

Jan. 19, 1926.

1,570,474

H. R. GEER
INGOT STRIPPING

Filed April 24, 1922

2 Sheets-Sheet 1

Fig. 1.

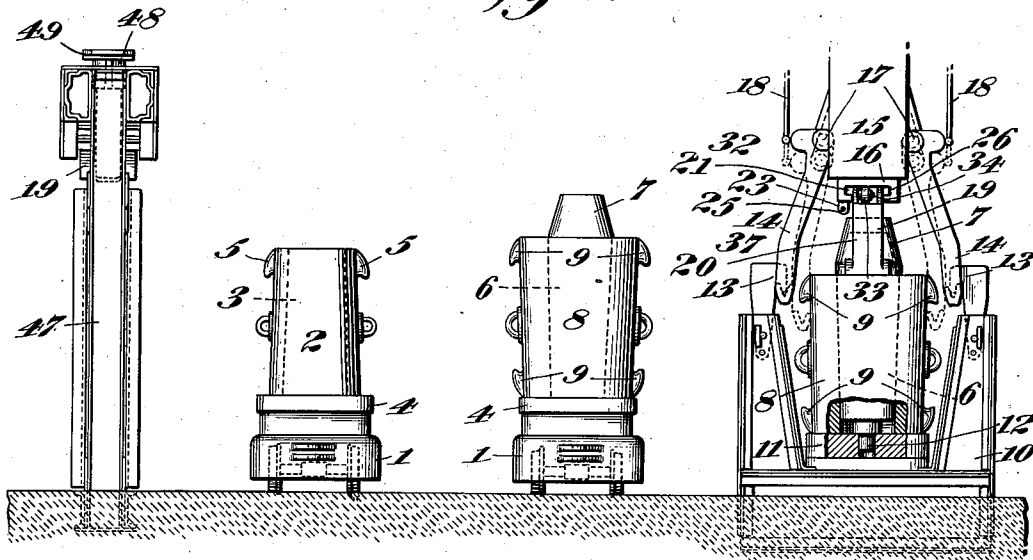


Fig. 2.

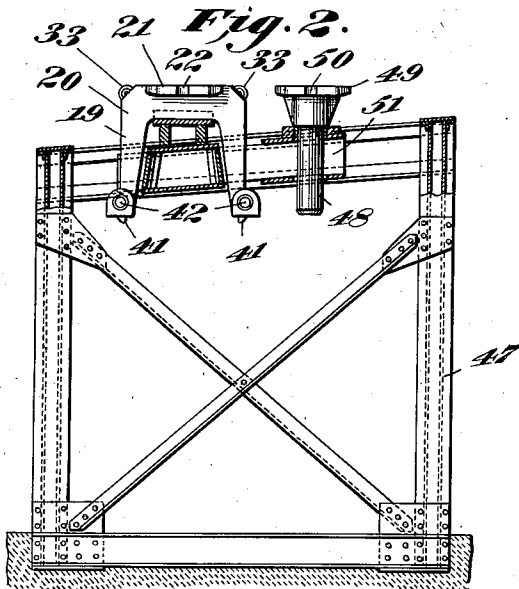
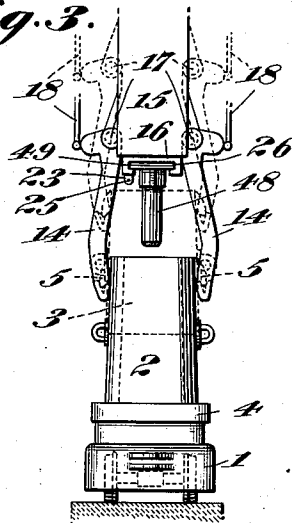


Fig. 3.



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2 Sheets-Sheet 2

Fig. 4.

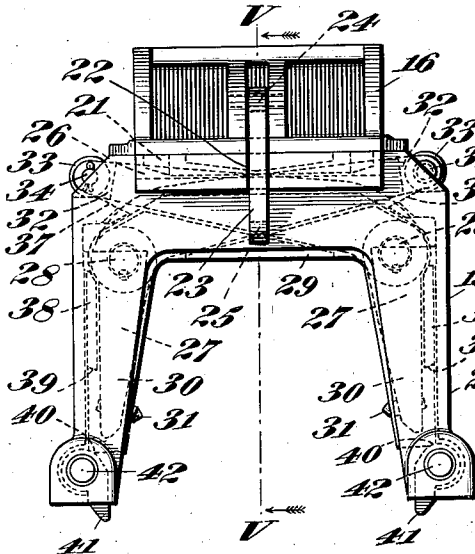


Fig. 5.

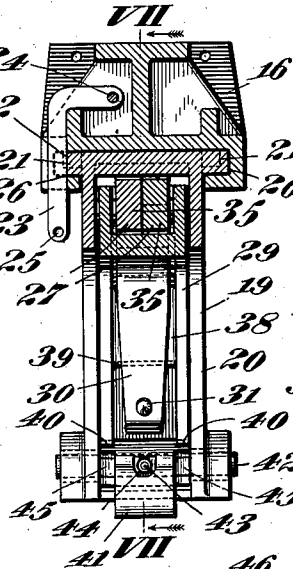


Fig. 6.

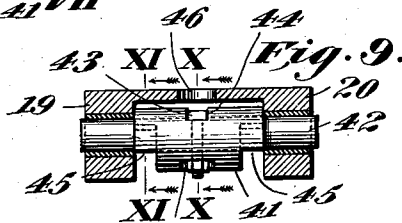
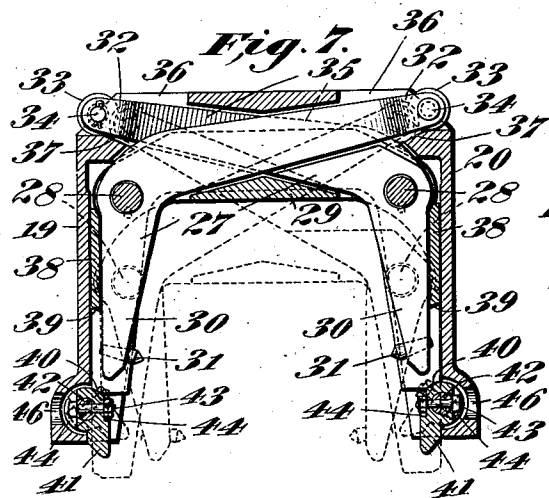
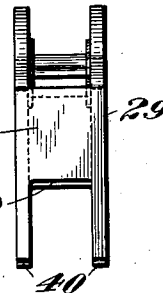


Fig. 10.

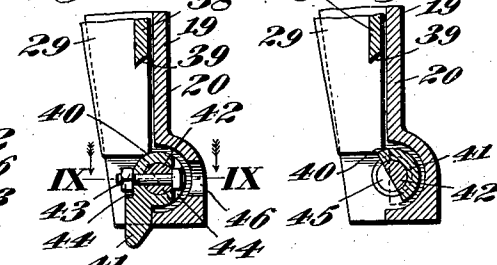


Fig. 11.

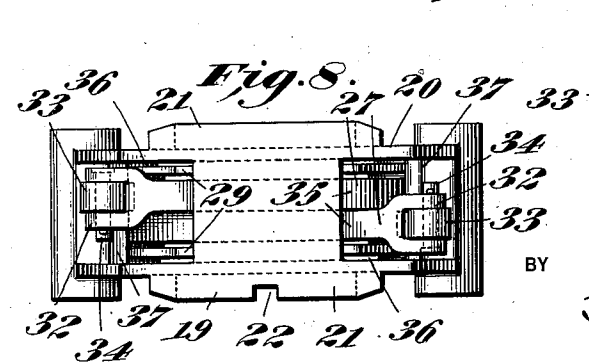
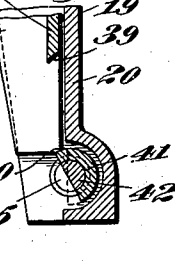
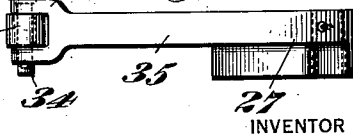


Fig. 12.



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UNITED STATES PATENT OFFICE.

HARRY R. GEER, OF JOHNSTOWN, PENNSYLVANIA.

INGOT STRIPPING.

Application filed April 24, 1922. Serial No. 556,229.

To all whom it may concern:

Be it known that I, HARRY R. GEER, a citizen of the United States, and a resident of the city of Johnstown, county of Cambria, and State of Pennsylvania, have invented certain new and useful Improvements in Ingot Stripping; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to separating ingots from molds, and I provide a method and apparatus of universal application which will handle both types of ingots, namely, those having smaller tops and larger bottoms and those which have larger tops and smaller bottoms, and either of these types may have a sink head top portion which is ordinarily formed in a separate refractory non-conducting casing mounted on the mold.

My apparatus is so designed as to utilize the present and prior types of stripping machines which have hitherto been only adapted for use in removing molds from the prior customary types of ingots, namely, those with smaller tops and larger bottoms, and in doing this in the previously customary way it was or is only necessary to lift the mold from the ingot and then grasp the ingot by suitable tongs and place it where desired. These prior machines were also each provided with a pusher to facilitate the extraction of stickers, which pusher was generally formed integral with the ram or firmly secured thereto, so that it was not removably mounted nor interchangeable with the other apparatus, as in my case.

In order to make my universal apparatus I utilize a stripping machine having a ram movable up or down, or laterally and also longitudinally if desired, mounted on a crane, and I provide on the lower portion of the ram an attachment comprising a casing with a preferably T-shaped groove therein adapted to receive the head or upper flanged portion of a specially formed and preferably automatic tongs adapted to grasp an ingot or to push a mold by contact with its end and the groove of the casing is also adapted to receive a similarly flanged head portion of a pusher bar which is interchangeable with the tongs, and in order to facilitate the change I provide a special stand to receive the tongs or pusher, which

stand may be at a convenient height such that the ram of the stripping machine can reach it within the limits of its travel, as such rams ordinarily operate at a height above the ground floor level, as the ingots are tall and sit on cars. This stand is provided with a sliding portion on which the tongs or pusher are temporarily mounted, so that when the ram is lowered to release the tongs or the pusher, either may be seated upon its proper stand or support and the ram then traversed by the usual method, so that the slot in the ram casing will engage the flange of the tongs or pusher and it may be seated properly in the ram casing. As the clearance between the flanges and the retaining head is necessarily slight to make a close fit, the supports which temporarily receive the tongs or pusher bar are mounted on an inclined slide on the stand, so that their movement longitudinally with this inclined support will raise or lower the tongs or pusher so that the flange of either will enter the slot in the ram casing.

The tongs which I use are a special form of bell-crank tongs mounted in a casing provided with the usual points or gripping dogs at their lower ends, and the tongs are adapted to be closed upon an ingot by their own weight, and the upper bell-crank portions, which are preferably provided with rollers at each end, are adapted to slide on suitable ways of the tong casing, so that the weight of the ingot grasped will serve to close the tongs more tightly. The tongs are also of special construction in that two triggers are provided to hold the tongs open and in an upward position until they are lowered, when the triggers strike the upper surfaces or ends of the mold, whereupon the triggers release the yoke which carries the tongs and they drop downwardly in position to grasp an ingot, and the upward movement of the tongs by the machine will lift the ingot and it may then be transported where desired. The tong casing also acts as a mold pusher, as it has two arms which straddle an ingot top while their lower ends rest on the mold end, and the downward movement of the ram will push or hold the mold as desired.

Practice has shown that about sixty per cent of the ingots with larger tops can be removed or stripped easily from their molds, in which case, after the sinkhead casings are lifted therefrom, preferably at the steel

plant, my tong mechanism is required only to lift these ingots from the molds, preferably by their upwardly projecting sinkhead portions, and convey them to cars for delivery to the mill heating furnaces, or otherwise or elsewhere. My tongs may also be made or so proportioned as to lift an ingot by grasping the upper ends of the body portion just below the sinkhead top portion.

10 In some cases large top ingots are not readily removed from their molds, as they adhere thereto from various causes, and in some cases about forty per cent so adhere, and these are known as stickers, which require considerable force to separate them from the molds and stools. In order to accomplish this I provide a special stand provided with standards having a pair of hooks arranged at about the height of the upper mold lugs, spaced apart, projecting inwardly, and adapted to engage with the links of the stripper to hold the rest of the apparatus, including the stripper crane, its trolley and attachments firmly while the ram moves down, and between these standards I provide a stool having an upwardly projecting portion or ejector adapted to contact with the bottom of the ingot. A mold with the contained sticker ingot is lifted by the links of the stripper, set in position with the projecting plug or ejector against the ingot bottom. The links of the stripper are then engaged with the hooks of the stand, and the casing of the ingot tongs, which is bifurcated or of inverted U-shape and thus adapted to straddle the ingot top, is then pushed downwardly by the ram with the lower ends of its projections or bifurcations contacting with the upper end of the mold and the mold is pushed downwardly thereby from the ingot, after which the links are released from the hooks and the tongs grasp the ingot, preferably by its sinkhead top, and place it where desired.

43 By means of my apparatus ingots of both types may be separated from their molds, and my apparatus will also strip stickers as well as those ingots which do not stick in their molds.

50 The necessary motions of my apparatus may be accomplished by the crane operator with the possible exception of operating the lock which quickly secures the pusher head or tongs to the ram of the stripper machine, although he may also operate the cable or handle which does this if so desired.

60 Having thus given a general description of my invention, I will now, in order to make the matter more clear, refer to the two annexed sheets of drawings, which form part of this specification and in which like characters refer to like parts:

65 Figure 1 is a side elevation of a portion of an ingot stripping plant illustrating the application of my invention; Figure 2 is a

side elevation of the supporting stand for holding the stripper tongs and pusher head with parts of the frame broken away to more clearly show the construction of these portions; Figure 3 is a side elevation of my improved stripper arranged for stripping ingots of the ordinary type, which are smaller at the top than at the bottom; Figure 4 is a side elevation of the stripper tongs mounted in the ram casing of the stripper machine; Figure 5 is a vertical transverse sectional elevation of the stripper tongs taken on the line V—V of Figure 4; Figure 6 is an end elevation of the yoke casting of the stripper tongs; Figure 7 is a vertical longitudinal sectional elevation through the stripper tongs taken on the line VII—VII of Figure 5; Figure 8 is a top plan view of the stripper tongs; Figure 9 is a sectional elevation through the lower portion of one end of the stripper tongs on the line of the trigger, the section being taken on the line IX—IX of Figure 10; Figure 10 is a detail sectional elevation through the lower end of one of the sides of the stripper tongs on the line X—X of Figure 9; Figure 11 is a detail sectional elevation through the lower end of one of the sides of the stripper tongs taken on the line XI—XI of Figure 9, and Figure 12 is a top plan view of one of the tong bell-crank levers.

Referring now to the characters of reference on the drawings:—1 represents the ingot cars provided with molds in which the ingots are cast, 2 is an ingot mold, the top of which is smaller than the bottom and which mold therefor may be stripped from the ingot 3 by lifting it upwardly from the stool 4 by means of its lugs 5. 6 is an ingot, the top of the body of which is larger than the bottom and has an upper sinkhead portion 7, which is formed in a sinkhead casing in any usual manner. The mold in which this ingot is formed is 8, provided with top and bottom lugs 9 and is mounted on the stool 4 carried by the ingot car 1. My stripper stand in general is 10, provided with a stool 11 mounted therein, the stool having a central perforation in which is mounted the lower end of the plug or ejector 12, the upper portion of which projects above the same as illustrated. 13 are the inwardly extending hooks mounted on the upper ends of the standards of the stripping stand provided with lug portions of conformation similar to those of the lugs of the molds and adapted to be engaged by the usual links or grips 14 of the ingot stripper, which links or grips are adapted to be moved up and down with relation to the ingot stripper ram 15 and opened or closed, and in this case the ram 15 is provided with a casing 16 having a T-shaped slot 26 therein, which is adapted to receive either the flange 21 of the outer casing 20 of the

tongs 19 or the flanged head 49 of the pusher 48.

The links 14 are pivoted at 17 and are provided with rods or cables 18 whereby they are opened or closed as indicated by full and dotted lines in Figure 1, or they may be raised or lowered as indicated by full and dotted lines in Figure 3, the mechanism for this forming part of the usual stripping crane (not shown). 19 are the ingot tongs in general, which are provided with an outer casing or guide 20 heretofore referred to, which casing is provided with an upper flange 21 adapted to be inserted in the slot 26 of the ram casing 16. A notch 22 is provided in one side of the flanged edge 21 and an L-shaped latch 23 is pivotally mounted at 24 and provided with an eye 25 in its lower end adapted to receive the cable or handle for operating the latch to lock the flange 22 in position in the slot 26 of the ram casing 16, or this latch may also similarly lock the pusher 48 by means of its similar notch 50 in its flange 49. My ingot tongs are provided with bell-crank levers 27 which are mounted to be slightly rotated upon the pivot shafts 28, and I provide a special yoke 29 in which the pivot shafts 28 are journaled as shown. The bell-crank tongs have lower gripping ends 30, which are provided with removable teeth or dogs 31 adapted to grasp the hot ingot in the usual manner. The upper arms 35 of the tong levers 27 are provided with bifurcations 32 at their ends, in which rollers 33 are rotatably mounted on the pins 34. The upper intermediate portions of the bell-cranks of the tong levers 27 are 35, and their outer ends project through the openings 36 in the upper portions of the tong casing 20. The rollers 33 are adapted to roll on the inclined guides or ways 37 in such a way that when the tongs are lowered with respect to the casing 20 their teeth or dogs 31 will approach each other and forcibly grasp the ingot, and as the weight is carried by the ends of the tongs provided with rollers 33, the weight itself will cause the tongs to close and grasp the ingot very firmly. The yoke 29 is provided with integral side portions 38 mounted within and adjacent the side portion of the tong casing 20 and has lower contacting edges 39 which are adapted to rest on the triggers 41 when the movable portions of the tongs are in their extreme lower position. The lower ends 40 of the sides of the yoke 29, when the tongs are open, are adapted to rest upon the triggers 41, which are rotatably mounted in the lower ends of the tong casing 20, as illustrated, these triggers being mounted upon shafts 42 and secured thereon by means of the bolts 43, the heads of which are seated within the notches 44, and these triggers are provided with inner notches

or cut-away portions 45, and when the triggers are in certain positions they will allow the yoke 29, which carries the tong levers 27, to be lowered with respect to the casing 20 so that the gripping ends 30 of the tongs may be closed upon the ingot. This is accomplished by the operator, who lowers the tongs when the triggers 41 are in the position illustrated in full lines in Figure 7, whereupon the lower projecting ends of these triggers will contact with the mold top and rotate the triggers sufficiently to turn the notch portion 45 to such a position as to allow the lower ends 40 of the yoke to pass the triggers, thus carrying the tong levers downwardly, and as they move they will automatically close by reason of the contact of the rollers 33 on the inclined ways 37. This is indicated by dotted lines in Figure 7. The tongs may be opened again by lowering them on an ingot top or other object to contact with the intermediate portion of the yoke 29 between the tong levers 30, which raises the yoke and tong levers, whereupon the triggers drop by gravity and hold the yoke 29 and thereby maintain the tongs in open position.

The casing 20 is provided with holes 46 to allow the insertion of the bolts 43. 47 is the stand for receiving the tongs 19 and the pusher head 48, each of which is provided with a suitable support as illustrated, mounted on the sliding portion 51.

If, for example, the tongs should be on the stand and the pusher bar on the stripping machine, and it is desired to change, the machine is moved over the slide 51, the pusher inserted in its stand, the latch 23 is opened, the machine is moved in such a way as to disengage the pusher head from the slot 26 in the ram casing 16, and then the machine is traversed and moved in such a way as to engage the flange 21 of the tongs within the slot 26, and as the flange fits closely within the slot the slide is made inclined, so that as the stripping machine is moved the tongs will slide slightly until the flange registers with the slot, whereupon it will be seated within the casing 16, and the latch 23 is then closed and the machine may then be operated with the tongs for uses as described.

The operation of my apparatus is as follows:—If desired to strip a small-top ingot 3 from its mold 2, the pusher head 48 is first placed in position in the casing 16 of the ram 15, the links 14 are engaged with the lugs 5 and the mold lifted therefrom, and if the ingot should stick in the mold the pusher is projected against the top of the ingot and the links are then moved upwardly, thus separating the ingot from the mold, and the mold is then lifted from the ingot and placed elsewhere. After the molds are thus stripped from the ingots the tongs 19 are substituted

for the pusher and the ingots placed on the cars or elsewhere for heating, rolling or storage as may be desired. After the small-top ingots 3 are removed from the stools, the molds 2 may be lifted by the links 14 and replaced on other cars for further use.

Large-end-up ingots which are not stickers may be lifted by my tongs, which are set, when open, over the projecting sink-head portion, and then moved downwardly, and when the triggers contact with the mold top the tongs close on the sink-head portion and the tongs are then raised, grasping the ingot more firmly, lift it from the mold and set it on a car for transporting to a heating furnace or elsewhere, or it may be set anywhere within the limits of the stripping crane movement.

In order to strip large-end-up ingots, which are stickers, from their molds, the links 14 are engaged with the lugs 9 and the mold and the contained ingot are seated over the stool 11 of the stripper stand 10, with the end of the ingot on the plug or ejector 12. The links 14 are then swung outwardly in engagement with the hooks 13 and the tong casing 20 is pushed downwardly with its two ends or bifurcations against opposite portions of the upper end of the mold; the mold is then pushed downwardly from the ingot, and after this is accomplished the links 14 are disengaged from the hooks 13 and an upward movement of the tongs will cause them to firmly grasp the ingot and remove it elsewhere as desired. After this is done the links 14 are engaged with the lugs 9 and the mold may be replaced on its car 1 for further use.

Although I have shown and described my invention in considerable detail, I do not wish to be limited to the exact and specific details thereof, as shown and described, but may use such modifications in, substitutions for, or equivalents thereof as are embraced within the scope of my invention or as pointed out in the claims.

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

1. In an ingot stripper, the combination with the ram, of a socket casing mounted thereon, and an ingot tongs adapted to be removably mounted in said socket.

2. In an ingot stripper, the combination with the ram of a socket casing mounted thereon, a tongs provided with a flange or projection adapted to be removably seated in said socket, and means for quickly securing it in and for releasing it from said socket.

3. In an ingot stripper, the combination with the ram, of a socket casing secured to its end portion and a pusher provided with a flange adapted to be removably secured in said socket.

4. The combination with an ingot stripper of an automatic tongs removably secured to the ram thereof, a casing therefor, triggers rotatably mounted in the lower end of said casing with their ends normally projecting downwardly therefrom, a slidable yoke in said casing adapted to be held in its upper position by contact with said triggers and released by the turning of said triggers due to their contact with any object therebelow, and tong levers pivoted in said yoke.

5. An automatic tongs comprising a casing, triggers mounted in the lower end of said casing with portions normally projecting therebelow, a yoke slidably mounted in said casing, supported by said triggers when in its upper position, said triggers being adapted to be partially rotated by the contact of their projecting portions with any object therebelow; whereby the ends of the yoke register with notches or cut-away portions of said triggers, thus allowing the yoke to drop by gravity, tongs comprising a pair of bell-crank levers pivotally mounted in said yoke, with the ends of their upper arms adapted to contact with and be supported by the casing aforesaid.

6. An automatic ingot tongs, comprising a casing, triggers rotatably mounted in the lower ends thereof with portions normally adapted to project therebelow, notches or cut-away portions in said triggers, a yoke slidably mounted in said casing and normally adapted to be supported in its upper position by said triggers, a pair of tongs pivotally mounted in said yoke with the ends of their upper arms provided with anti-friction rollers, and guides on the upper part of said casing adapted to support and guide said rollers; whereby when said tongs are lowered on an ingot or other object the triggers rotate, registering the notches with the yoke, thus allowing the yoke to descend and the tongs to close.

7. In an automatic tongs of the character described, the combination with a casing, of a trigger rotatably mounted in the lower end thereof, a shaft on which said trigger is mounted, actuating arms on said trigger eccentrically located with respect to said shaft and normally projecting downwardly from said casing, adapted to normally support a yoke carrying a pair of tongs, notches in said trigger whereby, when it is turned the notches will register with the yoke, thus allowing the yoke to descend by gravity.

8. An ingot stripping machine provided with a ram to be moved up or down and laterally, a pair of links adapted to be opened or closed and raised or lowered with respect to said ram, whereby they are adapted to engage with mold lugs or hooks, a stand provided with hook portions spaced apart adapted to be engaged by said links, a tongs mounted on said ram and provided

with a casing adapted to bear on the top of an ingot mold, whereby a mold can be pushed downwardly to free it from the ingot and then the latter be promptly lifted by said tongs.

9. An ingot stripping machine comprising a ram, a pair of links adapted to be moved upwardly or downwardly with respect thereto, a stand provided with hooks adapted to receive said links, a tongs secured to said ram, an ejector mounted on the base of said stand on which an ingot contained in a mold is adapted to be seated, said tongs being mounted in a bifurcated casing, the ends of which casing are adapted to abut the end of a mold, and means for

moving said ram downwardly and upwardly.

10. In an ingot stripper, a ram, a bifurcated casing mounted therein, a pair of links adapted to be raised, lowered and swung inwardly and outwardly, a stand provided with a pair of hooks spaced apart and adapted to co-operate with the links aforesaid, an ejector or plug mounted on the stand adapted to contact with the end of an ingot, and means for pushing the ram casing downwardly against the upper end of an ingot mold.

In witness whereof I hereunto affix my signature.

HARRY R. GEER.