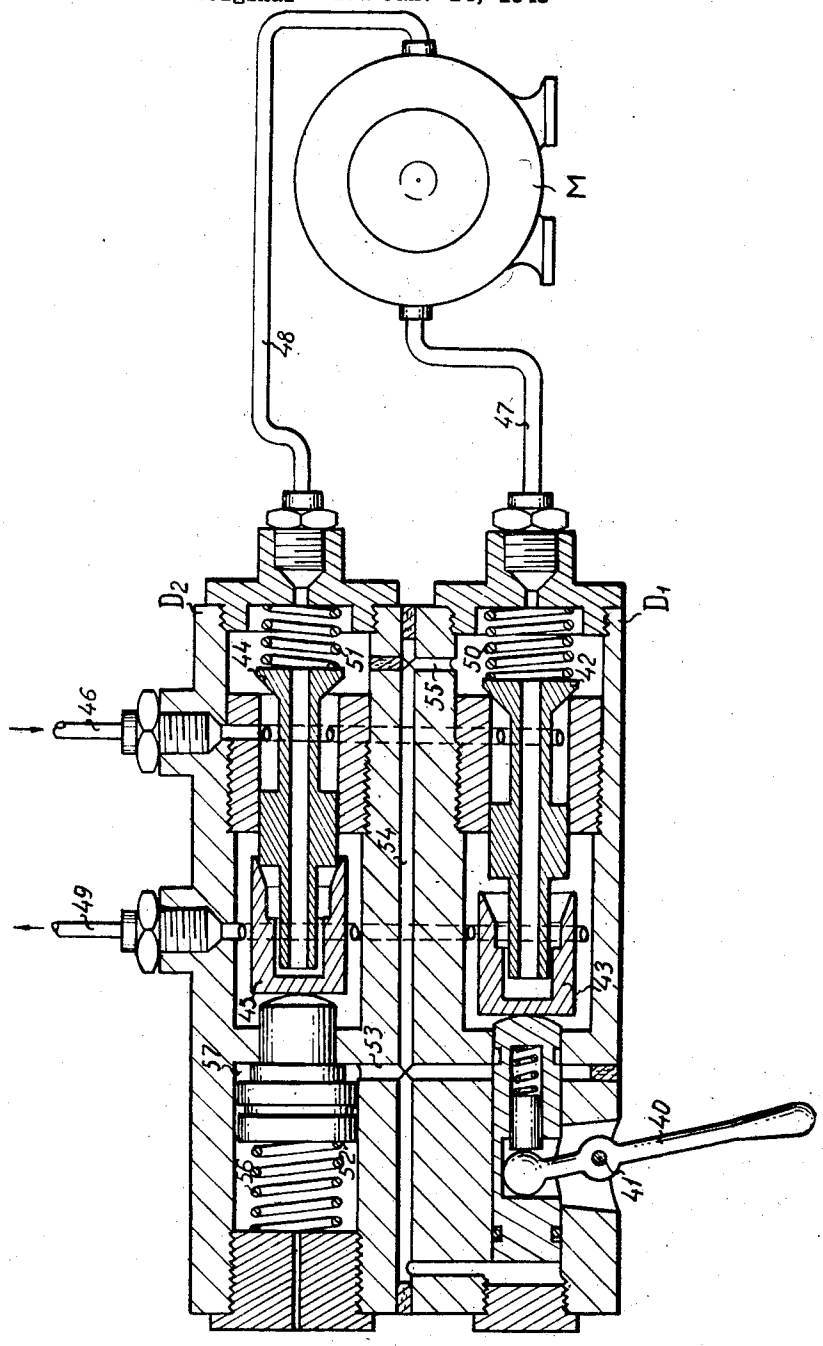
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PRESSURE FLUID DISTRIBUTOR VALVES

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Jean Mercier
INVENTOR
By Rutherford, Davis and Norton
his Att'ys.

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PRESSURE FLUID DISTRIBUTOR VALVES

Jean Mercier, New York, N.Y.

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3 Claims. (Cl. 121—46.5)

This invention relates to pressure fluid distributor valves comprising two coaxially aligned valves permitting a precise and undelayed opening and closing of ports or orifices controlled thereby and this is true regardless of the fluid used or the circuit in which the distributor is inserted.

The present application is a division of application, Serial No. 2,286, filed January 14, 1948, now Patent No. 2,787,255, issued April 2, 1957.

In known distributors of this kind, the two coaxial valves are mounted within a valve casing coaxially therewith, whereby the movable member of one of the valves forms the seat for the movable member of the other valve, the displacements of which are guided by an inner wall portion of the valve casing in such a manner that this other movable valve member will engage its seat in a more or less well centered position. When the two valves are mounted within a valve casing so that their axial displacements are guided by the casing itself, it will be necessary either to produce precise machined guiding surfaces for maintaining the two valves always in coaxial relation, or to provide for a transverse play permitting one of the valves to "seat" perfectly on the other valve when either one of the valves returns to its closed position; it is difficult to determine in advance the exact amount of transverse play permitting the valves to center themselves on the respective seat during return movement into closed position since a too small play may be insufficient whereas a too great play may cause undesirable leakage; thus, the provision of a predetermined transverse play may be considered as a "trial and error" method, that is, the chosen amount of transverse play may be satisfactory in one case and unsatisfactory in another case.

The object of the present invention is to remedy these drawbacks and to provide for precision alignment of the movable valve members regardless of their transverse play or the machining of their guiding surfaces, thereby improving the structure of the distributor valve, facilitating production and minimizing its cost of manufacture.

The distributor valve construction according to the present invention will now be described by way of example with reference to the accompanying drawing which shows a fluid pressure control system embodying two distributor valves.

In the drawing there is shown a hydraulic control system incorporating two distributor valves. The hydraulic control system comprises a controlled element constituted by a hydraulic motor M and a control element constituted by a lever 40 pivoted at 41 to the body of a control device including two distributors D1 and D2. Distributor D1 comprises an inlet valve 42 and an outlet valve 43, and distributor D2 an inlet valve 44 and an outlet valve 45. The inlet valve 42 of distributor D1 controls the communication between a pressure liquid supply conduit 46 and a conduit 47 leading to the left side of motor M, whereas the inlet valve 44 of distributor D2 controls the communication between said supply conduit 46 and a conduit 48 leading to the right side of

motor M. The outlet valve 43 of distributor D1 controls the communication between the conduit 47 and a discharge or exhaust conduit 49, and the outlet valve 45 of distributor D2 the communication between the conduit 48 and said discharge conduit 49. The inlet valves 42 and 44 are constantly urged towards their corresponding seats by spring members 50 and 51, respectively, and the outlet valve 45 of distributor D2 is maintained in abutting contact with the rod of a piston 52 mounted in a cylindrical chamber formed in the body of distributor D2. The space 57 of this cylindrical chamber at the right side of piston 52 may be connected through ducts 53, 54 and 55 and distributor D1 either with the pressure liquid supply conduit 46 or with the discharge conduit 49. A spring 56 is arranged in the cylindrical chamber to urge piston 52 constantly towards the outlet valve 45.

The operation of the control system can be easily understood:

When the lever 40 occupies the position shown in the drawing the pressure liquid supplied through the conduit 46 flows through the open inlet valve 44 of distributor D2 and conduit 48 to the right side of motor M, while the left side of this motor is connected, through conduit 47 and the open outlet valve 43 of distributor D1, with the discharge conduit 49. But when the upper end of lever 40 is displaced from left to right so as to close the outlet valve 43 of distributor D1 to thereby interrupt the communication between the left side of motor M and the discharge conduit 49, the liquid coming from the left side of motor M will flow through the ducts 55, 54 and 53 into the space 57 of the cylindrical chamber containing the piston 52 so as to push the latter against the action of spring 56 toward the outer end of the cylindrical chamber. Spring 51 is thus allowed to close the inlet valve 44 of distributor D2 so that the two distributors of the control device are in neutral, i.e. closed position. When lever 40 is further actuated to open the inlet valve 42 of distributor D1 in order to connect the left side of motor M and the space 57 of the auxiliary chamber of distributor D2 with the pressure liquid supply conduit 46, the piston 52 will be further displaced to the left to allow the outlet valve 45 of distributor D2 to open under the action of the pressure liquid coming from the right side of motor M so that this liquid can discharge through conduit 49.

As it has been mentioned above, the improved distributor valves according to the invention may be used with any pressure fluid and any circuit, but are particularly applicable to be used as pressure reducing valves and in hydraulic transmission or control systems comprising a slave unit with a follow-up action to bring the movable member of the slave unit to a position corresponding exactly to that occupied by a valve actuating member, the distributor valves permitting not only to reproduce exactly the displacements of the movable part of the distributor by the slave unit with an absolute precision and without any time lag, but also to ensure at all times a perfect fluid-tight closing of the aligned valves due to their exact concentricity with respect to each other.

What is claimed is:

1. A control device for a fluid motor, comprising, in combination, a casing formed with a first valve chamber and a second valve chamber, said first valve chamber having an inlet port, an outlet port and a take-off port communicating with one side of said fluid motor, and said second valve chamber having an inlet port communicating with the inlet port of said first valve chamber, an outlet port communicating with the outlet port of said first valve chamber, and a take-off port communicating with the other side of said fluid motor, a valve seat formed in each

valve chamber between said inlet ports and said take-off ports, respectively, a movable valve member in each chamber cooperating with said valve seat thereof to constitute an inlet valve, an outlet valve in each chamber arranged in alignment with the corresponding inlet valve and having a closure member adapted to cooperate with a seat formed on the corresponding movable valve member, a passage in each inlet valve controlled by the corresponding outlet valve, a bore formed in said casing in alignment with said first valve chamber, a piston slidable in said bore and having its working face formed with an axial projection extending into said first valve chamber so as to contact the outlet valve therein, resilient means in said bore arranged to urge said piston in a direction in which said extension opens said inlet valve in the first valve chamber without moving the outlet valve in said first valve chamber of its seat, a passageway in said casing for interconnecting the space of said bore in front of said working face of the piston with the take-off port of said second valve chamber, and valve actuating means adapted to open one of the valves in said second valve chamber without moving the other valve of its seat, whereby said space in front of the working face of said piston will be connected either with the inlet port or with the outlet port of said second valve chamber and the valves in said first valve chamber actuated through said piston so as to control the operation of said fluid motor in accordance with the control motion of said valve actuating means.

2. A device as defined in claim 1 wherein said valve actuating means includes a bore in said casing in alignment with said second chamber, a cylinder slidably mounted in said last-mentioned bore and having a recess in one side thereof, said cylinder bearing against the outlet valve in said second chamber, and a lever pivotally mounted in said casing and having its inner end engaged in said recess.

3. A control device for a fluid motor, comprising, in combination, a casing formed with a first valve chamber

and a second valve chamber, each valve chamber having an inlet port means, an outlet port means and a take-off port means, first movable valve means arranged in said first valve chamber to selectively provide an inlet passage between said inlet port means and said take-off port means or an outlet passage between said take-off port means and said outlet port means of said first valve chamber, resilient means in said casing to urge said first valve means in one direction to close said outlet passage and to open said inlet passage, second movable valve means arranged in said second valve chamber to selectively provide an inlet passage between the inlet port means and the take-off port means or an outlet passage between the take-off port means and the outlet port means of said second valve chamber, fluid pressure responsive means associated with said first valve means and communicating with the take-off port means of said second valve chamber to move said first valve means in the opposite direction against the action of said resilient means in response to fluid pressure in the take-off port means of said second valve chamber, to thereby close the inlet passage and open the outlet passage in said first valve chamber, and valve actuating means adapted to operate said second valve means so as to open either the inlet passage or the outlet passage in said second valve chamber.

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