

In regard to the class of boats for use in conjunction with dredges working on swift-flowing streams, experience has gone to show that a boat should have considerable beam in proportion to its length, and be built with high bluff bows. This latter feature enables the boat to take plenty of sheer when attached to a line, and thus the risk of swamping is considerably reduced. It has been found necessary in some cases to condemn unsuitable boats, and to prohibit their further use. Such boats have usually been ships' boats or light craft supplied either through ignorance of the class of boat required or else on the penny-wise principle.

It sometimes happens that accidents occur to men through being caught by parts of machinery in motion, although reasonable provision is made for the fencing or guarding of exposed belts, fly-wheels, shafting, &c. These accidents, as a rule, occur whilst oiling or examining the machinery when running, also to men crossing the bucket-chain when in motion. This latter practice is distinctly prohibited by the special rules; it has been the cause of several accidents, and any workman guilty of such an act (or of any other in violation of the regulations) should at once be summoned by the dredgemaster to answer to his offence before a Court of justice. Oiling of machinery in motion should also be prohibited by the dredgemaster in charge. It may be that familiarity with danger breeds contempt for it, but this is no excuse for the ofttime reckless and foolhardy actions of workmen which have from time to time resulted not only in serious but in fatal accidents.

#### CONSTRUCTION OF DREDGES.

As regards dredge design and construction generally, various modifications, alterations, and improvements are being made from time to time with the object of gaining increased efficiency in both machinery and gold-saving arrangements. It is pleasing to note that in some instances the pontoons have been divided into compartments, in order to minimise the risk of sinking in the event of damage to any portion of the pontoons. The ventilation of the pontoon compartments is another feature which will be referred to and illustrated further on.

Among improvements and modifications referred to in last year's report may be mentioned the Payne and Peck patent centrifugal elevator and O'Brien's hydraulic-power dredge, both of which are to be seen at work. The first-named machine is working successfully on a number of dredges, and stacks the tailings very uniformly. In watching this elevator in action I noticed, and subsequently urged, the desirability of the tailings being conveyed to it with the least possible amount of water. There should be very little difficulty in preventing the water from reaching the elevator. The object of the elevator is to stack tailings, and not to raise water. By allowing the latter to flow on to the elevator and come within the scope of its action, power is uselessly absorbed; in fact, it is simply acting like so much brake-power on the engine. Not only is this the case, but, the water being thrown from the vanes, or "beaters," of the elevator in the form of a spray (which is more or less dense in proportion to the amount of water allowed to come into contact with the machine), the passage of fine tailings is retarded, and therefore they are not thrown as far from the dredge as would be the case if the spray were absent, the latter presenting a dense medium through which the stones, small gravel, &c., have to pass.

O'Brien's method of working dredges by hydraulic pressure through the medium of Pelton wheels has proved a practical success at Waipori and at Cardrona. Of course, it is only applicable at places where water-power is available, but, given these conditions, the system is about the most economical yet adopted, as the power employed on steam and electrically driven dredges to pump water for washing the gravels is saved entirely where the amount required can be taken from the pressure-pipes. Failing this, the water which is used for driving the Pelton wheel can be exhausted into the sluice-boxes, and so reduce the volume to be lifted. The accompanying illustrations of the La Franchi dredge at Cardrona show the system of ball-and-socket joints in the pipe-line which admits of a flexible connection between the pressure-pipes on land and the floating dredge.

Current-wheel dredges are now practically things of the past. The most modern installation was in the Clutha River below Alexandra (Otago). It is found that dredges so driven do not work steadily; they can only work in the current, and this is liable to be checked or diverted by the stack of tailings piled up by the dredge. It is proposed to drive the dredge referred to by oil-engines; in fact, one engine of this class is already driving the centrifugal pump.

Electrically driven dredges are not so general as might have been expected. The difficulties and expense attending the coaling of dredges in the gorge below Alexandra are such as would naturally lead to the adoption of an electric-power station at or near the coal-mines, if only the several dredging companies could amalgamate with such an object in view, or form a company for the supply of electric power. The Earnscliffe No. 3 dredge—one of the largest in the colony—has been put to work since the commencement of the year, and is driven by electricity generated by water-power from the Fraser River. I understand that the dredge is working satisfactorily, and that the electric plant is powerful enough to supply current for the working of more dredges.

In America, Mr. R. H. Postlethwaite, formerly of Dunedin, New Zealand, and now of the Risdon Iron and Locomotive Works, San Francisco, has done good work in connection with gold-dredging on the New Zealand system. In addition to the designing and building of steam-driven dredges, Mr. Postlethwaite has given considerable attention to the question of driving dredge machinery by electrical power, and several dredges of this class have been constructed by the firm with which he is now associated. Through the courtesy of Mr. Postlethwaite I am enabled to reproduce a drawing showing the general arrangements of one of his electrically driven dredges. A prominent feature in connection with the working is that, instead of one large motor driving the bulk of the machinery—as is generally the case on steam-dredges—every department of work has its own motor. On reference to the drawing it will be noticed that there are six motors disposed as follows:—