As soon as it was realised that gold-dredging on the Coast would become an established industry, the ingenuity of inventors was exercised to design efficient tables that could be erected on the limited space available on the deck of a dredge. The first step in the evolution of the modern table was the introduction of what was known as Jones's patent on the Waipuna, Grey River, and other machines. This was an improvement on the Otago appliances, and consisted of the addition to the ordinary tables of distributers and mixing-wells, the latter being generally known as "boil-boxes." It is only fair to state that at a sluicing claim at Barrytown, where a littoral deposit containing large quantities of black sand and very fine gold was being successfully dealt with, the mixing of the pulp in quantity and its even distribution over the tables had been accomplished long before. To deal with sands in quantity on dry land, where space is of no consequence and the quantity of water available only limited by the means of the operator, is very different from treating large quantities successfully in the available space on the pontoons of a dredge, where the supply of water depends upon the size of the pump or the power of the engine. But when once the principles governing the mixing and distribution of the sands had been learned the evolution of the present tables was rapid. The latest improvements suggested by experience are embodied in Cowan's Pactolus tables and Phillips's black-sand tables, diagrams of which accompany this paper. The former are in use on the Pactolus, Garibaldi, and other dredges, where only a limited deck-space is available, and give every satisfaction. As will be seen in the drawings, the tables are superimposed one over the other, thus making a given area provide space for double the spread. The upper spread of tables is fed from one side of the distributing-box, and the lower from the other side. The method of distributing by fixed partitions in the distributing-box is not so good as with Phillips's doors, which are provided with quadrants and thumb-screws, and are adjustable. As the deck of a dredge and, consequently, the bottom of the distributing-box is seldom absolutely level in cross-section for any length of time when the dredge is working, there must always be a slight variation between the quantity of pulp discharged from one side of the box and the other. Phillips's tables are working on the North Beach dredge, a machine dealing with a littoral deposit of sand and shingle. The gold is very finely divided, and associated with large quantities of black ironsand (magnetite and ilmenite). The sand is saved with the gold, and afterwards separated by amalgamation. If any loss of gold occurs over either Cowan's or Phillips's tables it is not due to any want of efficiency of the tables, but from the failure of the pump to lift the quantity of water required to keep the strakes free from gravel, and this will always be liable to occur so long as a separate engine is not provided to drive the pump alone. As the quantity of sand passed over the tables is governed by the size of the perforations in the screen, and there are no other means by which it can be regulated, there will always be a varying quantity of solid matter in the pulp. No two cubic yards of gravel in a working-face can be relied upon to contain equal quantities of fine material of less than 1 in. in diameter, the size of the largest perforations in many screens. Where the ground consists of alternate layers of sand and shingle, the quantity of fine material varies with nearly every bucket discharged. In creek beds and flats there are occasional deposits of fine drift resting directly on the auriferous wash and lifted with it, which for a time largely increases the quantity of solid matter passing over the tables. When dredging through ground of this loose nature the tendency is for the face to fall in freely to the buckets, with the result that the whole of the buckets come up full and sometimes piled up. Now, material of this description packs closer in the buckets, and consequently the weight of the ladder is largely increased. On a machine where the engine under normal conditions is working at its maximum efficiency, which is often the case, the additional load at once reduces the speed. The lifting-capacity of a centrifugal pump varies with the number of revolutions it makes within certain limits, so that the effect of the reduced speed is a diminished supply of water just at the moment when the largest quantity of solid matter is passing over the tables. If gold is lost over the Pactolus or Phillips tables, it is under these abnormal but frequently occurring conditions, and no tables will ever be designed to prevent this loss until the pump is driven by a separate engine instead of by a belt from the main engine.

With the few Otago dredges on which any attempt has been made to improve the gold-saving appliances it has been by the adoption of West Coast methods and tables. A serious difficulty in the way of improvement is the reluctance of the dredgemasters to admit that gold is being lost, believing that such admission would be a reflection on their own efficiency rather than that of the appliances with which they are supplied. Mr. E. Roberts, who designed many of the Otago and West Coast dredges, having recently satisfied himself that the old-fashioned tables do not save the gold, has designed a set of tables for Roberts's Naumai dredge which are a modification of both the Phillips and Pactolus tables. Sufficient space being available, the tables are not doubled, but spread on both sides of the distributing-box; the distributing is effected with adjustable doors, as on the Phillips tables; whilst the mixing and spreading wells, or "boil-boxes," are after the Pactolus pattern.

As the difference in first cost between the old style of table and those fitted with distributers is merely nominal, the question of expense can never be pleaded as an excuse for shortsighted conservatism.

HIGH-LIFT CENTRIFUGAL PUMPS FOR MINING PURPOSES.

The problem of raising large quantities of water against a considerable head is one which has occupied the attention of hydraulic and mining engineers for many years, and which has demanded all their available skill and energy in order to arrive at a practical solution.

The difficulty with mine-pumps lies in the intermittent acceleration of heavy columns of water, when the shock due to the reversal of even slowly moving plungers tells most severely on the