April 27, 1943. W. W. URMETZ 2,317,565

STRIPPING MECHANISM

Filed Jan. 14, 1942 2 Sheets-Sheet 1

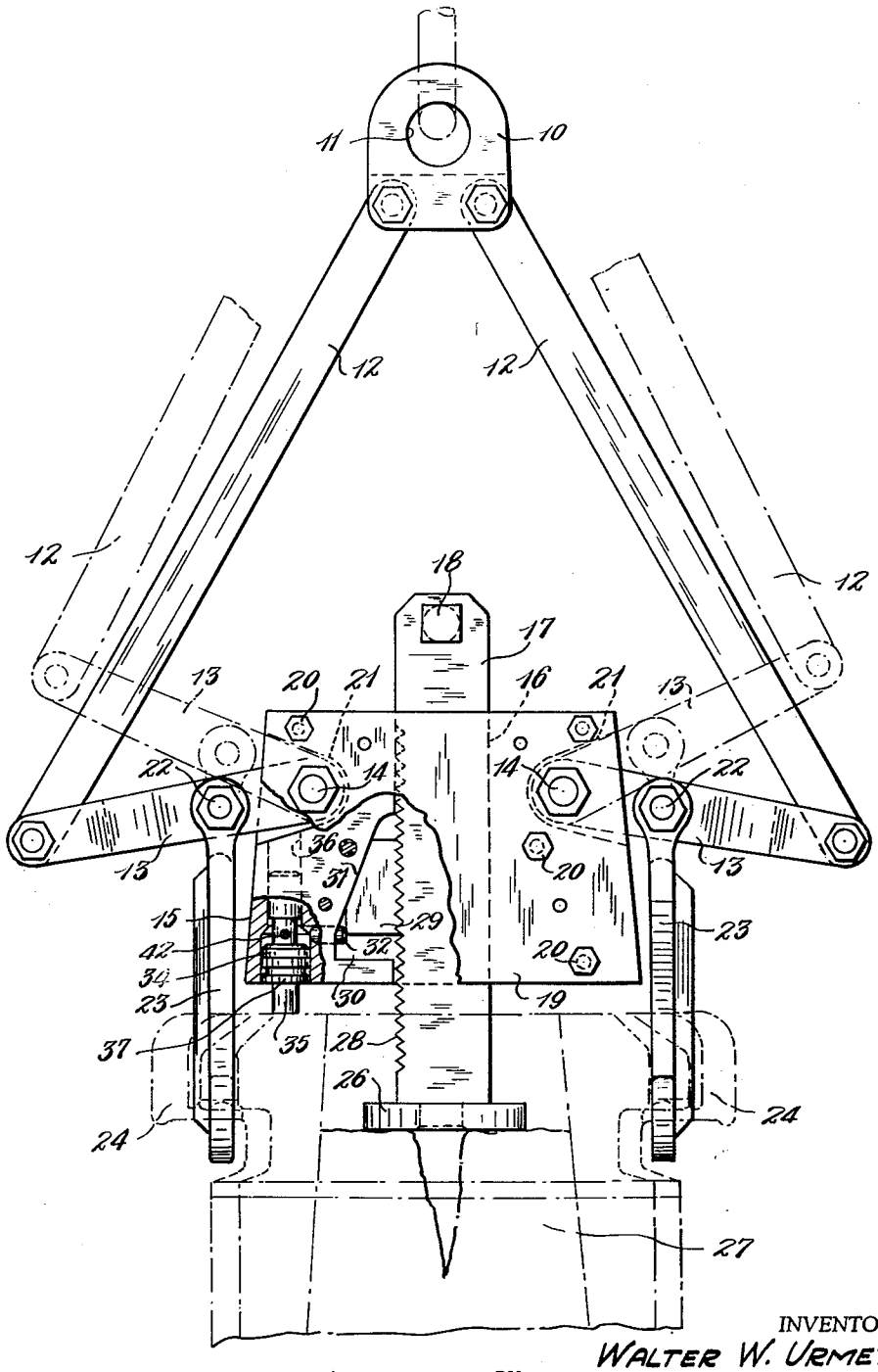


FIG. 1

BY

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STRIPPING MECHANISM

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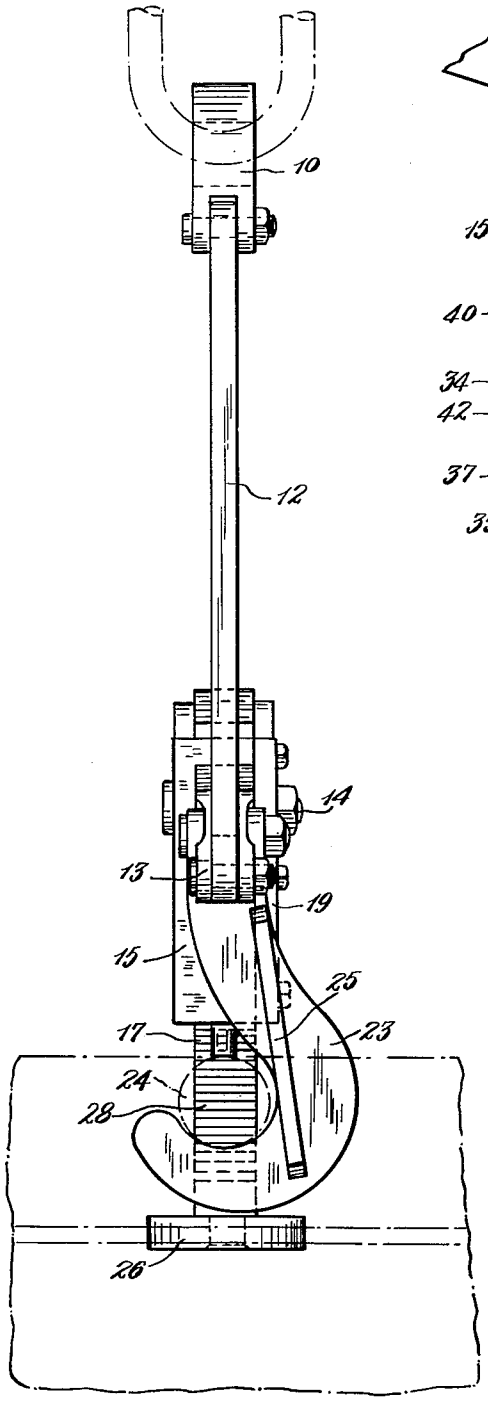


FIG. 2

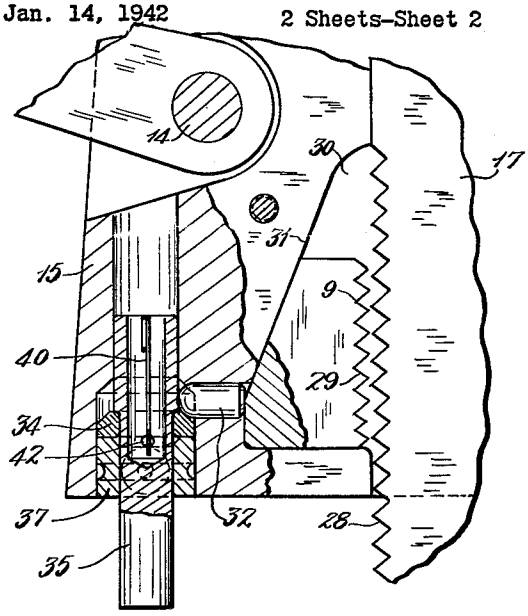


FIG. 3

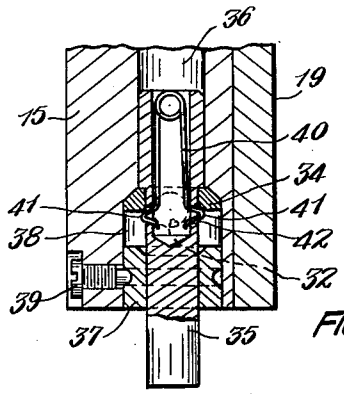


FIG. 4

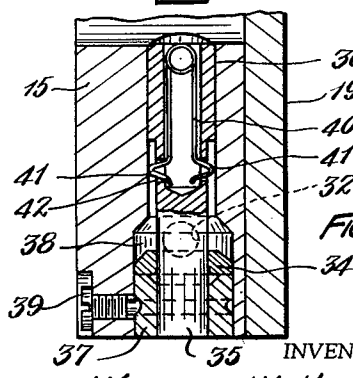


FIG. 5

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2,317,565

STRIPPING MECHANISM

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Application January 14, 1942, Serial No. 426,747

7 Claims. (Cl. 22—95)

This invention relates to improvements in stripping mechanism, particularly strippers which are equipped with means for breaking loose from a steel ingot a hot top to which the ingot adheres tightly, as occasionally happens, or for stripping an ingot from a big-end-down mold. For example, due to difficulties in cutting off the flow of molten metal from the pouring ladle, a mold with a hot top attached is sometimes filled to overflowing, in which event if metal extending over the upper surface of the hot top freezes the hot top is firmly attached to the ingot. My invention embodies means for exerting force in such a case tending to break the hot top loose from the ingot.

One of the objects of the invention, therefore, is the provision of a stripper embodying means for exerting down pressure on the ingot and simultaneously an upward pull on the hot top or on the mold, as the case may be.

Another object is the provision of means for automatically adjusting the position of the ingot engaging ram relative to the rest of the apparatus, so that the stripper may accommodate itself to hot tops or molds of varying design and ingots of varying height.

Other objects and features of novelty will appear as I proceed with the description of that embodiment of the invention which, for the purposes of the present application, I have illustrated in the accompanying drawings, in which:

Fig. 1 is an elevational view, partly in section, of a stripper embodying the invention, the apparatus being shown in operative engagement with a hot top and ingot and ready for the application of lifting force:

Fig. 2 is an elevational view taken at right angles to Fig. 1;

Fig. 3 is a fragmental view on a larger scale showing the means for automatically locking the ram to the housing, the parts being illustrated in this figure in positions which they take when the stripper is hanging free from a crane;

Fig. 4 is a fragmental view at right angles to Fig. 3 showing the control mechanism in a different position; and

Fig. 5 is a similar view showing the control mechanism in the position which it occupies after the hot top is broken loose and is lifted into engagement with the housing, thereby providing relatively fixed pivots for the inner ends of the actuating levers so that the hot top may be raised clear of the ingot.

In the drawings, 10 is a shackle having an opening 11 therethrough to receive a crane hook or the like by means of which the apparatus may be suspended and transported and through which lifting force may be applied. A pair of links 12 are pivotally supported in the shackle 10 and at their lower ends are pivotally connected with the outer extremities of a pair of levers 13 which may be bifurcated to receive the lower ends of the links, as indicated in Fig. 2.

The inner ends of the levers 13 are carried upon pivots 14 that are mounted in a housing 15 through which there extends vertically a guiding passage 16 wherein a ram 17 is mounted to slide, its downward movement being limited by a pin 18 which is adapted to engage the top of the housing. The housing comprises a cover plate 19 removably secured to the housing proper by bolts 20 or the like. The pivots 14, which may be bolts, extend through aligned openings in the housing 15 and its cover plate 19 and also through cavities 21 in the housing with divergent upper and lower walls, the upper walls constituting stops limiting the swinging of the levers 13 in the upward direction.

At intermediate points of the two levers 13 there are pivots 22 upon which are hung hooks 23 that are adapted to engage a hot top or mold. As shown herein, these hooks engage trunnions 24 which extend outwardly from the casing of a composite hot top at diametrically opposed points. The hooks 23 may face in opposite directions and may be caused to engage the trunnions by swinging the stripper around its vertical axis. A reenforcing rib 25 may be formed on each hook. Obviously hooks of different form may be used if desired. In order to apply lifting effort through a relatively great leverage, I prefer to position the pivots 22 near the inner ends of the levers 13.

The ram 17 is provided with a foot 26 to engage the top of an ingot, represented at 27 in the drawings. Teeth 28 are formed in one side wall of this ram, with which similar teeth 9 on a wedge block 29 cooperate. This block is positioned in a cavity 30 opening away from the guide passage 16 and having an inclined rear wall 31. The block 29 may move up and down and laterally in this cavity behind the cover plate 19.

Normally when the stripper is hanging from a crane without load, the ram 17 is in its lowermost position and the wedge block 29 is out of engagement with the ram, as illustrated in Fig. 3. The wedge block may be pushed over far enough to cause loose engagement between the teeth 9 and 28 by means of a pin 32, whereupon, if the housing is lowered with respect to the ram, and with respect to the block 29 which is then loosely

engaged by the ram, the inclined surface 31 of the cavity 30 will force the wedge block into tight engagement with the ram, and the housing and ram will be locked together thereby.

The means which I provide for sliding the pin 32 from the position of Fig. 3 to that of Fig. 1 comprises a ring 34 which surrounds the lower and smaller diameter portion of a plunger 35 and is beveled on its upper periphery. The upper and larger diameter portion of this plunger 35 slides in a bore 36 in the housing 15 and the lower portion slides in a bearing 37 fitted into a relatively large bore 38 coaxial with the bore 36, this bearing being held in position by a setscrew 39 or the like. Normally the shoulder between the larger and smaller diameter portions of plunger 35 rests upon ring 34 to support the plunger in the position illustrated in Fig. 3. The upper end of plunger 35 is drilled axially to receive a wire spring 40 provided with humps 41 which project through transverse holes 42 in the plunger. These humps 41 are adapted to engage the under surface of the ring 34 when the parts are in the position of Fig. 3 and the plunger may then be moved upwardly with respect to the housing to raise the ring to the position of Fig. 4. When this occurs, the bevel on the upper surface of the ring engages the rounded end of pin 32 and cams it over to the Fig. 1 position. While the spring 40 is strong enough to raise ring 34 and shift pin 32 against the slight resistance offered by the wedge block 29, it should be observed that this spring can yield under slightly greater resistance, and thus the humps 41 may pass through the ring 34 from bottom to top or vice versa.

Operation.—Assuming that the stripper is hanging from a crane, not shown, and is about to be lowered into position upon a hot top, the automatic control mechanism being in the position of Fig. 3, the device is then centered over the hot top and permitted to descend until the foot 26 of the ram engages the top of the ingot 27. The descent of the housing containing the plunger 35, which is then hanging from the housing in the position illustrated in Fig. 3, will presently cause the plunger to contact the upper surface of the hot top. A short further downward movement of the housing will cause the plunger 35 to slide into its socket, raising the ring 34 from the position of Fig. 3 to that of Fig. 4, which will cause the ring to cam the pin 32 over from the position of Fig. 3 to that of Fig. 1. By this means the block 29 will be shifted to the right, causing the teeth on the block to enter the spaces between teeth on the ram 17. After the pin 32 is thus pushed laterally by the ring 34, the plunger 35 must continue to rise relative to the housing. In doing so the spring 40 is contracted and the humps 41 pass upwardly through the ring 34, whereupon the ring immediately falls back to its seat upon bearing 37, as shown in Fig. 1.

When the wedge block 29 has been shifted, bringing about loose engagement of its teeth and those of the ram 17 as previously described, relative movement between the ram and the block ceases. In other words, the block 29 remains stationary with the ram while the housing continues to descend. A certain amount of downward travel of the housing 15 must take place after this loose engagement before the block 29 becomes tightly wedged between the inclined surface 31 and the toothed surface of the ram. As soon as that occurs, downward movement of the housing is stopped.

Now, the operator continues to lower the shackle 10, the links 12 and the levers 13 thereby moving from the dotted line positions of Fig. 1 to positions somewhat below the full line positions of that figure, but with the hooks 23 angularly spaced from the trunnions 24. The operator then stops the downward movement of the device and rotates it around its vertical axis far enough to cause the hooks 23 to engage the trunnions 24. Next the operator causes an upward pull to be exerted upon the shackle 10, and through the links 12 the outer ends of the levers 13 are lifted. The pivots 14 may be considered to be the fulcrums for the levers, since the housing 15 is locked to the ram 17 and the latter is fixed by its engagement with the ingot. A pull is thus exerted upon the hooks 23 tending to move the hot top with respect to the ingot.

Now as soon as the grip of the ingot upon the hot top has been broken by the simultaneous push on the ingot and pull on the hot top, the latter immediately rises in response to the continued pull of the shackle 10, forcing the plunger 35 upward until it is completely enclosed by the housing, as in Fig. 5. When the hot top engages the lower surface of the housing, the pivots 14 may be said to take bearing from the hot top, so that thereafter lifting effort applied to the outer ends of the levers merely raises them bodily and with them the hot top and the housing. The device then becomes a simple lifting and transporting bail. The raising of the housing does not at first lift the ram 17. It does, however, lift the inclined surface 31 out of engagement with the inclined edge of block 29, and the weight of that block causes the interengaging teeth to cam the block away from the then stationary ram. As soon, however, as the rising housing strikes the pin 18, the ram is lifted along with the housing.

The crane is then of course operated to transport the hot top to some preselected station where it is deposited upon a suitable support. When this has been done the device is swung on its axis far enough to disengage the hooks from the hot top trunnions and the stripper is then raised. As soon as the weight of the hot top is removed from the hooks 23, further lifting effort will swing the levers 13 upwardly to the dotted line position of Fig. 1 and will then lift the housing. The weight of plunger 35 will then cause it to move downwardly to the Fig. 3 position, the humps 41 being cammed inwardly by the upper surface of ring 34 permitting them to pass the ring and engage its under surface again, as in Fig. 3. The mechanism is therefore again in condition for operation upon another hot top in the same manner.

Having thus described my invention, I claim:

1. In stripper mechanism of the character described, a vertical ram for exerting downward pressure, a housing, means for locking the ram against movement downwardly relative to the housing after the engagement of the ram with the work is effected, a pair of levers pivotally connected at their inner ends with said housing, means for applying lifting force to the outer ends of said levers simultaneously, and lifting hooks pivotally connected with said levers at points intermediate the ends of the latter.

2. In stripper mechanism for separating inner and outer members by vertical displacement of one relative to the other, a ram for engagement

with the top of the inner member, a housing, means for locking the ram to the housing after engagement with the inner member is effected, a pair of levers pivotally connected at their inner ends with said housing, means for applying lifting force to the outer ends of said levers simultaneously, and hooks for engagement with the outer member, said hooks being pivotally connected with said levers at points intermediate the ends of the latter, said housing having portions adapted to engage the outer member after the latter is broken loose from the inner member, whereby the said lifting means may be used to raise the outer member clear of the inner member.

3. In stripper mechanism for separating inner and outer members by vertical displacement of one relative to the other, a ram for engagement with the top of the inner member, a housing through which the ram is adapted to slide vertically, means carried by the housing comprising a plunger normally extending downwardly therefrom functioning when the housing has been lowered to a predetermined distance above the outer member to initiate the automatic locking together of the ram and housing, a pair of levers pivotally connected at their inner ends with said housing, means for applying lifting force to the outer ends of said levers simultaneously, and hooks for engagement with the outer member, said hooks being pivotally connected with said levers at points intermediate the ends of the latter, whereby lifting force applied to the outer ends of the levers tends to move the inner and outer members in opposite directions.

4. In stripper mechanism for separating inner and outer members by vertical displacement of one relative to the other, a ram for engagement with the top of the inner member, a housing through which the ram is adapted to slide vertically, means carried by the housing comprising a plunger normally extending downwardly therefrom functioning when the housing has been lowered to a predetermined distance above said outer member to initiate the automatic locking together of the ram and housing, a pair of levers pivotally connected at their inner ends with said housing, means for applying lifting force to the outer ends of said levers simultaneously, and hooks for engagement with the outer member, said hooks being pivotally connected with said levers at points intermediate the ends of the latter, whereby lifting force applied to the outer ends of the levers tends to move the inner and outer members in opposite directions, said housing comprising portions adapted to engage the outer member when the latter is broken loose and lifted whereby further lifting effort results in the raising of the outer member sufficiently to clear the inner member.

5. In stripper mechanism for separating inner and outer members by vertical displacement of one relative to the other, a ram for engagement with the top of the inner member, a housing through which the ram is adapted to slide vertically, means for limiting its downward movement, wedge means within the housing adapted to lock the ram to the housing, a plunger slidable vertically in the housing and normally depending therefrom in position to engage the top of the outer member, means actuated by the relative upward movement of said plunger in the housing adapted to shift the wedge means into operative relation with the ram when the housing descends to a predetermined distance above the outer member, a pair of levers pivotally connected at their inner ends with said housing, means for applying lifting force to the outer ends of said levers simultaneously, and hooks for engagement with the outer member, said hooks being pivotally connected with said levers intermediate their ends.

6. In stripper mechanism for separating inner and outer members by vertical displacement of one relative to the other, a ram for engagement with the top of the inner member, a housing through which the ram is adapted to slide vertically, teeth on one side of the ram, a plunger carried by the housing normally extending downwardly therefrom in position to engage the top of the outer member, a wedge block within the housing having teeth adapted to engage the teeth on the ram, means actuated by the relative upward movement of said plunger for shifting the wedge to cause loose engagement of its teeth with those of the ram, said housing having an inclined surface adapted to shift the wedge block into tight engagement with the ram when the housing is lowered following said loose engagement of the teeth, a pair of levers pivotally connected at their inner ends with said housing, means for applying lifting force to the outer ends of said levers simultaneously, and hooks for engagement with the outer member, said hooks being pivotally connected with said levers intermediate their ends.

7. In stripper mechanism of the character described, a vertical ram for exerting downward pressure, a housing, means effective after the engagement of the ram with the work and dependent upon the lowering of the housing relative to the ram for locking the ram and housing together, a pair of levers pivotally connected at their inner ends with the housing, means for applying lifting force to the outer ends of said levers simultaneously, and lifting hooks pivotally connected with said levers at points intermediate the ends of the latter.

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