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PUMP PLUNGER

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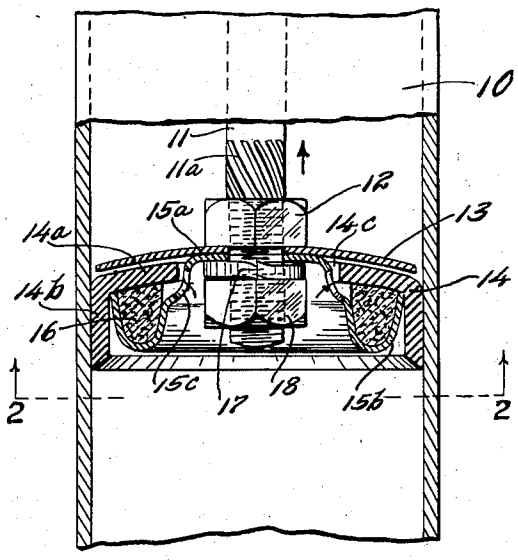


Fig. 1.

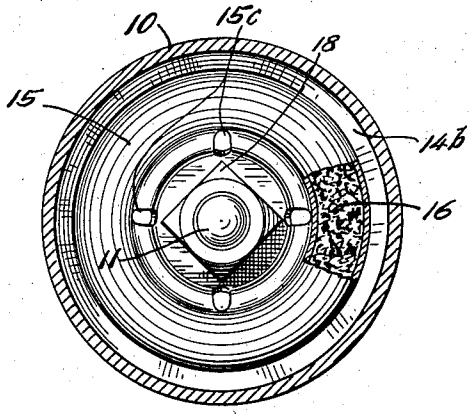


Fig. 2.

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PUMP PLUNGER

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6 Claims. (Cl. 230—221)

This invention relates to a structure of pump plunger and while the invention may have many applications, it is intended particularly for the plungers of air pumps of comparatively small size such as are used in connection with sprayers, tire pumps and other pumps using a plunger of flexible material such as leather. Such plungers are usually made of a sheet of flexible material held between plates or other members and adapted to engage the wall of a cylinder. Such plungers are usually lubricated or impregnated with some liquid to keep them in soft pliable condition. This liquid or lubricant tends to evaporate so that the plunger often becomes dry and this frequently happens when the pump has not been used for some time. When the plunger thus becomes dry it is quite inefficient and does not engage the cylinder wall so as to properly discharge the air.

It is an object of this invention therefore, to provide a structure of pump plunger having means to supply a lubricant to the plunger.

It is a further object of the invention to provide a pump plunger structure comprising a plunger rod, a plunger of flexible material secured thereto, and means carried by said rod containing a lubricant and held in engagement with said plunger.

It is another object of the invention to provide a structure of pump plunger in which the air passing said plunger on the intake stroke thereof does not have to pass around the peripheral edge of said plunger.

It is still another object of the invention to provide a pump plunger structure comprising a plunger having an aperture therethrough, means at one side of said plunger having an opening communicating with said aperture and means at the other side of said plunger for closing said aperture on the discharge stroke of said plunger whereby air may pass through said aperture and opening on the intake stroke of said plunger but cannot pass therethrough on the discharge stroke of said plunger.

These and other objects and advantages of the invention will be fully set forth in the following description made in connection with the accompanying drawing in which like reference characters refer to similar parts throughout the several views and in which:

Fig. 1 is a central vertical section through the plunger and the cylinder in which it operates, a portion of the cylinder being shown in side elevation; and

Fig. 2 is a horizontal section taken on line 2—2 of Fig. 1 as indicated by the arrows, a portion being broken away.

Referring to the drawing, a cylinder 10 is shown which will form the cylinder of an air or fluid pump. A plunger rod 11 is provided and this will be suitably guided to be reciprocated longitudinally of the cylinder and coaxial therewith. Rod 11 is knurled or broached adjacent one end as shown at 11*a* and is threaded from portion 11*a* to its end, portion 11*a* forming a shoulder. A nut 12 is threaded on rod 11 and engages the shoulder at the end of portion 11*a*. A disk 13 which is of semi-spherical form has its convex side engaged by nut 12 and is held on the rod 11 in such position. A plunger 14 is provided and this will be made of leather or some similar flexible sheet material. Plunger 14 is shown as having the portion 14*a* shaped similarly to plate 13 and as having the cylindrical portion 14*b* which engages the wall of cylinder 10. Portion 14*b* is preferably provided with a bevelled edge so that the sharp angle of said edge is adjacent the cylinder wall. Plunger 14 is thus cup-shaped and said plunger is provided with a central aperture 14*c* in its portion 14*a*. A member 15 formed of sheet material, preferably sheet metal, is provided and said member has a central portion 15*a* apertured to have rod 11 pass therethrough and which is shaped similarly to and engages the side of plate 13 opposite nut 12. Member 15 extends downwardly as shown in Fig. 1 from portion 15*a* and then extends outwardly, the same being formed with an annular trough 15*b*. The central part of member 15 is thus disposed in the aperture 14*c*. Member 15 has a plurality of holes or openings 15*c* formed therethrough at the edge of its portion 15*a* or in the portion which connects portion 15*a* with the trough 15*b*. It will be seen from Fig. 1 that the openings 15*c* communicate with aperture 14*c*. A wick 16 is disposed in trough 15*b* and is thus of annular form. Wick 16 engages the convex side of plunger 14 and this wick will be saturated with oil or with a liquid for lubricating plunger 14. A lock washer 17 engages the concave side of member 15 and is in turn engaged by a nut 18 threaded on rod 11. Members 13, 14 and 15 are thus securely attached to rod 11.

In operation, wick 16 which as stated, is saturated with oil or the lubricant will supply lubricant to the plunger 14. Plunger 14 will thus be kept in moist lubricated condition and will always be in condition to tightly engage the wall of cylinder 10.

In previous plungers particularly those of the

cup-shaped form, the air on the intake stroke of the plunger would pass the plunger by passing around the cylindrical portion 14b thereof. The plunger would thus be more or less collapsed on the intake stroke to permit this passage of air. In the present structure plunger 14 is not held rigidly at its central portion but has freedom for a slight movement longitudinally of the cylinder between plate 13 and member 15. On the intake stroke of the plunger air will pass through the openings 15c and through aperture 14c and this air will pass between portion 14a of the plunger and plate 13 and around the edge of plate 13 to the upper side of the plunger structure. Air does not have to pass between portion 14b of the plunger and the wall of the cylinder. On the discharge stroke the air forces plunger 14 tightly against plate 13. Portion 14a closely engages the concave side of plate 13 and aperture 14c is closed so that no air can pass therethrough. The air is thus discharged from the cylinder by the plunger.

From the above description it is seen that applicant has provided a very simple and yet a very efficient structure of plunger. The plunger is kept in the desired flexible and lubricated condition even though the pump is not used for quite a period. The air does not have to pass around the cylindrical part of the plunger or around the edge of the plunger and a groove or wrinkle will thus not be formed in the edge of the plunger through which air might pass on the discharge stroke. The peripheral part of the plunger is thus maintained in constant and undisturbed contact with the wall of the cylinder. The parts of the device are quite few and the same can be easily made and assembled. The plunger has been amply demonstrated in actual practice and found to be very successful and efficient.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts, without departing from the scope of applicant's invention, which generally stated, consists in a device capable of carrying out the objects above set forth in the parts and combinations of parts disclosed and defined in the appended claims.

What is claimed is:

1. A pump plunger structure comprising a plunger rod, a plunger of flexible material and of cup shape secured to said rod, said plunger thus having a cylindrical portion adapted to engage the wall of a cylinder, an annular member secured to said rod and comprising an annular trough within said cylindrical portion having an open side facing said plunger and a wick in said trough engaging said plunger.

2. A pump plunger structure comprising a plunger rod, a plunger of flexible material secured to said rod, said plunger being adapted to engage the wall of a cylinder, an annular member secured to said rod and comprising an annular trough and a wick carrying lubricant in said trough engaging said plunger for transferring lubricant thereto.

3. A pump plunger structure comprising a plunger rod, a plunger of flexible material and of cup shape secured to said rod, said plunger thus having a cylindrical portion adapted to engage the wall of a cylinder, a rigid plate at one side of said plunger adapted to be engaged by said plunger, a member at the other side of said plunger and within said cylindrical portion having an annular trough formed therein with an open side facing said plunger and a wick in said trough containing lubricant and engaging said plunger for transferring lubricant thereto.

4. A pump plunger structure comprising a plunger rod, a plunger of flexible material secured to said rod and being of cup-shape so as to have an open or concave side and an opposite closed or convex side, a member disposed in said open or concave side of said plunger containing lubricant and constructed and arranged to transfer lubricant to the concave side of said plunger.

5. A pump plunger structure comprising a plunger rod, a plunger of flexible material secured to said rod and being of cup shape, thus having an open or concave side and a closed or convex side, an annular member disposed at the open or concave side of said plunger, the same being in the form of a trough having an open side adjacent said plunger with an outer diameter substantially the same as the internal diameter of said plunger and a wick containing lubricant disposed in said trough and arranged to engage said plunger through said open side and to transfer lubricant to said plunger.

6. A pump plunger structure comprising a plunger rod and plunger of flexible material and of cup shape having a central opening surrounding said rod, a plate mounted on said rod and overlying said plunger, the same being arranged to engage the convex side of said plunger about said opening, a second plate at the concave side of said plunger having a central portion extending through said opening and engaging said first mentioned plate for supporting said plunger, means on said rod for clamping the central portions of said plates together, said second plate being apertured outwardly of said central portion and said plunger having movement longitudinally of said rod between the outer portions of said plates so that when disposed against said second plate air may pass the same but when supported against said first mentioned plate no air can pass said plunger.

HENRY E. BRANDT.