MINING INSTITUTE OF CORNWALL.

The members of the Mining Institute of Cornwall recently inspected the jigging machinery working on that sett. The modus operandi was detailed to the members and their friends by Captain Argall, the manager, who lately read an interesting paper on the subject at a meeting of the Institute. For a long time the applicability of jigging machinery to tin mining has been a debatable point, and those who have favoured the idea have been the exception rather than the rule. The process has been tried at Wheal Jane tin mine, and Captain Southey claims that it has answered well. Its chief merit is that it effects the desired speedy classification of the ore. The other day blende was under treatment, and so far as that material is concerned it was fully acknowledged the jigging left little or nothing to be desired. The machinery is so laid out that the ore from both shafts of the mine passes by a tramway direct to the crusher, where it is placed between the rolls, and is not again touched until completely dressed. The stuff classified passes to the machines, and the concentrated ore deposited in compartments underneath the waste in wagons conducted over the waste heap. The cost of the process is about 6d. per ton, and the quantity treated is about four tons an hour. The machinery cost about £700, and has been in active operation for about two years. There can be no denying, however, that many of the members, while fully recognising the efficiency of the apparatus for the treatment of lead and blende, strongly adhered to their conviction that it was not adapted to tin dressing. Possibly some may be somewhat prejudiced on this point, but others argued with much reason that with the tin stamps for reducing the ore to a fine grain, the subsequent "bubding" operation was the more preferable process, as it both separated and classified. But it is still a question which method secure the largest percentage of mineral, and where the waste is largest in the slimes. Perhaps it would be well to make a practical test, and in this matter it would be possible for the Mining Institute to afford much valuable assistance, so that the views of those interested might be regulated on a more accurate basis than is now available. In justice to Capt. Argall, it should be added that at Duchy Peru they are dealing with stuff as fine as the average tin stamped in Cornwall, and at a cost of 70 per cent. less than the methods usually observed.

DAM ACROSS THE OTTAWA RIVER. AND NEW CANAL AT CARILLON. QUE.

By Andrew Bell, Resident Engineer.

(*See Page* 269.)

The natural navigation of the Ottawa River from the head of the Island of Montreal to Ottawa City—a distance of nearly a hundred miles—is interrupted between the villages of Carillon and Grenville, which are thirteen miles apart, by three rapids, known as the Carillon, Chûte à Blondeau, and Longue Sault Rapids, which are in that order from east to west. The Carillon Rapid is two miles long, and has, or had, a fall of 10 feet; the Chûte à Blondeau, a quarter of a mile, with a fall of 4 feet, and the Longue Sault six miles, and a fall of 46 feet. Between the Carillon and Chûte a Blondeau there is or was a slack water reach of three and a half miles, and between the latter and the foot of the Longue Sault a similar reach of one and a quarter miles.

Small canals, limited in capacity to the smaller locks on them, which were only 109 feet long, 19 feet wide, and 5 to 6 feet of water on the sills, were built by the Imperial Government as a military work around each of the rapids. They were begun in 1819 and completed about 1832. They were transferred to the Canadian Government in 1856. They are built on the north shore of the river, and each canal is about the length of the rapid it surmounts.

The Grenville canal (around the Longue Sault) with seven locks, and the Chûte à Blondeau with one lock, are fed directly from Ottawa. But with the Carillon that method was not followed, as the nature of the banks there would have, in doing so, entailed an immense amount of rock excation—a serious matter in those days. The difficulty was overcome by locking up at the upper or western end 13 feet and down 23 at lower end, supplying the summit by a "feeder" from a small stream called the North River, which empties into the Ottawa three or four miles below Carillon, but is close to the main river, opposite the canal.

In 1870-71, the Government of Canada determined to enlarge these canals to admit of the passage of boats requiring locks 200 feet long, 45 feet wide, and not less than 9 feet of water on the sills at the lowest water. In the case of the Grenville Canal this was, and is being, done by widening and deepening the old channel and building new locks alongside of the old ones. But to do that with the Carillon was found to be inexpedient. The rapidly increasing traffic required more water than the North River could supply in any case, and the clearing up of the country to the north had materially reduced its waters in summer and fall, when most needed. To deepen the old canal so as to enable it to take its supply from the Ottawa would have caused the excavation of at least 1,250,000 cubic yards of rock, besides necessitating the enlargement of the Chûte à Blondeau also.

It was therefore decided to adopt a modification of the plan proposed by Mr. T. C. Clarke, of the present firm of Clarke, Reeves & Co.; several years before when he made the preliminary surveys for the then proposed "Ottawa Ship Canal," namely, to build a dam across the river in the Carillon Rapid, but of a sufficient height to drown out the Chûte à Blondeau, and also to give the required depth of water there.

During the summer and fall of 1872 the writer made the necessary surveys of the river with that end in view. By gauging the river carefully in high and low water, and making use of the records which had been kept by the lock masters for twenty years back, it was found that the flow of the river was, in extreme low water, 26,000 cubic feet per second, and in highest water 190,000 cubic feet per second; in average years about 30,000 and 150,000 cubic feet respectively. The average flow in each year would be nearly a mean between those quantities, namely, about 90,000 cubic feet per second. It was decided to locate the dam where it is now built, namely, about the centre of Carillon Rapid, and a mile above the village of that name, and to make it of a height sufficient to raise the reach between the head of Carillon and Chûte à Blondeau about six feet, and that above the latter two feet in ordinary water. At the site chosen the river is 1,800 feet wide; the bed is solid limestone, and more level and flat than is generally found in such places—the banks high enough and also composed of limestone. It was also determined to build a slide for the passage of timber near the south shore (see map), and to locate the new canal on the north side.

Contracts for the whole works were given out in the spring of 1873, but as the water remained high all the summer of that year very little could be done in it at the dam. In 1874 a large portion of the foundation, especially in the shallow water, was put in. 1875 and 1876 proved unfavorable and not much could be done, when the works were stopped. They were resumed in 1879, and the dam, as also the slide, successfully completed, with the exception of gravelling of the dam, in the fall of 1881. The water was lower that summer than it had been for thirty-five years before. The canal was completed and opened for navigation the following spring.

THE DAM.

In building such a dam as this, the difficulties to be contended against were unusually great. It was required to make it as near perfectly tight as possible, and to be, of course, always submerged. Allowing for water used by canal and slide and the leakage, there should be a depth on the crest of the dam in low water of 2·50 feet, and in high about in 10 feet. These depths turned out ultimately to be correct. The river reaches its highest about the middle of May, and its lowest in September. Nothing could be done except during the short low water season, and some years nothing at all. Even at the most favorable time the amount of water to be controlled was large. Then, the depth at the site varied in depth from 2 to 14 feet. The current was at the rate of from 10 to 12 miles an hour. Therefore, failures, losses, etc., could not be avoided, and a great deal had to be learned as the work progressed. I am not aware that a dam of the kind was ever built, or attempted to be built, across a river having such a large flow as the Ottawa.

The method of construction was as follows: Temporary structures of various kinds, suited to position, time, etc., were first placed immediately above the site of the dam to break the current. This was done in sections, and the permanent dam proceeded with under that protection.

In shallow water, timber sills, 36 feet long and 12 inches by 12 inches, were bolted to the rock up and down stream, having their tops a uniform height, namely, 9·30 feet below the top of dam when finished. These sills were, where the rock was high enough, scribed immediately to it, but if not, they were "made up" by other timbers scribed to the rock,