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JACK

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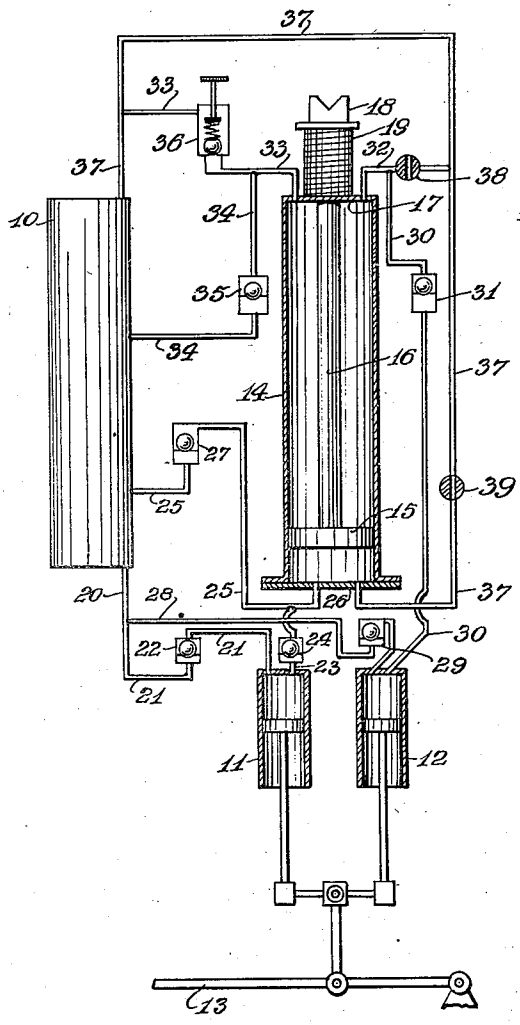



Fig. 1.

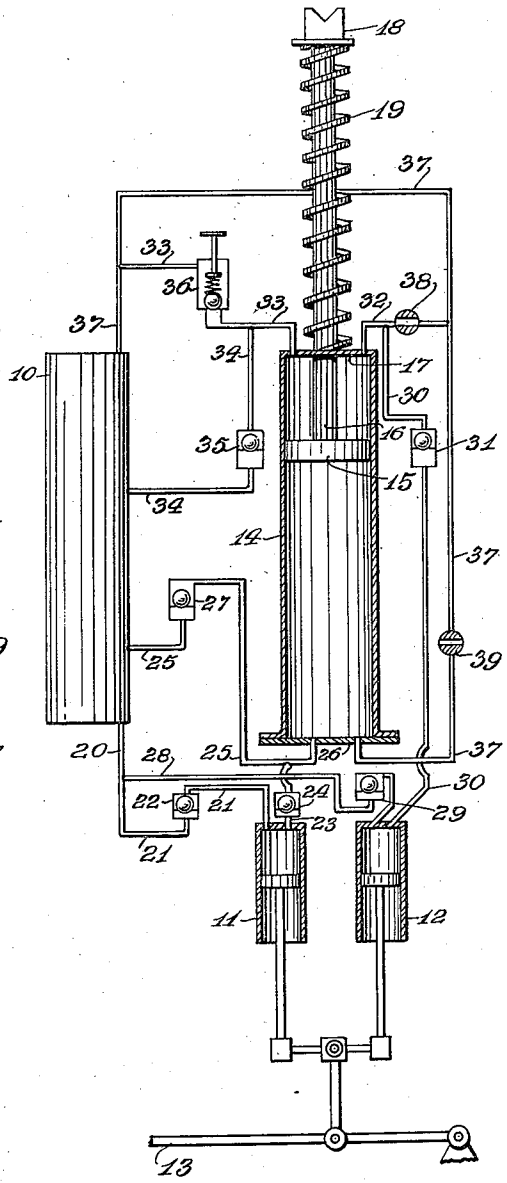



Fig. 2.

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## JACK

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2 Claims. (Cl. 60—52)

This invention relates to load-moving or load-lifting devices, generally known as jacks, and especially to a type wherein the load-engaging means are automatically moved to a load-engaging position prior to the amount of forcibly engaging the load to move it.

The principal object of this invention is to provide a device of this kind whereby the load-engaging member of such device is associated with means which hold the load-engaging member normally in a retracted position, so that when said means are released, the load-engaging member will move into its load-engaging position preparatory to the moment when force for the actual movement of the load is applied.

Another object of this invention is to provide a load-moving device of the hydraulic type wherein means are provided for keeping the load-engaging member normally in a retracted position, and where control means are connected with the device for instantaneously releasing the load-engaging member into a load-engaging position, or stopping that load-engaging member at any intermediate desired position.

The foregoing and still other objects and important advantages will become more readily understood from the ensuing description and the accompanying drawing, which latter are held in a purely diagrammatical form for illustrating the principle of the device, and are therefore by no means intended to limit me to the specific construction shown, and wherein

Fig. 1 illustrates my device in a position prior to engaging a load, and

Fig. 2 illustrates the same device at a moment when its load-engaging member is released for contacting with the load.

Referring now specifically to the drawing, numeral 10 denotes a reservoir wherein a liquid medium is stored under pressure. Numerals 11 and 12 indicate pump means which are preferably operated simultaneously by any suitable device, such as indicated at 13. Numeral 14 denotes a cylinder in which operates a piston 15 and from which extends a piston rod 16 through one end 17 of the cylinder. At the outer end of piston rod 16, there is preferably provided load-engaging means 18, shown here in the form of a V-shaped block, the shape of which, of course, may be varied. Between block 18 and the upper face of cylinder end 17, an expansion spring 19 is mounted which, when released, has the tendency of drawing piston rod 16 outwards and into engagement with the load to be lifted.

Reservoir 10, pump means 11 and 12, and cylinder 14 are all inter-connected by a system of conduits in which are located a plurality of check valves, manipulating valves and pressure control valves which permit the efficacious operation of the device and its automatic control at any desired position. From one end of reservoir 10 there issues conduit 20, which is connected by means of conduit 21, through check valve 22, to pump 11. From this pump leads another conduit 23, through check valve 24, to conduit 25, and through it to the bottom head 26 of cylinder 14. Conduit 25 connects through check valve 27 to the reservoir.

Connected also with conduit 20, is conduit 28 leading through check valve 29 to pump 12. From the latter leads conduit 30, through check valve 31, to conduit 32, into the upper head 17 of cylinder 14. Connected with this head is conduit 33 which branches into conduit 34, through check valve 35, to reservoir 10. Conduit 33 continues through pressure regulating valve 36 to conduit 37, which latter connects with conduit 32. In this conduit is provided a hand-operated control valve 38. Conduit 37 also connects with the bottom head 26 of cylinder 14 and is provided with another hand-operated control valve 39.

Check valves 22 and 29 of pumps 11 and 12, respectively, may be considered intake valves. They operate only in one direction, permitting liquid to be drawn from reservoir 10 into cylinders 11 and 12. Check valves 24 and 31 are outlet valves and permit liquid to enter, respectively, below and above piston 15, from pumps 11 and 12, when their pistons move toward their heads. Check valves 27 and 35 are again one-way valves and permit the passage of liquid from the reservoir, respectively, to below or above piston 15. Pressure control valve 36 permits passage of liquid from above piston 15 into the reservoir when the pressure in the cylinder becomes excessive. Control valve 38 governs the flow of liquid from the upper end of the cylinder, above the piston, while control valve 39 regulates the flow of liquid at the lower end of the cylinder, below piston 15.

### *Operation*

The usual employment of jacks in lifting or otherwise moving loads consists generally in first, moving the load-engaging member for some distance towards the load, until the load-engaging member contacts with the load, whereupon the operation continues for actually moving the load. The first step of the operation of moving the load-engaging member towards the load is not only time-taking but involves an unnecessary effort.

With the present invention, the load-engaging member, in this instance piston 16 with its end block 18, is normally held in the position shown in Fig. 1, that is, in opposition to compression of spring 19. This position is reached by closing valve 38 and opening valve 39, and actuating pumps 11 and 12. From Fig. 1 it will be clearly

seen that pump 12 will supply liquid medium through upper head 17, above piston 15, whereas pump 11 will supply the liquid medium through head 26, below piston 15, but inasmuch as valve 39 in conduit 37 is open, the liquid pumped by pump 11 is passed back into reservoir 10. When spring 19 reaches its completely or sufficiently compressed state and the upper portion of the cylinder cannot absorb any more of the liquid pumped in by pump 12, pressure regulating valve 36 will open and permit the excessive liquid to pass through conduit 33 by way of conduit 37 into reservoir 10.

The position of the piston and rod 16 shown in Fig. 1, is the normal position of the jack when not in use and when ready to be moved below the load to be engaged. The moment it reaches a desired place at which the load is to be lifted, valve 39 is closed and valve 38 is opened, as shown in Fig. 2, whereby a free passage of the liquid is established between the upper portion of the cylinder and the reservoir.

Spring 19, being originally under compression, is released through this valve manipulation and automatically pulls up piston rod 16 into load-engaging position. The liquid above piston 15 passes through conduit 32, valve 38 and conduit 37, into the reservoir, and the liquid thus released from the cylinder enters through conduit 25 and check valve from the reservoir into the lower half of the cylinder below piston 15.

When block 18 forms contact with the load, pumps 11 and 12 are again actuated. Inasmuch as control valve 38 is open, any liquid ejected by pump 12 is passed through conduit 30, check valve 31, into conduit 32, and through control valve 38 and conduit 37 to reservoir 10, whereas the liquid pumped by pump 11 enters the cylinder below piston 15, and since the liquid thus entering cannot escape through closed control valve 39, piston 15 is pushed upwards, whereby the load is actually lifted by the jack.

When now the jack is to be released, valve 39 is opened and valve 38 is closed, at which moment the weight of the load will cause the downward movement of piston rod 16. At this moment the liquid below piston 15 can escape through open valve 39 into the reservoir, whereas liquid is drawn from the reservoir through conduit 34, and check valve 35, into the upper portion of the cylinder, as piston 15 moves downwards.

In order to bring spring 19 into its normally compressed position, pumps 11 and 12 are operated, whereby additional liquid is forced by pump 12 on top of the piston, whereas the liquid from below the piston is passed through conduit 37 and open valve 39, into the reservoir. It is obvious, of course, that by closing valves 38 and 39 at the same time, piston 15 may be stopped at any desired position, whether under the load or free of the load.

In the drawing, I have illustrated a hydraulic jack. It is, of course, evident that similar results may be obtained by employing mechanical devices for compressing spring 19 and for releasing it, and I therefore shall not be limited to the application of an automatically operable load-engaging member to hydraulic jacks only. Furthermore, I have illustrated in the drawing a purely diagrammatical scheme of the conduit and valve arrangements, and have shown a jack for vertically lifting a load. It is obvious, however, that the jack may be placed horizontally or in any other desired position, and provided, instead of with block 18, with a suitable lever arrangement, such as is employed in service jacks for garages, wherein the entire jack arrangement is set on rollers and may be moved beneath a car.

By the same token, the arrangement of the conduit system may be changed and differently located to meet specific requirements, since the drawing only serves for better understanding the broad principle of my invention.

I further wish to state that my device may be readily employed for moving loads other than those of automobiles and trucks, such as used in building construction or moving large objects. It is obvious, therefore, that the application of the principle of my invention may be applied to any power device for moving loads, and I therefore reserve for myself the right to make changes and improvements and adapt my device to different applications as may be required, without departing from the broad scope of my invention, as set forth in the annexed claims.

I claim:

1. In a hydraulic jack, a cylinder, a piston therein, a piston rod extending from said cylinder and provided with load-engaging means, a spring interposed between said load-engaging means and said cylinder, hydraulic pump means and a reservoir, a system of valve-equipped conduits connecting said pump means and said reservoir with said cylinder, control valves for governing the flow of liquid above and below said piston, a pressure regulating valve in said system, said spring being adapted to be kept normally under compression, when the control valve above said piston is closed and liquid is drawn from said reservoir and is injected by way of said pump means into the cylinder above the piston, said spring being further adapted to automatically elevate the load-engaging means into a load-engaging position when said control valve above the piston is opened, and to cause the outflow of liquid from above the piston to below the piston by way of said reservoir.

2. In a device for automatically engaging a load to be lifted, a hydraulic jack consisting of a cylinder, a piston operative therein, a piston rod projecting from the cylinder, a spring interposed between the outer end of the piston rod and said cylinder, a reservoir, pump means, a system of conduits connecting both ends of the cylinder, the reservoir and said pump means, check valves in the conduits between said reservoir and said pump means permitting the movement of liquid from said reservoir to the pump means only, check valves in the conduits between the pump means and both ends of the cylinder, permitting the flow of liquid into the cylinder only, check valves in the conduits between the reservoir and both ends of the cylinder, permitting the flow of liquid into the latter only, a pressure regulating valve in a conduit connecting the upper cylinder end with the reservoir and permitting the flow of liquid from the cylinder into the reservoir at excessive pressure only, control valves for governing the flow of liquid at the upper and lower ends of the cylinder, said spring being adapted to be kept normally compressed when the upper control valve is closed and the upper end of the cylinder is filled with liquid, and to automatically elevate the piston rod to a load contacting position, when said upper control valve is opened and the liquid is urged by the action of the spring to pass from the upper cylinder end into its lower end via said reservoir.

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