A. M. BARRETT, W. CHILDRESS, AND F. TROTT.

LIFTING TRUCK.

APPLICATION FILED JUNE 13, 1918. RENEWED FEB. 15, 1922.

1,428,523. Patented Sept. 12, 1922.

2 SHEETS—SHEET 1.

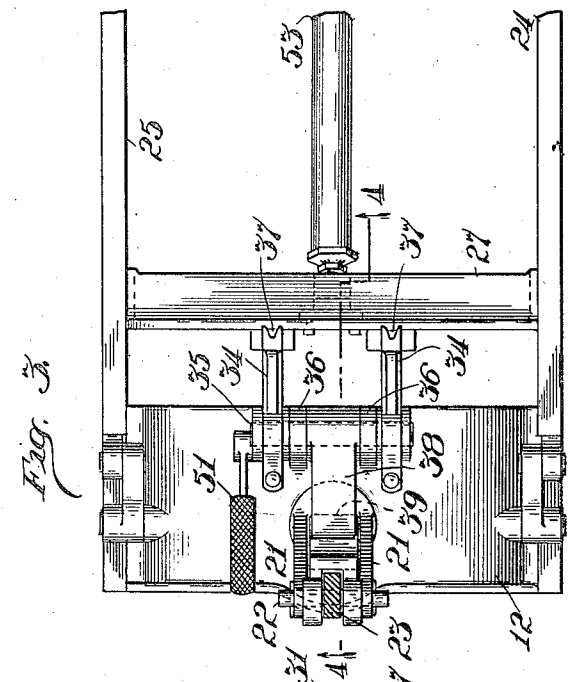


Fig. 3.

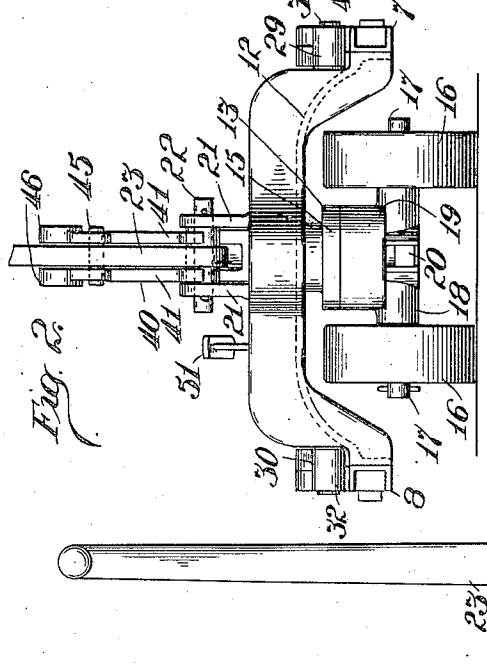


Fig. 2.

Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 4.

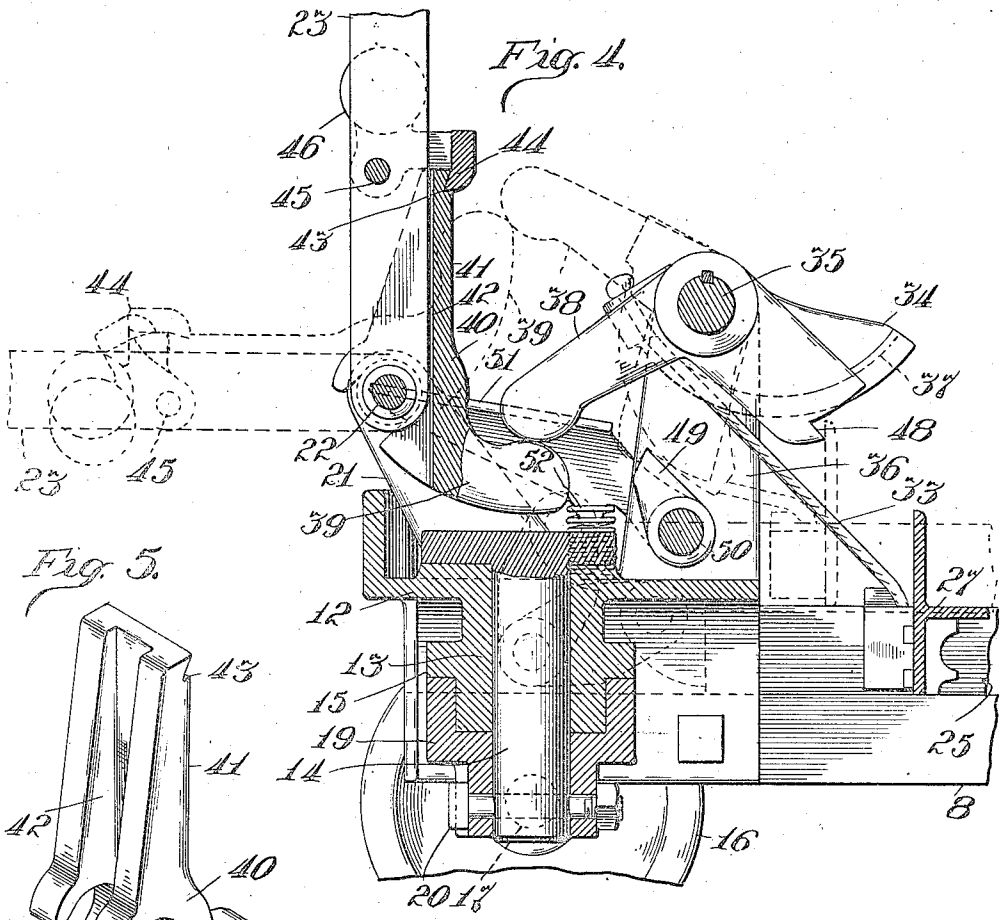
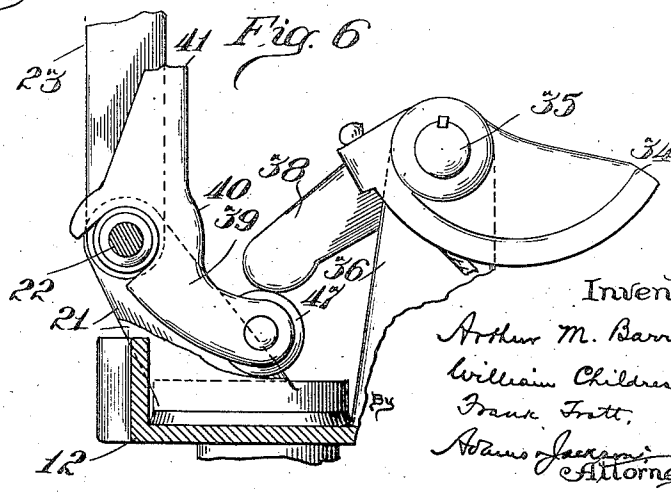


Fig. 5.

Fig. 6



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UNITED STATES PATENT OFFICE.

ARTHUR M. BARRETT, OF WINNETKA, WILLIAM CHILDRES, OF OAK PARK, AND FRANK TROTT, OF HARVEY, ILLINOIS, ASSIGNORS TO SAID BARRETT.

LIFTING TRUCK.

Application filed June 13, 1918, Serial No. 239,739. Renewed February 15, 1922. Serial No. 536,838.

To all whom it may concern:

Be it known that we, ARTHUR M. BARRETT, a citizen of the United States, and a resident of Winnetka, in the county of Cook and State of Illinois, WILLIAM CHILDRESS, a citizen of the United States, and a resident of Oak Park, in the county of Cook and State of Illinois, and FRANK TROTT, a citizen of the United States, and a resident of Harvey, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Lifting Trucks, of which the following is a specification, reference being had to the accompanying drawings.

Our invention relates to trucks designed for transporting loads in warehouses and similar places, of the type known as lifting trucks, the characteristic feature of such trucks being the provision of a rising and falling frame mounted on a main frame having supporting and steering wheels, the latter wheels being arranged to be steered by means of a lever or handle which also serves to operate the lifting frame. The object of our invention is to provide improved mechanism for operatively connecting the steering handle with the lifting frame which will permit said handle to be operated to lift said frame regardless of the angular position to which the front or steering wheels may have been turned; also to provide lifting mechanism of such construction that the leverage of the lifting handle at the beginning of the lifting movement will be greater than at the latter part of such movement, thereby enabling the operator to lift the load more easily and also increasing the rapidity of movement of the lifting frame during the latter part of the lifting operation; also to provide improved means for locking the lifting frame in its elevated position, and to improve the construction of trucks of this character in other respects hereinafter pointed out. We accomplish our objects as illustrated in the accompanying drawings and as hereinafter described. What we regard as new will be set forth in the claims.

In the accompanying drawings:

Fig. 1 is a side elevation of our improved truck showing the position of the parts at the beginning of the lifting operation;

Fig. 2 is a front view thereof, part of the steering handle being omitted;

Fig. 3 is a plan view of the front portion of the truck;

Fig. 4 is an enlarged detail, being a partial longitudinal vertical section on line 4—4 of Fig. 3;

Fig. 5 is a perspective view illustrating the bell-crank lever through which the steering handle operates the lifting mechanism; and

Fig. 6 is a fragmentary view, partly in section, showing a modification.

Referring to the drawings,—7—8 indicate the side bars of the main frame of the truck, which are preferably channel bars, as shown in Fig. 2. At their rear ends said bars carry brackets 9 in which is journalled a rear axle 10 upon which are mounted rear wheels 11 as shown in Fig. 1. At their front ends said side bars are connected by a cross-head 12, as shown in Fig. 2, said cross-head having somewhat the shape of an inverted U to clear the front wheels and provide a low support for the side bars 7—8, as illustrated in said figure. Said cross-head is provided centrally with a depending sleeve 13 shown in Fig. 4, which forms a bearing for a king bolt 14, and said sleeve is provided with a peripheral flange 15 which provides a more extended bearing for the front wheel connection hereinafter described. 16 indicates the front wheels which are mounted on spindles 17 carried by a front axle 18, as shown in Fig. 2. Said axle is provided with a central cylindrical bearing 19 which fits upon the lower end of the sleeve 13 and bears against the under surface of the flange 15 as shown in Fig. 4. The king bolt 14 passes down into the bearing 19 and is secured thereto by a bolt 20 as shown in said figure. Thus the front wheels may be turned about the sleeve 13 as an axis, and by rotating the king bolt the front wheels may be turned laterally in either direction to steer the truck.

At its upper end the king bolt carries a pair of parallel rigid arms 21, shown in Fig. 2, in which is mounted a pivot 22 which carries the lower end of a steering handle 23, as shown in Fig. 4. Thus the steering handle may be swung vertically about the pivot 22, and by swinging said handle lat-

erally the front wheels may be turned to steer the truck.

24—25 indicate the side bars of the lifting frame which also are preferably channel bars and are connected at their rear ends by a transverse bar 26, as shown in Fig. 1. Near their forward ends said side bars are connected by a cross-bar 27, as shown in Fig. 3. The rear end of the lifting frame is supported upon the rear axle 10 by links 28 so arranged that when the lifting frame is in its lowermost position said links incline backward and upward, as indicated in Fig. 1; consequently by swinging said links forward toward a vertical position the rear portion of the lifting frame will be lifted. The specific construction employed at the rear portion of the truck is not illustrated in detail as it forms no part of our present invention. We prefer, however, to employ the construction shown and described in the application of Arthur M. Barrett, filed December 21, 1917, Serial No. 208,280. The front ends of the side bars 24—25 are connected by links 29—30 with the end portions of the cross-head 12, said cross-head being provided with pivots 31—32 upon which said links are mounted, as shown in Figs. 1 and 2. The links 29—30 are arranged similarly to the links 28, so that by moving the lifting frame 24 forward to move said links to a more nearly upright position the lifting frame rises in a substantially level position thereby lifting the load.

Power is applied to the lifting frame to raise it through cables 33, the rear ends of which are connected to the cross-bar 27, their forward ends being connected to a rocking member, preferably in the form of cam pulleys 34 mounted upon and keyed to a cross-shaft 35 which is supported by standards 36 carried by the cross-head 12, as shown in Figs. 1, 3 and 4. We prefer to provide two of the cam pulleys 34, but one or more may be used. The cam pulleys 34 are provided with grooves 37 in their peripheries to receive the cables, as shown in Fig. 3, and they are so shaped that when the lifting frame is in its lowermost position the cables are nearest the axis of said pulleys. Consequently, by rotating the shaft 35 said cam pulleys will operate to pull forward and upward on the cables 33, the leverage at the beginning of the movement being greatest and gradually diminishing as the cam pulleys rotate. This also has the effect of moving the lifting frame more slowly at the beginning of the operation, its speed gradually increasing as it rises.

The shaft 35 is rocked, or partly rotated, to raise the lifting frame by means of an arm 38 which is non-rotatably secured to the shaft 35 between the cam pulleys 34, as shown in Fig. 3, and projects forward therefrom over the rearwardly projecting arm 39 of a bell-crank lever 40 which is mounted on the pivot 22, as shown in Figs. 1 and 4. Said bell-crank lever is provided with an upwardly projecting arm 41, the inner surface of which is provided with a groove 42, as shown in Fig. 5, which receives the upper edge of the handle 23, as shown in Figs. 1 and 4, so that said bell-crank lever is adapted to form an extension of the lower end of said handle. For temporarily connecting the lever 40 to the handle 23 so that said lever will act as a power transmitting device between the handle and the rocking member 34, the arm 41 is provided near its upper edge with a notch 43 which is adapted to be engaged by a latch 44 mounted on the handle 23 by means of a pivot 45, as shown in said figures. Thus when the latch 44 engages the arm 41 the bell-crank lever 40 is rigidly connected with the handle 23, but by disconnecting the latch 44 said handle may be swung vertically independently of said bell-crank lever. 46 indicates a counterbalance weight carried by the latch 44 and so arranged that when the handle 23 is swung downward from its upright position said weight tends to swing the latch 44 out of engagement with the lever 40.

It will be apparent from the foregoing description that when the parts are in the position shown in Fig. 1, by swinging the handle 23 downward the arm 39 of the bell-crank lever 40 will swing the arm 38 upward thereby rocking the shaft 35 and lifting the lifting frame, and this is true regardless of the angular position of the front wheels, as the operative relation between the arms 38—39 is not affected by the lateral turning of the handle and front wheels. In Fig. 1 we have shown the engaging ends of the arms 38—39 as being rounded and bearing directly upon each other, but if desired one or the other of said arms, as 39, may be provided with an anti-friction roller 47 as shown in Fig. 6 to reduce the friction between them.

For the purpose of locking the lifting frame in its elevated position the shaft 35 is provided with a notched bar 48 which is adapted to be engaged by a tooth 49 carried by a shaft 50 which also carries a forwardly projecting foot lever 51, as shown in Fig. 4. The shaft 50 is mounted between the standards 36, and the tooth 49 is normally held in operative position by a spring 52 which acts on the foot lever 51, as shown in Fig. 4. The arrangement is such that when the shaft 35 is rocked to raise the lifting frame to its uppermost position the locking bar 48 will engage the tooth 49 thereby locking the lifting frame in such position. It may, however, be released by depressing the foot lever 51, thereby permitting the lifting frame to descend. The lifting frame, if desired, may be provided

with a check 53 for easing its descent, and for this purpose we prefer to use the construction shown and described in the Barrett application hereinbefore referred to. Also a spring may be provided to start the descent of the lifting frame according to well-known practice.

When the lifting frame has been elevated and locked in its raised position in the manner described, the arm 38 will assume the position shown in dotted lines in Fig. 4 and will remain in such position so long as the lifting frame remains raised. Consequently when the lifting handle 23 is moved upward from the dotted line position shown in Fig. 4 the strain upon the upper arm 41 of the bell-crank lever 40 will be relieved, and this will permit the counterbalance weight 46 to swing the latch 44 to its inoperative position, as indicated in Fig. 4, thereby releasing said bell-crank lever from the lifting handle 23. The bell-crank lever may, therefore, swing to the position shown in full lines in Fig. 4 independently of the handle 23, which may then be operated separately. This feature is advantageous because trucks of this character are frequently moved around from place to place unloaded and it is, therefore, desirable that the handle be capable of being swung down into position for steering the truck while the lifting frame remains in its lowered position. Obviously if the handle were permanently secured to the bell-crank lever 40 when said handle was swung down it would necessarily raise the lifting frame to a greater or less extent, but by making them detachable, as described, the handle may be manipulated for steering the truck without affecting the position of the lifting frame. The handle may, however, be easily connected with said lever 40 at any time by means of the latch 44.

Except as specifically claimed our invention is not limited to the use of a flexible connection between the rocking member or cam 34 and the lifting frame as other suitable means may be employed. Furthermore, while we prefer to use two steering wheels that is not essential.

What we claim as our invention and desire to secure by Letters Patent, is—

1. A lifting truck comprising a main frame having supporting and steering wheels, a lifting frame mounted on said main frame and movable longitudinally and vertically relatively thereto, a steering handle connected with the steering wheel, a rocking member mounted on said main frame, means operatively connecting said rocking member with said lifting frame whereby said lifting frame may be raised and moved longitudinally by rocking said member, and means detachably connected with said steering handle and adapted to swing laterally therewith when the same is operated to steer the truck, for actuating said rocking member.

2. A lifting truck, comprising a main frame having supporting and steering wheels, a lifting frame mounted on said main frame, a steering handle connected with the steering wheel, a rocking member mounted on said main frame and having a projecting arm, flexible means operatively connecting said rocking member with said lifting frame whereby said lifting frame may be raised or lowered by rocking said member, and a finger connected with said steering handle and movable by vertical swinging thereof to operate said arm to lift said lifting frame regardless of lateral movement of said steering handle.

3. A lifting truck, comprising a main frame having supporting and steering wheels, a lifting frame mounted on said main frame, a steering handle connected with the steering wheel, a rocking cam mounted on said main frame, flexible means connected with said lifting frame and operated by said cam to lift said lifting frame, and means connected with said steering handle and actuated thereby to rock said cam regardless of lateral movement of said handle.

4. A lifting truck, comprising a main frame having supporting and steering wheels, a lifting frame mounted on said main frame, a steering handle connected with the steering wheel, a rocking cam mounted on said main frame and having a projecting arm, flexible means connected with said lifting frame and operated by said cam to lift said lifting frame, and means connected with said steering handle and adapted to engage and operate said arm to rock said cam regardless of lateral movement of said steering handle with relation to the longitudinal axis of the truck.

5. A lifting truck, comprising a main frame having supporting and steering wheels, a lifting frame mounted on said main frame, a steering handle connected with the steering wheel, a rocking member mounted on said main frame and having a projecting arm, means operatively connecting said rocking member with said lifting frame whereby said frame may be raised or lowered by rocking said member, and means detachably connected with said steering handle and adapted to be actuated thereby to engage said arm and rock said rocking member regardless of lateral movement of said handle.

6. A lifting truck, comprising a main frame having supporting and steering wheels, a lifting frame mounted on said main frame, a steering handle connected with the steering wheel, a rocking member mounted on said main frame and having a projecting arm, means operatively connect-

ing said rocking member with said lifting frame whereby said frame may be raised or lowered by rocking said member, swinging means adapted to engage said arm to rock said rocking member, and a latch for operatively connecting said swinging means with said steering handle.

7. A lifting truck, comprising a main frame having supporting and steering wheels, a lifting frame mounted on said main frame, a steering handle connected with the steering wheel, a rocking member mounted on said main frame and having a projecting arm, means operatively connecting said rocking member with said lifting frame whereby said frame may be raised or lowered by rocking said member, swinging means adapted to engage said arm to rock said rocking member, and a latch for operatively connecting said swinging means with said steering handle, said latch being adapted to be disconnected by a movement of said handle.

8. A lifting truck, comprising a main frame having supporting and steering wheels, a lifting frame mounted on said main frame, a steering handle connected with the steering wheel, a rocking member mounted on said main frame, flexible means operatively connecting said rocking member with said lifting frame whereby said lifting frame may be raised or lowered by rocking said member, a latch cooperating with said rocking member for holding said lifting frame in its elevated position, and means operated by said steering handle for rocking said rocking member to lift the lifting frame.

9. A lifting truck, comprising a main frame having supporting and steering wheels, a lifting frame mounted on said main frame, a steering handle connected with the steering wheel, a rocking member mounted on said main frame and operatively connected with said lifting frame whereby said lifting frame may be raised or lowered by rocking said member vertically, swinging means mounted to swing laterally with the steering handle and adapted to engage said rocking member and to be operated by said steering handle for rocking said rocking member, and means for connecting said swinging means with or disconnecting it from said steering handle.

10. A lifting truck, comprising a main frame having supporting and steering wheels, a lifting frame mounted on said main frame, a steering handle connected with the steering wheel, a rocking member mounted on said main frame and operatively connected with said lifting frame whereby said lifting frame may be raised or lowered by rocking said member, swinging means mounted concentrically with the axis of said steering handle and adapted to engage said rocking member and to be actuated by said steering handle to rock said rocking member, and a latch connecting said swinging means with said steering handle.

11. A lifting truck comprising a main frame having supporting and steering wheels, a lifting frame mounted on said main frame and movable longitudinally and vertically relatively thereto, a steering handle connected with the steering wheel, a rocking member mounted on said main frame, means operatively connecting said rocking member with said lifting frame whereby said lifting frame may be raised and moved longitudinally by rocking said member, and means detachably connected with said steering handle and movable therewith to operate said rocking member regardless of lateral movement of the handle.

12. A lifting truck, comprising a main frame having supporting and steering wheels, a lifting frame mounted on said main frame, a steering handle connected with the steering wheel, a rocking member mounted on said main frame, flexible means operatively connecting said rocking member with said lifting frame whereby said lifting frame may be raised by rocking said member, and means connected with said steering handle and movable therewith to operate said rocking member regardless of lateral movement of the handle.

13. In a lifting truck, the combination with a truck frame, supporting and steering wheels therefor, a lifting frame, and a steering handle arranged to swing vertically and laterally, of means for actuating said lifting frame by said steering handle, comprising a member pivotally mounted on the truck frame to swing vertically and operatively connected with the lifting frame, and a lever for actuating said member adapted to be operatively connected with and operated by said steering handle in any steering position thereof, said steering handle being adapted to be disconnected from said lever so that it may be swung vertically independently thereof.

14. In a lifting truck, the combination with a truck frame, supporting and steering wheels therefor, a lifting frame, and a steering handle arranged to swing vertically and laterally, of means for actuating said lifting frame by said steering handle, comprising a member mounted on the truck frame and operatively connected with the lifting frame, said member having an arm adapted to swing in a vertical plane, and a lever for actuating said arm adapted to be operatively connected with and operated by said steering handle in any steering position thereof, said lever being in operative relation to said arm when the steering handle is in any steering position, and said

steering handle being adapted to be disconnected from said lever so that said handle may be swung vertically independently of said lever.

15. In a lifting truck, the combination with a truck frame, supporting and steering wheels therefor, a lifting frame, and a steering handle arranged to swing vertically and laterally, of means for actuating said lifting frame by said steering handle, comprising a member mounted on the truck frame and operatively connected with the lifting frame, said member having an arm adapted to swing in a vertical plane, and a bell-crank lever fulcrumed coaxially with the steering handle and arranged to swing laterally therewith, said lever being adapted to operatively engage said arm when the steering handle is in any steering position, and said steering handle being adapted to be operatively connected with said lever for actuating the same, and to be disconnected therefrom so that it may swing vertically independently thereof.

16. In a lifting truck, the combination with a truck frame, supporting and steering wheels therefor, a lifting frame, and a steering handle arranged to swing vertically and laterally, of means for actuating said lifting frame by said steering handle, comprising a member mounted on the truck frame and operatively connected with the lifting frame, said member having an arm adapted to swing in a vertical plane, and a bell-crank lever fulcrumed coaxially with the steering handle and disposed between the steering handle and said arm, one arm of said lever extending under said vertically swinging arm and being adapted to actuate the same to elevate said lifting frame, said steering handle being adapted to be operatively connected with said lever for actuating the same, or to be disconnected therefrom to permit said steering handle to be swung vertically independently thereof.

17. A lifting truck comprising a main frame, a steering head, a lifting platform movable longitudinally and vertically, a steering handle, a lifting lever adapted to swing vertically and laterally with said steering handle, means actuated by said lifting lever for moving said lifting frame longitudinally and vertically, and a latch adapted to be operated independently of the handle to operatively connect said lifting lever with or disconnect it from the steering handle.

18. A lifting truck comprising a main frame, a steering head, a lifting platform movable longitudinally and vertically, a steering handle, a lifting lever adapted to swing vertically and laterally with said steering handle, means actuated by said lifting lever for moving said lifting frame longitudinally and vertically, and a latch mounted on the steering handle and adapted to be operated independently thereof to operatively connect said lifting lever with or disconnect it from the steering handle.

19. A lifting truck comprising a main frame, a steering head, a lifting platform movable longitudinally and vertically, a steering handle, a lifting lever adapted to swing vertically and laterally with said steering handle, means actuated by said lifting lever for moving said lifting frame longitudinally and vertically, and a latch pivotally mounted on the steering handle and adapted to be operated independently thereof to operatively connect said lifting lever with or disconnect it from the steering handle.

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