

the balance of the timber being Norway pine. The elevator is entirely covered with corrugated elevator siding, painted black. The marine leg is of steel, with a capacity of 15,000 bush. an hour. The inside lifters have cups 32x7x8 inches, the belts travelling 700 ft. a minute. There are 4 conveyers made of 40-in. rubber belting, travelling 1,000 ft. a minute, and a full equipment of steamship shovels. The engine is capable of developing 500 h.p., and steam is supplied from 2 horizontal boilers. There are also 4 1,200 bush. hopper scales of new pattern, and 4 bifurcated loading spouts for loading cars, and the track accommodation provides for the loading of 200 cars a day of 10 hours.

SHIPPING MATTERS.

The Dredge J. Israel Tarte.

The powerful hydraulic dredge the J. Israel Tarte, built by the Polson Iron Works, Toronto, was given its official test, Nov. 26, in the presence of the Minister of Public Works, and a large number of others interested in shipbuilding and the development of Canada's waterways. After the dredge had been inspected and a test of its capacity made, the company was entertained at luncheon on board by the proprietors of the works.

In proposing the toast of the builders of the dredge, Mr. Tarte said he was proud of them, they had shown what they could do when they had the opportunity. It had been designed by a Canadian, built by Canadians, and a great proportion of the material used was Canadian. He trusted that the day was not far distant when Canadian ships would be built entirely of Canadian material. In connection with the improvement of the water-ways, the Government had built six new dredges for the St. Lawrence, and with these 80 miles of the river had been dredged to a depth of 30 ft. for a width of from 450 to 800 ft. There were only 15 miles of the distance between Montreal and Quebec that needed to be dredged to this depth to make a 30 ft. channel between the two places. Referring to the scarcity of Canadian vessels suitable for carrying of grain on the lakes Mr. Tarte said: "You all know what has happened within the last few days. Firms in Winnipeg and Montreal asked the Government to allow U. S. vessels to load grain at Fort William and carry it to another Canadian port. After due consideration we decided to say 'No.' A U. S. boat may go to Fort William and carry grain to a U. S. port, but when the grain is to be taken to a Canadian port it must be shipped in a Canadian bottom. If we have not ships enough for our trade, we must build them. We have proved that we can build Canadian ships on Canadian territory, and it is the duty of this nation to see that there are enough Canadian bottoms to carry all our trade through Canadian channels."

F. B. Polson, in reply, stated that the Polson Iron Works also tendered, and were prepared to build within the time limit the two large cruisers recently ordered by the Marine and Fisheries Dept. of the Dominion Government from Scotland, but owing to well-understood conditions, their price was necessarily higher than the Scotch firm, and they there fore lost the order. This only goes to show the necessity of something being done by the Government to put our home ship builders in such a position that they can compete on at least equal terms with those of other nations for the home supply. He added that the system of financing shipbuilding schemes was wrong, and an abnormal rate of interest was charged those who borrowed money to invest in shipbuilding. The rates of insurance were sufficient to cover any possible risk, and there was no excuse for demanding 8 or 10% for money loaned on security of ships to be constructed.

Mr. Tarte, in reply to the toast of his health, which was proposed by F. B. Polson, said the question of transportation was not a party matter but a national one. It was a question whether the people were prepared to spend the money necessary to carry forward the work which had been started. He thought the people should go ahead with the work of developing their waterways, and concluded, "I, for one, am prepared to take a bold stand upon this national question. I am not the 'Master of the Administration.' I am sorry, of course, that I am not, but if I were I would not hesitate about spending money in building up the country now. We are not in it, so far as trade is concerned, and we must improve wherever improvement is needed. Whether it be the establishing of a fast line, the deepening of rivers and harbors, or the improvement of other works, we must keep steadily at it."

The J. Israel Tarte is the largest and most powerful dredge of its kind ever built, and represents the highest development of engineering in this direction. Its total cost is about \$250,000, but it will be cheaper in operating when compared with the small dredges hitherto operated on the St. Lawrence. The hull is built of steel, and is 160 ft. long, 42 ft. wide and 13 ft. deep. It is fitted with an opening or well in the centre, through which the gigantic suction pipe operates. This suction pipe is 40 in. in diameter, and is built in the form of a square box girder, having extended flanges of great width to resist the strains of coming in contact with the bottom. At the lower end of this suction pipe there is an immense rotary cutter built entirely of steel. This cutter is 9½ ft. in diameter, and weighs 10 tons. It is driven by a pair of double tandem compound engines mounted on top of the girders at the upper end. These engines are 300 h.p., and are of the most massive construction. The cutter is designed to excavate hard clay or any other difficult substance other than stones or rock, without difficulty, and it is sufficiently strong that if any immovable resistance, such as rock, should be encountered no breakage will occur, but the engines will simply stop, all the working parts being strong enough to stall the engines. It is not, however, intended that this dredge will work in localities where the material is hard, as it is pre-eminently a soft material dredge of large capacity.

The great advantage of this type of dredge over any other is that it transports and discharges all the dredged material at one operation without the use of scows, with their attendant expenses and interruptions. In fact, it would be almost impossible to provide sufficient scows and manipulate them fast enough to take away the large amount of material which this machine is capable of dredging. In this dredge the operation is continuous and uninterrupted, the material being discharged through a long, floating steel pipe with flexible connections. This pipe is 3 ft. in diameter and 2,000 ft. long, and floats upon the water like a huge snake. Each length of pipe is 100 ft. long, and it is sustained by two cylindrical pontoons 42 in. in diameter by 98 ft. long. There are thus practically three pieces firmly braced together in each length. The central one forms the conduit, and the two sides form the air chambers or floats. The discharge end of the pipe is carried over a large-sized wooden scow which is anchored in position where required, and is able to feed itself along as the dredge progresses, by means of a steam winch. Some idea may be had of the enormous capacity of this dredge from the fact that the main pump discharges at the rate of 75,000,000 gallons per 24 hours, which is about four times the capacity of all the pumps of the Montreal water works. Under ordinary working conditions from 20 to 25% of this volume is solid material, thus giving

the dredge a capacity of 3,000 cubic yards per hour. As a cubic yard of material is equal to 1½ tons, this means that the dredge can excavate from a depth of 50 ft. and deliver 2,000 ft. away 4,500 tons of material per hour. In practice, however, about one-half of this amount is realized, owing to the incidental delays and conditions of work.

The motive power of the dredge is a set of triple expansion engines of 1,200 h.-p. which drive a large centrifugal pump. This pump is of special construction for the work, being designed for great efficiency and so that it will not clog with large masses of solid material. There are 4 boilers adapted for 160 lbs. of steam and fitted for induced draft. The consumption of fuel will be about one ton of coal per hour when in full work. The dredge is capable of working to a depth of 50 ft. and of making a cut 400 ft. wide with one setting of the anchors. Its movements are controlled by powerful steam winches at either end, by means of which the dredge is fed over the bottom at any desired rate and under perfect control at all times. Commodious quarters for the officers and crew are provided both on the main and upper decks. There is also a complete electric light installation so that the dredge can work night and day.

The construction of this dredge marks a new era in the method of carrying on our public works in which dredging is required, and the dredges of the future will be large, high power machines capable of doing from 6 to 10 times the work of the old fashioned machines of a few years ago, and at a fraction of the cost. This forward movement has been rendered necessary by the great developments that have taken place during the past 10 years in transportation interests, both land and marine, which have brought into prominence the great importance of so developing our waterways that trade will not be restricted. The weight and hauling power of locomotives has more than doubled, and the carrying capacity of freight cars in proportion to their dead weight has also more than doubled. On water so great is the economy brought about by the building of big ships that small vessels can no longer compete with large ones where there is sufficient volume of trade. As an instance of this the large cargo carrying str. Celtic may be quoted. This vessel has a load line displacement of 26,000 tons, and she can carry one ton of pay cargo 100 miles on 4 lbs. of coal, whereas the largest cargo steamer of 10 years ago required 10 lbs. to do the same duty. This result is mainly due to the large increase in carrying capacity, and to the fact that a large vessel requires less power per ton to propel it at a given speed than a small vessel. It is also due in some measure to the advances which have been made in the design and efficiency of the marine engine. All this means that to keep pace with the rate of progress we must increase the depth of our harbors and waterways so as to permit the use of large and economical vessels. It is a fact that the only limitation at present to the size and capacity of ocean steamships is the capacity of the harbors and docks and depth of water in the channels. Only quite recently British shipbuilders sent inquiries to this country to know how big ships they dare build for the St. Lawrence route, and it is evident we will be greatly handicapped in the race for supremacy if we do not offer the facilities that are demanded.

The six dredges built for the Government have all been of an increasing size, and the one projected for the Lower St. Lawrence is to be larger than the J. Israel Tarte. This latter is the second dredge built for the Government by the Polson Iron Works, and for which A. W. Robinson, of Montreal, a Canadian mechanical engineer, whose work in this line