April 20, 1943. M. HARRIS 2,317,270

FLUID DISPENSING GUN

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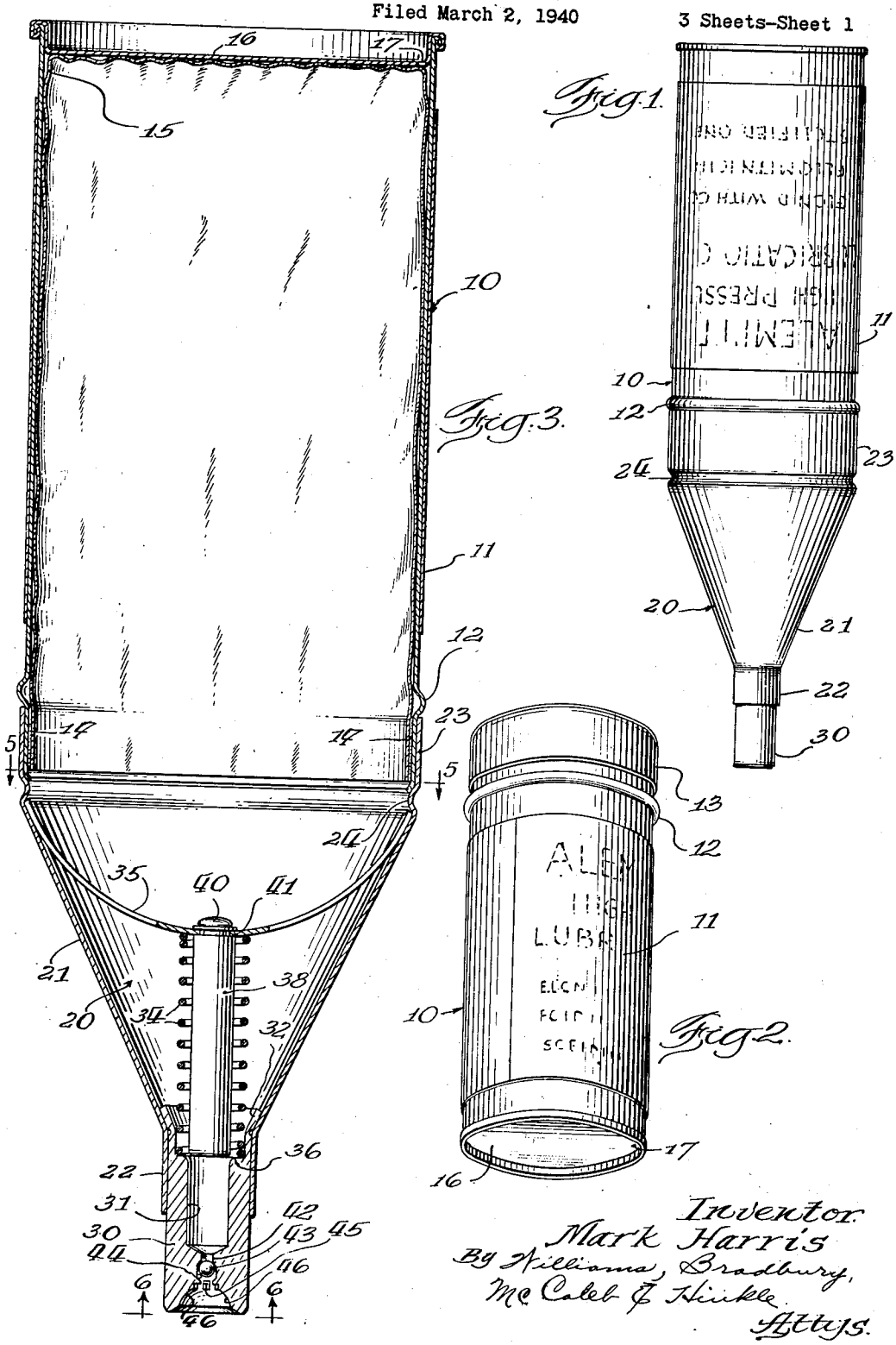



Fig. 1.

Fig. 3.

Fig. 2.

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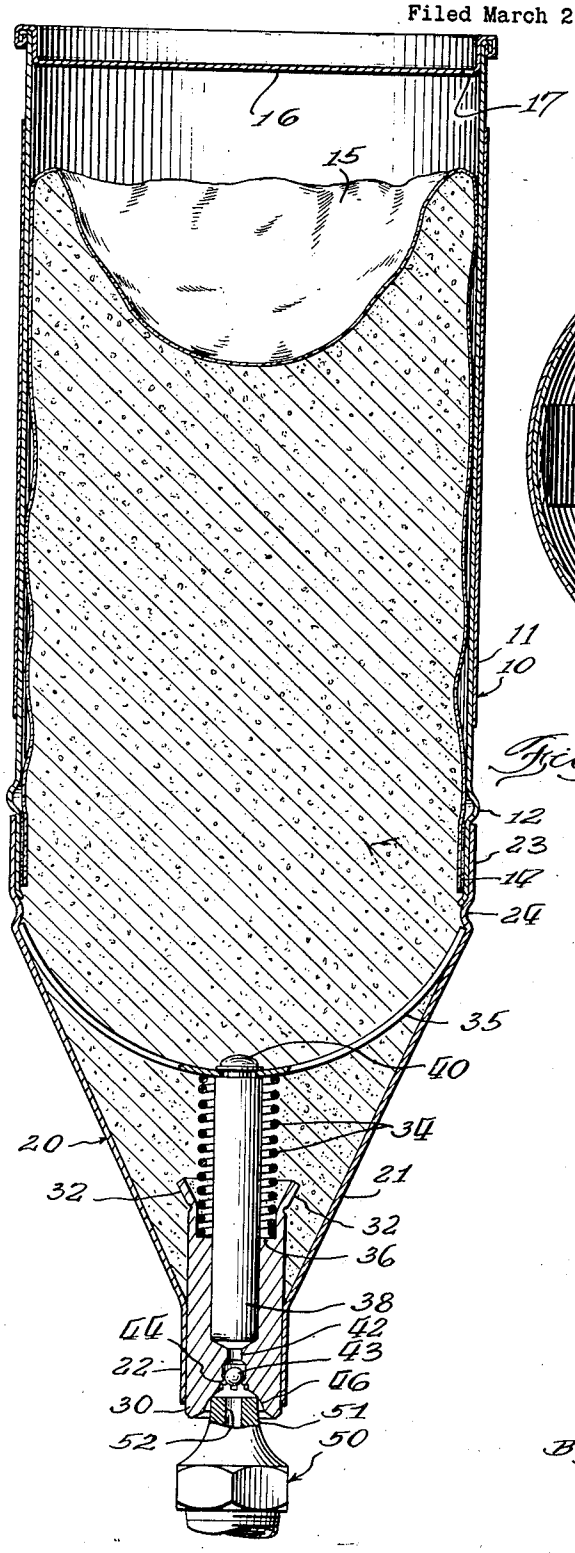



Fig. 4.

Fig. 5.

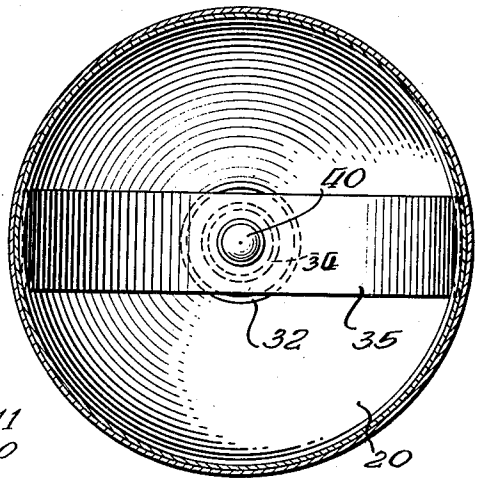
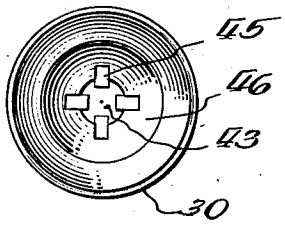



Fig. 6.




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Fig. 7.

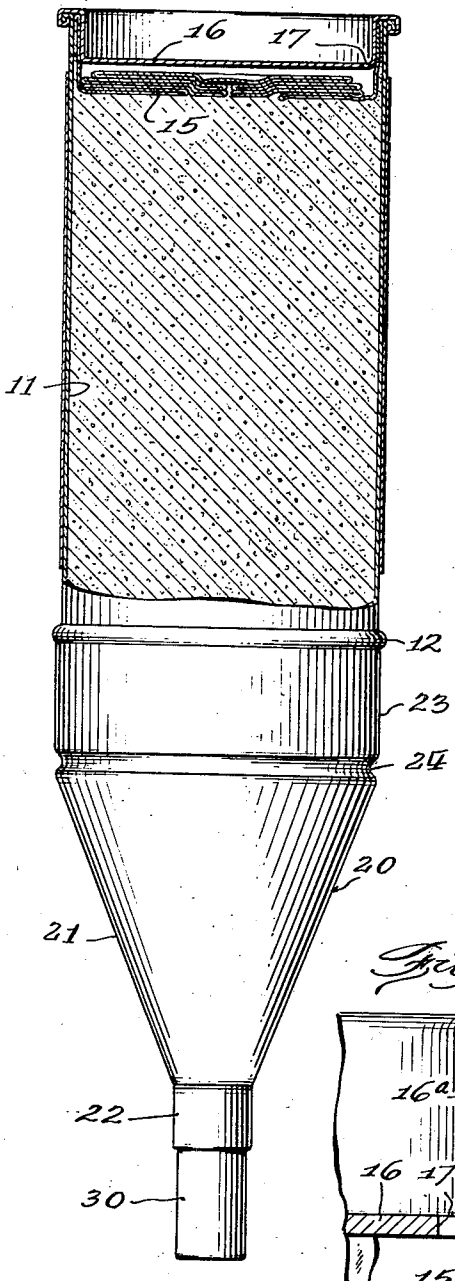



Fig. 8.

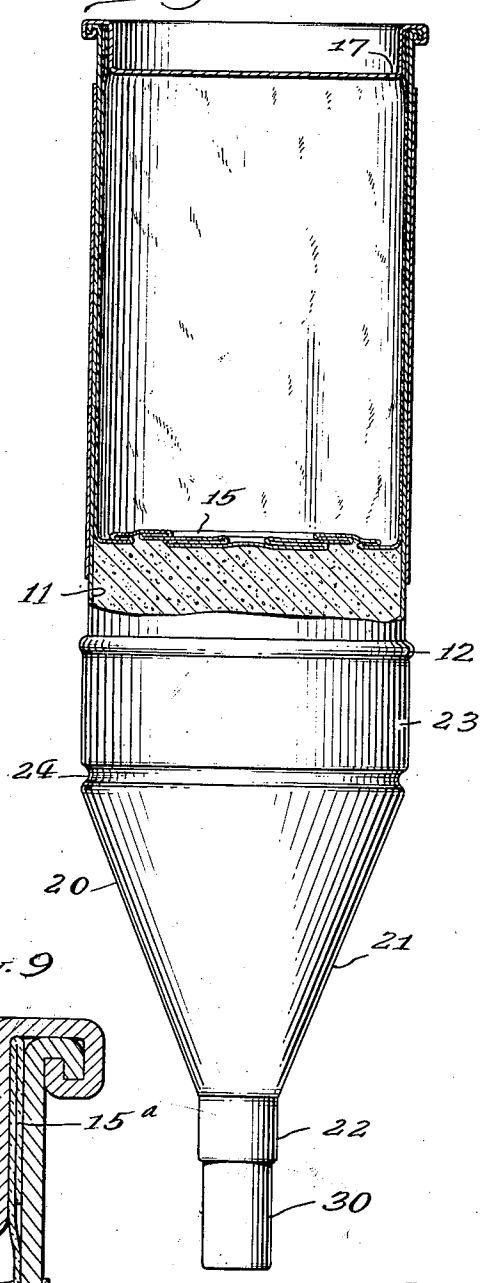
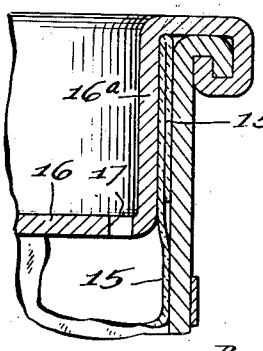



Fig. 9




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Patented Apr. 20, 1943

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# UNITED STATES PATENT OFFICE

2,317,270

## FLUID DISPENSING GUN

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Application March 2, 1940, Serial No. 321,844

7 Claims. (Cl. 221—47.4)

My invention pertains to fluid dispensing guns of the type requiring no external source of fluid under high pressure, but which includes a self-contained fluid reservoir and manually operated means for ejecting the fluid at high pressures.

My device is useful for lubricating machinery fitted with lubricant-receiving fittings adapted to cooperate with the gun which I am about to describe, especially where such machinery is not normally or only occasionally accessible to lubrication from power operated high pressure lubricant guns.

My fluid dispensing gun is also useful for dispensing fluids such as hand lotions, cold cream, and various other fluid preparations, especially if they be of a viscous or semi-solid nature.

One of the objects of my invention is to provide a small self-contained manually operated fluid dispensing gun which may be applied in situations not accessible to power operated dispensing means.

Another object of my invention is to provide a manually operated fluid dispensing gun provided with a self-contained fluid reservoir.

Another object of my invention is to provide manually operated means for producing exceedingly high fluid pressures at the lubricant fittings of bearings requiring this type of lubrication.

Another object of my invention is to provide manually operated fluid dispensing means having a detachable fluid reservoir which may be removed when empty and replaced by a new full reservoir.

Other objects and advantages of my invention will become apparent upon reading the following description thereof, taken in conjunction with the appended drawings, in which:

Fig. 1 is an elevation of a manually operated fluid dispensing gun according to my invention;

Fig. 2 is an elevation of one of the replaceable reservoirs for use with my fluid dispensing gun;

Fig. 3 is a longitudinal section through my fluid dispensing gun when the reservoir thereof is filled with lubricant;

Fig. 4 is a longitudinal section through the gun partially discharged of its content of lubricant and in contact with a lubricant fitting of well known type, said gun being illustrated in its pressure producing position;

Fig. 5 is a section taken along the lines 5—5 of Fig. 3;

Fig. 6 is a view taken along the line 6—6 of Fig. 3;

Fig. 7 is a longitudinal section through a fluid dispensing gun incorporating a modified form of fluid reservoir when filled;

Fig. 8 is a view similar to Fig. 7, showing the reservoir partially emptied; and

Fig. 9 is an enlarged section through a corner of the bottom of the reservoir.

In all the figures, like reference numerals have been applied to similar parts.

A fluid dispensing gun according to my invention, adapted for dispensing lubricant, consists of a lubricant reservoir 10 and a pressure head 20. The lubricant reservoir 10 comprises an ordinary inexpensive tin can attractively decorated upon the outside by a pleasing label 11 preferably designed to convey useful information to the prospective purchaser and which, when full and while yet unattached to the pressure head 20, is provided with an ordinary friction cap 13 which prevents loss of the contents of the can. A protruding annular ring 12 formed near the upper rim of the can serves both to lend rigidity to the relatively light metal container and to provide a seat for the edge of the cap 13 or for the edge of the pressure head 20.

The reservoir 10 is lined with an impervious air-tight "Cellophane" sack 15 coextensive with the reservoir and hermetically sealed to the walls thereof near the upper inside rim of the reservoir by means of an application 14 of rubber cement or some like effective impervious adhesive. The "Cellophane" sack 15 is filled with a suitable lubricant, preferably of the solidified oil type, which is free flowing under pressure, but not liquid, thereby avoiding loss while the can is being attached to the pressure head, and at other times when the cap is removed. The bottom 16 of the can is provided with a small pin hole 17 communicating with the slight air space between the sack 15 and the inner walls of the reservoir. The function of this vent will become apparent later.

The pressure head frictionally engaging the lubricant reservoir comprises a generally conical spun or drawn metal dome 21 terminating in a narrow cylinder 22 and provided with a relatively short cylindrical base 23, which frictionally engages the top of the reservoir 10 when the cap 13 thereof is removed. Air-tight frictional engagement of the reservoir with the pressure head is aided by an inner annular ring 24 formed around the pressure head at the junction of the

cylindrical base with the conical portion 21. The annular ring 24 cooperates with the upper edge of the reservoir as does the lower edge of the pressure head base 23 with the annular ring 12 of the reservoir and helps to maintain air-tight engagement. The upper cylindrical portion 22 of the pressure head 21 is fitted with a relatively long sliding piston 30 provided with an irregular bore 31 whose outer edges 32 have been flared outwardly to serve as a check against complete withdrawal of the piston 30 from the cylinder 22. This piston is urged outwardly under the influence of a spring 34 seating upon an arch-shaped metal support 35 and reacting against a shoulder 36 formed by a widening of the bore 31.

The ends of the arch-shaped support 35 are braced against the previously described inner annular ring 24. The arched support 35 also mounts a plunger 38 centrally located within the spring 34 and fastened to the support 35 by means of its peened over reduced portion 40 passing through a hole 41 at the vertex of the arched support 35. The diameter of the plunger 38 is very precisely determined to fit within the bore 31 and to serve as a piston for expelling lubricant accumulated within the bore through the narrow orifice 42 and past the ball check valve 43 located in the valve seat 44. The ball 43 is prevented from leaving the seat 44 by the staked edges 45 thereof. The outer end of the piston 30 is provided with the usual hemispherical seat 46, which cooperates with most of the standard lubricant fittings or nipples now fitted to the bearings of various machinery and vehicles.

It is to be noted that when the piston 30 protrudes from cylinder 22 to its maximum extent, as shown in Fig. 3, the end of plunger 38 is completely withdrawn from the bore 31 into which it fits and is at a point some slight distance below the shoulder 36 in order to allow lubricant to flow into the bore 31.

The concave seat 46 of the piston 30 effectively seats upon the head 51 of a standard lubricating fitting 50 or nipple as shown in Fig. 4. Because the seat 46 is spherical and because the upper edge of the nipple head 51 is perfectly circular, leakproof engagement at varying angles of application of the lubricant gun to the nipple is maintained. Lubricant flows past the ball valve 43 retained in valve seat 44 by peened over edges 45 thereof (Fig. 6), into the narrow bore 52 of the nipple 50, and from thence into the bearing being lubricated.

My invention is applied to lubricating bearings provided with standard lubricant fittings in the following manner. A fresh can or reservoir 10 of solidified lubricant of the proper quality and viscosity is selected from the stock of such cans usually kept on hand by the consumer or the retailer. The cap 13 is then removed and the pressure head 20 substituted therefor, which combination results in a manually operable lubricant gun ready for use as illustrated in Fig. 3. The gun is applied to the lubricant fitting 50 of the bearing desired to be lubricated by engaging the head 51 of the fitting with the concave seat 46 of the piston 30, the reservoir 10 being grasped in the hands as a handle would be grasped. Pressure is now applied to the gun by means of the hand in the direction of the lubricant fitting, thereby forcing the piston 30 into the cylinder 22 against the influence of spring 34.

I shall for the moment assume that the pressure head and the bore 31 of the lubricating gun are already filled with grease. Upon forcing the piston 30 into the cylinder 22, the plunger 38 enters the bore 31 and forces the lubricant contained therein past the ball valve 43 into the bearing in the manner described. When the manual pressure applied to the gun is relaxed, the piston 30 is returned from within the cylinder 22 and the plunger 38 is withdrawn from the bore 31 under the influence of spring 34. This creates a slight vacuum within the pressure head 20 and the bore 31 causing the ball valve 43 to close, being drawn against the seat 44, thus preventing lubricant or air from being returned into the pressure head. The vacuum within the pressure head induces grease from within the "Cellophane" sack 15 in the reservoir 10 to flow into the pressure head, as a result of the pressure of the air around the sack 15, which causes the sack to collapse as shown in Fig. 4.

Air pressure around the sack 15 is maintained by the small orifice or pin hole 17 in the bottom 16 of the reservoir 10. The vacuum resulting from the operation of the pump structure within the pressure head 20 is maintained as a result of the careful sealing of the sack 15 to the upper rim of the reservoir by a leakproof adhesive 14. It is also necessary to insure an air-tight frictional contact between the cylindrical base 23 of the pressure head and the upper rim of the reservoir 10.

The pumping action may be continued by repeated application of manual pressure to the lubricant gun, each stroke of the gun forcing the quantity of lubricant within the bore 31 into the bearing, and each return stroke of the gun withdrawing an equal quantity of lubricant from the reservoir 10 to replace the quantity ejected.

When the lubricant within the reservoir 10 has been ejected, the empty can can be discarded and the pressure head 20 may then be fitted to a fresh can of lubricant. This feature makes my fluid dispensing gun very economical to operate, because the pressure head can be used over and over again, with successive cans of fluid. The gun is, nevertheless, quite inexpensive in itself as compared with the lubricant dispensing guns now in common use. The pressure head may be used with various qualities and grades of lubricant contained in separate cans appropriately designated in order to distinguish their content. The cans need not be of the same size, but may be long or short, although necessarily of the same diameter.

A leakage of air past the adhesive seal 14 or past the friction joint between the reservoir 10 and the pressure head 20 does not destroy the effectiveness of the gun, because although the vacuum resulting from the pumping action may be impaired, due to leakage of the air, it is quite possible to feed fluid from the reservoir into the pressure head by jarring or striking the reservoir with the hand. It is preferable and more convenient, however, to depend upon the suction normally produced when the gun is in use and to that end it is desirable to maintain an air-tight seal, and an unobstructed opening in the bottom of the reservoir.

Various modifications of my invention are possible. One such modification is depicted in Figs. 7, 8 and 9. In this modification the fluid in the reservoir 10 is not contained within the collapsible sack 15, but is in direct contact with the sides of the can 11. The sack 15, which may be of Cellophane or of a resilient material such as rubber, if the fluid to be used does not react detrimentally

upon the rubber, is compactly folded, and partially contracted in the case of rubber, in the bottom 16 of the reservoir 10.

As fluid is pumped out of the reservoir 10, air enters through the vent 17 and helps to expel the fluid by exerting a pressure against the folded Cellophane sack 15 or against a rubber membrane, if such be employed. The sack 15 is progressively expanded as fluid is withdrawn from the reservoir 10.

The edges of the sack or membrane 15 may be attached to the sides of the reservoir near the bottom thereof by means of adhesive, or preferably by a more secure method of attachment which consists of doubling over the edge of the sack 15 to form a folded edge 15*a*, which folded edge is frictionally held between the flange 16*a* and the bottom 16 and the sides of the reservoir 10.

Various other modifications of my invention will suggest themselves to those skilled in the art, and I do not wish to be confined to the particular embodiment of my invention herein described, but only by the following claims.

I claim:

1. A manually operable fluid dispensing gun comprising a fluid reservoir, a collapsible impervious sack whose edges are fastened to the sides of the reservoir, a pressure head whose base is adapted to engage the rim of said reservoir, said pressure head terminating in a tubular extension, a nozzle slidable in said tubular extension, said nozzle also being provided with a ball check valve, resilient means urging said nozzle to slide out of said tubular extension, and a plunger held stationary with respect to the pressure head, the end of the plunger nearest the nozzle being normally spaced from the end of the nozzle to allow the access of fluid to the bore of the nozzle, but adapted to enter into and to create pressure within said bore when the nozzle is forced back into the tubular extension.

2. A manually operable gun for dispensing viscous and semi-solid material comprising a pressure head, a separable container of generally cylindrical shape and having an open end of substantially the same cross section as that of the main part of said container, said open end being closed by said pressure head and forming a leakproof seal therewith, a collapsible, impervious sack having edges fastened to the side of said container adjacent said open end, pumping means carried by said pressure head and functioning to withdraw material from said container by creating a suction therein, means for admitting atmospheric pressure to the outside of said sack, said sack being of sufficient strength to withstand a pressure differential adequate to move vicsous or semi-solid material from said container to said pumping means for all positions of said gun, said pumping means being operable in response to force exerted on said container toward a part engaged by said pressure head.

3. A manually operable gun for dispensing viscous and semi-solid material comprising a pressure head, a separable container of generally cylindrical shape and having an open end of substantially the same cross section as that of the main part of said container, said open end being closed by said pressure head and forming a leakproof seal therewith, a collapsible, impervious sack having edges fastened to the side of said container adjacent said open end, pumping means carried by said pressure head and functioning to withdraw material from said container by creating a suction therein, said container being constructed to admit atmospheric pressure to the outside of said sack, said sack being of sufficient strength to withstand a pressure differential adequate to move viscous or semisolid material from said container to said pumping means for all positions of said gun, and a nozzle through which said material is discharged, said pumping means being operable in response to force exerted on said container toward a part engaged by said nozzle.

4. A manually operable gun for dispensing viscous and semi-solid lubricant comprising a pressure head, a separable container of generally cylindrical shape and having an open end of substantially the same cross section as that of the main part of said container, said open end being closed by said pressure head and forming a leakproof seal therewith, a collapsible, impervious sack having edges fastened to the side of said container adjacent said open end, pumping means carried by said pressure head and functioning to withdraw material from said container by creating a suction therein, said pumping means including a part rigid with said head and a second part reciprocable relative to said first part, a nozzle movable with said reciprocable part and adapted to make a lubricant-tight seal with a lubricant receiving fitting, vent means for admitting atmospheric pressure to the outside of said sack, said sack being of sufficient strength to withstand a pressure differential adequate to move viscous or semi-solid material from said container to said pumping means for all positions of said gun, said pumping means being operable in response to force exerted on said container toward a fitting engaged by said nozzle.

5. A reservoir adapted to be attached to a pressure head containing pumping means for withdrawing material from said reservoir and comprising a rigid container having a closed bottom, substantially straight sides, and an open top of approximately the same cross section as the main part of said container, and a flexible, impervious sack having its edges hermetically sealed to the inside walls of said container adjacent the said open top, said container having a vent for admitting air between said container and said sack, said sack being of sufficient strength to withstand a pressure differential adequate to move viscous or semi-solid materials from said container for all positions thereof.

6. A fluid reservoir adapted for attachment to a pressure head having pumping means for withdrawing the contents of said reservoir and comprising a substantially rigid cylindrical container having a closed bottom and an open top, the periphery of the container adjacent the top thereof being adapted to receive and frictionally to retain a pressure head, and a flexible, impervious sack whose edges are hermetically sealed to the inside of the rigid container adjacent said open top, said flexible sack being adapted to expel the contents thereof when the pressure in the space between the flexible sack and the rigid container becomes greater than the pressure within the flexible sack, said sack being sufficiently strong to withstand a differential pressure great enough to expel from said sack a viscous or semi-solid material against the force of gravity acting thereon, and said rigid container having a vent for admitting air to the space between the flexible sack and the rigid container.

7. A manually operable gun for dispensing vis-

cous and semi-solid material comprising a pressure head, a separable container of generally cylindrical shape and having an open end of substantially the same cross-section as that of the main part of said container, said open end being closed by said pressure head and forming a leakproof seal therewith, a collapsible, impervious sack having edges fastened to the side of said container adjacent an end thereof, pumping means carried by said pressure head and functioning to withdraw material from said container by creating a suction therein, said sack having a side exposed to the material in said container, means for admitting atmospheric pressure to the other side of said sack, said sack being of sufficient strength to withstand a pressure differential adequate to move viscous or semi-solid material from said container to said pumping means for all positions of said gun, said pumping means being operable in response to force exerted on said container toward a part engaged by said pressure head.

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