "The Mining Companies Act, 1894," from acting as share-brokers, and also that negligence in the publication of the company's statement of affairs in the *Gazette,* as provided in section 35 of that Act, renders them liable to a heavy penalty. In the case of foreign companies, regulations have been issued under which the schedule (No. 4) has been modified to enable the attorney in the colony to furnish such a statement as the Colonial Register will permit.

THE CYANIDE PROCESS.

"The Cyanide Process Gold-extraction Act, 1897," was passed by the Legislature during the last session, and resulted in the purchase by the Government of the patent rights of the Cassel Gold-extraction Company (Limited) in the process known as the cyanide process for extracting gold from its matrices. Upon payment of £10,000, which was made on the 10th January last, the Government secured the sole right of user of this process in the colony, with the rights of royalty on all plants employing the same, four companies—the Waihi Gold-mining Company, the Waitekauri Gold-mining Company, the Union Waihi Gold-mining Company, and the New Zealand Crown Mines Company—only being exempted, under prior arrangements with the Cassel Company. The provision made in section 3 of the Act, whereby the patent rights were transferred as from the 20th August, 1897, enabled the Government to receive royalty from that date at the rate prescribed in the regulations subsequently issued. The Act provides that when the total sum received as royalty from users of the process reaches the amount which has been expended from the Consolidated Fund in connection with the purchase and attendant expenses a Proclamation shall be issued declaring that the process may thenceforth be used without payment of royalty. Ten licenses have been issued under the Act to mines in the northern district, two in the West Coast district, and one in the southern district. The returns of royalty for the period ending the 31st March have been £676 17s. 1d.

The following companies have taken out licenses for the use of the process:—

Coromandel.—Kapai-Vermont Gold-mining Company, Mariposa Gold-mining Company, Irene (Hauraki) Gold-mining Company (Limited), Great Mercury Gold-mining Company.

Thames.—Moanataiari Gold-mining Company (Limited), Tararu Creek Gold-mining Company (Limited).

Ohinemuri.—Waihi-Silverton Extended Gold-mining Company, New Zealand Talisman Gold-mining Company, Woodstock Gold-mining Company, Komata Reefs Gold-mining Company.

West Coast District.—E. C. Kingswell, Big River Gold-mining Company.
Otago District.—The Glenrock Consolidated.

The following regulations have been gazetted under the Act:—

Regulations under "The Cyanide Process Gold-extraction Act, 1897."

RANFURLY, Governor.

In pursuance and exercise of the powers and authorities conferred upon me by section seventeen of "The Cyanide Process Gold-extraction Act, 1897" (hereinafter called "the said Act"), and of all other powers enabling me in that behalf, I, Uchter John Mark, Earl of Ranfurly, the Governor of the Colony of New Zealand, do hereby, for the purposes of the said Act, make the regulations following, that is to say,—

REGULATIONS.

1. Every application for a license under the said Act shall be made, in the form numbered 1 in the Schedule hereto, or to that effect, to the Warden of the district wherein or nearest whereto is situate the mine wherein the licensee proposes to use or employ the patent rights referred to in the said Act.

2. Such application shall be lodged in the Warden's office either personally, or by a barrister or solicitor of the Supreme Court, or a registered mining agent.

3. As soon as practicable after receipt of such application the Warden shall issue to the applicant a license in the form numbered 2 in the Schedule hereto, or to that effect, and shall also forward a duplicate original of such license to the nearest Inspector of Mines, who shall retain and file the same.

4. Before the license is issued it shall be recorded in the Warden's Court by the Mining Registrar, in a book to be kept for the purpose, and the Mining Registrar shall certify on the face of the license that such record has been made.

5. Every license shall be deemed to be issued, and shall be held, subject to the terms and conditions following, that is to say:—

(1.) That the licensee duly and punctually pays the royalty hereinafter prescribed, and faithfully observes and complies with the provisions of the said Act, and the regulations from time to time in force thereunder.

(2.) That on breach of any of the terms and conditions subject to which the license is held, any Warden may, in his discretion, cancel the license.

6. The royalty shall be payable on the following graduated scale according to the value of all gold and silver produced from each ton of quartz or other ore in the mine wherein the said patent rights are used or employed, that is to say,—

(1.) One per cent. of such value where the same does not exceed £2 per ton;
(2.) One and a half per cent. where such value exceeds £2 but not exceed £3 per ton;
(3.) Two per cent. where such value exceeds £3 but does not exceed £4 per ton; and
(4.) Two and a half per cent. where such value exceeds £4 per ton.

7. The royalty on all gold and silver produced between the 20th day of August, 1897, and the date of the license shall be payable by the licensee when making the first payment, as hereinafter prescribed, in respect of the gold or silver produced subsequent to such date.

8. The royalty on all gold and silver produced subsequent to the date of the license shall be payable by the licensee on or before the seventh day of each calender month after such date, each such payment being in respect of the gold and silver so produced during the then last-preceding calendar month.

9. For the purpose of enabling the amount of the royalty to be ascertained and computed, each licensee shall, on or before the due date of each periodical payment in respect of royalty, furnish to the Receiver of Gold Revenue for the mining district wherein the license is issued a return in the form numbered 3 in the Schedule hereto, or to that effect, showing for each such period the total number of tons of quartz or other ore treated, the total number of ounces of gold and silver respectively produced, the value thereof, and the amount of royalty payable in respect thereof.

10. Such return shall be verified by the statutory declaration of the licensee, or some responsible person competent to speak to the facts.

11. All royalty shall be payable to the Receiver of Gold Revenue for the mining district wherein the license is issued.

12. If any person commits any breach of any of the foregoing regulations, then, in addition to any other penalty or punishment to which he thereby exposes himself, he, and in the case of a company the manager and every director thereof, are severally liable to a penalty not exceeding £5.

13. The Receiver of Gold Revenue for the district wherein any license is issued shall, not later than the 10th day of January, April, July, and October in each year, transmit to the Minister of Mines at Wellington a statement, in the form numbered 4 in the Schedule hereto, or to that effect, of all royalties, penalties, and other moneys received by him under the said Act during the previous three months.

As witness the hand of His Excellency the Governor, this twenty-sixth day of January, one thousand eight hundred and ninety-eight.

W. C. WALKER,
For Minister of Mines.

Amended Regulations under "The Cyanide Process Gold-extraction Act, 1897."

RANFURLY, Governor.

In pursuance and exercise of the powers and authorities conferred upon me by "The Cyanide Process Gold-extraction Act, 1897," I, Uchter John Mark, Earl of Ranfurly, the Governor of the Colony of New Zealand, do hereby amend the regulations made by me under the aforesaid Act on

the twenty-sixth day of January, one thousand eight hundred and ninety-eight, by revoking clause six thereof, and substituting in lieu thereof the following clause:—

6A. The royalty shall be payable on the following graduated scale, according to the value of all gold and silver produced from each ton of quartz or other ore in the mine wherein the said patent rights are used or employed, that is to say,—

(1.) One and a half per cent. of such value where such value does not exceed £3 per ton;
(2.) Two per cent. where such value exceeds £3, but does not exceed £4 per ton; and
(3.) Two and a half per cent. where such value exceeds £4 per ton.

As witness the hand of His Excellency the Governor, this seventh day of February, one thousand eight hundred and ninety-eight.

WM. HALL-JONES,
For Minister of Mines.

The following additional Regulations have also been gazetted since the expiry of the year ended 31st March, 1898:—

Additional Regulations under "The Cyanide Process Gold-extraction Act, 1897."

RANFURLY, Governor.

In pursuance and exercise of the powers and authorities conferred upon me by "The Cyanide Process Gold-extraction Act, 1897," I, Uchter John Mark, Earl of Ranfurly, the Governor of the Colony of New Zealand, do hereby make the following regulations in addition to the regulations made by me under the aforesaid Act on the twenty-sixth day of January, one thousand eight hundred and ninety-eight.

1. Any licence may be cancelled by the Warden for breach of any of the provisions of the aforesaid Act or regulations.

2. At any time, upon payment of all royalty, and upon due compliance with all the provisions of the aforesaid Act and regulations up to the date of surrender, any licensee may surrender his license to the Warden for cancellation, and the Warden may cancel the same.

3. The cancellation of a license shall in no case release the licensee from his liability in respect of any royalty, penalty, or obligation under the aforesaid Act or regulations up to the time when the license is cancelled.

As witness the hand of His Excellency the Governor, this tenth day of June, one thousand eight hundred and ninety-eight.

A. J. CADMAN,
Minister of Mines.

SUNDAY LABOUR IN MINES.

The Act providing that no labour except that which is imperatively necessary should be employed in mines on Sundays came into operation on the 18th December, 1897, and generally may be said to have acted beneficially. Since the Act has been in force permits for 445 men have been granted, 349 in the northern, thirty-six in the West Coast, and fifty-eight in the southern mining districts. At date of writing there are fifty-six permits in force, allowing the employment of 311 men. The fact that there has been only one—that of the Waihi Company—appeal to the Warden against the decisions of the Inspectors of Mines in granting permits for fewer men than were applied for would indicate that these officers have used their powers with intelligence and discretion. The following schedule shows the number of men employed and the companies employing them:—

SCHEDULE OF PERMITS ISSUED BY INSPECTORS OF MINES.

Date of Issue.	Number of Men.	Issued to.	Date of Expiry.
		Southern Mining District.	
30/12/97	6	Kaitangata Railway and Coal Company... ...	Till notified.
4/1/98	4	Shag Point Colliery	"
8/1/98	2	Fernhill Coal-mine	"
24/1/98	3	Barewood Quartz Mining Company	"
25/1/98	1	Moonlight Sluicing Company	"
3/2/98	5	Morning Star Gold-mining Company	"
8/2/98	1	Allandale Coal Company	"
16/2/98	15	Round Hill Mining Company	"
2/3/98	4	Golden Site Extended Gold-mining Company ...	"
2/3/98	2	Achilles Goldfields (Limited)	"
1/4/98	3	Kildare Hill (St. Bathan's, J. Ewing)	"
1/4/98	1	Vinegar Hill " "	"
1/4/98	2	Shepherd's Flat " "	"
1/4/98	2	Cambrian's " "	"
1/4/98	1	Matakanui " "	"
1/4/98	1	Bald Hill Flat " "	"
1/4/98	3	Hercules, Roxburgh " "	"
13/4/98	2	Freeman's Coal Company	"
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SCHEDULE OF PERMITS ISSUED BY INSPECTORS OF MINES—*continued.*

Date of issue.	Number of Men.	Issued to.	Date of Expiry.
		Northern Mining District.	
1/1/98	6	Woodstock Gold-mining Company	31st March, 1898.
1/1/98	4, and 3 occasionally	New Zealand Talisman Gold-mining Company ...	"
1/1/98	6	New Zealand Crown Mines (Limited)	"
1/1/98	36	Waihi Gold-mining Company	"
1/1/98	4	Waihi Gold-mining Company (cyanide-vats) ...	"
1/1/98	21	Waitekauri Gold-mining Company	"
1/1/98	7	Waihi-Silverton Extended Gold-mining Company	"
14/1/98	3	Waihi Consolidated	"
15/1/98	4	Waihi Union	"
15/1/98	4	Ohinemuri Syndicate	"
26/1/98	14	Kauri Freehold Gold Estates	"
26/1/98	7	Moanataiari Gold-mining Company	"
25/1/98	4	Fortuna (Hauraki) Gold-mines (Limited) ...	"
25/1/98	6	New Zealand Jubilee Mine	"
28/1/98	6	Komata Reefs	"
18/3/98	6	Waihi Gold-mining Company (Victoria Mill) ...	31st December, 1898
31/3/98	4	Big Pump	"
31/3/98	2	Deep Sinker...	"
31/3/98	6	Woodstock	"
30/3/98	3	Fortuna Hauraki	"
30/3/98	3	Waihi Consolidated	"
28/3/98	12	Waihi	"
28/3/98	4	Hauraki Main Lodes	"
28/3/98	7	Talisman	"
30/3/98	21	Waitekauri	"
1/4/98	6	Hauraki South	"
1/4/98	10	Waihi-Silverton Extended	"
2/4/98	2	Moanataiari	"
2/4/98	6	Scotty's Hauraki	"
2/4/98	9	Golden Pah of Hauraki	"
2/4/98	6	Royal Oak of Hauraki	"
2/4/98	12	Hauraki	"
2/4/98	9	Kathleen	"
2/4/98	9	Kapanga	"
5/4/98	10	Waihi	"
5/4/98	4	Whangamata Proprietary	"
5/4/98	4	Ohinemuri Syndicate	"
5/4/98	3	Welcome Find	"
28/3/98	6	Komata Reefs	"
6/4/98	4	Hauraki North	"
6/4/98	5	Union Waihi	"
6/4/98	2	Blagrove's Freehold	"
12/4/98	3	Kathleen Crown	"
6/4/98	14	Kauri Freehold Gold Estates	"
19/4/98	7	Taupiri Extended Coal Company	"
29/4/98	7	Blagrove Freehold Gold-mining Company (Limited)	"
20/5/98	11	New Zealand Crown Mines (Limited)	"
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		West Coast Mining District.	
25/3/98	2	Westport-Cardiff Coal Company	24th June, 1898.
31/3/98	16	Brunner	30th September, 1898.
13/4/98	5	Progress Mines	13th October, 1898.
15/4/98	6	Denniston Mine	15th October, 1898.
9/5/98	4	Big River	7th November, 1898.
25/5/98	3	Granity Creek Mines	23rd November, 1898.
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PROVISIONAL WARRANTS.

The issue of provisional warrants to act as mine-managers has been largely taken advantage of, and the legislation provided by the Amendment Act, 1896, enabled the owners of mines to employ capable men who otherwise did not possess the necessary qualification to manage their mines. The number of mining companies that sprung into existence has now become very much curtailed, and the necessity, therefore, for the issuing of warrants is past, as the number of managers holding first-class certificates is in excess of the present demand. The provision that the Board of Examiners may issue certificates to holders of warrants will enable several old and skilful managers to have the opportunity of availing themselves of the concessions which no doubt the Legislature had in view when the Act was framed.

TESTING PLANTS FOR QUARTZ PROSPECTORS.

In view of the need of a ready opportunity of testing and ascertaining the value of quartz lodes situated at a distance from mining centres, the Government has decided on the erection of small plants for that purpose. It is probable that one of those plants will be erected at Mahakirau, in the Mercury Bay portion of the Hauraki district. The following is a copy of the regulations to be observed :—

Regulations for the Erection and Working of Small Testing Plants for the Use of Prospecting Associations.

1. When the plant has been erected by the Mines Department it will be handed over to a responsible prospecting association, to be approved by the Minister of Mines, to be held in trust for the Government.
2. The person to be appointed by the prospecting association to take charge of the plant must be approved by the Inspector of Mines of the district.
3. The charges for crushing will be fixed by the Minister of Mines, after consultation with the prospecting association, at such rates as will merely cover the wages of the man in charge and provide for working-expenses and keeping the plant in repair.
4. Should the amounts received for crushing at any time not be sufficient to keep the plant in repair and pay the wages of the man employed, any deficiency must be paid by the prospecting association.
5. The cost of obtaining quicksilver, and anything of a kindred nature required for the treatment of the ores, must be borne by the association; but a reasonable percentage of loss will be considered a fair charge on working-expenses.
6. No "cleaning-up" will be allowed to take place except in the presence of representatives of the persons or companies for whom crushing is done unless they first give their written consent to the contrary.
7. Payment for crushing must be made before the gold and silver obtained is handed over, otherwise the cost will be deducted from such gold and silver.
8. The man in charge will be required to furnish a weekly report to the Inspector of Mines of the district, showing—
   - (*a.*) Number of hours the battery has been employed.
   - (*b.*) Total number of tons of ore crushed.
   - (*c.*) Names of persons for whom ore has been crushed, and the number of tons for each person.
   - (*d.*) Names of claims or licensed holdings for which crushing has been done.
   - (*e.*) Breakage or damage (if any) done to plant.
   - (*f.*) Estimated cost of repairing the same.
9. The man in charge will also be required to furnish a monthly or quarterly return of receipts and expenditure in connection with the plant.
10. The Inspector of Mines must report quarterly on the condition of the plant.
11. Arrangements must be made between the association and the Inspector of Mines whereby the battery cannot be monopolized for too long a period by any one party of prospectors.
12. Should any dispute arise under these regulations it shall be decided by the Inspector of Mines for the district.

WATER-CONSERVATION.

Mr. Perham, Engineer for Water-conservation, in consultation with Mr. Alex. Aitken, C.E., of Kumara, inspected the site of the proposed Eweburn Dam, and a joint report has been forwarded finally recommending the suitability of the ground, as previously ascertained by borings, &c., for the erection of the dam. Mr. Perham has also since been through the Hauraki Goldfields on business connected generally with water-conservation, and will furnish reports on the Thames Low-level Water-race and domestic water-supply for the mining townships of Coromandel, Karangahake, Waihi, Waitekauri, and Te Aroha, the last combining electric lighting of the domain and the new bath-houses.

"NEW ZEALAND MINES RECORD."

The publication of this journal, which commenced in August, 1897, has been continued monthly by the Mining Bureau. The "Record" is widely distributed, and copies are frequently sought after by outside capitalists and by the mining journals in England, America, South Africa, and the Australian Colonies. Some of the reports which have appeared have been printed separately and forwarded to the Agent-General and to the parties more particularly interested; while the article "Explosives in Coal-mines" and the "Prospecting Regulations" have been printed in pamphlet form and hundreds of copies sent for distribution to the Inspectors of Mines and Mining Registrars throughout the colony. Special articles on improved mining appliances and metallurgical processes, which appear from time to time, afford information to those engaged in mining in this colony as to the latest and best methods in use for economical milling and gold-extraction in other countries where mining is carried on.

AID TO DEEP-LEVEL MINING.

The substantial aid given by the Mines Department from votes allocated for furthering deep-level mining has been the means of aiding and carrying on various works to that end in the Hauraki district of the Auckland Goldfields.

The Hauraki Properties Company, at the Thames, has completed the expenditure of their proportion of the cost of machinery and sinking at the Queen of Beauty shaft, and the full amount of the subsidy authorised towards that work, viz.: £25,000 has now been expended, £21,270 15s. having been paid during the past year.

The deep-level tunnel at the Jubilee Mine, Waitekauri, has only been extended during the year to such an extent as to be entitled to a further payment from the vote on that account of £61 4s.

The Kapanga Company, at Coromandel, has been subsidised to the amount of £503 6s. 11d.

The total expenditure from the different votes has been £21,835 5s. 11d.

GEOLOGICAL EXAMINATIONS.

In the season of 1897–98 Mr. McKay, the Government Geologist, was engaged during December in making an examination of the reef deposits of Kirwan's Hill and the adjacent ranges on the west flank of the Victoria Mountains, between Larry's Creek and the Waitahu or north branch of the Inangahua River. His conclusions are that the rocks of the district examined are the same as those that extend from the eastern sources of Rainy Creek to Big River, and that the rich quartz found on the surface of the southern slope of Kirwan's Hill is derived from reefs in the neighbourhood, which will probably be found along the western boundary of the Lord Brassey Claim.

After the New Year the survey of the Hauraki Goldfields on the Cape Colville Peninsula was continued during January. At the beginning of February Mr. McKay went to Whangaroa, north of the Bay of Islands, for the purpose of examining the outcrops of copper-ore occurring in the Valley of the Pupuki River, from which examination it would appear that there are considerable bodies of ore, some of which is of high quality, but as yet very little has been done in the way of proving the importance and permanence of the supposed lodes.

At the same time an examination was made of the western part of the Kawakawa Coalfield, in order to ascertain the probabilities of success of recent efforts to reach coal by boring on that part of the field lying to the south of Scoria Flat. Mr. McKay does not think that the operations of the Russell Syndicate will be attended with success.

On the Cape Colville Peninsula work up to April was chiefly confined to a belt of country following the Ohinemuri Valley from Karangahake to the sea, on the east coast, south of Mataura. Along this belt of country the geological features were studied with care, and a large collection of rocks and minerals was made, illustrating conditions at the surface and in the various mines. One important result of work in this southern part of the goldfields is the proof that in some of the mines rhyolite rock forms the walls of the lode and spherulitic rhyolite has been found associated with the older group of volcanic rocks on the higher part of Karangahake Mountain.

Te Puke Goldfield was visited, and a general similarity of the rocks and quartz lodes to those of the southern part of the Hauraki Goldfields was made out, yet Mr. McKay finds that there is no direct connection between the south continuation of the Cape Colville ranges and those of the Te Puke Goldfield.

In the Thames field Mr. McKay's work was confined to the district between Tararu and Hape Creeks, and to an investigation of the disposition of the various classes of country found on that field, an investigation of the effects of the Moanataiari fault or slide, and of other slides on the field, and the identity or otherwise of the country on each side of the main faults.

DIAMOND DRILLS.

The application of diamond drills for the purpose of boring to test the deeper levels in the gold-mining districts of the colony has not up to the present proved to be a success. The varying nature

of the strata through which the bore has to be taken has militated against the profitable use of this apparatus. The drill owned by the department is still in use at the Kapanga Mine, and has done useful work where the strata was of a suitable nature for its employment. Diamond drills have in the past been successfully used in prospecting the coal-measures at Kawakawa and Kamo.

Applications for the hire or loan of drills for prospecting for coal having been frequently received, it may be well to state that the department is not at present in possession of any drills or rods suitable for this class of operations.

FATALITIES IN MINES.

Exclusive of the dredging industry, the particulars in respect to which are given elsewhere, nine fatal accidents occurred during the year. Of these, three happened in the northern, four in the West Coast, and two in the southern mining district. Inquiries into the cause and circumstances connected with each of these fatalities were instituted, and from the reports submitted thereon it has been ascertained that in no case was negligence of due precaution the cause of the accident.

The number of men employed in quartz and alluvial mining was 14,198, and the rate per thousand of fatalities was 1, a very moderate percentage when the inevitably dangerous nature of the miner's occupation is taken into consideration.

A number of accidents of more or less gravity occurred during the year, but in each case inquiry has exonerated the officials in charge of the mine from blame.

ACCIDENTS ON DREDGES.

The number of men employed on the dredges in the southern mining district is estimated at 420. The number of fatalities which occurred during the year was no less than five, being at the rate of 11·9 per thousand. The circumstances under which this branch of the gold-mining industry is carried on are such that men are necessarily exposed to considerable risk to life and limb, and it was accordingly deemed advisable to draw the attention of dredge-owners to the provisions of section 29 of "The Mining Act Amendment Act, 1895," with reference to the precautions to be observed for the safety of those engaged in this class of work. The following circular letter was therefore addressed to the owners and managers of dredges, and it is anticipated that, with increased attention to the safeguards therein referred to, the mortality during the ensuing year will be materially lessened:—

I have to direct your attention to section 29 of "The Mining Act Amendment Act, 1895," which provides that—(1.) Every dredge used for mining purposes shall at all times be equipped with life-saving appliances to the satisfaction of the Inspector, and shall have at least one suitable boat. (2.) Every manager who fails or neglects to comply with the provisions of this section is liable for each offence to a penalty not exceeding twenty pounds.

In pursuance of which, notice is hereby given that all dredges must be equipped with safety appliances as under:—Two life-buoys and two light lines, to be hung in conspicuous places within easy reach fore and aft; two boat-hooks, and one boat containing a life-buoy, line, and boat-hook.

If working in or adjacent to a current, the following additional appliances must be provided, viz.: Life-belts to be worn by each member of the crew of any boat while engaged in shifting the lines; one extra boat, containing a life-buoy, line, and boat-hook.

Attention is directed to the practice of men stepping on buckets when in motion for the purpose of crossing the well. This is dangerous and must be strictly prohibited; and, where practicable, the well should be protected by a movable fence, or covered over as much as possible with a platform in, say, 2 ft. sections. Where neither method is practicable, a gangway at least 2 ft. 6 in. wide and fitted with substantial hand-rails at each side is to be used for crossing the well.

Where coal, &c., is not brought on board by boats, a gangway of sufficient length, not less than 2 ft. 6 in. wide, and fitted with a substantial hand-rail at each side must be provided and used, as the practice of carrying coal on board a dredge across an unprotected plank or gangway is dangerous.

On dredges which are not entirely covered in, the sides of the uncovered portion of the hull must be fitted with stanchions, not more than 8 ft. apart, and two substantial rails or tightly stretched wires or chains, the lower rail, wire, or chain not being more than 10 in. above the deck, and these may be made movable for the purpose of taking coal, &c., on board, but are to be kept in position at all other times, as the practice of leaving certain portions of the hull unprotected is dangerous.

SLUDGE-CHANNELS.

The following list shows the rivers throughout the various mining districts which have been proclaimed as watercourses into which tailings and mining *débris* may be discharged, and the dates from which the Proclamations have taken effect. The supplementary schedule shows those rivers and creeks concerning which the required notice of intention to proclaim has been gazetted, but in respect to which, owing to various causes, Proclamations have not as yet been issued;—

SCHEDULE OF RIVERS PROCLAIMED AS WATERCOURSES FOR THE DISCHARGE OF TAILINGS.

Name of River.	Date from which Proclamation takes Effect.	Name of River.	Date from which Proclamation takes Effect.
Maerewhenua	June 24, 1891	Tauperikaka	June 1, 1895
Teremakau	Aug. 2, 1888	Waita	" 1, 1895
Arahura	" 2, 1888	Haast	" 1, 1895
Nelson Creek	Oct. 10, 1894	Okuru	" 1, 1895
Parapara	June 1, 1894	Turnbull	" 1, 1895
Little Wanganui, Karamea	" 1, 1894	Hapuka	" 1, 1895
Granity Creek, Oparara	" 1, 1894	Waiototo	" 1, 1895
Karamea	" 1, 1894	Arawata	" 1, 1895
Little Wanganui	" 1, 1894	Smoothwater	" 1, 1895
Oparara	" 1, 1894	Humming Cove Creek	" 1, 1895
Granity Creek	" 1, 1894	Dandy Creek	" 1, 1895
Duffer's Creek	Mar. 18, 1895	Stafford	" 1, 1895
Donnelly's Creek	July 1, 1895	Cascade	" 1, 1895
Kanieri River	Oct. 10, 1894	Hope	" 1, 1895
Totara (Ross)	July 1, 1895	Spoon Creek	" 1, 1895
Matakitaki	June 1, 1895	Fork Creek	" 1, 1895
Half-ounce Creek	July 1, 1895	Gorge Creek	" 1, 1895
Black Ball Creek	June 1, 1895	Longridge Creek	" 1, 1895
Brandy Jack's Creek	July 1, 1895	Hacket Creek	" 1, 1895
Ford's Creek	June 1, 1895	Waihou, or Thames	July 10, 1895
Duffer's Creek (Ross)	July 1, 1895	Ohinemuri	" 10, 1895
Bradshaw's Creek	June 1, 1896	Kuaotunu Creek	" 10, 1895
Red Jack's Creek	May 10, 1897	Doctor's Creek	" 10, 1895
No Town Creek	" 10, 1897	Kaituna } Aorere River	Sept. 23, 1897
New River	" 10, 1897	Staunton's Creek }	
Mikonui	June 1, 1895	Aorere	Dec. 23, 1897
Waitaha	" 1, 1895	Moonlight Creek	Mar. 1, 1896
Wanganui	" 1, 1895	Baxter's Creek	" 1, 1896
Poerua	" 1, 1895	Caledonian Creek	" 1, 1896
Wataroa	" 1, 1895	Deep Creek	June 1, 1897
Waitangitaona	" 1, 1895	Wangapeka River	April 7, 1898
Waitangiroto	" 1, 1895	Nile, or Waitakere	Dec. 23, 1897
Okarito	" 1, 1895	Four-mile, or Tikipihi	" 23, 1897
Waiho	" 1, 1895	Hauhau, or Three-mile	" 23, 1897
Totarakaitorea	" 1, 1895	Wakamarina	" 23, 1897
Totara	" 1, 1895	Wareatea	Aug. 1, 1898
Alpine Creek	" 1, 1895	Waimea	" 1, 1898
Omoera	" 1, 1895	Maruia	" 1, 1898
Waikukupa	" 1, 1895	Whaririki	" 1, 1898
Waihapi Creek	" 1, 1895	Mangamangarakau	" 1, 1898
Hauraki Creek	" 1, 1895	Big River	" 1, 1898
Waikohai Creek	" 1, 1895	Kahurangi	" 1, 1898
Weheka (or Cook's)	" 1, 1895	Seal Creek	" 1, 1898
Oinetamatea	" 1, 1895	Waimori	" 1, 1898
Karangarua	" 1, 1895	Waterfall Creek	" 1, 1898
Manakaiau	" 1, 1895	Heaphy	" 1, 1898
Makawihu	" 1, 1895	Kararoa	" 1, 1898
Mahitahi	" 1, 1895	Wekakura	" 1, 1898
Oinemaka	" 1, 1895	Kohai-hai	" 1, 1898
Paringa	" 1, 1895	Blackwater Creek	" 1, 1898
Moeraki	" 1, 1895	Ngakawhau	" 1, 1898
Wakapohia	" 1, 1895	Dee Creek	" 1, 1898
Kotokakorakota	" 1, 1895	Coal Creek	" 1, 1898

SUPPLEMENTARY SCHEDULE.

Waipori
Noble's
Orwell
Doctor's Creek
Coal Creek
German Gully Creek
Callaghan's Creek
Totara River, Charleston
Saltwater Creek, or Paroa River
Boatman's Creek
Baton River
Ahaura River
Main Totara River
Branch Totara River
Anatoki
Takaka
Hokitika
Stillwater Creek
Liverpool Davy's Creek
Orawaiti
Dead Man's Creek
Te Hapu Creek
Waitaki Creek
Ngutuhi Creek
Paturau
Blow-hole Creek
Punipawa Creek
Sandhills Creek
Slaty Creek
Malone's Creek
Anatori
Turinawiwi
Anaueka
Raukawa
Mokihinui
Rough, or Brown's Creek
Landing Creek
Soldier's Creek
Walker's Creek
Black-sand Creek
Big Kapitea Creek
Little Kapitea Creek
Pelorus River
Grey River,

COAL-MINING.

North Island.

The coal-mining industry, especially in the northern portion of Auckland District, has not been progressive, the output from the various mines showing a general falling-off; whilst in the southern district the mines in Waikato, as well as the Mokau Coal-mine, show an increase; the total increase for the whole district being 1,473 tons.

The New Bay of Islands Mine, at Kawakawa, has given an output 2,833 tons less than that of last year, and if no new discovery is made the quantity produced last year will not again be exceeded in any one year.

Hikurangi Mines.—The Hikurangi Coal Company still maintain a steady output. 30,663 tons were produced, being an increase of 2,683 tons compared with last year. The West Bryan's Mine produced only 2,142 tons, being a decrease for the year of 7,397 tons, whilst the Phœnix Mine produced 5,026 tons, giving an increase of 2,926 tons. A new mine is being opened close to the railway which will soon be in a position to produce coal. No difficulty would be experienced in maintaining a large output from this district if the demand should increase.

The output of the Ngunguru Mine for the year was 16,248 tons, being a decrease of 3,985 tons.

The Kamo New Mine, at Whangarei, still continues to produce coal in small quantities, chiefly for local consumption.

In the Waikato district there has been a general increase in the output of coal, the Taupiri Extended Company alone producing 33,066 tons, being an increase of 4,925 tons over the output of the previous year. Although there has been a slight falling-off in the Waikato Company's return, the Taupiri Reserve Company's mine shows an increase on the output of last year of 210 tons. A very large output of coal of this class could be maintained from this district, especially as Ralph's Mine, which has been closed for the past five years, is about to be reopened by a new company.

Mokau Mine.—This mine is being energetically opened up, and, as the company has now a steamer capable of carrying 120 tons, the trade has increased. The output of coal for the year was 3,448 tons, an increase of 1,205 tons over that of the previous year.

Middle Island.

A limited amount of coal has been put out from the Pakawau and Enner Glyn Mines, at Collingwood and Nelson respectively.

The Mokihinui Mine was closed down during the year.

The Westport Cardiff Mine has produced 54,280 tons, being an increase of 13,849 tons over the output of the preceding year.

The Granity Creek Mine has produced 59,240 tons, being an increase of 38,697 tons over the yield of last year.

The Coalbrookdale Mine shows a decrease of 6,599 tons, the output for the year being 184,376 tons.

The mines at Longford, Boatman's, and Reefton continue to produce small quantities of coal for local requirements.

In the mines in the Greymouth district, there was a falling-off in the Blackball of 2,688 tons, and in the Brunner Mine of 6,526 tons.

In the West Coast and Nelson districts the increase in the output for the year was 26,115 tons.

In the Canterbury District there was a decrease of 323 tons in the Springfield Mine, the output for the year being 2,357 tons. The Homebush Mine yielded 3,718 tons, being an increase of 554 tons over the output of the previous year. The Mount Somers Mine produced 2,818 tons, an increase for the year of 800 tons. The total produce of coal in this district for the year was 13,710, showing an increase of 1,893 tons.

In North Otago the Shag Point Mine yielded 23,334 tons, an increase of 2,237 tons on the output of last year. The Allendales Mines yield was 11,635 tons, showing an increase of 180 tons. The total quantity of coal produced in this district was 39,015 tons, the total increase for the year being 2,176 tons.

In the South Otago district the Fernhill Colliery produced 7,191 tons, an increase of 754 tons. Freeman's Mine yielded 7,824 tons, also an increase of 274 tons over the yield of the preceding year. The Walton Park Green Island Collieries produced 11,554 tons, a decreased output of 5,058 tons. The Kaitangata Mines return for the year was 92,914 tons, being an increase of 20,378 tons on the output of the previous year. The Castle Hill Colliery only produced 472 tons, a decrease of 12,253 tons as compared with the return of last year. Conical Hills Mine produced 2,006 tons, a decrease of 54 tons. For the whole district 148,059 tons was produced, being an increase of 10,769 tons.

In the Central Otago district the yield from the various mines was 25,218 tons, being an increase of 5,533 tons. The demand for coal to supply the dredges on the various rivers caused increased activity in the pits in this district.

In Southland the Nightcaps Mine was the largest producer, 22,792 tons being obtained, an increase of 5,887 tons. The total yield for the whole district was 43,704 tons, or a decrease of 97 tons.

The total increase in the output of coal for the colony during the year was 47,862 tons, the output for the year 1896–97 being 792,851, and that of the present year 840,713 tons.

Accidents in Coal-mines.

During the year four fatal accidents took place in coal-mines. Of these, one occurred in the North Island, and three in the southern district, there being no fatalities recorded from the West Coast district. The number of men engaged in coal-mining in the colony being 1,912, the rate of fatal accidents for the year was 2·092 per thousand. The usual number of serious and minor

casualties occurred during the year, the sufferers receiving aid from the Coal-miners' Relief Fund or the District Sick and Accident Funds in each case.

Hunt Coal-cracker.

Many engineers being of opinion that bituminous coal can be more advantageously used in furnaces, and more perfect combustion secured, when the fuel is broken into small lumps, my attention has been directed to the Hunt Coal-cracker, patented by the C. W. Hunt Company, of New York, from the description of which it appears that the machine secures the desired end—viz., to crack, but not to crush, the large lumps of coal into pieces of a smaller and more suitable size for use in the furnaces of stationary or locomotive engines.

Masut.

In forwarding an extract from *Chambers's Journal* on "masut" recently, the Acting-Inspector of Mines for Otago and Canterbury called attention to the fact that the only coal really suitable for ocean-steamers is that of the West Coast district, and that, so far as Canterbury, Otago, and Southland are concerned, they are dependent on brown coals and lignites; and the same may be said to some extent of the North Island. In the working of our best brown coals there is a good deal of waste slack for which there is no market, and it had often occurred to him that this might be used for the production of oil-fuel. When this slack is left in the mines it generally causes underground fires, and when banked up at the surface it burns away, spontaneous combustion almost invariably taking place. If "masut" or its equivalent could be made from our lignites and brown coals cheaply enough for use on steamers, locomotives, &c., it would prove a great help to the Otago and Southland Districts, and enhance the value of our mineral deposits. In addition to oil-fuel there would, he thinks, be a fair yield of ammoniacal liquor, from which sulphate of ammonia, which is a valuable fertiliser, could be made. In Central Otago there are oil-shales underlying thick beds of lignite, yielding a good percentage of crude oil; also at Orepuki, in Southland, but not so good as that from Central Otago. The following is the extract referred to:—

"For many years in the distillation of raw petroleum there has been a by-product called masut, for which no use could be found. It could not be turned into lubricating oil, or vaseline, or any marketable commodity; but it burns with a steady, clean flame, and gives out a very great heat. In consequence, it has been used extensively in Russia for firing steam-boilers. It has been used on the railways, and in steamships, and in manufactories; but the great difficulty lay in inventing a suitable furnace to burn it in. It is a dark-brown oily liquid, and, of course, the furnaces used for coal are of no use. But at last this difficulty has been overcome. By employing steam to blow it into the furnace, on the principle of the Lucigen light, it can now be used without difficulty. The Russian navy and the Italian navy have used it for some years with success. During the years 1895 and 1896 the German navy has carried on a series of experiments for testing the value of the new fuel, and the results of these experiments are now published. Germany has no great oil-wells like Russia and America, but she has coalfields. A cheap kind of brown coal found in Saxony has been used for the manufacture of masut, and a new and flourishing industry has in consequence been started in that province. It was with this brown coal (masut) that the experiments were made which have been so successful. Masut is said to have many advantages over coal. The first claimed is that it is much cheaper than good coal—as much as 40 to 50 per cent. cheaper. It is difficult to see how it can be produced so very cheaply, unless it be that the materials from which it is made being practically worthless it can be sold at the cost of production. The second advantage claimed is that it is a better heat-raiser. The result of a comparison of masut with the best steam-coal showed a result in favour of masut as a heat-raiser in the proportion of 17 to 10. That is more than half as good again; and, even supposing the same good results could not always be obtained in ordinary cases, we may be safe in saying that masut is at least 20 per cent. better as a heat-raiser than coal. The third advantage claimed is that it burns with a steady, brisk flame, and requires scarcely any stoking; in fact, the lighting of our engine fires may probably become as simple as the lighting of the gas, and likely also to require as little attention. The next point in favour of masut is that it is much better adapted for raising heat in the newer types of steam-boilers than coal. Steam can be got up quicker by it than by coal, and in consequence of its greater heating-power a higher pressure of steam can be kept up, and a greater amount of work got out of the machinery.

"The experiments in the German navy were made during the first year in a torpedo-boat, and afterwards in cruisers and battleships; and this is a point of great importance from a naval point of view. To be able to get up steam quickly and keep up a high pressure are points of vital importance in the navy in time of war. Another point claimed for masut, which weighs heavily in the minds of naval officers, is that it gives out no smoke. The torpedo-boat, and even the battleship, can get up full steam on the shortest notice, and no sign of it can be seen in the sky. In warfare this is of immense importance. At present our swift steamers leave behind them a long trail of smoke across the sky, and the enemy, even below the horizon, can be detected by the black canopy of soot. Henceforth it will be different. A whole fleet might come within striking distance of our shores and remain unnoticed. We have introduced smokeless powder; it may be necessary, if other nations adopt it, that we also adopt smokeless fuel."

KAURI FREEHOLD GOLD ESTATES.

The following account of the Kauri Freehold Gold Estates Company's Mine and works from Mr. Alexander Montgomery, Superintending Engineer for the company, did not reach me in time to be included in my report:—

The freehold property acquired by the Kauri Freehold Gold Estates (Limited) comprises, roundly, 36,000 acres, including the following blocks: Opera, Whangapoua, Maungatapu, Horongo-

herehere, Kaeaea, Hikutawatawa, Te Ranga, Waitekuri, Opitonui, one-half of Wairoa, Owera, Otanguru, Opou, Moewai, Ngarahutunoa, Weiti No. 1, Whakau, and Kaimarama, all situated near Whangapoua and Whitianga Harbours; Willis's and Graham's Blocks, near Tairua Harbour; and Matakitaki and Taparahi No. 1 Blocks on the upper portion of the Tairua River basin.

Prospecting operations have been vigorously carried on by the company since its inception, and gold has been proved to exist more or less all over the property, the main exceptions being the Kaimarama Block, which is mainly composed of rhyolitic rocks, and Weiti No. 1 and Whakau, which are swamps of recent geological formation, really slightly elevated portions of the bottom of Mercury Bay. Gold-bearing reefs of considerable size and value have been discovered on the Opera, Te Ranga, Waitekuri, Opitonui, Owera, Otanguru, and Ngarahutunoa Blocks, also at Taparahi No. 1, and traces of gold found on all the other blocks except the three above mentioned. The prospecting has demonstrated the generally auriferous character of the company's property, and gives great reason to believe that many portions of it will contain valuable mines.

The principal workings of the company are on the Opitonui Block, about five miles inland from the Whangapoua Wharf, with which they are now connected by a narrow-gauge railway. Here a large block, containing 810 acres, has been surveyed off into nine square special claims of 90 acres each, the whole block being known as the Castle Rock Consolidated Mines Block. This area is full of reefs, more than a dozen of which have been tested to some extent, and nine of which have been proved to carry gold in notable quantities. These are known as—(1) The Maiden reef, (2) the Carvill reef, (3) the Lanigan's and Hilda reef, (4) the Hilda Cross reef, (5) the Zealandia No. 1 reef, (6) the Zealandia No. 2 reef, (7) the Australasia reef, (8) the Opitonui reef, (9) the Golden Hill reef. The principal mining worksare on the Maiden, Carvill, Lanigan's and Hilda, and Opitonui reefs. There has been a good deal of work done on the others, and some very fair auriferous quartz has been obtained from them, but they must still be regarded as in the prospecting stage of development.

The Maiden reef is a strong body of quartz running north-westerly and underlying to the south-west. Two tunnels have been driven on it, No. 1 being 378 ft. in length, and No. 2 697 ft. A fine chute of payable ore, 571 ft. in length, has been proved in the No. 2 tunnel, and the reef is from 2 ft. to 10 ft. in width. Over 1,500 tons of good ore have been saved during the driving of this tunnel, without any stoping. The gold is free but very fine, requiring the use of the cyanide process for its extraction. A branch tramway has been made from the main line, 39 chains in length, to the mouth of a third adit, about 70 ft. below No. 2, which will be called No. 3 tunnel. Machinery for a main winding-shaft has also been erected, and shaft-sinking has begun. The winding-engine is of Tangye's couple-geared pattern, with two cylinders 8 in. by 16 in., and winding-drums 4 ft. in diameter, and takes steam from a Tangye's 25-horse power (nominal) steel Cornish boiler, which also supplies steam to a Tangye's 14 in. by 7 in. by 24 in. vertical "special" sinking-pump, capable of raising 9,800 gallons of water per hour from a depth of 300 ft.

The Carvill reef has a course nearly at right angles to that of the Maiden lode, and should intersect the latter. The main shaft is about 1,100 ft. to the eastward of the Maiden main shaft, and is served by the same tramway which goes to the latter. An adit-level has been driven to cut the reef, which proved to be from 2 ft. to 4 ft. wide, and yielded some good payable stone, often showing visible gold. A fault cut this off, and the drive was continued in soft ground some 152 ft. before cross-cutting to recover the lode. When this was cut again it was about 2½ ft. wide and payable, but going south became mullocky and valueless. Good gold is known along this reef for a total distance of 250 ft., the entire length driven being 431 ft. A winze sunk on the reef has gone down now about 45 ft., in good payable ore, often showing gold freely. The main shaft has been sunk 71 ft., and a level is being driven from it at the 60 ft. level to intersect the reef. The machinery on this shaft is of a temporary character, consisting of a steam-winch and steam-pump, driven by a semi-portable boiler of 14-horse power (nominal). A heavier plant will be obtained for working purposes.

The Lanigan's and Hilda reef is so called on account of formerly having been worked by two separate proprietaries, Lanigan's and the Hilda Gold-mining Companies. The work of the present owners has shown that the old workings were all on the same reef, Lanigan's adit being now below the old Hilda workings. In Lanigan's section of the mine the old low-level tunnel has been repaired by the present company and extended to a total length of 1,185 ft., and a drive east on the north branch of the reef has been made 77 ft. in length. In this some very fair stone was obtained. From the junction of the main and north branches westwards the reef was very poor for 584 ft., after which the chute of ore formerly worked by the Hilda Company at a higher level was met with, and has been driven through for 111 ft. This chute yields some good ore, with visible gold, but on the whole is of low grade at this level. The chute originally worked by Lanigan's Company continuing under foot in the adit-level it became necessary to sink a shaft to work it. This has been done, the shaft being 135 ft. in depth, with No. 1 level opening from it at 130 ft., or a little over 70 ft. below the adit-level. At 143 ft. east from the shaft Lanigan's chute of ore was cut, and has continued good up to the present, a total distance of 314 ft. from the shaft. The ore in this chute has been highly payable, and appears to be much richer than at the adit-level. The main shaft is equipped with a fine winding plant, supplied by the Union Ironworks, of San Francisco, U.S.A., consisting of a 10 in. by 16 in. double-cylinder double-reel hoisting-engine, with feed-pump and feed-water heater, supplied with steam from a 54 in. by 16 ft. horizontal tubular boiler, which also actuates a No. 9 Cameron sinking-pump, capable of raising about 10,000 gallons of water per hour.

In the Hilda section the No. 2 level is 90 ft. above Lanigan's adit. The cross-cut to the reef is 162 ft. in length, and from it the lode has been followed eastward 117 ft., and westward 723 ft. The eastern portion was worked by the Hilda Company. West of the cross-cut the lode was very poor for about 280 ft., where a good chute of ore began to make, and continued for 160 ft. From the end of this chute onwards the level has proved ore of low grade, with several short chutes of good payable stone. It has passed beneath a level know as the Hilda west tunnel, which is 125 ft.

above the No. 2 level. In this west tunnel, which is 170 ft. in length, there was a vein of fair gold-bearing stone on the south wall, but the bulk of the reef was poor. In the level below there has been a great improvement, both in the quantity and quality of the ore. The Hilda No. 1 level is 87 ft. above No. 2, and consists of a cross-cut 150 ft. in length and driving on the lode 105 ft. Some very rich ore has been got in this level, and the bulk is of fair value, showing the continuance upwards of the Hilda main ore chute.

The Lanigan's and Hilda reef runs nearly east and west, and dips almost vertically. The average width of the reef is from 4 ft. to 8 ft., but in the main Hilda ore chute it is 10 ft. The reef has now been proved by actual mining-work for a total distance of 1,870 ft. It is a fine strong lode, containing several well-marked ore chutes.

The Hilda Cross reef runs about east-north-east and west-south-west, and has been driven along for 303 ft., yielding several good bunches of gold-bearing quartz. The reef appears to be very much shattered at this level.

The Zealandia No. 2 lode runs north-westerly, and has been driven along for 185 ft. There is some fair stone on surface in this reef, but so far it has been poor at the tunnel-level.

The Zealandia No. 1 lode also yields fair stone on surface, but has been poor at the tunnel-level, except for a short chute of payable ore. The tunnel is in 334 ft.

The Australasia lode runs about north-west and south-east, and has been tested by two tunnels, No. 1 being 132 ft. in length, and No 2 368 ft. Some very good stone has been got in No. 1 level, but the reef is very much broken.

The Opitonui reef is a very large reef running north-easterly, and traceable by large outcrops on surface for about 50 chains. A large amount of prospecting has been done on this reef, six cross-cuts having been driven to intersect it. It is a huge mass of quartz, from 8 ft. to 30 ft. in width, but is generally very poor in gold. Near Lanigan's old dam, however, there is a chute of gold in the foot-wall portion of the reef, which has been proved for a distance of 320 ft., and is worth opening up at greater depth. Gold has also been got in a trench on the outcrop about 490 ft. to the north of these workings. The total amount of cross-cutting done to prove this lode and another large one west of it which outcrops on surface amounts to about 800 ft. In order to work the known chute of gold in the Opitonui reef it will be necessary to sink a large shaft, the site for which has been partly excavated; but it is not intended to go on with this for the present.

Branches from the main railway-line run to the Carvill and Maiden Mines, to Lanigan's shaft, and the mouth of the Hilda No. 2 tunnel, and to the Opitonui shaft. Two branches have also been made up Quartz Creek to get out mining and building timber, and to allow of the Zealandia and Australasia Mines being more thoroughly opened up. The company have bought the standing kauri forest in the Quartz Creek and Maiden Creek Valleys from the Kauri Timber Company, the estimated quantity purchased being 6,500,000 superficial feet. To make the most of this a sawmill has been built, driven by steam, containing a breaking-down frame, circular-saw bench, and breast-bench. This mill stands in the angle between the main railway-line and the branch lines up Quartz Creek.

The stone raised from the various mines will be trucked into hoppers over the railway branches, and thence drawn by a locomotive to the stamp-mill. This is now in course of erection at a central point in the Estates Company's property, about half-way between the above mines and the wharf at Whangapoua. The mill will use the wet-crushing and amalgamating process, with cyanide treatment of the tailings. The plant already contracted for and now partly on the ground consists of two Blake stone-breakers, 15 in. by 9 in. jaw-openings, four grizzlies 4 ft. by 10 ft., eight suspended ore-feeders, forty-stamp battery of 1,150 lb. stamps; and all the other usual appurtenances of a well-equipped mill. The machinery is made by Messrs. Fraser and Chalmers (Limited), at a cost, in London, of £2,567. The steam-power installation consists of one tandem compound Corliss engine, 12 in. by 20 in. by 36 in., and two tubular boilers, 60 ft. by 16 ft., with feed-pumps, heaters, &c. This is also of Fraser and Chalmers's manufacture, and costs in London £2,095 12s. It is proposed to add to the above two 5 ft. Huntingdon mills for regrinding the coarsest sands, four sets of spitzlutten and spitzkasten for classifying, and a full cyanide plant for treatment of an output of 120 tons per day.

At the site chosen for the battery water-power can be obtained by a system of races combining the water from the Awaroa, Opitonui, Waingaro, and Waitekuri Streams; but, as the first cost of this would be heavy, it has been decided to use steam until it is seen that the mines will certainly pay for the extra outlay.

The mill-site is chosen at a central point, to which quartz could readily be brought from the Waingaro, Waitekuri, Owera, and Otanguru Valleys by an extension of the tramway system, as well as from the Opitonui Mines. In all these valleys promising gold-bearing reefs have been discovered.

The railway-line and its branches at present constructed and under construction have a total length of track amounting to nine miles. The rails are 28 lb. per yard, made of steel, with flat fish-plates; 2,000 sleepers are used to the mile. The gauge of the track is 24 in. The locomotive is a Krauss engine, weighing about 7½ tons, capable of drawing a load of 24 tons up a gradient of 1 in 25. The steepest grade on the main line from the wharf to Opitonui is 1 in 40, and the sharpest curve has a radius of 3½ chains. On the branch lines gradients of 1 in 25, and curves of 2½ chains radius, are employed. Ballast of good quality is cheaply obtained from shingle beds in the Waitekuri River.

At Whangapoua a substantial wharf has been built, 70 ft. long, with totara piles and kauri superstructure. A storage-shed is in course of construction. A large and strong goods-shed has also been built at the Opitonui terminus.

The Owera Mine lies four miles east of Opitonui, in the basin of the Owera River. A large amount of work was done here some years ago by the Owera Gold-mining Company, who discontinued operations on account of the ore running down to a very low grade. The present company reopened and retimbered the old levels, and has greatly extended them, and has found a chute of gold quite to the north of the old company's workings. The reef runs north-easterly and dips to

the south-east. It lies in a high spur separating a branch of the Owera Creek from one of the main branches of the Otanguru Creek, and has been attacked from both sides of the ridge, the total distance that the reef has been traced by tunnels being 1,850 ft. Two tunnels on the Otanguru side are known as No. 1 (Otanguru) and No. 2 (Otanguru). The first is 117 ft. below the crown of the spur, and the second 65 ft. below No. 1. In No. 1 tunnel the reef was cut at the end of a cross-cut 95 ft. in length, and has been driven along for 77 ft. The quartz was 2 ft. to 4 ft. in width, much iron-stained, rubbly, and of very variable value, some of it very good, other portions worthless. A short rise of about 12 ft. at the south end connects this with the No. 1 level from the Owera side of the hill. The No. 2 (Otanguru) level is 428 ft. long, 313 ft. being on lode-matter. Here the lode is very mullocky and valueless. The No. 1 (Owera) tunnel is in 379 ft. on the lode, which has been gold-bearing more or less all the way, parts being of really good quality. No. 2 (Owera) tunnel is the top level of the old company, and has not been reopened by the present owners. No. 3 (Owera) tunnel is about 165 ft. vertically below No. 1, or 200 ft. on the underlay. The two are connected by a winze sunk from No. 1. The No. 3 tunnel is now in 1,040 ft. In sinking the winze from No. 1 tunnel the chute of gold pitched northward, and the bottom portion became valueless, but driving northward at No. 3 level the gold came in again, and has been followed for about 200 ft. The lode is very large between its true walls, but is mostly filled with iron-stained mullock. The quartz vein is from 6 in. to 2 ft. in thickness, and, on the whole, of low grade. The No. 4 tunnel is 90 ft. below No. 3, and has been driven a total distance of 792 ft. on the lode, with cross-cuts totalling 245 ft. more. In this level the lode is very much shattered, and is valueless. This level is not yet far enough north to cut the chute of gold seen in the north end of the No. 3 tunnel. Another tunnel has also been put in to the south of the No. 4 level, and 60 ft. higher, which has been driven 214 ft. on the lode, with 100 ft. of cross-cutting. The lode is here little more than a smooth well-defined fissure. The Owera Mine at present is not very promising, but it contains a considerable chute of proved gold-bearing stone which could be very cheaply extracted. There is a ten-head-stamp battery about half a mile from the mine, driven by water-power. This was built by the old company, and is now in rather bad order.

A large amount of work has been done by the Kauri Freehold Gold Estates on the Murphy's Hill Mine, about a mile and a half north-east from the Owera Mine. Here there is a very large quartz reef, which has been traced on surface for 2,800 ft. Some years ago some very good gold-bearing stone was obtained from the outcrop at the south end, and in consequence a good deal of mining-work has been done here, but without success. The lode-matter steadily carries a little gold, but is not payable so far as work has gone. It consists largely of fractured angular blocks of quartz, with a great deal of soft earthy black oxide of maganese. The No. 1 level consists of a cross-cut 85 ft. and driving on the lode 256 ft. The No. 2 level is 100 ft. lower, and in it there are 250 ft. of cross-cut to the reef, and a further 136 ft. of continuation of the cross-cut, 140 ft. of driving southward on the lode, 607 ft. of driving northward on the lode, and 232 ft. of cross-cutting. The lode runs north-easterly. After trying the reef at this part without success another tunnel was put in at the north end of the outcrop. This has been driven 442 ft., in faulted, broken country, and has not yet met with the lode, though the outcrop is visible on surface directly overhead. A very large fault seems to traverse the whole country, nearly parallel with the lode, being met with both in this drive and in the extension of the No. 2 level cross-cut.

About 3,400 ft. north-north-west from the main Murphy's Hill workings a number of large loose quartz boulders have been found, some of which give good prospects of gold. To try for the reef from which these have come a cross-cut has been driven from the side of the Kuaotunu Road a total distance of 420 ft., through somewhat hard country. At 400 ft. a reef was met with, which has been driven along for 74 ft. It is small and poor where cut.

A large amount of work has also been done in the Lillis Mine, in the Te Ranga Block, near the top of the main range between Whangapoua and Coromandel. Here work has been carried on for seven years past by Messrs. Lillis and Ryan, who obtained several parcels of excellent "specimens," and took out, in all, some 1,300 oz. of gold. Several lodes are known to traverse the ground. The company's work has been confined to two tunnels principally, known as Lillis's tunnel and the Eastern tunnel. The Lillis Tunnel has been driven a total distance of 458 ft. across the line of the Lillis and Plutus lodes, and these have been followed northwards 152 ft. and 118 ft. respectively. The Eastern Tunnel cross-cut has been driven 240 ft., cutting two lodes. On the second of these, driving north has been carried on for 142 ft. A cross-cut has also been driven 70 ft. to intersect a lode which gives good prospects on surface near the eastern corner of the Lillis Special Claim. A road has been made, three miles in length, from the Waitekuri River up to the mine.

The expenditure of the company on wages alone, not including supplies and machinery, has been as follows: 1897—April, £1,536 4s. 6d.; May, £1,540 14s. 1d.; June, £1,311 17s. 1d.; July, £1,479 1s. 9d.; August, £1,845 7s. 8d.; September, £1,877 17s. 2d.; October, £1,458 12s. 11d.; November, £2,088 7s. 8d.; December, £2,542 1s. 5d. 1898—January, £2,352 17s. 5d.; February, £2,450 4s. 6d.; March, £1,971 17s. 11d.; April, £1,986 1s. 9d.; May, £2,117 3s. 8d.; June, £2,072 9s. 4d. Total for fifteen months, £28,630 18s. 10d.

BARRIER REEFS.

The following account of the Barrier Reefs Mine by Mr. Albion S. Howe, the manager, reached me too late for inclusion in my report:—

The property of the company consists of 80 acres freehold, situated on the Great Barrier Island. The ground is about two miles and a half from Blind Bay, and about one mile and a quarter from Wangaparapara in an air line, but by track and road these distances are nearly doubled. From Blind Bay towards the mine about three miles of wagon-road was lately constructed by the Government. This road is an improvement on the horse-tracks, but it never will be of much service to any of the mines working from low levels, as it has been carried

along too near the top of the hill. The present terminus of the road is about 500 ft. above the company's low-level tunnel, and when extended to the south boundary of the Barrier Reefs it will be about 600 ft. above the tunnel. As the mill and permanent plant of this or any other producing mine in this neighbourhood would naturally be placed at a level considerably lower than the said tunnel it will never pay to use the present road for transportation of ores and machinery when a road can be built on a level or constantly descending grade to the sea.

The present plant of the company consists of a 12-horse-power upright boiler and a donkey single-cylinder hoisting-engine, a circular saw, a corrugated-iron engine-house, corrugated-iron bunk-house and a cook-house for the men, a blacksmith's shop, and all necessary tools, &c., to work the mine. For the office and manager are two 9 ft. by 12 ft. tents, on wooden frames, with board floors. A 12 ft. by 14 ft. frame cottage, now in Wangaparapara, has been purchased, and will be taken down and moved to the mine, to be used as an assay office—a very necessary adjunct to a property of this kind.

The Barrier Reefs' upper level begins about 70 ft. from the boundary of the Great Barrier Gold and Silver Company's ground, and extends in a westerly direction on the Lee reef for about 150 ft.; at that point the reef has broken up and pinched out. The country at that point is a soft, sedimentary, and drift formation, and of a different nature from what we should get lower down. The mouth of this level was formerly about 20 ft. further to the eastward, but the ground was taken out in excavating for the engine-house. Eighty feet from the mouth of the upper level is the mouth of the upper level of the Great Barrier Gold and Silver Company. This level has been driven in their ground and on the Lee reef for about 450 ft. further to the eastward.

About 20 ft. from the boundary-line and between the mouths of the two tunnels is the 4 ft. by 6 ft. vertical shaft. This has been sunk to a depth of 214 ft. The last 120 ft. of this shaft was done by contract, and has just been completed. The sinking of this shaft will expedite the opening-up of the ground, and the shaft will always serve as an air-way to ventilate the workings below.

From the shaft a cross-cut tunnel is now being started to cut the reef at a depth of 202 ft. below the top of the shaft. According to a plan made by a surveyor for the company, this cross-cut will have to be extended 90 ft. from the shaft to cut the reef, but your manager thinks the reef will be cut at a distance of about 50 ft. in the cross-cut from the shaft.

As hard ground is expected in the cross-cut rapid progress is not likely to be made, and it is impossible to state the exact time necessary to do the work; but the work will be pushed ahead as fast as possible towards the reef. When the reef is cut a drive will be carried on it westward to connect with the low-level adit. According to the survey plan, the distance to drive along the Lee and Iona reefs to connect the shaft cross-cut and the low-level adit-tunnel is 335 ft.

The low-level adit is being done by contract. The contract was let for 600 ft. of tunnel. At this date 500 ft. of the tunnel has been driven, leaving 220 ft. more to drive before intersecting the Iona reef. The face of this low-level tunnel is in very hard, tough country, and the present progress there is slow. A progress of from 75 ft. to 80 ft. a month has been cut down to 5 ft. a week. According to the survey made for the company, this adit should cut a large reef (the Iona) at a distance of 720 ft. from its mouth. When this reef is cut it is the present intention to drive upon it in the direction of the shaft to meet the drive on the Lee reef coming from the shaft, both drives to meet at the same level. As the exact dip and strike of the Iona reef cannot be determined from the surface outcrop on this property there is an uncertainty as to where it will be cut 300 ft. below its outcrop, and possibly the junction of the two reefs may be to the westward from the adit-tunnel instead of east from it as shown on the plan. There are a number of leaders and other reefs showing on the surface and one other large reef, all of which, if they live down, will be cut by the tunnel. To avoid mistakes, and also to prove these veins, the tunnel should be extended to the south beyond the Iona intersection.

Should the present development-work now under way prove that the ore continues valuable in depth, then a more extensive development should be continued. The shaft should be sunk deeper and cross-cuts driven from it to the reef; levels driven, and the ground blocked out for stoping out the ore. The adit-tunnel should be continued towards the southern boundary of the property to prove the reefs that are known to traverse that ground. Should any of these prove valuable a large amount of ore can be blocked out on them, as the tunnel will cut such reefs about 500 ft. below the surface. At the same time, any other reefs encountered carrying payable ore could be opened up by driving on them from the adit-tunnel, which will cross-cut the mineral belt. All of this underground work could be under way while erecting a plant for extraction and while making the necessary surface improvements.

The work at the mine since the present company was organized has all been on developments, not on the reefs, and consequently our knowledge of the Lee reef has not increased since that time. The low-level tunnel will prove the ground, and it is the key to the whole hill to the southward, as all ores, whether in Barrier Reefs' ground or in ground of neighbouring companies, could be handled cheaper and with more backs through this tunnel than through any other tunnel likely to be driven into the hill in the near future.

The plan of development of the mine proposed when the company was organized has been and is now being strictly followed. Should the ores live in depth the shaft and adit-tunnel will be permanent and necessary improvements, and it will not take long to make the mine a steady producer and dividend-payer.

In continuing the work we apprehend no great difficulties. The water in the shaft is now causing some trouble, and there seems to be more coming in, but unless it more than doubles in quantity we will handle it without a pump. We are now baling about one-third of the time, using an iron ore-bucket with a capacity of seventy gallons.

There are over twenty reefs on this property, running in all directions, but the trend of the majority of them is from east to west, with a dip to the south of from 35 deg. to 80 deg. from the horizon. The reef upon which all the work has been done on this property, and also on that of our

neighbour to the eastward—the Great Barrier Gold and Silver Company—is a small reef from 8 in. to 2 ft. 6 in. in width, strike magnetic east and west, and dip 72 deg. south. This reef we call the "Lee reef," in honour of its discoverer, Thomas Lee.

The ore of the Lee reef at the surface is a silver-ore carrying gold, but in depth the percentage of silver decreases and that of gold increases, so that it becomes a gold-ore, with the gold-values much in excess of those in silver. The silver occurs as sulphides, stephanite, pyrargyrite, and proustite. The gold seems to be nearly all contained in the copper-pyrites. The ore is light in colour, except where banded by black streaks of stephanite. In appearance it much resembles that of the Comstock lode, Nevada, United States of America. The gangue is mostly quartz, with a little calcite.

The shaft was sunk 214 ft., and a cross-cut made to the reef. The reef was cut 50 ft. from the shaft; it was 18 in. wide, and good ore. This was about the 18th February. Work was then stopped at the shaft and confined wholly to the low-level adit. On the 31st March it was into the hill over 600 ft., and work has been continuous in driving it since that date. We expect to get the Lee reef about 800 ft. in, and then drive 300 ft. east on the reef to connect with shaft cross-cut. The adit will cut the reef about 350 ft. below the surface at that point. The shaft is in a gully near a creek, and is about 150 ft. lower.

The work of making connection from the present adit to the shaft cross-cut will take until November to complete. I wished to work both ways, from the shaft as well as from the adit, in making this connection, but the directors decided that the saving of time would not compensate for the extra expense of handling rock and water through the shaft.

THE PERMANGANATE GOLD-RECOVERY PROCESS.

[By Professor Black, Otago University, Dunedin.]

This is a French invention, and is now being patented in all the Australian Colonies, the United States, South Africa, and Europe. It is a leaching process very similar in the plant required and in the manner of working to the now well-known cyanide process. It differs from the latter, however, in the chemical nature of the solvent solution, the rapidity with which it dissolves the gold, the method of precipitation or recovery of the gold from the solution, and in the important fact that it does not extract the silver from ores of that metal. If, however, the pulverised silver-bearing ore be roasted with from 3 to 5 per cent. of salt the permanganate process leaves the silver in a condition in which it is very amenable to the very cheap hyposulphite-of-lime leaching process.

The permanganate process can be used only on ores free from iron-pyrites or other sulphides or arsenides. Ores, therefore, that contain such refractory ingredients as these must undergo a thorough roasting process in a reverberatory furnace with a good current of air passing through it; and the roasting must be continued, with constant stirring, or rabbling with an iron tool, till all the sulphur is burnt away as sulphurous-acid gas or converted into the higher sulphate of iron. In this roasting the arsenic is oxidized and blown away as arsenious-acid fumes. Before removing the charge from the furnace it must stand the following test: Portions of the ore in the furnace are taken out from different parts of the charge so as to give a fair sample; these are mixed, and ½ oz. or so of the mixture is put into, say, a wine-glass, and covered with twice its bulk of the Etard permanganate solution, with which it is to be stirred up and then allowed to stand for ten minutes. If the purple-red permanganate still retains its own red tint the charge in the furnace is sufficiently roasted; but if the red tint is entirely bleached it is an indication that the roasting is not completed.

The presence of copper-pyrites or other copper compounds is no objection in the use of this process. Several samples of ore containing from ½ per cent. up to 6 per cent. of copper have been treated very successfully in quantities of 15 lb. to 40 lb. in the laboratory. One sample of copper-pyrites, containing 21 per cent. of copper, was roasted with salt to a dead or sweet roast, and on being treated with the permanganate solution behaved admirably, not reducing the colour of the solution, and giving up the gold just as well as if copper had not been present at all. No difficulty was found in treating parcels of 40 lb. of the most refractory parts of the Monowai ore, consisting chiefly of zincblende, galena or sulphide of lead, copper-pyrites or sulphides of copper and iron. With much galena in the ore it is better to begin roasting with a low temperature in the furnace, and a strong draft of air, letting the temperature rise gradually, and finishing, as in all other cases, with a strong red heat.

The lead and zinc of such ores as the Monowai become oxides of these metals in the furnace, and, beyond consuming more acid, these oxides have no injurious effect on the efficiency of the process, as they do not interfere at all with the permanganate, and therefore do not prevent the solution of the gold. The lead is retained in the leaching-vat as insoluble sulphate of lead. The zinc and copper pass out as sulphates and chlorides of these metals, accompanied by some of the iron as higher salts of iron, and none of these solutions has any deleterious effect on the gold-solvent.

When there is much antimony-sulphide in the ore the roasting is more difficult to carry out with satisfactory results, because this mineral melts or fuses at a comparatively low temperature, and in the fused state does not allow the air to get free access into the interior of the mass, and in this condition it is apt to obstruct the passage of the air, and protect the other refractories from the oxidizing action of the draft. To meet this difficulty common salt should be mixed with the ore before roasting, weight for weight with the sulphide of antimony supposed to be present, and a strong blast of air should be passed through the furnace, finishing with a long-continued high temperature. This treatment will carry away most of the antimony as chloride of that metal,

while the sulphur will be partly removed in fumes, and partly converted into the harmless sulphate of soda.

The difficulty with antimony-sulphide may also be met fairly, provided the ore does not contain more than, say, 5 or 6 per cent. of that mineral, by roasting without salt, but keeping the temperature down so as not to fuse the sulphide, and keeping the draft strong, and very slowly raising the temperature, but so as not to fuse any part of the charge, and finishing up with a bright-red heat, continued for several hours, or until fumes cease to come off, and till the charge answers the test given above. This treatment will send most of the antimony off in fumes, and convert what remains of it into the tetroxide of the metal, which has very little injurious action on the permanganate solution.

Ores containing much carbonate of lime, carbonate of magnesia, or other carbonates, are not amenable to the process, as there would be an expenditure of acid incurred in the proportion of about one part of sulphuric acid for one part of carbonate of lime in the ore. This means for every ton of ore an expenditure of 22½ lb. of sulphuric acid (costing, say, 2s.) for every per cent. of carbonate of lime in the ore. If, for example, the ore contained 5 per cent. of carbonate of lime, 1 cwt. of sulphuric acid (costing, say, 10s.) would have to be added to each ton of ore before the permanganate solution would dissolve any of the gold. The presence of much lime would be objectionable also (even with the addition of the acid) from the fact that the sulphate, not being very soluble, would tend to clog and retard the leaching.

The plant required for the permanganate process will be—(1) a vat in which to make up the solution; (2) leaching-vats; (3) either precipitating-vats or else charcoal filters, and in this last case a neat, clean, small furnace in which to burn the charcoal, from the ash of which the gold is recovered by fusion with borax. The solution- and leaching-vats, (1) and (2), should be made of wood (the harder the better), just similar in every way to the wooden vats now used for the same purposes in the cyanide process. But as wood, especially green new wood with its sap in it, has a reducing or decolourising and therefore destructive effect on the permanganate solution, these vats should be painted inside with a coating of paraffin, which has no reducing or injurious action on the solution. The paraffin coating or lining should be put on in the following way: The solid paraffin, or paraffin wax as it is called (costing about 8d. per pound), is melted in an iron pot over the fire, and heated till fumes begin to rise from it. It is then brushed in the melted state by means of a brush on the inner surface of the vat, in patches of 1 or 2 square feet at a time, till the whole inside surface is thoroughly covered with a skin of the paraffin. A hot flame, as from a painter's scarifying lamp (costing £1), to heat the wood strongly in front of the brush, secures a more durable coating of the paraffin, as it sinks more into the hot wood and takes a better hold of it. Any metal surface, such as the heads of nails inside the tank, should also be carefully paraffined, as all metals have a very destructive action on the permanganate solution. A coating of paraffin would do no harm to the precipitating-tanks, but it is not necessary in that case, and may be cheaply substituted by an application of a mixture of pitch and tar to prevent absorption; or, as recommended by Eissler and others, the precipitating-vats may be lined with sheet lead. Neither lead nor any other metal, nor the mixture of pitch and tar, can, however, be used for lining or coating the solution- or leaching-vats—(1) and (2). Indeed, an application of paraffin as above described is the only efficient lining for these vats. Glass would do, or tiles, or slate; but wooden vats lined with paraffin seem preferable from an economic point of view to any other materials for these (1) and (2) vats.

The vats may be of any size and any shape; square or oblong would be just as good as round, and probably cheaper. The great thing is to have them well paraffined to begin with. One thorough dressing of paraffin as described should not require renewing for months, but if at the discharging of a vat a naked place is noticed it will be an easy matter to rub it dry and apply the paraffin.

The permanganate solvent solution contains 12 lb. of common salt, about 14 lb. of strong sulphuric acid, and about 6 oz. or 7 oz. of permanganate-of-potash crystals, all dissolved in every 100 gallons of water. The solution is made up as follows: The salt and permanganate in the proportion named above are weighed out and thrown into the paraffined solution-tank; the water is then run in, and the contents of the vats stirred, so as to dissolve the salt and permanganate. The sulphuric acid is then mixed with about six or seven times its bulk of water in a separate vessel—say, a stoneware jar, glass jar, paraffined wooden bucket, or vessel of any kind lined with lead (the acid being poured into the cold water and not the water into the acid). This acid mixture is then poured into the vat, which already contains the salt and permanganate, and the whole is stirred with a wooden rod or stake, to insure a uniform mixture. The wooden rod should be withdrawn as soon as the stirring (which need not occupy more than half a minute) is finished, as bare wood weakens the solution.

The solution thus prepared has a fine deep violet-red colour and an acid salt taste. It is quite harmless in small quantities; indeed, when mixed with eight or ten times its bulk of water it would make a very wholesome and agreeable summer drink. So long as the solution retains a violet or reddish or pink colour it has the property of dissolving gold, and may be used over and over again for this purpose, becoming richer in gold and paler in colour at each time. It cannot, however, be used again after the gold has been precipitated from it, as the same agents that throw down the gold will bleach or decolourise the solution, and thereby utterly destroy its power of dissolving gold.

So soon as the reddish or violet colour is destroyed, from whatever cause, the gold-dissolving power is quite gone. If the colour is weakened, or made paler it may, however, be restored by the addition of more permanganate of potash, either with or without the addition of salt or sulphuric acid. In some cases, when the colour is nearly gone but the acid taste still perceptible, it is economical to revive the colour by a small addition of permanganate dissolved in water. One soon becomes acquainted with the colour of the most effective solution, and it is an easy matter to keep the colour up by such additions.

The leaching-vats, as described, may be of any size or shape—round, square, or oblong—made of wood, and the inside, bottom of course included, brushed over with melted paraffin (2); a convenient depth would be 5½ ft. or 6 ft. On the bottom is placed a filter-bed of (commencing at the bottom) coarse clean quartz pebbles, ½ in. to ¾ in. size, and free from pyrites or other sulphides, this layer occupying, say, 6 in. or 7 in. in depth; resting on this another layer of smaller quartz pebbles or gravel; and on this again still smaller quartz gravel, or coarse sand, the whole being topped with fine clean sand. The whole depth of such filter-bed would be 12 in. to 14 in. There must not be any sulphides or any other reducing agents, or sea-shells or limestone, or black oxide of iron in these filter-beds, nor, indeed, anything that reduces the colour of the permanganate solution when steeped in it for a day or two. Quartz pebbles and quartz sand, when free from pyrites or other sulphides, answer the purpose very well, but should be tested by steeping samples in a little permanganate solution for, say, two days: if the solution by the end of that time will be found to retain its true colour, the materials will be suitable for making the filter-bed.

The bluestone basalt road-metal at Dunedin, broken up, is found very suitable; but the scoria about Auckland and the road-metal there is utterly unsuitable, as it contains a good deal of the magnetic or black oxide of iron, which has a very deleterious effect on the permanganate solution, and was a source of much trouble in experiments conducted in Auckland in March last. For small laboratory experiments pounded glass makes a good filter-bed; but if it be pounded in an iron mortar it is liable to contain small particles of metallic iron, which is also very injurious to the solution.

The ore, crushed and passed through a 30-wire sieve (900 holes to the square inch), or the concentrates, or concentrated tailings, as the case may be, after thorough dead- or sweet-roasting, and tested for deadness as described above, are placed in the leaching-vat on the filter-bed to the depth of 3 ft. to 4 ft. or 4½ ft., and the permanganate solution run on gently and evenly till it covers the ore and stands a few inches above the level of it. The solvent action is so rapid that the short wooden pipe leading to the precipitating-vat or charcoal filter-bed may be opened at once. The permanganate solution is then allowed to trickle slowly from the solution-vat (1) into the leaching-vat (2) at the same rate as the outflow from the leaching-vat into the precipitating-vat or filter-bed. The percolation proceeds much faster with the acid permanganate than with alkaline cyanide. Gold begins to make its appearance in the outflow usually within a quarter of an hour to half an hour after this overflow begins. The presence of gold in the outflow is indicated by the greenish-blue or greenish-violet colour produced when some ferrous sulphate solution is added to a portion of it in a test-tube or a wine-glass. The richness in gold of this outflow increases for some time till it reaches a maximum, then it goes level (continues of the same quality) for some time, varying in different ores (according to the coarseness of the particles of gold) from an hour up to perhaps five or six hours, or still longer in some cases. The richness then diminishes very gradually; and when this diminution is thoroughly pronounced it may be taken to indicate that all the recoverable gold is in solution, and only requires washing out with water instead of the permanganate. The permanganate-solution tap is therefore closed, and leaching with water continued for a few hours till very little or no more gold is coming through.

The man in charge of the leaching operations tests a sample of the outflow from time to time in a glass test-tube or wine-glass by adding to it a small quantity of the protosulphate-of-iron solution, and he judges the degree of richness by the depth of greenish-blue or brown colour produced.

At Mount Morgan Mine, in Queensland, the process-manager recognises eight degrees of richness by the degree and shade of colour so produced by the sulphate of iron. The degrees are—(1) light trace, (2) trace, (3) strong trace, (4) light black, (5) black, (6) strong black, (7) rich, (8) very rich. If the outflow should not show the gold indication nor the pink colour for any considerable time—say, an hour or so—it is something in the charge that is robbing it, owing to imperfect roasting. A sample of it should then be tested as follows: A small quantity of the permanganate solution—say, five drops—should be put in a wine-glass or test-tube, and the outflow should then be run into this; when, if it rapidly destroys the colour of the five drops of permanganate, it is an indication that, from insufficient roasting, there is in the charge in the leaching-vat either protosulphate of iron or some metallic sulphide or arsenious acid, or the sulphide of some metal. Of course, if the test for effective dead-roasting or calcining mentioned near the beginning of this article were properly made, and with a satisfactory result, this will not happen, and the gold will come early. As the leaching proceeds, the purple-red-violet colour will be deepening in the outflow, and could, when very deep, be economically returned into the vat with all its load of gold in it; for so long as the rich red colour is there the solution is capable of dissolving more gold, and so enriching itself still further.

The gold is recovered from the leach in the precipitating-vats by the addition of a strong solution of freshly prepared green crystals of ferrous sulphate (protosulphate of iron, or "green vitriol"). This solution of sulphate of iron is made by dissolving the green crystals in water. The addition of iron nails and some sulphuric acid keeps the solution fresh for a long time—many days—and strengthens it by the formation of more sulphate by the action of the acid on the iron.

Instead of dissolving the green crystals of ferrous sulphate, the iron precipitating solution may be made by steeping scrap-iron, pieces of iron (not galvanised), fencing-wire, or iron nails, or indeed any pieces of iron, in dilute sulphuric acid, one part of strong acid to eight or ten parts of water, or even weaker still. The first effect of the sulphate-of-iron solution is to quite decolourise or bleach the permanganate colour in the precipitating-vats; and enough must be added to do this. The next and almost immediate effect is to throw the gold out of solution, or, in other words, to precipitate the gold in a very fine state of division—so fine, indeed, that the precipitate has not the ordinary yellow colour of gold at all, but appears dark-brown when there is much present, or bluish-green or violet when there is only a little present.

The sulphate of iron solution must be stirred into the liquid very thoroughly, so as to come into full contact with every part, and thus precipitate all the gold. The fine gold will settle to the bottom in the form of a brown-coloured gold slime, which is really pure gold, in the course of twenty-four

hours or so, when the clear water may be run off, the slime collected, washed by shaking up with fresh water, again allowed to settle, collected, dried, and fused with borax into a cake of yellow gold.

The gold may also be precipitated in the vats by passing a current of sulphurous-acid gas into the solution, with stirring, so that the acid may come in contact with every part of it, first decolourising the solution and then throwing down the gold. By this sulphurous-acid process the gold is thrown out in coarse particles, and settles to the bottom more rapidly than when sulphate of iron is the precipitating agent.

The sulphurous-acid gas—more correctly named sulphur-dioxide—is made by heating, in a glass retort, either charcoal or sulphur with strong sulphuric acid, and leading by a glass tube the gas thus made into the solution in the vat.

Instead of running the outflow into precipitating-vats it may, as at the Mount Morgan Mine, be passed into a bed of wood charcoal, the pieces of charcoal being of the size of from a pin's head to peas and beans, or even larger, the bed being, say, 1 ft. or 2 ft. deep, in a small vat, say, 3 ft. diameter by 3 ft. deep. The charcoal decolourises the liquid, and extracts or arrests or precipitates on itself the gold. The liquor is allowed to percolate through among the charcoal, and pass away by an outlet at the bottom of the charcoal-vat. The outflow from this charcoal filter-vat may be tested occasionally by the addition of a little sulphate-of-iron solution to a portion of it in a wine-glass, when any gold present will at once reveal itself by imparting a greenish tint to the solution. The charcoal, when saturated with gold, is then carefully burnt to ashes in a nice clean furnace; the gold is in the ash, and is recovered by fusion with borax.

The most important points that require the most careful attention in this process are—(1) The proper roasting (to a perfectly dead roast) of the ore in a furnace of the reverberatory type, in which the ore does not come in direct contact with the fuel, and in which there is a good draft of air sweeping the flames across the fire-bridge over the surface of the ore, while the latter is being continuously rabbled to bring fresh portions to the surface, and therefore into contact with the oxygen of the air; (2) the second point of importance is the making-up of the solution according to the prescription given above. The solution should be made, if convenient, on the day on which it is to be used, as it slowly loses strength on being kept. It should not be kept more than two days in any case.

Instead of the prescription given above—namely, 12 lb. of common salt, 14 lb. of strong sulphuric acid, and 6 oz. or 7 oz. of permanganate crystals per 100 gallons of water—Etard, of Paris, the inventor, recommends, where (as in Europe) muriatic acid is cheap, a solution containing 45 lb. of strong commercial muriatic acid (or hydrochloric acid), 12 oz. of permanganate crystals dissolved in 220 gallons of water. This is called the Etard permanganate solution. The other is called the Black-Skeet permanganate solution, and is for economical reasons suggested as preferable in these colonies, where sulphuric acid is readily and cheaply made or purchased.

At quotations from Sydney, Dunedin, and Melbourne the Black-Skeet solution will cost about ½d. a gallon, and with properly calcined ore from 100 to 150 gallons should be quite sufficient for the leaching of a ton of roasted ore. The most favourable result got at the Mount Morgan Mine on the properly roasted ore was an extraction of 94½ per cent. of the gold, at a cost for chemicals of 4s. 6d. per ton. At the Permanganate Company's works at Dunedin a ton of Mount Morgan roasted ore, assaying 10 oz. 15 dwt. to the ton, gave an extraction of 95·6 per cent. of the gold by nineteen hours' treatment, at a cost of 4s. 4½d. per ton of roasted ore.

These permanganate solutions—the Etard and the Black-Skeet—do not generate chlorine gas to any appreciable extent in the absence of gold or something else that has an attraction for chlorine. Indeed, it is claimed that in the process there is practically no chlorine gas generated (no free chlorine produced), but that the gold takes the chlorine direct from the hydrochloric acid in the Etard solution, and from the common salt in the Black-Skeet solution. Gold, it is well known, does not take chlorine from hydrochloric acid nor from common salt without the intervention of some other active ingredient. In the Etard solution this active ingredient is the permanganate, supplying, as it does, oxygen to the hydrogen of the hydrochloric acid, and forming water, and thereby enabling the gold to get the chlorine of the broken partnership. In the Black-Skeet solution the same end is obtained by the oxidation of the sodium of the salt, thereby fitting it for union with the sulphuric acid to form bisulphate of soda, while the other partner in the salt (namely, the chlorine) is in a position to make a new arrangement and ally itself in a partnership with the gold as chloride of gold. It cannot in either case be called "catalytic" action, nor can the chlorine be called "nascent," for chlorine is not liberated at all; it is never free; it does not leave the sodium till it is in union with the gold; it is, at no stage, between the two metals. The reaction would be better described in each instance as a case of "concurrent affinity," in which two factors in the Etard manage, by their concurrent attraction—drawing in opposite directions—to effect the separation of the hydrochloric acid into its two constituents—hydrogen and chlorine—the oxygen of the permanganate taking as its share the former, and the gold the latter, thus becoming water and chloride of gold. In the Black-Skeet three factors are concerned simultaneously in effecting the chemical changes—namely, (1) the oxygen of the permanganate unites with the sodium of the salt; (2) the soda thus produced unites with the sulphuric acid; and (3) the gold pulling at the chlorine of the salt, manages to capture it, owing to the simultaneous capture of the sodium of the salt by the oxygen of the permanganate. In the Black-Skeet solution the sodium would not break its partnership with the chlorine of the salt without the aid of the gold in taking the other partner. On the other hand, the gold could not take the chlorine from the sodium of the salt without the aid of the oxygen taking charge of the other partner—namely, the sodium; and, in its turn, the oxygen would not take the sodium if the sulphuric acid were not present to unite with the soda thus formed.

The whole of the simultaneous concurrent changes in the Etard process may be shown by the following equation:—

$$6\ KMnO_4 + 30\ HCl + 8\ Au = 6\ KCl + 3\ Mn_2O_3 + 15\ H_2O + 8\ AuCl_3,$$

which may be translated thus: Six molecules of permanganate of potash and thirty molecules of hydrochloric acid and eight atoms of gold produce six molecules of chloride of potassium, three molecules of sesquioxide of manganese, fifteen molecules of water, and eight molecules of the trichloride of gold.

The concurrent changes effected in the Black-Skeet process are probably as follows:—

$$6\ KMnO_4 + 24\ NaCl + 30\ H_2SO_4 + 8\ Au = 6\ KHSO_4 + 24\ NaHSO_4 + 3\ Nm_2O_8 + 15\ H_2O + 8\ AuCl_3,$$

which, in plain English, would read thus: Six molecules of permanganate of potassium, twenty-four molecules of common salt, thirty molecules of sulphuric acid, and eight atoms of gold produce six molecules of bisulphate of potash, twenty-four molecules of bisulphate of soda, three molecules of sesquioxide of manganese, fifteen molecules of water, and eight molecules of trichloride of gold.

It has already been stated that the permanganate process does not deal with silver in the ore. That metal, indeed, when present as an alloy of silver and gold, obstructs the solution of the gold by forming a coating of insoluble chloride of silver on the surface of the particles of bullion, and this protects what gold there is in the bullion from the attack of the solvent.

In the case of ores such as the Monowai, City of Auckland (old Sylvia), Great Barrier, the low-level refractory portions of the Waihi and of the Waihi Grand Junction and other Upper Thames mines, where the silver is present chiefly as sulphide rather than as alloy, the permanganate process has proved most successful by numerous laboratory experiments on parcels up to 56 lb. weight, after a dead roasting with 3 to 6 per cent. of salt. By such roasting the silver of these Upper Thames and Monowai ores is converted in the furnace into chloride of silver, which has not, so far as yet observed, had any retarding action at all, in the case of such ores as these, on the extraction of the gold up to from 90 to 98 per cent. Indeed, the most rapid extraction yet obtained has been got from the most refractory parts of the Monowai ore, specially picked out at the mine for its refractory character, as a severe test for the permanganate process. In this case the samples put through contained about 22 per cent. of zincblende (or sulphide of zinc), 8 per cent. of galena (or sulphide of lead), 3 per cent. of copper-pyrites, and 9 per cent. of iron-pyrites. The ore thus contained 42 per cent. of the sulphides of zinc, lead, copper, and iron. The silver was present in the proportion of 546 oz. to the ton, and gold 9 oz. 14 dwt. per ton. The ore was ground and passed through a 40-sieve (1,600 holes to the square inch). It was then mixed thoroughly with 6 per cent. of salt, and roasted to a perfectly dead state in the Permanganate Company's reverberatory furnace at their testing plant in Dunedin. The roasting process occupied eight hours, the temperature being kept low at first, and gradually rising (while the charge was being constantly turned over or rabbled) to a full red heat, and kept so till a portion of it steeped in twice its bulk of the permanganate solution, and shaken up, left the purple-red colour of that solution very little changed.

The roasted charge was then placed on the filter-bed of clean gravel and sand (described above) in a 5-gallon glass cylinder, fitted with the necessary outflow-pipe. The permanganate solution was then put on it, the outflow-pipe being left open, and within ten minutes of the commencement of the outflow the gold was beginning to come through. In one hour from the start it had reached the very rich indication, and retained that for three hours. The gold indication then began to go down very slowly, until at the end of another three hours it was at "black." The leaching (or rather washing now) was then continued with water instead of permanganate until only a trace of gold was coming through. The whole time occupied in the leaching and washing was thirteen hours.

The gold was then precipitated by protosulphate-of-iron solution, washed, collected, melted, and weighed, showing a 96·5 extraction of that metal. The charge was now ready for the recovery of the silver by the hyposulphite-of-lime (thiosulphate of calcium) process. The acid was found to have been well washed out of it by the water used in the last stage of the leaching just described. The hyposulphite-of-lime leaching was continued till, at the end of another period of sixteen hours, only a trace of that metal was coming through. The hyposulphite used was made on the spot by heating flowers of sulphur with slaked lime and water till the solution had a yellowish-brown colour. It was then decanted, and a current of sulphurous-acid gas (sulphur-dioxide) was passed through it till it smelt strongly of that gas. This solution, now colourless, after the subsidence of the free sulphur, was used as the leaching liquid for the silver, as described. The silver was afterwards precipitated as sulphide by the addition of sulphuretted hydrogen and a little ammonia. The black precipitate was then roasted and fused with carbonate of soda and a little saltpetre to recover the silver. The extraction of silver was 97 per cent.

The hyposulphite of lime can, as the materials (lime and sulphur) are cheap, be made in large quantities at little cost, and, with such a fine extraction in rich gold-silver refractory ores such as the Monowai, Sylvia, and the deeper parts of the Upper Thames mines produce, will be a most satisfactory and remunerative adjunct to the permanganate process.

Similar laboratory experimental trials on parcels of ore weighing from 6 lb. to 56 lb. were made at the Dunedin University Laboratory. The ores treated were from nine different mines on the Thames and Upper Thames; the Barewood and Premier concentrates (containing 30 to 50 per cent. of iron and arsenical pyrites and a little antimony), in Otago; the Mount Morgan refractory ore from Queensland, containing about 20 per cent. of iron-pyrites and 2 per cent. of copper-pyrites; the Great Barrier ore; the Beaconsfield concentrates (the richest gold-mine in Tasmania); and about fifteen refractory sulphide-ores from Gippsland, Stawell, and other parts of Victoria; and from the Dromedary Mine, in New South Wales, containing about 30 per cent. of copper-pyrites. In all these cases, the roasting being perfect, the extraction of gold did not fall below 89 per cent., the average being between 93 and 96 per cent.; and where the ore was treated for silver as well as gold, and the salt-roasting preceded the permanganate and was followed by the hypo, the silver-extraction gave from 82 to 98 per cent.

I do not think the process will profitably treat bullion containing, say, half as much silver as gold, but it will (with the salt-roasting) treat ore in which there is any amount of silver as sulphide

merely, and not as bullion. This has been abundantly proved by the treatment of the Monowai and other Hauraki Gulf ores. The largest parcel treated at one time by the process was 22 cwt. in the company's vats in Dunedin. It was from the Mount Morgan Mine, in Queensland, and had been roasted at that mine before being sent to Dunedin. The ore contained 10 oz. 15 dwt. of gold per ton. The extraction was 95·6 per cent. of the gold, at a cost in chemicals (salt, sulphuric acid, and permanganate) of 4s. 4½d. per ton.

The best extraction at the Mount Morgan works, where several trials were made, was 94½ per cent., at an estimated cost, after roasting, of about 4s. 6d. per ton.

The points that require most careful attention—repeated here for the purpose of emphasizing them—are: (1) Perfect dead calcination (with salt in the case of much copper or silver or both); (2) a perfectly clean pure quartz filter-bed; (3) due attention to the proportion of the ingredients in making up the solution; and (4) seeing that the solution-tanks and leaching-vats are protected internally by a coating of paraffin-wax, as described above.

ELECTRO-DEPOSITION OF GOLD UPON THE GOLD OF OUR DRIFTS.

[By William Skey, Analyst to the Department of Mines. Read before the Wellington Philosophical Society, 22nd December, 1897.]

If among the many strange and fanciful theories that the ancient digger and the masterful miner have invented for the explanation of the various phenomena that they have observed in the solitudes of nature's laboratory there is one that as first presented to us appears the strangest—the farthest fetched of any of these—it is, I think, the one which maintains that the nuggets of our drifts have generally grown or been formed therein, and that even all gold can also grow therein—that is, *in situ*—and this by a kind of selective process, by which it accretes to itself the gold from its solution in the auriferous waters that flow around it—that, in fact, under favouring conditions every particle of gold acts as a nucleus for any soluble gold that it comes in contact with—that in reality gold as present in our spring waters has the same tendencies to go to gold in its *uncoined* state in the domain of nature as it has in its *coined* state in the hands of those who have it.

Nor was this wild theory of the digger and the miner merely a speculative one, for they believed in it to such an extent that they acted up to it by purposely leaving gold—a little "seed-gold," as they termed it—in their tailings to draw the precious metal to itself for a profitable rewashing thereof.

The first scientist, so far as I am aware, who had the hardihood to patronise this theory—to father it, I may say—was Dr. Selwyn, Secretary to the Mines Department, Victoria. This was in the sixties. His precise theory, as stated before the Royal Society of Victoria,* is thus given: "That nuggets may be formed, and particles of gold may increase in size, through the deposition of gold from the meteoric waters percolating the drifts, which water, during the time of our extensive basaltic eruptions, must have been of a thermal and probably of a highly saline character, favourable to their carrying gold in solution."

Thus Dr. Selwyn; and though he did not furnish anything in its favour of a very convincing kind—nothing much more, in fact, than had already been adduced—he had performed the signal service of giving to this wild and unproven theory an air of respectability—the sanction of a great name: he had brought it to the forefront of science, and it was not long before converts to these views were made, one of whom, and the first, I believe, was Professor Ulrich, who gave much attention to the subject, and his remarks thereon appear in the work on the "Goldfields of Victoria," by Mr. R. Brough Smyth, F.G.S., pp. 356–57. In these he particularly draws attention to these three facts—(1) That nuggets even above 1 oz. in weight are of rare occurrence in quartz reefs; (2) that a tremendous cataclysmic force would be required to move large nuggets to the situation in the drifts that we find them in; and (3) that there is a great difference in the standard of fineness between alluvial and reef gold.†

But whatever quantity of evidence had been adduced geologically for this accretion of gold on gold, one thing was lacking, for the theory had no solid ground to rest upon so long as the chemist did not, or could not, show some natural process by which was effected this building-up of gold on gold in the coherent reguline lustrous form that all nuggets and particles of native gold have taken.

Years passed away, and no evidence of this kind was forthcoming, when, about the year 1871, the scientific world was startled by an announcement from Mr. Daintree of a very singular and unexpected circumstance that he had observed bearing on the question. Professor Ulrich states the matter thus: "Mr. Daintree's discovery consisted in the fact that a speck of gold lying in a solution of chloride of gold increased several times its original size after a small piece of cork had accidentally fallen into the solution."‡

Here, then, appeared to be the "one thing that was wanted" to show how gold can accrete gold to itself in a natural way, and discovered by one of those accidents that luckily had an observer, and one who was competent to see the full significance of it. Thus, it appears that all we require for this accretion of gold on gold in our drifts is a weak solution of gold in an acid, organic matter therein of a somewhat unstable character, and metallic gold. I say here "it appears," for it will be noted there is a tantalising lack of detail, of precision, and, indeed, of certainty, in the description of the circumstances of the case that detracts greatly from the value of the evidence; and yet there was such a promise of useful knowledge to be gathered by a careful

* Trans. and Proc. of the Royal Society of Victoria, vol. ix., p. 53. † It appears very improbable that nuggets of reef gold can ever have any notable proportion of their silver substituted by gold when they get into our drifts, as the atomic volumes of the two metals are practically the same. ‡ "The Goldfields of Victoria," by R. Brough Smyth, Secretary of Mines, Victoria.

investigation of the case that I among others attempted it, but, for myself, was quite unable to realise the promise—in fact, I was unable to repeat the phenomenon as described. I got nothing to indicate that gold is nuclear to itself in solutions that contain organic matter, whether in a solid or in a dissolved form. The effect of such matters (organic), I found, was rather to disperse any gold it reduces than to concentrate such gold in a nuggety form.

The results of these researches of mine were contained in a paper which was read before the Wellington Philosophical Society in 1872, and from this paper I make the following quotations:* "So far, therefore"—alluding to results just stated—"gold reduced from solution of its chloride by aid of organic matter, such as cork or wood, does not in the manner of its deposition exhibit such a notably selective power for metallic gold as the description of Mr. Daintree's results lead us to suppose. It does not, indeed, show any such selective process at all—that is, to a greater extent than can be attributed to the action of surfaces generally regardless of their nature; and in support of this I believe I am quite correct in stating that the whole sum of our experiences (omitting those of Mr. Daintree) is directly against this theory. . . . So far as I am aware, we only produce by these means (organic matters) fine incoherent powder—minute crystals or films of exceeding thinness, nothing at all nuggety."

I have since learned that Mr. Cosmo Newberry, late Analyst to the Geological Survey of Victoria, has confirmed the general accuracy of these assertions of mine by showing that gold is not nuclear to gold under the circumstances given by Mr. Daintree.

Thus it seems that, after all, as yet we have got nothing more than the hazy, crude idea of the Old-World digger of the growth of nuggets in our drifts, an idea that many geological facts support, while others are antagonistic to it. And this growth of the nugget has been asserted by scientists to have been produced by nuclear action. Nuclear action, indeed! *alias* nuclear force! I take it to be of the same misbegotten fraternity as the centrifugal and centripetal forces of our oldest school-books—those learned terms that only obscured the truth they were invented to show.

A long period of time again passed; the subject had apparently dropped out of mind, when a second time the scientific world was startled by a communication on the same subject, and for the same object. This time it was Mr. Charles Wilkinson, of the Geological Survey, and evidently the theory of Mr. Daintree, above detailed, had worked in his mind, and inspired its operations—the possible or probable nuclearity of gold for gold as in our drifts—that is, under natural conditions—had yet to be proved. But, as he thought, why limit the problem to gold? Why not try some of the native minerals that frequently exist along with gold? Filled with this idea, he, after making numerous unsuccessful experiments, at length tried the metallic sulphides, and was handsomely rewarded. He had, as he thought, got the key to the problem. His results are given in a paper entitled "On the Formation of Gold Nuggets."† Shortly stated, this paper informs us that cupreous and iron sulphides, arsenical pyrites, galena, zincblende, stibnite, wolfram, and molybdenite act as gold does for nuclei to gold as reduced and precipitated from its chloride in water by organic matter.

The accuracy of these statements thus given by Mr. Wilkinson was soon afterwards vouched for by Mr. Cosmo Newberry. Here, then, at last it appeared that this so-called "nuclear action" of a solid substance for gold had been sheeted home—that certain kinds of minerals can accrete, can attract, as it were, unto themselves the minute particles of gold that organic matters liberate from auric chloride, and mould these to the coherent, the crystalline, the massive form of the metal as we see it in the nugget; and thus the idea of a nuclear action of gold itself for gold, as Mr. Daintree's observation favours, receives apparently a further accession of proof.

These results that Mr. Wilkinson obtained very much interested me, and I repeated them with such variations as my previous knowledge of the subject, and particularly of the dispersing effect of organic matter on gold solution, led me to make.

Leaving out, then, the organic matter, I simply introduced a crystal of pyrites into the weak solution of gold trichloride in distilled water, when after a two-hours contact I found that this crystal was completely gilded over. The metal thereon was lustrous and coherent, and the crystal had all the appearance of solid gold. I afterwards found that the metallic sulphide arsenides generally as used without organic matter had the same effect as pyrites. Thus it was proved that derelict atoms of gold are not required for the accretion of gold on gold in the concrete form which obtains in our auriferous drifts.‡

The explanation of this liberation of gold from its solution is simple. For this we must look upon the gold in solution as being a part of the combination—hydrochloride of oxide of gold, or hydrated trichloride of gold, the oxygen of which oxidizes both the sulphur and the metal of these sulphides so as to leave the gold upon them at the scene of action in the metallic state.

But this, though explanatory of the reduction of gold, is not explanatory of the fact that the gold thus reduced is (the greater part at least) close and reguline, in place of its particles being more or less discrete, as they would be in the case of a deposit by simple reduction. This, I find, however, is explained by the fact that after the first few seconds of contact of the metallic sulphide with the auriferous solution the gold is deposited electrically—that, in fact, an electrical current is produced by the oxidation of the sulphide, and so the process is an electrolytic, an electro-gilding one.

In all this we have a proper rendering of the terms "nuclear action" or "nuclear effect" if we wish to keep them up in all their absurdity—gold can be nuclear to gold only as under the influence of an electric current.

Thus it comes about as probable—indeed, as a certainty, I think—that if the nuggets and particles of gold in our drift formations do accrete gold—do exercise a "nuclear effect, as it is termed, for gold—it is under the directing influence of an electric current, or perhaps I should say

* Trans. N.Z. Inst., vol. v., p. 372. † Trans. Roy. Soc. Vict., vol. viii., art. ii. ‡ Although I have some twenty years ago published this fact—viz., that organic matter is not necessary for the gilding of pyrites, &c., in this way—authors of works on gold do not correct the old idea by this later knowledge.

it is simultaneously with the production of an electric current at the seat of action. In regard to this, we have seen that in our metallic sulphides as associated with auriferous solutions we have the means for producing electric currents—that is, electrolytic action; but, except in the case of our deeper-seated reefs, we do not get these sulphides, and, as in contact with the gold of our drifts we only get it rarely, therefore the question we have is this: Does there exist a general agency in these drifts for the production of electric currents in or in juxtaposition to the gold of these drifts? This question that I have just worked up, and in such a way as to incorporate here the historical facts above stated, I shall endeavour to answer, and in the affirmative. I shall, as I think, show that there are in these auriferous drifts generally the means whereby the electro-deposition of gold on gold can be accomplished, and this in a general, a natural way; and I shall also endeavour to show what these means are.

Now, it is on record* that in 1876 I communicated to this society a knowledge of the fact I had just then discovered, that electrical currents are generated by platina when paired with graphite in alkaline and also in saline solutions; a fact that, by the way, I afterwards found had just a little prior to this time been announced both by Professors Becquerel and Gaugain† in publications to which I had not access for years afterwards. At that time I attributed these currents to chemical action at the surface of the platina, and not to a mere polarisation of the metal, as Professor Becquerel maintained. Thoroughly believing my view of the case to be correct, it occurred to me, in view of the question before us, to carry my investigation of the subject far enough to ascertain whether any of our noble metals do give, in alkaline solutions, electric currents sufficiently strong and persistent to decompose acid solutions of gold and deposit the metal in the form in which we find it in our auriferous drifts. For my first—my tentative—experiment I made choice of platina as the metal that, if it did give me any results at all, would exhibit them with unmistakable clearness. Thoroughly cleaning a wire of this metal in suitable acids, I waxed it to within ½ in. of each extremity, and then plunged one end of it in a weak solution of caustic potash, and the other end I placed in a very weak solution of auric chloride, making the interpolar connection between the two vessels containing these solutions with stiff gelatine in a U-shaped glass tube, when, after the expiration of four hours, I found the platina wire was gilded up to the waxed part, while in twenty-four hours all the gold of the solution had been electro-deposited on the platina wire. The gold was in the highest degree solid, lustrous, and reguline.

This was very encouraging, so I at once continued the investigation by experimenting upon gold, and the results of this I herewith state as shortly as I can, and in the order that I obtained them:—

1. When pure gold in weak or strong solutions of an alkali is electrically connected with gold in a weak solution of the terchloride of that metal a deposit of gold (out of the metallic solution) upon the gold therein occurs, and this gold is both lustrous and coherent.

2. When the ordinary acids, such as hydrochloric, sulphuric, and acetic acids, also the neutral salts generally, are substituted for the alkali the same effects are produced, but at a much slower rate.

3. Common spring water and distilled water may be substituted for the acids with similar but, of course, far less pronounced effects.

4. The same results as those above stated are also to be obtained if the solution of gold is feebly alkalized with an alkaline bicarbonate.

5. No such deposit occurs if the auric chloride or bicarbonate is replaced by an alkaline aurate.

6. A large sheet of gold in the auric chloride, coupled with a small sheet of gold in the same solution and of the same strength, deposits gold on the small sheet.

7. With gold in a weak solution of the auric chloride, as against gold in a strong solution of this salt, this metal is precipitated on the gold in the strong solution.

8. If gold or platina in auric chloride be connected with platina or gold that is in good contact with any ordinary soil it receives a deposit of bright solid gold thereon in a few hours, while the metal that is in the soil becomes coated with a thin but continuous film of peroxide of iron in most cases.

9. Gold in an alkaline solution is electro-positive to gold in acid solutions generally.

In every case the gold or the platina that stood in the auric chloride solution was coated with wax to well below the surface of the liquid, to guard against any irregular deposit of gold brought about by differences in the surroundings of the metal.

It was proved that the gelatine used for the interpolar connections in these experiments had no part (by its deoxidizing properties) in the production of these metallic deposits.

These results, as a whole, show very clearly that gold can be nuclear to itself in the popular meaning of the term—that, in fact, it can either of itself, or assisted in some way that at present we do not understand, slowly build gold upon gold in that solid coherent form that our nuggets are in. They show, besides, that, whatever the means are by which this is produced, these will exist throughout all the drifts in which native gold occurs. Thus, any particle or nugget of gold lying in the bed, or partly in the bed, of a stream that contains gold in solution will certainly become coated with gold, and this because it is in such a position that the upper and lower surfaces of it are in a saline solution of a different nature, the water being acidic from the presence of free carbonic acid, while the sand and earth are more or less alkaline, the alkaline solution, as we have seen, being especially favourable to the liberation of gold from acid solutions of it. This liberation is a chemical act, and therefore is accompanied by an electric current, by which the gold is electro-deposited on the upper part of the particle or nugget of gold.

All this signifies that for the deposition of gold we have here there must be the "seed-gold," or auriferous nuclei, to start with; but it is not necessary to go to the reef for this. In any strong proto-compound of iron or metallic sulphide, or even organic matter, we have in conjunction with

* Trans. N.Z. Inst., vol. viii., page 332. † Watt's Dic. Chemistry, 2nd supplement, page 444.

such auriferous water the means to insure the small particles—the nuclei, the seed-gold—necessary for this metallic accretion.

Thus far I have carefully restricted myself to showing the single fact that particles and nuggets of gold in our drifts must generally enlarge by the accretion of gold thereon from its solution in the waters which permeate these drifts: the question as to how these accretions are effected, or, rather, what initiates the process, I have abstained from trenching upon; but this question I now, in due course, discuss.

We have seen that during these deposits of gold that I have shown to occur under the conditions here cited currents of electricity are generated—that, in fact, it is by these currents that the gold is deposited in the concrete—the massive form in which nuggets are in. All I have to do, then, is to show how these currents are produced.

I will note here, in the first place, that these currents are of a different class to those described by Professors Becquerel and Gaugain, which are currents produced by immersing the plates of platina in different physical conditions into acid or alkaline solutions or distilled water, and are acknowledged by these investigators to be merely ephemeral, and so are not of that determined character necessary for the work here demanded of them.

Now, in our Transactions for 1875 I showed that platina in an alkaline solution is electrically positive to platina in an acid or in a neutral solution. The currents, however, obtained in this way appear to be like those treated by Professor Becquerel, above described; but I found that if the platina in the alkaline solution were coupled with platina or gold in nitric acid or in auric chloride the electric current was not of an ephemeral character, but, on the other hand, was regular and continuous, so long as there was nitric acid or the gold salt present. The currents, then, may properly be termed permanent, and, being so, the difficulty of accounting for them appears greater than in the case of Professor Becquerel's currents, for they cannot be properly referred to any polarisation of the surfaces of the metals or to any condensation of gas thereon, as he supposes takes place for the production of his currents, but they demand the even, the constant, expenditure of some power, and which, under the circumstances, must involve chemical action, and this absolutely contiguous to the metal—at least, to one of the metals—that is, to one of the poles used. Being so, then the only thing left to do is to determine what are the two substances to which this chemical is due, and what substances form this chemical combination in the immediate vicinity of the metal. Now, it is quite certain that neither of these substances is the platina or the gold itself, for they do not suffer, to any determinate extent, loss during the reaction, nor can they be oxidized except very superficially. (See addenda for further notes on this matter.)

The chemical action, then, that is necessary to produce the current must be produced in one of the three following ways:—

1. By the (chemical) combination of the free oxygen and nitrogen gases present as air at the surface of the metal.
2. By the oxidation of nitrogen by the oxygen of the water.
3. By the oxidation of the alkali or the acid present by the oxygen of water.

Now, in regard to the first theory, it has to be considered that the deposition of gold in these cases being, as we have seen, an electrolytic effect, an electrolysis of both solutions is demanded, and I cannot see how the mere combination of oxygen and nitrogen could effect this; the only result would be a minute production of heat.

We have therefore, as I conceive, only the two remaining theories to consider, and, as both involve a decomposition of water, it is only a question whether the nitrogen gas present is oxidized, or the potash is oxidized to the binoxide, or the acid is further oxidized by the oxygen of the water so as to produce the chemical action—the electrolytic effect—that we require. This question I have to leave for the present undetermined for want of leisure and suitable apparatus, but I shall take the matter up again shortly, and the results of this further investigation I will acquaint you with in due course; meanwhile I will here describe the results of two experiments made to settle the question.

Two platina plates, one in a gold solution the other in a potash solution, were connected through a galvanometer, and the deviation of the needle marked when it had attained constancy. A stream of oxygen was then passed through the potash solution, when it was ascertained that the deflection of that needle was neither notably increased nor decreased, a fact that appears to prove that it is not the nitrogen which is oxidized.

In another experiment I found that the potash solution had not bleached organic matters—litmus paper, &c.—at all, even after the deposition of gold had extended over eight hours.

These results are conflicting. However, these experiments are merely of a tentative character; but, as I say, I hope very soon to be able to make further and complete investigations on the subject.

There is one circumstance in connection with the alleged discovery of Mr. Daintree of a nuclear action of gold for gold as liberated by organic matter from its chloride that, in conclusion, I would like to make a few observations upon, and this in justice to the memory of that scientist. It may be remembered by some here that I did not hesitate to avow a certain amount of incredulity as to the alleged growth of the particle of gold that Mr. Daintree left in the solution of gold that he had prepared; but just lately, in further considering the case in connection with the facts that I have here stated before you, I could not but think that probably, after all, this scientist's statement as to a certain palpable increase in the size of this gold residue might be correct. The question was, then, if correct, to what was this increase due? Now, it did not appear very likely, under the circumstances, that all this increase was due to differences in the strength or nature of the solution itself whereby action would, as we have seen, be set up; so it occurred to me to try whether or not contact of the gold with the vessel itself had anything to do with it. Binding, therefore, some clean platina wires round small pieces of white porcelain, glass, and white quartz respectively, I

placed these pairs in the trichloride of gold, while a similar wire I wrapped in filter-paper and immersed in the same solution of gold, when in four hours I observed that the wires that were attached to the porcelain and glass were feebly gilded, whilst that attached to the quartz was thickly gilded, but the wire unattached did not exhibit any trace of gold thereon. Gold in place of platina in these experiments also accretes gold to itself, which is clearly revealed by the altered appearance that in a few hours it presented.

As the quartz was of the pure white variety I was led at first to suppose that it at least possessed the same property in relation to the electro-deposition of gold above noted as the noble metals do, but I soon ascertained that this was simply owing to the presence in the quartz of a minute proportion of some proto-compound of iron, for on igniting the quartz, or digesting it with hydrochloric acid before placing it (as wired with platina) in the solution of gold, the gold was deposited upon the wire. The same negative results occurred in the case of the glass when similarly treated prior to the immersion.

These results, as I think, clearly show that any gold that had deposited upon the normal gold in the case that Mr. Daintree gives us had in greater part, if not wholly, been electro-deposited there by means of a chemical combination set up by the oxidation of the protoxide of iron of the glass vessel upon which that normal or original piece of gold lay.

The fact that the whitest and purest quartz at my disposal did, when thus coupled with platina or gold, become solidly gilded when placed in an auric-chloride solution is, I think, rather a remarkable one, for the quartz thus appears to act as the positive pole of an electric circuit. Had it not thus acted we should have had the gold liberated from the auriferous salt by the oxidation of iron deposited in minute disconnected granules on and partly in the body of the quartz, in place of the reguline deposit on the metal attached thereto, as in my results.

In regard to this, some here may contend that the general idea is that all bodies are electric conductors in the same sense that the metals are, but it seems to me that if this were really the case we should be able to electro-deposit gold on quartz, which, as I said above, I have been unable to do. The whole matter, however, requires further research. Meanwhile we have the knowledge that particles and nuggets of gold in auric chloride do increase their size when they have full contact with quartz, glass, and siliceous substances generally that contain ferrous oxide, and this circumstance fully explains how any small increase which obtained in the size of Mr. Daintree's residual gold was brought about.

Addenda.

The following facts may prove interesting, and also useful, for enabling one to understand some of the phenomena above described :—

If a piece of pure bituminous coal is immersed in a weak solution of auric chloride, and rested clear of the containing vessel—say, on filter-paper—no deposit of gold occurs on the coal; but if this coal is allowed to have contact with quartz, earthenware, or glass, in a short time it will be tinged brown near the junction of the two solids, and in a few hours the whole of the coal is well gilded. Here it is shown that the coal is a pretty fair conductor of weak electric currents.

If pure platina be coupled with pure gold in equal-sized plates in an auric-chloride solution no deposit of gold occurs—at least, I found none; a fact which goes towards proving that these metals in all the experiments I describe here only act as inert poles—as mere "ways and means" for the passage of electric currents.

The electric current is stronger when the gold in the potash is paired with gold in auric chloride than with gold in hydrochloric acid, a circumstance no doubt due to the easier decomposition of the gold salts than the acid.

When the platina of a zinc-platina couple is connected with a platina pole in the alkali solution, and the zinc of this couple is connected with the other platina pole (that which is in the gold solution), the deposition of gold on the platina is not stopped, but only retarded. Using a copper-zinc couple instead of the zinc-platina one, the rate of the deposition of gold is but little, if at all, affected.

A copper-zinc couple in sulphuric acid connected with two gold plates in the auric-chloride solution deposits gold only at a very slow rate, and this even when the copper and zinc plates are much larger than the gold plates.

From the results above stated it appears that the electro-motive power yielded by potash and auric chloride with gold or platina plates is of considerable strength—at any rate, is stronger than that given by the copper-zinc couple in sulphuric acid.

NOTE.—Since the above paper was read I have ascertained that the statements in chemical works as to "gelatine not being appreciably soluble in water" are not absolutely correct. It therefore follows that in some of the experiments I have described gold has been reduced from my solutions by this substance—gelatine, as used in making the necessary electrical connections. The first question, then, is to determine the proportion of gold that was liberated by the gelatine so used. A few tentative experiments showed that when using filter-paper, Swedish or asbestos, both well washed, for the electrical connections, and common spring water to make up the solutions, gold deposits were obtained about as rapidly as before, but by using distilled water to make up my solutions only very slight deposits of gold were obtained, so slight, indeed, that they might well have formed by the aid of organic matter derived from the dust or living organisms derived from the air. This requires further investigation. Anyway, the results of this paper clearly show that whenever the metal gold is in natural waters, containing gold in solution, it will become coated with reguline gold if only there are the conditions present that can insure the electrical polarisation of that metal, such as its contact with solutions of different strength of a somewhat dissimilar nature.—WILLIAM SKEY.

A REMARKABLE MINERAL WATER.

[Memorandum regarding a Carmine-coloured Water (No. 8124/L) from Stinking Creek, Marlborough, to the Under-Secretary for Mines. By WILLIAM SKEY.]

On the 14th March, 1898, I had a mineral water sent to me by the Secretary of the Department of Agriculture. It proved to be such a remarkable one that it was not before I had certain proofs* that it occurred naturally as alleged in the advices accompanying it that I examined it to the length that I now have.

This water, as I have hitherto had it, varies from a pale to a rich carmine colour, and it keeps persistently turbid for some weeks. It has a strong saline taste and a feeble odour of sulphuretted hydrogen. The proportion of fixed salts found in it was 3·51 per cent. thereon, and this is mainly sodic chloride. It therefore classifies with the chlorinated waters of our text-books, and, indeed, so far as I have as yet been able to get results upon the very limited quantity at my disposal, they show that it compares very well with certain of our sea waters in every way except for the presence of the substance to which its singular colour is due. This substance is quite insoluble in water (hot or cold), but is easily soluble in alcohol, ether, and benzol; and feebly soluble in alkalized waters, but precipitated therefrom by excess of acids generally. It remains in suspension in water along with the clayey matters, but does not appear to be combined with these matters (as a lake), as particles of it burn entirely away.

Taking all these facts into due consideration, one must look upon this substance as being a resin, and most probably in the series of acid or oxygenated resins. Particulars as to the nature of the surroundings of this spring will be collected for publication, and a complete analysis of the water will be made and reported on as soon as a sufficient quantity of it is to hand for the purpose. It is just probable that this spring passes over a bed of rock-salt; also probable that the red colour that some of our rock-salts have is owing to a red resin such as the one here described; and, further, that the blue colour of the rock-salt of Stassfurt is due to the presence therein of a finely divided coloured resin.

I reserve further remarks for a future occasion.

The Secretary for Agriculture, Wellington.

I BEG to forward a sample of water brought to this office to-day by Mr. Jackson, chemist, which was procured from Stinking Creek, Awatere, this morning. Mr. Jackson would be glad to ascertain the analysis of same. The water is as taken from the creek, no colouring matter having been introduced.

Blenheim, 10th March, 1898. JOHN MOORE, Stock Inspector.

Inspector Moore, Blenheim.

ATTACHED please find Analyst's report on sample of water forwarded per Mr. Richardson. Kindly see Mr. Skey's remarks, and say if the sample sent is in its natural condition. At same time please forward larger sample—say, about a quart.

23rd March, 1898. R. EVATT, *pro.* Secretary.

Mineral Water of a Full Pink Hue.

This is a highly saline water, and belongs to the class of mineral waters known as the chlorinated waters. The colouring matter is organic, with a mordant of alumina. It resembles cochineal. I have no knowledge of any natural water occurring that is coloured like this water; so, before I fully analyse the water, I would like to be certain that it is natural and unsophisticated water.

15th March, 1898. WILLIAM SKEY, Analyst to the Mines Department.

Pink Mineral Water from Stinking Creek, Awatere.

The Secretary for Agriculture, Wellington.

THE sample forwarded for analysis was natural water as taken from the creek, and has had no colouring matter added. I have written to request Agent McKenzie to take a clean quart bottle to the creek, fill, and bring it in himself, and will forward on receipt.

Blenheim, 24th March, 1898. JOHN MOORE, Stock Inspector.

The Secretary for Agriculture, Wellington.

I HAVE forwarded by mail this day two bottles containing water from Stinking Creek—one perfectly colourless, but containing fibrous roots, watercress; I think the other taken from the stream a mile below the spring-head and highly coloured, as in case of last sample forwarded. These samples may be depended on as natural, as taken from the creek and put into a clean bottle.

Blenheim, 4th April, 1898. JOHN MOORE, Inspector of Stock.

THE RELATIVE STRENGTH OF WROUGHT-IRON AND STEEL PIPE.

[From the *Engineering and Mining Journal*, New York.]

An investigation into the relative strength of wrought-iron and steel pipe was recently made by Professor Henry M. Howe at the instance of the National Tube-work Company, and the results of these tests have been made public. Three points were included in the trials, the resistance to bursting under pressure, the tensile strength, and the friction, or resistance to the pressure of water. In each three classes of pipes were tried, 2 in. line pipes, 2 in. tubes, and $5\frac{5}{8}$ in. casing. The steel pipes were made at the National Tube-works, and were taken from the ordinary market stock; the wrought-iron pipes were obtained from three makers of good standing, and also represented the usual stock quality.

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* See copies of letters.

In the bursting tests fifty-one wrought-iron and thirty-six steel pipes were subjected to hydraulic pressure, the results being summed up in the accompanying table:—

TESTS OF WROUGHT-IRON AND STEEL PIPES.

Size of Pipe.	Weight in Pounds per Running Foot.						Bursting-pressure, Pounds per Sq. Inch.					
	Wrought Iron.			Steel.			Wrought Iron.			Steel.		
	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.
2 in. line pipe ...	3·105	3·702	3·452	3·331	4·073	3·821	1,000	4,000	2,918	2,300	6,000	4,733
2 in. tubing ...	3·592	3·995	3·864	3·739	3·961	3·840	3,300	5,000	4,106	5,150	6,000	5,800
5⅝ in. casing ...	8·991	10·417	10·003	9·293	10·328	9·824	250	1,400	931	1,450	2,750	2,038

Size of Pipe.	Tensile Strength, Pounds per Sq. Inch Section.					
	Wrought Iron.			Steel.		
	Min.	Max.	Av.	Min.	Max.	Av.
2 in. line pipe ...	43,107	53,809	50,002	63,025	67,586	65,999
2 in. tubing ...	47,244	55,074	51,852	60,370	66,495	63,057
5⅝ in. casing ...	47,312	61,309	54,311	75,931	91,591	82,325

This shows that the bursting-strength of the steel pipes of the three classes tested exceeded that of wrought-iron by 62 per cent., 84 per cent., and 119 per cent. respectively. These percentages should probably be increased, as twelve pieces of the steel pipe did not burst under a pressure of 6,000 lb., the highest measured. Comparing the minimum strength of the two classes, the weakest iron 2 in. line pipe was found less than one-half as strong as the worst steel one; the worst 2 in. iron tube had only 64 per cent. of the strength of the worst steel; while six out of sixteen of the 5⅝ in. iron casings were only from one-sixth to one-half as strong as the weakest steel ones.

The 2 in. steel pipes were slightly heavier than the wrought-iron pipe of the same diameter, but the difference in weight was far too small to account for the great difference in strength. The tensile tests were made on eleven steel and eleven wrought-iron pipes, and the results are given in the accompanying table. The steel showed tensile strength greater by 32 per cent. in the 2 in. pipe, 22 per cent. in the 2 in. tubes, and 52 per cent. in the 5⅝ in. casing. The results do not call for special remarks.

The friction tests are described by Professor Howe as follows: "These were of two kinds, scraper tests and hydraulic tests. The scraper tests were made by drawing through each of ten steel and twelve wrought-iron pipes a steel boiler-tube scraper under a constant pull and noting how fast it travelled. In the hydraulic test I coupled together six 2 in. steel pipes in one lot about 104 ft. long, and six 2 in. wrought-iron pipes in another lot of the same length. Through each 104 ft. lot thus made I then ran water at full hydrant pressure, and also at lower pressure, and noted in each case the loss of pressure of water in travelling the length of the pipe. This loss of pressure gives us a measure of the friction in each 104 ft. lot. In the scraper tests neither metal has a decided advantage over the other. In many cases, owing to the lightness of the pull used, the scraper was arrested by the friction of the surface of the pipe after it had travelled only part of the measured distance. As regards the proportion of the arrests thus caused the steel stands somewhat better than the wrought iron, the arrests being 34 per cent. of the total number of trials for steel against 44 per cent. for wrought iron. On the other hand, on a general average of those cases in which the scraper was drawn through without arrest, the velocity of travel was rather greater in the wrought-iron than in the steel pipes. But as this leaves out of consideration all the cases in which the scraper was arrested, and thus did not give sufficient weight to the rougher pipes of each class, and as the number of arrests thus left out of consideration was greater in case of wrought-iron pipes than in the case of the steel ones, these averages give an undue advantage to the wrought-iron pipes. In the hydraulic tests the steel showed a constant and pretty uniform superiority to the wrought iron. For given initial pressure the final pressure is on an average of 0·1 lb. per square inch greater in case of steel pipe than in case of wrought-iron pipe. In other words, for given initial pressure the final pressure is about 5 per cent. greater in case of steel than in that of wrought iron."

In the resistance to bursting-strain, which is the most important point in the investigation, Professor Howe's conclusions are strongly in favour of the steel pipe. In his summing-up on this point he says, "Whether we compare the average of the worst of the steel and wrought-iron pipes together, we find that the steel excels the wrought iron very greatly; so greatly, indeed, and so uniformly, that we may safely conclude that steel pipe resists bursting much better than the wrought-iron pipes of the brands which I examined. The explanation of the very great superiority of the steel pipe over the wrought iron pipe is twofold: First, that the bursting-strength of a pipe is limited by the strength of the metal across the grain, and that, while wrought iron is very weak across the grain, steel is nearly as strong across as along the grain. It is natural that, owing to the extreme weakness of wrought iron across the grain, pipes made of it should be very deficient in

bursting strength. Second, that the steel used welds so thoroughly that the pipe as a whole gets the benefit of the fact that the steel of which it is made is much stronger than wrought iron. This inference agrees with other facts, of which I will refer to two: First, of the twenty-three steel pipes which burst at all, 17·4 per cent. burst elsewhere than at the weld, showing that in these cases the weld was not the weakest place in the pipe. Second, in a German investigation into the strength of nineteen welded boiler-flues made of soft steel like yours it was found that the weld was practically as strong as the solid metal. Here the strength of the weld was on an average 99·3 per cent. of the strength of the solid unwelded metal, the weakest weld being 91·9 per cent. as strong, and the strongest 109·3 per cent. as strong, as the solid metal."

ORE-TREATMENT IN BOULDER COUNTY, COLORADO.

The following paper, written for the *Engineering and Mining Journal* by C. C. Burgher, may be of interest now that attention is being directed to telluride-ores in the Australian Colonies:—

The ores of this county may be conveniently divided into two classes—tellurium and sulphide. The districts producing them are in general quite distinct and separated by a porphyry dyke. The sulphide-ores, containing iron and copper sulphides, are mostly confined to the Ward district, and their treatment comprises the usual methods of stamping and concentration. Here and there through the county some lead-silver ore is obtained, which goes direct to the sampling-works and smelters.

The tellurium-ores consist of the various tellurium minerals, marcasite and some pyrite disseminated through a calcareous and magnesia gangue. Sylvanite and petzite are the principal tellurium minerals found, though calaverite, hessite, lead telluride, nickel telluride, bismuth telluride, and iron tellurate are frequently met with. Little or no silver is found in the lower grades of this class of ore. In the early days of the county, when nothing less than 4 oz. or 5 oz. ore was looked for or shipped, the question of treatment was not considered; but, as in other localities, of late years the question of economic milling of the ore at the mine has arisen. The outcome of this feeling was the erection of over twenty mills scattered throughout the county, most of which are now lying idle from various causes. Some of them are closed owing to differences between the owners, but the great majority of them were ill-advised ventures, resulting in a plant unsuited to the ore, or so badly constructed as to be an economic failure. Concentration and cyanidation seem to have been the most favoured methods of treatment. As is well known, it is not possible to satisfactorily concentrate tellurium-ores; when such material is crushed through a 20- to 40-mesh screen the values will float off any vanner or concentrating-machine ever devised. The cyanide-mills have met with very poor success in Boulder County, with one or two exceptions, where the ore was decomposed and the gold entirely free. The ores must be crushed finely for cyanide treatment, and the lime, magnesium, and aluminium compounds render leaching nearly if not quite impossible. As most of the ores carry sulphur and tellurium an efficient roasting is absolutely required before even a fair extraction can be obtained with potassium-cyanide solution.

The Delano Mining and Milling Company, when seeking to find a process thoroughly suitable to the ores in question, after carefully examining most of the different mills in Colorado, in particular those of the Cripple Creek district, decided to erect a 50-ton chlorination plant. The mill * has now been in operation six months, and has demonstrated that it is a metallurgical and economic success, and that chlorination is a process well adapted to the treatment of tellurium-ores. The general arrangement and operation of the mill is as follows: The crushing, roasting, and chlorination houses are erected on level ground, the ore being handled by elevator-belts and belt and screw conveyors. The advantage of having a compact mill all on one floor is obvious. The different elevators and conveyors have worked very satisfactorily, and have cost little or nothing for repairs as yet.

The ore is delivered to a 9 in. by 15 in. Blake crusher, elevated to a set of coarse rolls 16 in. by 36 in., set to $\frac{1}{4}$ in. The ore leaving the rolls slides along a chute in which a horizontally moving plate is set, provided with a slot one-tenth of the width of the chute. As the ore passes over the plate one-tenth of it is delivered on the floor as a sample, the balance going to the bedding-floor. The sample thus obtained is split, shovelled, recrushed, and again cut down to a suitable size for the sample-room. Here it is ground in a coffee-mill, finishing on a bucking-board, until all of it will pass a 120-mesh sieve. On most of the ores this degree of fineness seems necessary in order to get results that will closely check. The bedding-floor used at present is simply a utilisation of unoccupied floor-space in the crusher-house. The writer, on taking charge of the mill, soon found a bedding-floor to be indispensable, there being no method as practical and convenient for mixing widely different ores. The bedded ore is elevated to storage-bins, thence allowed to pass through a cylindrical dryer divided by longitudinal partitions into four compartments so as to obtain as much heating surface as possible. The dried ore is elevated to the screens, 16-mesh, the over-size being returned to two sets of fine crushing-rolls, size 14 in. by 30 in., the discharge from the rolls falling into the same elevator as the dried ore, thence to screens. The latter, conical in shape and set horizontally, are placed over bins of 25 tons capacity each. All bins are made of heavy sheet iron supported by substantial framework. The rolls used in the crushing and sampling department are known as the Rogers roll. Their distinguishing features are great strength and general compactness, one shell being placed above the other, not vertically, but at such an angle as to throw all the weight possible of the upper roll on to the ore. The upper roll works in a guide against a powerful spring. The speed of the coarse rolls is seventeen revolutions per minute; that of

* The mill and its chlorinating machinery which the article describes were designed and successfully run by Mr. John E. Rothwell, of Denver, Colorado, the well-known authority on chlorination of gold-ores.

the fine thirty revolutions, this low speed varying as the diameter gives a circumferential speed nearly equal to the speed of the falling ore. The result of this is that there is no dragging nor grinding of the ore, but simply a cracking. The importance of this feature in not producing slimes cannot be overestimated.

A table of mesh determinations made of an average sample of ore is as follows, the size of screen being 16-mesh (heavy rolled wire). The screens through which the sample was passed were all of fine wire, and there was little difference in size between the 16-mesh mill-screen and the 20-mesh sample screen:—

	Per Cent.
Stayed on 20-mesh	3·7
Stayed on 30-mesh	34
Stayed on 40-mesh	16
Stayed on 60-mesh	16
Stayed on 80-mesh	9
Stayed on 100-mesh	6·2
Through 100-mesh	15·1
Total	100·0

It will be noticed that the proportion of fine material is relatively small.

All belts used in the crushing-house for elevating ore are of "Leviathan" belting (made of prepared cotton duck), with one exception. This belting seems little or no worse for five months' wear, while one 8 in. 4-ply rubber belt has been nearly cut to pieces in the same time. The hard, tough, yet non-cracking surface of the "Leviathan" belt seems to make it an ideal conveyor of ore.

Every precaution is taken in the sampling and crushing department to avoid the sometimes considerable loss in dust. All ore is dampened before being crushed, the floors are sprinkled with water two or three times to each shift. The discharges from the fine rolls, elevator to screens, screen-bins, &c., are all connected with an exhaust-fan which delivers the dust into a hopper, from which it may be drawn off as desired.

From the screen-bins the ore is carried on a belt conveyor provided with flanged sides to the feed-hopper of a 40 ft. diameter Pearce turret roaster, similar in general design to those used elsewhere, except that the latest improvement in cooling the rabble-arms by water instead of air is made use of. Accompanying this innovation forged-steel teeth are employed for stirring the ore in place of the usual blades. These improvements are of very great advantage; no useless cold air is admitted to an ore that needs little air but very great heat; the arms retain their shape, being comparatively unaffected by the heat; while the teeth will last a year or two, thus doing away with the expense and annoyance of putting in a set of arms every week or so. In roasting concentrates, sulphides, &c., the deterioration of the air-cooled arm is not nearly so rapid, and the air is a very necessary adjunct; but in roasting such ore as is under discussion a very great heat is required —far greater than the former ores would stand without melting. With the old style of rabble-arm and blades any slight variation in the relative height of each arm above the hearth will cause an unequal distribution of the ore, and it will pile up either on the outside or inside of the hearth, resulting, of course, in an imperfect roast; with the forged-steel teeth this never occurs, each tooth seeming to act independently of every other one. The teeth are shaped in the form of a ploughshare. They were at first used in a nearly flat form, but they had a tendency to carry raw ore around the hearth in one revolution. As soon as the present angular shape was adopted they gave perfect satisfaction. The furnace is provided with three fire-boxes; Northern Colorado or lignite coal is the fuel employed, occasionally mixed wtih Rock Springs coal if necessary.

A feature of the roasting department that deserves especial attention is that the roasted ore as it leaves the hearth is automatically cooled, carried in a screw conveyor to the boot of an elevator, which delivers it to the hoppers above the chlorination-barrels. The cooler consists of an iron box set in the hearth at the point of discharge, provided with 2 in. tubes, through which the ore is gradually drawn down to a feeding-plate—actuated by trips on the moving gear on the roaster—into a screw conveyor which delivers, as stated above, to an elevator leading to the chlorination-house. The cooling is accomplished by keeping the tubes surrounded by cold water. This device, during six months' actual work, has proved itself to be a thorough practical success. It does away with the first cost of a cooling-floor and the great expense for labour in moving 50 tons of ore every twenty-four hours. It is true that the ore is not delivered absolutely cold from the cooler, but it has never been hot enough to damage the elevator-belt or to cause the least anxiety as to fire. Water is allowed to drip on the ore at several points as it passes through the screw conveyor, the quantity being adjusted so as to just keep the dust down and not wet the ore so that it will not discharge from the elevator. This serves as a further protection against fire.

The chlorination-house comprises five floors set vertically above each other. On the top are three 5-ton hoppers; on the floor below are set three 5-ton lead-lined barrels of the usual type, except that they are provided with Rothwell's sand filter—illustrated and described in the *Engineering and Mining Journal* of the 19th October, 1895—instead of asbestos. The filter consists of a layer of coarse quartz 6 in. deep, kept in place by a slotted wooden bottom and a perforated lead sheet on top; the whole is securely braced and held in place by 2 in. by 6 in. slats wedged tightly under wooden strips bolted to the barrel. Through this medium, using 20 lb. to 40 lb. water-pressure, a charge can be filtered in from sixty to ninety minutes. The sand at first used was far too fine, and it was found necessary to use 2-mesh quartz, the idea being to let some of the slimes through, getting rid of them in the settling-tanks, and thus prevent the filter from clogging up.

Below the barrels are the solution-tanks, four in number, each of capacity sufficient to hold the solution from 25 tons of ore. On the same floor are likewise two settling-tanks and two precipitating-tanks of the same capacity. The use of a Montejus tank for transferring the solution

is discontinued, being replaced by an application of the Pohle air-pump. All four of the solution-tanks are connected underneath by a 3 in. lead pipe, which joins a pipe of similar size leading down under the floor below (to give the solution a certain amount of head), then turning and leading up, over, and into the settling-tanks. Just beyond the lower elbow a lead air-pipe is introduced. When it is desired to move the solution the method of procedure is as follows: The valves of the solution-tanks are opened, allowing the liquid to flow through the piping, air-pressure is turned on, and the rising bubbles of air suck the solution along with them. The operation is entirely automatic and requires little or no attention. The second settling-tanks and the precipitating-tanks are connected by a similar continuance.

All solution is allowed to stand twelve hours in the solution-tanks and twelve hours in the second settling-tanks before being pumped over for precipitation, thus insuring the complete settling of all slimes. Precipitation of the gold is accomplished by the use of sulphur-dioxide and hydrogen-sulphide, the resulting sulphides being collected in a filter-press, dried, roasted, and melted.

Some metallurgical features developed in actual working may be of interest. Before taking charge of the mill the writer had been informed that Boulder County ores should be roasted at a very low heat, not only on account of the loss of gold by volatilisation along with the tellurium, but because marcasite and the ferro-tellurides were so apt to form non-porous black oxide of iron under a high heat. The latter condition does not seem to have been attained any more than in roasting iron-pyrite. A very careful and exhaustive system of checking by bullion returns and by assays shows that there has not been any appreciable loss by volatilisation since the mill started. An average of all daily assays made on ore entering and leaving the roaster has shown a slight increase in value instead of a loss, as it should, owing to the loss in weight incurred in roasting. This increment is 0·03 oz. on 1 oz. to 3 oz. ore. It was at first deemed necessary to maintain a moderate fire in the first fire-box of the roaster, and apply the greater part of the heat through the second and third box. This practice was found to diminish the capacity; the three fire-boxes are now fired alike, and are crowded to the utmost, a steam-jet being used under the grates to aid combustion. The average contents in sulphur of the ore treated has been 2·5 per cent.; this must be reduced to a trace or a few hundredths to give a 95-per-cent. extraction. Hence the necessity of a very great heat. In the light of our experience here, remembering also that nearly every member of the tellurium family has occurred in the ore treated, it would seem that the loss of gold in roasting tellurium-ores has been overrated, certainly on material ranging from 1 oz. to 3 oz. in value. Occasional lots of even much higher grade have been treated without any sensible loss.

After numerous experiments, the least amount of chemicals that was safe to use was found to be 10 lb. chloride of lime and 15 lb. sulphuric acid 66° for the barrel-charge per ton of ore; and $\frac{1}{8}$ lb. sulphur, $\frac{3}{4}$ lb. iron-sulphide, and $1\frac{1}{4}$ lb. sulphuric acid per ton for precipitation.

TEMPERATURE IN AMALGAMATION.

[From the *Engineering and Mining Journal*, New York.]

Some months ago Mr. Thomas J. Grier, manager of the Homestake Company's mines in the Black Hills, in South Dakota, ascertained by experiment that the cooling of the water used in the stamp-mill batteries very considerably increased the yield of gold from the Homestake ore. The difference was in the saving of the fine gold—the coarse gold taking care of itself—which was apparently much greater at lower than at higher temperatures. The facts, as communicated to us through the courtesy of Dr. Franklin R. Carpenter, of Deadwood, are that two batteries side by side were run upon the same ore, one with the water at a temperature of about 50 deg. Fahr., and the other at a higher temperature of 60 deg. to 70 deg. There was no possible doubt of the increased yield from the colder battery. It was supposed that more fine gold amalgamated at the lower temperature—the coarse gold not being lost at any temperature. Mr. Grier desired to make the facts public for the benefit of mill-men, and we do so with much pleasure, hoping to draw out discussion on the causes of this difference, as well as notes of the experience in other mills.

The first theory propounded by those to whom the facts were submitted was that at the lower temperature there was either less oxidation of the mercury or that there was less decomposition of iron-pyrites or other minerals contained in the ore to foul the quicksilver. Either of these causes would, of course, interfere with the amalgamation of the fine gold. In answer to a suggestion that in warming the water by waste steam small particles of oil might be carried to the batteries, Dr. Carpenter obtained from Mr. Allan J. Clark, assayer for the company, a statement that the mill water, while the higher temperature was used, was never in contact with any oil or grease. The steam from the cylinders was passed through a series of pipes, with which the mill water was held in contact for a period of time sufficient to give the desired temperature. The condensed steam was discarded.

Mr. Clark also added to the facts in the case the statements, from his personal observations, that in the Golden Star Mill the water of a single battery was cooled by contact with pipes containing a freezing mixture placed immediately below the first row of plates, so that the water on the second row of this battery was about 10 deg. Fahr. below that on the adjacent plates presumably receiving the same quality of ore. The recovery of amalgam was decidedly better than from the other plates. In the Highland plate-house (third row plates) the recovery of amalgam would diminish during a period of warm weather, and perhaps for twenty-four hours after.

There seems to be no doubt about the correctness of Mr. Grier's observations, nor about the fact that better results were obtained in amalgamating Homestake ore when the water was at a temperature of 50 deg. than when it was at 60 deg. or over. Whether the explanation is that given above, whether there is really a temperature at which the affinity of quicksilver for gold is at a maximum or whether the effect is only mechanical, does not seem to be decided.

Some light may be thrown upon the question by experience in other places, and in this connection we find the following statements in Mr. T. A. Rickard's "Stamp-milling of Gold-ores," pages 125, 126, the first reference being to Australian practice: "At the Britannia United, on Bakery Hill, in Ballarat, the water used in the batteries is warm, and is made so by conducting the condenser water of the engine into the tank which supplies the mill. Two points open to discussion are here suggested, the use of warm water and the addition of lime. The object of heating the battery water in such a warm climate as that of Ballarat does not appear very evident. The use of condenser water in any mill is decidedly objectionable. To consider these two propositions, let us take first the effects of warm water upon amalgamation. At the alluvial mines of the mountains of the interior of Otago, New Zealand, the use of mercury, the good friend of the miner all the world over, is hardly known, and the explanation given is that mercury will not act in the cold climate of that region. This is due to the use of hot water in cleaning up at both mines and mills. The idea is, of course, quite an erroneous one, though there is a substratum of truth in it, from the fact that amalgamation is usually assisted by heat and retarded by cold, but within narrow limits only. The amalgamation of gold, not silver, in ordinary stamp-milling, not pans, is here discussed. On the other hand, at Black Hawk, at over 8,000 ft. above the sea-level, in the bitter cold of the Colorado winters, the mill-men will tell you that cold weather is better for amalgamation upon the plates than summer heat. Why? Because heat thins the amalgam, and the vibration of the mill, due to the falling stamps, causes the globules of mercury to run off and down the surface of the amalgamating-tables, while cold (which thickens the amalgam) tends to keep it in position. From one point of view hot water is to be recommended. Slimes which will float on cold water will sink in warm water, owing to the expansion of the air bubbles, which float the fine dust and are the *raison d'être* of the slimes. On the whole, however, while amalgamation (and here the amalgamation of gold is the only question discussed) is assisted by heat, yet below the temperature of boiling water the effects of a small rise are so slight that it is doubtful if the use of warm water is to be advised in ordinary gold stamp-milling. It is certainly not to be recommended in summer at a locality having the climate of Ballarat, and therefore its use at the Britannia United is to be objected to. (At the time referred to it was summer, and the temperature outside the mill 82 deg. Fahr.)"

The excellent paper on the "Amalgamation of Free-milling Gold-ores," by Mr. Louis Janin, jun., in "The Mineral Industry," vol. iii., has brief references only to this question. Thus he says, on pages 328 and 343: "Some mill-men believe in heating the battery water, but it would seem doubtful if this can produce any result other than to create a fluid amalgam. The plates in particular are softer when warm water is used, but this is a doubtful advantage. If the water be heated at all it should not be done by the direct application of the exhaust steam, as is explained elsewhere. A peculiarity of amalgam is that it contains more gold in winter than in summer. This is due undoubtedly to the warmer water in summer making the amalgam more fluid. The difference ordinarily is slight. Amalgam that retorts 40 per cent. in summer may retort 45 per cent. in winter."

The experience reported by Mr. Allan J. Clark in the Homestake Mill itself points rather to the theory that the effect is chiefly mechanical. In the cases reported by him the amalgam from the third row of plates is softer than that of the first row—it rarely retorts over 20 to 22 per cent., as against 35 to 37 per cent., and after standing for some time after squeezing it assumes a more or less liquid condition—the material collected during two weeks after coming down to the assay-office for retorting, fully 75 per cent. in liquid form, with a few pasty lumps included in it. Moreover, this condition has not been so noticeable during the winter months as it was during the summer and autumn. In this case the colder water, by hardening or stiffening the amalgam, may prevent scouring, and so give higher results.

Mr. Reed, amalgamator at the Golden Star Mill, experimented with a battery that had been worked for some time on water at 56 deg. Fahr. Before leaving the mill one evening he changed it to 70 deg. Fahr.—at this time the plates being covered with amalgam—and next morning at 7 o'clock much of this had washed off, small wedges remaining where the brushes had broken the even surface of the amalgam; at 11 a.m. these had disappeared, and the plate was almost bare. This was a silver plate; the copper-plate of the first row showed no such changes in working when the temperature is varied. Mr. Reed adds that he has only occasionally observed any evidences of chemical action when using warmer water, a black scum showing on the surface of the plate when it is gently rubbed with the hand.

So far, therefore, the weight of testimony seems to be rather in favour of the mechanical effect. The experience of mill-men in other localities may point to different theories, however; it would at any rate be of value. Mr. Grier's discovery is suggestive, and it is quite possible that it might be of advantage to pay more attention to the temperature of the water than has heretofore been done in many places.

PATENT RIGHTS GRANTED.

An Improved Process for extracting Gold from Ores, Minerals, and other Gold-bearing Substances.

We, James Gow Black, of Dunedin, in the Colony of New Zealand, Professor of Chemistry in the University of Otago, and Robert Challen Skeet, of Oamaru, in the Colony of New Zealand, do hereby declare the nature of our invention for "An improved Process for extracting Gold from Ores, Minerals, and other Gold-bearing Substances," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to processes used for obtaining gold from ores, minerals, and other gold-bearing substances, and its object is to obtain the gold in a rapid, efficient, and inexpensive manner.

The invention is carried into effect by treating the ore or other gold-bearing substance, after it has been reduced to a powder in any well-known manner, with a dilute solution containing about from 10 lb. to 20 lb. of strong sulphuric acid (oil of vitriol), about from 12 lb. to 20 lb. of chloride of sodium (common salt), and about from 5 oz. to 9 oz. of permanganate of potash, in about 100 gallons of water.

A solution of from a quarter of the above strength to four times the above strength is serviceable in extracting the gold, but we prefer the strength as above.

Bisulphate of soda may be used instead of sulphuric acid, but in the proportion of about two and and a half parts by weight of the bisulphate instead of one part by weight of the acid. Chloride of calcium, or chloride of potassium, or chloride of ammonium, or chloride of magnesium, or other suitable chlorides may be used instead of chloride of sodium, in their equivalent proportions.

The manner in which the solvent is prepared is as follows: (1.) Mix together 50 gallons of fresh water and from 10 lb. to 20 lb. of sulphuric acid. (2.) Mix together 50 gallons of fresh water, 12 lb. to 20 lb. of chloride of sodium, and from 5 oz. to 9 oz. of permanganate of potash. These two mixtures are mixed together to form a dissolving liquor, which must be used within twenty-four hours to keep its strength. It is advisable to keep the two mixtures apart until they are required for use.

Manganate of potash, or permanganate of soda, or manganate of soda may be used instead of permanganate of potash, but if manganates are used about 40 per cent. more will be required and about a third more of the sulphuric acid.

Ores or other gold-bearing substances containing pyrites or arsenical pyrites, or other sulphides or arsenides, or tellurides, or selenides, or antimonides, or organical substances, must be thoroughly roasted before treatment with the solution.

In carrying out the invention any suitable apparatus may be used, but we prefer to provide tanks wherein to mix the solution, which tanks are of any convenient shape, and of any desired size, according to the quantity of the solution to be made. In one tank we mix fresh water and strong sulphuric acid, in the proportion previously given of 50 gallons of water to from 10 lb. to 20 lb. of acid, the water to be put into the tank before the acid, the mixture to be stirred while the acid is being put in, so as to insure a thorough mixture. In another tank we dissolve and mix permanganate of potash and chloride of sodium in fresh water, in the proportion previously given of from 5 oz. to 9 oz. of permanganate of potash and from 12 lb. to 20 lb. of chloride of sodium in 50 gallons of water. The two mixtures are mixed together in another tank to form the dissolving liquor, which must be employed within twenty-four hours to keep its strength, as previously stated.

The raw or roasted ore or other gold-bearing substance, in a finely powdered condition, is put into leaching-tanks having a false bottom, fixed at about 1 in. to 2 in. above the true bottom, and perforated with holes of about 1 in. in diameter and 6 in. to 10 in. apart. On this false bottom is placed a filter-bed of quartz pebbles and sand about 6 in. deep, larger pebbles resting immediately on the false bottom, with smaller pebbles above, the size gradually diminishing upwards, with coarse sand above and finally fine sand at the top. All the above tanks may be lined with enamelled iron, glazed earthenware, or a preparation of paraffin or other material upon which the solvent will not act. The leaching-tanks are filled to within about 10 in. of the top with raw or roasted ore or other gold-bearing substance, in a finely powdered condition, and the solvent solution is then added gradually until it stands at a depth of about 6 in. above the surface of the ore. A stop-cock communicating with the space between the two bottoms is afterwards opened, when the solution which will have filtered or percolated through the filter-bed and false bottom is drawn off into precipitating-tanks, which are preferably made of wood. The tanks may be of any convenient size or shape, and lined as previously described. Instead of such filter-bed, the false bottom may be covered with any suitable textile material (such as asbestos) as will allow the liquid to pass through freely, and will not decolourise the purple-red colour of the permanganate solution.

As it is necessary that the dissolving solution should be in contact with every particle of ore, it is necessary or desirable to agitate the mixture in the leaching-tanks to secure such contact. After agitation and standing some time—from about twelve to seventy-two hours, or longer if necessary, according to the coarseness of the particles of gold—the solution is drawn off into precipitating-tanks by opening a stop-cock communicating with the space between the two bottoms.

Should the reddish-violet colour of the solutions become faint or vanish during leaching, then more of the solution must be added; but so long as the solution retains its reddish-violet colour it may be used for dissolving gold.

The methods of precipitating gold are well known, and the sulphurous-acid or the ferrous-sulphate solution is preferred. By this invention the gold is dissolved rapidly as soon as the solution comes into contact with it, the gold taking the chlorine of the salt, whilst the sulphuric acid in the presence of the nascent oxygen from the permanganate takes the soda and the potash from the common salt and the permanganate respectively, the reaction thus being a case of concurrent attraction or affinity, therefore specific.

We do not claim as part of our invention the use of the permanganates or manganates of potash or of soda in the above solution, but only the use of sulphuric acid and chloride of sodium in combination with the permanganates or manganates.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is,—

1. The improved process for extracting gold from ores, minerals, or other gold-bearing substances consisting in submitting such ores, minerals, or other gold-bearing substances in a powdered condition to the action of a dilute solution containing sulphuric acid, chloride of sodium, permanganates or manganates of potash, and water, substantially as described.

2. The improved process for extracting gold from ores, minerals, or other gold-bearing substances consisting in submitting such ores, minerals, or other gold-bearing substances in a powdered condition to the action of a dilute solution containing sulphuric acid, chloride of sodium, permanganates or manganates of soda, and water, substantially as set forth.

3. In a process for extracting gold from ores, minerals, or other gold-bearing substances, a solvent solution prepared by mixing, and composed of fresh water and sulphuric acid in the proportion of 50 gallons of water to 10 lb. to 20 lb. of sulphuric acid, and then mixing such solution with fresh water, chloride of sodium, and permanganates of potash in the proportion of 50 gallons of water to 12 lb. to 20 lb. of chloride of sodium and 5 oz. to 9 oz. of permanganates of potash, substantially as set forth.

4. In a process for extracting gold from ores, minerals, or other gold-bearing substances, consisting in submitting such ores, minerals, or other gold-bearing substances in a powdered condition to the action of a dilute solution containing sulphuric acid, chloride of sodium or other suitable chloride, permanganates or manganates of potash or of soda, and water, substantially as set forth.

Dated this 28th day of August, 1897.

W. E. Hughes,
Agent for the Applicants.

A New Process for the Treatment of Gold and Auriferous Ores, entitled "Etard's Gold-dissolvent."

I, Alexander Etard, of 14, Rue Monsieur le Prince, Paris, France, chemist, engineer, and professor of sciences, do hereby declare the nature of my invention for "A New Process for the Treatment of Gold and Auriferous Ores, entitled 'Etard's Gold-dissolvent,'" and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to processes used for obtaining gold from ores or auriferous minerals or substances, and its object is to obtain the gold in a rapid, efficient, and inexpensive manner.

The invention is carried into effect by treating the ore, after it has been reduced to a powder in any well-known manner, with a dilute solution containing about 45 lb. to 66 lb. of strong commercial hydrochloric acid and about 12 oz. to 16 oz. of permanganate of potash per cubic metre of water (one cubic metre of water being equal to 35·32 cubic feet), or, in other words, about 45 lb. to 66 lb. of strong commercial hydrochloric acid and about 12 oz. to 16 oz. of permanganate of potash in every 2,207 lb. of water. Solutions of from a quarter of the above strength to four times the above strength are serviceable, but I prefer the strength as above, the solvent solution to be made up as follows: (1.) Mix together—fresh water, 100 gallons; ordinary hydrochloric acid, 40 lb. to 60 lb. (2.) Mix together—fresh water, 100 gallons; permanganate of potash, 12 oz. to 16 oz. These two mixtures are mixed together to form a dissolving liquor, which must be used within twenty-four hours to keep its strength. It would be advisable to keep the two mixtures apart until they are required for use.

Manganate of potash or permanganate or manganate of soda may be used instead of permanganate of potash, but so that 20 oz. of manganate of potash or 11 oz. of permanganate of soda or 17 oz. of manganate of soda shall be used in place of 12 oz. of permanganate of potash; and, if manganates are used, about a third more of hydrochloric acid will be required.

Ores or other auriferous substances containing sulphur, tellurium, selenium, arsenic, antimony, pyrites, or organical substances must be thoroughly roasted before treatment with the solution.

In carrying out the invention any suitable apparatus may be used, but I prefer to provide tanks wherein to mix the solution, which tanks are of any convenient shape and of any desired size, according to the quantity of solution to be made. In one tank I mix fresh water and strong commercial hydrochloric acid, in the proportion previously given of 100 gallons of water to 40 lb. or 60 lb. of acid. In another tank I dissolve and mix permanganate of potash in fresh water, in the proportion previously given of 12 oz. to 16 oz. of potash to 100 gallons of water.

These two mixtures are mixed in another tank, to form the dissolving liquor, which must be employed within twenty-four hours to keep its strength, as previously stated.

The raw or roasted ore or other auriferous substance is put into leaching-tanks having a false bottom, fixed at about 1 in. or 2 in. above the true bottom, and perforated with holes of about $\frac{1}{2}$ in. in diameter, and 6 in. to 10 in. apart. On this false bottom is placed a filter-bed of quartz pebbles and sand about 6 in. deep, larger pebbles resting immediately on the false bottom, with smaller pebbles above, the size gradually diminishing upwards, with coarse sand above, and finally fine sand at the top.

Instead of such filter-bed the false bottom may be covered with any suitable textile material (such as asbestos) as will allow the liquid to pass through freely, and will not decolourise the purple-red colour of the permanganate solution.

The leaching-vats are filled to within about 10 in. of the top with the raw or roasted ore or other auriferous substance in a finely powdered condition, and the solvent solution is then added until there is a depth of about 6 in. above the surface of the ore. All the above tanks may be lined with enamelled iron, glazed earthenware, a preparation of paraffin, or any material which will not affect the permanganate solution. A stop-cock communicating with the space between the two bottoms is afterwards opened, when the solution which will have filtered or percolated through the filter-bed and false bottom is drawn off into precipitating-tanks, which are preferably made of wood. The tanks may be of any convenient size and shape.

As it is necessary that the dissolving solution should be in contact with every particle of the ore it is necessary or desirable to agitate the mixture in the leaching-tanks to secure such contact. After agitation and standing some time—from about twelve to seventy-two hours, or longer if necessary, according to the coarseness of the particles of gold—the solution is drawn off into the precipitating-tanks by opening a stop-cock communicating with the space between the two bottoms.

Should the reddish-violet colour of the solutions become faint or vanish during leaching, then more of the solution must be added, but so long as the solution retains its reddish-violet colour it may be used for dissolving gold.

The methods of precipitating gold are well known, and the sulphurous-acid or the ferrous-sulphate solution is preferred.

By this invention the gold is dissolved rapidly as soon as the solution comes into contact with it. The nascent oxygen or ozone from the permanganate unites with the hydrogen of the hydrochloric acid, whilst the gold at the same time unites with the chlorine of the acid, the permanganate and the acid thus concurring to effect the solution of the gold, the reaction being an example of concurrent affinity or attraction (sometimes called "catalytic action"), and in this respect differing from the well-known chlorination processes. The reaction is therefore specific.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. The improved process for extracting gold from ores consisting in submitting such ores in a powdered condition to the action of a dilute solution containing hydrochloric acid, permanganate or manganate of potash, and water, substantially as described.

2. The improved process for extracting gold from ores consisting in submitting such ores in a powdered condition to the action of a dilute solution containing hydrochloric acid, permanganates or manganates of soda, and water, substantially as described.

Dated this 28th day of August, 1897.

W. E. Hughes,
Agent for the Applicant.

An Improved Apparatus for the Treatment of Slimes and Tailings to extract the Precious Metals therefrom.

I, Thomas James Denny, of 29, Great George Street, Westminster, in the County of Middlesex, engineer, do hereby declare the nature of my invention for "An Improved Apparatus for the Treatment of Slimes and Tailings to extract the Precious Metals therefrom," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to an improved apparatus for the treatment of slimes and tailings formed in the reduction of ores to extract the precious metals therefrom.

It is designed with the object of providing a simpler and more efficient plant for this purpose, cheaper both in original outlay and also in actual working-expenses than those generally in use at present; to avoid handling of the slimes when subjecting them to treatment, and to enable the treatment to be carried out continuously.

It consists of an apparatus composed of a series of precipitating- or settling-vats, and mixing- or solution-chambers, each vat being provided with a pipe led upwards through the bottom of the vat, projecting internally to a point of discharge within the vat below the surface of the water, which point of discharge is variable as the density of the outflowing pulp, and which said pipe is preferably fitted with a wide or bell-shaped mouth; the water or cyanide solution, as the case may be, escapes along an overflow- or discharge-launder at the top of the vat, while at the bottom of the vat is a regulating stop-cock or valve to enable the slimes, which have been settled, to be drawn off into a cylinder or vessel into which cyanide solution is introduced with or without pressure for the solution of the gold; compressed air may also be admitted in order to agitate the mixture thoroughly.

In practice I find it advantageous to have a direct connection between the vat and the mixing-chamber, thus making the latter an entirely closed vessel.

The apparatus will be more fully described with reference to the accompanying drawings, in which Fig. 1 is a front elevation showing arrangement of my apparatus, Fig. 2 an end sectional elevation of mixing-chamber G, and Fig. 3 a sectional plan of my apparatus. A is a circular tank or vat, constructed of iron, wood, or other suitable material, the lower portion of which is preferably of a conical section; D is a pipe leading from the spitzkasten or spitzluten, or other discharge of slimes and tailings (or either), from a battery into the vat A, so arranged that its outlet shall be in an upward vertical direction from a point near the bottom of the vat or tank; this inlet-pipe D is preferably provided with a wide or bell-shaped mouth E to better disseminate the pulp as it flows into the vat; a funnel X is suspended, mouth downwards, in the vat, so arranged that its mouth shall be just above the mouth of the inlet-pipe D, the stem or tube J of the said funnel being of a length sufficient to project above the level of the sides of the vat. Around the inner periphery of the top of the vat A an overflow-launder C is arranged. At the bottom of the vat A an outlet is provided with a cock F, affixed so that the outflow may be regulated to any desired degree. The said outflow is arranged immediately above the opening G^1 in the mixing-chamber G, which chamber is constructed preferably with a sloping bottom, as shown in Fig. 1, at the lower end of which is attached the outflow-pipe D^1. H is a pipe leading into the said mixing-chamber G, through which cyanide solution may be introduced, while K K are inlets through which compressed air may be admitted. The outlet-pipe D^1 from the mixing-chamber G leads, in precisely the same manner as the intake-pipe D, already described, into a second vat or tank A^1 of precisely similar construction and arrangement as A.

It is obvious that the series of settling-vats A and mixing-chambers G may be of any desired number according to the treatment to which it is desired to subject the pulp.

The method of working the apparatus may be described as follows:—

The pulp from the spitzkasten, spitzluten, or launder is fed into the vat A through the pipe D, and outflows thereinto in a gentle upward stream, the effect of which is to settle or precipitate the particles, allowing only the pure water to overflow through the launder C. This action

is accounted for by the well-known fact that a rising column of water has a tendency to leave behind or settle all suspended matter. Moreover, the pressure exerted by the superincumbent water in the vat also tends to rapidly settle the slimes. The precipitation of the particles is accelerated by the employment of the inverted funnel X as already described, against which the incoming flow of slimes is projected.

The slimes or tailings as they are precipitated pass through the outlet F into the mixing-chamber G, where the cyanide solution is introduced through H and compressed air admitted through K K. The employment of compressed air is solely for the purpose of thoroughly agitating the mixture of slimes or tailings and cyanide solution, and in nowise for the purpose of providing additional oxygen, the application of which I am well aware to be old.

The mixture of slimes and cyanide solution passes from the mixing-chamber G through pipes D^1 into the vat A^1, where the same operation is automatically performed as in the first tank A, with the difference, however, that, whereas in the former case water overflows by the launder C, in the latter cyanide solution escapes and is conveyed to the extractor-boxes, where the gold in solution is recovered.

The precipitated slimes are then drawn off into any convenient sump, where they may be again washed with water, or, if desired, into a third separation-vat for the purpose of waterwashing to recover any cyanide solution which may be remaining therein.

The special and economical features of the hereinbefore described apparatus are that—(1) The whole treatment, from the time the slimes are taken over by the slimes-treatment apparatus until finally discharged into the sumps, is entirely automatic and continuous; (2) the cyanide solution is thoroughly incorporated with the slimes without any stirring or mixing other than that automatically effected by the compressed air; (3) the whole apparatus needs no attention when once the various cocks have been properly regulated.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. In apparatus for the treatment of slimes and tailings to extract the precious metals therefrom, a precipitating-vat with the supply-pipe so arranged that its delivery is in an upward direction beneath the surface of the water or liquids, so as to cause the mixture to assume a gentle rising motion in its passage through the vat and out at the overflow, substantially as hereinbefore described and illustrated on the accompanying drawings.

2. In apparatus for the treatment of slimes and tailings to extract the precious metals therefrom, a precipitating-vat A in combination with the inflow-pipe D provided with the bell-shaped mouth E, the inverted funnel X having the hollow stem or tube J, the bottom discharged with the outflow-cock F and the overflow-launder C, substantially as hereinbefore described and illustrated on the accompanying drawings.

3. In apparatus for the treatment of slimes and tailings to extract the precious metals therefrom, a vessel or chamber G, into which the slimes or tailings are introduced through the opening G^1 and the pipes H and K, for the admission respectively of cyanide solution and compressed air, substantially as hereinbefore described and illustrated on the accompanying drawings.

4. In apparatus for the treatment of slimes and tailings to extract the precious metals therefrom, the combination of a precipitating-vat as referred to in claims 1 and 2 with the mixing vessel or chamber referred to in claim 3, substantially as hereinbefore described and illustrated on the accompanying drawings.

5. An apparatus for the treatment of slimes and tailings to extract the precious metals therefrom arranged substantially as hereinbefore described and illustrated on the accompanying drawings.

W. E. Hughes,
Agent for the Applicant.

Dated this 14th day of April, 1898.

Improvements in or relating to the Treatment of Ores and in Apparatus therefor.

I, Elizabeth Barnston Parnell, of Gillmon House, West Street, Carshalton, Surrey, England, do hereby declare the nature of my invention for improvements in or relating to the treatment of ores and in an apparatus therefor, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to the treatment of ores, its object being to extract the base metals from auriferous or argentiferous ores, leaving the gold and silver clean and free in the gangue, from which they can be recovered by any of the well-known solvents.

In carrying out my process the ore under treatment should first be crushed and concentrated by any of the well-known means, or preferably by means of the improved concentrator according to this invention. This improved concentrator comprises one or more wells in the surface of an oscillating table, with a slightly sloping surface, upon which the crushed ore is delivered, and over which a stream of water flows.

The water in the well or wells is kept in a state of perturbation or agitation by means of a "douche," which consists of streams of water or air delivered from suitable nozzles into the water. The nozzles preferably dip below the surface of the water to be agitated, as their action is then found to be greatly improved. The table should also preferably carry at its higher end an amalgamated plate, and a quicksilver well placed at the lower end of the amalgamated plate. A second plate may advantageously be added below the quicksilver well just referred to. When several water wells with "douches" are employed the crushed ore is by their action automatically "classified" in order of coarseness, the particles retained in the first well being the coarsest. Together with the hereinbefore-mentioned amalgamated plate and quicksilver well, the apparatus thus constructed acts at the same time as an amalgamator, concentrator, and "classifier."

The concentrated ore is next subjected to the oxidizing action of ozone, nascent oxygen, or other powerful oxidizing agent, which may be produced chemically or electrically, but I have found

a convenient method is to mix a suitable portion of chromic acid or other oxygen-producing agent with the concentrated ore. This treatment will partially oxidize and decompose the ore, and prepare it for roasting.

The ore which has thus been treated is next passed into a roasting-furnace, and may be conveyed backwards and forwards by a suitable conveyor until the roasting process is complete.

The furnace may be constructed from iron plates bolted together and arranged preferably to form a triangle in section—though I do not confine myself to this form—and adapted to carry a muffle-hearth.

The upper angle forms a flue-way for the fumes evolved from the roasting ore; the two lower angles form flues for the fire, which thus passes on each side (beneath the half-muffle) to the stack.

The furnace can be converted to a reverberatory by directing the flame over, instead of beneath, the hearth.

After roasting, the ore, if acid, may be neutralised with an alkali, such as ordinary ammonia or the waste ammoniacal liquors from gasworks, although caustic soda, or other suitable alkali, may be employed. The ore now passes into an extractor, which is preferably, though not necessarily, of cylindrical form, and may be made of any suitable material. In this extractor the ore is "boiled" with water at a considerable pressure. I have found from two to four atmospheres to give satisfactory results; and this has the effect of dissolving out the base constituents of the ore more effectually than occurs at the ordinary boiling temperature, leaving the ore in a fit condition to be acted upon by solvents for the extraction of the precious metals contained therein.

In extracting soluble sulphates from ore it is advantageous to keep the ore in motion, and for this purpose the extractor may be seated on a rocker actuated by cams, or other device worked by gearing; when the rocker is in motion the ore in the extractor will be thrown from end to end, and every particle effectually cleansed.

The apparatus employed may be varied without departing from the spirit of my invention, the main features of my system consisting in the oxidation by ozone, nascent oxygen, or other powerful oxidizing agent, aided by roasting and the dissolving-out of the base constituents of the ore thus rendered soluble by steam-pressure preferably exceeding two atmospheres.

Before the ore is subjected to my treatment it should be crushed so as to pass a 40- to 60-mesh screen, and then concentrated in any well-known manner, after which it should be dried. It is then ready for treatment according to this invention, the details of which are as follows:—

The oxidation and decomposition of the ore may be effected in various ways, the time required varying with the means employed. I do not confine myself to any one means, but may use ozone chemically or electrically produced, or I may employ hydrogen-peroxide or other powerful oxidizer. I obtain good results by taking imperfectly dried ore and intimately mixing this damp crushed ore with chromic acid, and, when the mixture has been thoroughly effected in suitable vessels, the vessels and their contents are covered and allowed to stand for, say, ten to twelve hours. The result is a partial oxidation and decomposition of the sulphides, which are partially transformed into sulphates, and thus prepared for roasting. While powerful oxidizers or ozonizers have been employed theretofore in the leaching of ores, the above treatment previous to, and thus preparatory to, roasting which operation is thereby much facilitated and its duration lessened is, to the best of my knowledge, entirely novel and very valuable.

After preparation in the above-described manner the ore is transferred to a furnace of any construction to be roasted, after which it is treated in an extractor as hereinafter described. Although other furnaces and extractors may be employed, I prefer to use a furnace and extractor of the special construction hereinafter described, and of which the accompanying drawings illustrate one form as constructed in accordance with this invention: Fig. 1 being a longitudinal section of a furnace on the line 1–1 of Fig. 2, Fig. 2 a transverse section of the furnace shown in Fig. 1 on the line 2–2 of Fig. 1, Fig. 3 a longitudinal section of an extractor on the line 3–3 of Fig. 4, and Fig. 4 an end elevation of the extractor shown in Fig. 3; Fig. 5 an elevation, and Fig. 6 a plan of a plough used in conjunction with the furnace; Fig. 7 a side elevation; Fig. 8 an end elevation in part section, and Fig. 9 a plan of concentrator according to this invention; Fig. 10 is a perspective view of an improved construction of amalgamating-plate.

With reference first to Figs. 1 and 2, A is a shell, built conveniently of cast-iron, forming a housing, triangular in cross-section, for the hearth, a fire-grate and bridge being provided at A^8 and A^9 respectively.

The hearth is shown at B, extending for the greater part of the length of the housing A, and is preferably of curved form in cross-section, as shown in Fig. 2.

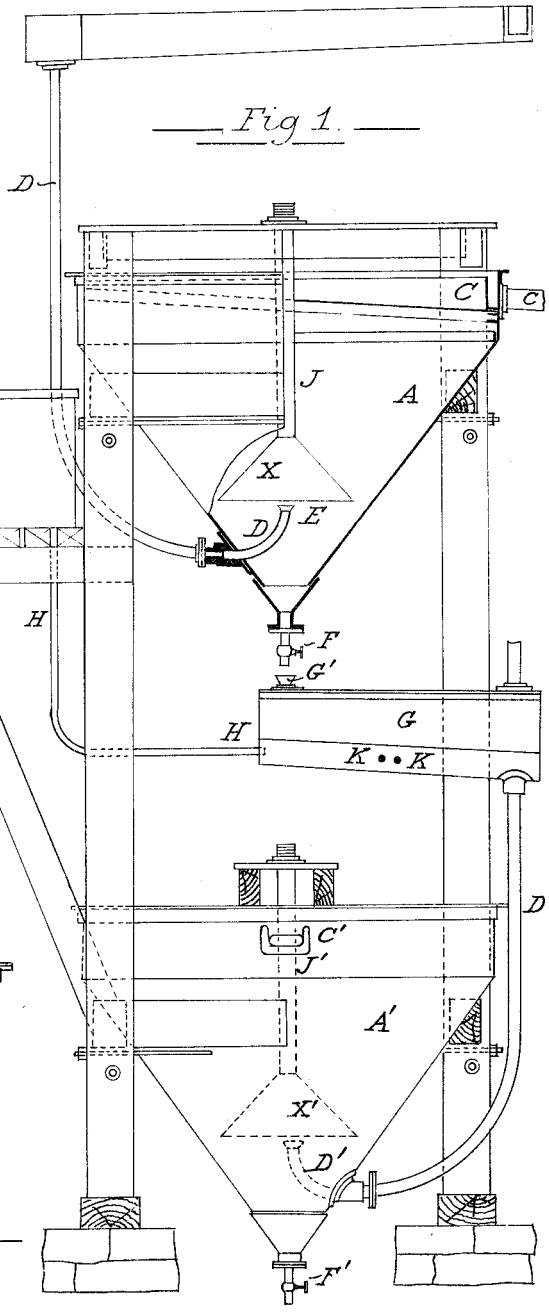
The hearth thus divides the space within the shell into long compartments or flues, three in this case, and one of the most important features of this construction is that the furnace can be made to act as either a muffle or a reverberatory furnace by directing the fire either along the two lower flues, marked A^1, or along the upper one, marked A^2. Or the flame may be directed over the charge at the same time that heat from the fire is being directed under the hearth along the two lower flues. I have found this last method of using the furnace of very great efficacy in the roasting of ores giving off arsenical and other volatile or easily oxidizable fumes.

The direction of the heat or flame from the fire along the upper flue or under flues, or along both simultaneously, may be effected by dampers or doors in a well-known manner. The shell, whose iron walls are lettered at *a*, has preferably a suitable lining, as shown at a^1, and the whole shell may be conveniently mounted on brickwork, such a mounting being shown in the drawings and lettered C. The charge of ore already treated, say with chromic acid, is fed on to the hearth B through a hopper A^3, seen in Fig. 1, and is caused to slowly travel the whole length of the hearth, on reaching the end of which it is discharged into wagons or other receptacles provided. Suitable sight-holes are provided at intervals in the length of the furnace, as are shown at A^6. The means adopted to convey the charge through the furnace may be of any well-known kind, but I prefer a conveyor of the following special construction:—

Improved Apparatus for treatment of Slimes & Tailings.

Denny's Patent.

Fig 1.



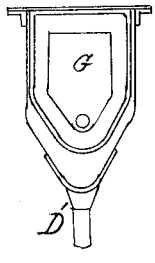


Fig 2.

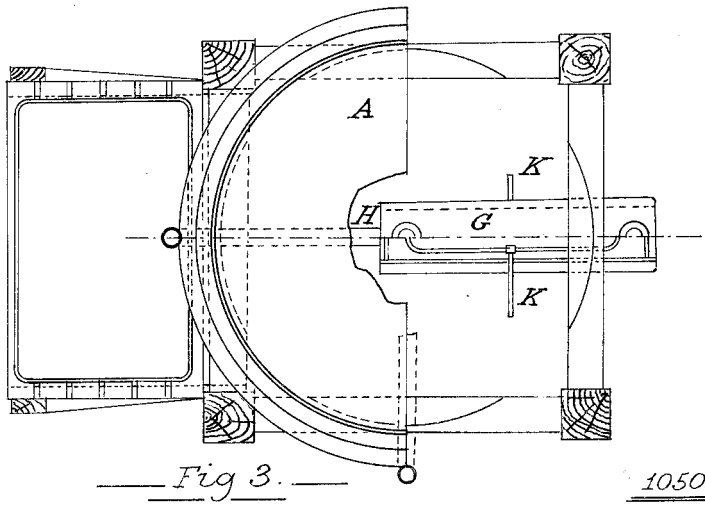
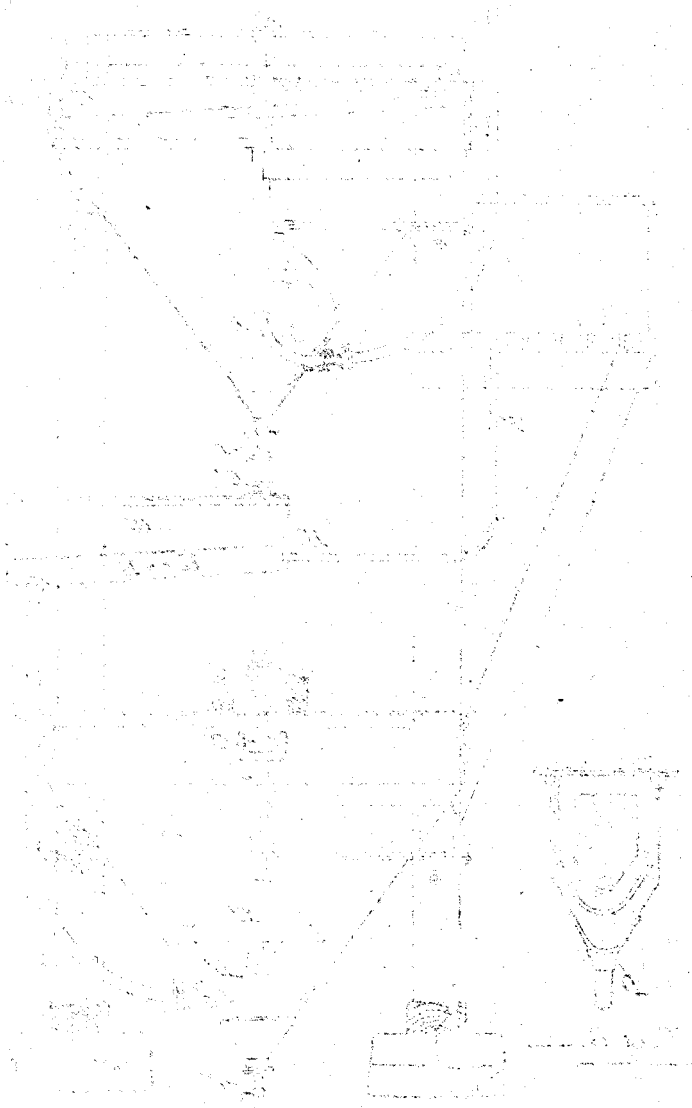
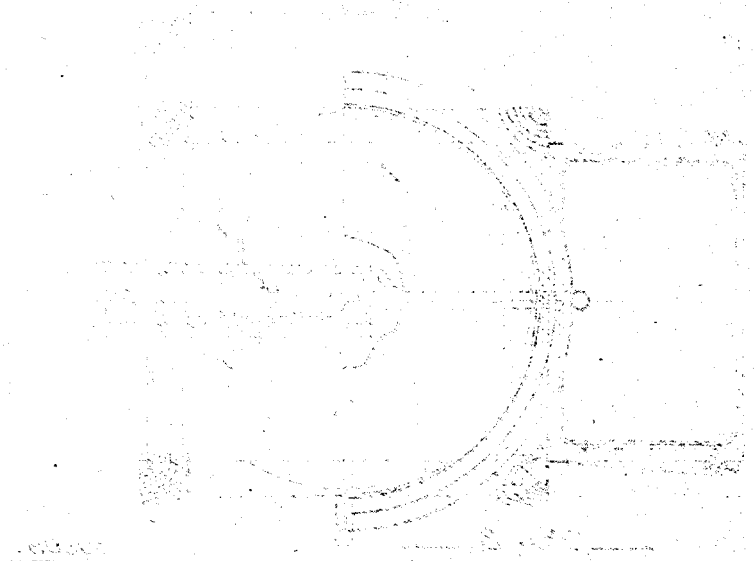


Fig 3.

10509.





IMPROVED APPARATUS FOR TREATMENT OF ORES.

Parnell's Patent.

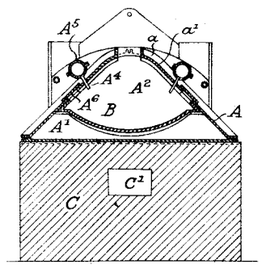


Fig 2.

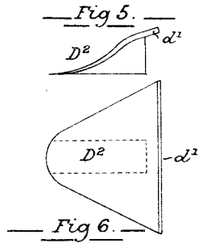


Fig 6.

Fig 5.

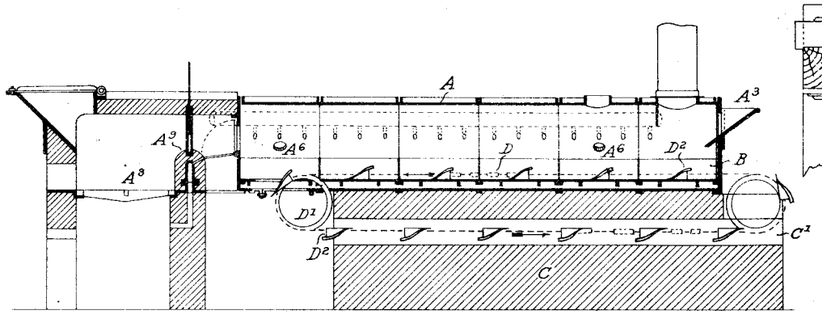


Fig 1.

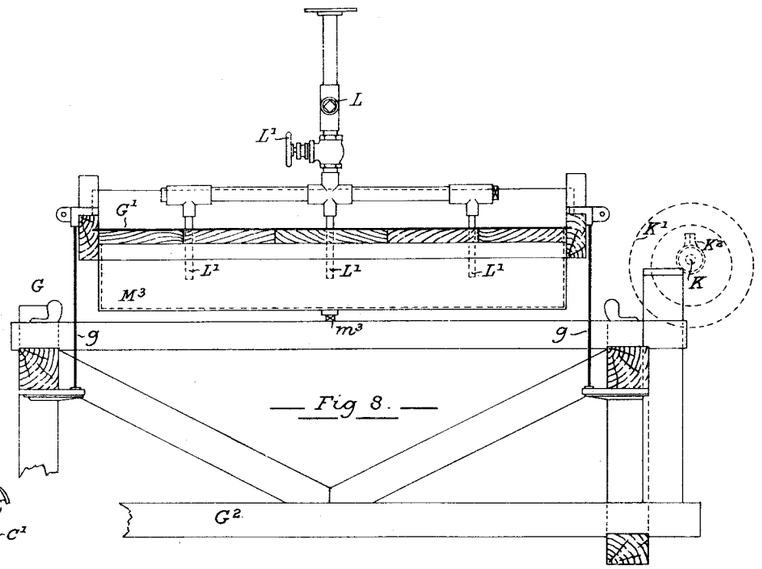


Fig 8.

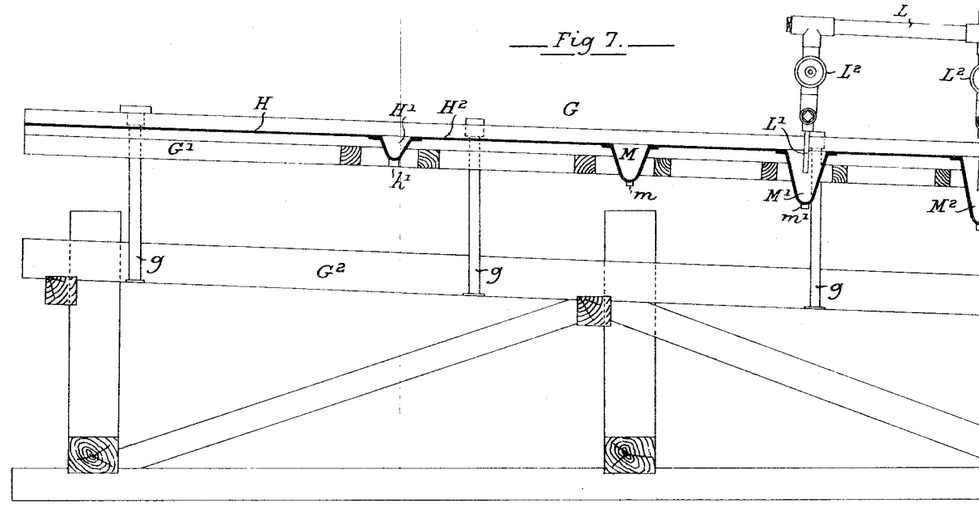


Fig 7.

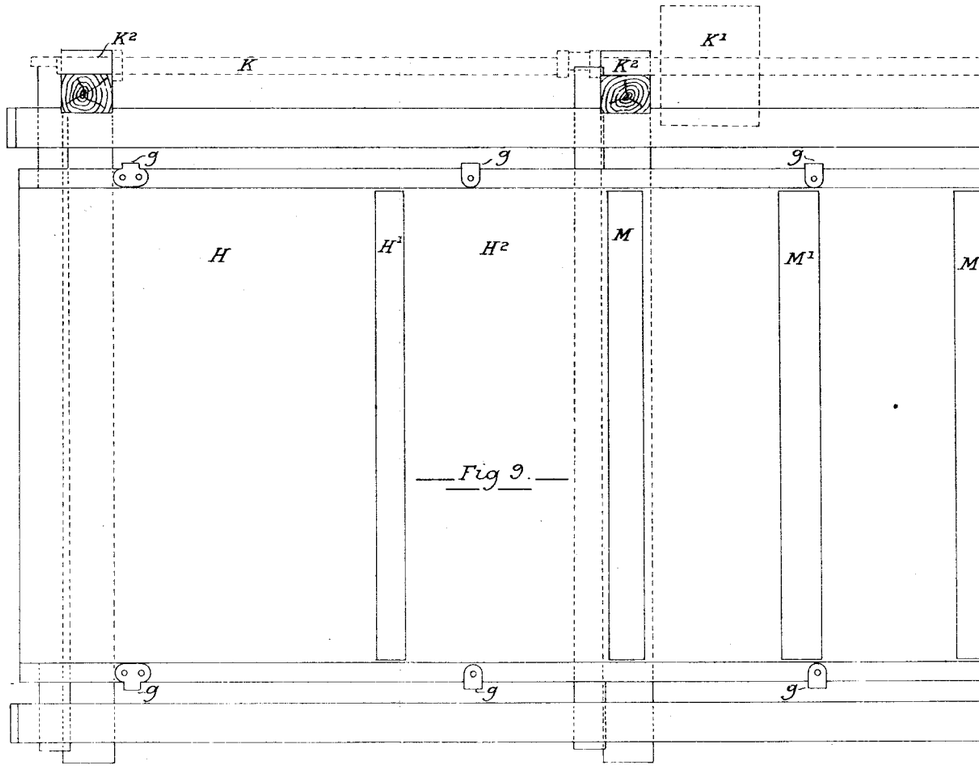


Fig 9.

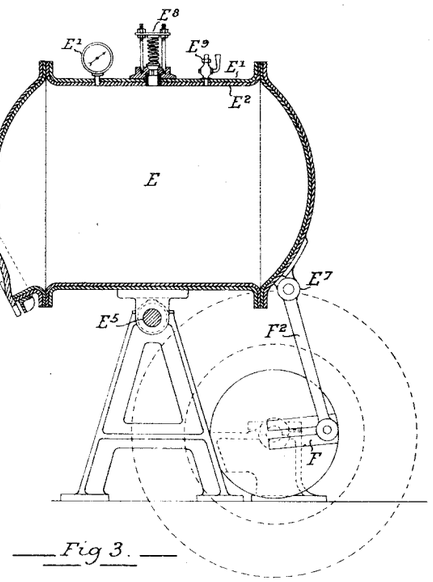


Fig 3.

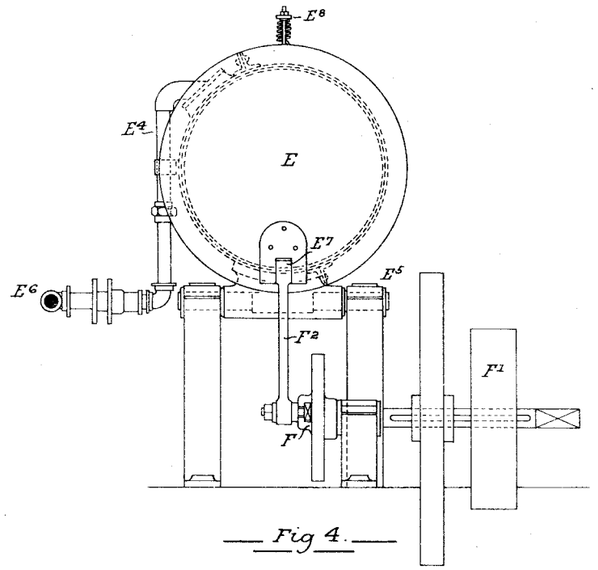


Fig 4.

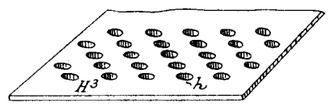


Fig 10.

One or more endless chains, preferably of cast-iron, and having ploughs or conveyors attached, pass along the hearth from end to end. One such chain is shown at D. At each end where the chain emerges from the furnace it passes over a chain-wheel D^1, one of which is caused to rotate and drag the chain in a direction from the hopper end to the delivery end of the hearth. A return-way for the chain is provided in the brickwork at C^1, during passage through which it becomes well cooled. The chain has attached to it at various points ploughs or conveyors adapted to thoroughly stir and "turn" the charge without carrying it too rapidly through the furnace. The ploughs are shown at D^2, in Figs. 1 and 2, and one is shown to a larger scale in Figs. 5 and 6. In these two figures d^1 are "wings" of the plough, which are the most effective part of the device in bringing fresh portions of the charge to the surface. The speed at which the ploughs move through the charge may be varied to suit different kinds of ores requiring roasting for different periods, the usual time required when the ore has been prepared as hereinbefore described being eight to ten hours.

Provision is made in this furnace for the copious admission of wet steam through nozzles or holes placed as near to the hearth as conveniently possible, so that the steam can play upon the charge during the process of roasting, the steam being required for the formation of sulphates. One form of nozzle is shown in the drawings Figs. 1 and 2, at A^4, being connected to a steam-pipe A^5 extending along both sides of the shell on the outside. Provision for the admission of air or oxygen is shown at A^7. The ore should not be heated to a higher temperature than is necessary for the formation of sulphates. When the roasted ore has been discharged into the wagons or other receptacles it may be ground and again roasted, or may be at once treated with alkali, if requiring such treatment, and transferred direct to an extractor. A special form of extractor, constructed according to this invention, is shown in Figs. 3 and 4 of the accompanying drawings. E is a cylindrical vessel, closed at each end, to the inside of whose walls E^1 is attached a lining of, say, copper E^2, which is not subject to corrosion or the attacks of any chemicals likely to be present in the ore, and capable, in conjunction with the walls E^1, of withstanding a steam-pressure of several atmospheres within the vessel E. The ore is mixed with water to a cream-like consistency, and the whole introduced into the extractor through a door E^3.

A steam inlet is provided either by using hollow trunnions or as shown by the steam-pipe E^4, Figs. 3 and 4, and the charge is "boiled" under a high steam-pressure. I frequently find two to four atmospheres sufficient, though I do not confine myself to this or any particular pressure, but it should not be less than that of the atmosphere. This operation I term "boiling," and "boiling" under high pressure thus has been found by me to effect the extraction far more thoroughly than at ordinary pressure. A steam-gauge and safety-valve may be fitted to the extractor, and are shown at E^7 and E^8 respectively, E^9 being a blow-off cock. The whole vessel E is capable of rotation about an axis transverse to that of the cylinder of which it is formed, and means for oscillating or rocking it about such an axis are provided, as shown in the drawings, F being a crank receiving rotation from a pulley F^1, driven by any suitable source of power, F^2 being a connecting-rod hinged by one end to the extractor at E^7, and connected by its other end to the crank. The extractor is mounted in bearings E^5, which permit of oscillation about the axis F^6.

The charge is thus thrown to and fro from end to end of the cylinder E, and kept in violent agitation under steam-pressure, the result being to get all the sulphates and other soluble salts thoroughly into solution, the precious metals being subsequently thoroughly separated from the sulphates or "cleaned" by washing in vats in the usual manner. The concentrator G, illustrated in Figs. 7, 8, and 9, comprises a frame G^1 supported upon a stationary frame G^2 by means of flat springs g^1, so as to be capable of receiving an oscillating motion. Neither the method of supporting the oscillating table nor the means adopted to impart the motion form, however, part of the subject-matter of the present application for patent, any suitable construction or mechanism being used as may be desired. In Figs. 8 and 9 is shown in chain lines a crank-shaft K, with pulley K^1, mounted on bearings K^2, by which the desired motion may be imparted to the table through connecting-rods such as K^3. Above the table is a device which will hereinafter be termed a "douche," and which comprises a water or compressed-air supply-pipe L, communicating with several rows of nozzles L^1, each of which rows is provided with a valve L^2 to control its supply. This "douche" may be supported in any convenient way, either from one of the frames G^1, G^2, or independently of the concentrator itself.

If supported from the frame G^1 a flexible coupling-pipe must be provided to unite the pipe L with the source of supply, in order at the same time to allow of the motion of the frame G^1. The frame G^1 carries the table G^3 of the concentrator. This table slopes slightly from one end to the other, as is usual in such apparatus, and is provided with side walls G^4 to prevent the material from being carried over the sides. The table is faced with an amalgamated plate H at its upper end. At the lower end of this plate is a well H^1 containing quicksilver, and below this is preferably a second amalgamated plate H^2. Below these are several wells M, M^1, M^2, M^3, the number in the example illustrated being four. These are termed "pyrites wells," as they are intended to retain the pyrites, and each well is preferably somewhat deeper than that just above it. The wells are also preferably constructed with their sides nearest the higher end of the table vertical, but with their opposite sides sloping. Each well, including the well H^1, is provided with a draw-off plug, as shown at h^1, m, m^1, m^2, m^3, respectively. The surface of the table between any two wells is shod with iron or other durable material; the second amalgamated plate H^2 may be replaced by such a plain iron plate, if desired. The walls are advantageously made sloping from end to end, so that the material settling in them is deeper at one end than the other. The amalgamated plate H^1 may have a plain surface, but it is found very advantageous to employ a plate of the construction shown at H^3 in Fig. 10, in which are depressions h arranged in rows, and alternated so that a depression in one row comes below the interval between the two depressions in the preceding row. The operation of the concentrator is as follows: The crushed, or crushed and amalgamated, ore is fed on to the plate H together with a stream of water, the table being maintained in oscillation. The globules of mercury, or of amalgam, and the particles of gold contained in the material are retained by the plate H,

well H^1, and plate H^2. The crushed ore is carried on by the flow of water, assisted by the oscillation, to the wells M, M^1, M^2, and M^3 in succession, the "douche" maintaining the contents of the wells in a state of agitation, with the result that the packing of the material is avoided, and the heaviest particles settle in the first well, the lighter in the next, and the lighter still in the next, and so on, the lightest worth retaining settling in the last well, while the valueless gangue is carried away over the end of the table.

The contents of the wells may be drawn off periodically by means of the outlet plugs, to which reference has already been made, or a continuous discharge may be obtained by allowing the accumulation of material to force its way through an adjustable opening in the bottom of any or all of the wells. The employment of the plate H^3 obviates a small loss of quicksilver or amalgam, which is sometimes liable to occur owing to the globules leaping the well H^1, or being in such an extremely fine state of division that they are carried over the well with the water.

When depressions such as *h* are present these fine globules are retained therein before they reach the well H^1, and are unable to leave these depressions until by agglomeration with other retained globules they grow to a size sufficient to enable them to be carried onwards.

The curved, approximately hemispherical depressions employed according to this invention have proved to be most effective in obviating all loss of quicksilver or amalgam during concentration owing to the above-described action. Compressed gas or gases or any desired fluid may be employed in the "douche" in the place of air or water.

When this process has been carefully carried out, and the base metals thus reduced to a minimum in the gangue, it will be found that an extremely small proportion of solvent for the precious metals is required as compared with the solvent required when the gangue has been prepared by other methods now in use, especially when copper is among the base metals to be eliminated and the solvent used is chlorine.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. In the treatment of refractory ores subjecting them to an oxidizing and decomposing agent as a preliminary to roasting for the purpose described.
2. In the treatment of refractory ores "boiling" the roasted ore with water under pressure greater than that of the atmosphere for the purpose described.
3. A process of treatment for refractory ores in which they are first oxidized or decomposed, next roasted, and then boiled in water under pressure for the purpose described.
4. In a concentrator for the treatment of metalliferous ore or deposit the combination with one or more amalgamated plates and one or more quicksilver wells of one or more water wells with or without a "douche," substantially as described.
5. The complete process for the treatment of metalliferous ore by which the ore is first crushed, then concentrated, then oxidized or decomposed, then roasted, then "boiled" under high pressure, and lastly subjected to a solution treatment, substantially as described.
6. In a concentrator for the treatment of metalliferous ore or deposit the combination with a water well of an air, water, or other "douche," substantially as described.
7. In an amalgamator for the treatment of metalliferous ore or deposit an amalgamating-plate having depressions such as *h*, substantially as and for the purpose described and illustrated in the accompanying drawings.
8. In the treatment of refractory ores a furnace divided by the hearth into flues, and adapted for use either as a muffle or as a reverberatory furnace or as a half-muffle, substantially as described.
9. In the treatment of refractory ores a furnace of substantially triangular form in cross-section divided by the hearth into flues, and adapted for use either as a muffle or as a reverberatory furnace or as a half-muffle, substantially as described.
10. In this treatment of refractory ores a furnace-hearth curved transversely.
11. The combination and arrangement of parts constituting the complete furnace substantially as described and illustrated in Figs. 1 and 2 of the accompanying drawings.
12. In the treatment of refractory ores the combination with a furnace-hearth of one or more ploughs or conveyors such as D^2 constructed and operating substantially as and for the purpose described.

Dated this 3rd day of March, 1898. ELIZABETH BARNSTON PARNELL.

IMPROVEMENTS IN THE TREATMENT OF ORES, TAILINGS, AND THE LIKE, AND APPARATUS THEREFOR, THE INVENTION BEING ALSO IN PART ADAPTED FOR THE TREATMENT OF SEWAGE.

I, John Poole, of Coolgardie, Western Australia, but at present of London, England, mining engineer, do hereby declare the nature of my invention for "Improvements in the Treatment of Ores, Tailings, and the like, and Apparatus therefor, the Invention being also in part adapted for the Treatment of Sewage," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My invention relates to improvements in the treatment of pulverised ores and to apparatus therefor, the invention being particularly applicable to gold- and silver-bearing ores, tailings, slimes, and the like which are to be treated by cyanide or other like gold and silver solvent solutions, the invention being also in part adapted for the treatment of sewage. In the accompanying drawings is illustrated apparatus forming part of my invention, and for carrying same into effect. In these drawings Fig. 1 is an elevation of same. Fig. 2 is a plan. Fig. 3 is an end view looking from the right hand. Fig. 4 is a part elevation of one set of the settling-tanks employed. Fig. 5 is an elevation on an enlarged scale showing one form of the raking or harrow teeth, and Fig. 6 is an elevation showing another form of tooth. The apparatus is shown as arranged in a suit-

able covered building, and consists of one, two, or more shallow tray-like baths *a* connected at their ends with a common bath a^1, with which communicates a conveyor or bucket-belt a^2. In the baths *a* are rakes or harrows *b*, preferably suspended by flexible connections *c*, such connections (which may be cords, chains, or the like) passing over pulleys and down to winches or other mechanism *d*, by which the harrows may be raised or lowered to suit the amount or quality of material in the bath, such harrows being preferably always suspended, so that they do not touch the bottom, and capable of being raised when required to empty the bath.

A reciprocating movement is given to the harrows by means of the pitmen *e*, connected to the cranks of a shaft *f*, which is suitably rotated from a shaft f^1, driven by a pulley f^2, from a pulley f^3, on a main shaft f^4, driven by suitable engines or motors.

At the ends of the baths *a* are situated a series of similar shallow tray-like baths *g* of larger dimensions, provided also with harrows or rakes *h*, hung on flexible connections c^1, attached to winches d^1, such rakes being operated by pitmen *i* connected to cranks on the shaft f^1. These baths are preferably placed at a slight incline towards one end, where there are situated overflow-chutes *j* j^1, which overhang respectively the end tanks of a series of settling-tanks *k*, k^1, k^2.

These tanks are each provided with pipes *l*, draining into a pipe common to all such pipes *l*, having cocks at different heights placed in the tanks, and communicating therewith. The tanks have also sloping bottoms, indicated at *m*, Fig. 3, communicating with doors m^1, while between each pair of tanks *k k* or k^1 k^1 is a sump or pit, in which works an endless conveyor or bucket-belt *n* n^1, arranged to deliver into troughs or launders *o* o^1 having each two spouts or branches passing to the tanks k^1 k^1 and k^2 k^2 respectively. Such spouts are provided with dams or doors *p*, as are also the chutes *j* j^1 and baths *a* a^1. There are provided also suitable tanks *q q* and *r* for the mixing and storage of the cyanide or other dissolving working solutions.

The teeth *s* of the rakes or harrows may be solid or hollow throughout their length, and open at their ends, as shown in Fig. 5, or they may be perforated, as at s^1, Fig. 6, such teeth being connected through pipes with a flexible tube *t*, by which air, liquid, or gases may be forced or introduced into the body or mass of material in the baths.

In carrying out the process the tailings, slimes, pulp from the mill, sands, alluvial or other matter to be treated, and in a more or less finely divided state, is elevated by the conveyor a^2 into the bath a^1, supplied with water, and from thence overflows into the baths *a*, where it is subjected to a raking action in the water by the harrows. In these baths *a* any free gold present has an opportunity to settle. If clean and free-milling ores are being treated quicksilver may be placed in the bath to amalgamate the gold. The rest of the pulp is allowed to gradually flow over the ends or edges of the baths into the first bath or vat *g*, in which the pulp or tailings are treated with cyanide, bromine, chlorine, or other desired solutions, and which are continuously supplied to same. These baths are so arranged or inclined that the pulp and solution flow over the edge of the first one into the one next in order, the agitation to which they are subjected, and the large surface which is exposed by reason of the formation of the baths, enabling the pulp with cyanide or like solution to be brought very effectively into contact with the air.

In these baths the fine gold is dissolved, and from them the tailings and solution flow by the chutes *j* or j^1 into the tanks *k k*, where in due course the gold-bearing solution is drawn off by the pipes *l* and taken to the usual extractor-boxes, where it is treated in the ordinary way. The tailings remain at the bottom of the tank *k* until the door m^1 is opened, when it is discharged into the sump, in which works the conveyor *n*, which will raise the tailings and deliver it into the launder *o*, and from thence into the next tanks k^1 k^1. This launder *o* may have a studded or ribbed bottom to break up the material, and will have a weak cyanide or like solution or water wash supplied to it. In the first tank the tailings may be deprived of, say, 50 per cent. of its bullion, and in the second tank, which also contains a cyanide or like solution, it will be deprived of, say, 50 per cent., or one-half of the bullion remaining therein, after which the same process may be repeated, the tailings being removed and elevated to the third tanks k^2 k^2, and so on, as required to obtain as far as possible all the bullion contained therein, any suitable number or arrangement of tanks being employed, about one-half of the remaining bullion in the tailings being extracted at each operation.

The tanks may be so arranged that one set are being used for settling while another set are being emptied of solution and tailings, as previously described, this being effected by the dams or doors *p*.

By the means above described the coarse as well as the greater portion of the fine gold may be obtained within a few hours of crushing, the remainder being afterwards secured. The water required is considerably less than that used in battery treating, and the loss but little more than the moisture in the residues.

The quantity required in the agitation can be as low as equal weight of tailings or slimes, while the strength of the solution will vary with the ore, but, for example, 0·01 per cent. will work with some slimes.

In treating slimes direct and tailings carrying very fine gold, they may be delivered into the large baths *g* without the intervention of the first bath *a*.

All free-milling ores, sands, and tailings may be leached as formerly, after the agitation as above described, wherever suitable.

Where it is desired to use chlorine gas or the like under pressure, the baths *g* may be provided with gastight covers, and have suitable packing-boxes through which the parts operating the agitating-harrows work.

By this process amalgamation by copper-plates and leaching of the cyanide or other solution is no longer necessary, nor is the presence of slimes to be feared, as the ore may be crushed dry or wet as fine as is possible in order to liberate the whole of the precious metal from the gangue.

A small quantity of lime may be crushed with the ore or mixed in the first or concentrating baths *a*, for the double purpose of neutralising the acids in the ores and for causing a quick precipitation of the solid matter in the settling-tanks. In order to remove the soluble sulphates, acids, salts, and the like, a preliminary water wash may be necessary.

The apparatus is also adapted for treating sewage with air or chemicals, and for the settling and decantation of same.

The process and apparatus is adapted for the treatment of alluvial and beach sands in a similar and direct manner without first pulverising the wash, but by first separating the large stones, pebbles, and the like with a revolving screen or similar means, and then treating the residue as for ordinary tailings.

By means of the process and apparatus above described it will be seen that a comparatively thin body of material is exposed to the action of the cyanide or like solution, that such body of material is being continuously moved, and that the solution itself has a large surface exposed to the air, all these being very desirable features in the working particularly of the cyanide process, and that the treatment is a continuous one, the material passing through the apparatus at a rate which may be regulated by the manner in which the extraction is proceeding.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. The herein-described continuous process for the treatment of pulp, slimes, tailings, and the like, consisting in moving a thin body of same in a cyanide or like solution having a large surface exposed to the air, and subsequently transferring such material and solution to settling-tanks, substantially as and for the purpose described.

2. The herein-described process for the continuous treatment of pulp, slimes, tailings, and the like with cyanide and similar solutions, consisting in subjecting a comparatively thin body or mass of same in the solution to the action of moving rakes or like apparatus, and subsequently allowing the mass of tailings or the like to separate from the solution in settling-tanks, substantially as and for the purpose described.

3. The herein-described process for the continuous treatment of tailings and the like with cyanide and similar solutions, consisting in subjecting a comparatively thin body of same to a raking or stirring action in water with or without quicksilver, lime, or other desired additions, and then treating such thin body in a series of baths, and in a continuously supplied cyanide or like solution, to the action of rakes or stirrers, and subsequently allowing the mass to separate from the solution in one or more settling-tanks, substantially as described.

4. The combination with a series of shallow tray-like baths, having suitably operated rakes or the like therein, of settling-tanks provided with means for the removal of the solid and liquid contents separately, substantially as and for the purposes described.

5. The combination with a series of settling-tanks having means for discharging the solid and liquid contents of conveyors adapted to transfer the solid contents of one or one series into the next tank or series, substantially as and for the purposes described.

6. The arrangement of apparatus substantially as and for the purpose described and illustrated in the accompanying drawings.

Dated this 4th day of August, 1897. JOHN POOLE.

A RESPIRATOR FOR USE IN DRY-CRUSHING AND SIMILAR DUSTY OPERATIONS.

I, Holroyd Fitz-William Way, of Hauraki, Thames, in the Provincial District of Auckland, miner, do hereby declare the nature of my invention for "A Respirator for Use in Dry-crushing and similar Dusty Operations," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My respirator for use in dry-crushing and similar dusty operations is an apparatus consisting of a watertight vessel made of gutta-percha or metal with a capacity of about a quarter of a pint, and shaped outside like a watch, but the outside shape is immaterial. The watertight vessel is attached to the chest of the workman by a hook or pocket in the shirt, and is connected to the nose and mouth by a flexible tube of rubber with one end funnel-shaped, and lined with chenille or some fluffy material, to fit over the nose and mouth. The watertight vessel is about two-thirds full of water, and may be readily filled and emptied from time to time. On the accompanying drawing at Fig. 1 is an outside view of the watertight vessel. At letter A is an interior division shown by dotted lines, which separates the watertight vessel into two compartments, with the exception of a small space at the bottom marked letter B. The water is shown by horizontal dotted lines. At letter C is a funnel-shaped opening for admitting the dusty air. At letter D is a nozzle upon which is fitted the flexible tube, marked letter E. To fill the watertight vessel it is only necessary to pull it off from the flexible tube E and dip it into a bucket of water. To empty the watertight vessel when the water has become impure from dusty particles it is only necessary to pull it off from the flexible tube E and turn it upside down and shake the water out. The dusty air that is breathed through the watertight vessel is filtered by the water in manner similar to a Turkish hubble-bubble tobacco-pipe. The funnel-shaped end of the flexible tube is kept in position over the nose and mouth by a string or elastic passing round the head of the workman.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is: The watertight vessel with the interior division, the funnel-shaped opening, the nozzle, and the flexible tube, substantially as shown and described.

Dated this 27th day of August, 1897. H. F. WAY.

AN IMPROVED COMBINED FURNACE AND PRECIPITATING APPARATUS FOR RECOVERING GOLD FROM CHARCOAL OR SIMILAR SUBSTANCES.

I, James Turnbull, of 72, King William Street, Fitzroy, in the Colony of Victoria, engineer, do hereby declare the nature of my invention for "An Improved Combined Furnace and Precipitating Apparatus for recovering Gold from Charcoal or similar Substances," and in what manner the

IMPROVED APPARATUS FOR TREATMENT OF ORES, TAILINGS &c.

Poole's Patent.

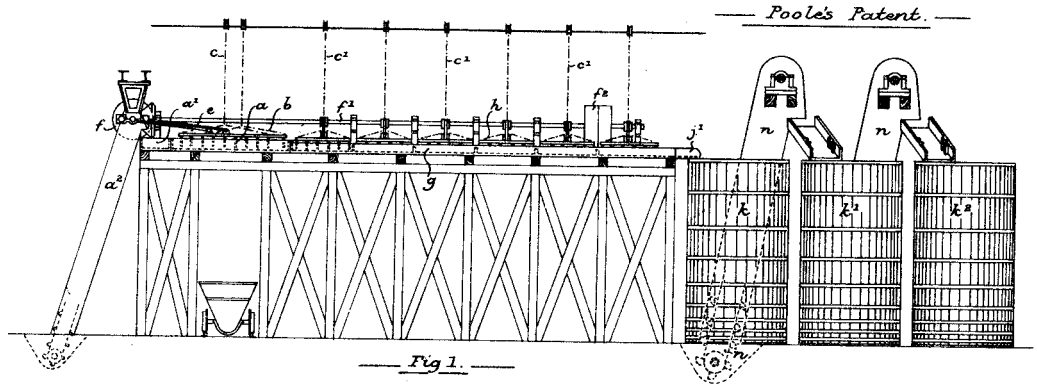


Fig 1.

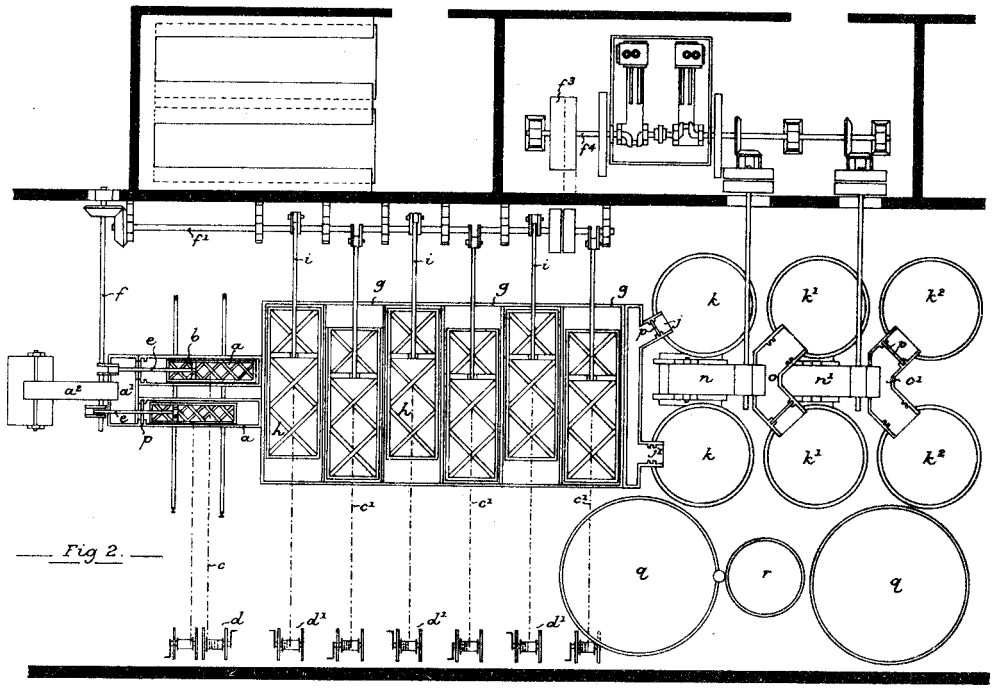


Fig 2.

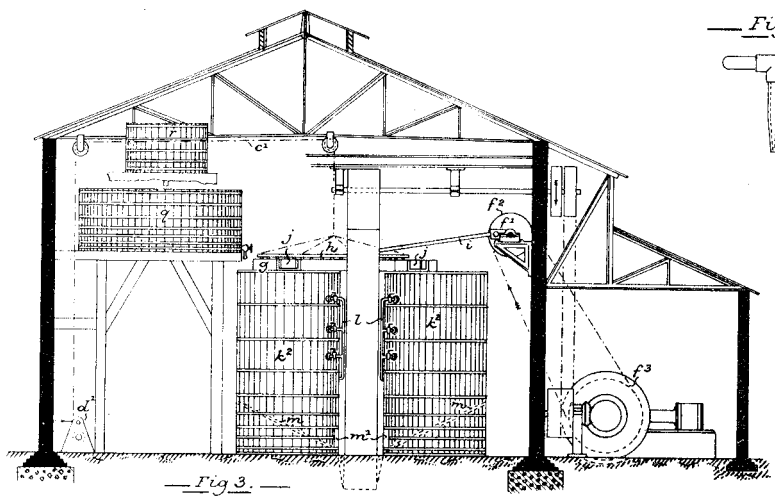


Fig 3.

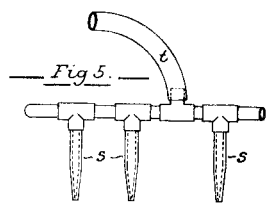


Fig 5.

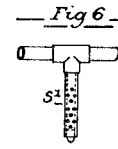


Fig 6

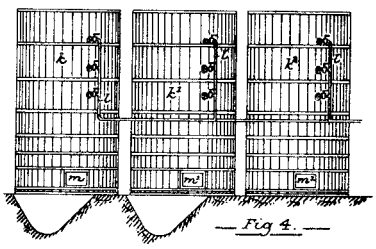


Fig 4.

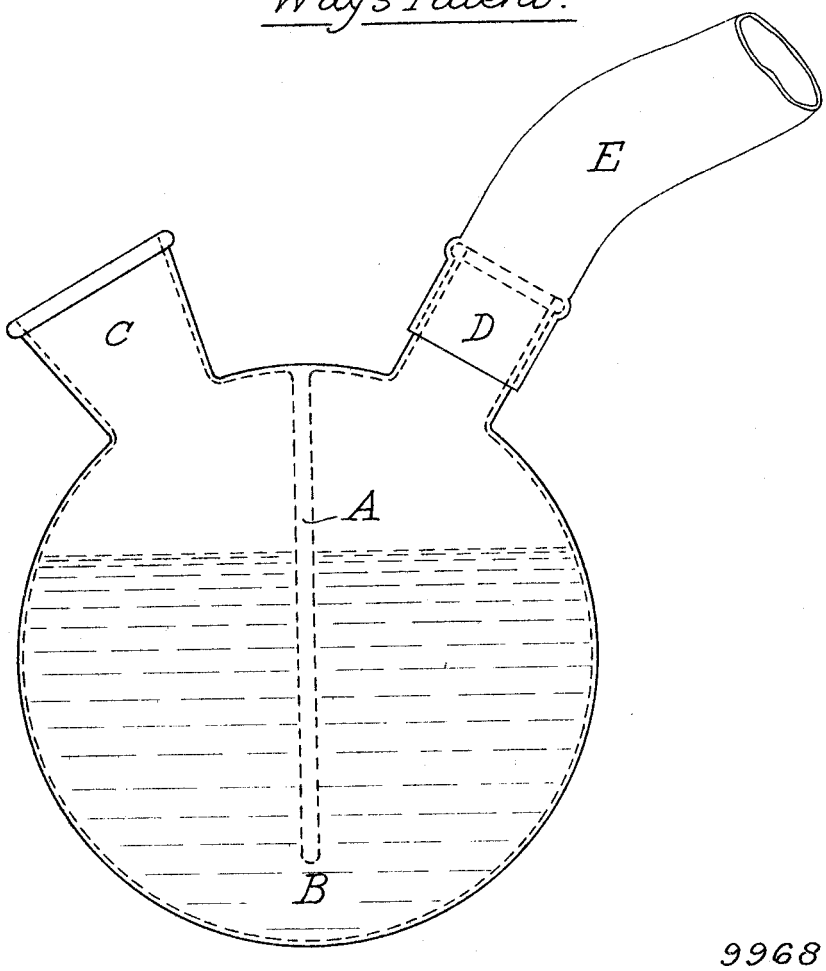
9894.

RESPIRATOR

for

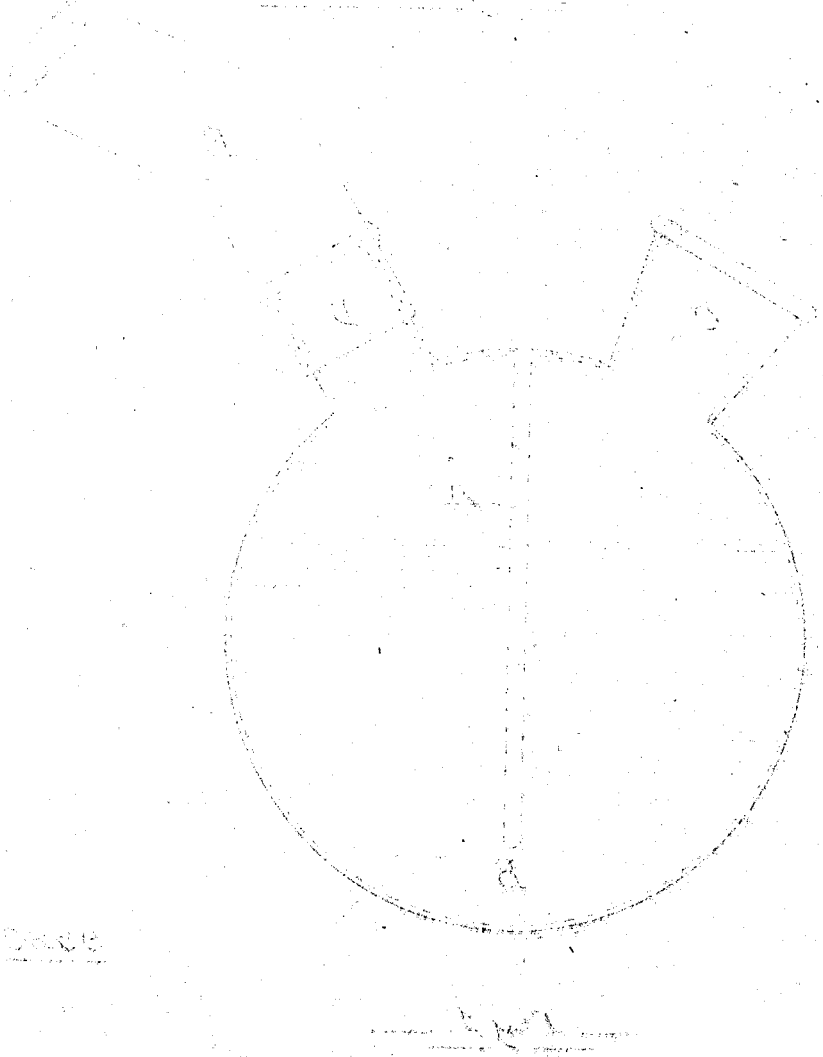
use in dry crushing.

Way's Patent.



9968

Fig 1.



Improved Combined Furnace & Precipitating Apparatus for Recovering Gold from Charcoal &c.

Turnbull's Patent.

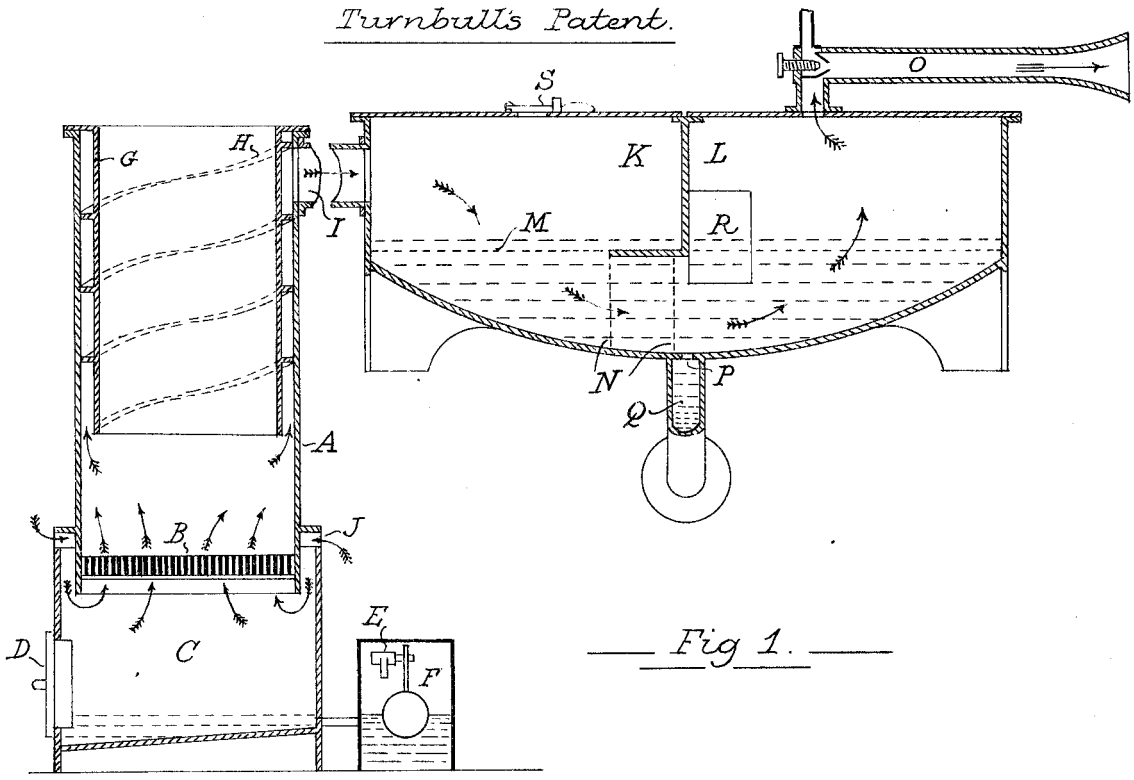


Fig 1.

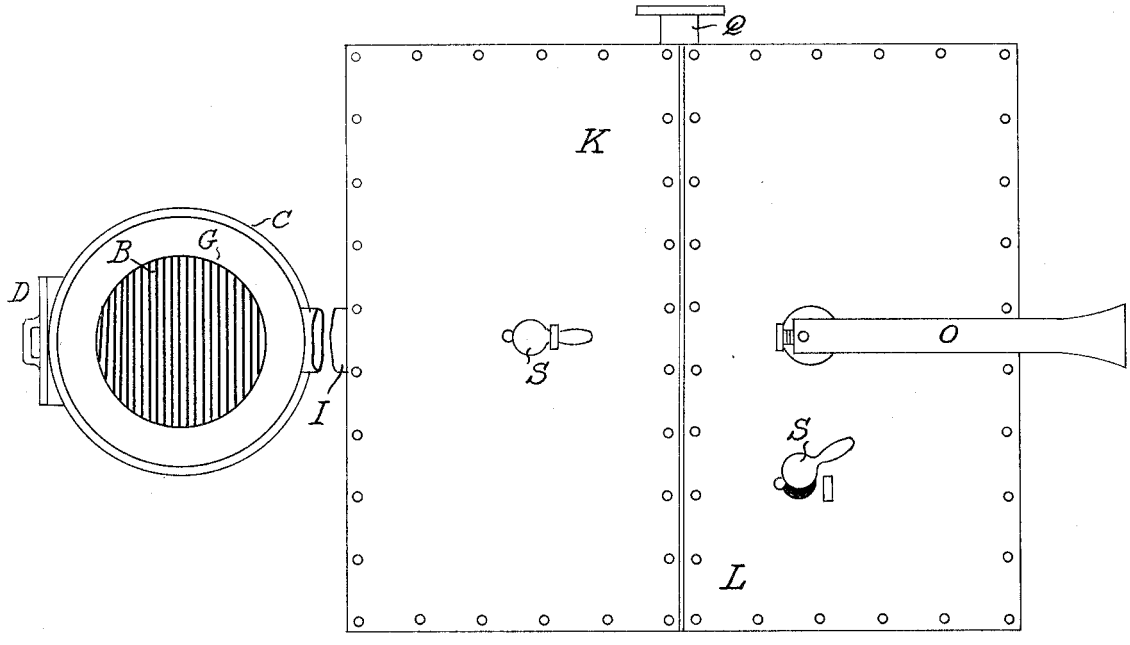
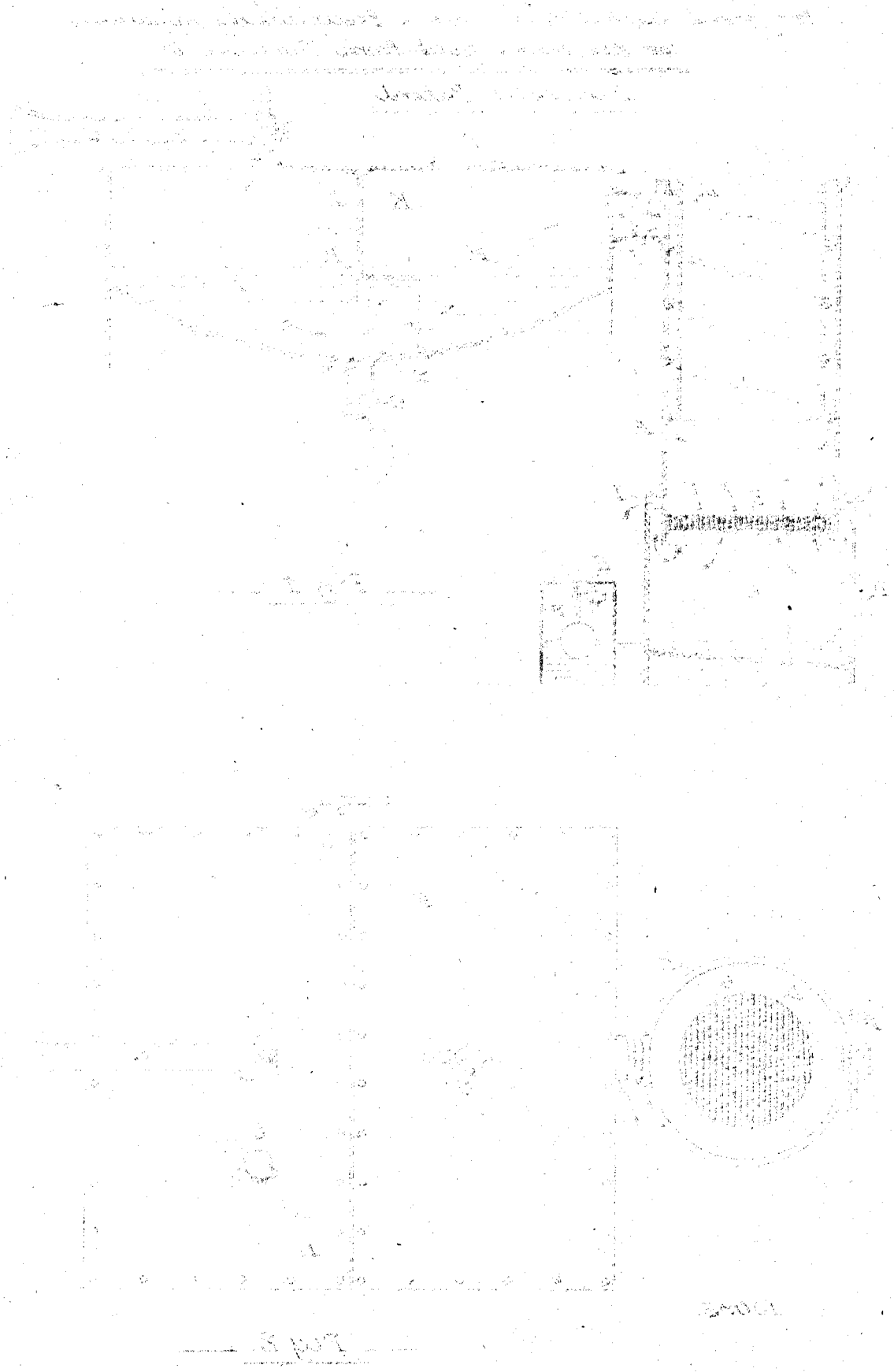


Fig 2.

10095.



same is to be performed, to be particularly described and ascertained in and by the following statement:—

The object of my invention is to provide a cheap and effective apparatus for recovering gold which has been precipitated from its solution upon charcoal or similar substances. The processes that have hitherto been employed have been both slow and wasteful, and, owing to the minuteness of the gold particles to be recovered, unavoidable losses of that metal have always arisen. But with my improved furnace and apparatus a much quicker destruction or burning of the charcoal is admitted, whilst it has the distinct advantage of recovering the whole of the gold.

My invention consists of a circular or other shaped outer shell situated over a series of furnace-bars. Inside the outer shell is an inner one, into the top of which the auriferous material to be treated is placed. The fire already kindled causes fumes to be liberated from the charcoal, which fumes are drawn into the space (annular or otherwise) which exists between the inner and outer shell. From the top of this space they are drawn into a precipitating-box, in which they are robbed of all the particles that may be held in suspension.

But in order that my invention may be better understood I will now refer to the accompanying sheet of drawings, which are to be taken as part of this specification, and read herewith.

Fig. 1 represents a sectional elevation of my invention, the arrows showing the course of the ingoing air and of the outgoing fumes generated. Fig. 2 represents a plan of the same. Similar letters of reference indicate similar or corresponding parts where they occur in the several views. On reference to the drawings it will be seen that A is the outer shell, near the bottom of which are the furnace-bars B. These latter are placed at the top of the lower chamber C, and may be removed or replaced either from the top of the outer shell or from a door in the side of the same. This lower chamber or ash-pit is provided with a draw-off or drain-tap and a door D, through which door, after or before the water is drawn off, all auriferous accumulations or sludges are removed. The chamber C is partially filled with water, the height of which is regulated preferably by a ball-operated tap E, situated within an auxiliary water-chamber E. Resting upon the top of A, or secured in any other way, is the inner shell G. This, which is open at both ends, may be either taper or parallel or longer or shorter than shown. As will be seen, the bottom end does not reach the fire-bars, but stands some distance above them. Into the top of G, which is generally uncovered, the auriferous material is fed wet, as it comes from the fillers, when it falls upon the fire-bars upon which a fire has been previously kindled. The charcoal is fed into G until it is flush with the top of the same, and as it is consumed the supply is replenished. Air is admitted beneath the furnace-bars by the air-inlet holes J, situated in the ash-pit portion, the area of which holes may be adjusted in any well-known way.

The gases or fumes arising from combustion, instead of passing upwards and outwards through the top of G, are drawn into the covered space between A and G, which may be provided with a spiral circulating web or webs H. At the top of A is a pipe I leading the fumes into the inlet end of a precipitating-box K containing water.

This box is divided above the water-line into an inlet and an outlet end by a bulkhead or baffle-plate L, which descends from the top and is partially immersed in the water. The height of this bulkhead, which may be of any shape or shapes, is regulated in any well-known way, either from the interior or the exterior of the box. Beneath the surface of the water and at any predetermined height, and extending from one end of the box to the other, is a gauze or grating M. Beneath L one or more similar gratings N extend to the bottom of the box. Above the water on the outlet end is a discharge-pipe O, on which is an ejector operated by water, exhaust or other steam, compressed air, or a fan; or a natural draught may be induced by a chimney.

At the bottom of the precipitating-box, which, to assist the wash of the water, is preferably made with a concave bottom as shown, is a longitudinal or other slot P. In this the auriferous or other deposits gradually fall and gather in a receiver Q, from which they can be removed for treatment by a sluice valve, cock, or other means without arresting the progress of operations. In the side of the tank and in any convenient position may be situated an observation-window R. There may also be a gauge-glass if necessary; and on the top of the box, and attached to the removable covers thereon, one or more water-inlet or flushing cocks S. To the said box may be connected, as to the ash-pit chamber, an auxiliary water-chamber, whereby the water in the box may be maintained at a uniform level.

The cycle of operations is as follows: A fire having been kindled on the bars and the ash-pit being partially fitted with water, the auriferous material is charged into the inner shell. The air, entering the air-inlet holes, passes with the water-vapour generated from the water in the ash-pit through the fire-bars.

As the air and vapour emerge from above the fire they enter the space between the two shells, and pass out of the same by the pipe leading to the inlet end of the precipitating-box. The fume-laden air then enters the water with which the latter has been first charged, and, passing through the horizontal and vertical gratings, has thereby arrested all the particles that it was carrying away in suspension. These are precipitated in the form of a deposit or sludge in the bottom of the box, and are removed from the receiver and treated as required.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. The improved furnace for recovering gold from charcoal or similar substances, consisting of the combination of an outer shell as A, with an inner shell as G, both of which are situated above a series of fire-bars, all as and for the purposes hereinbefore described and as illustrated in the drawings.

2. The improved furnace for recovering gold from charcoal or similar substances, consisting of the combination of an outer shell as A, having air-inlet holes on its bottom, an inner shell as G, having a spiral web as H around its circumference, both shells being above fire-bars as B, a closed

ash-pit as C having a door as D, and self-regulating water-supply, all as and for the purposes hereinbefore described and as illustrated in the drawings.

3. In an improved furnace for recovering gold from charcoal or similar substances a water-charged ash-pit, above which are furnace-bars, and an inner and an outer shell, all as and for the purposes hereinbefore described and as illustrated in the drawings.

4. An improved precipitating apparatus for recovering gold from charcoal or similar substances, and in combination a precipitating-box containing water, through which the fumes pass, and in which descends a bulkhead and a grating or gratings, and across which and beneath the water is a similar grating, all as and for the purposes hereinbefore described and as illustrated in the drawings.

5. An improved precipitating apparatus for recovering gold from charcoal or similar substances, and in combination a precipitating-box as K, having therein a bulkhead as L, and a grating or gratings, a slot as P, and receiver as Q, a window as R, flushing-cocks as S, and a discharge-pipe as O, all as and for the purposes hereinbefore described and as illustrated in the drawings.

6. In an improved furnace and precipitating apparatus for recovering gold from charcoal or similar substances, and in combination an outer shell as A, an inner shell as G, between which is a web as H, fire-bars as B, a closed ash-pit as C, the water in which is maintained at a constant height, a precipitating-box as K, having therein a bulkhead and gratings and a receiver beneath the same, and water maintained at a uniform height, all as and for the purposes hereinbefore described and as illustrated in the drawings.

7. The whole of the combination and arrangement of parts as hereinbefore described and as illustrated in Figs. 1 and 2 of the accompanying drawings, and constituting an improved combined furnace and precipitating apparatus for recovering gold from charcoal or similar substances.

W. E. Hughes,
Agent for the Applicant.

Dated this 4th day of November, 1897.

Improvements in extracting Precious Metals from Minerals containing them, and Apparatus therefor.

I, Beda Becker, of Hufengasse, 13, Eupen, in the German Empire, civil engineer, do hereby declare the nature of my invention for "Improvements in extracting Precious Metals from Minerals containing them, and Apparatus therefor," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My invention relates to the treatment of minerals containing precious metals, for the extraction of these metals, and to apparatus for that purpose, which I shall describe, referring to the accompanying drawings: Fig. 1 is a sectional elevation of a dissolving-vat according to my invention, with means of circulating its contents. Fig. 2 is a plan to an enlarged scale of a nozzle that may be applied to the bottom of the vat. Fig. 3 is a sectional elevation of an electrolytic vat employed in conjunction with the dissolving-vat. Fig. 4 is a plan on the line 4–4 of Fig. 3, showing some of the electrodes. Fig. 5 is a similar view showing a modification.

Similar letters of reference indicate corresponding parts in the several figures. *a* is the dissolving-vat, preferably of conical form. *b* are amalgamating-plates, which in some cases are removably attached to the side of the vat, preferably in separate sections. *c* is a rotary pump, having suction-pipe *d* leading from the upper part of the contents of the vat, and having suspended from it a shield d^1 having its edge just below the surface of the liquid, so that the liquid has to flow over the sides, and thus only the clearest of the solution is drawn off by the pump through the pipe *d*. *e* is the discharge-pipe leading to the nozzle *f*, which has a passage or passages so arranged as to discharge the entering fluid towards the sides of the vat, these passages being preferably helical, so as to give rotary motion to the material passing through it. *j* is a valve by opening which the contents of the vat, or a portion of them, can be discharged or delivered into a recipient *i*. In operating with this apparatus alone the vat is filled above the mouth of the pipe *d* with solution of a suitable solvent, such as potassium-cyanide, and the pump *c* is put in motion so as to cause active circulation from the upper part of the solution down the pipe *d*, then along the pipe *e* through the nozzle *f*, and up through the vat, preferably with the whirling motion due to the helical passages in *f*. The crushed mineral to be treated is introduced into the circulating liquid, by which the precious metal or a portion thereof is dissolved. When the amalgamating-plates *b* are employed portions of the metal are deposited in amalgam on the plates, which are from time to time removed, fresh plates being substituted for them. After a time the speed of the pump, and consequently of the circulation of the fluid, is lessened, so that the heavier particles suspended in the fluid, along with such portions of amalgam as may be detached from the plates, subside to the lower part of the vat, and are by opening the valve *j* discharged into the removable recipient *i*. The heavier particles and amalgam may be thus repeatedly removed, and the remaining contents of the vat can be run off, to be treated by electrolysis or in any known manner for the recovery of the metal which it contains. I prefer, however, to apply electrolytic treatment to the contents of the vat, it may be while the solution is proceeding, and for this purpose I employ the arrangement of the electrolytic vat along with the dissolving-vat for recovering the precious metals. In this apparatus *k* is the electrolytic vat, which is connected at the bottom by a pipe *l* with valve *y* and at the top by a pipe *m* with valve *w* to the pump suction-pipe *d*. The pipe at the top of the electrolytic vat is adapted to be readily removed so as to give access to the vat. It rests on supports *u u*, and communicates through a plug *p* with perforated branch-pipes *o*, which are caused to rotate by a band on a pulley *c* or otherwise, so as to distribute liquid from the vat *a*.

From a frame *s*, supported on brackets *t t*, depend a number of anode plates *r*, and from insulated frames *v* depend cathode plates *u*, which alternate with the anode plates, and can be lifted out from between them when required. The anodes and cathodes may be curved and concentric as shown in Fig. 5, or may be straight and radial as shown in Fig. 4.

While solution is going on for a time in the vat *a* the electrolytic vat *k* is disconnected from it by closing the valves *w* and *y*, but when the solution has for some time gone on in *a* the valves *w* and *y* are opened, and a valve *x* in the pipe *d* is closed. The fluid carrying the mineral matter is thus caused to circulate not only through *a*, but also through *k* from the distributing-pipes *o* downward past the electrodes to the suction of the pump, and thence as before through *a*, and so on. When the vat *k* is of metal its interior should be enamelled or otherwise coated to prevent electro-chemical action on it.

Instead of employing electrolysis as above described, for which a current of electricity is necessary, the metal may be deposited from the solution upon zinc shavings, in the known manner. When this method of depositing is adopted it is only necessary to remove the electrodes from the electrolytic vat and charge it with zinc shavings; all the connections to the dissolving-vat remain unchanged.

Instead of employing a single dissolving-vat several of these may be arranged to operate in succession with one electrolytic vat or several of these. Each of the dissolving-vats may deliver to the next in order solution with a less quantity of solid matter and the liquid from the last of these vats, whence after deposit of the precious metal the liquid may be returned to the first of the dissolving-vats.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. In apparatus for extracting precious metals from minerals containing them the combination of a dissolving-vat with a circulating pump, or its equivalent, with suction- and discharge-pipes and a valved discharge, substantially as and for the purpose set forth.
2. In combination with the dissolving-vat above referred to amalgamating-plates attached to its sloping sides, substantially as described.
3. In combination with a dissolving-vat such as is above referred to a nozzle to the discharge-pipe having helical passages, substantially as and for the purpose set forth.
4. In combination with the dissolving-vat above referred to an electrolytic vat with connecting pipes and valves and with electrodes arranged therein, substantially as described.
5. The herein-described method of treating minerals containing precious metals for extraction of the metals therefrom by causing the crushed mineral mixed with solvent solution to circulate or pass through a dissolving-vat or several of these which may contain amalgamating-plates, and also through an electrolytic vat, or other depositing-vat.

Dated this 22nd day of October, 1897. BEDA BECKER.

IMPROVED APPARATUS FOR SAVING FINE GOLD.

I, George Henry Oatway, 31, Moray Place, Dunedin, New Zealand, merchant, do hereby declare my invention for "Improved Apparatus for saving Fine Gold," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The object of this invention is to produce an apparatus that will arrest any fine gold that passes through it, and it consists of a combination in any description of enclosed box, chamber, or flue of straight, fluted, or curved metal plates having plain, chequered, or roughened prepared gold-saving surfaces (the sides of the box will usually be lined in a similar manner, and where required may be used so lined and without plates) in either case for the purpose of reclaiming the light or float gold which sometimes escapes to the dump in the tailings or tail-water of a dredge, hydraulic elevator, or ground-sluice.

These plates or lining are preferably placed at an inclined plane to the current, and far enough apart to discount choking, whilst (when using the plates) dividing the auriferous wash- and tail-water to be dealt with into as many separate streams or slices as may be expedient.

The passage through between the plates is either a parallel one without break or angle, or taper, preferably narrowing towards the lower or outlet end, and generally widening the other way, so that the same area is maintained throughout.

Where curved or fluted plates are used the same method would be adopted; the streams being compressed one way and forced out laterally into a fan shape tend to facilitate contact of the gold and the saving surfaces of the plates or sides of the box.

The auriferous material and water may thus be passed through in one stream or film, or may be split up into a number of streams or films, and in its passage through the apparatus it is confined between surfaces, whether parallel or converging, fluted, straight, or curved.

A fixed, vibratory, or revolving screen, sieve, or grating, or a series of any screens, sieves, or gratings, for attachment to or for use in conjunction with the tailings-chute, or sluice-boxes, or races of a hydraulic elevator or ground-sluice, for the purpose of restraining or preventing the coarser pieces of quartz or stones travelling with the auriferous wash and water from passing through to the prepared gold-saving plates and scouring or rubbing off the amalgam or other preparation or material, or choking. This screen or series of screens may be fixed in the sides of the races to allow the fine wash to pass to the plates on either side or horizontally, vertically, or at any incline to the current, or in any other way, for the purpose indicated.

Also the same fixed, vibratory, or revolving screen, or series of screens, sieves, or gratings, for attachment to and for use in conjunction with the tables, sluices, or other gold-saving appliances of a dredge for the purpose of receiving the auriferous wash and water at any time after its delivery from the principal revolving screen, or from the buckets or suction-pipe if no screen is used, and restraining or preventing the coarser particles travelling with such washdirt from passing between

the gold-saving plates and scouring or rubbing off the amalgam or other gold-saving preparation or material, or choking, blocking, or damaging the plates.

In combination with the screen last described of a fixed or pivoted comb or series of combs or weights, used either together or separately, of any suitable substance, but preferably of silvered copper, which may be used at any angle in the tail-race, sluice-box, or on the tables for the purpose of reducing or breaking the velocity of the wash and allowing it to settle through the screen to the gold-saving plates.

These combs or brushes may be suspended above the current in such a way that its velocity is checked by their weight, or may be fixed either above or below in such a manner that their members or long fingers may partly obstruct the flow for the purpose described.

Referring to the accompanying drawing, Fig. 1 is a diagram of a number of boxes arranged in different ways and at different angles for treating gold-saving wash. For convenience these boxes are shown as arranged under a race the bottom of which is perforated or has bars where the boxes are attached, though obviously the boxes may receive the wash in any manner so that the wash passes through it or them. Fig. 2 is a cross-section of one of the boxes, showing the spreading or fan-shaped widening to counteract the narrowing sideways and maintain the same area throughout, or approximately so. A is a taper box shown containing straight converging plates marked *a*. B is a parallel box shown with parallel straight plates, but corrugated or fluted plates could be used in it; the straight plates are marked *b*, and plan of fluted plates A^1. C and the plates *c* are similar arrangements placed at an angle. D is a box similar to B or C, with plates broken as to their continuity. E and plates *e* are similar to A and *a*, but curved. It is obvious that the shapes are capable of large variety for the same purpose. When parallel boxes are adopted they would generally be parallel in the cross section, not as in Fig. 2, or fan-shaped. F shows one place where screening may be used—namely, at the inlet to the boxes.

To prevent the rush of the wash over the screen-plates combs would be placed so as to arrest and turn the body of wash, and cause a swirl in the box, or weights, preferably balls, would be suspended from a convenient place. These are marked G and H respectively, and any suitable partial obstruction would be used, and in cases the obstruction would be of a gold-saving character.

Any suitable materials or sizes may be adopted in this invention, and any description of surface for catching, arresting, or saving gold mechanically or chemically.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. In an apparatus for saving gold consisting of a box, chamber, or flume (such as A, B, C, D, E) lined with gold-saving plates or material, and with or without intermediate plates (such as A^1, *a*, *b*, *c*, *d*, *e*) for splitting up the stream of auriferous wash that passes through the apparatus, the combination of such box, and the lining or plates, with any description of screen or screens (such as F) and current deflectors (such as G, H), substantially as described and explained, and as illustrated in the accompanying drawing.

2. In an apparatus for saving gold the combination of special taper one way and fan-shaped the cross way, for forming boxes for passing through the auriferous wash so as to get substantially the same area throughout the box or divisions, with screening apparatus (such as F) and deflectors for breaking a straight or rushing current when required (such as G, H), substantially as described and explained, and as illustrated in the accompanying drawing.

Dated this 9th day of December, 1897. GEO. H. OATWAY.

AN IMPROVED METHOD AND APPARATUS FOR TREATING REFRACTORY ORES CONTAINING GOLD, SILVER, NICKEL, AND THE LIKE.

I, John Edward Preston, of 8, Burton Road, Brixton, London, S.W., England, engineer, do hereby declare the nature of my invention for "An improved Method and Apparatus for treating Refractory Ores containing Gold, Silver, Nickel, and the like," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My invention relates to a specially constructed furnace or apparatus for the treatment of refractory ores, for the purpose of extracting or separating therefrom such precious or other metal or metals as they may contain, the object of my said invention being to provide an apparatus and system that may attain the ends stated more rapidly, effectively, and at less cost than has been possible by the methods and means hitherto employed for the same purpose.

My invention consists of a suitably shaped furnace built of firebricks or other fire-resisting material, or an outer casing of iron lined with fire-bricks or other suitable material, and so constructed and arranged that the base or bottom is provided with a central opening surrounded by a fixed or integral conical perforated chamber extending upwardly into the said furnace, the finely pulverised ore being fed by the force of a blast from a suitable blower through conduits terminating in a nozzle fixed within the said chamber, from which the said pulverised ore is caused to exude with great force out of the top of the said chamber, and to impinge against the under-surface of a block or diaphragm of fireclay or other suitable substance, fixed in such a position within the furnace as to become incandescent by the heat, and by impinging against this the said pulverised ore would become atomized, and the metallic portions be deflected thereby in a downward direction into the body of the furnace, suitable exhausts being provided through which the recovered metal may be led or drained from the furnace, while the fumes and dust would be conveyed by convection in an upward direction through suitable apertures in the said diaphragms into the atmosphere or caused to traverse a conduit leading past a water-curtain or and into a suitable condenser, when such fumes or dust may be impregnated with such volatile metallic particles as may be worthy of recovery.

IMPROVED APPARATUS FOR EXTRACTION OF PRECIOUS METALS FROM THEIR ORES.

Becker's Patent.

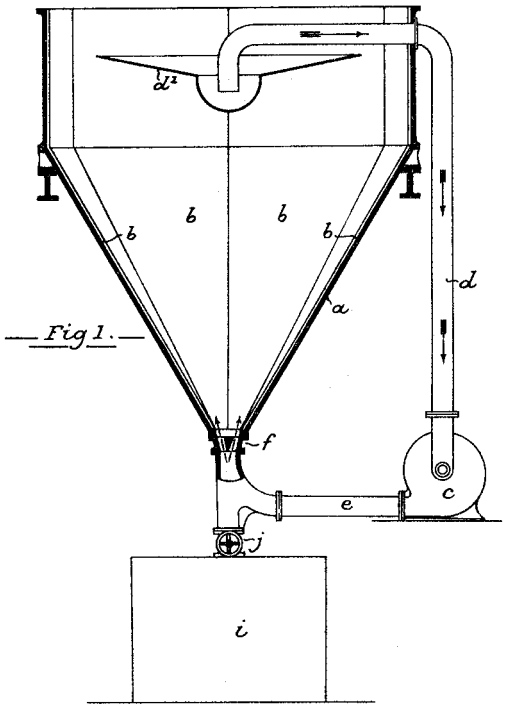


Fig 1.

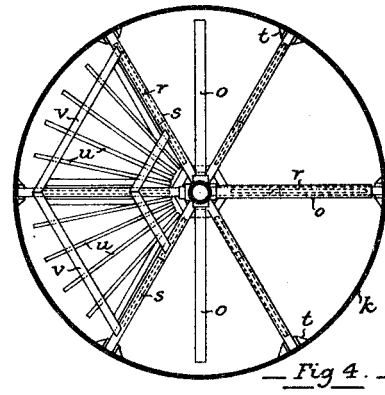


Fig 4.

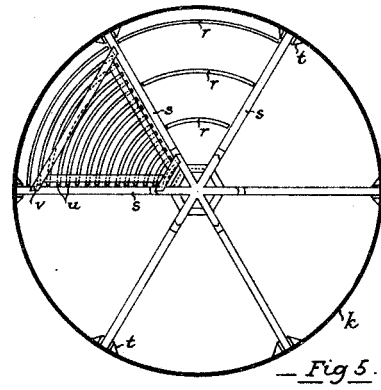


Fig 5.

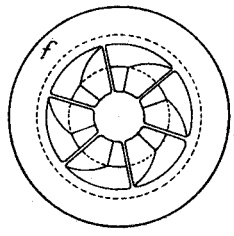
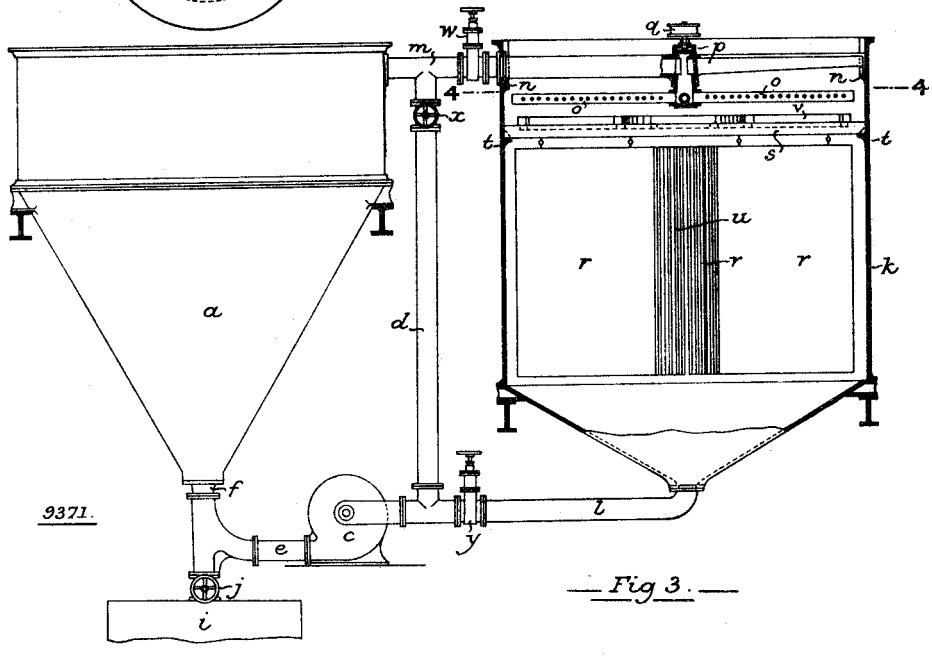


Fig 2.



9371.

Fig 3.

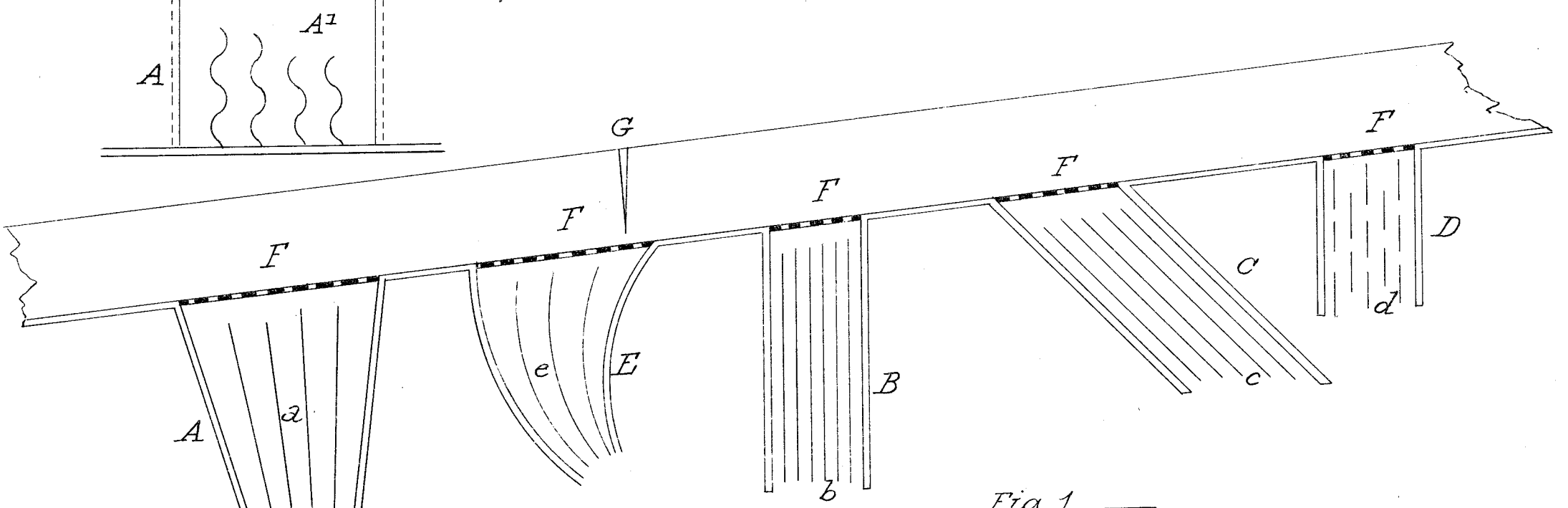


Fig 1.

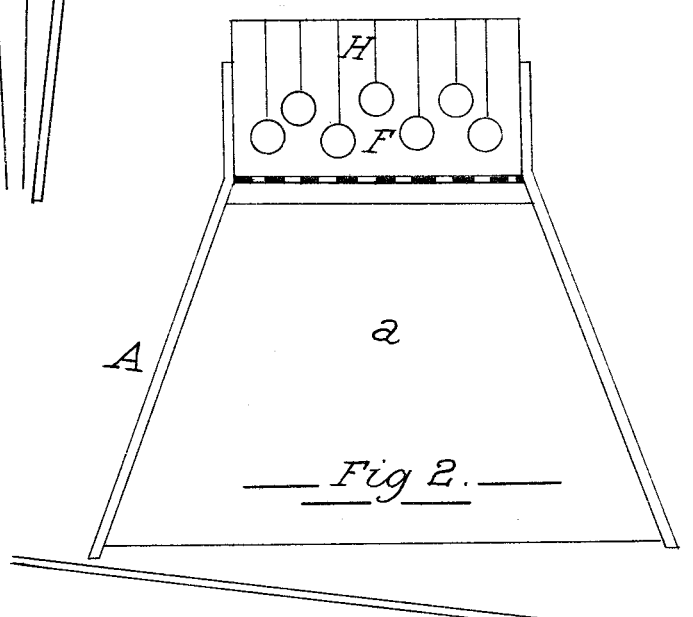
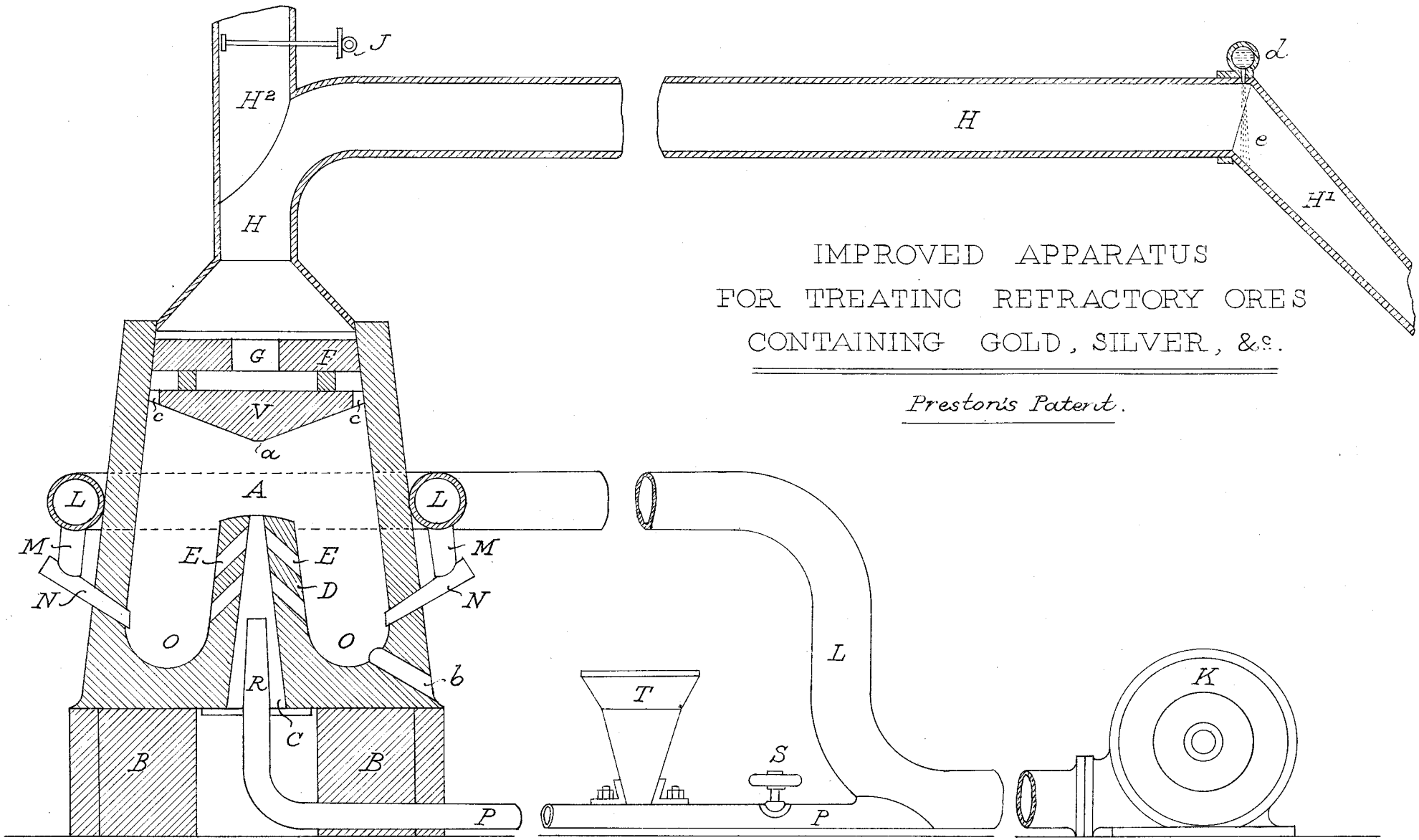


Fig 2.

Improved Apparatus
for
saving fine gold.
Oatway's Patent.

10209.



IMPROVED APPARATUS FOR TREATING REFRACTORY ORES CONTAINING GOLD, SILVER, &c.

Prestoris Patent.

10446.

In order that my improved system and apparatus and the manner, or substantially so, in which I purpose constructing the latter may be fully understood, reference is hereinafter made to the accompanying drawings, in which the furnace and certain of its conduits are shown in section.

In carrying my invention into effect I prefer to construct the furnace proper A of circular formation in plan, and slightly coned or tapered from the bottom to the top, and I may provide the said furnace wholly of firebricks or other suitable material, or with an outer casing of iron lined with firebricks or other material, but preferably the former; and in any convenient part of the said furnace I may provide an opening and door, or openings and doors (not shown), through which the fuel may be fed, when solid fuel is used, but when petroleum or other liquid fuel is employed this may be fed into the furnace by other means hereinafter explained. By preference the said furnace would rest upon any number of suitable blocks B, and between and within these the bottom of A would be provided with a central aperture C, surrounded by a conical or tapered chamber D, standing up within the furnace, and provided with any number of perforations or holes E, inclined in an upward direction from the outer to the inner surface. The said chamber may conveniently be of the same material as A, when the latter is constructed without a metallic casing, and may be either fixed in position by any suitable means or formed integrally with A, preferably the latter, as shown. The upper end of a furnace is closed by a fireclay or other diaphragm F, having a central opening G, and upon the said diaphragm rests the funnel-shaped mouth of a fume and dust conduit or exhaust H, which may bend and extend in any direction, its final end H^1 leading to a suitable condenser (not shown), and in a direct line above the opening G in F the said conduit H is provided with a branch H^2 leading to the atmosphere, in which a suitable damper J is provided, by means of which the said branch may be opened or closed at will.

In any suitable position adjacent to the furnace and convenient for operation by any available power I provide a suitable blower K, the air-current from which is conveyed by a pipe L to surround or partly surround the furnace A, and at suitable intervals in this I provide any number of depending branches M, each connected to a suitable fireclay or other nozzle or tuyere N leading through apertures in the wall of A into the fire-space O, and, by means of the said conduit and nozzles, the whole or part of the said blast may be employed, when needed, for imparting extra draught to the furnace, suitable throttle or other valves being provided in any part of the conduit L, when necessary, for opening and closing this at will. The conduit L is provided with a branch-pipe P, which terminates in a nozzle R within the chamber D, and at any convenient part of the said branch-pipe P a suitable adjustable hopper T is provided, which receives the finely pulverised ore to be treated, and anywhere between the said hopper and the conduit L the said pipe P is provided with a screw-down or other suitable valve, such as S, by means of which the passage through P may be wholly or partly closed or opened at will, to regulate the force of the blast.

The manner of operation is as follows: Given that the fire in the furnace has been lighted and in a condition for work, the air-blast through L may be wholly or partly closed, when the ore, in a finely pulverised condition, would be fed into the hopper T, and the valve S be opened, when the current of air passing through P would convey with it the pulverised ore, which would be thereby forced up through the nozzle R and out at the top of the chamber D, and this forced draught through D would create an up-draught of superheated air through the perforations E in D, thus superheating the powdered ore, which would be caused to impinge upon the point *a* of the under-surface of a coned plate or diaphragm V, suspended beneath the diaphragm F, and now white hot or incandescent from the heat of the furnace; and this being now the hottest part of the furnace, such impact with V would vapourise or atomize the pulverised ore, and deflect this in all directions from the centre of the furnace, when the metallic portions would be melted and fall into the fire at O, and pass out through suitable outlets *b*, while the fumes, dust, and more volatile portions would, by the aid of convection (and, maybe, by assisted draught through the nozzles N), pass upwardly through apertures *c* in V, and through the opening G in F, into the conduit H, and, by opening the damper J, be allowed to pass out through H^2 into the atmosphere, or, by closing the said damper, to pass along the conduit H and H^1 into a suitable condenser, according to the constituents of the fumes; or, as the ore under treatment is known to contain metal of greater or lesser density, and for the purpose of recovering from the said fumes such metallic portions as may be valuable, I may, in lieu of or in addition to the use of a condenser in the usual way, provide a water-curtain at the end of the conduit H (shown by dotted lines at *e*), by the means of a water-conduit *d*, having suitable perforations through which the water may fall.

I may find it convenient to employ petroleum or other liquid fuel in lieu of ordinary fuel, in which case I may employ means by which such liquid fuel may be conveyed into the furnace O by the use of certain of the nozzles or tuyeres N, which, for this purpose, may be perforated at their final ends, so as to emit the said liquid fuel in the form of a spray, suitable valves or taps being provided where necessary to regulate the flow of the said liquid fuel.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. The improved method of and apparatus for treating refractory ores, substantially as herein described and shown.

2. In the treatment of refractory ores the combination of a reducing-furnace, and means for conveying the said ores in a finely powdered condition thereinto by the use of a powerful air-blast, substantially as herein described and shown.

3. In the treatment of refractory ores the combination of a furnace A, having diaphragms F and V, and chamber D, with perforations E, with means for conveying a blast of air to the said furnace from a suitable blower, and by means of a conduit such as P, and nozzle R, for utilising the said blast for conveying finely pulverised ore from a hopper such as T to the said furnace, and means such as a conduit H, H^1, and H^2, and water-curtain *e*, for exhausting the fumes from the furnace and recovering volatile metallic particles therefrom, substantially as herein set forth and shown.

Dated this 4th day of February, 1898. J. E. PRESTON.

IMPROVEMENT IN WET PROCESS FOR EXTRACTING GOLD FROM GOLD-ORES OR ORE WASTE.

I, Arnold Fredrik Lundstrom, of 50, Klarabergsgatan, Stockholm, engineer, do hereby declare the nature of the invention for "Improvement in Wet Process for extracting Gold from Gold-ores or Ore Waste," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The wet processes heretofore used for extracting gold from gold-ore have chiefly been based upon the solubility of the gold in materials which contain or develop free chlorine or bromine, such as nitro-muriatic acid, chloride of lime, and muriatic or sulphuric acid, &c., or in cyanide compounds, as, for instance, cyanide of potassium, &c.

The object of this present invention is to extract the gold by means of solutions which, while containing or developing chlorine or bromine, also contain chlorine or bromine compounds of such metals which with the chlorine or bromine are able to form higher chlorine or bromine compounds, such as superchlorides, which, like a kind of carriers, cause the dissolving action of the chlorine upon the gold. Such suitable metals are, for instance, lead and manganese, but even the higher chlorine compounds of nickel or cobalt, as well as iron, have a favourable influence upon the extracting of the gold.

Solvents of this kind, containing also higher chlorine or bromine compounds, extract the gold more easily than the compounds containing only chlorine or bromine. The gold is thus extracted easier by means of a chloride-of-lime solution acidulated with muriatic or sulphuric acid to which is added lead-chloride, $PvCl_2$, which is thereby transformed into a superchloride, $PvCl_4$; the case is analagous with regard to an addition of chloride of manganese, $MnCl_2$, which by free chlorine is transformed into superchloride of manganese, $MnCl_4$, and so also with the chlorine compounds of other metals which by free chlorine are transformed into higher chlorine compounds.

The aforesaid favourable action of the higher chlorine or bromine compounds is explained thereby that the chlorine or bromine thereby always acts, as it were, in a nascent state, as the higher chlorine or bromine metals easily give off a part of their chlorine or bromine to the gold, which is then extracted in the form of chloride or bromide of gold, whereupon the lower chlorine or bromine compounds thus formed are transformed in higher chlorine or bromine compounds by a new accession of chlorine or bromine.

In order to describe the new process more fully I shall select chloride of lead as an example of a chlorine or bromine metal acting in this manner, and a chloride-of-lime solution acidulated by muriatic or sulphuric acid as an example of a chlorine- or bromine-developing solution. Through treatment of the chloride of lime with water a solution is first obtained, the strength of which is chosen according to the condition of the ore. Thus, for ores that do not contain more than 10 gr. of gold per ton, and not too large amounts of other chlorine-consuming materials, a chloride solution of 1 to 2 per cent. strength will be suitable. With richer ores somewhat stronger solutions should be used. This solution, together with muriatic acid somewhat in surplus relatively to the amount of chloride of lime, and a solution of chloride of lead to about one-tenth of the amount of chloride of lime, or some other lead compound which with the muriatic acid and chloride of lime solution forms chloride of lead, is then put into extracting-vats with the finely ground ore; free chlorine will then evolve, superchloride of lead is formed, and the gold is extracted as chloride. From this chloride the gold is then separated in some known manner, such, for instance, as by reducing agents, electrolysis, &c. Similarly, the process is carried on if other chlorine metals than chloride of lead are used, or other chlorine-developing means than chloride of lime and an acid—such, for instance, as an electrolysed solution of chlorine metal.

The aforesaid extracting process may be adopted for other than water solutions of chlorine or bromine compounds.

When the ores are rich in silver special silver-extracting chemicals, such as chlorinatrium, hyposulphite, &c., are added to the extracting medium.

Having now particularly described and ascertained the nature of the said invention, and in what manner the same is to be performed, I declare what I claim is: The process for extracting gold from gold-ores or ore waste, consisting in leaching same with chlorine- or bromine-containing or chlorine- or bromine-evolving solutions, to which are added before or during the leaching chlorine or bromine compounds of those metals which by free chlorine or bromine can form higher and less constant chlorine or bromine compounds, superchlorides, or superbromides.

ARNOLD FREDRIK LUNDSTROM.

Dated Stockholm, this 31st day of August, 1897.

IMPROVEMENTS IN THE TREATMENT OF MINERALS FOR SMELTING AND OTHER PURPOSES.

I, Robert Fergusson Strong, of Victoria Street, London, England, inventor and civil engineer, do hereby declare the nature of my invention for "Improvements in the Treatment of Minerals for Smelting and other Purposes" and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

Many attempts have been made to utilise minerals of various descriptions which, owing to their granular or friable condition, are not in a fit state for ordinary use. Some of these are mixed with clay or other materials, pressed into blocks, and dried or burned in kilns before using in the reducing-furnace. This is a slow and costly operation, besides adding to the bulk a useless mass, and requiring extra fuel in smelting. Others, again, have used coal-tar and pitch to bind the minerals, and found this mixture would not stand the heat in the smelting-furnace, so that the blocks quickly decrepitated and endangered the proper working of the furnaces by blocking the outlets, and in the case of coal and other minerals of a like nature intended for block fuel the addition of coal-tar and pitch largely increased the smoke, formed clinkers in the fire-boxes, and furred and clogged the tubes of locomotive and other boilers.

My invention is simple. Moreover, the principal binding ingredient—pyroligneous acid—possesses great caloric power, and considerably reduces the quantity of ordinary fuel required in smelting the ores; the ordinary fuel may be altogether dispensed with, and the pyroligneous acid added to coal as a fuel so improves the caloric or burning quality that inferior or waste small coal by this process becomes equal to large, and burns with a clear, bright, smokeless flame.

The pyroligneous acid is the tarry liquid obtained from the dry distillation of waste wood and other ligneous substances, and is easily manufactured at low cost.

In carrying the invention into practice I grind or granulate the minerals, adding fresh calcined alkaline earth (preferably lime) and pyroligneous acid. These are mixed and ground together, or ground separately and mixed, and at once pressed in blocks, which are fit for immediate use.

If it is simply desired to bind the minerals for the reducing-furnace I add about 5 per cent. of lime and about 10 per cent. of tarry pyroligneous acid (all by weight); but if in addition it is desired that the ingredient should act as fuel the pyroligneous acid may be increased to 20 or 30 per cent.

In the case of coal, or other minerals of a like description which is intended for steam or household fuel, I only add 1 or 2 per cent. of lime and from 10 to 15 per cent. of the pyroligneous acid.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. The treatment of minerals for the production of metals by adding to them a dry caustic alkaline earth, such as lime, and pyroligneous acid, and grinding or mixing all together, substantially as and for the purposes described.

2. The treatment of minerals for the production of metals by adding to them a dry caustic alkaline earth, such as lime, and pyroligneous acid, and grinding or mixing all together, and then pressing the same into blocks, substantially as and for the purposes described.

3. The treatment of coal and other minerals of a like nature for the purposes of fuel by adding to them a dry caustic alkaline earth, such as lime, and pyroligneous acid, grinding or mixing all together, and then pressing the same into blocks, substantially as and for the purposes described.

Signed at Middlesbrough, in the County of Yorkshire, England, this 7th day of August, 1897.

ROBERT FERGUSSON STRONG.

AN IMPROVEMENT IN THE CYANIDE PROCESS OF EXTRACTING GOLD AND SILVER FROM ORES OR COMPOUNDS CONTAINING THE SAME.

I, Alexander McLean Cameron, director and science teacher of the School of Mines, Vincent Street, Daylesford, in the Colony of Victoria, metallurgical chemist, do hereby declare the nature of my invention for "An Improvement in the Cyanide Process of extracting Gold and Silver from Ores or Compounds containing the same," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to the extraction of gold and silver from ores or compounds containing the same by means of cyanogen solution, and its main object is to lessen the time required for that operation, to conserve the cyanide, and to increase the extraction. This I accomplish by the addition of an alkaline permanganate or manganate as hereinafter more particularly specified.

According to the well-known cyanide process the ore or other compounds to be treated are very finely ground and preferably neutralised or rendered more or less alkaline before being subjected to the action of the cyanide solution.

In carrying out the process by my invention the same preliminary treatment obtains, and an aqueous solution of an alkaline permanganate or manganate—*e.g.*, potassium, sodium, ammonium, calcium, or other alkaline radical—is prepared and either mixed with the cyanide solution before lixiviation or applied to the material to be treated prior or subsequent thereto. If intended for immediate use the compound solution may be prepared by simply placing the requisite quantity of cyanide and permanganate or manganate in a tank and adding water thereto until it is sufficiently dilute.

The proportions will, of course, vary considerably according to the nature of the material to be treated, but I find that about $1\frac{1}{2}$ oz. of permanganate and 2·8 lb. of potassium-cyanide, both dissolved in 112 gallons (or 18 cubic feet) of water for every ton of material, is a practical and useful solution.

I wish it to be understood that I do not confine myself to the precise sequence of operations or to the particular proportions specified.

I am aware that prior attempts have been made to hasten or expedite the cyanide process by forcing air through the solution, by the admixture of bromine and other chemicals; but, whilst these attempts have in part accomplished the object sought to be attained, it has been at the expense of the cyanide, whereas by my invention the process is greatly expedited and the cyanide conserved.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is: The improvement in the cyanide process of extracting gold and silver from ores or compounds containing the same, consisting in the use of an alkaline permanganate or manganate in conjunction with a solution containing cyanogen, substantially as and for the purposes herein specified.

Dated this 23rd day of November, 1897.

A. M. CAMERON.

MINE-MANAGERS' EXAMINATION PAPERS.

Questions used in Examination of First-class Mining Managers.

("The Mining Act, 1891.")

First Day.—Time: 9 a.m. to 12 noon.

[No book will be permitted to be used with the exception of logarithm tables. The candidates must attempt to answer every question. All calculations to be shown in detail.]

Subject A.—*On the Sinking of Shafts and Construction of Main Drives.*

1. Describe the method you would adopt in sinking a shaft when it was known there were 30 ft. of quicksand to go through under a great depth of clay and gravel which could be sunk through by the ordinary methods of timbering.

2. If you had to sink a shaft to cut a quartz lode that was lying at an inclination of 55° from the horizon at a depth of 700 ft., what distance from the outcrop would you commence to sink the shaft? Show by calculation how you arrive at the result.

3. If a lode was outcropping on the side of a range and underlying to the east at an angle of 60° from the horizon, and the slope of the range to the west was 18° from the horizon, what would be the length of an adit level if constructed from the west side to cut the lode so as to have 150 ft. of backs?

4. Describe how you would sink a shaft in hard rock when you had at least 500 gallons of water to contend with per minute and a draw-lift pump to lift the water. (1) What provision would you make to protect a pump when blasting? (2) How would you continue sinking to keep the pump always lifting this quantity of water?

5. Describe, and also show by sketch, how you would widen a shaft which was used for both pumping and winding at the change of lifts, the ordinary size of the pumping compartment being 9 ft. long and 7 ft. wide when there were two plunger-pumps working, each 20 in. in diameter, having one rising column of same diameter. Give the dimensions that the shaft would require to be at the change of lifts to allow the pumps to be placed.

6. If you were working an alluvial mine from a shaft 300 ft. in depth, the auriferous layer of ground being 6 ft. high and the overlying material being very loose and liable to run, describe how you would open out from the shaft and construct a main level to block out the whole of the ground so as to insure the stability of the level; also describe how you would block out the whole of the ground if it comprised an area of 20 chains square.

First Day.—Time: 2 p.m. to 5 p.m.

Subject B.—*On the Timbering of Shafts, Adits, Main Drives or Levels, Passes, Stopes, and generally on the Systems of Timbering Mines, and also in Filling up Old Workings.*

1. Show by sketch how you would fit the timber for a main level, and give the dimensions of sets of timber for a drive of sufficient size to admit of a single road-way; also describe how you would construct it so as to have places when the empty and full trucks pass, giving the dimensions of these places.

2. If you were constructing a drive through loose alluvial drift, describe how you would keep up the roof to prevent a run taking place; also, how would you put in the timber to prevent more than two sets of timber or slabs coming down in the event of a cap-piece breaking.

3. Show by sketch how you would fit timber in a shaft if it was timbered with frames, and also if timbered with planking. Give the dimensions of a shaft suitable for having two winding compartments and ladder-way. Show how you would fit the timber so as to have neither battens or pegs at the divisions of a slabbed shaft.

4. Show by sketch how you would timber a shaft with planking at the change of lifts if pumps were placed in such a shaft and had to be widened. Describe, and also show by sketch, how you would turn the width to the ordinary width of the shaft under the pumping lifts.

5. How do you ascertain the breaking strain of beams or cap-pieces used in connection with mines? Show by calculation the breaking strain on a cap-piece of kauri, 12 in. in diameter, 8 ft. between supports, and uniformly loaded. Show by calculation the breaking strain on a prop 8 in. in diameter and 10 ft. long.

6. Show by sketch how you would fit the timber for passes, giving the dimensions and the distance that the passes should be apart, and give your reasons fully.

7. How would you fit guides in a shaft to work cages? Give the size of the guides, the method of fixing them, and how you would join the ends together.

8. If you met with a flow of water on striking the solid rock after sinking through 30 ft. of alluvial drift, what steps would you take to prevent the water following down the shaft, and describe the system of timbering that you would adopt if you used planking in the shaft.

Second Day.—Time: 9 a.m. to 12 Noon.

Subject E.—*On the Ventilation of Mines.*

1. State the gases generated in metalliferous mines in which operations are being conducted, their composition, and weight in relation to air.

2. What means should be adopted to remove the gases from the different levels in a mine worked from a shaft, and also to provide a supply of fresh air in the workings?

3. Describe the systems of mechanical ventilation in general use.

4. State what experience you have had in respect to mechanical ventilation.

5. What quantity of air is required to circulate in a drive 6 ft. by 3 ft. to dilute CO_2 given off at the rate of 10 cubic feet per minute?

SECOND DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT F.—*Tapping Water in Mines, and Mode of constructing Dams in Underground Working.*

1. State how you would construct a dam in a drive in solid rock to dam the water up to a height of 6 ft.; also describe how you would construct a dam in same drive if the water had to be held back up to a height of 250 ft.

2. If the face of a dam was 6 ft. by 7 ft., and it had to withstand a pressure of water which stood up to a height of 400 ft., show by calculation the pressure in pounds that would be on the face of the dam.

3. In sinking a shaft through solid rock where a horizontal fissure was met with at a depth of 200 ft. from which there was a quantity of water issuing, describe how you would dam it back to prevent it getting down the shaft.

4. In approaching a place where there was a lodgment of water, what precaution would you take—(1) If you were approaching it by a drive in alluvial ground requiring to be timbered, state how you would secure the drive; (2) If the drive were in a solid rock. How would you proceed in both instances?

SUBJECT G.—*On Blasting and the Use of Explosives.*

1. When dynamite is in a frozen state how would you use it as an explosive? Can proper combustion be effected? If so, state how it could be accomplished.

2. Give the relative strength of dynamite, rackarock, gelignite, and roburite in relation to gunpowder.

3. Describe how you would prepare rackarock cartridges to use as an explosive, and give its composition.

4. If a shot missed fire what steps would you take? And how would you proceed to work in the same place?

5. Describe how you would tamp a hole, the materials and appliances you would use for tamping, both for blasting-powder and dynamite.

6. Show by calculation the pressure the expansion of gases liberated by an explosion of gunpowder would exert per square inch at a temperature of 64° Fahr.

THIRD DAY.—TIME: 9 A.M. TO 12 NOON.

[Candidates must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT I.—*A Knowledge of Underground Surveying, and the Making of Plans of Underground Workings, showing also the Dip or Inclination and Strike of the Reefs or Lodes.*

(*a.*) The candidate must produce a plan drawn to a scale not less than 5 chains to an inch, showing the surface boundaries of a mining claim not less than 20 acres in extent. The plan must also show the underground workings on the same plan, but in different coloured inks. All traverse-lines on which the survey is based must be shown, with their bearings and lengths, all offsets to boundaries or other objects, together with the lines connecting the underground with the surface survey. The plan must have a north point, and the word "magnetic" or "true" written on it according to the meridian used. All traverses should be calculated from the starting-point or a trig. station. The plan must bear a certificate as follows: "I certify that the survey from which this plan has been drawn was done by myself, and that the plan is my own work also"; and it must be signed and dated. The area in acres must be shown. The survey must be actually closed on the ground. Calculated closures are not admissible.

(*b.*) The original field-notes of the survey must be produced, together with the tables of meridian and perpendicular distances (if any) for each traverse station in the survey; also produce a specimen of the method of calculations from which the positions have been derived. All of these must be signed by the candidate and dated.

(*c.*) Give a full description, in writing, of the method adopted in the survey, describing the initial point from which it was started, and show the close of the work, both in links or feet, and the angular difference on closing. Describe how the incline measurements were reduced to horizontal. State whether the true or what other meridian was used, and whether the same meridian was used both above and below ground.

(*d.*) Say what precautions were used to ascertain if the instrument was in adjustment, and how the length of the chain or tape was tested. Did you adjust the instrument yourself, and test the chain or tape yourself? What adjustments were tested? [A full description of the usual adjustments is to be given under heading (*i*).] What instrument was used for the angular measurements, and what for the linear measurements?

(*e.*) Draw a rough diagram to show how the surface and underground surveys were connected, and describe in writing the method adopted. State your opinion of the most accurate way of performing the above operation—first, when there is only one shaft; second, when there are two or more shafts. State what parts of the operation require the most care, and what precautions should be taken to insure accuracy in carrying the meridian down shafts.

THIRD DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT I.—*continued.*

(*f.*) State whether the compass can be relied on for underground surveys, and give your reasons for the answer. If you had a choice of a compass or a theodolite, which would you use?

(*g.*) If you are obliged to make a magnetic underground survey, state what means you would use to check the correctness of the survey, and how you would know that the surface and under-

ground survey are on the same meridian, or how you would reduce them to the same supposing one to be magnetic, the other true.

(*h.*) From the last station used in the underground survey, calculate the length and bearing of a line drawn thence to any one of the corners of the claim; or a line may be calculated from any one station of the surface survey to any one corner of the claim.

(*i.*) Describe in writing the adjustments of a plane theodolite under the headings of: "Horizontal Level," "Vertical Level," "Collimation," "Parallax"; and state what others are necessary. Also describe a miner's compass and its adjustments. (In both of these subjects the candidate will be examined by the Supervisor, who must furnish a separate report on each candidate's knowledge of the subject.)

(*j.*) Describe the method of plotting the plan, and how the area of the claim was ascertained, and what instruments were used.

(*k.*) What are the regulation marks that should define the boundaries of a claim under the Mines Act, and state sizes?

(*l.*) State where you learnt surveying, and who taught you, and how long you have had practice at surveying.

FOURTH DAY.—TIME: 9 A.M. TO 12 NOON.

[No books will be permitted to be used with the exception of logarithm tables. The candidates must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT C.—*On the Drainage of Mines and Pumping Appliances.*

1. What does the term "modulus" applied to a pump mean?
2. What is about the modulus of the centrifugal, low-lift, ordinary-lift, and force pumps?
3. How many cubic feet of water is a 6-horse-power steam-pump capable of lifting per hour to a height of 20 ft., efficiency = ·66?
4. A 6-horse-power steam-pump lifts 6,273 cubic feet of water per hour to a height of 20 ft. What is the modulus of the pump?
5. Which class of pumps are most economical for low lifts?
6. Which class of pumps are most economical for deep lifts?
7. Required the indicated horse-power of an engine to pump 6,273 cubic feet of water per hour from a depth 20 ft., efficiency = ·66?
8. How many 3 in. pipes would I require to equal a 12 in. pipe?

SUBJECT D.—*On the Haulage in Shafts and in Underground Planes; also on the Strength of Hauling-ropes and -chains.*

1. What means are adopted to prevent overwinding?
2. Describe any method of signalling that could be used for raising men and materials from a mine.
3. Describe any system of underground haulage.
4. What horse-power would be required to lift 200 tons per hour 1,000 ft., each lift occupying $1\frac{1}{2}$ minutes, weight of cage, &c., = $2\frac{1}{2}$ tons?
5. What is the breaking-weight of a 3 in. ordinary wire rope?
6. Does galvanising a wire rope reduce its strength? Why?
7. What is the working-load on a $\frac{5}{8}$ short-linked chain?
8. Does a chain get brittle by constant use? How can it be restored to its original condition?

FOURTH DAY.—TIME: 2 P.M. TO 5 P.M.

[Candidates must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT H.—*The Effect that Faults, Slides, and Mullock-bars have on Lodes, and how to ascertain the Direction of Slides and Heavals.*

Give six diagrams, with fully written explanations, to illustrate the effect that is exercised on mineral lodes by faults, slides, and mullock-bars; and describe instances from your personal observations.

SUBJECT J.—*A Knowledge of the Different Rocks where Gold, Silver, Tin, Copper, Zinc, Lead, and Antimony are found, and on the Formation of Lodes and Leads.*

1. What metallic ores are usually associated with granite slate, propolyte, serpentine, and limestone respectively?
2. What is the composition of the chief ores of silver, lead, tin, antimony, copper, and zinc, and where are they found in New Zealand?

SUBJECT K.—*A Knowledge of Arithmetic and the Method of keeping Accounts.*

1. Divide ·004397 by ·000349, and extract the cube root of the quotient.
2. If 4 men accomplished a certain piece of work in 5 days 3 hours, working 9 hours per day, how long would it take 9 men to do the same work?
3. The wages of 24 men and 9 boys for 24 days' work amounted to £254; each boy was paid $\frac{3}{5}$ths of a man's wage. How much did each man and boy receive?
4. Three hundred tons of ore were treated, having an assay-value of £3 14s. 9d. per ton; the bullion contained 13 per cent. of gold, worth £4 per ounce; and the balance was silver, worth 2s.

per ounce; 95 per cent. of the gold was saved, and 45 per cent. of the silver. What was the value of the bullion recovered?

5. There were 189 props, 97 caps, and 269 slabs delivered at a mine; the value of the props was £4 12s. 6d. per 100, the caps £5 18s. 9d. per 100, and the slabs £1 12s. 6d. per 100. Give the value of the whole.

6. A piece of sawn timber is 79 ft. long, cut taper, being 2 ft. 3 in. square at one end and 15 in. square at the other end; the contract price for the same was 14s. 6d. per 100 superficial feet. How many feet are there in the piece, and how much did it cost?

SUBJECT L.—*A Knowledge of Part VI. of "The Mining Act, 1891."*
Oral.

FOURTH DAY.—TIME: 5 P.M.

SUBJECT L.—*Oral Examination on Part VI. of "The Mining Act, 1891."*

1. What are the exceptions in being liable to a penalty for acting as a mine-manager without a certificate?
2. What persons are prohibited from being employed for hire in or about any mine?
3. State in what manner explosive or inflammable substances should be stored—(1) on the surface, (2) in the workings of a mine.
4. State what parts in a mine worked from a shaft must be securely fenced or securely covered.
5. From and to what parts of a mine worked from a shaft shall some proper means of communicating distinct and definite signals be provided?
6. State what parts of machinery should be kept securely and safely fenced.
7. What is the time appointed—(1) for examining the state of safety-appliances and gear connected with the cages, winding-ropes, &c., (2) for the general examination of buildings, machinery, shafts, &c., and the record of such examination?
8. State—(1) what is the duty of any person employed in or about any mine before commencing work, (2) what steps he should take if anything is found unsafe.
9. What is set down as the instructions to the mining manager of a mine after the occurrence of any accident attended with serious injury to any person?

QUESTIONS USED IN EXAMINATION OF MINING MANAGERS FOR SECOND-CLASS CERTIFICATES.
("The Mining Act, 1891.")

FIRST DAY.—TIME: 9 A.M. TO 12 NOON.

[Candidates must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT A.—*The Laying-out and Construction of Shafts, Chambers, Main Drives or Levels, Uprises, and Stopes.*

1. In laying out the position of a vertical shaft to work a lode dipping at an inclination of 45° eastward, if the outcrop of the lode was seen on the surface, state where you would sink the shaft in relation to the lode, giving your reasons fully.
2. If you had to drive an adit in a westerly direction to cut a lode which was underlying 50° to the westward, and the angle on the fall of the range was 25°, and the mouth of the adit being 300 ft. distant from the outcrop, what would be the length of the adit to cut the lode at 100 ft. in depth below the surface?
3. Give the dimensions of a main level or drive for a double line of rails, and also the dimensions of a chamber you would construct if there were forty men employed in each shift below ground.
4. What is meant by a "pass"? What is its use, and how would you construct one; and what distance would you have "passes" apart if you were working a lode 6 ft. in width?
5. If a quartz lode were dipping on an inclination of 9½ in. to any foot vertical, and you were to sink a vertical shaft on the outcrop of the lode on the surface to a depth of 600 ft., what distance would you have to drive from the bottom of the shaft to cut the lode?

SUBJECT C.—*On the Ventilation of Mines.*

1. What is meant by "ventilation"? Why is it required? What quantity of air is required by the Mines Act for every man employed in a mine?
2. If you had carbonic-acid gas in a quartz-mine, give its composition, and state how you would detect its presence; also state what effect water has (if any) in absorbing this gas. Give your reasons fully.
3. How is ventilation produced—(*a*) by natural means; (*b*) by mechanical means? State fully how you would produce it by both systems.
4. How would you ascertain when the air in a mine is deleterious and unfit for workmen to be employed therein if you had carbonic-acid gas to contend with?

FIRST DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT B.—*On the Timbering of Shafts, Adits, Main Drives or Levels, Passes, Stopes, and generally on the Systems of Timbering Mines, and also in Filling up Old Workings.*

1. Give the dimensions of timber for a main adit in heavy ground—(*a*) if for a double line of rails, (*b*) for a single line of rails. State how you would make each set, and what provision you would make if the ground was liable to swell. Give your reasons fully.

2. How far apart do you consider it most economical to have passes, and how would you timber them in heavy ground? Give dimensions of passes, and size of timbers. Give your reasons fully.

3. State how you would timber a shaft with formed sets if the shaft was 12 ft. by 6 ft. in the clear; give the dimensions of timber you would use; and show by sketch how you would fit the timber, and the distance you would place the sets apart if the ground was heavy.

4. How would you secure the ground in stoping out a lode 6 ft. wide—(*a*) timbering the stope, (*b*) to secure the ground after being stoped out—if the ground was liable to crush, and the lode underlying at an angle of 40°?

5. Describe how you would secure the timber in a main adit so as to prevent more than two sets of laths coming down in the event of a cap breaking; also give your reasons why all empty spaces should be filled up on the top of the laths.

SUBJECT D.—*Tapping Water in Mines.*

1. What precaution would you take if you were constructing a drive to connect with old workings where it was known there was a lodgment of water?

2. Describe fully how you would construct a dam in a drive in solid rock to keep water back if it had to rise 100 ft. above the level of the drive, and what material you would use.

3. In approaching a place where there was a lodgment of water by a drive or adit, and the ground was of a loose character, how would you secure it to render operations being carried on with safety? Describe how you would secure the timber in a drive before tapping the water.

SECOND DAY.—TIME: 9 A.M. TO 12 NOON.

SUBJECT E.—*On Blasting and the Use of Explosives.*

1. What explosives do you consider the best to use in cross-cutting in hard rock? Give your reasons fully.

2. What is the relative strength of dynamite, rackarock, compressed powder, and blasting-gelatine in comparison with the ordinary blasting-powder?

3. What method would you use to thaw dynamite when in a frozen condition, and at what temperature does it freeze?

4. What explosive do you consider the best to use in wet and hard ground? Give your reasons fully.

5. If a shot were to miss fire, what precautions would you take, and how would you proceed to disintegrate the rock that the miss-charge was in?

SUBJECT F.—*A Knowledge of Arithmetic and the Method of keeping Accounts.*

1. If 12 men could earn £180 by working 10 hours a day, how many men could earn £300 by working 8 hours a day?

2. If a man took 25 days to do a piece of work, and received £2 8s. a week of 48 hours, what would the work cost?

3. If repairs to a shaft took 3 men 35 days, and cost £44, how long would it take 7 men to do it; and what would be the difference in the cost if the men received 8s. 6d. a day?

4. If 150 tons of ore assaying 2 oz. 4 dwt. 12 gr. per ton only yielded 280 oz. 7 dwt. by battery treatment, what is the percentage-recovery?

5. If a lode were 4 ft. 2 in. at one end, and gradually tapered till it was 1 ft. 10 in. at a distance of 88 ft., being also 42 ft. high, how many cubic yards would it contain?

SUBJECT G.—*A Knowledge of Part VI. of "The Mining Act, 1891."*

Oral.

QUESTIONS USED IN EXAMINATION OF BATTERY SUPERINTENDENTS FOR CERTIFICATES.

("The Mining Act Amendment Act, 1894.")

FIRST DAY.—TIME: 9 A.M. TO 1 P.M.

[The candidates will not be allowed any books other than logarithm tables during the time they are sitting for examination. They must attempt to answer every question, and all calculations must be shown in detail.]

SUBJECT A.—*The Different Modes of Reducing and Pulverising Ores.*

1. State what experience you have had in ore-crushing plants. Give the name of the company you were employed by, and the period and date you have been so employed.

2. Describe the difference between a Blake-Marsden ore-crusher and a Gates's crusher, and the action of each.

3. A crushing battery having forty stamps of 1,000 lb. each makes ninety-seven blows per minute, and has a drop of 7 in. at each blow: show by calculation the force exerted in foot pounds.

4. The head and shoe of a stamp is 21 in. long, and 9 in. in diameter, of cast-iron, and the stem is of wrought-iron, 14 ft. long, $3\frac{1}{2}$ in. in diameter: show by calculation the weight in pounds of the head, shoes, and stem.

5. Describe a Huntington mill of 5 ft. diameter, and give a detail of the different parts and appliances required to be fixed in conjunction with this mill as an ore-pulveriser.

6. Describe and also show by sketch a mortar-box suitable for dry-crushing, and the automatic appliances used to convey the pulverised ore into a bin.

7. If gold were very finely disseminated through the ore, what mesh of screens would you use for dry-crushing? and give your reasons fully.

8. What are the advantages or disadvantages of using stamps for pulverising the ore when it has to be treated with cyanide solutions?

SUBJECT B.—*Amalgamating-machines.*

1. Show by sketch an amalgam-trap, and describe how it is placed and applied.

2. Give the speed that Wheeler's, McKay's, and combination-pans require to be worked, and horse-power required to work them, and quantity of material they are capable of operating on in twenty-four hours.

3. What is the difference between a Watson-Denny pan and a combination-pan? Describe fully.

4. Show by sketch a berdan, and describe its action, the quantity of quicksilver you would use in it, the speed and angle at which it is set, and give the horse-power required to work it.

5. Describe the King amalgamator, and its action, giving its speed, and all details.

6. What are settlers used for? Give their dimensions, and describe fully how they work.

FIRST DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT C.—*The Use of Quicksilver and the Methods of using it in connection with the Extraction of Gold and Silver from Ores.*

1. Describe how you would clean copper plates and coat them with quicksilver; also how you would remove gold amalgam.

2. What is the chemical effect of using chloride of sodium and sulphate of copper in pan-amalgamation? What are the advantages or disadvantages in using these salts?

3. What effect has an electrical action on quicksilver used for amalgamating purposes, and how is it applied?

4. What class of auriferous and argentiferous ores are best suited for the recovery of the gold and silver by amalgamation?

5. What effect have ores containing sulphides of zinc and antimony on quicksilver used for amalgamation of the gold and silver the ore contains?

6. Describe how you would separate the gold and silver from quicksilver when in the form of amalgam; also how you would purify quicksilver charged with base metals.

SUBJECT E.—*Chlorination Process of Recovering Gold from Ores.*

1. What class of ore is best suited for chlorination? State fully, giving your reasons why.

2. Describe a modern chlorination plant, giving all details, and show the advantages it has over the Plattner chlorination process, giving the time and quantity of material operated on in each charge.

3. Describe the different methods by which chlorine gas is generated, giving the composition of chemicals used, and also state how it is applied to the ore.

4. State the different processes used for precipitating the gold from chlorine solutions, giving full details.

5. How would you recover any silver that was in ores treated by chlorination? Describe the process you would use fully.

6. Show by sketch a modern chlorination plant, with all appliances, with distinguishing letters on each part.

7. Describe how you would roast ore in a reverberatory furnace. Give full details of the process, and state what chemicals you would use (if any), and give the reason why, and the action that the chemicals used produce on the ore.

8. Describe how ores are roasted in the Bruckner, White-Howell, and Stedtefelt furnaces, and give the action of each.

SECOND DAY.—TIME: 9 A.M. TO 1 P.M.

SUBJECT D.—*Lixiviation Process of Recovering Gold and Silver from Ores.*

1. Show by sketch a cyanide plant with five percolating-vats for treating auriferous and argentiferous ores, and give full details as to the dimensions of each part, and how it is placed.

2. Describe the whole process of treating ores with cyanide solutions, and how you would prepare a strong solution, and the method of dissolving the salt.

3. How would you ascertain the strength of a cyanide solution? Describe fully.

4. State how gold and silver are precipitated from cyanide solutions, and the different methods adopted, giving full details.

5. State how you arrive at the strength of the cyanide solutions best suited to the class of ore you have to deal with.

6. How many tons of a 19-per-cent. KCN solution would you require to make up 30 tons of a sump solution containing 0·02-per-cent. to a 0·25-per-cent. solution?

7. Describe how you would ascertain the value of sump solution, and the methods of testing them.

8. How would you prepare a silver-nitrate standard solution?

9. If a vat were 22 ft. 6 in. in diameter, and filled with ore to a depth of 22 in., how many cubic yards would it contain? Also give the weight of solution occupying 11½ in. of the vat.

10. If 4 tons of wash-water contained 0·04-per-cent. KCN, how many pounds of KCN would be required to make up a 0·3 solution, supposing you were using crude KCN salt containing 73 per cent. of KCN?

11. How many tons of a 0·63-per-cent. KCN solution would be required to make up 50 tons of a 0·15-per-cent. solution, using a sump solution containing 0·007-per-cent. KCN?

12. How many tons of a 0·18-per-cent. solution could be obtained from 9 tons of a 6-per-cent. KCN solution?

13. Describe the class of auriferous and argentiferous ores best suited for treatment by cyanide solutions.

14. What effect have base metals in ores containing gold and silver in the treatment of the latter by cyanide solutions; also give the solubility of copper, zinc, antimony, and lead in relation to the solubility of gold in cyanide solutions?

15. Give the reasons why so large a percentage of silver in the form of sulphides cannot be recovered from cyanide solutions as when the silver is in the form of chlorides.

16. How would you neutralise ores containing acids, and state whether this is required for the treatment of ore by cyanide solutions? and, if so, give your reasons fully.

17. If any one were poisoned by cyanide solutions, what would you do, and what antidote would you apply?

SECOND DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT F.—*Sampling and Testing of Ores.*

1. How would you determine the special character of mine-water?
2. What are the usual tests for copper?
3. How would you test for the presence of nickel and cobalt?
4. Give the special tests for lead.
5. How would you assay a poor galena in a matrix of pyritous quartz?
6. Give the test for manganese by the pyro, also by the wet, process.
7. What are the tests for sulphur as combined with the metals generally?
8. How would you determine the proportion of copper in the oxide; also in its sulphide?
9. Describe the characteristic reactions of zinc.

SUBJECT G.—*Knowledge of Arithmetic and Method of keeping Accounts.*

1. Divide 0·3567 by 0·8434, and extract the cube root of the quotient.

2. If 44 oz. 13 dwt. of gold of 24 carats fine were worth £178 12s., what would be the value of this quantity of gold if it were ony 15·8 carats fine?

3. A pole is 100 ft. long standing vertical; the top of it breaks off without actually parting, and touches the ground on the same level as its base at a distance of 34 ft. from the base: give the length of the two pieces—that is, the perpendicular and hypotenuse.

4. If ore assays before treatment 2 oz. 16 dwt. 5 gr. gold and 16 oz. 2 dwt. 15 gr. silver to the ton, what percentage would be saved from the treatment of 100 tons of ore if only 74·3 per cent. of the gold were saved and 35·9 per cent. of the silver?

5. If 9 men and 5 boys were employed for 14 days 3 hours to do a certain piece of work, the work the men did was equal to $1\frac{1}{13}$ times as much as the boys, how long would it take 15 men to do the same quantity of work?

6. A building is 30 ft. high vertical, but the ground is sloping downwards on a gradient of 1 in 9·3: required the length of a ladder that would reach the top of the building when the bottom was standing on the sloping ground 23 ft. 3½ in. on the slope from the bottom of the wall.

QUESTIONS USED IN EXAMINATION OF MINE MANAGERS FOR FIRST-CLASS CERTIFICATES.

("The Coal-mines Act, 1891.")

FIRST DAY.—TIME: 9 A.M. TO 12 NOON.

SUBJECT I.—*On the Sinking of Shafts and Construction of Main Roadways, Opening-out a Mine, and the Division of a Mine into Districts.*

1. Describe the method of sinking a pit through water-bearing strata, having very soft ground to commence with, giving sketches, and dimensions of the materials you would use for a shaft 14 ft. in diameter.

2. Draw a ground plan showing surface arrangements of an independent average-sized colliery fully equipped—say, for 500 tons per day of eight hours.

3. How would you secure a main drawing road with heavy side-pressure and soft roof? Road of the following dimensions: 8 ft. by 6 ft. in the clear. Give sizes of material used.

4. Explain what is meant by pillar and stall working, and what advantage is there in having the workings laid out in districts.

SUBJECT II.—*The Various Methods adopted in securing Shafts and Workings in a Mine, showing the Relative Advantage and Efficiency of each Class of Material used.*

1. Show (with sketches) some of the various modes of setting timber in a mine, and state the advantages of each.
2. Upon what system would you work a mine liable to spontaneous combustion, and how would you deal with a gob fire in such a mine?
3. What are the chief points to be considered in selecting a system (pillar, stall, or long-wall) in working a coal-seam?
4. How is creep and thurst brought on, and what would you do to prevent it?
5. Describe the mode of working thick coal-seams lying at an angle of over 40 degrees.

FIRST DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT III.—*The Various Methods of hewing and cutting Coal of Different Classes to advantage, and securing the Ground while so engaged.*

1. Make a sketch of a section of stoping showing the arrangements of lifts, &c.; pillars, 30 yards by 20 yards.
2. Sketch and describe fully some methods of working narrow-edge (highly inclined) seams of coal.
3. Do you consider a pillar as strong if it has hard ribs of stone or coal and soft ones alternately as one of uniform density? Give your reasons.
4. Enumerate the circumstances which govern the size of pillars to be left.
5. What rules should be laid down to prevent accidents from falls of roof and shot-firing?

SUBJECT IV.—*The Various Methods of Ventilation, and the Construction of Airways so as to produce a Good Circulation of Fresh Air in any Part of a Mine.*

1. Do changes in the barometer affect the issue of gases in the underground workings of a coal-mine?
2. Describe with sketches the construction of an air-crossing to pass 20,000 cubic feet of air per minute, giving sizes of material used.
3. What precautions are to be taken in laying out the ventilation of a coal-mine, as to length, size, and form of splits, and number of splits, crossings, doors, stopings, &c.
4. Describe with a sketch any furnace or ventilating-fan you are acquainted with, and state its advantages.
5. What methods have been proposed for detecting small quantities of gas in the air of coal-mines?

SECOND DAY.—TIME: 9 A.M. TO 12 NOON.

SUBJECT V.—*On the Areas of Airways, the Velocity and Divisions of Currents, and the Deductions to be made for Friction.*

1. If 6-horse power be required to circulate 20,000 cubic feet of air in a mine, what horse-power must be employed to pass 35,000 cubic feet through it, the airways remaining in the same condition?
2. State the benefits from splitting the air. Where should the splits be to obtain the greatest advantage, and where should they join again?
3. In opening up a new mine where the measures have an average dip of 15°, it is proposed to work three coal-seams. State how you would open the slope and fanway and other openings, and how you would conduct your air-current.
4. What is the most effective method of dealing with firedamp in mines?
5. Upon what does natural ventilation depend; is it reliable, and, if not, why not?

SUBJECT VI.—*On the Nature and Composition of Explosive and Dangerous Gases occurring in Coal-mines, and on Spontaneous Combustion.*

1. After an explosion of firedamp what gases result?
2. Enumerate the noxious gases found in collieries, and state the specific gravity and composition of each.
3. Describe the principle of the safety-lamp, and the construction of one of the safest form.
4. What are the principal nitro-compounds used as explosives, and what methods have been proposed to prevent flame in the use of explosives in collieries?
5. How does spontaneous combustion occur in coal-mines?

SECOND DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT VII.—*On the Drainage of Mines, and Pumping Appliances.*

1. What arrangements are necessary for renewing the wearing parts of mine-pumps and generally for keeping the pit-work in order?
2. Explain by means of ink sketches the difference between a "force" or plunger pump and a "lifting" or bucket pump.
3. What size of pumps and engine would you erect to pump 600 gallons of water per minute from a depth of 720 ft.? Give a general description of the engine you prefer with the principal sizes.

4. Find pressure on a dam 8 ft. wide by 4 ft. high. Head of water 87 yards.
5. Make a simple sketch, and describe the action, of Moore's hydraulic pump or other you are conversant with.

SUBJECT VIII.—*The Haulage on Planes and in Shafts; also the Different Systems of Underground Haulage, with Horse-power required to do the Work.*

1. Find size of ropes and cylinder of engine, and what kind of engine you would use to raise 800 tons of coal per day from a depth of 400 yards. Give the length of stroke of engine, diameter of drum and pulleys, weight of cage, coals, hutches, and rope.
2. Make a neat sketch of a carriage for winding in steep seams, marking on the principal sizes.
3. Describe some form of endless-rope haulage, showing how branches are taken off, hutches conducted round curves, and how fixed to rope, and form of driving-wheel used.
4. Find the resistance in moving a run of five full hutches along a level road if the co-efficient of friction is $\frac{1}{70}$ of the load and each full hutch weighs 16 cwt.
5. What are the different strains a winding-rope is subjected to? How may these strains be averted?

THIRD DAY.—TIME: 9 A.M. TO 12 NOON.

SUBJECT IX.—*The Theoretical and Effective Power of Steam-engines and Boilers; also on the Strength of Hauling-ropes and -chains.*

1. Can you describe the usual appendages to colliery boilers, their utility, and what are the requirements of "The Coal-mines Act, 1891," with reference to them?
2. The area of the piston of a steam-engine is 500 square inches; the mean effective pressure of the steam is 30 lb.; the length of stroke 8 ft., with twenty strokes per minute: required the horse-power.
3. Find the safe working-pressure of a boiler, $\frac{3}{8}$ in. plates, wrought-iron, and 54 in. diameter; also steel—(*a*) single, (*b*) double riveted.
4. Suppose a weight for cage, boxes, &c., and find what size of round rope, crucible steel, you would use for a depth of 600 ft.
5. What size of chain would you use for a lift of 9 tons? Give its weight.

SUBJECT X.—*The Incrustations in Steam-boilers and Cause of same, and the Remedy therefor.*

1. State what are some of the most important duties of a fireman or boiler attendant.
2. What are the causes of internal corrosion in boilers, and how may it be prevented?
3. Enumerate the dangers that may arise through boilers "priming," and how they may be overcome.
4. Describe the action of the Griffiths injector.
5. What is meant by the term "grooving," and in what position is such generally found?

THIRD DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT XI.—*Tapping Water in Mines, and the Mode of constructing Dams in Underground Workings to keep Water back.*

1. What is the pressure on a ram per square inch with a head of 600 ft. of water?
2. Required the total pressure on a 10 ft. by 5 ft. dam placed at bottom of incline drive; length of incline drive, 600 yards, with an average angle of 10° from the horizontal.
3. What are the requirements of the Act with respect to approaching abandoned workings known to contain a body of water?

SUBJECT XII.—*Blasting and Use of Explosives.*

1. What is an explosive? Describe its action.
2. Describe the operation of charging and firing shots in a sinking pit (dynamite and gunpowder).
3. Enumerate the necessary precautions which should be taken in the charging and firing of shots in a dry, dusty mine.

SUBJECT XIII.—*The Effect that Faults produce in Coal-seams, and how to ascertain the Direction of a Coal-seam when severed by a Fault.*

1. Explain by sketches the difference between "synclinal" and "anticlinal," and give an example of an anticlinal fault, and say what is the effect of it in any district you know.
2. Illustrate by sketches in ink the way in which coal-seams are often "thrown" by faults and igneous dykes, and explain the common effect of such faults and dykes upon the adjacent coal.
3. When a seam of coal is cut off by a fault, what operations are necessary to prove the throw?
4. Describe concisely the geology of some coalfield or colliery that you are acquainted with.

FOURTH DAY.—TIME: 9 A.M. TO 12 NOON.

SUBJECT XIV.—*A Knowledge of the Composition and Character of the Different Classes of Coal, and also of the Character of the Rocks and Formation of the Country where Coal is likely to be found.*

1. In what formations is coal found besides the coal-measures? Do such coals differ from those of the Carboniferous period?

2. Describe the general character and structure of a coal-seam and its associated strata.
3. Explain the difference between the terms bituminous, free-burning, smokeless, and brown coals.
4. In what way is geology of use in the art of mining?
5. What is understood by the terms aqueous, sedimentary, and stratified?

SUBJECT XV.—*A Knowledge of Surface and Underground Surveying, and of making Plans, showing System of Working, Inclination of Seam, Faults, and System of Ventilation.*

1. Candidate must produce plan showing the system of working in a colliery with the surface taken up for at least 20 acres in the vicinity of the shaft, and the underground workings in different-coloured ink. He must describe how he would connect them with the surface in the event of there being only one shaft. The levels and main headways must have assumed traverse calculated in detail, and showing latitude and departure for each bearing.
2. Describe fully how you would make an underground survey with the magnetic (loose) needle, and show your method of booking it?
3. The level course of a seam is due east and west, and dips due south at 1 in 5. A road is driven in the seam 45° north-east. What is the gradient?
4. In a shaft there are two seams of coal 39 ft. apart, and dipping 1 in 4½. What length must the drive be to connect the two seams, coming from the bottom seam and rising 1 in 8, and an upthrow fault of 25 ft. lying across the drive?
5. Plot the following bearings: N.E. 10°, 205 links; N.E. 6°, 157 links; N W. 4°, 96 links; N.W. 5°, 103 links; N.W. 89°, 87 links; S.E. 5°, 103 links; S.W. 80°, 205 links; S.E. 45°, 96 links; S.E. 89°, 87 links; S.W. 6°, 157 links. Join the last and first station and give the bearing.

FOURTH DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT XVI.—*A Knowledge of Arithmetic and the Method of keeping Accounts.*

1. A collier has 10s. 3d. per day, and is reduced 12 per cent.: find his fortnight's wages for eleven days after the reduction.
2. How many cubic yards are in a shaft 600 ft. deep and 13 ft. diameter?
3. How many gallons of water will a 12 in. bucket deliver per hour if the stroke is 7 ft. and makes seven strokes per minute; slip, 10 per cent.?
4. Find the square root of ½, and also of 11,025.
5. An oblong pit is 24 ft. by 7 ft.: find diameter of circular shaft to have the same area.

SUBJECT XVII.—*A Knowledge of the Provisions of "The Coal-mines Act, 1891."*

1. Describe the provisions of the Coal-mines Regulation Act—(1) With regard to ventilation; (2) with regard to reporting accidents; (3) with regard to shaft-signals; (4) inspection of shafts; (5) inspection of machinery.
2. What are the principal points to be observed in the management of a fiery mine to comply with the Coal-mines Regulation Act, inspection, fixed stations, use of explosives, &c.? Enumerate all the requirements of the Act with regard to survey and plans.
8. What are the provisions of the Act with regard to fencing abandoned workings, providing refuge-holes, providing second outlet, timbering of roads and places, setting of sprags while undercutting, approaching old workings?

[Supervisor to be good enough to report result of this oral examination.]

QUESTIONS USED IN EXAMINATION OF MINING MANAGERS FOR SECOND-CLASS CERTIFICATES.

("The Coal-mines Act, 1891.")

FIRST DAY.—TIME: 9 A.M. TO 12 NOON.

[Candidates must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT I.—*On the Sinking of Shafts and Construction of Main Roadways, Opening-out of a Mine, and the Division of a Mine into Districts.*

1. Describe the necessary fittings required for the starting of a new shaft, and explain the operation of sinking to the stone head, and kind of timbering you would use in supporting walls of shaft until walling put in.
2. What do you consider a good method of lighting shots in a sinking-shaft; and what precautions are necessary to prevent accident in connection with shot-firing? Give particulars of any improved method of shot-firing of which you have had experience.
3. What means are generally adopted to make sure of getting good solid beds for walling-rings in a sinking-shaft?

SUBJECT II.—*The Various Methods adopted in securing Shafts and Workings in a Mine, showing the Relative Advantages and Efficiency of each Class of Material used.*

1. In putting in brick lining in a shaft, what precautions would you adopt to secure safety of men working on scaffold? State how you would secure scaffold when in use.
2. Sketch set of timber suitable for ground where side pressure very considerable.
3. How would you timber the bottom of a winding-shaft where the roof is strong and sides and floor weak?

4. In what system of working coal are chocks used in preference to prop-wood? What are the advantages of using timber in this form?

5. What fittings are required for relieving the cast-iron tubbing used in shafts from the pressure of water during time the tubbing is being fixed in position?

FIRST DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT III.—*The Various Methods of hewing and cutting Coal of Different Classes to advantage, and securing Ground while so engaged.*

1. Describe the mode of working any seam of coal with which you are acquainted, and show by sketches the position of main level and branch headings.

2. What size pillars would you leave to support shaft 200 yards deep, seam pitching at an angle of 14 degrees?

3. The greater number of accidents are due to falls of roof and sides in working-places. State what, in your opinion, is productive of such accidents, and how they may be prevented.

4. What does the Coal-mines Act require as to the inspection of mines before starting work?

5. What precautions should you take with regard to missed shots?

SUBJECT IV.—*The Various Methods of Ventilation, and the Construction of Airways so as to produce a Good Circulation of Fresh Air in any Part of a Mine.*

1. What size would you make an airway to pass 10,000 cubic feet of air per minute, at a velocity of 4 ft. per second?

2. State your views as to how a mine is affected during a heavy fall of the barometer?

3. What are the most dangerous gases commonly met with in coal-mines? Why are they dangerous? And state which of these you have had most experience of.

4. What is the duty of a manager as regards ventilation, and what is the minimum quantity of air which should circulate per man employed in non-fiery mines?

SECOND DAY.—TIME: 9 A.M. TO 12 NOON.

SUBJECT V.—*On the Area of Airways, the Velocity and Division of Currents, and the Deductions to be made for Friction.*

1. State the general laws relating to the friction of air in mines.

2. What quantity of air per minute will pass through a shaft or circular airway 10 ft. diameter, speed of current being 5 ft. per second?

3. Explain use of water-gauge, and state when it should be fixed to ascertain the drag of the mine.

4. Sketch air-crossing or bridge for carrying main return over the intake airway: say how you would construct such, and material to be employed.

5. Have you any knowledge of the construction of "ventilating-fans"? Describe such a fan as you may have had experience of.

SUBJECT VI.—*On the Nature and Composition of Explosives and Dangerous Gases occurring in Coal-mines, and on Spontaneous Combustion.*

1. Describe the best type of safety-lamp of which you have had experience.

2. Have you any knowledge of high explosives in use in coal-mines? Describe such, and give composition.

3. In what position would you expect to find black-damp or carbonic acid in a coal-mine, and what are the causes tending to the production of this gas?

4. Have you had experience of underground fires? If so, describe what, in your opinion, led up to the firing; and state generally your views as to spontaneous combustion, and best means of dealing with a mine so circumstanced.

SECOND DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT VII.—*On the Drainage of Mines, and Pumping Appliances.*

1. What are the conditions which would decide you to wind the water from a shaft, in preference to pumping?

2. What are the conditions rendering the fixing of a direct-acting pump at shaft-bottom preferable to putting a pumping-engine at surface?

3. A shaft 100 fathoms, from which it is required to pump 100 gallons per minute, the engine being placed on surface: how many lifts would you apply? and sketch arrangement where lifts junction.

4. Give your experience of the erection and working of pumping appliances.

SUBJECT VIII.—*The Haulage on Planes and in Shafts; also Different Systems of Underground Haulage, with Horse-power required to do the Work; also on Strength of Hauling-rope and -chains.*

1. What do you consider the most easily applied and generally useful application of rope-haulage? Give your experience, and describe fully means of attaching the tubs to rope, also arrangement of tension.

2. Give sketch of a useful form of drum for use in lowering coal on self-acting inclines, feeding the main haulage-road.

3. On an incline having a grade of 1 in 5, and 40 chains long, it is required to lower 12 tubs in a race, the weight of coal being 6 tons, empties weighing 6 cwt. Give particulars of the drum you would erect, size of rope, and general arrangement of incline with passing-place.

THIRD DAY.—TIME: 9 A.M. TO 12 NOON.

SUBJECT IX.—*Tapping Water in Mines, and Mode of constructing Dams in Underground Workings to keep Water back.*

1. Being required to drive towards old workings known to contain a large body of water, what special precaution would you adopt in order to prevent accident? Give fully your reasons for the precautions you would adopt.

2. If required to fix dam to keep back water, what are the conditions which you would try to secure in the site where dam to be fixed? Sketch form of suitable dam to resist a head of 150 ft., and material used in its construction.

3. Suppose water to exist in old workings adjacent to mine in which you are engaged, what thickness of barrier would you leave and through which water could be run off?

SUBJECT X.—*Blasting, and the Use of Explosives.*

1. Give your experience of explosives other than powder, and detail their advantages or otherwise.

2. What are the objections to powder in fiery mines?

3. Have you experience of the system of water-cartridge in use in some mines?

4. What rules should be observed as regards shot-firing in mines giving off gas, in order to minimise accident?

LIST OF MINING MANAGERS, BATTERY-SUPERINTENDENTS, AND ENGINE-DRIVERS WHO HAVE OBTAINED CERTIFICATES UNDER THE MINING AND COAL-MINES ACTS OF 1886, 1891, AND 1894.

As there have been several inquiries made as to the names of persons who hold certificates as mine-managers and engine-drivers, the annexed is a complete list of those holding certificates at the date of this report, taken from the register:—

THE MINING ACT.

FIRST-CLASS SERVICE CERTIFICATES.

Issued under "The Mining Act, 1886," without Examination.

Adams, H. H., Waiorongomai.
Anderson, P., Thames.
Andrews, T., Thames.
Barclay, T. H., Thames.
Bennett, J., Alexandra.
Benney, J., Coromandel.
Black, T., Waiomai.
Bollersley, N., Boatman's.
Bradbury, M., Reefton.
Bray, John, Lyell.
Burch, W. H., Thames.
Byrne, J. F., Stafford.
Cameron, A., Macetown.
Cameron, E., Te Aroha.
Chapman, J. A., Dunedin.
Clarke, G. S., Thames.
Comer, R., Thames.
Conradson, M., Thames.
Cornes, C. A., Karangahake.
Coutts, J., Thames.
Crawford, T. H., Thames.
Crowley, C., Reefton.
Cummings, W., Reefton.
Davis, J. E., Queenstown.
Davey, C., Ross.
Donald, J., Cromwell.
Dunlop, T. A., Thames.
Edwards, J., Skipper's.
Elliott, J., Macetown.
Evans, F., Skipper's.
Evans, J. H., Skipper's.
Fitzmaurice, R., Reefton.
Frewen, J.B., Queenstown.
Gavin, T., Te Aroha.
Gilbert, J., Reefton.
Gilmour, T., Thames.
Giles, G. F., West Wanganui.
Glass, W. M., Naseby.
Goldsworthy, J., Waiorongomai.
Greenish, J., Reefton.
Greenville, W., Ohinemuri.
Hansen, P. C., Thames.
Harris, J., Owen's Reefs.
Harrison, R. H., Coromandel.
Hilton, G. P., Bendigo.
Hodge, F., Coromandel.
Hollis, W., Thames.
Hunter, R., Thames.
James, F., Thames.
Jamieson, A., Coromandel.
Jenkins, M., Wakatipu.
Johnstone, H., Bluespur.
Julian, J., Boatman's.
Kelly, J., Lyell.
Kerr, J., Thames.
Lawn, E., Black's Point.
Lawn, H., Boatman's.
Lawn, J., Reefton.
Littlejohn, W., Karangahake.
Lowe, E. W., Thames.
Malfroy, J. M. C., Ross.
Martin, W. G., Thames.
McCullum, J., Reefton.
McCullough, R., Thames.
McGruer, N., Karangahake.
McIntosh, D., Bluespur.
McKay, J., Ross.
McKenney, J., Reefton.
McKenzie, W., Thames.
McLiver, H., Thames.
McMaster, J., Reefton.
Moore, H. W., Thames.
Morgan, R., Otago.
Morrisby, A. A., Glenorchy.
Nasmyth, T., Reefton.
Newman, W., Naseby.
Northey, J., Thames.
O'Sullivan, D. E., Thames.
Polton, A., Karangahake.
Porter, J., Waipori.
Purvis, G., Ross.
Quinn, E., Te Aroha.
Radford, T., Thames.
Ralph, J. G., Thames.
Ranger, J., Reefton.
Rasmussen, C. L., Mokihinui.
Rasmussen, C. P., Mokihinui.
Reid, P., Coromandel.
Resta, L., Macetown.
Roberts, E., Ross.
Rooney, F., Reefton.
Scott, T., Waiorongomai.
Searight, A., Reefton.
Senior, J., Thames.
Smith, J. E., Thames.
Stone, F., Karangahake.
Steedman, J. B., Thames.
Sturm, A., Waipori.
Taylor, N., Thames.
Todd, C., Heriot.
Treloer, J. S., Reefton.
Tripp, R. S., Arrowtown.
Vivian, J. G., Thames.
Vivian, S., Reefton.
Walker, J. W., Thames.
Watson, T., Reefton.
Wearne, J. E., Endeavour Inlet.
Wilcox, J., Thames.
Williams, J., Skipper's.
Wright, G., Boatman's.
Wylie, W., Ross.
Young, G., Skipper's.

First-class Mine-managers' Certificates, issued after Examination, under "The Mining Act, 1886," and Amendment Acts.

Adams, B., Thames.
Baker, W., Thames.
Black, G., Reefton.
Caples, P. Q., Reefton.
Casley, G., Reefton.
Cochrane, D. L., Reefton.
Coombe, J., Reefton.
Crawford, J. J., Thames.
Cummings, W., Reefton.
Donaldson, W., Otago.
Fleming, M., Thames.
Gardner, W. P., Reefton.
Harris, W., Thames.
Horn, G. W., Thames.
Horne, W., Coromandel.
Hornick, M., Thames.
Hosking, G. F., Auckland.
Kruizenza, W., Reefton.
Lawn, T., Reefton.
Logan, H. F., Wellington.
Mangan, T., Thames.
Mouat, W. G., Dunedin.
Truscott, G., Thames.
Watkins, C. E., Reefton.
Wilkie, J., Reefton.

First-class Mine-manager's Certificate, issued on Production of Certificate from a recognised Authority outside the Colony, under "The Mining Act, 1886," and "The Mining Act, 1891."

Argall, W. H., Coromandel.
Beckwith, L. H., Wellington.
Datson, J., Manaia.
Goold, A. L., Auckland.
Griffiths, A. P., Auckland.
Griffiths, H. P., Auckland.
Hailey, R. C., Dunedin.
Williams, W. H., Auckland.

First-class Mine-manager's Certificate, issued to Inspector of Mines by virtue of his Office, under "The Mining Act, 1886."

Binns, G. J., Dunedin.

First-class Mine-managers' Certificates, issued after Examination, under "The Mining Act, 1891."

Agnew, J. A., Thames.
Annear, William, Reefton.
Bennett, E. P., Thames.
Boydell, H. C., Coromandel.
Bray, E., Thames.
Bruce, Malcolm, Thames.
Carroll, J., Lyell.
Cartwright, E., Thames.
Crabb, J., Reefton.
Dobson, J. A., Auckland.
Evans, H. A., Wellington.
Fahey, P., Reefton.
Flannigan, Francis, Reefton.
Gilmour, J. L., Thames.
Hodge, J. H., Thames.
James, T., Thames.
Keane, P. E., Thames.
Lane, J., Reefton.
Lawn, C. H., Capleston.
Linck, F. W., Thames.
Marshall, F., Reefton.
Morrison, R., Thames.
McDermott, J., Thames.
McDermott, G., Thames.
McDermott, W., Thames.
McGregor, W. T., Thames.
McKenzie, H. J., Coromandel.
McPeake, J., Thames.
O'Keeffe, M. D., Thames.
Paul, Matthew, Thames.
Paltridge, Henry, Thames.
Prince, F. H., Reefton.
Robertson, D. B., Stafford.
Ross, Richard, Thames.
Shepherd, H. F., Thames.
Stanford, W. J., Macetown.
Steedman, J. G., Thames.
Sutherland, Benjamin, Reefton.
Tierney, R., Thames.
Vialoux, F., Coromandel.
Warne, George, Thames.
White, G. H., Thames.
Whitley, A., Thames.
Williams, C., Capleston.

Second-class Mine-manager's Certificates, issued after Examination, under "The Mining Act, 1891."

Christie, William, Waitekauri.
Draffin, S., Waitekauri.
Dunkin, T., Coromandel.
Evans, H. A., Skipper's.
Gatland, V. Y., Coromandel.
McNeil, A. H., Coromandel.
White, G. H., Thames.

SECOND-CLASS SERVICE CERTIFICATES AS MINE-MANAGERS.

Issued under "The Mining Act, 1891."

Adams, W. J., Thames.
Agnew, J. A., Coromandel.
Allen, Richard, Reefton.
Argall, A. E., Coromandel.
Bennett, C. H., Coromandel.
Begley, Thomas, Reefton.
Beard, W. T., Reefton.
Bone, William, Reefton.
Bowler, John, Thames.
Blair, Thomas, Kuaotunu.
Bray, Edwin, Reefton.
Brownlee, Thomas James, Thames.
Brokenshire, James, Thames.
Bolitho, James, Reefton.
Brown, John, Macrae's.
Bremner, John, Coromandel.
Borlase, J. H., Capleston.
Bunny, Joseph, Thames.
Byrne, John, Karangahake.
Caird, Alexander McNeil, Reefton.
Campbell, J., Kuaotunu.
Climo, Noah, Coromandel.
Comer, George, Thames.
Cowan, Hugh, Kuaotunu.
Corbett, T., Paeroa.
Comer, W. W., Thames.
Crabb, Thomas, Reefton.
Daniel, P. F., Greymouth.
Dobson, John Allen, Kuaotunu.
Edwards, George, Westport.
Ellery, John, Reefton.
Flannigan, Francis, Reefton.
Foster, Thomas, Wellington.
Gale, C. W., Coromandel.
Gill, George, Thames.
Glasgow, T. M., Thames.
Goldsworthy, Henry, Thames.
Govan, Joseph, Thames.
Griffin, Patrick, Thames.
Grimmond, Joseph, Ross.
Goldsworthy, William, Mauku, Auckland.
Gemmings, Charles, Thames.
Gribble, James, Norsewood.
Guthrie, John, Wellington.
Guy, Robert, Kuaotunu.
Harvey, William, Reefton.
Hardman, James Edward, Thames.
Hetherington, William, Thames.
Hill, Alex. Grey, Waikakaho.
Hore, John, Wellington.
Hollis, Fred. J., Waihi.
Hornibrook, H. P., Kuaotunu.
Jamieson, John, Reefton.
Johnstone, William, Collingwood.
Jobe, James, Thames.
Johns, Thomas, Thames.
Kendall, Henry, Thames.
Kerr, George, Kamo.
Kirker, Thomas, Thames.
Laughlin, David, Thames.
Law, John, Thames.
Loughlin, S., Thames.
McLean, James, Thames.
McLean, Alex., Coromandel.
McLean, Charles, Thames.
McCormick, Charles, Coromandel.
McQuillan, John, Reefton.
McNeill, Daniel, Thames.
McNeill, George, Upper Kuaotunu.
McCombie, John, Karangahake.
McEwen, James, Reefton.
McLoghry, Archibald, Karangahake.
Mackay, William, Nenthorn.
Martin, James, Reefton.
Meagher, John, Karangahake.
Mills, George, Thames.
Mayn, John, Coromandel.
Martin, David, Black's Point.
Morgan, William, Upper Thames.
Moorecroft, Thomas, Thames.
Milne, John, Thames.
Moyle, Thomas, Thames.
Naysmith, James, Reefton.
Newdick, Alfred, Thames.
Notman, Alexander, Reefton.
O'Keefe, M. W. D., Thames.
Page, John, Lyell.
Parkiss, Jos, W., Reefton.
Potts, W. H., Thames.
Primrose, J., Kuaotunu.
Pettigrew, Robert, Sydney.
Peebles, Alexander, Kuaotunu.
Pollock, John, Thames.
Rabe, Henry, Thames.
Reid, Thomas Groat, Thames.
Richard, John, Thames.
Richards, A. H., Kuaotunu.
Radford, Thomas, Thames.
Rogers, Charles Henry, Reefton.
Rogers, William Henry, Kumara.
Ross, J., Thames.
Rowe, James, Thames.
Shaw, James, Karangahake.
Sligo, Alex., Nenthorn.
Thomas, James, Thames.
Thomas, A., Thames.
Thomson, John, Dunedin.
Tregellas, James, Reefton.
Tregoweth, William, Thames.
Wells, Charles Lewis, Thames.
Willets, Henry, Thames.
Williams, James, Thames.
Williams, John, Thames.
Whisker, Charles, Thames.
White, John S., Karangahake.
Wilson, James R. S., Kuaotunu.
Wilson, J. G., Thames.
Woolcock, James, Thames.
Worth, Robert, Waihi.

ENGINE-DRIVERS' SERVICE CERTIFICATES.

Issued under "The Mining Act, 1891."

Audley, F., Coromandel.
Battens, H., Coromandel.
Black, C., Reefton.
Black, G. J., Reefton.
Bridson, Mat. J., Thames.
Casley, J., Thames.
Clerkin, F., Reefton.
Crabb, J., Reefton.
Crofts, J. W., Skipper's.
Cook, W., Thames.
Craig, D., Thames.
Davies, T., Thames.
Dunstan, J., Thames.
Faithful, William, sen., Cromwell.
Faithful, William, jun., Cromwell.
FitzMaurice, Raymond, Reefton.
Grundy, T., Thames.
Harrison, R. H., Kuaotunu.
Hope, J. S., Waitekauri.
Hufton, George, Reefton.
Ivey, R., Thames.
Latimer, Alfred, Dunedin.
Lamberton, J., Reefton.
Lawn, E., Reefton.
McLean, J., Reefton.
Milne, S., Coromandel.
Murphy, A. R., Queenstown.
Morton, C., Thames.
Patterson, D., Reefton.
Patten, A. C., Reefton.
Phillips, W. H., Thames.
Ryan, J. P., Coromandel.
Roche, H., Thames.
Saunders, William, Reefton.
Smith, R., Thames.
Skilton, A. G., Westport.
Sullivan, W., Coromandel.
Titley, A. W., Black's Point.
Walding, J., sen., Coromandel.
Walding, J., jun., Coromandel.
Warne, G., Thames.
Wishart, R., Thames.
Wood, A., Thames.

Engine-drivers' Certificates, issued after Examination, under "The Mining Act, 1891."

Allen, A., Thames.
Auld, James, Reefton.
Blackadder, D., Reefton.
Cook, S., Fairfield.
Daldy, E. A., Coromandel.
Dunstan, I., Waihi.
Elliston, A. J., Reefton.
Lawn, C. H., Capleston.
McAuley, T., Reefton (for water).
Ross, M., Reefton.
Slowey, William, Reefton.
Wilson, F. H., Thames.
Wynn, M., jun., Reefton (for water).

THE COAL-MINES ACT.

FIRST-CLASS MINE-MANAGERS' CERTIFICATES.

Issued under the Coal-mines Acts, 1886 and 1891.

Aitken, T., Wendon.
Alexander, T., Brunnerton.
Austin, J., Sheffield.
Bishop, J., Brunnerton.
Brown, T., Westport.
Brown, T., Glentunnel.
Cameron, J., Denniston.
Campbell, J. C., Fairfield.
Collins, W., Taupiri.
Dando, M., Brunnerton.
Elliott, R., Wallsend.
Ferguson, A., Whitecliffs.
Freeman, J., Green Island.
Geary, J., Kamo.
Gray, J., Abbotsford.
Harrison, J., Brunnerton.
Irving, J., Kaitangata.
Jemison, W., Waimangaroa.
Kenyon, J., Shag Point.
Kerr, G., Kamo.
Lindop, A. B., Springfield.
Lindsay, W., Otago.
Lloyd, J., Invercargill.
Louden, J., Green Island.
Love, A., Whangarei.
Mason, J., Nightcaps.
May, J., Greymouth.
Moody, T. P., Kawakawa.
Moore, W. J., Springfield.
Nelson, J., Green Island.
Ord, J., Huntly.
Redshaw, W., Whangarei.
Reed, F., Westport.
Richardson, D., Abbotsford.
Shore, J., Kaitangata.
Shore, T., Orepuki.
Shore, W. M., Kaitangata.
Smart, W., Christchurch.
Smith, A. E., Nelson.
Smith, T. F., Nelson.
Sneddon, J., Mosgiel.
Swinbanks, J., Kawakawa.
Taylor, E. B., Huntly.
Thompson, A., Whitecliffs.
Walker, J., Collingwood.
Williams, W. H., Shag Point.

Certificates issued after Examination under the Coal-mines Acts, 1886 and 1891.

First-class.

Armitage, F. W., Auckland.
Armstrong, J., Brunnerton.
Barclay, T., Kaitangata.
Carson, W., Kaitangata.
Coulthard, J., Taylorville.
Dixon, W., jun., Kaitangata.
Dunn, W., Brunnerton.
Fleming, J., Kaitangata.
Gibson, John, Westport

First-class.

Gillanders, A., Shag Point.
Green, E. R., Abbotsford.
Green, J., Brunnerton.
Herd, J., Brunnerton.
Hosking, G. F., Auckland.
Jebson, D., Canterbury.
Leitch, J., Blackball.
McCormack, W., Denniston.
Milligan, N., Thames.
Murray, F., Westport.
Newsome, F., Denniston.
Tattley, E. W., Huntly.

Second-class.

Barclay, T., Kaitangata.
Dixon, W., jun., Kaitangata.
Harris, A., Saddle Hill.
Lindsay, J. B., Orepuki.
Snow, T., Mercer.

Mine-managers' Certificates, issued on Production of English Certificate, under "The Coal-mines Act, 1886."

Binns, G. J., Dunedin.
Black, T. H., Waipori.
Broome, G. H., Ngakawau.
Cater, T., Auckland.
Cochrane, N. D., Dunedin.
Garrett, J. H., Auckland.
Hayes, J., Kaitangata.
Hodgson, J .W., Ross.
Macalister, J., Invercargill.
Nimmo, J., Oamaru.
Straw, M., Westport.
Tattley, W., Auckland.

First-class Mine-managers' Certificates, issued to Inspectors of Mines by virtue of Office, under the Mining Acts and the Coal-mines Acts.

Cochrane, N. D., Westport.
Coutts, J., Wellington.
Gordon, H. A., Wellington.
Gow, J., Dunedin.
McLaren, J. M., Thames.
Wilson, G., Thames.

Mine-managers' Certificates, issued on Production of English Certificate, under "The Coal-mines Act, 1891.'

Alison, R., Greymouth.
Frame, Joseph, Kaitangata.
Irvine, James, Dunedin.
Jordan, R. S., Kaitangata.
Lewis, W., Blackball.
Pollock, James, Green Island, Otago.
Proud, Joseph, Wanganui.
Scott, Joseph, Ngahere.
Tennent, R., Brunnerton.
Wright, E. S., Auckland.

SECOND-CLASS MINE-MANAGERS' SERVICE CERTIFICATES.

Issued under "The Coal-mines Act, 1891."

Carson, M., Kaitangata.
Collier, Levi, Kamo.
Clarke, Edward, Shag Point.
Elliot, Joseph, Coal Creek.
Harris, John, Denniston.
Herd, Joseph, Brunnerton.
Howie, James, Kaitangata.
Leeming, William, Whitecliffs.
Lobb, Joseph, Mokau.
Love, Alexander, Orepuki.
McIntosh, Allan, Shag Point.
Marshall, J., Ngakawau.
Murray, Thomas, Denniston.
Nimmo, George Stewart, Ngapara.
Radcliffe, William, Reefton.
Roberts, John, Brunnerton.
Ross, John, Kawakawa.
Sara, James, Reefton.
Smith, Charles, Whangarei.
Thomas, James, Springfield.
Wallace, William, Huntly.
Willetts, John, Papakaio.
Willetts, John Morris, Papakaio.
Young, William, Waimangaroa.

ENGINE-DRIVERS' CERTIFICATES.

Issued under "The Coal-mines Act, 1886."

Bainbridge, William, Brunnerton.
Beirn, William H., Kaitangata.
Clark, A., Kaitangata.
Davidson, Robert, Walton Park.
Elliott, R., Denniston.
Eltringham, Stephen, Greymouth.
Foote, Thomas, Miranda.
Gall, Adam, Huntly.
Gill, Robert, Shag Point.
Gillies, D., Walton Park.
Girven, Adam, Kawakawa.
Grundy, Walter, Kamo.
Gibson, J., Denniston.
Gray, G. A., Kaitangata.
Harrison, C. F. R., Huntly.
Hazeldene, T., Denniston.
Hartley, H., Huntly.
Henderson, J., Huntly.
Hetherington, R., Huntly.
Howie, William, Walton Park.
Kelly, Peter, Kaitangata.
Leisham, G., Denniston.
Marriott, T., Huntly.
Mason, J., Springfield.
Muir, T., Huntly.
Moore, Luke Martin, Brunnerton.
McFarlane, Henry, Miranda.
McGarry, James, Brunnerton.
McGregor, Duncan, Stirling.
McIntosh, Donald, Allandale.
McVie, John, Walton Park.
O'Neil, J., Denniston.
Porter, H. R., Huntly.
Ryan, T., Huntly.
Sampson, J., Huntly.
Saunders, J., Denniston.
Shore, Joseph, Kaitangata.
Skilton, F. G., Denniston.
Skellern, R., Huntly.
Smith, J., Denniston.
Southall, James, Brunnerton.
Thomas, William, Kamo.
Troughhear, Robert, Dobson.
Turner, Henry, Kawakawa.
Vincent, James, Miranda.
Wearn, Alfred, Boatman's.
Wearn, James, Wallsend.
Williams, Llewellyn, Kawakawa.
Woods, William, Kawakawa.
Williams, F. A., Shag Point.

ENGINE-DRIVERS' SERVICE CERTIFICATES.

Issued under "The Coal-mines Act, 1891."

Archibald, W., Kaitangata.
Barlow, William John, Shag Point.
Boag, John, Shag Point.
Forrestor, Robert, Kaitangata.
Girvan, R., Kawakawa.
Greening, Luke, Springfield.
Johnstone, R. N., Kaitangata.
McVie, Gavin, Kaitangata.
Milburn, Edward, Westport.
Park, John A., Huntly.
Prentice, J., Shag Point.
Rixon, William E., Shag Point.
Todd, William, Dunedin.
Webb, Peter Oliver, Nightcaps.

Engine-drivers' Certificates, issued after Examination, under "The Coal-mines Act, 1891."

Johnston, W. P., Kaitangata.
Marshall, D., Kaitangata.
Napier, A. T., Kaitangata.
Shearer, W., Huntly.

BATTERY-SUPERINTENDENTS' CERTIFICATES.

Issued under "The Mining Act 1891 Amendment Act, 1894," without undergoing Examination.

Adams, H. H., Waihi.
Banks, Edwin Gripper, Waihi.
Barry, Hubert Percy, Waihi.
Goldsworthy, Henry, Kuaotunu.
Goldsworthy, John, Kuaotunu.
Greenway, H. Howard, Auckland.
Heard, G. St. Clair, Waihi.
Hope, John S., Waitekauri.
Hutchison, William, Karangahake.
Margetts, Frederick Ernest, Kuaotunu.
Merlett, Richard Sheridan, Waitekauri.
Napier, James, Karangahake.
Noble, James R., Karangahake.
Park, James, Thames.
Shepherd, Henry Franklin, Waihi.
Walker, James A., Kuaotunu.
Wilson, Arthur E., Waihi.
Wilson, James Kitchener, Auckland.

Battery-superintendents' Certificates, issued after Examination, under "The Mining Act 1891 Amendment Act, 1894."

Adams, A. A., Thames.
Allen, F. B., Thames.
Allom, H. O., Thames.
Ansley, Comyn, Paeroa.
Bowers, W., Thames.
McMicken, S. D., Thames.
McKenzie, H. J., Thames.
Morgan, P. G., Thames.
Morrin, W. S., Thames.
Robinson, J. R., Waitekauri.
Taylor, C. H., Tararu.
Thorpe, A. H., Thames.

WINDING-ENGINE DRIVERS' CERTIFICATES OF COMPETENCY.

Issued under "The Inspection of Machinery Act 1882 Amendment Act, 1894."

Aickin, Charles James.
Allen, William John.
Bainbridge, Henry.
Bentley, John Daniel.
Bickford, Charles Frederick.
Bolitho, James.
Bowman, Charles Henry.
Budge, George Symons.
Burgess, Benjamin.
Buxton, Harry Arthur.
Bydder, Charles Alfred.
Cathey, Alexander.
Chamberlain, Charles.
Cheverton, George Henry.
Christian, Herbert.
Coad, Albert.
Colligan, John.
Copeland, Joseph Barlow.
Cowie, Alexander.
Cunningham, George.
Dawson, William.
Dodd, William.
Eustace, Charles Henry.
Fraser, Theodore Tinne.
Greenway, George.
Harkins, William.
Henry, Francis.
Highet, John.
Hill, Benjamin.
Hughes, William Henry.
Hunter, George.
Jenkinson, Alfred.
Johnson, Thomas.
Jones, Hugh Pughe.
Kay, John.
Kelly, Peter George.
Lamb, Edward.
Langford, Samuel George.
Lawle, James.
Lennox, James Fisher.
Letcher, John Henry.
Lovatt, Charles Robert.
Lyons, John.
Mackie, Edward Morrison.
Maloney, James Joseph.
Martin, Thomas.
Mussicks, John Jackson.
McAnulty, William.
McAuley, Thomas.
McFarlane, Robert John.
McIntosh, John.
McIntyre, James.
McLean, Arthur Charles.
McLelland, James.
McMahan, Timothy.
Norris, John William.
Parker, Daniel.
Provan, Andrew.
Radford, Thomas.
Rayner, Alfred Edward.
Roach, Thomas Jenkin.
Robertson, John.
Roering, Franz.
Ryan, John Patrick.
Sargent, Henry.
Saunders, William Henry.
Schmetzer, Percy Carl.
Scobbie, George.
Scott, Walter George.
Seawright, Robert E. E. M.
Shortt, Edward.
Sinclair, George.
Skelton, John.
Slater, William.
Smith, Walter.
Snow, John George.
Taylor, Alfred Edward.
Thwaites, William.
Tills, Charles.
Todd, James.
Trembath, John.
Turner, George Frederick.
Wearne, Jaketh Joseph.
Welby, Amos Walter.
Williams, Francis.
Williams, Reece.
Wilson, Daniel.
Wilson, John.
Wray, John.
Wylan, John.

WINDING-ENGINE DRIVERS' SERVICE CERTIFICATES.

Issued under "The Inspection of Machinery Act 1882 Amendment Act, 1894."

Boswell, James.
Broomfield, Charles Jones.
Bruggy, Patrick M.
Buchan, George A.
Burk, Thomas.
Cassidy, James.
Clarke, George.
Collier, Levi.
Coutts, John.
Cummock, John.
Elmore, William H.
Ford, Arthur S.
Griffin, Jonathan.
Kennedy, Edward Thomas.
Leece, Henry S.
Lindsay, Robert.
McCormick, John.
McKenzie, John.
McMillan, William.
McQuade, Richard C.
Porch, John James.
Robinson, John.
Sachirthal, Edward.
Soppet, Frederic W.
Thomson, James.
Walsh, Patrick.
White, Alexander.
Wilson, James William.

SUMMARY OF WORKS CONSTRUCTED.

The following statement shows the whole of the different classes of works constructed by the department, either by direct grants or by subsidies to local bodies, during the last sixteen years (the votes for this purpose having been under the control of the Hon. the Minister of Mines), for the purpose of opening up the mineral belts throughout the colony, and also for the development of the mining industry:—

Nature of Works.	Total Cost of Construction, or Amount authorised to be expended.	Expenditure, by way of Subsidy or otherwise, by Mines Department.	Amount of Liability by Mines Department on Works in Progress.
UP TO YEARS 1882–83 AND 1883–84.	£ s. d.	£ s. d.	£ s. d.
Water-races	29,252 1 11	14,853 9 5	14,398 11 6
Roads on goldfields	21,437 11 2	13,089 16 0	8,347 15 2
Roads and tracks undertaken by County Councils, subsidised by Mines Department	52,841 17 0	21,844 16 7	10,207 15 9
Works undertaken by prospecting associations, subsidised by Mines Department	13,216 13 4	3,350 0 0	3,400 0 0
Construction of drainage- and sludge-channels, subsidised by Mines Department	5,750 0 0	2,468 15 4	781 4 8
	122,498 3 5	55,606 17 4	37,135 7 1
1884–85.			
Water-races	4,846 1 9	14,596 2 9	4,648 11 6
Roads on goldfields	13,667 10 1	9,630 9 6	12,384 15 9
Roads and tracks undertaken by County Councils, subsidised by Mines Department	13,566 14 1	6,293 16 6	12,739 17 6
Roads to mines, other than gold, subsidised by Mines Department	4,594 10 0	111 19 0	2,888 1 0
Works undertaken by prospecting associations, subsidised by Mines Department	850 0 0	108 0 0	3,692 0 0
Construction of drainage- and sludge-channels, subsidised by Mines Department	4,050 0 0	1,050 0 0	1,931 4 8
Diamond and other drills	3,600 0 0	1,858 0 0	..
	45,174 15 11	33,648 7 0	38,284 10 5
1885–86.			
Water-races	3,660 4 9	6,063 2 3	6,964 4 4
Roads on goldfields	27,543 18 8	12,360 14 9	27,567 19 8
Roads undertaken by County Councils, subsidised by Mines Department	14,773 2 3	13,043 15 9	12,477 9 2
Roads to mines, other than gold, subsidised by Mines Department	1,551 19 10	4,327 0 10	490 12 8
Works undertaken by prospecting associations, subsidised by Mines Department	11,860 18 0	1,999 5 7	6,389 5 9
Construction of drainage- and sludge-channels, subsidised by Mines Department	10,051 14 9	3,994 16 6	6,995 9 9
Schools of Mines	2,160 9 7	1,260 9 7	900 0 0
	71,602 7 10	43,049 5 3	61,785 1 4

SUMMARY OF WORKS CONSTRUCTED—*continued.*

Nature of Works.	Total Cost of Construction, or Amount authorised to be expended.	Expenditure, by way of Subsidy or otherwise, by Mines Department.	Amount of Liability by Mines Department on Works in Progress.
1886–87.	£ s. d.	£ s. d.	£ s. d.
Water-races	..	1,928 14 4	3,466 0 8
Roads on goldfields	12,453 3 5	22,229 16 1	17,791 7 0
Roads and tracks undertaken by County Councils, subsidised by Mines Department	12,613 4 8	7,415 19 6	10,455 1 5
Roads to mines, other than gold, subsidised by Mines Department	..	306 1 0	110 13 1
Works undertaken by prospecting associations and companies, subsidised by Mines Department	15,671 19 6	4,521 7 3	4,618 4 7
Construction of drainage- and sludge-channels, subsidised by Mines Department	5,549 14 6	6,207 18 0	672 6 10
Diamond and other drills	422 15 6	422 15 6	..
Schools of Mines	3,183 7 1	3,383 7 1	700 0 0
	49,894 4 8	46,415 18 9	37,813 13 7
1887–88.			
Water-races	6 6 6	6 6 6	..
Roads on goldfields	6,860 4 3	17,281 11 3	7,370 0 0
Roads and tracks undertaken by County Councils, subsidised by Mines Department	2,998 15 0	8,012 5 2	3,942 4 2
Roads to mines, other than gold, subsidised by Mines Department	..	14 5 4	..
Works undertaken by prospecting associations and companies, subsidised by Mines Department	6,456 8 0	2,703 19 3	924 8 0
Construction of drainage- and sludge-channels, subsidised by Mines Department	..	1,110 4 11	2,054 10 6
Schools of Mines	1,859 3 7	2,221 19 4	337 4 3
Aids to treatment of ores	1,200 0 0	390 18 3	209 1 9
	19,380 17 4	31,741 10 0	14,837 8 8
1888–89.			
Roads on goldfields	10,253 5 3	4,304 3 9	13,218 11 6
Roads and tracks undertaken by County Councils, subsidised by Mines Department	7,318 1 0	2,466 16 8	5,195 6 1
Works undertaken by prospecting associations and companies, subsidised by Mines Department	474 0 0	236 0 0	687 8 0
Construction of drainage- and sludge-channels, subsidised by Mines Department	..	54 10 6	..
Wharves, contributions by Mines Department	589 19 5	96 6 0	343 13 5
Aids to treatment of ores, subsidised	..	209 1 9	..
Schools of Mines	895 16 10	1,188 6 10	44 14 3
	19,531 2 6	8,555 5 6	19,489 13 3
1889–90.			
Roads on goldfields	3,834 9 7	9,148 5 9	8,005 5 4
Roads and tracks undertaken by County Councils, subsidised by Mines Department	8,507 15 8	3,451 17 11	5,928 1 3
Works undertaken by prospecting associations and companies, subsidised by Mines Department	..	..	663 0 0
Water-races	2,200 0 0	719 0 0	681 0 0
Wharves	..	150 0 0	193 13 5
Schools of Mines	1,040 0 8	1,034 0 11	50 14 0
Aids to treatment of ores	142 8 9	142 8 9	..
Tracks to open up mineral lands	1,000 0 0	207 3 6	792 16 6
Diamond drills	425 14 5	425 14 5	..
	17,150 9 1	15,278 11 3	16,314 10 6
1890–91.			
Roads on goldfields	8,811 14 4	10,815 14 8	5,201 5 0
Roads and tracks undertaken by County Councils, subsidised by Mines Department	2,703 5 0	2,252 5 5	5,027 8 4
Works undertaken by prospecting associations and companies, subsidised by Mines Department	..	..	663 0 0
Water-races	5,542 19 8	6,234 4 6	..
Wharves	..	39 9 9	..
Schools of Mines	3,847 10 0	3,898 4 0	..
Tracks to open up mineral lands	..	78 4 7	419 19 5
	20,905 9 0	23,319 2 11	11,311 12 9
1891–92.			
Roads on goldfields	14,226 5 1	8,460 0 3	11,767 9 10
Roads and tracks undertaken by County Councils, subsidised by Mines Department	3,162 0 0	1,720 18 6	4,937 10 2
Works undertaken by prospecting associations and companies, subsidised by Mines Department	1,455 5 5	336 15 9	1,663 0 0
Water-races	2,256 13 6	2,256 13 6	..
Wharves	..	..	..
Schools of Mines	1,370 19 9	1,370 19 9	..
Tracks to open up mineral lands	40 0 0	41 16 0	418 3 7
	22,511 3 9	14,187 3 9	18,786 3 7

SUMMARY OF WORKS CONSTRUCTED—*continued.*

Nature of Works.	Total Cost of Construction, or Amount authorised to be expended.	Expenditure, by way of Subsidy or otherwise, by Mines Department.	Amount of Liability by Mines Department on Works in Progress.
1892–93.	£ s. d.	£ s. d.	£ s. d.
Roads on goldfields	15,199 2 4	17,325 10 0	9,628 6 10
Roads and tracks undertaken by County Councils, subsidised by Mines Department	550 0 0	1,033 0 0	4,831 9 10
Works undertaken by prospecting associations and companies, subsidised by Mines Department	970 4 9	865 4 3	1,768 0 6
Water-races	3,811 1 10	3,811 1 10	..
Wharves	..	..	..
Schools of Mines	1,232 4 4	1,232 4 4	..
Tracks to open up mineral lands	..	..	419 19 5
Artesian-well boring, Maniototo Plains	550 0 0	281 3 6	268 16 6
	22,312 13 3	24,548 3 11	16,916 3 1
1893–94.			
Roads on goldfields	18,418 19 2	15,056 0 11	13,013 18 5
Roads and tracks undertaken by County Councils, subsidised by Mines Department	5,038 11 6	2,718 17 8	5,576 10 7
Works undertaken by prospecting associations and companies, subsidised by Mines Department	2,245 19 4	1,709 18 5	1,027 7 11
Water-races	5,271 17 1	5,271 17 1	900 0 0
Drainage-channels	..	..	1,000 0 0
Wharves	..	..	..
Schools of Mines	1,555 19 9	1,555 19 9	..
Tracks to open up mineral lands	..	..	..
Repairing flood damages	500 0 0	500 0 0	..
Artesian-well boring, Maniototo Plains	800 0 0	518 16 6	..
	33,831 6 10	27,331 10 4	21,517 16 11
1894–95.			
Roads on goldfields	20,908 13 7	15,160 3 5	18,752 10 7
Roads and tracks undertaken by County Councils, subsidised by Mines Department	685 18 4	2,295 9 2	1,934 5 7
Works undertaken by prospecting associations and companies, subsidised by Mines Department	10,805 15 4	2,378 13 2	3,006 13 0
Water-races	4,801 19 7	2,427 10 11	2,151 18 8
Drainage-channels	1,521 0 0	673 14 10	3,647 5 2
Wharves	..	..	..
Schools of Mines	999 8 6	999 8 6	..
Tracks to open up mineral lands	..	..	..
Repairing flood damages	..	..	..
Artesian-well boring, Maniototo Plains	505 19 11	505 19 11	..
Diamond-drills	..	..	..
	40,228 15 3	24,440 19 11	29,492 13 0
1895–96.			
Roads on goldfields	14,554 0 7	19,970 6 6	14,086 4 8
Roads and tracks undertaken by County Councils, subsidised by Mines Department	4,614 11 1	1,607 8 6	4,290 16 11
Works undertaken by prospecting associations and companies, subsidised by Mines Department	3,477 7 0	1,726 4 8	10,093 3 0
Water-races	6,820 18 3	5,162 9 2	2,515 7 9
Drainage-channels	5,100 0 0	2,240 5 1	2,657 0 1
Wharves	..	..	..
Schools of Mines	999 3 0	999 3 0	..
Tracks to open up mineral lands	..	..	..
Repairing flood damages	..	..	..
Artesian-well boring, Maniototo Plains	..	..	..
Diamond-drills	216 1 6	216 1 6	..
	35,782 1 5	31,921 18 5	33,642 12 5
1896–97.			
Roads on goldfields	57,685 9 6	30,720 12 7	35,622 15 3
Roads and tracks undertaken by County Councils, subsidised by Mines Department	11,677 0 0	1,759 6 5	4,079 18 3
Works undertaken by prospecting associations and companies, subsidised by Mines Department	1,570 7 3	1,533 6 7	2,915 14 3
Water-races	3,090 11 1	3,927 18 0	1,678 0 10
Drainage-channels	1,409 0 0	2,149 3 11	2,516 16 2
Wharves	..	..	..
Schools of Mines	1,682 19 5	1,682 19 5	..
Tracks to open up mineral lands	..	..	..
Repairing flood damage	..	..	..
Artesian-well boring, Maniototo Plains	..	..	..
Resumption of land	300 0 0	300 0 0	..
Prospecting deep levels	25,500 0 0	2,697 14 5	22,802 5 7
	102,915 7 3	44,771 1 4	69,615 10 4

SUMMARY OF WORKS CONSTRUCTED—*continued.*

Nature of Works.	Total Cost of Construction, or Amount authorised to be expended.	Expenditure, by way of Subsidy or otherwise, by Mines Department.	Amount of Liability by Mines Department on Works in Progress.
1897–98.	£ s. d.	£ s. d.	£ s. d.
Roads on goldfields	71,318 11 7	37,410 14 3	33,907 17 4
Roads and tracks undertaken by County Councils, subsidised by Mines Department	25,151 9 8	12,158 6 7	9,677 14 0
Works undertaken by prospecting associations and companies, subsidised by Mines Department	3,939 8 1	2,357 15 1	1,581 13 0
Water-races	3,275 8 9	2,272 5 0	1,003 3 9
Drainage-channels	4,481 14 0	1,212 14 9	3,268 19 3
Schools of Mines	1,780 17 3	1,780 17 3	..
Prospecting deep levels	25,500 0 0	21,520 15 0	1,281 10 7
Water-conservation	507 3 9	507 3 9	..
Construction of telephone-lines	60 0 0	50 0 0	..
Compensation proclamation of rivers	5,196 13 10	5,196 13 10	..
	141,211 6 11	84,467 5 6	50,720 17 11
SUMMARY.			
Roads on goldfields	317,172 18 7	242,963 19 8	33,907 17 4
Subsidised roads and tracks	166,202 5 3	88,075 0 4	9,677 14 0
Subsidised roads and tracks other than on goldfields	6,146 9 10	4,759 6 2	..
Prospecting	71,045 10 0	23,827 10 8	1,581 13 0
Water-races	74,836 4 8	69,530 15 3	1,003 3 9
Wharves	435 15 9	285 15 9	..
Schools of Mines	22,607 19 9	22,607 19 9	..
Drainage-channels	33,913 3 3	21,161 3 10	3,268 19 3
Diamond-drills	5,170 11 4	3,428 11 4	..
Treatment of ores	1,342 8 9	742 8 9	..
Tracks to open up mineral lands	325 8 1	325 8 1	..
Artesian-well boring, Maniototo Plains	800 0 0	800 0 0	..
Repairing flood damages	500 0 0	500 0 0	..
Prospecting deep levels	25,500 0 0	24,218 9 5	1,281 10 7
Resumption of land	300 0 0	300 0 0	..
Water-conservation	507 3 9	507 3 9	..
Construction of telephone-lines	60 0 0	50 0 0	..
Proclamation of rivers	5,196 13 10	5,196 13 10	..
	732,062 12 10	509,280 6 7	50,720 17 11

It will be seen from the foregoing statement that works to the value of £141,211 were authorised during the past year, as against £102,915 for the previous year, whilst the expenditure during the period referred to was £84,467, as against £44,771 for the year previous, leaving the liabilities on works authorised and in progress on the 31st March last to be £50,721. The actual cost of works undertaken, completed, and in progress during the last sixteen years that votes for this purpose have been under the direct control of the Mines Department for the development of the goldfields, has been £732,063, out of which the Government has expended £509,280 in subsidies to local bodies and direct grants for the construction of the different works, whilst £222,783 has been contributed by local bodies and prospecting associations.

The widely separated places in which prospecting was carried on, and where discoveries of gold were made, rendered the increased expenditure on new roads and tracks necessary, and the department, in view of the continued extension of these discoveries, had good warrant for undertaking the works. There is still urgent need for further roads and tracks to give access to localities where mining operations are carried on, and to which it is at present almost impossible to convey supplies and machinery at anything except prohibitive rates.

The quartz reefs, both in the North and South Island, are generally to be found in mountainous and rough country.

The vast alluvial deposits in the South Island, which are so widely distributed, extending as they do from sea-level to altitudes of 4,000 ft., are not by any means yet fully explored, and it is evident that means of approach to some of these is necessary in order to permit of a further development of their mineral wealth.

The introduction of capital and the extensive works undertaken during the past two years have not so far had the effect of increasing the gold returns; indeed, the contrary has been the case, the returns of gold exported being less for 1897–98 than those for 1896–97. Notwithstanding the shrinkage in the yield of gold for this year it is expected that the new machinery for ore-treatment and the introduction of further water-supplies for alluvial mining will, by increasing the quantity of material operated on, cause an increased output next year. The addition to the number of dredges will also enable larger quantities of the gravels in river-beds and other deposits to be dealt with.

It is satisfactory to note that the efforts of the highly qualified mining engineers and managers in charge of some of the best-known and valuable mines in the colony, and whose intelligent development operations have been carefully watched, are having a beneficial effect on the stability of the industry; and it is anticipated that, though more caution may be exercised by investors, it will always be possible to obtain ample capital to develop legitimate mining undertakings under the conduct of men of high integrity and practical experience.

Although it has not been my good fortune to report a more satisfactory yield of gold for the past year, it is gratifying to be able to say that improved methods of working, gold-saving, and extraction give indications that an increased yield will be recorded in the future.

I have, &c.,

GEO. WILSON,

Inspecting Engineer.

LIST of WORKS on GOLDFIELDS undertaken wholly by the Mines Department, or by Subsidies to County Councils, Local Bodies, and Prospecting Associations, in Progress on the 31st March, 1898.

Locality and Nature of Works.	Total Cost, or Amount authorised.	Amount of Contribution paid by Mines Department.	Amount due by Mines Department on Works still in Progress.
NORTH ISLAND.			
ROADS (SUBSIDISED).			
Coromandel County.	£ s. d.	£ s. d.	£ s. d.
Bridge across Warekaho Creek	300 0 0	100 0 0	50 0 0
Cabbage Bay to Mines	400 0 0	100 0 0	100 0 0
Two bridges and approaches, Kuaotunu Main Road	300 0 0	100 0 0	50 0 0
Widening Waitaia Battery Road	200 0 0	50 0 0	50 0 0
Road from Success Road to workings of Karaka Block Company	200 0 0	..	100 0 0
Tiki to Opitonui	500 0 0	..	250 0 0
	1,900 0 0	350 0 0	600 0 0
Thames County.			
Karaka Creek Road	150 0 0	68 4 6	6 15 6
Te Papa Gully Road	100 0 0	..	50 0 0
Omahu to Tairua	50 0 0	42 0 0	8 0 0
Repairs, Waiotahi and Moanatairi Aqueducts	500 0 0	..	252 0 0
Townsend's Road	150 0 0	..	150 0 0
	950 0 0	110 4 6	466 15 6
Thames Borough.			
Widening, &c., Karaka Creek	300 0 0	..	150 0 0
Metalling roads	876 0 0	..	438 0 0
	1,176 0 0	..	588 0 0
Ohinemuri County.			
Drain along Mill Road, Paeroa	200 0 0	90 2 5	32 7 7
Road running south on left bank of Waihou River	600 0 0	117 15 0	282 5 0
Drain from railway-line to Waihou River	137 10 0	..	68 15 0
Road from Paeroa Bridge to Kuaoti Bridge	400 0 0	31 15 4	101 11 4
Road adjoining Te Iringa-o-Pirori Blocks	286 0 0	8 15 3	134 4 9
Low-level tunnel, Jubilee Mine (E. Kersey Cooper)	1,500 0 0	103 16 0	646 4 0
Kaimanawa Road	200 0 0	..	100 0 0
Karangahake Bridge	1,032 0 0	107 3 1	407 16 11
	4,355 10 0	459 7 1	1,773 4 7
Te Aroha Town Board.			
Repairs, flood-damages	150 0 0	43 15 0	31 5 0
Katikati Road Board.			
Katikati–Karangahake Track	200 0 0	100 0 0	100 0 0
Piako County.			
Waiorongomai Tramway	250 0 0	..	125 0 0
MIDDLE ISLAND.			
ROADS (SUBSIDISED).			
Picton Road Board.			
Repairs, Kaituna–Tuamarina Road	100 0 0	..	50 0 0
Pelorus Road Board.			
Widening road to Golden Bar Mine	50 0 0	..	30 0 0
Collingwood County.			
Aorere Bridge	200 0 0	..	100 0 0
Buller County.			
Road to Britannia Company's Mine, Stoney Creek	400 0 0	..	200 0 0
Lyell Creek to Gibbstown	200 0 0	66 13 4	33 6 8
Road, Stoney Creek–Waimangaroa	400 0 0	..	200 0 0
Road, Costello's Hill–Charleston (alteration)	600 0 0	..	300 0 0
Dee Creek Company's Claim	350 0 0	..	175 0 0
	1,950 0 0	66 13 4	908 6 8
Inangahua County.			
Widening track from Scotia Tunnel, on Big River Road, to Inkermann Mine	200 0 0	80 9 0	19 11 0
Grey County.			
Marsden–Dunganville Road	100 0 0	..	50 0 0
Ten-mile Creek Bridge	400 0 0	150 0 0	170 0 0
Deviation Moonlight Track	100 0 0	25 0 0	25 0 0
Track to Crœsus battery-site, Paparoa	200 0 0	50 0 0	50 0 0
Road, Seventeen-mile Bluff to Barrytown Gold-mining Company	100 0 0	..	40 0 0
Blackball to Paparoa	1,386 0 0	700 0 0	586 10 0
Ahaura Bridge	2,250 0 0	1,400 0 0	1,050 0 0
	4,536 0 0	2,325 0 0	1,971 10 0
Westland County.			
Improving road, Seven-mile, Taipo	150 0 0	17 8 0	57 12 0

List of Works on Goldfields, &c.—*continued.*

Locality and Nature of Works.	Total Cost, or Amount authorised.	Amount of Contribution paid by Mines Department.	Amount due by Mines Department on Works still in Progress.
Tuapeka County.	£ s. d.	£ s. d.	£ s. d.
Metalling road, Lawrence to Waipori	550 0 0	291 3 6	58 16 6
Shelter-sheds and snow-poles	100 0 0	..	50 0 0
Miller's Flat Bridge	11,242 0 0	5,398 7 3	1,222 12 9
	11,892 0 0	5,689 10 9	1,331 9 3
Lake County.			
Skipper's Bridge	4,244 0 0	500 0 0	1,000 0 0
Southland County.			
Dray-road to Ferry Terrace, Nokomai	100 0 0	..	50 0 0
Repairs to roads and tracks	500 0 0	..	400 0 0
	600 0 0	..	450 0 0
Works constructed wholly by Mines Department.			
Puriri to Tairua	836 6 3	546 16 10	289 9 5
Kauaeranga Valley Road	276 10 0	..	276 10 0
Waiomo to Monowai	31 6 0	..	31 6 0
Waitahi Village Settlement	12 1 6	..	12 1 6
Tapu Creek extension	806 1 11	606 1 11	200 0 0
Thames to Waikawau	1,735 11 7	1,350 11 7	385 0 0
Thames to Hikutaia	1,432 0 0	1,205 0 2	226 19 10
Puru Creek Road	400 0 0	300 0 0	100 0 0
Turua to Netherton	650 0 0	350 0 0	300 0 0
Hikutaia–Whangamata "Wires" Track	1,040 0 0	671 11 5	368 8 7
Upper Tararu Road	490 9 9	304 6 8	186 3 1
Matatoki Road	260 0 0	138 14 2	121 5 10
Wharepoa Settlement Road	623 7 5	504 2 5	119 5 0
Omahu to Whangamata	700 0 0	106 4 0	593 16 0
Drains, Hikutaia	150 0 0	..	150 0 0
Whakapara–Puhipuhi	350 0 0	250 0 0	100 0 0
Kiripaka to coal-mines	100 0 0	..	100 0 0
Tairua–Whenuakite	300 0 0	250 0 0	50 0 0
Tiki to Kaimarama	300 0 0	250 0 0	50 0 0
Mercury Bay to Whenuakite and Boat Harbour	200 0 0	150 0 0	50 0 0
Netherton Road	75 0 0	28 14 6	46 5 6
Whangamata Road	75 0 0	..	75 0 0
Hikutaia to Waihi	2,315 0 0	1,815 0 0	500 0 0
Paeroa to Waitoa	705 13 4	205 13 4	500 0 0
Road-formation, Waitekauri to Cross Road	300 0 0	271 11 11	28 8 1
Waihi to Whangamata	500 0 0	300 0 0	200 0 0
Paeroa to Te Aroha	400 0 0	300 0 0	100 0 0
Whangamata to Wharekiraupunga	250 0 0	..	250 0 0
Waitekauri to Wharekiraupunga	250 0 0	..	250 0 0
Hikutaia to Waitekauri	200 0 0	..	200 0 0
Komata Reefs to Paeroa	300 0 0	..	300 0 0
Komata Reefs to Waitekauri	200 0 0	..	200 0 0
Repairing flood-damages, Matamata	100 0 0	..	100 0 0
Roads, Katikati and Tauranga	1,260 0 0	530 0 0	730 0 0
Bartlett's Creek Track	350 0 0	183 10 4	166 9 8
Clearing Cullensville–Waikakaho Track	25 0 0	..	25 0 0
Foot-bridges, Dead Horse and Walker's Creeks	25 0 0	..	25 0 0
Gravelling road through Mr. Adams's property	100 0 0	94 9 0	5 11 0
Gravelling Onamalutu Track	100 0 0	98 17 0	1 3 0
Rocky Ferry to Kaituna	500 0 0	..	500 0 0
Tracks, Wakamarina and Mahakipawa	100 0 0	23 16 6	76 3 6
Re-metalling Wakamarina Road	500 0 0	468 5 0	31 15 0
Onamalutu–Wakamarina Track	539 0 0	400 0 0	139 0 0
Havelock–Tuamarina Road	400 0 0	294 3 9	105 16 3
Richmond to Collingwood	500 0 0	250 0 0	250 0 0
Bonny Doon Road	600 0 0	500 0 0	100 0 0
Collingwood to Parapara	800 0 0	500 0 0	300 0 0
Anatoki Track	150 0 0	..	150 0 0
Takaka River Foot-bridge	150 0 0	..	150 0 0
Scott's Creek Bridge	100 0 0	..	100 0 0
Pakawau Bush Road	425 0 0	200 0 0	225 0 0
Inland Road, Parapara to Takaka	500 0 0	..	500 0 0
Mud-flat, portion of Takaka–Collingwood Inland Road	200 0 0	..	200 0 0
Karamea Track	250 0 0	..	250 0 0
Road to Fenian Creek, Karamea	250 0 0	..	250 0 0
Road from Westport and Mokihinui Railway-line to Jones's Creek	100 0 0	..	100 0 0
Road from Seddonville to Mokihinui	770 0 0	570 0 0	200 0 0
Track, Seddonville to Mokihinui Mine	100 0 0	..	100 0 0
Granity Creek southwards	200 0 0	..	200 0 0
Deadman's Creek to Christmas Terrace	250 0 0	150 0 0	100 0 0
Wilson's Lead Road	300 0 0	150 0 0	150 0 0
Millerton Road	300 0 0	200 0 0	100 0 0
Lyell Bridge to Ryan's	250 0 0	100 0 0	150 0 0
Track up Four-mile and Nile Rivers	400 0 0	250 0 0	150 0 0
Big Totara River Bridge	450 0 0	..	450 0 0
Little Totara River Bridge	350 0 0	..	350 0 0
Denniston to Cascade Creek	100 0 0	..	100 0 0
Bradshaw's Lead Road	100 0 0	..	100 0 0
Road, Oparara River, Karamea	200 0 0	..	200 0 0
Road, Westport–Mokihinui	500 0 0	..	500 0 0

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost, or Amount authorised.	Amount of Contribution paid by Mines Department.	Amount due by Mines Department on Works still in Progress.
WORKS CONSTRUCTED BY MINES DEPARTMENT—*continued.*	£ s. d.	£ s. d.	£ s. d.
Mokihinui to Reefs (widening)	250 0 0	..	250 0 0
Denniston Hill Road	500 0 0	..	500 0 0
Eight-mile Lyell to Mokihinui	250 0 0	..	250 0 0
Mokihinui to Wanganui (improving)	250 0 0	..	250 0 0
Addison's Road to Buller Road	250 0 0	..	250 0 0
Track to Piper's Flat, Addison's	225 0 0	150 0 0	75 0 0
Reefton–Maruia	1,185 8 6	879 18 0	305 10 6
Maruia Road and horse-track *vid* Caslani's	200 0 0	158 0 0	42 0 0
Hampden to Horse Terrace	3,484 0 0	3,450 18 6	33 1 6
Snowy Creek to reefs	250 0 0	..	250 0 0
Murray Creek to Painkiller	678 4 0	474 0 0	204 4 0
Lyell to Victoria Range	300 0 0	100 0 0	200 0 0
Track to Adamstown	450 4 0	375 4 0	75 0 0
Road, Hampden Cemetery to Schoolhouse, Murchison	300 0 0	..	300 0 0
Little Grey River Bridge	400 0 0	..	400 0 0
Culverts, Devil's Creek	100 0 0	..	100 0 0
Dray-road, Capleston to Larry's	300 0 0	..	300 0 0
Glenroy to Maruia Plains	250 0 0	..	250 0 0
No Town to Big Bill's (widening)	20 0 0	..	20 0 0
Footbridge, No Town Creek	30 0 0	..	30 0 0
Wood's Creek Bridge	80 0 0	..	80 0 0
Maori Creek Bridge	50 0 0	..	50 0 0
Grey River to Moonlight	400 0 0	350 0 0	50 0 0
Moonlight to Paparoa	100 0 0	75 0 0	25 0 0
Footbridges, Cobden–Seven-mile Road	325 0 0	275 0 0	50 0 0
Track, Fagan's Creek, near Barrytown, to Paparoa Ranges	425 0 0	300 0 0	125 0 0
Waipuna Road	200 0 0	100 0 0	100 0 0
Paroa–Teremakau	425 0 0	225 0 0	200 0 0
Brunnerton to Paparoa	200 0 0	50 0 0	150 0 0
Bridges, Raleigh's Creek (three)	300 0 0	..	300 0 0
Nelson Creek Bridge	600 0 0	..	600 0 0
Callaghan's Creek Bridge	200 0 0	..	200 0 0
Brandy Jack's Creek Bridge	100 0 0	..	100 0 0
Track up Ten-mile Creek	100 0 0	..	100 0 0
Repairs, Cobden–Barrytown Road	800 0 0	..	800 0 0
Road, Cobden to Warren's Accommodation-house and Ten-mile Bluff to Barrytown	200 0 0	..	200 0 0
Cape Terrace Road continuation	150 0 0	..	150 0 0
Mosquito–Maori Creek Track	100 0 0	..	100 0 0
Lake Brunner Road towards Maori Creek	150 0 0	..	150 0 0
Bridge over Kanieri River	125 0 0	94 5 0	39 15 0
Main South Road to Mikonui Beach	100 0 0	84 15 0	15 5 0
Track, Waikupakupa, Ocean Beach to main road	100 0 0	84 8 0	15 12 0
Totara River to Constitution Hill	140 0 0	123 1 0	16 19 0
Waiho River Bridge	150 0 0	..	150 0 0
Deviation, Larrikin's Road	1,494 16 5	1,375 4 2	119 12 3
Renewal, Fisherman's Creek Bridge	100 0 0	..	100 0 0
Doughboy Road	300 0 0	..	300 0 0
Totara River to Farmer's Creek	200 0 0	150 3 0	49 17 0
Widening and repairing Lamplough Track	150 0 0	95 15 0	54 5 0
Extension Gillam's Gully Road	100 0 0	67 0 0	33 0 0
Track and wire bridge, Upper Calary	200 0 0	..	200 0 0
Teremakau–Paroa	250 0 0	..	250 0 0
Mahinapua and South Terrace Track	250 0 0	..	250 0 0
Adair's Track, Mahinapua Road	150 0 0	..	150 0 0
Seven-mile Creek, Taipo	350 0 0	..	350 0 0
Veronica Creek Track	200 0 0	..	200 0 0
Repairing bridge, Donnelly's Creek	150 0 0	..	150 0 0
Punt, Hawea and Wanaka districts	300 0 0	..	300 0 0
Clyde–Queenstown	750 0 0	250 0 0	500 0 0
Track up Shotover River	200 0 0	50 0 0	150 0 0
Arrowtown to Macetown	1,150 0 0	900 0 0	250 0 0
Lawrence–Clyde	2,000 0 0	1,500 0 0	500 0 0
Lawrence–Waipori	750 0 0	377 0 9	372 19 3
Roxburgh–Clyde	500 0 0	..	500 0 0
Waitahuna to Bruce County boundary	150 0 0	..	150 0 0
Bridge at Waipori	400 0 0	..	400 0 0
Orepuki, Block I., Longwood	500 0 0	250 0 0	250 0 0
Waipori–Berwick Gorge Road	1,976 18 9	1,476 18 9	500 0 0
Reefton–Hokitika–Ross	5,850 0 0	4,890 13 5	959 6 7
Okuru River Ford Track	291 0 0	194 19 11	96 0 1
Kokatahi Road	506 6 6	451 2 5	55 4 1
Karangarua Bridge	450 0 0	4 13 0	445 7 0
Pine-tree Road	75 0 0	45 10 7	29 9 5
Widening Cook's River Flat Road	400 0 0	366 11 6	33 8 6
Wire bridge, German Gully Track	120 0 0	89 0 6	30 19 6
Waiau to Preservation Inlet	1,600 0 0	1,397 5 0	202 15 0
Walker's Creek Bridge	250 0 0	..	250 0 0
Landing Creek Bridge	500 0 0	..	500 0 0
Improving Ford, Granity Creek	300 0 0	..	300 0 0
Dee Creek Bridge	300 0 0	..	300 0 0
Mangle's Bridge	1,000 0 0	248 0 8	751 19 4
Wangapeka–Wanganui	1,750 0 2	1,459 14 3	290 5 11
Belgrove–Westport–Reefton	5,750 0 0	5,464 1 8	285 18 4
Picton–Grove	700 0 0	165 6 3	534 13 9
Table-land Horse-track	200 0 0	177 15 5	2 4 7

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost, or Amount authorised.	Amount of Contribution paid by Mines Department.	Amount due by Mines Department on Works still in Progress.
WORKS CONSTRUCTED BY MINES DEPARTMENT—*continued.*	£ s. d.	£ s. d.	£ s. d.
Bell Hill Road	200 0 0	..	200 0 0
Greenstone–Teremakau	200 0 0	118 12 6	81 7 6
Roads, Preservation Inlet	300 0 0	..	300 0 0
Tracks, Cromarty	200 0 0	..	200 0 0
Clifden Bridge, Waiau River	500 0 0	..	500 0 0
	77,764 16 1	43,781 18 9	33,982 17 4
SCHOOLS OF MINES.			
Schools of Mines	15,857 19 9	15,857 19 9	..
Schools of Mines (Otago University)	6,750 0 0	6,750 0 0	..
	22,607 19 9	22,607 19 9	..
PROSPECTING SUBSIDIES.			
Kapanga Gold-mining Company (Limited)	20,600 0 0	1,735 3 11	183 11 11
Kuaotunu Prospecting Association	48 10 0	26 0 0	22 4 0
Coromandel County Council	200 0 0	50 0 0	50 0 0
Te Aroha Town Board	100 0 0	37 17 6	12 2 6
Katikati Prospecting Association	52 0 0	20 0 0	6 0 0
New Bay of Islands Coal Company	200 0 0	89 17 0	110 3 0
Bombay Prospecting Association	40 0 0	16 7 9	3 12 3
Paparata Road Board (Parker and Piggott)	65 0 0	22 0 0	10 10 0
Hororata Prospecting Association	70 0 0	17 5 0	17 15 0
Charleston Miners' Association	110 0 0	33 8 6	21 11 6
Buller County, Fairdown Tunnel	150 0 0	..	150 0 0
Buller County (Reaney and Rasmussen)	120 0 0	30 0 0	30 0 0
Buller County (Samuel and party)	100 0 0	5 11 0	94 9 0
Buller County (Berry and party)	26 0 0	..	13 0 0
Gold-mining League, Westport, Beaconsfield Tunnel	15 0 0	..	7 10 0
Gold-mining League, Westport (McFarlane and others)	39 0 0	13 10 0	6 0 0
Westport Miners' Association, Rough and Tumble Creek	30 0 0	..	15 0 0
Prospecting tunnel, Boatmans (Cornwall, Walker, and party)	302 10 0	40 4 3	114 15 9
Inangahua County (Gabriel and party)	100 0 0	11 11 0	38 9 0
Miners' Association, Nelson Creek (McGowan and party)	160 0 0	..	80 0 0
Drainage-tunnel, Dunedin Flat (£ for £)	2,375 0 0	1,087 10 4	100 0 0
Westland County, prospecting, Rimu (£ for £)	2,617 2 4	1,308 11 2	..
Westland County, prospecting, Kanieri	489 7 0	244 13 6	..
Westland County, prospecting (Holmes and party)	200 0 0	..	100 0 0
Westland County, prospecting (Dwyer and party, Blue Spur)	400 0 0	167 4 0	32 16 0
Westland County (N. Johnston, Fox's Flat)	140 0 0	53 19 2	17 9 10
Miners' Association, Ross (Marchesi and Foletti)	93 0 0	45 0 0	1 5 0
Miners' Association, Ross (McKay and Brown)	26 0 0	13 0 0	13 0 0
Miners' Association, Ross, Park Terrace Tunnel	57 10 0	..	28 15 0
Miners' Association, Ross (McEwen and McKechnie)	13 0 0	..	13 0 0
Miners' Association, Greenstone (Crawford and party)	97 10 0	33 0 0	64 10 0
Miners' Association, Greenstone (Dickson and party)	72 0 0	..	36 0 0
Miners' Association, Dillmanstown (Black and party)	31 10 0	12 0 0	10 10 0
Tapanui Prospecting Association	40 0 0	18 10 0	11 10 0
Tuapeka County, Gabriel's Gully Reef Prospecting Association	400 0 0	106 14 0	93 6 0
Hyde Miners' Association	20 0 0	..	20 0 0
Longwood Sluicing Company, Riverton	30 0 0	142 10 0	7 10 0
Miners' Association, Lowburn (Tilliman and party)	57 10 0	42 9 9	15 0 3
Miners' Association, Glenorchy	13 0 0	..	13 0 0
Miners' Association, Upper Waikaia	19 10 0	13 0 0	6 10 0
Miners' Association, Riverton	18 0 0	7 3 0	10 17 0
	29,738 19 4	5,444 0 10	1,581 13 0
PROSPECTING DEEP LEVELS.			
Thames-Hauraki Goldfields (Limited), Queen of Beauty shaft	25,000 0 0	23,864 6 1	1,135 13 11
Thames-Hauraki Goldfields (Limited), Queen of Beauty shaft, inspector's fee	500 0 0	354 3 4	145 16 8
	25,500 0 0	24,218 9 5	1,281 10 7
WATER-RACES.			
Waimea–Kumara Water-race	32,624 19 1	32,036 6 8	588 12 5
Mount Ida Water-race	8,399 19 5	8,399 19 5	..
Mountain Hut Water-race	72 4 1	72 4 1	..
Gentle Annie Creek, Mata, R. Kelly	200 0 0	40 0 0	60 0 0
Finlay McLiver	400 0 0	34 5 4	165 14 8
Sulky Gully Water-race	504 0 0	179 3 4	38 16 8
Argyle Water-race	550 0 0	200 0 0	150 0 0
	42,751 2 11	40,961 18 10	1,003 3 9
DRAINAGE- AND TAILINGS-CHANNELS.			
Kumara Sludge-channel No. 5	5,339 8 4	3,316 6 5	2,023 1 11
Trustees' Main Tail-race, Waimea	1,800 0 0	885 19 1	114 0 11
Kelly's Terrace Tunnel	1,562 10 0	460 13 7	1,131 16 5
	8,701 18 4	4,662 19 1	3,268 19 3
WATER-CONSERVATION ON GOLDFIELDS.			
Engineer's salary and expenses	245 15 7	245 15 7	..
Eweburn Reservoir	180 15 8	180 15 8	..
Coromandel Harbour and Kuaotunu Sludge-channel	80 12 6	80 12 6	..
	507 3 9	507 3 9	..

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost or Amount authorised.	Amount of Contribution paid by Mines Department.	Amount due by Mines Department on Works still in Progress.
Summary of Works.			
Roads (subsidised)—	£ s. d.	£ s. d.	£ s. d.
Coromandel County	1,900 0 0	350 0 0	600 0 0
Thames County	950 0 0	110 4 6	466 15 6
Thames Borough	1,176 0 0	..	588 0 0
Ohinemuri County	4,355 10 0	459 7 1	1,773 4 7
Te Aroha Town Board	150 0 0	43 15 0	31 5 0
Katikati Road Board	400 0 0	100 0 0	100 0 0
Piako County	250 0 0	..	125 0 0
Picton Road Board	100 0 0	..	50 0 0
Pelorus Road Board	50 0 0	..	30 0 0
Collingwood County	200 0 0	..	100 0 0
Buller County	1,950 0 0	66 13 4	908 6 8
Inangahua County	200 0 0	80 9 0	19 11 0
Grey County	4,536 0 0	2,325 0 0	1,971 10 0
Westland County	150 0 0	17 8 0	57 12 0
Tuapeka County	11,892 0 0	5,689 10 9	1,331 9 3
Lake County	4,244 0 0	500 0 0	1,000 0 0
Southland County	600 0 0	..	450 0 0
	33,103 10 0	9,742 7 8	9,602 14 0
Works constructed wholly by Mines Department	77,764 16 1	43,781 18 9	33,982 17 4
Schools of Mines	22,607 19 9	22,607 19 9	..
Prospecting subsidies	29,737 19 4	5,444 0 10	1,581 13 0
Prospecting deep levels	25,500 0 0	24,218 9 5	1,281 10 7
Water-races	42,751 2 11	40,961 18 10	1,003 3 9
Drainage- and tailings-channels	8,701 18 4	4,662 19 1	3,268 19 3
Compensation, proclamation of rivers	5,196 13 10	5,196 13 10	..
Water-conservation on goldfields	507 3 9	507 3 9	..
Total	245,821 4 0	157,123 11 11	50,720 17 11

LIST of WORKS on GOLDFIELDS constructed wholly by the Mines Department, or by Subsidies to County Councils, Local Bodies, and Prospecting Associations, and completed prior to the 31st March, 1898.

Locality and Nature of Works.	Total Cost.	Amount of Contribution paid by Mines Department.
NORTH ISLAND.		
ROADS (SUBSIDISED).		
Bay of Islands County.	£ s. d.	£ s. d.
Tiriwhanga Gorge to Galbraith's Road, Puhipuhi	237 0 0	118 10 0
Air-line Road to battery-site, Puhipuhi	73 0 0	36 10 0
Tiriwhanga Gorge to Puhipuhi	800 0 0	800 0 0
New Bay of Islands Coal Company	500 0 0	250 0 0
Road, Taumarere Railway-station to Puhipuhi	482 0 0	146 0 0
	2,092 0 0	1,351 0 0
Coromandel County.		
Improving road to Iona and Just in Time Companies' mines	200 0 0	133 6 8
Making and improving track from Tokatea towards Kennedy Bay	320 0 0	213 6 8
Golden Belt Track	100 0 0	50 0 0
Tokatea Road (repairs)	300 0 0	150 0 0
Making and improving track from Golden Belt to Tiki	239 3 3	159 8 10
Making road from Ring's Bridge to Kapanga Mine	150 0 0	100 0 0
Making road to Kapanga Mine	132 0 0	88 0 0
Temporary track from Tokatea Saddle to Waikoromiko	50 0 0	33 6 8
Continuation of track from Success Company's mine to top of main range	80 0 0	53 6 8
Completion of road from Tokatea Saddle to Tokatea Battery	50 0 0	33 6 8
Widening road from Matawai to Vaughan's claim	357 0 0	238 0 0
Improving track, Mercury Bay to Waitai	100 0 0	66 13 4
Continuation and improving Waikoromiko Track	150 0 0	100 0 0
Emily Battery to Rocky Creek	60 0 0	40 0 0
Track, Bismarck Battery to Kennedy Bay	200 0 0	133 6 8
Road up Manaia	675 10 6	450 7 0
Extension of Vaughan's and Vizard's Tracks	150 0 0	100 0 0
Vizard's towards Marebel	200 0 0	133 6 8
Extending and widening Waitaia Road	100 0 0	66 13 4
Makarau to Waiau	1,600 0 0	1,066 13 4
Waikawau to Tiki	500 0 0	333 6 8
Paul's Creek to Cabbage Bay	200 0 0	133 6 8
Waikawau Creek Track	100 0 0	50 0 0

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost.			Amount of Contribution paid by Mines Department.		
Coromandel County—continued.	£	s.	d.	£	s.	d.
McLaughlin's Road	100	0	0	50	0	0
Manaia to McGregor's new find	100	0	0	50	0	0
Manaia to Tiki	500	0	0	250	0	0
Old sawmill towards Matawai	200	0	0	100	0	0
Extension of Paul's Creek Track	300	0	0	150	0	0
Matarangi Track	400	0	0	200	0	0
Thames–Coromandel Road, *viâ* Manaia	300	0	0	150	0	0
Harbour View extension	210	0	0	105	0	0
Kapanga to Paul's Creek	200	0	0	100	0	0
Mercury Bay to Kuaotunu	360	0	0	180	0	0
Wainara to Kuaotunu	450	0	0	225	0	0
Sea-beach to Kuaotunu	1,650	0	0	1,450	0	0
Just in Time Road, extension to Coromandel	450	0	0	225	0	0
Road, Waikawau Bridge to McLaughlin's	67	10	0	45	0	0
Mercury Bay Road	990	0	0	495	0	0
Bridge to Dugend's store, and widening and metalling road from bridge to Log Hut	450	0	0	300	0	0
Road from junction of Red Mercury battery up Pumpkin Flat to Waitaia	345	0	0	230	0	0
To connect road from Log Hut to commencement of contract of Kuaotunu–Mercury Bay Road	150	0	0	100	0	0
Road, with culverts and bridge, from Kapanga Hill to Scotty's Gold-mining Company's mine	200	0	0	150	0	0
Pumpkin Flat–Just in Time Road	310	0	0	170	0	0
Lower road from Great Mercury battery to Kapai low level and battery-site	450	0	0	300	0	0
Road from main road, Kapanga to Success Mine	600	0	0	300	0	0
Cemetery Road and Bridge, Kuaotunu	100	0	0	75	0	0
Road from Coromandel–Kennedy Bay Main Road to Wareroa Creek	300	0	0	150	0	0
Leading Wind Mine Road	100	0	0	50	0	0
Fury's Bridge	450	0	0	225	0	0
Carroll's Bridge	400	0	0	200	0	0
Horne's Bridge	200	0	0	100	0	0
Road from Main Kennedy Bay Road to Monte Carlo and other claims	300	0	0	150	0	0
Castle Rock Mine Road, Tiki	200	0	0	100	0	0
Road between Bismarck Battery and Hauraki Associated Gold Reefs	400	0	0	200	0	0
	17,246	3	9	10,500	15	10
Te Aroha Town Board.						
Road to connect with railway-station	120	0	0	60	0	0
Lipsey's Bridge	64	0	0	32	0	0
	184	0	0	92	0	0
Thames County.						
Making new road from Ohinemuri River to Karangahake Quartz-mine	650	0	0	433	6	8
Dray-road to connect Otanui Mines with crushing-battery at Maungawherawhera Creek	710	0	0	473	6	8
Improving roads from Waitekauri Road to Katikati Road	250	0	0	166	13	4
Improving road up Karaka Creek to Lucky Hit Company's mine	263	1	0	175	7	4
Improving road to upper mines, Waitahi	258	18	10	172	12	7
Karangahake to battery	300	0	0	200	0	0
Ralph's Battery, Waitekauri	399	1	0	199	10	6
Otanui Road to mines	299	18	0	199	18	8
Road to Wick's Battery	70	0	0	46	13	4
Rocky Point Road, Tararu	300	0	0	200	0	0
Thames Borough boundary to hæmatite-mine	350	0	0	233	6	8
Widening road from bridge over Hape Creek to Otanui Mines	183	17	0	122	11	4
Track, Karangahake Goldfield	784	1	0	522	14	0
Kauaeranga Valley to Otanui	470	7	0	313	11	4
Tapu Road to mines	81	17	9	54	11	10
Tauranga Road to Karangahake Bridge site	341	5	0	227	10	0
Karangahake Bridge	229	6	6	152	17	8
Track up Maungakerikeri Creek	93	4	4	62	2	11
Thames Borough boundary to Hape Creek No. 2	600	0	0	300	0	0
Upper Karaka Road	179	13	0	119	15	4
Repairing flood-damages, Waiotahi, Moanataiari, Karaka, and Collarbone Roads	350	0	0	175	0	0
Sea-beach to Waiomo	750	0	0	375	0	0
Te Papa Gully Road	75	0	0	37	10	0
New Find to Waiomo Battery	110	0	0	55	0	0
Rocky Point Road	429	11	10	214	15	11
Waiotahi towards Mercury Bay	522	11	0	261	5	6
Te Mata Road	178	17	6	89	8	9
Waiomo Creek to Tapu	1,499	0	0	749	10	0
Alabama Creek Track	100	0	0	50	0	0
Road from Prospectors' Mine, Puriri, to battery	50	0	0	25	0	0
Karaka Creek to Lucky Hit	365	0	0	182	10	0
Bullion Mine, Tapu, to battery	36	5	0	18	2	6
Track to Hikutaia Goldfield	147	15	2	73	17	7
Upper Tararu Road to Sylvia Mine	684	7	0	342	3	6
Road to Puriri Battery	11	13	0	5	16	6
Thames–Waikawau Road	37	10	0	18	15	0
Track from Tararu Creek Road to McDermot's Claim	45	0	0	22	10	0
Track to Try Fluke Claim, Tapu	94	15	0	47	7	6
Waiomo to Puhoi Creek	33	0	0	16	10	0

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost.	Amount of Contribution paid by Mines Department.
	£ s. d.	£ s. d.
Thames County—continued.		
Waiokaraka Road, Bella Street, and Campbell Street to Moanataiari Creek ..	200 0 0	100 0 0
Moanataiari Creek Road	100 0 0	50 0 0
Tararu Creek Road and Tararu Road	150 0 0	75 0 0
Hape Creek Road	150 0 0	75 0 0
	12,934 15 11	7,436 12 11
Thames Borough.		
Repairing roads	975 19 2	600 0 0
Ohinemuri County.		
Jubilee Mine Track	118 0 0	59 0 0
Track up Tui Creek	306 0 0	153 0 0
Prospecting track, Whangamata and Waitekauri	200 0 0	166 13 4
Tramway, Karangahake to Railey's reduction-works	400 0 0	200 0 0
Strengthening bridges, Waihi Road	200 0 0	133 6 8
Paeroa to Hikutaia	400 0 0	200 0 0
Repairs, flood-damages	34 13 8	17 6 10
Hikutaia River to Marototo Mine	180 15 0	90 7 6
Karangahake through Gorge (bridge and culverts)	200 0 0	100 0 0
Waitekauri Lower Road	360 0 0	189 2 8
Metalling Karangahake Gorge Road	170 0 0	85 0 0
Karangahake and Waihi Road	237 10 0	118 15 0
Karangahake Hill Track	87 4 0	43 12 0
Bridge over Ohinemuri River at Karangahake	12 11 0	6 5 6
Hikutaia–Paeroa Road	500 0 0	250 0 0
Paeroa–Te Aroha Road	200 0 0	100 0 0
Tui Creek Track	129 18 6	64 19 3
Waitekauri to Lowrie's and Birnie's	200 0 0	100 0 0
Road, Karangahake to Waihi	246 12 3	164 8 2
Lower Waitekauri Road	347 13 4	230 16 4
Road, Thames Road to Netherton Punt	60 0 0	50 0 0
Komata Creek Road	600 0 0	300 0 0
	5,190 17 9	2,822 13 3
Piako County.		
Extension and completion of Te Aroha Tramway	18,000 0 0	12,000 0 0
Tramway to Fergusson's Battery, Waiorongomai	1,500 0 0	1,000 0 0
Road, Waiorongomai	497 17 0	331 18 0
Track to claims at Buck's Reef	55 5 6	36 17 0
Track, Fern Spur to Butler's Spur	231 17 9	154 11 10
Tracks up Stony Creek, Te Aroha Goldfield, &c.	54 0 0	36 0 0
Repairs, Upper Premier Track and new track towards Waitawheta	40 0 0	20 0 0
Repairs, Te Aroha–Lichfield Road	302 0 0	125 0 0
	20,681 0 3	13,704 6 10
Hutt County.		
Road to connect Otorongo Bay with Albion Company's battery, also to connect Terawhiti Quartz-mine with battery	509 16 6	210 17 0
Road, Makara Junction to Terawhiti	450 0 0	225 0 0
	959 16 6	435 17 0
SOUTH ISLAND.		
(ROADS SUBSIDISED).		
Marlborough County.		
Track, Deep Creek to Dead Horse Creek	68 0 0	45 6 8
Mouth of Gorge to Forks, Cullensville to Mahakipawa Diggings	450 0 0	225 0 0
Formation of road at Cullensville, Mahakipawa	217 4 0	108 12 0
Havelock–Mahakipawa Road	905 0 0	505 0 0
Dead Horse Creek to Sunnyside	75 0 0	50 0 0
	1,715 4 0	933 18 8
Waimea County.		
Road to open up Table Diggings	260 0 0	130 0 0
Punt over Motueka River	100 0 0	50 0 0
Repairing Baton to Table-land Track	40 0 0	20 0 0
Dove River to Baton Saddle, and from Rolling River to Wangapeka Saddle ..	120 0 0	60 0 0
	520 0 0	260 0 0
Collingwood County.		
Road, West Wanganui	300 0 0	200 0 0
Bridge over Aorere River	173 14 0	115 16 0
Extending Anatoki Bridle-track	160 0 0	80 0 0
Bridge over Takaka River at Pain's Ford	1,597 7 8	798 13 10
Repairs Silverstream Bridge and forming and metalling Bainham Road	200 0 0	100 0 0
	2,431 1 8	1,294 9 10

List of Works on Goldfields, &c.—*continued.*

Locality and Nature of Works.	Total Cost.			Amount of Contribution paid by Mines Department.		
	£	s.	d.	£	s.	d.
Buller County.						
Deviation of road from Candlelight Flat to Deep Creek, Charleston	370	0	0	246	13	4
Road from Orowaiti Lagoon to North Terrace	256	18	6	171	5	8
Prospecting track from Razorback to Paparoa Range	100	0	0	66	13	4
Track from Seatonville to Larrikin's	438	9	6	292	6	4
Waimangaroa to Denniston	787	0	0	393	10	0
Road to connect alluvial workings with Charleston Road	400	0	0	266	13	4
Track, Four-mile Creek towards Grey Valley	300	0	0	200	0	0
Road to connect alluvial diggings north of Deadman's Creek	278	0	0	185	6	8
Ngakawau to Mokihinui, *viâ* beaches	100	0	0	66	13	4
Road to connect Ngakawau Railway with Mokihinui Coal Company's workings	193	0	0	128	13	4
Lyell Bluff to Victor Emmanuel Claim	650	0	0	433	6	8
Beach, Little Wanganui to Mokihinui	300	0	0	100	0	0
Cape Foulwind Road	450	0	0	300	0	0
Road up Nile Valley	56	16	4	28	8	2
Denniston extension	850	0	0	425	0	0
Promised Land towards Motueka	380	0	0	190	0	0
Road over Gentle Annie	200	0	0	100	0	0
Extension, Lyell Creek to Low-level Tunnel	60	0	0	30	0	0
Extension of track 50 chains south of Brighton	140	0	0	70	0	0
Continuation of road, Deadman's Creek	437	17	0	218	18	6
Ngakawau Railway-station to Mokihinui	50	0	0	25	0	0
Addison's Flat towards ranges	20	0	0	10	0	0
North Terrace to Oparara Diggings	500	0	0	333	6	8
Extension of Croninville Road	100	0	0	50	0	0
Waimangaroa to sea-beach	80	0	0	40	0	0
Extension of track, Oparara to Fenian Creek	100	0	0	50	0	0
Con's Creek to Beaconsfield	80	0	0	40	0	0
Addison's Flat to Caroline Terrace	200	0	0	100	0	0
Waimangaroa to sea-beach extension	390	0	0	195	0	0
Addison's Flat to Gallagher's Lead	50	0	0	25	0	0
Road to Swanston's Gold-mining Company	50	0	0	25	0	0
Repairs to roads at Lyell	200	0	0	100	0	0
Track, Fairdown from North Terrace	150	0	0	97	8	0
Improving Road to Four-mile Creek, Charleston	900	0	0	450	0	0
	9,618	1	4	5,454	3	4
Inangahua County.						
Dray-road from Soldier's Creek to Devil's Creek	647	0	0	431	6	8
Dray-road from Inangahua to Rainy Creek Battery	900	10	0	606	6	8
Dray-road from Capleston up Little Boatman's Creek	379	0	0	252	13	4
Dray-road from Capleston up Main Boatman's Creek	697	0	0	464	13	4
Dray-road from Westport Road to Inangahua River	224	5	0	149	10	0
Track from Devil's Creek to Big River	134	3	6	89	9	0
Track from Waitahu River to Capleston	358	0	0	238	13	4
Survey and expenses	250	0	0	166	13	4
Track from Cariboo to Big River	728	0	0	364	0	0
Dray-road up Murray Creek to United Inglewood Claim	3,472	0	0	2,314	17	4
Road from Reefton to Big River, *viâ* Devil's Creek	614	0	0	307	0	0
Road up Big River	922	19	0	615	6	0
Continuation of dray-road up Little Boatman's Creek	169	7	6	112	18	4
Road from Capleston to Larry's Creek	640	0	0	426	13	4
Track to connect Capleston with Lone Star	75	0	0	50	0	0
Crushington to Globe Company's workings	403	0	0	201	10	0
Snowy Creek Track	85	15	0	42	17	6
Reefton to Big River	1,792	0	0	1,194	13	4
Glenroy to Horse Terrace	254	0	0	122	10	0
Devil's Creek to Globe Hill	917	6	2	458	13	1
Extension of dray-road to Boatman's *viâ* Painkiller	53	17	6	26	18	9
Mangles Valley to McGregor's Station	600	0	0	300	0	0
Globe Hill to Merrijigs	1,397	6	0	698	13	0
Larry's Creek to Lyell	1,061	15	0	530	17	6
Widening Larry's Creek Road	118	10	0	59	5	0
Road up Burke's Creek, Little Boatman's	149	0	0	74	10	0
	17,052	14	8	10,300	8	10
Grey County.						
Road from No Town to Deep Creek	1,100	0	0	550	0	0
Road from Langdon's to Moonlight	1,600	0	0	800	0	0
Contribution from goldfields vote towards main road	2,296	6	6	2,296	6	6
Track, Waipuna to Clarke's River	1,200	0	0	800	0	0
Track, Cameron's to Cape Terrace	700	0	0	466	13	4
Road, Limestone to Maori Creek	800	0	0	533	6	8
Red Jack's to Nelson Creek	601	17	6	401	5	0
Barrytown to Deadman's	2,240	0	0	1,493	6	8
German Gully to Arnold's Flat	120	0	0	60	0	0
Baird's Terrace to Lake Brunner	400	0	0	200	0	0
Hatter's Terrace Road	1,000	0	0	500	0	0
Irishman's to Lake Brunner	2,400	0	0	1,200	0	0
Hatter's Terrace	600	0	0	400	0	0
Track, Baird's Terrace to Irishman's	250	0	0	125	0	0
Deep Creek to Bell Hill	1,331	0	0	665	10	0
Track to Blackball Diggings	790	0	0	395	0	0

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost.	Amount of Contribution paid by Mines Department.
Grey County—continued.	£ s. d.	£ s. d.
Track from Ahaura, Kapara, Reese's Flat, to new rush on banks of Ahaura River ..	20 0 0	10 0 0
Renewal, bridge over Nelson Creek, Marsden–Dunganville Road	38 0 0	19 0 0
Repairs (corduroying), Cobden–Seven-mile Road	36 0 0	18 0 0
Repairs, Cobden–Point Elizabeth Road	30 0 0	15 0 0
Extension Ngahere–Blackball Road to Blackball Ferry	50 0 0	25 0 0
	17,603 4 0	10,973 8 2
Westland County.		
Improving track, Butcher's Creek to Gentle Annie Terrace	225 10 0	163 13 4
Bridle-track to Kanieri Lake	719 11 0	350 5 6
Bridle-track to Eel Creek	168 9 0	84 4 6
Tunnel-track, Galway Beach to Gillespie's Beach	437 5 0	218 12 6
Road from Duffer's Creek, Greenstone Road, to fifteen-mile peg, Christchurch Road	726 9 0	480 4 6
Continuation of track, Back Creek to Eel Creek	249 4 0	166 3 4
Bridle-track, Duffer's Creek, Bowen and Okarito Road, to sea-beach	333 18 0	222 12 0
Ross Borough boundary to Mount Greenland	1,280 15 0	853 16 8
Track, Kanieri Lake to Humphrey's Gully	279 2 0	186 1 4
Track, Larrikin's to Loop-line Dam	449 11 0	299 14 0
Rough Wainihinihi to Upper Dam	450 0 0	300 0 0
Browning's Pass to Reefs	3,311 6 0	2,207 10 8
Okarito Forks to Teal Creek	600 0 0	400 0 0
Road, Christchurch to Baldhill Range reefs	500 0 0	250 0 0
Extension of Tucker's Flat Road to New Rush	170 19 6	85 9 9
Hokitika Borough boundary (Reefton) to Shotover Rush	120 0 0	60 0 0
Track to New Rush, Back Creek	100 0 0	50 0 0
Repairing old track round Wataroa Bluff	50 0 0	25 0 0
New Rush, south side of Hokitika River	37 18 6	18 19 3
Cedar Creek Road to Farmer's Creek	55 7 0	27 13 6
Road to gold discovery near Blue Spur	75 0 0	37 10 0
Widening Seddon's Terrace Track	150 0 0	65 10 0
Branch Road at Seddon's Terrace	38 10 6	19 5 3
	10,528 15 6	6,581 6 1
Taieri County.		
Mullocky Gully to Silver Peak	499 15 0	333 3 4
Lake County.		
Track, Skipper's to Phœnix and Scandinavian Reefs	292 2 3	194 14 10
Track to connect scheelite-mine with Lake Wakatipu	225 0 0	150 0 0
Arrowtown to Macetown, construction	225 0 0	150 0 0
Arrowtown to Macetown, maintenance	150 0 0	100 0 0
Invincible Quartz-reef Track, Rees River	300 0 0	200 0 0
Rees Valley to company's workings	61 7 6	30 13 9
Pack-track, Criffel Diggings	50 6 6	33 11 0
Left-hand Branch Road, Skipper's	63 9 10	31 14 11
Old Morven Ferry Road	289 0 0	144 10 0
Road to workings above Cardrona	70 0 0	35 0 0
Piers, Victoria Bridge	725 0 0	362 10 0
Skipper's Road Saddle to Deep Creek	200 0 0	100 0 0
	2,651 6 1	1,532 14 6
Tuapeka County.		
Making road from top of Terrace to Waipori Bush	300 0 0	200 0 0
Road, Beaumont to Remarkable Bush	300 0 0	200 0 0
Improving road from Waipori Township to antimony-mines, Lammerlaw Ranges ..	200 0 0	133 6 8
Waipori Township to Waipori Bush	200 0 0	133 6 8
Clutha River to Campbell's	76 9 0	50 19 4
Waitahuna to copper-mine	200 0 0	133 6 8
Road to open up quarry for Waitahuna Bridge	160 9 10	106 19 11
Waipori Road, *vid* Bungtown	566 8 10	283 4 5
	2,003 7 8	1,241 3 8
Wallace County.		
Track, Colac Bay to Round Hill	200 0 0	133 6 8
Pack-track to Round Hill, Colac, and Orepuki	1,050 0 0	500 0 0
Cutting tracks, Longwood	59 6 0	29 13 0
	1,309 6 0	662 19 8
Vincent County.		
Renewal bridge to Bannockburn	1,532 0 0	850 0 0
Maniototo County.		
Road to Serpentine Diggings	136 10 0	91 0 0
Pig and Whistle to Clarke's Diggings	200 0 0	133 6 8
Shepherd's Hut Flat to Vinegar Hill	100 0 0	66 13 4
Kyeburn Peninsula to main road	82 0 0	41 0 0
	518 10 0	332 0 0

List of Works on Goldfields, &c.—*continued.*

Locality and Nature of Works.	Total Cost.	Amount of Contribution paid by Mines Department.
	£ s. d.	£ s. d.
Fiord County.		
Dusky Sound, tracks	300 0 0	200 0 0
Waitaki County.		
Road, Naseby to Livingstone	41 12 0	20 16 0
Southland County.		
Improving tracks from Mataura to Nokomai	75 0 0	50 0 0
Improving road, Waikaka to Leatham	150 0 0	100 0 0
Improving road from Waikaka Township to Leatham Creek	30 0 0	20 0 0
Improving road from Waikaka to Waikaka railway-siding	150 0 0	100 0 0
Widening and improving bush-track to Waikawa	150 0 0	100 0 0
Waikaka to Switzer's	150 0 0	100 0 0
Road near Waikaka Township	150 0 0	100 0 0
Waikaia to Whitcombe	311 6 8	180 13 4
Waipapa to Six-mile Beach	175 0 0	87 10 0
Repairing bridges, Waikaia Bush	38 13 4	13 4 0
	1,380 0 0	851 7 4
Diamond and other Drills.		
Inangahua County Council (diamond)	2,000 0 0	1,000 0 0
Springfield Colliery Company (diamond)	1,250 0 0	625 0 0
Westland County Council (tiffin)	350 0 0	233 0 0
Diamond drills for prospecting purposes	1,570 11 4	1,570 11 4
	5,170 11 4	3,428 11 4
Wharves.		
Repairs to wharf, Coromandel	300 0 0	150 0 0
Anikiwi Jetty, Marlborough	135 15 9	135 15 9
	435 15 9	285 15 9
Aids to Prospecting.		
Construction of low-level tunnel, Terawhiti	750 0 0	150 0 0
Queen of Beauty Company, prospecting deep levels	300 0 0	150 0 0
Caledonian Low-level Company, prospecting deep levels	300 0 0	150 0 0
Red Hill Gold-mining Company, prospecting deep levels	600 0 0	300 0 0
Caledonian Low-level Company, low-level tunnel	2,700 0 0	300 0 0
Lyell Creek Extended Company, low-level tunnel	300 0 0	150 0 0
New Cromwell Gold-mining Company	250 0 0	100 0 0
Deep-level Association, Waipori	450 0 0	300 0 0
Little Boatman's deep-level tunnel	600 0 0	300 0 0
Oterongia Prospecting Association	198 17 2	99 8 7
Vincent County	137 9 0	68 14 6
Tapanui Prospecting Association	25 0 0	12 10 0
Tuapeka County	12 0 0	6 0 0
Maniototo County	500 0 0	250 0 0
Pullar, Shelmerdine, and Basan	400 0 0	200 0 0
Royal Oak Association	300 0 0	150 0 0
Star of the East Quartz-mining Company	150 0 0	75 0 0
West Coast Prospecting Association	300 0 0	150 0 0
McBride and party	169 2 2	84 11 1
McLean and party	66 0 0	33 0 0
Deep-level Tunnel, Tokatea	700 0 0	350 0 0
Deep-level Tunnel, Owharoa	300 8 0	200 5 4
Deep-level Tunnel, Tapu	1,200 0 0	600 0 0
Deep-level Tunnel, Cedar Creek	1,207 10 0	603 15 0
Manuka Flat Prospecting Association	200 0 0	100 0 0
Red Hill Minerals Company	437 19 10	218 19 11
Tuapeka Prospecting Association	277 0 0	138 10 0
Cardrona Prospecting Association	800 0 0	400 0 0
Cromwell Prospecting Association	500 0 0	250 0 0
Coromandel County	550 0 0	275 0 0
Thames County	309 18 0	154 19 0
Thames Borough	200 0 0	100 0 0
Buller County	146 12 6	73 6 3
Inangahua County	488 7 0	244 3 6
Westland County	1,236 19 4	618 9 8
Grey County	871 15 2	435 17 7
Deep-level Prospecting Association, Waipori	432 9 8	216 4 10
Waipu Prospecting Association	180 0 0	90 0 0
Hokianga County	100 0 0	50 0 0
Vulcan Smelting-works, Onehunga	30 0 0	15 0 0
Ohinemuri County	100 0 0	50 0 6
Waitaki County	29 5 0	14 12 6
Waihemo County	85 9 0	42 14 0
William Fox and party	711 1 8	355 10 11
Kirk and party	176 0 10	88 4 10
Hodge and party	98 13 8	49 6 18
Carey and Hyndman	441 9 4	220 14 0
Don, Boyce, and party	107 16 0	53 18 0
Quentin McKinnon	58 10 0	29 5 0

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost.	Amount of Contribution paid by Mines Department.
AIDS TO PROSPECTING—*continued.*	£ s. d.	£ s. d.
Bullion Mine, Deep-level Tunnel	300 0 0	150 0 0
Sutherland and party	30 0 0	15 0 0
Inangahua Low-level Tunnel	6,966 0 0	3,000 0 0
Deep-level Tunnel, Manaia	451 4 0	225 12 0
Waimea Miners' Association, prospecting at Callaghan's	50 0 0	50 0 0
Totara Miners' Association, Ross	51 3 6	51 3 6
Ross, Cunningham, and another	9 0 0	9 0 0
Wm. Thompson, stores from Benmore Station	2 1 10	2 1 10
Totara Miners' Association, Ross	8 6 6	8 6 6
Harris, Davidson, and party	27 7 6	27 7 6
Boatman's Tailings Company	150 0 0	150 0 0
Boys's Tunnel, Bluespur	94 12 3	94 12 0
Totara Miners' Association, Ross, Montina and party	246 10 0	246 10 0
Gillam's Gully Prospecting Association	94 15 0	94 15 0
Deep-level Prospecting Committee, Dillmanstown	407 0 3	407 0 3
Westport Prospecting Association	25 0 0	25 0 0
Te Aroha Prospecting Association	20 12 6	20 12 6
Robert Richie, Kuaotunu	72 3 0	36 1 0
Owharoa Tunnel, Lindsay Jackson	325 0 0	162 10 0
Coromandel County (£ for £)	200 0 0	100 0 0
Mr. G. Rehay, Arahura	98 15 0	49 7 6
Hyndman and party, Callaghan's Flat	552 14 6	276 7 3
Lakes Mapourika, Waiho, and Wataroa Miners' Association	53 12 0	26 16 0
Kumara Miners' Association	22 10 0	11 5 0
Thames Miners' Union	75 15 0	37 17 6
Star of Canterbury Miners' Association	38 5 0	19 2 6
Miners' Association, Rimu	16 0 0	8 0 0
Buller County, Messrs. Negri and others	27 0 0	13 10 0
Johnson and party, tunnel at Callaghan's Flat	90 0 0	45 0 0
W. L. Webb, Nelson	24 0 0	12 0 0
Kumara Miners' Association, Solberg, Stewart, and party	64 15 0	32 7 6
Buller County, between head of Fox's River, Brighton, and Deadman's Creek	29 5 0	14 12 6
Welcome United Gold-mining Company, Greymouth	245 12 6	122 16 3
Orepuki Miners' Association	90 0 0	45 0 0
Totara Miners' Association, Gagliardi and party	12 10 0	6 5 0
Contingencies	484 15 10	242 7 11
Halligan and party (tunnel at Cedar Creek)	198 1 10	99 0 11
Totara Miners' Association (Chamberlain and party)	208 10 0	104 5 0
Miners' Association, Greenstone	59 0 0	29 10 0
Westland County, T. Radonicki and party	40 0 0	20 0 0
Waimea Miners' Association (Lot, Keir, and party)	90 0 0	45 0 0
Cardrona Prospecting Association	140 5 4	70 2 8
Waimea Miners' Association, Stafford	113 1 0	56 10 6
H. Crossan, Beaumont	28 0 0	14 0 0
Prospecting Association, Westport	39 0 0	19 10 0
Cape Colville Prospecting Syndicate	32 0 0	16 0 0
Port Charles Prospecting Association	28 0 0	14 0 0
Totara Miners' Association, Ross	24 0 0	12 0 0
Lake Mapourika Miners' Association	12 0 0	6 0 0
Lister and Robertson, Karamea	13 0 0	13 0 0
Canada Reefs Tunnel	187 10 0	93 15 0
Otago Miners' Association	600 0 0	291 8 2
Westland County (Goudie and party)	215 19 9	107 19 6
Paparata Road Board	26 0 0	13 0 0
Tauranga County, Te Puke Prospecting Association	50 0 0	25 0 0
Havelock Miners' Association	78 0 0	39 0 0
Ohinemuri County	200 0 0	6 0 0
Mr. Olderog, Arahura	54 18 0	16 4 0
Miners' Association, Ross (J. Smith and party)	135 0 0	61 7 6
Extension of low-level tunnel, Boatman's	300 0 0	137 7 11
Prospecting tunnel, south side Inangahua River	60 0 0	25 0 0
Prospecting Association, Mokihinui	40 0 0	15 0 0
Miners' Association, Kumara (John Kane)	9 0 0	1 2 6
Prospecting Association, Invercargill	150 0 0	68 13 6
Miners' Association, Kuaotunu	40 0 0	13 2 6
Miners' Association, Ross (Waylen and party)	50 0 0	16 13 0
Prospecting Association, Coromandel (Leahy and others)	200 0 0	100 0 0
Adit level, Maungatawhiri Creek (G. B. Osmond)	120 0 0	68 17 0
Bay of Islands County Prospecting, Pokaka	112 13 0	112 13 0
Prospecting Russell's Outcrop	100 0 0	100 0 0
Fox's River Prospecting Association (A. T. Bate, Secretary)	19 10 0	19 10 0
Buller County (Newton and party, shaft, Ballarat Terrace)	22 15 0	22 15 0
Buller County (Spence and party)	19 10 0	19 10 0
Wairau Miners' Association	50 0 0	48 4 0
Miners' Association, Nelson Creek (Thrower and Potts)	45 0 0	45 0 0
Miners' Association, Dillmanstown (Turnbull and others)	7 10 0	7 10 0
Miners' Association, Ross (Gagliardi and party)	64 18 0	64 18 0
Miners' Association, Ross (Allen and Son)	40 0 0	20 0 0
Miners' Association, Ross (A. Zala)	42 15 0	42 15 0
Miners' Association, Greenstone (Black and party)	27 0 0	27 0 0
Miners' Association, Cardrona	40 0 0	40 0 0
Miners' Association, Lowburn (E. Murrell)	20 0 0	13 5 0
Puhipuhi Prospecting Association	200 0 0	13 15 0
Thames County (F. and J. Wallis)	97 10 0	35 19 2

List of Works on Goldfields, &c.—*continued.*

Locality and Nature of Works.	Total Cost.			Amount of Contribution paid by Mines Department.		
	£	s.	d.	£	s.	d.
Aids to Prospecting—*continued.*						
Thames County (Sheridan Company's tunnel, Tapu)	180	10	0	30	5	0
Cinnabar Mining Company, Auckland (£1 to £1 10s.)	162	16	9	108	11	2
H. H. Adam's, Waiorongomai	250	0	0	48	3	9
Miners' Association, Ross (C. Porter)	226	0	0	125	3	0
Miners' Association, Ross (Moye and Son)	15	10	0	6	10	6
Westland County (J. Staines)	96	0	0	4	10	0
Westland County (O'Brien and Glynn)	40	0	0	36	10	6
Upper Moutere Road Board	40	0	0	1	16	0
Buller County (Mohan and party)	220	0	0	71	8	6
Buller County (Gardiner and McKay)	56	0	0	24	0	0
Buller County (Negri and others)	43	0	0	29	1	3
Buller County (Scarlett and McHarrie)	39	0	0	18	0	0
Kumara Miners' Association (Scatterini and Anderson)	124	0	0	6	13	6
Kumara Miners' Association (Henley and party)	58	14	0	2	8	0
Kumara Miners' Association (M. Manton)	57	10	0	3	18	9
Kumara Miners' Association (Rogers and Block)	75	0	0	35	6	6
Frying-pan Tail-race	600	0	0	161	11	3
Prospecting Association, Mokihinui (French and others)	58	10	0	11	5	0
Prospecting Association, Westport	432	6	0	197	9	8
Dyer and party, Kuaotunu	120	0	0	37	16	0
Gillam's Gully Prospecting Association (Bramhall and party)	60	0	0	12	3	0
Miners' Association, Riverton	100	0	0	32	0	0
Kennedy-Waikaia Miners' Association, Invercargill	100	0	0	9	0	0
Inangahua District Miners' Association	100	0	0	25	17	6
New El Dorado Sluicing Company, Fat Boys, Criffel	300	0	0	94	4	9
Miners' Association, Greenstone (O'Donnell and party, and J. Pope)	75	0	0	30	4	3
Miners' Association, Tinkers, prospecting Matakanui	6	0	0	3	0	0
Chatterbox Tunnel (G. Clapton)	6	0	0	2	17	9
Port Charles Prospecting Association	20	0	0	11	8	0
Miners' Association, Lake Mapourika	17	4	0	7	13	3
Pitchers and Kitto, Anderson's Flat	100	0	0	20	5	11
Miners' Association, Nelson Creek (Kelly and party)	23	5	0	9	18	0
South British Prospecting Association, Lyell	135	0	0	6	15	0
	40,330	1	2	18,383	9	10
Water-races.						
Water-main, Bull's Battery	350	0	0	100	0	0
Round Hill Water-race	200	19	0	133	19	4
Tomkiss's Water-race	100	0	0	100	0	0
Cardrona Sludge-channel	100	0	0	50	0	0
New water-mains, Thames Water-race	1,479	10	4	739	15	2
Argyle Water-race	8,103	15	1	8,103	15	1
Nelson Creek	957	16	9	957	16	9
Mikonui Water-race	14,279	16	4	14,279	16	4
Brown and party, Kumara	90	0	0	22	10	0
Randall Creek Water-race	222	2	3	222	2	3
Thames Water-race	1,250	0	0	1,250	0	0
Contingencies	659	12	8	659	12	8
Randall Creek Water-race	100	15	0	100	15	0
Quinn's Creek Water-race	70	0	0	70	0	0
Wainihinihi Water-race	84	3	8	84	3	8
Survey, water-race, Ninety-mile Beach	65	6	7	65	6	7
Improving water-supply, Oamaru	1,250	0	0	1,150	7	2
Roaring Meg Water-race (Jones, Baxter, and party)	1,600	0	0	478	16	5
	31,463	6	7	28,568	16	5
Drainage- and Tailings-channels.						
Drainage-channel, Lawrence (total cost, approximate)	3,000	0	0	2,000	0	0
Subsidy towards purchase of Messrs. Laidlaw and Crawford's freehold in Spotti's Creek, to allow tailings to be deposited (Tinker's Diggings)	500	0	0	400	0	0
Damage by floods, Thames	1,000	0	0	500	0	0
Sludge-channel, Smith's Gully, Bannockburn	1,000	0	0	251	1	0
Round Hill Sludge-channel survey	52	19	7	52	19	7
Compensation to J. Costello, damage done by tailings	788	0	0	788	0	0
Long Gully Sludge-channel	150	0	0	100	0	0
New Pipeclay Gully Sludge-channel	1,547	18	0	773	19	0
Kumara Sludge-channel No. 2	2,762	17	2	2,762	17	2
Ophir Tail-race	2,300	0	0	1,150	0	0
Lawrence Drainage-channel	1,150	0	0	956	14	0
Muddy Creek Channel	2,000	0	0	1,000	0	0
St. Bathan's Channel	2,000	0	0	1,000	0	0
Tailings-outlet, Maerewhenua	1,595	4	0	1,595	4	0
Ross Sludge- and Storm-water-channel	1,675	10	6	1,675	10	6
Kumara Sludge-channel No. 4	1,000	0	0	1,000	0	0
Kuaotunu Sludge-channel (£ for £)	400	0	0	200	0	0
Branch tail-race to No. 4 Channel	100	0	0	100	0	0
Rimu Drainage-channel	500	0	0	191	19	6
	23,522	9	3	16,498	4	9
Aid towards the Treatment of Ores.						
Testing-plant, School of Mines, Thames	1,200	0	0	600	0	0
Testing minerals, Dunedin Exhibition	142	8	9	142	8	9
	1,342	8	9	742	8	9

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost.			Amount of Contribution paid by Mines Department.		
	£	s.	d.	£	s.	d.
AID TOWARDS CONSTRUCTION OF TELEPHONE LINES.						
Bannockburn to Nevis	60	0	0	50	0	0
WORKS WHOLLY CONSTRUCTED BY MINES DEPARTMENT.						
Construction of road, Arrowtown to Macetown	9,270	6	8	9,270	6	8
Road to open up Woodstock Goldfield	1,000	0	0	1,000	0	0
Ahaura to Amuri	2,504	19	7	2,504	19	7
Waikaia Bush Road	1,000	0	0	1,000	0	0
Waitahuna Bridge	750	0	0	750	0	0
Merrivale tracks	500	0	0	500	0	0
Mokihinui to Specimen Creek	1,238	7	5	1,238	7	5
Wilberforce Quartz-reef Road	1,830	17	7	1,830	17	7
Opening Mokau River	552	8	0	552	8	0
Lyell to Mokihinui	5,098	8	6	5,098	8	6
Brighton to Seventeen-mile Beach	1,789	7	2	1,789	7	2
Whangapeka to Karamea	2,000	0	0	2,000	0	0
Hatter's Terrace to Bell Hill	500	0	0	500	0	0
Cedar Creek Road	3,000	0	0	3,000	0	0
Owen Valley Road	2,208	9	2	2,208	9	2
Cobden to Seventeen-mile Beach	3,036	1	4	3,036	1	4
Cedar Creek Road	1,500	0	0	1,500	0	0
Bridle-track to Upper Anatoki	722	8	0	722	8	0
Whangamata Road	141	10	6	141	10	6
Karangahake through Gorge	1,000	0	0	1,000	0	0
Arthur's Point to Skipper's	12,167	4	1	12,167	4	1
Tracks to Coal Island	54	6	3	54	6	3
Grey Valley to Teremakau	900	0	0	900	0	0
Rimu to New Rush	829	17	9	829	17	9
Tapu to Waikawau	750	10	0	750	10	0
Puhipuhi Road	1,396	17	9	1,396	17	9
Jackson's Bay to Cascade and George River district	5,310	10	11	5,310	10	11
Improving roads and tracks, Collingwood to Takaka and Motueka	10,905	8	11	10,905	8	11
Tramway from New Find to Waitekauri	100	0	0	100	0	0
Havelock–Mahakipawa Dray-road	1,311	9	0	1,311	9	0
Mokihinui to Wanganui	200	0	0	200	0	0
Burnett's Face to Coalbrookdale	200	0	0	200	0	0
Deadman's to Christmas Terrace	20	0	0	20	0	0
Low-level Alpine Claim, Lyell	80	0	0	80	0	0
Bowen Road to Salt-water Beach	60	0	0	60	0	0
Repairing damage done by floods, Westland County	100	0	0	100	0	0
Deviation of road at Kanieri Forks	140	0	0	140	0	0
Road up Dart River	200	0	0	200	0	0
Kuaotunu to Mercury Bay	350	0	0	350	0	0
Thames to Manaia	500	0	0	500	0	0
Cobden to Seventeen-mile Beach	400	0	0	400	0	0
Bridge over Mahinapua Creek	503	16	10	503	16	10
Track up Waiho River	105	0	0	105	0	0
Haast Ferry to Glue-pot	126	0	0	126	0	0
Paeroa–Waihi Road	114	0	0	114	0	0
Waitekauri to New Find	250	0	0	250	0	0
Mahakipawa to Waikakaho	183	12	1	183	12	1
Oparara through gorge to gold-workings	150	0	0	150	0	0
Okira Bridge, at Dirty Mary's Creek	100	0	0	100	0	0
Lagoon Bridge	100	0	0	100	0	0
Widening Cape Terrace Road	100	0	0	100	0	0
Deviation, Granville Road	70	0	0	70	0	0
Tucker's Flat Road	247	18	7	247	18	7
Dillman's–Larrikin's Road	125	15	0	125	15	0
Track at Kanieri Lake and McIntosh Falls; Lake Mahinapua	195	4	6	195	4	6
Extension of road, Rimu to Shallow Rush	150	0	0	150	0	0
Gillam's Gully Track	149	16	0	149	16	0
McKay's Creek, Kokatahi Track	100	0	0	100	0	0
Aorere Valley to Karamea and Mokihinui	29,938	1	2	29,938	1	2
Arrowtown to Macetown	450	0	0	450	0	0
Nelson Creek Bridge	100	0	0	100	0	0
Cascade to Barn Bay Road	411	7	0	411	7	0
Repairs to decking, Tapu Wharf	100	0	0	100	0	0
Waitekauri Battery from Junction–Waihi Road	150	0	0	150	0	0
Deep Creek, Wakamarina, to Empire City Company's claim	50	0	0	50	0	0
Track to diggings at Cape Foulwind	497	11	0	497	11	0
Bridge over Fox's River at Brighton	100	0	0	100	0	0
Totara Bridge	255	0	0	255	0	0
Road from Mokihinui Bridge to gold-workings	75	0	0	75	0	0
Clearing two miles of old track from right-hand branch of Kanieri River to Gentle Annie Terrace	13	0	0	13	0	0
Extending horse-track to Blackball Creek	500	0	0	500	0	0
Matawai to Kaimarama	150	0	0	150	0	0
Tiki to Mahakirau	250	0	0	250	0	0
Karangahake Gorge to Waihi	350	0	0	350	0	0
Upper Tararu Road	471	10	3	471	10	3
Red Hill Road	249	8	1	249	8	1
Repairs, Nile Bridge	1,131	2	6	1,131	2	6
Miller's Flat to Skipper's	580	0	0	580	0	0
Cobden to Coal Creek	375	0	0	375	0	0
Track to New Find, Tairua	47	11	6	47	11	6

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost.			Amount of Contributions paid by Mines Department.		
WORKS WHOLLY CONSTRUCTED BY MINES DEPARTMENT—*continued.*	£	s.	d.	£	s.	d.
Cedar Creek Dray-road	466	11	2	466	11	2
Road to Matarangi Goldfield	75	0	0	75	0	0
Repairs, Manaia Track	90	0	0	90	0	0
Upper Township School Bridge	50	0	0	50	0	0
Tiki Bridge across Waiau	256	0	0	256	0	0
Scott's Bridge	175	0	0	175	0	0
Oteau Bridge	150	0	0	150	0	0
Mercury Bay–Kaimarama Road	50	0	0	50	0	0
Stoney Creek Track	15	0	0	15	0	0
Road to mines, Waiomo	50	0	0	50	0	0
Upper Hill Track to branch track, Waiorongomai	30	0	0	30	0	0
Canadian Gully Bridge, and repairs to tunnel on horse-grade, Waiorongomai	70	0	0	70	0	0
Waiorongomai Road	100	0	0	100	0	0
Track from Slate River to Rocky	225	0	0	225	0	0
Pack-track to Killdevil	100	0	0	100	0	0
Repairs, Wangapeka Road towards Crow Diggings	153	0	7	153	0	7
Repairing flood-damages, Grey County	370	0	0	370	0	0
Taipo Track to Seven-mile	194	5	8	194	5	8
Repairs, Totara Bridge	336	0	0	336	0	0
Repairs, Kanieri Lake Road	80	0	0	80	0	0
Mercury Bay to Whenuakite and Boat Harbour	150	0	0	150	0	0
Tiki to Gum Town, *viâ* Kaimarama	160	0	0	160	0	0
Driving Creek to Cabbage Bay and Driving Creek to Cape Colville	660	0	0	660	0	0
Tiki to Waikawau	600	0	0	600	0	0
Paeroa to Te Aroha	365	0	0	365	0	0
Puriri to east side of range	596	19	6	596	19	6
Onamalutu to Wakamarina Forks	400	0	0	400	0	0
Waimangaroa to Denniston	100	0	0	100	0	0
Road to Lyell's Creek Extended Company's tunnel	200	0	0	200	0	0
Jackson's Bay to Cascade	1,110	8	1	1,110	8	1
Bridge over Ogilvie's Creek	150	0	0	150	0	0
Gillam's Gully Track	220	0	0	220	0	0
Bridge over Kanieri River at Kokatahi	467	10	10	467	10	10
Road to Oparara Diggings	100	0	0	100	0	0
Millerton Road	249	0	3	249	0	3
Waiau to Preservation Inlet	7,961	19	6	7,961	19	6
Hatter's Terrace to Haupiri	1,650	0	0	1,650	0	0
Grey River to Moonlight	530	0	0	530	0	0
Blackball Track	1,185	12	5	1,185	12	5
Ahaura–Kopara Road	400	0	0	400	0	0
Mackley's to Waipuna Terrace	100	0	0	100	0	0
Footbridge over Blackball Creek	150	0	0	150	0	0
Waipapa to Waikawa	200	0	0	200	0	0
Waipapa to Six-mile	100	0	0	100	0	0
Drain at Adamson's	50	0	0	50	0	0
Maruia Track, between Reefton and Maruia	50	0	0	50	0	0
Sledge-track to Langdon Reefs	30	0	0	30	0	0
Track to Blackball Township, repairs	40	0	0	40	0	0
Track, Old Man Range	50	0	0	50	0	0
Road to gold discovery near Blue Spur	45	0	0	45	0	0
Bartlett's Creek Track	200	0	0	200	0	0
Prospecting track, Brunnerton to Paparoa	125	0	0	125	0	0
Extension Seddon's Terrace Track to new claim	208	10	6	208	10	6
West Tokatea Road	50	0	0	50	0	0
Waitaia Battery Road	150	0	0	150	0	0
Preece's Point Road	150	0	0	150	0	0
Tokatea–Kennedy Bay Road	100	0	0	100	0	0
Main Cabbage Bay Road	50	0	0	50	0	0
Hooker's to Mercury Bay	100	0	0	100	0	0
Opeto Road	100	0	0	100	0	0
Blagrove's Road	400	0	0	400	0	0
Cemetery–Cabbage Bay Road	100	0	0	100	0	0
Rails for Coromandel Wharf	31	5	0	31	5	0
Culverts, Tiki Road	100	0	0	100	0	0
Soldier's Creek Road	198	5	0	198	5	0
Road to Barrytown	300	0	0	300	0	0
Tracks to Western Sounds	7,307	17	11	7,307	17	11
Road to R. Kelly's Claim, Gentle Annie Creek	100	0	0	100	0	0
Waitekauri to New Find	250	0	0	250	0	0
Paeroa Mill Road	50	0	0	50	0	0
Owharoa to Waitawheta	50	0	0	50	0	0
Deviation Road, Earl's Hill	200	0	0	200	0	0
Waihi to Katikati	75	0	0	75	0	0
Bridge over Slate River	50	0	0	50	0	0
Pack-track to Glover's Flat, Lower Anatoki	50	0	0	50	0	0
Clearing Karaka Creek of flood-damage	50	0	0	50	0	0
Track up right-hand branch of Cullen's Creek	25	0	0	25	0	0
Footbridge, Waimangaroa River	50	0	0	50	0	0
Track up Calary Branch, Waiho River	70	0	0	70	0	0
Converting Wilson's Lead Track, Addison's, into a dray-road	400	0	0	400	0	0
Cabbage Bay to Port Charles and Cape Colville	1,200	0	0	1,200	0	0
Cabbage Bay to mines	400	0	0	400	0	0
Coromandel to Cabbage Bay	250	0	0	250	0	0
Tokatea to Kennedy Bay	200	0	0	200	0	0

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost.			Amount of Contributions paid by Mines Department.		
WORKS WHOLLY CONSTRUCTED BY MINES DEPARTMENT—*continued.*	£	s.	d.	£	s.	d.
Coromandel to Kuaotunu	2,070	0	0	2,070	0	0
Tiki to Manaia	300	0	0	300	0	0
Manaia to Waikawau	1,500	0	0	1,500	0	0
Kuaotunu to Mercury Bay	750	0	0	750	0	0
Manaia to mines	100	0	0	100	0	0
Whitianga to Mahikirau	300	0	0	300	0	0
Whangapoua Mill Road	100	0	0	100	0	0
Kuaotunu Bridge	200	0	0	200	0	0
Granity Creek to Ngakawau	100	0	0	100	0	0
Crow Diggings Track	527	8	2	527	8	2
Road to diggings, Cape Foulwind	100	0	0	100	0	0
Ngahere to Blackball	600	0	0	600	0	0
Ahaura to Haupiri	200	0	0	200	0	0
Fencing land, Blackball Road	110	0	0	110	0	0
Prospecting track, Greek's Gully to Kanieri Forks	150	0	0	150	0	0
Repairing Jones's Creek and Donohue's Storm-channels	100	0	0	100	0	0
Deviation, Pleasant Creek Track	130	0	0	130	0	0
Road-works at Ohaeawai	500	0	0	500	0	0
Mahakirau Creek Road	200	0	0	200	0	0
Puriri to mines	100	0	0	100	0	0
Katikati–Waihi Road	150	0	0	150	0	0
Pack-track from Kerikeri	50	0	0	50	0	0
Track to Waitakohe Goldfield	50	0	0	50	0	0
Repairing bridges to mines, Te Puke	250	0	0	250	0	0
Helena Bay to Whakapara Railway-station	100	0	0	100	0	0
Gordon Settlement to Waharoa	600	0	0	600	0	0
Waiorongomai Road	300	0	0	300	0	0
Approach to Railway Bridge, Te Aroha	150	0	0	150	0	0
Thompson's Track	3,523	19	11	3,523	19	11
Upper Waitekauri Bridge	250	0	0	250	0	0
Junction Waihi Road to New Find, Waitekauri	328	8	0	328	8	0
Canaan Road	200	0	0	200	0	0
Repairing bridges, Doctor's and Staunton's Creeks	200	0	0	200	0	0
Four-mile Bridge	100	0	0	100	0	0
Fox's Bridge	100	0	0	100	0	0
Fairdown–Waimangaroa	200	0	0	200	0	0
Charleston–Nine-mile Beach	200	0	0	209	0	0
Road, Promised Land–Karamea	550	0	0	550	0	0
Karamea Bridge and approaches	3,565	19	8	3,565	19	8
Approaches, Matakitaki Bridge	279	15	0	279	15	0
Snowy Creek Bridge	300	0	0	300	0	0
Big River Road	4,571	0	0	4,571	0	0
Footbridge across by-wash, Ngahere–Blackball Ferry	210	0	0	210	0	0
Track to Healey's Gully	90	0	0	90	0	0
Track, Lancashire Flat to head of Clearwater Creek	50	0	0	50	0	0
Granville Road	100	0	0	100	0	0
Footbridges, Blackwater and Greenstone	300	0	0	300	0	0
Brown's Terrace to Arnold	200	0	0	200	0	0
Protective works, main Grey Bridge	191	0	0	191	0	0
Extension, Tucker's Flat Road	103	2	6	103	2	6
Butcher's Creek Bridge, Kanieri Lake Road	129	17	6	129	17	6
Kapitea Creek Bridge, Lamplough Track	118	0	0	118	0	0
Great South Road	11,478	3	6	11,478	3	6
Widening Milltown Track to Humphrey's Gully	600	0	0	600	0	0
Pack-track, Seddon's Terrace to Eel Creek	246	17	6	246	17	6
New bridge, Kapitea Creek, Loop-line Road	30	8	7	30	8	7
Stribbing's Creek Bridge	70	8	11	70	8	11
Widening Seddon's Terrace Road Extension	199	0	0	199	0	0
Compensation, Larrikin's Road	56	0	0	56	0	0
Garston to Nevis	1,965	17	2	1,965	17	2
Nevis Valley Road	400	0	0	400	0	0
Okarito River Bridge	300	0	0	300	0	0
Stafford–Awatuna	390	13	11	390	13	11
Drainage, Stafford Township	399	17	5	399	17	5
Wataroa Bluff Track	194	4	8	194	4	8
Wangapeka Track, Rolling River–Kiwi Creek	149	19	10	149	19	10
Tracks, Stewart's Island	718	7	8	718	7	8
Hokitika–Jackson's	1,332	16	2	1,332	16	2
Widening Lake Mapourika–Waiho Road	782	6	8	782	6	8
Roads, Great Barrier	604	4	2	604	4	2
Riversdale–Waikaia	200	0	0	200	0	0
Prospecting track, Lyell–Larry's	100	0	0	100	0	0
Track to New Find, Victoria Range	500	0	0	500	0	0
Extending road into bush, Addison's	100	0	0	100	0	0
Clearing rocks and easing curves, Nine- and Ten-mile Bluffs	129	6	11	129	6	11
Repairs flood damages, South Westland	100	0	0	100	0	0
Hungerford's Bridge	444	11	5	444	11	5
Waitangi Bluff Track	99	18	9	99	18	9
Track from Cedar Creek Road to Ford and Thompson's claim	20	0	0	20	0	0
Repairs Mount Greenland Track	50	0	0	50	0	0
Ross Road, towards Ranges	199	12	6	199	12	6
Repairs Pack Track, Cedar Creek	100	0	0	100	0	0
Kinsella's land, taken for Blackball Road	5	11	0	5	11	0

List of Works on Goldfields—*continued.*

Locality and Nature of Works.	Total Cost.	Amount of Contributions paid by Mines Department.
Works wholly constructed by Mines Department—*continued.*	£ s. d.	£ s. d.
Maratoto to Mines	149 5 6	149 5 6
Hatter's Terrace–Haupiri	200 0 0	200 0 0
Upper Waiotahi Road	492 10 0	492 10 0
Inland from Omahu	400 0 0	400 0 0
Gannon's to Painkiller	196 10 6	196 10 6
Contingencies	697 11 10	697 11 10
	198,749 8 4	198,749 8 4
Roads to open up Mines other than Gold.		
Aniseed Valley to Champion Copper-mine	4,963 10 6	4,116 10 6
Richmond Hill to copper-mine	315 16 0	209 4 0
Track, Ohinemuri Coal-seam	267 3 4	133 11 8
Road, Kanieri Coalfield	600 0 0	300 0 0
	6,146 9 10	4,759 6 2
Tracks to open up Mineral Lands.		
Glory Harbour to Kopack	50 0 0	50 0 0
Port Pegasus Track	155 7 6	155 7 6
Removing snags and felling timber, Mokau River	40 0 0	40 0 0
Ngakawau Footbridge	80 0 7	80 0 7
	325 8 1	325 8 1
Repairing Flood-damages.		
Thames Borough	500 0 0	500 0 0
Artesian-well Boring.		
Maniototo Plains	800 0 0	800 0 0
Resumption of Land for Mining.		
Resumption of J. Holmes's land at Kumara for a tailings-site	300 0 0	300 0 0

Summary of Works.

Roads (subsidised)—	£ s. d.	£ s. d.
Bay of Islands County	2,092 0 0	1,351 0 0
Coromandel County	17,246 3 9	10,500 15 10
Te Aroha Town Board	184 0 0	92 0 0
Thames County	12,934 15 11	7,436 12 11
Thames Borough	975 19 2	600 0 0
Ohinemuri County	5,190 17 9	2,822 13 3
Piako County	20,681 0 3	13,704 6 10
Hutt County	959 16 6	435 17 0
Marlborough County	1,715 4 0	933 18 8
Waimea County	520 0 0	260 0 0
Collingwood County	2,431 1 8	1,294 9 10
Buller County	9,618 1 4	5,454 3 4
Inangahua County	17,052 14 8	10,300 8 10
Grey County	17,603 4 0	10,973 8 2
Westland County	10,528 15 6	6,581 6 1
Taieri County	499 15 0	333 3 4
Lake County	2,651 6 1	1,532 14 6
Tuapeka County	2,003 7 8	1,241 3 8
Wallace County	1,309 6 0	662 19 8
Maniototo County	518 10 0	332 0 0
Vincent County	1,532 0 0	850 0 0
Fiord County	300 0 0	200 0 0
Waitaki County	41 12 0	20 16 0
Southland County	1,380 0 0	851 7 4
	129,969 11 3	78,765 5 3
Diamond and other drills	5,170 11 4	3,428 11 4
Wharves	435 15 9	285 15 9
Aids to prospecting	40,330 1 2	18,383 9 10
Water-races	31,463 6 7	28,568 16 5
Drainage- and sludge-channels	23,522 9 3	16,498 4 9
Aid towards treatment of ores	1,342 8 9	742 8 9
Roads wholly constructed by Mines Department	198,749 8 4	198,749 8 4
Roads to open up mines other than gold	6,146 9 10	4,759 6 2
Tracks to open up mineral lands	325 8 1	325 8 1
Repairing flood-damages	500 0 0	500 0 0
Artesian-well boring, Maniototo Plains	800 0 0	800 0 0
Resumption of land for mining	300 0 0	300 0 0
Aid towards construction of telephone lines	60 0 0	50 0 0
	439,115 10 4	352,156 14 8

RETURN showing the VALUE of the SALES of WATER, and EXPENDITURE on, and COLLATERAL ADVANTAGES derived from, the Working of the WATER-RACES constructed and maintained by GOVERNMENT during the Year ending 31st March, 1898.

Name of Water-race.	Value of Sales of Water and Channel-fees.	Expenditure on Maintenance.	Profit or Loss.	Cost of Construction.	Total Cost of Construction.	Percentage on Capital invested.	Average Number of Men employed.	Approximate Amount of Gold obtained.	Value of Gold obtained.	Average Weekly Earnings of Men after deducting Value of Sales of Water and Channel-fees.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.			Oz.	£ s. d.	£ s. d.
Waimea	787 18 7	677 1 6	110 17 1	138,631 11 1		..	49·5	2,409	9,395 2 0	3 6 10
Kumara	2,889 3 3	1,841 0 0	1,048 3 3	42,166 2 8	202,762 11 11	..	71·83	4,720	18,408 0 0	4 3 0
Kumara Sludge-channel	..	..	..	21,964 18 2		..	..	..	..	..
Nelson Creek	..	..	..	..	90,722 10 8	..	..	..	..	..
Argyle	..	..	..	..	15,151 15 3	..	..	..	..	..
Mikonui	..	..	..	..	25,927 4 6	..	..	..	..	..
Mount Ida	1,395 18 11	1,384 18 9	11 0 2	69,756 9 6	69,756 9 6	..	61	2,885	11,107 5 0	3 1 2
Blackstone Hill	126 16 1	30 10 0	96 6 1			..	8·75	160	616 0 0	1 1 0
Callaghan's	172 0 0	125 5 0	46 15 0	6,027 15 6	..	..	7.37	315	1,228 10 0	3 3 0
Totals	5,371 16 10	4,058 15 3	1,313 1 7	278,546 16 11	404,320 11 10	..	..	10,489	40,754 17 0	..

GEORGE WILSON, Inspecting Engineer.

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