found to have a temperature of 31 degrees, Fahrenheit. Hence, the pipe did not give satisfaction, and in five years, more money had been expended on searching for and repairing leaks under the water than the original cost of the pipe; while only an intermittent supply had been provided and an immense amount of fresh water wasted. In 1912 the pipe was finally condemned.

To replace it, a four-inch, flexible, bronze tubing was chosen, being considered especially adaptable for this

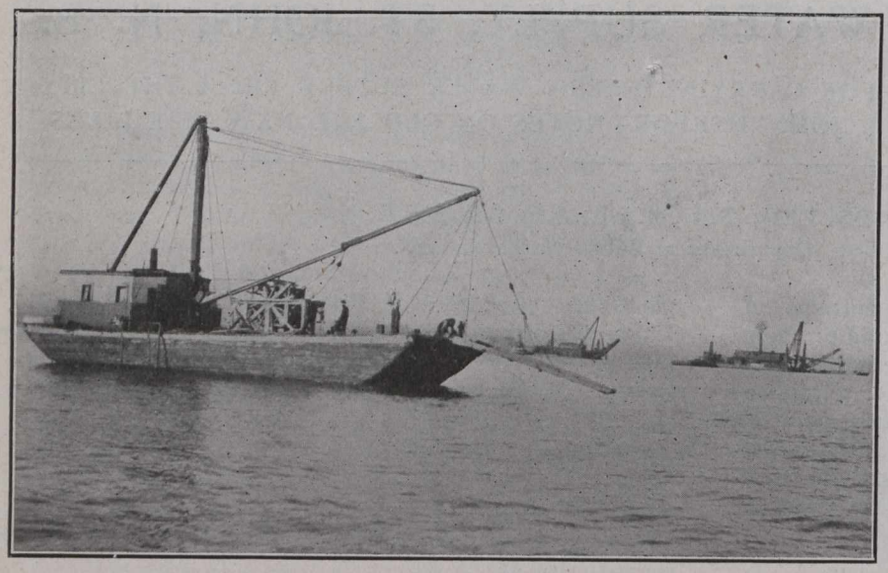

Fig. 2.—Harbor Operations During Laying of Tubing.

work owing to its flexibility, weight and durability in salt water. While the tubing itself was considerably more expensive than wrought iron pipe per lineal foot, the connections, or joints, were much cheaper and fewer in number, and, as expected, the ease with which the tubing was handled, made it less expensive than the original pipe used. In order to protect the fresh water from possible contamination by laying in contact with the bronze, the tubing was heavily tinned on the inside.

The tubing, as specified, consists essentially of a single strip of bronze, wound spirally, each winding overlapping and interlocking with the last, the joint thus formed being packed with asbestos. The bronze was required to contain 98 per cent. of copper. The coupling was threaded to the groove on the outside of the pipe, and rendered tight by soldering in place. The tubing was supplied in 30 to 40-foot lengths, with couplings attached. Purchase was made by tender from the Canadian Fairbanks-Morse Company, Limited, representing the American Metal Hose Company.

No case of the use of this tubing as a water pipe was known, and it was first recommended by the United Flexible Metallic Tubing Company, of Ponders End, Middlesex, England. Tubing had been supplied by them, in sizes up to 12 inches, to the British Admiralty, for conveying oil fuel aboard warships, and had given satisfaction. This tubing had also proved very efficient as steam hose. This company, moreover, put in the lowest tender for supplying the tubing, but could not fulfil the conditions of delivery.

Instead of allowing the new pipe to lie on the surface of the bottom, it was buried in a dredged trench, 6 feet deep, the whole way across the channel. Owing to the fact that the material in the channel was generally sand and gravel, the pipe had to be laid immediately behind the dredge, as the trench would fill. On one occasion the end of the pipe was buried in the trench by a storm, and a hole, 12 feet deep, had to be dredged beside the end of the pipe, until the material fell away, uncovering the end.

The tubing was placed from a steam scow on which a wooden reel, 9 inches in diameter, had been erected. Some 200 feet of the tubing were connected up at a time, wound on this reel, and subjected to a pressure of 200 pounds per square inch, supplied from a pump connected with the engine, one end of the tubing being capped. It was then connected up with the section already laid, and this connection tested. The scow was then pulled ahead, along the dredged trench, which was marked by ranges on shore; and the pipe, unwinding from the reel, was allowed to slide down an inclined and partly submerged platform. Detachable, tagged lines, with buoys, were attached to the tubing every 50 feet, and by the aid of these lines and sounding along the pipe it was possible to see that the tubing was placed satisfactorily in the trench.

The work was much delayed by bad weather; and the actual placing of the tubing was delayed by the dredging, since part of the time it was necessary to employ a large dredge, which could only work during high tide. The actual work of testing and laying the tubing, exclusive of delays from weather and dredging difficulties, only took 25 days; while the maximum length laid in one day was 600 feet. The scow had to be towed about a mile and a half from the wharf, where the pipe was loaded and tested, to the site of laying. The party consisted of a foreman and ten men, and the average cost per day, including the hire of a scow and gasoline tow boat, was about $70. The work was completed last September.

For the greater part of the distance the trench filled quickly, burying the pipe, but near the inner end of the

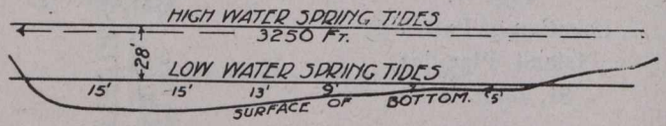

Fig. 3.—Profile of Pipe-line from Mainland to Partridge Island.

breakwater, a few scow loads of soft mud were dumped in the trench to cover the pipe.

The tubing has given entire satisfaction. It is absolutely watertight, as shown by frequent tests, when a gate on the Island end of the pipe is closed and meter readings are taken at the mainland. During six months, 3,800,000 gallons of water have been supplied to an average number of 325 people on the island; and a pressure of 40 pounds per square inch maintained at the highest point.

The exports of coal in 1914 were 1,423,126 tons, valued at $3,880,175, as compared with exports of 1,562,020 tons, valued at $3,961,351 in 1913, a falling off of 138,894 tons or 8.89 per cent.

The value of the production by provinces is as follows:—Nova Scotia, $16,381,228; British Columbia, $6,994,810; Alberta, $9,367,602; Saskatchewan, $375,438; New Brunswick, $260,270; Yukon, $53,760.