Aug. 29, 1950 I. F. SCHRECK 2,520,857

LIFT TRUCK

Filed Nov. 19, 1946 3 Sheets-Sheet 1

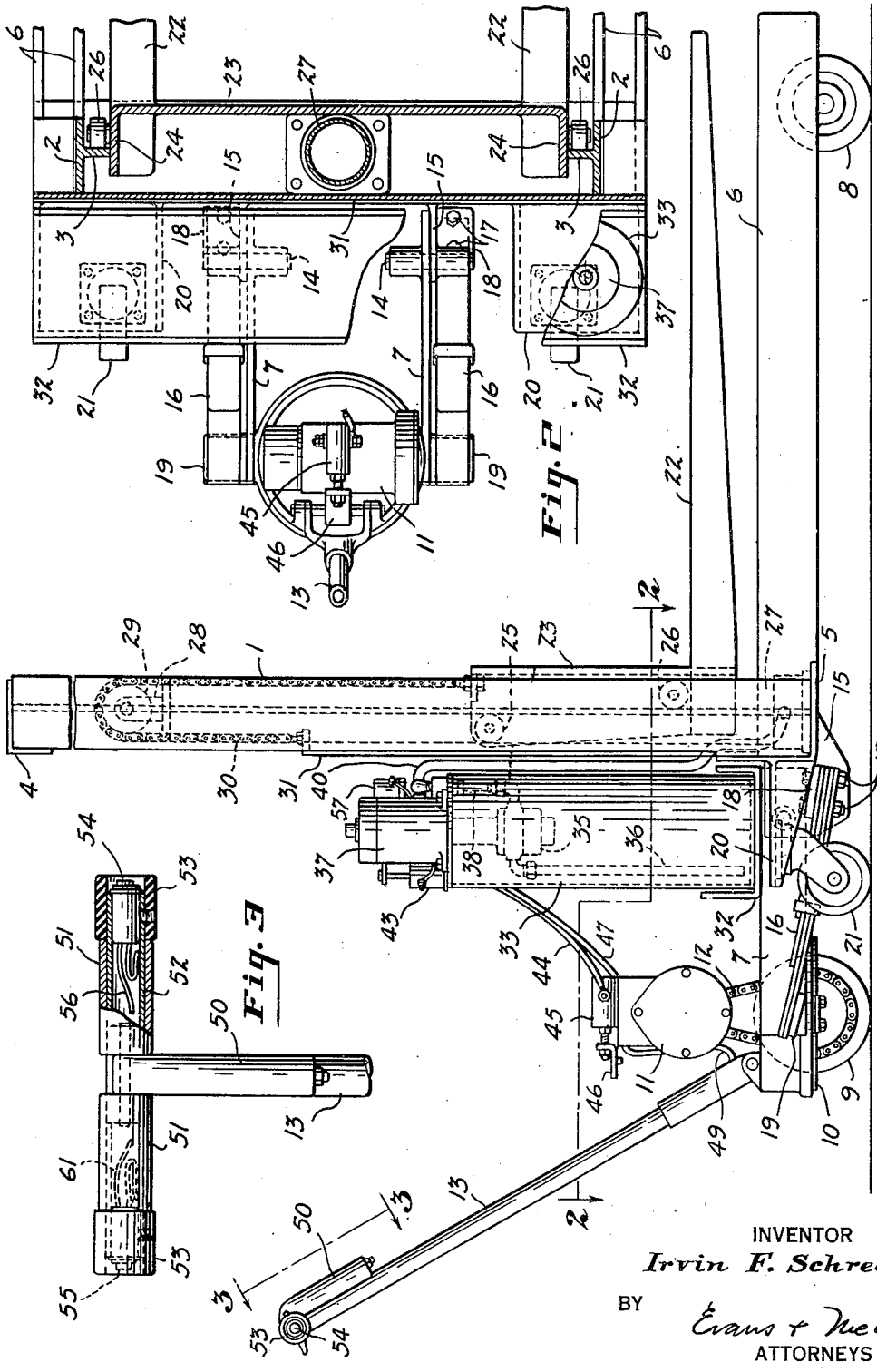


Fig. 2

Fig. 1

Fig. 3

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LIFT TRUCK

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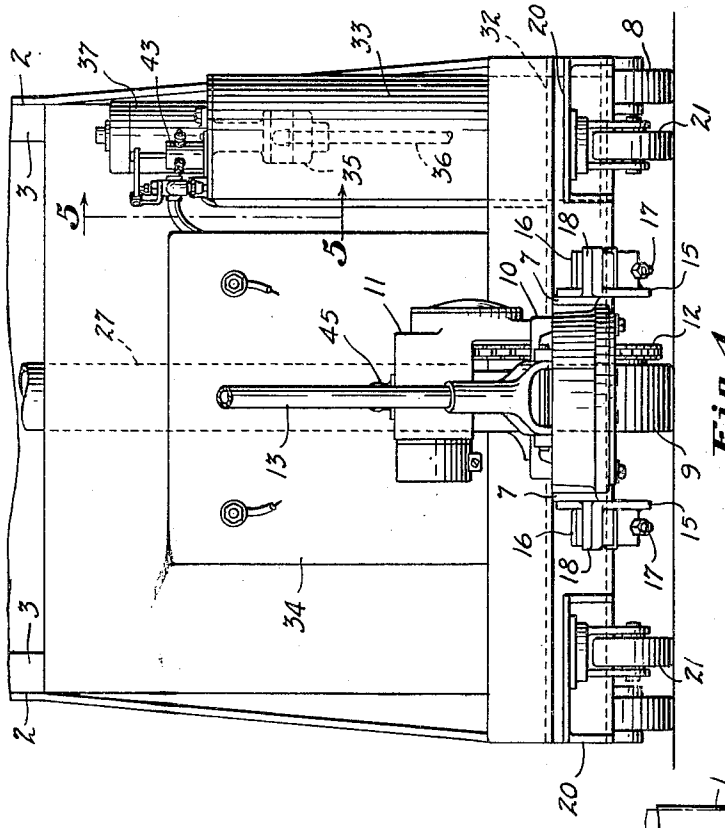


Fig. 4

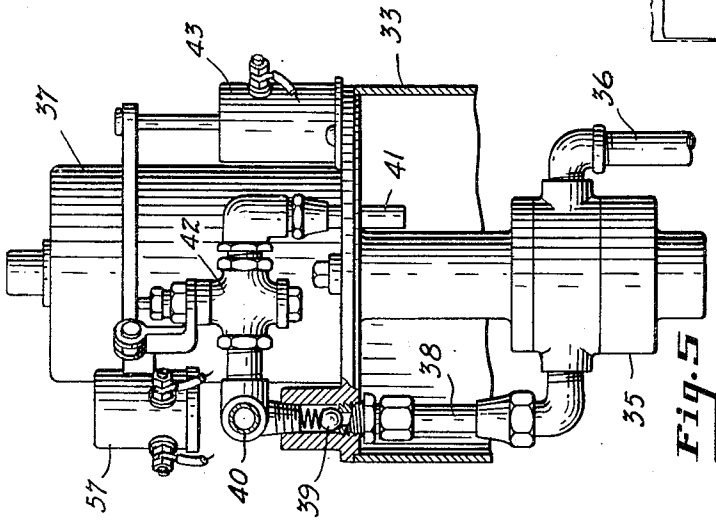


Fig. 5

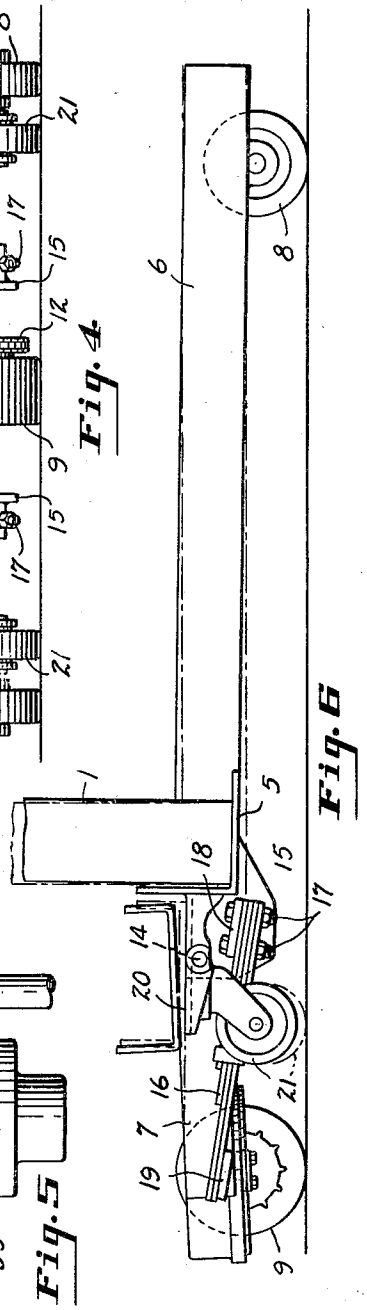


Fig. 6

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LIFT TRUCK

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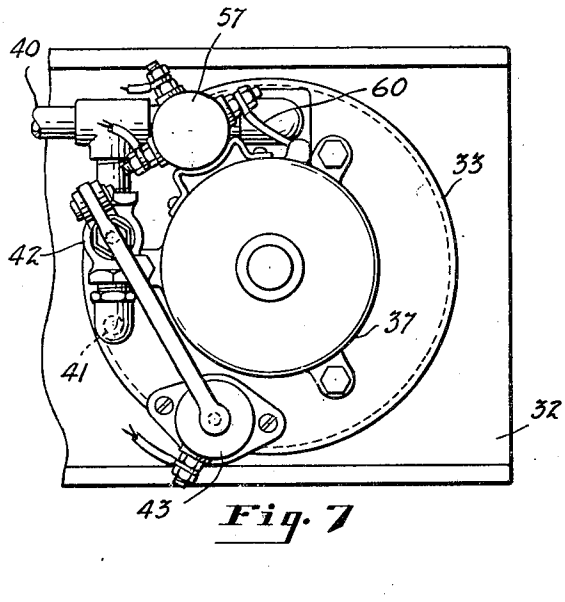


Fig. 7

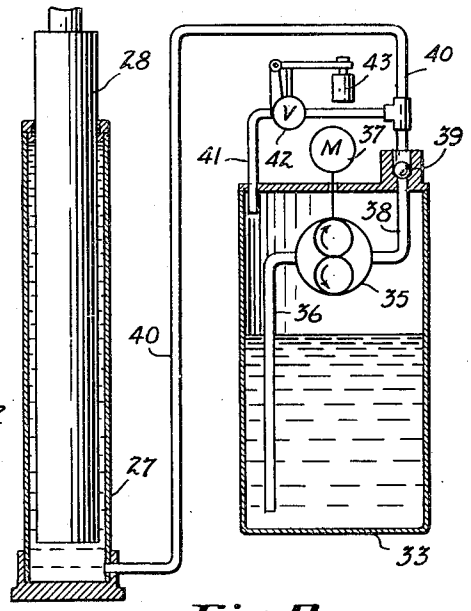


Fig. 8

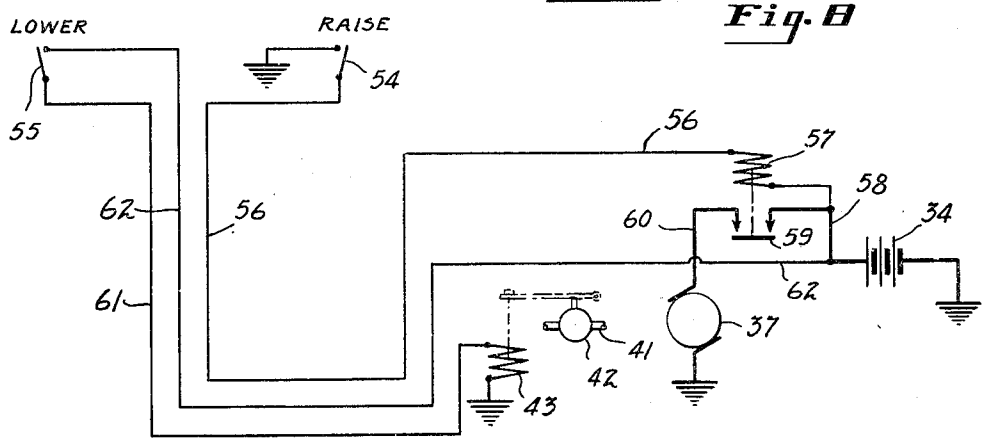


Fig. 9

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2,520,857

UNITED STATES PATENT OFFICE

2,520,857

LIFT TRUCK

Irvin F. Schreck, Cleveland Heights, Ohio

Application November 19, 1946, Serial No. 710,889

4 Claims. (Cl. 187—9)

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This invention relates to lift trucks and more particularly to trucks of the type disclosed in my Patent No. 2,395,345 granted February 19, 1946, which are supported at their front ends by a swiveled propelling and steering wheel and guided by means of a draft tongue.

An important object of the present invention is to provide an improved control for the load lifting mechanism.

It is also an object of the invention to so dispose the operating mechanism with respect to the elevator standard of the truck as to provide a truck with a low center of gravity to provide stability and of minimum overall length so that the truck can be conveniently manipulated in restricted spaces in warehouses, factories and the like.

A further object of the invention is to provide a truck with an improved hydraulic lift in which danger of liquid leakage is minimized.

With the above and other objects in view, the invention may be said to comprise the lift truck as illustrated in the accompanying drawings, hereinafter described and particularly set forth in the appended claims, together with such variations and modifications thereof as will be apparent to one skilled in the art to which the invention pertains.

Reference should be had to the accompanying drawings forming a part of this specification, in which:

Figure 1 is a side elevation of a truck embodying the invention;

Fig. 2 is a horizontal section taken on the line indicated at 2—2 in Fig. 1;

Fig. 3 is a view partially in section of the outer end of the draft tongue viewed as indicated at 3—3 in Fig. 1;

Fig. 4 is a front elevation of the truck;

Fig. 5 is a fragmentary vertical section through the upper portion of the liquid reservoir, showing the motor and pump in side elevation;

Fig. 6 is a fragmentary side elevation of the truck frame with the operating mechanism removed;

Fig. 7 is a top plan view of the motor and liquid reservoir shown in Figs. 4 and 5;

Fig. 8 is a diagrammatic view showing the hydraulic hoist mechanism, and

Fig. 9 is a wiring diagram showing the control for the load carriage raising and lowering mechanism.

Referring to the accompanying drawings, the truck of the present invention has a frame which includes an elevator standard 1 formed of two

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vertical side posts 2 each provided with a web 3 projecting from its inner face, a top cross bar 4 and a bottom cross bar or base member 5 connecting the lower ends of the posts. The frame also includes rearwardly projecting side members 6 rigidly attached to the base of the standard 1, and a forwardly projecting frame member 7 connected to the base member 5 intermediate the posts 2. Rear supporting wheels 8 are carried by the arms 6 and a front steering and driving wheel 9 is mounted in a frame 10 swiveled in the forwardly extending frame member 7. The wheel 9 is driven by means of an electric motor 11 mounted on the frame 10 and geared to the wheel 9 through a sprocket chain 12.

A draft tongue 13 is connected by a horizontal pivot 14 to the frame 10 and may be used to steer the truck while it is being propelled by the motor 11, or to manually move the truck forwardly or rearwardly when the motor 11 is idle. The forwardly extending frame member 7 is preferably pivoted to the base member 5 of the standard and as herein shown is connected by horizontal pivots 14 to brackets 15 which may be formed integrally with the base member 5. In order to insure adequate traction, means is provided for maintaining a substantial proportion of the load upon the front supporting wheel 9.

As shown in Figs. 1, 4 and 6, leaf springs 16 are rigidly attached at their rear end by means of bolts 17 to flanges 18 formed integrally with the brackets 15 on the outer sides thereof. The springs 16 extend forwardly at a slight inclination and engage the upper sides of flanges 19 formed integrally with the frame member 7 on opposite sides of the swiveled frame 10. The springs 16 tend to lift the standard 1 so as to dispose the forwardly projecting frame member 7 at a slight inclination to the arm 6 of the frame so that the load imposed on the standard 1 deflects the springs 16 and maintains a downward thrust upon the wheel 9.

In order to increase the stability of the truck, brackets 20 are carried by the opposite ends of the base member 5 and project forwardly therefrom, the tops of the brackets being preferably below the top of the forwardly projecting frame member 7. The brackets 20 carry castor wheels 21 which engage the floor when the truck is loaded, to limit the downward movement of the standard 1 with respect to the supporting wheels and to prevent tipping of the truck. The castor wheels 21 being swiveled to turn about vertical axes, do not interfere with the steering of the truck by turning the front supporting wheel 9.

A load supporting carriage 22 in the form of a forwardly projecting platform is mounted for vertical travel on the standard 1 and is provided at its forward end with a vertically disposed plate 23 that is positioned between the posts 2 and provided with forwardly projecting side flanges 24 which carry vertically spaced rollers 25 and 26 which engage with the front and rear faces of the webs 3 of the posts 2. The carriage 22 is raised and lowered by means of an hydraulic cylinder 27 mounted in vertical position upon the base member 5 midway between the side posts 2 of the standard 1. The cylinder 27 has a vertically movable plunger 28 that carries a sprocket wheel 29 at its upper end. A sprocket chain 30 is attached at one end to the upper end of the carriage plate 23, extends over the sprocket 29 and is attached at its opposite end to the upper end of a guard plate 31 which is attached to the posts 2 and extends across the space between the posts 2 at the front side of the standard.

Immediately to the front of the standard 1 a platform 32 is attached to the top of the frame member 7 and this platform extends the full width of the standard, having its opposite ends overlying the brackets 20 and castor wheels 21. The platform 32 provides a support for a liquid reservoir in the form of a tank 33 mounted at one end thereof and a battery 34 mounted alongside the liquid reservoir. Liquid from the tank 33 is delivered under pressure to the cylinder 27 to elevate the load carriage by means including a pump 35 that is mounted within the tank 33. The pump 35 has an inlet pipe 36 that extends downwardly to near the bottom of the tank 33 and is operated by a driving motor 37 mounted upon the top of the tank. The pump 35 delivers liquid under pressure through an outlet pipe 38 within the tank 33 and the check valve 39 mounted in the top of the tank, to a pipe 40 that leads from the tank to the cylinder 27. A return pipe 41 connects the pipe 40 to the upper portion of the tank 33 and a normally closed valve 42 is provided in the return pipe 41. When the valve 42 is closed liquid may be delivered under pressure into the cylinder 27 by operating the pump 35, and when the valve 42 is opened the liquid may flow from the cylinder 27 back into the tank 33, the valve 42 preferably providing a passage of a size suitable to provide the desired rate of flow of liquid from the cylinder to the tank and the desired lowering speed for the carriage. The valve 42 is controlled by suitable means such as a solenoid 43 which acts to open the valve when it is energized.

The battery 34 provides current for operating the propelling motor 11, the pump motor 37 and the solenoid 43. The battery is connected to the motor 11 through a cable 44 and a normally closed safety switch 45 which is controlled by an abutment 46 that is engaged by the tongue 13 to open the switch 45 when the tongue is swung to vertical position. Suitable conductor cables 47 carry wires leading from the battery 34 to the swiveled frame 10 and the motor control wires extend at 49 from the frame 10 to the draft tongue 13 so that the operation of the motor 11 and the raising and lowering mechanism for the load carriage may be controlled by the operator from the draft tongue.

At the outer end of the draft tongue there is mounted a controller 50 which is movable endwise and connected to sleeves 51 that are rotatable on tubular hand grip members rigidly attached to the outer end of the draft tongue 13

and projecting from opposite sides thereof. The controller 50 operates suitable switches, so that when shifted in one direction it causes the motor 11 to be driven in a direction to propel the truck forwardly and when moved in the opposite direction it causes the truck to be propelled in a rearward direction. The controller 50 may be the same as that shown in my copending application Serial No. 547,930, filed August 3, 1944, now Patent No. 2,478,327, dated August 9, 1949. Sleeves 51 are retained on the tubular hand grip members 52 by means of collars 53 attached to the outer ends of the members 52.

In order to provide a control for the load lifting and lowering mechanism that is at all times conveniently positioned with respect to the operator, normally open push button switches 54 and 55 are mounted in the outer ends of the tubular hand grip members 52. The switch 54 serves to energize the electric motor 37 to operate the pump to elevate the carriage and the switch 55 serves to energize the solenoid 43 to open the valve 42 and lower the carriage. As shown in Fig. 9, the switch 54 is connected by a wire 56 to one terminal of a solenoid 57, the other terminal of which is connected to the battery 34 by a wire 58. The solenoid 57 operates a switch 59 which when closed connects the wire 58 to a wire 60 leading to the motor 37 to energize the same. While the switch 54 is held closed by the operator the solenoid 57 is energized and the switch 59 is held closed to operate the motor 37. When the switch 54 is released and allowed to open, the motor 37 is stopped and the carriage 22 will be held in adjusted position by the liquid which is trapped in the cylinder 27 and the pipe 40 by the check valve 39.

One terminal of the switch 55 is connected by a wire 61 to one terminal of the solenoid 43, the other terminal of which is grounded and the other terminal of the switch is connected to the battery 34 by a wire 62. While the switch 55 is held closed by the operator, the solenoid 43 is energized to hold the valve 42 in open position. Whenever the switch 55 is released and allowed to open, the valve 42 will again close and the carriage 22 will be held in adjusted position by liquid trapped in the cylinder 27 and pipe 40 by the check valve 39. By providing a control for the load raising and lowering mechanism on the draft tongue, desired adjustments of the load may be effected while the truck is in motion or while the truck is being stopped by swinging the tongue 13 to vertical position and while the operator still holds the tongue.

By mounting the liquid supply tank 33 and battery 34 side by side immediately to the rear of the elevator standard, the frame member 7 may be made shorter and the center of gravity lowered. Shortening the truck is advantageous in that it enables the truck to be more easily manipulated in restricted spaces in warehouses, factories and the like, and the lowering of the center of gravity is advantageous because it reduces the tendency of the truck to tip.

A difficulty that is commonly experienced with trucks provided with hydraulic lifts is the leakage of oil past the pump packing onto the floor of the building in which the truck is used, which necessitates frequent replacement of the oil sealing rings of the pump. By placing the oil pump within the oil tank 33 slight leakage of oil past the pump packing does no harm, since the oil simply drips into the tank and frequent replacement of oil seals is unnecessary.

It is to be understood that variations and modifications of the specific devices herein shown and described for purposes of illustration, may be made without departing from the spirit of the invention.

What I claim is:

1. A lift truck having a wheel carrying frame adjacent its front end swiveled to turn about a vertical axis, a draft tongue pivoted to said swiveled frame, said draft tongue having hand grip portions at its outer end that project laterally from opposite sides thereof, a load supporting member mounted for vertical movement on said truck, means for raising said load carrying member, means for lowering said load carrying member, means for controlling the operation of said raising means including a normally open push button switch in the outer end of one hand grip portion of said draft tongue, and means for controlling the operation of said lowering means including a normally open push button switch in the outer end of the other hand grip portion of said draft tongue.

2. A lift truck having a wheel carrying frame adjacent its front end swiveled to turn about a vertical axis, a draft tongue pivoted to said swiveled frame, said tongue having hand grip portions projecting laterally from opposite sides thereof at its outer end, a motor for propelling said truck, a vertically movable load supporting member on the truck, means for raising said load supporting member, means for lowering said load supporting member, means for controlling the operation of said raising means including an electric push button switch in the outer end of one hand grip portion, means for controlling the operation of said lowering means including a push button switch in the outer end of the other hand grip portion, and a controller for said motor including a sleeve rotatable on a hand grip portion of said tongue.

3. A lift truck having a frame comprising a vertically disposed guide standard, members projecting forwardly and rearwardly from the base of said standard, the forwardly projecting member being centrally disposed and connected at its rear end to the standard by a horizontal pivot

and the rearwardly extending members being rigidly connected to the standard, supporting wheels carried by the rearwardly extending members, a steering and driving unit mounted in the forwardly extending member and including a swiveled frame, a supporting wheel and a driving motor, a platform on said forwardly projecting member immediately in front of said standard adjacent its base and between said standard and said steering unit, said platform projecting past opposite sides of said forwardly projecting member, a load carrying member mounted for vertical movement on said standard, means including a motor for raising and lowering said load carrying member, a battery mounted on said platform, means connecting said battery to said motors, means for controlling said motors, and a leaf spring extending longitudinally of the truck frame and beneath said platform, said spring being interposed between the standard and said forwardly extending member and arranged to exert a downward thrust on the latter, brackets attached to the base of said standard and projecting forwardly on opposite sides of said forwardly projecting member beneath said platform to limit the downward movement of said forwardly projecting member about its horizontal pivot, and castor wheels carried by said brackets.

4. A lift truck having an elevator standard, a carriage mounted for vertical movement on the standard, a hydraulic cylinder for operating said carriage, a reservoir for liquid comprising a storage chember, and means including a motor driven pump within said storage chamber for delivering liquid under pressure to said cylinder.

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The following references are of record in the file of this patent:

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