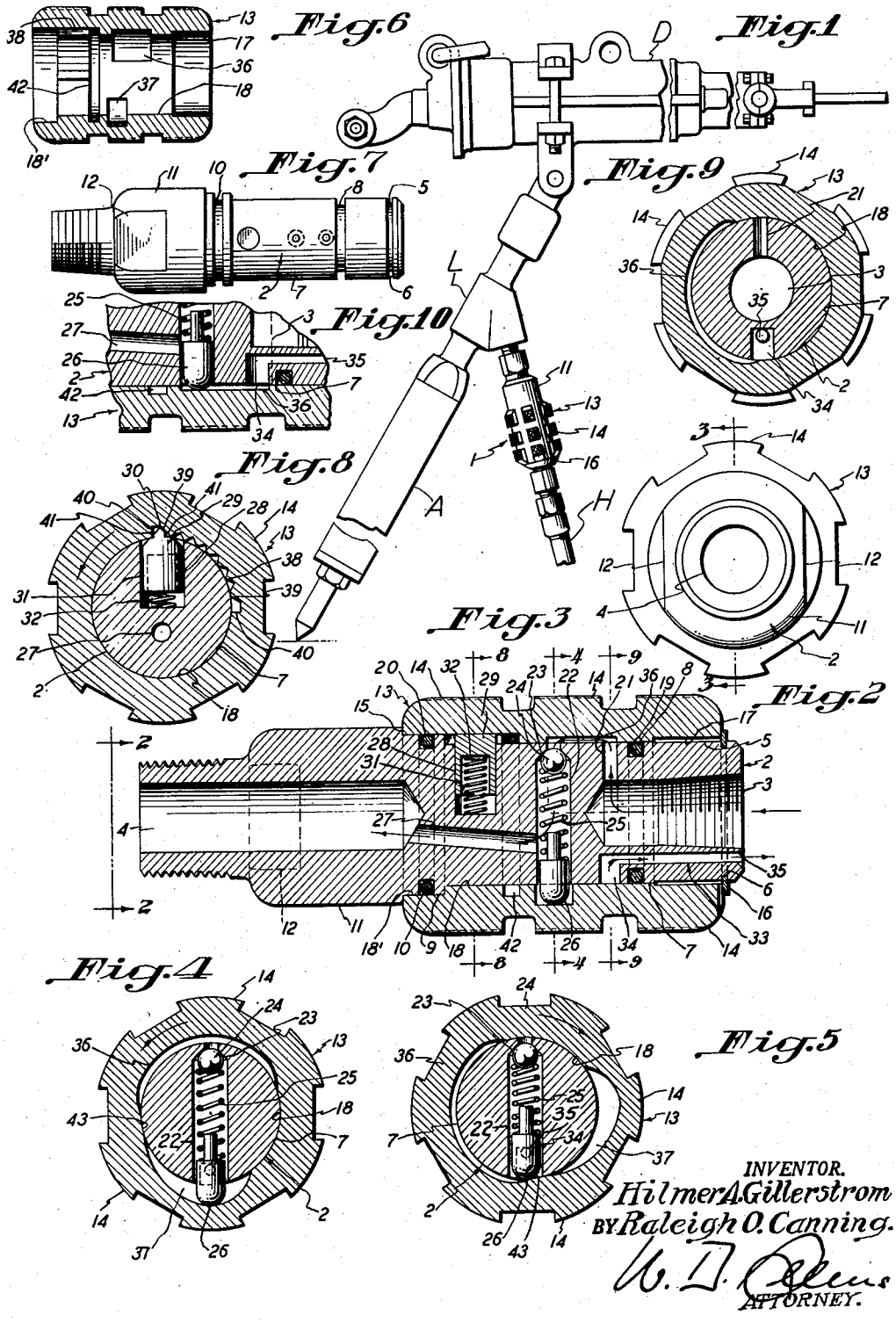
Nov. 3, 1953 H. A. GILLERSTROM ET AL 2,657,709

VALVE

Filed March 25, 1952



Patented Nov. 3, 1953 2,657,709

UNITED STATES PATENT OFFICE

2,657,709

VALVE

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Application March 25, 1952, Serial No. 278,382

20 Claims. (Cl. 137—614.2)

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This invention relates to valves for rock drills and more particularly to an improved throttle valve for controlling power actuated legs therefor such as sinker legs, raiser legs, or stoper legs, which may be collectively termed feed legs.

An object of the present invention is to provide an improved throttle or air supply valve for controlling the rate of air flow to a feed leg of a rock drill.

Another object of the invention is to provide a feed leg air control valve including a manually operable element which may be operated from any side around its connection with the leg.

A further object of the invention is to provide a control valve for the feed leg of a rock drill or the like which serves as a manually variable pressure regulator.

Still another object of the invention is to provide a throttle valve for rock drill feed legs in which the foregoing objectives are realized and which is composed of few parts, is simple in construction, easy to maintain, and reliable in its operation.

With the foregoing objects in view, together with such additional objects and advantages as may subsequently appear, the invention resides in the parts, and in the construction, combination and arrangement of parts, described by way of example in the following specification of a representative mode of execution of the invention, reference being had to the accompanying drawings which form a part of said specification and in which drawings:

Figure 1 is a fragmentary side elevation of a rock drill having an air cylinder powered feed leg to which a control valve embodying the invention is applied;

Figure 2 is an enlarged elevation of the outlet end of the valve constructed in accordance with the present invention, being a view looking in the direction of the arrows on the line 2—2 of Figure 3;

Figure 3 is a medial longitudinal sectional view of the valve on the line 3—3 of Figure 2;

Figures 4 and 5 are transverse sectional views taken on the line 4—4 of Figure 3 showing the relative positions of the valve parts in the open and closed positions, respectively;

Figure 6 is a reduced medial longitudinal sectional view of the operating element or sleeve of the valve shown in the position it occupies in Figure 3;

Figure 7 is a reduced side elevation of the valve body;

Figure 8 is a transverse section on the line 8—8

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of Figure 3 and shows the cooperating movement limiting means on the valve body and rotatable control sleeve element;

Figure 9 is a transverse sectional view taken on the line 9—9 of Figure 3 showing details of the pressure bleeding means; and

Figure 10 is a fragmentary view similar to Figure 3 but showing the valve in closed position and the relative position of the parts to effect pressure bleeding.

Referring first to Figure 1, there is shown a typical pneumatic rock drill D mounted on a support including a leg L having an extensible air cylinder unit A effective to maintain the drill at a constant height as it advances into the work. The air cylinder A receives compressed air through a supply hose H under the control of valve means positioned between those elements and generally designated by the reference character 1.

The illustrated form of the invention is shown in detail in Figures 2 to 9, inclusive, and comprises a body 2 generally of elongated cylindrical form having an internally threaded, axially disposed inlet port 3 at one end and an externally threaded, axially disposed outlet port 4 at the opposite end. From the inlet end to the outlet end the exterior of the body member 2 comprises in the order recited a clearance diameter portion 5 interrupted at its outer end by a snap ring-receiving groove 6; a slightly larger bearing portion 7 interrupted adjacent the clearance diameter 5 by a gasket-receiving groove 8 and having openings in its surface as will be described in detail; a short, large diameter sealing portion 9 having a gasket-receiving groove 10; and an enlarged wrench-engageable portion 11 having flat parallel faces 12, 12 separated from body portion 9 by a shoulder 15. Rotatably mounted on the bearing portion 7 of the body 2 is a cylindrical valve-operating member or sleeve 13 the outer surface of which preferably is roughened for manual grasping as, for example, by the presence of longitudinally and circumferentially spaced series of rectangular bosses 14 having knurled or otherwise roughened surfaces. One end of the operating sleeve member 13 abuts shoulder 15 formed by the juncture of body portions 9 and 11 while its other end is engaged by a snap ring 16 seated in a groove 6 in portion 5 of body member 2. Internally from its end adjacent the inlet end 3 of the body 2, the operating member has a clearance diameter portion 17 substantially coextensive in length with the length of the clearance diameter portion 5 of the body member; a

bearing portion 18 closely but slidably fitting the bearing portion 7 of the body; and a short, larger diameter portion 18' closely but slidably fitting the sealing portion 9 of the body. Gaskets 19 and 20, which may be of the O ring type, in the grooves 8 and 10, respectively, engage the inner opposite surfaces of the enclosing operating member 13 to provide air-tight seals which prevent the escape of air from the interior of the valve between the operating and body members.

At the inner end of the inlet port 3, the body 2 is provided with a radially extending passage 21 which terminates in the surface of bearing portion 7. Also, inwardly of the end of the inlet port 3, body 2 is provided with a diametrically extending open-ended bore 22 extended substantially parallel to passage 21 and reduced in diameter at its end thereof adjacent the opening of passage 21. Bore 22 is formed with a frusto conical shoulder 23 between its larger and smaller portions which serves as a seat for a valve ball 24 disposed in the larger portion of the bore. Ball 24 is yieldingly urged into sealing engagement with the seat 23 by a compression spring 25 housed within the bore 22 and reacting between the ball and a plunger 26 slidable in the opposite end of the bore 22 and extended therefrom into engagement with the sleeve 13 as will be described. A longitudinally extending passage 27 connects bore 22 with the inner end of outlet port 4. The bearing portion 7 of the body member 2 is additionally provided with a radial bore 28 disposed adjacent the body sealing portion 9. A detent element 29 is slidable in bore 28 and has a wedge-like outer end 30 adapted to cooperate with detent-engaging teeth on the operating member 13, as will be later described in detail. The inner end of the detent element is provided with a shallow bore 31 which houses one end of a compression spring 32 the opposite end of which abuts the inner end of bore 28 enabling the spring to urge the detent radially outwardly from the body member. Additionally, body member 2 is provided with a bleed off passage 33 comprising a radial bore 34 and a longitudinal bore 35, the former extending inwardly from the bearing surface 7 in substantially the same transverse plane and in longitudinal alignment with bore 22. Bore 34 is positioned longitudinally between bore 22 and the sealing gasket groove 8 and communicates with the inner end of the bore 35 which is disposed at one side of and extends parallel to the inlet port 3 to the end of the body 2.

The inner surface of operating member 13 includes a wide shallow groove 36 extending longitudinally of member 13 from the side of the passageway 21 nearest the inlet end of the body member to the opposite side of the bore 22 at its reduced end (see Figure 3). In length groove 36 extends substantially half the inner circumference of operating member 13 (see Figure 5). Substantially diametrically opposite groove 36 the inner surface of operating member 13 is provided with a cam groove 37 of the same width as the diameter of the larger portion of the bore 22 and, being located directly opposite that bore, receives and seats the outer end of plunger 26. Finally, the operating member 13 is provided interiorly in its portion 18 with a circumferentially arranged series of longitudinally extending teeth 38 disposed opposite the detent 29 and extending substantially through an arc of 90 degrees as shown in Figure 8. The teeth 38 are formed with sloping side faces, the last tooth at each end having a longer side face 39 than the other detent-engaging faces. Spaced from each of the end teeth is a radially disposed shoulder 40 adapted to abut a corresponding face 41 formed on the otherwise sloping end face of the detent 29 to prevent movement of the detent past the toothed range and thus limit the extent of rotative movement of the operating member to approximately 90 degrees. At the side of the toothed area of the operating member spaced from the outlet end 4 of the valve, its portion 18 is formed with an annular groove 42 primarily to provide the tool clearance necessary in the formation of the teeth 38.

The operation of the device is as follows. Assuming that the valve is in the shut off position, as shown in Figures 5 and 9, it will be noted that the small end of the bore 22 is closed by the surface of the bearing portion 18 of operating member 13, and that the plunger 26 is riding on the short land 43 between the adjacent ends of the grooves 36 and 37 compressing the spring 25 and increasing the pressure with which the valve ball 24 abuts its seat 23. Rotation of the operating member 13 in a clockwise direction, as viewed in Figure 5, will bring the groove 36 into registry with the radial passage 21 and also with the small end of the bore 22 thus affording communication between them and connecting the valve closed end of the latter with the inlet port 3. At the same time the gradually retreating cam face of the groove 37 permits the plunger 26 to move radially outward allowing the spring 25 to expand and thus lessening the force exerted by it against ball 24. Thereupon the inlet air pressure present in groove 36 will unseat the ball slightly and force its way into the bore 22 and thence through the passageway 27 to the outlet port 4 and from the latter to the air cylinder A. The pressure and flow of the air in bore 22, and so in the cylinder A, are controlled by the pressure with which the spring-pressed ball 24 resists its entrance into the bore 22. The ball pressure is determined by the spring 25 which is expanded, and so exerts less pressure on the ball, as the plunger 26 moves radially outwardly as permitted by the contour of cam groove 37. It will be obvious that as the operating member 13 is turned to the full open position, shown in Figures 3, 4 and 8, the detent 29 by engagement with the teeth 38 will hold it against accidental displacement at any intermediate position, the force exerted by the spring 25 being reduced as the member 13 is rotated clockwise as viewed in Figure 5. The ball 24 and its seat function as a spring-biased check valve to provide a controllable pressure drop between the inlet line pressure and the air cylinder A with resultant controllable variability in the force exerted by the leg L in holding the drill D in engagement with the work face and in its rate of expansion. When the valve is returned to off position, see Figures 5 and 10, it will be noted that the sloped end of groove 36 extends partially under the plunger 26, and so the bore 22, and also under the bore 34 of the bleed off passageway 33. Since the passageway 27 connected to air cylinder A through outlet 4 communicates directly with the bore 22 without obstruction, air pressure in the cylinder A will bleed off at the inlet end of the valve when the control sleeve 13 is in its off position. This is necessary when it is desired to reduce the length of the leg L for any reason. The gaskets 19 and 20, being of the pressure-responsive O ring type, allow the operating mem-

ber 13 to be rotated on the body member 2 while sealing the surfaces between said members against leakage.

The device comprising the present invention is characterized by simple and rugged design well suited to the character of work for which it is intended. The component parts are of simple construction and economical to manufacture. The assembled valve is readily taken apart for service and may be as readily reassembled, the securing means being the simple snap ring 16.

While in the foregoing specification there has been described and illustrated one preferred embodiment of the invention, it is appreciated that in the light of the foregoing disclosure modifications will suggest themselves to others skilled in the art. Consequently, the invention is not to be deemed to be limited to the specific example disclosed and instead it is to be understood that the invention embraces all such modifications in the parts and in the construction, combination and arrangement of parts as shall come within the purview of the appended claims.

We claim:

1. In a supply valve for a rock drill feed leg, a generally cylindrical valve body member having an inlet port at one end and an outlet port at the opposite end and passage means interconnecting said ports, a spring biased, normally closed valve means in said body member interposed in said passage means, said valve means being constructed and arranged to be opened by inlet pressure, a valve-operating element comprising a sleeve mounted for rotation on the exterior of said body member and having a cam surface on the inner surface thereof effective at different rotative positions of said sleeve on said body member to vary the spring bias on said valve means, and sealing gaskets interposed between the adjacent surfaces of said body member and said sleeve to prevent escape of fluid from the valve.

2. In a supply valve for a rock drill feed leg, a generally cylindrical valve body member having an inlet port at one end and an outlet port at the opposite end and passage means interconnecting said ports, a spring bias, normally closed valve means in said body member interposed in said passage means, said valve means being constructed and arranged to be opened by inlet pressure, a valve-operating element comprising a sleeve mounted for rotation on the exterior of said body member and having a cam surface on the inner surface thereof effective at different rotative positions of said sleeve on said body member to vary the spring bias on said valve means, sealing gaskets interposed between the adjacent surfaces of said body member and said sleeve to prevent escape of fluid from said passage means, and a ratchet interposed between said body member and said sleeve effective to permit relative rotary movement therebetween in either direction and to releasably lock said sleeve in selective positions of said relative rotary movement.

3. In a supply valve for a rock drill feed leg, a generally cylindrical valve body member having an inlet port at one end and an outlet port at the opposite end and passage means interconnecting said ports, a spring biased, normally closed valve means in said body member interposed in said passage means, said valve means being constructed and arranged to be opened by inlet pressure, a valve-operating element comprising a sleeve mounted for rotation on the exterior of said body member and having a cam surface on the inner surface thereof effective at different rotative positions of said sleeve on said body member to vary the spring bias on said valve means, sealing gaskets interposed between the adjacent surfaces of said body member and said sleeve and disposed to prevent escaped fluid from said passage means, and means interposed between said body member and said sleeve constantly effective to releasably lock said sleeve at a plurality of predetermined positions of said relative rotary movement.

4. In a supply valve for a rock drill feed leg, a generally cylindrical valve body member having an inlet port at one end and an outlet port at the opposite end and passage means interconnecting said ports, a spring biased, normally closed valve means in said body member interposed in said passage means, said valve means being constructed and arranged to be opened by inlet pressure, a valve-operating element comprising a sleeve mounted for rotation on the exterior of said body member and having a cam surface on the inner surface thereof effective at different rotative positions of said sleeve on said body member to vary the spring bias on said valve means, sealing gaskets interposed between the adjacent surfaces of said body member and said sleeve and disposed to prevent escaped fluid from said passage means, and a ratchet interposed between said body member and said sleeve effective to permit relative rotary movement therebetween in either direction and to releasably lock said sleeve in selective positions of said relative rotary movement, said ratchet including devices effective to limit the extent of said relative rotary movement to an amount less than one complete revolution.

5. In a supply valve for a rock drill feed leg, a generally cylindrical valve body member having an inlet port at one end and an outlet port at the opposite end and passage means interconnecting said ports, a spring biased, normally closed valve means in said body member interposed in said passage means, said valve means being constructed and arranged to be opened by inlet pressure, a valve-operating element comprising a sleeve mounted for rotation on the exterior of said body member and having a cam surface on the inner surface thereof effective at different rotative positions of said sleeve on said body member to vary the spring bias on said valve means, sealing gaskets interposed between the adjacent surfaces of said body member and said sleeve and disposed to prevent escaped fluid from said passage means, and means interposed between said body member and said sleeve constantly effective to releasably lock said sleeve at a plurality of predetermined positions of said relative rotary movement, said last-named means including stop means effective to limit the extent of said relative rotary movement to an amount less than one complete revolution.

6. In a supply valve for a rock drill feed leg, a generally cylindrical valve body member having an inlet port at one end and an outlet port at the opposite end and passage means interconnecting said ports, a spring biased, normally closed valve means in said body member interposed in said passage means, said valve means being constructed and arranged to be opened by inlet pressure, a valve-operating element comprising a sleeve mounted for rotation on the exterior of said body member and having a cam surface on the inner surface thereof effective at different ro-

tative positions of said sleeve on said body member to vary the spring bias on said valve means, and sealing gaskets interposed between the adjacent surfaces of said body member and said sleeve at each end of said sleeve, said valve means comprising a bore extending transversely of said body member at a point between said gaskets and having a valve seat adjacent the fluid entrance end thereof, a valve element in said bore engaging said valve seat, a compression spring in said bore having one end thereof bearing on said valve element, and a plunger slidably mounted in said bore having one end thereof engaging said spring and its other end engaging said cam surface.

7. In a supply valve for a rock drill feed leg, a generally cylindrical valve body member having an inlet port at one end and an outlet port at the opposite end and passage means interconnecting said ports, a spring biased, normally closed valve means in said body member interposed in said passage means, said valve means being constructed and arranged to be opened by inlet pressure, a valve-operating element comprising a sleeve mounted for rotation on the exterior of said body member and having a cam surface on the inner surface thereof effective at different rotative positions of said sleeve on said body member to vary the spring bias on said valve means, sealing gaskets interposed between the adjacent surfaces of said body member and said sleeve at each end of said sleeve, and means interposed between said body member and said sleeve constantly effective to releasably lock said sleeve at a plurality of predetermined positions of said relative rotary movement, said valve means comprising a bore extending transversely of said body member at a point between said gaskets and having a valve seat adjacent the fluid entrance end thereof, a valve element in said bore engaging said valve seat, a compression spring in said bore having one end thereof bearing on said valve element, and a plunger slidably mounted in said bore having one end thereof engaging said spring and its other end engaging said cam surface.

8. In a supply valve for a rock drill feed leg, a generally cylindrical valve body member having an inlet port at one end and an outlet port at the opposite end and passage means interconnecting said ports, a spring biased, normally closed valve means in said body member interposed in said passage means, said valve means being constructed and arranged to be opened by inlet pressure, a valve-operating element comprising a sleeve mounted for rotation on the exterior of said body member and having a cam surface on the inner surface thereof effective at different rotative positions of said sleeve on said body member to vary the spring bias on said valve means, sealing gaskets interposed between the adjacent surfaces of said body member and said sleeve at each end of said sleeve, and means interposed between said body member and said sleeve constantly effective to releasably lock said sleeve at a plurality of predetermined positions of said relative rotary movement, said last-named means including stop means effective to limit the extent of said relative rotary movement to an amount less than one complete revolution, said valve means comprising a bore extending transversely of said body member at a point between said gaskets and having a valve seat adjacent the fluid entrance end thereof, a valve element in said bore engaging said valve seat, a compression spring in said bore having one end thereof bearing on said valve element, and a plunger slidably mounted in said bore having one end thereof engaging said spring and its other end engaging said cam surface.

9. In a supply valve for a rock drill feed leg, a generally cylindrical valve body member having an inlet port and an outlet port at its opposite ends and a valve-operating rotatable sleeve element mounted on said body member, said body member having a passage extending radially from said inlet port to a side surface of said body member, a valve chamber in said body member comprising a bore extending transversely through said body member at a point adjacent said passage, a second passage extending generally axially of said body member from said valve chamber to said outlet port, a valve seat in said valve chamber bore at the end thereof adjacent said first-named passage, a valve element in said bore engaging said seat, a spring in said bore urging said valve element into engagement with said seat, a plunger element in said bore having one end thereof engaging said spring, and a cam surface on said sleeve engaging the opposite end of said plunger and effective incident to relative rotative movement between said body member and said sleeve to vary the position of said plunger axially of said bore with incident variation of the force exerted by said spring against said valve element.

10. In a supply valve for a rock drill feed leg, a generally cylindrical valve body member having an inlet port and an outlet port at its opposite ends and a valve-operating rotatable sleeve element mounted on said body member, said body member having a passage extending radially from said inlet port to a side surface of said body member, a valve chamber in said body member comprising a bore extending transversely through said body member at a point adjacent said passage, a second passage extending generally axially of said body member from said valve chamber to said outlet port, a valve seat in said valve chamber bore at the end thereof adjacent said first-named passage, a valve element in said bore engaging said seat, a spring in said bore urging said valve element into engagement with said seat, a plunger element in said bore having one end thereof engaging said spring, a cam surface on said sleeve engaging the opposite end of said plunger and effective incident to relative rotative movement between said body member and said sleeve to vary the position of said plunger axially of said bore with incident variation of the force exerted by said spring against said valve element, and a groove on the inner face of said sleeve at a point longitudinally thereof embracing said first-named passage and said valve chamber bore and disposed diametrically opposite said cam surface effective when in registry with said first-named passage and said bore to afford communication between said passage and said bore.

11. In a supply valve for a rock drill feed leg, a generally cylindrical valve body member having an inlet port and an outlet port at its opposite ends and a valve-operating rotatable sleeve element mounted on said body member, said body member having a passage extending radially from said inlet port to a side surface of said body member, a valve chamber in said body member comprising a bore extending transversely through said body member at a point adjacent said passage, a second passage extending generally axially of said body member from said valve chamber to said outlet port, a valve seat in said valve cham-

ber bore at the end thereof adjacent said first-named passage, a valve element in said bore engaging said seat, a spring in said bore urging said valve element into engagement with said seat, a plunger element in said bore having one end thereof engaging said spring, a cam surface on said sleeve engaging the opposite end of said plunger and effective incident to relative rotative movement between said body member and said sleeve to vary the position of said plunger axially of said bore with incident variation of the force exerted by said spring against said valve element, and a pressure bleed passage extending first radially inwardly of said body member from a point between said valve chamber bore and said inlet port and thence longitudinally parallel to said inlet port to the inlet port end of said body member.

12. In a supply valve for a rock drill feed leg, a generally cylindrical valve body member having an inlet port and an outlet port at its opposite ends and a valve-operating rotatable sleeve element mounted on said body member, said body member having a passage extending radially from said inlet port to a side surface of said body member, a valve chamber in said body member comprising a bore extending transversely through said body member at a point adjacent said passage, a second passage extending generally axially of said body member from said valve chamber to said outlet port, a valve seat in said valve chamber bore at the end thereof adjacent said first-named passage, a valve element in said bore engaging said seat, a spring in said bore urging said valve element into engagement with said seat, a plunger element in said bore having one end thereof engaging said spring, a cam surface on said sleeve engaging the opposite end of said plunger and effective incident to relative rotative movement between said body member and said sleeve to vary the position of said plunger axially of said bore with incident variation of the force exerted by said spring against said valve element, a pressure bleed passage extending first radially inwardly of said body member from a point between said valve chamber bore and said inlet port and thence longitudinally parallel to said inlet port to the inlet port end of said body member, and stop means interposed between said sleeve and said body member effective to limit the extent of relative rotation therebetween to an amount less than one revolution.

13. In a supply valve for a rock drill feed leg, a generally cylindrical valve body member having an inlet port and an outlet port at its opposite ends and a valve-operating rotatable sleeve element mounted on said body member, said body member having a passage extending radially from said inlet port to a side surface of said body member, a valve chamber in said body member comprising a bore extending transversely through said body member at a point adjacent said passage, a second passage extending generally axially of said body member from said valve chamber to said outlet port, a valve seat in said valve chamber bore at the end thereof adjacent said first-named passage, a valve element in said bore engaging said seat, a spring in said bore urging said valve element into engagement with said seat, a plunger element in said bore having one end thereof engaging said spring, a cam surface on said sleeve engaging the opposite end of said plunger and effective incident to relative rotative movement between said body member and said sleeve to vary the position of said plunger axially of said bore with incident variation of the force exerted by said spring against said valve element, a pressure bleed passage extending first radially inwardly of said body member from a point between said valve chamber bore and said inlet port and thence longitudinally parallel to said inlet port to the inlet port end of said body member, and stop means interposed between said sleeve and said body member effective to limit the extent of relative rotation therebetween to an amount less than one revolution, said stop means including ratchet devices effective to releasably lock said sleeve in any one of a plurality of predetermined positions within the range of said relative rotary movement.

14. In a supply valve for a rock drill feed leg, a generally cylindrical valve body member having an inlet port and an outlet port at its opposite ends and a valve-operating rotatable sleeve element mounted on said body member, said body member having a passage extending radially from said inlet port to side surface of said body member, a valve chamber in said body member comprising a bore extending transversely through said body member at a point adjacent said passage, a second passage extending generally axially of said body member from said valve chamber to said outlet port, a valve seat in said valve chamber bore at the end thereof adjacent said first-named passage, a valve element in said bore engaging said seat, a spring in said bore urging said valve element into engagement with said seat, a plunger element in said bore having one end thereof engaging said spring, a cam surface on said sleeve engaging the opposite end of said plunger and effective incident to relative rotative movement between said body member and said sleeve to vary the position of said plunger axially of said bore with incident variation of the force exerted by said spring against said valve element, and a groove on the inner face of said sleeve at a point longitudinally thereof embracing said first-named passage and said valve chamber bore and disposed diametrically opposite said cam surface effective when in registry with said first-named passage and said bore to afford communication between said passage and said bore, said groove extending approximately one half of the inner circumference of said sleeve member and being so disposed that when one end is out of registry with said first-named passage, the opposite end of said groove will be in registry with said valve chamber bore and said second passage.

15. In a supply valve for a rock drill feed leg, a generally cylindrical valve body member having an inlet port and an outlet port at its opposite ends and a valve-operating rotatable sleeve element mounted on said body member, said body member having a passage extending radially from said inlet port to a side surface of said body member, a valve chamber in said body member comprising a bore extending transversely through said body member at a point adjacent said passage, a second passage extending generally axially of said body member from said valve chamber to said outlet port, a valve seat in said valve chamber bore at the end thereof adjacent said first-named passage, a valve element in said bore engaging said seat, a spring in said bore urging said valve element into engagement with said seat, a plunger element in said bore having one end thereof engag-

ing said spring, a cam surface on said sleeve engaging the opposite end of said plunger and effective incident to relative rotative movement between said body member and said sleeve to vary the position of said plunger axially of said bore with incident variation of the force exerted by said spring against said valve element, and stop means interposed between said sleeve and said body member effective to limit the extent of relative rotation therebetween to an amount less than one revolution.

16. In a supply valve for a rock drill feed leg, a generally cylindrical valve body member having an inlet port and an outlet port at its opposite ends and a valve-operating rotatable sleeve element mounted on said body member, said body member having a passage extending radially from said inlet port to a side surface of said body member, a valve chamber in said body member comprising a bore extending transversely through said body member at a point adjacent said passage, a second passage extending generally axially of said body member from said valve chamber to said outlet port, a valve seat in said valve chamber bore at the end thereof adjacent said first-named passage, a valve element in said bore engaging said seat, a spring in said bore urging said valve element into engagement with said seat, a plunger element in said bore having one end thereof engaging said spring, a cam surface on said sleeve engaging the opposite end of said plunger and effective incident to relative rotative movement between said body member and said sleeve to vary the position of said plunger axially of said bore with incident variation of the force exerted by said spring against said valve element, and stop mean interposed between said sleeve and said body member effective to limit the extent of relative rotation therebetween to an amount less than one revolution, said stop means including ratchet devices effective to releasably lock said sleeve in any one of a plurality of predetermined positions within the range of said relative rotary movement.

17. In a supply valve for a rock drill feed leg, a generally cylindrical valve body member having an inlet port and an outlet port at its opposite ends and a valve-operating rotatable sleeve element mounted on said body member, said body member having a passage extending radially from said inlet port to a side surface of said body member, a valve chamber in said body member comprising a bore extending transversely through said body member at a point adjacent said passage, a second passage extending generally axially of said body member from said valve chamber to said outlet port, a valve seat in said valve chamber bore at the end thereof adjacent said first-named passage, a valve element in said bore engaging said seat, a spring in said bore urging said valve element into engagement with said seat, a plunger element in said bore having one end thereof engaging said spring, a cam surface on said sleeve engaging the opposite end of said plunger and effective incident to relative rotative movement between said body member and said sleeve to vary the position of said plunger axially of said bore with incident variation of the force exerted by said spring against said valve element, a groove on the inner face of said sleeve at a point longitudinally thereof embracing said first-named passage and said valve chamber bore and disposed diametrically opposite said cam surface effective when in registry with said first-named passage and said bore to afford communication between said passage and said bore, and stop means interposed between said sleeve and said body member effective to limit the extent of relative rotation therebetween to an amount less than one revolution.

18. In a supply valve for a rock drill feed leg, a generally cylindrical valve body member having an inlet port and an outlet port at its opposite ends and a valve-operating rotatable sleeve element mounted on said body member, said body member having a passage extending radially from said inlet port to a side surface of said body member, a valve chamber in said body member comprising a bore extending transversely through said body member at a point adjacent said passage, a second passage extending generally axially of said body member from said valve chamber to said outlet port, a valve seat in said valve chamber bore at the end thereof adjacent said first-named passage, a valve element in said bore engaging said seat, a spring in said bore urging said valve element into engagement with said seat, a plunger element in said bore having one end thereof engaging said spring, a cam surface on said sleeve engaging the opposite end of said plunger and effective incident to relative rotative movement between said body member and said sleeve to vary the position of said plunger axially of said bore with incident variation of the force exerted by said spring against said valve element, a groove on the inner face of said sleeve at a point longitudinally thereof embracing said first-named passage and said valve chamber bore and disposed diametrically opposite said cam surface effective when in registry with said first-named passage and said bore to afford communication between said passage and said bore, and stop means interposed between said sleeve and said body member effective to limit the extent of relative rotation therebetween to an amount less than one revolution, said stop means including ratchet devices effective to releasably lock said sleeve in any one of a plurality of predetermined positions within the range of said relative rotary movement.

19. In a supply valve for a rock drill feed leg, a generally cylindrical valve body member having an inlet port and an outlet port at its opposite ends and a valve-operating rotatable sleeve element mounted on said body member and formed with an arcuate groove on its interior surface, said body member having a passage extending radially from said inlet port to a side surface of said body member, a valve chamber in said body member comprising a bore extending transversely through said body member at a point adjacent said passage, a second passage extending generally axially of said body member from said valve chamber to said outlet port, a valve seat in said valve chamber bore at the end thereof adjacent said first-named passage, a valve element in said bore engaging said seat, a spring in said bore urging said valve element into engagement with said seat, a plunger element in said bore having one end thereof engaging said spring, a cam surface on said sleeve engaging the opposite end of said plunger and effective incident to relative rotative movement between said body member and said sleeve to vary the position of said plunger axially of said bore with incident variation of the force exerted by said spring against said valve element, a pressure bleed passage extending first radially

inwardly of said body member from a point between said valve chamber bore and said inlet port and thence longitudinally parallel to said inlet port to the inlet port end of said body member, and stop means interposed between said sleeve and said body member effective to limit the extent of relative rotation therebetween to an amount less than one revolution, said groove in said sleeve element extending approximately one half of the inner circumference of said sleeve element and being so disposed that when one of its ends is out of registry with said first-named passage its opposite end will be in registry with said valve chamber bore and said bleed passage.

20. In a supply valve for a rock drill feed leg, a generally cylindrical valve body member having an inlet port and an outlet port at its opposite ends and a valve-operating rotatable sleeve element mounted on said body member and formed with an arcuate groove on its interior surface, said body member having a passage extending radially from said inlet port to a side surface of said body member, a valve chamber in said body member comprising a bore extending transversely through said body member at a point adjacent said passage, a second passage extending generally axially of said body member from said valve chamber to said outlet port, a valve seat in said valve chamber bore at the end thereof adjacent said first-named passage, a valve element in said bore engaging said seat, a spring in said bore urging said valve element into engagement with said seat, a plunger element in said bore having one end thereof engaging said spring, a cam surface on said sleeve engaging the opposite end of said plunger and effective incident to relative rotative movement between said body member and said sleeve to vary the position of said plunger axially of said bore with incident variation of the force exerted by said spring against said valve element, a pressure bleed passage extending first radially inwardly of said body member from a point between said valve chamber bore and said inlet port and thence longitudinally parallel to said inlet port to the inlet port end of said body member, and stop means interposed between said sleeve and said body member effective to limit the extent of relative rotation therebetween to an amount less than one revolution, said stop means including ratchet devices effective to releasably lock said sleeve in any one of a plurality of predetermined positions within the range of said relative rotary movement, said groove in said sleeve element extending approximately one half of the inner circumference of said sleeve element and being so disposed that when one of its ends is out of registry with said first-named passage its opposite end will be in registry with said valve chamber bore and said bleed passage.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
453,109	Dreisorner	May 26, 1891
459,271	Dreisorner	Sept. 8, 1891
1,150,641	Smith	Aug. 17, 1915
1,406,216	Olson	Feb. 14, 1922
1,558,695	Manuel	Oct. 27, 1925
2,587,421	Willach	Feb. 26, 1952