

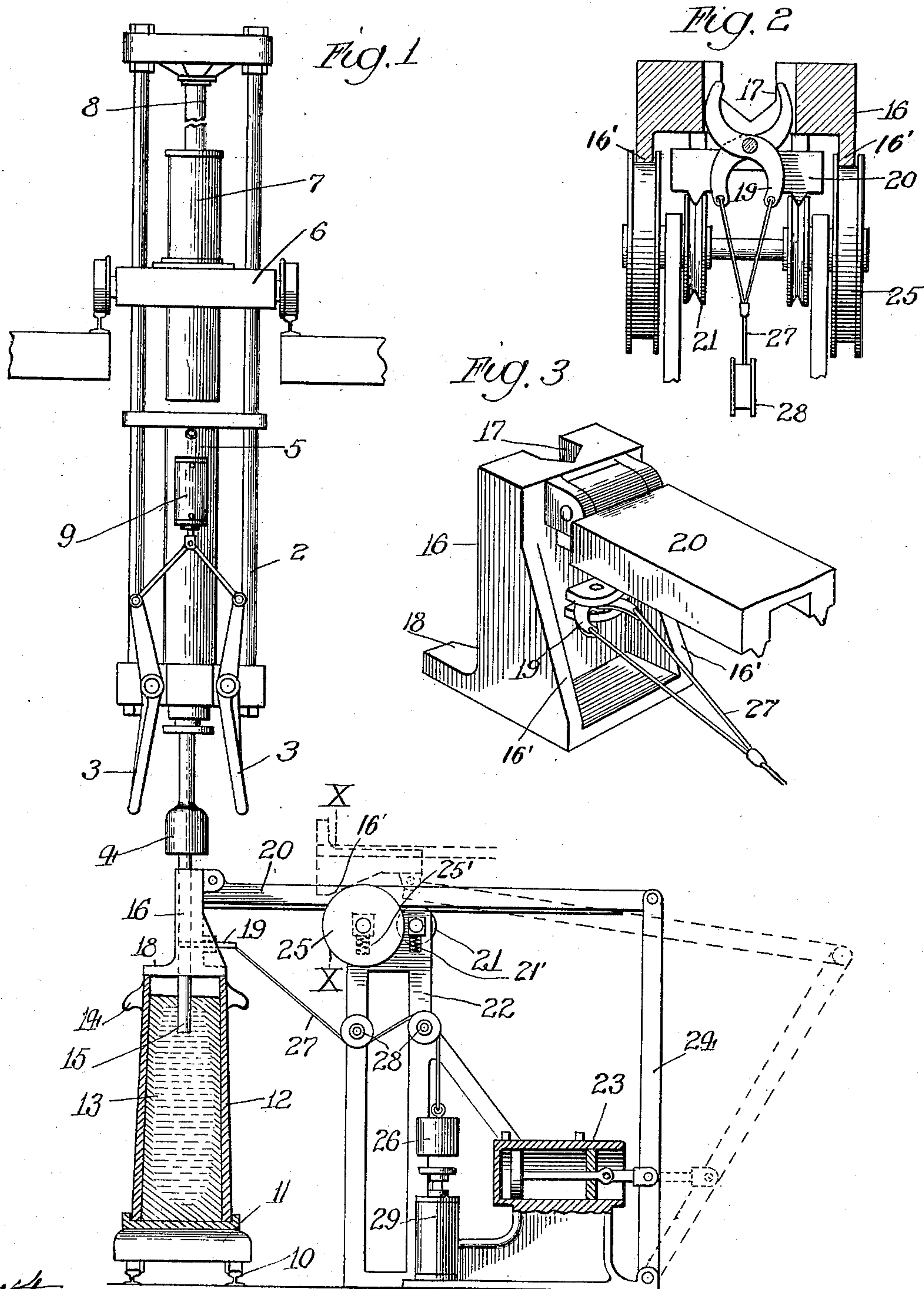
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R. W. HUNT.
APPARATUS FOR PERFECTING INGOTS.

APPLICATION FILED MAY 20, 1903.

NO MODEL.



Witnesses
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UNITED STATES PATENT OFFICE.

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APPARATUS FOR PERFECTING INGOTS.

SPECIFICATION forming part of Letters Patent No. 755,496, dated March 22, 1904.

Application filed May 20, 1903. Serial No. 158,045. (No model.)

To all whom it may concern:

Be it known that I, ROBERT W. HUNT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new, useful, and Improved Apparatus for Perfecting Ingots, of which the following is a specification.

This invention relates to means for perfecting or solidifying steel ingots prior to the removal thereof from their molds.

At the present time steel ingots are cast with great rapidity as compared with their production under the old methods, and so little care is used in the pouring and treatment of the ingots that large quantities of the ingots become piped and are really unfit for use. These conditions are particularly prevalent in rail-mills, and at such plants practically all of the ingots that are made are manufactured into rails, with the result that many imperfect and piped rails are produced. These, if detected, are discarded; but many go into actual service, and railway-records contain many instances of wrecks occasioned by the breakage of such weak piped rails. There are several methods of treating ingots immediately after the same are cast and which, if employed, give fair assurance of freedom from pipes and blow-holes; but these methods have been discarded because of their initial cost and more particularly because the same tend to reduce the output of ingots at the converter-station, thereby causing a large loss in that and the other departments of the mill.

The object of this invention is to provide means whereby an ingot may be perfected—that is, filled and solidified at the same time that the mold is stripped from the ingot and without interrupting the work of the mill or reducing the number of ingots that may be handled in a given time.

The particular object of my invention is to provide a combined ingot perfecting and stripping machine or a mechanism that may be added to and employed with the ordinary stripping-machines.

With these ends in view my invention consists generally in the combination of a stripping-machine for removing the molds from successive ingots with a bar or billet holder

for grasping and holding a perfecting-bar used to fill and finish an ingot and means for actuating said holder in conjunction with said stripping-machine, whereby said bar or billet may be driven into an ingot.

My invention also resides in various constructions and in combinations of parts, all as hereinafter described, and particularly pointed out in the claims.

The invention will be more readily understood by reference to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a vertical elevation of a machine embodying my invention, the ingot and the ingot-mold being shown in section beneath said machine. Fig. 2 is an enlarged sectional view of the block when in the position illustrated by dotted lines in Fig. 1, (see section-line *xx*.) Fig. 3 is a perspective view of the rod or billet holder or block.

In constructing my machine I employ an ordinary stripper (stripping-machine) intact. This may be of any desired form or type, having for its essential features the vertically-movable frame 2, carrying the mold-lifting links or hooks 3 3 and the plunger 4, with its cylinder 5. Said frame 2 is carried by the laterally-movable car 6 and is raised and lowered by means of the hydraulic engine 7, the piston-rod 8 of which is connected with top bar of the frame 2. Suitable fluid-pressure connections are provided for the cylinders 5 and 7 and for the link-actuating cylinder 9, and the movements of the car, the frame, the links, and the plunger are controlled by levers situated in a convenient gallery near the stripping-machine. Beneath the stripping-machine is the track 10 for the mold stools or cars 11, each of which carries a mold or molds containing the ingot 13 and placed beneath the stripping-machine ready to be operated upon.

14 14 are hooks or lugs on the mold for engagement with the stripper hooks or links 3 3.

15 is one of the perfecting bars or billets that I employ in perfecting the ingots. The office of this bar is to enter the ingot through the top crust thereof and displace the molten metal within the ingot to such an extent as to

completely deflate the pipe or cavity which may have formed in the ingot and to expel the impurities that usually collect in the central upper part of the ingot. When once inserted
 5 in the ingot, the billet is left therein and becomes a part thereof. The bar or billet is of considerable weight and, furthermore, is usually hot, so that it cannot be handled conveniently except by a mechanism regularly con-
 10 stituted for the purpose. The bar is first held in place above the ingot and is then driven into the ingot by the stripping-machine, which is allowed to fall thereon. It is only necessary to hold the rod until its lower end has pierced
 15 the crust of the ingot, and I therefore employ a very simple mechanism for steadying and aligning the bar momentarily until thus driven by the fall of the stripper. The holding device is then removed to permit the complete fall of
 20 the stripper to drive the rod wholly into the ingot. The particular mechanism that I prefer to use comprises the block 16, that is provided with a groove 17 to receive said rod or billet
 25 15. Said block is provided with a wide base 18, adapted to rest upon the top of the ingot-mold, and is also provided with a pair of tongs 19 to grasp and hold the rod 15 in the groove 17. The block 16 is pivoted on the end of the
 30 beam 20. This beam rests on the rollers 21, borne by spring-bearings 21' in the frame or standard 22, and may be reciprocated by means of the hydraulic or steam engine 23, the lever 24 of which is pivoted to the rear end of the
 35 block which is provided with the inclined faces or flanges 16' engages with the large rollers 25, borne by spring-bearings 25' on the standard, and is thereby tipped or lifted into the horizontal position, (shown in dotted lines in
 40 Fig. 1,) in which position it is adapted to receive a perfecting or finishing rod 15, as also shown by said dotted lines. The tongs are normally held closed by the weight 26, connected thereto by the cable 27, which passes
 45 through the pulleys 28 on the standard 22. When it is desired to open the tongs, the weight is raised, and for this purpose I may use the vertical fluid cylinder or engine 29,
 50 the piston-rod of which is adapted to move upward and lift the weight 26 to slacken the cable 27. The weight is thus raised when the block is in the horizontal position, and at this time the tongs by reason of the weight of their
 55 upper ends open automatically to receive the perfecting rod or billet. During these operations the stripping-machine is lifted to allow a large space between it and the top of the ingot. The block is then projected over the mold and is accurately placed by means of the
 60 operating-engine 23. At this time the block will stand slightly above the top of the mold, with the rod in proper position beneath the stripping-machine. At the next instant the plunger of the stripper is forcibly projected

and engaging with the rod forces the block 65 down onto the top of the mold and drives the rod against the upper crust of the ingot with such force as to pierce the same. When this has been accomplished, the tongs are released
 70 by means of the device 29, and the block is immediately drawn back out of the way by means of the engine 23. The plunger of the stripper meantime remains in engagement with the upper end of the rod, and as soon as
 75 the block 16 is removed the stripper is allowed to fall—that is, its whole weight is placed upon the rod and drives the rod fully into the ingot. As soon as the rod has been driven home the plunger may be seated upon the top
 80 of the ingot and the links engaged with the lugs 14 of the mold, whereupon the mold may be stripped from the complete or perfected ingot.

The gist of my invention resides in the rod or billet holder or temporary guide employed 85 in conjunction with the stripping-machine, and as it is obvious that numerous modifications of my invention will readily suggest themselves to one skilled in the art I do not
 90 confine the invention to the specific constructions herein shown and described.

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

1. An ingot-perfecting apparatus, comprising a stripping-machine, in combination with 95 a rod or billet holder for operation between the same and the top of the ingot-mold, as and for the purpose specified.

2. An ingot-perfecting apparatus, comprising a stripping-machine for removing the 100 molds from successive ingots, in combination with a holder for grasping and holding a perfecting bar or billet, used to fill and finish an ingot, and means for actuating said holder in
 105 conjunction with said stripping-machine; whereby said bar or billet may be driven into an ingot, substantially as described.

3. An ingot-perfecting apparatus, comprising an ingot-stripping machine provided with a power-actuated plunger and also having suitable 110 mold hooks or links, in combination with a rod or billet holder movable toward and from said stripping-machine, beneath the same, and means for operating said holder, substantially as described. 115

4. An ingot-perfecting apparatus, comprising an ingot-stripping machine provided with a power-actuated plunger and also having suitable 120 mold hooks or links, in combination with a rod or billet holder movable toward and from said stripping-machine, beneath the same, means for operating said holder and the ingot-perfecting bar or billet slidably held in
 125 said holder and adapted to be driven into an ingot by the plunger of said stripping-machine, substantially as described.

5. An ingot-perfecting apparatus, comprising a stripping-machine adapted for vertical

movement above an ingot-mold stand, in combination with a rod or billet holder laterally movable above said mold-stand and comprising a guide-block, having bar-gripping means, 5 and a mechanism for actuating said block, substantially as described.

6. The ingot-perfecting attachment, for stripping-machines, comprising a suitable frame, in combination with a rod or billet 10 holder and means for moving the same upon said frame, to position said holder beneath the stripping-machine or withdraw it therefrom, substantially as described.

7. The ingot-perfecting attachment, for 15 stripping-machines, comprising a suitable frame, in combination with a rod or billet holder movable thereon and adapted to assume two positions, means upon said holder for gripping a rod or billet and a suitable mechanism 20 for closing said gripping means in one position of the holder and opening the same

in the other position of the holder, substantially as described.

8. An ingot-perfecting apparatus, comprising a stripping-machine, in combination with 25 a frame arranged in proximity thereto, a bar or beam movable on said frame, a rod or billet holder carried by said beam and provided with a base adapted to rest upon the top of an ingot-mold arranged beneath the stripping- 30 machine, said holder being adapted for slight vertical movement and being provided with rod-gripping means, substantially as described.

In testimony whereof I have hereunto set 35 my hand, this 11th day of May, 1903, at Chicago, Illinois, in the presence of two witnesses.

ROBERT W. HUNT.

Witnesses:

C. G. HAWLEY,
JOHN H. GARNSEY.