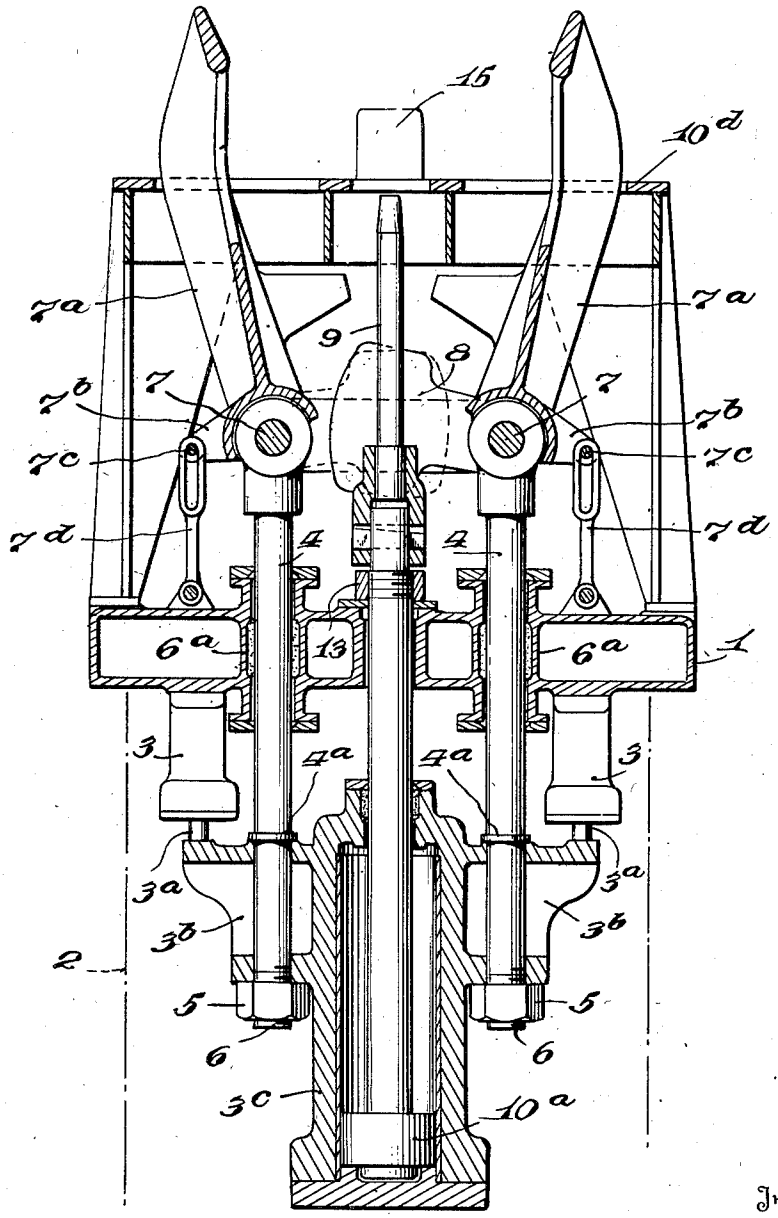
Nov. 14, 1944. O. HIVELY 2,362,696

INGOT STRIPPER

Filed March 13, 1944 4 Sheets-Sheet 1

Fig. 1



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INGOT STRIPPER

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Fig. 2

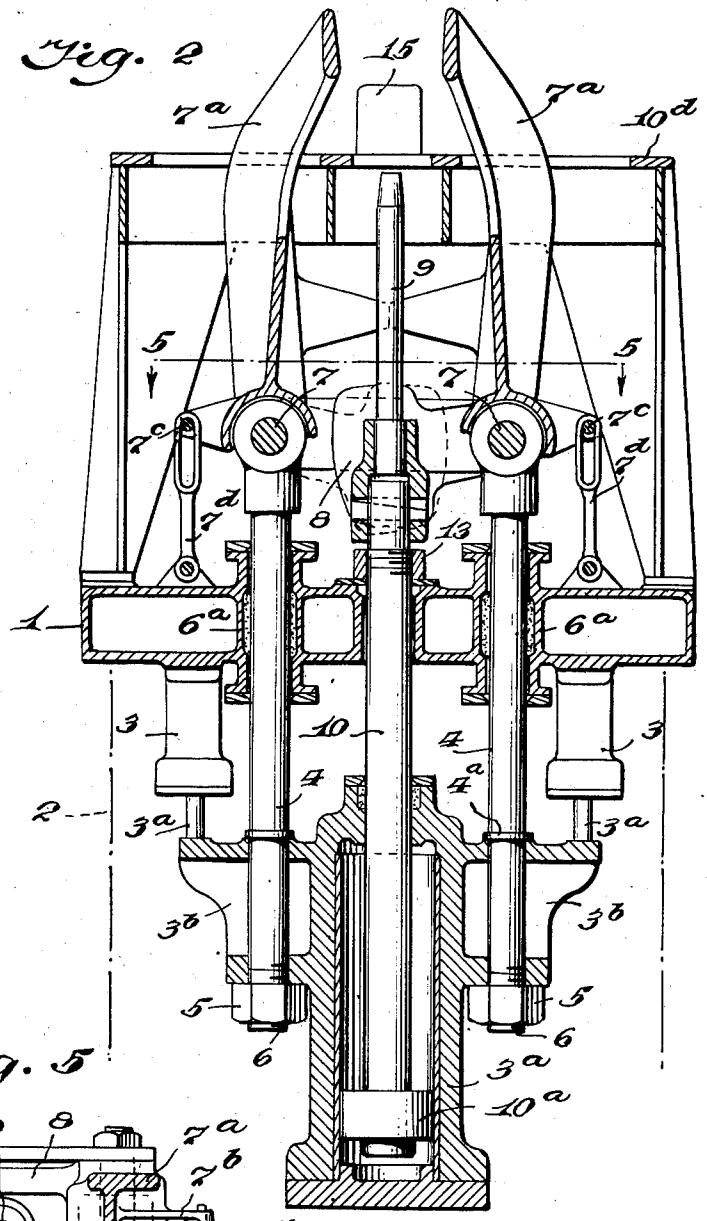
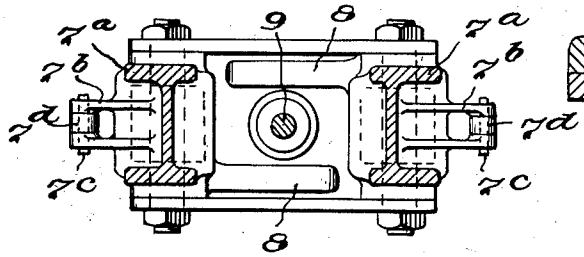


Fig. 5



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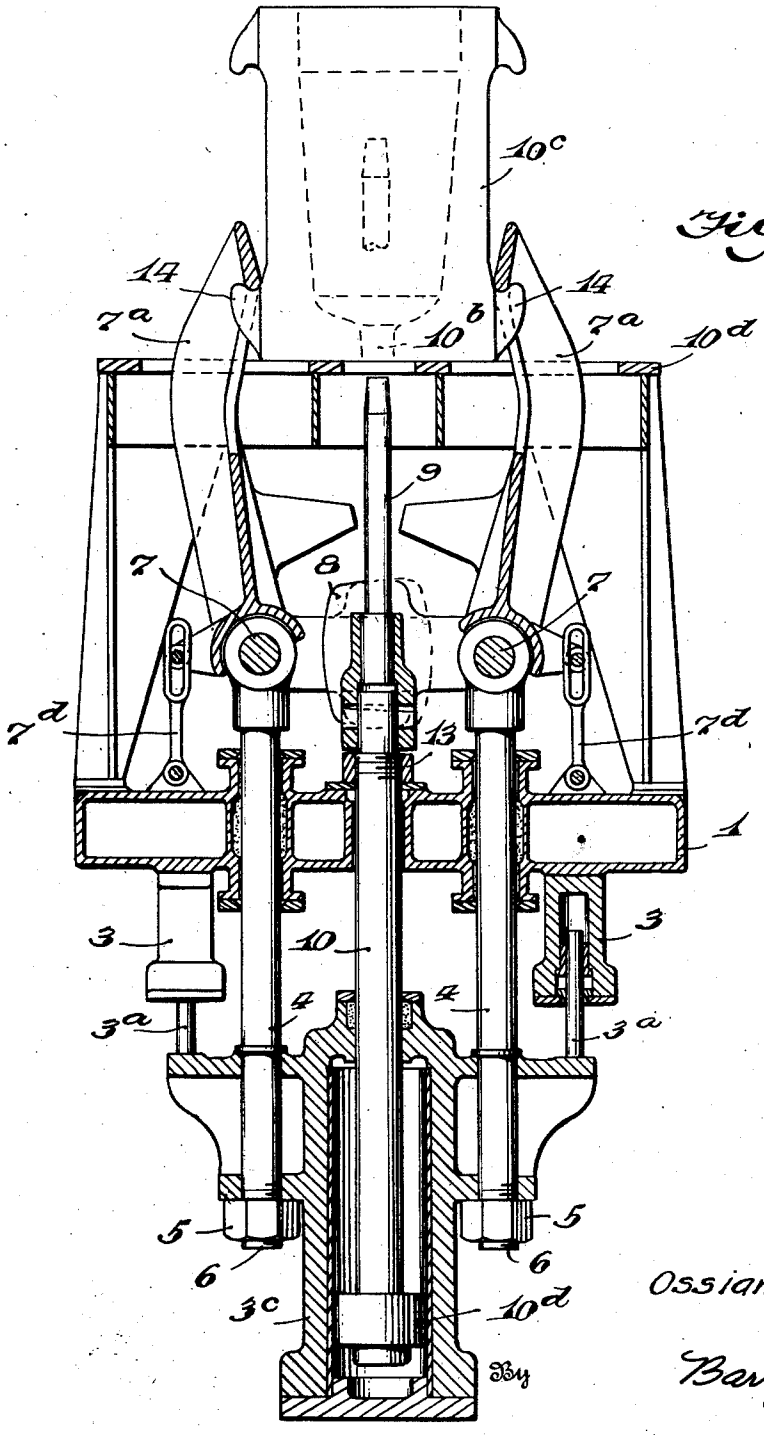
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INGOT STRIPPER

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Fig. 3



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INGOT STRIPPER

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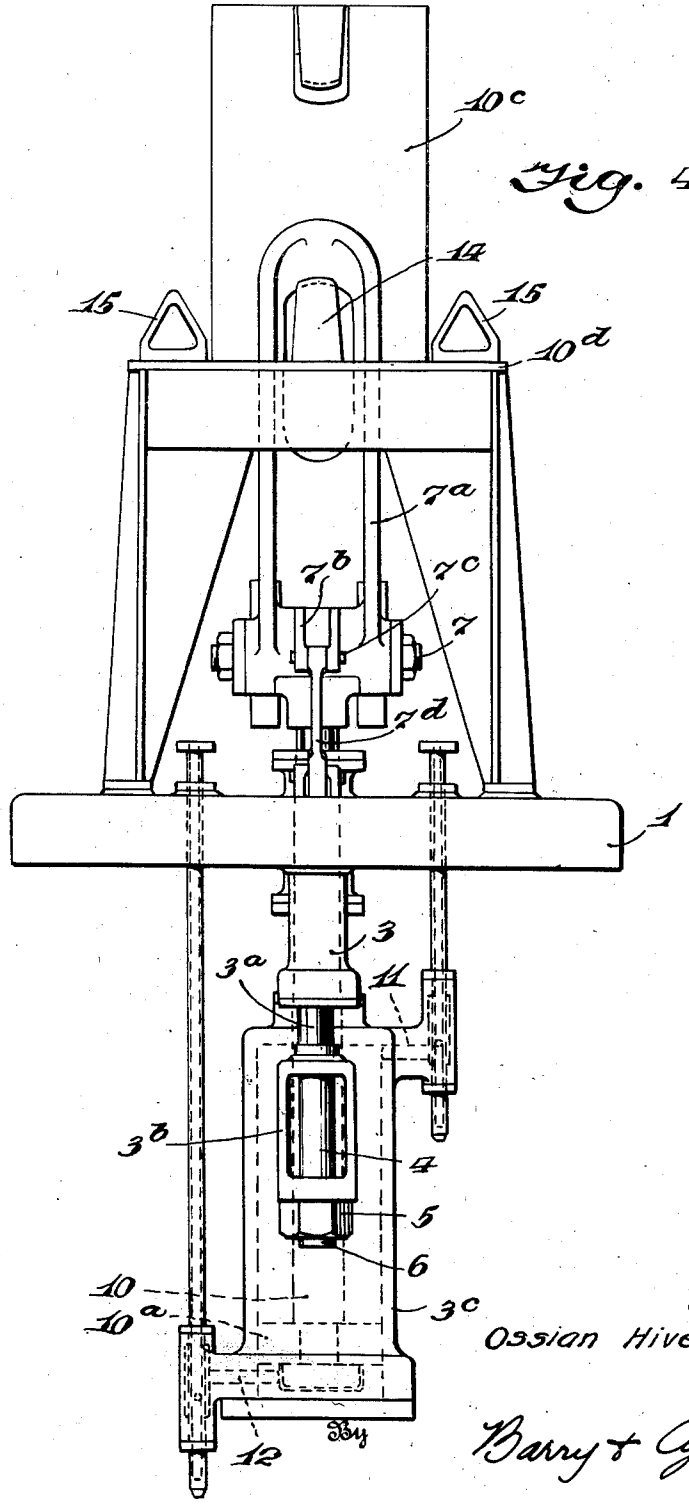


Fig. 4

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UNITED STATES PATENT OFFICE

2,362,696

INGOT STRIPPER

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Application March 13, 1944, Serial No. 526,238

13 Claims. (Cl. 22—95)

This invention relates to improvements in ingot strippers and more particularly to a novel stripper of the inverted type.

My improved stripper is adapted for use with either hot top or flush top ingots, or any other type of ingots cast in what are known as "big end up" type molds, and which are stripped by means of a plunger being forced upward through an aperture in the bottom of the mold. For sinkhead ingots or partially filled molds, a stripper of this type is about the only practical one.

A number of patents disclosing inverted strippers for the above-mentioned type of molds and ingots have been issued. In some of them the stripper was installed beneath the ingot car tracks, and as the cars carrying the ingot molds passed over the stripper, the ejecting plunger entered the aperture in the bottom of the mold through an opening in the car floor. To my knowledge, no one has ever built a stripper as described in such patents, probably because it would require special ingot mold cars, which would not be justified, considering the relatively small percentage of steel poured in this type of mold, up to this present time. While considerable steel is poured in "big end up" molds, it is poured with the upwardly projecting hot top, which permits stripping with overhead strippers.

While others have also proposed to strip from the bottom of the mold by means not requiring cars with apertured floors, such strippers are relatively complicated, and it is one of the objects of my invention to simplify the construction and render the same easier to operate or control.

Another object of the invention is to provide stripping mechanism employing a fewer number of parts than heretofore proposed.

Other objects and advantages will be apparent from the following description, the accompanying drawings, and the appended claims.

In the drawings, in which a preferred embodiment of the invention is shown for purposes of illustration—

Fig. 1 is a vertical sectional view of my improved stripper with the links or tongs in fully open position.

Fig. 2 is a similar view with the links in extreme closed position.

Fig. 3 is another vertical sectional view with the links engaged with a mold and with the ram or plunger ready to strip the ingot.

Fig. 4 is a side elevation of the stripper.

Fig. 5 is a horizontal sectional view taken on the line 5—5 of Fig. 2.

Referring to the drawings, 1 designates a frame adapted to rest on a surface at the top of a pit 2. Depending from the frame is a pair of cylinders 3 adapted to be constantly supplied with a pressure medium under a constant pressure, preferably from a plant accumulator (not shown). Pistons 3a extend into the cylinders and have their lower ends in contact with ears 3b at opposite sides of a vertically movable cylinder 3c. Posts 4 are provided with flanges 4a resting on top of the ears and the posts are rigidly secured in place by nuts 5 engaging the threaded lower ends 6 of the posts. These posts are guided by bearing sleeves 6a in the frame and are pivotally connected at 7 to tongs 7a for movement about horizontal axes. Each tong is provided with a weighted arm 8 (Fig. 5) tending to move the upper ends of the tongs toward one another. Each tong is also provided with an arm 7b having a pin 7c travelling in the slot of a link 7d, pivotally connected to the top of the frame.

The links cooperate with a ram or ejector plunger 9 that is connected to a piston rod 10 having a piston 10a operating in the cylinder 3c. When the piston is elevated, the ram will pass through an aperture 10b in the bottom of a mold 10c supported on a platform 10d mounted on the frame 1.

The cylinder 3c has an upper passageway 11 and a lower passageway 12 for the introduction of a pressure medium into or the discharge of said medium from the top and bottom of the cylinder. At this point it will be noted that the piston rod 10 is provided with a nut 13 normally resting on the frame 1.

Operation

To open the tongs so that an ingot mold can be placed in position for stripping, the pressure medium is introduced into the top of the cylinder 3c above the piston, and as nut 13 prevents the rod from lowering, the pressure in the upper part of the cylinder will build up and cause the cylinder, posts 4 and tongs 7a to rise until the pins 7c reach the top of the slots in the links 7d. At this position, the links 7d are sufficiently high to pass over lugs 14 at the bottom of the mold, and a further continued upward movement of the cylinder results in an opening of the links as they turn about their fulcrums 7 when the pins 7c are prevented from rising further by the upper ends of the links 7d. A mold with an ingot therein is then carried to and placed on the platform 10d being positioned by guide blocks 15. The next step is to engage the tongs 7a to the lugs on the mold and this is accomplished as follows: Pres-

sure medium is exhausted from the upper part of the cylinder 3c which allows the pressure medium in the cylinders 3, plus gravity, to lower the cylinder 3c. As soon as this beings, the counterweights 8 begin to close the tongs, and they move in a closing direction until they come in contact with the mold. Their closing movement being arrested, the further downward movement of cylinders 3c pulls the links down and leaves them hooked onto the lugs of the mold which places everything in position for the ejecting action.

It is to be noted that now the cylinder 3c, posts 4, fulcrums 7, tongs 7a and their subsidiary attachments are all hanging on the lugs of the mold. Pressure medium is now introduced into the cylinder 3c below the piston and as the cylinder is held from going any lower, the piston 10a must raise and force the ram upward through the aperture in the bottom of the mold and strip the ingot from the mold.

After this is accomplished, pressure is relieved from the bottom of the piston and the pressure medium is again introduced above the piston to withdraw the plunger to initial position and to raise the tongs until the pins 7c engage the upper ends of the slots of the links 7d and open the tongs so that the mold with the loosened ingot may be removed from the platform.

As a four-way manually operated valve may be employed to control the entry and discharge of the pressure medium into and from the ends of the main cylinder, it will be appreciated that only three hand movements of the four-way valve lever to complete a full cycle of stripping is required with my improved mechanism.

Starting with the lever at neutral, its first movement introduces pressure medium above the piston 10a and at the same time allows exhaust from below the piston. Its second movement is to introduce pressure below the piston and allow exhaust from above the same. Its third is the same as the first movement.

From the foregoing, it is believed that the construction, operation, and advantages of my improved stripping may be readily understood by those skilled in the art, and I am aware that changes may be made in the details disclosed without departing from the spirit of the invention as expressed in the claims.

What I claim and desire to secure by Letters Patent is:

1. A stripper of the character described, comprising a frame, means above the frame adapted to support a mold having external lugs and an opening in its bottom, upwardly and downwardly movable supporting means guided by the frame, means for limiting downward movement of the supporting means relatively to the frame, tongs movably connected to the upper portion of the supporting means and having upper ends movable toward and away from one another for engaging and disengaging the lugs of the mold, a cylinder carried by the supporting means and arranged below the frame, a piston in the cylinder, means for introducing a pressure medium into the cylinder above and below the piston and for discharging the pressure medium from the cylinder, a piston rod connected to the piston and extending upwardly therefrom, a ram carried by the piston rod and adapted to pass through the opening in the bottom of the mold, means for limiting downward movement of the piston rod relatively to the frame, and means for causing said tongs to open and close due to movement of the supporting means.

2. A stripper of the character described, comprising a frame, means above the frame adapted to support a mold having external lugs and an opening in its bottom, upwardly and downwardly movable supporting posts guided by the frame, means for limiting downward movement of the supporting posts relatively to the frame, tongs movably connected to the upper portion of the supporting posts and having upper ends movable toward and away from one another for engaging and disengaging the lugs of the mold, a cylinder carried by the supporting posts and arranged below the frame, a piston in the cylinder, means for introducing a pressure medium into the cylinder above and below the piston and for discharging the pressure medium from the cylinder, a piston rod connected to the piston and extending upwardly therefrom, a ram carried by the piston rod and adapted to pass through the opening in the bottom of the mold, means for limiting downward movement of the piston rod relatively to the frame, and means for causing said tongs to open and close due to movement of the supporting means.

3. A stripper of the character described, comprising a frame, means above the frame adapted to support a mold having external lugs and an opening in its bottom, upwardly and downwardly movable supporting means guided by the frame, means for limiting downward movement of the supporting means relatively to the frame, tongs pivotally connected to the upper portion of the supporting means and having upper ends movable toward and away from one another for engaging and disengaging the lugs of the mold, a cylinder carried by the supporting means and arranged below the frame, a piston in the cylinder, means for introducing a pressure medium into the cylinder above and below the piston and for discharging the pressure medium from the cylinder, a piston rod connected to the piston and extending upwardly therefrom, a ram carried by the piston rod and adapted to pass through the opening in the bottom of the mold, means for limiting downward movement of the piston rod relatively to the frame, and means for causing said tongs to open and close due to movement of the supporting means.

4. A stripper of the character described, comprising a frame, means above the frame adapted to support a mold having external lugs and an opening in its bottom, upwardly and downwardly movable supporting posts guided by the frame, means for limiting downward movement of the supporting posts relatively to the frame, tongs pivotally connected to the upper portion of the supporting posts and having upper ends movable toward and away from one another for engaging and disengaging the lugs of the mold, a cylinder carried by the supporting posts and arranged below the frame, a piston in the cylinder, means for introducing a pressure medium into the cylinder above and below the piston and for discharging the pressure medium from the cylinder, a piston rod connected to the piston and extending upwardly therefrom, a ram carried by the piston rod and adapted to pass through the opening in the bottom of the mold, means for limiting downward movement of the piston rod relatively to the frame, and means for causing said tongs to open and close due to movement of the supporting means.

5. A stripper of the character described, comprising a frame, means above the frame adapted to support a mold having external lugs and an

opening in its bottom, upwardly and downwardly movable supporting means guided by the frame, means for limiting downward movement of the supporting means relatively to the frame, tongs movably connected to the upper portion of the supporting means and having upper ends movable toward and away from one another for engaging and disengaging the lugs of the mold, a cylinder carried by the supporting means and arranged below the frame, a piston in the cylinder, means for introducing a pressure medium into the cylinder above and below the piston and for discharging the pressure medium from the cylinder, a piston rod connected to the piston and extending upwardly therefrom, a ram carried by the piston rod and adapted to pass through the opening in the bottom of the mold, means for limiting downward movement of the piston rod relatively to the frame, means for constantly urging the tongs into closed position, and means for causing said tongs to open due to movement of the supporting means.

6. A stripper of the character described, comprising a frame, means above the frame adapted to support a mold having external lugs and an opening in its bottom, upwardly and downwardly movable supporting means guided by the frame, means for limiting downward movement of the supporting means relatively to the frame, tongs movably connected to the upper portion of the supporting means and having upper ends movable toward and away from one another for engaging and disengaging the lugs of the mold, a cylinder carried by the supporting means and arranged below the frame, a piston in the cylinder, means for introducing a pressure medium into the cylinder above and below the piston and for discharging the pressure medium from the cylinder, a piston rod connected to the piston and extending upwardly therefrom, a ram carried by the piston rod and adapted to pass through the opening in the bottom of the mold, means for limiting downward movement of the piston rod relatively to the frame, means for constantly urging the tongs into closed position, and means operatively connecting the tongs to the frame whereby upward movement of the supporting means will cause tongs to open.

7. A stripper of the character described, comprising a frame, means above the frame adapted to support a mold having external lugs and an opening in its bottom, upwardly and downwardly movable supporting means guided by the frame, means for limiting downward movement of the supporting means relatively to the frame, tongs movably connected to the upper portion of the supporting means and having upper ends movable toward and away from one another for engaging and disengaging the lugs of the mold, a cylinder carried by the supporting means and arranged below the frame, a piston in the cylinder, means for introducing a pressure medium into the cylinder above and below the piston and for discharging the pressure medium from the cylinder, yielding means for constantly urging the cylinder downwardly, a piston rod connected to the piston and extending upwardly therefrom, a ram carried by the piston rod and adapted to pass through the opening in the bottom of the mold, means for limiting downward movement of the piston rod relatively to the frame, and means for causing said tongs to open and close due to movement of the supporting means.

8. A stripper of the character described, comprising a frame, means above the frame adapted to support a mold having external lugs and an opening in its bottom, upwardly and downwardly movable supporting means guided by the frame, means for limiting downward movement of the supporting means relatively to the frame, tongs movably connected to the upper portion of the supporting means and having upper ends movable toward and away from one another for engaging and disengaging the lugs of the mold, a cylinder carried by the supporting means and arranged below the frame, a piston in the cylinder, means for introducing a pressure medium into the cylinder above and below the piston and for discharging the pressure medium from the cylinder, auxiliary cylinders connected to the frame, plungers secured to the first mentioned cylinder and extending into the auxiliary cylinders, a piston rod connected to the piston and extending upwardly therefrom, a ram carried by the piston rod and adapted to pass through the opening in the bottom of the mold, means for limiting downward movement of the piston rod relatively to the frame, and means for causing said tongs to open and close due to movement of the supporting means.

9. A stripper of the character described, comprising a frame, means above the frame adapted to support a mold having external lugs and an opening in its bottom, upwardly and downwardly movable supporting means guided by the frame, tongs having lower portions pivotally connected to the upper portion of the supporting means, and having upper ends movable toward and away from one another for engaging and disengaging the lugs of the mold, a cylinder carried by the supporting means and arranged below the frame, a piston in the cylinder, means for introducing a pressure medium into the cylinder above and below the piston and for discharging the pressure medium from the cylinder, a piston rod connected to the piston and extending upwardly therefrom, a ram carried by the piston rod and adapted to pass through the opening in the bottom of the mold, means for limiting downward movement of the piston rod relatively to the frame, and means for causing said tongs to open and close due to movement of the supporting means.

10. A stripper of the character described, comprising a frame, means above the frame adapted to support a mold having external lugs and an opening in its bottom, upwardly and downwardly movable supporting means guided by the frame, means for limiting downward movement of the supporting means relatively to the frame, tongs movably connected to the upper portion of the supporting means and having upper ends movable toward and away from one another for engaging and disengaging the lugs of the mold, a cylinder carried by the supporting means and arranged below the frame, a piston in the cylinder, means for introducing a pressure medium into the cylinder above and below the piston and for discharging the pressure medium from the cylinder, a piston rod connected to the piston and extending upwardly therefrom, a ram carried by the piston rod, arranged between the tongs and adapted to enter the opening in the bottom of the mold, means for limiting downward movement of the piston rod relatively to the frame, and means for causing said tongs to open and close due to movement of the supporting means.

11. A stripper of the character described, comprising a frame, means above the frame adapted

to support a mold having external lugs and an opening in its bottom, upwardly and downwardly movable parallel posts guided by the frame, tongs having lower ends pivotally connected to the upper end portions of the posts and having upper ends movable toward and away from one another for engaging and disengaging the lugs of the mold, a cylinder positioned between the posts and having oppositely disposed ears rigidly secured to the lower end portions of the posts, means for limiting downward movement of the posts relatively to the frame, a piston in the cylinder, means for introducing a pressure medium into the cylinder above and below the piston and for discharging the pressure medium from the cylinder, a piston rod connected to the piston and extending upwardly therefrom, a ram carried by the piston rod and extending upwardly between the tongs for entry through the opening in the bottom of the mold, means for limiting downward movement of the piston rod relatively to the frame, and means for causing said tongs to open and close due to movement of the posts.

12. A stripper of the character described, comprising a frame, upwardly and downwardly movable supporting means guided by the frame, tongs connected to the supporting means and arranged at one side of the frame, said tongs having ends movable toward and away from one another for engaging and disengaging the lugs of an ingot mold, a cylinder secured by the supporting means and arranged at the opposite side of the frame, means for limiting movement of the supporting means away from the frame, a piston in the cylinder, means for introducing a pressure medium into the cylinder above and below the piston and for discharging the pressure medium from the cylinder, a piston rod connected to the piston and extending toward the tongs, a ram carried by the piston rod, extending between the tongs and adapted to enter a mold gripped by the tongs, means for limiting movement of the piston rod in one direction relatively to the frame, and means for causing said tongs to open and close due to the movement of supporting means.

13. A stripper of the character described, comprising a frame, upwardly and downwardly movable supporting means guided by the frame, tongs movably connected to the upper portion of the supporting means, and having upper ends movable toward and away from one another, a cylinder carried by the supporting means and arranged below the frame, a piston in the cylinder, means for introducing a pressure medium into the cylinder above and below the piston and for discharging the pressure medium from the cylinder, a piston rod connected to the piston and extending upwardly therefrom, means for limiting downward movement of the piston rod relatively to the frame, and means for causing said tongs to open and close due to movement of the supporting means.

OSSIAN HIVELY.