

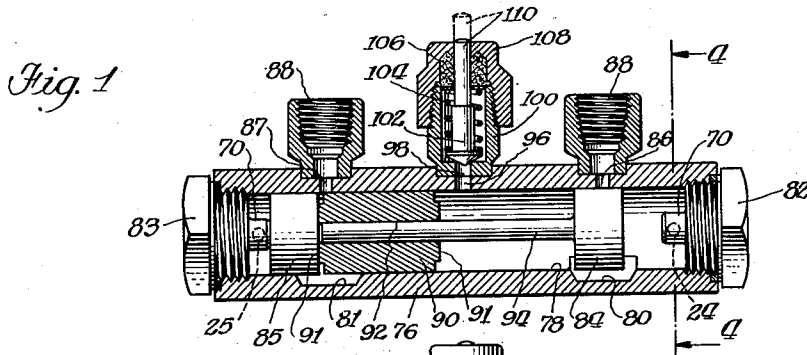
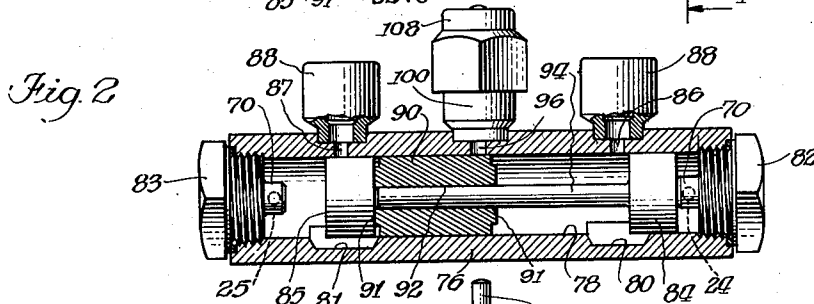
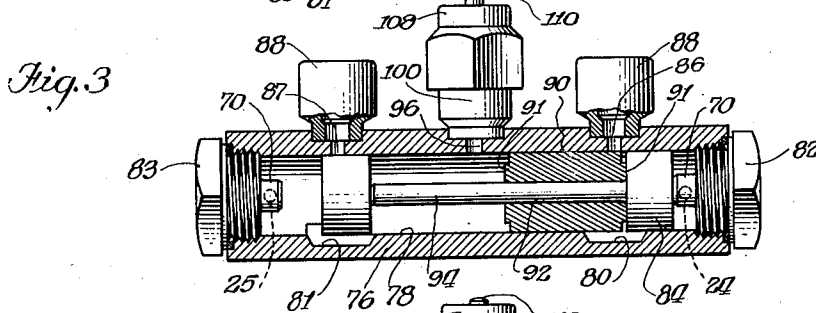
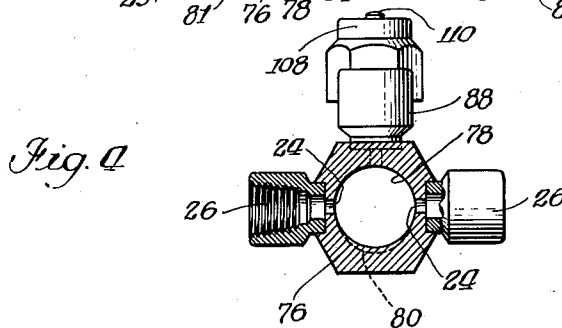
Oct. 17, 1950

J. T. LEONARD
LUBRICATING APPARATUS

2,526,568

Original Filed Aug. 12, 1944

2 Sheets-Sheet 1



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Fig. 5

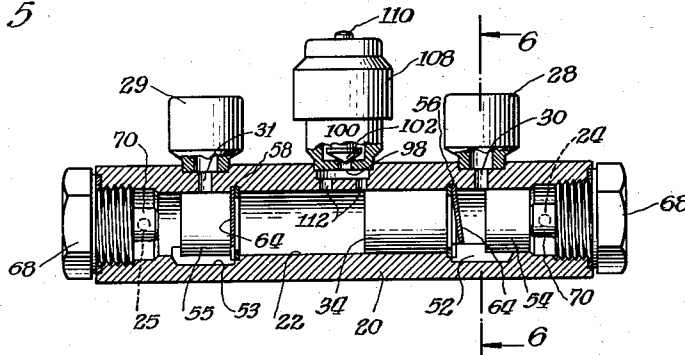


Fig. 7

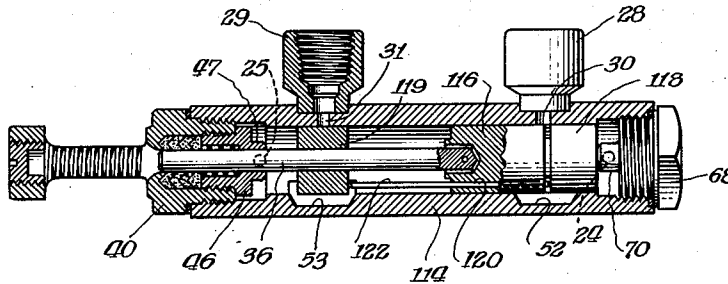
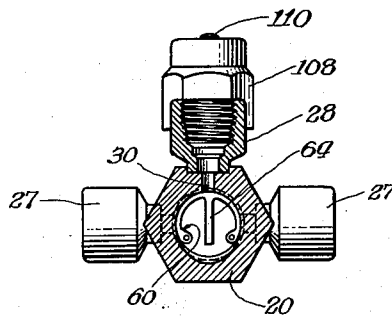


Fig. 6



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UNITED STATES PATENT OFFICE

2,526,568

LUBRICATING APPARATUS

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Original application August 12, 1944, Serial No. 549,223, now Patent No. 2,440,410, dated April 27, 1948. Divided and this application June 7, 1946, Serial No. 675,239

4 Claims. (Cl. 184-7)

1

This invention relates generally to lubricating apparatus, and more particularly to centralized lubricating systems and measuring valves used as parts of said systems.

One object of the invention is to provide an improved high pressure lubricating system employing an improved form of measuring valve.

A further object of the invention is to provide an improved measuring valve which is durable and reliable in operation, and may be economically manufactured, and which is adapted for use either with grease or with oil as the lubricant.

Other objects and advantages will appear from the following description, reference being had to the accompanying drawings, in which:

Fig. 1 is a central longitudinal sectional view of one form of lubricating valve made in accordance with this invention and showing the valve with the parts in their initial position before the application of pressure;

Fig. 2 is a central longitudinal sectional view similar to Fig. 1 except that the parts are shown at certain intermediate positions during an operative cycle of the system;

Fig. 3 is also a longitudinal sectional view similar to Fig. 1 but with the parts shown at their limiting positions at the end of one-half of the operating cycle;

Fig. 4 is a transverse sectional view taken as indicated at line 4-4 of Fig. 1;

Fig. 5 is a central longitudinal sectional view of a modified form of the measuring valve, embodying certain features of the invention;

Fig. 6 is a transverse sectional view taken as indicated at line 6-6 on Fig. 5;

Fig. 7 is a central longitudinal sectional view of another modification of the measuring valve.

This application is a division of my application Serial No. 549,223, filed August 12, 1944, which on April 27, 1948, matured into Patent No. 2,440,410, and relating to lubricating apparatus, and it is concerned with certain forms of measuring valves adapted for use in lubricating systems, particularly those of the multiple dual line type in which in most cases a plurality of measuring valves are provided, each with two inlet ports, and are connected with two supply lines through which lubricant under pressure is supplied alternately, thus causing measured quantities of lubricant to be delivered from each of the valves, first through one outlet and then through a second outlet, said outlets leading to bearings or other parts of a mechanism requiring lubrication. The application of pressure is controlled so as to be supplied at intervals only and not continuously.

2

The form of measuring valve shown in Fig. 1 comprises a valve body 76 having a bore 78 with milled by-passes 80 and 81 and with plugs 82 and 83 threaded into the ends of the bore 78. Piston valves 84 and 85 are slidable in the bore 78 and are adapted to control the flow of lubricant through the by-passes 80 and 81 as well as through ports 86 and 87, which are adapted to be connected to the parts to be lubricated by coupling fittings 88. A piston 90 is reciprocable in the bore 78 and has a longitudinal drilled hole 92 extending therethrough for reception of a closely fitting valve operating stem 94. The valve stem 94 may be secured rigidly to one of the valves 84 or 85 or may be in the form of a pin unattached to either of these valves but serving to define a minimum spacing between them.

Centrally of the valve body 76 is a port 96 which communicates with a valve port 98 formed in an indicator body 100. A poppet type valve 102 is reciprocable in the body 100 being normally pressed downwardly by a compression coil spring 104, the upper end of which presses a suitable packing 106 into a packing cap 108. Upon the application of sufficient lubricant pressure at the valve port 98 the valve 102 will be raised and its outer end or stem 110 will be projected outwardly from the cap 108 as indicated in dotted outline in Fig. 1 and in full lines in Fig. 3.

In the lubricating system in which these measuring valves are adapted to be used, there is provided a pumping mechanism and a suitable control valve structure whereby lubricant is alternately forced under pressure through the laterally disposed inlet ports 24 and 25 in the valve body 76. Such pumping and valve apparatus may be of the type shown in my Patent No. 2,399,277, granted April 30, 1946, or may be of any other suitable construction. As shown in the drawings, the plugs 82 and 83 which close the ends of the valve body 76 are formed with centrally disposed projections 70 of reduced diameter which serve to limit the strokes of the adjacent valves 84 and 85 and which thus prevent the valves from closing the inlet ports 24 and 25 which are disposed adjacent the extreme ends of the bore 78. In the form illustrated, the valve body 76 is designed as an individual unit and as seen in Fig. 4 the two diametrically opposite inlet ports 24 at one end of the body are provided with coupling fittings 26 by which they may be connected into one of the lubricant feed lines of the system. Similar couplings are also supplied for the inlet ports 25 at the opposite end of the valve body for connecting the measuring valve with the other

supply line of the system; but it may be understood that a plurality of bores 78 may be formed in a single header block of the type shown in my copending application Serial No. 549,223 in which case the coupling fittings 26 may be omitted and the ports 24 and 25 will be connected by bores or passages formed directly in the block.

The operation of the valve shown in Figs. 1 to 4 will be readily understood from a comparison of these views. Upon application of lubricant pressure to the bore 78 through the ports 25 at one end thereof, the valve 85 will be forced to the right, carrying with it the valve 84 and the piston 90. The valve 84 being thus moved to the position shown in Fig. 2 will cut off its by-pass 80 and uncover the port 86 leading to the bearing to be lubricated. After the valve 84 encounters the stop 70 on the plug 82, the movement of the valve 85 will also be arrested by reason of the spacing effect of the stem 94, but lubricant will continue to flow through the by-pass 81 to force the piston 90 to the right and thereby discharge the lubricant at the right of this piston through the outlet port 86. Preferably, the piston 90 is formed at 91 with a reduced projection at the end adjacent the valve 85, thus providing an annular space between the valve and the end of the piston for the application of pressure to the piston by way of the by-pass 81. The other end of the piston has a similar projection 91 which operates in the same manner during reverse movement of the parts.

When the first half of the cycle of operation has been completed, causing the piston 90 to be forced toward the right-hand end of the cylinder and into contact with the valve 84 therein, the continued supply of lubricant under pressure to the left-hand end of the bore 78 will cause the pressure to build up therein, and since at this phase of the operating cycle the piston will have uncovered the port 96, the plunger valve 102 will be raised from its seat against the force of a spring 104 so as to cause its stem or end portion 110 to be projected from the cap 108, thus apprising the operator that this phase of the lubrication operation has been completed. The operator may observe that the end of the plunger valve 102 projects from the cap, or if the measuring valve is located in a place of poor visibility, the operator may hold his finger over the cap 108 and thus, when the valve plunger moves outwardly, receive a tactile signal that this part of the lubricating cycle has been completed. Thereafter the operator will reverse the lubricant supply so as to relieve the pressure at the left-hand end of the bore 78 and to supply lubricant under pressure to the right-hand end thereof to bores 24. From the foregoing it will be apparent that parts of the valve structure will be returned to the position in which they are shown in Fig. 1, and a measured charge of lubricant will be forced through the outlet port 87 to the part to be lubricated. When the second phase of the operating cycle is thus completed, the lubricant pressure in the bore 78 at the right of the piston 90 will again operate the visual tactile signal valve 102 by projecting its stem 110 from the cap 108 to indicate to the operator that a complete cycle of operation of the apparatus has been effected.

Figure 5 discloses a modified form of the invention which in some respects resembles the principal form shown in my copending application Serial No. 549,223 of which the present application is a division. Figure 5 shows a valve body 20 having inlet ports 24 and 25 near its opposite

ends respectively and having those ends closed by plugs 68 with reduced stop projections 70. Within the bore 22 of the body 20 there is a reciprocable piston 34 which feeds lubricant alternately through outlet ports 30 and 31 having coupling fittings 28 and 29 respectively for connection with conduits leading to the bearings to be lubricated. Diametrically opposite the outlets 30 and 31, the bore 22 is formed with by-passes 52 and 53 which are of slightly greater length than the piston valves 54 and 55 mounted slidably in the bore 22 for controlling the by-passes and the outlet ports 30 and 31.

In this particular form of valve the bore 22 is provided with annular grooves 56 and 58 in which are mounted the arcuate leaf springs 60 formed as shown in Fig. 6 and each having a central tongue 64 initially shaped to project toward the adjacent valve 54 or 55. Figure 5 shows the valve 55 in the position which it assumes when lubricant under pressure has been supplied through the port 25. The spring tongue 64 is forced back into the plane of the groove 58 while lubricant flows through the by-pass 53 and past the spring to force the piston 34 to its right-hand limit of movement. The function of the spring 64 as more fully explained in my said copending application is to shift the valve 55 back to position for closing the by-pass 53 when the pressure is relieved from the left-hand end of the valve body 20 and applied to the right-hand end through ports 24.

The movement of the piston 34 to either limit of its travel in the bore 22 uncovers the ports 112 which lead to the port 98 and permit the lubricant pressure to be applied to the valve 102 for projecting its stem 110 from the cap or casing 108, thus notifying the operator when each half of the cycle has been completed, as already explained in connection with the valve shown in Figs. 1 to 4.

Figure 7 shows a third form of measuring valve embodying certain features of this invention. In this structure the valve body 114 is provided with a piston 116 reciprocable therein and with piston valves 118 and 119 which respectively control by-passes 52 and 53 and outlet ports 30 and 31 in substantially the same manner as the valve members 54 and 55 and the valve members 84 and 85 already described. The piston 116 has an eccentrically located hole 120 in which a valve operating pin 122 is slidable, the fit of the pin in bore 120 being sufficiently close to prevent leakage of lubricant past it. Thus, as lubricant under pressure is supplied to the left-hand end of the valve body 114, the initial movement of the valve 119 to the right causes exactly corresponding movement of the valve 118, due to the mechanical connection provided by the pin 122. As in the case of the pin 94, the pin 122 may be secured rigidly to one of the valves or may be unattached to either of them, but preferably, in view of its eccentric location in the piston 116, the pin 122 will not be attached to either of the valves.

In this form of valve, one end of the body 114 is closed by a threaded plug 68 having a reduced projecting portion 70 serving as a stop for the valve 118. The other end of the body 114 is closed by a two-part plug having an outer portion 40 and an inner end portion 46 with a reduced projection 47 acting as a stop for the valve 119. This plug has a bore through which an indicator stem 36 extends slidably from the piston 116 to which it is loosely anchored. This stem 36 projecting from the plug 40 at one end of the body

114 serves to apprise the operator of the position and movements of the piston 116 in a manner more fully described in my said copending application Serial No. 549,223, thus serving the same purpose as the indicator stem 110 of Figs. 1 and 5.

While there are shown and described herein certain structures embodying my invention and illustrative thereof, it is to be understood that the invention is not limited thereto or thereby, but that it embraces all modifications, variations and equivalents which may come within the scope of the appended claims.

I claim:

1. A lubricant measuring valve comprising a valve body having a bore extending therethrough, said bore having a bypass at each end thereof, a cylindrical valve at each end of said bore and operable to cut off its adjacent bypass when in one position and to uncover said bypass when in another position, a piston reciprocable in said bore between said valves, a valve stem extending through said piston and having its ends normally engaging said valves to cause them to move one with the other, means for supplying lubricant under pressure alternately to the opposite ends of said bore, and discharge ports near the ends of said bore and adapted to be covered respectively by said valves, said cylinder having a port uncovered by said piston when the latter is at either end of its stroke, and a hydraulic pressure indicator connected to said last named port.

2. In a lubricant measuring valve having a measuring cylinder, a piston reciprocable in said cylinder, means for limiting the stroke of said piston, a bypass at each end of said cylinder for conducting lubricant to the portion of the cylinder in which the piston is reciprocable, a valve associated with each of said bypasses and operative to prevent flow of lubricant therethrough, a pair of outlet ports formed in said body and communicating with the opposite ends of said cylinder, each of said valves being operable to control the flow of lubricant through one of said bypasses and one of said outlet ports, said cylinder having a port uncovered by said piston when the latter is at either end of its stroke, and a hydraulic pressure indicator connected to said last named port.

3. A lubricant measuring valve comprising a valve body having a bore extending therethrough, plugs closing both ends of said bore, said bore having a bypass adjacent each end thereof, a cylindrical valve in each end of said bore and slidable therein to cut off its adjacent bypass when in one position and to uncover said bypass when

in another position, a piston reciprocable in said bore between said valves, said bore having a port uncovered by said piston when the latter is at either end of its stroke, a pair of outlet ports formed in said body and communicating with opposite end portions of the bore respectively, each of said valves being operable to direct the flow of lubricant alternately through one of said bypasses and one of said outlet ports, means for supplying lubricant under pressure alternately to the opposite ends of said bore, such means including laterally disposed ports in said body formed respectively adjacent said plugs which close the ends of said body, each of said plugs having at its inner end a projection of cross-section less than that of the bore, said projection serving to limit the movement of the adjacent valve toward the end of the bore and preventing the valve from closing the inlet port at that end, and a hydraulic pressure indicator connected to the port uncovered by said piston when the latter is at either end of its stroke.

4. A lubricant measuring valve comprising a valve body having a bore extending therethrough, said bore having a bypass at each end thereof, a cylindrical valve at each end of said bore and operable to cut off its adjacent bypass when in one position and to uncover said bypass when in another position, a piston reciprocable in said bore between said valves, means for supplying lubricant under pressure alternately to the opposite ends of said bore, and discharge ports near the ends of said bore and adapted to be covered respectively by said valves, said cylinder having a port uncovered by said piston when the latter is at either end of its stroke, and a hydraulic pressure indicator connected to said last named port.

JOHN T. LEONARD.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,935,139	Barks	Nov. 14, 1933
1,935,150	Fox	Nov. 14, 1933
2,006,181	Reswick	June 25, 1935
2,115,637	Leonard	Apr. 26, 1938
2,269,928	Dirkes	Jan. 13, 1942
2,284,799	Brownstein	June 2, 1942
2,300,330	Acker	Oct. 27, 1942

FOREIGN PATENTS

Number	Country	Date
735,550	France	Aug. 30, 1932