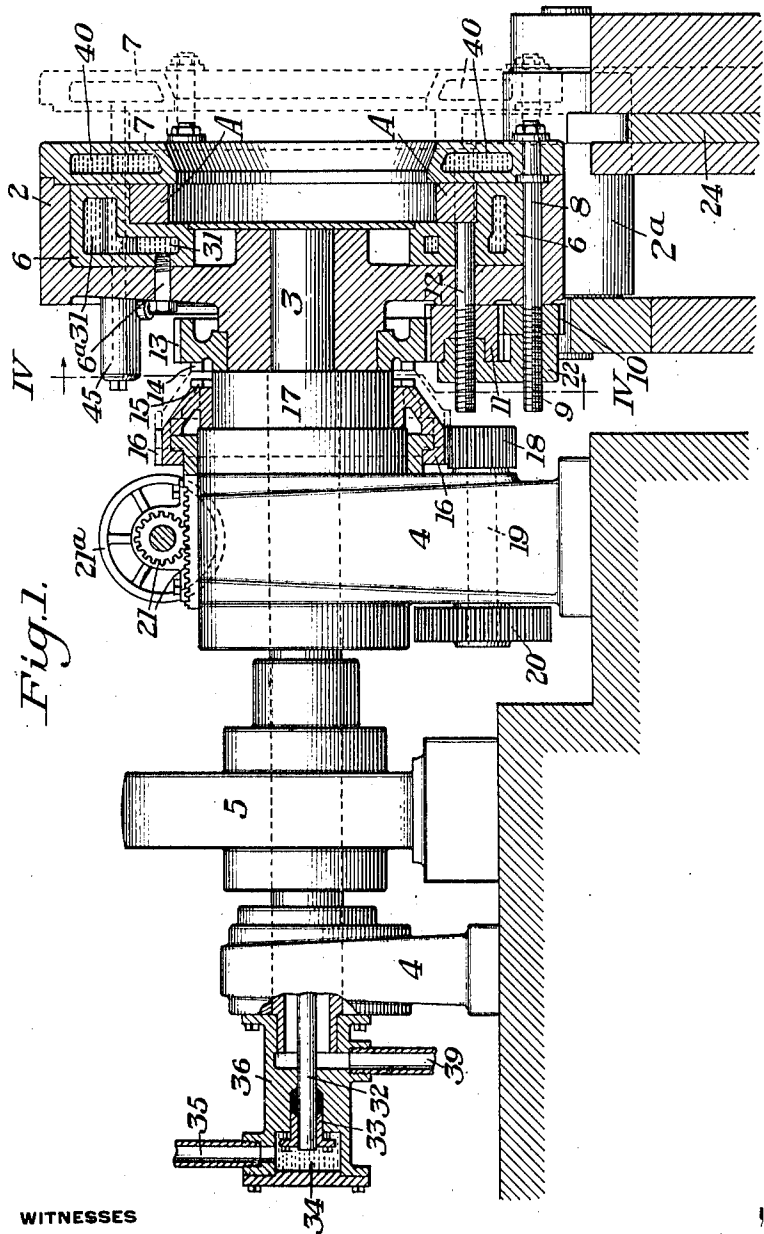


T. A. DICKS.
CENTRIFUGAL CASTING APPARATUS.
APPLICATION FILED OCT. 9, 1918.

1,314,512.

Patented Sept. 2, 1919.
3 SHEETS—SHEET 1.



WITNESSES

R. A. Balderson
& B. Blum

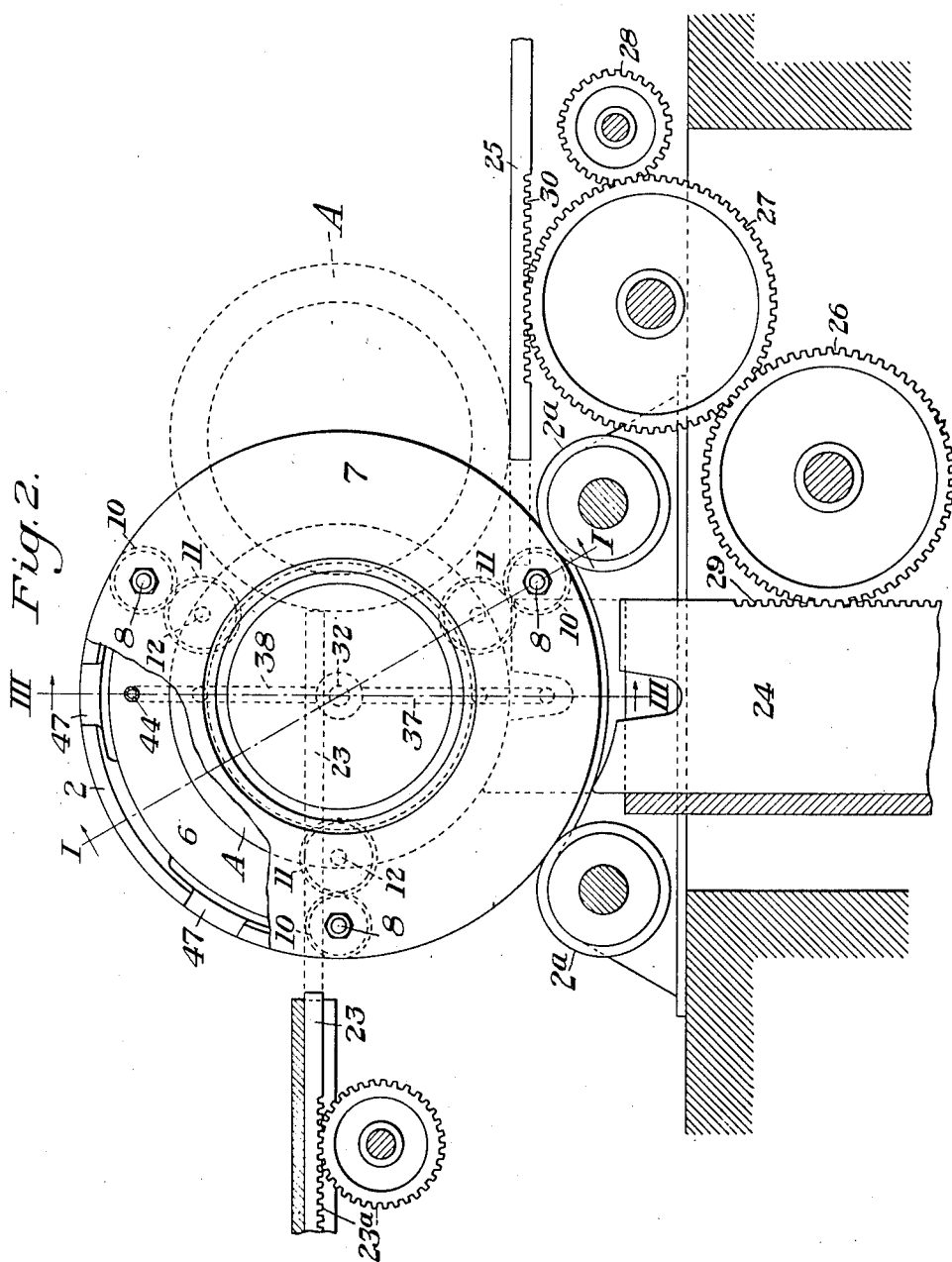
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Fig.4.

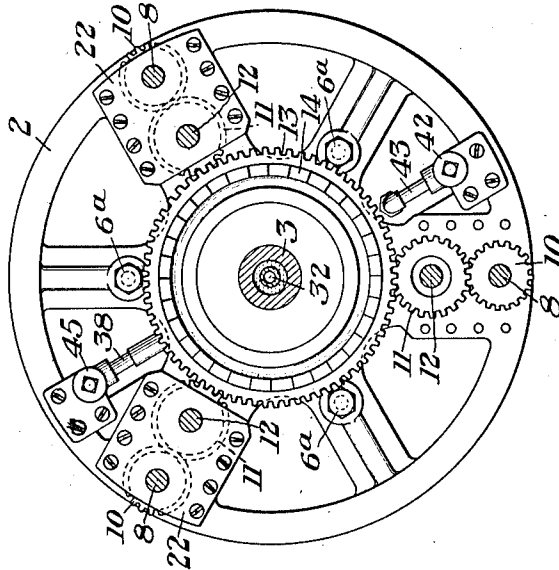
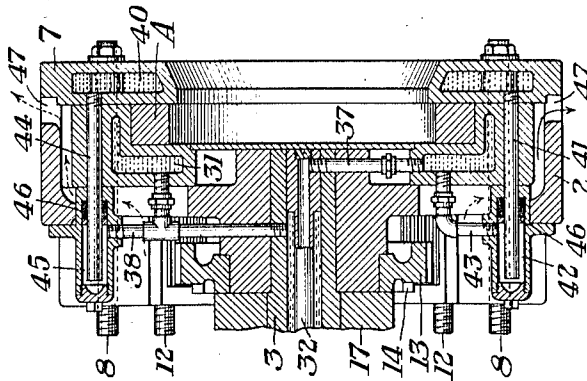


Fig. 3.



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Thos. A. Hicks
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UNITED STATES PATENT OFFICE.

THOMAS A. DICKS, OF WILKINSBURG, PENNSYLVANIA.

CENTRIFUGAL CASTING APPARATUS.

1,314,512.

Specification of Letters Patent.

Patented Sept. 2, 1919.

Application filed October 9, 1918. Serial No. 257,516.

To all whom it may concern:

Be it known that I, THOMAS A. DICKS, a subject of the King of Great Britain, residing at Wilksburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Centrifugal Casting Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a view partly in side elevation and partly in vertical section, the plane of the sectional portion of the figure being on the line I—I of Fig. 2;

Fig. 2 is a view partly in front elevation and partly in vertical section;

Fig. 3 is a section on the line III—III of Fig. 2; and

Fig. 4 is a section on the line IV—IV of Fig. 1.

My invention has relation to centrifugal casting apparatus, and is more particularly designed as an improvement upon the apparatus as shown and described in my Patent No. 1,072,436, dated September 9, 1913.

The object of the present invention is to provide means of novel, practical and efficient character for facilitating the removal of the produced castings from the centrifugal mold, whereby this operation may be more conveniently and rapidly performed. A further object is to provide efficient means for preventing undue heating of the mold parts.

The apparatus herein described may be used not only for the purpose of carrying out the method of casting large ingots, as described in my said patent, but may also be used for producing cast rings of various other forms and for various other purposes.

Referring to the accompanying drawings, the numeral 2 designates a circular mold body mounted upon rollers 2^a and secured to a rotary shaft 3, which is journaled in suitable bearings 4 and which may be driven from any suitable source of power, such as the motor 5. The rotating mold body 2 is provided with a seat in which is detachably secured a mold ring 6, and which is secured thereto by bolts 6^a. 7 designates a face plate which is secured to the open side of the mold body 2 and mold ring 6, forming the outer wall of the mold cavity, and which is also partially supported by the rollers 2^a.

This plate 7, in accordance with my present invention, is carried by supporting members upon or with which it is movable toward and away from the mold cavity to permit of the removal of the formed casting, without entirely detaching it from the mold body. For this purpose I have shown the said plate as having three rearwardly projecting rods or bolts 8 secured thereto and extending rearwardly through the mold body 2, their rear end portions being threaded as indicated at 9. Mounted upon the threaded portion of each of these bolts is a toothed pinion 10 which also acts as a nut. Each of the three pinions 10 has its teeth engaged by a pinion 11 mounted on a pusher rod 12 hereinafter described. The three pinions 11 have their teeth engaged by the teeth of a gear wheel 13 which is mounted for rotation on the hub portion of the mold body 2. The gear wheel 13 is provided with clutch members 14 adapted for engagement with corresponding clutch members 15 on a gear 16 which is rotatably mounted on the bearing member 17, and which is arranged to be driven by a pinion 18 on a shaft 19 journaled in the pillow blocks of one of the bearings 4 and provided with driving means 20. Any suitable means may be provided for driving this shaft 19. I have shown the gear wheel 20 adapted to be engaged by any suitable driving gearing, such as the pinion of an electric motor. The gear member 16 is longitudinally movable on the bearing member 17 and may be moved into and out of clutched engagement with the gear wheel 13 by any suitable means such as the rack and pinion 21, operated by the hand wheel 21^a.

The pusher rods 12 before referred to extend through the web portion of the mold body and through the mold ring 6 to the bottom face of the mold surface of said ring. The gears 11 mounted on the threaded portions of these pusher rods also act as nuts, these gears, together with the pinions 10, being held in place by housing plates 22 secured to the mold body 2, as best shown in Fig. 4.

The molten metal to be cast is poured into the revolving mold in any suitable manner, such as that illustrated in my said patent, and is thrown outwardly by centrifugal force to form a dense uniform annular casting, which may be of any desired cross

section. When the casting is completed, the rotation of the mold body 2 is stopped, the clutch connections between the gears 13 and 16 are engaged with each other by actuating the hand wheel 21^a, and the shaft 19 is put in motion. This revolves the pinions 10 and 11, the former acting to run the rods 8 outwardly therethrough to move the plate into the position shown in dotted lines in Fig. 1. The plate 7 is moved along the faces of the rollers 2^a which are of sufficient length to permit such movement, so that the weight of the plate is sustained by the rollers, to prevent undue strain on the rods 8. At the same time the pinions 11 operate upon the rods 12 to move them against the inner face of the cast ring A and thereby push said ring out of the mold cavity.

The rods 8 are so spaced that there will be just room for the casting to be pushed laterally between two of these rods, in the manner shown in dotted lines in Fig. 2, after it has been pushed out of the mold. For this purpose I may employ another pusher such as that indicated at 23, which may be actuated by the rack and pinion mechanism 23^a, or in any other suitable manner. In order to catch and support the casting as it is pushed laterally in this manner, I provide a vertically movable support 24, and a laterally movable support 25, the former being movable into position below the casting as it is pushed out of the mold cavity by the pushers 12, and the latter being movable into position at one side of the mold to catch the ring as it is pushed in a lateral direction by the pusher 23. Any suitable means may be employed for operating these supports, such as the gears 26, 27 and 28 and the racks 29 and 30 (see Fig. 2).

When the casting A has been moved to the position on the support 25 shown in dotted lines in Fig. 2, it may be readily caught by the hook of a suitable crane and carried to any desired point for further operations, or may be handled in any other suitable way.

In order to prevent undue heating of the mold parts, I provide the mold ring 6 with an internal cavity 31. The shaft 3 is also made hollow and is provided with a centrally extending water inlet pipe 32 which, at its rear end, extends through a suitable stuffing box 33 into a chamber 34 having an inlet connection 35. The rear end of the shaft 3 extends into and rotates within the member 36 connected to the left hand bearing 4, and which member carries the stuffing box 33. The cold water passes in through the pipe 32 and into the cavity 31 of the mold ring by means of the branch pipe 37 (see Fig. 3). After circulating around the said ring, the water passes out by the branch connections 38 leading into

the space in the hollow shaft 3 surrounding the pipe 32 and is finally carried off at the outlet connection 39 from the member 36. I may, however, also provide for the cooling of the face plate 7. For this purpose I have shown it as provided with the internal chamber or cavity 40. This cavity may be supplied by a pipe 41 which telescopically seats in the mold body 2 and extends rearwardly into an inlet chamber 42. This inlet chamber may be supplied by a connection 43 leading from the cavity of the mold ring 6. The cavity 40 has an outlet pipe 44 similar to the inlet pipe 41 and which extends within an outlet chamber 45 having a connection with the outlet pipe 38 before referred to. The pipes 41 and 44 extend through stuffing boxes 46 to prevent leakage.

When the mold is being rotated, there may be interference with the water circulation through the parts just described. The mold parts are, however, at rest while a formed casting is being removed and while the plate 7 is being moved back into position for the next casting. During these intervals of rest there will be no interference with the circulation and the mold parts may therefore be kept in properly cooled condition.

If desired, I may form a plurality of ports 47 through the periphery of the mold ring 6 through which air will be forced during the rotation of the mold, as shown in Fig. 3, which will provide additional cooling means therefor.

My invention provides a centrifugal casting machine which may be used for a variety of purposes, and may be made of any desired size, from that suitable for casting relatively small rings up to large machines for casting ingots from which rails and other large metal objects may be manufactured, as described in my said patent. The means provided for discharging the castings enable this work to be done conveniently and with but little delay, thereby largely increasing the capacity and output of the machine. The water circulating system described effectively keeps the mold parts from becoming overheated. The mold ring 6 and face plate 7 may be removed and replaced at any time, either when unfit for further use, or to be replaced by parts of different form for the purpose of varying the shape or size of the mold cavity.

I do not limit myself to the details of construction and arrangement of parts which I have herein shown and described, as it will be obvious that various changes can be made without departing from the spirit and scope of my invention as defined in the appended claims. Thus, the arrangement of the gearing for operating the face plate and the pushers may be widely

changed, the details of the water circulating system may be varied, and various other changes may be made.

I claim:

- 5 1. A centrifugal casting machine, comprising a rotary mold body and a face plate secured to said body and forming a part of the mold walls of the machine, and means whereby said face plate may be moved toward and away from said body sufficiently to permit the formed casting to be ejected through the opening formed by the separation of said parts without disconnecting it therefrom, substantially as described.
- 10 2. A centrifugal casting machine, comprising a rotary mold body, a face plate carried by said mold body and forming a part of the mold cavity, a plurality of supporting members for the face plate, and means for simultaneously actuating said members to move said plate toward or away from the mold body, substantially as described.
- 15 3. A centrifugal casting machine, comprising a rotatable mold body, a face plate carried by said body and forming a part of the mold cavity, a plurality of supporting members connected to said plate and arranged to rotate within the mold body, and gearing for simultaneously rotating said members to move the face plate relatively to the mold body, substantially as described.
- 20 4. A centrifugal casting machine, comprising a rotary mold body having a mold cavity therein, a plurality of spaced apart pusher devices carried by the mold body and projecting into said cavity, and means for simultaneously actuating said devices to eject the formed casting; substantially as described.
- 25 5. A centrifugal casting machine, comprising a rotary mold body, a plurality of pusher members carried by the mold body and projecting into said cavity in spaced relation to each other, and means for actuating said pusher members, substantially as described.
- 30 6. A centrifugal casting machine, comprising a rotary mold body, a face plate movable toward and away from said body, and having supporting members carried thereby, a plurality of pusher members also carried by said mold body, and gearing for simultaneously actuating the supporting and pushing members, substantially as described.
- 35 7. A centrifugal casting machine, comprising a rotary mold body having a mold cavity therein, a face plate movable toward and away from said body, a plurality of supporting members for said plate extending into said body, a plurality of pusher members also carried by said body and arranged to be projected into the mold cavity, gearing for actuating the pusher members, and a connection between the actuating gearing for the pusher members and the

supporting members, whereby the latter are also actuated, substantially as described.

8. In a centrifugal casting machine, the combination with a mold body and a face plate movable toward and away from the open side of said body, of a pushing device adapted to operate in a lateral direction between the mold body and the face plate when the latter is moved away from said body, substantially as described.

9. In a centrifugal casting machine, the combination with a rotary mold body, and a face plate carried by said body and adapted to be moved a limited distance toward and away from said body, of a support adapted to be moved into position to receive the casting after the face plate has been moved away from the mold body and the casting ejected from the mold, substantially as described.

10. In a centrifugal casting machine, the combination with a rotary mold body, a face plate carried by said body and movable a limited distance away from the same to release the casting, pushing means for ejecting the casting from the mold cavity, and other pushing means arranged to move the ejected casting laterally between the mold body and the separated face plate, substantially as described.

11. In a centrifugal casting machine, the combination with a rotary mold body, a face plate carried by said body and movable a limited distance away from the same to release the casting, pushing means for ejecting the casting from the mold cavity, and other pushing means arranged to move the ejected casting laterally between the mold body and the separated face plate, together with vertically and laterally movable supports arranged to receive the casting as it is ejected from the mold and moved laterally with respect to the mold body, substantially as described.

12. A centrifugal casting machine, comprising a rotary mold body and a face plate secured to said body and forming a part of the mold walls of the machine, and means whereby said face plate may be moved toward and away from said body sufficiently to permit the formed casting to be ejected through the opening formed by the separation of said parts, without disconnecting it therefrom, together with means for circulating a cooling fluid within said mold body; substantially as described.

13. A centrifugal casting machine, comprising a rotary mold body having a chambered mold member therein, a face plate carried by the mold body and movable toward and away from the same, and also having a chamber therein and means for effecting a water circulation through the chambers of the mold member and face plate, substantially as described.

14. A centrifugal casting machine, comprising a rotary mold body, a shaft to which said body is secured, a face plate movable toward and away from the mold body, means
5 for effecting a water circulation through the mold parts of the mold body, and means for effecting a water circulation through said face plate in the different positions thereof, substantially as described.
- 10 15. Centrifugal casting apparatus, comprising a rotary mold body mounted to rotate about a horizontal axis, and a face plate secured to said body and forming a part of the wall of the mold cavity, means permitting
15 said face plate to be moved away from said body a sufficient distance to permit a formed casting to be ejected through the opening formed by such separation, ejector means for engaging the casting and ejecting
20 it, and means for simultaneously actuating the face plate and the ejector means; substantially as described.
16. A centrifugal casting machine, comprising a rotary mold body, a shaft to which
25 said body is secured, a face plate movable toward and away from the mold body, means for effecting a water circulation through the mold parts of the mold body, and means for effecting a water circulation through said
30 face plate in the different positions thereof, together with means for supporting said

plate independently of its actuating means; substantially as described.

17. A centrifugal casting machine, comprising a rotary mold body and a face plate
35 secured to said body and forming a part of the mold walls of the machine, and means whereby said face plate may be moved toward and away from said body sufficiently to permit the formed casting to be ejected
40 through the opening formed by the separation of said parts, without disconnecting it therefrom, together with means for supporting said plate while so moved independently of its actuating means; substan-
45 tially as described.

18. A centrifugal casting machine, comprising a rotary mold body and a face plate
secured to said body and forming a part of the mold walls of the machine, and means
50 whereby said face plate may be moved toward and away from said body sufficiently to permit the formed casting to be ejected through the opening formed by the separation of said parts, without disconnecting it
55 therefrom, together with means for circulating a cooling fluid within said mold body, and also within the face plate; substantially as described.

In testimony whereof, I have hereunto set
60 my hand.

THOMAS A. DICKS.