Dec. 11, 1945. C. E. FITCH 2,390,831

HAND OPERATED TANK LUBRICATOR

Filed June 23, 1942 3 Sheets-Sheet 1

Fig. 1.

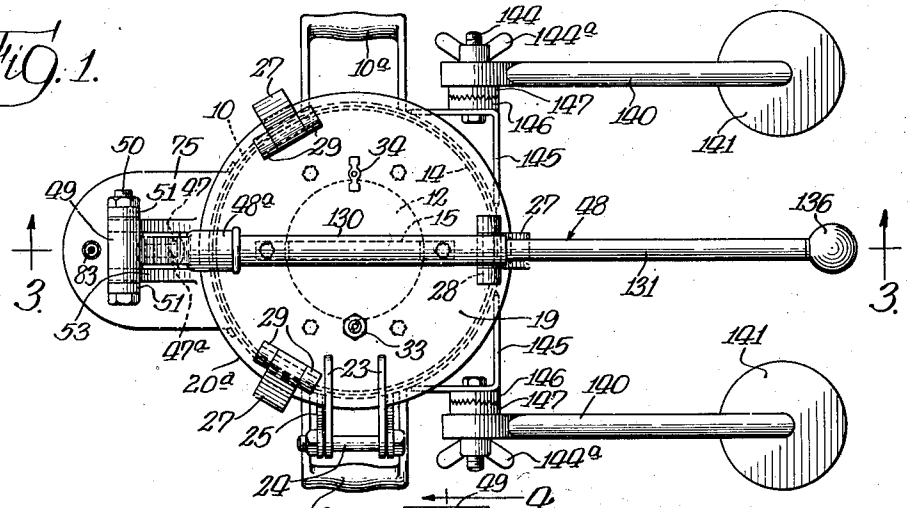

Fig. 2.

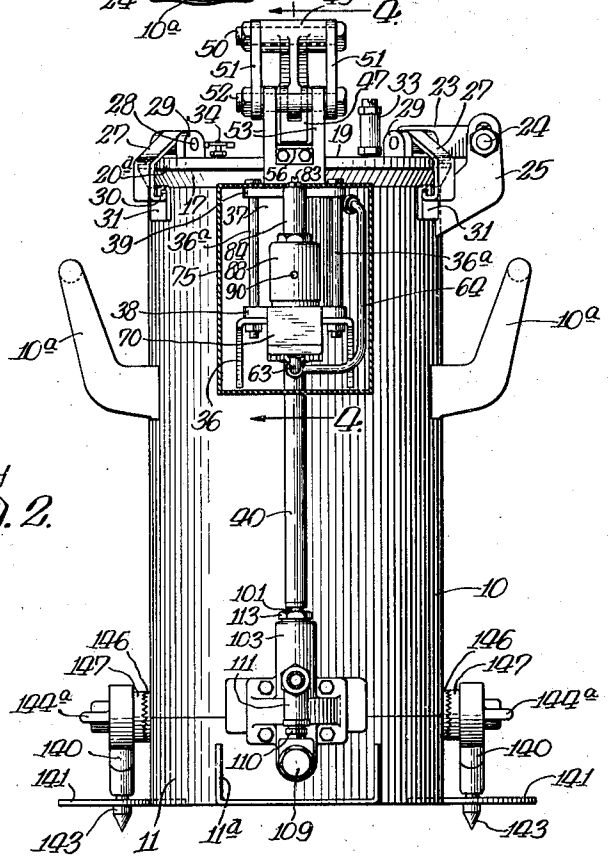

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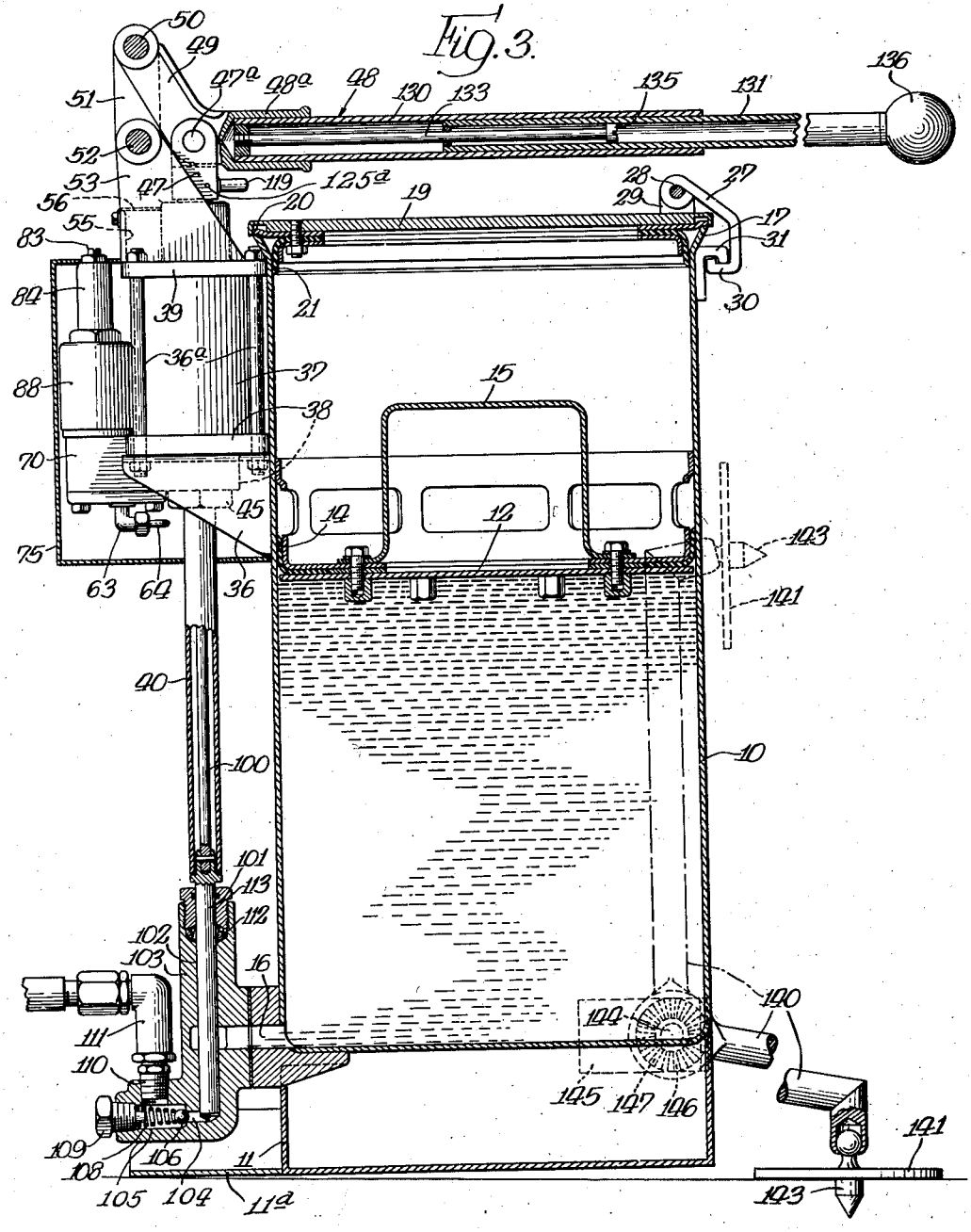
Fig. 3.



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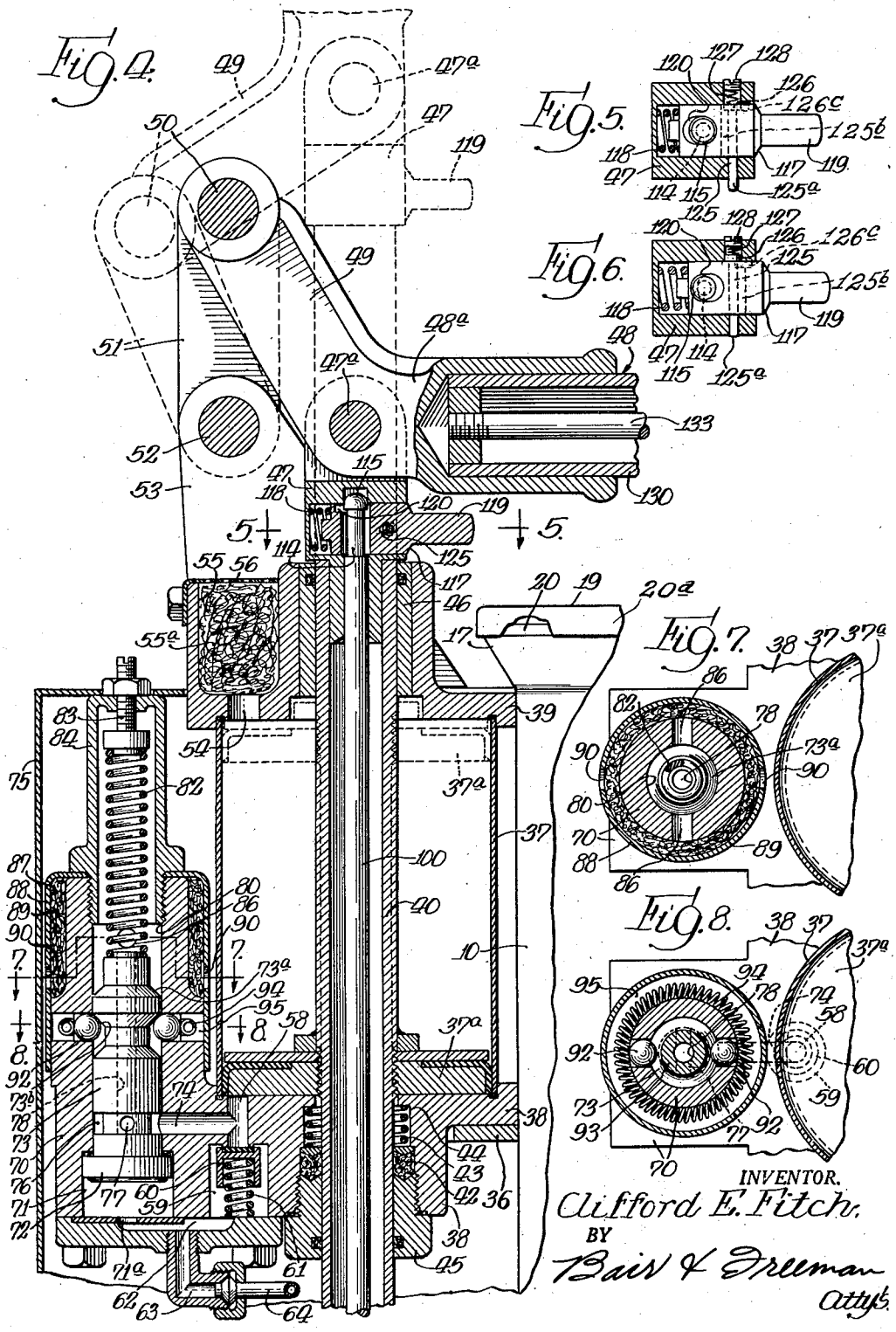

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UNITED STATES PATENT OFFICE

2,390,831

HAND OPERATED TANK LUBRICATOR

Clifford E. Fitch, Bryan, Ohio, assignor to The Aro Equipment Corporation, Bryan, Ohio, a corporation of Ohio

Application June 23, 1942, Serial No. 448,120

16 Claims. (Cl. 222—262)

The present invention relates to lubricant dispensing apparatus, and more particularly to a portable hand-operated tank lubricator unit, in which air pressure is applied to a follower acting on a head of lubricant, such as grease, in a dispensing chamber, and wherein a pump is utilized for forcibly displacing the grease dispensed from the chamber.

One of the objects of this invention is to provide an improved lubricator apparatus of the character indicated, which is of compact construction, adapted for expeditious and efficient dispensing of lubricants, particularly greases, and which apparatus is capable of being economically manufactured.

A further object is to provide an improved lubrication apparatus of the character indicated, including novel pumping mechanism constructed and arranged for constantly and automatically maintaining relatively uniform air pressure acting on a follower in the storage compartment, containing heavy lubricant, and also serving as the means for forcibly discharging the lubricant dispensed from the storage compartment.

A further object is to provide an improved lubrication apparatus of the character indicated, characterized by the provision of novel pumping mechanism constructed and arranged for constantly and automatically maintaining a relatively uniform head of air pressure on a follower in a storage compartment containing heavy lubricant, and which also serves as the medium for forcibly discharging the lubricant dispensed from the compartment, together with the provision of means for varying the effective range of predetermined air pressure developed by the pumping mechanism for acting upon the follower.

Still another object is to provide an improved lubrication apparatus of the character indicated characterized by the provision of a novel form of pumping apparatus constructed and arranged for constantly and automatically maintaining relatively uniform air pressure acting on a follower in a storage compartment, containing heavy lubricant, and serving also as the means for forcibly discharging the lubricant dispensed from the compartment, together with means for by-passing air supplied by the pumping mechanism, when a predetermined pressure in the compartment has been attained, so as to permit full utilization of energy for pumping the lubricant, as it is dispensed from the compartment.

A still further object of this invention is to provide a novel and improved safety cover construction for receptacles or compartments containing fluid pressure, so that opening of the cover is precluded until the pressure within the receptacle or storage compartment is reduced to substantially atmospheric pressure.

Still a further object of this invention is to provide a novel form of stabilizing means for maintaining the portable lubricating apparatus in a relatively stationary position during operation thereof.

With these and other objects in view, my invention consists in the construction, operation and combination of the various parts of my apparatus, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawings, in which:

Figure 1 is a plan elevation of the novel lubrication apparatus embodying the present invention;

Figure 2 is a rear elevational view thereof;

Figure 3 is a vertical section through the apparatus, taken as indicated at line 3—3 on Figure 1;

Figure 4 is an enlarged, fragmentary vertical section through the pumping apparatus, taken as indicated at line 4—4 on Figure 2;

Figure 5 is a transverse sectional view through the control means for the lubricant pump, in an inoperative position of adjustment, taken substantially as indicated at line 5—5 on Figure 4;

Figure 6 is a sectional view similar to Figure 5, but showing the control means in an operating position of adjustment; and

Figures 7 and 8 are transverse sectional views through a portion of the pumping apparatus, taken as indicated substantially at lines 7—7 and 8—8 respectively on Figure 4.

The lubricant apparatus illustrated in the drawings is of the portable unitary type, which may be physically carried from place to place, or may be mounted upon a wheeled dolly for convenient movement from place to place.

As seen in the drawings, the apparatus includes a storage compartment or receptacle 10, in the form of a cylinder, which is disposed in upright position for use, and provided at opposite sides with a pair of handles 10a for conveniently lifting and carrying the entire apparatus.

Formed as an extension of the lower end of the receptacle 10 is an auxiliary cylindrical body 11, which is secured to the lower end of the receptacle in any convenient manner, such as by welding, and which constitutes the supporting base for the apparatus.

Mounted for vertical sliding movement within

the receptacle is a follower 12 of generally disc form, the outer marginal edge of which is provided with a flexible, dish-shaped gasket member 14 for insuring snug sealing engagement of the follower with the interior wall of the receptacle. The follower rests directly upon the body of lubricant in the receptacle, and, as shown in Figure 3, corresponds to a position at which it is supported by the body of lubricant. Connected to the upper surface of the follower is a handle member 15, which permits convenient removal of the follower when it is desirable to replenish the supply of lubricant in the receptacle 10.

The lower end of the storage receptacle is provided with an outlet 16 adjacent the bottom thereof, and said outlet, as will hereinafter be described, directly communicates with a pumping apparatus by which the lubricant is forcibly discharged.

The upper end of the receptacle is open, and the marginal portion of the wall of the storage receptacle, at said open end, terminates in an outwardly extending flare, as indicated at 17, in Figure 3 of the drawings. The upper end of the receptacle is adapted to be closed and sealed by a novel cover construction, including a main cover element 19, to the under surface of which, at the outer marginal edge thereof, is applied a flexible seal 20, the outer marginal portion of which is adapted to overlie, in abutting relation, the upper edge of the flared portion 17 of the upper end of the receptacle. The marginal edge of the cover element 19 terminates in a depending skirt 20a, dimensioned for telescopically overlapping the outer edge of the flexible seal 20, and the upper flared portion 17 of the receptacle, as seen in the drawings, to serve as a seal against dust and dirt. An inverted, annular cup-shaped seal of flexible material, as indicated at 21, is mounted beneath the seal 20, as seen in Figure 3 of the drawings, and is positioned for a snug sealing engagement with the inner wall of the receptacle 10.

The cover is hingedly connected to the receptacle 10, and is provided with a pair of laterally extending, spaced apart arms 23, the outer ends of which are pivotally connected by a bolt 24 to a pair of upstanding lugs 25 connected to the external surface of the receptacle 10, adjacent the upper end, as seen in the drawings.

It is to be understood that the follower 12 is placed in the receptacle 10 so as to rest directly upon the head of lubricant stored therein, and, as will hereinafter be described, air under pressure is introduced in the upper portion of the receptacle above the follower so as to cause the follower to exert a substantial pressure upon the body of lubricant in the receptacle, causing it to flow through the discharge outlet 16.

The cover 19 is adapted to be locked in sealing engagement with the upper end of the receptacle 10 by a novel form of safety device. As seen in the drawings, the cover is engaged by three circumferentially spaced apart locking devices, each of which includes a locking member 27 pivotally connected by a pin 28 to a pair of spaced apart ears 29, secured to the upper surface of the cover 19, as seen in the drawings. The locking member 27 terminates at its lower end in a hook-shaped portion 30, as seen in Figure 3 of the drawings, and is adapted to be swung into cooperating relation to an oppositely-formed, hook-shaped member 31, with the terminal ends of the hook-shaped portion 30 of the member 27 and of the member 31 disposed in position for interlocking engagement with each other.

When the receptacle 10 is vented to atmosphere, and the cover 19 placed in position thereon, the pivoted locking members 27 are swung downwardly so as to cause the hook portions 30 to pass beneath the cooperating ends of the hook members 31. In such position of the cover, the sealing members 20 and 21 are operative to effectively seal the receptacle. Then air under pressure is admitted to the upper end of the receptacle, above the follower 12, and reacts to exert a pressure upon the follower and the under side of the cover 19, tending to raise the latter with respect to the receptacle 10, and thereby disposing the locking members 27 in an interlocked relationship to the members 31, as seen in Figure 3 of the drawings. Under such conditions it is impossible to inadvertently open the cover 19 when the receptacle 10 is under pressure. The cover 19 can only be opened when the air pressure within the receptacle is reduced substantially to atmosphere, so as to permit the operating ends of the hook portions 30 of the locking members 27 to be swung clear of the operating ends of the cooperating hook members 31.

Mounted on the cover 19, in communication with the interior of the receptacle, is a relief valve 33 which is adapted to be adjusted so as to serve as a safety valve in the event of failure of operation of the other mechanism, hereinafter to be described, which would tend to cause the pressure in the receptacle, above the follower, to build up in excess of a predetermined amount.

There is also provided on the cover 19, in communication with the interior of the receptacle, a hand-operated relief valve 34, which, when operated, immediately relieves the pressure within the receptacle so as to permit disengagement of the locking members 27 from the cooperating members 31, preparatory to opening of the cover 19.

The pumping mechanism is mounted against the rear external wall portion of the receptacle 10, and is supported on a bracket 36 secured to the receptacle. The pumping mechanism includes an air cylinder 37 disposed in upright position, seated in sealing engagement at its lower end in a base casting 38, and its upper end is closed by a head 39. The cylinder, base and head are rigidly connected together and connected to the support 36 by bolts 36a. Mounted within the cylinder 37 is a piston 37a connected to a vertically reciprocable operating tube 40 which extends downwardly through the base 38 and is sealed thereat against air leakage by a packing gland including a compressible body 42 seated against a coil spring 43, disposed in a recess 44 formed in the support 36. The body of compressible material 42 is held against the spring by a nut 45. The upper end of the tube 40 is slidably guided in a journal bearing 46 in the head 39, and fixedly secured in the upper end of the tube is a slidable portion of a clevis 47, the upper end of which straddles and is pivotally connected at 47a to a handle socket fixture 48a of a manually operable handle 48, which normally extends in horizontal direction, over the receptacle, as seen in Figure 3 of the drawings.

The handle socket includes an extension 49, which is pivotally connected at its outer end by a bolt 50, between a pair of upwardly extending toggle links 51, the lower ends of which are pivotally connected by a bolt 52 to a pair of spaced ears 53, extending upwardly from the air cylinder head 39.

It will now be apparent that by rocking the

pump handle 48 about its pivot 47a, in a vertical plane, causes raising and lowering of the piston 37a in the cylinder 37. Air is admitted into the cylinder 37 through a duct 54 communicating with an air cleaning chamber 55 formed in the head 39. Said chamber is provided with a filter of suitable material, as indicated at 55a, for removing solid particles from the air. The upper end of the chamber 55 is closed by an apertured or reticulated cover plate 56.

Air is discharged from the lower end of the cylinder 37, through a duct 58 formed in the base 38. The opposite end of the duct connects into a chamber 59, and is controlled by a valve member 60, yieldingly urged to closed position by a coil spring 61. The valve 59 serves to control communication between the lower end of the duct 58 and a passageway 62, the latter being connected, intermediate its length, to a passageway 63 which is in direct communication with a conduit 64. The other end of the conduit 64 is connected to the interior of the receptacle 10, adjacent the upper end. It is by virtue of these ducts and passageways that air is supplied under pressure to the interior of the receptacle 10, above the follower 12. It is to be understood that the valve 60 is normally closed and is caused to open when the piston 37a compresses the air in the cylinder 37, until the pressure within the receptacle 10 reaches a predetermined amount. When the air pressure in the receptacle reaches a predetermined amount the valve 60 will not be opened, and the air compressed by piston 37a will be by-passed, as will now be described.

The mechanism for by-passing air when the air pressure within the head of the receptacle 10 reaches a predetermined amount, includes a housing 70, formed as an integral part of the base 38, in the lower end of which is formed a cylinder chamber 71, the lower end of which communicates, through aperture 71a, directly with the passageway 62. Reciprocably movable in the chamber 71 is a piston 72, formed on the lower end of a vertically movable, two-position control member 73.

An auxiliary or by-pass duct 74 is connected to the duct 58, and is normally sealed, at the opposite end, during the time that the air in the head of the receptacle 10 is being built up to a predetermined pressure. When the air pressure within the receptacle reaches a predetermined value, the control member 73 moves to the position seen in Figure 4 of the drawings, at which position the by-pass duct 74 is in full registration with an annular channel 76, formed about the control member 73. Said channel is always in communication with a radial duct 77, which opens into a centrally disposed vertical duct 78, formed in the control member 73, and which latter duct opens at its upper end into a chamber 80.

The control member 73 is normally, during the time that the pressure in the receptacle 10 is being built up, held in a position in which the piston 72 seals the aperture 71a, and at which position of adjustment the end of the duct 74 is likewise sealed by the control member. Said control member is held in such position of adjustment by a coil spring 82, the lower end of which is seated on the upper end of said member 73, and the upper end of which is seated against an adjustable screw 83, threaded into a hollow tubular body 84, having a threaded connection with the upper end of the housing 70. The screw 83 is slotted at its upper end for receiving a screw driver for conveniently threading it in or out for varying the pressure exerted by the coil spring 82. In other words, the pressure exerted by the coil spring 82 determines the approximate amount of pressure of air to be built up in the receptacle 10.

The upper end of the body 70, surrounding the chamber 80, is provided with a pair of passageways 86, providing communication between the chamber 80 and a breather chamber 87, which is formed by a cup-shaped housing 88 surrounding the upper end of said member 73. A filter of suitable material, as indicated at 89, is disposed in the chamber 87 for the purpose of collecting and removing particles of solid matter from the air. The breather chamber 87 is vented to atmosphere through a pair of apertures 90.

It is highly desirable that the control member 73 be moved with a snap action so as to yieldingly maintain the control member at either of its two limiting positions of vertical adjustment. This will eliminate the constant opening and closing of the ducts 58 and 74, due to variation in the pressure in the receptacle 10. For this purpose, the control member is provided with two axially and vertically spaced apart, oppositely disposed frusto-conical surfaces 73a and 73b, which serve as cams for cramping the member 73 to its respective positions of adjustment. A pair of metal balls or detents 92 are disposed within apertures formed in the body member 70 in position to engage said surfaces. Said balls are held yieldingly inwardly by an annular coil spring 94, disposed in an annular groove 95 in the body member 70, as seen in Figure 4.

It will now be apparent that as the control member 73 moves from its lowermost position to the position seen in Figure 4 of the drawings, the metal balls 92 are pressed outwardly and are held in an outward position beyond the wall of the cavity in which said member 73 moves, until the clearance or notch portion of the control member, adjacent the frusto-conical surface 73b, comes into registration with the balls so that the balls then yieldingly engage said frusto-conical face 73b and thereby retain the control member in the raised position seen in Figure 4 of the drawings.

When the control member moves downwardly, the reverse action takes place until the balls 92 engage the frusto-conical face 73a and thus tend to cramp the control member in a downward position within the cylinder 72, sealing the aperture 71a, and, at the same time, the body of the control member serves to seal the duct 74.

The air pump and associated control members are totally enclosed in a sheet metal housing 75, connected at its vertical edges to the external wall of the receptacle 10.

The apparatus thus far described relates to the control apparatus for automatically maintaining a predetermined air pressure in the receptacle 10 for acting upon the follower 12, and which, in turn, exerts pressure on the body of lubricant within the receptacle for forcing it through the outlet 16. As is well known, the apparatus thus far described in itself is insufficient to exert adequate pressure on the body of heavy lubricant, such as heavy grease, for forcibly dispensing the grease through conduits, for use in lubricating other apparatus. Hence, a separate grease pump is incorporated in this apparatus, and includes a vertically disposed operating rod 100 enclosed within the air pump tube 40. The lower end of the rod terminates in an

elongated solid piston 101 slidably movable in a cylinder in the form of a duct 102, formed in a fixture 103, secured to the lower portion of the receptacle 10, and which includes the outlet duct 16 communicating with the interior of the receptacle 10. The cylinder or duct 102 intersects the duct 16 and communicates at its lower end with a passageway 104 terminating in an enlarged cavity 105. Disposed in the cavity 105 is a ball check valve 106 normally held seated by a spring 108 reacting against a threaded plug 109. Communicating with the chamber 105 is a fitting 110 which is connected to a conduit 111, the free end of which, it may be understood, is provided with a suitable fixture, not shown, through which the grease is forcibly discharged. The upper end of the fixture 103, surrounding the piston 101, is provided with a packing gland including a compressible body 112, held firmly in position in sealing engagement with said piston by a hollow screw plug 113.

The upper end of the pump rod 100 is reduced, as indicated at 114, to form a head 115. Mounted within a cavity formed within the clevis 47 is a control member 117, surrounding the reduced portion 114 of said rod, and normally urged to the position, seen in Figures 4 and 5 of the drawings, by a coil spring 118.

The control member includes a finger-piece 119 for conveniently moving the control member inwardly in a horizontal direction for effecting disengagement of operating connections with the pump rod 100. The upper face of the control member is recessed to provide a crescent-shaped shoulder 120, which normally, in one position of adjustment of the control member, as seen in Figures 4 and 5, is out of engagement with the underside of the head 115 of the pump rod, so that the pump rod remains stationary while the handle 48 may be oscillated for imparting vertical reciprocable movement to the tube 40 and its associated piston 37a of the air pump.

The control member is provided with a transversely extending pin 125 cooperating with the walls of the clevis 47. Said pin is provided with a head 126 engaging the end of a coil spring 127, disposed in a recess formed in the wall of the clevis member, the spring being held captive by a cap screw 128. The control member is formed with an opening 125b of elongated cross-section, terminating in a recess 126c into which the head 126 of said pin may be seated. Said opening permits a limited range of horizontal movement of the control member 117 relatively to said pin 125. The head 126 of said pin is normally seated in recess 126c, as seen in Figures 4 and 5 of the drawings, at which position the head 115 of the pump rod 100 is disengaged.

When it is desired to engage the pump rod, so as to operate the grease pump piston 101, the projecting end 125a of the pin 125, as seen in Figure 5, is pressed inwardly by the finger, so as to move the head 126 into the cavity of the spring 127, as seen in Figure 6 of the drawings, at which time the control member 117 is projected forwardly by the action of the coil spring 118, so as to dispose the crescent-shaped shoulder 120 in a position to engage beneath the head 115 of the pump rod. This position of the control member 117 may be assumed, even when the pump handle and control member are in raised position, so that, upon downward movement, the control member engages the head 115 of the pump rod in camwise action until the shoulder 120 is in position to snap into operating position beneath said head 115, under control of spring 118. In such position of adjustment of the control member it will be apparent that upon continued operation of the handle 48 the grease pump piston 101 will be operated simultaneously with the air piston 37a. When it is desired to disengage the grease pump it is merely necessary to grasp the finger-piece 119 and push the control member 117 inwardly against the reaction of coil spring 118, until the recess 126c is aligned with the pin head 126, at which time the spring 127 will project pin 125 outwardly into latching engagement in the recess 126c to hold the control member in latched position, as seen in Figure 5 of the drawings.

For convenience in use, the operating handle includes a pair of telescoping tubular members 130 and 131, the former being fixedly connected to the handle socket fixture 48a. A rod 133 is fixedly connected in the extreme inner end of the tube 130 and is slidably mounted in the adjacent end of the tube 131, and is provided with a head 135 for limiting the extent of outward telescopic relationship of the tubes. The outer end of the tube 131 is provided with a hand grip 136 in the form of a ball for convenience in operating the handle.

It will now be apparent that by virtue of the novel handle construction it is possible, when not in use, to be collapsed in a relatively compact relationship to the general over-all dimensions of the entire apparatus, and when in use, the handle may be extended a substantial distance forwardly of the receptacle so as to provide adequate leverage in the operation of the air and grease pumps.

As is well known, due to the nature of apparatus of this type, substantial force is required in operating the pump handle, particularly in discharging heavy grease, and there is a tendency in the application of pressure to the handle to cause tilting or rocking of the total apparatus. To insure adequate stability of the entire apparatus during the time it is being operated, I provide a novel form of stabilizing means in the nature of a three-point support, including a fixed foot 11d, formed as a channel and secured to the rear side of the base 11, with the web thereof disposed substantially flush with and constituting an extension of the bottom of said base, and a pair of legs 140, the outer ends of which are swivelly connected to flat-faced discs 141. The under surfaces of the discs are provided with taper-pointed bodies 143, for conveniently engaging into the ground for rigid anchorage. As seen in the drawings, these legs are mounted at opposite sides of the storage receptacle 10, and their inner ends are pivotally connected by wing nut bolts 144 to brackets 145 connected to the receptacle 10.

Rigidly connected to the outer faces of said brackets are locking members 146, disposed adjacent one side of the ends of said legs. The cooperating faces of the leg members and locking members are each provided with a series of radial serrations 147, adapted to intermesh to hold the legs at any desired position of pivotal adjustment by merely tightening the wing nuts 144a. Preferably, the legs are disposed in an operating position, as seen in Figure 3 of the drawings, with the forward end of the base 11 elevated so that said foot 11d, together with the discs 141, constitute a three-point support for the apparatus, to maintain it in relatively stable con-

dition while in use. Said legs may be swung upwardly into inoperative position, adjacent the receptacle 10, as indicated in dot-and-dash outline in Figure 3 of the drawings, permitting the apparatus to rest upon the bottom of its base 11, and also rendering the entire apparatus convenient for movement from place to place.

The operation of the apparatus is as follows:

After the receptacle 10 is filled to a suitable level with lubricant, such as heavy grease, the follower 12 is placed in position and the cover 19 moved to a closed sealing position on the receptacle, and the locking members 27 are disposed in a position to interlock with their cooperating members 31. The stabilizing legs may, if desired, be placed in operating position for maintaining the apparatus relatively stable. The pump handle is then preferably extended and vertically oscillated. This action first operates the air piston 37a for forcing air through the duct 58 and opening the valve 59, because the duct 74 is sealed at this time. The air then passes into the chamber 59 through the ducts 62 and 63 into the conduit 64, which communicates directly with the upper end of the receptacle 10 above the follower. As the air pressure builds up in the upper end of the receptacle 10, the cover becomes positively locked in a sealed position. During the time that the air pressure is being built up in the receptacle 10, air pressure acting through the duct 62 and the aperture 71a is reacting against the bottom of the piston 72. As the pressure in the tank tends to equalize the pressure exerted by the coil spring 82, the control member 73, by the action of air pressure on the bottom of piston 72, moves upwardly until the detent balls 92 ride into engagement with the frusto-conical surface 73b, thus tending to hold the control member 73 in such raised position as seen in Figure 4 of the drawings. When this occurs, the duct 74 is then in open communication with the annular duct 76, so that the air is by-passed from the cylinder 37 to the atmosphere. This is the result of the direct communication of the annular duct 76 with the axial duct 77, which opens into the chamber 80, and the latter communicating through ducts 86, and the air filters directly to the exterior through the vent apertures 90.

Thus, when the air within the receptacle has attained a predetermined pressure, any further action of the air pump merely by-passses the air.

When the pressure in the receptacle is reduced to a predetermined amount, such as by equilization of pressure incident to discharge of lubricant from the storage receptacle, the operation of the control apparatus, while the handle 48 is being operated, becomes operative and moves the control member 73 from the position seen in Figure 4, downwardly, causing the piston 72 to seal the aperture 71a, and thus simultaneously the duct 74, thereby permitting re-establishment of communication for passage of compressed air into the upper end of the storage receptacle.

When the air is being by-passed, the air filters 55a and 89 merely serve as breathers, the air being drawn in and pushed out through these filters incident to the action of the piston 37a.

When it is desired to pump grease, the pin 125 is first pushed inwardly to release the control member 117 to assume a position as seen in Figure 6, adapted to be operatively engaged with the pump rod 100, by engagement of the crescent-shaped shoulder 120 beneath the under side of the plunger head 115. Vertical oscillation of the handle with the control 117 in such position, in addition to pumping air, also imparts vertical reciprocation to the grease pump piston 101 for forcibly feeding the heavy lubricant through the check valve and into the supply conduit 111 for dispensing the same.

During the action of the grease pump, the air pump continues to function, so that when the pressure of air in the receptacle 10 recedes to a predetermined amount, the controls automatically become adjusted for re-establishing communication between the air pump and the receptacle for again building up the air pressure in the receptacle to the predetermined value.

It is by virtue of this construction that it is possible at all times to maintain a relatively uniform pressure of air in the lubricant receptacle chamber, without any thought on the part of the operator, after the apparatus has once been properly set and adjusted.

A further advantage of the interlocking pump relationships is that when the predetermined pressure exists in the receptacle 10 the full energy of the operator is free to be utilized in the operation of the grease pump for efficiently and expeditiously discharging the heavy grease through the supply conduit 111.

Some changes may be made in the arrangement and construction of the various parts of my lubricant discharging apparatus without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims, any modified forms of construction or use of mechanical equivalents, which may be reasonably included within their scope.

I claim as my invention:

1. In a tank lubricator, the combination of a storage receptacle for a body of lubricant and adapted to be sealed to atmosphere, a follower seated upon the head of lubricant, an air pump including conduit connections for supplying compressed air to the upper end of the receptacle for building up pressure therein and causing the follower to exert pressure on the body of lubricant, tending to discharge the same through an outlet from the receptacle, a grease pump operatively associated with the discharge outlet of the receptacle, and means for operating the grease pump including detachable connections to said air pump for selective simultaneous operation of both of said pumps or of said air pump alone.

2. In a tank lubricator, the combination of a manually operated air pump including conduit connections for supplying compressed air to a receptacle or the like, and automatic control means for by-passing the air from the conduit when the air in the receptacle attains a predetermined pressure, and re-establishing operative connections for supplying air to the receptacle when air in said receptacle recedes to a second and lower predetermined pressure, said control means including a movable body adapted to assume either of two limiting positions of adjustment and adapted at one position to seal the by-pass of air from the conduit, said body having a piston at one end movable in a cylinder, one end of the cylinder being connected by a passageway to said conduit to permit exertion of pressure against the piston substantially equal to the air pressure in the receptacle, and resilient means for yieldingly opposing movement of the body and piston in one direction, a yielding means opposing movement of said body and piston in either direction said body and piston being moved by such exerted pressure in opposition to said resilient means plus the force of said

yielding means to the other limiting position of movement when the pressure in the receptacle exceeds the force of said resilient means, to establish the by-pass of air from the conduit to atmosphere, and said body and piston being moved to said one limiting position of movement by said resilient means when the pressure in the receptacle is reduced to less than the force of the resilient means plus the force of said yielding means.

3. In a lubricator, the combination of a manually operated air pump including conduit connections for supplying compressed air to a receptacle or the like, and automatic control means for by-passing the air from the conduit when the air in the receptacle attains a predetermined pressure, and re-establishing operative connections for supplying air to the receptacle when air in said receptacle recedes to a predetermined pressure, said control means including a movable body adapted to assume either of two limiting positions of adjustment and adapted at one position to seal the by-pass of air from the conduit, said body having a piston at one end movable in a cylinder, one end of the cylinder being connected by a passageway to said conduit to permit exertion of pressure against the piston substantially equal to the air pressure in the receptacle, resilient means for yieldingly opposing movement of the body and piston in one direction, whereby said body and piston are moved in opposition to the resilient means to the other limiting position of movement when the pressure in the receptacle exceeds the force of said resilient means, to establish the by-pass of air from the conduit, and said body and piston being moved by said resilient means to the said one limiting position of movement when the pressure in the receptacle is reduced to less than the force of said resilient means, detent means for yieldingly maintaining said body and piston at either of its two limiting positions to provide maximum and minimum limits of air pressure in said receptacle at which said body and piston are moved, and means for retaining said detent means against movement longitudinally of said cylinder.

4. In a tank lubricator, the combination of an air pump including conduit connections for supplying compressed air to a receptacle, and automatic control means for by-passing the air from the conduit when the air in the receptacle attains a predetermined pressure, and re-establishing operative connections for supplying air to the receptacle when air in said receptacle recedes to a predetermined pressure, said control means including a movable body adapted to assume either of two limiting positions of adjustment and adapted at one position to seal the by-pass of air from the conduit, said body having a piston at one end movable in a cylinder, one end of the cylinder being connected by a passageway to said conduit to permit exertion of pressure against the piston substantially equal to the air pressure in the receptacle, a coil spring positioned to yieldingly oppose movement of the body and piston in one direction, whereby said body and piston are moved in opposition to the spring to the other limiting position of movement when the pressure in the receptacle exceeds the force of said spring, to establish the by-pass of air from the conduit, and said body and piston being moved to the said one limiting position of movement by said coil spring when the pressure in the receptacle is reduced to less than the force of said spring, and detent means for yieldingly maintaining said body and piston at either of its two limiting positions to provide maximum and minimum limits of air pressure in said receptacle at which said body and piston are moved, said detent means including two spaced apart tapered surfaces on said body and yieldingly spring-pressed members for engaging said surfaces alternately, tending to cramp said body and piston toward its respective positions of adjustment, said spring-pressed members beig held against movement longitudinally of said cylinder.

5. In a tank lubricator, the combination of, a manually operated air pump including conduit connections for supplying compressed air to a receptacle, and automatic control means for by-passing the air from the conduit when the air in the receptacle attains a predetermined pressure, and re-establishing operative connections for supplying air to the receptacle when air in said receptacle recedes to a predetermined pressure, said control means including a movable body adapted to assume either of two limiting positions of adjustment and adapted at one position to seal the by-pass of air from the conduit, said body having a piston at one end movable in a cylinder, one end of the cylinder being connected by a passageway to said conduit to permit exertion of pressure against the piston, substantially equal to the air pressure in the receptacle, a coil spring positioned to yieldingly oppose movement of the body and piston in one direction, whereby said body and piston are moved in opposition to the spring to the other limiting position of movement when the pressure in the receptacle exceeds the force of said spring, to establish the by-pass of air from the conduit, and said body and piston are moved to the said one limiting position of movement by said coil spring when the pressure in the receptacle is reduced to less than the force of said spring, and means for varying the pressure of said coil spring and thereby rendering said control means responsive to a different range of air pressure in said receptacle.

6. In a portable tank lubricator, the combination of a storage receptacle for a body of lubricant and adapted to be sealed to atmosphere, a follower seated upon the head of lubricant, an air pump including conduit connections for supplying compressed air to the upper end of the receptacle for building up pressure therein and causing the follower to exert pressure on the body of lubricant, tending to discharge the same through an outlet adjacent the bottom of the receptacle, and a grease pump located below said air pump and operatively associated with said discharge outlet of the receptacle, said pumps each including pistons and piston rods, said grease pump rod being surrounded by said air pump rod and passing through said air pump to said grease pump, and means for selectively connecting said rods together for simultaneous operation of said pumps, when said air pump is operated or disconnecting said rods relative to each other for operation of said air pump only.

7. In a tank lubricator of the character disclosed, the combination of a storage receptacle for a body of lubricant and adapted to be sealed to atmosphere, a follower seated upon the head of lubricant, a manually operated air pump including conduit connections for supplying compressed air to the receptacle for building up pressure therein and causing the follower to exert pressure on the body of lubricant, tending to discharge the same through an outlet of the

receptacle, a grease pump operatively associated with said discharge outlet of the receptacle, detachably engageable means for simultaneously operating said pumps, whereby the air pump may be separately operated or operated simultaneously with the grease pump, and automatic valve means open from said pump to atmosphere for by-passing the air from the conduit and freely to atmosphere when the air in the receptacle attains a predetermined pressure, and a second automatic valve means open from said pump to the receptacle for re-establishing operative connections for supplying air to the receptacle when air in said receptacle recedes to a predetermined pressure.

8. In a portable tank lubricator, the combination of a storage receptacle for a body of lubricant and adapted to be sealed to atmosphere, a follower seated upon the head of lubricant, a manually operated air pump including conduit connections for supplying compressed air to the upper end of the receptacle for building up pressure therein and causing the follower to exert pressure on the body of lubricant, tending to discharge the same through an outlet from the receptacle, a grease pump operatively associated with the discharge outlet of the receptacle, means for operating the grease pump including manually controlled detachable connections to said air pump for selective simultaneous operation of both pumps or operation of the air pump only, automatic valve means open from said air pump to atmosphere only for by-passing the air from the conduit when the air in the receptacle attains a predetermined pressure, and a second automatic valve means open from said air pump to the receptacle re-establishing operative connections for supplying air to the receptacle when air in said receptacle recedes to a predetermined lower pressure.

9. In a portable hand operated tank lubricator, the combination of a lubricant storage receptacle, pumping means having an operating handle for forcibly discharging lubricant under pressure, said receptacle being adapted to be supported directly on the ground, and stabilizing means comprising a leg adapted to extend a substantial distance forwardly of the receptacle, and a foot swivelly connected to the outer end of said leg and including a relatively large supporting surface adapted to be disposed in engagement with the ground for counterbalancing a tendency to tipping of the receptacle incident to actuation of said pumping means.

10. In a portable hand operated tank lubricator, the combination of a lubricant storage receptacle, pumping means having an operating handle for forcibly discharging lubricant under pressure, and stabilizing means comprising a leg adapted to extend a substantial distance forwardly of the receptacle, and a foot carried on the outer end of said leg for seating upon the ground, said foot being in the form of a wide face, the under side of which is provided with a prong for firm anchorage in the ground.

11. In a portable hand operated tank lubricator, the combination of a lubricant storage receptacle, pumping means having an operating handle for forcibly discharging lubricant under pressure, and stabilizing means comprising a leg adapted to extend a substantial distance forwardly of the receptacle, and a foot carried on the outer end of said leg adapted to be seated in engagement with the ground for counterbalancing a tendency to tipping of the receptacle incident to actuation of said pumping means, the other end of the leg being pivotally mounted on the receptacle for swinging into an upright position adjacent the wall of the receptacle when not in use.

12. In a portable hand operated tank lubricator, the combination of a lubricant storage receptacle, pumping means having an operating handle for forcibly discharging lubricant under pressure, and stabilizing means comprising a pair of legs at opposite sides of the receptacle, adapted to extend a substantial distance forwardly of the receptacle, and a foot carried on the outer end of each leg adapted to be seated in engagement with the ground for counterbalancing a tendency to tipping of the receptacle incident to actuation of said pumping means, the other ends of said legs being pivotally mounted on the sides of the receptacle for swinging into upright position adjacent the wall thereof when not in use.

13. In a portable hand operated tank lubricator, the combination of a lubricant storage receptacle, pumping means having an operating handle for forcibly discharging lubricant under pressure, and stabilizing means in the form of a three-point support comprising a rearwardly extending foot fixedly secured to the receptacle and having its supporting face disposed substantially flush with the base of the receptacle, and a pair of legs at opposite sides of the receptacle, adapted to extend a substantial distance forwardly of the receptacle, and a foot carried on the outer end of each leg adapted to be seated in engagement with the ground for counterbalancing a tendency to tipping of the receptacle incident to actuation of said pumping means, the other ends of said legs being pivotally mounted on the sides of the receptacle for swinging into upright position adjacent the wall thereof when not in use.

14. In a portable tank lubricator, the combination of a storage receptacle for a body of lubricant and adapted to be sealed to atmosphere, a follower seated upon the head of lubricant, a manually operated air pump including conduit connections for supplying compressed air to the upper end of the receptacle for building up pressure therein and causing the follower to exert pressure on the body of lubricant, tending to discharge the same through an outlet adjacent the bottom of the receptacle, a grease pump operatively associated with said discharge outlet of the receptacle, said air pump and grease pump being axially aligned, said pumps each including pistons and piston rods, one of said rods surrounding the other, means for detachably connecting said rods together for simultaneous operation of said pumps when so connected and for operation of only the air pump when not so connected, whereby the air pump may be separately operated or operated simultaneously with the grease pump, automatic valve means open from said air pump to atmosphere for by-passing the air from the conduit and freely to atmosphere when the air in the receptacle attains a predetermined pressure, and a second valve means open from said air pump to said receptacle re-establishing operative connections for supplying air to the receptacle when air in said receptacle recedes to a predetermined pressure.

15. In a portable hand operated tank lubricator, the combination of a lubricant storage receptacle, pumping means mounted rearwardly of the receptacle, and a manually operated pump handle pivotally connected to said pumping means and normally extending forwardly over

the top of said receptacle, said handle comprising a plurality of telescoping members, one being extensible relatively to the other and the outer end of the outer member being provided with a hand grip whereby the latter member, in extended operating position, projects a substantial distance forwardly of said receptacle, and supporting arms also extending forwardly of said receptacle to provide an effective extension of the base of the receptacle to a position substantially under said hand grip when said pump handle is in its extended position.

16. In a portable tank lubricator, the combination of a storage receptacle for a body of lubricant and adapted to be sealed to atmosphere, a follower seated upon the head of lubricant, a manually operated air pump including a conduit connection for supplying compressed air to the reecptacle for building up pressure therein and causing the follower to exert pressure on the body of lubricant, tending to discharge the same through an outlet from the receptacle, a grease pump operatively associated with the discharge outlet of the receptacle, means for operating the grease pump including manually controlled detachable connections to said air pump for simultaneous operation of said pumps, an automatic control member responsive to pressure in said container and having means of communication with said conduit connection for permitting air from said air pump to be discharged to atmosphere when the pressure in the container attains a predetermined value, and a check valve in said conduit connection to prevent air from said container returning therefrom and entering said means of communication, when said control member is in position permitting discharge of air from said air pump to atmosphere, said control member, when the air in said receptacle recedes to a predetermined lower pressure, closing said means of communication whereby said air then pumps air through said check valve to said container.

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