Dec. 13, 1927.

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A. LOSEY

PROCESS OF MANUFACTURING CENTRIFUGALLY CAST CAST IRON PIPE AND APPARATUS THEREFOR

Filed March 24, 1925

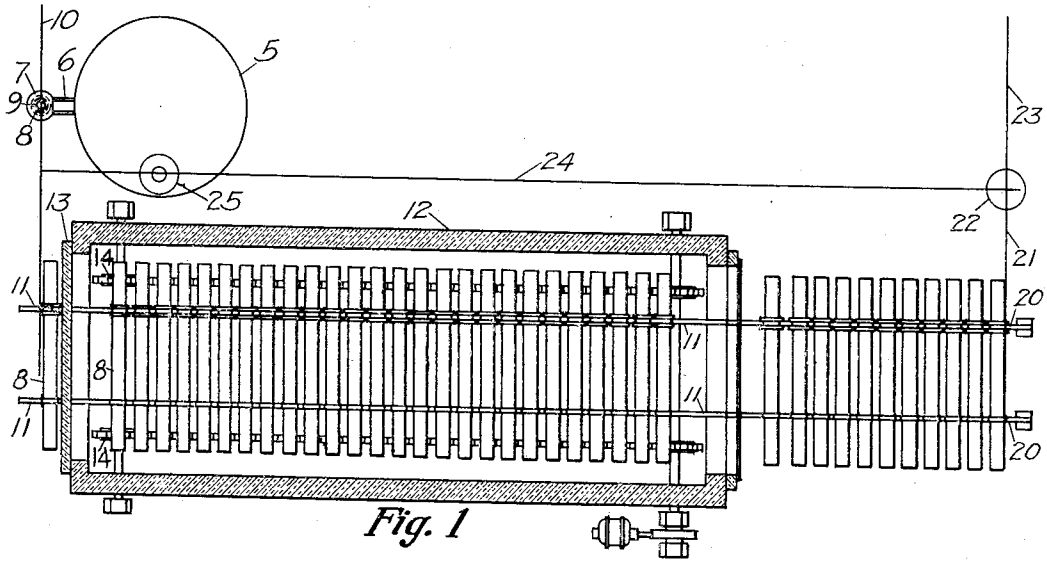


Fig. 1

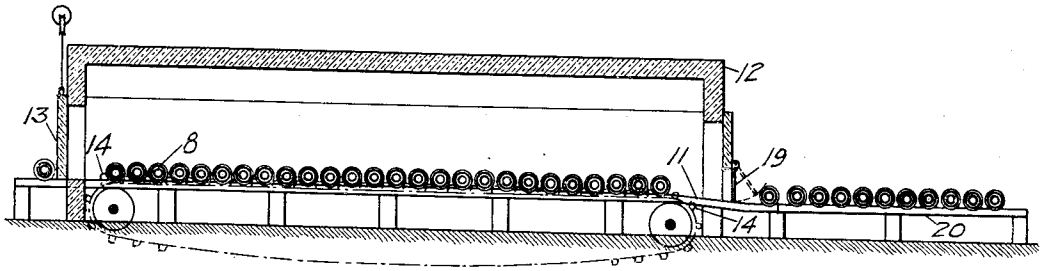


Fig. 2

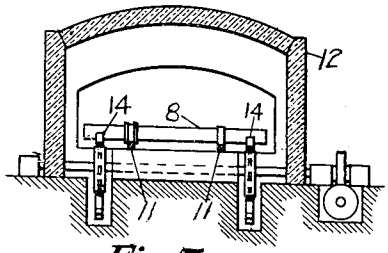


Fig. 3

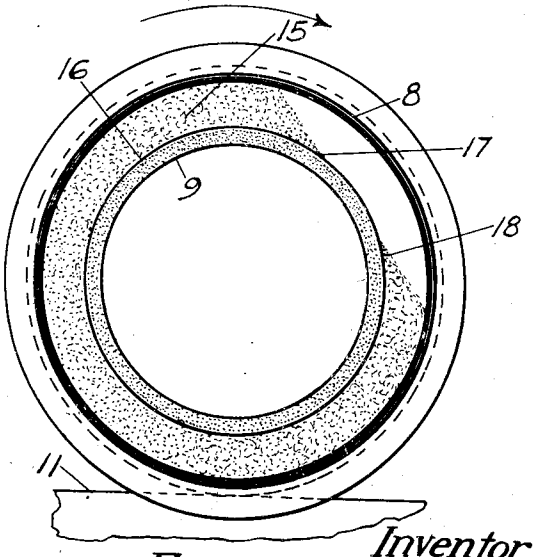


Fig. 4

Witness:

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UNITED STATES PATENT OFFICE.

ARTHUR LOSEY, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO UNITED STATES CAST IRON PIPE & FOUNDRY COMPANY, OF BURLINGTON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PROCESS OF MANUFACTURING CENTRIFUGALLY-CAST CAST-IRON PIPE AND APPARATUS THEREFOR.

Application filed March 24, 1925. Serial No. 17,962.

This invention relates to improvements in process of manufacturing centrifugally cast cast-iron pipe and apparatus therefor.

The principal object of my invention is to produce centrifugally cast cast-iron pipe which is tougher and more ductile than that made by other processes now in use.

With the above and other objects in view, the present invention broadly considered, provides certain novel features which make possible the economical production of centrifugally cast cast-iron pipe.

In the manufacture of centrifugally cast pipe it is customary to anneal the cast-iron pipe after removal from the metal moulds in order to convert the chilled outer portion of white iron into softer grey iron, whereas: one novel feature of my invention resides in the provision of a process by which the annulus of white iron, chilled during the casting period, instead of being converted into grey iron by annealing, is converted into malleable iron by reactions brought about by heated iron oxide in contact therewith during the annealing operation.

Another novel feature of my invention resides in the provision of a process of subjecting heated centrifugally cast cast-iron pipe to the action of heated iron oxide which is progressively exposed, rejected and rearranged during transit thru the furnace.

Another novel feature of my invention resides in the provision of means by which said process of converting said annulus of white iron to malleable iron may be effected.

Another novel feature of my invention resides in the provision of means by which the iron oxide in contact with the surface being malleableized may be progressively released and rearranged during its transit thru the furnace in order that said process may proceed with great rapidity.

Still another novel feature of my invention resides in the provision of means by which the contaminated and reduced iron oxide may be revivified for continuous malleableizing use.

Apparatus suitable for carrying out my process is illustrated in the accompanying drawing in which,

Fig. 1 is a sectional plan of malleableizing furnace and a conventional plan of auxiliary equipment showing malleableizing cells.

Fig. 2 is a longitudinal sectional elevation thru malleableizing furnace and cooling skids showing malleableizing cells.

Fig. 3 is a transverse sectional elevation thru malleableizing furnace showing malleableizing cell.

Fig. 4 is a transverse section thru one of the malleableizing cells with centrifugally cast cast-iron pipe and iron oxide in position, a portion of the furnace rail being shown.

It should be understood that the illustrations are suggestive and the invention may be embodied in various forms other than those shown.

Referring to the drawing, the operation of process and apparatus in accordance with my invention may be as follows;

Iron oxide having been heated in kiln 5 to temperature at which it will readily form a reaction with carbon, is released at spout 6 and guided thru funnel 7 enters malleableizing cell 8 in which a centrifugally cast cast-iron pipe 9 has been placed, said pipe having been received in heated condition from a centrifugal casting machine served by monorail 10.

The malleableizing cell is then placed on rails 11 of malleableizing furnace 12 into which it is rolled after raising door 13. Chain dogs 14 serve to push the cells as they slowly roll thru the furnace. The malleableizing cell and the cast-iron pipe placed therein receive heat from the furnace gases and serve to heat iron oxide 15 shown in Fig. 4 while annulus of white iron 16 is converted into malleable iron by action of iron oxide, the particles of which are progressively exposed, rejected at 17 and rearranged at 18 as the cell is rolled thru the furnace. As the combined carbon changes to graphitic carbon, the heated iron oxide Fe_2O_3 having greater affinity for carbon than has the white cast-iron, the removal of carbon from the annulus of white iron proceeds as a gradual combustion according to reactions which are influenced by the temperature of the carbon and oxide, such as at 750 degrees Fahr. the reaction becomes $3CO+2Fe$ which is of a reducing character and does not injure the iron pipe, while the middle strata is undergoing more favorable conditions which prevent formation of excessive graphitic carbon flakes. The exposure, re-

jection and rearrangement of heated iron oxide facilitates maximum oxidation of the carbon during the process, thereby producing heat, which is continued for considerable time after the malleableizing cell opens hinged door 19 and rolls along cooling skids 20. A monorail 21 serves pipe extractor 22 and monorail 23 enables the extracted pipe to be transported to the inspection and testing department, likewise monorail 24 serves for conveying the malleableizing cell and its contents of iron oxide to hopper 25 where the oxide is discharged into the kiln. The oxidizing atmosphere present during combustion in the kiln serves to heat the contaminated iron oxide thereby consuming the absorbed carbon and oxidizing the iron particles which had previously been in the form of iron oxide, thus rendering the oxide capable of being repeatedly utilized in the cells.

The malleableizing cell is available for reception of another centrifugally cast cast-iron pipe and may again be placed where heated iron oxide may be released at the spout and the circuit continued.

It should be understood that the above described apparatus may be used for analogous operations and, consequently while it is herein described by reference to a particular application, this description is not intended as a limitation of the present invention. It is obvious that a mineral oxide, other than iron oxide may be employed for removing the carbon from the annulus of white iron.

Various changes may be made in process and apparatus by those skilled in the art, without departing from my invention, but what I claim as being new and desire to secure by Letters Patent is;

1. The method of malleableizing iron castings in which the casting is subjected to the action of a heated mass of metallic oxide the particles of which are rearranged in the mass during the operation so that deoxidized particles in contact with the casting are removed therefrom and fresh particles brought in contact therewith.

2. The method of malleableizing centrifugally cast cast iron pipe in which the exterior of the casting is subjected to the action of a heated mass of metallic oxide the particles of which are rearranged in the mass during the operation so that deoxidized particles in contact with the exterior of the pipe are removed therefrom and fresh particles brought in contact therewith.

In testimony whereof, I have signed my name to this specification, this 21st day of March 1925.

ARTHUR LOSEY.