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SAFETY PUMP PLUNGER

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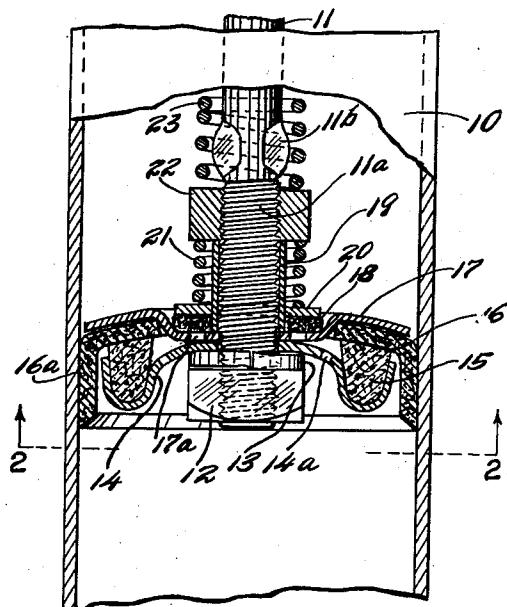


Fig. 1.

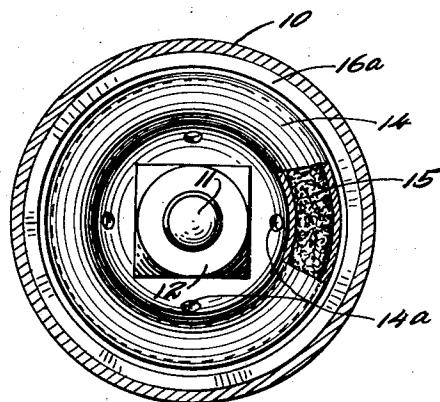


Fig. 2.

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SAFETY PUMP PLUNGER

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2 Claims. (Cl. 230—221)

This invention relates to a plunger structure for a pump and while the invention may be applicable to various pump plungers, it is illustrated as used in an air pump one specific use of which is for a spraying or liquid discharge device in which the liquid is placed under pressure.

In such liquid discharge devices as stated, the liquid in the container is placed under pressure and it may happen that excessive air pressure will be put on the liquid through the pumping means, which excessive pressure may cause damage to the device or cause an objectionable discharge of the liquid. It is desirable therefore, to regulate the pressure which can be put on the liquid or, in other words, produced in the container.

It is an object of this invention therefore, to provide a simple and efficient structure of pump plunger having means for regulating the pressure which may be created by operation of said plunger.

It is further an object of the invention to provide a pump plunger structure comprising a plunger having means through which air may pass to bypass said plunger and means engaging said means to prevent said passage of air including a spring and preferably means for adjusting the tension of said spring to regulate the pressure at which air may bypass the 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 for the most part a central vertical section through a portion of a pump cylinder and plunger construction embodying the invention; and

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

Referring to the drawing a pump cylinder 10 is shown which preferably will be made of some suitable and comparatively thin metal. A plunger rod 11 is disposed axially of said cylinder, the same being threaded at its lower end as shown at 11a. A nut 12 is threaded onto the lower end of rod 11, the same being shown as engaging a spring split washer 13. Washer 13 in turn engages the lower side of a plate 14 apertured for plunger 11 to pass therethrough and being formed at its outer portion into an annular trough having an upper open side. The inner portion of plate 14 has a plurality of circumferentially

spaced holes 14a therethrough. A wick 15 of felt or other similar material, is disposed in the trough of plate 14 and is thus of annular form. Wick 15 will contain a suitable lubricant and said wick is shown as engaging at its upper side with a plunger 16 which will be made of some flexible material such as leather or some rubber and fabric composition. Plunger 16 is shown as generally of cup-shape, the same having a cylindrical wall 16a engaging the inner side of cylinder 10. Said plunger is shown as somewhat curved and the same thus has an open or concave side and an upper closed or convex side. A plate 17 overlies plate 14 and is apertured to have plunger 11 pass therethrough and has an outer annular offset portion overlying the upper or convex portion of plunger 16. The inner or depressed portion of plate 17 is provided with a plurality of apertures 17a. A washer 18 of leather, fabric or fiber composition overlies the inner or depressed portion of plate 17 and covers the apertures 17a. A sleeve 19 surrounds plunger 11 and passes through the opening in the washer 18, the same having its lower end engaging plate 17. A disk or washer 20 surrounds sleeve 19 and overlies the washer 18. A coiled compression spring 21 surrounds sleeve 19 and engages the washer or disk 20, said spring being engaged at its upper end by a nut 22 threaded on rod 11. Rod 11, some distance above nut 22 is broached or swaged as shown at 11b to have expanded portions preventing further upward movement of nut 22. A coiled compression spring 23 rests loosely on nut 22 surrounding rod 11 and acts as a buffer spring for engaging the upper end of cylinder 10.

In operation, when air is to be pumped, rod 11 will be reciprocated. When the same is lifted air will be drawn into the cylinder 10 below the plunger, said air passing around the plunger. Plunger 16 may move somewhat longitudinally of rod 11 and in the intake stroke engages wick 15. It is then slightly separated from plate 17 and air can pass around the edge of plate 17, through the central opening in plunger 16 and through the openings 14a. When the rod is moved downwardly the air in cylinder 10 will be forced downwardly, plunger 16 will tightly engage the undersurface of plate 17 so that no air can pass the plunger and the holes 14a will be kept closed by members 18 and 20 due to the pressure of spring 19. Should the pump be operated until the pressure below the plunger exceeds the strength or tension of spring 19 air will pass through the openings 14a and through openings 17a and lift members 18 and 20 against the ten-

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sion of spring 19. Air can pass around members 18 and 20 after passing through holes 17a and bypass the plunger. It will thus be impossible to create a pressure below the plunger or in the 5 container into which air is being pumped which is greater than the tension of spring 19. The tension of spring 19 may be varied by adjustment of nut 22 so that the pressure to be obtained may be varied.

10 From the above description it is seen that I have provided a very simple, efficient and compact structure of plunger which will act to limit the amount of pressure which may be pumped by the pump comprising the same. The necessary 15 parts for obtaining this result are very few and of very simple, rugged and inexpensive construction.

16 The device has been amply demonstrated in actual practice, found to be very successful and 20 the same is being commercially made.

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, 25 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:

30 1. A pump plunger structure having in combination, a plunger rod, a cup shaped plunger of flexible material having a central opening surrounding said rod, a rigid backing mem-

ber at the concave side of said plunger having an imperforate central portion surrounding said rod and openings outwardly thereof beyond said central portion, a plate having an outer annular portion disposed above said plunger and a central portion engaging the imperforate portion of said backing member and having a plurality of openings therethrough, a sleeve surrounding said rod, means surrounding said sleeve overlying said plate and closing said openings and resilient means urging said last mentioned means against said plate.

2. A pump plunger structure having in combination, a plunger rod, a cup shaped plunger of flexible material having a central opening surrounding said rod, a plate overlying the convex side of said plunger outwardly of said opening and having a central portion with a plurality of apertures therethrough, a second plate disposed at the concave side of said plunger having a central portion engaging the central portion of said first mentioned plate, a sleeve surrounding said rod engaging said first mentioned plate at its lower end, means surrounding said sleeve overlying said first mentioned plate and adapted to close the apertures therethrough, a spring surrounding said sleeve having its lower end engaging said means, adjustable means on said rod engaging the upper end of said spring and adapted to be limited in its movement by the upper end of said sleeve.

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