

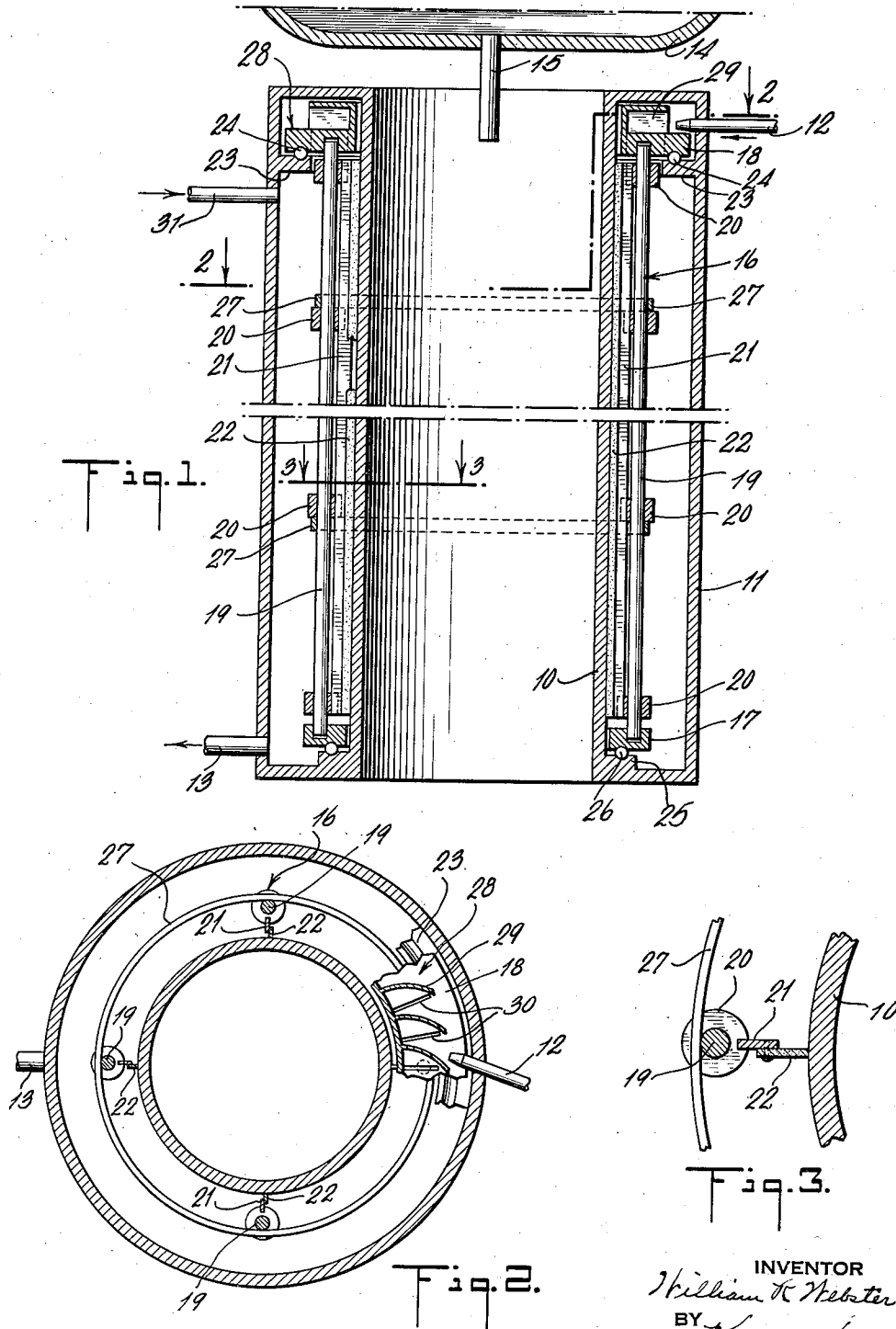
June 24, 1941.

W. R. WEBSTER

2,246,908

CONTINUOUS MOLDING MACHINE

Filed Nov. 23, 1940



INVENTOR
William R. Webster
BY *Kenyon Kenyon*
ATTORNEYS

UNITED STATES PATENT OFFICE

2,246,908

CONTINUOUS MOLDING MACHINE

William R. Webster, Bridgeport, Conn.

Application November 23, 1940, Serial No. 366,807

8 Claims. (Cl. 22—57.2)

This invention relates to continuous molding machines and more especially to means for dissipating heat from the mold to promote solidification of the metal from molten form into an ingot.

One type of continuous molding machine to which this invention applies consists essentially of a tubular molding chamber having a top inlet into which molten metal is introduced and a bottom outlet through which solidified metal is withdrawn. Solidification of the molten metal is promoted by the provision of a jacket around the mold through which water is circulated in heat exchange relation to the outer wall of the mold for dissipating heat therefrom. In molds of this character, it is necessary to provide a very effective cooling system and unless the heat is rapidly withdrawn from the mold, bubbles of steam form on the exterior surface of the mold and have an insulating effect which reduces the efficiency of the cooling system.

An object of this invention is a cooling system having provision for removing steam bubbles from the exterior surface of the mold and injecting the steam bubbles into the body of circulating water, thereby effecting condensation of the steam and maintaining contact of the cooling water with the entire outer surface of the mold.

In one embodiment of the invention, a cylindrical frame is rotatably supported within the jacket and means are provided for effecting rotation of said frame. The frame supports a plurality of longitudinal wipers arranged to engage the outer surface of the mold, whereby rotation of the frame causes the wipers to disengage vapor bubbles from the surface of the mold and move them outwardly into the body of the liquid contained in the jacket. Any suitable means may be provided for effecting rotation of the frame and a simple arrangement is the provision of an impact type water wheel at one end of the frame.

Other objects, novel features and advantages of this invention will become apparent from the following specification and accompanying drawing, wherein:

Fig. 1 is a vertical section through one embodiment of the invention;

Fig. 2 is a section on the line 2—2 of Fig. 1, and
Fig. 3 is a section on the line 3—3 of Fig. 1.

In the drawing, 10 is a vertical molding tube or chamber open at its upper and lower ends and arranged within a casing 11 constituting a jacket for circulating cooling liquid around the molding tube. Pipes 12 and 13 are provided for supplying

and withdrawing the cooling liquid. A pouring box or dish 14 is supported above the molding tube 11 by any suitable means (not shown) and preferably a pipe 15 extends from the bottom of the pouring box 14 into the molding tube 10 a predetermined distance below the top of the molding tube but such pipe may be dispensed with in which case the metal flows in an unconfined stream from the dish 14 into the mold. Molten metal is supplied to the pouring dish 14 by any means well known in the art, but not disclosed herein and also means (not shown) are provided for withdrawing the solidified ingot from the bottom of the mold tube.

A cylindrical frame 16 is arranged within the jacket 11 and surrounds the mold tube 10. This frame consists of a bottom ring 17 and a top ring 18 which are fastened together by a plurality of vertically disposed rods 19. Upon each rod 19 are mounted two or more collars 20 supporting wings 21 extending substantially the full length of the rod. To each wing 21 is attached a wiper 22 of felt or other similar material, the inner end of which engages the outer surface of the mold tube 10. Near the upper end of the jacket 11 there is provided a flange or shelf 23 in which is provided a raceway receiving anti-friction balls 24 which also are received in a co-acting raceway in the top ring 18. In the bottom of the jacket is formed a shoulder 25 having a raceway in which are received the anti-friction balls 26 which are also received in a co-acting raceway in the lower ring 17. The frame 16 is rotatably supported within the jacket through the medium of the ball bearings 24 and 26. Reinforcing bands 27 are provided at intervals between the ends of the frame 16.

Rigidly attached to the upper ring 18 is a water wheel 28 of the impact type comprising vanes 29. The inlet pipe 12 is arranged at proper elevation to supply a stream of water to the wheel 28 to effect rotation of the frame 16 thereby causing the wipers 22 to pass over the outer surface of the mold 10. In the ring 18 are provided slots or apertures 30 through which water may pass from the water wheel into the interior of the water jacket 11. Preferably, these slots or apertures are disposed obliquely to a vertical plane so that the water passing into the water jacket may be caused to circulate around the tube 10. As the amount of water required to effect the proper rotational speed of the element 19 may be insufficient to effect heat dissipation by the water jacket at the proper rate, an auxiliary inlet 31 is provided for the purpose of sup-

plying to the jacket whatever additional water may be necessary. This arrangement permits of maintaining proper balance between the rotational speed of the frame 16 and the rate of flow of water through the jacket.

Rotation of the frame 16 and the connected wipers 22 effects removal from the outer surface of the mold 10 of any bubbles of steam which may form thereon due to the heating of the cooling liquid to a temperature above its boiling temperature by heat derived from the metal in the mold and also produces a rapid circulation of the water in horizontal planes thereby assisting to prevent the formation of bubbles of steam. Such bubbles of steam are moved toward the exterior of the jacket and by contact with the cooling water the steam is condensed. Therefore, the formation of a layer of steam or bubbles in contact with the outer wall of the mold 10 is avoided and thus the heat transfer efficiency is increased.

While the water wheel above described provides a sufficient and efficient means of rotating the frame any other suitable driving means therefor may be utilized. Also, it is to be understood that various other modifications may be made in the structure above described without in any way departing from the spirit of the invention as defined in the appended claims.

I claim:

1. In a continuous molding apparatus, a cylindrical mold having a top inlet for the introduction of molten metal and a bottom outlet for the removal of solidified metal, a cylindrical jacket surrounding said mold, means for circulating water through said jacket, and means movable in said jacket for removing vapor from contact with the outer surface of said mold.

2. In a continuous molding apparatus, a cylindrical mold having a top inlet for the introduction of molten metal and a bottom outlet for the removal of solidified metal, a cylindrical jacket surrounding said mold, means for circulating water through said jacket, and means rotatable in said jacket to wipe the outer wall of said mold to remove vapor therefrom.

3. In a continuous molding apparatus, a cylindrical mold having a top inlet for the introduction of molten metal and a bottom outlet for the removal of solidified metal, a cylindrical jacket surrounding said mold, means for circulating water through said jacket, means rotatable in said jacket to wipe the outer wall of said mold to remove vapor therefrom, and means operated by the flow of water through said jacket to effect rotation of said wiping means.

4. In a continuous molding apparatus, a cylindrical mold having a top inlet for the introduction of molten metal and a bottom outlet for the removal of solidified metal, a cylindrical jacket surrounding said mold, means for circulating water through said jacket, a cylindrical frame rotatably supported in said jacket, longitudinal wipers carried by said frame for engagement with the outer surface of said mold to remove vapor therefrom, and means to effect rotation of said frame.

5. In a continuous molding apparatus, a cylindrical mold having a top inlet for the introduction of molten metal and a bottom outlet for the removal of solidified metal, a cylindrical jacket surrounding said mold, means for circulating water through said jacket, a cylindrical frame rotatably supported in said jacket, longitudinal wipers carried by said frame for engagement with the outer surface of said mold to remove vapor therefrom, and means operated by the flow of water through said mold to effect rotation of said frame.

6. In a continuous molding apparatus, a cylindrical mold having a top inlet for the introduction of molten metal and a bottom outlet for the removal of solidified metal, a cylindrical jacket surrounding said mold, means for circulating water through said jacket, a cylindrical frame rotatably supported in said jacket, longitudinal wipers carried by said frame for engagement with the outer surface of said mold to remove vapor therefrom, a water wheel carried by said frame, and means for directing a stream of water into contact with said water wheel.

7. In a continuous molding apparatus, a tubular mold having a top inlet for the introduction of molten metal and a bottom outlet for the removal of solidified metal, a jacket surrounding said mold, means for circulating water through said jacket, means movable in said jacket for removing vapor from contact with the outer surface of said mold, and driving means for said movable means.

8. In a continuous molding apparatus, a cylindrical mold having a top inlet for the introduction of molten metal and a bottom outlet for the removal of solidified metal, a cylindrical jacket surrounding said mold, means for circulating water through said jacket, means rotatable in said jacket to wipe the outer wall of said mold to remove vapor therefrom, and driving means for said rotatable wiping means.

WILLIAM R. WEBSTER.