(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 080 441**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **82850179.1**

(22) Date of filing: **10.09.82**

(51) Int. Cl.³: **F 15 B 13/02**

(30) Priority: **19.11.81 SE 8106882**

(43) Date of publication of application: **01.06.83 Bulletin 83/22**

(84) Designated Contracting States: **AT CH DE FR GB IT LI NL**

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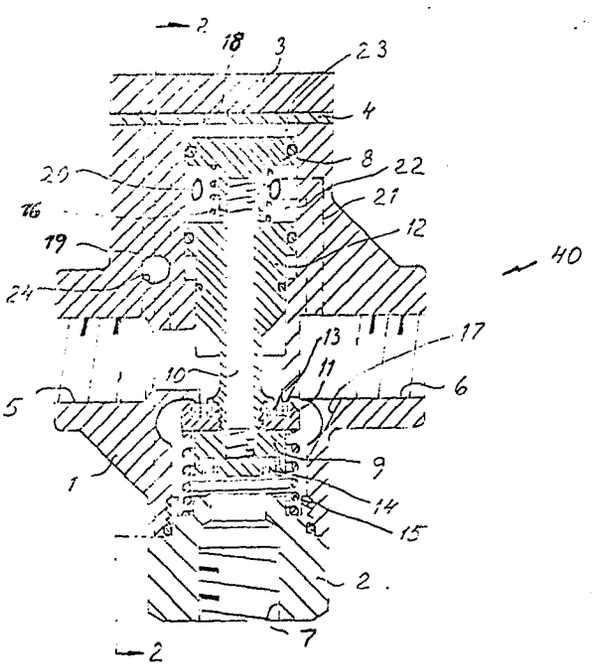
(54) Valve device for controlled pressurization of a pressure fluid system.

(57) A valve device for controlled pressurization of a pressure fluid system (35). The device comprises two coaxial valve bodies (9, 13), one (11) for controlling flow communication between inlet port (5) and outlet port (6) and the other (9) for controlling flow communication between outlet port (6) and drain port (7). The coaxial build-up gives short and direct channels and thus small dimensions for a given flow capacity.



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Valve device for controlled pressurization of a pressure fluid system

The present invention relates to a valve device for controlled pressurization of a pressure fluid system.

When the pressure fluid system is disconnected from the pressure fluid source the valving should both interrupt the supply of pressure fluid to the system and vent the system. If this has been done, e.g. because of some emergency situation, different actuators in the system are left in arbitrary positions. If, outgoing from this situation, the system is to be pressurized again there is a risk that actuators are in unsuitable positions so that very sudden movements of the actuators may occur. This may cause damage to equipment or even result in accidents.

In order to avoid the above mentioned risks the pressure fluid system is pressurized through a conduit having restricted flow capacity. When the pressure in the pressure fluid system has reached a predetermined level, e.g. 50 % of full pressure, a valve is opened to give full flow capacity.

When solving the above mentioned problem it has always been a desire to obtain high flow capacity within small dimensions.

Prior art solutions comprise combinations of valves, in separate valve bodies, or special valves. Existing special valves are, however, rather big compared to the flow capacity.

The present invention is an improvement over prior art primarily because of reduced physical dimensions for a given flow capacity. This is obtained by means of

short and direct main flow channels. The short and direct flow channels are made possible by using two valve bodies having coaxial movement as defined in the appended claims.

An embodiment of the invention is described below with reference to the accompanying drawings in which fig. 1 shows a section through a valve device according to the invention. Fig 2 shows a section according to 2-2 in fig. 1. Fig. 3 is schematic representation of the valve device.

The valve devide 40 shown in the drawings comprises a valve housing 1 having an inlet port 5 and an outlet port 6. Inlet port 5 is connected to a source of pressure fluid 34 and outlet port 6 to a pressure fluid system 35. A first valve body 11 provided with an annular seal 13 and connected to a piston 12 is movable in a transverse bore in the valve housing 1 to control fluid communication between the inlet port and the outlet port via channel 17. Valve housing 1 is further provided with a nut 2 in which a drain port 7 is provided. A second valve body 9 having an annular seal 14 controls flow communication between outlet port 6 and drain port 7. Valve body 9 is connected with a rod 10 which is coaxial with and slidably received in piston 12. A piston 8 is connected with the other end of rod 10. The transverse bore is covered by a seal 4 and a plate 3. A spring 15 biases first valve body 11 towards closed position. Spring 16 biases second valve body 9 towards open position. A pilot valve 28 is provided in a bore 27 in valve housing 1. Bore 27 is in flow communication with inlet opening 5. Valve housing 1 is furthermore provided with a bore 24 in which an adjustable screw 25 is movable to adjust an annular restriction 26. Pilot valve 28 controls flow communication between inlet port 5 and a channel 30. Channel 30 ends in an opening 20 in chamber 22. Chamber 22 is via a channel 21 connected to outlet port 6. Inlet port 5 can also via channel 19 and port 33 be connected to a valve 36, fig. 3. Valve 36 is via connection 32 and hole 31 connected to the upper side of

pilot valve 28. There is also a slot 18 in seal 4 between hole 31 and chamber 23. Valve 36 is furthermore connected to the pressure fluid source 34 via port 33.

The shown valve device 40 operates in the following way. Valve 36 is moved to the position opposite the one shown in fig. 3. Pressure fluid is then applied to the upper end of pilot valve 28 and to chamber 23 above piston 8. Piston 8 is moved downwards so that the second valve body 9 closes communication between outlet port 6 and drain port 7. At the same time pilot valve 28 opens up a flow communication at 29 so that pressure fluid is transferred from inlet port 5 via channel 19, restriction 26, flow communication 29, channel 30, chamber 22 and channel 21 to outlet port 6. The pressure fluid is thus transferred at a restricted rate to pressure fluid system 35 . When the pressure in chamber 22 has risen to a predetermined level, which is depending on the spring forces and the pressure forces, piston 12 is moved downwards so that first valve body 11 opens a full capacity flow communication between inlet port 5 and outlet port 6. The high flow capacity obtained in this way because of the short and direct channel between inlet and outlet is further increased somewhat because of the parallel arrangement of restriction 26 and pilot valve 28.

When valve 36 is moved back to the position shown in fig. 3 the upper end of pilot valve 28 and chamber 23 are vented. Pilot valve 28 closes and piston 8 moves upwards so that first valve body 11 closes flow communication between inlet port 5 and outlet port 6. Pressure fluid system 35 is vented through drain port 7.

Claims:

1. A valve device for controlled pressurization of a pressure fluid system (35) comprising a valve housing (1), an inlet port (5) in the valve housing for supply of pressure fluid from a pressure fluid source (34), an outlet port (6) in the valve housing in communication with said pressure fluid system and a first valve body (11) movable in the valve housing for controlling a pressure fluid communication between said inlet port and said outlet port, characterized by a second valve body (9) being coaxial with said first valve body (11), said second valve body controlling communication between said outlet port (6) and a drain port (7), a restricted communication (26) in the valve housing (1) between said inlet port (5) and said outlet port (6) and a communication (21) between the outlet port and said first valve body so that the pressure in the outlet port strives at opening up the pressure fluid communication between the inlet port and the outlet port.

2. A valve device according to claim 1, characterized thereby that said first valve body (11) is connected with a piston (12) being slidable in the valve housing (1) and that said second valve body (9) is connected with a rod (10) being slidably received in and coaxial with said piston (12).

3. A valve device according to claim 1 or 2, characterized thereby that a channel (21) connects the outlet port (6) with a chamber (22) in the valve housing (1), said piston (12) extending into said chamber, whereby the pressure in the outlet port loads said piston in the opening direction of said first valve body (11).

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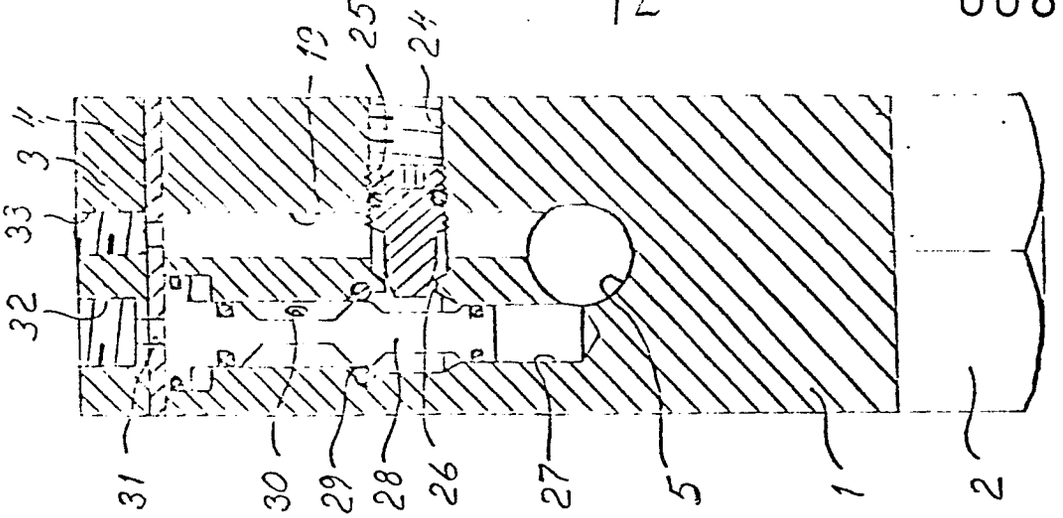

Fig. 2

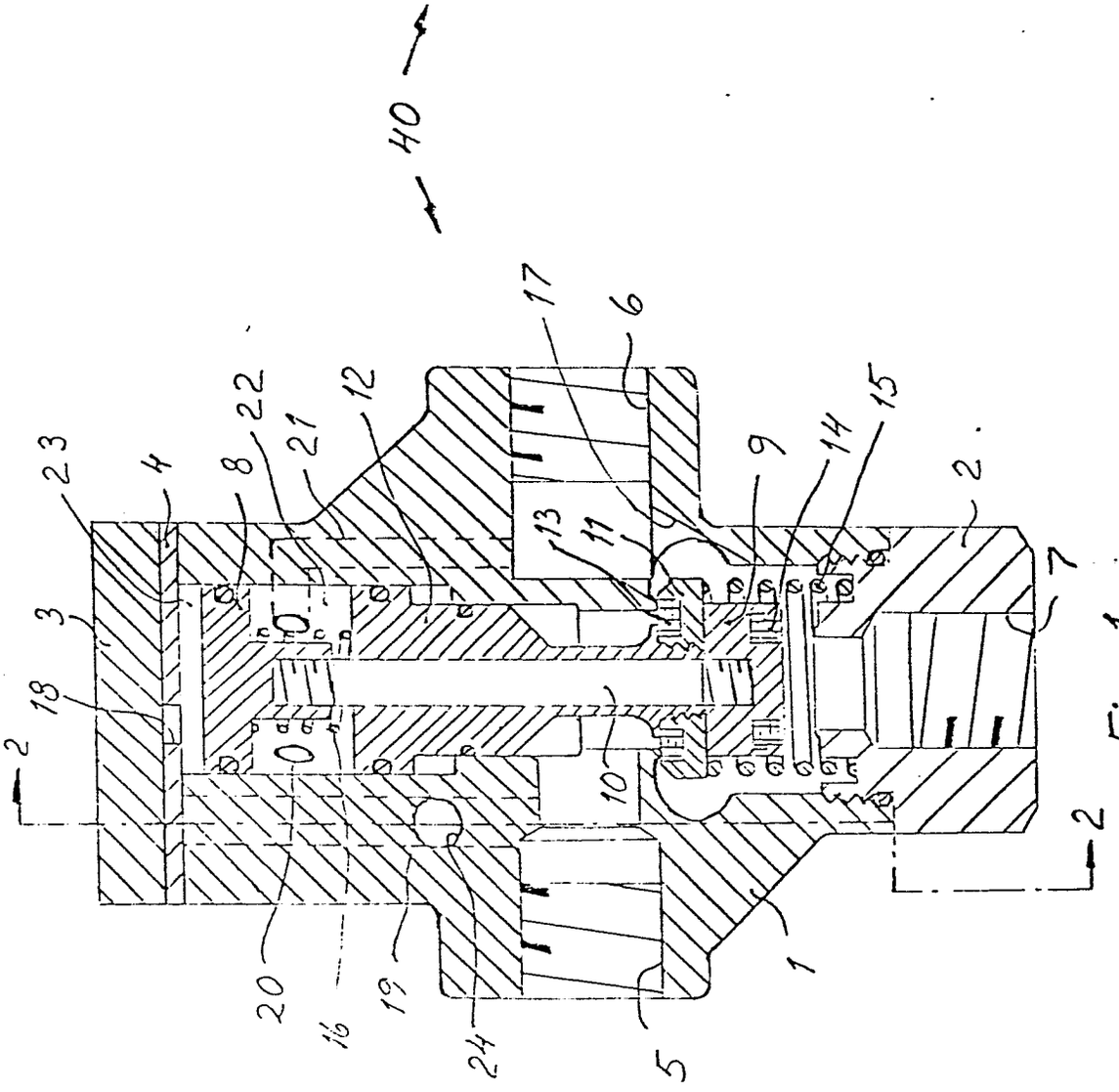

Fig. 1

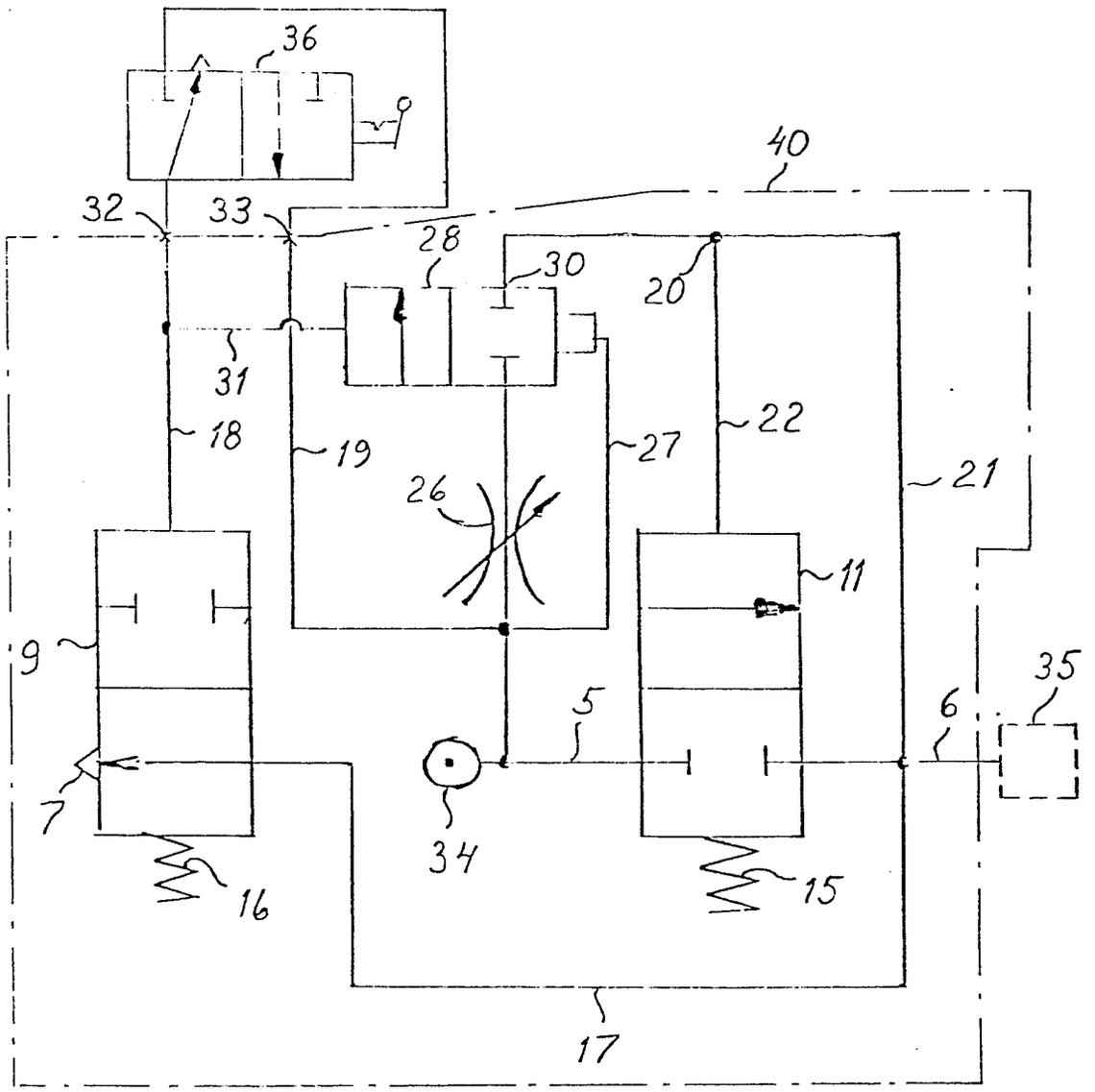

Fig. 3