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THE MANUFACTURE OF DRAIN PIPE.

The manufacture of drain pipes is similar in many respects to that of bricks and tiles. It depends little upon manipulative skill, but much upon the thorough intermixing of the material used and the freedom of the same from impurities. The clay used in this vicinity is a refractory potter's or plastic clay containing lime and magnesia, with more or less oxide of iron, either black or red. It comes from the large beds existing near Woodbridge, N. J., and belongs to the series of upper secondary rocks underlying the green sand deposits.

The first process which the material undergoes is tempering with water and mixing in pug mills in which are spirally disposed blades, which cut up the mass and at the same time move it forward. It passes through two mills, one horizontal and the other vertical, and is then transported to the press. Before it is placed in the latter it is wired, that is, taking a good sized lump, a workman cuts it through repeatedly with a wire, and in this way removes all large nodules of iron pyrites, stones, and similar foreign substances. Iron in the clay is the chief difficulty with which potters of every grade have to contend. It obtrudes itself in microscopic specks in fine kaolin, and in lumps as big as an egg in the coarse drain pipe material. In fine porcelain it produces black spots, which at once reduce the goods to inferior quality, while in drain pipe it melts, runs, and leaves holes. To extract even the large masses by wiring by hand seems at the present time, when processes infinitely more delicate and complicated are done by machinery, rather behind the age; but we were informed that no other means answers the purpose so well. The clay is tempered so stiff that it is practically impossible to force it through sieves or grating without breaking the latter away, nor does there, for the same reason, seem any apparent way whereby magnets could be advantageously used to extract the iron.

After being wired the plastic mass is placed in the press, Fig. 1. This consists of a receiving cylinder in which is a follower driven down by the large steam cylinder above. Through the lower cylinder runs a spindle which supports at its lower end a core. At the bottom of the cylinder are adjustable dies, between which and the core the clay is forced, emerging, as in the case of the lead in lead pipe manufacture, in tubular form. Before pressing begins, however, a wooden drum is placed upon a platform which may be screwed up and down, and which is located on the bed block of the press. Sliding on this drum is a core or mould of the exact shape and size of the inside of the enlargement or collar of the pipe. This mould, when the pressing first begins, is brought up close under the cylinder and a pair of collar dies are brought around it. The annular space between these dies and the core is closed beneath, so that when the clay is forced it cannot descend, but must fill said annular space. This done, the collar dies are opened and the pressing is continued, the pipe of uniform diameter thus produced sliding gradually down over the drum, as represented in the illustration.

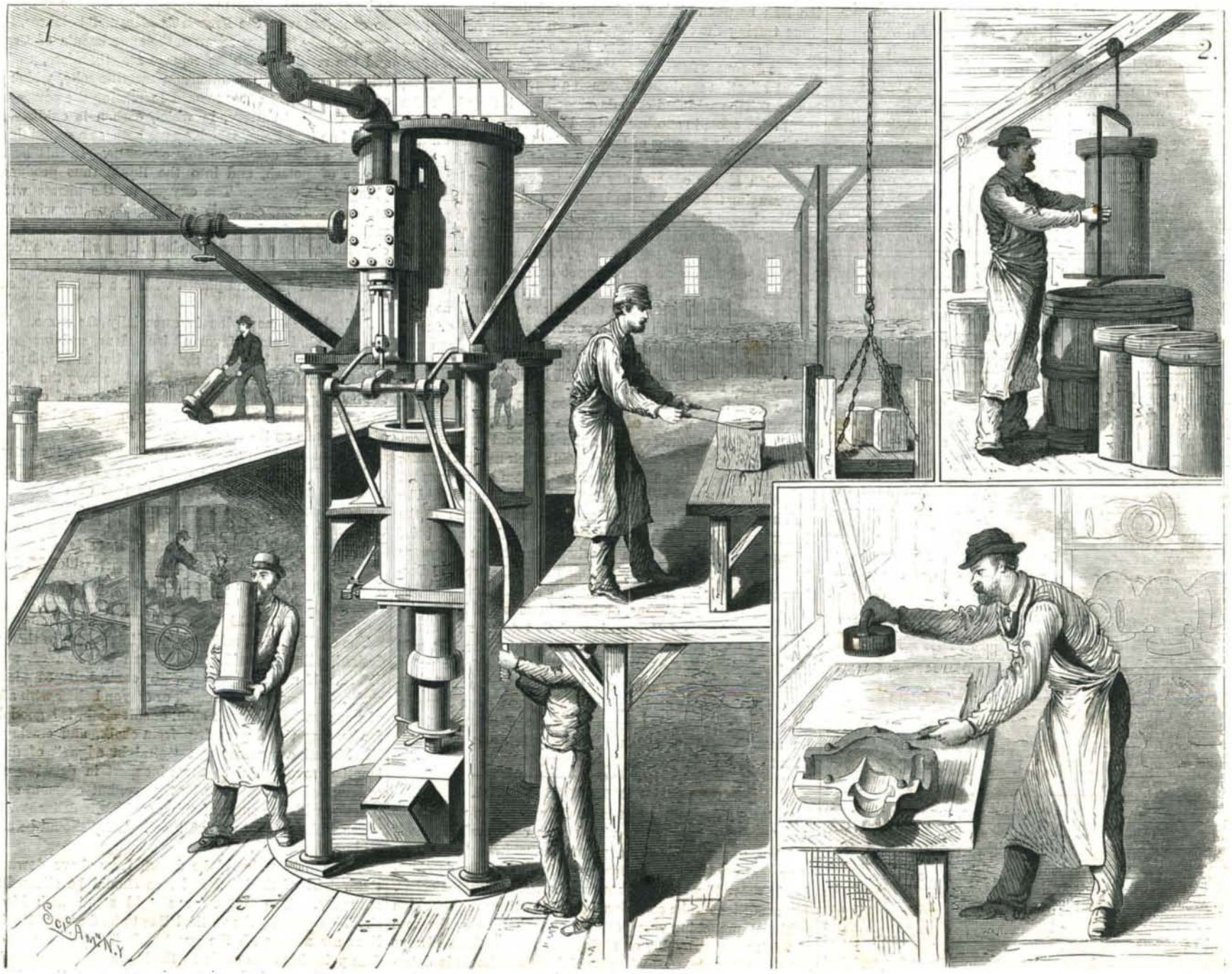
If, however, the pipe is to be curved instead of straight, the guide drum below is not used; but as soon as the collar is formed, the attendant grasps the pipe as it comes out and bends it to the desired curve by hand. As soon as each section of pipe is thus finished, it is removed and placed upon a rack until thoroughly dry.

The glaze used is ordinary slip with no coloring matter, the clay employed being of such a nature that it will melt without running by the time the material of which the pipe is composed is burned to a body. Dipping in the glazing is done in the case of large pipe by the simple means shown in Fig. 2. The pipe rests on a counterweighted suspended platform, which is easily raised or lowered by hand into or out of the mixture. In making traps and odd shapes from the plastic mass, no press is used, but the clay, cut into slabs, is first hammered into compact condition by hand and then packed in moulds, as shown in Fig. 3.

Baking is done in the ordinary way in kilns. No seggars are used, and the pipes are disposed in nests, that is, inside of a 12 inch pipe there is usually placed an 8 inch, and inside of that again a 4 inch. The heat is kept up for from 54 to 56 hours, when the glaze turns to a dark brownish, glossy hue, and the work is done.

The New Minneapolis Suspension Bridge.

The new suspension bridge in Minneapolis was completed in 1877, under direction of T. M. Griffith. The span is 675 feet; towers, 111 feet high; roadway, 20 feet wide; foot walks, each 6 feet wide; platform, 40 feet above ordinary stage of water. The cables for the main bridge are 9½ inches in diameter, those for the foot walks 4 inches in diameter. The strength of the cables is 10,996,000 pounds, strength of floor stays, 440,000 pounds. The anchorage extends through limestone rock 10 feet thick. An additional protection is made by heavy masonry around each of the four anchors. Cost of the bridge and approaches, about $200,000. Minneapolis was surveyed in 1854. Population in 1870, 18,000; in 1877, 40,000. Capacity of water power, 124,000 horse power. There are 21 flouring mills in the city, manufacturing 1,306,000 barrels of flour annually. There are 20 sawmills, producing 200,000,000 feet of lumber annually. The industries of the city are numerous. Among the many are shingle and lath mills, machine shops, foundries, car shops, woolen mills, paper mills, oil mills, plow, harvester, and agricultural works, planing mills, barrel factories, etc., etc. Annual product of manufactories, about $17,000,000. The city contains 52 churches, 10 large public school buildings, State university, and numerous seminaries and private schools.



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