

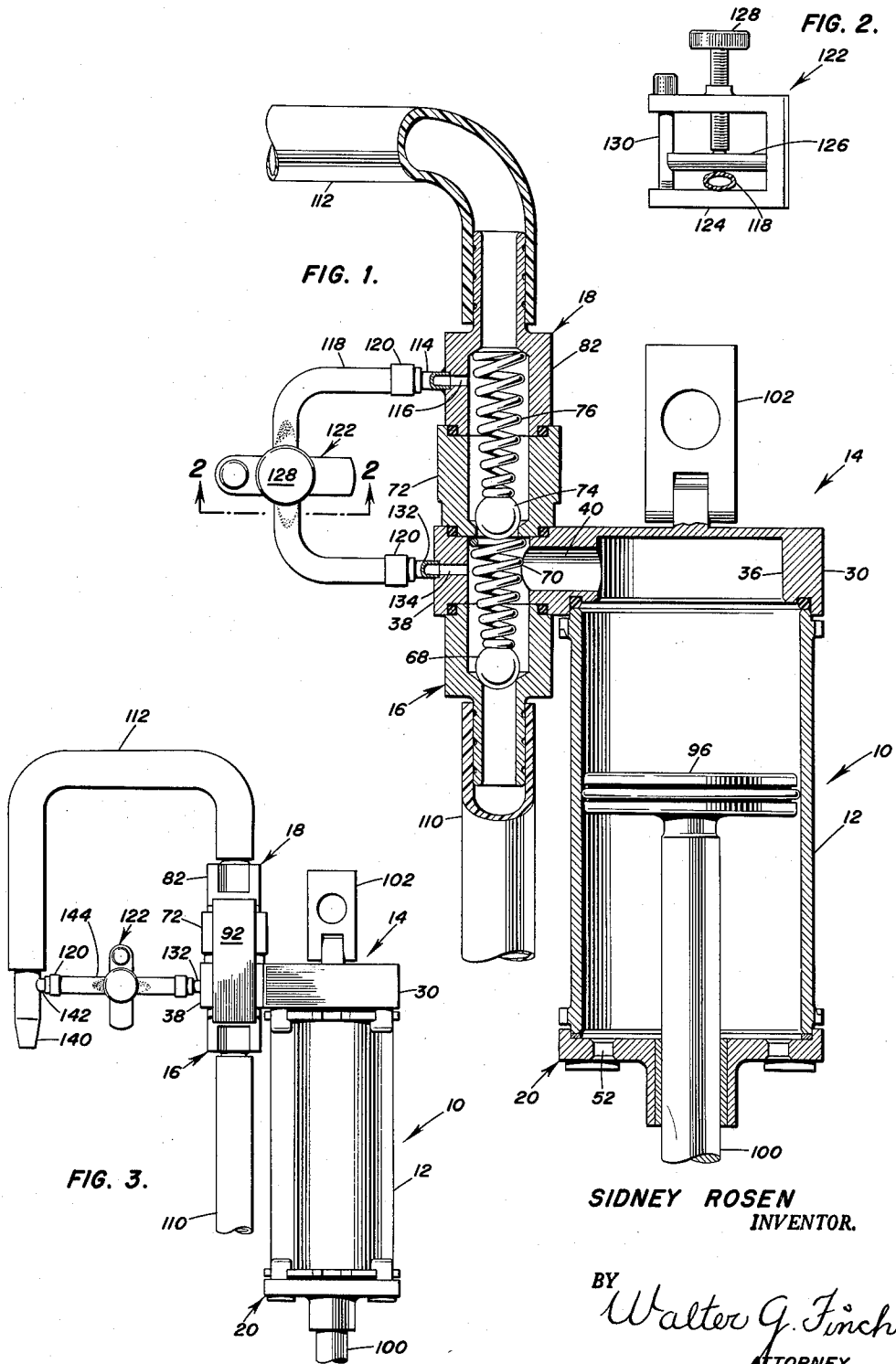
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VARIABLE PRESSURE SUCK-BACK DEVICE FOR A PUMP

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VARIABLE PRESSURE SUCK-BACK DEVICE
FOR A PUMP

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4 Claims. (Cl. 222—318)

This invention relates generally to pumps for dispensing viscous liquids, and more particularly to an arrangement which permits a pump to suck-back a measured quantity of material delivered with each dispensing stroke.

In the packaging of various viscous and semi-viscous liquids such as catsup or glue; or the many syrup-based pharmaceuticals, it is extremely difficult to insure that the delivery of the liquid being packaged will be cut off cleanly at the end of each delivery stroke of the pump piston. Certain amounts of the liquid will cling to the inner wall of the delivery nozzle and allow a drop to form at its exit.

This condition is highly objectionable for several reasons. As in the case of glues, the drop will begin to harden and to allow additional glue to accumulate at the dispensing nozzle, thus allowing the calibrated amount of material to be delivered and necessitating frequent disassembly and cleaning of the nozzle. Furthermore, some of the material will drop from the nozzle onto the line of containers, or onto the conveying apparatus, rendering the containers unfit for labeling and requiring a shut down of the conveyor for cleaning.

It is, therefore, an object of the present invention to provide a pump which will deliver precise quantities of viscous liquids for long packaging runs without requiring frequent readjustment or cleaning of the pump.

Another object of this invention is to provide a pump with a suck-back arrangement which can be very readily adjusted to suit the characteristics and needs of liquids of various states of viscosity.

Still another object of this invention is to provide an inexpensive suck-back arrangement for pumps which is extremely simple to manufacture and which can be quite readily installed on existing pumps, necessitating only a very minor amount of modification to the pump itself.

Other objects of this invention are to provide a pump with a new type of suck-back arrangement which is economical to manufacture, and which is efficient and reliable in operational use.

These and other objects and attendant advantages of this invention will become readily apparent and understood from the detailed specification and accompanying drawings in which:

Fig. 1 is an axial section through a pump incorporating the features of this invention with certain elements being shown in elevation;

Fig. 2 is a cross-section taken on line 2—2 of Fig. 1; and

Fig. 3 is an elevation, on a reduced scale, of a pump embodying a modification of this invention.

Referring now to Fig. 1 of the drawings, there is shown generally a cylinder and piston type precision dispensing pump 10. The pump 10 is provided with a cylinder 12 upon which is mounted an upper cylinder head assembly 14 and a lower cylinder head 20. Slidably arranged within the cylinder 12, is a piston 96 which is driven by a piston rod 100 that passes through the lower cylinder head 20 to a driving source (not shown). The lower

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cylinder head 20 is provided with a plurality of ports 52 which exhaust air from the underside of the piston 96.

The upper cylinder head assembly 14 consists of a thick body or block 30 containing a bore 36 concentrically arranged with respect to the cylinder 12. The left side of the body 30, as viewed in Fig. 1, is provided with a boss 38 containing a passage 40 which communicates with an inlet valve assembly 16 and an outlet valve assembly 18 and the bore 36 of the body 30.

The inlet valve 16 carries a ball 68 which is urged downwardly to the shut-off position by a conical spring 70. The outlet valve 18 is formed of two pieces comprising an upper half 82 and the lower half which is a valve seat 72 containing a ball 74 which is urged downwardly to the shut-off position by a spring 76.

The various elements of valves 16 and 18 are securely locked to the boss 38 by a pair of keeper bars 92 which are best illustrated in Fig. 3. A fully detailed disclosure of the manner of assembling the valves 16 and 18 may be had from an examination of applicant's co-pending application entitled "Piston Pump with Cam Coupling and Crank Assembly," Serial Number 841,641 filed September 22, 1959. The entire pumping arrangement is pivotally mounted to a driving apparatus (not shown) by means of an eye 102.

Referring now to the details of one embodiment of the suck-back arrangement, it is to be noted in Fig. 1, that the upper portion 82 of valve 18 is provided with a small bore 116 into which is silver-soldered a nipple 114. The boss 38 is similarly provided with a small bore 134 into which is silver-soldered a nipple 132.

A small diameter hose 118 is secured, at its ends, to the nipples 114 and 132 by clamps 120. Approximately midway between its ends, there is installed on hose 118 a hose cock clamp 122. This type of clamp finds considerable favor in laboratories because of its ability to maintain an easily made fine adjustment.

Fig. 2 depicts such a clamp wherein a sliding bar 126, which is driven by a thumbscrew 128, adjustably restricts or permits passage of viscous fluid through hose 118. The bar 126 is restricted against rotation by having its left end contoured to ride against a keeper screw 130, the lower end of which engages a threaded hole in the lower leg or anvil of frame 124.

The pump 10 and suck-back arrangement operate as described below:

When the piston 96 is pulled downwardly, a quantity of liquid is drawn through a hose 110 driving the ball 68 upward against the bias of spring 70. At the end of the downstroke of the piston 96, ball 68 is returned to its seat by spring 70 sharply cutting off the liquid supply. The upstroke of piston 96 will now force the liquid past ball 74, against the bias of spring 76, through outlet valve 18 to a delivery nozzle through an outlet hose 112. It is to be understood, of course, that after delivery of the fluid is begun, the valve 18 will remain substantially full at all times.

Now, as the piston 96 begins a new downward stroke, the ball 74 will seat sharply, with the assistance of spring 76, thereby preventing all the fluid in valve 18 from returning to cylinder 12. However, as the piston 96 moves downwardly, a small quantity of fluid will bypass ball 74 through passage 116, hose 118, and passage 134. Thereby, a slight reverse suction will be created in outlet hose 112 causing any drops of liquid depending from the outlet nozzle to be drawn back into the nozzle to be delivered at the next upstroke of piston 96.

The valve 122 is adjustable to accommodate various liquids of different viscosity. However, when liquids of extremely high viscosity are to be delivered, the suck-back arrangement illustrated in Fig. 3 becomes more desirable. In this arrangement a suck-back hose 144

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communicates directly with a delivery nozzle 140 by means of a nipple 142, with the hose clamp 122 being positioned as indicated.

While but two forms of the invention have been illustrated in the drawings and described herein, it is not intended to limit the design and manufacture to such particular forms for the pump, as it is appreciated that other arrangements of the suck-back device can be designed and made that would use the same principles and come within the scope of the appended claims.

What is claimed is:

1. In combination, a dispensing pump having a cylinder with a piston therein and a piston rod connected to said piston for the movement in said cylinder, said cylinder having a passageway provided in its cylinder wall, inlet valve means connected to said passageway to pass fluid therethrough to said cylinder when said piston is retracted, a dispensing nozzle, outlet valve means connected to said dispensing nozzle and to said passageway to pass fluid pumped from said cylinder through said passageway and outlet valve means to said dispensing nozzle during the discharge movement of said piston, and tube means having one end connected intermediate said outlet valve means and inlet valve means and to said passageway and its other end to said dispensing nozzle for causing a reverse flow of any pump fluid in said dispensing nozzle back therefrom to said passageway when said piston is retracted.

2. In a dispensing pump having a cylinder with a piston therein and a piston rod connected to said piston for the movement thereof, said cylinder having a passageway provided in its cylinder wall, inlet valve means connected to said passageway to pass fluid therethrough to said cylinder when said piston is retracted, a dispensing nozzle, outlet valve means connected to said dispensing nozzle and to said passageway to pass fluid pumped from said cylinder through said passageway and outlet valve means to said dispensing nozzle during the discharge movement of said piston, and variable pressure means connected intermediate said outlet valve means and said inlet valve means to said passageway and to said dispensing nozzle for causing a reverse flow of any pump fluid in said

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dispensing nozzle when said piston is retracted in said cylinder.

3. In a dispensing pump having a cylinder with a piston therein and a piston rod connected to said piston for the movement thereof, said cylinder having a passageway provided in its cylinder wall, inlet valve means connected to said passageway to pass fluid therethrough to said cylinder when said piston is retracted, a dispensing nozzle for dispensing said fluid from said cylinder, outlet valve means connected to said dispensing nozzle and to said passageway to pass fluid pumped from said cylinder through said passageway and valve means to said dispensing outlet nozzle during the discharge movement of said piston, and variable pressure means connected to said dispensing nozzle and to said passageway and arranged to bypass said outlet valve means for causing a reverse flow of any pump fluid back from said dispensing nozzle when said piston is retracted in said cylinder.

4. In combination with a dispensing pump having a cylinder with a piston therein and a piston rod connected to said piston for the movement thereof, said cylinder having a passageway provided in its cylinder wall, directional inlet valve means connected to said passageway to pass fluid therethrough to said cylinder when said piston is retracted, directional outlet valve means also connected to said passageway to pass fluid pumped from said cylinder through said passageway and directional outlet valve means to said dispensing nozzle during the discharge movement of said piston, and means including an adjustable passageway having one end connected between said directional outlet valve means and said directional inlet valve means to said cylinder passageway and its other end connected to said dispensing nozzle for causing a reverse flow of any pump fluid back from said dispensing nozzle to said cylinder passageway when said piston is retracted in said cylinder.

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