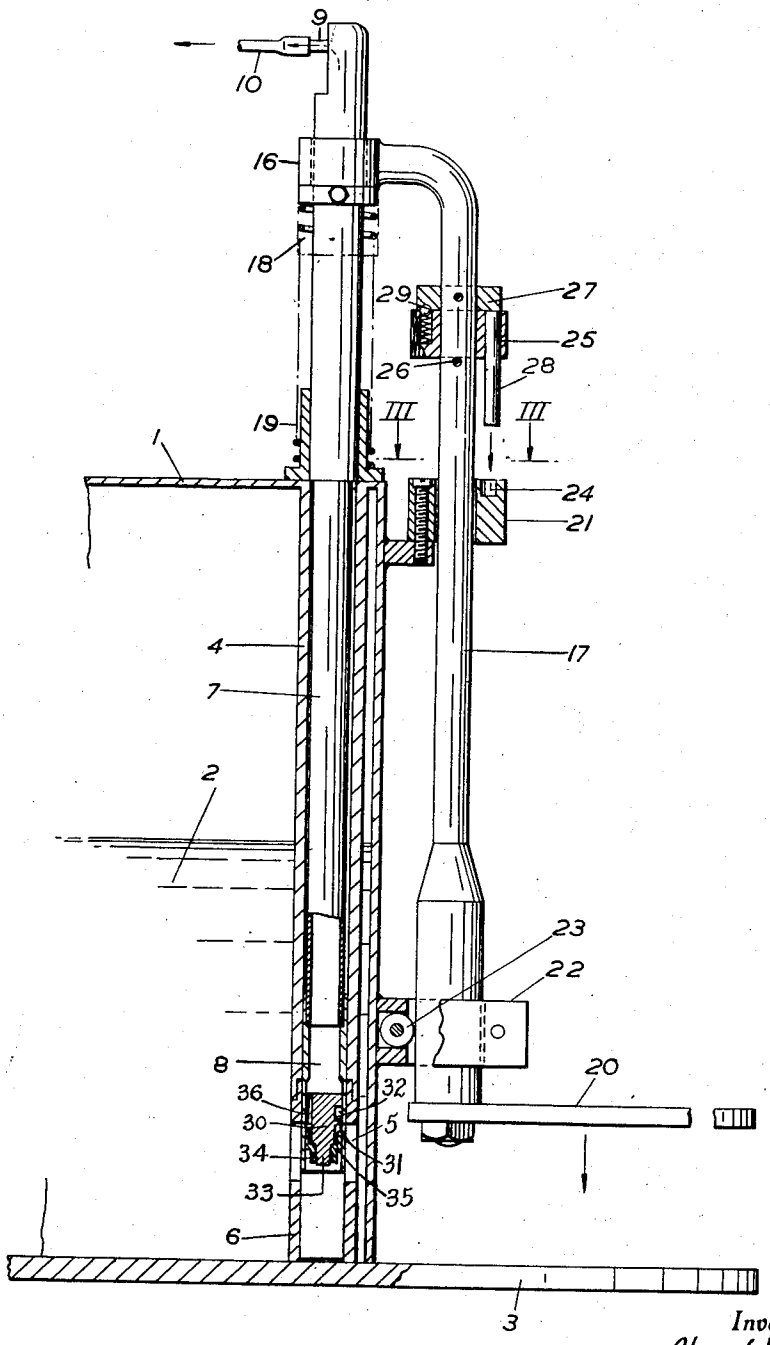
Sept. 14, 1954 A. FREEMAN 2,689,067

DISPENSING CONTAINER WITH PUMP HAVING AN ADJUSTABLE-STROKE PISTON

Filed Feb. 7, 1951 2 Sheets-Sheet 1

FIG. 1.



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FIG. 2.

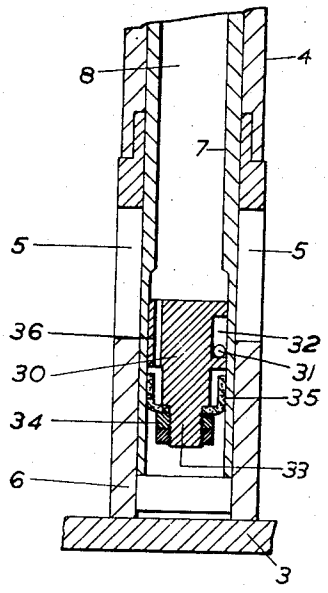


FIG. 3.

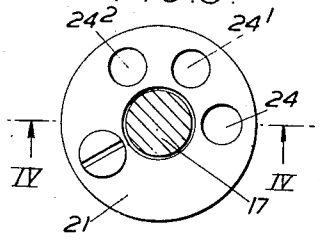


FIG. 4.

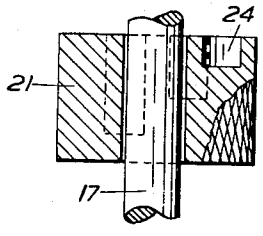
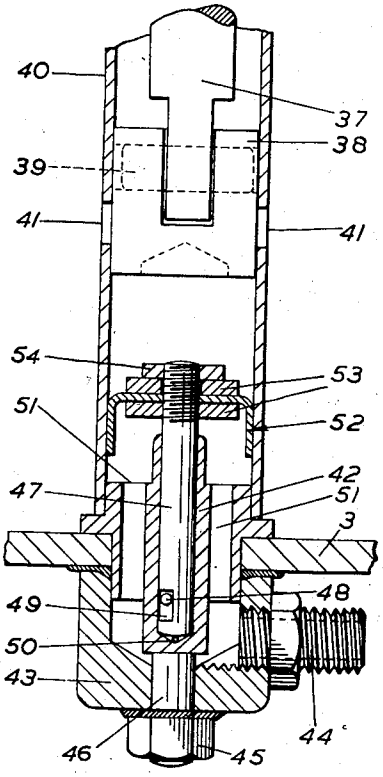


FIG. 5.



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DISPENSING CONTAINER WITH PUMP HAVING AN ADJUSTABLE-STROKE PISTON

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Claims priority, application Great Britain February 7, 1950

6 Claims. (Cl. 222—309)

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The present invention is concerned with devices for dispensing liquids, which latter term is to be understood to include colloids, dispersions, solutions, and similar media acting as a liquid. The invention has, moreover, primarily been devised in connection with the dispensing of glue or adhesive in the boot and shoe industry, and will be hereinafter described in this particular form and application, but it is to be understood that the invention has potential application to many other fields of use and is therefore not limited in scope to that particularly described hereinafter.

In the boot and shoe industry it is customary to apply the adhesive or cement, required to secure together various components of boots and shoes, from a pressurised container. Hence the interior of the latter is connected by a flexible tube with a dispensing nozzle (usually incorporated in a brush for spreading the adhesive after delivery on to the work), and a valve or switch is associated with this nozzle so that the operative can control the amount of discharge adhesive whilst at the same time being able to direct the point of application of this adhesive.

However, this arrangement involves the use of a container in which the adhesive is stored under compression. In view of the volatile and inflammatory nature of some of these liquids, the present invention has been devised with the object of eliminating the pressure storage.

Hence this invention provides, in association with a non-pressurised container, piston pump means which is arranged to suck in and discharge a quantity of the liquid in the container as a result of the reciprocation of the piston, and adjustable means for positively varying at will the length of the piston stroke and thus the amount of liquid discharged at each stroke.

The piston pump can be hand or foot operated, or actuated by a power drive, as required. By controlling the travel of the piston, the need for a switch or valve in the nozzle or brush is avoided, although one could if desired be employed, as hereinafter described.

In the absence of such a switch or valve, the amount of liquid or adhesive discharged from the nozzle or brush at each piston stroke will be determined by the length of this stroke and will not be left to the judgment and skill of the operative each time. The advantage is in precision and economy of having means available to discharge single or multiple blobs of, say, adhesive are manifest.

The piston pump can take a variety of forms but, in a convenient case, may be located in the

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container itself, the piston or its operating mechanism entering through the wall of this container so as to be capable of actuation from the exterior.

Hence, the piston may be arranged to slide in a cylindrical casing secured for example to the top and/or bottom walls of the container, and a suitable non-return valve may be provided for the admission of surrounding liquid (adhesive) to the delivery line in response to the compression or down-stroke of the piston. This piston itself can pass through the top of the container and be reciprocated from the outside of the latter.

The piston can be hollow and have an outlet port for the expulsion of adhesive therefrom during the compression stroke or downward travel of the piston, and this outlet port will lead to the delivery line, preferably a flexible tube, through which the adhesive is directed to the point of application, for instance to the discharge nozzle of a spreader brush. The delivery line may be connected directly or through a separate conduit into the interior of the piston, in which case the latter will have a longitudinal bore therethrough passing to the working face. This bore may contain a non-return valve.

In another arrangement the liquid may be forwarded, not through the piston, but from a part of the cylinder beyond the working face of this piston, a non-return valve being arranged intermediate these.

In any event, the non-return valve may very conveniently be of a flexible character so as to provide a more or less liquid-tight seal during the suction stroke of the piston, and be movable relatively to the latter so as to effect a sharp cut-off of the liquid supply at the end of the compression stroke, as will hereinafter be explained.

The means for actuating the piston can take a variety of forms. In preferred forms, however, these means include a depressible arm carrying an abutment cooperating with a fixed stop to determine the length of the piston stroke. The arm can be manually, foot, or mechanically operated, and the fixed stop and/or the abutment may be made rotatable for the purpose of varying this stroke at will.

Forms of dispenser according to the invention, intended for use primarily for delivering solution in controlled fashion to a brush with which the cement is applied in the manufacture of boots and shoes, are illustrated in the accompanying drawings in which:

Figure 1 is an elevational part side-view of the device with a portion seen in section.

Figure 2 is a vertical section of an enlarged

detail of the lower end of the piston and cylinder.

Figure 3 is a section on III—III of Figure 1, also shown enlarged.

Figure 4 is a similarly enlarged sectional view of the fixed abutment, this being taken on IV—IV of Figure 3.

Figure 5 is an enlarged vertical section of the lower piston and valve portion of a modified assembly.

The dispensing device illustrated in Figures 1 to 4 comprises a cylindrical body 1 for receiving the solution 2, which is not under pressure. The container is furnished with an extended base piece 3 at one side.

Secured with the container body is a cylinder 4 consisting of a hollow tube which is provided with opposed apertures 5 near its lower end. This lower end is closed to form a sort of cup 6. Movable in the cylinder 4 is a piston 7 having a hollow bore 8, this piston being continued upwards out of the body 1 and the bore 8 communicating with a spigot 9 to which a flexible tube 10, representing the solution delivery line to the applicator brush, is connected.

In this instance the valve body is represented by an element 30, which is mounted within the lower end of the piston and is slidable relatively to the latter. This relative movement is limited by a pin 31, integral with the piston, which engages in a longitudinal groove 32 in the valve element 30.

At its lower end this element is formed with a reduced spigot 33 on the outer end of which are threaded lock nuts 34 serving to secure a leather cup washer 35. The element is further provided with a longitudinal passage 36.

Secured to the upper part of the piston outside the container body 1 is a collar 16 which carries a mainly-vertical operating arm 17. This collar also serves as a bearing for a return spring 18 disposed around the piston and supported at its lower end around a boss 19.

The arm 17 is furnished at its lower end with an actuating pedal 20 and is guided in a pair of brackets 21 and 22 secured externally to body 1. The second of these brackets is equipped with a guide roller 23, whilst the first has three cylindrical recesses 24, 24^1, and 24^2 therein, these being of different depth.

Disposed around the arm 17 is a rotatable collar 25 which is located between a pin 26 and a fixed washer 27, and carries a dependent pin 28. The collar 25 has a ball catch 29, cooperating with recesses (not shown) in the washer, these recesses being sited to correspond with the positions in which pin 28 registers with the respective sockets 24, 24^1 and 24^2. The collar 25 is peripherally knurled to facilitate manipulation thereof. It will therefore be apparent that by setting the collar 25 to a selected rotational position the stroke of the arm 17 can be varied.

Thus, when the piston 7 is in its inoperative position, raised by the spring 18, its lower end is at least above the level of the bottom edges of ports 5, so that adhesive from the main container will enter the lower part 6 of the pump cylinder, and the pin 31 is located at the upper end of groove 32, as in Figure 1.

When now the pedal is depressed, the piston 7 automatically follows, the pin 31 moving down groove 32 to the lower end of the latter and the piston thereby picking-up the valve body 30 as in Figure 2.

At an early part of this downward movement the piston 7 closes the ports 5. A specific quantity of adhesive is then trapped in the cup 6 and forces its way past the leather 35, causing the latter to deform and be pressed inwards around the spigot 33, through passage 36 into the delivery line. As will be appreciated, the quantity of adhesive thereby discharged from the delivery line will be determined by the downward travel of the piston beyond the lower edges of ports 5, i. e. a distance which is determined by the setting of collar 25.

When now the pedal 20 is released, the piston 7 is moved upwards by the spring 18. During the first part of this motion the piston moves up relatively to the valve body 30, i. e. until the pin 31 engages the upper edge of groove 32 and so carries the valve upwards. The lost motion between the valve body and piston creates a reduced pressure on the adhesive in the delivery line and thus prevents weeping or dribble from the delivery nozzle.

Figure 5 illustrates part of another embodiment in which the piston is adapted to drive the adhesive forwards out of its container. Hence the piston has a stem 37, and a head 38 connected to this stem by a gudgeon pin 39. The piston head is reciprocable in a cylinder 40 located in the adhesive container and provided with opposed liquid-inlet ports 41.

Secured in the base 3 is a bearing member 42, and at the underside of the latter is secured a cap 43 which furnishes a discharge outlet to the delivery line via a union 44. The cap is welded to the underside of base 3 and is secured, by nut 45, to a rod 46 depending from the bottom of the member 42.

This member is furnished centrally with a socket which receives a slidable valve stem 47. The sliding movement is delimited by a pin 48 which enters a groove 49 in this stem, and a vent 50 is provided at the bottom of the socket. Channels 51 are formed in the member 42 for the passage of liquid.

At its upper end the stem 47 has the valve member proper secured thereto, i. e. a cup leather 52 which is retained by washers 53 and a nut 54.

In this arrangement, the discharge of adhesive is effected, as in the foregoing cases, by reciprocation of the piston 38. On the down stroke, the liquid trapped in the cylinder when the piston head passes the ports 41 is compressed so pressing down the stem 47 until it is arrested by pin 48 and then distorting the leather 52 downwards. This liquid consequently flows through conduits 51 and out to the delivery line, and a fixed amount of adhesive is discharged.

On the return stroke of the piston the leather 52 re-seals against the internal walls of the cylinder and the valve assembly is then lifted by suction until stopped by the pin 48. As in the previous example, this reduces the pressure on the adhesive on the delivery side and so eliminates any after-delivery or drip at the nozzle.

What we claim then is:

1. A liquid dispensing device comprising a container for holding a body of the liquid, a cylinder associated with said container and formed with at least one lateral filling port, a piston reciprocable in said cylinder and thereby movable over said port to open the same and admit liquid from the container and to close the same and compress the admitted liquid in said cylinder, said cylinder and piston constituting a pump, a liquid discharge outlet for the pump, means defining a liquid passage between the working side of the piston and said discharge outlet, a non-return valve in the liquid passage between the working

side of the piston and the liquid discharge outlet of the pump, means operatively connecting the piston and non-return valve so that the non-return valve has sliding movement relative to the piston, said valve incorporating sealing means disposed to seal said passage during the liquid admission stroke of said piston and to be opened by the compressed fluid during the compression stroke of said piston to allow the forced flow of liquid to the discharge outlet, and adjustable means for positively varying the length of the piston stroke and the amount of liquid discharged per compression stroke.

2. A liquid dispensing device as claimed in claim 1, wherein the non-return valve is shiftable relatively to said cylinder during the admission and compression strokes to vary the effective volume of the said liquid passage.

3. A liquid dispensing device as claimed in claim 1, wherein the non-return valve is a flexible washer which is carried by a movable support and cooperates with the walls of the liquid passage between the working side of the piston and said liquid discharge outlet.

4. A liquid dispensing device comprising a container for holding a body of the liquid, a cylinder mounted in said container and formed with at least one liquid-admission port, a hollow piston in said cylinder, means connected to said piston for reciprocating the same in said cylinder to close and open said port, a valve member slidably mounted in said piston and movable under the action of liquid compressed by said piston in said cylinder after closure of said port to allow flow through at least one channel in the valve member to a liquid discharge outlet and a delivery line, means delimiting the travel of said valve member relatively to said piston, a flexible washer carried by said valve member and adapted to seal against the wall of the piston bore, and adjustable means for positively varying the length of the piston stroke and the amount of liquid discharged per stroke.

5. A liquid dispensing device comprising a container for holding a body of the liquid, a cylinder mounted in said container and formed with at least one liquid-admission port and a liquid discharge outlet, a piston reciprocable in said cylinder, and controlling said port to pump liquid from the cylinder, means connected to said piston for reciprocating the same in said cylinder to close and open said port, a supporting member secured within said cylinder between the admission port and discharge outlet, this supporting member having a recess therein and at least one channel therethrough, a valve member having a stem slidable in the recess of said supporting member and having a head carrying a flexible washer adapted to seal against the internal wall of said cylinder, means delimiting the travel of said valve member relatively to the cylinder, and adjustable means for positively varying the length of the piston stroke and the amount of liquid discharged per stroke.

6. A liquid dispensing device as claimed in claim 1, wherein the means operatively connecting the piston and non-return valve include a groove in the valve and a pin extending into the groove, the engagement of the pin with opposite walls of the groove serving to limit the travel of the valve.

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