

No. 870,764.

PATENTED NOV. 12, 1907.

A. CHRISTIANSON.
GRIPPING TONGS.

APPLICATION FILED DEC. 22, 1906.

2 SHEETS—SHEET 1.

FIG. 2

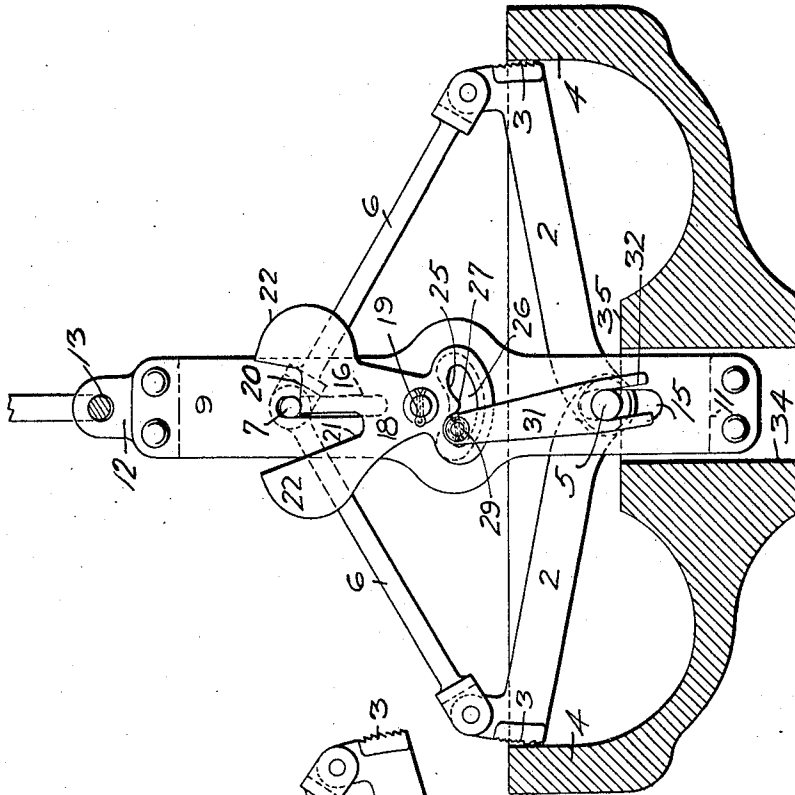
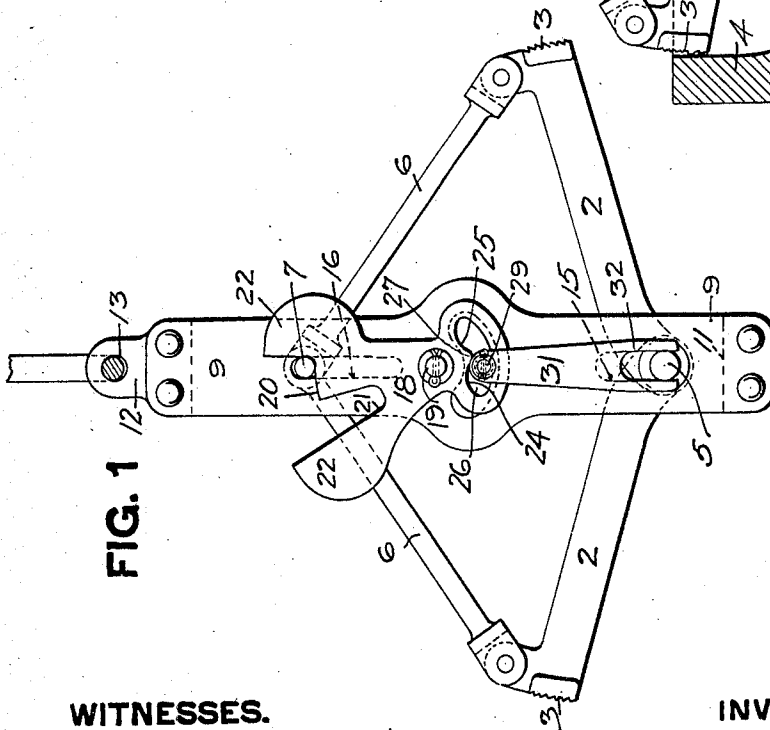


FIG. 1



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2 SHEETS—SHEET 2.

FIG. 4

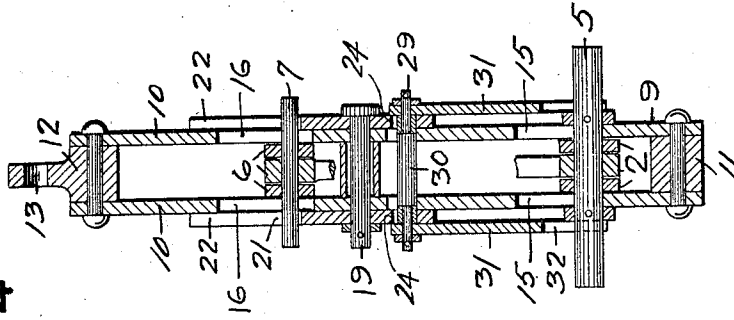
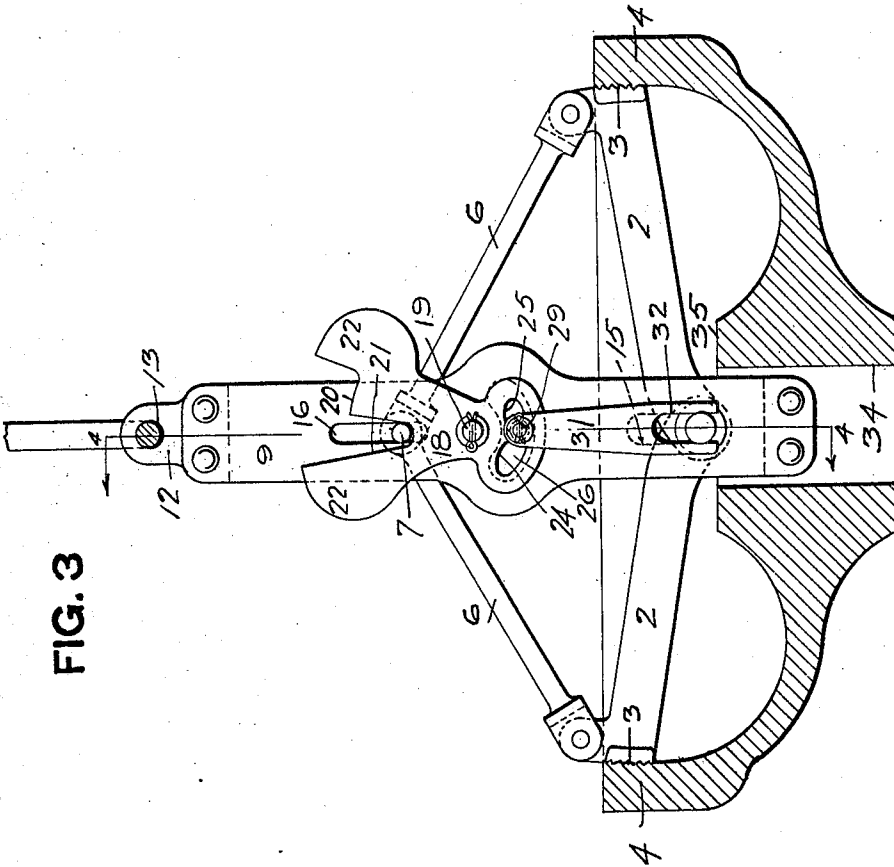


FIG. 3



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ANDREW CHRISTIANSON, OF BUTLER, PENNSYLVANIA.

GRIPPING-TONGS.

No. 870,764.

Specification of Letters Patent.

Patented Nov. 12, 1907.

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To all whom it may concern:

Be it known that I, ANDREW CHRISTIANSON, a resident of Butler, in the county of Butler and State of Pennsylvania, have invented a new and useful Improvement in Gripping-Tongs; and I do hereby declare the following to be a full, clear, and exact description thereof.

This invention relates to lifting mechanism and more especially to mechanism for use in mills and manufacturing plants for the purpose of engaging various articles, lifting the same and carrying to another part of the mill or plant and then disengaging the same.

The object of the invention is to provide mechanism of this character which operates automatically both for gripping or engaging the article and for releasing the same, these results being accomplished by the mere raising and lowering of the mechanism, such as by means of an ordinary crane.

The invention comprises, generally stated, gripping or article engaging members together with suspending means therefor and means actuated automatically by the mere raising and lowering of the mechanism for alternately opening and contracting said gripping members. The invention also comprises the combinations of parts hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a side view of the mechanism showing the grippers in open or idle position; Fig. 2 is a similar view showing the mechanism in the act of engaging an article; Fig. 3 is a similar view showing the parts after engaging the article and lifting the same; and Fig. 4 is a central vertical section of the mechanism taken on the line 4—4 Fig. 3.

The mechanism is capable of being embodied in various forms and for the purpose of engaging, carrying and releasing various articles and I wish it, therefore, understood that no limitations are to be imposed upon the terms of the claims hereinafter made, either by the specific illustration or the specific description herein contained.

As shown in the drawings, the mechanism is adapted for engaging and lifting large bodies which are to be engaged interiorly, such, for instance, as a partially forged wheel blank. The mechanism comprises article gripping or engaging members 2 in the form of arms or levers provided at their outer ends with gripping jaws or faces 3 for engaging the inside face of the upwardly projecting portion 4 of the wheel blank. These gripping members, at their inner ends, are pivotally mounted upon a suitable supporting member, which in this case as a pin or stub shaft 5. To the outer ends of the gripping arms or levers 2 are connected links or rods 6 which may, if desired, be replaced by chains or other suitable members. The upper ends of these links are pivotally connected, as by means of the pin or stub

shaft 7, so that said levers in effect act like toggles. For convenience of connection both at the pin 5 and at the pin 7, one of the arms 2, as well as one of the links 6, is forked so as to admit the end of the other thereof between the limbs thereof.

9 indicates a suitable suspending frame, this comprising the side members 10 suitably spaced apart, as by means of the bottom piece 11 and top piece 12 so as to receive between said side members the gripping levers 2 and links 6. This frame is adapted to be suspended by any suitable means, such as by being provided with an eye 13 for attachment to the hook or chain of a crane derrick or other suitable lifting mechanism.

The side members of the suspending frame are provided near their lower ends with vertical slots 15 through which the ends of the pin 5 project, and near their upper ends with vertical slots 16 longer than the slots 15 and through which the ends of the pin 7 project, thus giving the frame a certain amount of vertical movement independently of either the pin 5 or pin 7, or in other words, providing a lost motion connection between said suspending frame and the links, and also between said frame and the gripper arm supporting or connecting member 5.

My invention operates upon the principle of supporting or suspending the grippers alternately from the pin 5 and from the pin 7, thus in the first instance causing the gripping arms to expand and grip and carry the article and in the second instance causing the gripping arms to be contracted in order to release the article. Suitable means, acting automatically by the mere lifting and lowering of the device, are provided for alternately connecting the suspending frame to the pins 7 and 5. This automatic connecting mechanism in the specific embodiment shown comprises a pair of movable members 18 in the form of oscillating plates pivoted to the side members of the suspending frame on the pin 19. These oscillating plates are provided with shoulders 20 which, when the plates are in position to bring the shoulders underneath the pin 7, as shown in Fig. 1, support said pin 7 and thereby connect said pin to the suspending frame so that in this position the links 6 pull upwardly on the outer ends of the arms 2 and collapse the latter. Adjacent to these shoulders, the plates are provided with the notches 21 which, when swung into line with the pin 7, as shown in Fig. 3, enable the latter to drop down into the notches 21, or in other words, permit the suspending frame to rise without said plates contacting with the pin 7 to lift the latter. In this position the suspending frame carries the grippers by contact of the pin 5 with the lower ends of the slots 15, thus carrying said pin 5

and causing the gripping arms 2 to expand. The plates 18 have portions 22 projecting upwardly above the upper ends of the slots 16, but these are merely for the purpose of preventing the plates 18 from swinging too far in either direction.

The means for oscillating the plates 18 in order to bring either the shoulders 20 or notches 21 into line with the pin 7 comprises two cam shaped faces 24 and 25 forming the upper wall of an opening 26 in the lower ends of these plates, and separated by the projecting portion 27. Extending through the openings 26 of the plates 18 is a bar, pin or bolt 29 surrounded by a sleeve 30 and having its ends secured to the upper ends of arms or bars 31, whose lower ends are forked, as shown at 32, and straddle the ends of the pin 5.

The operation of the mechanism is as follows: The frame 9 will be suspended from the hook or chain of a crane, derrick or other suitable lifting mechanism. We will suppose that an article has just been released and the mechanism is in position, shown in Fig. 1, to engage another article. The plates 18 are in such position that the shoulders 20 engage the pin 7, thus connecting said pin to the suspending frame and through said pin carrying the links 6 and arms 2, the pin 5 being free to drop down in the slots 15. Obviously, in this position the gripping arms 2 are collapsed or contracted. In this position the device is brought over the article to be gripped and lifted, such as the wheel blank shown. The mechanism is lowered down, the lower end of the frame passing down into the eye or bore 34 of the wheel hub, thus guiding the gripping mechanism to position. In this downward movement the projecting ends of the pin 5 contact with the upper edge of the hub 35 of the wheel blank and said pin is held by the latter against further downward movement. The frame, however, continues to drop, thus causing the pin 5 relatively to rise in the slots 15 and also thereby relatively carrying or pushing upwardly on the arms or bars 31. This continued movement finally causes the bar 29, carried by the arms 31, to engage the cam faces 24 on the plates 18 and the further upward movement of said bar 31, or more strictly speaking, the continued downward movement of the frame, causes the bar 29 to push upwardly on the cam face 24 and on account of the incline of this cam face the arms 31 swing on the pin 5, carrying the bar 29 toward the left (viewing Fig. 2) and pushing against the plates 18 on the left hand side of the center of their pivotal points 19. Consequently, said plates are rotated on said pivot 19, and swung to the position shown in Fig. 3. This withdraws the shoulders 20 on the plates 18 from underneath the pin 7 and brings the recesses 21 of said plates into line with said pin. As soon as this is effected the operator lifts the suspending frame 9. In the upward movement of said frame the pin 7 at the upper ends of the links 6 merely drops in the slots 16, but in the upward movement the lower ends of the slots 15 finally come against the pin 5, the slots 15 and 16 being of such lengths relatively that this will occur before the bottom of the slots 15 or recesses 21 will come into contact with the pin 7. Conse-

quently, the gripping arms will be lifted by the pin 5, thus causing the arms 2 to swing outwardly as toggles to a substantially horizontal position, shown in Fig. 3, and gripping the interior of the wheel blank. In this position the article can be lifted and carried to any point desired.

In the foregoing lowering movement the projecting cam portions 27 of the plates 18 were swung beyond the central median line, and in the lifting movement the arms 31 and bar 29 fell back to the central median position of the frame. To disengage the article the operator merely lowers the device until the article strikes the floor. In this downward movement of the mechanism the downward movement of the pin 5 is again arrested by contacting with the now stationary article and the further lowering of the frame causes a repetition of the action of the bar 29 on the plates 18, except that in this instance said bar acts upon the opposite cam faces 25, thus swinging the plates back to the position shown in Fig. 2, bringing the shoulders 20 underneath the pin 7, so that when the frame is again lifted the suspending frame is connected, through the plates 18 and pin 7, to the upper ends of the links 6, thus drawing up on said links and causing the gripping arms 2 to be collapsed (Fig. 1) to disengage the ends thereof from the article. In this position the mechanism can be carried to any desired point and is in position to automatically engage another article by the mere lowering thereof.

While the tongs have been shown and described as provided with jaws which engage the article by a gripping action, it is obvious that they can be modified so as to be provided with openings for receiving lugs on the article, or, vice versa, the tong jaws may be provided with studs or projections to enter openings in the sides of the article. In neither of these cases would the tongs, strictly speaking, grip the article, but would nevertheless engage the same. By the terms "gripping" and "grippers" as used in the claims herein made I intend to cover not only jaws which actually grip the article by a pinching action but also such modifications as merely engage the article either by projections on the article or projections on the jaws.

It will be observed that the device described operates entirely automatically by the mere raising and lowering of the same. In this particular it is essentially different from any shop or mill tongs heretofore devised in which an attendant has always been required to either open the tongs to engage the article, or to open the tongs to release the article. I believe I am the first to devise gripping and carrying mechanism which operates automatically, both to close and to open and which remains open until a new article is engaged.

What I claim is:

1. Lifting mechanism comprising in combination work engaging members, supporting means and actuating means therefor, suspending means having vertical movement independently of said supporting and actuating means, means movable to two positions and arranged in one position to connect the suspending means to the supporting means and in the other position to connect the suspending means to the actuating means, and connections actuated by the

weight of the suspending means on relative vertical movement between the same and the supporting and actuating means and arranged to positively move said connecting means alternately to its two positions.

5 2. Lifting mechanism comprising in combination work engaging members, a supporting member therefor, links arranged to actuate said work engaging members, suspending means having vertical movement independently of said supporting member and links, a member movable to
10 two positions and arranged in one position to connect the suspending means to the supporting member and in the other position to connect the suspending means to the links, and connections actuated by the weight of the suspending means on relative vertical movements between
15 itself and the links and supporting member and arranged to positively move said movable member alternately to its two positions.

3. Lifting mechanism comprising in combination, work engaging levers, a supporting member to which said work engaging levers are pivotally secured, links connected to said levers, suspending means having vertical movement independently of said supporting member and links, means connected to the suspending means and movable to two positions and arranged in one position to connect the
25 pending means and supporting member and in the other position to connect the suspending means and links, and connections actuated by the weight of the suspending means on relative vertical movements between the same and the supporting member and arranged to positively
30 move said connecting means alternately to its two positions.

4. Lifting mechanism comprising in combination, gripping levers, a support to which said levers are pivotally connected, links connected to said levers, suspending means having movement independently of said links and supporting member, a member provided with cam faces and movable to two positions and arranged in one position to connect the suspending means and supporting member and in the other position to connect the suspending means and
40 links, and connections actuated by the weight of the suspending means on relative vertical movements between the same and the supporting member and arranged to engage the cam faces on the movable member and thereby positively move the same alternately to its two positions.

5. Lifting mechanism comprising in combination, gripping levers, a supporting member to which said levers are pivotally secured, toggle links connected to said levers, suspending means for movement independently of said links and supporting member, a movable member connected to the suspending means and having two positions and arranged in one position to connect the suspending means and supporting member and in the other position to connect the suspending means and links, and connections actuated by relative vertical movements of the suspending means and supporting member and arranged to positively
55 move said movable member alternately to its two positions.

6. Lifting mechanism comprising in combination, gripping members, a supporting member to which said grippers are pivotally connected, toggle links connected to the grippers, a suspending frame, and means for alternately connecting said suspending frame to the joint of the toggle links and to the gripper supporting member.

7. Lifting mechanism comprising in combination, gripping levers, a pivotal member for said levers, links connected to said levers, a suspending frame having movement independently of said links and pivotal member, a movable piece connected to the frame and having two positions and arranged in one position to connect the suspending frame and links and in the other position to disconnect the same, and a connecting member between said movable member and the pivotal member and arranged on relative movements between the suspending frame and pivotal member to positively move the movable member
75 alternately to its two positions.

8. Lifting mechanism comprising in combination, gripping members, a supporting member to which the same are pivotally connected, links connected to said grippers, a

suspending frame having movement independently of the gripper supporting member and links, a movable member
80 arranged to alternately connect and disconnect the links to said suspending frame, and means actuated from the gripper supporting member for actuating said movable member.

9. Lifting mechanism comprising in combination, gripping members, a supporting member to which the same are pivotally connected, links connected to said gripping members, a suspending frame having movement independently of said links and gripper supporting member, a member mounted on said suspending frame and movable into
90 and out of engagement with the links, and means actuated by the raising and lowering of the mechanism for moving said member.

10. Lifting mechanism comprising in combination, work engaging levers, links connected with said levers, a suspending frame, pivotal and sliding connections between said suspending frame and said levers and free ends of said links, and means for alternately connecting said frame to the pivotal points of the levers and to the links.

11. Lifting mechanism comprising in combination work engaging levers, links connected to said levers, a suspending frame, pivotal and sliding connections between said suspending frame and said levers and the free ends of said links, a movable member for alternately connecting the free ends of the links to said frame and disconnecting the same therefrom, and automatic means for actuating said movable member.

12. Lifting mechanism comprising in combination, work engaging levers, links connected to said levers, a suspending frame, pivotal and sliding connections between said frame and said levers and free ends of said links, a movable member on said frame, and means actuated by the movement of the levers with reference to the suspending frame for moving said member to alternately connect and disconnect the free ends of the links and said frame.

13. Lifting mechanism comprising in combination, work engaging levers, a member to which the inner ends of said levers are pivotally connected, links connected to the outer ends of said levers, a member to which the free ends of the links are pivotally connected, a suspending frame having a sliding connection with the pivotal members of the levers and links, and automatically actuated means for alternately connecting said frame to said pivotal members.

14. Lifting mechanism comprising in combination, work engaging levers, a member to which the inner ends of said levers are pivoted, links connected to the outer ends of said levers, a member to which the free ends of the links are pivotally connected, a suspending frame having a sliding connection with the pivotal members of the levers and links, a movable piece on the frame, and automatically acting means for alternately moving the same into and out of the path of one of said pivotal members.

15. Lifting mechanism comprising in combination, work engaging levers, a member to which the inner ends of said levers are pivoted, links connected to the outer ends of said levers, a pivotal member for the free ends of the links, a suspending frame having a sliding connection with the pivotal members of the levers and links, a movable piece mounted on the frame, and means actuated from the pivotal member of the levers for moving said piece into and out of the path of movement of the pivotal piece of the links.

16. Lifting mechanism comprising in combination, work engaging levers, a pivotal member to which the inner ends of the levers are connected, links connected to the outer ends of said levers, a pivotal member to which the free ends of the links are connected, a suspending frame provided with vertical slots of different lengths for receiving the pivotal members of the levers and links, a movable piece mounted on the frame and arranged to intercept the longer of said slots, and means actuated from the other pivotal member for moving said piece.

17. Lifting mechanism comprising in combination, work engaging levers, a pivotal member to which the inner ends of said levers are connected, links connected to the outer
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- ends of the levers, a pivotal member to which the free ends of the links are connected, a suspending frame provided with vertical slots for receiving said pivotal members, the slots for the pivotal members of the links being longer than those for the pivotal members of the levers, a movable piece mounted on the frame, and means actuated from the pivotal member of the links for moving said piece alternately into and out of the path of the pivotal member of the links.
- 10 18. Lifting mechanism comprising in combination, work engaging levers, a pivotal member to which the inner ends of the levers are connected, links connected to the outer ends of the levers, a pivotal member to which the free

ends of the links are connected, a suspending frame having vertical movement independent of said pivotal members, a swinging piece mounted on the frame, cam faces formed on said piece, and an actuating member engaging said cam faces and connected to the pivotal member of the levers. 15

In testimony whereof, I the said ANDREW CHRISTIANSON have hereunto set my hand. 20

ANDREW CHRISTIANSON.

Witnesses:

ROBERT C. TOTTON,
J. R. KELLER.