

March 21, 1950

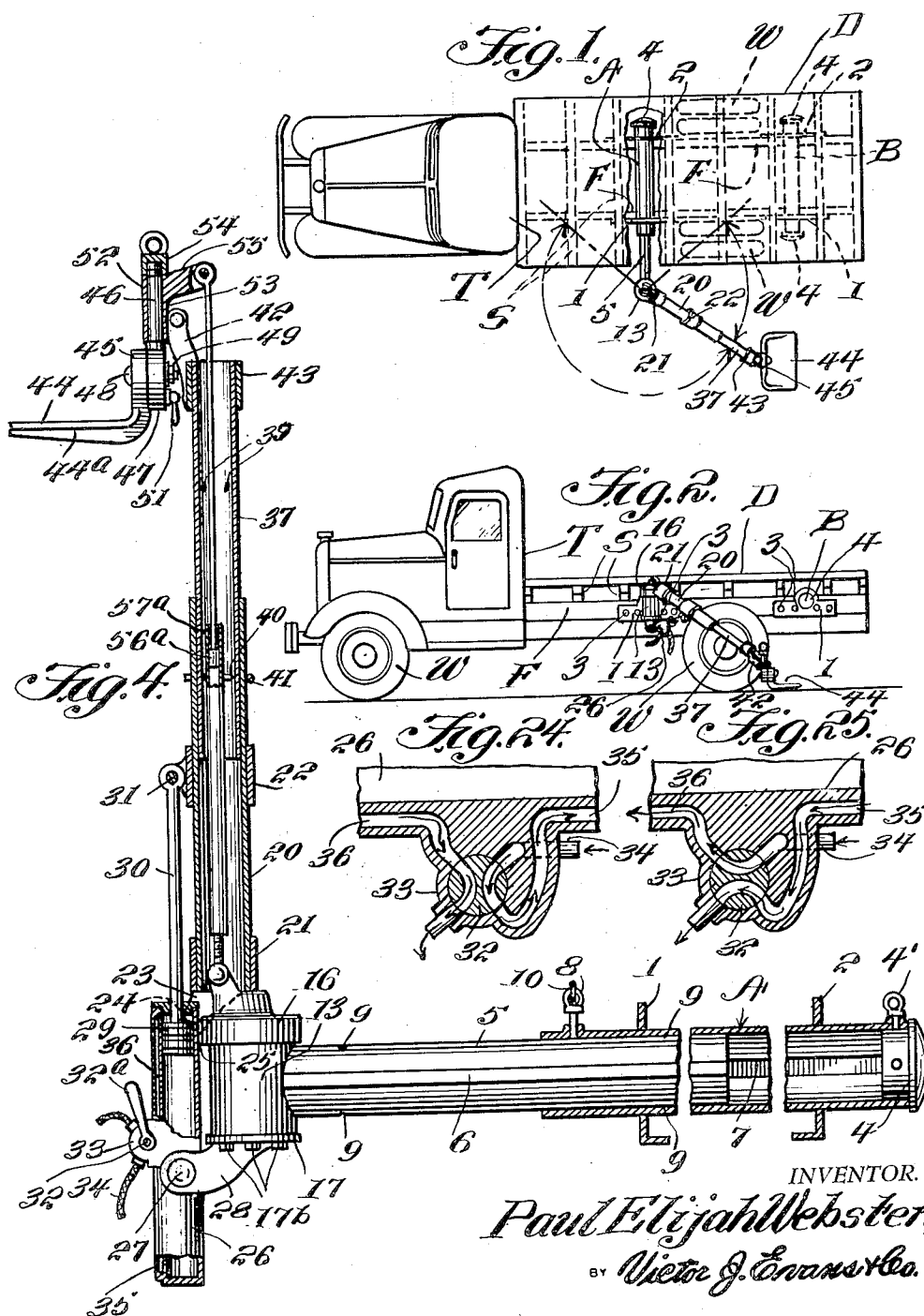
P. E. WEBSTER

2,501,112

PORTABLE LIFT ATTACHMENT FOR TRUCKS

Filed May 24, 1948

4 Sheets-Sheet 1



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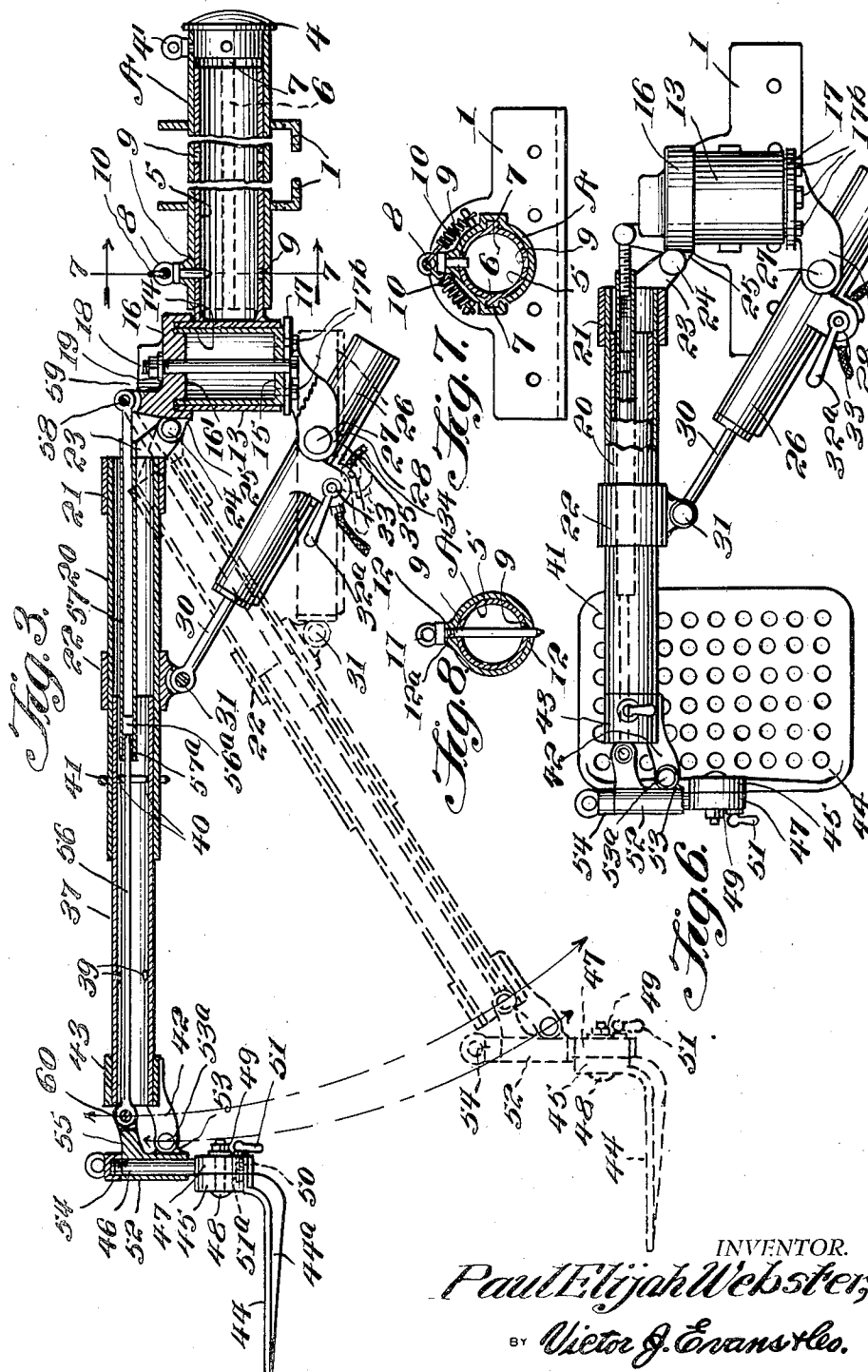
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4 Sheets-Sheet 2



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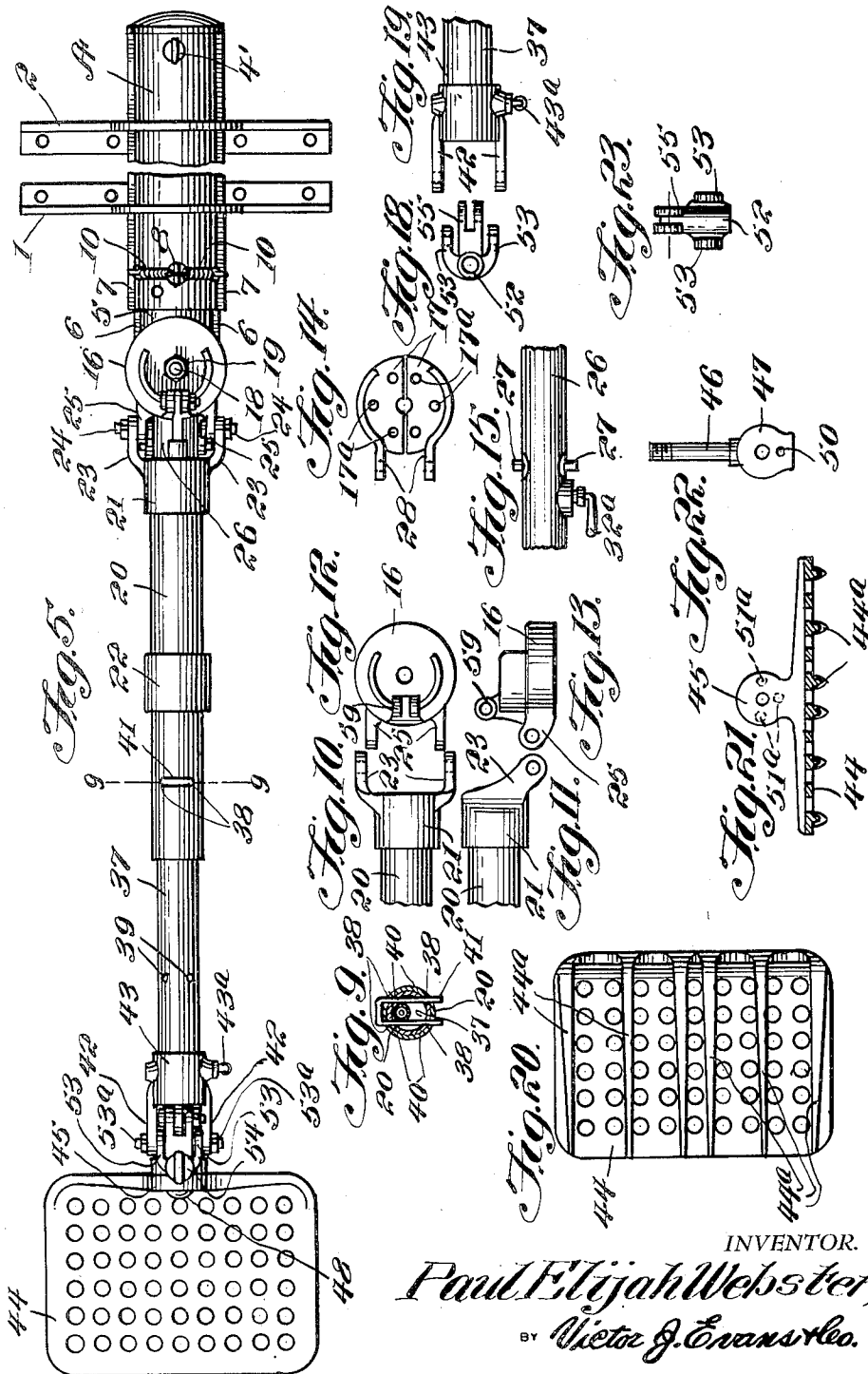
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4 Sheets-Sheet 3



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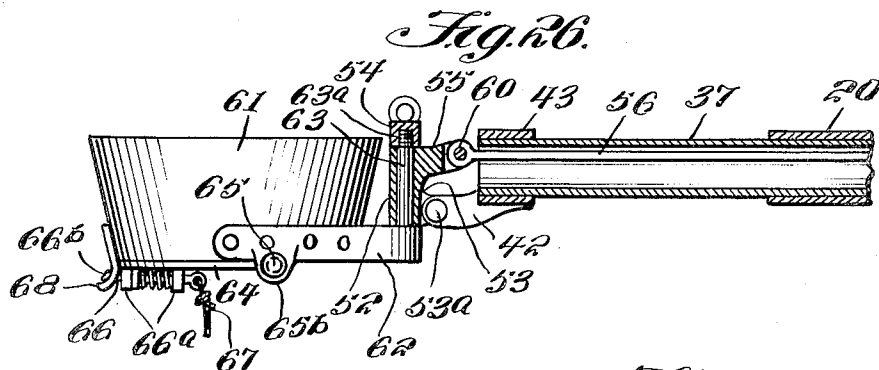
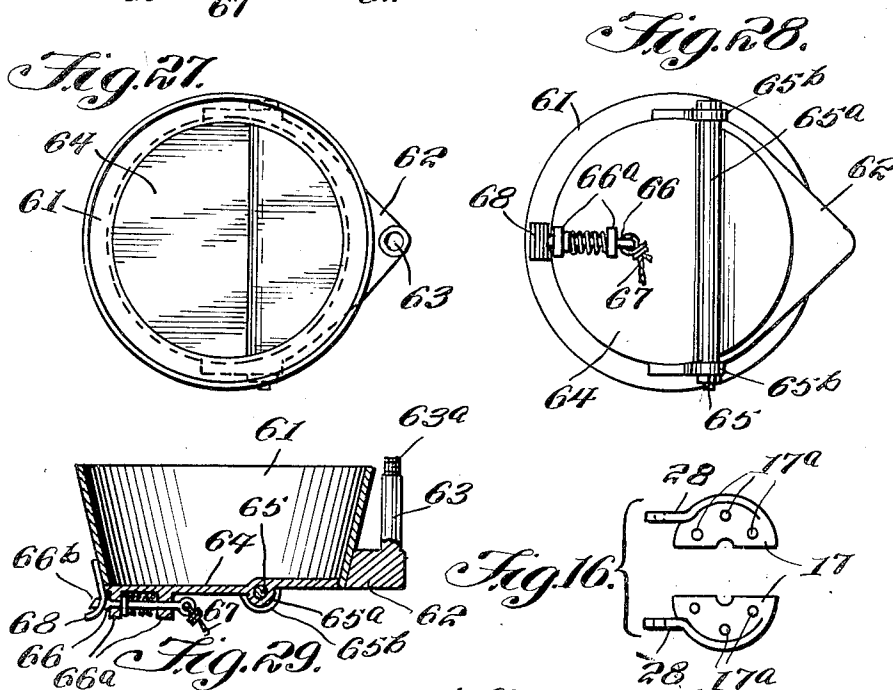
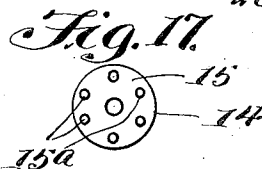
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PORTABLE LIFT ATTACHMENT FOR TRUCKS

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4 Sheets-Sheet 4



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PORTABLE LIFT ATTACHMENT FOR TRUCKS

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Application May 24, 1948, Serial No. 28,792

4 Claims. (Cl. 214—78)

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The present invention relates to improvements in portable lift hoists, and in particular to a hoist adapted to be removably and detachably secured to a motor vehicle to facilitate the loading and handling of various articles.

One object of the invention is to provide a portable hoist capable of being conveniently connected to and supported on either side of a motor vehicle to enable the vehicle to be loaded or unloaded without considerable effort on the part of the operator.

Another object is to provide a portable lift for a motor vehicle which can be operated by hand and power, such as a hydraulic motor operated by pressure fluid from a suitable source such as the motor or engine of the vehicle.

Another object is to provide a portable lift which can be conveniently and quickly applied to a vehicle and removed when not in use, and which can be easily stored after being contracted and folded within the confines of the vehicle beneath the body thereof.

Another object is to provide a portable hoist which is capable of handling loose materials or packages and other objects so as to swing the same from a ground level to a position above the vehicle body, and vice versa, to either load or unload the vehicle in a quick and easy manner.

Another object is to provide a portable hoist for self-loading vehicles which is adapted to operate in a wide arc, and from the ground level to a considerable distance above the loading bed such as the vehicle body.

Another object is to provide a portable hoist for self-loading vehicles having a level loading pan which is adapted to operate without slings or hooks or other devices of a similar nature liable to become entangled and twisted.

Another object is to provide a portable hoist for self-loading vehicles having a load supporting platform, pallet or bucket which is adapted to swing vertically and horizontally in parallel relation with the ground surface.

Another object is to provide a portable hoist for self-loading vehicles having a control valve for admitting pressure fluid to opposite ends of the lifting cylinder, and thereby raise or lower the hoist boom about a horizontal pivot axis. The boom also being arranged to swing about a vertical pivot axis which may be accomplished manually during the vertical swinging movement under the influence of the hydraulic control system.

Another object of the invention is to provide a portable hoist for self-loading vehicles which

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may be detachably and removably secured to the front or rear portion of the vehicle body, as well as to the right and left hand side thereof to enable the vehicle to be loaded from either side at the front and rear in certain loading operations under various handling conditions.

Other objects and advantages of the invention will become apparent during the course of the following description of the accompanying drawings wherein:

Figure 1 is a top plan view of a motor vehicle showing the portable hoist likewise in top elevation, removably and detachably connected in an operative position to facilitate loading of the vehicle from the left hand side thereof.

Figure 2 is a side elevational view of a motor vehicle showing the manner in which the portable hoist is connected and supported on the chassis frame and beneath the floor of the vehicle.

Figure 3 is a longitudinal cross sectional view showing the hoist boom in its projected position, and illustrating the manner in which the hoist boom is adapted to swing vertically under the influence of a hydraulic pressure system from the dotted line position or one of loading to the full line position.

Figure 4 is a side elevational view of the portable hoist mechanism showing portions thereof in section to illustrate various details of construction, and the manner in which the boom hoist may be swung from the dotted line position, Figure 3, to a completely elevated position wherein the boom is substantially perpendicular.

Figure 5 is a top elevational view of the portable hoist showing the same in its fully projected operative position.

Figure 6 is a side elevational view of the portable hoist showing the boom retracted and folded to extend parallel with the chassis frame structure of the vehicle, and illustrating the pallet or load supporting platform angularly displaced 90 degrees from a horizontal operative position to a vertical inoperative position to enable the hoist to be swung to a folded position against the chassis frame of a vehicle.

Figure 7 is a transverse cross sectional view taken on line 7—7 of Figure 3 looking in the direction of the arrows to illustrate the manner in which the locking pin is yieldingly held in place.

Figure 8 is a transverse cross sectional view similar to Figure 7, and showing a slightly modified supporting arm structure and locking pin for the portable hoist.

Figure 9 is a transverse cross sectional view taken on line 9—9 of Figure 5 showing a U-shaped locking key for holding the boom arm in its fully projected position.

Figures 10 and 11 are a top and side elevational views respectively of a fitting for the inner end of the boom to facilitate pivotal connection thereof to the swivel head.

Figures 12 and 13 are top and side elevational views respectively of a swivel head cap member to which the boom is pivoted to swing about a horizontal axis.

Figure 14 is a bottom elevational view of a diametrically divided anchoring member adapted to be connected to the lower end of the swivel sleeve for rockably supporting the hydraulic control cylinder.

Figure 15 is a fragmentary side elevational view of the hydraulic motor cylinder for controlling vertical swinging movement of the hoist boom, showing the control valve built into the cylinder.

Figure 16 is a bottom plan view of the lower swivel plate sections for retaining the swivel head in assembled relation and rockably supporting the hydraulic control motor.

Figure 17 is a bottom plan view of a bearing sleeve to which the diametrically divided retaining plate structure shown in Figure 16 is bolted.

Figure 18 is a top plan view of the swivel connection for pivotally connecting the pallet or load supporting platform to the free swinging end of the hoist boom.

Figure 19 is a fragmentary top elevational view of a fitting attached to the end of the boom to accommodate the swivel fixture shown in Figure 18.

Figure 20 is a bottom plan view of the load supporting pallet or platform showing spaced apart ribs for supporting the same slightly above the ground surface.

Figure 21 is a longitudinal cross sectional view taken transversely of the axis of the hoist boom, and illustrating the circular bearing lug for supporting the platform.

Figure 22 is a front elevational view of a spindle and bearing extension to which the circular bearing lug of the platform is adapted to be bolted for pivotal adjustment.

Figure 23 is a front elevational view of the swivel fixture shown in Figure 18 illustrating the relative position of the two sets of lugs carried thereby.

Figure 24 is an enlarged fragmentary longitudinal sectional view of the hydraulic motor cylinder showing the control valve arranged to supply pressure fluid to one end of the cylinder for swinging the hoist boom vertically, while allowing escape and return of pressure fluid from the opposite end of the cylinder.

Figure 25 is a longitudinal fragmentary cross sectional view similar to Figure 24, but showing the control valve angularly displaced 90 degrees to supply pressure fluid to the opposite end of the cylinder, thereby causing the hoist boom to swing downwardly and permitting the fluid at the opposite end of the cylinder to return to the supply reservoir.

Figure 26 is a side elevational view of a slightly modified form of the invention, employing a bucket for supporting the load on the end of the boom arm.

Figure 27 is a top plan view of the modified load supporting bucket for handling bulk material shown in Figure 26.

Figure 28 is a bottom plan view of the load supporting bucket showing the latch for the tilting bottom and the control cord therefor, and

Figure 29 is a diametrical cross sectional view of the load supporting bucket taken in a direction transverse to the swing axis of the tilting bottom.

In the drawings, attention is directed to the form of the invention shown in Figures 1 to 25, and in particular to Figures 1 and 2 wherein for the purpose of convenience the invention is shown as being installed on the left hand side of a motor vehicle. The motor vehicle T is of conventional design and includes supporting wheels W for the chassis frame F. Transverse sill members S are supported by the chassis frame bars F and a flat car or stake body D is supported on the transverse sill members.

The portable hoist mechanism is adapted to be supported on either side of the vehicle body in the front or rear thereof, and in order to accomplish this, two pairs of bracket plates 1 and 2 are bolted in spaced apart relation to each of the chassis frame bars F to provide front and rear opposed bracket sets as shown in Figure 1. The two sets of bracket plates 1 and 2 are provided with suitable openings for receiving bolts 3 to secure the plates in position.

Each pair of supporting plates 1 and 2 is connected by cylindrical barrels A and B, which are open at both ends and extend transversely of the chassis frame beneath the vehicle floor D. Each of the barrels A and B are adapted to be closed when not in use by suitable closure plugs 4 which may be held in place by suitable locking keys or pins 4'. As shown in Figure 4, one of the caps has been removed for slidably receiving a tubular hoist supporting arm 5 having longitudinally extending ribs 6 arranged in diametrically opposed relation for being slidably received in ways 7 likewise diametrically opposed and formed in the cylindrical support or barrel A.

The tubular support 5 is provided adjacent its ends with diametrically opposed apertures 9, Figure 4. When the ribs 6 and 7 are employed a short locking pin 8 is inserted in an opening in the barrel A for alternately engaging one of the pairs of opposed openings 9 to hold the tubular supporting arm 5 in an extended or retracted position. The locking pin 8 is adapted to be yieldingly held in place by means of coil springs 10, Figure 7, which have one end anchored to the bracket plate 1, and their opposite ends affixed to the loop of the pin 8. Thus, the pin 8 can be conveniently displaced so that the tubular supporting arm 5 may be projected and the pin 8 engage within the opening 9 in the end which is slidably received in the barrel A or, when it is desired to retract the tubular supporting arm 5 the pin may engage within one of the set of openings 9 adjacent the outer end thereof.

As shown in Figure 8, a slightly modified form of locking pin is employed where the guide ribs 6 and opposed ways 7 are eliminated. As shown in Figure 8 a locking pin 11 is provided with a relatively long shank or pin portion which is adapted to pass through diametrically opposed openings 12 in the cylindrical fixed support or barrel A in addition to being passed through the openings 9 at each end of the tubular support 5. One of the openings 12 is threaded for receiving a correspondingly threaded portion 12a of the pin 11. Thus, the pin 11 may be inserted in the sets of openings 9 and 12 and turned so that the

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threaded portion 12a of the pin 11 will hold the pin against accidental displacement.

Welded or otherwise affixed to the outer end of the tubular supporting arm 5 is a cylindrical bearing 13 having its axis normal to the axis of the tubular support 5, Figure 3. Slidably mounted within the cylindrical bearing 13 is a bearing sleeve 14 having a closed lower end 15 provided with a series of circumferentially spaced threaded openings 15a, Figure 17. A swivel cap 16 is rotatably mounted on the opposite end of the bearing sleeve 14 and is provided with a shoulder plate 16 which extends into the upper end of the bearing sleeve 14 and retains the bearing cap 16 in centered relation. A bolt 18 extends through central aligned openings in the bottom wall 15 of the bearing sleeve 14 and the swivel cap 16, and is held in place by a nut 19. Bolted to the bottom wall 15 of the bearing sleeve 14 is a diametrically divided retaining plate 17 which has formed therein spaced apart openings 17a adapted to register with the openings 15a in the bottom wall 15 of the bearing sleeve 14 for receiving anchoring bolts 17b, Figure 3. The plates 17 are cut away to provide a central opening to accommodate the bolt 18 and are of a diameter when assembled to extend beyond the lower edge of the tubular swivel support 13. Thus, the bearing cap 16 is provided with a bearing surface of greatly increased area and the bearing cap 16 is provided with a depending annular flange which overlies the upper edge of the tubular swivel support 13.

Formed integral with the bearing cap 16 is a pair of spaced apart bearing lugs 25 to which is pivotally attached a pair of correspondingly spaced bearing arms 23 which are formed integral with a sleeve casting 21. The sleeve casting 21 is pivotally connected to the bearing cap by means of a bearing pin 24 having the ends threaded for receiving retaining nuts. Affixed to the sleeve casting 21 is a tubular boom arm 20 on which is mounted a sleeve 22 to which is pivotally attached the hydraulic lifting device. Formed integral with the diametrically divided bearing retaining assembly 17 is a pair of spaced apart bracket arms 28 for pivotally mounting a hydraulic cylinder 26 by means of diametrically arranged trunnions 27. A piston 29 (Fig. 4) is reciprocally mounted in the cylinder, and is provided with a piston rod 30 having its outer end connected to a pair of bearing bosses on the sleeve 22 by means of a pivot pin 31. Thus, when pressure fluid is admitted to opposite ends of the cylinder 26, the tubular boom arm 20 will be swung vertically about the horizontal pivot axis 24 and the cylinder 26 will rock upon the trunnion bearings 27.

Formed integral with the cylinder 26 is a valve housing 33 for rotatably mounting a plug valve 32, Figures 24 and 25. Pressure fluid from a suitable source such as a pump driven by the vehicle motor is admitted to the valve casing 33 through a pipe line 34 so that when the valve 32 is in the position shown in Figure 24, pressure fluid may be admitted to the inner end of the cylinder 26 to force the piston and piston rod 30 in an opposite direction. Simultaneously, the opposite end of the cylinder is ported to a return pipe to said source of pressure fluid through a duct 36. When it is desired to admit pressure fluid to the outer end of the cylinder, the plug valve 32 is shifted as shown in Figure 25. Thus, the pressure fluid source or pipe 34 is placed in communication with the port 36, while the other duct 35 is con-

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nected to the return pipe. A manual control handle 32a is mounted on the control valve 32 to facilitate operation thereof.

Slidably mounted in the outer end of the tubular boom arm 20 is an extensible and retractible tubular boom arm 37 having pairs of diametrically spaced apertures 39 and 40 which are adapted to alternately register with diametrically opposed sets of apertures 38 for receiving a U-shaped locking key 41. When the tubular boom extension 37 is in an extended position the locking key 41 is passed through the registered sets of diametrically opposed apertures 38 and 40. Similarly, when the tubular boom extension 37 is in its retracted position, the U-shaped locking key 41 is passed through the registered sets of opposed openings 38 and 39.

Mounted on the free swinging end of the tubular boom extension 37 is a sleeve 43 having a pair of spaced apart bearing bracket arms 42 for pivotally supporting a pallet or load platform 44. The load platform 44 is provided on its under surface with a series of spaced apart ribs 44a which are adapted to space the pallet or load support a slight distance from the ground when the boom arm has been lowered to a loading position. Formed integral with the rear portion of the pallet is an upstanding projection 45 of circular shape which is adapted to be supported and clamped to a correspondingly shaped depending bracket 47 on a spindle 46. A clamping bolt 48 is passed through centrally arranged openings in the upstanding circular portion 45, and correspondingly shaped depending bracket 47, and said clamping bolt is held in place by means of a retaining nut 49, thus the pallet 44 can be adjusted about the axis of the clamping bolt 48. In order to retain the pallet in a horizontal position, the depending bracket 47 is provided with an aperture 50 for receiving a locking pin 51 which is adapted to project into one of a series of circumferentially spaced openings 51a in the circular extension 45 of the pallet 44, Figure 21. The spindle 46 is supported on the free end of the swinging boom 37 by means of a tubular casting 52 which is provided with a pair of spaced apart lugs 53 for receiving a bearing pin 53a. The bearing pin 53a also passes through bearing openings in the bearing bracket arms 42 so that the platform or pallet 44 may pivot relative to the vertically swinging boom arm during movement thereof in a vertical direction. The upper end of the spindle 46 is threaded for receiving a correspondingly threaded cap 54 as shown clearly in Figure 3.

Also formed integral with the spindle casting 52 is a bearing arm 55 which is spaced slightly above the bearing lugs 53. The bearing arm 55 is connected to an upstanding projection 59 formed integral with the bearing cap 16 by means of a pair of telescopic rods 56 and 57. The inner end of the tubular rod 57 is pivotally connected to the upstanding projection 59 by means of a pin 58, while the free end of the telescopic rod 56 is pivotally connected to the bearing arm 55 by means of a pivot pin 60. The tubular rod 57 is provided at its outer end with a plug 57a having a bore slidably receiving the rod 56, and similarly, the telescopic rod 56 is provided with a slightly enlarged head 56a for being slidably received in the tubular rod 57. Thus, when the telescopic rods 56 and 57 are fully extended the enlarged head 56a will engage the plug 57a and prevent separation of the telescopic rods, and simultaneously maintain the axis of the spindle casting 52

in a perpendicular position throughout the entire arc of travel of the boom arm. Thus, the platform 44 is moved in parallelism from a loading position to a dumping position by reason of the rectangular linkage system.

In order to displace the pallet or load support 44 90 degrees from the position shown in Figure 3 to that shown in Figure 6, the sleeve casting 43 is provided with a threaded locking pin 43a which is adapted to tightly clamp the sleeve casting 43 on the free end of the telescopic boom arm 37. Thus, when the pallet or work platform 44 is displaced 90 degrees, Figure 6, the entire assembly may be folded beneath the vehicle body and in close proximity to the chassis frame.

When it is desired to so fold the lifting hoist the tubular supporting arm 5 is slid inwardly of the tubular support A so that the locking pin 8 may engage the upper opening 9 in the free end of the sliding arm 5. The hydraulic cylinder 26 is then manipulated by the control handle 32a so as to position the tubular boom arms 20 and 37 in a horizontal direction as shown in Figure 3. The horizontal boom arm may then be swung parallel with the vehicle chassis after the extension 37 has been moved to a retracted position and locked by the pin 41 being passed through the openings 39.

For consideration of the operation of the invention shown in Figures 1 to 25 inclusive, it will be assumed that the tubular supporting sleeve A or B at the front and rear of the vehicle has been selected and for the purpose of convenience of illustration, it will be assumed that the forward tubular support A has been selected for supporting the hoist mechanism. After the cap 4 of said tubular support A has been removed by displacing its retaining pin 4', the tubular supporting arm 5 is inserted in the open end so that the locking screw 8 will enter the opening 9 in the inner end of said tubular supporting arm so that the sleeve bearing 13 will be positioned a considerable distance beyond the vertical edge of the vehicle to facilitate vertical and horizontal swinging movement of the hoist without being obstructed by the side edge of the vehicle truck platform D.

After the hoist has thus been positioned the telescopic tubular boom arm 37 is extended to the position shown in Figures 3, 4 and 5, so that the key 41 will enter the openings 40 and 38 in the respective telescopic sections 37 and 20 of the hoist arm. When the tubular boom extension 37 is projected from the position shown in Figure 6 and locked by the U-shaped locking key 41, the platform or pallet 44 is displaced 90 degrees from the position shown in Figure 4 so that it will assume a horizontal position, Figures 1 to 5 inclusive. The locking pin screw 51 is then inserted so that the end thereof will engage the lowermost opening 50 in the depending bracket 47 and retain the work support of pallet against displacement.

The hoist is now in position for loading or unloading the vehicle, Figures 1 and 2, by manipulating the control handle 32a of the plug valve 32 such as to admit pressure fluid to the left hand end of the cylinder 26, Figure 3, which will cause the hoist boom to swing from its lowermost position (dotted lines) Figure 3, to a vertical position Figure 4. When it is desired to load a vehicle pressure fluid is admitted to the outer end of the cylinder 26 so as to lower the hoist boom as shown in Figure 2, whereupon the work support or pallet 44 will rest upon the

ground and may be loaded with stacked bricks, packages or other objects. After the pallet is thus loaded, pressure fluid is admitted to the inner end of the cylinder 26 by manipulating the plug valve control handle 32a so as to swing the hoist boom vertically about the axis of the horizontal pivot pin 24. When the hoist arm has been elevated a sufficient distance above the vehicle body platform D the hoist boom may be swung manually about the vertical pivot axis of the cylindrical bearing 13 so as to position the work pallet or support 44 over the top of the vehicle body platform D for unloading. After the objects have been unloaded the hoist boom is swung clear of the vehicle body horizontally by grasping the same and manually moving the boom through an arc as shown in Figure 1. The control valve 32a is again manipulated to admit pressure fluid to the outer end of the cylinder 26, whereupon the hoist boom and load platform 44 will be swung downwardly about the pivot axis of the horizontal pivot pin 24.

In the modified form of the invention shown in Figures 26 to 29 inclusive, a slightly different load support is employed in lieu of the platform 44 shown in the form of the invention illustrated in Figures 1 to 25 inclusive. In Figure 26 the spindle casting 50, boom arm 37 and 20 is identical to that shown in Figures 1 to 25 inclusive, and will not need further discussion. The spindle 46, Figure 1 to 25 inclusive, being removed and replaced by a spindle 63 which has formed at its lower end a yoke 62 to which is affixed a bucket 61 adapted to support bulk or liquid material. The bottom wall 64 of the bucket 61 is pivotally attached to the yoke 62 by means of a diametrically extending pivot rod 65 which extends through a tubular boss 65a formed integral with the bottom wall 64 so that the ends of the rod may be journaled in bearing projections 65b adjacent the ends of the yoke 62.

The spindle 63 is inserted in the tubular spindle casting 50 and is held in place by means of a threaded retaining cap 54 threaded on the upper end 63a of the spindle 63.

In order to retain the bottom wall 64 in a closed position, a yielding spring pressed latch 66 is slidably guided in spaced projections 66a so that the pointed end 66b will engage a keeper plate 63 affixed to the bucket 61 directly opposite the spindle 63. A release cord 67 is tied to one end of the spring pressed locking bolt 66 to release the bolt from a remote point and permit the bucket bottom 64 to rock about the axis of the bolt 65 and discharge the load of the bucket 61.

It will be readily appreciated that other forms of load supports may be detachably connected to the free swinging end of the hoist arm or boom 20-37, and that various other changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. In a portable lift for an automotive vehicle having a chassis frame, a plurality of transversely arranged supporting sleeves for selective use, a tubular support adapted to be inserted in one of said sleeves, a tubular bearing member secured to the outer end of said supporting arm, a bearing sleeve mounted in said tubular bearing member, bearing a plate at each end of said sleeve, means for holding said plates together, a boom arm mounted on the uppermost bearing plate on the outer end of the tubular support

for vertical and horizontal swinging movement, a load support on the free swinging end of the boom, means for retaining said support in parallelism and pressure fluid means for swinging said boom vertically.

2. In a portable lift for vehicles having a chassis frame, a plurality of transverse supporting sleeves affixed to said frame for selective use, a tubular supporting arm adapted to be mounted in one of said sleeves, a tubular bearing member secured to the outer end of said supporting arm, a bearing sleeve mounted in said tubular bearing member, bearing a plate at each end of said sleeve, means for holding said plates together, a telescopic boom pivoted to the uppermost bearing plate on the outer end of said tubular support for vertical and horizontal swinging movement, a load support on the free swinging end of said boom to travel in parallelism and pressure fluid means for rocking said boom about a horizontal axis to swing the same vertically.

3. In a portable lift for vehicles having a chassis frame, a sleeve supported by said frame, a tubular supporting arm slidably and removably mounted in said sleeve, a sleeve bearing mounted on the outer end of said tubular arm, a bearing cap rotatably mounted at one end of said sleeve, a retaining plate mounted at the other end of said bearing sleeve, a telescopic boom pivotally connected to the bearing cap to swing vertically, a pressure fluid motor rockably mounted on said bearing plate, a load support removably mounted on the free swinging end of the telescopic boom, means connecting the pressure fluid motor to the boom arm to swing the same vertically and means for retaining said load support in parallelism during vertical swinging movement of the boom.

4. In a portable lift for vehicles having a 40

chassis frame, a plurality of supporting sleeves carried by said frame for selective use, a tubular supporting arm removably and slidably mounted in one of said sleeves, a tubular bearing member 5 secured to the outer end of said supporting arm, a bearing sleeve mounted in said tubular bearing member, bearing plates at each end of said sleeve, means for holding said plates together, a telescopic boom arm pivoted to the uppermost bearing plate to swing about a vertical axis, a pressure fluid motor rockably mounted on the lowermost bearing plate having a piston rod connected to the inner section of the telescopic boom, means for admitting pressure fluid to 10 either end of the motor, a load support removably and adjustably pivoted to the free swinging end of the telescopic boom, means for holding the supporting arm in a projected or retracted position, means for holding the outer section of the telescopic boom in a projected or retracted position and means for locking the load support in a horizontal position.

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