The finest alluvial gold yet found is that which occurs on the ocean-beaches either adjacent to the mouth of gold-bearing rivers, or upon beaches where an ocean-current impinges after sweeping past one of these estuaries. There can be no doubt this gold is brought to the sea by the rivers. It is the most difficult of any to save, not owing so much to its fine state of division as to the shape it has assumed during its travels. At least 50 per cent. of the grains are doubly concave, the centre of the scale being considerably thinner than the edge. Measurements made by Clarke of gold in the magnetic ironsands of the Californian beaches gave a diameter to the smallest scales of 0·003 in. to 0·0035 in. Scales of gold not more than 0·002 in. in diameter by a thickness of 0·0005 in. are frequently met with on the beaches of Southern Otago. The difficulty experienced in saving this class of gold is greatly increased owing to its always being associated with grains of magnetite and ilmenite, minerals of high specific gravity. In experiments made by the writer, a cubic yard of beach-sand was passed through a strake over coir matting; 80 lb. of concentrates resulted, which assayed 12 dwt. 10 gr. of gold to the ton, equal to 10·6 gr. per cubic yard of sand. From 10 to 15 per cent. of the gold was lost in concentrating. By contact amalgamation of the concentrates only about 60 per cent. of the gold could be extracted; by frictional amalgamation nearly 90 per cent. was recovered, a little of the quicksilver being floured. The residues assayed 1 dwt. 7 gr. per ton. After two hours and a half roasting at a red heat in a muffle furnace very little magnetic iron was left unconverted. The roast was sufficient to permit the gold to be removed by a 0·35-per-cent. chlorine solution in fifty hours, the extraction being practically complete. The best method of working these extensive littoral deposits by dredging is a problem for the near future.

A gold of a somewhat similar character is found on the beaches of the Mataura River, almost from its source to within a few miles of Gore. Well-rounded smooth pebbles form the drift, and the continual pounding of these pebbles has reduced the gold to a state of extremely fine subdivision, and at the same time produced in some of the particles the double concavity mentioned before. Very little of this gold sinks into the gravels; it is found on the beaches, which are sometimes rich enough for skimming and cradling. The gold is deposited upon a beach during a fresh in the river, and is left about high-water level as the river recedes. The next rise, instead of covering it with silt, floats it away to a beach further down the stream, hence the richness of the surface layer. There is always a quantity of black sand caught with the gold, but as the latter can be amalgamated without difficulty a separation is easily effected.

The gold of the Clutha River seldom exhibits concavities; when in scales the surfaces are either convex or plane, the smaller grains are generally oval in outline, and, compared with beach or Mataura gold, easily arrested on the tables. The results of some measurements of the finest gold saved by one of the electric dredges, made by the writer and published in the *Mining Journal*, were afterwards confirmed by the New South Wales Government expert sent to report upon the dredging industry of New Zealand. The extract reads, "A sample of fine gold from the Electric Company's dredges, about 2 gr. in weight, which had been sifted through a sieve of 3,600 holes to the inch was again sifted through one of 4,900 holes, and the gold which passed through sorted under a powerful lens. One hundred of the smallest of these pieces were thus selected, and examined under a microscope. Measured with a micrometer, their dimensions in fractions of an inch varied between 0·009 and 0·006, and 0·003 and 0·002, the mean of twenty measurements being 0·0065 × 0·0042. The hundred particles were then carefully weighed, and found to have a mass of 0·097 of a grain. The mean weight of the pieces was therefore 0·00097, or a little under one-thousandth of a grain." Beyond proving that very fine gold exists in the Kawarau near its junction with the Clutha, and consequently in the Clutha lower down, and the limit in size of the particles of gold saved on the tables, the measurements afford little information. What proportion of gold in this fine state of division is saved compared with what is lost cannot be determined. No gold-saving appliances on Otago dredges are constructed with a view to saving gold of this description, and what little is caught is more the result of accident than design. That fine gold is present in the wash is made evident by carefully panning down dish prospects.

The gold of the valley deposits and flats in which quartz-drifts have accumulated is similar to the gold contained in the corresponding undisturbed deposits occurring on the ranges. A simple reassortment of the gravels has taken place, frequently resulting in their enrichment. The gold is tabular, often containing fragments of quartz foreign to the gold. These quartz splinters have been forced into the soft metal during its travels. The gold is sometimes stained or tarnished, generally with a brown discolouration, and occasionally with a white metallic stain like electro-silver-plating laid on in patches. The flattened grains frequently attain a diameter greater than $\frac{1}{8}$ in.; the thickness is variable. The heavy material saved with the gold is ilmenite, magnetite, garnet, scheelite, and marcasite. Not more than one-third is magnetic; but as very little of the gold refuses to amalgamate with mercury a satisfactory separation can always be made. It is impossible to separate the heavy material from the gold by panning without loss.

In the (*d*) lake-bed deposits the gold resembles the containing wash, in that it is little water-worn; the finest grains seldom bear signs of having been battered by the breccias in transport. No difficulty is experienced in separating the gold from the black-sand residues by panning. The grains are heavier in proportion to their surface area than those in any other class of deposit. The whole of the gold lifted by a dredge working on ground of this nature should be easily saved.

The Efficiency of Gold-saving Appliances.

In a metallurgical sense the gold-saving appliances in use on dredges consist of a sizing and concentrating plant. The sizing is done in a perforated screen, and the concentration on inclined tables covered with coir matting. Any gold too large to pass through the perforations in the screen is generally lost. The gold that escapes arrest in this way is hardly worth taking into