June 11, 1929. B. CARTWRIGHT 1,717,006

HOISTING AND LOWERING CARRIER

Filed Oct. 12, 1927 3 Sheets-Sheet 1

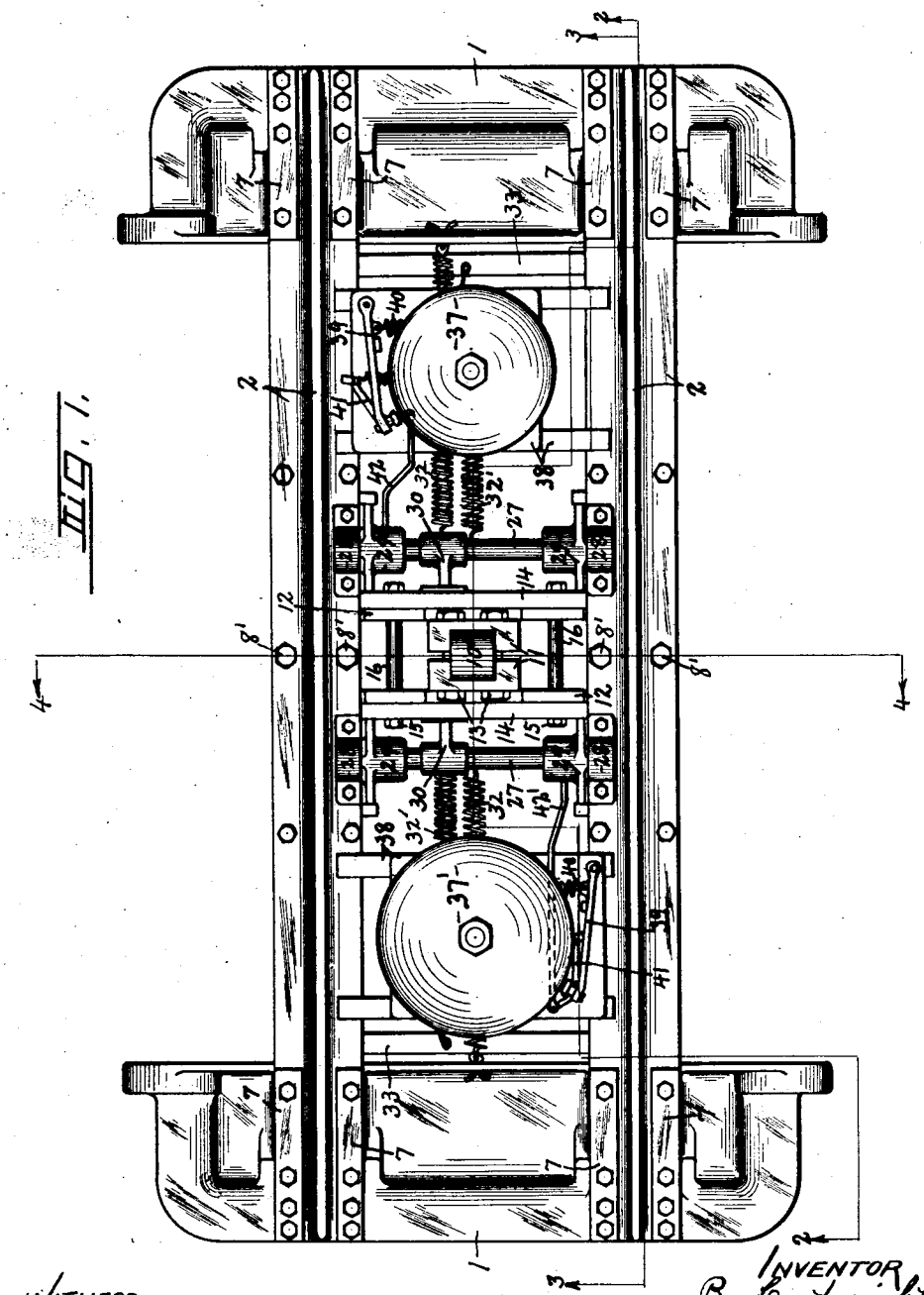


Fig. 1.

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FIG. 2.

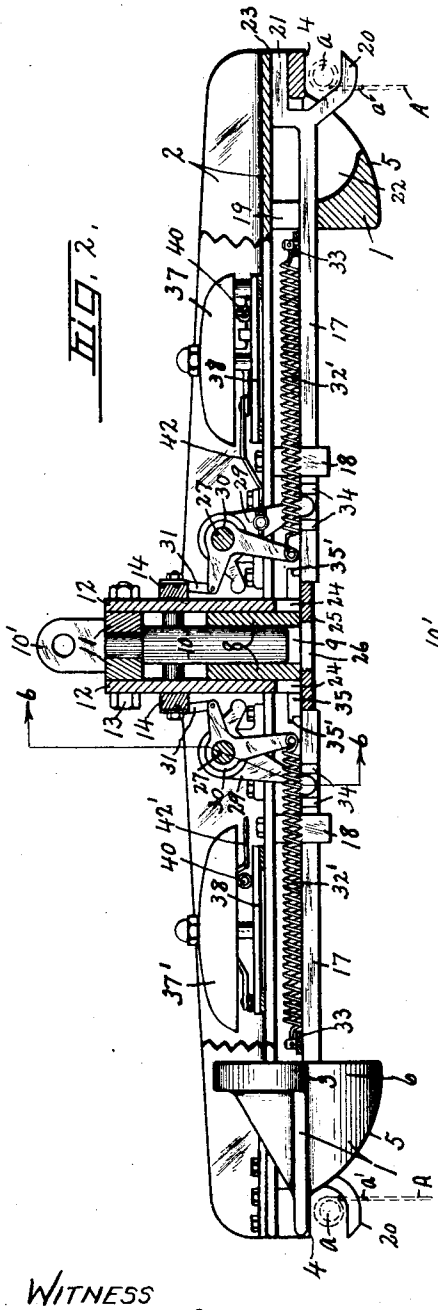
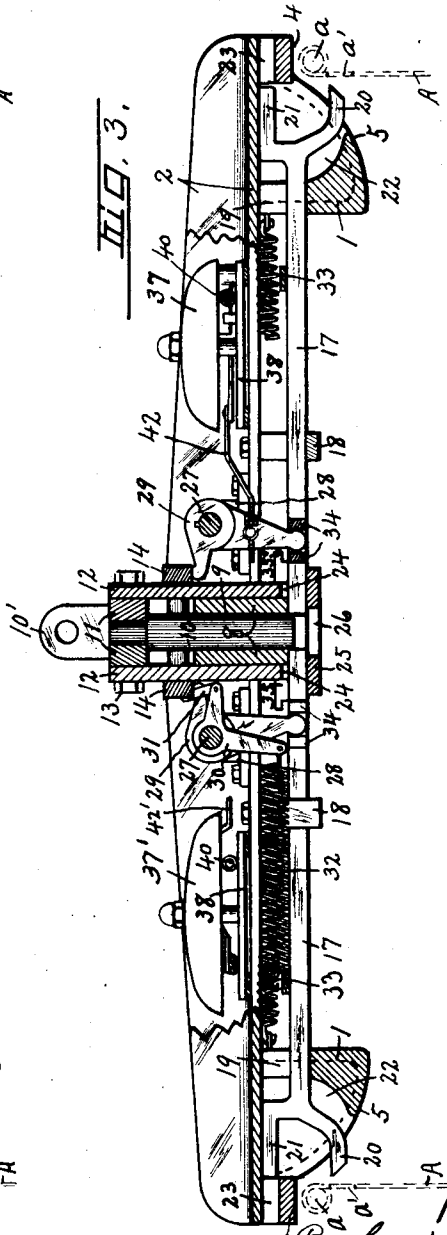


FIG. 3.



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Fig. 4.

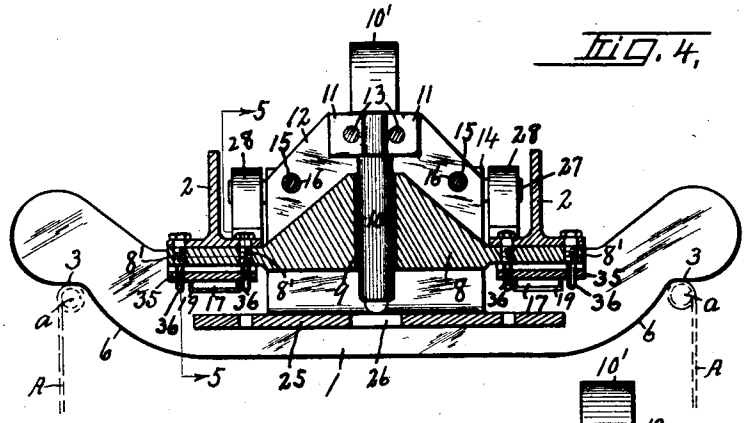


Fig. 5.

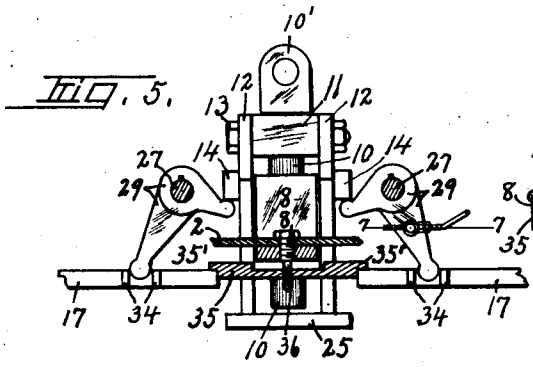


Fig. 6.

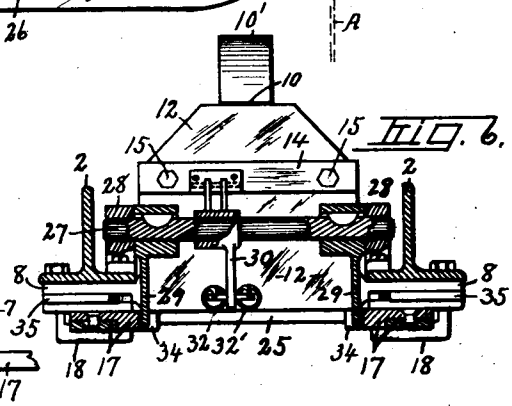
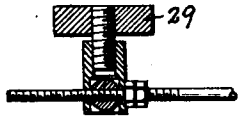


Fig. 7.



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Patented June 11, 1929. 1,717,006

UNITED STATES PATENT OFFICE.

BURR CARTWRIGHT, OF SYRACUSE, NEW YORK, ASSIGNOR TO SYRACUSE WASHING MACHINE CORPORATION, OF SYRACUSE, NEW YORK, A CORPORATION OF DELAWARE.

HOISTING AND LOWERING CARRIER.

Application filed October 12, 1927. Serial No. 225,750.

This invention relates to a hoisting and lowering carrier adapted to be used in connection with overhead conveyors or cranes for grappling, hoisting, carrying, lowering and releasing boxes, containers and other objects which are to be transported from place to place.

One of the objects is to provide the carrier with means whereby when it is lowered upon the object it will automatically lock itself thereto and remain in locking engagement therewith during the hoisting and conveying operation.

Another object is to utilize the same mechanism for automatically releasing the carrier from the object when the carrier with the object thereon is lowered to a position of rest.

In other words, I have sought to provide the carrier with simple and efficient means for automatically locking and releasing it to and from the object as the latter is picked up by the carrier and redeposited thereby reducing to a minimum the time and labor required for transporting objects from one place to another.

Another object is to provide suitable signals preferably distinctive, one to indicate the completion of the locking of the carrier to the object and the other to indicate the complete release of the locking mechanism from the object.

Other objects and uses relating to specific parts of the apparatus will be brought out in the following description.

In the drawings:—

Figure 1 is a top plan of a carrier embodying the various features of my invention showing the locking signal as having just been operated to indicate that the locking mechanism is in its locking position, the release signal being in its normal position.

Figures 2 and 3 are longitudinal vertical sectional views taken respectively in the planes of lines 2—2, and 3—3, Figure 1, except that in Figure 3, the locking mechanism is shown in its unlocked position.

Figure 4 is a transverse vertical sectional view taken in the plane of line 4—4, Figure 1.

Figure 5 is a detail sectional view taken in the plane of line 5—5, Figure 4.

Figure 6 is a transverse vertical sectional view taken in the plane of line 6—6, Figure 2.

Figure 7 is a detail sectional view taken in the plane of line 7—7, Figure 5.

As illustrated, the device is adapted to be used for raising and lowering metal boxes or containers —A— partially shown by dotted lines in Figures 2, 3 and 4 as provided with a marginal bead or flange —*a*— extending around the top thereof and also provided with openings —*a'*— in its opposite end walls directly beneath the marginal flange —*a*— for receiving the locking bolts of the carrier presently described, and in order that the container may be properly balanced and supported by the carrier it is preferable to provide each end wall with a pair of the openings —*a'*— equal distances at opposite sides of the longitudinal center thereof and to also provide the carrier with a corresponding number of locking bolts, two at each end thereof.

With this particular use in mind the carrier comprises a pair of similar parallel longitudinally spaced end heads —1— corresponding approximately to the length of the container —A— and a pair of lengthwise T-rails —2— arranged in parallel spaced relation and having their ends bolted or otherwise rigidly secured to the upper faces of the heads —1— at equal distances from the longitudinal centers thereof to form therewith a rigid frame structure for receiving and supporting the various moving parts of the carrier and also the signals.

The heads —1— are provided with laterally projecting shoulders —3— in transversely spaced relation corresponding approximately to the distance between the side flanges —*a*— of the box —A— and are also provided with end shoulders —4— spaced longitudinally a distance corresponding approximately to the length of the box, said shoulders serving to rest upon the upper face of the marginal flange —*a*— of the box when the carrier is placed in operative position thereon for locking engagement therewith.

The heads —1— are provided with opposite pairs of longitudinally extending cam faces —5— extending downwardly and inwardly from the shoulders —4— for engaging the inner faces of the upper marginal edge of the box and thereby centering the carrier longitudinally thereon, said heads being also provided with additional cam surfaces —6— extending downwardly and inwardly from the shoulders —3— for engaging the inner faces of the upper marginal edge of the

box and thereby centering the carrier transversely thereon.

The T-rails —2— are arranged in an inverted position with their flat heads engaged with flat upper faces of the heads —1— so as to permit those parts to be bolted flatwise against each other for rigidity and strength and, in some instances, additional clamping plates as —7— may be interposed between the heads of the bolts and upper faces of the bottom flanges of the rails where they overlap upon the heads —1— to additionally strengthen the connection between the rails and heads.

A cross bar —8— is rigidly secured by bolts —8′— to the undersides of the rails —2— midway between the ends thereof and in equally spaced relation to the inner faces of the heads —1— to form a part of the main supporting frame and is provided with a central vertical guide opening —9— for receiving and guiding a vertically movable plunger —10—, the intermediate portion of the cross bar —8— being enlarged vertically in more or less truss form for reinforcing purposes and also to increase the length of the guide opening —9— while the opposite sides of said bar underlying the rails —2— are of less vertical depth and substantially flat for purposes hereinfater described.

The upper end of the plunger —10— is provided with an enlarged apertured draft head —10′— constituting a means for attachment to any suitable hoisting and lowering device such as on overhead conveyor or crane, not shown.

The portion of the plunger —10— directly below the draft head —10′— is reduced in diameter for receiving a pair of opposite clamping plates —11— carrying a pair of opposite guide plates —12— which extend downwardly therefrom across and in sliding contact with the opposite flat faces of the cross bar —8— to assist in guiding the plunger —10— in its vertical movement.

The upper portions of the guide plates —12— are secured to the opposite faces of the clamping plates —11— and the latter secured to the reduced portion of the plunger —10— by means of bolts —13— as shown more clearly in Figures 2 and 4.

It is now clear that the plunger —10— and guide plates —12— are free to move vertically in unison relative to the cross bar —8— upon which those parts are guided, the plates —12— being held in parallel spaced relation corresponding to the lengthwise thickness of the adjacent portion of the cross bar with just sufficient clearance to permit said free vertical movement of the plunger and guide plates.

A pair of cross bars —14— are secured by bolts —15— to the outer faces of the guide plates —12—, said bolts being extended across the intervening space between the guide plates at opposite sides of the plunger —10— and some distance above the upper edge of the cross bar —8— of the frame and are provided with spacing sleeves —16— for holding the guide plates in relatively fixed spaced relation to avoid excessive frictional engagement of the guide plates with the opposite end faces of the cross bar —8—, it being understood that the transverse widths of the guide plates —11— is less than the distance between the rails —2— to avoid friction therewith as the plunger and guide plates are moved vertically.

These cross bars —14— are straight and parallel and are disposed in substantially the same horizontal plane some distance above the upper face of the adjacent portion of the cross bar —8— of the frame to move vertically with the plunger —10— and guide plates —12— and together with said plunger and guide plates constitute a part of the mechanism for controlling the operation of a plurality of, in this instance four, locking bolts —17— in a manner hereinafter explained.

These locking bolts are preferably arranged in pairs directly beneath and lengthwise of the rails —2— and in substantially the same horizintail plane equal distances from the longitudinal center of the frame, those of each pair being alined with each other endwise in more or less longitudinally spaced relation for endwise movement in reverse directions.

The intermediate portions of the locking bolts are supported in suitable guide brackets —18— on the undersides of the corresponding rails —2—, the outer ends of said locking bolts being guided in suitable openings —19— in the adjacent cross heads —1— and are preferably bifurcated to form lower and upper lock arms —20— and —21—, which are movable in suitable chambers —22— in the lower outer sides of said cross heads as shown more clearly in Figures 2 and 3, the lower arms —20— being adapted to engage in the apertures —*a*′— of the box —A— while the upper arms —21— are movable in additional guide openings —23— in the outer portions of the heads —1— to interlock therewith simultaneously with the interlocking engagement of the arms —20— with the box —A—.

The adjacent ends of each pair of locking bolts —17— are movable in guide openings —24— in the lower portions of guide plates —12— and just above a locking plate —25— which is riveted or otherwise secured to the lower edges of the guide plates —12— across the guide openings —24— and adapted to move to and from a position between the adjacent ends of the bars of the locking bolts of each pair as the plunger 10 and guide plates —12— are moved vertically to different positions, said locking plate —25— being provided with a central opening —26— to facili-

tate the assembly of the plunger and guide plates upon the cross bar —8—.

A pair of cross shafts —27— are journaled in suitable bearings —28— on the lower inner flanges of the rails —2— in longitudinally spaced parallel relation adjacent the outer faces of the cross bars —14— on the guide plates —12— and preferably at equal distances from the axis of the plunger 10 and are each provided with a pair of bell-crank levers —29— keyed or otherwise secured thereto for transmitting motion from the adjacent cross bars —14— to the locking bolts —17— as the plunger —10— and guide plates —12— are reciprocated vertically in a manner hereinafter more fully explained.

Additional ball-crank levers —30— are loosely mounted upon the intermediate portions of the rock shafts —27— and are provided with inwardly projecting arms connected by links —31— to the adjacent cross bars —14—, the other arms of said levers being extended downwardly and connected to the inner ends of opposite pairs of longitudinally extending coiled springs —32— and —32′— having their outer ends attached respectively to the end heads —1— and to the intermediate portions of cross bars —33— which connect the corresponding locking bolts —17—.

The springs —32— having one end connected to a lever 30 and the other end connected to head —1— will serve to operate the levers —30— to draw the plunger —10— and parts carried thereby downwardly to the position shown in Figure 5 for forcing the locking bolts to their locking positions while the springs —32′— having one end connected to a lever 30 and the other end connected to a cross bar —33— which connects the sliding locking bolts 17 will serve to withdraw the bolts from their locking positions when the locking plate —25— is displaced from between the inner ends of the locking bolts as shown in Figure 3.

The bolt operating levers —29— are secured to their respective shafts —27— adjacent the inner edges of the rails —2— and are provided with upper arms projecting inwardly beneath and in the path of movement of the cross bars —14— on the plunger plates —12—, the other arms of said levers being extended downwardly between longitudinally spaced lugs —34— on the inner sides of the adjacent locking bolts —17— for transmitting motion from the levers to their respective locking bolts and from the locking bolts to the levers.

For example, when the carrier is lowered upon and supported by the box —A— or other support and the upward pull of the hoisting device upon the upper end of the plunger —10— is completely released, said plunger and parts mounted thereon including the guide plates —12—, locking plate —25— and cross bars —14— will drop by their own weight aided by the springs —32— to the position shown in Fig. 5, thus lowering the locking plate 25 below the locking bolts 17.

This dropping of the plunger causes the cross bars —14— to engage and depress the inwardly projecting arms of the levers —29— thereby rocking the lower arms of said levers outwardly for forcing the locking bolts —17— into locking engagement with the box —A— and outer ends of the heads —1— or slightly beyond the locking position shown in Figure 2 at which time the inner ends of the locking bolts of each pair will have been drawn apart a distance slightly greater than the longitudinal width of the locking plate —25— to receive a pair of slightly wider superposed locking plates —35— which automatically drop in place by their own weight to temporarily hold the locking bolts in their locking positions until displaced by the locking and lifting plate —25— as the latter is being raised relative to the locking bolts 17 by the hoisting device preparatory to hoisting the carrier with the load locked thereon.

During the downward movement of the plunger —10— and parts carried thereby as just previously described, the inwardly projecting arms of the bell-crank levers —30— will be depressed by the coresponding cross bars —14— through the medium of the links —31— thereby rocking the lower arms of said levers outwardly to release the tension upon the springs —32— and —32′— and thus permit the levers —29— to force the locking bolts to their locking position with less resistance of the springs.

As shown more clearly in Figure 4 the locking plates —35— are yieldingly mounted in a horizontal plane upon suitable guide pins —36— on the cross bar —8— between the opposite sides of said cross bar and corresponding sides of the locking plate —25—, each locking plate —35— being provided with opposite end flanges —35′— adapted to rest upon the upper faces of the adjacent ends of the locking bolts —17— when in its locking position, as shown in Figure 5.

When the locking bolts —17— are positively interlocked in the openings —a'— of the box —A— and temporarily locked in that position by the plate —35— the hoisting apparatus may be operated to lift the plunger —10— and parts carried thereby causing the opposite sides of each locking plate —25— to enter between the inner ends of the locking bolts —17— and thereby to displace the locking plate —35— upwardly a sufficient distance above the horizontal plane of the locking bolts to permit the locking plate —25— to assume its locking position between the inner ends of the locking bolts to hold the latter in their locking positions as shown in Figure 2 against the action of the springs —32— and incidentally holding the bell-

crank levers —29— from returning to their normal positions or in the position shown in the same figure.

It will be observed, however, that this upward movement of the plunger —10— and parts carried thereby causes a corresponding inward rocking movement of the lower arms of the levers —30— for placing the springs —32— and —32′— under greater tension at which time the locking plate —25— which is then in its locking position for holding the locking bolts —17— in their locking positions, engages the lower face of the cross bar —8— and also forces the plates —35— against the undersides of the adjacent portions of the cross bar so that as the hoisting operation continues the carrier with the box locked thereto may be lifted and conveyed to any desired place for deposit.

Now, as the hoisting device is operated to lower the carrier and release the box or other load carried thereby to a position of rest the continued release of the upward pull upon the push rod —10— will permit said plunger and parts carried thereby to drop by its own weight until the locking plate —25— is displaced from between the adjacent ends of the locking bolts —17— allowing the springs —32— to instantly withdraw the locking bolts from their locking positions to their unlocked positions as shown in Figure 3 leaving the locking plates —35— resting upon the upper faces of the adjacent ends of the locking bolts.

It is evident that during this downward movement of the plunger —10— and parts carried thereby the lower arms of the levers —30— will be moved outwardly by reason of their link connections —31— with the cross bar —13— but the springs —32 —will still be sufficiently tensioned to cause the withdrawal of the locking bolts from their locking positions.

During this withdrawal of the locking bolts the lower arms of the levers —29— of each pair will be rocked toward each other thereby rocking the free ends of the upper arms of said levers upwardly until limited by their engagement with the undersides of the adjacent cross bars —14—, it being understood that the levers —29— and cross bars are relatively adjusted and timed so as to stop the inward movement of the locking bolts —17— and downward movement of the plunger —10— and parts carried thereby at about the same time the outer ends of the locking bolts are withdrawn from locking engagement in the apertures —*a*′— of the box.

At this time the further lowering of the plunger —10— and parts carried thereby may be checked by the stoppage of the lowering mechanism as determined by a suitable signal hereinafter described, leaving the locking plate —25— in engagement with the lower faces of the adjacent ends of the locking bolts —17— and the inner ends of the locking bolts a sufficient distance apart to permit further downward descent of the plunger between them.

The guide openings for the inner ends of the plungers in the lower ends of the guide plates —12— are of sufficient vertical height to permit additional downward movement of the plunger when the locking bolts are withdrawn from the opening —*a*′— in the box —A—.

When the movable parts are in a position just described, the carrier may be hoisted, conveyed and lowered into engagement with another box which is to be transported from its place of rest ready for a repetition of the locking operation, previously described.

That is, when the carrier is lowered upon the box so as to rest thereon the release of the upward pull of the hoisting device upon the upper end of the plunger —10— will permit the plunger and parts carried thereby to descend by their own weight from the position shown in Figure 3 to the position shown in Figure 5, thereby operating the levers —30— to reduce the tension of the springs —32— and —32′— and also cause the operation of the levers —29— to move the locking bolts —17— outwardly until interlocked in the apertures —*a*′— of the box, at the same time withdrawing the inner ends of the locking bolts a sufficient distance apart to allow the locking plates —35— to drop between the adjacent ends of both pairs of bolts for temporarily holding them in their locked position thus completing the cycle of operation.

The carrier is provided with suitable signals, one of which is adapted to be operated instantly upon the withdrawal of the bolts from their locking position and the other to be operated instantly upon the completion of the movement of the bolts to their locking position.

These signals preferably consist of standard types of bells —37— and —37′— which are mounted upon cross frames —38— secured upon the lower inner flanges of the rails —2— between the heads —1— and cross shafts —27—, said signals being provided with the usual hammer bars —39—, operating springs —40— and trip levers —41—.

The tripping levers —41— of the bell —37— is connected by a rod —42— to one of the adjacent bell-crank levers —29—, in the manner shown more clearly in Figure 7 so that when the lower arm of said lever is moved outwardly to lock the corresponding bolt —17— the rod —42— will be simultaneously operated to cause the ringing of the gong —37—.

The tripping lever —41— of the gong —37′— is connected by a rod —42′— to one of the adjacent bell-crank levers —29— whereby the withdrawal of the locking bolts

from their locking position will automatically cause the operation of the gong —37'—.

The operation of the invention will be readily understood upon reference to the foregoing description, taken in connection with the drawings, but it is evident that various changes may be made in the detail construction of the carrier and locking mechanism as may be required for grappling, hoisting, lowering and releasing various types of boxes or other objects without departing from the spirit of the invention.

What I claim is:

1. In a hoisting and lowering carrier, a frame, a raising and lowering device reciprocally movable on the frame, locking members reciprocally movable on the frame for engaging and releasing an object to be carried, means actuated by the lowering of said device for forcing the locking members to their engaging positions, and means actuated by the raising of said device for hoisting the carrier.

2. In a hoisting and lowering carrier, a frame, a raising and lowering device reciprocally movable on the frame, locking members reciprocally movable on the frame for engaging and releasing an object to be carried, means actuated by the lowering of said device for forcing the locking members to their engaging positions, and means actuated by the raising of said device for locking said members in their engaging position and for hoisting the carrier.

3. In a hoisting and lowering carrier, a frame, a raising and lowering device reciprocally movable on the frame, locking members reciprocally movable on the frame for engaging and releasing an object to be carried, means for temporarily locking said members in their engaging positions as the device is lowered, and means actuated by the raising of said device for displacing the temporary locking means and holding the members in their engaging positions and for hoisting the carrier.

4. In a hoisting and lowering carrier, a frame, a raising and lowering device reciprocally movable on the frame, locking members reciprocally movable on the frame for engaging and releasing an object to be carried, means actuated by the lowering of said device for forcing the locking members to their engaging positions, a signal actuated by a part of said means for indicating the movement of the locking members to their engaging positions, and means actuated by the raising of said device for hoisting the carrier.

5. In a hoisting and lowering carrier, a frame, a raising and lowering device reciprocally movable on the frame, locking members reciprocally movable on the frame for engaging and releasing an object to be carried, means actuated by the lowering of said device for forcing the locking members to their engaging positions, a signal acuated by a part of said means for indicating the movement of the locking members to their releasing positions, and means actuated by the raising of said device for hoisting the carrier.

6. In a hoisting and lowering carrier, a frame, a raising and lowering device reciprocally movable on the frame, locking bolts reciprocally slidable endwise upon the frame for engaging and releasing an object to be carried, a raising and lowering device reciprocally movable vertically on the frame, springs for withdrawing the locking bolts from their locking positions, means actuated by the lowering of said device for forcing the locking bolts to their locking positions, means for temporarily locking the bolts in their locking positions, and additional means actuated by the raising of said device for displacing the temporary locking means and relocking the bolts in their locking positions.

7. In a hoisting and lowering carrier, a frame, a raising and lowering device reciprocally movable on the frame, a locking bolt reciprocally movable on the frame for engaging and releasing an object to be carried, a bell-crank lever mounted on the frame, connections between said device and one arm of the lever for transmitting motion from one to the other, spring connections between the other arm of the lever and locking bolt to assist in lowering said device, and means actuated by the lowering of said device for forcing the locking bolt to its locking position.

8. In a hoisting and lowering carrier, a frame, a raising and lowering device reciprocally movable on the frame, a locking bolt reciprocally movable on the frame for engaging and releasing an object to be carried, a bell-crank lever mounted on the frame, connections between said device and one arm of the lever for transmitting motion from one to the other, spring connections between the other arm of the lever and locking bolt to assist in lowering said device, and means actuated by the lowering of said device for forcing the locking bolt to its locking position, means for holding the locking bolt in its locked position, and means actuated by the raising of said device for hoisting the carrier.

9. In a hoisting and lowering carrier, a frame, a raising and lowering device reciprocally movable upon the frame, locking bolts arranged end to end and reciprocally slidable endwise upon the frame, means actuated by the lowering of said device for sliding the bolts endwise in opposite directions to their locking positions for engaging the object to be carried and simultaneously spacing the adjacent ends of the locking bolts some distance apart, a temporary locking member movable into the space as the device is lowered for temporarily holding the locking bolts in their locking positions, means actuated by the raising of said device for displacing the tem-

porary locking member from between the bolts and for re-locking said bolts in their locking positions, and additional means actuated by the raising of said device for hoisting the carrier.

10. In a hoisting and lowering carrier, a frame, a raising and lowering device reciprocally movable vertically upon the frame, locking bolts reciprocally movable horizontally upon the flange for engaging and releasing an object to be carried, means actuated by the lowering of said device for forcing the locking bolts to their locking positions, and means actuated by the raising of said device for hoisting the carrier.

11. In a hoisting and lowering carrier, a frame, a raising and lowering device reciprocally movable vertically on the frame, locking bolts reciprocally movable horizontally upon the frame for engaging and releasing an object to be carried, means actuated by the lowering of said device for forcing the locking bolts to their locking positions, a signal actuated by a part of said means for indicating the movement of the locking bolts to their locking positions, and means actuated by the raising of said device for holding the locking bolts in their locking positions.

12. In a hoisting and lowering carrier, a frame, a raising and lowering device reciprocally movable vertically on the frame, locking bolts reciprocally movable horizontally on the frame for engaging and releasing an object to be carried, means actuated by the movement of said device to a certain position for forcing the locking bolts to their locking positions, means actuated by the movement of said device to another position for holding the locking bolts in their locked positions and when shifted in one direction from said position for releasing the bolts, and means for withdrawing the bolts from their locking positions when said device is shifted to release the bolt-locking means.

In witness whereof I have hereunto set my hand this 5th day of October 1927.

BURR CARTWRIGHT.