

of gold-mining work. For some considerable time past the company referred to have been engaged in extensive and costly works, comprising the construction of water-races and other necessary erections, and are to be congratulated on having at length reached a productive stage. The engineer, Mr. E. W. Spencer, reports having erected gold-saving tables at the end of the ordinary wash-boxes. These have proved very effective in catching the fine gold, as much as 27 per cent. of the gross yield being saved by this means. The results are further proof of the loss of fine gold which takes place at many sluicing claims where tables are not provided. This is a feature to which I have repeatedly drawn the attention of various claim-managers, and have the satisfaction of knowing that the results obtained by the subsequent adoption of tables has led to mining operations which were previously carried on at a loss becoming commercially successful.

In connection with the question of saving fine gold, Mr. H. W. Young, A.M.I.C.E., of Grey-mouth, who has had considerable experience in the West Coast goldfields, has very kindly placed the following notes and accompanying drawings, together with photographs showing the Waiwhero Sluicing Company's plant at Barrytown, at my disposal for the purposes of this report. Mr. Young says,—

"I may premise that, excepting amongst those more or less familiar with the subject, great misapprehensions exist as to the practicability of economically working what is vaguely termed 'black-sand' ground, and of saving the very fine gold with which black sand is frequently associated. Many regarded this as a mysterious and insoluble problem, and there was a widespread delusion that fine gold never was or could be profitably recovered from black-sand wash. These views are disproved by the history of the industry on the West Coast, for the golden beaches were discovered in the first year of the rush, and have contributed a most profitable and large proportion of the whole yield of these goldfields. The beach-workings of the earlier period extended more or less throughout the entire length of the coast-line, and were held in small claims, worked in most cases by 'paddocking.' Thus the overburden was removed by stripping, and cast aside, only the leads or layers of concentrated washdirt being washed. The gold was saved on plush, &c., by cradles or toms, or by copper plates. The washdirt usually contained a large proportion of black sand, and was sometimes almost entirely of heavy black and grey sands. The quantities dealt with and the appliances required were small, all operations being carefully conducted by hand. As usual, the miners tested and watched their tailings, letting no gold escape that it would pay them to save. By degrees, and as the richer deposits were worked out, small water-races were brought in and ground-sluicing resorted to, also the process known as 'beach-combing' or 'haymaking,' by which were worked the gold-bearing black sands sorted out and deposited on the beaches by wave-action. Many tracts of beach have thus been continuously worked for more than thirty years, often by their original holders or their descendants. The modes of working such claims have not materially altered, though many ingenious devices in connection with them may be observed.

"Fine-gold working on a large scale has been largely confined to and developed in the vicinity of Westport, where extensive gold-bearing marine deposits exist. When the richer leads were worked out in small claims, poorer ground in larger areas was taken up, and the systematic development was begun of washing-appliances capable of putting through large quantities of comparatively poor dirt at a cheap rate. At first the plant was generally somewhat similar in construction to the American undercurrent tables, having a main cross-launders discharging on to the tables through numerous small gates, but this and other arrangements and details gradually developed according to experience. During the period of development there was no lack of means to supply the plant, or of skilful and observant men to adapt it to its purposes. Innumerable experiments of all kinds were tried, some leading to progress and others abandoned after failing to stand a working-test, and it is interesting to note that amongst the latter are many which have been recently suggested or patented as up-to-date novelties.

"Without going into the particulars of older forms of tables, and confining these remarks to the general Westport type and improvements on it, it may be said that the modern fine-gold-washing plant as used on the West Coast consists of three main essential parts. The first is the hopper-box with stone-shoot, which receives the water and gravels from the tail-race connecting with the sluicing-face, and separates the stones and shingle from the water and sands. The second comprises the 'sand-box' or 'boil-box,' with its discharge-ducts and other accessories, intermediate between the hopper and the tables. The third comprises the washing-tables and their accessories. These three essential parts deal with the stuff from the face and reduce it to concentrated gold and heavy sand ready for amalgamation. While these three features are necessary elements in any successful plant, they differ in form and detail in various constructed examples. Some four years ago, as engineer for the Waiwhero Sluicing Company, it was my business to provide working-drawings for a plant of medium size, and later for a much larger one, both of which have stood long and satisfactory working-tests; also (for other companies) designs for somewhat similar plants, but with modifications to suit special circumstances. Based on a knowledge of the successes and failures of the Westport district, and with all available information from those who had special experience in the matter, it was possible to make designs embodying and improving on the best practice of the time. It may be best to describe this in detail, noting possible variations or improvements, as the conditions and necessities of each case may require special attention and modifications.

"The object of the hopper-box is to receive the discharge of the tail-race from the sluicing-face and eliminate the coarser stones from it. The most suitable width for the hopper-plates is 3 ft. for small water-supply up to, say, five heads, and 4 ft. for larger ones. The plates should be square, of equal breadth and length, so that they can be turned round and over to equalise wear, and of steel $\frac{3}{8}$ in. thick, punched (not bored) with holes $\frac{1}{4}$ in. in diameter, about $1\frac{1}{2}$ in. pitch on diagonal lines. The plates are subject to great scour, necessitating frequent renewals,