June 9, 1942. J. DRAGAN ET AL 2,286,071

LIFTING DEVICE

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Fig. 1.

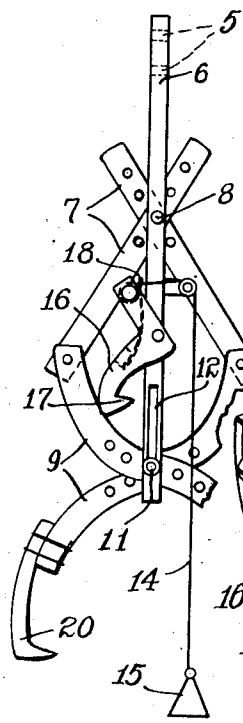



Fig. 2.

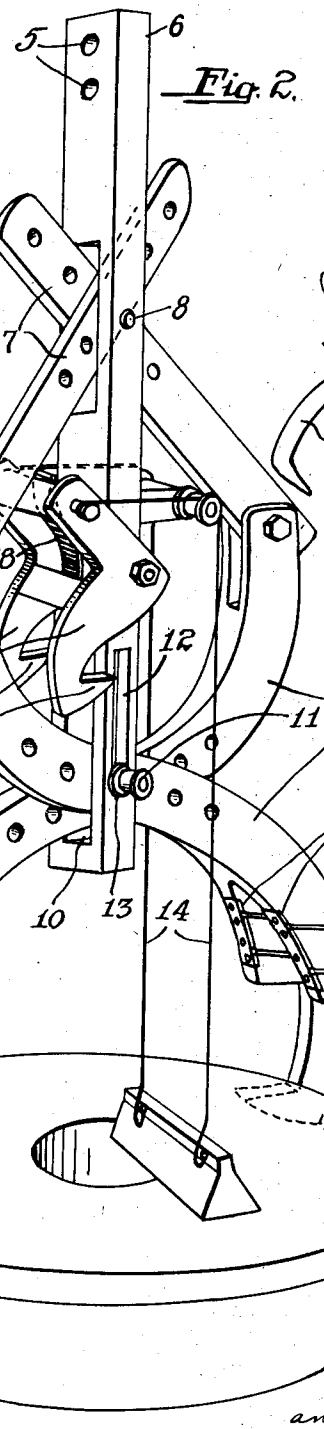
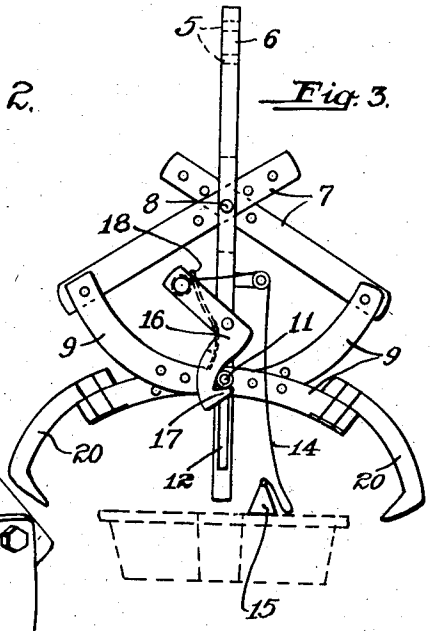



Fig. 3.




INVENTORS
Joseph Dragan
and Nicholas J. Dragan
By Archworth Martin
Their Attorney

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Fig. 4.

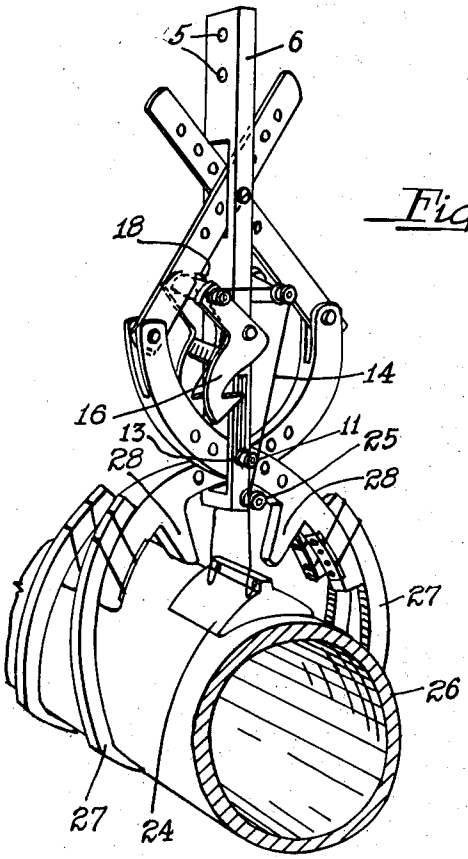
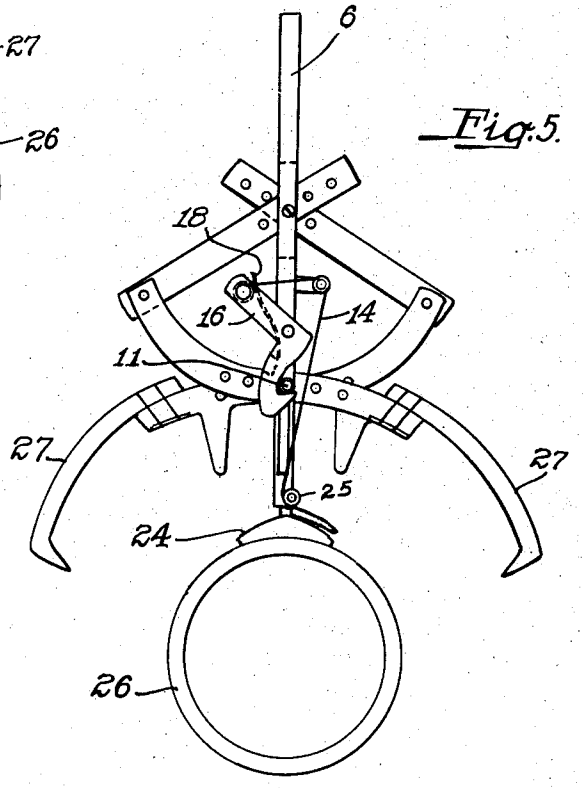



Fig. 5.




INVENTORS
Joseph Dragan
and Nickolas J. Dragan
By Archworth Martin
Their Attorney

Patented June 9, 1942 2,286,071

# UNITED STATES PATENT OFFICE

2,286,071

## LIFTING DEVICE

Joseph Dragan and Nickolas J. Dragan, McKees Rocks, Pa.

Application December 10, 1941, Serial No. 422,318

4 Claims. (Cl. 294—119)

Our invention relates to lifting tongs that are particularly suitable for use with hoisting cranes and the like and has for its object the provision of apparatus whereby the tongs can automatically be actuated to first grip an article; to then release the article after it has been transported to a desired location, and to finally reset the apparatus for engagement with and transporting of another article, all through manipulation of a hoisting or lifting element.

Some of the forms which our invention may take are shown in the accompanying drawings, wherein Figure 1 is a fragmentary view showing the positions occupied by the various parts of the apparatus when tongs are to be lowered for engagement with an article; Fig. 2 is a view on an enlarged scale showing the positions occupied by the parts when gripping an article; Fig. 3 is a view showing the tongs latched in wide-open position; Fig. 4 shows a form of apparatus which may be employed in the handling of pipes, logs and the like, with the tongs in gripping engagement with the article, and Fig. 5 shows the tongs of Fig. 4 latched in open position.

Referring first to Figs. 1 to 3, the apparatus comprises a lifting frame 6, which is here shown as in the form of a bar having slots through which various of the elements extend, it being understood that the frame 6 will be connected to a hoisting crane or some other form of lifting apparatus, whereby the frame and an article carried thereby can be lifted and moved from place to place. Holes 5 are provided for crane hooks or lifting pins. The frame is provided with a slot through which links 7 extend and wherein the links are pivotally held in place by a bolt or pin 8 that extends through holes in the frame and the links, the links being provided with a plurality of holes whereby they may be adjusted in longitudinal directions, to change the effective lengths of the links. At the lower ends, the links 7 are pivotally connected to two tong members 9, which extend in crossed relation through a slot 10 in the lifting member 6. A shaft 11 extends through the tong members 9 to pivotally connect them and through slots 12 in the member 6. This arrangement permits oscillation of the members 9 on the shaft 11 and vertical shifting of the shaft in the slots 12. Spools 13 are provided on the ends of the shaft to serve as pulleys or guides for cables 14 which may be deflected to engage the sides of the spools and hold a weight element 15 in vertical alignment with the lifting bar 6. A latch 16 is pivotally connected to the bar 6 and has hooks 17 for engagement with the ends of the shaft 11 when the lower ends of the tongs are moved to wide spread position as shown in Fig. 3. A spring 18 urges the latch 16 in a counterclockwise direction, so that it will snap over the shaft 11 when the shaft is raised to the upper ends of the slots 12. However, the element 15 has sufficient weight to overcome the force of the spring 18, so that when the weight element is unsupported, as in Fig. 1, it will pull on the latch to release position as in Fig. 1.

At their lower ends, the tong members 9 have detachable connection with hooks 20, whereby various forms of hooks may be substituted, depending upon the nature of the objects to be transported. This detachable fastening consists of metallic rings 21, whose ends rest within the slots formed in the members 9 and 20, the slots in the inner sides of the members 9 being covered by plates 22 detachably held in place by screws. To disconnect a hook from its associated member 9, it is pushed upwardly, thus swinging the links around on their inner ends and providing clear space between the adjacent faces of the members 9 and 20, so that the member 20 can be pushed inwardly to clear their slots from the rings 21, whereupon the hooks can be slid out of position and other slotted hooks slid into place.

With the apparatus ready for use, the parts will be approximately in the position indicated in Fig. 1. When the lifting member 6 is lowered, the hooks 20 will first engage the top of an article and further downward movement of the frame 6 will cause them to be pushed off the edges of the article, the weight 15 meanwhile coming to rest upon the surface of the article. This downward movement of the frame is stopped before the shaft 11 is pushed up far enough to latch with hooks 17. Upon lifting of the frame 16, the lifting force will be transmitted through the shaft 8 to the links 7 and to the tong members 9, causing the hooks 20 to be drawn against the sides of the article and grip the same while it is being raised. When the article has been moved to its destination, the frame 6 will be lowered and the lower ends of the members 9 spread through sliding contact by them with the upper surface of the article, or spread through sliding contact of the hooks 20 with the floor. In either case, the lowering movement is continued until the hooks 20 have been spread to approximately their limit of outward movement, at which time the shaft 11 will have been raised to a point that it is snapped behind the hooks 17. When the frame 6 is then lifted, the hooks 20 will be held against closing,

so that they will clear the article. After the hooks have passed above the plane of the article, the slack in the cables 14 will be taken up and the weight 15 will trip the latch 16 so as to release the shaft 11 and allow the parts to move to the position shown in Fig. 1, ready for another cycle of operations. This form of apparatus can be used not only to lift flanged wheels, but also blocks of wood, ice, etc.

In Figs. 4 and 5, we show an arrangement similar to that shown in Figs. 1 to 3, but which is particularly suitable for the handling of pipes, logs and the like. In this instance, the weight 24 is of somewhat different shape than the weight 15 and is guided by the spools 13 on the shaft 11 and spools 25 on the lower end of the frame 6, so as to reduce tendency of the weight to swing when the tongs are raised and to centralize it on the article 26. When lowering the tongs for releasing the article it is important that the weight engage the top of the article, the cables 14 will be relieved of tension and thus permit the latch 16 to engage the shaft 11 as in Fig. 3.

In this case, as in the case of Fig. 2, the parts are initially in substantially the position shown in Fig. 1, whereupon the frame 6 is lowered, the hooks 27 being spread or pushed outwardly through contact with the article, as the device is lowered. The lowering movement is stopped before the shaft 11 engages the latch 16, and the weight 24 coming to rest upon the top of the article. After the article is transported, another lowering movement of the frame 6 deposits the article at its destination and continued lowering movement thereof causes spreading of the hook members 27 to wide-open position and latching of the shaft 11 by the latch 16. This spreading movement, in the case of the smaller articles, can be effected through engagement of the lower ends of the hooks with the floor, but where they cannot engage the floor, the spreading movement is effected by bosses 28 on the tong members, engaging the article 26 and thereby caused to be pushed in a spreading direction to effect latching of the shaft 11 as in Fig. 5. In this instance, as in the other case, the hooks 27 are then clear of the article, and when the frame 6 is raised sufficiently high, the weight 24 will function to trip the latch and cause the tongs to be retracted to their original position.

We claim as our invention:

1. Lifting apparatus comprising a vertically movable lifting frame, a pair of links pivotally connected to the frame and disposed in relatively angular relation, a pair of tong members each having its upper end pivotally connected to one of the links, a shaft pivotally connecting the tong members intermediate their ends, the shaft being shiftable vertically with respect to the frame, during opening and closing movements of the tong members, a latch carried by the frame, in position to engage and hold the shaft when the tong members are spread to approximately wide-open position at their lower ends and a weight element connected with the latch and operable to disengage the same when the frame is lifted to such height that the weight is free of any supporting surface.

2. Lifting apparatus comprising a vertically movable lifting frame, a pair of links pivotally connected to the frame and disposed in relatively angular relation, a pair of tong members each having its upper end pivotally connected to one of the links, a shaft pivotally connecting the tong members intermediate their ends, the shaft being shiftable vertically with respect to the frame, during opening and closing movements of the tong members, a latch carried by the frame, in position to engage and hold the shaft when the tong members are spread to approximately wide-open position at their lower ends, and a weight element connected with the latch and operable to disengage the same when the frame is lifted to such height that the weight is free of any supporting surface, the tong members being relatively flared at their lower ends, whereby upon lowering movement of the frame they will be spread farther apart when engaging the upper surface of an article to be lifted, to permit their extremities to move off said upper surface and then to engage the sides of the article during upward movement of the frame.

3. Lifting apparatus comprising a lifting frame, a pair of links pivotally connected thereto, a pair of tongs each pivotally connected at its upper end to one of the links, means pivotally connecting the tongs intermediate their ends, the tongs being relatively flared at their lower ends so that upon lowering movement of the frame they will be spread apart when engaging the upper surface of an article to be lifted, to move off said upper surface and then to permit their extremities to engage the sides of the article during upward movement of the frame, means positioned to engage the tongs and automatically latch them in open position through spreading of their lower ends a distance substantially greater than that at which they will be caused to grip the sides of the article through lifting of the frame, and means automatically operable upon movement of the tongs to a distance remote from the article, for disengaging the latch means, to permit movement by the lower ends of the tongs toward closed position.

4. Lifting apparatus comprising a lifting frame, a pair of links pivotally connected thereto, a pair of tongs each pivotally connected to one of the links, means for automatically spreading the lower ends of the tongs when the apparatus is moved in position to engage an article and for causing them to engage the sides of the article upon lifting movement of the frame, means for automatically spreading the tongs when the article has been deposited at a destination, to disengage the tongs therefrom, means automatically operable through spreading movement of the tongs beyond the point of said disengagement for then automatically latching the tongs in open position, and means for automatically unlatching the tongs when the apparatus has been completely removed from the article.

JOSEPH DRAGAN.
NICKOLAS J. DRAGAN.