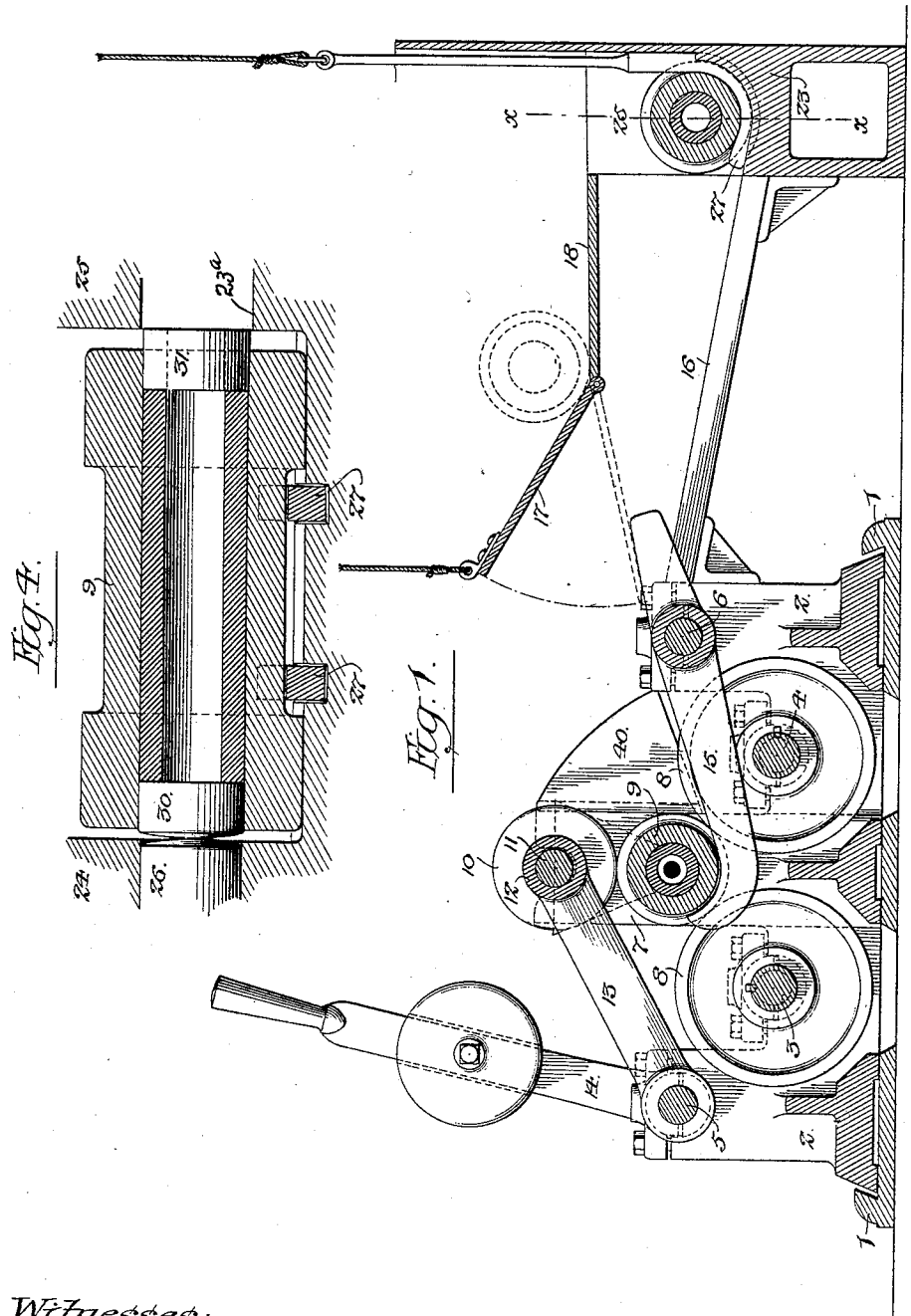
No. 644,018. Patented Feb. 20, 1900.

N. H. O. LILIENBERG.

APPARATUS FOR CASTING HOLLOW INGOTS.

(Application filed Dec. 2, 1898.)

(No Model.) 3 Sheets—Sheet 1.



Witnesses:-
Louis M. Whitehead.
Charles De Leon.

Inventor:-
Nils Henry Ossian Lilienberg.
by his Attorneys.
Howson & Howson

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3 Sheets—Sheet 2

Fig. 3.

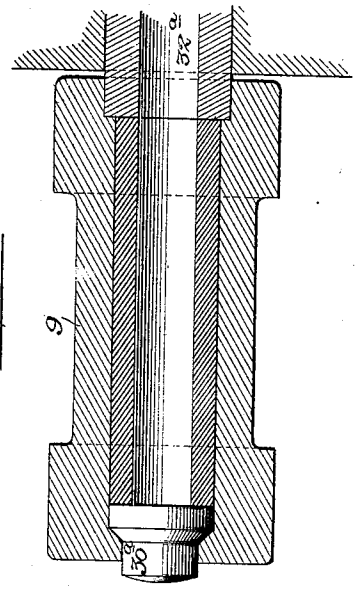

Fig. 2.

Witnesses:-
Louis W. F. Whitehead.
Charles DeTeso.

Inventor:
Nils Henry Ossian Lilienberg
by his Attorneys:
Howson & Howson

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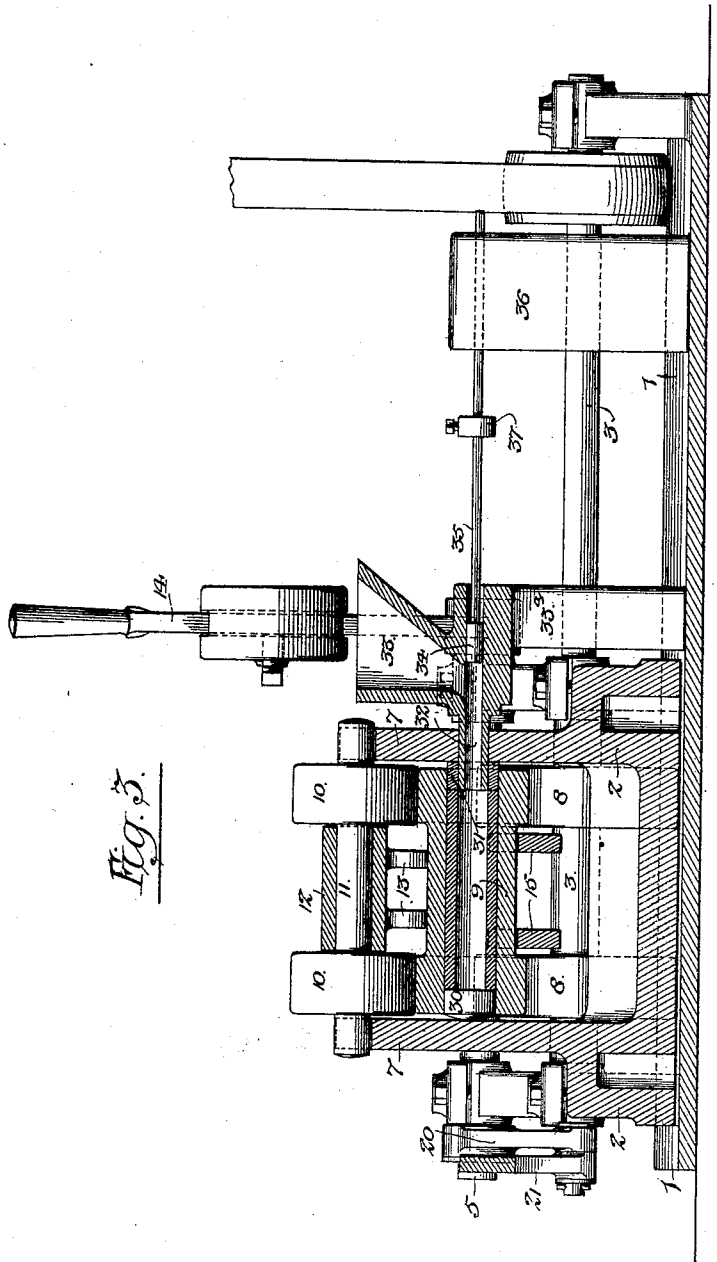

Fig. 3.

Witnesses:-
Louis M. Whitehead
Charles Dalton.

Inventor:-
Nils Henry Ossian Lilienberg.
by his Attorneys.
Howson & Howson

UNITED STATES PATENT OFFICE.

NILS HENRY OSSIAN LILIENBERG, OF NEW YORK, N. Y.

APPARATUS FOR CASTING HOLLOW INGOTS.

SPECIFICATION forming part of Letters Patent No. 644,018, dated February 20, 1900.

Application filed December 2, 1898. Serial No. 698,084. (No model.)

To all whom it may concern:

Be it known that I, NILS HENRY OSSIAN LILIENBERG, a subject of the King of Sweden and Norway, and a resident of New York city, State of New York, have invented certain Improvements in Apparatus for Casting Hollow Ingots, of which the following is a specification.

My invention consists of apparatus intended for the rapid formation of hollow ingots by casting the metal in rotating molds, the essential feature of the invention being the use of a number of independent molds which are successively fed to the mold-rotating devices and are removed from the latter in order to have the ingot ejected.

In the accompanying drawings, Figure 1 is a transverse section of ingot-casting apparatus constructed in accordance with my invention. Fig. 2 is an end view of part of the same. Fig. 3 is a longitudinal section of the machine. Fig. 4 is an enlarged section on the line *x x*, Fig. 1; and Fig. 5 is an enlarged section of another form of mold.

To a suitable foundation or bed 1 is secured a structure 2, having bearings for a pair of rotating shafts 3 and 4 and for a pair of rock-shafts 5 and 6, said structure also having upwardly-projecting standards or cheek-pieces 7, as shown in Figs. 2 and 3. Each of the shafts 3 and 4 is provided with a pair of mold-supporting pulleys or drums 8, upon which rest the flanged ends of the ingot-mold 9, said flanged ends of the mold being pressed into frictional driving contact with the drums 8 by means of rollers 10 bearing from above upon said flanges of the mold and carried by a shaft 11, which is free to turn in a bearing 12, mounted upon arms 13 on the rock-shaft 5, said shaft having also a counterweighted arm 14, with handle by which it may be readily turned so as to either cause the rollers 10 to bear upon the flanged ends of the mold, as shown in Fig. 1, or to lift said rollers free from contact with or out of the path of the mold in its passage into or from the machine, as shown in Fig. 2.

The shafts 3 and 4 are driven by means of belt and pulleys or other available devices, so that the drums 8 will travel at the same surface speed, and will thereby impart the desired rotating movement to the ingot-mold when the same is pressed upon them.

To the rock-shaft 6 are secured a pair of tilting mold-carriers 15, which by the rocking of said shaft may be moved either into alinement with a delivery-runway 16, as shown in Fig. 2, or into position to receive a swinging flap 17, hung to and forming a continuation of an elevated charging-platform 18, as shown in Fig. 1.

Movement of the rock-shaft 6 simultaneously with that of the rock-shaft 5 is effected by means of an arm 20 on said rock-shaft 5, which is connected by means of a link 21 to an arm 22 on the rock-shaft 6, as shown in Fig. 2.

The delivery-runway 16 discharges into a mold-retainer 23, curved in cross-section to conform to the shape of the mold and having opposite end pieces 24 and 25, each provided with openings in line with the opening of the mold when the latter is in the position of rest upon the mold-receiver 23, one of these openings containing a plunger 26, intended to be operated by steam, hydraulic, or other power, so as to effect the ejecting of the ingot from the mold after said mold has been received upon the mold-retainer 23.

A mold-elevator consisting of a pair of curved claws or fingers 27, connected to suitable hoisting mechanism, operates in conjunction with the mold-receiver 23 and serves to lift the mold after the ingot has been ejected therefrom to the level of the charging-platform 18, onto which the mold rolls when it leaves the mold-elevator, so as to be in position to be again fed to the rotating and charging devices.

The pivoted flap of the charging-platform is connected to suitable devices whereby its free end may be raised and lowered, so that when elevated, as shown by full lines in Fig. 1, it will retain the mold on the platform, but when lowered, as shown by dotted lines in said Fig. 1, will permit the mold to roll down onto the carrier 15 and thence into position upon the mold-rotating drum 8.

When the ingot is being cast into the mold, the opposite ends of the latter are closed by means of plugs 30 and 31, the former being a solid block, but the plug 31 being tubular for the reception of the projecting nozzle 32 of the feed-hopper 33, which is mounted upon a slide 33^a, the latter being movable longitudinally

upon the base of the machine, so that the projecting nozzle of the hopper can be introduced into or withdrawn from the hollow plug at the end of the mold. The hollow nozzle 32 is continued rearwardly through the feed-hopper, and to this rearward continuation of the nozzle is fitted a plug 34, carried by a stem 35, which is guided in a fixed bearing 36 and has an adjustable collar 37. Hence as the feed-hopper is moved rearwardly after the casting of an ingot in the mold the plug 34 and stem 35 will move with it until the collar 37 comes into contact with a bearing 36, whereupon continued rearward movement of the hopper will cause the plug 34 to eject from the nozzle 32 any metal which may remain therein and which if allowed to harden would obstruct the same.

Supposing the mold to be in place in the machine for having a casting formed therein and another mold to occupy a position in the mold-receiver 23, the operation of the machine is as follows: The mold mounted upon the drums 8 is rapidly rotated, while the molten metal is fed into the same through the nose of the feed-hopper 33, and while this operation is being performed the cast ingot and end plugs are being ejected by the plunger 26 from the mold on the receiver 23 to the bed 23^a thereof, and said mold is then raised by the mold-elevator, so as to roll down the charging-platform 18 until its movement is arrested by the raised flap 17. Fresh plugs 30 and 31 are then inserted into the ends of the mold, so that the latter is ready to take its place in the machine as soon as the filled mold has been discharged therefrom, this operation being effected by movement of the arm 14, so as to lift the bearing-rollers 10 and tilt the mold-carrier 15 from the position shown in Fig. 1 to that shown in Fig. 2, thus directing the filled mold onto the delivery-runway 16 and into the mold-receiver 23. As the tilting mold-carrier moves to resume the position shown in Fig. 1 the flap 17 is lowered, so as to permit the empty mold to roll down over the same and into position upon the drums 8, where it is held by the pressure of the rollers 10 and receives a fresh charge of molten metal from the feed-hopper 33.

To retain the mold in position while it is rolling on the tilting mold-carrier 15, I provide the cheek-pieces 7 with projecting aprons 40, as shown in Figs. 1 and 2.

The mold shown in Fig. 5 has but one plug 30^a, this plug having an enlarged head within the mold and the opposite end of the mold being closed by the projecting nozzle 32^a of the feed-hopper.

By the use of end plugs 30 31 of different lengths different lengths of ingot can be produced in the same mold.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. The combination in an ingot-casting machine, of an ingot-mold, drums upon which the same is supported and by which it is rotated, means for pressing the mold into contact with said drums, said means being movable a sufficient extent to permit the mold to be moved laterally onto and from said drums, and provision for supplying molten metal to the mold, substantially as specified.

2. An ingot-casting machine, in which are combined an ingot-mold, drums for supporting and rotating the same, means for moving the mold laterally onto and from said drums, cheek-pieces between which the mold is longitudinally retained, and provision for introducing metal into the mold, substantially as specified.

3. An ingot-casting machine in which are combined drums for supporting and rotating the mold, a tilting mold-carrier for directing the mold to or from said rotating devices, a receiver for the filled mold, and an ingot-ejector working in conjunction with said receiver, substantially as specified.

4. An ingot-casting machine in which are combined drums for supporting and rotating the mold, means for supplying molten metal to said mold, a tilting mold-carrier for directing the mold to or from said rotating devices, a receiver for the filled mold, an elevated feed-platform, a mold-elevator for conveying the mold from the receiver to said platform, and means for governing the passage of the molds from said platform to the tilting mold-carrier, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

NILS HENRY OSSIAN LILIENBERG.

Witnesses:
WILL. A. BARR,
JOS. H. KLEIN.