

greater prominence, and is engaging the attention not only of the speculator, but also of the conservative man of business, who, under existing circumstances, has difficulty in obtaining suitable and safe investments through the ordinary and recognised channels of investment for his capital. The prejudice which the industry has had to meet and overcome in order for it to gain a footing as a recognised and accepted branch of mining, a prejudice caused entirely by the inherent defects and consequent failures of the earlier types of dredges, and the fact that such prejudice has actually been overcome, as evidenced by the interest now taken in the industry, proves to demonstration that the modern dredge is a complete and unequivocal success.

In considering and discussing the dredging industry it will be but necessary to criticize and comment on the three recognised types of dredges built and in use at the present day—namely, the hydraulic-suction dredge, the shovel dredge, and the continuous-bucket ladder dredge. Of these types the first named is gradually becoming, and may be now looked upon as, a back number so far as dredging for gold is concerned. For digging sand and very small gravel the suction dredge is admirably adapted, but for lifting boulders or even large stones, an essential attribute of the successful gold-dredge, the suction dredge is comparatively useless; for when designed to lift boulders or large stones a tremendous and disproportionate loss in efficiency occurs. The shovel dredge will also, in the course of a few years, in all probability be an unknown quantity in the mining world. In this type of dredge there are many points of inferiority when compared with the continuous-bucket type, but there are, unfortunately for itself, no corresponding points of superiority. The dredge which most nearly fulfils or approaches to the following conditions is the dredge which must of necessity be the best adapted to gold-dredging: (1.) Speed and readiness in moving and taking up different positions: this qualification is especially necessary in a dredge when the ground to be worked contains very heavy boulders, too large for the dredge to lift, or submerged trunks of trees, for in such cases it becomes imperative to change the point of attack and so dig that the boulder may be released from its surroundings, and may roll back into the hole previously prepared for it. Again, it is at all times a great advantage, particularly when working into a bank and stacking tailings at a great height, to be able to move at will the stern of the dredge without at the same time being compelled to change the position of the bow. (2.) Adaptability for cleaning the bed-rock. (3.) The possibility of digging to a maximum depth: this qualification is particularly valuable when the ground to be worked is of great depth and the values near the bed-rock. (4.) The feasibility of working a high bank and taking charge of the tailings. (5.) Cheapness in working: this is absolutely essential where a low-grade property is being operated. (6.) A close gold-saving apparatus or device.

By comparing to a common standard the two types of dredges above referred to, an intelligible and fair criticism of their respective merits may be made, and a sound judgment arrived at. The shovel dredge, of necessity, must be operated by means of spuds, and cannot, therefore, with any degree of celerity, be made to move from one position to another, nor can the bow or stern be readily shifted without moving the entire dredge. The continuous-bucket type of dredge, a full description of which is given below, being operated by means of lines, can be easily and rapidly made to take up any position desired. The cleaning of the bed-rock, it will be readily seen, particularly when uneven and composed of a hard material, is much more easily effected by the comparatively small buckets of the continuous-bucket machine than by the wide-mouthed shovel of the other type of dredge under discussion. The principle of construction of the shovel dredge *ipso facto* renders that type suitable only for digging in comparatively shallow ground, whereas the continuous-bucket type can operate with full efficiency to a depth of 60 ft. The latter type of dredge can and is operating inland, working into banks from 10 ft. to 16 ft. above water-level, and is, without difficulty, taking charge of and stacking the tailings behind it to a height of from 24 ft. to 30 ft. There is no case on record where a dredge of the shovel type has operated under similar conditions; it may therefore be presumed that the dredge, as at present designed and constructed at all events, is not suitable for that class of work. The crew necessary to operate a shovel dredge is from two to three times that required to operate the most modern pattern of the continuous-bucket dredge, and the power required to operate the former is nearly twice that necessary for the latter. The power in the case of the shovel dredge is required intermittently, consequently a much more severe strain is thrown upon the entire dredge than in the case of the bucket dredge, where the power used is constant and the strain is comparatively steady. The cost of working a shovel dredge runs from 7 cents per cubic yard upwards, whereas the most approved pattern of bucket dredge can be operated at a cost of from 3 cents to 5 cents per cubic yard, which latter estimate includes \$100 per week to depreciation account, though the actual depreciation, experience teaches, does not amount to half that sum. In order to make a close saving of the gold, a steady, continuous, and not too heavy feed is necessary; the quantity of material fed to the machine must be regulated by the size or area of the gold-saving tables or apparatus, in such manner that not more than a thin stream of gravel shall be washed over the tables at any one time. This is possible when the material is dumped continuously and in comparatively small quantities, as in the bucket dredge, but is not possible in the case of a shovel dredge when a cubic yard and a half of gravel is dumped into the hopper at one time, for, up to date, no satisfactory automatic hopper has been devised to feed uniformly to the tables such a large quantity of material. Another serious objection to the shovel dredge is the difficulty of keeping the door of the shovel sufficiently tight to prevent a leakage of the small gravel and black sand, which, of course, carries the gold.

There are numerous patterns of the continuous-bucket and ladder dredge; some of these are, however, extremely inefficient for gold-saving purposes, because they do not grade the material before running it over the tables or through the sluices, as the case may be. It is a well-recognised fact amongst miners that very fine gold cannot be saved in sluices constructed for heavy material. Again, other dredges partly grade the material, but not to a sufficient