Oct. 29, 1940. R. J. HARRY 2,219,479

TONGS

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Fig. 2.

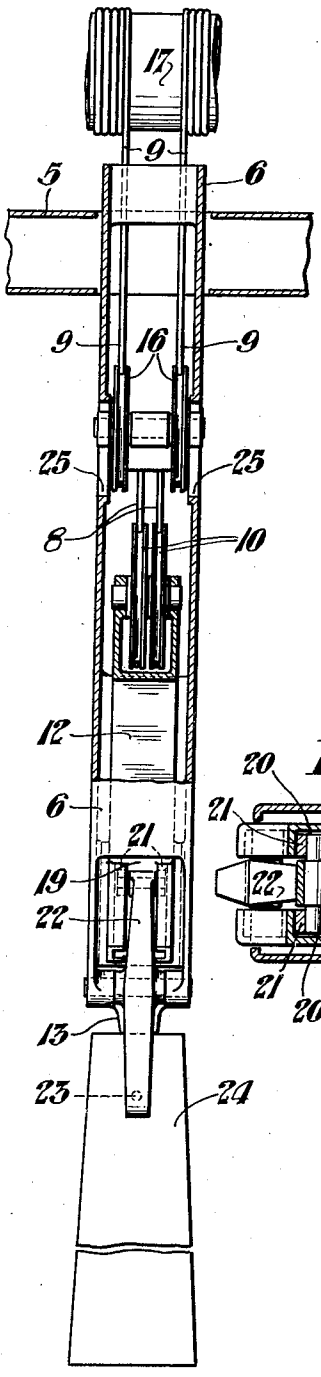


Fig. 1.

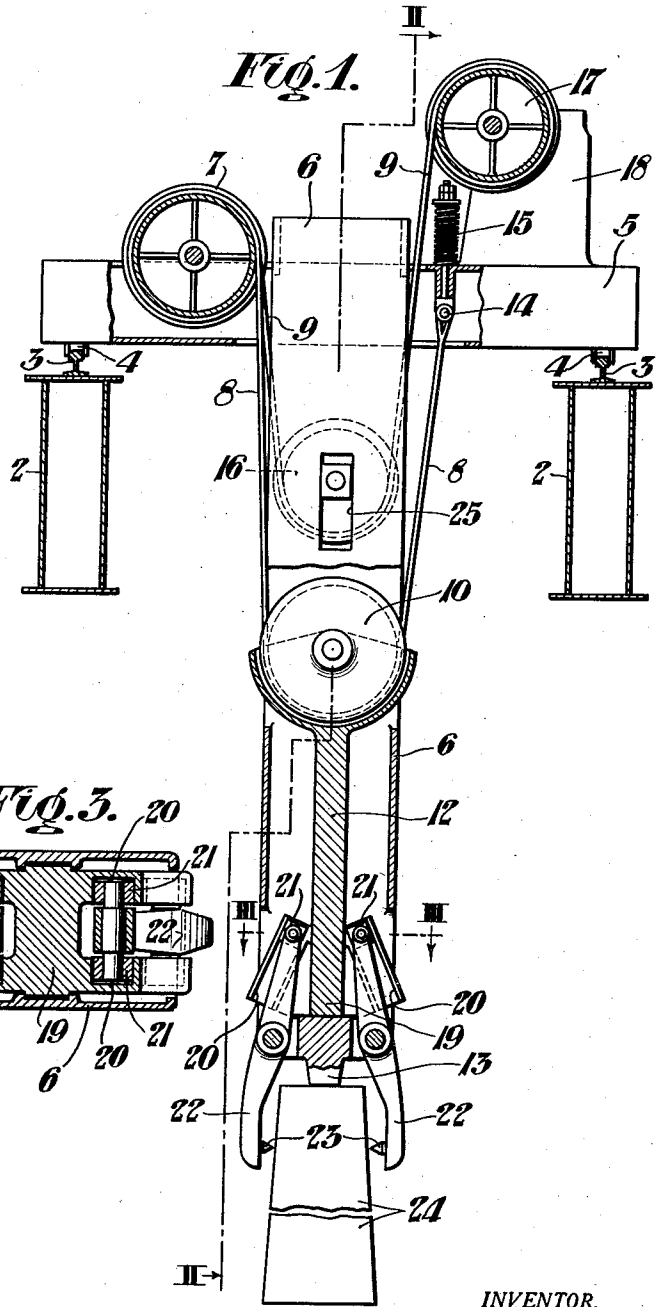


Fig. 3.

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Fig. 4.

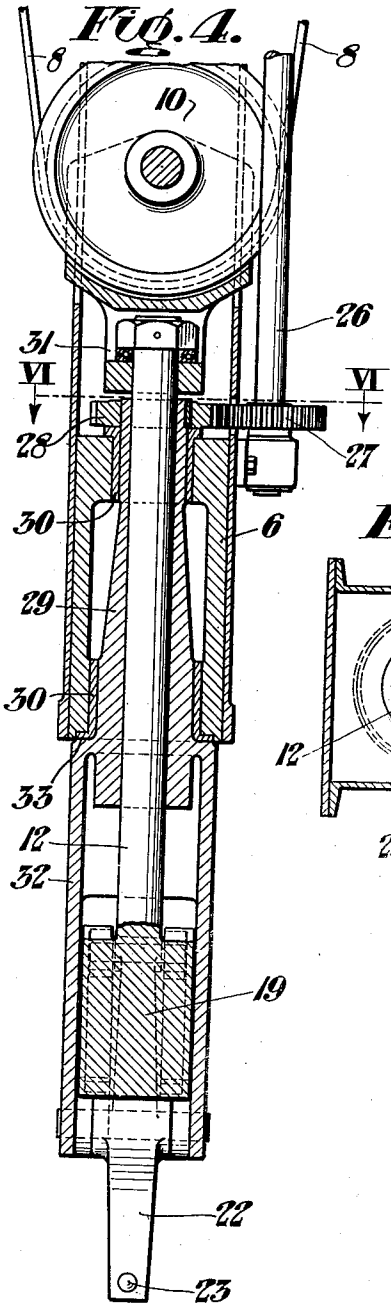


Fig. 6.

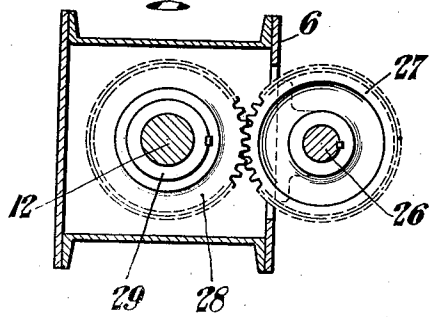
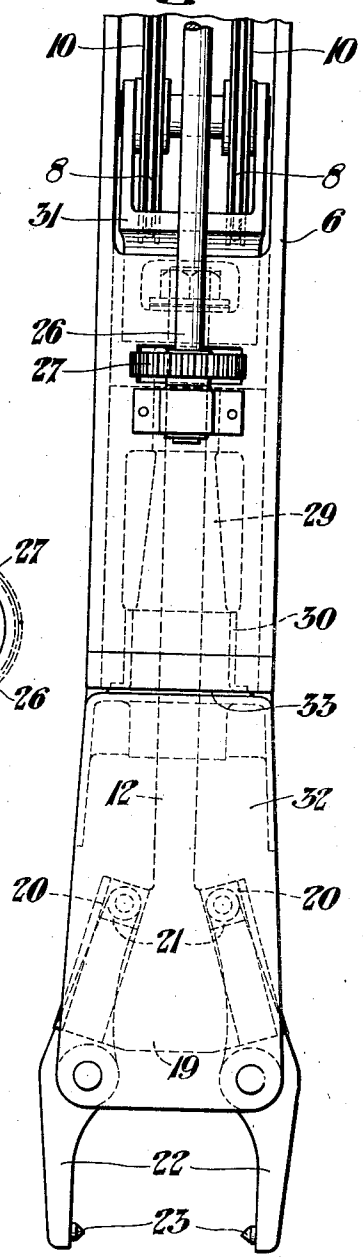


Fig. 5.



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UNITED STATES PATENT OFFICE

2,219,479

TONGS

Robert J. Harry, Alliance, Ohio

Application May 29, 1937, Serial No. 145,409

8 Claims. (Cl. 294—112)

The present invention relates to an improvement in the construction of tongs to increase their gripping power for lifting ingots or the like.

An object of this invention is to materially increase the initial grip of the tongs upon cold or hot top ingots.

The initial grip of the tongs upon the ingot is very important in handling cold ingots or hot top ingots that cool very rapidly and, although the body of the ingot may be red hot, the top may be cool and, due to the taper, is very hard to grip. The initial grip upon the ingot of tongs now in practical use is obtained by the weight of the operating rod and the crosshead. While effective to a considerable extent, this does not insure positive gripping of the cold ingot, and elimination of the existing danger of having the ingot slip from the tongs after having been hoisted into the air for removal to the soaking pits. However, under the present invention, the initial gripping power of the tongs upon the cold ingot is materially increased, and the possible danger of the ingot slipping from the tongs is eliminated.

Other objects and advantages will become apparent as the description proceeds, in which:

Figure 1 is a sectional elevation of the operating mechanism of the present invention;

Figure 2 is a section on line II—II of Figure 1;

Figure 3 is a section on line III—III of Figure 1;

Figure 4 is a sectional elevation of another form of the invention;

Figure 5 is a side view of Figure 4; and

Figure 6 is a section on line VI—VI of Figure 4.

In the drawings, the numeral 2 represents overhead track supporting frames upon which are positioned rails or tracks 3. Any conventional type of wheels 4 are suitably supported on opposite ends of a trolley frame 5, and are adapted to be positioned on the rails 3 whereby said trolley frame may be moved thereover. The trolley frame is provided with an opening within which a relatively heavy travelling column 6 is vertically movable, said column comprising one of the essential elements of my improved tongs.

A main hoisting drum 7, suitably mounted on said trolley frame, is provided with two sets of cables 8 and 9. The cables 8 extend around sheave wheels 10 which are directly connected to a tong operating and supporting rod 12 movably disposed vertically and centrally within the column 6. The other ends of cables 8 are dead-ended at 14 to said trolley frame 5 and, in order to prevent shock to the crane, this dead-end connection is usually provided with springs 15 adapted to absorb any shock.

The other set of cables 9 extends around sheave wheels 16 which are carried by the travelling column 6, said cables being wound upon a tongs-operating drum 17 journalled in a support 18 carried by the trolley frame 5, thereby providing an actuating means for raising and lowering said column. The column 6 is provided with elongated apertures 25 which permit bearings of the sheaves 16 to slide vertically therein, permitting relative vertical movement of said sheaves and column to release the weight of the latter as hereinafter described.

Mounted upon the lower end of said operating rod 12 is a cam 19 preferably in the form of oppositely disposed cam-ways or channels 20 positioned and arranged divergently downward and slidably receiving followers or slide-blocks 21 carried by the upper ends of the tong grips or tongs proper 22. The said tongs 22 are pivotally mounted on opposite sides of the lower end of the column 6 below the cam means 19 and are provided on their depending terminal ends with bits 23 to engage and grip an ingot 24 or the like therebetween.

In operation, the drum 17 is actuated to raise sheaves 16 and column 6 with the tongs proper 22, so as to support the weight of the column and move slide-blocks 21 of the tongs inwardly and upwardly within their cam-ways 20 to open the tongs. The drum 7 is then operated to lower the entire tong assembly to position the tong grips 22 over the end of an ingot or other work 24 to be lifted.

In such position, the drum 7 is stopped, thereby supporting the rod 12 with its cam 19 immediately over or with a provided terminal anvil 13 in contact with the top of the ingot. With the position of the rod and cam thus fixed, drum 17 is operated to lower the column 6, whereby the terminal ends of the tong grips 22 are contracted by the outward movement of their upper portions due to the travel of their slide-blocks 21 in the downwardly diverging cam-ways 20.

As the said grips engage the ingot or the like, the downward movement of the column 6 imparts the entire weight of said column to the closing movement of the grips through the cam action described, to provide a substantial initial grip in direct proportion to the weight of the column. The downward travel of column 6 is arrested upon engagement of the grips and ingot, and further downward travel of the sheaves 16 in the vertical slots 25 in the column 6 re-

leases the full weight of the column upon said cam and grip mechanism. The lost motion travel of the sheaves 16 in said slots 25 also serves to maintain the cable 8 taut under the weight of said sheaves, to maintain the proper relation thereof for further operation.

Upon gripping the ingot in the manner described, the drum 7 is driven to raise the tong assembly and ingot, the cables 8 and 9 being wound on the same drum without altering their relationship to the tong-gripping mechanism, the weight of the tongs and ingot being supported by the cables 8 and rod 12 while being raised.

To release the tongs, the drum 17 is operated to raise sheaves 16 to engage their bearings with the upper ends of the slots 25 and thence to raise the column 6, whereupon the tong grips are opened by the reverse action of the cam-ways 20. Upon releasing the tongs, the drum 7 may be operated to raise or lower the entire assembly as described.

In the showing of Figures 4 to 6, inclusive, the operation of the column 6 and tongs 22 is the same as that shown and described in Figures 1 to 3, inclusive, except in this showing, the tongs can be revolved in the column as will be hereinafter described.

Mounted in suitable bearings upon the outside of said travelling column 6 is a shaft 26 adapted to be driven by any conventional means for imparting rotation to a gear wheel 27 which is constantly in mesh with a gear wheel 28 keyed on a rotatable member 29. Suitable bearings support the rotatable member 29 within the column 6. The rotatable member 29 is provided with a central vertical opening through which said operating rod 12 is adapted to move in order to be raised or lowered by said set of cables 8 when the main hoisting drum 7 is operated. The shroud of the sheave wheels 10 supports the end of said operating rod 12 for swivel movement when said tong assembly is rotated by the gear wheels 27 and 28.

The rotatable member 29 extends below the end of said column 6 to form a housing 32 which is adapted to enclose the sliding block 19, guides 20 and members 21 carried by the ends of said tong grips 22. This housing is provided with a shoulder 33 abutting the surface of the lower bearing member 30 which permits a rotative movement of the tongs 22 independent of the column 6.

Under such a construction, it is possible not only to obtain the improved initial gripping action of the tongs upon the ingot as hereinbefore described, but also affords a means whereby the ingot may be rotated after having been gripped by the tongs, or if desired, the tongs may be rotated to properly position them for gripping an ingot.

While I have shown and described a specific embodiment of the invention, it will be understood that I do not wish to be limited exactly thereto since various modifications may be made without departing from the scope of the invention as defined by the following claims.

I claim:

1. Tongs including a pair of relatively movable members, movable tong grips mounted on one of said members and cam means on the other member adapted to be engaged by the tong grips to impart a gripping movement to the latter, means for suspending one of said members, and means for lowering and releasing the other member, said cam means and grips coacting to support the weight of said released member and exert a gripping force between the grips in proportion to said weight.

2. Tongs including a vertically movable column, tong grips pivotally mounted on the column, an operating rod having cam means thereon adapted to be engaged by the grips to impart a gripping movement to the latter, means for suspending the operating rod, and means for lowering and releasing the column, said cam means and tong grips coacting to support the weight of said column and exert a gripping force between the grips in proportion to said weight.

3. Tongs including a vertically movable column, tong grips pivotally mounted on the column, an operating rod having cam means thereon adapted to be engaged by the grips to impart a gripping movement to the latter, means for suspending the operating rod, means for lowering and releasing the column, said cam means and tong grips coacting to support the weight of said column and exert a gripping force between the grips in proportion to said weight, and means for simultaneously raising or lowering the operating rod and column while maintaining their relative positions and the said gripping force between the tong grips.

4. Tongs including a vertically movable column, tong grips pivotally mounted on the column, an operating rod having cam means thereon adapted to be engaged by the grips to impart a gripping movement to the latter, cables and a sheave supporting the operating rod, and cables and a sheave supporting the column, means for driving the column cables to lower said column, means providing for lost motion between said column and its sheave to release the column from support by its cables, said cam means and tong grips coacting to support the weight of the column upon the release thereof and exert a gripping force between the grips in proportion to said weight, and a drive for all of said cables for simultaneously raising or lowering the operating rod and column while maintaining their relative positions and the said gripping force between the tong grips.

5. Tongs including a vertically movable column, an operating rod disposed centrally within the column, a pair of downwardly divergent camways carred by said rod, a pair of tong elements pivotally mounted on and adjacent the lower end of the column, said elements having portions above their pivots slidable in the cam-ways and having gripping portions depending below the column, means for suspending the operating rod, and means for lowering and releasing the column, whereby the cam-ways and tong elements coact to support the weight of the column, the cam-ways actuating the tong elements to exert a gripping force between their grip portions in proportion to the weight of the column.

6. Tongs including an operating rod, a vertically movable column associated therewith and carrying a pair of movable tong grips, cam means on the operating rod engageable by the tong grips to impart a gripping movement thereto, means for lowering the column and the grips with the latter in engagement with the cam means, and means for releasing the column in lowered position whereby the weight thereof is applied to the gripping movement of the tong grips.

7. Tongs including an operating rod, a vertically movable column associated therewith and carrying a pair of movable tong grips, cam means

on the operating rod engageable by the tong grips to impart a gripping movement thereto, means for lowering the column and the grips with the latter in engagement with the cam means, means for releasing the column in lowered position whereby the weight thereof is applied to the gripping movement of the tong grips, and means for raising or lowering the operating rod while maintaining the relative position of said rod and the column to maintain the gripping force between the tong grips.

8. In a device of the class described, a supporting column, an operating rod in said column, means for vertically moving said operating rod, a rotatable member within said column, said rotatable member provided with a housing extending beyond the end of said column, tongs pivotally mounted on said housing, means for moving the tongs about their pivot for gripping an ingot when the column is lowered, and means for maintaining the grip upon the ingot when the operating rod is raised.

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