One motor driving the chain of buckets; one driving screen and elevator; one driving winch working the bucket-ladder; one driving winches for head and side lines; one driving centrifugal pumps; and one driving sand-pump for fine tailings. These arrangements will, no doubt, be viewed with interest by the several classes of persons interested in dredge design in this colony.

A recent dredge designed by Messrs. Cutten Bros., of Dunedin and Greymouth, for the Feddersen Gold-dredging Company (Limited), Three-Channel Flat, Buller River, and recently put to work, is illustrated. Its length is 86 ft., beam 29 ft., depth 7 ft. The ladder is 56 ft. long, and when at an angle of 45° is capable of dredging to a depth of 30 ft. The buckets have a capacity of 5 cubic feet each. The elevator is rope-driven, the power being applied to the top tumbler, and the tailings can be stacked to a height of 30 ft. Steam is generated in a multitubular boiler of 30 nominal horse-power. The main engines are of the compound type, rated at 16 nominal horse-power, and built by Marshall, Sons, and Co. (Limited), of Gainsborough, England. The winches are worked by a small pair of coupled vertical engines. A revolving screen is used, and the tables are covered with expanded metal above the matting. The Davis patent grapnel has been adopted on this dredge.

The Davis Patent Grapnel.—In addition to the adoption of this appliance on the Feddersen dredge just referred so, it is also in use on the following machines: viz., Kohikohi, Grey Lagoons, Stafford Waimea, Golden Bay, Amikitea, Three-mile Greenstone, Greenstone Junction, New Greenstone, Greenstone Creek, and Earnscleugh. The invention is intended to supersede the ordinary grab-hook as usually found on the bucket-chains, and the advantages claimed for the grapnel are that owing to the method of its construction it acts as a pick in loosening the face of work on which the dredge is operating, and so effects a saving in the wear-and-tear of bucket-lips. The construction of these grapnels is such that on reaching the five-sided bottom tumbler they project past the line of the bucket-lips, and tear into the tight gravels, receding within the line of the lips immediately they leave the tumbler. For comparison with the ordinary grab-hooks, it may be said that the latter are constructed to stand about 4 in. beyond the line of the bucket-lips, and in lowering the ladder the hooks are the first things to catch the drop-shute. The Davis grapnel-hooks are said to keep within the line of the lips in passing the drop-shute, and the ladder may consequently be lowered further than with the ordinary hook. An additional feature is that the Davis grapnel-hook does not project beyond the line of the bucket-lips until it reaches the five-sided bottom tumbler, and therefore does not tear up the bottom to the same extent as the ordinary hook does.

Pontoon Ventilator.—This consists of a sheet-iron casing provided with doors and attached to the ashpit of the dredge-boiler, as shown on the drawing reproduced. The ashpit is therefore connected with the inside of the pontoon through openings cut in the deck, and the draught required for the furnace of the boiler passes through the pontoons, and may be controlled from any part. The principle is really that of furnace-ventilation adapted from the method formerly common for the ventilation of coal-mines, is quite simple, and can be fitted up at small cost. Adequate ventilation of the interior of wooden pontoons is very essential.

I have to thank Mr. W. Faithful, of the firm of Cutten Bros., Greymouth, for the drawings of the Davis grapnel and pontoon ventilator.

Payne's Patent Elevator-bucket.—The following particulars and the drawings of elevator-buckets have been furnished by Mr. F. W. Payne, consulting engineer, Dunedin: Fig .A shows the patent bucket. The shoot delivering into buckets illustrates the way in which the tailings are filled into the buckets without any falling through between. It will also be noticed that the buckets open out and have plenty of freedom at top and bottom tumblers, which is a most important point. In the tray buckets, Fig. B, the illustration shows the form usually employed, and the laps of the buckets, it will be noticed, are unavoidably arranged to allow the tailings material to get in, and also leakage of water to take place. If the laps were arranged the other way it would be impossible to obtain a clear delivery over the top tumbler. In the V form of bucket shown on Fig. C the laps are necessarily the same as in the tray bucket, and an additional drawback is that the buckets close together in coming round the tumblers. This is especially objectionable in the bottom tumbler, as stones are apt to fall and roll between the top and bottom lines of buckets, and get pinched between the backs of buckets in coming round bottom tumblers. A further great advantage of the patent buckets is that, not being composed of a continuous line of buckets as in all other classes of elevator-buckets, but alternately bucket and set of links, like main buckets, they allow of the links and buckets being all bushed in the same manner as main buckets. Some of the dredges fitted with this bucket are the Dunstan Lead, Leviathan, Grey River, Olrig, and at the time of writing a leading Otago dredging company are having their original class of bucket replaced by the patent ones. From experience gained from those already in use, a great saving is effected both in ordinary wear-and-tear and in freedom from breakdowns where this bucket is used.

McCallum and Roberts's Patent Improved Screen.—The description and drawing of this invention (which is applicable to other purposes than dredging) has been supplied by Mr. Edward Roberts, consulting engineer, Dunedin. Its object is to replace the circular screens at present in use with a view to more effectual screening, and, in the case of gold-dredges, to enable the material to be more thoroughly washed. In the ordinary gold-mining circular screens the material simply lies in the hollow, rising and falling with the motion of the screen for 1 ft. or 15 in., but not turning over. To assist the stones being turned over angle irons and bars of various kinds have been tried, but with doubtful results. If these bars are made too high the stones get jammed and carried around, often damaging and sometimes destroying the sparge-pipe. The improved screen may be made hexagon shape or any other polygonal form, or corrugated or oval, as desired. The material must of necessity be turned over and shaken about, and consequently more effectively washed by the action of the water from the sparge-pipe. Another advantage this screen possesses is the fact that in the polygonal form the plates are flat and in sections, and can therefore be made any thickness,