

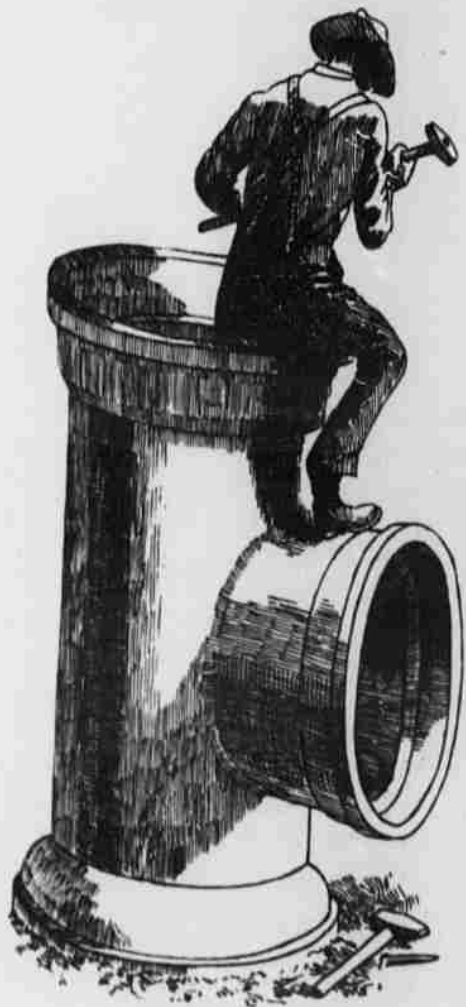
the large lumps are put through a crusher. From the pockets where deposited from the cars, the ore is taken in carts, carefully weighed again so as to accurately regulate the amount of the charge to correspond with given quantities of charcoal and limestone that go into the furnace with it, elevated to the top of the furnace and charged into the hopper. The proportions of charcoal and limestone and ore vary. After melting and being purified in the furnace, the molten metal is run off and cast into pigs in sand moulds. This process is faithfully shown in the colored picture in the center of this paper. At intervals and at the end of each casting the cinder, or slag, embracing the bulk of the impurities of the materials charged into the furnace, is drawn off and run out of doors. This is a product of no particular value, though it is sometimes crushed and used for paving streets, when not too hard and sharp.

The metal is drawn off twice each day, and cast into pigs of different qualities, according to the proportions of materials in the charges, the degree of heat employed and other considerations understood by workers of the craft. Different qualities of iron are obtained from the same casting. The metal is drawn off twice daily, about 5:00 o'clock a. m. and the same hour in the afternoon. Referring to the illustration, the process may be readily understood. The moulds are simply carefully formed trenches in the sand. The stream of molten metal flows down through the main trench direct from the furnace until the end is reached, where it is turned aside and fills the first set of moulds. Then the second set is filled, and so on until all the moulds are full, or until the blast is exhausted. Then the pigs are covered with the sand in which they are run, and after a few minutes are sufficiently cooled to be pryed out of their beds by a crowbar, so that they may cool more rapidly. It is some time before they lose their red glow, however. When sufficiently cooled, the pigs of iron are loaded on cars and taken to the pipe works, or piled up to be sent to market as they are. Between twenty and thirty tons of pig iron are cast every day in the year.

The fuel for the stoves in which the air blast is heated is supplied by waste gas from the furnace. Cold air is taken into those stoves and circulated until it has a temperature exceeding 900 degrees, when it is discharged into the furnace, as required, by means of a blowing engine having a capacity of 12,000 cubic feet of air per minute. Both for heating the three immense stoves and for generating steam the only fuel is waste charcoal gas from the furnace. A smoke-stack 160 feet high furnishes a powerful draft.

Continuing the manufacturing process, the pig iron goes from the furnace to the pipe works. There it is broken in pieces, properly graded so as to make the

particular quality of iron that gives the best service in cast pipes, and charged into the cupola for re-melting. The structure in which the ore is reduced is called the "furnace," while that in which the pig iron is re-melted for casting is termed the "cupola." While in the furnace the fuel is charcoal, in the cupola coke is used, in order to better refine the iron by driving out carbon and silicon. The charges for the cupola consist of pig iron of various grades, limestone and coke. Each



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week day the casting of pipe begins between 8:00 and 9:00 o'clock in the morning, and continues from two to three hours. This work is pursued with perfect system, each man performing his duty with the accuracy of a machine.

The casting pit is a deep trench forming a little more than a semicircle, deep enough so that the top end of pipes twelve feet long is about waist-high to the workman standing on the ground. In this pit iron flasks, of the size it is desired to make the pipes, or moulds, are suspended. Within the flasks cores are inserted and the molten iron is run between the core and the flask, the space between the two determining the thickness of the pipe. A few minutes after pouring in the metal the cores are drawn by the powerful