

heavy design, and consist of six barrels or drums, one for the head-line, one for ladder-line, and four for side-lines, and are driven by a pair of vertical engines. The screen is 31 ft. long, 4 ft. 6 in. in diameter, driven by friction of flat rollers. The material is delivered into the screen in the usual way, and from there the coarse material is directed into main elevator-buckets; the finer portions that pass through the screen are delivered on to the gold-saving tables, the tailings from which are deposited into a settling-tank, from which they are lifted by means of a supplementary elevator into the main elevator, this method being rendered necessary by the presence of a large amount of fine material which, if not thus disposed of, would seriously impede the working of the dredge by banking up under the stern. The main elevator is the principal feature of this dredge, being 145 ft. between centres of top and bottom tumblers, and is capable of stacking tailings to a height of 80 ft. above water-line. The elevator is driven by means of two wire ropes—one each side.

The Golden Run dredge, which has been designed by Mr. Edward Roberts, consulting engineer, of Dunedin, is also another very large machine, and is illustrated from drawings kindly supplied. It is to work in the Clutha River, near Miller's Flat. Mr. Roberts describes this dredge as follows:—

The dredge illustrated is now being built to work the company's claim in the River Molyneux, at the upper end of the Island Block Flat. The claim embraces a considerable portion of the flat, into which rich leads of gold have been traced by the small dredge formerly working on the claim. The dredge worked a portion of the river claim, and got a large quantity of gold of the value of £13,971 in four years, but the dredge was too small to tackle the high banks or to work the river to any advantage. The company therefore decided to have a large dredge built which would be capable of working the whole of the river portion of the claim, and also the high banks, which vary from 15 ft. to 30 ft. above river-level. Several new features have been introduced into the design with a view to increased handiness, amongst which may be specially mentioned a patent ladder extension. In this extension arrangement the ladder pivot-bearings are supported by inclined guides or girders, on which they slide by means of screw-gear. Should it be desired to dredge a little deeper than ordinary the pivot-bearings can be made to slide down the inclined planes towards the deck, and extra buckets and links put in. An extra roller is provided, the bearings of which can be bolted to the inclined guides, which then form a standing portion of ladder. An extra depth of from 8 ft. to 10 ft. may be reached by this extension. Other ideas have been also adopted which have been used on other dredges built by the same designer, and have proved efficient—namely, the large A frames first introduced into the Golden Beach dredge, the elevator with the curved buckets, the mode of supporting the elevator first introduced in the Golden Point dredge. The elevator is pivoted on strong cast-iron brackets or frames, which also carry all the gearing, making a rigid job. The elevator is hung in two places from the head of a pair of tubular shear-legs pivoted in line with the elevator. Sheave-blocks are attached to the head of the shear-legs, and other sheave-blocks to the head of the A frames, two sets of blocks being used. Wire tackle is rove through the blocks, and the falls led to two handy winches affixed to the A frames. The height of the elevator can be adjusted with facility without ever stopping the dredge. The designer has recognised the importance of providing against the sagging which takes place athwartship in dredges caused by the great weight of the machinery being chiefly along the centre-line of the dredge. The A frames before mentioned are instrumental in checking this tendency, being well braced transversely by diagonal bracing. Further provision has also been made astern to counteract the weight of the elevator by a frame built across the vessel fitted with heavy diagonal stay-ropes. Longitudinal stiffeners and the tendency to hog is prevented by a system of hog-posts combined with the A frames and front gantry and stay-ropes forming a truss. The engine and boiler are on the port side of the dredge, and the winch with the main friction-gear on the starboard side. The two men in charge are therefore able to attend to their respective employments without continually crossing the well; this idea was first introduced by the designer in the Golden Gate dredge. The winch is a very handy one. The motive-power is supplied by a pair of inverted vertical engines driving through double gear the main pinion-shaft situated in the centre of the winch. From this main pinion-shaft the motion is transmitted to the head-line and ladder-line barrels by separate clutch-pinions. These clutch-pinions have break-sheaves attached and strap-breaks, and the breaks being on the pinions instead of being on the winch-barrels permit of much better control, it being possible to lower the ladder with safety by the break. Another advantage is that when the breaks are on and the clutches out of gear the spur-wheels and pinions are stopped when the other barrels of the winch are in use. The bucket-ladder is very heavy, and fitted with large rollers. The buckets are each of $6\frac{1}{2}$ -cubic-feet capacity. The revolving screen is 6 ft. diameter, and delivers into a distributing-box having adjustable slots in the bottom to deliver the material fairly on the divide of the tables and to regulate the discharge. The screen is driven by friction-rollers from the lower end. The gold-saving tables are arranged as usual in separate strakes. The engine is a 25-horse-power nominal compound engine (Marshall's). The surface-condenser is horizontal, with 4 in. tubes, the water being drawn through the condenser from the side by a 12 in. Tangye pump, which delivers the water for the tables into the tank at the head of screen, from which it is led to the screen and tables. The boiler is of 40-horse power nominal, internally fired. The elevator is specially light in the frame, and is fitted with elevator-buckets having Roberts's patent cast-steel ends. Tube-stays are provided to counteract the side-movement, and the outer end has a pivoted discharge-shoot capable of adjustment in either direction. The hull is built with blue-gum frames and kauri planking $2\frac{1}{2}$ in. thick. The general dimensions are as follows: Length of hull, 110 ft.; breadth astern, 36 ft.; breadth at bow, 30 ft.; depth astern, 8 ft. 9 in.; depth abaft of tumbler-frame, 6 ft.; width of well, 6 ft.; length of main ladder, 75 ft.; length of elevator, 97 ft.; weight of elevator, 20 tons; capacity of main buckets, $6\frac{1}{2}$ cubic feet; capacity with buckets three-parts full, 172 cubic yards per hour; depth dredged at 45 degrees, 45 ft. below water-line; height to which tailings may be stacked, 48 ft. above water-line.