

bucket-elevators lift the tailings into a sluice on the surface, while the water passes away through a tunnel tail-race. Mr. Batchelor informed me that he is now constructing a reservoir which, when completed, will give him not only a larger supply of water, but an additional pressure for sluicing purposes. This pressure is required, as a portion of the ground consists of hard cemented gravel, difficult to disintegrate by the action of water from a sluicing-nozzle. Mr. Batchelor is, however, well satisfied with the returns he is getting, and contemplates making considerable improvements to his plant.

Gillam's Gully.

This gully leads down into Flowery Creek, and is about a mile and a half distant from the Stafford. About eighteen months ago the Stafford Prospecting Association sunk a shaft here close to the foot of the range which runs above Ballarat Terrace; but, owing to some disagreement between the prospecting association and the men they had employed to work the ground, operations in the shaft have been suspended, and the latter is now full of water. The sample of gold obtained from the ground worked from the shaft indicates, however, that there must be some fairly good auriferous drifts in the neighbourhood, but to what extent it is difficult to state.

In all probability the gold found here is derived from the denudation of the old high-level ocean-beach or Hau-Hau lead. The same marine sands can yet be seen on the top of the terraces between this and Stafford; but even at this place they are partially denuded. The ground in the vicinity of Gillam's Gully contains a good deal of water, and, as the difficulty of contending with this prevents prospecting operations being carried on, the miners now contemplate the construction of a tunnel draining-race from the Waimea Creek to Gillam's Gully, a distance of something like 7,000ft. This tunnel would, no doubt, be the means of opening up some fresh ground; but it is very questionable if the cost of construction would ever be recouped by the advantages gained. There is not sufficient known about the ground here yet to justify any large expenditure.

ARAHURA.

Humphrey's Gully Company.

This company holds mining leases comprising an area of over 200 acres on the Hokitika Harbour Board Reserve at Humphrey's Gully. The present company is a reconstruction of the original company who first took up the ground; but, after expending about £10,000, the present company was formed with a capital of £150,000, of which £77,000 was declared paid up. This left £73,000 for the construction of works and opening out the ground. The original scheme included a water-supply from the Arahura River; but the directors employed men to report on the supply of water from other sources, with the result that they were advised that a sufficient supply could be obtained from other creeks at a much cheaper cost than by continuing the water-race to the Arahura River. Had the company employed an experienced man to gauge the quantity of water flowing in the creek-beds, instead of getting men who had no knowledge of hydraulics but who merely looked at the stream and estimated the quantity of water by rule of thumb, they would have been in a prosperous condition, as they own one of the most valuable hydraulic-sluicing properties there is in the colony. Not only is the area a large one, but in very few places, if any, is the depth of auriferous gravel less than 60ft., and in a large portion of the ground it is between 200ft. and 300ft. and over in depth, containing gold-bearing layers all through it.

Present Water-supply.—The present water-supply is obtained from creeks on the line of race between the mining property and the Arahura River. A dam has been constructed in Granite Creek by forming an earthwork embankment about 3 chains long on the top, with a maximum height in the centre of 35ft. There is a puddle-wall in the centre of the embankment 14ft. wide at the bottom and 6ft. on the top, while the total width of the top of the embankment is 12ft. It has a slope of 3 to 1 on the breast or inner side, which is pitched with broken metal, the outside slope being 2 to 1. The dam is strongly constructed, and is capable of holding 5,300,000 cubic feet of water, equal to a supply of about thirty sluice-heads for two days.

Water-race.—There is a supply-race from the creeks previously referred to, leading the water into the dam, and from that point the main conduit commences. The water-race leading from the dam has a large amount of fall. Indeed, for the first 40 chains the fall is such that the conduit is scoured to such an extent that one would now think it was a channel excavated by flood-water by the course of nature. The water passes into a flume about 60 chains in length, and has a maximum height of about 45ft. The flume is said to have a fall of 33ft. per mile. At the lower end of this flume there is an open conduit 6ft. wide at the bottom and 5ft. deep, having a batter of $\frac{1}{4}$ to 1 on sides, and constructed on a gradient of 1 in 660, or 8ft. per mile. There are several tunnels on the line of race; but when coming on to the lease there is a tunnel over 60 chains in length, which took about three years to complete, owing to the difficulties met with in its construction. In going through the range a blue reef was intersected, which, if properly timbered at once, is very easy to contend with; but where once material of this description is met with in tunnels the work must be carried on continuously, and as fast as it can be constructed. The reef is of a tough substance when first broken into, and had the tunnel been close-timbered, bottom, top, and sides, with extra-strong sets, and the work carried on continuously, no difficulty would have been met with in its construction; but if allowed to stand for a night, the air has such an effect upon ground of this character that it very soon becomes a soft puddle, and will run to such an extent that it will very soon fill up chains of the constructed portion. Such was the case with the tunnel in question, which is said to have cost about £11,000 to put through. After getting the tunnel completed, the size was reduced to such dimensions that only about one-third of the water that the flume and open conduit was capable of conveying could flow through. The tunnel, however, has been sufficiently large to take the whole of the water available, except in time of floods, and very seldom was there sufficient water to fill this tunnel.