Dec. 10, 1940. W. STUEBING, JR 2,224,166

LIFT TRUCK

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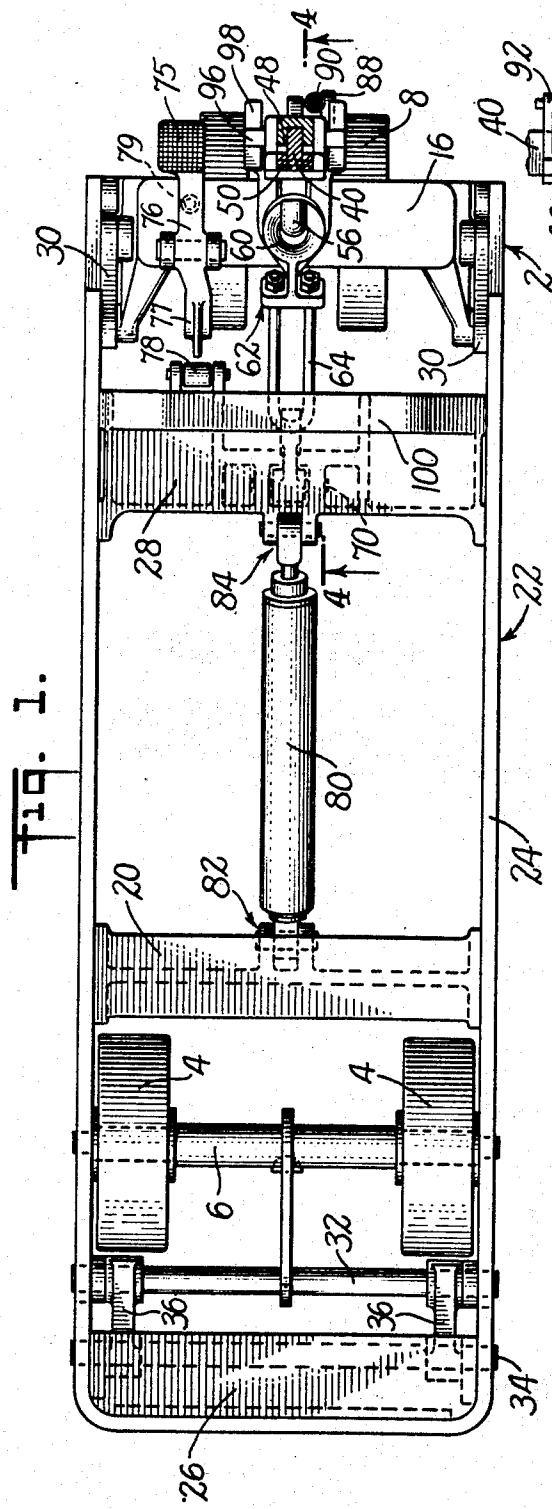


Fig. 1.

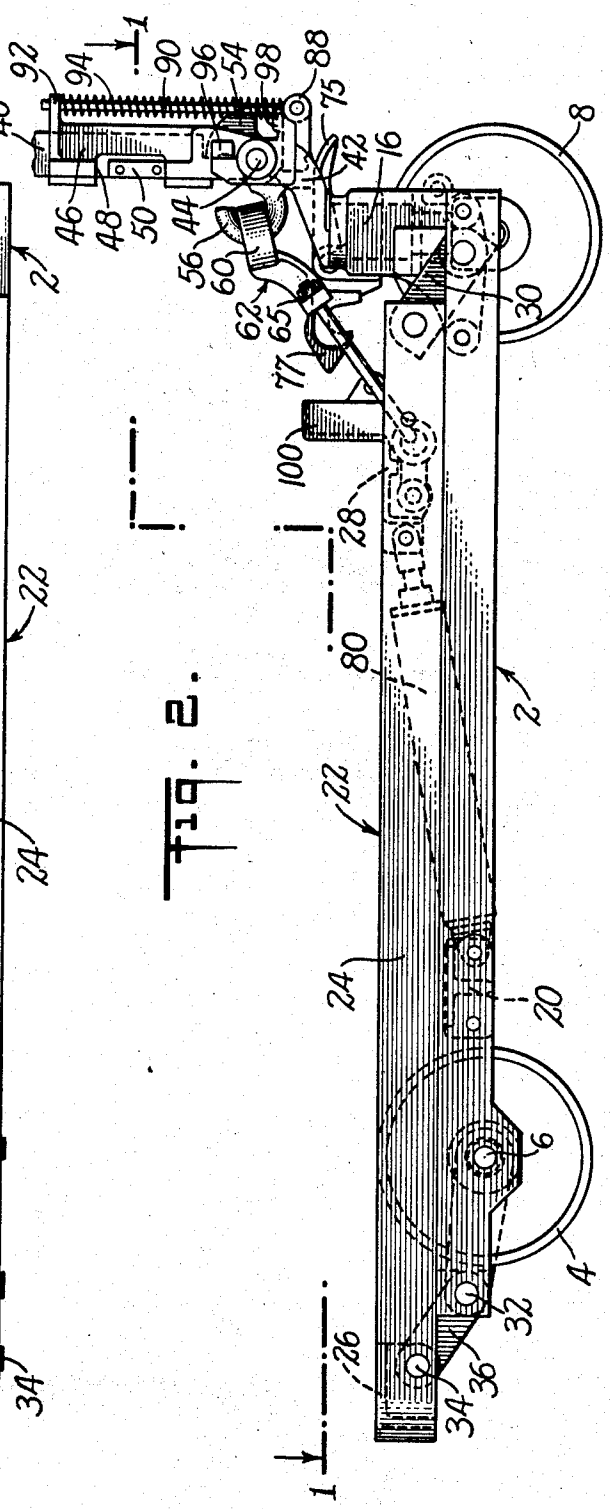


Fig. 2.

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Fig. 4.

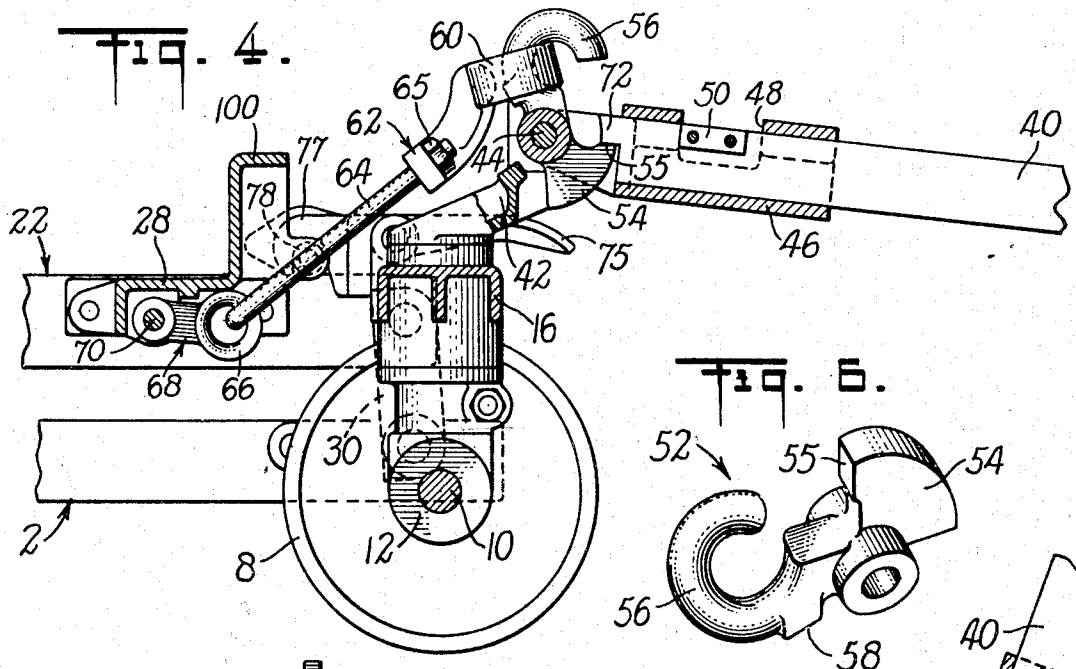


Fig. 6.

Fig. 7.

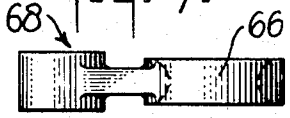


Fig. 3.

Fig. 5.

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LIFT TRUCK

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5 Claims. (Cl. 254—10)

This invention relates to lift trucks and more particularly to hand-operated mechanical lift trucks which are operated by a releasable direct mechanical connection between the steering handle and the lifting frame, and where the lifting operation is performed by a single downward movement of the steering handle.

An object of this invention is to provide a manually operated mechanism for lifting and conveying articles which ordinarily are upon movable platforms. A further object is to provide a mechanism of the above character which is sturdy in construction and efficient in operation and which, at the same time, is light in weight and economical to manufacture. A still further object is to provide a mechanism of the above character which may be used in a thoroughly practical and dependable manner to manually lift a large article or a quantity of small articles by a single lifting operation and then, without further delay, manually convey the lifted article to another location. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combination of elements, and arrangements of parts as will be exemplified in the structure to be hereinafter described and the scope of the application of which will be indicated in the following claims.

In the drawings in which one embodiment of the invention is disclosed:

Figure 1 is a plan view with the steering handle of the truck in section along the line 1—1 of Figure 2;

Figure 2 is a side view of the truck shown in Figure 1 with the steering handle broken away;

Figure 3 is a front view with the central portion of the steering handle broken away;

Figure 4 is a sectional view on the line 4—4 of Figure 1 but showing the lifting frame raised and the other elements in the positions which they occupy at the end of the lifting stroke of the steering handle;

Figure 5 is a view similar to Figure 4 with the lifting frame elevated but showing the linkage mechanism after it has been released from the steering handle;

Figure 6 is a perspective view of the lifting hook which cooperates with the end of the steering handle to provide the mechanical connection between the handle and the lifting linkage mechanism; and

Figure 7 is a plan view of the idler link which connects the lifting frame with the lifting linkage mechanism.

In the illustrative embodiment of this invention, the lift truck is completely manual. A lower frame is provided with wheels, and a lifting frame is mounted upon this lower frame to move vertically. Thus, the frames of the truck are pushed under the loaded platform and the lifting frame is then elevated with the result that the load is supported by the lift truck. The lift truck is then moved to the new location where the lifting frame is lowered releasing the load.

Referring particularly to Figure 2 of the drawings, a lower frame 2 is provided at the left with a pair of rear wheels 4 mounted upon an axle 6, and at the right with a pair of front wheels 8 (see also Figure 3). Front wheels 8 are mounted upon the ends of an axle 10 which in turn is carried by a fork 12 rigidly secured to the lower end of a king bolt 14. King bolt 14 extends through a cross-head 16 which forms the forward end of the lower frame 2. As shown best in Figures 1 and 2, the lower frame is reenforced at the right of rear wheels 4 by a rear cross-beam 20.

Mounted above lower frame 2 is a lifting frame 22 which (see Figure 1) is formed by a U-shaped side member 24 extending along the sides and the rear of the truck, a rear brace 26, and a front cross-beam 28. At the front, each end of side member 24 is attached to lower frame 2 by a link 30 pivoted upon suitable studs, and at the rear, lower frame 2 is provided with a cross bar 32, and lifting frame 22 is provided with a similar cross bar 34. Pivotally connecting these two cross bars are two links 36. Links 36 and 30 are of the same length, and, thus, the two frames remain parallel as the lifting frame swings between its lower position (Figure 2) and its elevated position (Figures 4 and 5).

Lifting frame 22 is raised to the position shown in Figures 4 and 5 by a linkage mechanism at the front of the truck, which is operated by the steering handle 40. Rigidly mounted upon the top of wing bolt 14 and extending to the right (Figure 2) is a forked bracket 42 which carries a pivot pin 44 extending between the two arms of the bracket (see also Figure 3). Pivot pin 44 carries a steering-handle sleeve 46 having two ears at its lower end which are pierced by and pivot upon pivot pin 44, there being one ear adjacent each of the two arms of bracket 42. The body portion of steering-handle sleeve 46 is hollow and slidably receives the lower end of the steering-handle 40 (see Figure 5). The rear central portion of the steering-handle sleeve is cut away at 48, and mounted upon the opposite sides of steering-handle 40 at 48

are two blocks 50. Blocks 50 are shorter than the length of the cut-away portion 48 and thus, the steering handle is permitted a limited sliding movement with respect to the steering-handle sleeve 46.

Mounted upon the center of pivot pin 44 between the ears of steering-handle sleeve 46 is a segment-hook 52 which is shown best in Figure 6. Segment-hook 52 is provided with a disc segment 54 having a radial surface 55, and a hook portion 56. At the base of the hook portion is a bumper 58 which, as shown in Figure 5, limits counterclockwise movement of the segment-hook. In operation, hook 56 is engaged with the eye 60 of a lifting link 62, the lower portion of which (see Figure 1) is formed by a U-bolt 64 rigidly secured by nuts 65. The lower end of U-bolt 64 is looped into one eye of an idler link 68 (shown in Figure 7), the other end of which is carried by a pivot pin 70 rigidly mounted at the center of the cross-beam 28 of lifting frame 22.

The lower end of steering handle 40 is provided with a latch portion 72 which, as shown best in Figure 4, is adapted to engage with the segment portion 54 of segment-hook 52. When thus engaged, the linkage mechanism, including segment-hook 52, lifting link 62 and idler link 68, is moved by the steering handle. If the steering handle is raised to the position of Figure 2, the limited sliding movement between steering handle 40 and steering-handle sleeve 46 permits the steering handle to move downwardly toward pivot pin 44 so that the latch portion 72 moves along surface 55 of segment 54. As the handle is then swung downwardly, the linkage mechanism moves to the position of Figure 4, and lifting frame 22 moves to its elevated position.

Referring to Figure 3, at the right of the steering handle and rockably mounted upon head 16 is a holding hook 76 which, as shown in Figure 1, is provided with a foot treadle 75, and a hook portion 77 which, when the lifting frame is moved to the position of Figure 4, is adapted to engage a roller 78 carried by the lifting frame. When in this position, links 30 and 36 extend upwardly and slightly to the rear so that they are substantially vertical but the lifting frame tends to swing to the rear. Thus, by providing hook 76 which prevents rearward movement of the lifting frame, the lifting frame is rigidly held in its elevated position. In this embodiment, treadle 75 of hook 76 is urged upwardly by a spring 79 so that the hook dependably engages roller 78.

When the lifting frame is in its elevated position, the linkage mechanism is permitted to take the position shown in Figure 5 by sliding steering-handle 40 longitudinally in steering-handle sleeve 46 so that latch portion 72 is released from engagement with surface 55 of segment link 52. The extreme end of steering-handle 40 is provided with an arcuately extending end surface with the same curvature as the periphery of segment 54. Thus, when the steering handle is unlatched from segment hook 52 by sliding the steering handle outwardly, this arcuate end surface rides along the arcuate surface of segment 54, and the steering handle cannot move inwardly. Blocks 50 prevent further outward movement of the steering handle, and the steering handle is thus rigidly held from further longitudinal movement with respect to sleeve 46, though the handle may be swung freely up and down. In this manner the steering handle is efficiently operated to elevate the lifting frame and then is used to pull, push and steer the truck.

When it is desirable to lower the lifting frame, treadle 76 is depressed releasing hook 77 and the lifting frame tends to settle to the position of Figures 1 and 2. However, in order to avoid too rapid lowering of the lifting frame and its load, an automatic check 80 is provided (see Figure 1). Check 80 comprises an outer cylinder which is connected at its left end to the rear cross-beam 20 of lower frame 2 through a pivot connection indicated at 82, and a check-piston connected to cross-beam 28 of lifting frame 22 through a piston rod and pivot connection indicated at 84. The piston of check 80 may be moved to the right without resistance, but rapid return movement to the left is resisted. Thus, the lifting frame is elevated and the piston is moved to the right in the cylinder without resistance, but as the lifting frame starts to descend from its elevated position, the check becomes operative, and the lifting frame settles slowly to its lower position.

Referring to Figure 2, extending to the right from bracket 42 is an ear 88 which carries a pivotally mounted pin 90, the upper end of which extends through an ear 92 upon the top of steering-handle sleeve 46. Surrounding pin 90 is a handle-balancing compression spring 94 which is compressed between ears 92 and 88 as the handle swings downwardly. Spring 90 is adjusted to the conditions of usage and to the weight of handle 40 so that the handle may be manipulated without difficulty. As shown in Figure 3, upon the opposite sides of steering-handle 46 are stops 96 which cooperate with suitable stops 98 upon bracket 42 to limit the downward swinging movement of handle 40.

When the lifting frame is in its lower position (Figures 1 and 2), segment 54 holds handle 40 extended relative to sleeve 46 except when the handle is raised. However, when the handle is raised as in Figure 2, the handle automatically drops and latch 72 falls behind the left-hand end of segment 52 so that latch 72 (see also Figure 4) moves along surface 55. Thus the handle is held from falling and may be used to elevate the lifting frame when desirable. Cross-brace 28 is provided with a vertically extending load-bumper 100 which limits the movement of the truck under a load. The truck is therefore backed under the load as far as it will go; the load is then raised by a single downward stroke of the steering handle. The handle is then pulled outwardly and the linkage 62—68 drops to the position of Figure 5 so that the handle 40 is disengaged from the lifting mechanism and held rigid with respect to sleeve 46.

As many possible embodiments may be made of the above invention and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore set forth, or shown in the accompanying drawings, is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. In lift truck apparatus of the class described, the combination of: a steering handle pivotally mounted to swing through a vertical arc comprising, a sleeve member pivotally mounted at one end, a main handle member extending into said sleeve member toward the pivotal axis; means to limit the relative sliding movement between said main handle member and said sleeve member including a segment of a disc mounted with its axis substantially coincident with said pivotal axis,

said segment having a peripheral raceway along which an engaging surface of said main handle member rides, said segment being normally positioned to have said engaging surface ride along it during the normal swinging movement of the handle from a substantially horizontal position to a substantially vertical position, said main handle member being held at the limit of its movement away from said pivotal axis by the engagement of said engaging surface with said peripheral raceway, said segment having a radial surface which extends vertically when said segment is in said normal position and said main handle member having integral therewith a latch portion which drops behind said segment along said radial surface when said main handle member reaches a vertical position and is released to drop towards said pivotal axis due to said engaging surface moving beyond said peripheral raceway—whereby said segment is swung downwardly by the subsequent downward swinging stroke of said steering handle.

2. In lift truck apparatus of the class described, the combination of: means forming a base including a pivot member mounted upon a wheeled support which is pivoted to obtain a steering action; a steering handle comprising, a first member, and a second member having limited longitudinal movement with respect to said first member toward and away from said pivot member; a segment-lever member rockably mounted to be moved to and from a position where it is contacted by said second member to hold said second member in its extended position away from said pivot member; and means operative when said second member is moved toward said pivot member and swung about its pivotal axis to effect elevation of a load.

3. In lift truck apparatus of the class described, the combination of: means forming a base including a pivot member mounted upon a wheeled support which is pivoted to obtain a steering action; a steering handle comprising, a first member, and a second member having limited longitudinal movement with respect to said first member toward and away from said pivot member; a segment-lever member rockably mounted to be moved to and from a position where it is contacted by said second member to hold said second member in its extended position away from said pivot member; means operative when said second member is movd toward said pivot member and swung about its pivotal axis to effect elevation of a load; and a spring balancing means for said steering handle comprising, a spring guide rod pivoted about an axis spaced from the pivotal axis of said steering handle, a compression spring surrounding said guide rod, and an ear carried by said steering handle and surrounding said guide rod to contact and compress said spring as said steering handle swings toward its horizontal position.

4. In a manually operated lift truck, the combination of: a chassis comprising a supporting frame having mounted thereon a set of wheels and a steering handle; a lifting frame mounted upon said chassis and adapted to be moved to and from a raised position where it engages and lifts a load; means to elevate said lifting frame comprising, an idler link having two eyes one of which is attached to said lifting frame, an intermediate linkage having a lower U-shaped portion which is looped into the other of said eyes of said idler link and having an upper eye, and a segment-hook member having a hook portion extending through the last named of said eyes and a segment portion extending in the plane of said hook; a pivot means forming a mounting for said steering handle and said segment-hook member, said steering handle comprising a sleeve member rockably mounted at one end upon said pivot means and a main handle member extending through said sleeve member and having limited relative movement with respect thereto, said main handle member being mounted to swing in alignment with said segment and having an integral latch portion which is adapted to engage said segment, said latch portion having an end surface which is adapted to ride along the arcuate periphery of said segment when said main handle is slid within said sleeve member to its extreme outer position and said latch portion being adapted to move along the radially extending side of said segment to thereby mechanically interengage said main handle member and said segment-hook member—whereby said main handle member may be interengaged with said segment member to elevate said lifting frame by means of the mechanical connection through said intermediate link and said idler link, and said main handle member may subsequently be moved longitudinally in said sleeve member to cause said latch portion to ride on the peripheral surface of said segment and thereby prevent further longitudinal movement of said main handle member with respect to said sleeve member; and releasable means to retain said lifting frame in its elevated position.

5. In a lift truck of the class which is manually pulled, pushed and steered by means of a steering handle and which is backed to a position beneath a load and a lifting means is then manually operated to lift the load, whereupon the load is moved to a new location, the combination of: a chassis construction including a plurality of wheels; a load-engaging means including a plurality of collapsible linkages connected to said chassis construction, said load-engaging means being adapted to move when the linkages are extended to engage and lift the load; holding means to hold the load in elevated position comprising, a roller mounted upon said load-engaging means, a hook member rotatably mounted upon said chassis construction to receive and hold said roller, and means to release the engagement between said hook and said roller; and means to move said load-engaging means into engagement with the load and elevate the load comprising, a collapsible linkage unit including a plurality of link members connected serially with a first end link member connected to said load-engaging means and a second end link member rockably mounted upon a lifting pivot, a segment of a disc mounted with its axis substantially coincident with the axis of said pivot and rigidly mounted with respect to said second end link member to rock therewith about said pivot, said collapsible linkage unit and said segment normally tending to move due to gravity to one extreme position, and a main handle member rockably mounted upon said pivot with its inner end adjacent said segment and mounted to slide longitudinally between an inner and an outer position toward and away from said pivot, said main handle member having its inner end surface arcuately shaped to substantially the curvature of the periphery of said segment and having a latch portion which is adapted to move along a radially extending surface of said segment when said main handle member is moved longitudinally to its inner position, said main handle

member being held at its extreme outer position when said end surface is in engagement with the peripheral surface of said segment, and said main handle member being adapted to swing to a vertical position and then drop toward said pivot with said latch portion moving along said radially extending surface of said segment—whereby said handle may be swung downwardly about said pivot and said load-engaging means is caused to engage and lift the load, and the load is then releasably held by said holding means.

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