Aug. 12, 1924. 1,504,497

J. A. PERRY

METHOD AND MEANS OF LINING PIPE MOLDS

Original Filed June 27, 1921

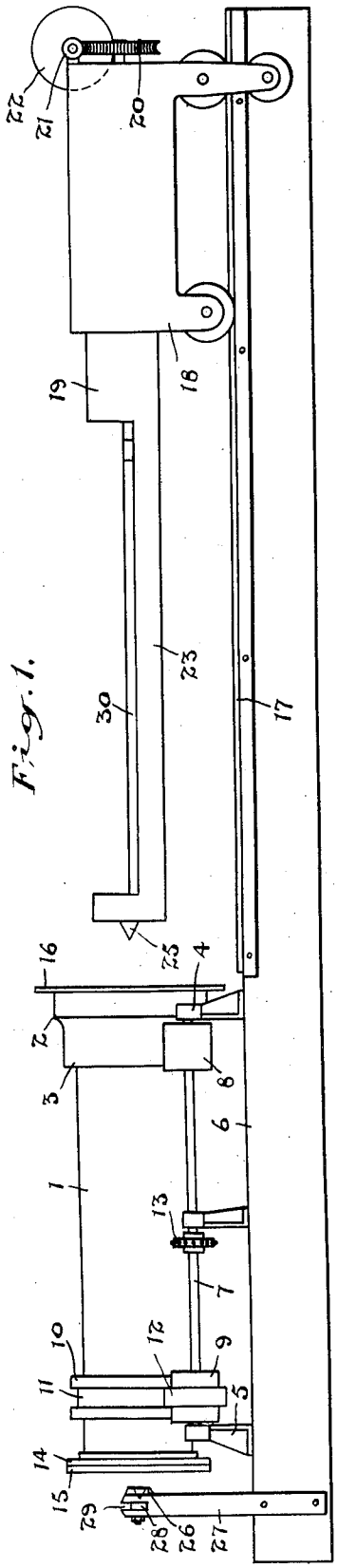


Fig. 1.

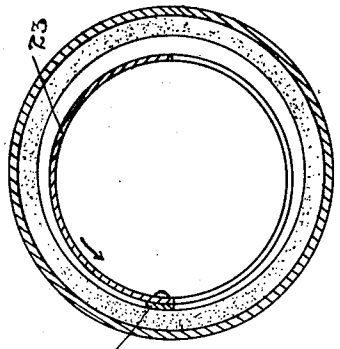


Fig. 5.

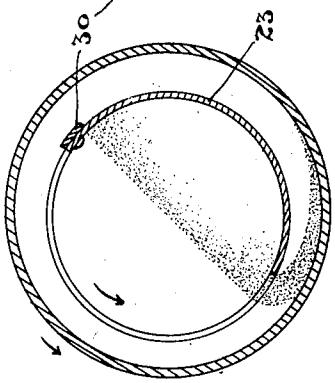


Fig. 4.

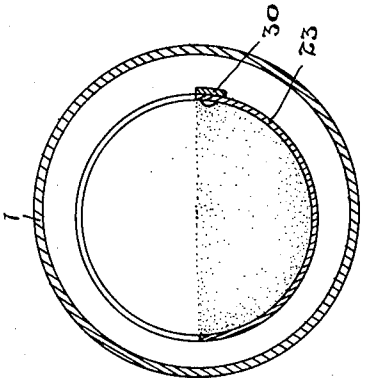


Fig. 3.

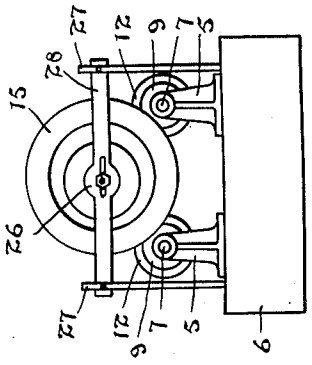


Fig. 2.

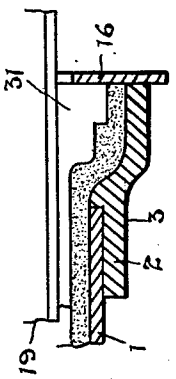


Fig. 6.

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UNITED STATES PATENT OFFICE.

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METHOD AND MEANS OF LINING PIPE MOLDS.

Application filed June 27, 1921, Serial No. 480,873. Renewed June 25, 1924.

To all whom it may concern:

Be it known that I, JOHN A. PERRY, a subject of the King of Great Britain, and resident of the city of Toronto, county of York, Province of Ontario, in the Dominion of Canada, have invented certain new and useful Improvements in Methods and Means of Lining Pipe Molds, described in the following specification and illustrated in the accompanying drawings, that form part of the same.

The principal objects of this invention are to reduce the cost of manufacture of cast iron pipes and to greatly facilitate the quantity production of such articles by producing in a simple and effective manner a substantial form of mold for shaping the metal.

The principal feature of the invention consists in the novel manner of placing within a cylindrical casing a lining of refractory material whereby the said material is uniformly distributed over the interior of the casing through centrifugal action, and whereby the surface of the refractory material is shaped to the desired form and rendered smooth and hard to form a desirable surface for the moulding of the iron.

In the accompanying drawings, Figure 1 is a diagrammatic elevational view of a machine embodying this invention.

Figure 2 is an end elevational view.

Figure 3 is an enlarged cross sectional view through the mold casing and sand supporting trough showing the trough in the initial position.

Figure 4 is a cross sectional view through the mold casing and sand trough showing the trough partly dumped.

Figure 5 is a cross sectional view showing the refractory lining completed.

Figure 6 is an enlarged longitudinal sectional view of a portion of one of the ends of the mold showing the formation of the lining for the "bell" end of a pipe.

In the casting of iron pipe many devices have been proposed in which the metal is flowed over the mold surface by a centrifugal action and it has been known to line such molds with refractory material but such linings have not apparently been successful in operation as the later development of the art shows the use of centrifugal molds wherein the molten metal is poured into contact with metallic surfaces. In such devices the problem of cooling the molds has been a great difficulty and further the use of metallic molds necessitates the special treatment of the pipe after it is formed as it is "chilled" by contact with a metal surface.

By my improved method of lining a mold casing with refractory material, I am able to present an extraordinarily smooth and hard surface which will not "chill" the metal poured thereinto and the process is extremely simple and effective.

In the application of the invention herein shown, the mold casing 1 is of cylindrical form and may be made of standard pipe. At one end of this pipe is secured a collar 2 which serves the double purpose of forming a larger diameter for the shaping of the "bell" and of the mold and also forms an external bearing surface 3 upon which the mold is rotatably supported.

Suitable journals 4 and 5 are arranged upon a base 6 at either side of the longitudinal centre of the mold casing and between these journals are supported the parallel shafts 7. Rollers 8 are mounted on these shafts at one end to support the bearing surface 3 of the collar 2 and rollers 9 are secured to said shafts at the opposite end to engage a collar 10 encircling the mold casing. This collar is preferably provided with a circumferential channel 11 to engage the larger diameter 12 of the rollers 9, thus holding the mold from longitudinal movement. The shafts are rotated in a suitable manner to impart rotation to the mold casing, a sprocket 13 being shown upon one of these shafts to be suitably driven.

A flange ring 14 is secured to the end of the casing 1 adjacent to the collar 10 and to this flange ring is secured a ring plate 15 which partly closes the end of the mold to securely retain the sand lining when it is placed therein. A similar plate 16 is secured to the "bell" end of the mold.

Upon the base 6 and extending from the "bell" end of the mold casing is arranged a trackway 17 and upon this trackway is mounted a carriage 18 which may be of any suitable design. Within this carriage is rotatably mounted a tubular member 19 which is adapted to be rotated in the carriage and about its own axis by means of a worm wheel 20 and worm 21 operated by a suitable hand wheel 22. The tubular member projects from the opposite end of the carriage and it is cut away for the major

portion of its extension end to form a semi-cylindrical trough 23 into which a charge of sand is placed which is to form the refractory lining for the mold.

The outward end 24 of the trough is preferably provided with a centre point 25 and a bearing block 26 is supported at the farther end of the mold casing 1 from suitable standards 27. The block is here shown carried upon a cross bar 28 extending between the standards and said block is transversely adjustable, a slot 29 being shown in the cross bar.

The axial centre of the trough 23 is arranged slightly eccentric to the axial centre of the mold casing 1 so that one side of the trough will be closer to the interior wall of the mold casing than the other. At one edge of the trough is secured a sweep 30 which is a strip of suitable material which is adapted to sweep the surface of the sand dumped from the trough into the casing. This sweep will be enlarged at the "bell" end to shape the inner surface of the mold to the desired contour as indicated by the numeral 31 in Figure 6.

The opposite end of the sweep may be shaped to form a bead for the spigot end of the pipe.

In the operation of this invention, the mold casing 1 is placed into position upon the rotating rollers and it is rotated at a desirable speed. The trough 23 is loaded from end to end with the sand for the lining and the carriage is then moved to insert the trough into the mold casing and the end is suitably supported in the bearing carried on the standards 27. The operator then rotates the trough slowly by means of the hand wheel and worm gear, tipping it so that the sand will be split into the rotating mold casing. The rapid rotation of the mold casing holds the sand to its inner wall and the sand is thus built up around the inner surface of the mold casing and as the said trough is turned completely over and deposits the last of its load, the sweep 30 is brought into closer relationship to the interior wall of the casing 1 by reason of the eccentric arrangement of the casing and trough.

The sweep thus moves gradually into contact with the swiftly revolving sand lining and it smoothes it and packs it tightly in place, shaving the surface at the "bell" and spigot ends forming a hard, smooth surface which will be capable of withstanding the contact of the flow of the molten metal afterwards to be deposited therein by a suitable centrifugal casting machine.

This machine may be operated so that after the mold is prepared in the manner described the metal may be poured therein as it continues to rotate but the casting of the metal within the mold is not a portion of this invention. It will be understood however that mold casings may be placed upon the "lining" machine to be lined and then removed and placed upon a casting machine, if desired. In this way the operation of the "lining" machine may be maintained continuously. By lining the molds in the manner described, the expense of water cooling equipment and operation is dispensed with. It enables a very rapid production. It renders possible the use of inexpensive mold casings and as the casing is lined with sand, the pipes may be formed with beaded spigot ends and they will be easily withdrawn.

The most important consideration in connection with this invention is that the metal of the cast pipe is poured into a sand mold and is not chilled and therefore does not require an expensive annealing process to produce a marketable article.

What I claim as my invention is:—

1. A method of lining pipe molds with refractory material, consisting in distributing the refractory material from a central holder circumferentially over the inner surface of a cylindrical casing while said casing is rapidly rotating and finally smoothing and compressing the material so distributed to a uniform thickness.

2. A means for lining pipe molds, comprising, a cylindrical rotating mold casing, means for containing a quantity of loose refractory material adapted to be projected into the mold casing to deposit said refractory material uniformly from end to end of said casing, and means supported by said carrier for smoothing and compressing the surface of the refractory material deposited within the rotating mold casing.

3. Means for lining pipe molds, comprising, a rotatable cylindrical mold casing, a trough member movable longitudinally and adapted to extend into said mold casing and arranged in eccentric relation thereto and adapted to be rotated to deposit a charge of molding sand within the mold casing, and a sweep secured to the outside of said trough adapted to be brought into contact with the sand distributed over the surface of the mold casing by the centrifugal action of its rotation and to smooth and compress the sand to a uniform density and thickness.

JOHN A. PERRY.