D. S. DE LAVAUD.

ROTARY CASTING.

APPLICATION FILED APR. 21, 1919.

1,329,296. Patented Jan. 27, 1920.

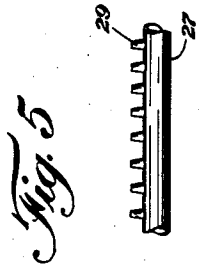


Fig. 5

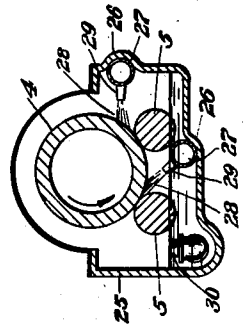


Fig. 4

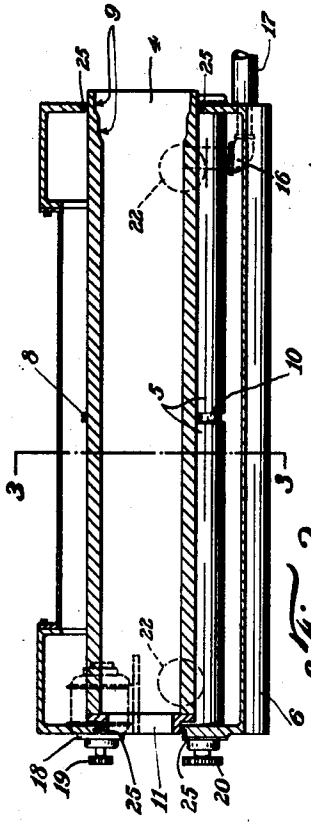


Fig. 1

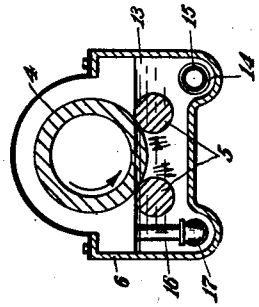


Fig. 3

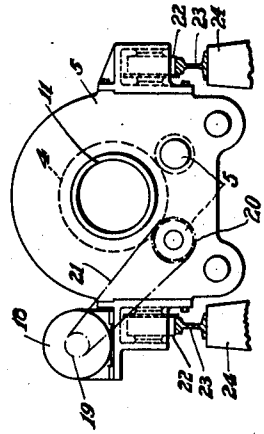


Fig. 2

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ROTARY CASTING.

1,329,296. Specification of Letters Patent. Patented Jan. 27, 1920.

Application filed April 21, 1919. Serial No. 291,662.

To all whom it may concern:

Be it known that I, DIMITRI SENSAUD DE LAVAUD, a citizen of the United States of Brazil, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Rotary Casting, of which the following is a specification.

This invention relates to rotary casting, and provides an improved method of casting metallic bodies in a non-laminated rotary mold. The object of the invention is to avoid the necessity of using either or both the more or less complicated arrangements disclosed in my copending U. S. applications Serial Nos. 194,976 and 194,977, while nevertheless water-cooling the mold and supporting the same for rotation to prevent any possibility of the mold jamming in its journaling bearings during rotation or warping longitudinally or otherwise becoming injured as the result of uneven heat expansions following the deposit therein of a charge of molten metal to cast an article or articles of the annular type in the mold by the rotary casting method.

The present invention provides means devised conveniently to carry out a novel method of supporting, rotating and fluid-cooling the mold during casting based on certain discoveries made subsequent to the invention disclosed in my copending application, Serial No. 264,444. Consequently, the present application is a continuation in part of the last mentioned copending application, pursuant to the statements included in the last paragraph added to the specification of said copending application by amendment.

In the last mentioned copending application the serious difficulties sought to be overcome by the above mentioned copending applications, Serial Nos. 194,976 and 194,977, and the disclosures of these two last mentioned applications, were fully disclosed; and it was explained that said application, Serial No. 264,444 also overcame these difficulties but in connection with the provision of a laminated mold.

The present invention discloses a novel method of cooling even a solid or one-piece rotary mold in a rotary casting machine, satisfactorily, without using the more or less complicated arrangements disclosed in said copending applications, Serial Nos. 194,976 and 194,977. The present method consists in providing a solid mold, by which is meant also a mold formed of a plurality of longitudinally joined sections of lengths considerably greater than they would have, to be characterized as transversely arranged laminæ, supporting such a mold only at points below its axis, rotating the mold as thus supported on a substantially horizontal axis, and providing a cooling fluid and confining and directing the fluid toward a circumferential subdivision of the mold at any instant at a predetermined point relative to the axis of the mold during rotation of the mold, so that the fluid acts on successive circumferential subdivisions of the mold while other circumferential subdivisions of the mold are exposed to the atmosphere. By stating that said other circumferential subdivisions of the mold are exposed to the atmosphere, there is meant that said subdivisions are removed out of the field of action of the confined and directed fluid; in other words, a circumferential subdivision of the mold which is frictionally coated with a thin layer of the cooling fluid, as the result of friction between the mold exterior and the fluid particles, is deemed to be exposed to the atmosphere where such thin layer of adhering fluid is exposed to the atmosphere. The mold may be supported for rotation as described above, by setting the mold on two cylindrical rollers, one of which may be power driven, and both of which are arranged parallel to the axis of rotation of the mold. These rollers are preferably arranged with their axes in a common horizontal plane, with such axes spaced a distance less than the external diameter of the mold. Such rollers may then be used to support the mold only at points below its axis. The cooling fluid may be confined and guided, pursuant to the present invention, by providing a receptacle, and feeding the fluid to the receptacle to maintain a collection of fluid therein at a predetermined level such that the mold during rotation is partially submerged in the fluid collection; and in such case the rollers, too, are also submerged in the collection of fluid, at least partially, whereupon during rotation of the mold, one of the rollers will rotate in one direction and the other roller will rotate in the opposite direction, thereby setting up currents of cooling fluid under pressure relative to each circumferential subdivision of the mold as such subdivision approaches the predeter-

mined point aforesaid. The new method of cooling the mold, with such mold rotated when supported only at points below its axis pursuant to the present invention, may also be carried out, in so far as directing a current of cooling fluid under pressure against the mold is concerned, by providing injecting or spraying devices for directing currents of cooling fluid under pressure against the mold during rotation.

The invention will be more clearly understood from the following description, when taken in connection with the accompanying drawing illustrating apparatus at present preferred for carrying out the process.

In this drawing,

Figure 1 is an axial sectional view of one type of apparatus;

Fig. 2 is an end elevation of the parts shown in Fig. 1, looking toward the right of Fig. 1;

Fig. 3 is a transverse section taken on the line 3—3 of Fig. 1;

Fig. 4 is a view similar to Fig. 3, but showing a different apparatus; and

Fig. 5 is a fragmentary detail view, showing a longitudinal fraction of one of the two fluid spraying or injecting devices of Fig. 4.

The new method will be more clearly understood if described in connection with the following explanation of the structural elements and operations of the apparatus shown.

Referring first to Figs. 1, 2 and 3, the mold 4 is supported upon a pair of parallel rollers 5, journaled at their opposite ends in the end walls of the receptacle 6. In the present case, the mold is shown as being of one-piece construction, having a detent-ring 8 for co-action with suitable grooves in rollers 5, one of which grooves is shown at 10, Fig. 1. The parts 8 and 10 serve to prevent longitudinal shifting of the mold relative to the rollers 5. At one end, the interior of the mold may be shaped as indicated at 9 in Fig. 1, to facilitate the casting of belled pipe. The left end of the mold is formed of a shaped ring 11. As is well known, any one of various suitable devices (not shown) may be used at the other end of the mold, for making an end closure similar to that provided by the ring 11.

The receptacle 6 is designed for the accommodation of a preferably circulating collection 13 of cooling water. This water is admitted to the receptacle through an inlet conduit 14 secured to the receptacle and telescoping another inlet conduit 15 leading from a source of water supply. The collection 13 is maintained at the desirable level indicated in Fig. 3 by means of a vertical drain pipe 16 opening into an outlet conduit 17 secured to the receptacle and telescoping another conduit (not shown) leading to a suitable point of discharge.

When, during casting, the mold 4 is rotated, partially submerged in the collection 13, great facility in cooling the mold is afforded, due to the rotation under water of the supporting rollers 5, coincident with the rotation of the mold, since one at least of these rollers, irrespective of the direction of the rotation of the mold, always sets up water currents in the collection 13 tending to drive the water toward the mold exterior 7 with some force, resulting in high efficiency in suppressing steam formation where it would otherwise occur, that is, exteriorly of the mold where it is submerged. In this connection, attention is directed to Fig. 3, from which it will be seen that, assuming the mold to be rotating in the direction of the curved arrow, the rollers 5 set up water currents under pressure as indicated by the groups of straight arrows.

The mold 4 is rotated by employing one of the rollers 5 as a driving roller, this roller 5 being in turn driven by an electric motor 18 mounted upon a bracket at one side of the receptacle 6; the motor shaft having fixed thereon a pinion 19, and roller 5 just referred to having fixed thereon a gear 20, and the gear and pinion being coupled by a link belt or the like, as indicated in 21.

The telescoped inlet and outlet conduits for the receptacle above described, and the mounting on the receptacle of the complete power plant for rotating mold 4, permit the apparatus of the present invention to be advantageously used if desired, pursuant to the invention disclosed in U. S. Letters Patent No. 1,276,038 issued to me, so far as moving the mold relative to the metal delivering means, rather than moving the latter relative to the mold, is concerned. And to this end the receptacle 6 carries a plurality of wheels 22, adapted to travel on rails 23 fixed to a suitable base 24.

Packing, as indicated at 25, may be provided to prevent exit of the fluid from the receptacle 6 other than by way of the drain pipe 16.

Referring to Figs. 4 and 5, it will be seen that the mold 4 is mounted again on a pair of rollers 5 which rollers are duplicates of the rollers 5 of Fig. 3. Instead of a receptacle 6, a receptacle 25, of slightly different cross-section, is provided. Running the length of the receptacle, and secured in suitable recesses 26, are injector or sprayer devices 27 for the cooling fluid currents 28, one or both of which devices may be used. Each device 27 throughout its length is constructed as indicated in Fig. 5, that is, it is provided with a straight-line series of spaced nozzles 29. As the mold rotates, the fluid currents 28 under pressure are directed against successive circumferential subdivisions of the mold as such subdivisons pass a predetermined point or points, that is, pass

the zone of impingement of one or both of the currents 28. The surplus fluid not adhering to the exterior of the mold, as the circumferential subdivisions of the mold pass upward beyond the higher current 28, falls or drips back into the bottom of the receptacle 25, the surplus collected fluid running off through a suitable drain pipe 30.

I claim,

1. The method of cooling a metal mold in a rotary casting machine, which consists in providing a mold, supporting the mold only at points below its axis, rotating the mold as thus supported on a substantially horizontal axis, and providing a cooling fluid and confining and directing the fluid relative to a circumferential subdivision of the mold at any instant at a predetermined point relative to the axis of the mold during rotation of the mold, so that the fluid acts on successive circumferential subdivisions of the mold while other circumferential subdivisions of the mold are exposed to the atmosphere.

2. The process defined in claim 1, wherein the fluid is confined and guided by providing a receptacle, and feeding cooling fluid to the receptacle to maintain a collection of fluid therein at a predetermined level such that the mold during rotation is partially submerged in the fluid collection.

3. The process defined in claim 1, wherein the fluid is confined and guided so as to direct a current of cooling fluid under pressure toward each circumferential subdivison as it passes said predetermined point during rotation of the mold.

Signed at New York in the county of New York and State of New York this 17th day of April, A. D., 1919.

DIMITRI SENSAUD DE LAVAUD.