

Pressure Modulating Selector Valve

Technical Field

This invention relates to a pressure modulating selector valve of the type particularly adapted for use in a control circuit for hydraulically actuating clutches of a transmission.

Background Art

Hydraulically actuated clutches require control modulation to provide for the gradual engagement thereof, maintenance of a top actuating pressure and controlled modulation during disengagement of the clutch. Conventional pressure modulating relief and reducing valves do not always provide for the close control of such clutch operating functions and are often times unduly complex. U.S. Patent 3 960 172 discloses a separate modulating valve positioned within each of a plurality of conduits extending between a control valve and a plurality of fluid actuated clutches. The modulating valve individually controls the fluid flow through the conduit so that pressurized fluid communicated to the associated clutch from the control valve increases at a gradually increasing rate and the fluid is vented from the clutch at a gradually decreasing rate.

U.S. Patent 3 923 076 relates to a transmission control circuit having selector valves for communicating fluid at a first pressure to selected speed ratio clutches and for communicating fluid at a second pressure to directional clutches capable of acting as master clutches. A first modulating valve modulates the first fluid pressure and a differential valve establishes the second fluid pressure relative to the first fluid pressure. The control circuit also includes a manually controlled modulating valve having a modulating spool which is manually operable for selectively modulating the second fluid pressure in two discrete operating modes for regulating clutch engagement under different operating conditions. The manually controlled modulating valve also includes a relief valve for selectively reducing the first fluid pressure during regulation of the second fluid pressure by the manually controlled modulating valve.

Disclosure of the Invention

An object of this invention is to provide an improved pressure modulating selector valve which more closely modulates fluid pressure.

In accordance with the invention a pressure modulating selector valve having an inlet, an outlet and a drain comprises valve means within a housing for movement between a normally closed position blocking communication of fluid from said inlet to said outlet and an open position communicating fluid from said inlet to said outlet, said valve means providing communication between said outlet and drain in the

closed position and preventing communication between said outlet and drain in the open position, selector piston means responsive to a fluid pressure pilot control signal for movement in the opening direction towards said valve means to a limit stop position, a load piston responsive to movement of said selector piston means in said opening direction for initially moving said valve means to a partially open position through an interposed means to communicate said inlet with said outlet and closing said drain, and modulating means interconnected between said outlet and said load piston for controlling gradual further movement of said valve means to its fully open position in response to fluid pressure in the outlet to modulate the increase of fluid pressure in said outlet to a predetermined level.

Preferred modifications of the pressure modulating selector valve of the invention are given in the appended claims.

Brief Description of Drawings

Other features of this invention will become apparent from the following description and accompanying drawings wherein:

Fig. 1 is a longitudinal sectional view of a pressure modulating selector valve incorporated into a hydraulic circuit for actuating a clutch;

Figs. 2—12 graphically represent pressure traces upon engagement or disengagement of a particular clutch; and

Fig. 13 graphically represents clutch pressure traces upon up-shifting and down-shifting of an eight-speed transmission.

Best Mode for Carrying Out the Invention

Fig. 1 illustrates a pressure modulating selector valve 10 comprising a housing 11, having first means in the form of a modulating spool 12 reciprocally mounted therein. The spool is shown in its closed position whereby the communication of pressurized fluid from an inlet 13 to an outlet 14 of the valve is prevented. The inlet communicates with a pressurized fluid source, including a pump 15, whereas the outlet communicates with a hydraulically actuated clutch 16 employed in a conventional transmission. Although the pressure modulating selector valve of this embodiment finds particular application in a control circuit for such a clutch, the valve has other applications which are recognized to those skilled in the arts relating hereto.

The valve further comprises a selector piston or second means 17 reciprocally mounted in housing 11 and responsive to a fluid pressure pilot signal in a conduit 18 for movement towards spool 12. An annular boss 19 forms a first stop means on the end of piston 17 to engage the housing when the piston reaches its

extreme leftward position in the housing. The space surrounding the boss defines an actuating chamber 20 for receiving the fluid pressure pilot signal from conduit 18. An annular groove 21 is formed on the periphery of the piston to communicate with the plurality of radially disposed ports 22 formed through the piston for purposes hereinafter explained.

A load piston 23 comprises third means responsive to rightward movement of piston 17 for moving spool 12 rightwardly to communicate inlet 13 with outlet 14. Piston 23 has an annular boss 24 formed thereon to provide second stop means normally abutting piston 17 when selector valve 10 is maintained in its disengaged position, illustrated in Fig. 1. Biasing means in the form of a compression coil spring 25 is disposed between piston 23 and spool 12 which together provide modulating means for aiding in the modulation of hydraulic fluid from the inlet to the outlet.

A control chamber 26 is thus defined between pistons 17 and 23 and communicates with a drain conduit 27, via ports 22 and groove 21, when clutch 16 is disengaged. A restrictive orifice 28 is mounted in conduit 27 to aid in modulating fluid flow upon disengagement of clutch 16, as will be hereinafter explained.

As the clutch is disengaged, spool 12 is urged leftwardly by a biasing spring 30 until its leftward end engages an annular collar 29 secured to housing 11. Collar 29 forms a third stop in the selector valve for maintaining the spool 12 in its disengaged position and also functions to limit rightward movement of piston 17.

A cylindrical slug 31 is reciprocally mounted in the rightward end of the spool to function in a conventional manner.

System fluid pressures and pulsations are dampened by a standard spring-biased poppet valve 32, mounted in spool 12. It should be noted that a port 33 and orifice 34 are formed through a side wall of the spool to communicate such system fluid pressures to the poppet valve. It should be noted that fluid trapped behind the poppet valve 32 will pass through orifice 34 back to outlet 14. Leakage fluid is drained via a drain outlet 31a.

A second orifice means 35 is interconnected between outlet 14 and load piston 23 via groove 21 and port 22 of piston 17 provides modulating means for controlling movement of the load piston and thus modulating spool 12 to modulate the fluid pressure level in clutch 16. The modulating means may be deemed to further comprise chamber 26 which communicates with orifice means 35 via ports 22, groove 21 and a conduit 36. A conduit 37 which connects the upstream side of the orifice means with outlet 14 may be subjected to fluid pressures within the range of 200 to 500 psig (1400 to 3500 k Pa), for example.

A rod 38 may be loosely contained within spring 25. The rod is normally employed in a

selector valve whose associated clutch 16 requires a relatively steep pressure rise during actuation thereof, i.e., modulating spool will undergo a quicker response (rightward movement) upon engagement of a load piston 23 with the rod upon clutch engagement.

In addition, a standard relief valve 43 is connected to the inlet conduit on the downstream side of pump 15. A plurality of radial ports 41 are preferably formed through piston 17 to provide drain passages for the chamber containing spring 25 when the rightward end of the piston abuts collar 29. At least one radial port 42 is formed through piston 23 to provide a similar drainage function.

Operation

When selector valve 10 is conditioned to disengage clutch 16, as illustrated in the drawing, outlet 14 will communicate directly with a drain outlet 39. Furthermore, control chamber 26 communicates with drain conduit 27 whereby modulating spool 12 is urged leftwardly to its closed position by positioning spring 30. Communication of pressurized fluid from inlet 13 to outlet 14 is thus blocked off to prevent engagement of the clutch.

Upon actuation of a conventional pilot control means 40 to communicate pressurized fluid to actuating chamber 20 via conduit 18, selector piston 17 will move rightwardly against stop means 29. Groove 21 will thus move out of communication with drain conduit 27, but will remain in communication with conduit 36. Simultaneously, load piston 23 will move rightwardly, permitting spring 25 to overcome the opposed biasing force of spring 30, and moving modulating spool 12 rightwardly to close off drain outlet 39. The modulating spool 12 will simultaneously move to an open position to communicate inlet 13 with outlet 14, initiating filling of the actuating chamber (not shown) of clutch 16 with hydraulic fluid.

Upon filling of the clutch to approximately 20 psig (140 k Pa) in a time interval of approximately 0.2 seconds, pressurized fluid in conduit 37 will pass through orifice means 35 and into control chamber 26 via groove 21 and ports 22. The pressurization of the control chamber 26 will function to move load piston 23 further rightwardly (selector piston 17 remaining in contact with stop means 29) to gradually modulate rightward movement of modulating spool 12 to its open position for communicating full supply pressure (e.g. 200 psig) (1400 k Pa) from inlet 13 to clutch 16.

Springs 25 and 30 and orifice means 35 may be suitably calibrated to provide the clutch with infinite modulating characteristics. For example, it is normally desirable to have different shift characteristics (clutch fill pressure versus time of filling) for the various clutches employed in a transmission. It may be desirable to engage a speed clutch prior to engagement of a directional clutch.

Upon disengagement of clutch 16, pilot control means 40 is actuated to exhaust actuating chamber 20 of pilot pressure, causing leftward movement of selector piston 17 until stop means 19 abuts housing 11 under the influence of spring 25. Drain conduit 27 will thus be placed in communication with control chamber 26 via groove 21 and ports 22. Since the drain conduit is restricted by an orifice 28, load piston 23 will move leftwardly in a controlled manner under the influence of springs 25 and 30 to slowly close off inlet 13 and open drain outlet 39. For example, upon initial exhaust of chamber 20, clutch pressure may fall to approximately one-third that of full clutch engagement pressure (e.g., 200 psig) (1400 kPa) and then gradually reduce at a rate determined by the calibration of orifice 28. Thus, a closely controlled modulation of clutch disengagement is achieved.

Figs. 2—9 illustrate graphs of pressure (psig) versus time (sec.) for typical clutch disengagements. Fig. 2 illustrates disengagement of a clutch when no orifice 28 is used. Variations of clutch disengagement achieved by varying the size of orifice 28 are shown in Fig. 3 and Fig. 6.

Further control of clutch disengagement can be achieved by employing an exhaust orifice (not shown) in association with pilot means 40. Effects of such an orifice are shown in Fig. 4 and Fig. 7. The results of using both orifices combined are shown in Fig. 5, Fig. 8 and Fig. 9. Delay of clutch engagement can be achieved by employing a supply orifice (not shown) in pilot means 40. Fig. 10 is a typical clutch engagement with no supply orifice. Fig. 11 and Fig. 12 show the effects of varying a pilot supply orifice.

Typical clutch pressure traces for an eight-speed transmission using a different modulating selector valve 10 for each clutch (C1 through C8) thereof are shown in Fig. 13. The traces sequentially illustrate an up-shifting from neutral (N) to first gear (1F), first gear to second gear (2F) and et seq. and a subsequent down-shifting from eighth gear (8F) to seventh gear (7F), seventh gear to sixth gear (6F) and et seq.

Claims

1. A pressure modulating selector valve (10) having an inlet (13), an outlet (14) and a drain (39) and comprising valve means (12) within a housing (11) for movement between a normally closed position blocking communication of fluid from said inlet (13) to said outlet (14) and an open position communicating fluid from said inlet to said outlet, said valve means (12) providing communication between said outlet (14) and drain (39) in the closed position and preventing communication between said outlet (14) and drain (39) in the open position, selector piston means (17) responsive to a fluid pressure pilot control signal for movement in the opening direction towards said valve

means (12) to a limit stop position, a load piston (23) responsive to movement of said selector piston means (17) in said opening direction for initially moving said valve means (12) to a partially open position through an interposed means (25) to communicate said inlet (13) with said outlet (14) and closing said drain (39), and

modulating means (35) interconnected between said outlet (14) and said load piston (23) for controlling gradual further movement of said valve means (12) to its fully open position in response to fluid pressure in the outlet (14) to modulate the increase of fluid pressure in said outlet to a predetermined level.

2. The pressure modulating selector valve of claim 1 wherein said valve means comprises a modulating spool (12) reciprocally mounted in the housing (11) and positioning means (30) for biasing said spool (12) to the closed position, blocking communication of fluid from said inlet (13) to said outlet (14).

3. The pressure modulating selector valve of claim 2 wherein said positioning means comprises a compression coil spring (30) mounted between said spool (12) and said housing (11).

4. The pressure modulating selector valve of any of claims 1 to 3 wherein said selector piston means comprises a selector piston (17) reciprocally mounted in the housing (11) and wherein said load piston (23) is reciprocally mounted in said selector piston (17).

5. The pressure modulating selector valve of any of claims 1 to 4 wherein said interposed means comprises modulating biasing means (25) disposed between said load piston (23) and said valve means (12) for aiding in modulating movements of said valve means.

6. The pressure modulating selector valve of any of claims 1 to 5 further comprising stop means (19) formed on said selector piston means (17) to abut said housing (11) to define an actuating chamber (20) adapted to receive said pilot pressure signal therein for selectively moving said selector piston means (17) towards said valve means (12).

7. The pressure modulating selector valve of claim 6 further comprising pilot control means (40) for selectively communicating said pilot pressure signal to said actuating chamber (20).

8. The pressure modulating selector valve of any of claims 1 to 7 further comprising stop engaging said selector piston means (17) to define a control chamber (26) therebetween communicating with said modulating means (35) for receiving pressurized fluid therefrom for moving said load piston (23) towards said valve means (12).

9. The pressure modulating selector valve of claims 4 and 8 further comprising at least one port (22) formed through said selector piston (17) for communicating said control chamber (26) with said modulating means (35).

10. The pressure modulating selector valve

Upon disengagement of clutch 16, pilot control means 40 is actuated to exhaust actuating chamber 20 of pilot pressure, causing leftward movement of selector piston 17 until stop means 19 abuts housing 11 under the influence of spring 25. Drain conduit 27 will thus be placed in communication with control chamber 26 via groove 21 and ports 22. Since the drain conduit is restricted by an orifice 28, load piston 23 will move leftwardly in a controlled manner under the influence of springs 25 and 30 to slowly close off inlet 13 and open drain outlet 39. For example, upon initial exhaust of chamber 20, clutch pressure may fall to approximately one-third that of full clutch engagement pressure (e.g., 200 psig) (1400 kPa) and then gradually reduce at a rate determined by the calibration of orifice 28. Thus, a closely controlled modulation of clutch disengagement is achieved.

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Further control of clutch disengagement can be achieved by employing an exhaust orifice (not shown) in association with pilot means 40. Effects of such an orifice are shown in Fig. 4 and Fig. 7. The results of using both orifices combined are shown in Fig. 5, Fig. 8 and Fig. 9.

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Typical clutch pressure traces for an eight-speed transmission using a different modulating selector valve 10 for each clutch (C1 through C8) thereof are shown in Fig. 13. The traces sequentially illustrate an up-shifting from neutral (N) to first gear (1F), first gear to second gear (2F) and et seq. and a subsequent down-shifting from eighth gear (8F) to seventh gear (7F), seventh gear to sixth gear (6F) and et seq.

Claims

1. A pressure modulating selector valve (10) having an inlet (13), an outlet (14) and a drain (39) and comprising valve means (12) within a housing (11) for movement between a normally closed position blocking communication of fluid from said inlet (13) to said outlet (14) and an open position communicating fluid from said inlet to said outlet, said valve means (12) providing communication between said outlet (14) and drain (39) in the closed position and preventing communication between said outlet (14) and drain (39) in the open position,

selector piston means (17) responsive to a fluid pressure pilot control signal for movement in the opening direction towards said valve

means (12) to a limit stop position,

a load piston (23) responsive to movement of said selector piston means (17) in said opening direction for initially moving said valve means (12) to a partially open position through an interposed means (25) to communicate said inlet (13) with said outlet (14) and closing said drain (39), and

modulating means (35) interconnected between said outlet (14) and said load piston (23) for controlling gradual further movement of said valve means (12) to its fully open position in response to fluid pressure in the outlet (14) to modulate the increase of fluid pressure in said outlet to a predetermined level.

2. The pressure modulating selector valve of claim 1 wherein said valve means comprises a modulating spool (12) reciprocally mounted in the housing (11) and positioning means (30) for biasing said spool (12) to the closed position, blocking communication of fluid from said inlet (13) to said outlet (14).

3. The pressure modulating selector valve of claim 2 wherein said positioning means comprises a compression coil spring (30) mounted between said spool (12) and said housing (11).

4. The pressure modulating selector valve of any of claims 1 to 3 wherein said selector piston means comprises a selector piston (17) reciprocally mounted in the housing (11) and wherein said load piston (23) is reciprocally mounted in said selector piston (17).

5. The pressure modulating selector valve of any of claims 1 to 4 wherein said interposed means comprises modulating biasing means (25) disposed between said load piston (23) and said valve means (12) for aiding in modulating movements of said valve means.

6. The pressure modulating selector valve of any of claims 1 to 5 further comprising stop means (19) formed on said selector piston means (17) to abut said housing (11) to define an actuating chamber (20) adapted to receive said pilot pressure signal therein for selectively moving said selector piston means (17) towards said valve means (12).

7. The pressure modulating selector valve of claim 6 further comprising pilot control means (40) for selectively communicating said pilot pressure signal to said actuating chamber (20).

8. The pressure modulating selector valve of any of claims 1 to 7 further comprising stop means (24) formed on said load piston (23) for engaging said selector piston means (17) to define a control chamber (26) therebetween communicating with said modulating means (35) for receiving pressurized fluid therefrom for moving said load piston (23) towards said valve means (12).

9. The pressure modulating selector valve of claims 4 and 8 further comprising at least one port (22) formed through said selector piston (17) for communicating said control chamber (26) with said modulating means (35).

10. The pressure modulating selector valve



of claim 8 or 9 further comprising a drain conduit (27) communicating — in the normal position of the selector piston (17) — with said control chamber (26) and orifice means (28) disposed in said drain conduit (27) for modulating movement of said load piston (23) away from said valve means (12) when said valve means (12) at least partially blocks communication of fluid from said inlet (13) to said outlet (14).

11. The pressure modulating selector valve of any of claims 8 to 10 wherein said modulating means comprises orifice means (35) for modulating fluid flow from said outlet (14) to said control chamber (26).

12. The pressure modulating selector valve of any of claims 1 to 11 wherein common stop means (29) are secured to said housing (11) for engaging an end of said valve means (12) when said valve means normally block communication of fluid from said inlet (13) to said outlet (14) and for engaging said selector piston means (17) when said selector piston means moves towards said valve means (12).

Revendications

1. Soupape sélectrice à modulation de pression (10) ayant une entrée (13), une sortie (14) et un drain (39) et comprenant un organe de soupape (12) logé dans une enveloppe (11) de façon à pouvoir se déplacer entre une position normalement fermée interrompant une communication de fluide de ladite entrée (13) à ladite sortie (14) et une position ouverte permettant une communication de fluide de ladite entrée à ladite sortie, ledit organe de soupape (12) établissant une communication entre ladite sortie (14) et le drain (39) dans la position fermée et empêchant la communication entre ladite sortie (14) et ledit drain (39) dans la position ouverte, un moyen à piston de sélection (17) qui en réponse à un signal de commande de pression pilote de fluide se déplace dans la direction d'ouverture vers ledit organe de soupape (12) à une position d'arrêt limite, un piston de charge (23) qui en réponse au mouvement dudit moyen à piston de sélection (17) dans ladite direction d'ouverture déplace initialement ledit organe de soupape (12) à une position d'ouverture partielle par un organe interposé (25) de façon à faire communiquer ladite entrée (13) avec ladite sortie (14), et ferme ledit drain (39), et un moyen de modulation (35) interconnecté entre ladite sortie (14) et ledit piston de charge (23) pour commander un mouvement ultérieur graduel dudit organe de soupape (12) à sa position d'ouverture complète en réponse à la pression de fluide dans la sortie (14) afin de moduler l'augmentation de la pression du fluide dans ladite sortie à un niveau prédéterminé.

2. Soupape sélectrice à modulation de pression selon la revendication 1, dans laquelle ledit organe de soupape comprend un tiroir de

modulation (12) monté à mouvement alternatif dans l'enveloppe (11) et un moyen de positionnement (30) pour solliciter ledit tiroir (12) vers la position fermée dans laquelle il interrompt la communication de fluide entre ladite entrée (13) et ladite sortie (14).

3. Soupape sélectrice à modulation de pression selon la revendication 2, dans laquelle ledit moyen de positionnement comprend un ressort hélicoïdal de compression (30) interposé entre ledit tiroir (12) et ladite enveloppe (11).

4. Soupape sélectrice à modulation de pression selon l'une quelconque des revendications 1 à 3, dans laquelle ledit moyen à piston de sélection comprend un piston de sélection (17) monté à mouvement alternatif dans l'enveloppe (11) et dans laquelle le piston de charge (23) est monté à mouvement alternatif dans ledit piston de sélection (17).

5. Soupape sélectrice à modulation de pression selon l'une quelconque des revendications 1 à 4, dans laquelle l'organe interposé comprend un élément de sollicitation de modulation (25) disposé entre ledit piston de charge (23) et ledit organe de soupape (12) afin de contribuer aux mouvements de modulation de celui-ci.

6. Soupape sélectrice à modulation de pression selon l'une quelconque des revendications 1 à 5, comprenant en outre une butée (19) formée sur ledit moyen à piston de sélection (17) de façon à venir heurter ladite enveloppe (11) afin de délimiter une chambre d'actionnement (20) adaptée à recevoir ledit signal de pression pilote pour déplacer sélectivement ledit moyen à piston de sélection (17) vers ledit organe de soupape (12).

7. Soupape sélectrice à modulation de pression selon la revendication 6, comprenant en outre un moyen de commande pilote (40) pour transmettre sélectivement ledit signal de pression pilote à ladite chambre d'actionnement (20).

8. Soupape sélectrice à modulation de pression selon l'une quelconque des revendications 1 à 7, comprenant en outre une butée (24) formée sur ledit piston de charge (23) pour venir en contact avec ledit moyen à piston de sélection (17) afin de délimiter une chambre de commande (26) communiquant avec ledit moyen de modulation (35) pour en recevoir un fluide sous pression afin de déplacer ledit piston de charge (23) vers ledit organe de soupape (12).

9. Soupape sélectrice à modulation de pression selon les revendications 4 et 8, comprenant en outre au moins un orifice (22) traversant ledit piston de sélection (17) pour faire communiquer ladite chambre de commande (26) avec ledit moyen de modulation (35).

10. Soupape sélectrice à modulation de pression selon la revendication 8 ou 9, comprenant en outre un conduit de drainage (27) communiquant — dans la position normale du piston de sélection (17) — avec ladite chambre



de commande (26), et un étranglement (28) disposé dans ledit conduit de drainage (27) afin de moduler le mouvement dudit piston de charge (23) à l'opposé dudit organe de soupape (12) quand cet organe de soupape (12) bloque au moins partiellement la communication de fluide entre ladite entrée (13) et ladite sortie (14).

11. Soupape sélectrice à modulation de pression selon l'une quelconque des revendications 8 à 10, dans laquelle ledit moyen de modulation comprend un étranglement (35) pour moduler la circulation de fluide entre ladite sortie (14) et ladite chambre de commande (26).

12. Soupape sélectrice à modulation de pression selon l'une quelconque des revendications 1 à 11, dans laquelle une butée ordinaire (29) est fixée à ladite enveloppe (11) pour venir en contact avec une extrémité dudit organe de soupape (12) quand celui-ci bloque normalement la communication de fluide entre ladite entrée (13) et ladite sortie (14) et pour venir en contact avec ledit moyen à piston de sélection (17) quand ce dernier se dirige vers ledit organe de soupape (12).

Patentansprüche

1. Auswahlventil (10) mit Druckmodulation mit einem Einlaß (13), einem Auslaß (14) und einem Abfluß (39), wobei folgendes vorgesehen ist: Ventilmittel (12) innerhalb eines Gehäuses (11) zur Bewegung zwischen einer normalerweise geschlossenen Position zur Blockierung einer Strömungsmittelverbindung vom Einlaß (13) zum Auslaß (14) und einer offenen Position zur Strömungsmittelverbindung vom Einlaß zum Auslaß, wobei die Ventilmittel (12) eine Verbindung zwischen dem Auslaß (14) und dem Abfluß (39) in der Schließposition vorsehen und die Verbindung zwischen dem Auslaß (14) und dem Abfluß (39) in der Öffnungsposition vorsehen, Wahlkolbenmittel (17) ansprechend auf ein Strömungsmittel-druckpilotsteuersignal zur Bewegung in der Öffnungsrichtung zu den Ventilmitteln (12) hin in eine Grenzanschlagposition, einen Lastkolben (23) ansprechend auf die Bewegung der Wahlkolbenmittel (17) in der Öffnungsrichtung zur anfänglichen Bewegung der Ventilmittel (12) in eine teilweise offene Position, und zwar durch dazwischen angeordnete Mittel (25) zur Verbindung des Einlasses (13) mit dem Auslaß (14) und zum Schließen des Abflusses (39), Modulationsmittel (35) verbunden zwischen dem Auslaß (14) und dem Lastkolben (23) zur Steuerung der graduellen weiteren Bewegung der Ventilmittel (12) zu deren vollständig offenen Position infolge von Strömungsmittel-druck im Auslaß (14) zur Modulation des Strömungsmittel-druckanstiegs in Auslaß auf ein Vorbestimmtes Niveau.

2. Auswahlventil mit Druckmodulation nach Anspruch 1, wobei die Ventilmittel einen im

Gehäuse (11) hin und her bewegbar angeordneten Modulationskolben (12) und Positionierungsmittel (30) aufweisen, zum Vorspannen des Kolbens (12) in die Schließposition, wobei die Strömungsmittelverbindung vom Einlaß (13) zum Auslaß (14) blockiert ist.

3. Auswahlventil mit Druckmodulation nach Anspruch 2, wobei die Positionierungsmittel eine Schraubendruckfeder (30) angeordnet zwischen dem Kolben (12) und dem Gehäuse (11) aufweisen.

4. Auswahlventil mit Druckmodulation nach einem der Ansprüche 1 bis 3, wobei die Wahlkolbenmittel einen Wahlkolben (17) hin und herbewegbar im Gehäuse (11) angeordnet aufweisen, und wobei der Lastkolben (23) in dem Wahlkolben (17) hin und her bewegbar angeordnet ist.

5. Auswahlventil mit Druckmodulation nach einem der Ansprüche 1 bis 4, wobei die dazwischen angeordneten Mittel Modulationsvorspannmittel (25) aufweisen, und zwar angeordnet zwischen dem Lastkolben (23) und den Ventilmitteln (12), um bei den Modulationsbewegungen der Ventilmittel unterstützend zu wirken.

6. Auswahlventil mit Druckmodulation nach einem der Ansprüche 1 bis 5, wobei ferner Anschlagmittel (19) ausgebildet an den Wahlkolbenmitteln (17) vorgesehen sind, um an dem Gehäuse (11) anzustoßen, um so eine Betätigungskammer (20) zu definieren, und zwar geeignet zum Empfang eines Pilotdrucksignals darinnen zum selektiven Bewegen der Wahlkolbenmittel (17) zu den Ventilmitteln (12) hin.

7. Auswahlventil mit Druckmodulation nach Anspruch 6, wobei ferner Pilotsteuermittel (40) vorgesehen sind, um das Pilotdrucksignal in selektiver Weise mit der Betätigungskammer (20) zu verbinden.

8. Auswahlventil mit Druckmodulation nach einem der Ansprüche 1 bis 7 mit Anschlagmitteln (24) ausgebildet am Lastkolben (23) zum Eingriff mit den Wahlkolbenmitteln (17) zum Zwecke der Definition einer Steuerkammer (26) dazwischen, und zwar in Verbindung stehend mit den Modulationsmitteln (35) zum Empfang von unter Druck stehendem Strömungsmittel von dort zur Bewegung des Lastkolbens (23) zu den Ventilmitteln (12) hin.

9. Auswahlventil mit Druckmodulation nach Ansprüchen 4 und 8, wobei mindestens eine Öffnung (22) durch den Wahlkolben (17) ausgebildet ist, und zwar zur Verbindung der Steuerkammer (26) mit den Modulationsmitteln (35).

10. Auswahlventil mit Druckmodulation nach Anspruch 8 oder 9, wobei ferner eine Abschlußleitung (27) vorgesehen ist, die in der Normalposition des Wahlkolbens (17) mit der Steuerkammer (26) in Verbindung steht, und wobei Zumeßöffnungsmittel (28) in der Abschlußleitung (27) angeordnet sind, um die Bewegung des Lastkolbens (23) von den Ventilmitteln (12) weg zu modulieren, wenn die Ventilmittel (12) mindestens teilweise die Ver-



bindung des Strömungsmittels vom Einlaß (13) mit dem Auslaß (14) blockieren.

11. Auswahlventil mit Druckmodulation nach einem der Ansprüche 8 bis 10, wobei die Modulationsmittel Zumeßöffnungsmittel (35) aufweisen, um den Strömungsmittelfluß vom Auslaß (14) zur Steuerkammer (26) zu modulieren.

12. Auswahlventil mit Druckmodulation nach einem der Ansprüche 1 bis 11, wobei gemein-

same Anschlagmittel (29) am Gehäuse (11) befestigt sind, und zwar zum Eingriff mit einem Ende der Ventilmittel (12), wenn die Ventilmittel normalerweise die Strömungsmittelverbindung vom Einlaß (13) zum Auslaß (14) blockieren, und zum Eingriff mit den Wahlkolbenmitteln (17) dann, wenn die Wahlkolbenmittel sich zu den Ventilmittel (12) hin bewegen.



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