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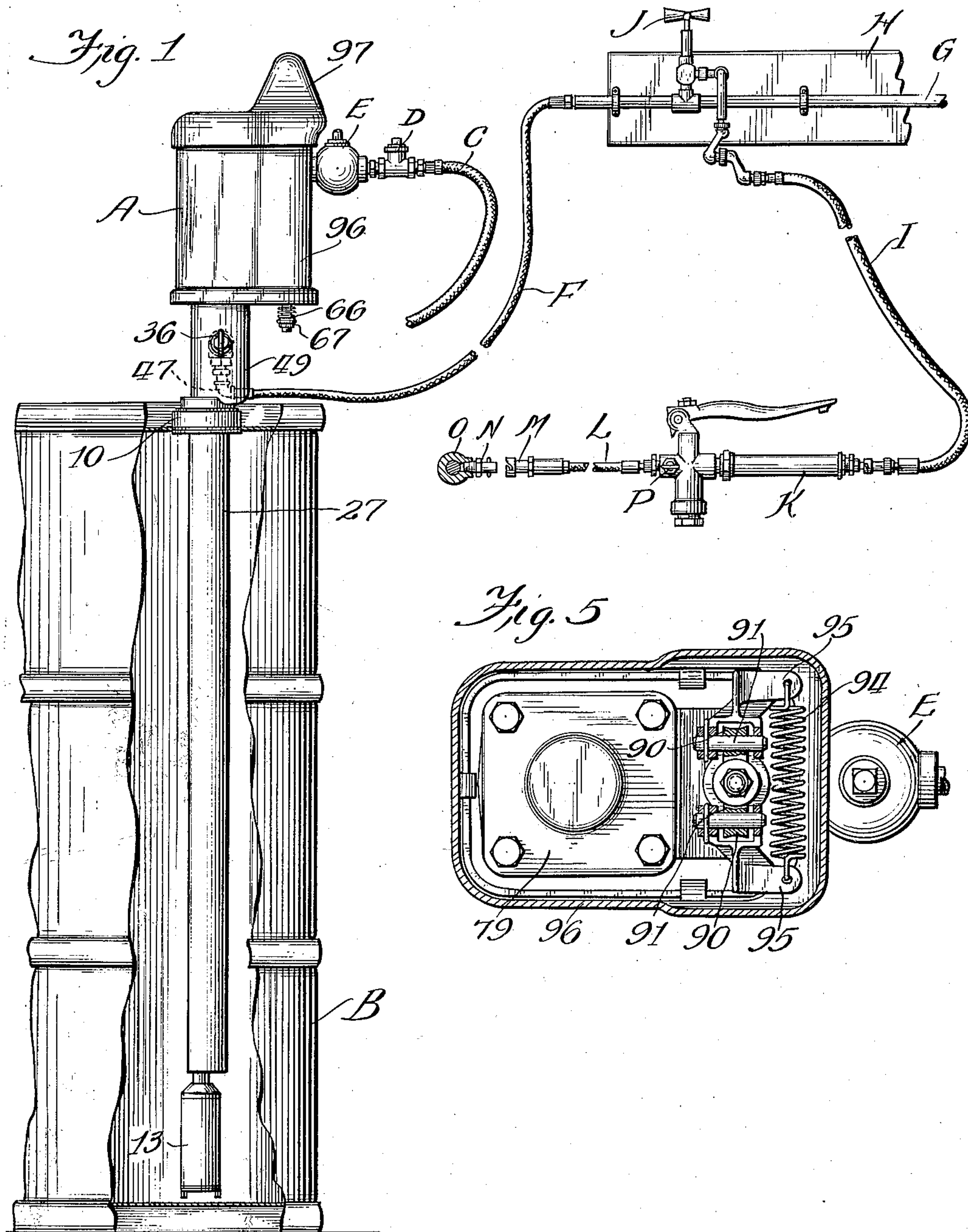
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2,022,232

HIGH PRESSURE BARREL PUMP

Filed May 22, 1933

3 Sheets-Sheet 1



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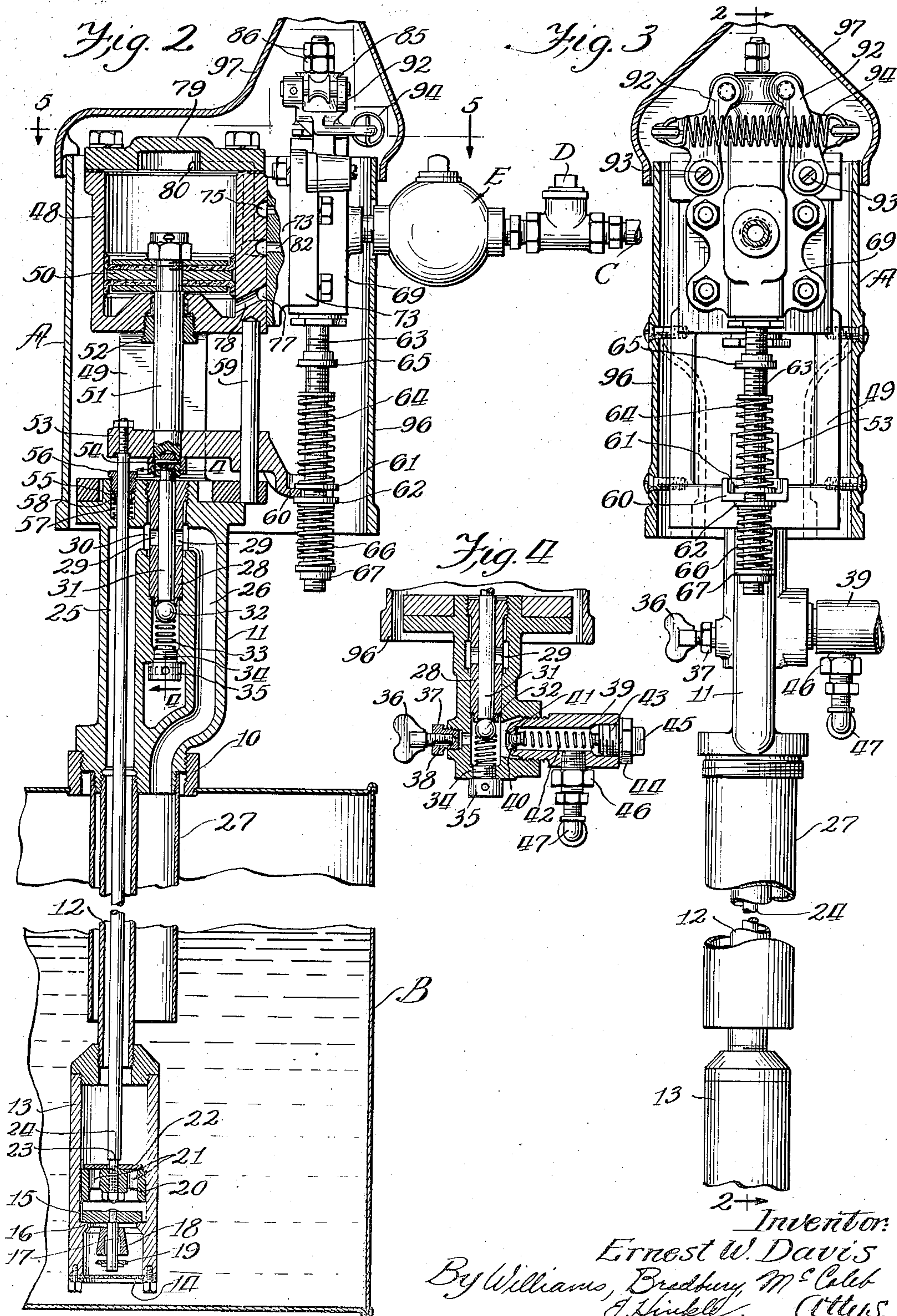
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3 Sheets-Sheet 2



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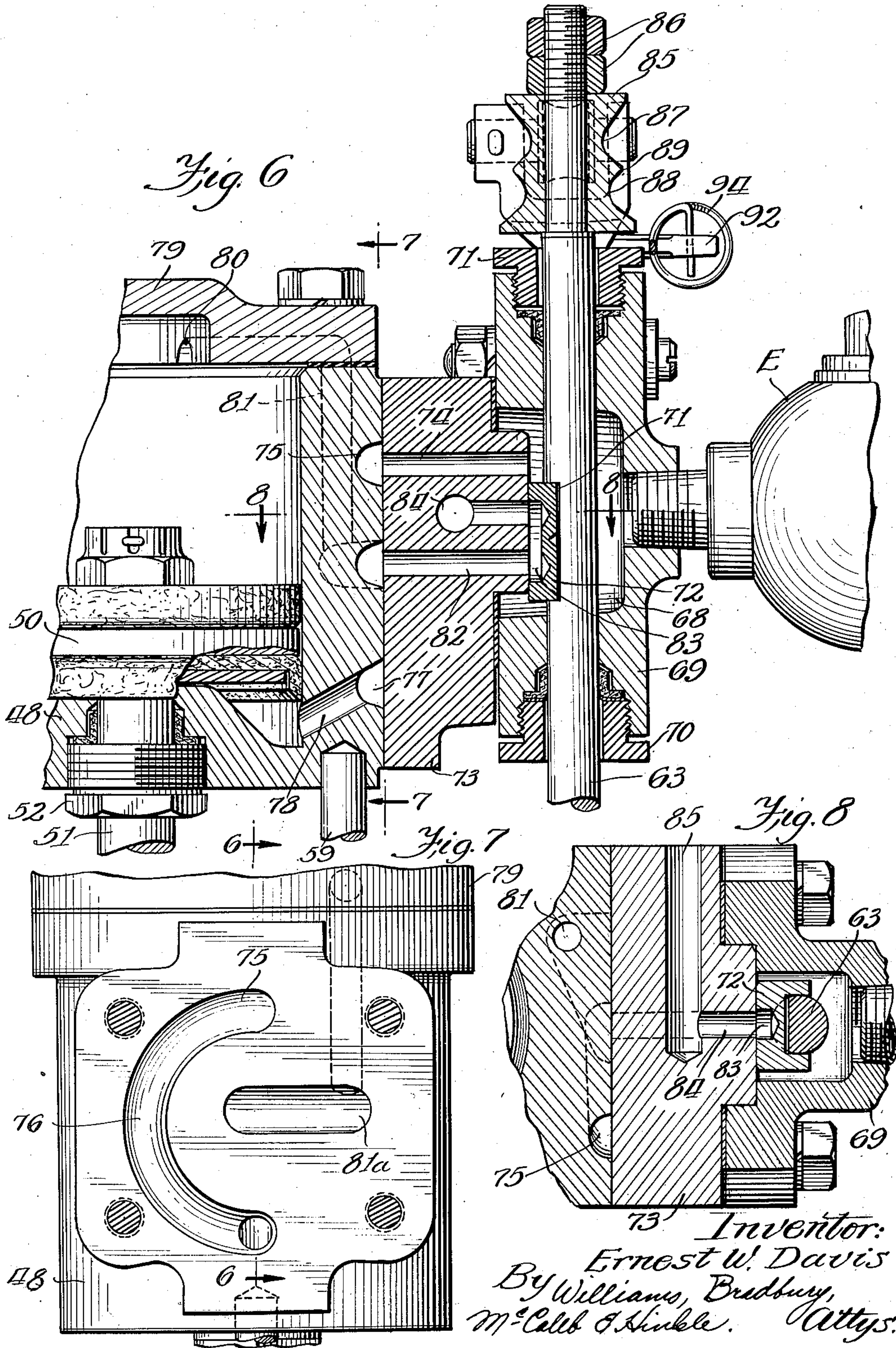
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3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

2,022,232

HIGH PRESSURE BARREL PUMP

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mesne assignments, to Stewart-Warner Cor-
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Application May 22, 1933, Serial No. 672,107

12 Claims. (Cl. 103—5)

My invention pertains to high pressure barrel pumps adapted for supplying lubricant to the chassis bearings of automobiles through the lubricant fittings commonly associated with such bearings. Heretofore attempts have been made to provide high pressure lubricant pumps adapted to withdraw lubricant directly from the barrels or drums in which it is commonly shipped and to force this lubricant directly into the bearings of automobiles. Such pumps have heretofore not been used extensively because of the difficulty of providing a pump of this type which will not become air-bound.

An object of my invention is to provide a high pressure barrel pump having novel priming means which prevent the pump from becoming air-bound.

Another object is to provide a simplified and improved operating motor.

Another object is to provide simplified and improved valve mechanism for the operating motor.

Another object is to provide an improved type of outlet valve for the lubricant discharge conduit to facilitate cleansing the valve of dirt or other obstructions which may collect thereon.

Another object is to provide a barrel pump which is simple in construction, inexpensive to manufacture, and economical and durable in operation.

Another object is to provide a barrel pump which is attractive in appearance, wherein the moving parts are protected, and which is safe and light to handle.

Other objects and advantages will become apparent as the description proceeds.

In the drawings,

Figure 1 is an elevation showing somewhat diagrammatically one type of installation of my high pressure barrel pump;

Figure 2 is a vertical section through my high pressure barrel pump, taken on the line 2—2 of Figure 3;

Figure 3 is an elevation of my high pressure barrel pump with part of the casing removed;

Figure 4 is a vertical section taken on the line 4—4 of Figure 2;

Figure 5 is a horizontal section taken on the line 5—5 of Figure 2;

Figure 6 is an enlarged view of the valve mechanism of the air motor and is taken on the line 6—6 of Figure 7;

Figure 7 is a section showing the port arrangement of the air motor valve mechanism and is taken on the line 7—7 of Figure 6; and

Figure 8 is another section showing the air

motor valve mechanism and is taken on the line 8—8 of Figure 6.

Referring to Figure 1, I have illustrated my high pressure barrel pump A as supported in a barrel or drum B of the kind in which lubricant is commonly shipped. The barrel pump is supplied with air under pressure from any suitable source through a conduit C. Interposed between the motor part of the barrel pump and the conduit C are an air strainer D and an air oiler E, both of which may be of any usual construction.

The high pressure barrel pump A is connected to a lubricant discharge conduit F which, in the particular installation shown, leads to a system of piping G attached to the grease rack H or other suitable supporting means for automobiles being lubricated. A flexible conduit I is connected to the piping G, a valve J being located at the point of connection and affording a means for closing communication between the flexible conduit I and the piping G. The flexible conduit I leads to a control valve K which may be of the type disclosed and claimed in the application of Ernest W. Davis and Reuben Wedenberg (Case 12), Serial No. 677,624, filed June 26, 1933.

The control valve K controls the discharge of fluid through the outlet conduit L, having a suitable coupler M adapted for making a lubricant-tight connection with the fittings N attached to the bearings O of the automobile chassis. The control valve K has a pressure release device P to facilitate disconnection of the coupler M from the fittings N.

It is to be understood that the foregoing installation is merely typical of the many different types of installations which may be made. The air supply conduit C and the lubricant discharge conduit F are preferably so attached to the high pressure barrel pump A that they may be quickly disconnected therefrom and reattached thereto so that the pump A may be quickly removed from a barrel from which the lubricant has been exhausted and attached to a new barrel full of lubricant.

Referring more particularly to Figure 2 of the drawings, it will be apparent that the lubricant barrel B is provided with a threaded opening adapted to receive the complementary thread provided on one end of a casting 11 forming an important part of my high pressure barrel pump. A tube 12 depends from the casting 11 to a point adjacent the lower end of the barrel B and carries a low pressure pump cylinder 13. The lower end of the pump cylinder is spaced a short dis-

tance above the lower end of the barrel and carries a suitable screen 14. A valve member 15 normally rests on its seat 16 and has a stem 17 guided in a part 18 which is shown as integral with the cylinder 13. Upward movement of the valve member 15 is limited by the stop 19.

A priming piston 20 is located in the cylinder 13. This priming piston has passageways 21 therethrough and above the piston is a valve member 22 which is confined between the upper end of the piston and a shoulder 23 formed on the piston rod 24. The passageways 21 and valve member 22 permit lubricant to by-pass the piston on its downward stroke and prevent lubricant from by-passing the piston during its upward stroke.

As the piston 20 moves upwardly in its cylinder 13, lubricant is drawn from the barrel past the valve member 15 and into that part of the cylinder 13 below the piston. The lubricant above the piston is forced upwardly through tube 12 and into a passageway 25 formed in the casting 11. The upper end of the passageway 25 connects with a horizontal passageway leading to a third passageway 26 communicating with a large sleeve 27 attached to the lower end of the casting 11. The sleeve 27 extends well down into the barrel B and terminates just above the upper end of the cylinder 13.

A high pressure cylinder 28 is located in the upper end of casting 11 and has ports 29 communicating with a cylindrical enlargement 30 formed in the horizontal passageway which connects the upper ends of the vertical passageways 25 and 26. A piston 31 is reciprocally mounted in the high pressure cylinder 28. A ball valve 32 is located in a chamber at the lower or discharge end of the high pressure cylinder and is urged against said end by a valve spring 33 supported on a plug 34 having an enlarged head 35 provided with cross drills into which the end of a nail or other tool may be inserted for the purpose of unscrewing the plug and for again screwing it back into place.

At one side of this chamber is an outlet normally closed by a bleed screw 36 which is shown as being in the form of an ordinary wing nut having a tapered end normally sealed against a shoulder formed in a tubular plug 37. Any air which may have found its way into the valve chamber can be discharged by simply unscrewing the bleed screw 36 a partial turn, whereupon the air can escape through a groove 38 formed in the threaded part of the screw 36.

A fitting 39 is screwed into the casting 11 and communicates with the opposite side of the valve chamber located at the lower end of the high pressure cylinder. The end 40 of the fitting 39 forms a seat for a discharge valve 41 pressed against said seat by a spring 42 resting on a plug 43 threaded into the opposite end of the fitting 39. The plug 43 has a hexagonal portion 44 adapted to cooperate with a wrench and a knurled cylindrical extension 45 which may be readily gripped by the hand to rotate the plug 43. The valve 41 is relied upon to prevent the high pressure piston 31 from sucking lubricant from the discharge conduit back into the high pressure cylinder during the return stroke of this piston, and it is therefore important that the valve 41 be maintained in good condition.

When the lubricant used is of the cheaper grades or has been carelessly handled, it may contain dirt or lumps which would render the valve 41 inoperative to accomplish its important

function if such dirt or lumps should lodge thereon. I therefore find it important and desirable that this valve 41 be so constructed and arranged that it can be quickly removed and replaced. To facilitate such removal and replacement, the valve 41 is attached to the spring 42 by clamping one end of the spring 42 into a groove formed in the short stem located on the rearward side of the valve 41, and the other end of the spring 42 is similarly engaged in a groove formed in a suitable extension on the plug 43 so that the plug 43, spring 42 and valve 41 constitute an assembly which may be removed and replaced as a unit. It is only necessary that the operator attach a wrench to the hexagonal portion 44 of the plug 43 and give the plug a partial turn with the wrench, after which the plug, with its attached spring and valve, can be quickly removed by gripping the knurled part 45 with the fingers and rotating the plug.

In reassembling the valve mechanism, the plug 45 can be screwed into place simply by gripping the knurled part 45 with the fingers, and it is only necessary to engage a wrench with the hexagonal portion 44 and give a partial turn in order to securely lock the plug 45 and its associated valve mechanism in sealing engagement with the fitting 39.

A nipple 46 is screwed into a threaded opening in the side of the fitting 39, and an elbow 47 on the end of the conduit F is removably attached to the nipple 46 so that the conduit F may be easily disconnected from the pump whenever it is necessary to substitute a new barrel for an exhausted one.

The cylinder 48 of the air motor has a depending bracket 49 secured to the upper end of the casting 11. A piston 50 having opposed cup leathers, is reciprocally mounted in the cylinder 48 and is secured to the upper end of a piston rod 51 projecting through the lower end of the cylinder and through a suitable stuffing box 52. The lower end of the piston rod 51 has a recess which receives and is pivotally connected to the upper end of high pressure piston 31. An arm 53 is clamped between a shoulder provided on the piston rod 51 and a nut 54 and reciprocates with piston 50 and piston rod 51.

The upper end of the piston rod 24, which operates the priming piston 20, is attached to one end of the arm 53. At the point where the upper end of the piston rod 24 projects through the upper end of the casting 11 a seal is effected by a hat-shaped leather gasket 55 which surrounds the piston rod 24 and which is pressed against said rod and a hollow threaded plug 56 by a spring 57 acting on an inclined metal washer 58 which contacts with the lower end of the cylindrical portion of the hat-shaped leather gasket.

The other end of the arm 53 is guided by a pin 59 and has a valve operating extension 60 located between metal washers 61 and 62 slidably carried on valve operating rod 63. A spring 64 is slidably mounted on the valve rod 63 between the washer 61 and an adjustable flange 65 threadedly engaging the valve rod, and a second spring 66 is located between the washer 62 and a second flange 67.

The valve rod 63 extends through a valve chamber 68 provided by a valve casing 69, suitable stuffing boxes 70 and 71 being provided at the points where the valve rod 63 passes through the casing 69 to prevent leakage at these points. The air oiler E is shown as directly threaded into an opening provided by the valve casing 69 and air

under pressure is supplied to the chamber 68 through the oiler E.

The valve rod 63 has a channel 71 formed in one side thereof, in which is located a slide valve 72 which slides over and controls the admission of air to and the discharge of air from the ends of ports formed in a block 73 located between the casing 69 and one side of the motor cylinder 48.

In the position shown in Figure 6, air entering the chamber 68 can freely pass into the port 74 which communicates with the end 75 of a semi-circular groove 76 formed in the adjacent surface of the cylinder 48. The other end 77 of this groove communicates with a port 78 leading to the lower side of the piston 50. The head 79 of the cylinder 48 has a groove 80 which establishes communication between the upper end of the cylinder and a port 81 formed in the cylinder wall. The lower end of port 81 extends laterally and communicates with one end of groove 81a, the other end of which communicates with port 82.

In the present position of the valve 72, the right-hand end of the port 82 communicates through the recess 83 formed in the left-hand side of slide valve 82 with a port 84 having a lateral extension 85 which communicates with atmosphere.

A spool 85 (Figure 6) is secured to the upper end of the valve rod 63, being clamped between a shoulder formed on the upper end of the valve rod and nuts 86. This spool 85 has a deep annular groove 87 and a slightly shallower annular groove 88. Between the annular grooves 87 and 88 is a relatively sharp annular ridge 89.

The spool 85 is engaged by rollers 90 mounted on pins 91 carried in the yoke-shaped ends of levers 92 which are attached to the casing 69 by pivots 93. A spring 94 is attached to extensions 95 provided on said levers 92 and holds the rollers 90 firmly in engagement with the spool 85. In the position shown in the drawings, the rollers 90 are engaged in the upper groove 87 formed in the spool 85.

The reciprocating parts of the mechanism which would otherwise be exposed are preferably covered by housings 96 and 97. These housings give the high pressure barrel pump a more attractive appearance, protect the reciprocating parts from damage, and also prevent the operator from getting his hands into the reciprocating parts of the mechanism and having his hands injured thereby.

In operation, the air under pressure is first cleaned of dirt by the strainer D and is then passed through the oiler E where it picks up enough oil to lubricate properly the parts of the valve mechanism and the piston of the air motor. Entering the chamber 68, the air under pressure is alternately admitted to ports 74 and 82, and alternately acts on opposite sides of the piston 50 to reciprocate said piston and the mechanism operated thereby. The air pressure on the back of the valve 72 is sufficient to maintain the left-hand side of this valve in sealing engagement with the right-hand side of the block 73.

As the piston 50 moves upwardly from its lowermost position, as shown in Figure 2, the extension 60 of the arm 53 also moves upwardly. This carries with it the spring 64 and washer 61, and as this upward movement continues, the upper end of the spring 54 is brought into engagement with and presses against the flange 65 on the valve rod 63.

When the pressure exerted on the spring 64

by the end of the arm 53 is sufficient to overcome the force with which the spring 94 causes the rollers 91 to engage the groove 87 in the spool 85, the valve rod and spool 85 move upwardly and the rollers 91 are forced outwardly over the annular ridge 89 and into the annular groove 88. This movement of the valve rod shifts the valve 72 from the position shown in the drawings to its upper position where it establishes communication between the ports 74 and 84 and permits air under pressure to enter the port 82, thereby reversing the motion of the piston 50.

On the succeeding downward motion of the piston, force is exerted on the valve rod through arm 53, spring 66 and flange 67, and at the lower end of the stroke of the piston 50 the slide valve and valve rod 63 are again shifted to the position shown in the drawings. The relatively sharp edge of the ridge 89, together with the force stored up in either the spring 64 or the spring 66, insures that the slide valve 72 will make a full stroke and that the air motor will not stall with the valve in mid position.

During the upward movement of the priming piston 20, the lubricant in the cylinder 13 above said piston is forced upwardly through tube 12 and passageway 25 to the ports 29 leading into the high pressure cylinder. During most of the upward stroke of the priming piston 20, lubricant cannot enter the high pressure cylinder through the ports 29 because the high pressure piston 31 closes said ports to the admission of lubricant. During this part of the stroke of the priming piston 20, however, a volume of lubricant many times the volume of the high pressure cylinder is forced through the annular passage surrounding the ports 29 and back through passageway 26 and sleeve 27 to the lower portion of the barrel B. This large flow of lubricant past the ports 29 carries away from said ports any air bubbles which might otherwise tend to collect thereat, and thus insures a large and air-free supply of lubricant for the high pressure cylinder as soon as the ports 29 are uncovered by the upward movement of the high pressure piston 31.

As the priming piston 20 moves upwardly in its cylinder 13, the cylinder below the piston is filled with a fresh charge of lubricant drawn through the strainer 14. On the following down stroke of the priming piston 20, the valve 15 closes and the lubricant between this valve and the priming piston 20 by-passes the priming piston and assumes a position above said piston.

This downward stroke of the priming piston 20 is accompanied by a downward stroke of the high pressure piston 31 which forces the lubricant in the high pressure cylinder 28 past the check valve 32 and into the chamber located therebeneath. At the same time a corresponding quantity of lubricant is discharged from this chamber past the check valve 41 and into the lubricant line leading to the bearing being lubricated. On the succeeding upward stroke of the high pressure piston the valves 32 and 41 close and prevent lubricant from being drawn back into the high pressure cylinder from the discharge conduit.

When my high pressure barrel pump is first placed in use or when, for any other reason, the high pressure cylinder has become filled with air, this air may be discharged through the bleed screw 36 as previously described.

While I have illustrated and described only a single form of my invention, it is to be understood that my invention may assume numerous forms

and that the scope of my invention is limited solely by the following claims.

I claim:

1. In a barrel pump of the class described, the combination of a large volume priming cylinder adapted to be located adjacent the bottom of a barrel, a high pressure cylinder located outside of said barrel, conduit means establishing communication between said cylinders, means for returning excess lubricant discharged from said priming cylinder to said barrel, pistons reciprocable in said cylinders, and a single motor for operating both of said pistons.
2. In mechanism of the class described, the combination of a priming cylinder adapted to be located adjacent the bottom of a lubricant container, a high pressure cylinder located outside of said container, said high pressure cylinder having an inlet, means providing a conduit receiving the discharge from said priming cylinder passing by said inlet in communicating relation thereto and returning to a point adjacent the bottom of said container, pistons reciprocable in said cylinders, and means for operating said pistons.
3. In mechanism of the class described, a unitary high pressure barrel pump comprising a priming cylinder adapted for location adjacent the bottom of a barrel, a high pressure cylinder entirely outside of said barrel, means providing a loop-shaped conduit having one end connected to said priming cylinder, a second end communicating with the interior of said barrel at a point adjacent the bottom thereof and an intermediate portion communicating with said high pressure cylinder, pistons reciprocably mounted in said cylinders, and means for reciprocating said pistons.
4. In a high pressure barrel pump of the type described, the combination of a casting having a part adapted to fit the opening in a lubricant container, said casting having a high pressure cylinder formed therein, said cylinder being located outside of said container, a tube attached to and depending from said casting, a priming cylinder supported on the lower end of said tube and adapted to be located adjacent the bottom of said container, said casting having a loop-shaped passageway formed therein, one end of said passageway communicating with said tube, a piston in said priming cylinder, a piston rod for said piston extending through said tube and a part of said loop-shaped passageway, a second tube depending from said casting into said barrel, said second tube being in communication with the other end of said passageway, said passageway communicating with said high pressure cylinder, a piston reciprocable in said high pressure cylinder, a discharge conduit communicating with said high pressure cylinder, and motor means for reciprocating said high pressure piston and said piston rod.
5. In a barrel pump of the class described, the combination of a casting having a high pressure cylinder located therein, said casting adapted for attachment to the opening in a lubricant container, a priming cylinder depending from said casting and located adjacent the bottom of a container, conduit means connecting said cylinders, a motor cylinder supported on said casting valve mechanism for said motor cylinder including a slide valve, pistons in said cylinders, and means connecting said pistons and slide valve so that all move in the same direction simultaneously.
6. In mechanism of the class described, the

- combination of a high pressure cylinder, a second cylinder for priming said high pressure cylinder, pistons reciprocably mounted in said cylinders, a motor cylinder, a piston reciprocable in said motor cylinder, means connecting said pistons to operate in unison, valve means including a slide valve for admitting fluid under pressure to said motor cylinder, and means for moving said slide valve in the same direction as said motor piston.
7. In mechanism of the class described, the combination of a part providing a high pressure cylinder and adapted for attachment to a lubricant container, a priming cylinder carried thereby and located adjacent the bottom of said container, each of said cylinders having inlets and outlets, the inlet of the high pressure cylinder being in communication with the outlet of the priming cylinder, said high pressure cylinder being located above said container, a motor cylinder supported on said part and being in substantially axial alignment with said high pressure cylinder, a piston reciprocable in said last-named cylinder, a piston rod reciprocable with said piston, a high pressure piston in said high pressure cylinder, a flexible connection between said piston rod and said high pressure piston, a priming piston reciprocable in said first-mentioned cylinder, a piston rod therefor, an arm attached to and reciprocable with said first-mentioned piston rod, said arm being connected to the piston rod for reciprocating said priming piston, valve mechanism including a slide valve for controlling the admission of fluid to said motor cylinder, a rod attached to and reciprocable with said slide valve, and means providing a yielding abutting connection between said rod and said arm.
8. In mechanism of the class described, a sleeve having a high pressure cylinder bore, a piston reciprocable therein, said sleeve having inlet ports intermediate its ends, means providing a conduit communicating with said ports and having a cylindrical portion of greater diameter than said sleeve and surrounding said sleeve opposite said ports, means for supplying lubricant to one end of said conduit in far greater quantities than needed by said high pressure cylinder, said conduit extending beyond said cylindrical portion and communicating with a container for receiving the excess of lubricant supplied to said high pressure cylinder, means for reciprocating said piston, and a discharge conduit communicating with said cylinder.
9. In mechanism of the class described, means providing a conduit having an intermediate portion communicating with a cylinder and end portions located below said intermediate portion, a sleeve extending across said intermediate portion of said conduit, said sleeve having a high pressure cylinder bore and inlet ports therefor located in said intermediate portion of said conduit, said intermediate portion of said conduit being of greater cross section than said sleeve and providing a passageway therearound, a piston located in said cylinder bore, means for reciprocating said piston, a discharge pipe communicating with said cylinder bore, a valve in said discharge pipe, and means for supplying fluid to one end of said conduit in much greater quantities than required by said high pressure cylinder.
10. In mechanism of the class described, the combination of a low-pressure cylinder having an inlet and an outlet, means providing a discharge conduit communicating with said outlet, said discharge conduit including a loop-shaped por-

tion, a high-pressure cylinder communicating with said conduit, said high-pressure cylinder having an outlet located in said loop-shaped portion, pistons in said cylinders, and means for operating said pistons.

11. In mechanism of the class described, the combination of a high-pressure cylinder, a low-pressure cylinder, said latter cylinder having an inlet and an outlet, means providing a conduit communicating with said outlet, said conduit having a loop-shaped portion, said high-pressure cylinder intersecting and communicating with said conduit and having an outlet located in the center of the loop formed by said loop-shaped portion, pistons reciprocable in said cylinders, and means for reciprocating said pistons.

12. Compressor mechanism adapted for attachment to the circular wall of the small opening ordinarily provided in lubricant shipping containers, comprising a casting having a part adapted for attachment to said wall, a priming cylinder depending from said casting and of such size that it will pass through said opening, said priming cylinder having an inlet and an outlet, means including said casting providing a conduit communicating with said outlet, a high-pressure cylinder located in said casting and communicating with said conduit, said high-pressure cylinder having an outlet, pistons in said cylinders, and a double acting motor carried by said casting for operating said pistons.

ERNEST W. DAVIS.