

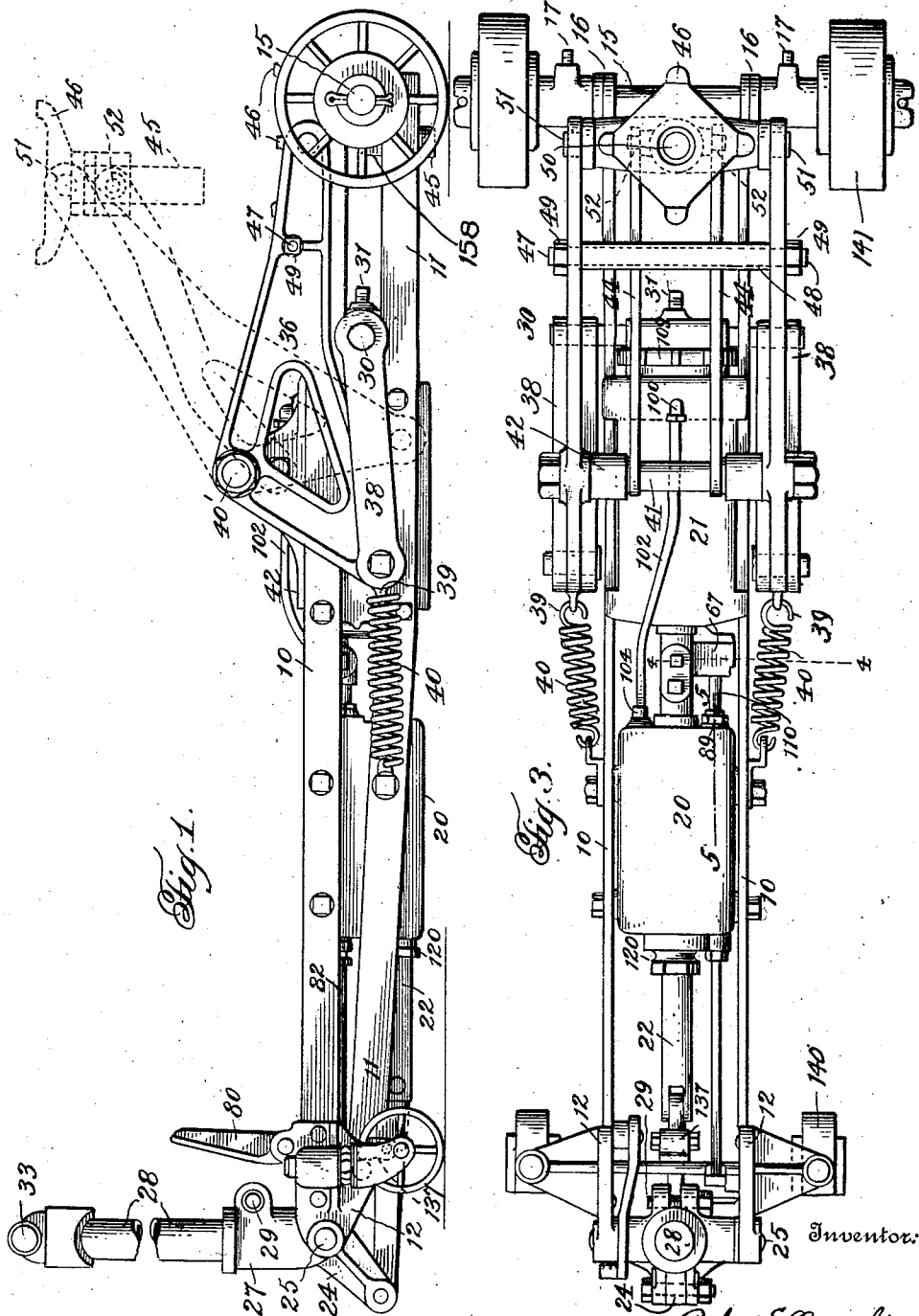
May 19, 1931.

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1,805,588

HYDRAULIC JACK

Filed Jan. 5, 1926 4 Sheets-Sheet 1



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4 Sheets-Sheet 2

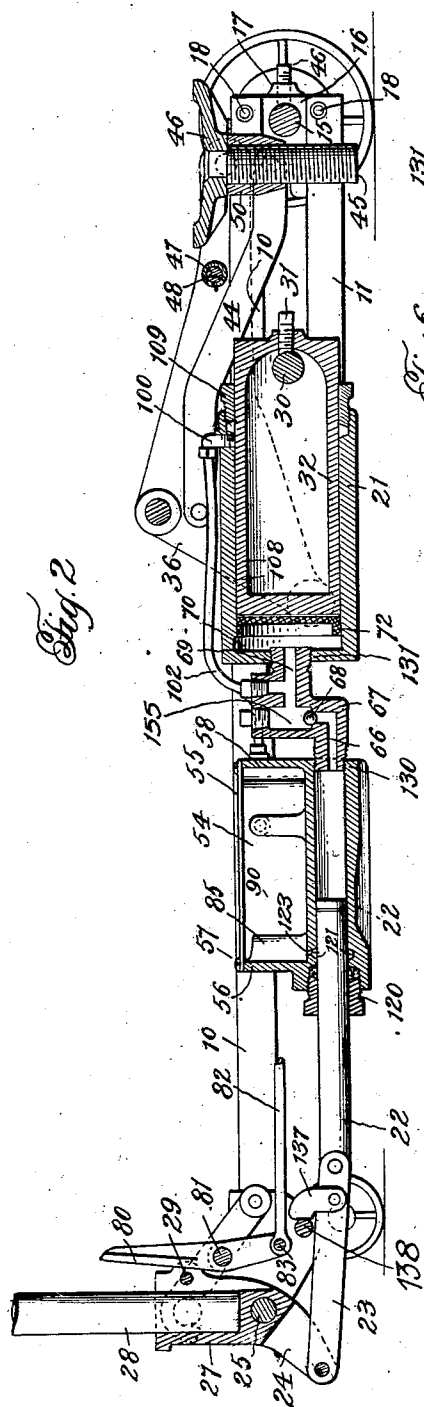


Fig. 2

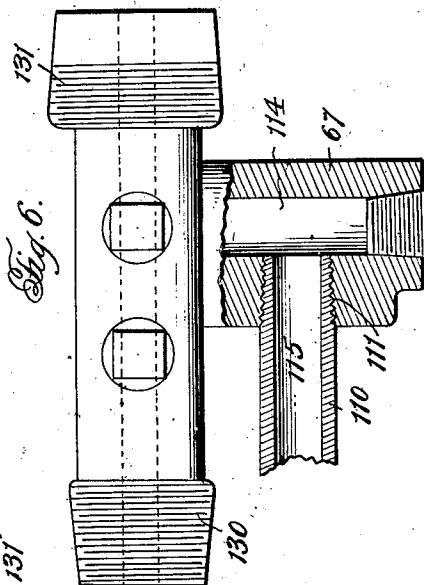


Fig. 6

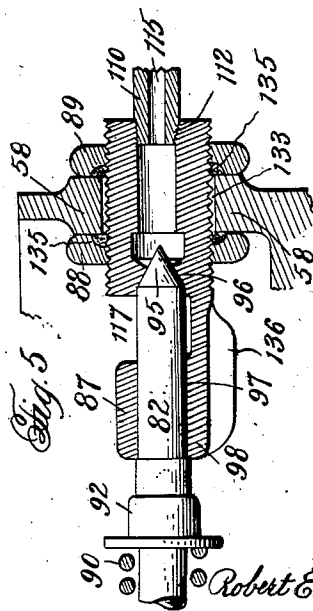


Fig. 5

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Fig. 4.

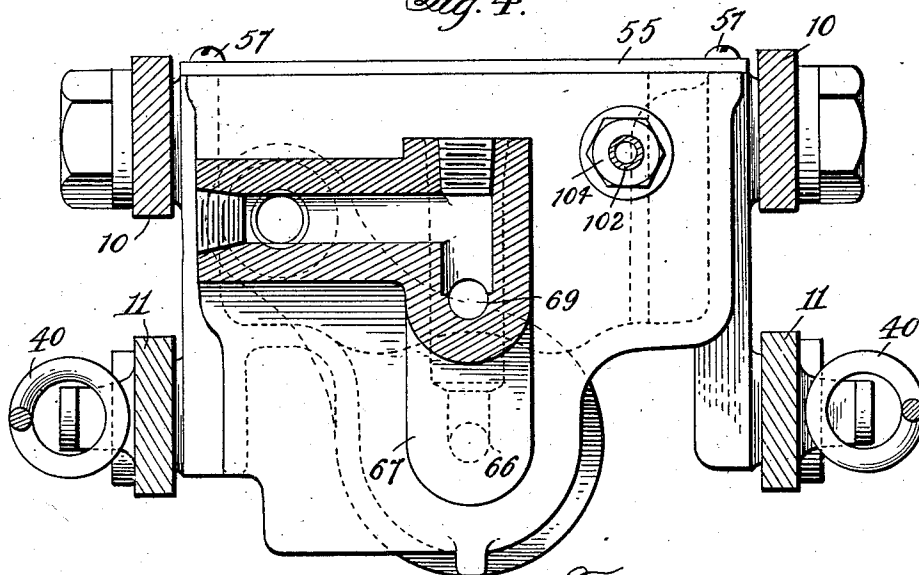
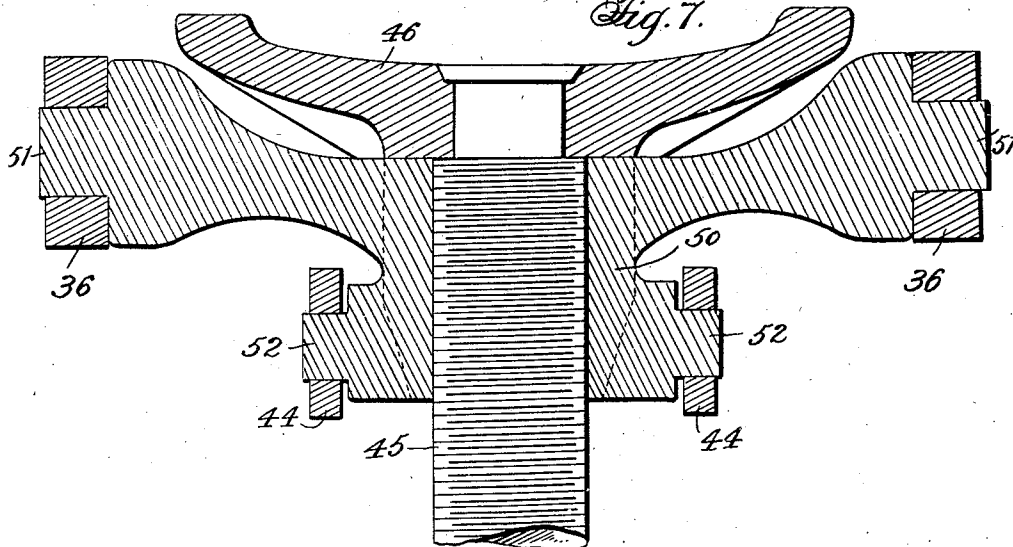


Fig. 7.



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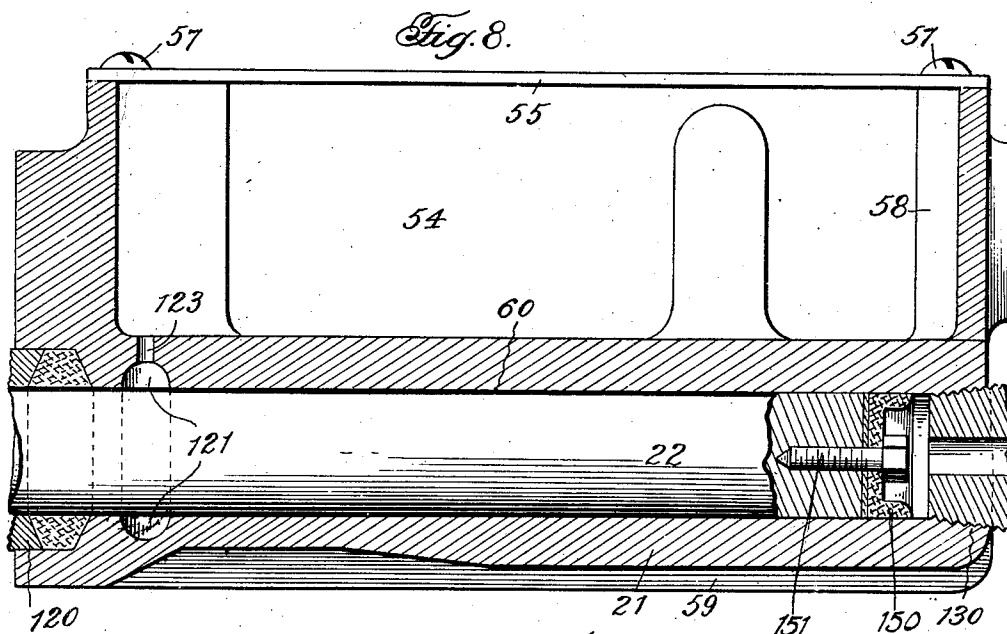
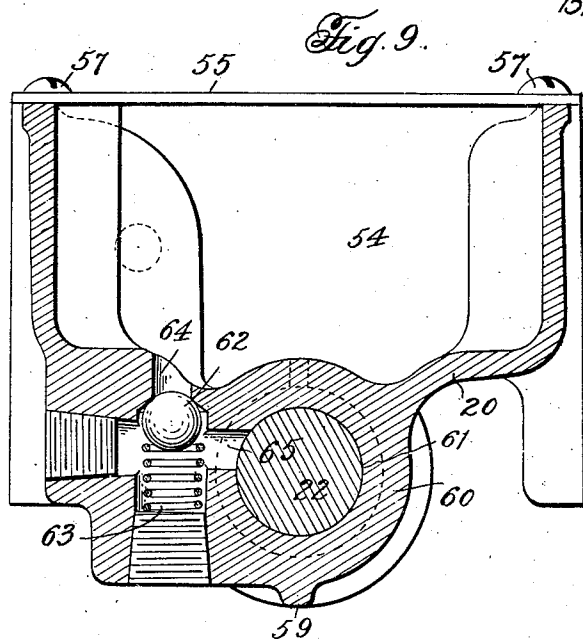
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HYDRAULIC JACK

Application filed January 5, 1926. Serial No. 79,435.

This invention relates to automobile jacks, and has for its principal object the provision of a substantially fool-proof hydraulic jack having a high lift.

A further object of the present invention lies in the provision of a jack which can accommodate itself to a very small clearance, is simple to operate, and yet has sufficient capacity to raise a vehicle or other load to a satisfactory height. A still further object of this invention is to provide a hydraulic jack which will be leak proof so as not to spill the oil on the floor. Other objects of the invention will be apparent from the following description and claims.

Of all pieces of garage equipment it is believed the jack is most subject to abuse, and it is therefore essential that an automobile jack be made as near fool-proof as possible, and particularly as regards to some means for preventing a thoughtless person from applying destructive power after the jack has been run to its maximum height, or when the lifting portion of the jack has encountered a load beyond the possibilities of the jack.

With the present popularity of the balloon tire it has become quite necessary that a garage jack shall have a very low clearance and it is equally essential that the jack must be capable of taking a very heavy pleasure car to a rather greater height than required with high pressure tires. It is also rather important that the jack should not be too heavy, but yet should be capable of lowering the larger cars with ease and dispatch, preferably without manipulating the lever which raises the car.

In the drawings:

Figure 1 is a side elevation.

Figure 2 is a longitudinal cross section.

Figure 3 is a plan view.

Figure 4 is a transverse section on line 4-4 of Figure 3.

Figure 5 is a longitudinal cross section on line 5-5 of Figure 3.

Figure 6 is a plan view partly broken away of the connecting casting.

Figure 7 is a transverse view thru the axis of the saddle.

Figure 8 is a longitudinal view thru the axis of the pump plunger.

Figure 9 is a transverse section thru the reservoir thru the inlet valve to the pump.

The main frame of the jack is built up of two upper bars 10 and two lower bars 11 connected at one end by the front casting 12 and at the other end by the rear axle 15, which is secured in each of the rear brackets 16 by a set screw 17, the brackets 16 each being permanently fastened to both the upper and the lower bars 10 and 11 respectively by means of rivets such as 18. Supported by the side bars 10 and 11 on each side are two large castings 20 and 21, the former being for the tank and pump while the latter, the front casting 21 forms the cylinder in which the hydraulic piston or ram slides. The pump piston or plunger 22 is connected by a link 23 with a lever 24 pivoted to the shaft 25, the upper end of the lever forming an upright socket 27 to receive the tongue 28, which is fastened in the socket 27 by means of the usual binding bolt 29. The jack is moved from place to place by means of the transverse grip bar or handle 33.

The main piston or ram 32 carries a wrist pin 30 fastened by a set screw 31. This wrist pin extends far beyond the piston and projects between the top and bottom side bars 10 and 11 where it is pivoted at each side to the walking beams 36 by means of links 38 each of which carries a lug 39 to which is secured a spring 40 attached at its free end to the frame, and tending to telescope the piston 32 into its cylinder 21.

The walking beams 36 are pivoted on the free ends of the upper shaft 40 which is mounted in brackets 42 which may be integral with the casting 21. To these same brackets 42 are pivoted the drag links 44 having for their purpose the vertical positioning of the post 45 which carries at its top the usual saddle 46 to engage a load to be lifted.

In order to secure rigidity of the walking beam structure it is found convenient to bolt the two beams 36 together by means of a rod 47 and a spacer pipe 48 held in center position between and engaging the beams 36, as by the nuts 49. The post support or sleeve 50 has a pair of trunnions 51 to serve as pivots

for the support 50 in the walking beams 36, and also has a pair of shorter trunnions 52 serving as a pivotal connection for the drag links 44 so that, since the pivots 40 and 53 are directly above one another, the pivots 51 and 52 will likewise remain one directly above the other in view of the parallel relation maintained by the bars, the vertical distance between the two pivots of each pair being the same.

The upper portion of the tank casting 20 forms an oil reservoir 54 closed at the top by a cover 55 which should be moderately strong for while there is normally no pressure in the oil chamber the oil from the ram cylinder is discharged back to the reservoir under a pressure dependent upon the weight of the vehicle which has been lifted. The corners of the reservoir chamber walls are filleted as at 56 to provide sufficient metal to receive the screws 57 and the walls are also thickened where necessary, as by the boss 58 for example, to support the various connections. The lower longitudinal rib 59 is merely for additional strength and is naturally optional.

The bottom of the tank casting 20 is formed by an integral member 60 in which there is a cylindrical bore 61 snugly receiving the pump piston or plunger 22, being in fact the cylinder thereof. A ball valve 62 held in place by the spring 63 admits oil through the ports 64 and 65, during the suction stroke of the plunger, but closes communication between the main tank body or reservoir 54 and the plunger cylinder bore 61 during the power stroke. As the handle 33 is moved downward and rearward the lever 24 and link 23 move the plunger 22 inward, driving oil through the passage 66 in the casting 67 and past a check valve 68 to the horizontal passage 69 and into the chamber 70 of the forward cylinder 21. The piston 32 is provided with a cup washer 72 substantially oil tight, so that as oil is driven into the chamber 70 the ram will move forwardly (i. e. toward the saddle 46) carrying with it the wrist pin 30 and consequently swinging the walking beams 36 about their pivots 40 so as to raise the saddle or load support 46.

A foot pedal 80 pivoted at 81 controls a rod 82 pivotally connected to the foot pedal 80 as at 83, which rod passes through a bore 85 in the tank casting 20, and its free end terminates just short of a guide block 87 mounted in the forward wall of the tank casting 20, the block being held in proper position with respect to the check body, by the lock nuts 88 and 89. A spring 90 engages the front wall of the tank casting 20 and also a collar 92 threaded on the rod 82 so as to hold this rod yieldingly in contact with a rather short cylindrical needle valve 95, the conical point of which seats in a similarly tapered bore 96 in the guide piece 87 while the body of the needle valve slides

freely in the cylindrical bore 97 at the front end 98 of the guide piece and is constantly in contact with the rod 82 except momentarily when the spring 90 is compressed by the foot pedal 80.

A nipple 100, preferably communicating with the stuffing box groove, connects the rear end of the piston chamber 70 of the tank chamber by means of a pipe 102 connected to the tank chamber by means of an ordinary union 104, and the nipple 105 threaded into the tank casting. This arrangement is to prevent loss of oil as I find it advantageous to provide some arrangement, for while the three oil grooves 108 allow but a very slight leakage, there is always some leakage, with or without rings, and this leaked oil finds its way back to the tank by way of the pipe 102, there being no restriction to rearward flow in this pipe (there is no pressure in the tank) and the pressure behind the ram therefore drives the oil back to the tank since it is not possible to escape through the stuffing box 109 closing the end of the pump cylinder in the usual manner.

The connecting casting or check body 67 is connected to the guide member 87 (which as shown has a bore completely through it) by means of a short straight pipe 110 threaded into the casting 67 as at 111, and threaded into the guide piece 87 as at 112, this means furnishing the return passage for the oil from the chamber 70. A load on the saddle 46 or the pull of the spring 40 or both tend to cause the piston 32 to move forwardly, in case the needle valve 65 is free to move, as when the pedal 80 is pushed rearwardly at the top, in which case the oil passes from the chamber 70 through the passageway 69, the passageway 114 in the outstanding lug of the casting 67, through the passage 115 in the pipe 110, into guide 87, and finally into the tank 20 through the opening 117 in the guide piece 87.

Leakage through the stuffing box 120 is prevented by providing an annular groove 121 in the forward end of the cylindrical chamber 60 and having this groove communicate with the tank 20 by means of a small vertical passage 123. There is no tendency for oil to flow into the groove 121 from the tank chamber as the plunger 22 is solid and its rear end never passes the groove. This leakage preventing means, and the quite similar means at the forward end of the ram cylinder are important features of the present invention as they insure against the untidiness almost invariably associated with hydraulic jacks of all types suitable for garage use.

It will be noted that the check body 67 is threaded into the tank casting 20 as at 130 and is also threaded into the forward or ram cylinder 21 as at 131, hence it is necessary to provide some manner of adjustably mounting

the guide block 87 with respect to the check body 67. The check body is tapped as at 111 to receive one end of the pipe 110 and the guide block 87 is also tapped at 112 to receive the other end of this short pipe in order to assemble the device, consequently the guide block 87 must be free to move with respect to the tank casting. I therefore make the threaded rear portion of the check body 87 smaller than the hole 133 in the boss 58 of the tank casting which receives it so as to provide a loose fit. When the other parts of the device are properly assembled and in permanent position the two lock nuts are brought to bear against opposite sides of the boss 58 in the tank casting so as to make an absolutely oil tight joint, packing 135 provided in the usual manner. The small longitudinal rib 136 is optional but it is very convenient to strengthen this small block, particularly in view of the vertical discharge orifice 117.

The operation of the device is as follows:—The jack as a whole is pulled from place to place by means of the tongue 28 which is prevented from moving rearwardly, that is, in a direction toward the load support, by a stop member 137 bolted on the link 23 in such position as to engage the pipe spacer 138 so as to insure that the plunger or solid piston 22 shall never be withdrawn from its cylinder. In such position the jack may conveniently be pushed forward into position under the car to be raised. If it is necessary to shift the rear wheels sideways this can readily be accomplished by lowering the handle 33 until the end of the plunger engages the threaded end 130 of the check body 67. With the parts in such position a slight further lowering of the handle 33 permits the forward end of the jack to be swung about the front ground wheels 140 as a pivot, raising the much larger ground wheels 141 slightly off the ground. When desired the saddle 46 may be raised with respect to its threaded sleeve 50 by revolving it in the usual and well-known manner within the limit of length of its post 45.

When in exactly the position desired, the handle 33 is reciprocated, on the upward stroke drawing oil from the reservoir 54 thru the vertical passage 64 and past the ball 62 which readily yields downward against the spring 63 so as to allow the oil to pass thru the horizontal transverse opening 65 leading to the pump cylinder 61. On the downward stroke of the handle 33 and post or tongue 28 the solid piston or plunger 22 moves rearwardly that is toward the load, until a convenient lowest position is reached or in case of a long stroke until the cup washer 150 strikes the tapered threaded rear end of the check body 67.

Attention might be invited at this point to the construction of this cup washer 150 which is of felt or any other material usual for the

purpose except that it is held in place by a single screw 151, tapped into the solid end of the plunger, this construction being very advantageous and eliminating the necessity of finishing the working face of the pump plunger. The oil from the pump cylinder is discharged thru the passage 66, from thence upward past the ball 68 into the horizontal passage 69 which is preferably coaxial with the ram cylinder.

The oil behind the ram 32 forces the latter toward the rear axle 15 and this movement swings the walking beams 36 about their pivoting shaft 40 by means of the transverse wrist pin 30 at the rear end of the ram and the two parallel links 38 which are pivoted to the walking beams at the lower ends of their short power arms while the load itself is carried at the free end of the longer load carrying arms of the walking beams which load carrying arms are horizontal when they have moved roughly one third of their upward travel. The two walking beams with their rigid cross connections 47—48—49 form a load carrying frame.

Should the ram or the load support meet an obstacle beyond the strength of the jack no harm is done for the spring 90 is set to open the needle valve 95 at a pressure giving a satisfactory factor of safety over the possible capacity of the jack. Hence excessive pressure within the chamber 70 simply causes the valve 95 to move away from the pipe 110 discharging oil thru the opening 117 until the pressure is reduced to the selected maximum pressure, the return being via the horizontal bore 69, the short vertical passage 155, the transverse passage 114 from the passage 155 to the pipe 110, passage 115 in the guide block 87 and into the reservoir 54 thru the opening 117.

I find it desirable to make the capacity of the reservoir 54 just sufficient to carry the load to the highest position desired, that is the cubic capacity of the reservoir shall exactly balance the cubic capacity of the chamber 70 at maximum movement of the ram plus the capacities of the various passageways.

In case it is preferred that the reservoir shall be able to hold an excess or reserve supply of oil some other means for limiting the stroke of the ram must be provided so I have shown a positive stop at 158 which is engaged by the wrist pin 30 at each side and thereby limits the movement of the ram on its working stroke.

To lower the load, the mechanic presses his foot against the upstanding lever 80 at the front of the truck and this withdraws the rod 82, compressing the spring 90 and allowing oil to pass from the ram cylinder 70 back to the reservoir 54 exactly as just described in connection with excess pressures. It should be noted that the operator can lower the load either very slightly or very slowly by press-

ing the foot treadle or lever 80 just sufficient to allow a slight escape of oil. The valve 95 is of such length as to remain within its guiding bore 97 when the rod 82 is withdrawn to its greatest extent. The return passages are of such size with respect to the volume of oil used that while the lowering of the load may take place in a very short period the action is always smooth even tho the pedal 80 is held to maximum release position.

What I claim is:—

1. In a hydraulic jack having a ram, a ram cylinder, a pump, and a reservoir so connected that the pump draws fluid from the reservoir and forces it into said ram cylinder behind said ram, said reservoir having a less capacity than the ram cylinder whereby the ram may not be driven out of its cylinder by continual pumping.
2. In a hydraulic jack having a ram, a horizontal ram cylinder, a pump, and a reservoir so connected that the pump draws fluid from the reservoir and forces it into said ram cylinder behind said ram, a stuffing box closing one end of the ram cylinder and forming an annular groove in said cylinder and a pipe extending outside of the cylinder for establishing free communication between said groove and said reservoir whereby fluid leaking around the ram will be discharged through said pipe into the reservoir without tendency to force its way past the stuffing box packing.
3. In a jack, a wheeled truck, a ram, a ram cylinder, a reservoir, a pump cylinder, a plunger therein, means connecting the pump cylinder with the ram cylinder and connecting the ram cylinder with the reservoir and a spring pressed valve normally closing communication between the ram cylinder and the reservoir but automatically releasable under excessive pressures.
4. The device of claim 3 in which manually operated means are provided for withdrawing the valve irrespective of pressure.
5. The device of claim 3 plus yielding means for holding the ram against the fluid delivered into the ram cylinder by the pump, and manually controlled means operable at will to permit said resilient means to empty the ram cylinder to lower the jack.
6. In combination a reservoir and a pump cylinder having three independent connecting passageways, one free, the second automatically discharging from the reservoir to the cylinder upon suction stroke, and the third automatically operating from the cylinder to the reservoir upon excessive pressure in the cylinder.
7. The device of claim 6 in which the third passageway may be manually opened irrespective of pressure in the pump cylinder.
8. In a reservoir for a ram and pump, a check body having a valved passageway therethru from the pump to the ram, a passageway between the ram and the reservoir, a valve therein, adjustable resilient means for closing the valve, and manually controlled means for releasing the valve from said resilient means to return fluid from the ram cylinder to the reservoir.

In testimony whereof I affix my signature.

ROBERT E. MANLEY.