

Dec. 5, 1939.

H. NILSON

2,182,676

JACK

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3 Sheets-Sheet 1

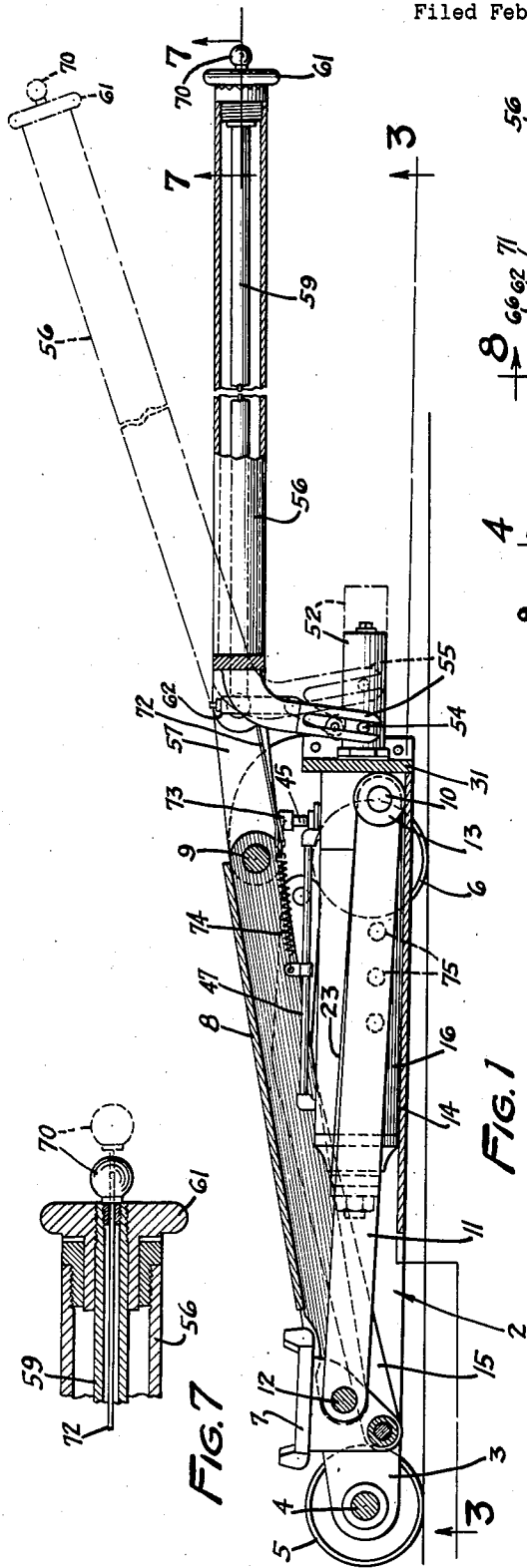


FIG. 1

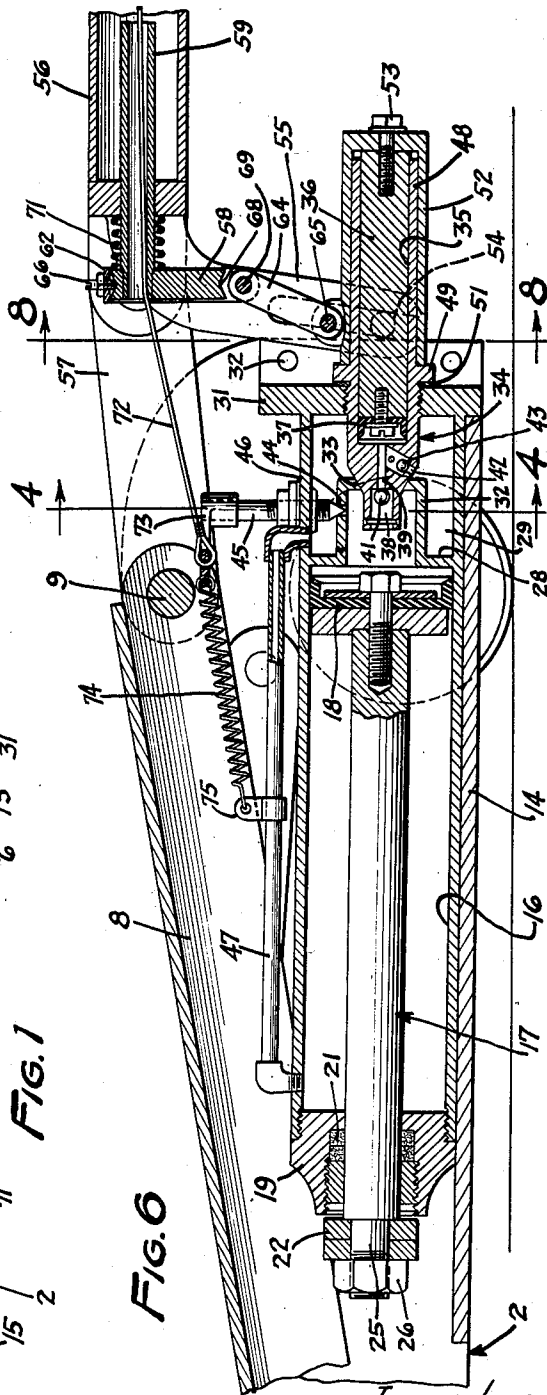


FIG. 6

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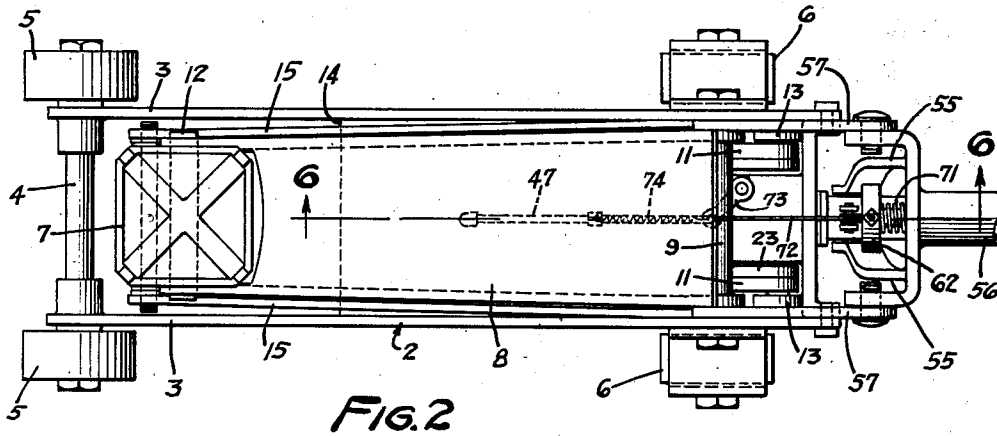
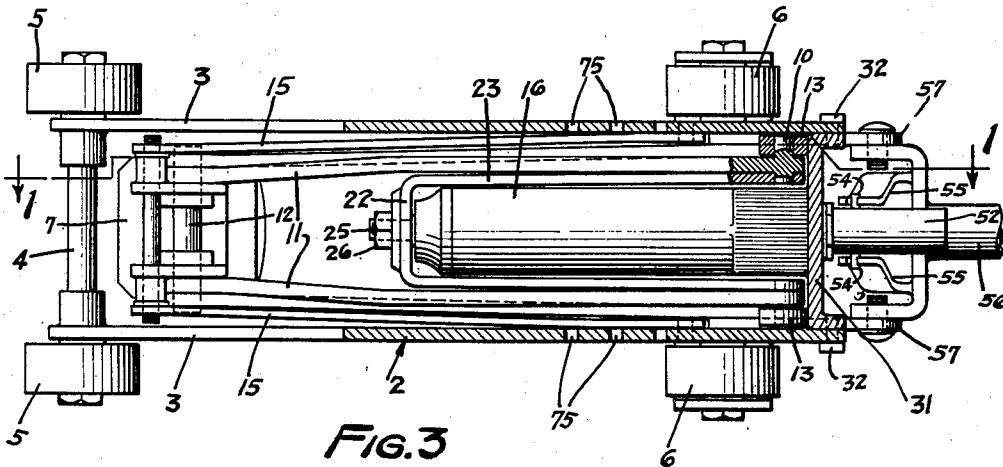
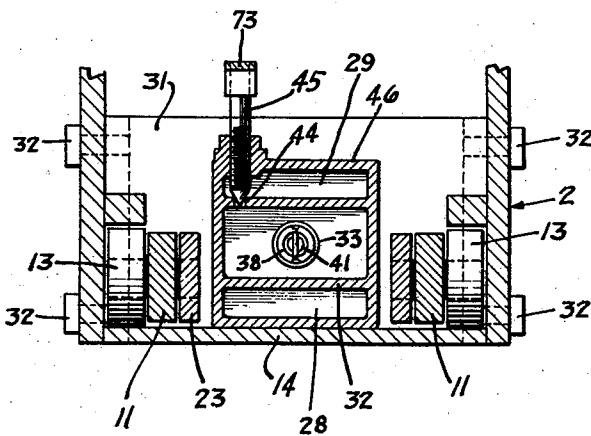


FIG. 4

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3 Sheets-Sheet 3

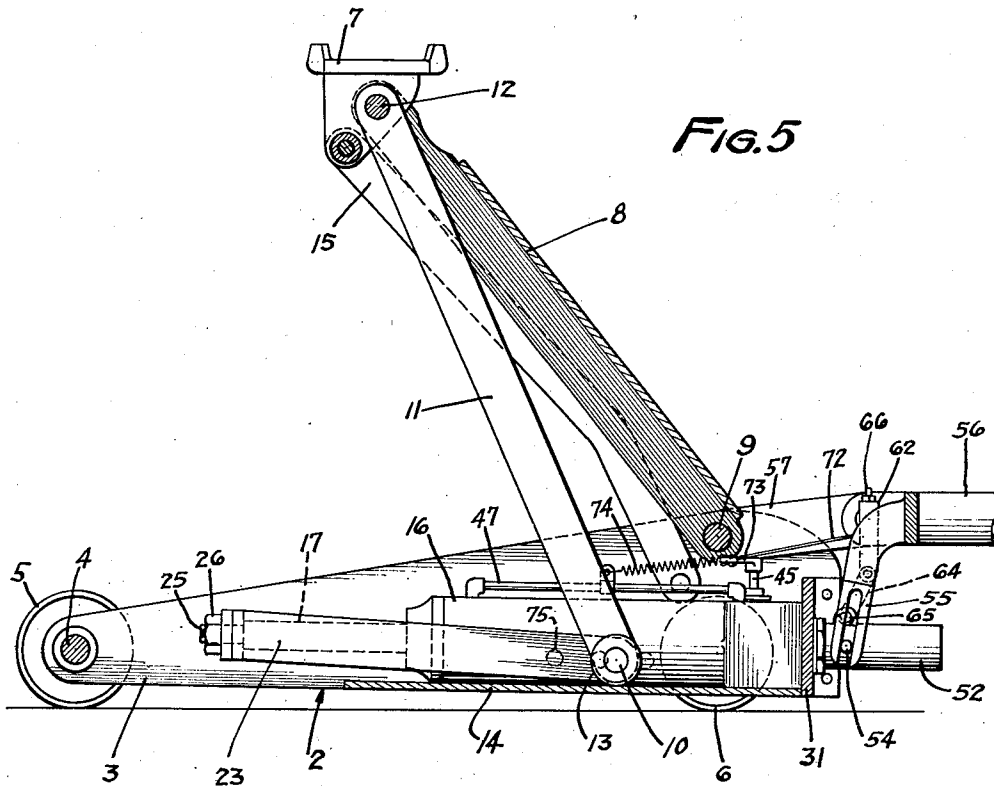
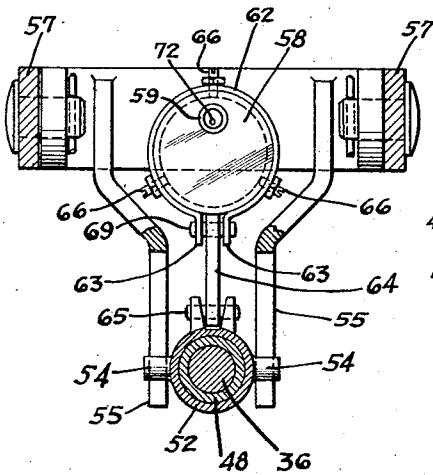
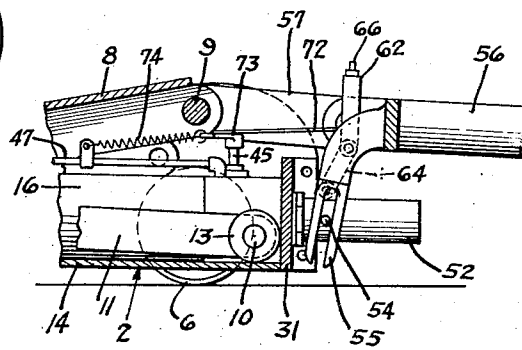


FIG. 8

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5 Claims. (Cl. 254—2)

This invention relates to new and useful improvements in jacks, and more particularly to such jacks of the service type, adapted for use in and about a garage, and whereby the wheels or body of an automobile or truck may be conveniently elevated with a minimum of effort.

An object of the present invention is to provide a jack of the character described comprising an operating mechanism having means for varying the speed or upward traveling movement of the lifting head of the jack.

A further object is to provide a jack of the fluid operated type comprising a lifting head or member and a plunger for elevating said head, and said plunger being actuated by a pressure fluid delivered thereagainst by a suitable pressure pump having an operating lever which is connected to the pump so that the leverage between the lifting head and said lever may readily be varied without changing the working stroke of the lever.

Other objects of the invention reside in the unique arrangement of the various parts of the jack, and whereby the lifting head, when in its lowermost position, is relatively close to the floor line, whereby the lifting head may readily be inserted beneath the axle of a conventional automobile when the tire thereof is flat; in the construction of the pressure pump which provides an integral unit having means for detachably securing it to the main cylinder of the jack, whereby it may readily be removed therefrom for repairs or other purposes, without otherwise dismantling the jack; in the means provided for operating the pump, whereby the stroke of the pump may readily be varied, to increase or decrease the leverage between the lifting head and the operating lever of the jack in accordance with the weight of each load; in the novel means provided for releasing the pressure fluid from the plunger cylinder to permit the lifting head to return to its normal lowermost position; in the linkage mechanism for supporting and adjusting the operating lever of the pump; and, in the simple and inexpensive construction of the apparatus as a whole, whereby it may be manufactured at a nominal cost.

Other objects of the invention will appear from the following description and accompanying drawings and will be pointed out in the annexed claims.

In the accompanying drawings there has been disclosed a structure designed to carry out the various objects of the invention, but it is to be understood that the invention is not confined

to the exact features shown as various changes may be made within the scope of the claims which follow.

In the drawings:

Figure 1 is a longitudinal sectional view on the line 1—1 of Figure 3, showing the lifting head in its normal inoperative position;

Figure 2 is a plan view of Figure 1;

Figure 3 is a sectional view on the line 3—3 of Figure 1, looking at the apparatus from the bottom side thereof;

Figure 4 is a cross-sectional view on the line 4—4 of Figure 6;

Figure 5 is a view similar to Figure 1, with some of the parts removed, and showing the lifting head in an elevated position;

Figure 6 is an enlarged detail sectional view on the line 6—6 of Figure 2, showing the construction of the plunger and its supporting cylinder, and the pressure pump connected thereto;

Figure 7 is an enlarged detail sectional view on the line 7—7 of Figure 1, showing the means provided at the end of the operating lever for opening the fluid release valve;

Figure 8 is an enlarged detail sectional view on the line 8—8 of Figure 6, showing the connection between the operating lever and the pressure pump; and

Figure 9 is a detail sectional view showing the operating lever adjusted to decrease the stroke of the pressure pump.

The novel apparatus herein disclosed is shown comprising a frame 2 having forwardly extending portions 3, in which is mounted an axle 4 having suitable carrying wheels 5 mounted thereon. The rear end of the frame is supported on similar carrying wheels 6.

A lifting head 7 is shown pivoted to one end of an arm 8 by a suitable pin 12. The opposite end of the arm 8 is pivotally supported on the side walls of the main frame 2 by a suitable shaft or rod 9, as best shown in Figure 5. The arm 8 may be channel-shaped in cross-section, as shown in Figures 2 and 5, to gain strength and provide a more rigid structure.

A pair of struts 11 are pivotally connected at one end to the pivot pin 12 of the lifting head 7. The lower ends of the struts 11 are preferably provided with suitable rollers 13, mounted on pins 10, and adapted to travel on the bottom wall 14 of the frame 2 of the apparatus, as clearly illustrated in Figure 5. Stabilizing links 15 have their ends connected respectively, to the lifting head 7 and frame 2, and operate to retain the head 7 in a

horizontal position, regardless of its position with respect to the floor line.

Means is provided for operating the struts 11 to elevate the lifting head 7, and comprises a cylinder 16 suitably supported on the main frame 2. A plunger, generally indicated by the numeral 17 is mounted for reciprocal movement in the cylinder, and is shown having a piston 18 for preventing the pressure fluid from escaping around the plunger. One end of the plunger is slidably supported in a head 19, secured to the forward end of the cylinder. A suitable packing 21 may be provided for preventing leakage of the fluid from the cylinder around the plunger. The forward end of the plunger 18 has the intermediate portion 22 of a yoke, generally indicated by the numeral 23, secured to the reduced threaded terminal 25 of the plunger 18, by a suitable nut 26. The connection between the intermediate portion 22 of the yoke and the reduced portion 25 of the plunger may be sufficiently loose to permit relative limited movement between said parts, should the roller 13 encounter foreign matter on the bottom wall 14 of the main frame.

The cylinder 16 is shown having a partition 28 adjacent its rear end, whereby a chamber 29 is provided between said partition and the rear wall or head 31 of the cylinder. This rear wall, as best shown in Figure 3, is secured to the side walls of the main frame 2 by suitable bolts 32, whereby said wall provides, in effect, a portion of the rear end of the main frame.

The partition 28 has a rearwardly extending portion 32 provided with an opening 33, forming a seat for the forward end of a suitable pressure pump, generally indicated by the numeral 34. The forward end of the pressure pump is cone-shaped, as illustrated in Figure 6, and is adapted to seat tightly against the conical wall of the opening 33, thereby to provide a leak-proof joint between the rear wall of the extension 32 and the forward end of the pressure pump 34.

The pressure pump 34 has a bore 35 in which is mounted a piston 36 provided with a suitable packing 37 at its forward end. The pressure pump has a valve chamber 38 at its forward end communicating with the interior of the cylinder 16, back of the piston 17. A passage 39 establishes communication between the valve chamber 38 and the bore 35 of the pressure pump. This passage is normally closed by a suitable check valve 41 provided in the valve chamber 38. A port 42 is provided in the forward end of the pressure pump rearwardly of the opening 33 in the extension 32 and is normally closed by a check valve 43.

A suitable fluid release port 44 is shown provided in the upper portion of the wall of the extension 32 of the partition 28, and is adapted to be closed by a needle valve 45 received in threaded engagement with the upper wall 46 of the valve chamber 29. Communication is established between the valve chamber 29 and the interior of the cylinder 16 at the forward end thereof by means of a conduit 47, as clearly illustrated in Figure 6.

An important feature of the present invention resides in the novel means employed for supporting the pressure pump 34, whereby it may readily be removed from the apparatus, as a unit, without requiring any other dismantling of the apparatus. As best shown in Figure 6, the pump 34 comprises a cylindrical housing 48 provided with an annular

for the pump piston 36. The periphery of the housing 48 is threaded immediately forwardly of the flange 49 and is adapted to be received in a threaded socket in the rear wall 31 of the cylinder. The flange 49 seats against the rear face of the wall 31, and a suitable gasket 51 is preferably interposed between said flange 49 and the rear wall 31 to prevent leakage of the pressure fluid from the chamber 29 at this point.

To operate the piston 36 of the pressure pump 34, a sleeve 52 is shown fitted over the housing 48, and having its rear end suitably secured to the piston 36 by such means as a screw 53, whereby the sleeve is fixed to the plunger for operation as a unit therewith. The sleeve 52 is provided with oppositely disposed trunnions 54 adapted to be engaged by slotted arms 55 secured to the forward end of a hollow operating member or lever 56, as clearly illustrated in Figures 1 and 6.

The operating lever is pivoted to the rear ends of a pair of links 57, the forward ends of which are pivotally connected to the cross shaft 9 of the member 8. These links prevent relative longitudinal movement of the lever 56 with respect to the main frame of the apparatus and, at the same time, permit the forward end of the lever to be vertically adjusted, as will subsequently be described, for the purpose of varying the stroke of the pump piston for a given stroke of the lever 56.

Another important feature of the invention resides in the novel means provided for varying the stroke of the pump piston for a given stroke of the operating lever 56, whereby the leverage between the lifting head 7 and the operating lever 56 may be varied in accordance with the weight of the load to be lifted.

The means provided for thus varying the stroke of the piston 36 is shown comprising an eccentric 58 secured to an operating rod 59 mounted for rotary adjustment within the hollow operating lever 56, as clearly illustrated in Figures 1 and 2. A suitable hand grip or wheel 61 is provided at the outer end of the lever 56, whereby the operating rod 59 of the eccentric may be conveniently operated, thereby to rotatably adjust the eccentric 58.

The eccentric 58, as best illustrated in Figure 8, is shown having an annular split band 62 mounted thereon, the terminals 63 of which are spaced apart to receive the upper end of a connecting link 64. The lower end of the link 64 is operatively connected to the sleeve 52 of the pressure pump by a suitable pin 65. A plurality of screws 66 are shown mounted in the band 62 and have their terminals projecting into the circumferential groove 68 of the eccentric, thereby to retain the band 62 on the eccentric so that it cannot become detached therefrom. A pin 69 operatively connects the upper end of the link 64 to the lugs 63 of the ring 62.

The pump stroke adjusting mechanism permits free oscillatory movement of the operating lever 56 in the operation of operating the piston 36 of the pressure pump 34. In Figures 6 and 8, the eccentric is shown positioned for maximum length pump stroke. In Figure 9, the eccentric is shown positioned for minimum pump stroke. In other words, when the eccentric is adjusted, as shown in Figure 9, the stroke of the piston 36 of the pressure pump is considerably shorter for a given stroke of the operating lever 56, than it is when the eccentric is positioned as shown in Figure 6. A suitable spring 71 is shown interposed between

the eccentric 58 and the forward end of the operating lever 56, to hold the operating rod 59 of the eccentric in the position shown in Figure 6.

Another feature of the invention resides in the novel means provided for operating the fluid release valve 45, when it is desired to permit the fluid in the cylinder 16 between the plunger head 18 and rear cylindrical wall 28 to return to the chamber 29. The means provided for thus operating the release valve 45 is shown comprising a suitable cable 72 extending lengthwise through the hollow operating rod 59 of the eccentric 58, and having a suitable finger grip 70 secured to the rear end thereof and disposed adjacent the adjusting wheel 61. The forward end of the cable 72 is suitably attached to an arm 73 secured to the upper end of the valve 45. One end of a spring 74 is secured to the arm 73, and its opposite end is shown secured to a clip 75 which may conveniently be secured to the conduit 47, as best shown in Figure 6. When the cable 72 is pulled rearwardly by the operator grasping the finger grip 70, the valve 45 is opened to permit the pressure fluid back of the plunger to return to the chamber 29 through the valve opening 44. When the operator releases his grip on the knob 70, the spring 74 will immediately close the release valve 45, as will readily be understood by reference to Figure 6.

A series of spaced apertures 75 are preferably provided in the side walls of the main frame, as clearly illustrated in Figures 1, 3, and 5. These apertures are so located that when the lifting head is in an elevated position, as shown in Figure 1, and a pin is inserted into one of said apertures, the wheel or roller 13 of the strut aligned therewith will engage said pin, whereby the struts are locked against further rearward movement, thereby positively locking the lifting head in an elevated position. This feature is particularly desirable when it is found necessary to leave the load supported on the jack for an indefinite length of time.

The novel jack herein disclosed, has been found particularly useful in garages, as a general service jack, and also for "curb service". Because of the unique arrangement of the supporting means of the lifting head, comprising the arm 8 and struts 11, the lifting head may be lowered to a position relatively close to the floor line whereby it may readily be inserted beneath an axle disposed relatively close to the floor line, as is often the case when tires of the balloon type become deflated.

The construction of the pressure pump and its connection with the operating lever 56 through the depending arms 55, is such that when the operating lever is in its normal horizontal position, as shown in full lines in Figure 1, the inherent construction of the pressure pump is such as to resist further downward movement of the outer end of the lever 56. By thus arranging the parts, it will readily be seen, by reference to Figure 1, that when downward pressure is exerted on the lever 56, when in the full line position, shown in Figure 1, the entire apparatus may be oscillated about the axis of the rear wheels 6, whereby the forward end of the jack may readily be swung about under the axle of the vehicle with the utmost ease. Also, by thus constructing the jack, the use of swivel casters for supporting it may be dispensed with.

In the operation of the jack, the operator may readily adjust the speed of the upward travel of the lifting head 7 by the simple manipulation

of the adjusting head or wheel 61 at the outer end of the lever 56. If the load is comparatively heavy in weight, the jack may be adjusted, as shown in Figure 9, whereby a relatively short stroke is imparted to the piston 36 of the pressure pump 34, for each stroke of the operating lever 56, thereby greatly increasing the leverage between the lifting head and the operating lever. On the other hand, should the load be relatively light in weight, the operator may adjust the eccentric 58 to the position shown in Figure 6, whereby a relatively longer stroke is imparted to the piston 36 of the pump, for a given stroke of the operating lever 56, with the result that the lifting head will travel a greater distance for each stroke of the operating lever.

It is also to be noted by reference to Figure 5, that the arm 8 and struts 11 which support the lifting head upon the main frame, are so arranged that after the lifting head engages the axle of the load to be elevated, the angle between the longitudinal centerline of the struts 11 and a vertical line drawn through the lifting head, quickly decreases as the head is elevated, thereby increasing the lifting leverage imparted against the head, with the result that the jack is rendered very easy in operation. The struts 11 are substantially in the position shown in Figure 5, when the lifting head reaches the limit of its upward movement whereby, when the release valve 45 is opened, the lower ends of the struts will gradually move backwardly, controlled by the return flow of the fluid from the cylinder 16 to the chamber 29, through the valve opening 44.

The apparatus is comparatively simple in construction and the parts are so arranged that the apparatus may be manufactured at small cost, which obviously, is a very desirable feature in structures of this general nature.

I claim as my invention:

1. In an apparatus of the class described, a wheel supported frame, an arm having one end pivoted to the frame, a lifting head pivotally connected to the opposite end of said arm, a strut having one end connected to the head, a member operatively connected to the opposite end of the strut and adapted for horizontal traveling movement on the frame, thereby to elevate the lifting head, an operating mechanism for said member including an operating lever adapted, upon oscillatory movement, to impart traveling movement to the lower end of the strut in a direction to elevate the lifting head, and means for locking the strut against return movement when the lifting head is in an elevated position.

2. In an apparatus of the class described, a frame comprising spaced side walls, an arm having one end pivoted to the frame, a lifting head pivotally connected to the opposite end of said arm, a strut having one end connected to the head, a member operatively connected to the opposite end of the strut and adapted for horizontal traveling movement on the frame, thereby to elevate the lifting head, an operating mechanism for said member including an operating lever adapted, upon oscillatory movement, to impart traveling movement to the lower end of the strut on said frame in a direction to elevate the lifting head, and means for locking the strut against return movement comprising spaced apertures in the side walls of said frame, and a locking pin adapted to be inserted in one of said apertures in the path of the lower end of the strut.

3. In an apparatus of the class described, a frame, an arm having one end pivoted to the frame, a lifting head, a pivot pivotally connecting the lifting head to the opposite end of the arm, a strut having one end connected to said pivot, a member pivotally connected to the opposite end of the strut and adapted for horizontal traveling movement on the frame, said member and strut being disposed in substantially parallel relation, when the arm is in its lowered inoperative position, a power mechanism for moving said member, the pivotal connection of the arm with the frame being disposed above the pivotal connection between the strut and said member, whereby when traveling movement is imparted to said member by the power device, the arm may be swung quickly upwardly into engagement with a load by the action of the strut, and the parts being so arranged that continued movement of the member will increase the leverage between the arm and said member, thereby to facilitate elevating the load.

4. In an apparatus of the class described, a frame, an arm having one end pivoted to one end of the frame, a lifting head, a pivot pivotally connecting the lifting head to the opposite end of the arm, a strut having one end connected to said pivot, a member pivotally connected to the opposite end of the strut and adapted for horizontal traveling movement on the frame, a power mechanism for moving said member, the pivotal connection of the arm with the frame being disposed above the pivotal connection between the strut and said member,

whereby when traveling movement is imparted to said member by the power device, the arm may be swung quickly upwardly into engagement with a load by the action of the strut, the parts being so arranged that continued movement of the member will increase the leverage between the arm and said member, thereby to facilitate elevating the load, and means for actuating the power device.

5. In an apparatus of the class described, a frame, an arm having one end pivoted to the frame, a lifting head, a pivot pivotally connecting the lifting head to the opposite end of the arm, a strut having one end connected to said pivot, a member pivotally connected to the opposite end of the strut and adapted for horizontal traveling movement on the frame, a power mechanism for moving said member, the pivotal connection of the arm with the frame being disposed above the pivotal connection between the strut and said member, whereby when traveling movement is imparted to said member, the arm may be swung quickly upwardly into engagement with a load by the action of the strut, said arm and strut being so arranged that continuous movement of the member will eventually increase the leverage between the arm and said strut, whereby the greatest leverage may be obtained after the lifting head engages the load, an operating lever for actuating the power device, and means associated with the operating lever whereby the leverage between the lever and power device may be varied.

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