

Description

Technical Field

This invention relates to valve systems, and in particular to pressure regulating valves for use in load controls.

Background Art

In one conventional system for controlling a fluid motor, such as used in lifting a load in a vehicle such as an earthworking machine, fluid pressure is delivered to a piston cylinder through a main control valve which is conventionally controlled by a pilot valve. The pressurized fluid is provided from a suitable high pressure pump which is driven when the apparatus is in operation. It is desirable to provide a pressure regulating means for regulating the pressure of the fluid delivered to the pilot valve, and for this purpose, pressure regulating valves have conventionally been employed.

The regulated pressure fluid is delivered to the pilot valve for modulation thereby in effecting the shifting of the main valve to provide the desired control of the fluid motor.

At times, it is necessary to operate the fluid motor in the absence of fluid pressure from the pump. Thus, at times, it may be desirable to lower the load at the time of an engine failure and the pressure source is de-energized such that the normal control of the piston cylinder is no longer available. To permit the controlled lowering of the load under such conditions, it has been conventional to provide a selector and a second valve which is arranged to provide controlled fluid pressure to the pilot valve by suitably controlling the fluid relieved from the piston cylinder.

A number of fluid systems have been developed for use in controlling such loads. Illustratively, in U.S. Letters Patent 3,703,850, of Don R. Honeycutt, a hydraulic control system is disclosed utilizing dump valves controlled by the hydraulic fluid of the system for removing from the system returning hydraulic fluid so as to eliminate the need for delivering the returning fluid back through a substantial length of the system and thereby providing a faster response time.

In U.S. Letters Patent 3,766,944, Josef Distler shows a pilot controlled fluid flow regulating valve wherein the pressure reducing signal is developed by a pilot valve. The flow regulating valve has a chamber receiving pressurized fluid from the pump through a pilot valve for moving the spool of the regulating valve from a neutral position to an intermediate position and thereupon to any one of several operative positions. A control piston is displaced by a manually operated handle in effecting the desired control of the fluid system.

In U.S. Letters Patent 3,840,049, of Jesse L. Field, Jr., which patent is owned by the assignee hereof, a fluid motor control system is provided having a float position. The control valve includes a spool and means for selectively shifting the spool in response to fluid pressure signals from a

manually operated pilot valve. The valve has make-up valve means which automatically opens a bypass passage between the fluid motor ports and fluid return passage when necessary to prevent cavitation of the motor such as during an overrunning condition from the external load force. In the Field, Jr. patent, the spool of the pilot valve has four positions, including a float position interconnecting the two motor ports and the fluid return passage so that the motor may move in either direction, as determined by external load forces. The pilot valve is manually actuated and utilizes a smaller pool than that of the directional valve.

In a second U.S. Letters Patent owned by the assignee hereof, Eugene E. Latimer discloses, in U.S. Patent 3,987,703, a hydraulic control system wherein the load lifting hydraulic motor is controlled from a source of pressurized fluid through a pilot-operated directional control valve having a combined restrictor and shuttle valve assembly. This assembly is operative to direct pressurized fluid from the pump for pilot operation of the main control valve when the pump is in operation. However, upon failure of the pump system to provide the desired pressure, the assembly provides an emergency source of hydraulic fluid for operation of the main control valve in the form of the load-generated pressure in the head ends of the implement jacks. This pressure is utilized to supply pressurized fluid to the pilot valve and is accomplished by automatic shifting of the shuttle valve by the spring biasing thereof as a result of an absence of pressure from the pump.

Pressure regulating valves operating on the force balance principle are well known in the art, see for example US-A-3 103 230.

Disclosure of Invention

The present invention comprehends an improved valve system wherein a pressure regulating valve is arranged to provide the selective regulation of fluid pressure delivered from the pump pressure source or from the load during a down condition of the pump.

The valve system is arranged to provide the alternate regulated fluid control automatically in the event of failure of the pump or failure of provision of the normal pressurized fluid for any reason.

Thus, the present invention is directed to overcoming one or more of the problems of the background art fluid pressure systems discussed above.

In one aspect of the present invention, a pressure regulating valve has a body, a chamber in the body, an inlet port and an outlet port communicating with the chamber, a valve member slidably positioned within the chamber and being movable between a first position at which the inlet port is in unrestricted communication with the outlet port and a second position at which the inlet port is in variable communication with the outlet port for reducing and regulating the pressure of the fluid passing from the inlet port to

the outlet port, and means for resiliently biasing the valve member to the first position. The valve member is moved to the second position in response to the fluid passing through the inlet port to the outlet port. The body has a second inlet port in communication with the chamber and is in communication with the outlet port at the first position of the valve member. The valve member is movable to an intermediate position at which the second inlet port is in variable communication with the outlet port for reducing and regulating the pressure of the fluid passing from the second inlet port to the outlet port. The valve member is moved to the intermediate position in response to fluid passing through the second inlet port and in the absence of fluid passing through the first inlet port to the outlet port.

In the illustrated embodiment, the biasing means urges the movable valve member to the first position in response to a failure of provision of the pressurized fluid normally controlling the disposition of the movable valve member by delivery thereof through the first inlet port.

In the illustrated embodiment, the movable valve member comprises a spool. In the illustrated embodiment, the outlet passage opens through one end of the spool and the biasing means acts against the opposite end of the spool.

The invention comprehends the use of the valve in a fluid power control system having a fluid motor connected to a load to be moved, fluid supply means for providing pressurized fluid for operating the fluid motor, a pilot controlled valve means for controlling operation of the fluid motor, pressure regulating valve means including a movable valve member and defining an outlet for providing fluid from the valve means at a reduced regulated pressure for operating the pilot controlled valve means, means for selectively connecting the pressure regulating valve means to the fluid supply means with the valve member in one pressure regulating disposition to provide fluid from the valve means to the pilot controlled valve means at a regulated pressure and connecting the valve means to the fluid motor with the valve member in another pressure regulating disposition to provide fluid from the fluid motor to the pilot controlled valve means at a regulated pressure in the event the load is in an extended condition and the fluid supply means is not providing the desired pressurized fluid.

Thus, the invention comprehends an improved fluid power control system having an improved, selector-pressure regulating valve for providing suitable regulated fluid from a plurality of different sources. The selection of control is effected automatically as a result of a failure of one of the sources to provide the desired fluid pressure. The valve is advantageously adapted for use in a fluid power control wherein a load is lifted as it provides improved means for permitting controlled, lowering of the load notwithstanding a failure of the high pressure pump at a time when the load is in a raised condition.

The apparatus of the present invention is ex-

tremely simple and economical of construction while yet providing the highly desirable features discussed above.

Brief Description of Drawing

Figure 1 is a schematic illustration of a fluid power control system having an improved control valve embodying the invention;

Figure 2 is a fragmentary section of the control valve illustrating the arrangement thereof in the normal control mode; and

Figure 3 is a fragmentary section illustrating the arrangement of the spool in effecting pressure regulation in controlling the fluid delivery from the fluid motor in the alternate mode of operation of the control valve.

Best Mode for Carrying Out the Invention

In the illustrative embodiment of the invention as disclosed in the drawing, a load is positioned by a fluid motor 10 illustratively comprising a cylinder 11 having a movable piston 12 therein and defining a head end 13 to which pressurized fluid is introduced to move the piston 12 in lifting the load. The pressurized fluid is delivered to the cylinder from a main valve 14 through a high pressure supply line 15 and a return line 16.

The fluid power control system generally designated 17 normally utilizes pressurized fluid delivered from a source, such as pump P. The pump receives fluid from a return tank T and provides the fluid under a high pressure to a first supply line 18 connected to the main valve 14 and through a second supply line 19 to a control valve 20 embodying the invention. The control valve, in turn, provides a reduced regulated pressure fluid supply through a transfer line 21 to a pilot valve 22. The pilot valve includes a manually operable control handle 23 so as to provide suitable pressurized fluid through lines 24 and 25 for operating the main valve suitably to move the piston 12 upwardly or downwardly to correspondingly raise or lower the load, as desired. As shown in Figure 1, the main valve is also connected to the tank to complete the fluid circuit.

As shown in Figure 1, the pump may be provided with an associated relief valve 26 for limiting the maximum pressure. As further shown, pilot valve 22 may be connected also to tank T.

In the illustrated embodiment, control valve 20 is provided with a wall means such as a body 27 defining a valve chamber 28 in which is received a movable valve member 29 which, in the illustrated embodiment, comprises a spool.

The spool is biased on one direction, i.e., to the right, as seen in Figure 1, by a spring 30 which extends between a removable plug 31 threaded to the wall means 27, and end 32 of the spool. The opposite end 33 of the spool is urged by spring 30 into abutment with a shoulder 34 on a plug 35 threaded into the wall means at the outer end of the valve chamber 28 and defining an outlet port 36 at the outer end of the valve chamber. As illustrated in Figure 1, the outlet port 36 is con-

ected through the transfer line 21 to the pilot valve 22.

The wall means 27 further defines a first inlet port 37 and a second inlet port 38 opening to the valve chamber 28 in axially spaced relationship. As shown in Figure 1, first inlet port 37 opens through an annular recess 39 to chamber 28 and second inlet port 38 opens through an annular recess 40 to the valve chamber.

The movable valve spool 29 is provided with a first transfer passage 41 adjacent recess 39 and a second transfer passage 42 adjacent recess 40. In the illustrated embodiment, the transfer passages 41 and 42 are defined by an array of radially opening, angularly spaced bores so as to provide a balanced fluid flow about the valve spool. As shown in Figure 1, the spool is provided with an axial outlet passage 43 opening through the end 33 so as to be in communication at all times with the outlet port 36 and with the transfer passages 41 and 42.

A check valve 44 is provided between the inlet port 38 and supply line 15 to prevent fluid flow outwardly through the inlet port 38 when high pressure fluid is being delivered from pump P to control valve 20.

In normal operation, the high pressure fluid from pump P is delivered through inlet port 37 and transfer passage 41 to the outlet port 42. The pressure of the fluid acts to urge the spool 29 to the left, as seen in Figure 2, so as to cause the transfer passage 41 to be controllably throttled at the left-hand end of the recess 39. Illustratively, as the pressure of the fluid increases, the spool 29 moves further to the left against the biasing action of spring 30, thereby further throttling the fluid flow and reducing the pressure thereof. Alternatively, when the pressure drops, spring 30 urges the spool to the right so as to align the transfer passage 41 more fully with the inlet port recess 39 so as to decrease the throttling effect. The reciprocal movement of the valve spool thusly acts as a pressure regulating means in providing to outlet port 36 fluid for delivery to the pilot valve 22 and main valve 14 at a reduced pre-selected regulated pressure, permitting the pilot valve to be operated by means of handle 23 so as to provide the desired operation of main valve 14 in controlling the disposition of the fluid motor piston 12, as discussed above.

As shown in Figure 2, when the pump is providing the high pressure fluid through the inlet recess 39 to the transfer passage 41, the spool 29 is moved sufficiently to the left to disalign the second transfer passage 42 relative to the second inlet port recess 40. Thus, the valve 20 functions simply as a pressure regulating valve under these conditions.

However, in the event that a failure of pump P occurs wherein the pressurized fluid is not delivered through the inlet port 37 to overcome the biasing action of spring 30, the spring urges spool 29 to the right, such as to the maximum position illustrated in Figure 1 wherein the end 33 of the spool abuts shoulder 34 of the valve body plug 35.

In this arrangement, the second transfer passage 42 is aligned with the recess 40 and, thus, fluid communication is permitted between the outlet port 43 and the inlet port 38, which, as indicated above, is connected to the head portion 13 of the cylinder 11 by supply line 15 and check valve 44. Thus, if the load is raised at the time the failure of pump P occurs, the fluid pressure within head end 13 causes the fluid to pass therefrom through supply line 15, check valve 44, inlet port 38, recess 40 and transfer passage 42 into the outlet port 43 of spool 29.

As illustrated in Figure 3, the pressure of the fluid so delivered from head end of cylinder 11 will tend to react against the biasing action of spring 30 so as to move the spool 29 back to the left and cause partial disalignment of the transfer passage 42 with the recess 40 so as to provide a pressure regulating function substantially in the same manner as discussed above relative to the movement of transfer passage 41 with respect to the recess 39. Thus, the delivery of fluid from the outlet passage 43 through outlet port 36 and transfer line 21 to the pilot valve 22 is maintained at a reduced regulated pressure and permits operation of the pilot valve and main valve in the same manner as when the pump P was providing the high pressure fluid to the control valve, thereby permitting operation of handle 23 to effect a controlled lowering of the load.

Industrial Applicability

The fluid power control system 17 is applicable to a wide range of fluid motor applications wherein it is desired to return a load to a rest position by controlled movement thereof notwithstanding a failure of the normal high pressure fluid supply. In the illustrated embodiment, the system is shown in connection with a fluid motor which raises and lowers a load, such as the bucket of an earth-working vehicle. As will be obvious to those skilled in the art, the control system is advantageously adapted for use with a wide range of different fluid motor-mode applications.

While specific pump and regulated pressures may be as desired, in the illustrated application, the regulated pressure may be approximately 2413 kPa (350 psi), with the pump pressure being approximately 13790 kPa (2000 psi). Where the load is a raised load, such as that of a bucket, the pressure in head end 13 of cylinder 11 may be substantially equal to the 13790 kPa normal pressure from pump P, while yet the control valve 20 automatically reduces and regulates the pressure delivered to the pilot valve from the head end 13 of cylinder 11 under such conditions to approximately the desirable regulated 2413 kPa pressure.

Thus, control valve 20 effectively defines a selector-pressure regulating and reducing valve, permitting a single valve member to serve both functions of providing pressure regulated fluid from the normal pump high pressure supply, or from the fluid motor during conditions where a failure of the pump supply occurs. As indicated

above, the valve 20 is arranged to automatically effect the alternative functioning under these different conditions.

The invention provides the improved functioning in a single control valve 20, eliminating the need for separate valves and other system components, thereby substantially reducing the cost and minimizing space requirements so as to be advantageously adaptable for use in vehicles and the like.

Claims

1. A pressure regulating valve (20) having a body (27), a chamber (28) in said body, an inlet port (37) and an outlet port (36) communicating with the chamber (28), a valve member (29) slidably positioned within the chamber (28) and being movable between a first position at which the inlet port (37) is in unrestricted communication with the outlet port (36) and a second position at which the inlet port (37) is in variable communication with the outlet port (36) for reducing and regulating the pressure of the fluid passing from the inlet port (37) to the outlet port (36), and means (30) for resiliently biasing the valve member (29) to the first position, said valve member (29) being moved to the second position in response to the fluid passing through the inlet port (37) to the outlet port (36), characterised in that said body (27) has a second inlet port (38) in communicating with said chamber (28) and being in communication with said outlet port (36) at the first position of the valve member (29), said valve member (29) being movable to an intermediate position at which the second inlet port (38) is in variable communication with the outlet port (36) for reducing and regulating the pressure of the fluid passing from the second inlet port (38) to the outlet port (36), said valve member (29) being moved to the intermediate position in response to fluid passing through the second inlet port (38) to the outlet port (36) and in the absence of fluid passing through the first inlet port (37) to the outlet port (36).

2. The pressure regulating valve as set forth in claim 1, including a check valve (44) connected to the second inlet port (38) for blocking fluid flow from said second inlet port (38).

3. The pressure regulating valve as set forth in claim 1, wherein said second inlet port (38) is blocked from communication with the outlet port (36) at the second position of the valve member (29).

4. The pressure regulating valve as set forth in claim 1, wherein said valve member (29) has a first transfer passage (41), a second transfer passage (42), and an outlet passage (43) communicating at all times with the first and second transfer passages (41, 42) and the outlet port (36), said first transfer passage (41) being in fluid communication with the first inlet port (37) at the first and second positions of the valve member (29), said second transfer passage (42) being in fluid communication with the second inlet port (38) at

the first and intermediate positions of the valve member (29).

5. The pressure regulating valve as set forth in claim 4, wherein the second transfer passage (42) is blocked from communication with the second inlet port (38) at the second position of the valve member (29).

6. A fluid power control system having a load supporting fluid motor (10), a pump (P), a pilot operated directional control valve (14) for controlling fluid flow between the pump (P) and the fluid motor (11), and a pilot circuit (21, 24, 25, 22) for controlling operation of the directional control valve (14), characterised in that said pilot circuit includes a pressure regulating valve as set forth in claim 1 wherein the first inlet (37) is connected to the pump (P), the outlet port (36) is connected to the pilot circuit, and the second inlet (38) is connected to the fluid motor (11).

7. A fluid power control system as set forth in claim 6, including a check valve (44) positioned between the second inlet (38) and the fluid motor (11).

Revendications

1. Valve régulatrice de pression (20) comprenant un corps (27), une chambre (28) disposée dans ledit corps, une lumière d'entrée (37) et une lumière de sortie (36) communiquant avec la chambre (28), un élément de valve (29) monté à coulissement à l'intérieur de la chambre (28) et apte à être déplacé entre une première position dans laquelle la lumière d'entrée (37) est en communication non restreinte avec la lumière de sortie (36), et une seconde position dans laquelle la lumière d'entrée (37) est en communication variable avec la lumière de sortie (36) en vue de réduire et de réguler la pression du fluide passant de la lumière d'entrée (37) à la lumière de sortie (36), et un moyen (30) pour solliciter élastiquement l'élément de valve (29) vers la première position, ledit élément de valve (29) étant amené vers la seconde position en réponse au passage du fluide par la lumière d'entrée (37) vers la lumière de sortie (36), caractérisée en ce que ledit corps (27) comporte une seconde lumière d'entrée (38) en communication avec ladite chambre (28), et étant en communication avec ladite lumière de sortie (36) dans la première position de l'élément de valve, ledit élément de valve (29) étant apte à être amené dans une position intermédiaire dans laquelle la seconde lumière d'entrée (38) est en communication variable avec la lumière de sortie (36) en vue de réduire et de réguler la pression du fluide passant de la seconde lumière d'entrée (38) à la lumière de sortie (36), et ledit élément de valve (29) étant amené dans la position intermédiaire en réponse au passage du fluide par la seconde lumière d'entrée (38) vers la lumière de sortie (36) et en l'absence du passage du fluide dans la première lumière d'entrée (37) vers la lumière de sortie (36).

2. Valve régulatrice de pression selon la reven-

above, the valve 20 is arranged to automatically effect the alternative functioning under these different conditions.

The invention provides the improved functioning in a single control valve 20, eliminating the need for separate valves and other system components, thereby substantially reducing the cost and minimizing space requirements so as to be advantageously adaptable for use in vehicles and the like.

Claims

1. A pressure regulating valve (20) having a body (27), a chamber (28) in said body, an inlet port (37) and an outlet port (36) communicating with the chamber (28), a valve member (29) slidably positioned within the chamber (28) and being movable between a first position at which the inlet port (37) is in unrestricted communication with the outlet port (36) and a second position at which the inlet port (37) is in variable communication with the outlet port (36) for reducing and regulating the pressure of the fluid passing from the inlet port (37) to the outlet port (36), and means (30) for resiliently biasing the valve member (29) to the first position, said valve member (29) being moved to the second position in response to the fluid passing through the inlet port (37) to the outlet port (36), characterised in that said body (27) has a second inlet port (38) in communication with said chamber (28) and being in communication with said outlet port (36) at the first position of the valve member (29), said valve member (29) being movable to an intermediate position at which the second inlet port (38) is in variable communication with the outlet port (36) for reducing and regulating the pressure of the fluid passing from the second inlet port (38) to the outlet port (36), said valve member (29) being moved to the intermediate position in response to fluid passing through the second inlet port (38) to the outlet port (36) and in the absence of fluid passing through the first inlet port (37) to the outlet port (36).

2. The pressure regulating valve as set forth in claim 1, including a check valve (44) connected to the second inlet port (38) for blocking fluid flow from said second inlet port (38).

3. The pressure regulating valve as set forth in claim 1, wherein said second inlet port (38) is blocked from communication with the outlet port (36) at the second position of the valve member (29).

4. The pressure regulating valve as set forth in claim 1, wherein said valve member (29) has a first transfer passage (41), a second transfer passage (42), and an outlet passage (43) communicating at all times with the first and second transfer passages (41, 42) and the outlet port (36), said first transfer passage (41) being in fluid communication with the first inlet port (37) at the first and second positions of the valve member (29), said second transfer passage (42) being in fluid communication with the second inlet port (38) at

the first and intermediate positions of the valve member (29).

5. The pressure regulating valve as set forth in claim 4, wherein the second transfer passage (42) is blocked from communication with the second inlet port (38) at the second position of the valve member (29).

6. A fluid power control system having a load supporting fluid motor (10), a pump (P), a pilot operated directional control valve (14) for controlling fluid flow between the pump (P) and the fluid motor (11), and a pilot circuit (21, 24, 25, 22) for controlling operation of the directional control valve (14), characterised in that said pilot circuit includes a pressure regulating valve as set forth in claim 1 wherein the first inlet (37) is connected to the pump (P), the outlet port (36) is connected to the pilot circuit, and the second inlet (38) is connected to the fluid motor (11).

7. A fluid power control system as set forth in claim 6, including a check valve (44) positioned between the second inlet (38) and the fluid motor (11).

Revendications

1. Valve régulatrice de pression (20) comprenant un corps (27), une chambre (28) disposée dans ledit corps, une lumière d'entrée (37) et une lumière de sortie (36) communiquant avec la chambre (28), un élément de valve (29) monté à coulissement à l'intérieur de la chambre (28) et apte à être déplacé entre une première position dans laquelle la lumière d'entrée (37) est en communication non restreinte avec la lumière de sortie (36), et une seconde position dans laquelle la lumière d'entrée (37) est en communication variable avec la lumière de sortie (36) en vue de réduire et de réguler la pression du fluide passant de la lumière d'entrée (37) à la lumière de sortie (36), et un moyen (30) pour solliciter élastiquement l'élément de valve (29) vers la première position, ledit élément de valve (29) étant amené vers la seconde position en réponse au passage du fluide par la lumière d'entrée (37) vers la lumière de sortie (36), caractérisée en ce que ledit corps (27) comporte une seconde lumière d'entrée (38) en communication avec ladite chambre (28), et étant en communication avec ladite lumière de sortie (36) dans la première position de l'élément de valve, ledit élément de valve (29) étant apte à être amené dans une position intermédiaire dans laquelle la seconde lumière d'entrée (38) est en communication variable avec la lumière de sortie (36) en vue de réduire et de réguler la pression du fluide passant de la seconde lumière d'entrée (38) à la lumière de sortie (36), et ledit élément de valve (29) étant amené dans la position intermédiaire en réponse au passage du fluide par la seconde lumière d'entrée (38) vers la lumière de sortie (36) et en l'absence du passage du fluide dans la première lumière d'entrée (37) vers la lumière de sortie (36).

2. Valve régulatrice de pression selon la reven-



dication 1, comprenant une valve de contrôle (44) reliée à la seconde lumière d'entrée (38) pour bloquer l'écoulement du fluide depuis ladite seconde lumière d'entrée (38).

3. Valve régulatrice de pression selon la revendication 1, dans laquelle ladite seconde lumière d'entrée (38) est fermée à une communication avec la lumière de sortie (36) dans la seconde position de l'élément de valve (29).

4. Valve régulatrice de pression selon la revendication 1, dans laquelle ledit élément de valve (29) comporte un premier passage de transfert (41), un second passage de transfert (42), et un passage de sortie (43) communiquant à tout instant avec les premier et second passages de transfert (41, 42) et la lumière de sortie (36), ledit premier passage de transfert (41) étant en communication fluidique avec la première lumière d'entrée (37) dans les première et seconde positions de l'élément de valve (29), ledit second passage de transfert (42) étant en communication fluidique avec la seconde lumière d'entrée (38) dans les positions première et intermédiaire de l'élément de valve (29).

5. Valve régulatrice de pression selon la revendication 4, dans laquelle le second passage de transfert (42) est fermé à une communication avec la seconde lumière d'entrée (38) dans la seconde position de l'élément de valve (29).

6. Système de commande de puissance à fluide comportant un organe à fluide moteur (10) supportant une charge, une pompe (P), une valve de commande directionnelle (14) commandée par un pilote pour commander le débit du fluide entre la pompe (P) et l'organe à fluide moteur (11), et un circuit pilote (21, 24, 25, 22) pour commander l'actionnement de la valve de commande directionnelle (14), caractérisé en ce que ledit circuit pilote comporte une valve régulatrice de pression selon la revendication 1, et dans lequel la première entrée (37) est reliée à la pompe (P), la lumière de sortie (36) est reliée au circuit pilote, et la seconde entrée (38) est reliée à l'organe à fluide moteur (11).

7. Système de commande de puissance à fluide selon la revendication 6, comportant une valve de contrôle (44) disposée entre la seconde entrée (38) et l'organe à fluide moteur (11).

Patentansprüche

1. Druckregelventil (20) mit einem Körper (27), einer Kammer (28) in dem Körper, einer Einlaßöffnung (37) und einer mit der Kammer (28) in Verbindung stehenden Auslaßöffnung (36), einem Ventilglied (29) gleitend positioniert in der Kammer (28) und zwischen einer ersten und einer zweiten Position bewegbar, wobei in der ersten Position die Einlaßöffnung (37) in uneingeschränkter Verbindung mit der Auslaßöffnung (36) steht und in der zweiten Position die Einlaßöffnung (37) in variabler Verbindung mit der Auslaßöffnung (36) steht, um den Druck des durch die Einlaßöffnung (37) zur Auslaßöffnung (36)

strömenden Strömungsmittels zu reduzieren und regulieren, und Mittel (30) zum elastischen Vorspannen des Ventilglieds (29) in die erste Position, wobei das Ventilglied (29) in die zweite Position infolge des durch die Einlaßöffnung (37) zur Auslaßöffnung (36) strömenden Strömungsmittels bewegt wird, dadurch gekennzeichnet, daß der erwähnte Körper (27) eine zweite Einlaßöffnung (38) in Verbindung mit der Kammer (28) aufweist und in Verbindung mit der Auslaßöffnung (36) in der ersten Position des Ventilglieds (29) steht, wobei das Ventilglied (29) in eine Zwischenposition bewegbar ist, in der die zweite Einlaßöffnung (38) in variabler Verbindung mit der Auslaßöffnung (36) steht, um den Druck des von der zweiten Einlaßöffnung (38) zur Auslaßöffnung (36) strömenden Strömungsmittels zu reduzieren und regulieren, wobei das Ventilglied (29) in die Zwischenposition bewegt wird, und zwar infolge des durch die zweite Einlaßöffnung (38) zur Auslaßöffnung (36) strömenden Strömungsmittels und bei Nichtanwesenheit von durch die erste Einlaßöffnung (37) zur Auslaßöffnung (36) laufenden Strömungsmittels.

2. Druckregelventil nach Anspruch 1 mit einem mit der zweiten Einlaßöffnung (38) verbundenen Rückschlagventil (44) zum Blockieren des Strömungsmittelflusses von der zweiten Einlaßöffnung (38).

3. Druckregelventil nach Anspruch 1, wobei die zweite Einlaßöffnung (38) gegenüber Verbindung mit der Auslaßöffnung (36) in der zweiten Position des Ventilglieds (29) blockiert ist.

4. Druckregelventil nach Anspruch 1, wobei das Ventilglied (29) einen ersten Übertragungsdurchlaß (41), einen zweiten Übertragungsdurchlaß (42) und einen Auslaßdurchlaß (43) aufweist, wobei letzterer zu allen Zeiten mit den ersten und zweiten Übertragungsdurchlässen (41, 42) und der Auslaßöffnung (36) in Verbindung steht, wobei ferner der erste Übertragungsdurchlaß (41) in Strömungsmittelverbindung mit der ersten Einlaßöffnung (37) an den ersten und zweiten Positionen des Ventilglieds (29) steht, und wobei ferner der zweite Übertragungsdurchlaß (42) in Strömungsmittelverbindung mit der zweiten Einlaßöffnung (38) an den ersten und Zwischenpositionen des Ventilglieds (29) steht.

5. Druckregelventil nach Anspruch 4, wobei der zweite Übertragungsdurchlaß (42) von einer Verbindung mit der zweiten Auslaßöffnung (38) in der zweiten Position des Ventilglieds (29) blockiert ist.

6. Strömungsmittelleistungssystem mit einem lastunterstützenden Strömungsmittelmotor (10), einer Pumpe P, einem pilotbetätigten Wegesteuerventil (14) zur Steuerung des Strömungsmittelflusses zwischen der Pumpe P und dem Strömungsmittelmotor (11), und eine Pilotschaltung (21, 24, 25, 22) zur Steuerung der Arbeitsweise des Wegeventils (14), dadurch gekennzeichnet, daß die Pilotschaltung ein Druckregelventil nach Anspruch 1 aufweist, wobei der erste Einlaß (37) mit der Pumpe P verbunden ist, die Auslaßöffnung (36) mit der Pilotschaltung



verbunden ist und der zweite Einlaß (38) mit dem Strömungsmittelmotor (11) in Verbindung steht.
7. Strömungsmittelleistungssystem nach An-

spruch 6, mit einem Rückschlagventil (44) positioniert zwischen dem zweiten Einlaß (38) und dem Strömungsmittelmotor (11).

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