

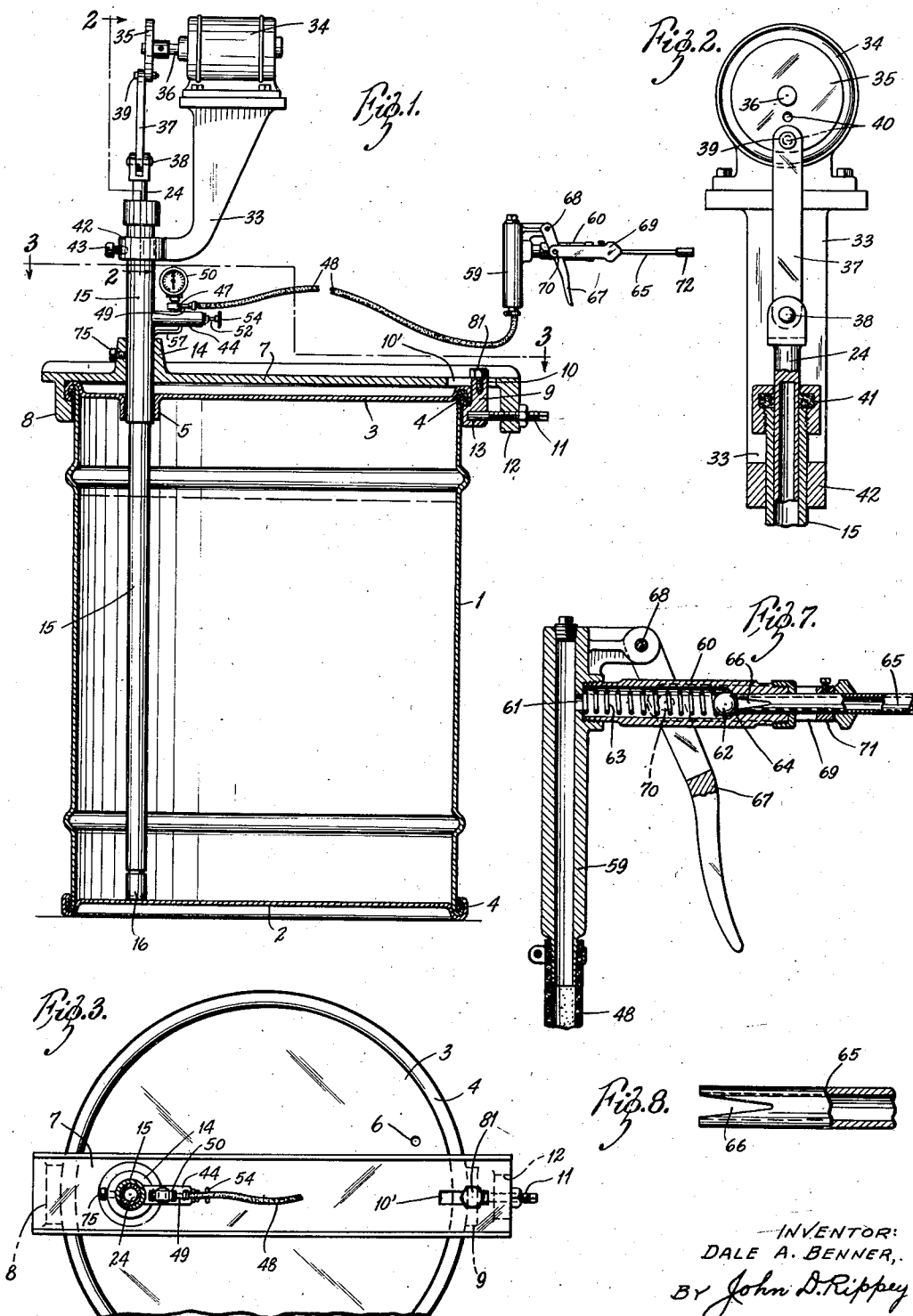
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D. A. BENNER
CONTAINER MOUNTED PUMP

2,431,534

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2 Sheets-Sheet 1



INVENTOR:
DALE A. BENNER,
BY John D. Rippey
HIS ATTORNEY

Nov. 25, 1947.

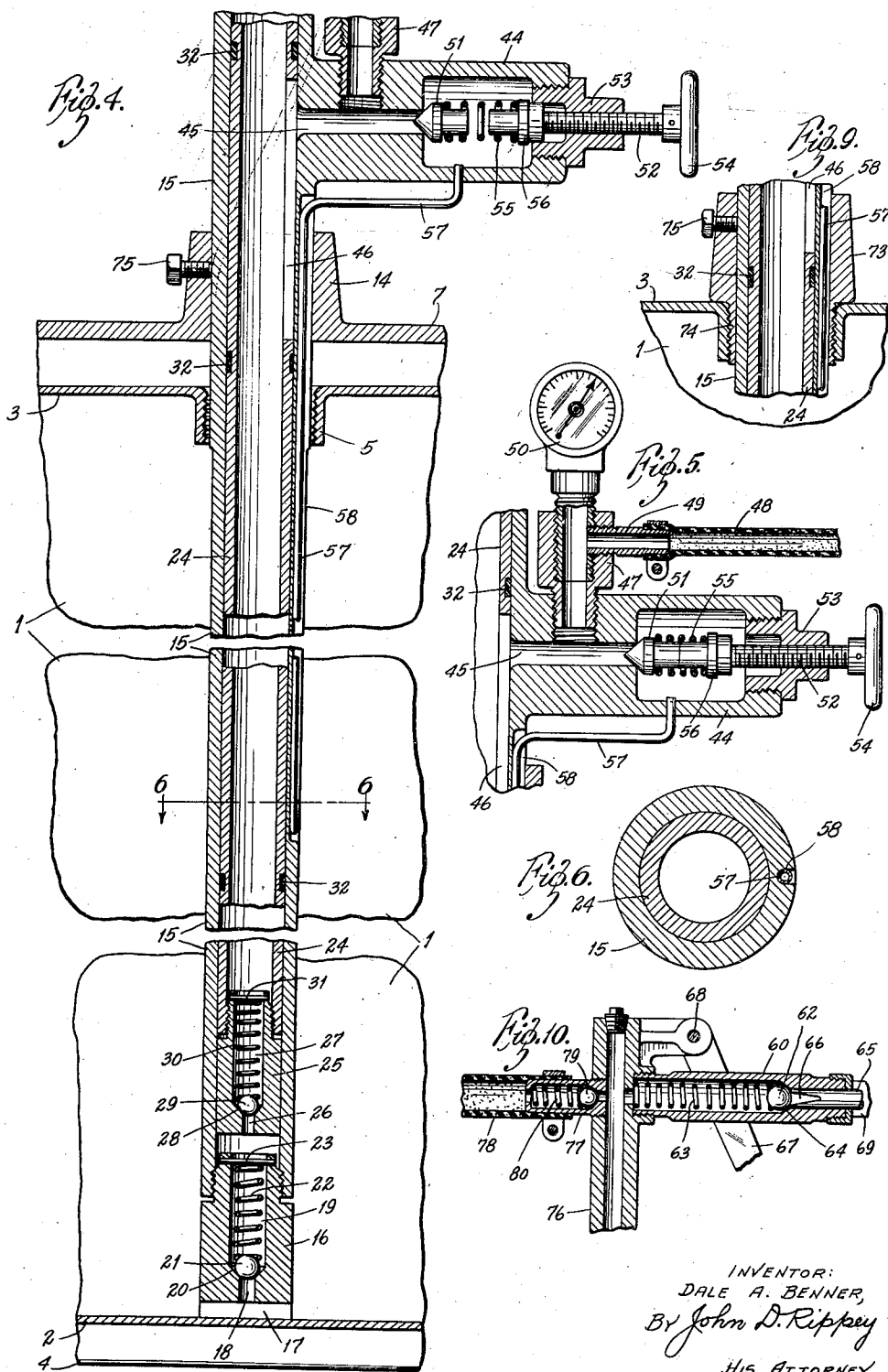
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UNITED STATES PATENT OFFICE

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CONTAINER MOUNTED PUMP

Dale A. Benner, Alton, Ill.

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3 Claims. (Cl. 222—383)

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This invention relates to lubricating mechanism for dispensing lubricants from barrels, tanks or other containers, and applying such lubricants under pressure to any articles, bearings, or other objects to be lubricated.

Objects of the invention are to provide improved lubricating mechanism for applying lubricant under regulated pressure to articles, bearings or other objects to which the lubricant is to be applied; to provide improved means for attaching said mechanism to and supporting the same in operative connection with a barrel, tank or other container for the lubricant so that, when said mechanism is in operation, the required amount of lubricant may be withdrawn from said barrel, tank, or other container and applied under pressure to any ultimate point of delivery, such as articles, bearings, or other objects to be lubricated; to provide improved means for controlling and regulating the amount of lubricant discharged by and from said mechanism, and to bypass other or excess quantities of lubricant withdrawn by said mechanism from said barrel, tank or container, and return the same thereto, so that only the desired or measured amount of lubricant will be discharged by and from said mechanism onto the article, bearing or object to be lubricated; and to provide improved regulating means in co-operative connection with said mechanism for indicating and for controlling the amount or degree of pressure by or under which the lubricant is delivered to the nozzle or applicator by and from which the lubricant is discharged onto or against the lubricated article, bearing or object.

Another object of the invention is to provide improved means for attaching the invention to and supporting the same rigidly in connection with the barrel, tank or other container for the lubricant.

Another object of the invention is to provide an improved pump mechanism for withdrawing lubricant from a barrel, tank or other container, for regulating the discharge of said lubricant under pressure against and onto the ultimate article, bearing or object to be lubricated, and for regulating bypass or return of excess amounts of lubricant that are not required for lubrication purposes, into said barrel, tank or container.

Various other objects and advantages of the invention will be apparent from the following description without specific mention thereof, reference being made to the annexed drawings, in which—

Fig. 1 is a side elevation of my improved lubri-

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cating mechanism applied or attached to a barrel, tank, or container for lubricant.

Fig. 2 is an enlarged view on the line 2—2 of Fig. 1, parts being shown in section.

Fig. 3 is a sectional view on the line 3—3 of Fig. 1, showing a plan of the attaching and supporting device, a part of the pump mechanism being shown in section.

Fig. 4 is an enlarged vertical sectional view of the pump cylinder and pump piston, a regulating bypass valve device being shown in section in an adjustment to bypass excess lubricant back into the barrel, tank or container.

Fig. 5 is a sectional view of the regulating bypass valve device in an adjustment in which the valve is positively held in closed position.

Fig. 6 is an enlarged horizontal sectional view on the line 6—6 of Fig. 4, showing the pump cylinder, pump piston, and bypass tube.

Fig. 7 is a sectional view of the manipulative valve mechanism controlling passage of the lubricant into and through the applicator nozzle or tip.

Fig. 8 is an enlarged view showing the inlet end of the applicator nozzle or tip detached from the cooperating elements.

Fig. 9 is a sectional view of a modified form of device for attaching the pump mechanism to and supporting said pump mechanism in connection with a barrel, tank, or other container from which the lubricant is to be removed by said pump mechanism.

Fig. 10 is a sectional view showing a modification of a part of the device for controlling passage of the lubricant into and through the applicator nozzle or tip, and comprising means for bypassing all or part of the lubricant back into the barrel, tank, or other container therefor as desired.

My improved lubricating mechanism is shown applied or attached to a barrel, tank or container for lubricant, including an enclosing wall 1, a bottom wall 2, and a top wall 3 attached to the lower and upper ends, respectively, of said wall 1. As shown, the walls 2 and 3 are attached to the respective ends of the wall 1 by interlocking bent portions 4 forming leakproof joints, and providing circumferential peripheral beads near the ends of said wall 1. The walls 1, 2 and 3 are usually composed of sheet metal of appropriate gage or thickness. However, the specific type of material of which the barrel, tank or container for the lubricant is formed is unimportant. Sometimes, the top wall 3 is formed with a hole surrounded by an inwardly extended annular

flange 5 providing a relatively short tube which may be internally screwthreaded for engagement of a screwthreaded closure bung therein. Also, the top wall 3 may be provided with a vent opening 6 to facilitate withdrawal of the lubricant contents of the barrel, tank or container.

My invention comprises a bracket 7 long enough to extend diametrically across the top of the barrel, tank or container for which it is intended. Said bracket includes a downwardly extended angular arm 8 rigidly attached to or integral with one end portion thereof and arranged to engage under the top bead 4 and against the wall 1 when the bracket 7 is placed diametrically upon said bead. The opposite end of the bracket 7 supports a releasable clamp device for cooperation with the arm 8 and adjustable to engage under a diametrically opposite portion of the bead 4 from said arm 8 and thereby interlock the bracket 7 with the top of the barrel, tank or container. Said clamp device comprises an angular member 9 complementary to the angular arm 8, having an upward extension 10 projecting through a slot 10' in the end portion of the bracket 8 and functioning to guide said member in its movements and also to prevent lateral displacement of said member relative to the bracket 7. An externally screwthreaded rod 11 is mounted for longitudinal movements in a threaded hole in the downwardly extended end portion 12 of the bracket 7, and has its inner end swiveled to and engaging in a seat 13 in the member 9. The rod 11 is operative to clamp the member 9 against and under the bead 4 diametrically opposite from the point at which the angular arm 8 engages under said bead. The rod 11 may also be operated outwardly to release the member 9 from clamping engagement under the bead 4 to permit removal of the mechanism from one and attachment to another barrel, tank or container. When applied or attached properly to the top end portion of a barrel, tank or container, the tubular boss 14 on the bracket 7 is in axial alinement with the tubular bung opening 5.

A vertically elongated cylinder 15 extends through the boss 14 of the bracket 7 and through the tubular bung opening 5 downwardly to a point adjacent to the bottom wall 2. Said cylinder is removably supported by the bracket 7. The cylinder 15 has a valve cage 16 detachably secured to its lower end. The lower end of the valve cage 16 may seat directly upon the bottom wall 2 or may be spaced therefrom, as desired, and is preferably formed with a transverse inlet groove or passage 17 communicating with an inlet port opening into the valve cage 16 and thence into the lower end of the cylinder 15. The inlet port consists of a lower portion 18 of relatively small cross-sectional area, and an enlarged upper portion 19, thus providing an internal annular seat 20 for a ball valve 21. The ball valve 21 is contained in and is of less diameter than the enlarged upper portion 19 of the inlet port, but is of greater diameter than the reduced lower portion 18 of said port. Thus, when the valve 21 is positively held upon the seat 20, the inlet port is closed to prevent any of the contents of the cylinder 15 from being discharged therefrom past the valve 21 and through the port 18—17. A spring 22 mounted in the valve cage is held under some compression against the valve 21 by a removable and replaceable pin 23 mounted in the upper end portion of the valve cage 16 across the upper end of the port 19 and constituting an abutment for the upper end of said spring but will yield to per-

mit upward opening movement of said valve as required to admit lubricant into the cylinder 15.

A unitary tubular piston 24 is mounted for longitudinal sliding or reciprocating movements in the cylinder 15. Said piston has a valve cage 25 detachably secured to its lower end within the cylinder 15. As shown, the valve cage 25 has an inlet port consisting of a lower portion 26 of relatively small cross-sectional area, and an upper portion 27 of larger cross-sectional area, thus providing an internal annular seat 28 for a ball valve 29. The valve 29 is contained in and is of less diameter than the enlarged upper portion 27 of the inlet port through the cage 25, but is of greater diameter than the reduced lower portion 26 of said port. A spring 30 mounted in the enlarged portion 27 of the inlet port through the valve cage 25 is held under some compression against the valve 29 by a removable and replaceable pin 31 located in the upper end of the valve cage 25 across the upper end of the said portion 27 of the inlet port and constituting an abutment for the upper end of said spring 30. The spring 30 will yield to permit upward opening movement of the valve 29 during downward movement of the piston 24 and while the valve 21 is closed in order to permit passage of lubricant from the cylinder 15 through the port 26—27 into and through the piston 24. A number of piston rings or packing rings 32 are mounted on the piston 24 at longitudinally spaced intervals in order to restrict or prevent flow or passage of lubricant between the walls of the piston and the cylinder.

A bracket 33 is detachably secured to the upper end of the cylinder 15 to support a motor 34 or other actuator for the piston 24. A crank wheel 35 is attached to the driven shaft 36 of said motor and is operatively connected with the upper end of the piston 24 by a link 37. As shown, the link 37 has one end connected with the upper end of the piston 24 by a pivot 38 and the opposite end connected with the crank wheel 35 by a detachable and replaceable pivot pin 39. The pivot pin may be connected with the crank wheel 35 at selected distances from the axis of the shaft 36 in order to vary the length of the stroke of the piston 24 as desired. For this purpose, the crank wheel 35 is provided with holes 40 located at different distances from the axis of the shaft 36 in order to receive the pin 39 and thereby regulate the extent of movement of the piston 24 by each rotation of the crank wheel 35 and shaft 36. The upper end of the tubular piston 24 is closed (Fig. 2) and the upper end of the cylinder 15 is closed by a detachable and replaceable packing gland device 41 through which the piston 24 extends for longitudinal reciprocating movements by the motor 34 or other chosen actuator as desired (Fig. 2). The motor 34 is supported on the upper end of the bracket 33, the lower end of said bracket 33 having a formation 42 through which the upper end of the cylinder 15 extends. A set screw 43 screwed in the formation is adjustable to secure the bracket 33 rigidly on the cylinder 15, and may be loosened to permit adjustment of said bracket along the cylinder 15, and to permit detachment of said bracket 33 from said cylinder when the gland device 41 is removed.

A combined pressure regulator device and valve housing 44 projects laterally from integral connection with the cylinder 15 above the bracket 7, and has an opening 45 communicating with the inside of said cylinder for the purpose of permitting the passage of lubricant from said cylinder into and from said housing. The tubular piston

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24 has a vertically elongated slot 46 which is in constant communication with the opening 45 in any position of said piston during operation thereof. This permits lubricant to pass from the inside of the piston 24 through the slot 46 and the opening 45 into the valve housing and thence through a tubular fitting 47 and a conduit or flexible tube or hose 48 having one end attached to a tubular fitting 49 (Fig. 5) opening into or from the device. The tubular fittings 47 and 49 together with the flexible conduit 48 form and provide a passage for conducting lubricant from the device 44 to the applicator device by which the lubricant is applied to the object to be lubricated. A pressure gage indicator device 50 of known construction and operation is attached to the tubular fitting 47 and is subjected and responds to the pressure of the lubricant contained in and passing through said fitting 47. The device 50 is responsive to the pressure of the lubricant so as to indicate visually and with required accuracy and precision the amount and degree of such pressure. The mechanisms of the indicator device 50 is not shown in detail for the reason that the construction and mode of operation thereof are known.

A pressure regulating valve 51 (Figs. 4 and 5) is mounted in the housing 44 beyond the opening into the fitting 47 in order to permit bypass flow of lubricant back into the barrel, tank or other container for said lubricant without causing the bypassed lubricant to be conducted to or discharged from the applicator device that is attached to the tube or hose 48. A valve controlling stem 52 is mounted for longitudinal movements in a fitting 53 detachably and replaceably secured to the housing 44. The stem 52 is screwed through the fitting 53 so that it will be moved longitudinally in one direction or the other and axially with respect to the valve 51 when said stem is rotated manually by the handle element 54, or otherwise. A spring 55 is mounted on axially aligned portions of the valve 51 and stem 52, and has one end seated against said valve and the opposite end seated against a collar 56 on the valve stem. It is evident that, when the valve stem is located in an outward adjustment (Fig. 4), the spring 55 is expanded, a gap is provided between axially aligned portions of the valve and valve stem, and the valve may open under the influence of pressure against its inner end to permit bypass flow of lubricant. When the valve stem 52 is in contact with the extension of the valve 51 (Fig. 5), said valve is thereby positively held closed and cannot open to permit bypass flow of lubricant. In intermediate positions of the stem 52, that is in positions of said stem between the position in which there is abutting contact with the valve 51 (Fig. 5), and extreme outward position of said stem, the valve 51 may be opened by different amounts or degrees of pressure against the inner end of said valve. That is, it requires greater pressure to open the valve 51 when the spring 55 is under increased tension than it does to open said valve when said spring 55 is under reduced tension. Thus, the valve and its equipment constitute means for regulating the pressure under which the lubricant is applied to the articles to be lubricated through the applicator device.

A tube 57 has one end opening into the space at the effluent side of the valve 51 and extends into and along a groove 58 extending longitudinally along one side of the cylinder 15. The opposite end of said tube 57 opens into the barrel, 75

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tank or other container to which the lubricating mechanism is applied and attached.

The opposite end of the flexible conduit 48 from the fitting 47 is attached to and opens into one end of a tube 59 constituting a part of the applicator device. A member 60 is detachably secured to the tube 59, extends laterally therefrom, and has communication with the inside of said tube 59 through a port 61. The member 60 functions as a conduit for conducting lubricant from the tube 59, as a housing for a ball valve 62 controlling and regulating discharge of lubricant from said member, as an enclosure for a spring 63 actuating and yieldingly holding said valve 62 closed against its seat 64, and as a support and guide for a movable applicator tube 65. The tube 65 extends for longitudinal sliding movements into the outer end of the member 60, has its inner end engaging against the effluent side of the ball valve 62, and is formed with a number of inlet openings or slots 66 which permit lubricant to enter said tube 65 when the ball valve 62 is open, that is, when said ball valve 62 is pressed inwardly from its seat 64. When the ball valve 62 is in closed position on the seat 64 to which said valve is moved by action of the spring 63, it is impossible for lubricant to pass said valve or to enter the tube 65. The tube 65 may be moved inwardly by pressure to force the valve 62 inwardly in opposition to the spring 63, and away from the valve seat 64, in order to permit lubricant to pass said valve under pressure from the pump mechanism and to be discharged under pressure through the applicator tube 65 onto the articles, bearings or other objects to be lubricated.

A bifurcated lever 67 embraces the member 60 between its arms which are connected with the tube 59 by a pivot 68. A bifurcated yoke 69 has its arms connected with the lever 67 by pivots 70, and its central portion provided with an opening through which the tube 65 extends (Fig. 7). A collar 71 is adjustably secured on the tube 65 and is engaged by the yoke 69 so that, when said yoke is operated by the lever 67, the tube 65 will be forced inwardly into the member 60 and will move the valve 62 from its seat 64 in opposition to the closure spring 63. The amount of lubricant that may pass the valve 62 for discharge under pressure through the applicator tube 65 depends upon the extent to which said valve 62 is opened, that is, the distance of said valve 62 from its seat 64. A tip 72 is detachably secured to the effluent end of the applicator tube 65 for jetting, spraying, or applying the lubricant to any articles, bearings, or other objects as desired.

A modified form of attaching and supporting device for the pump mechanism is shown in Fig. 9. This modified form of attaching and supporting device for the pump mechanism may be used in substitution for or instead of the bracket 7 in some instances, as when the walls 1, 2 and 3, and particularly the wall 3, are composed of sheet metal thick and strong enough to make use of the bracket 7 unnecessary. This form of the device consists of a fitting 73, analogous to the boss 14 but unattached to any bracket such as the bracket 7, having a cylindrical externally threaded downward extension 74 arranged and intended to be screwed into the internally threaded flange or short tube 5. This form of attaching and supporting device for the pump mechanism may be used in substitution for the elongated bracket 7 when at least the top wall 3 of the barrel, tank, or other lubricant container is strong enough to support the entire pump mechanism. A set screw

75 may be screwed through the fitting 73 into clamping engagement with the cylinder 15 to support said cylinder and thereby the pump mechanism by said fitting. Obviously, such a set screw 75 is used in the boss 14 for the same purpose.

A modification of a part of the device for controlling passage of the lubricant into and through the applicator device, consisting of the member 60, applicator tube 65 and tip 72, is shown in Fig. 10. This modified device may be used optionally in substitution for the applicator device shown in Figs. 1 and 7. This modified device consists of a tube 76 having the member 60 attached thereto for receiving and conducting lubricant therefrom in the same manner as said member 60 receives and conducts lubricant from the tube 59. A lateral tubular extension 77 from the tube 76 is attached to one end of a hose 78 having its opposite end opening through the top wall 3 of the barrel, tank, or container from which lubricant is removed by the pump mechanism. The tubular extension 77 and the tube 78 form a conduit or passage for conducting and bypassing lubricant from the tube 76 back into the barrel, tank, or container from which said lubricant is removed by the pump mechanism, without ejecting or discharging said lubricant through the applicator tube 65. A valve 79 actuated by a spring 80 controls and regulates passage of lubricant from the tube 76 into and through the passage 77-78 and, therefore, controls bypassing of said lubricant around or from the applicator device back into the barrel, tank, or container from which said lubricant had been removed. The spring 80 yields to pressure of lubricant against the valve 79, so that said valve 79 may open when the valve 62 is wholly closed or is only partly open, or when a greater amount of lubricant is pumped into the tube 76 than can be discharged past the valve 62 into and through the applicator tube 65. This modified form of applicator device may be used either when the pump mechanism is supported by a bracket such as the bracket 7, or when the pump mechanism is supported by the modified form shown in Fig. 9, as desired. When the bracket 7 is used, the angular member 9 may be detachably supported in connection therewith by a screw 81 having its head above the bracket 7 and wider than the slot 10'.

When my improved lubricating mechanism is attached or applied to a lubricant barrel, tank, or other container in the proper manner shown and described, lubricant may be pumped into the tubular piston 24 by reciprocating said piston vertically. Such reciprocating movements may be imparted to the piston 24 either by the motor mechanism shown or by any other actuator, as desired. During reciprocation of the pump piston 24, lubricant is caused to enter the opening 45 and to pass through the fittings 47 and 49, the tube 48, the tube 59, the member 60, and the applicator tube 65 when the valve 62 is open. The degree or extent of pressure and the amount of lubricant discharged from the applicator tube 65 may be optionally determined and regulated by adjustment of the valve 62. That is, when the valve 62 is fully open, a relatively larger amount of lubricant will be discharged from the applicator tube 65 in a given time than when said valve 62 is only partially open. The valve 62 also controls the pressure under which the lubricant is discharged from the applicator tube 65 and applied to the articles, bearings, or other objects to be lubricated. The extent to which the valve 62 is opened is optionally controlled by the oper-

ator through the lever 67, yoke 69, and applicator tube 65. The above control of pressure and flow of lubricant at the valve 62 (Fig. 7) is, of course, in conjunction with the control at the valve 51 (Fig. 5), because variations in the adjustment of the valve 51 controlling the bypassing of lubricant will automatically vary the pressure of the lubricant at said valve 62.

When the valve 62 is completely or partly closed and a greater amount of lubricant is being pumped into the opening 45 than is discharged through the applicator tube, such lubricant may be bypassed back into the barrel, tank or container from which the lubricant had been taken by adjusting the valve stem 52 away from and out of contact with the valve 51 to permit said valve 51 to be opened by the confined liquid under pressure. When the valve 51 is opened by the confined lubricant under pressure, said lubricant that passes said valve 51 will be bypassed and returned through the tube 57 into the barrel, tank, or container from which the lubricant had been pumped.

From the foregoing, it is plainly evident that this invention attains all of its intended objects and purposes efficiently and under perfect control of the operator. The construction and arrangement of the parts comprising the mechanism may easily be varied within the scope of equivalent limits without departure from the nature and principle of the invention.

I claim:

1. Lubricating mechanism comprising a vertical cylinder adapted to be inserted in a lubricant container, said cylinder having an inlet port at its bottom and an outlet port through its cylindrical wall at its upper portion, a check valve in said inlet port arranged to permit the flow of lubricant into the cylinder, a unitary tubular piston and conduit mounted for sliding movement in said cylinder, an inlet port in the bottom of said piston with a check valve therein arranged to permit the flow of lubricant into the piston and conduit from the cylinder, an outlet port in the conduit comprising a vertical slot in its wall registering with the outlet port in the cylinder for the full stroke of said piston, said piston and conduit being closed except for said inlet and outlet ports, and mechanism for vertically reciprocating said piston and conduit in the cylinder.

2. Lubricating mechanism comprising a vertical cylinder, said cylinder having an inlet port at its bottom and an outlet port through its cylindrical wall at its upper portion, a check valve in said inlet port arranged to permit the flow of lubricant into the cylinder, a unitary tubular piston and conduit mounted for sliding movement in said cylinder, an inlet port in the bottom of said piston with a check valve therein arranged to permit the flow of lubricant into the piston and conduit from the cylinder, an outlet port in the conduit comprising a vertical slot in its wall registering with the outlet port in the cylinder for the full stroke of said piston, said piston and conduit being closed except for said inlet and outlet ports, mechanism for vertically reciprocating said piston and conduit in the cylinder, a bracket secured to said cylinder for supporting the cylinder through a bung of a lubricating container, and clamping means for securing the bracket to the top of the container.

3. Lubricating mechanism comprising a lubricant container, a vertical cylinder extending downwardly through a bung in the top of the container to the bottom of the container and having

an inlet port at its bottom, a check valve in said port permitting the flow of lubricant into the cylinder, an outlet port through the wall of the cylinder above the top of the container, a unitary tubular piston and conduit mounted for sliding movement in said cylinder, an inlet port on the bottom of said piston with a check valve therein arranged to permit the flow of lubricant into the piston from the cylinder, an outlet port comprising a vertical slot in the wall of the conduit registering with the outlet port in the cylinder for the full stroke of said piston, said piston and conduit being closed except for said inlet and outlet ports, and mechanism for vertically reciprocating said piston and conduit in the cylinder.

DALE A. BENNER.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
2,169,514	Buzzard -----	Aug. 15, 1939
2,172,136	Davis -----	Sept. 5, 1939
1,633,304	Barks -----	June 21, 1927
1,749,216	Goldman -----	Mar. 4, 1930
1,768,909	Iddings -----	July 1, 1930
2,172,136	Davis -----	Sept. 5, 1939
1,880,857	Davis -----	Oct. 4, 1932
1,800,333	Wertz -----	Apr. 14, 1931