United States Patent [19]

Ellis, Jr.

[11] **3,734,327**

[45] **May 22, 1973**

[54] **LIFT TRUCK SIDE SHIFTING MEANS**

[76] Inventor: **William R. Ellis, Jr.**, 1056 Woodview Drive, Memphis, Tenn.

[22] Filed: **Apr. 5, 1971**

[21] Appl. No.: **131,422**

Related U.S. Application Data

[63] Continuation of Ser. No. 847,145, Aug. 4, 1969, which is a continuation-in-part of Ser. No. 591,759, Nov. 3, 1966, abandoned.

[52] **U.S. Cl.** .....**214/730,** 214/701 P

[51] **Int. Cl.** **B66f 9/14**

[58] **Field of Search** .....214/730, 731, 701 P, 214/750, 660

[56] **References Cited**

UNITED STATES PATENTS

2,270,664	1/1942	Weaver	214/730
2,820,562	1/1958	Schenkelberger	214/730
3,289,873	12/1966	Hansen	214/730
3,291,261	12/1966	Robb	187/9
3,414,150	12/1968	Ulinski	214/730
3,528,579	9/1970	Ulinski	214/701 R

FOREIGN PATENTS OR APPLICATIONS

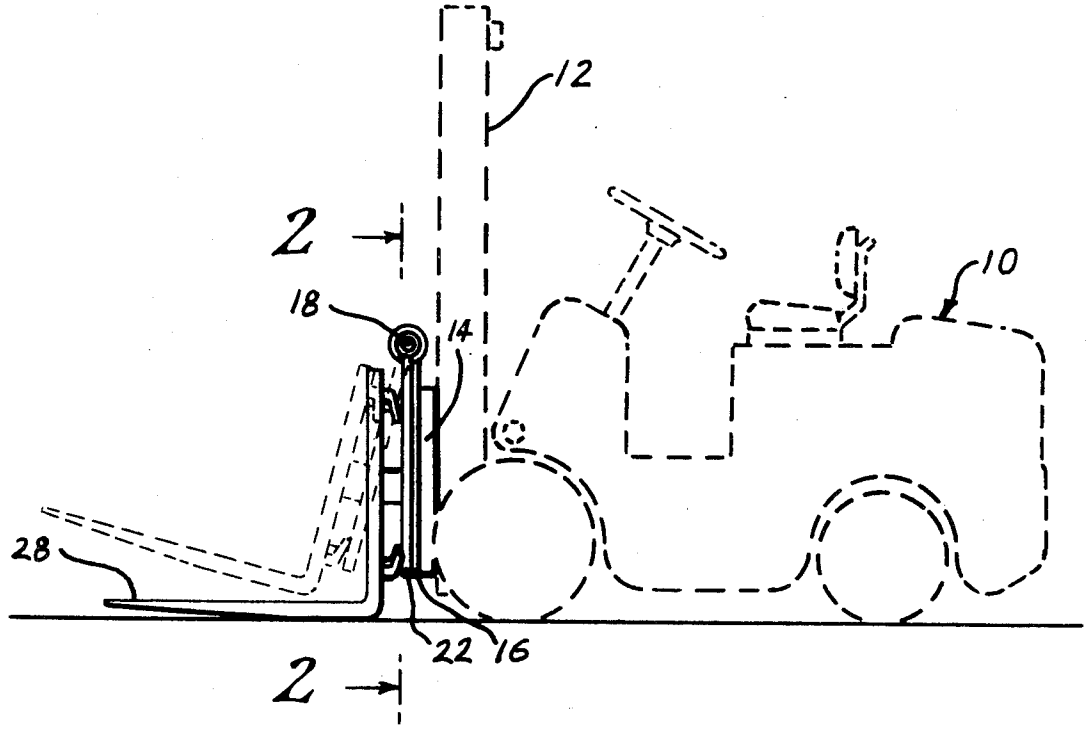
1,011,814	7/1957	Germany	214/674
964,161	7/1964	Great Britain	214/730

Primary Examiner—Gerald M. Forlenza
Assistant Examiner—Lawrence J. Oresky
Attorney—John R. Walker, III

[57] **ABSTRACT**

A side shifting means for lift trucks utilizing the horizontal support bar of shaft type fork mountings both as the support member for the forks and as the piston-cylinder for lateral shifting of the forks. By so doing, this allows the forks to pivot about the horizontal support bar and allows the front plate to be lifted upwardly for maintenance, without disengaging the piston from the remainder of the side shifting structure and reduces the load center loss.

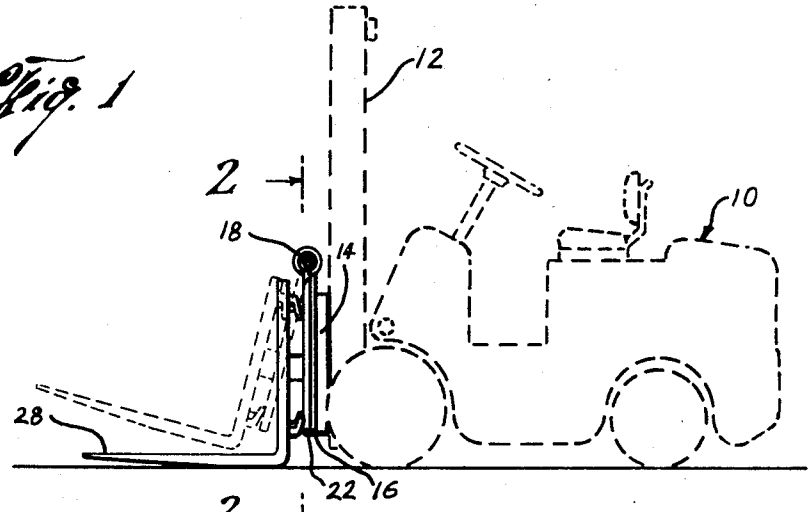
16 Claims, 8 Drawing Figures



Patented May 22, 1973 3,734,327

3 Sheets-Sheet 1

Fig. 1



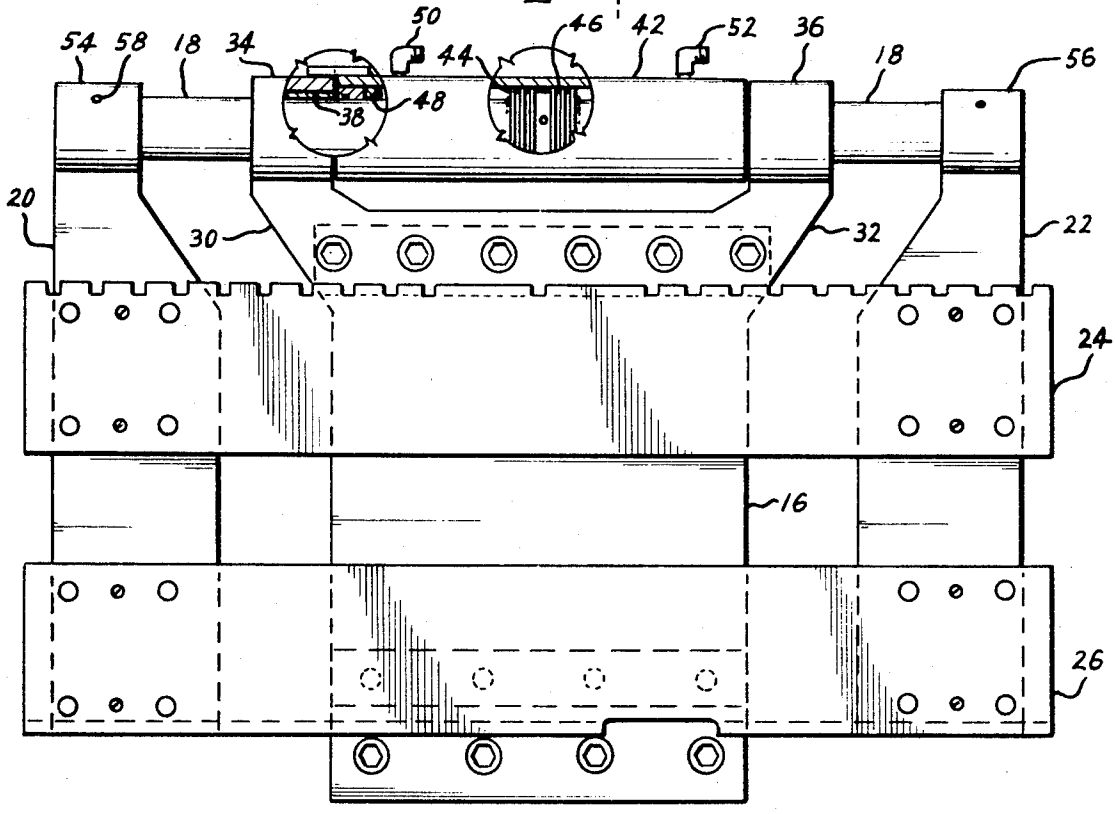


Fig. 2

William R. Ellis, Jr.
INVENTOR.

FIG. 3

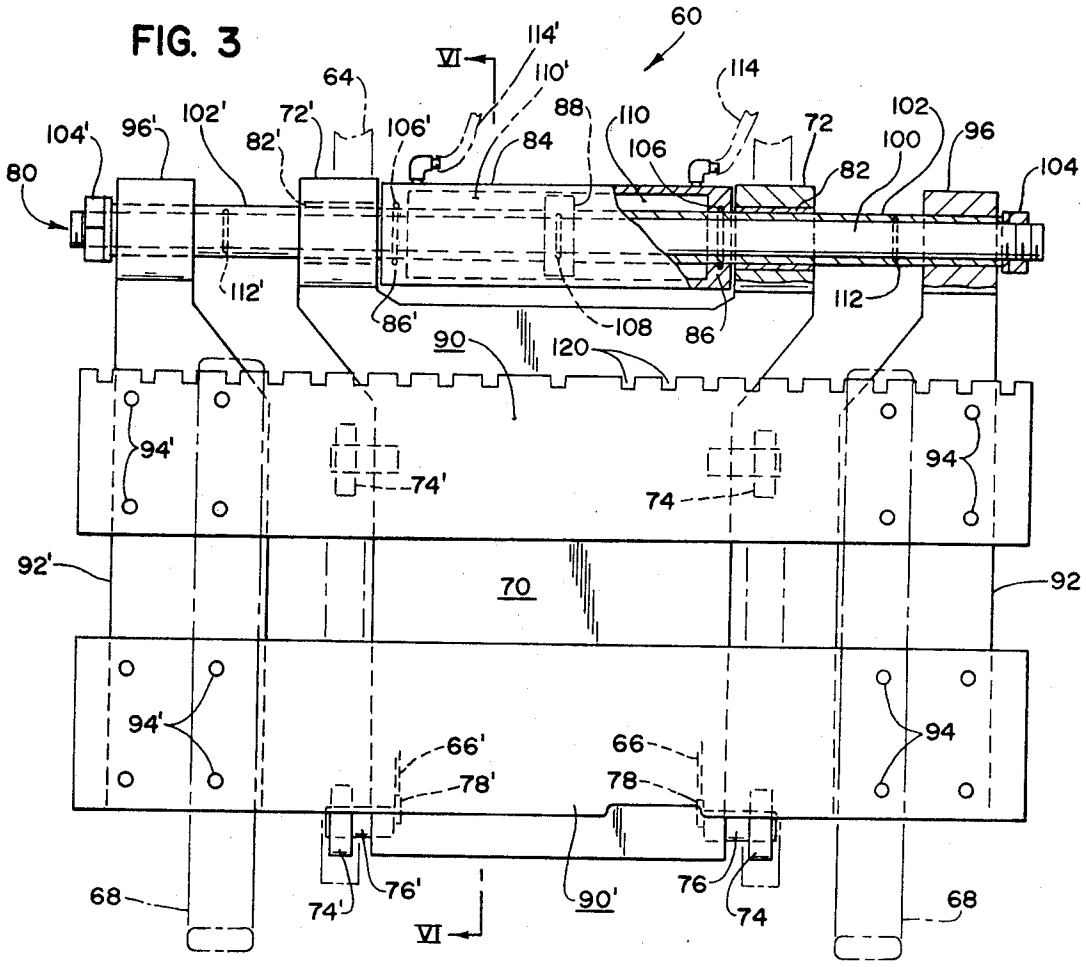
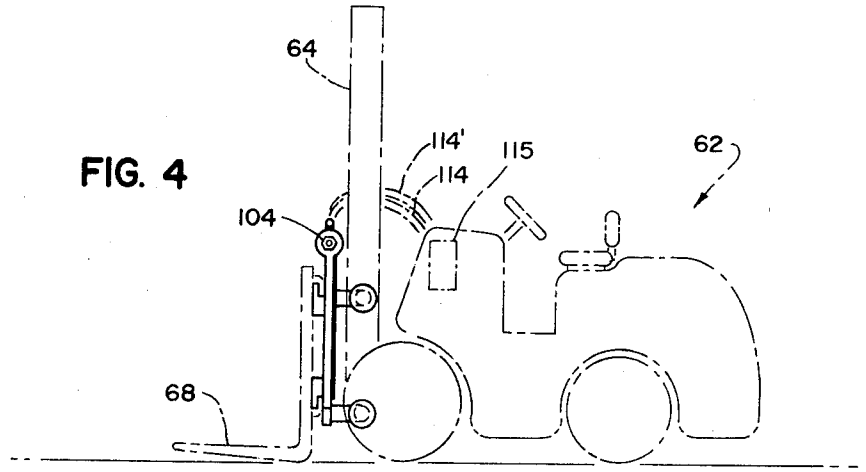


FIG. 4



INVENTOR.
WILLIAM R. ELLIS, JR.
BY John R. Walker, III
Attorney

FIG. 5

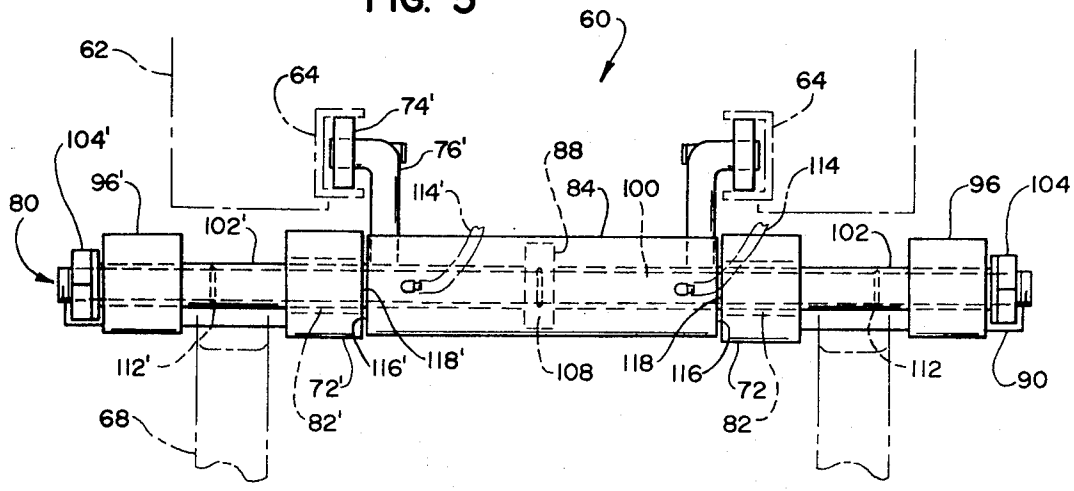


FIG. 6

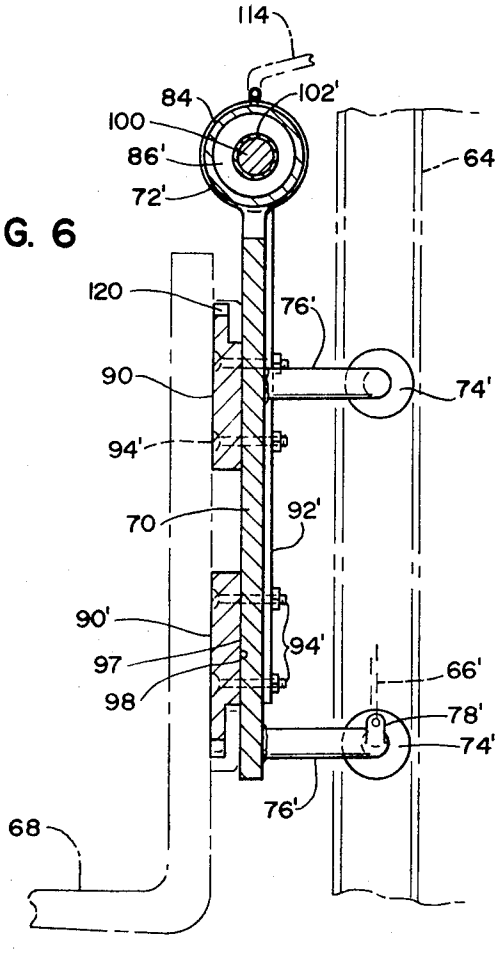


FIG. 7

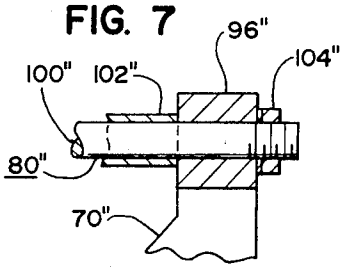
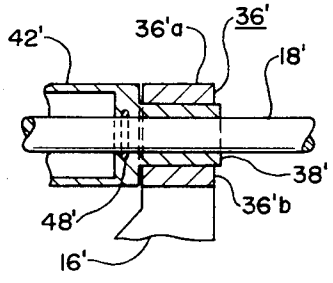


FIG. 8



INVENTOR.
WILLIAM R. ELLIS, JR.
BY John R. Walker, III
Attorney

LIFT TRUCK SIDE SHIFTING MEANS

CROSS REFERENCE TO RELATED APPLICATION

This is a continuation of my co-pending application Ser. No. 847,145, filed Aug. 4, 1969, entitled "Lift Truck Side Shifting Means," now abandoned. Said application, Ser. No. 847,145 was a continuation-in-part of my application Ser. No. 591,759, filed Nov. 3, 1966, entitled "Hydraulic Side Shifting Attachment," now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an improved hydraulic side shifting attachment or carriage for use on lift trucks, and more particularly relates to such side shifting structure wherein the horizontal support bar serves the function of supporting the forks and acts as the piston-cylinder for lateral shifting.

2. Description of the Prior Art

In the past, and in accordance with Industrual Truck Association recommended practices, the fork mountings for lift trucks have been either of the "hook" or "shaft" type mountings. In the hook arrangement, the forks are hooked over a recessed horizontal plate, which plate includes notches to laterally fix the spacing of the forks. In the shaft type mounting, a horizontal support shaft is mounted on the truck, and the forks have a hole bored therethrough for sliding upon this support shaft. This shaft allows the forks to pivot upwardly should the bottom of the fork hit an obstruction when the truck is backing up, or the like. In the past, to laterally shift either the hook or shaft type forks, it has been necessary to provide a hydraulic cylinder which is interconnected between the fork mounting plate and the frame, and these hydraulic cylinders have been so arranged that the fork mounting plate may not pivot about the horizontal bar without disconnecting either the piston or the cylinder from the fork mounting plate.

SUMMARY OF THE INVENTION

The present invention generally comprises a side-shifting means for a lift truck in which a horizontal support rod means is so arranged in conjunction with the other parts of the present invention that the load engaging means may be shifted laterally with the support rod means or may pivot about the longitudinal axis of the support rod means.

It is an object of the present invention to combine the advantages of both types of mountings with a hydraulically actuated side shifter so as to provide a hook type mounting plate for the forks, which mounting plate is pivoted about the horizontal support bar and which horizontal support bar further functions as the piston-cylinder for lateral shifting of the forks relative to the truck.

It is an object of the present invention to provide a hydraulic piston-cylinder which is incorporated into the support bar, so that the fork mounting plate or other such support structure may freely pivot, without the necessity of mechanically disconnecting the hydraulic cylinder.

It is a further object of the present invention to provide a side shifting carriage attachment or side shifting carriage per se, which, as contrasted with that shown in Abbe, U.S. Pat. No. 1,813,596, may be remotely actuated hydraulically, and to which hook type forks or other such load engaging means may be readily attached.

It is another object of the present invention to provide a hydraulic side shifting means which reduces the load center losses common to shaft type carriage side shifting devices and further offering to the hook type carriages the pivoting advantage of the fork shaft carriage.

It is a further object of the present invention to provide a hydraulic side shifting mechanism having hydraulic piston-cylinder and rod structure which is readily disassembled for repair of maintenance.

It is a further object to provide hydraulic side shifting means having frame structure which may readily be fitted with rollers and mounted on the mast structure of a typical lift truck. The side shifting mechanism of the invention may optionally be in an attachment form adapted for detachable attachment on an existing truck carriage, or may be in the form of a side shifting carriage per se embodied in the lift truck during manufacture.

BRIEF DESCRIPTION OF THE DRAWINGS

Other and further objects, features and advantages will be apparent from the following description of a presently preferred embodiment of the invention, given for the purpose of disclosure and taken in conjunction with the accompanying drawings, where like character references designate like parts throughout the several views, and where:

FIG. 1 is a side view showing the present invention as a detachable attachment type side shifting mechanism.

FIG. 2 is a partial sectional front view of the hydraulic side shifting mechanism of the present invention, taken along the line II—II of FIG. 1.

FIG. 3 is a front elevational view of another embodiment of the invention in the form of a side shifting carriage per se, adapted to be embodied in a lift truck vehicle during manufacture.

FIG. 4 illustrates a side elevational view of the side shifting carriage structure of FIG. 3 and as being in combination with the lift truck chassis structure and load engaging means thereof.

FIG. 5 is a top view of the side shifting carriage means of the invention.

FIG. 6 is a vertical plane sectional view taken as on the line VI—VI of FIG. 3.

FIG. 7 is a modification of the side shifting carriage structure shown in FIG. 3.

FIG. 8 is a modification which may optionally be incorporated in the side shifting means shown in FIG. 1 or FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, and particularly to FIGS. 1 and 2, reference numeral 10 generally designates an industrial lift truck which includes a lifting mast 12 having a carriage mounting plate 14 mounted thereon for vertical movement.

Attached to the plate 14 is the frame 16 of the hydraulic side shifting means of the invention. As seen in FIG. 2, supported by the frame 16 in a manner to be further described hereinafter, is a horizontal support rod or rod means 18 from which are suspended the brackets 20 and 22. Attached to the brackets 20 and 22

are the horizontal mounting plates 24 and 26 which are of a conventional spacing and configuration for the attachment of industry standard forks 28. Obviously, other standard lift truck attachments may be suitably attached to the mounting plates 24 and 26 in a conventional manner. As shown in dashed lines in FIG. 1, the brackets 20 and 22 are arranged to pivot about the rod 18 so that when the lift truck 10 backs over an obstruction, the forks, mounting plates, and brackets may pivot upwardly to clear the obstruction, and similarly, should the elevator mast 12 be tilted forwardly, the forks will remain essentially horizontal.

Referring now to FIG. 2, it is seen that the frame 16, which is attached to lift truck carriage has frame ears 30 and 32 extending upwardly therefrom. Attached to each of these ears is a circular boss 34 and 36, within which may be pressed a cylindrical bushing 38. The cylindrical bushings 38 support the rod 18 for rotary and lateral sliding movement, thus allowing the rod 18 to shift laterally.

Inset between the bosses 34 and 36 of frame 16 is a cylinder 42 which surrounds the rod 18. Centrally mounted on the rod 18 is the piston 44, which may comprise a cylindrical member suitably pinned to the rod 18. Centrally mounted on the rod 18 is the piston 44, which may comprise a cylindrical member suitably pinned to the rod 18. The piston 44 is arranged for sliding movement within the cylinder 42, and may include suitable grooves with packing 46 therein to sealingly retain hydraulic fluid on opposite sides of the piston. Mounted adjacent both ends of the cylinder 42 is additional rod packing 48 to maintain hydraulic fluid between the piston 44 and packing 48 and it is further seen that the bosses 34 and 36 serve as cylinder heads or abutment means for the centrally mounted cylinder 42. Thus, the present invention provides a double ended cylinder 42 having a piston rod 18 extending completely therethrough with appropriate bearing means and packing on both ends. Conventionally attached at the ends of the cylinder 42 are hydraulic conduits 50 and 52 for the introduction and removal of hydraulic fluid to hold or move the piston and rod.

The upper ends of the brackets 20 and 22 include circular bosses 54 and 56 which are suitably attached to the rod 18, as by a pin 58. Conventionally suspended from the brackets 20 and 22 are the horizontal hook fork mounting plates 24 and 26 to which may be attached appropriate lift forks. The upper plate 24 may include notches for the lateral spacing of the fork, in accordance with industry standards.

In operation, the frame 16 is suitably attached to the carriage mounting plate 14 of the lift truck. Thereafter, the appropriate forks or load engaging means are attached to the fork mounting plates 24 and 26. When it is desired to shift the forks laterally so as to maneuver the forks under the pallet, or the like, hydraulic fluid is introduced to one of the conduits 50 and 52, and removed from the other, thus acting against the piston 44 and sliding the rod 18 laterally. Lateral movement of the rod 18 results in lateral movement of the brackets 20 and 22 and hook fork mounting plates 24 and 26, and thus the forks 28 attached hereto.

Should the lift truck back over an obstruction which would hit the plate 26 or the forks 28, then the plates and brackets would pivot about the frame 16 freely and without damage to the hydraulic shifting mechanism. Similarly the forks may pivot when the mast 12 is tilted.

Thus, it is seen that the present invention has provided a hydraulic side shifter attachment which has advantageously combined the horizontal support bar both as the piston-cylinder for lateral shifting and as the horizontal support member for the forks so as to allow the forks to pivot about this bar and allow the mounting plates to be lifted upwardly for maintenance or the like, without disengaging the piston-cylinder from the remainder of the attachment.

The lift truck side shifting means of the embodiment shown in FIGS. 3 – 6 is indicated by numeral 60 and will be described in conjunction with a forklift truck 62 having mast structure 64 and selectively operative elevatingly positionable lifting elements 66. Embodiment 60 will also be described in conjunction with typical load engaging means in the form of a pair of lift forks 68.

Embodiment 60 basically includes a generally planar vertical frame 70 having left and right frame boss portions 72, 72'; roller and bracket means 74, 76 guidingly constraining frame 70 on the lift truck mast 64; lift lug means 78 formed on roller bracket 76 adapted for attachment to the lift truck lifting elements 66; a support rod means or assembly 80 horizontally supported in frame boss structure 72, 72' respectively by left and right rod bearing means 82, 82'; a cylinder tube 84 arranged between frame boss structures 72, 72' and supported respectively from rod assembly 80 by left and right bearing means respectively 86, 86'; a piston 88 mounted centrally on rod assembly 80 and sealingly fitted in cylinder tube 84; and, mounting means mounting the load engaging fork means 68 from rod assembly 80 including upper and lower horizontal mounting plates 90, 90' respectively, vertically arranged parallel bracket means 92, 92' fixedly secured at the lower end portions thereof by suitable means, as for example, bolt means 94, 94' respectively to opposite end portions of mounting plates 90, 90', and pendantly supported respectively at the upper end portions thereof to opposite end portions of rod assembly 80 by bracket boss structure 96, 96' respectively, and surface means, indicated 97, 98, arranged between lower mounting plate 90' and frame structure 70. Surface means 97, 98 permits antifriction shifting movement of lift forks 68 and the load being manipulated while constraining movement of the load and fork means against pivotal downward displacement relative to the axis of rod assembly 80.

The support rod assembly 80 preferably includes a core rod 100 and left and right arranged sleeve members 102, 102' concentrically fitted on the core rod and arranged respectively on opposite sides of piston 88. The core rod extends through cylinder tube 84, frame boss structure 72, 72' and bracket boss structure 96, 96'. Suitable securing means, as nut means 104, 104', preferably threadedly fitted respectively on opposite end portions of core rod 100 perform a twofold function: (1) Nut means 104, 104' are convergingly threadedly tightened respectively on opposite ends of core rod 100 thereby compressing sleeve members 102, 102' and holding the inward end portions thereof respectively in abutting engagement with opposite side surfaces of piston 88. (2) Nut fastener means 104, 104' are arranged respectively adjacent outside surfaces respectively of bracket bosses 96, 96' and constrain the bracket means 92, 92' and the load mounting means against bidirectional displacement on rod assembly 80.

Suitable seal means, as O-rings **106, 106'** and **108,** preferably are fitted respectively in cylinder tube bearing means **86, 86'** and in the bore of annular piston **88** for defining sealed hydraulic work chambers **110, 110'** in cylinder tube **84.** O-ring seal elements **112, 112'** also preferably are arranged concentrically between sleeve members **102, 102'** and opposite end portions of core rod **100** for preventing leakage of hydraulic fluid outwardly and toward the opposite ends of rod assembly **80.** Conduits **114, 114'** communicate respectively work chambers **110, 110'** of cylinder tube **84** with the hydraulic power system of lift truck **62** shown schematically as at **115.** The simultaneous charging-discharging of work chambers **110, 110'** is operative for causing selective displacement of rod assembly **80** leftward or rightward relative to shift carriage frame structure **70** supported on the lift truck chassis. The opposite end surfaces **116, 116'** of cylinder tube **84** preferably are arranged contiguous the confronting face surfaces **118, 118'** respectively of frame boss structure **72, 72'**; bidirectional counter thrust on cylinder tube **84** from movement of piston **88** is received respectively at one or the other end of tube **84** and respectively at abutting surfaces **116, 118** or **116', 118'.** Notches **120** are intermittently formed in the upper edge portion of upper mounting plate **90** for detachably receiving in lateral adjustment coacting lug portions (not shown) of lift forks **68.** It will be understood that other mounting means for mounting attachment devices other than lift forks **68** may be provided on mounting plates **90, 90'.**

Bracket boss means **96, 96'** engaging opposite end portions of rod assembly **80** may optionally be fixedly stationed on the rod assembly or may be turnably supported therefrom. FIGS. **3 – 6** illustrate a preferred embodiment wherein the boss portions **96, 96'** of brackets **92, 92'** are turnably supported on oppositely projecting end portions respectively of sleeve members **102, 102'.** FIG. **7** shows a modification of this structure and illustrates an embodiment wherein bracket boss structure **96''** is fixedly secured to an end portion of a rod assembly **80''.** In this arrangement, nut fastener **104''** threadedly clamps bracket boss structure **96''** against the piston (not shown) and through a short sleeve member **102''.** In this arrangement, rod assembly **80** is unitarily connected with the load engaging means and mounting plates **90, 90'**; pivotal upward and downward movement of the load engaging means thus causes turning movement of rod assembly **80** respectively in frame boss structure **72, 72',** and if cylinder tube **84** is maintained stationary, piston **88** simultaneously will be turned in the cylinder tube.

The modification shown in FIG. **8** may optionally be incorporated either in that embodiment shown in FIG. **1** or FIG. **3**; however, for purposes of simplicity and clarity, the structure of FIG. **8** will be described as being incorporated in the embodiment shown in FIG. **1**: A cylinder **42'** may be provided with a bearing projection **38'** which in turn may be turnably fitted in the bore of annular boss **36'** of frame structure **16'.** In this arrangement, cylinder **42'** is supported directly from frame structure **16'.** This is in contrast to the arrangement illustrated in FIG. **1** wherein the cylinder is supported by support rod **18.** In the structure shown in FIG. **8,** support rod **18'** is supported indirectly from frame boss structure **36'** through bearing projectiong **38'.** Frame boss **36'** preferably is longitudinally severed to include an upper half **36'*a*** and a lower half **36'.** Suitable fastening means (not shown) detachably secure the upper boss half **36'*a*** on the lower half **36'*b.*** This embodiment and the embodiments shown in FIGS. **1 – 7** permit ready removal of the cylinder structure from the frame structure for maintenance and repair of the side shifting mechanism.

The present invention, therefore, is well adapted to carry out the objects and attain the ends and advantages mentioned as well as others inherent therein. While presently preferred embodiments of the invention have been given for the purpose of disclosure, numerous changes in the details of construction and the combination, shape, size, arrangement of parts and uses may be resorted to without departing from the spirit and scope of this invention.

I claim:

1. In combination, a hydraulic side shifting means, a lift truck including a vertically movable means and a load engaging means, said side shifting means comprising a frame supported on said vertically movable means of said lift truck for vertical movement therewith, a hydraulic cylinder arranged horizontally adjacent the front of said lift truck and with said cylinder defining oppositely opening end openings, a horizontal support rod means extending through said cylinder and through the opposite end openings thereof, means slidably supporting said rod means from said frame for bidirectional endwise movement of said rod means relative to said frame in a direction along the longitudinal axis of said rod means, said cylinder being free to align with said rod means and being substantially unrestrained on the exterior thereof except being constrained from substantial endwise movement relative to said frame, piston means supported on said rod means and sealingly fitted in said cylinder, mounting means mounting said load engaging means, means supporting said mounting means from said rod means for pivotable movement about the longitudinal axis of said rod means and for lateral movement with the endwise movement of said rod means, and hydraulic power means operative for energizing said cylinder and selectively actuating said piston bidirectionally to move said rod means endwise and thereby laterally shifting said mounting means and said load engaging means.

2. A hydraulic side shifting attachment for lift trucks, said attachment including frame means for attachment to the lift truck, a horizontal support rod slidable horizontally in said frame means in a direction along its longitudinal axis and extending from said frame means, fork mounting plate means, of the hook type including means for hooking forks thereto, attached to the rod, and pivotable about the longitudinal axis of said rod, a hydraulic cylinder incorporated in said frame means, said cylinder being free to align with said rod means and being substantially unrestrained on the exterior thereof except being constrained from substantial enwise movement relative to said frame, a piston on said rod within said cylinder, and means to supply hydraulic fluid to said cylinder thereby laterally shifting said piston, laterally shifting said rod in a direction along its longitudinal axis, and laterally shifting said fork mounting plate therewith.

3. The invention of claim **2** including brackets suspended from the ends of the rod, and fork mounting plates attached to said brackets.

4. The invention of claim **3** wherein said frame means includes laterally spaced apart bosses, said cylinder ex-

tending between said bosses, and bushings mounted within said bosses slidably engaging said rod.

5. A hydraulic side shifting attachment for lift trucks including a frame removably attachable to the lift truck, a pair of laterally spaced apart bosses extending upwardly from the frame, a double ended hydraulic cylinder mounted between said bosses, a horizontal support rod extending through said bosses and slidable horizontally therein in a direction along the longitudinal axis of said rod, said cylinder being free to align with said rod and being substantially unrestrained on the exterior thereof except being constrained from substantial endwise movement of said bosses, a piston attached to said rod within said cylinder between said bosses, a pair of brackets respectively adjacent the ends of said rod, means suspending said brackets from said rod for pivot about said longitudinal axis of said rod, fork mounting plates horizontally mounted between and attached to the brackets, forks removably hooked to said plates and fixedly held relative to said plates, and hydraulic conduits communicating with each end of the cylinder.

6. The invention of claim 5 including packing glands at each end of the cylinder adjacent each boss, and bushings within each boss.

7. A hydraulic side shifting attachment for lift trucks including a double ended hydraulic cylinder, means for attaching said cylinder to the lift truck permitting pivotal movement of said cylinder about its longitudinal axis relative to the lift truck but preventing endwise movement thereof, a piston within the cylinder, piston rods extending from both ends of the cylinder, hook type mounting means for hooking forks thereto, hydraulic fluid means communicating with the interior of said cylinder for shifting said piston and said piston rods laterally, and means pivotally attaching said mounting means to said piston rods for pivot of said mounting means about the longitudinal axes of said rods and for causing lateral shifting of said mounting means laterally with said piston rods.

8. The combination with an industral lift truck having lift mast means, power operative lifting elements supported from said lift mast means selectively elevationally positionable and having load engaging means adapted for directly engaging and supporting load structure to be manipulated, of side shifting carriage means comprising frame means; means supporting said frame means from the lift mast and lifting elements of said lift truck; a hydraulic cylinder arranged horizontally generally at the forward center of said lift truck and with the cylinder structure defining oppositely opening end openings; continuous rod means extending through said cylinder and sealingly projecting through the opposite end openings; said cylinder being supported only by said rod means; piston means supported on said rod means and sealingly fitted in said cylinder means; hydraulic power means selectively operative for energizing said cylinder and actuating said piston bidirectionally; said frame means including left and right boss means arranged respectively adjacent opposite end structure of said cylinder means; left and right arranged primary bearing means supporting said rod means respectively from said left and right frame boss means, and left and right arranged secondary bearing means supporting respectively left and right end structure of said cylinder from said rod means; abutment means operative between said cylinder means and said frame means constraining said cylinder means against axial bidirectional displacement relative to said frame means; said cylinder being free to align itself with said rod means and being substantially unrestrained on the exterior thereof except by said abutment means; and mounting means for mounting said lift truck load engaging means forwardly of said frame means including mounting plate means, left and right arranged bracket means suspended from opposite end structure of said rod means and supporting said mounting plate means, and means arranged subjacently of said rod means permitting shifting movement of said mounting means and movement of said load engaging means while constraining said mounting means and said load engaging means against pivotal downward displacement about the axis of said rod means.

9. The combination with an industrial lift truck having lift mast means, power operative lifting element supported from said lift mast means selectively elevationally positionable, and having load engaging means adapted for directly engaging and supporting load structure to be manipulated, of side shifting means for shifting load structure laterally of said lift truck comprising frame means, means supporting said frame means from the lift mast and lifting elements of said lift truck; a hydraulic cylinder arranged horizontally generally at the forward center of said lift truck and with the cylinder having structure defining oppositely opening end openings; continuous rod means extending through said cylinder and sealing projecting through the opposite end openings thereof; piston means supported on said rod means and sealingly fitted in said cylinder means; hydraulic power means selectively operative for energizing said cylinder and actuating said piston bidirectionally; said frame means including left and right boss means arranged respectively adjacent opposite end structure of said cylinder means; left and right arranged bearing means supported respectively from said left and right frame boss means simultaneously supporting said rod means and said cylinder means and permitting bidirectional shifting movement of said rod means relative to said frame means; abutment means operative between said cylinder means and said frame means constraining said cylinder means agains axial bidirectional displacement relative to said frame means; said cylinder being free to align itself with said rod means and being substantially unrestrained on the exterior thereof except by said abutment means and; mounting means for mounting said lift truck load engaging means forwardly of said frame means including mounting plate means, left and right arranged bracket means suspended from opposite end structure of said rod means and supporting said mounting plate means, and means arranged subjacently of said rod means permitting shifting movement of said mounting means and shifting movement of said load engaging means while constraining said mounting means and said load engaging means against pivotal downward displacement about the axis of said rod means.

10. The side shifting means as defined in claim 9 wherein said rod means is in the form of a solid integral support rod.

11. The side shifting means as defined in claim 10 wherein said rod means is of composite form and includes an integral rod member, annular piston means concentrically arranged about said rod member and in the interior of said cylinder, left and right arranged rod

sleeve means concentrically arranged on said rod member on opposite sides of said piston;primary fastening means releasably constraining said piston, said left and right sleeve means and said rod member against relative axial displacement; and secondary fastening means releasably constraining said rod means against axial displacement relative to said left and right bracket means.

12. The side shifting means as defined in claim **11** wherein said bracket means includes a left and a right arranged annular bracket boss means concentrically fitted respectively over said left and right arranged rod sleeve means.

13. The side shifting means as defined in claim **12** wherein said left and right annular bracket boss means each are turnably supported respectively on said left and right rod sleeve means, and wherein said primary and secondary fastening means include respectively nut means arranged oppositely outwardly respectively of said left and right bracket boss means and detachably engaging opposite end portions of said rod member.

14. Side shifting attachment means for shifting load structure laterally of an industrial lift truck of the type including lift mast means, power operative lifting element supported from said lift mast means selectively elevationally positionable, and including load engaging means adapted for directly engaging and supporting load structure to be manipulated; said side shifting means comprising frame means; means for supporting said frame means from the lift mast means and lifting element of said lift truck; a hydraulic cylinder for arrangement horizontally generally at the forward center of said lift truck and with the cylinder having structure defining oppositely opening end openings; continuous rod means extending through said cylinder and sealingly projecting through the opposite end openings thereof; piston means supported on said rod means and sealingly fitted in said cylinder means; hydraulic power means selectively operative for energizing said cylinder and actuating said piston bidirectionally; said frame means including left and right boss means arranged respectively adjacent opposite end structure of said cylinder means; left and right arranged bearing means supported respectively from said left and right frame boss means simultaneously supporting said rod means and said cylinder means and permitting bidirectional shifting movement of said rod means relative to said frame means; abutment means operative between said cylinder means and said frame means constraining said cylinder means against axial bidirectional displacement relative to said frame means; mounting means for mounting said lift truck load engaging means forwardly of said frame means including mounting plate means, left and right arranged bracket means suspended from opposite end structure of said rod means and supporting said mounting plate means, means arranged subjacently of said rod means permitting shifting movement of said mounting means while constraining said mounting means against pivotal downward displacement about the axis of said rod means; said rod means being in the form of a solid integral support rod; said rod means being of a composite form and including an integral rod member; annular piston means concentrically arranged about said rod member and in the interior of said cylinder; left and right arranged rod sleeve means concentrically arranged on said rod member on opposite sides of said piston; primary fastening means releasably constraining said piston, said left and right sleeve means and said rod member against relative axial displacement; and secondary fastening means releasably constraining said rod means against axial displacement relative to said left and right bracket means.

15. The side shifting attachment means as defined in claim **14** wherein said bracket means includes a left and a right arranged angular bracket boss means concentrically fitted respectively over said left and right arranged rod sleeve means.

16. The side shifting attachment means as defined in claim **15** wherein said left and right annular bracket boss means each are turnably supported respectively on said left and right rod sleeve means, and wherein said primary and secondary fastening means include respectively nut means arranged oppositely outwardly respectively of said left and right bracket boss means and detachably engaging opposite end portions of said rod member.

* * * * *