

LAYING OF FLEXIBLE WATER PIPES.

The Rotterdam authorities lately started the work of laying a tube in the bed of the River Maas, for the conveyance of water from the intake to the other side of the river, where the town has very much increased in population during the last few years. Up to this moment the water passes through cast iron pipes, carried under the big foot bridge connecting the banks of the river. These pipes were about three miles in length, and much too small in diameter to supply the factories and hydraulic cranes, which, with the other causes of water consumption, now require several thousand cubic meters a day. A new and larger pipe was determined upon, but to sink it in the river bed was not an easy job, for the river traffic is heavy at that point. It was impossible to make a wooden structure on which a long length of pipes could be bolted together, and then, when finished, sunk horizontally, as is usual in sinking gas and water tubes in the Belgian canals. Therefore, a flexible tube was constructed, composed of short pieces connected with ball joints. Each pipe is 23.5 in. diameter and 0.4 in. thick, made of mild steel, and provided with steel flanges. The ball unions are cast iron, outside diameter 1.350 mm., or 4.5 ft.; weight, about 2,300 kilos., or 2.26 tons.

now with the season nearing a close elevators are blocked to overflowing with a grain crop equaled only by that of last year, which was largely left over to increase the business of the present season.

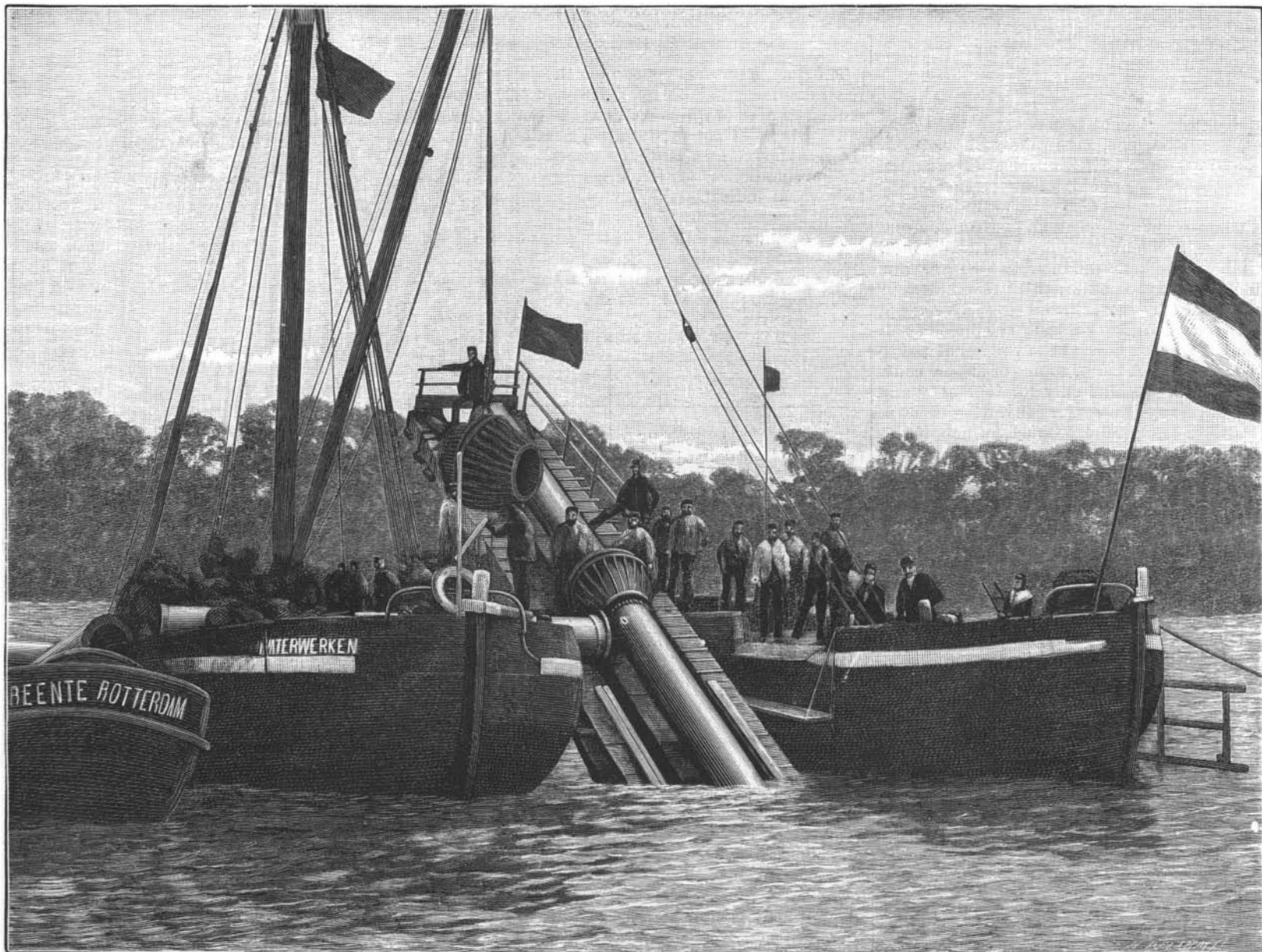
The only fear now is a blockade from the inability of elevators and railways to care for the grain in the West and take it from vessels at Buffalo. As yet no serious delays to vessels have occurred on this account, and chartering goes on at 4 cents from Duluth and 2¼ cents from Chicago to Buffalo, the demand in the case of Chicago being limited, however, on account of the disadvantages arising from delay in handling the grain. Ore freights still rule strong, with vessels in great demand at \$1.30 from the head of Lake Superior and 80 cents from Escanaba, while the supply of coal for all Lake Michigan ports is more liberal than at any time during the season, at advanced rates.—*Marine Review*.

Metal Decoration.

A new method of decorating metals is thus described: The decorative design is formed upon the metallic surface by means of etching and oxidation of the metal. Suppose the plate to be decorated to consist of polished sheet brass. The operator takes the polished plate

the acid, copper and brass, for a longer time, a green color is produced. Again dried in the sawdust and painted as before, a frosted effect is produced on the unpainted portion which is left by a quick dip in a bath of nitric or sulphuric acid and water, after which it is rinsed and dried quickly in hot sawdust. Now the operator removes the varnish with turpentine or other solvent; the entire design is exposed, and the plate is completed.

It is immaterial, after painting over the high lights, in what order the successive oxidations are produced, but it is preferable to oxidize the finer and more delicate portions of the design first, and finish with the ground etching. The depth of the etchings is of no consequence, the color, like beauty, being only skin deep. The varnish which the inventor prefers is made as follows: Asphalt, 2 ounces; white wax, 1½ ounces; Burgundy pitch, 1 ounce; and turpentine. Melt the asphalt in a glazed saucepan, and add the wax gradually, stirring with a glass rod; add the pitch and continue stirring, permitting it to boil up two or three times, but never to boil over. Take the saucepan from the fire and stir in enough turpentine to make it the consistency of tube oil paints. Other colors, such as dark purple and orange, red and green, green bronze



LAYING OF FLEXIBLE WATER PIPES, RIVER MAAS.

To sink the tube, two barges are fastened together, and between them is constructed a wooden inclined platform of about 120 ft. in length, and one end of which hangs in the furrow made in the bottom of the river to receive the pipes. The tube is built up on that platform, one end of the pipe being made fast on the bank. Afterward the barges are pulled back so far that there is room enough on the platform to put on another length of pipe with its ball joint, and so on. The length of one pipe with union is about 29.5 ft. The depth of the river is about 36 ft. The work has progressed rapidly, each day about 85 ft. being laid. The whole length of the tube will be about 3,000 ft.

Our engraving, showing the work in progress, is from a photograph, for which, and the above particulars, we are indebted to *The Engineer*, London.

Prosperous Condition of Freights.

Lake vessel owners have never experienced a more satisfactory season of navigation than that now drawing to a close, and at no time during the entire season has the amount of freight offered for shipment been greater than at present. Delay from bad weather has been limited, the draught of water in connecting channels has more than equaled expectations, and although freight rates have not been unusually high, they have been profitable in every line. It is the great movement of freight that is most wonderful, however, and

and covers with a brush, dipped in a suitable varnish, all those portions of the design which are finally to appear as polished surfaces, the high lights, or perhaps the outlines of the design. When the varnish is dry, the plate is immersed in a bath of nitric acid somewhat diluted, in which is a small piece of copper in process of dissolution. By this immersion the surface of the plate is both etched by the acid and discolored by the action of the copper which is dissolved by the acid. After immersing for a few minutes, the plate is removed and rinsed. As it dries in the air, the exposed surface becomes a dull brown, like old bronze. The operator then paints with the same varnish all the portions that are to retain this color, and then dips the plate in a weak solution of copper salt. This brightens the surface, and gives it a yellowish, mottled appearance. Then the plate is dried in fine sawdust, boxwood preferred.

After protecting with the varnish such of this color as it is desired to retain, the operator immerses again the plate in the same nitric acid bath until it has been sufficiently etched to remove the previous oxidation, again rinsing and holding it, either side up, over a tray containing diluted nitric acid and pieces of copper and sheet brass. After having been left to be oxidized in these fumes a few moments, the plate is again dried in sawdust, and the result is an orange color somewhat mottled. Again painted and exposed to the fumes of

and light green, bright green and red, bright pink, iridescent purple, may be made by the same method with various kinds of baths.

Improved Storage Battery Cars.

Ten cars to be propelled by electric storage batteries are now being built for the Second Avenue line in New York City. The system adopted is radically different from others, and the entire equipment, including batteries, motors, and plant, will be manufactured by the Waddell Storage Battery Company. In an experiment made with this class of car at Chester, Pa., during the winter of 1891-92, the car ran 5,000 miles.

The cars will be of regulation style, 16 foot bodies, palace finish and of complete appointment. They are to be lighted by an auxiliary set of batteries, so the light will be independent of grades and variations of speed. The batteries are to be disposed under the seats and contained in two long trays. They will be removed from the ends and not from the sides. Each car will be equipped with two motors; either will be of sufficient power to handle the car under ordinary conditions. This large amount of motor power will be for emergencies and heavy traffic, as well as for towing an additional car. The motors will be the hollow Gramme ring type. It is claimed that this system of accumulators has surmounted many of the difficulties of the storage battery system.