

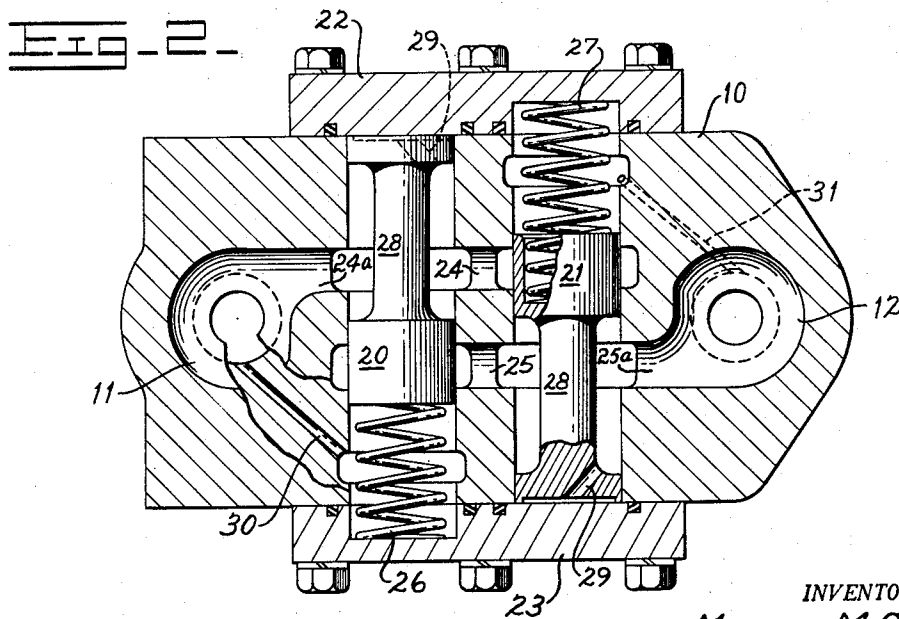
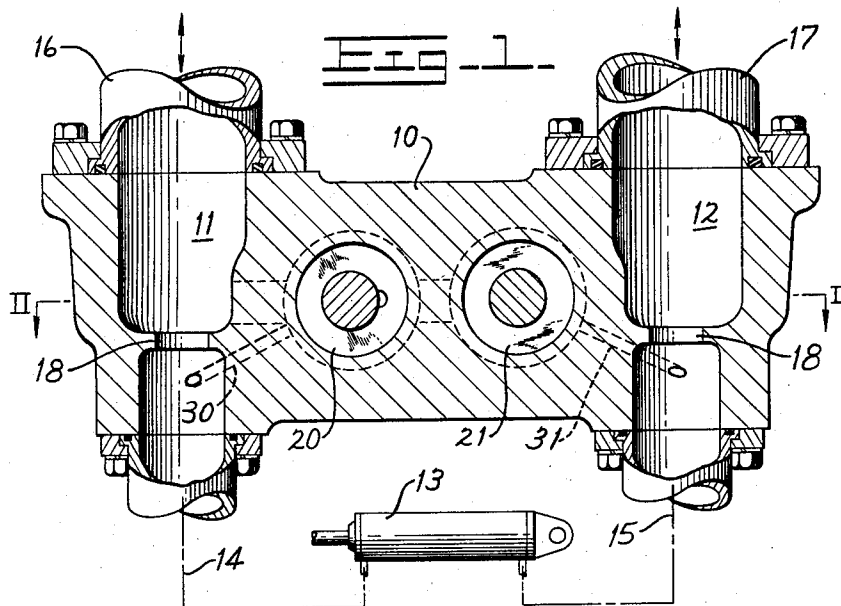
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FLOW CONTROL VALVE FOR HYDRAULIC JACK SYSTEM

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FLOW CONTROL VALVE FOR HYDRAULIC JACK SYSTEM

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4 Claims. (Cl. 121—46.5)

This invention relates to valves of the kind used in hydraulic system with reversible flow characteristics such as the system employed for double acting hydraulic jacks.

In such hydraulic jack systems, the pressure line to each end of the jack cylinder serves also as an exhaust or return flow line when pressure is directed to the opposite end of the cylinder. It is desirable in the actuation of jacks for some purposes, such for example as the control of various implements drawn or carried by tractors that the flow of fluid to the jack be restricted or limited to insure smooth, regulated, relatively slow movements of the implement.

It is the object of the present invention to provide a valve of simple compact design, which may be included in a hydraulic system of the kind referred to having common conduits for pressure and exhaust lines, and which serves to restrict flow in the line under pressure and communicate excess pressure resulting from the restriction to the exhaust line so that the excess fluid will be directed back to its source.

Further and more specific objects and advantages of the invention are made apparent in the following specification wherein reference is made to the accompanying drawing.

In the drawing:

Fig. 1 is a central sectional view of a valve embodying the present invention illustrating schematically its connection with a double acting hydraulic jack, and

Fig. 2 is a sectional view taken on the line II—II of Fig. 1.

The flow control valve is shown in the drawing as having a body 10 with a pair of passages 11 and 12 extending through it. At one end the passages 11 and 12 are connected to opposite ends of a double acting hydraulic jack 13 by conduits represented by the broken lines 14 and 15 respectively. Conduits 16 and 17, a portion of each being shown as connected to the opposite ends of the passages 11 and 12 communicate with a source of fluid under pressure and a supply reservoir in a system which includes a valve, the purpose of which is to direct fluid through one of the passages, as for example the passage 11, and communicate fluid from the opposite passage 12 back to the reservoir as it is exhausted from the low pressure end of the jack 13. It is possible to reverse the movement of the jack in which case the high pressure fluid will be in the opposite passage or the passage 12 while the passage 11 serves as the exhaust passage. This valve and pressure system are not illustrated as they are conventional and very well known in the art.

In order to control the volume and limit the rate of fluid directed to either end of the jack 13, either of the passages 11 and 12 has a restricted opening shown at 18 and back pressure resulting from the restriction is communicated to the opposite or exhaust passage. This is accomplished by a pair of spool valves 20 and 21 best shown in Fig. 2 disposed in cylinders which extend through the housing 10 at points between the passages 11 and 12 and which are closed at their ends by plates

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22 and 23 suitably secured to the valve body. The passage 11 communicates with the cylinders of the valves 20 and 21 by means of ports 24 and 24a formed in the body of the valve 10 and the passage 12 communicates with the cylinders by means of similar ports 25 and 25a. Valves 20 and 21 are urged toward one end of their respective cylinders by springs 26 and 27 to assume normal positions in which the valve 20 closes the passageway 25 and the valve 21 closes the passageway 24. Each of the valves 20 and 21 has a reduced portion 28 intermediate its ends to permit flow of fluid into the cylinders between its piston-like ends. At the end of each valve opposite the spring each has an orifice 29 to admit fluid to the corresponding end of the cylinder.

In operation and assuming that the jack 13 is to be retracted by fluid under pressure entering through the passage 11, the back pressure caused by the restriction 18 causes fluid to flow through the port 24 into the cylinder of the valve 20 and through the orifice 29 to move the spool in opposition to the pressure of the spring 26. This uncovers the port 25 permitting discharge of said fluid through the cylinder of valve 21 and into the passage 12 which, under these circumstances, is acting as an exhaust passage for directing fluid back to the source of supply. A bleed port 30 communicates between the chamber of the spring 36 and passage 11 to permit necessary movement of the valve 20 toward its open position.

A similar bleed port 31 communicates between the chamber of spring 27 and the passage 12.

When the jack 13 is extended by the admission of fluid under pressure through the passage 12, the above described operation is reversed so that the valve 21 is open and excess fluid under pressure is exhausted through its cylinder and port 24 to enter the exhaust stream in passage 11.

By arranging the valves 20 and 21 parallel to each other at right angles to the passages 11 and 12 and in opposed operating positions, a very compact simple and inexpensive structure is attained for automatically attaining the desired result.

I claim:

1. A flow control valve for use in a hydraulic system embodying two conduits which may be used selectively as pressure and exhaust conduits comprising passages with restrictions adapted to be included one in each of said conduits, port means leading from each passage to the other, two spring loaded valves normally closing said port means, and means to communicate high pressure fluid downstream from the restriction in either passage to one of said valves to open it and admit fluid to the other.

2. A flow control valve for use in a hydraulic system embodying two conduits which may be used selectively as pressure and exhaust conduits comprising passages with restrictions adapted to be included one in each of said conduits, a pair of valve cylinders disposed between said passages, a port leading from each passage to both said cylinders, a spool valve in each cylinder each normally closing one of said ports and adapted to be opened by fluid under pressure, and means to communicate high pressure downstream from the restriction in either passage to one of said valves to open it and admit fluid through said ports to the other passage.

3. A flow control valve for use in a hydraulic system embodying two conduits which may be used selectively as pressure and exhaust conduits comprising passages with restrictions adapted to be included one in each of said conduits, a pair of valve cylinders disposed between said passages, a port leading from each passage to both said cylinders, a spool valve in each cylinder, resilient means urging each valve to a position closing one of said ports, and means to communicate high pressure downstream from the restriction in either passage to one of said valves

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to open it and admit fluid through said ports to the other passage.

4. In a flow control valve of the kind described, a body having two parallel passages extending through it, two valve cylinders disposed in the body between said passages at right angles thereto, ports connecting the pas- 5 sages with said cylinders and connecting said cylinders

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with each other, valve means in the cylinders normally closing communication from one passage to the other, and means actuated by pressure in either passage to open said valve means and permit flow of fluid to the other passage.

No references cited.