June 2, 1942. R. G. BROWNSTEIN 2,284,799

LUBRICANT DISTRIBUTOR

Filed Sept. 25, 1941 2 Sheets-Sheet 1

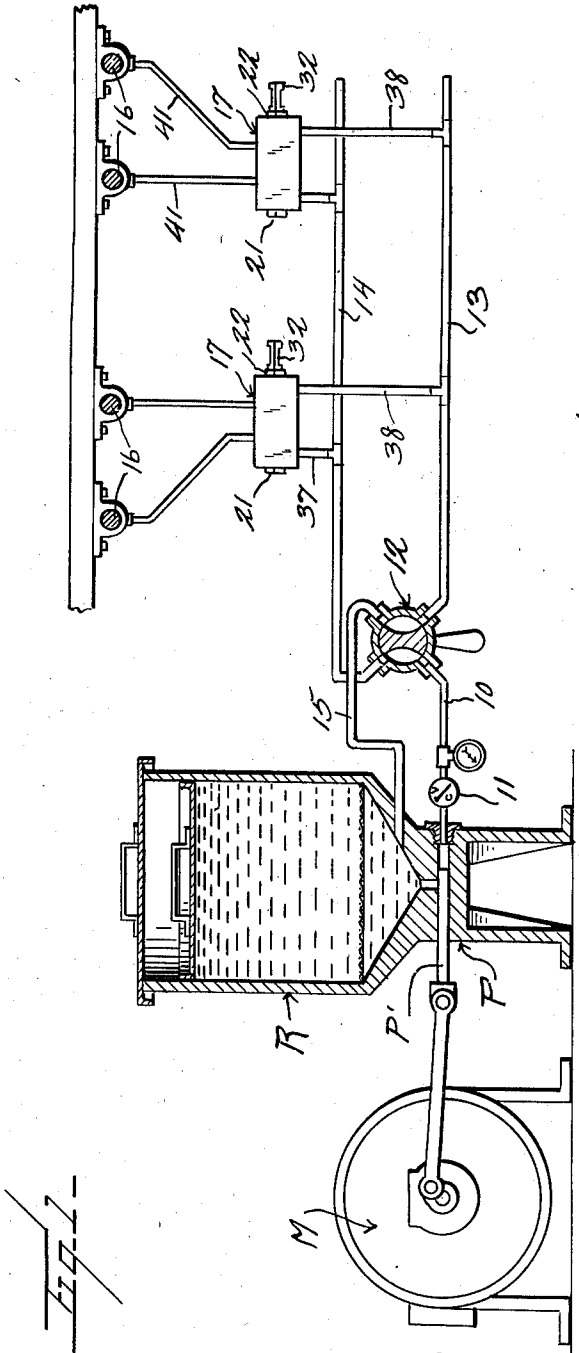


Fig. 1

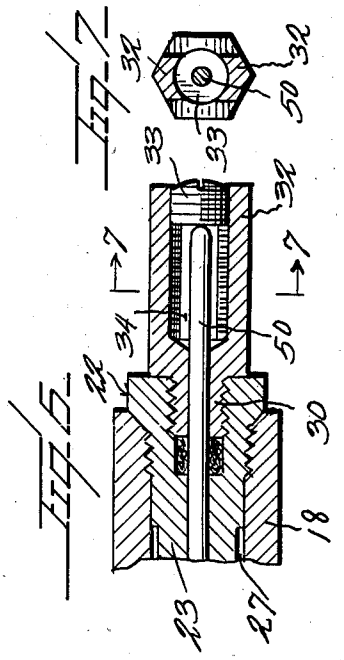


Fig. 6

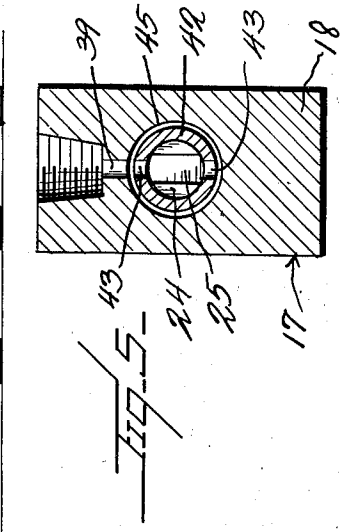


Fig. 5

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LUBRICANT DISTRIBUTOR

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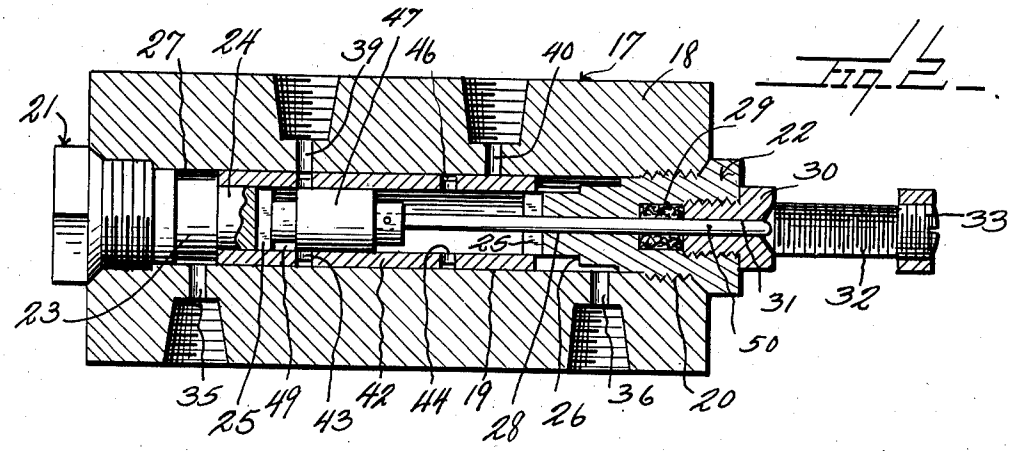


Fig. 2

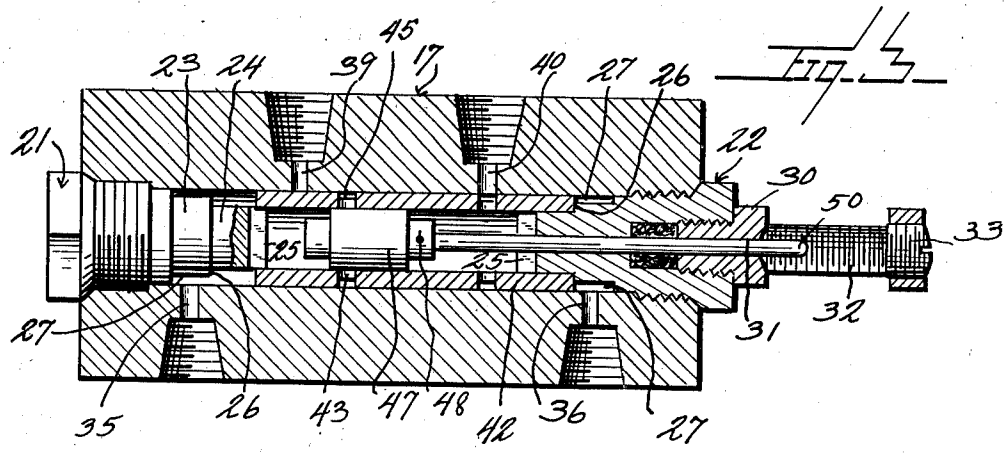


Fig. 3

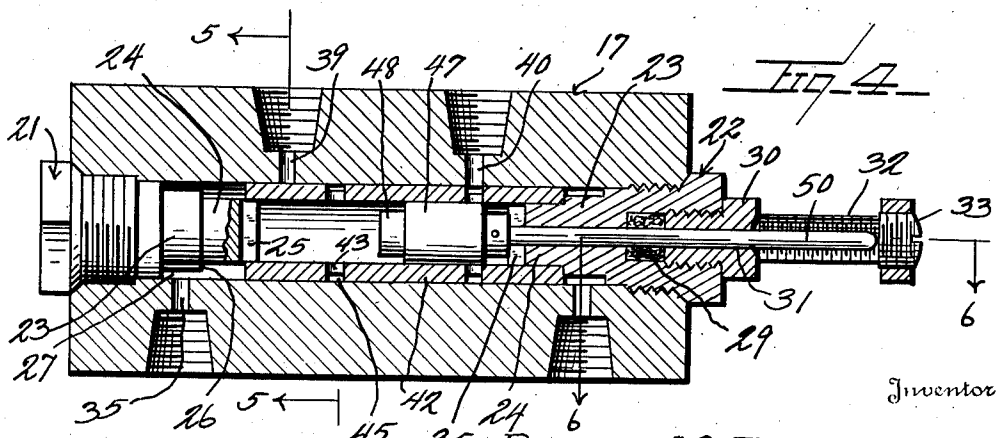


Fig. 4

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UNITED STATES PATENT OFFICE

2,284,799

LUBRICANT DISTRIBUTOR

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Application September 25, 1941, Serial No. 412,312

3 Claims. (Cl. 184—7)

This invention relates generally to improvements in lubricating mechanism and pertains more particularly to an improved lubricant measuring and feeding unit.

A primary object of the present invention is to provide a lubricant feeding and measuring device or unit having an extreme simplicity of construction whereby the same may be readily made from standard stock items thus making it possible to produce the device at the lowest possible cost and wherein the device has a flexibility to serve one or two bearings, is of positive operation under full line pressure and does not employ ball checks, springs, cup leathers, or restricted passages.

Another object of the invention is to provide a measuring valve of the character stated which has associated therewith a sight indicator, by means of which it is possible to determine at a glance whether or not the valve is operating to feed lubricant to a bearing or other unit.

Still another object of the invention is to provide a device of the character stated which has an adjustable volume discharge, whereby it is possible to vary the amount of lubricant ejected therefrom in accordance with the requirement of the bearing or other unit served by the valve.

Other objects and advantages of the invention will become apparent as the description of the same proceeds and the invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings, it being understood, however, that the invention is not to be considered as limited by the specific illustration or description but that such illustration and description constitutes a preferred embodiment of the invention.

In the drawings:

Fig. 1 is a view illustrating the installation of a pair of the present lubricant distributing and measuring units connected in a system with a control valve, a lubricant reservoir and a pump for moving the lubricant from the reservoir to the distributing unit.

Fig. 2 is a view in longitudinal section through the lubricant distributing and measuring unit embodying the present invention showing the movable parts thereof at the limit of their positions in one end of the device.

Fig. 3 is a sectional view similar to Fig. 2 but showing the initial movement of the sleeve valve from one extreme position to the other and the beginning of movement of the piston.

Fig. 4 is a sectional view similar to Fig. 2 but showing the piston moved to the extreme position in its path of movement and at the completion of the ejection operation.

Fig. 5 is a sectional view taken transversely of the structure on the line 5—5 of the Fig. 4.

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 4.

Fig. 7 is a sectional view taken of the line 7—7 of Fig. 6.

Referring now more particularly to the drawings reference will be first made to the system lay out shown in Fig. 1 and in which two of the units embodying the present invention are connected.

This system comprises a suitable pump P which is here shown as forming an integral part of the lower portion of a lubricant receptacle R. The pump is shown as having a ram or piston P' which is operated by a suitable motor M to eject lubricant or other materials into the pipe 10 through a check valve 11 and to a four-way valve which is indicated generally by the numeral 12. This four-way valve 12 has connected therewith the two feed lines 13 and 14 and the return line 15 which leads back into the reservoir R.

In the operation of the system when the lubricant under pump pressure goes through the valve 12 and into one of the feed lines, the other feed line is connected with the exhaust side of the valve and any lubricant pressure in it is relieved into the lubricant container or reservoir.

The four-way valve 12 here illustrated is shown as being designed for manual control but in actual practice it is contemplated to employ an automatic operating valve which will be controlled in its operation by the pump pressure to continuously reverse its position when it reaches a predetermined pressure setting which will operate all of the lubricators about to be described.

Any number of lubricators can be served by the two feed lines 13 and 14. A single lubricator can serve two bearings such as are indicated generally by the numerals 16 or both of the outlets which are had by each lubricator can be made to discharge into a single feed line and the lubricator will then only feed one bearing or other device.

The lubricator or lubricant distributing and measuring unit constituting the present invention is indicated generally by the numeral 17. As is shown in detail in Figs. 2, 3 and 4 this comprises a body 18 of suitable length, through which there is formed longitudinally of the body, the bore or passage 19 which is interiorly threaded at each end as indicated at 20.

Threadably secured in each end of the bore or passage 19 is a valve stop, one of which is indicated by the numeral 21 while the other is indicated by the numeral 22. As is shown each of these valve stops has two circumferential reductions at its inner end the first and smaller reduction being indicated at 23 while the second and greater reduction forms a terminal guide 24 upon the inner end of the stop over which an end of the hereinafter described sleeve valve is adapted to

slip. Each of these terminal guides 24 has a slot or kerf 25 formed transversely of its end. By the formation of these reductions upon the inner end of each stop there is provided a stop shoulder at the outer end of the guide 24 as indicated at 26 and an area 27 is provided around the first reduction 23 into which the lubricant is forced.

In addition to the details above set forth which are common to both stops, the stop 22 has an axial passage running therethrough as indicated at 28 which at its outer end is enlarged to receive packing 29. The enlarged outer end of the bore 28 of the stop 22 is threaded to receive a packing nut 30 and this nut also has an axial passage or bore 31 formed therethrough, which is of a diameter corresponding to the smaller diameter of the passage 28.

The packing nut 30 has joined thereto, as shown in Fig. 6, the pair of spaced arms 32, the inner or opposed faces of which are transversely curved on a common radius and are screw threaded so as to receive threadably between them the adjusting screw 33. The space 34 between the arms 32 provide sight openings for the observation of the movement of a piston stem hereinafter described.

The body 18 has two inlet ports 35 and 36 formed therein, which open into the bore 19 each in a space 27 which is between the first reduction 23 of a stop and the wall of the bore 19. One of these ports is connected by the pipe 37 with the feed line 14 while the other port is connected by the pipe 38 with the feed line 13.

There are also formed in the body 18 discharge ports 39 and 40 which open into the bore 19 each adjacent to and inwardly of the inner end of a stop. These discharge ports may be connected, as shown in Fig. 1, each by a pipe running to a bearing 16 or other units to be served by the device or, as previously stated, the discharge ports may be coupled to a single pipe to serve one bearing or other units. The pipes leading from the two discharge ports and each connected with a bearing, are indicated by the numeral 41.

As previously stated the bore 19 is of constant diameter throughout and there is snugly fitted into this bore a valve sleeve 42 which has a constant interior diameter of a dimension to snugly receive in each of its ends the adjacent guide 24. This valve sleeve moves axially in the bore 19 and its movement is limited by contact of its ends with the shoulders 26 of the opposing stops. As is clearly shown in Figs. 2 to 4 when the sleeve valve 42 is at the limit of its movement in either direction in the bore 19 the ends of both guides will still be within the adjacent ends of the sleeve but the end of one guide will be so nearly out of the sleeve that the two ends of the kerf 25, formed therein, will be uncovered and consequently grease or other material introduced into the bore 19 through the adjacent inlet port, can pass into the interior of the sleeve.

The sleeve 42 is provided with outlet apertures 43 and 44 and each of these apertures opens into a channel formed circumferentially in the outer side of the sleeve, the aperture 43 opening into a channel designated 45 while the aperture 44 opens into channel designated 46. As is shown in Figs. 2 to 4 the channels 45 and 46 are spaced from the adjacent ends of the sleeve 42 at the proper distance to bring them into registry with the outlet ports 39 and 40 respectively as the sleeve is shifted back and forth in the bore 19 between the opposed movement limiting shoulders 26.

Slidably disposed within the sleeve valve is a piston 47, upon each end of which is a short reduced axial extension 48. These extensions come into contact with the slotted reduced inner ends of the stops in the back and forth movement of the piston and there is thus maintained between either end of the piston and the guide 24 with which its reduced extension may be in contact, a space 49 into which grease may enter to start movement of the piston after the sleeve valve has been shifted in the manner hereinafter described.

Fixed to the end of the piston nearest the stop 22, is a stem 50 which passes through the passage 28 in the stop 22, through the packing 29 and through the passage 31 of the packing nut 30. This stem moves in and out between the arms 32 upon back and forth movement of the piston and such in and out movement is limited, and the movement of the piston is correspondingly limited, by the position of the adjusting screw 33 axially of the arms with which it is in threaded engagement.

In the operation of the device the flow of lubricant is as follows. The lubricant is pumped under pressure through the four-way valve 12 into the feed line 14, the sleeve valve 42 and the piston 47 being located in the left hand end of the device or adjacent the stop 21 as illustrated in Fig. 2. Feed line 13 is connected with the exhaust side of the four-way valve and its pressure is relieved. The lubricant flowing through the feed line 14 enters port 35, Fig. 2, under pressure and fills the annular space 27 from where it acts against the end of the sleeve valve 42. Since the pressure behind the sleeve valve in the annular space 27 at the opposite end is relieved through the port 36, feed line 13 and the four-way valve, the sleeve valve is moved to the right to its position as shown in Fig. 3. In this position the sleeve valve partially uncovers the ends of the slots 25 which is in the guide forming a part of the stop 21 and closes the outlet port 39 which leads to the bearing connected therewith, but opens the outlet port 40 which has now come into register with the annular channel 46. It also has shut off communication between the interior of itself and the port 36 which leads to feed line 13. The lubricant under pressure then moves through the partially uncovered slot 25, Fig. 3, and against the piston 47, forcing it to the right. As the piston moves to the right the lubricant on its right, that has been left there by the preceding operation, is forced through the apertures 44, into the annular groove 46 and through the outlet port 40 into the bearing which is connected with this port by the pipe 41. The flow of lubricant to the bearing continues until the piston 47 strikes against the inner end of the guide of the stop 22 as shown in Fig. 4, and has thus completed its full stroke. If a partial stroke of the piston is desired then the adjusting screw 33 is moved inwardly and the outer end of the piston stem strikes this screw to limit the movement of the piston under the pressure of the incoming grease at its opposite side.

When the piston 47 has completed its stroke in all of the lubricators and the four-way valve has reversed or has been manually reversed, then the cycle for lubricating the other bearing is performed in a similar manner as to that just described but with all of the conditions reversed as will be readily understood. In other words the sleeve valve 42 and the piston 47 are now in the right hand end of the lubricator and conse-

quently, upon reversal of the four-way valve 12, the grease under pressure will pass through the feed line 13 and in through the port 36 into the annular recess 27 adjacent the port 36 so as to shift the sleeve valve back to its former left hand position or in other words into the left hand end of the bore 19. This will result in the closing of the outlet port 40 and the opening of the port 39 as shown in Fig. 2 and will also bring about the uncovering, by the sleeve valve 42, of the slot 25 in the inner end of the stop 22 thus allowing the grease to enter into the sleeve valve behind the piston 47. The entering grease will then force the piston 47 back to the left and the grease left upon the left hand side of the piston by the preceding operation will be ejected through the port 39 and to the bearing connected therewith.

As will, of course, be readily understood, if the piston in making its right hand stroke went to the limit of its movement within the sleeve valve or, in other words, until it was stopped by engagement with the stop 22, then it will make a full stroke to the left until it is stopped by the inner end of the stop 21. However if the adjusting screw 33 had been set in so that the right hand movement was limited by engagement of the stem 50 with the screw 33 it will be obvious that although the piston will move all the way back until it is stopped by contact with the stop 21 still the amount of grease ejected will be less than would have been the case if the piston had gone to the right until it was stopped by the stop 22. In other words if the adjusting screw is set in to cut down the amount of grease ejected by one-half when the piston moves to the right then the same reduction in quantity of grease ejected will be effected when the piston moves to the left.

From the foregoing it will be readily apparent that the lubricator device herein disclosed is of such design that it may be easily and economically produced from standard stock items and that the feeding of lubricants is positive and the failure of the device to operate can be readily detected by a lack of movement of the stem 50 which is connected with the piston 47. While reference has been continuously made to lubricant and grease in connection with this device it is of course to be understood that it is capable of handling other fluid or semi-fluid substances. It will also be apparent that the lubricator device can be made in single blocks to serve one or two bearings or a number of assemblies can be comprised in one block to serve two, four, six, eight or more bearings from one block.

All wearing parts are machined and fit to very close tolerances so that they will be self sealing. As shown the valve stops 21 and 22 have a metal to metal fit with the lubricator body 18 on the straight part and a beveled shoulder to insure concentricity and axial alignment with the lubricator body and sleeve valve.

As previously stated the valve stops are made so that the sleeve valve never "runs off" of the guide, which makes for smooth positive action. The sleeve valve is lapped into the bore 19 of the lubricator body and the piston and valve stop guides 24 are lapped into the sleeve valve making these fits self-sealing.

What is claimed is:

1. A lubricant distributor comprising a body having a bore extending therethrough and of constant diameter throughout, said bore opening at its end to opposite sides of the body, a stop member removably secured in each end of the bore, each stop member being of reduced diameter through a portion of its length at its inner end to form with the bore a circular area and providing a stop shoulder, an inlet port opening into the bore into each of said circular areas, a sleeve valve slidably disposed in the bore and limited in its axial movement therein by contact of its ends with said shoulders, a pair of outlet ports for the bore each leading therefrom from a position inwardly of but adjacent to a shoulder, said sleeve having a pair of wall apertures arranged to register with an outlet when the adjacent end of the sleeve is in contact with a shoulder, said sleeve when in contact at either end with the adjacent shoulder being closed by that shoulder and being open at its opposite end, a piston freely movable lengthwise within the sleeve, and means for stopping the lengthwise movement of the piston short of the ends of the sleeve.

2. A lubricant distributor comprising a body having a bore therethrough and opening at its ends through opposite sides of the body, a stop secured in each end of the bore and having at its inner end a portion of reduced diameter forming with the wall of the bore a circular area, each stop having at its inner end an axial extension of a diameter smaller than the said reduced portion of the stop and forming a guide, there being an annular shoulder at the outer end of each guide, each guide having a slot formed across its inner end, an inlet port leading into each end of the bore into a circular area, a sleeve valve having an overall length less than the distance between said shoulders and slidably fitted in the bore, said sleeve having said guides slidably engaged in its ends, the slot of one guide being uncovered by the adjacent end of the sleeve when the other end of the sleeve is in contact with a shoulder, a pair of outlets for the bore, a pair of longitudinally spaced openings in the wall of the sleeve arranged to have one in communication with the outlet when the adjacent end of the sleeve is in contact with a shoulder, and a piston in the sleeve having free movement between the sleeve valve discharge openings.

3. A lubricator comprising a body having a bore therethrough, an inlet port leading into the bore adjacent each end, an outlet for the bore adjacent each inlet and disposed inwardly of the inlet, a sleeve axially movable in the bore and having longitudinally spaced wall apertures for alternate registry with the outlets, an element extending axially in each end of the bore for stopping the axial movement of the sleeve toward the ends of the bore short of a covering relation with the inlets, means operating to fully close one end of the sleeve when the said end is in stopping engagement with said element and to open the other end of the sleeve to communication with the adjacent inlet, a piston in and having free movement axially of the sleeve between said means, the sleeve aperture nearest the closed end of the sleeve being in registry with an outlet upon the side of the piston nearest said closed end after said end has become fully closed, the said sleeve end closing means being adapted to enter the end of the sleeve and function as a guide therefor.

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