length of blanket-tables, and from thence it is elevated to the tailing heap, where it is left, not being considered worthy of further attention. Stamps of 900 lb. are employed, and the average daily duty per stamp is about 3·2 tons. The engine which operates the 110 stamps is stationed at the extreme end of the cam-shaft, and the steam is generated by externally fired boilers of German pattern. I was informed that the public are charged at the rate of 2s. 3d. per hour per each 5 heads of stamps, which amounts to about 4s. 3d. per ton for treatment only. The bulk of the gold is saved inside the mortars. I inspected one mill of modern construction—viz., the 20-head mill at the Comet Mine; and I believe one or two others exist where the treatment of quartz is carried out on more modern lines than at Lansell's Bendigo battery.

The Ballarat School of Mines was also visited by me, and I was most courteously received by the professional staff, and shown over the establishment, which is the most extensive and complete school of mines I have ever seen. Every department of metalliferous mining and engineering appears to be catered for, and to enumerate what I saw would take a volume. The mining community of Victoria are fortunate to possess so fine an institution. Over three hundred students attend the lectures, and those I saw appeared to be an intelligent, keen body of young men of the same type as our New Zealand students. The equipment of the treatment plant is not so complete as that now being installed at the Thames School of Mines, the finer treatment by tube mills, air agitating-tanks, and the vacuum-filter process being absent at Ballarat. I did not observe that coal-mining received any great attention; but geology, electricity, chemistry, and mechanical engineering were taught in splendidly equipped buildings.

## Deep Lead Alluvial Mining.

The deep alluvial gold deposits of Victoria are the result of enormous denudation of the Ordovician rocks containing the auriferous quartz reefs as extensively worked in the Ballarat, Bendigo, and other districts, and it is estimated that such denudation has lowered the surface thousands of feet, resulting in the degradation of enormous quantities of rock and their contained auriferous matrices, setting free the gold-particles now found in the gravels. The rivers of that period were infinitely more potent than the streams of to-day; and there was probably glacial action in the mountains, glacial conglomerate in places forming the bed upon which rest the more recently formed auriferous gravels. With the lowering in force and volume of the ancient rivers, deposits of finer material were spread over the rich gravels in their channels, and then came a period of volcanic activity wherein, from numerous points of eruption, issued lava-streams which completely filled in and covered the old channels, forming level plains, along the edges of which the existing rivers have since eroded their courses. The old channels now constitute the gutters or leads which are extensively worked for their auriferous contents.

For the purpose of developing the deep leads rectangular shafts are sunk through the alluvium and basalt into the bedrock for a minimum distance of 20 ft. from the bottom of the former, from which level main drives necessary for haulage and drainage are driven in the bedrock under the leads and along their course; a series of boreholes are then put up by hand, so as to tap and thoroughly drain the accumulated water in the drifts and gravels, to admit of safe and profitable extraction of the auriferous wash resting upon the bed-rock or bottom. Uprises are then put up to the level of the wash, and cross-drives are driven along the lead, which, if the wash is reasonably solid and dry and does not exceed 4 ft. 6 in. in depth, is worked on the panelling system, by being divided by parallel truck-roads spaced 36 ft. apart (centre to centre) into blocks of indefinite length. The truck-roads may be 5 ft. high, with a bottom width 6 ft., and 3 ft. 6 in. top width inside the post-and-cap sets of timber employed. The system of panelling consists of splitting the blocks (by another truck-road) longitudinally, and from this road extracting the block in panels or strips 4 ft. 6 in. wide and 16 ft. deep, for the entire width of the strip; but if the ground is heavy, 8 ft. deep only is worked from the truck-road on either side. In the event of the wash being in thickness less than 3 ft., to enable mining to be conducted, the necessary height is obtained by removal of the bottom underlaying the wash.

The above system of working is shown on the accompanying plan and section, but the system is often varied and modified to suit local conditions. The panels are protected by light timber post-and-cap sets closely spaced, and no attempt is made to remove or draw these sets when the block is extracted. The superincumbent gravels shortly fall, burying the exhausted panels and disused truck-roads, and sometimes the cross-drives also.

If the conditions are unfavourable to panelling, owing to the heaviness of the wash, the ground is worked on the blocking-out system, which consists in driving parallel places in close proximity and the employment of heavier timber, and this will no doubt be adopted at Ross goldfields, Westland, where, in the early days, the blocking-out system was employed.

In Victoria the practice regarding the measurement of wash and the working-costs of its production are rather ambiguous, and need explanation. The quantity mined and treated is stated at per fathom, which consists of a superficial square fathom—viz., 36 square feet—by whatever depth of wash or bottom is removed, which may vary between 3 ft. and 7 ft., consequently a fathom of the former depth contains 4 cubic yards, and of the latter 9·3 cubic yards. The working-costs are stated in pennyweights of gold per fathom, the gold being estimated at £4 per ounce. The working-cost in Victoria range between 8 dwt. and 14 dwt. per fathom, which may be regarded as extreme cases.

In the Maryborough district I visited and descended two important deep alluvial mines—viz., the Charlotte Plains and the Duke and Main Lead Consuls.

The Charlotte Plains (Mr. G. F. Bryant, manager), employs the most extensive electrical installation on any mine in Australasia, and was the first mine in Victoria to use electrical power. The electrical equipment is particularly interesting, inasmuch as it includes extensive up-to-date machinery for generation, transmission, and utilisation of electric power. Briefly, the plant includes