

[54] FLUENT MATERIAL DISPENSER HAVING
OOZE PREVENTION MEANS

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[52] U.S. Cl. 401/174, 222/109, 222/390,
222/391
[51] Int. Cl. B43k 5/06
[58] Field of Search 222/386, 390, 391,
222/424, 109; 401/174, 176, 179, 180, 182

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[57] ABSTRACT

A fluent substance is forced through the dispensing outlet of a container by a screw-fed piston upon rotation of a screw mechanism in a dispensing direction. One end of a torsion spring device is secured for rotation with the drive portion of the screw mechanism, its other end frictionally engaging the inner container wall, such that rotation of the drive portion in the dispensing direction energizes the spring device, release of the drive mechanism enabling the torsion spring device to automatically reversely turn the drive mechanism and slightly retract the piston, thereby relieving the pressure on the fluent substance to prevent its oozing from the dispensing outlet of the container.

12 Claims, 9 Drawing Figures

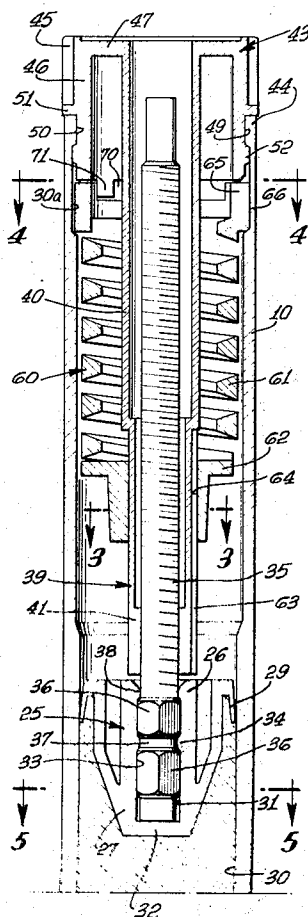


FIG. 1.

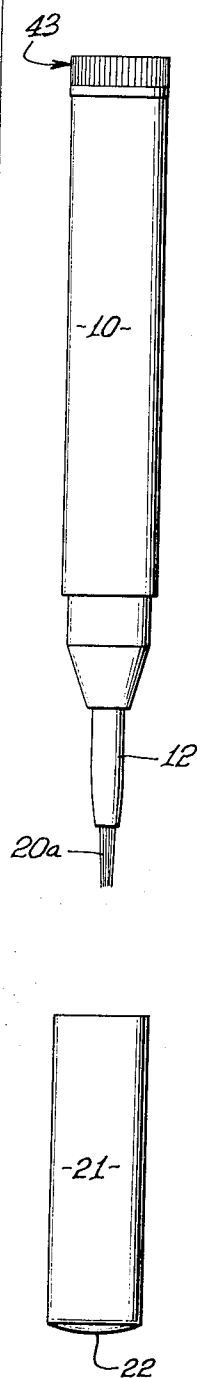


FIG. 2a.

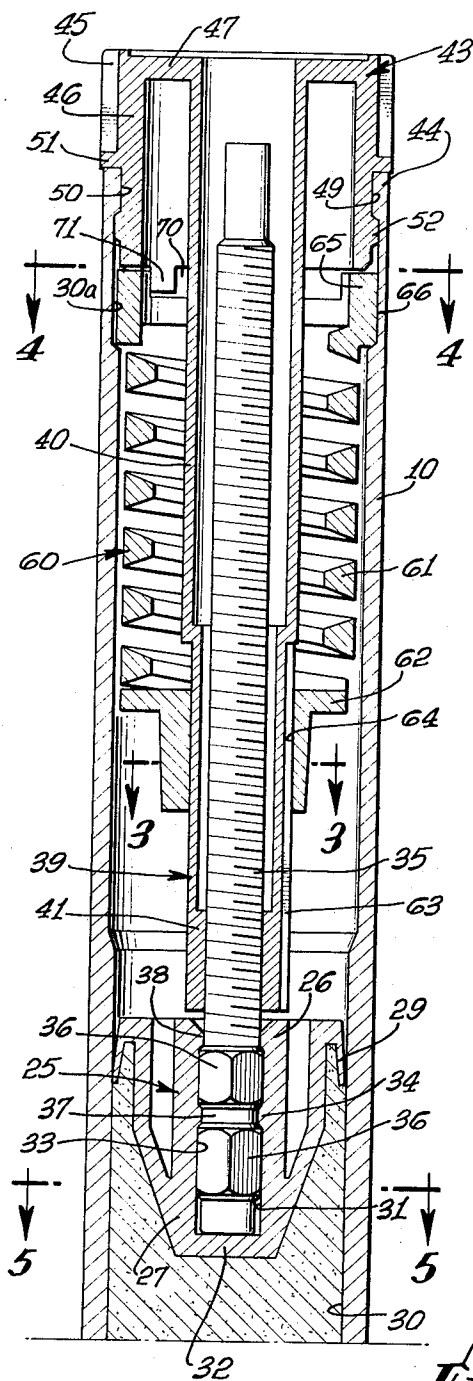


FIG. 2b.

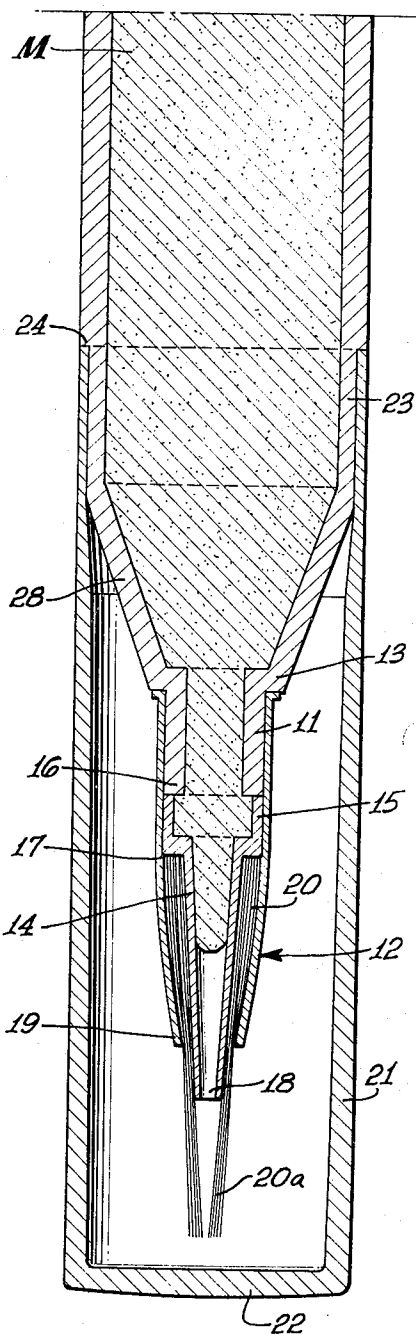
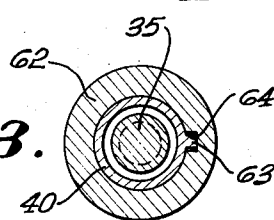
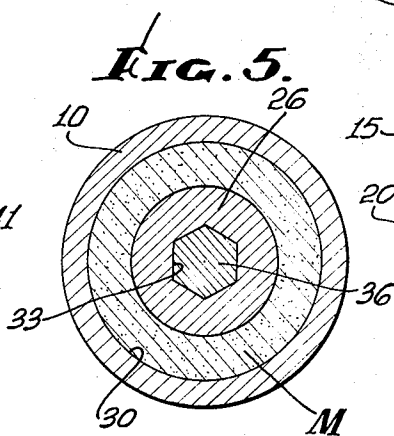
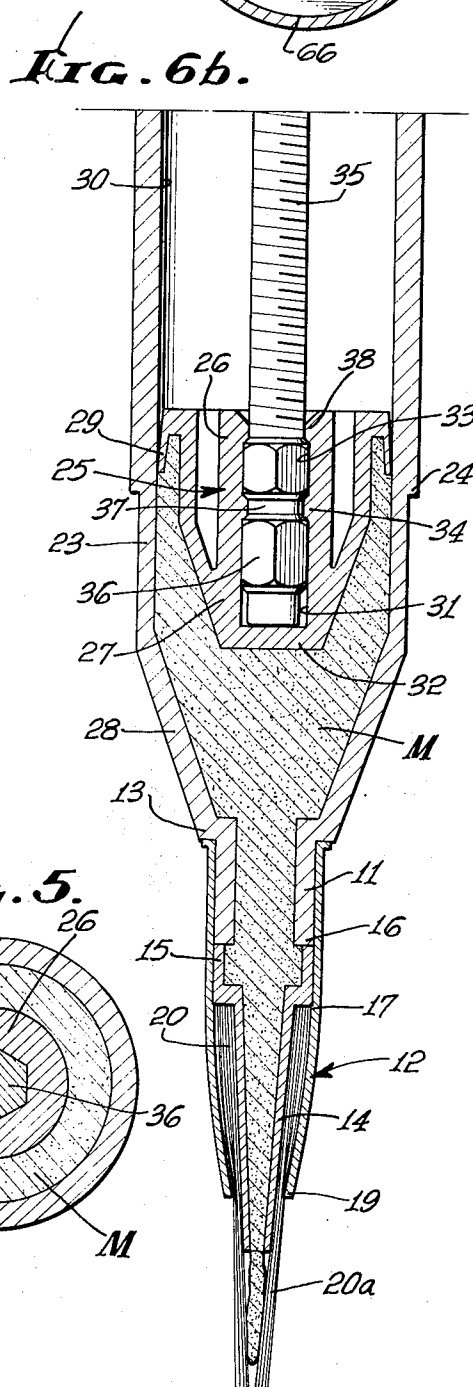
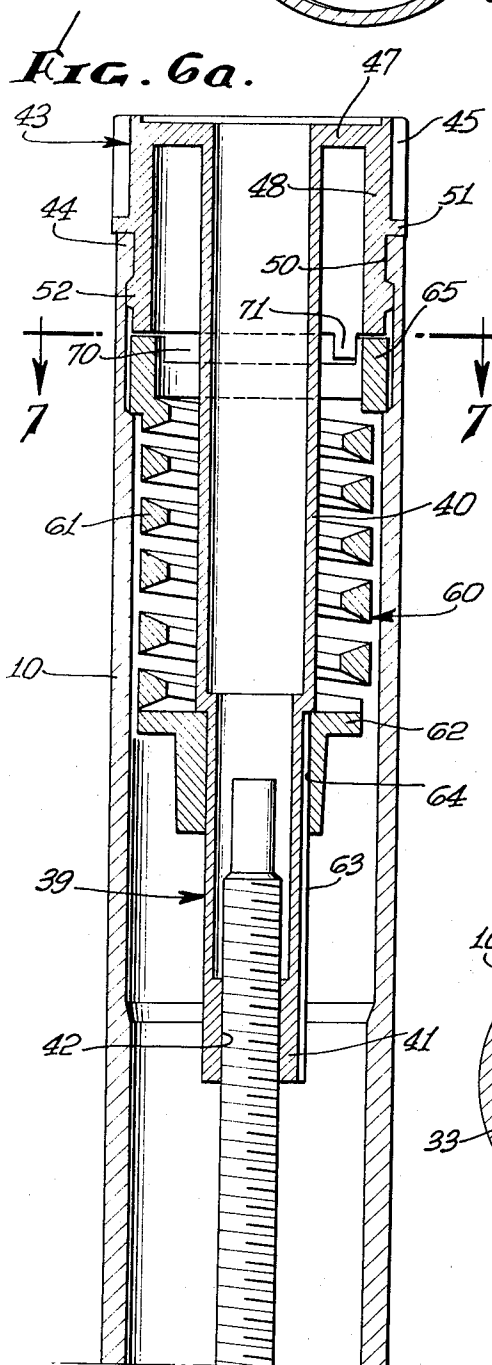
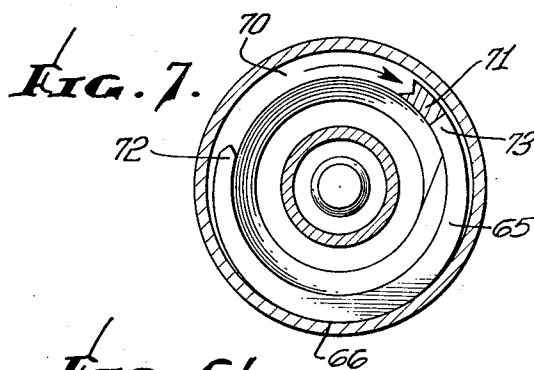
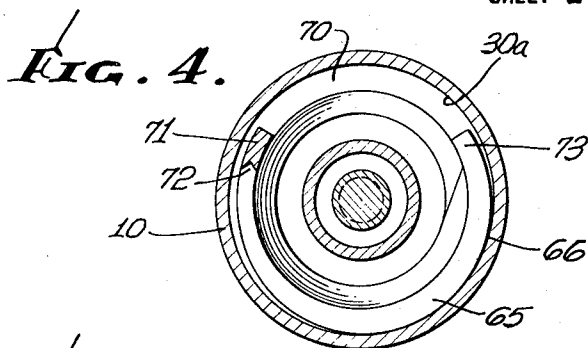


FIG. 3.





FLUENT MATERIAL DISPENSER HAVING OOZE PREVENTION MEANS

The present invention relates to dispensers, and more particularly to dispensers of fluent substances, such as creams, lipstick, deodorants, food stuffs, pharmaceuticals, and the like.

Dispensers for fluent materials are known in which rotation of a screw mechanism feeds a piston forwardly in a container to force the fluent material therein through the dispenser outlet or forward nozzle of the container. Such dispensers have the drawback of the fluent material tending to ooze through the dispensing outlet of the container, after rotation of the screw mechanism and forward feeding of the piston have ceased, because of the residual pressure built up by the piston on the fluent material in the container.

By virtue of the present invention, a dispenser is provided in which the residual pressure in the fluent material is relieved by a mechanism that retracts the piston automatically in the container to a small extent after the screw mechanism has been released. In fact, a slight negative pressure (subatmospheric) is developed in the container to retract the fluent material slightly through the dispensing outlet or into the nozzle of the container. More particularly, the invention is directed to a screw-feed mechanism for feeding the piston forwardly in the container against the fluent mass therein when a desired portion of the mass is to be forced from the container, rotation of the mechanism in a dispensing direction energizing a spring capable of imparting a reverse rotation to the mechanism when the latter is released to partially retract the piston in the container. The spring device may be helical, with one end coupled to the rotatable portion of the screw-feed mechanism, its other end frictionally engaging the container for slipping thereon after the spring device has been energized by the screw mechanism. The amount of torsion imparted to the spring of the device, or energy stored therein, by the screw-feed mechanism may be limited by effecting a positive drive between the screw-feed mechanism and the end of the spring device that frictionally engages the container, causing such end to be turned frictionally on the container.

This invention possesses many other advantages, and has other purposes which may be made more clearly apparent from a consideration of a form in which it may be embodied. This form is shown in the drawings accompanying and forming part of the present specification. It will now be described in detail, for the purpose of illustrating the general principles of the invention; but it is to be understood that such detailed description is not to be taken in a limiting sense.

Referring to the drawings:

FIG. 1 is an exploded side elevational view of a dispenser embodying the invention, with the cap removed from the forward portion of the dispenser container;

FIGS. 2a and 2b together constitute a longitudinal section through the dispenser illustrated in FIG. 1, with the piston in its full rearward position, FIG. 2b being a lower continuation of FIG. 2a;

FIG. 3 is a cross-section taken along the line 3—3 on FIG. 2a;

FIG. 4 is a cross-section taken along the line 4—4 on FIG. 2a;

FIG. 5 is a cross-section taken along the line 5—5 on FIG. 2a;

FIGS. 6a and 6b are views corresponding to FIGS. 2a and 2b, respectively, with the screw-feed mechanism and the piston portion of the dispenser shifted to the forward portion of the container along which the piston is slidable, and with certain parts in a different relative position than illustrated in FIGS. 2a and 2b; and

FIG. 7 is a cross-section taken along the line 7—7 on FIG. 6a.

The dispenser illustrated in the drawings includes an elongate cylindrical body or container 10 having a forward nose portion 11 through which a fluent mass M, such as lipstick, in the container is to be dispensed. The forward nose portion has a ferrule or body extension 12 secured thereon, with its rearward end engaging a nose shoulder 13, there being a nozzle 14 mounted within the body extension which has a rear head 15 secured within the ferrule, the rearward end of the head engaging the end 16 of the nose, with its forward end engaging opposite flanges 17 in the ferrule. The nozzle has an outlet or orifice 18 at its forward end that projects forwardly of the orifice 19 of the ferrule. A pony tuft 20, or other brush-like element, is secured between the nozzle and ferrule, projecting forwardly of the nozzle orifice 18, the fluent mass in the container being adapted to be dispensed through the nozzle 14 and into the brush portion 20a extending forwardly thereof. The brush elements, nozzle and ferrule, and the manner of their mounting on the nose portion 11 of the container, form no part of the present invention. Such portion of the disclosure is both described and claimed in the application of Walter B. Spatz, Ser. No. 205,214, filed Dec. 6, 1971, for "Brush and Method of Making the Same."

When not in use, a cover 21 having an end wall 22 may be slipped over the brush device and forward portion of the container 10, the rear portion of the cover or cap frictionally engaging a reduced diameter exterior portion 23 of the container, and with the rear end of the cover engaging a container shoulder 24. When the dispenser is to be used, the cover 21 may be readily removed from the container.

A piston 25 is disposed in the container rearwardly of the fluent mass M. This piston comprises a main body 26, the forward portion 27 of which tapers towards the outlet end of the container, to conform to the extent of taper of the forward portion 28 of the container adjacent to its nose 11. The rear portion of the body of the piston or chaser comprises a circumferential lip seal 29 facing in a forward direction and adapted to slidably seal against the inner cylindrical wall 30 of the container to prevent leakage of the fluent mass relatively rearwardly past the piston when the piston is shifted in a dispensing direction. This lip seal 29 frictionally engages the cylindrical wall of the container to resist rotation of the piston 25 therein. The piston body has a central socket 31 therein extending from a forward wall 32 of the piston and opening through the rear of the piston. This socket has longitudinally spaced internal non-circular, such as hexagonal, walls 33 separated by a circumferential internal rib 34, an externally threaded, elongate screw-feed shaft 35 having its forward portion disposed in the socket and provided with companion longitudinally spaced hexagonally shaped heads 36 snugly fitting within the hexagonal walls 35 of the piston, the hexagonal heads being separated by a circumferential groove 37 adapted to receive the rib 34.

The parts illustrated in the drawings are preferably made of synthetic resins having sufficient elasticity, such that the forward head portion 36 of the screw shaft 35 can be forced into the socket 31, the intermediate rib 34 and the rear rib 38 of the socket deflecting outwardly sufficiently to enable location of the heads 36 within the companion hexagonal walls 33 of the piston. As an example, the piston may be made of polyethylene; whereas, the screw-feed shaft 35 may be made of acetal. The major portion of the screw shaft is preferably formed with an external left-hand thread, the thread preferably being of multiple start, such as a two-start thread.

For the purpose of feeding the piston 25 forwardly in the container 10 to dispense the fluent mass therein through the outlet end of the container, a nut device 39 is threadedly associated with the screw shaft 35. As shown, the nut device comprises a hollow drive shaft 40 rotatably mounted in the container and prevented from shifting axially with respect thereto. Thus, the forward head 41 of the hollow shaft has internal threads 42, such as left-hand threads, meshing with the external left-hand threads of the screw shaft 35. The elongate portion of the hollow shaft rearwardly of its head 41 is out of engagement with the screw threaded shaft 35, the hollow shaft 40 extending rearwardly from its head and terminating in an enlarged wheel-like member of knob 43 extending beyond the rear end 44 of the container and having ribs or striations 45 thereon to facilitate gripping by a person's fingers. The wheel has a rim portion 46 containing the finger-gripping ribs and a disc 47 integrating such rim with the hollow shaft. The wheel includes a skirt portion 48 extending forwardly into the container 10 and provided with an external circumferential groove 49 receiving an inwardly directed circumferential rib 50 in the container to permit rotation of the wheel 43 and of the hollow shaft 40 within the container, the groove 49 receiving the container rib being defined by a forwardly facing shoulder 51 of the wheel and an external rib 52 on the sleeve engaging the container rib, to prevent longitudinal movement in both directions of the wheel 43 of the hollow drive shaft 40 integral therewith.

The rotary motion of the wheel 43 is imparted to the hollow shaft 40 integral therewith and to its internally threaded head 41. Such rotary motion effects longitudinal movement of the piston shaft 35 and of the piston 25 itself, the frictional engagement of the lip seal 29 with the container wall 30 preventing rotation of the piston and the screw shaft. Thus, turning of the wheel 43 and drive shaft 40 in a right-hand direction will cause the screw shaft 35 and piston 25 to move forwardly in the container to force a portion of the fluent mass M through the nose 11 and through the nozzle 14 into the brush 20, 20a associated therewith. Reverse rotation of the hollow drive shaft 40 will effect a longitudinal rearward movement of the screw shaft 35 and piston 25 secured thereto.

The forward feeding of the piston 25 imposes a pressure on the fluent material or mass M in the container, the cessation of the forward movement of the piston resulting in a residual pressure remaining in the fluent mass, which causes it to tend to ooze from the container and from the nozzle orifice 18, which is undesirable. By virtue of the present invention, such oozing is prevented. In fact, the fluent mass M is caused to be retracted to a small extent into the nozzle 14, such action

occurring automatically upon cessation of the forward feeding of the piston in the cylinder and upon release of the wheel 43 integral with the hollow drive shaft 40. As illustrated, a torsion spring device 60 is provided which encircles the hollow drive shaft 40 within the container. The device includes a torsion or helical spring 61 integral with a forward member 62 splined to the hollow drive shaft 40. The spline connection specifically disclosed includes a radial key or longitudinal rib 63 on the drive shaft fitting within a longitudinal keyway or groove 64 in the forward member 62. The spring device further includes a rear head 65 integral with the helical spring 61 itself, with its periphery 66 frictionally engaging the inner cylindrical wall portion 30a of the container, to resist turning of the rear portion of the spring 61 when the hollow drive shaft 40 is rotated, and feeding of the screw shaft 35 and piston 25 in the forward direction, which turning or rotation is transmitted to the forward member 62 splined to the hollow drive shaft. When the hollow drive shaft 40 is turned, the turning effort coils the spring 61 since rotation of the rear head 65 is resisted by its frictional engagement with the container wall 30a. Accordingly, the spring is coiled and energy is stored in it, the extent of coiling proceeding until sufficient force is exerted on the rear member 65 for it to slide frictionally around the cylindrical wall 30a, which will occur in the event that the drive shaft 40 is rotated to a substantial angular extent, or through a plurality of revolutions, in feeding the screw shaft and piston in a forward direction.

When the wheel is released, the energy stored in the spring 61 causes it to unwind or uncoil, the friction member 65 holding the rear end of the spring stationary, the forward head 62 rotating in a reverse or left-hand direction to correspondingly turn the hollow drive shaft 40 and effect rearward feeding of the screw shaft 35 within the container, thereby pulling the piston 25 rearwardly in the container 10 to a slight extent. Such rearward movement relieves the pressure on the fluent mass M and, in fact, may produce a negative pressure therein, the external atmospheric pressure then forcing the fluent mass partially back into the nozzle 14, as illustrated in FIG. 2b.

The action of the spring device 60 described above occurs in the absence of any rotatable driving connection between the wheel 43 and the rear friction head 65. It is desirable to impose a limitation on the extent of coiling or energizing of the spring 61, since it is only necessary for the spring to reversely rotate the hollow drive shaft 40 a fraction of a revolution to effect adequate retraction of the piston 25 when the wheel is released. In the mechanism illustrated, turning of the wheel 43 to a predetermined angular extent will then cause the wheel to directly turn the rear head 65, limiting the relative angular motion between the forward and rear heads 62, 65 of the spring device 60. Thus, the rear head has a cut-out portion 70, which, for example, may have an arcuate extent of about 145°. The wheel skirt 48 has a forward lug or finger 71 disposed within such cut-out portion. With the wheel released, the lug or finger engages one end 72 of the rear friction head defining the cut-out portion, as illustrated in FIGS. 2a and 4. When the wheel 43 is rotated to turn the shaft 40, energy is stored in the spring 61, until the finger 71 engages the head defining the other end 73 of the cut-out portion (FIG. 7). Continued turning of the wheel 43 in a direction to feed the screw shaft 35 and piston

25 in a forward direction will then cause the rear head 65 and forward head 62 to be turned together, the rear head frictionally sliding around the container wall 30a. Thus, a limited amount of torsion is imparted to the helical spring 61. By way of example, with the cut-out portion 70 extending 145° and the finger 71 having an arcuate extent of about 25°, the twisting of the coil spring is limited to a relative movement of the forward head 62 about 120° with respect to the rearward head 65.

With the lost motion connection 70, 71 provided between the wheel 43 and the rear head 65 of the spring device, dispensing can occur through a large number of revolutions of the shaft 40, if desired, but the coil spring 61 will be energized to a limited extent only, since the wheel 43 will then directly drive the rear head 65 frictionally around the wall 30a of the cylinder or container 10. Release of the wheel will cause the spring 61 to effect rearward rotation of the forward head 62 and of the rotatable drive shaft 40 to a partial revolution which, in the example given above, is about 120°, to effect a corresponding retraction of the left-hand screw shaft 35 and piston 25 within the cylinder 10.

I claim:

1. In a dispenser: a container having an outlet; piston means in said container; means movable in one direction for shifting said piston means forwardly in said container and against a substance in said container to force the substance through said outlet; energy storable means operatively connected to said movable means and adapted to have energy stored therein in response to movement of said movable means in said one direction, said energy storable means being constructed and arranged to move said movable means in the direction opposite said one direction and said piston rearwardly in said cylinder in response to release of said movable means and the subsequent release of the energy stored in said energy storable means.

2. In a dispenser as defined in claim 1; said movable means including an operating member located at least partially externally of said container, and instrumentalities operatively connected to said operating member and piston means and responsive to turning of said operating member in one direction for shifting said piston means forwardly in said container.

3. In a dispenser as defined in claim 1; said movable means including an operating member located at least partially externally of said container, a first threaded member operatively connected to said operating member, a second threaded member meshing with said first threaded member and operatively connected to said piston means, whereby turning of said first threaded member by said operating member feeds said piston means longitudinally forwardly in said container; said energy storable means being operatively connected to said first threaded member and having energy stored therein upon turning of said first threaded member; release of said operating member enabling said energy storable means to reversely turn said first threaded member.

4. In a dispenser: a container having an outlet; piston means in said container; means movable in one direction for shifting said piston means forwardly in said container and against a substance in said container to force the substance through said outlet; energy storable means operatively connected to said movable means and adapted to have energy stored therein in response

to movement of said movable means in said one direction, whereby release of said movable means enables said energy storable means to move said movable means in the opposite direction and cause said movable means to shift said piston means rearwardly in said container; said movable means including an operating member located at least partially externally of said container, a first threaded member operatively connected to said operating member, a second threaded member meshing with said first threaded member and operatively connected to said piston means, whereby turning of said first threaded member by said operating member feeds said piston means longitudinally forwardly in said container; said energy storable means comprising a spring device operatively connected to said first threaded member and frictionally engageable with said container, said spring device having energy stored therein upon turning of said first threaded member; release of said operating member enabling said spring device to reversely turn said first threaded member.

5. In a dispenser as defined in claim 4; and means providing a lost motion driving connection between said operating member and portion of said spring device frictionally engaging said container to limit the energy stored in said spring device upon turning of said operating member.

6. In a dispenser: a container having an outlet; piston means in said container; means movable in one direction for shifting said piston means forwardly in said container and against a substance in said container to force the substance through said outlet; energy storable means operatively connected to said movable means and adapted to have energy stored therein in response to movement of said movable means in said one direction, whereby release of said movable means enables said energy storable means to move said movable means in the opposite direction and cause said movable means to shift said piston means rearwardly in said container; said movable means including an operating member located at least partially externally of said container, a first threaded member operatively connected to said operating member, a second threaded member meshing with said first threaded member and operatively connected to said piston means, whereby turning of said first threaded member by said operating member feeds said piston means longitudinally forwardly in said container; said energy storable means being operatively connected to said first threaded member and having energy stored therein upon turning of said first threaded member; release of said operating member enabling said energy storable means to reversely turn said first threaded member; and means providing a lost motion driving connection between said operating member and energy storable means to limit the energy stored therein upon turning of said operating member.

7. In a dispenser: a container having a forward outlet; piston means movable longitudinally in said container; a threaded shaft secured to said piston for axial movement therewith and extending rearwardly therefrom; a threaded drive member meshing with said shaft; an operating member operatively connected to said drive member for rotating said drive member in one direction to feed said drive shaft and piston means forwardly in said container and said piston means against a substance in said container to force the substance through said outlet; a spring device having one portion operatively engaging said drive member and another portion

operatively engaging said container, whereby rotation of said drive member by said operating member in said one direction energizes said spring device and causes said spring device to reversely rotate said drive member in the opposite direction upon release of said operating member to move said drive shaft and piston means rearwardly in said container.

8. In a dispenser as defined in claim 7; said one portion of said spring device being coupled to said drive member, said another portion of said spring device frictionally engaging said container to resist turning of said another portion in said container.

9. In a dispenser as defined in claim 7; said spring device comprising a helical spring.

10. In a dispenser as defined in claim 7; said spring device comprising a helical spring; said one portion of said spring device being coupled to said drive member, said another portion of said spring device frictionally engaging said container to resist turning of said another portion in said container.

11. In a dispenser as defined in claim 7; said one por-

tion of said spring device being coupled to said drive member, said another portion of said spring device frictionally engaging said container to resist turning of said another portion in said container; and means providing a lost motion driving connection between said operating member and said another portion of said spring device to limit the energy stored in said spring device upon rotating of said operating member in said one direction.

12. In a dispenser as defined in claim 7; said spring device comprising a helical spring; said one portion of said spring device being coupled to said drive member, said another portion of said spring device frictionally engaging said container to resist turning of said another portion in said container; and means providing a lost motion driving connection between said operating member and said another portion of said spring device to limit the energy stored in said helical spring upon rotating of said operating member in said one direction.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,756,730 Dated September 4, 1973

Inventor(s) Walter B. Spatz

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

- Column 3, line 6: before "heads" insert --hexagonal shaft--;
- line 7: cancel "shaft ehads";
- line 27: change "of" to --or--.

Signed and sealed this 12th day of March 1974.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents