

on the quantity, and height it is required to be lifted. Merryweather and Sons, Greenwich Road, London, forwarded to the Mines Department through the Agent-General a description of an engine and pumps capable of lifting about two sluice-heads per minute to a height of 200ft.; the cost of which is £1,300, exclusive of pipes, &c. The engine is not, however, the one best adapted for the class of work required.

The distance to the Hokitika River from Belcher and party's shaft is about 40 chains, and the height of the surface of the ground at this point is 346·28ft. above the level of the river, but water would have to be lifted to an elevation of about 390ft. to command all the workings. There are several dams constructed on this terrace for supplying parties with water for working sluicing claims on the face of the terrace, but, with the exception of one, they are at too low an elevation to supply water for washing the dirt from the claims on the new rush. Annexed is a map showing the position of the claims on the field and the depths of the different shafts. This map and longitudinal section accompanying it show forty-nine shafts, varying from 43ft. to 100ft. in depth. There are about 147 men at the present time working on the field, and of this number about 110 men have claims which are considered payable. At the time of my visit, at the end of March last, wash-drift in the claims contained gold varying from 2dw. to 10dw. to the load. Taking an average of all the wash-drift in the different claims it would yield about 4½dw. of gold per load. There is a large extent of drift terraces likely to contain leads of gold between this and Ross which have never been prospected.

Hydraulic Sluicing.

Wherever water can be obtained, hydraulic sluicing is the most economical method of working alluvial drifts. Whether these drifts form terraces or flats, there are very few localities where there is not a little gold in layers all through them. In many instances the gold in the top drifts is of a very fine character, and requires a different method of saving than by an ordinary narrow sluice-box. In many instances the sluice-boxes and tail-races are too narrow. The idea that many of the old miners have is that it requires a moderately narrow sluice to get the material to run well, so as to keep it clear, whereas it is quite the reverse. A wide box will work better with less fall than a narrow one, and save considerably more gold. The principle of gold-saving is to have as thin a film of material running over the bottom of the box as possible, consistent with the quantity of material to be washed away. Whenever there is a great thickness of drift-gravel in the boxes it is a sure sign that a great deal of fine gold is being carried away, and where there are large quantities of fine material amongst the drifts, it is very liable to block the narrow sluices, causing loss of both time and gold.

It may be interesting to mention the quantity of gold lost by the miners at Kumara sluicing into the Kumara Sludge-channel during the last few years. Each of the parties sluicing into this channel had long tail-races, in which sluice-boxes were placed. These boxes varied from 18in. to 22in. wide, and were supposed to save most of the gold. The channel into which the tailings from these boxes were discharged was 3ft. 6in. wide, with a gradient of 1 in 28·8, or 3ft. 6½in. to the chain, and during the last four years that this channel was maintained by the Government 957oz. 9dw. 15grs. was attained, representing a value of £3,638 8s. 9d.; and had this channel been a much greater width far more gold would have been recovered. Indeed, the quantity of water and tailings this channel carried away was far too great for its capacity. If it had been 6ft. wide it would have worked much better, and more gold would have been saved. Although this channel was fully three-quarters of a mile long gold could be got at its extreme end. Wherever large hydraulic-sluicing operations are carried on there should be a series of grizzlies and drops in the main sluice and undercurrent boxes. These undercurrents are a series of shallow wooden boxes about ten times the width of the main sluice, and from 40ft. to 50ft. long, set on a gradient of from 1 in 10 to 1 in 12 if paved with riffles, but if paved with stones the gradient should be about 1 in 9. These undercurrents are divided into partitions by having longitudinal planks set on edge for the whole length, dividing the wide box into sections of about 5ft. in width.

In America every hydraulic-sluicing company uses a series of these undercurrents. The North Bloomfield Company in 1882, with a sluice 1,650ft. in length, had eight undercurrent boxes in this distance, and the gold return was £80,447. Of this amount, the gold saved by these undercurrents was equal to a value of £3,021, or nearly 4 per cent. The returns from Manzanita Mine showed for the same year a value of £45,109, while of this amount gold was obtained from eleven undercurrents, constructed at different places in the sluice—which was 7,600ft. long—to the value of £3,134, or about 7 per cent. of the total yield. At the French Corral Mine, in the same year, gold to the value of £38,040, the length of the main sluice being 5,300ft., and in this distance there was ten undercurrent boxes, from which gold to the value of £3,974 was obtained, or about 10·4 per cent. of the total yield. In America a large quantity of quicksilver is used in the sluices. In the Bloomfield sluice as much as 9,000lb. of quicksilver has been used during the year, but there is always a great loss in quicksilver, and consequently there must be a loss in gold. The undercurrent boxes ought, however, to be charged with quicksilver. There will always be a certain loss, but the extra quantity of fine gold saved will fully justify the use of quicksilver.

Hydraulic sluicing, where a plentiful supply of water can be got, will make very poor ground pay for working. Where there is plenty of dump for tailing, and where water can be obtained at a high elevation, the auriferous drifts in the low flats will be made to pay by lifting by hydraulic elevators at a small cost. More attention is being given to the construction of hydraulic plants than formerly. The canvas hose is rapidly disappearing, and iron or steel piping taking its place, although there are some places yet where the miners cannot see the advantage of substituting piping for the canvas hose. Some of the miners are content to pick down the material from the face and break it up by manual labour before running it into their sluice with water. This system, however, is rapidly disappearing, and water is made to do the work where manual labour was formerly employed.