June 17, 1924.

1,498,138

C. E. WILDER

CENTRIFUGAL PIPE MOLD

Filed March 5, 1923

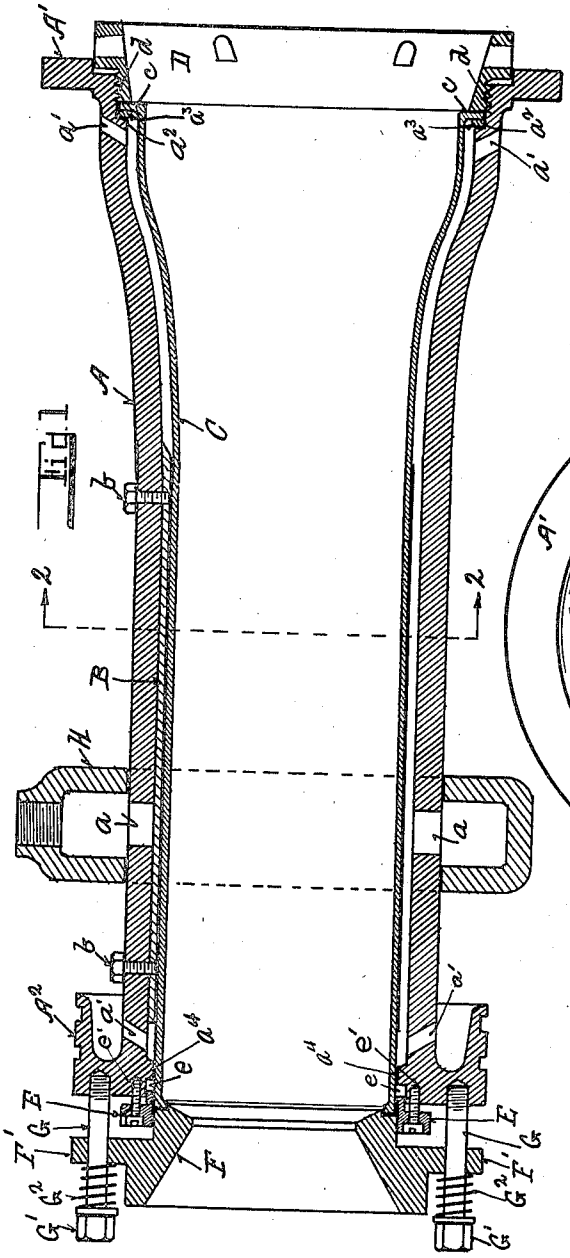


Fig 1

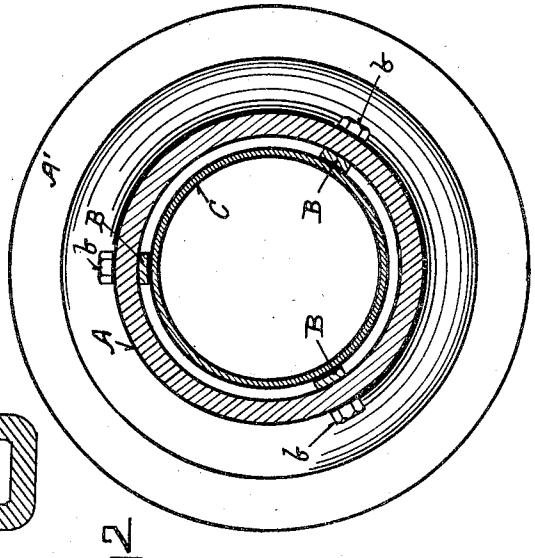


Fig 2

Inventor
Clinton E. Wilder
By Stinson Fatty

Patented June 17, 1924. 1,498,138

UNITED STATES PATENT OFFICE.

CLINTON E. WILDER, OF IRVINE, PENNSYLVANIA.

CENTRIFUGAL PIPE MOLD.

Application filed March 5, 1923. Serial No. 622,901.

To all whom it may concern:

Be it known that I, CLINTON E. WILDER, a citizen of the United States, residing at Irvine, in the county of Warren and State of Pennsylvania, have invented certain new and useful Improvements in Centrifugal Pipe Molds; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, forming part of this specification.

This invention relates to improvements in the construction of molds for centrifugal casting machines, in which machine the mold is rotated at a high rate of speed while a stream of molten metal is introduced therein in a suitable manner.

Heretofore it has been the practice to construct the mold tubes of centrifugal casting machines of sufficient wall thickness to ensure the mold maintaining accurate alignment, which necessitates a wall substantially one and one half inches thick.

This thick body of metal becomes very hot during operation of the machine, because it is not possible to extract the heat absorbed by the metal quickly enough to prevent undue expansion of the interior surface of the mold. This undue expansion of the inner surface of the mold is so great that when the mold contracts many small cracks or checks form in the inner surface of the mold which soon render the mold unfit for use.

Also when thick walled molds are used it requires considerable time for the molten metal poured into the mold to set and cool sufficiently to contract enough to be withdrawn from the mold.

The obect of my invention is to overcome the difficulties incident to the use of thick walled mold tubes in casting machines. I overcome these difficulties by providing a mold tube having a comparatively thin wall, as for example a wall about three sixteenths to one half of an inch thick, for which I provide suitable means to maintain all portions thereoef in accurate alignment. And I also provide means for circulating a fluid about the exterior surface of said mold tube for the purpose of extracting the heat therefrom, so that the mold tube will be cool at the point where the molten metal is placed thereon, so that said metal will be at once chilled, and will contract sufficiently to leave an air space between the casting and the inner surface of the wall of the mold tube, so that when the casting is completed it can at once be withdrawn from the mold tube.

These and other features of my invention are hereinafter set forth and pointed out and are illustrated in the accompanying drawings, in which:

Figure 1 is a longitudinal central section of a mold tube for centrifugal casting.

Figure 2 is a transverse section of the same on the line 2—2 in Fig. 1.

In these drawings A indicates a metal shell of suitable form and dimensions, to receive and support a metal mold tube, hereinafter described. A' and A^2 are flanges at the ends of the supporting shell A, whereby the supporting shell A, is supported and operated in the casting machine, (not shown).

The mold supporting shell A is provided with inlet and outlet openings a and a' through the wall thereof, for the purpose hereinafter set forth. At one end of the mold supporting shell A I provide an annular shoulder a^2 upon which I place a metallic gasekt a^3 of copper or other suitable material, and I preferable provide internal screw threads d in this end of the supporting shell A to receive a ring nut D as hereinafter described. If desired, however the ring nut D may be secured in place by other suitable means. The supporting tube A is provided with a radial flange A' by means of which the end of the shell is supported, and the shell rotated in the casting machine, (not shown). At the opposite end of the shell A is another flange A^2 of suitable contour to fit into the bearing therefor in the casting machine. Upon the inner surface of the wall of the shell A, under the flange A^2 are constructed bearings a^4 to receive and support the mold tube hereinafter described, said bearing points a^4 being spaced apart around the perimeter of the inner wall of the shell A, as may be required to permit of the expansion of the mold tube hereinafter described. Upon the inner surface of the wall of the shell A I provide ribs B in any convenient manner, but I preferably secure them in place by means of bolts b, at suitable spaced points around the inner perimeter of the wall of the shell A, to suitably

support the mold tube placed within the shell A, as hereinafter described, while I have shown but three ribs B, it is evident that a greater number can be used if desired. And while I have not shown said ribs extending the extra length of the shell, A, it will be evident that they can be extended the entire length of the shell A if desired, to accomplish the purpose intended. These ribs B support the wall of the mold tube, hereinafter described, in accurate alignment with the axis of the inner surface of the wall thereof.

Within the shell A and resting upon and guided by the ribs B, I insert a metallic mold tube C which is constructed with a relatively thin wall, for example from three sixteenths to one half an inch in thickness It may be found however that the wall of the mold tube C may have to be made thicker, or can be reduced in thickness, but as compared with the thickness of the supporting shell, A, or the wall of the mold tubes now in use in centrifugal casting machines, the wall of the mold tube C, is comparatively thin.

When in place in the supporting shell A, the mold tube is provided with a radial flange c at one end thereof, which engages the metallic gasket a^3, and the opposite end thereof rests upon the bearing points a^4 at the opposite end of the shell A. The intermediate portion of the wall of the thin mold tube C resting on and being supported by the ribs B in alignment with the axis of the shell A, and in spaced relation to the inner surface of the wall thereof. The shell A, is counter-bored to receive a packing gasket e and a gland E which is secured to the end of the shell A by means of bolts e', by means of which the gland E can be forced against the gasket e to seal the joint between the shell A and the mold tube C, so that a cooling fluid introduced into the space between the supporting shell A and the mold tube C can not leak out.

Within the gland E is inserted a funnel ring F so that it engages the end of the mold tube C, said funnel ring being secured in place on the shell A by means of bolts G tapped into the flange A^2 on the shell A, said bolts passing through openings in the flange F' on said ring F. Upon the bolts G are nuts G' and between the nuts G' and the flange F' are placed springs G^2 which are slightly compressed when the ring F is forced backwardly by reason of the longitudinal expansion of the mold tube during the operation of the mold.

H indicates a water ring which embraces the shell A, and covers the inlet openings a in the wall thereof, and is suitably connected with a suitable supply of cooling fluid. The ring H is rotatable on the shell A, or rather the shell A is rotatable within the ring H, there being a slight clearance between the ring H and the shell A so that the joint between them will be lubricated by the cooling fluid forced into the ring H, and thence through the inlet openings a into the space between the shell A and the mold tube, there being preferably sufficient pressure applied to the cooling fluid to cause it to circulate through said space and out of the outlet openings a'. The centrifugal force of the cooling fluid caused by the rotation of the shell A and mold tube therein causes said fluid to flow freely out of the outlet openings, a', the length of the openings, a', aiding the flow, consequently if said outlet openings a' are lengthened by making the wall of the shell A thicker or by other means, the centrifugal force of the cooling fluid within said openings will be increased, and the flow of cooling fluid through the space between the shell A and the mold tube C correspondingly increased.

In use this shell and enclosed mold tube are inserted in to the moulding machine, wherein they are entirely enclosed in a cooling jacket, containing water or other cooling fluid, between the ring H, so that any leakage of cooling fluid and shell A and the escape of fluid from the outlet openings, is into the cooling jacket of the machine, so that the structure shown and described herein will be entirely surrounded by cooling fluid, and the only pressure required is what will be sufficient to cause a circulation in the space between the walls of the shell A and mold tube C.

In operation the mold is caused to rotate on its axis very rapidly and the pouring of the molten metal is commenced at the larger or bell end of the mold, the pouring spout being inserted into the mold tube from the opposite end thereof, and being gradually withdrawn as the pouring progresses.

As the pouring spout recedes the molten metal is laid upon the inner surface of the rotating mold tube C, always upon a portion which has been cooled by the cooling fluid, said fluid travelling forward over that portion of the mold tube upon which the hot metal has been deposited, so that the incoming cooling fluid maintains the succeeding portion of the mold tube in a cool condition to receive and chill the metal deposited thereon.

The wall of the mold tube being thin does not absorb much of the heat from the molten metal, and therefore is quickly cooled by the fluid, said reduction of temperature being instantly communicated to the molten metal deposited thereon, so that because the mold tube does not absorb much heat, its expansion is correspondingly reduced, while the reduction of temperature of the molten metal as it hardens is greater than that of the tube, an air space progressively forms

between cast metal and the mold tube, which progresses longitudinally until the casting is finished, so that substantially as soon as the last metal is poured, and the rotation of the mold ceases the finished casting can be withdrawn from the mold, and the operation repeated indefinitely, because the mold tube, being comparatively thin, is easily kept cool, and the machine does not have to stand idle to permit the casting to shrink sufficiently to be withdrawn, and for the over-heated mold to cool.

Having thus shown and described the construction and operation of my invention so that others can construct and utilize the same, I do not desire to be limited to the exact construction shown and described as many modifications can be made therein without departing from the scope of my invention, therefore what I claim as new and desire to secure by Letters Patent is:

1. In an apparatus of the class described, an outer cylindrical shell adapted to be rotatably mounted in the water-jacket of a rotary casting machine and having openings in the wall thereof, and a cylindrical mold liner secured within said outer shell in spaced relation to the inner surface thereof.

2. In an apparatus of the class described, an outer cylindrical shell adapted to be rotatably mounted in the water-jacket of a rotary casting machine and having openings in the wall thereof, a cylindrical mold liner secured within said outer shell in spaced relation to the inner surface thereof, and means between the inner surface of the outer shell and the outer surface of said cylindrical mold liner to support said liner.

3. In an apparatus of the class described, an outer cylindrical shell adapted to be rotatably mounted in the water-jacket of a rotary casting machine, and having openings in the wall thereof, a cylindrical mold liner within said outer shell, means to secure one end of said mold liner to said outer shell to prevent longitudinal movement of said end of the liner with relation to said outer shell, and means to slidably secure the opposite end of said mold liner within the opposite end of said outer shell.

4. In an apparatus of the class described, an outer cylindrical shell adapted to be rotatably mounted in the water-jacket of a rotary casting machine and having a greater diameter at one end thereof than at the opposite end, and having openings through the wall thereof adjacent to each end, a cylindrical mold liner adapted to be inserted within said outer shell and having a space between the walls of said mold-liner and said outer shell, a radial flange around the larger end of said mold liner adapted to engage a shoulder within said outer shell, a ring-nut adapted to be screwed into said outer shell against said flange, a gasket around the opposite end of said mold liner and a gland-ring secured to said outer shell adapted to press against said gasket.

In testimony whereof I affix my signature.

CLINTON E. WILDER.