

April 13, 1948.

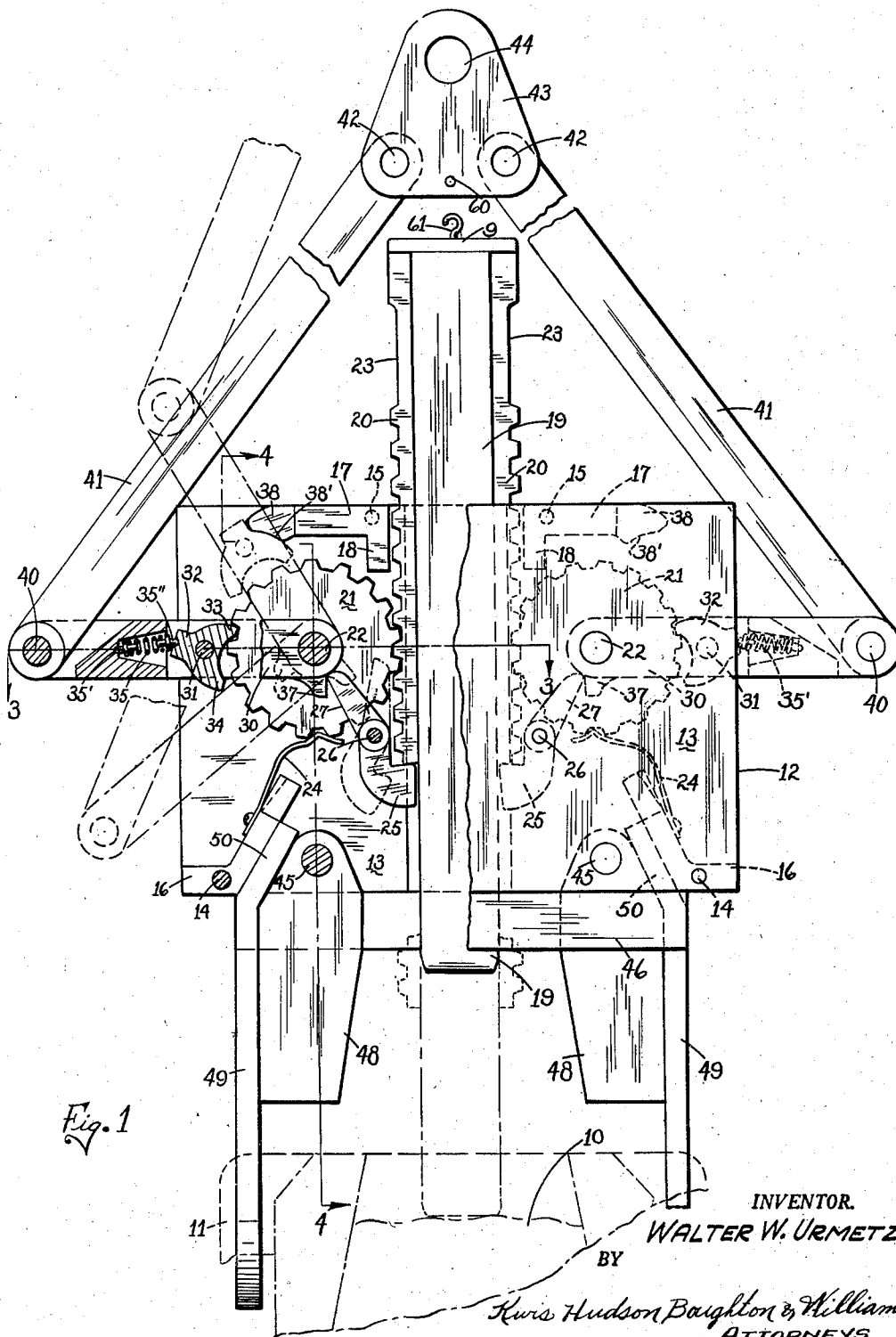
W. W. URMETZ

2,439,705

HOT TOP STRIPPER

Filed Aug. 24, 1944

2 Sheets-Sheet 1



April 13, 1948.

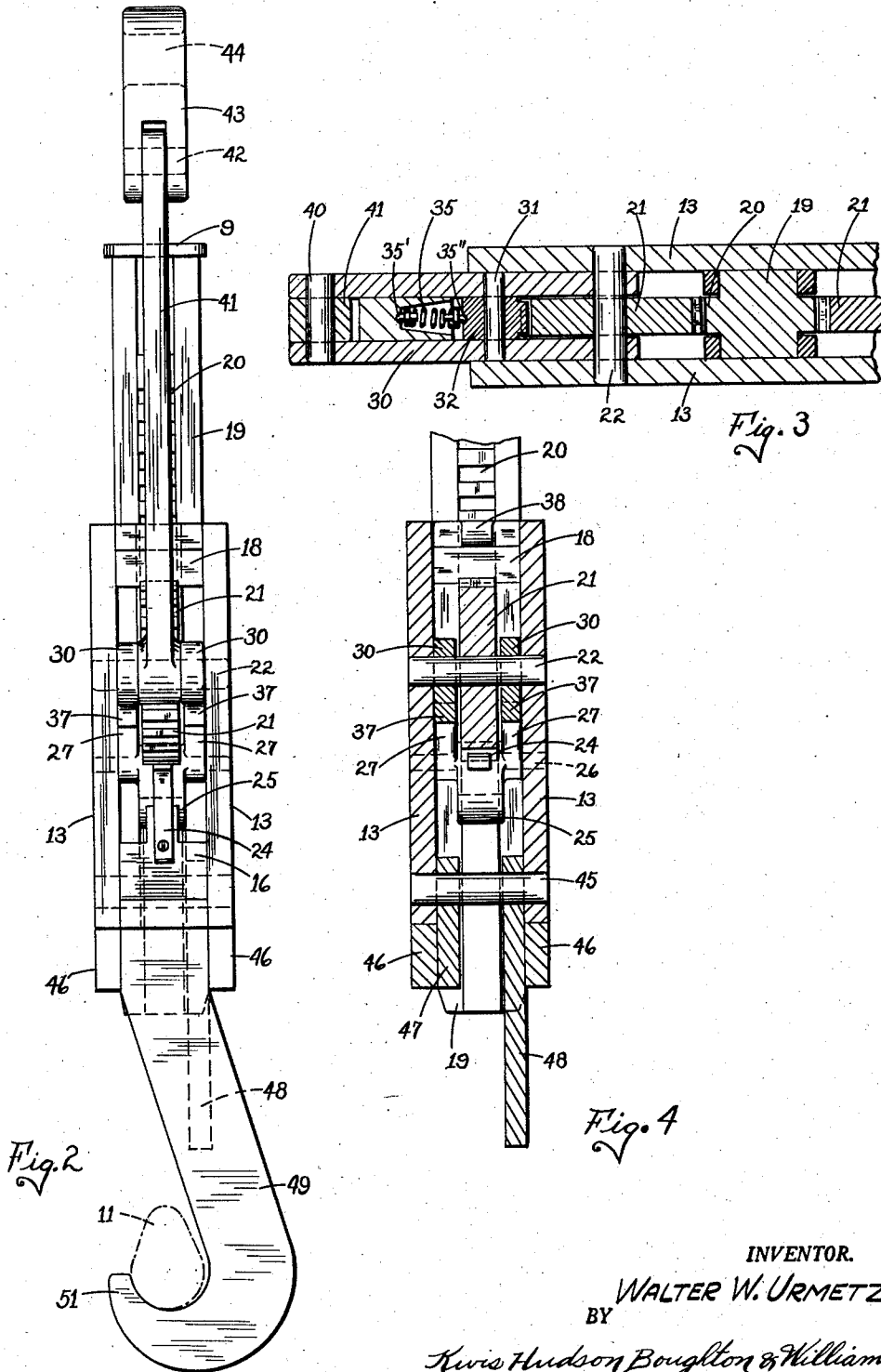
W. W. URMETZ

2,439,705

HOT TOP STRIPPER

Filed Aug. 24, 1944

2 Sheets-Sheet 2



INVENTOR.

WALTER W. URMETZ

BY

Kiris Hudson Boughton & Williams
ATTORNEYS

UNITED STATES PATENT OFFICE

2,439,705

HOT TOP STRIPPER

Walter W. Urmetz, Parma, Ohio, assignor to The Ferro Engineering Company, Cleveland, Ohio, a corporation of Ohio

Application August 24, 1944, Serial No. 551,008

3 Claims. (Cl. 22—95)

1

This invention relates to improvements in hot top strippers, that is to say, mechanism operated by a crane for breaking a hot top loose from the sinkhead portion of an ingot or from the ingot mold, and transporting it to a servicing bench or other desired location. Mechanism of this character must be rugged and certain in its operation, and should be adapted for use in connection with more than one size or style of hot top in order to be of the greatest usefulness in the average steel mill.

One of the objects of the present invention therefore is the provision of a simple and rugged hot top stripper which shall be capable of easy and certain operation under varying conditions.

Another object is the provision of a stripper mechanism which may be handled entirely by the crane operator, that is, without a helper for adjusting the hooks, etc.

Another object is the provision of a stripper having readily interchangeable hook assemblies for use upon hot tops of different sizes.

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 broken away and partly in section, of a hot top stripper embodying the invention.

Fig. 2 is an elevational view of the same taken at right angles to Fig. 1.

Fig. 3 is a horizontal sectional view taken substantially along the line 3—3 of Fig. 1, and

Fig. 4 is a vertical sectional view taken substantially along the line 4—4 of Fig. 1.

When in use with a crane the device of this invention is intended to exert a lifting effort upon the trunnions 11 at the same time that it pushes downwardly upon the sinkhead 10 within the hot top, thereby breaking the hot top loose from the ingot or mold. Thereafter continued lifting effort applied to the trunnions 11 raises the hot top sufficiently to clear the ingot, after which it may be transported by the crane to any desired location.

The stripper comprises a housing 12 which may be constructed of two heavy steel plates 13 disposed parallel to each other and preferably rather close together. These plates may be interconnected by suitable fastenings and spacers, as for example by pins or bolts 14 and 15 and spacing elements 16 and 17. The spacers 17 have downwardly directed portions 18 which form guides for a plunger 19 that slides between the slide

2

plates 13 of the housing and is provided on opposite sides with racks 20. Across the upper end of this plunger there is a plate 9 having projecting portions adapted to engage the top of the housing and to thereby limit the downward movement of the plunger.

Two gears 21 meshing with the racks 20 are rotatably mounted upon shafts 22, the ends of which are mounted in the housing plates 13. These gears are maintained in mesh with the racks 20 at all times except when the plunger is down as far as it will go, when the gears are cleared by recesses 23 in the racks and are then free to turn independently of the racks. At all times, however, the gears are maintained in correct relation to each other by spring fingers 24 which yield readily but present sufficient frictional resistance to prevent spinning or accidental movement of the gears.

As shown in the drawings the racks 20 terminate above the bottom of the plunger 19, and their lower ends may be engaged by latches 25 biased toward the latching position illustrated in Fig. 1.

These latches are pivoted at 26, and have bifurcated upper arms 27 which straddle the gears 21 and bring the centers of gravity of the latches sufficiently to one side of the pivots 26 to cause the latches to swing into latching position when they are otherwise free to do so. When the latches are withdrawn and the plunger is free to descend below the position illustrated in Fig. 1, the lower ends of the latches ride freely over the rack teeth.

Each of the gears 21 is straddled by the inner bifurcated end of a lever arm 30 which turns freely on the shaft 22. Connecting the bifurcations there is a pin 31 upon which is oscillatably mounted a pawl 32 having two lobes 33 and 34. A coil spring 35 mounted on a telescoping pin between center 35' on the lever arm and center 35'' on the pawl yieldably holds either of the lobes 33 and 34 in engagement with the teeth of the gear. Shifting of the pawl from one operative position to the other may be done manually through the open end of the housing. When the lobe 33 is in operative position, as illustrated in Fig. 1, the lever arm 30 may swing downwardly, the lobe 33 of the pawl riding over the teeth of the gear without imparting any motion to the latter. When, however, the lever arm 30 is swung upwardly, the pawl functions to lock the lever arm to the gear and rotates the latter, which communicates downward pressure to the corresponding rack 20 and thus to the plunger 19.

Each of the lever arms 30 has a pair of spaced lugs 37 disposed to contact the bifurcated arms 27 of the corresponding latch when the lever arm is lowered to a predetermined extent, and thereby to swing the latch into the inoperative position, as indicated by broken lines on the left side of Fig. 1. The plunger is then free to move down.

It is necessary at one stage of the operation of the device to free the racks and gears from the control of the lever arms 30. This is accomplished by providing on each side of the device a knockout 38, which may be conveniently formed on the spacer block 17, this knockout being so formed and positioned that when the lever arm is swung upwardly to a predetermined extent, the knockout will engage the pawl 32 and swing it against the action of spring 35 into the position shown in broken lines on the left side of Fig. 1, that is far enough to disengage lobe 33 from the gear teeth but not far enough to throw the pawl over center, the knockout 38 being formed with a reverse curve 38' fitting the contour of the pawl to prevent such overthrow. The gears and racks are then released and are free to move independently of the lever arms 30.

The levers 30 are bifurcated also at their outer ends where they carry pivots 40 upon which are mounted the lower ends of a pair of rigid links 41. The upper ends of these links are pivotally mounted at 42 between depending lips of a plate 43 which may have a hole 44 therethrough to be engaged by a crane hook.

The lever arms 30 are closely confined within the walls 13 of the housing, while the links 41 are closely confined at their lower ends between the outer bifurcations of lever arms 30 and at their upper ends between the depending lips of the plate 43. Hence, under all conditions the only possible movement of the lever arms and links relative to the housing 12 in the median plane of that housing, and movement in any other direction given to the links 41 through the plate 43 is communicated in the same degree to the housing to produce bodily movement thereof. This is important during the manipulation of the device required for bringing it into operative relation with a hot top.

Two pins or bolts 45 are removably mounted in the walls 13 of the housing. These pins or bolts serve to secure to the housing a hook assembly. The different parts of this assembly are interconnected and the assembly when mounted in the housing is rigid with respect thereto. The assembly comprises two rails 46, to one of which there are connected permanently a pair of upwardly extending ears 47, perforated to receive the removable pins 45. To the other rail 46 there are connected two legs 48, similarly provided with holes at their upper ends to receive the removable pins 45. At the ends of this assembly there are mounted the two hooks 49, the latter bridging the space between the rails 46 and secured thereto as well as to the ears 47 and the legs 48. In order to assist in locating the assembly when it is to be mounted in the housing and to brace it when so mounted, the upper ends of the hooks 49 may be turned inwardly as shown at 50 to engage with more or less wedging action the inclined portions of spacer block 16. In the usual steel mill several of these hook assemblies so designed that the hooks are differently spaced, will be required in order to accommodate hot tops of different sizes. The legs 48 are so dimensioned that when they are permitted to rest upon the upper surface of a hot top and are

dragged across it to position the hooks 49 with respect to the trunnions 11, the tips 51 of the hooks will clear the trunnions, after which a lifting effort exerted by the crane will cause the hooks to engage the trunnions, as in Fig. 2.

Operation. Assuming that the plunger is latched in its raised position, as in full lines in Fig. 1, and that the stripper is hanging from a crane, that is that both sets of lever arms and links are in the upper position indicated by broken lines at the left side of Fig. 1, at which time the gears are free from the lever arms 30 but are held from rotation by their engagement with the racks 20, the crane operator causes the crane to move into position above the hot top and lowers the stripper until the legs 48 thereof engage the upper surface of the hot top. Next he moves the crane to drag the legs over the hot top and position the hooks underneath the trunnions 11. The housing now rests upon the hot top. Next the operator lowers away, permitting the links 41 to descend and the lever arms 30 to swing down to the limit of their motion in that direction, the lobes 33 of the pawls ratcheting over the teeth of the gears. Near the bottom of the swing of the lever arms the lugs 37 push the latch arms 27 inwardly, which brings about the release of the racks when the plunger descends due to gravity, the gears 21 turning idly. Plunger 19 falls until it engages the upper surface of the sinkhead 10 in the hot top, the rounded lower ends of the latches 25 riding over the teeth of the racks 20. The operator then causes the crane to exert an upward pull on the plate 43 which operates through the links to swing the lever arms 30 upwardly. The arms when moving in this direction are locked to the gears 21 by the lobes 33 of the pawls.

The upward movement of the lever arms first causes the gears to ride upon the now fixed racks 20, which imparts an upward movement to the housing 12, lifting the legs 48 off the hot top and causing the hooks 49 to engage the trunnions 11, as in Fig. 2. Further lifting effort by the crane is then divided between the downward pressure on the plunger and the upward pull on the housing providing mechanical advantage in a ratio of the order of 1 to 3 or 4. This breaks the hot top loose from the ingot or the mold, or both, as the case may be, after which the first effect is continued, that is the gears climb up the racks 20, lifting the housing and with it the hot top. When the arms 30 reach the limit of their upward movement relative to the housing they then exert their lifting effort through the pins 22 and the whole mechanism moves upwardly with the hot top in its grasp.

At the upward limit of movement of the lever arms with respect to the housing the pawls 32 are disengaged. The weight of the plunger causes it to fall until stopped by the plate 9 engaging the top of the housing. The crane is then operated to transport the hot top to the desired location, when it is lowered and the hooks 49 disconnected from the trunnions 11. Next the stripper is lowered over some previously prepared upwardly extending projection which is of a character to engage only the plunger 19. During this operation the pawls 32 are held inoperative because of their engagement with knockouts 38, so that the gears 21 are free to ride idly as the housing descends relative to the plunger. At the end of this operation the latches 25 become effective automatically to latch up the plunger relative to

5

the housing, and the stripper is then ready for use upon the next hot top.

The lobes 34 on the pawls 32 do not come into use in the ordinary operation of the stripper. However, in the event that the device should be used upon a hot top which is so firmly locked to an ingot that it cannot be pulled loose, the parts may become jammed and difficult to dislodge, in which case the operator may flip the pawls 32 over to free the lobes 33 and cause the lobes 34 to engage the gear teeth, whereupon downward pressure on the outer ends of lever arms 30 will cause the housing to move downwardly relative to the plunger and thereby disengage the hooks 49 from the trunnions 11, when the whole device may be lifted out of the way and extraordinary methods employed to free the hot top from the ingot.

In cases where the sinkhead is low in the hot top and particularly where the internal diameter of the hot top is small relative to the cross-sectional size of the plunger, it may be difficult to disengage the stripper from the hot top. In such event the difficulty may be overcome by the employment of a chain, (not shown) which may be connected to the plate 43 through a hole 60 therein and to a hook 61 in the top of the plunger. The plunger is necessarily heavy because a heavy force must be exerted through it. Its mass may be greater than the effective mass of the lever arms 30 and the links 41, so that with the lobes 34 of the pawls in engagement with the gears, lowering of the plate 43 may not be effective to raise the plunger. In such case the plate 43 is lowered with the lobes 33 clicking on the gears, then the pawls 32 are shifted to cause the lobes 34 to engage the gears, after which the chain is connected between the plate 43 and the hook 61. Now the crane is caused to pull upwardly on the plate 43 and hence on the plunger, causing the lower end of the plunger to clear the hot top. This of course turns the gears, but such turning motion is permitted by the clicking of the lobes 34 without communicating any force to the lever arms. The length of the chain is such that, when the plate 43 is in its uppermost position and the plunger is latched up, the chain will be taut; in other words the chain is of such length that when the plate 43 is raised to its uppermost position relative to the housing the plunger will be raised sufficiently to permit latches 25 to become effective for latching up the plunger.

Having thus described my invention, I claim:

1. In a hot top stripper, a housing, a plunger vertically slidable therein adapted to bear at its lower end against a sinkhead, a rack on said plunger, a gear journaled in said housing meshing with said rack, a lever arm pivotally mounted to turn about the axis of said gear, a pawl on said arm adapted to engage the teeth of said gear for operatively connecting the lever arm to the gear during the upward motion of the arm, while permitting the arm to move downwardly, independently of the gear, means carried by the housing for engagement with the hot top to exert

6

a lifting force thereupon in opposition to the said plunger depressing force, and a knockout for said pawl at the upper limit of motion of said lever arm, leaving said gear free to turn in response to movement of said plunger.

2. In a hot top stripper, a housing, a plunger vertically slidable therein adapted to bear at its lower end against a sinkhead, a rack on said plunger, a gear journaled in said housing meshing with said rack, a lever arm pivotally mounted to turn about the axis of said gear, a pawl on said arm adapted to engage the teeth of said gear for operatively connecting the lever arm to the gear during the upward motion of the arm, while permitting the arm to move downwardly independently of the gear, means carried by the housing for engagement with the hot top to exert a lifting force thereupon in opposition to the said plunger depressing force, latching means for holding said plunger in a raised position, said latching means being biased toward latching position, and means on said arm for withdrawing said latching means when said arm is lowered to a predetermined extent.

3. In a hot top stripper, a housing, a plunger vertically slidable therein adapted to bear at its lower end against a sinkhead, a rack on said plunger, a gear journaled in said housing meshing with said rack, a lever arm pivotally mounted to turn about the axis of said gear, a pawl on said arm adapted to engage the teeth of said gear for operatively connecting the lever arm to the gear during the upward motion of the arm, while permitting the arm to move downwardly independently of the gear, means carried by the housing for engagement with the hot top to exert a lifting force thereupon in opposition to the said plunger depressing force, latching means for engagement with the lower end of said rack to hold said plunger in a raised position, said latching means being biased toward latching position but being adapted to ride freely over the teeth of the rack, and means on said arm for withdrawing said latching means when said arm is lowered to a predetermined extent.

WALTER W. URMETZ.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
832,758	Taylor	Oct. 9, 1906
1,059,667	Gathmann	Apr. 22, 1913
1,420,555	Klasing	June 20, 1922
1,474,785	Kruger	Nov. 20, 1923
1,526,125	Fellows	Feb. 10, 1925
1,957,462	Kress	May 8, 1934
2,317,565	Urmetz	Apr. 27, 1943

FOREIGN PATENTS

Number	Country	Date
441,284	Germany	Feb. 28, 1927