

gravel, and then it is superfluous work, as loose gravel seldom carries any gold.

In spite of the repeated failures in New Zealand, California, the Snake River, and many other places, even to the Mawdach Gold Dredging Co., in gallant little Wales, where an attempt was made to dredge for gold at Barmouth; an enormous amount of money was wasted at Ruby Creek, upon the Fraser River, in trying to make a centrifugal pump dredge for gold. Interluding a little foreign news, after having seen the Barmouth gold dredging claims, I will undertake to say that with a properly constructed dredge there should have been a handsome investment for the stockholders. This may seem news to some, but there is quite a large extent of auriferous country in Wales.

Next to the centrifugal pump came a giant clam-shell dredge, which was built some years ago at Lytton, upon the Fraser River. This was the old mud dredger system applied by a pair of semi-circular steel plate self-shutting shells, very like its patronymic in appearance, and lowered to the bottom of the river by means of chains. On lowering these into the river, two almost insurmountable difficulties were met with; in the first instance, the strong current carried the clams under the bottom of the scow upon which the machinery was placed, and rendered it nearly impossible to bring it up full. The next trouble was that when the clams did bite into the gravels, a boulder or large stone would be held between the jaws, and by keeping them that distance apart would allow the whole of the finer gravels and gold to escape back into the river. This experiment cost the unfortunate shareholders \$60,000 before knowing it was a failure.

After this came an attempt to exploit the gravels by means of a caisson or air-lock, by which men went down to the bottom of the river and by hand labour passed the gravel into an air-lock, and from there to the deck, where it was treated by means of an ordinary rocker. Owing to the writer being brought into a controversy over this machine by the promoters, the project was killed by the caustic remarks made about the enormous cost in labour and steam to bring up a yard of gravel yielding probably 25 to 30 cents from the bed of the Fraser.

The writer was working a ladder dredge upon ground over which a pneumatic dredge had passed and thoroughly prospected according to its ability and found too poor to work, which turned in to the shareholders for some years over 100 per cent. per annum clear of all working expenses.

Later upon the scene of dredging operations came the dipper dredge. This, as far as working a hole in the gravel, is moderately effective, and many of this type have been built and launched upon the Fraser and the Saskatchewan rivers. Yet there are great stumbling blocks to the use of this type as a gold dredger. Chief among these are the want of mobility in handling it in a rapid river, the great cost in working them (they require at the least 5 men per shift under favourable circumstances, as against 2 men of the bucket and ladder type), the intermittent discharge, the comparatively small cubic measurement of gravel actually worked in a week's run, and, worse than all, the inability to make a direct side-cut across a river or bar, thereby enabling the ground to be worked upon a face, and thus systematically clean up the bed-rock, or depth it is found necessary to go

with the dredger. These points will always militate against it as a dividend-producing machine, except under very and exceptionally favourable circumstances.

All of this class of dredge which were built upon the Fraser and other places near, have been started with a great flourish of trumpets (one was started last year), only to end disastrously. One manager of these dredges told the writer that his ground averaged 25 cents to the yard, and in the lower depths considerably more, yet he could not pay dividends owing to his intermittent digging. I understand that at 20 feet the gravel ran to as much as \$3.00 per yard, but he was unable to keep his cut open long enough to take more than an occasional bite at it, for the reasons mentioned above.

The first plant to work the Fraser River in its rapid current and heavy gravels successfully was one of the bucket and ladder type, built in 1899 in England under the writer's supervision upon New Zealand plans, altered slightly to suit the conditions met with in this country.

This is known as the Cobbledick dredge, and is now under another name, "The Fraser River Dredging Co." This plant failed dismally the first year to pay anything, although quite an amount of gold was won, owing to the want of experience of the then manager—who was also a large stockholder—made by selling the investors the claim. He was a clever man with extravagant ideas, and threw the old company into debt. It was reorganized, and under the present management is paying moderately well, and the writer has no doubt but that when those at the head of affairs have gained more experience, the company will pay handsome dividends upon its present capital.

Some Eastern capital, after seeing this plant work, decided to place a similar type, but of more powerful design, upon the North Thompson River, 15 miles north of Kamloops, and the writer was instructed to prepare plans for the same.

The whole of this machinery was built in Canada by the Wm. Hamilton Manufacturing Co., of Peterborough, who, to their credit, made a vast improvement upon the New Zealand and British work.

This dredge is capable of lifting from a depth of 40 feet below water, washing, treating, and stacking the coarse stones and boulders to a height of 30 feet astern of the dredge, a guaranteed capacity of 2,000 cubic yards of gravel per day, and cutting its channel through a flat of 20 feet in height. The girder, or ladder as it is known, for carrying the continuous bucket chain, is of the box type, built of $\frac{1}{2}$ in. by 3 ft. 9 in. steel plate, tapering from the centre to a depth of 3 ft. at each end.

The lower, or digging end, carries a five-faced cast steel tumbler, which weighs over 6,000 lbs. (also cast in Canada). This ladder runs in a fore-and-aft line from a radius point 60 feet back from the forward end of the scow, and extends forward and outside of the nose of the scow a distance of 10 feet; this latter fact enables the dredge to cut its own way when necessary, and keeps a channel open for the boat.

The bucket chain, or belt, consists of 35 heavy built-up steel plate buckets, with their necessary connecting links, each having an approximate capacity of slightly less than 6 cubic feet. There are also at mid-