June 14, 1966 W. B. SPATZ 3,255,935

DISPENSERS FOR FLUENT MASSES

Filed March 29, 1965 2 Sheets-Sheet 1

FIG. 1.

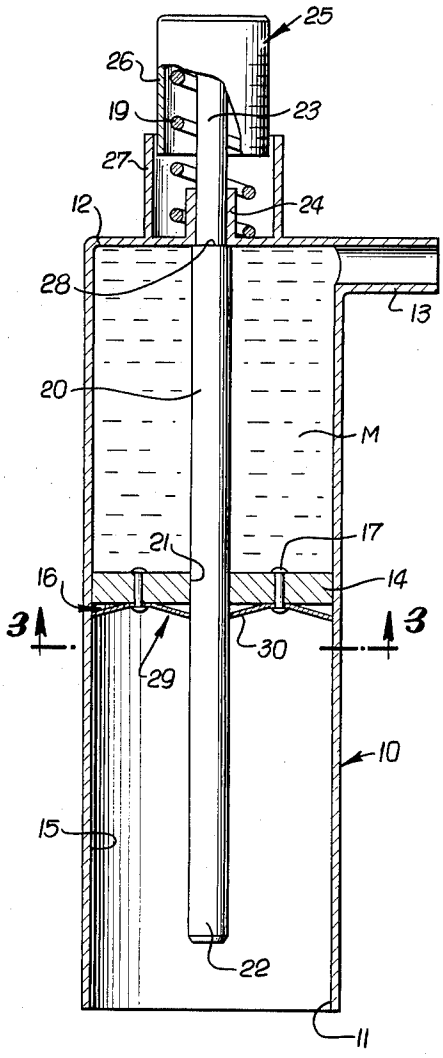


FIG. 2.

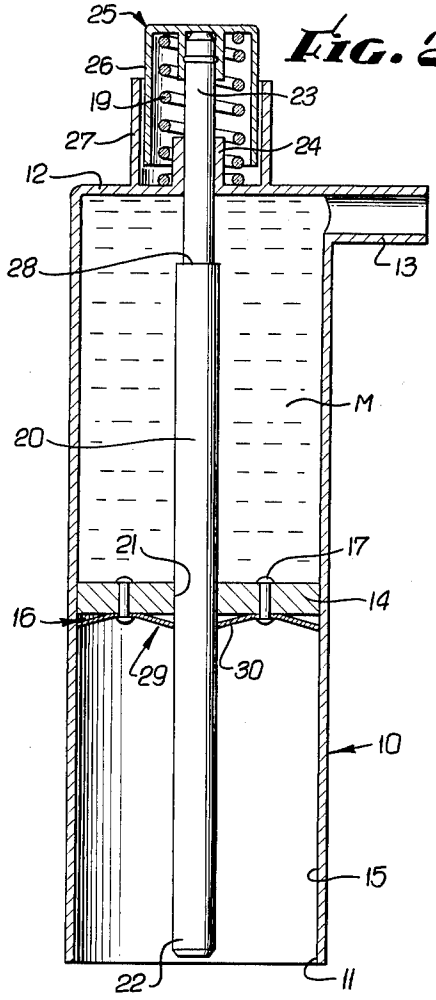
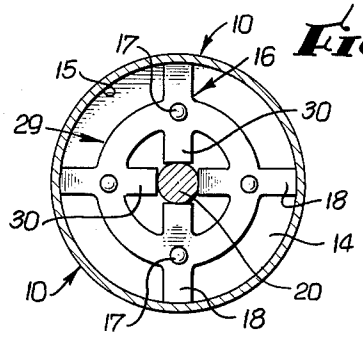


FIG. 3.



INVENTOR.
WALTER B. SPATZ
BY Bernard Kriegel
ATTORNEYS.

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FIG. 4.

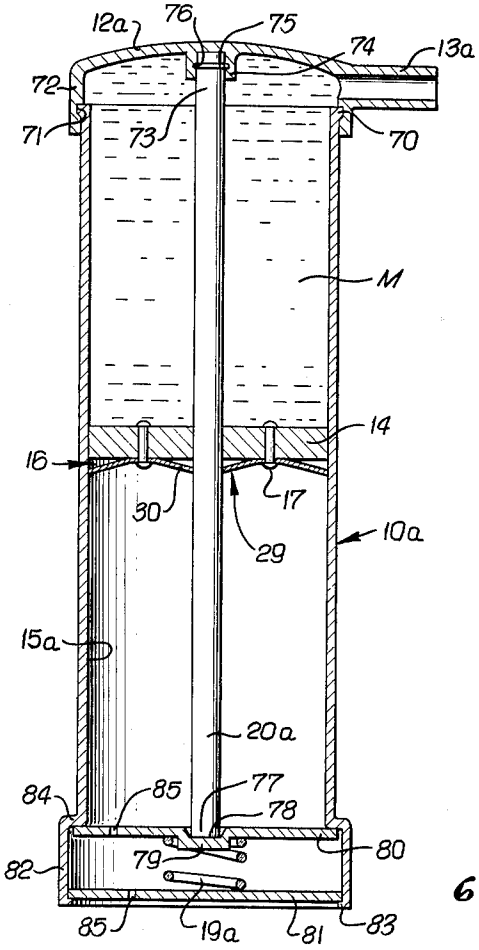
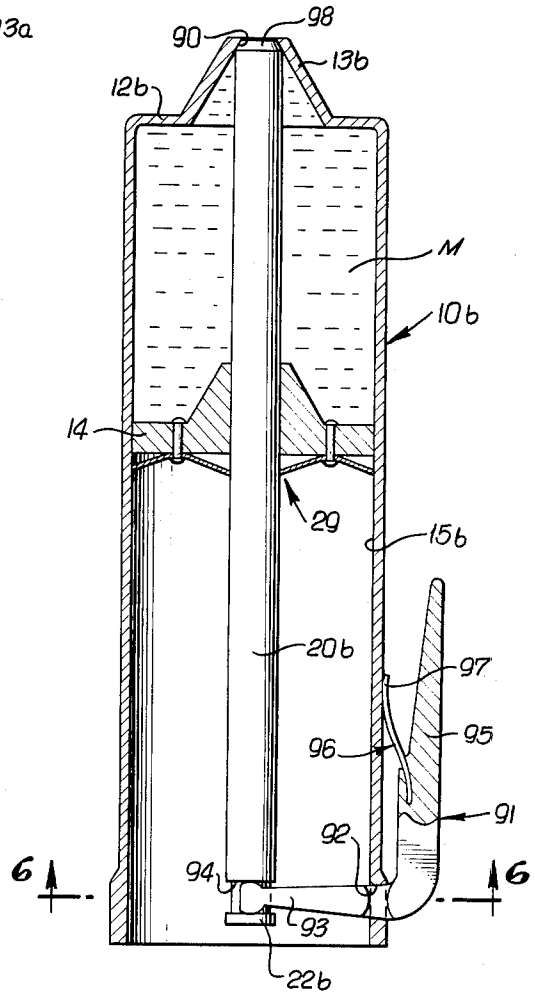


FIG. 5.



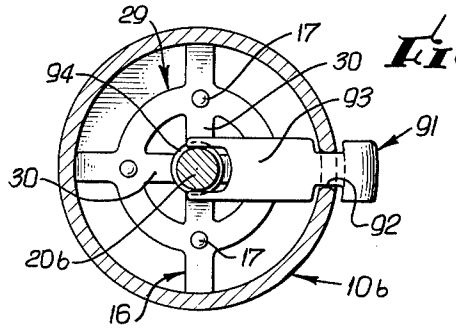


FIG. 6.

INVENTOR.
WALTER B. SPATZ
BY Bernard Kriegel
ATTORNEY.

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3,255,935

DISPENSERS FOR FLUENT MASSES

Walter B. Spatz, 11182 Sunset Blvd., Los Angeles, Calif. 90049

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11 Claims. (Cl. 222—340)

The present invention relates to dispensers, and more particularly to apparatus for dispensing fluent substances, such as hand-cream, toothpaste, sunburn lotion, mayonnaise, and the like.

An object of the invention is to provide a dispenser for a fluent substance in which energy is first imparted to a suitable device, such as a spring or the like, as by means of a person's hand, so that the energized source can effect discharge of the fluent substance from the dispenser.

A further object of the invention is to provide a dispenser embodying a container for a fluent substance having a dispensing piston or follower therein, in which energy is first stored in a suitable device, such as a spring or the like, without disturbing the piston, the energy being imparted to the spring or other device by a person's hand, and the stored energy then being capable of shifting the piston within the container in a dispensing direction.

Another object of the invention is to provide a dispenser of the type above indicated, in which the outlet for the container is automatically opened and closed while energy is being stored in the spring and during movement of the piston or follower in a dispensing direction.

This invention possesses many other advantages, and has other objects which may be made more clearly apparent from a consideration of several forms in which it may be embodied. Such forms are shown in the drawings accompanying and forming part of the present specification. These forms 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, since the scope of the invention is best defined by the appended claims.

Referring to the drawings:

FIG. 1 is a longitudinal section, with parts disclosed in side elevation, of one form of dispenser embodying the invention;

FIG. 2 is a view similar to FIG. 1, disclosing parts of the dispenser in another operative position;

FIG. 3 is a cross-section taken along the line 3—3 on FIG. 1;

FIG. 4 is a longitudinal section through still another embodiment of the invention;

FIG. 5 is a longitudinal section through yet a third embodiment of the invention;

FIG. 6 is a section taken along the lines 6—6 on FIG. 5.

In the form of invention illustrated in FIGS. 1, 2 and 3, a suitable container or tube **10** of cylindrical shape is illustrated which has a rear end portion **11** open to the atmosphere and a forward end wall or closure **12**. A suitable dispensing nozzle or spout **13** is located adjacent to the end wall through which a fluent mass M within the container can pass to the exterior thereof. This fluent mass is disposed between the forward end wall of closure **12** and a piston or follower **14** longitudinally movable in the container and slidable along its inner wall **15** in leakproof relation with respect thereto.

The piston **14** can move in a forward direction only within the container, for the purpose of forcing a portion of the fluent mass M through the dispensing nozzle or spout **13**. Its rearward movement in the container is prevented by a one-way gripper or brake **16** which can assume any suitable form. As disclosed, the one-way mechanism **16** is suitably secured to the rear portion of

the piston, as by means of rivets **17**, and has circumferentially spaced outwardly projecting fingers **18** extending outwardly toward the inner wall **15** of the container and inclined with respect thereto, so as to grip the inner wall in the event the piston tends to move in a rearward direction. However, the fingers **18** automatically release from the wall to permit movement of the piston in a forward direction within the container.

The piston **14** is actuated in a forward direction within the container as a result of first storing energy in a helical compression spring **19**, and then releasing the spring so that it can expand and transmit its motion to the piston. As disclosed, the actuating mechanism for the piston includes a rod **20** disposed axially in the container and extending slidably through a central bore **21** of the piston, the rear end **22** of the rod terminating adjacent to the open end **11** of the container. The rod has a reduced diameter forward portion **23** extending through the end wall or closure **12** and slidably through an outwardly projecting central boss **24** integral with the end wall, the forwardmost end of the rod being suitably secured to a cup-shaped plunger **25**. The helical compression spring **19**, or power spring, surrounds the outer portion **23** of the actuating rod and the boss **24**, its lower end bearing against the end wall **12** and its upper end bearing against the upper end of the plunger **25** that has a depending skirt **26** surrounding the spring. A cylindrical shield or skirt **27** extends upwardly or forwardly from the end wall **12** to conceal the spring.

Forward movement of the rod **20** and plunger **25** relative to the container **10** under the influence of the helical compression spring **19** is limited by engagement of a stop shoulder **28** on the rod with the end wall **12**. However, the plunger and rod can be pushed downwardly or rearwardly by the plunger **25**, the rod **20** being capable of passing in a downward or rearward direction freely through the piston **14**. However, return or forward movement of the rod under the influence of the helical spring **19** with respect to the piston is prevented by a one-way clutch or coupling device **29** that releasably attached the rod to the piston, so that forward movement of the rod **20** effects forward movement of the piston **14** within the container or tube **10**. As disclosed, the one-way clutch **29** can be made integral with the one-way gripper or brake device **16**, and comprises a plurality of inwardly directed radial gripping fingers **30** that are inclined toward the rod in a rearward direction, with the inner ends of the fingers engaging the periphery of the rod. The clutch fingers **30** will release to permit rearward or downward movement of the rod **20** within the piston **14**, but they will grip the rod and effect a coupling between it and the piston upon forward movement of the rod within the container **10**.

Because of the one-way brake **16** and one-way clutch mechanism **29** mounted on the piston **14**, the one-way brake will prevent rearward movement of the piston within the container or tube **10** by engaging the inner wall **15** of the latter, which will ensure that the rod **20** can move rearwardly within the piston without moving the latter, the one-way clutch fingers **30** automatically releasing from the rod. As the rod **20** is moved in a forward direction, the clutch fingers **30** grip the rod and couple it to the piston, the piston moving jointly with the rod in a forward direction, as permitted by the automatic release of the one-way brake or latch fingers **18** from the wall of the container.

The piston **14** is disclosed in FIGS. 1 and 2 in an intermediate position within the container **10**, or after a substantial portion of the fluent mass M has been dispensed through the nozzle or spout **13**. It is to be understood that initially the piston will be in a rear position within the container, with the fluent mass filling the

volume between the piston and the forward end wall 12 of the container. When a portion of the mass is to be dispensed, the plunger 25 is depressed, which will shift the rod 20 rearwardly with it and energize the spring 19 by compressing the latter. The piston 14 cannot move rearwardly in the container, since such action is prevented by the one-way gripper or latch element 16. However, the rod can move through the piston. Accordingly, depression of the plunger 25 and rod 20 effects no dispensing of the fluent mass through the spout 13. However, upon release of the plunger 25, the spring 19 expands and shifts the plunger and rod 20 in a forward direction, the rod becoming automatically clutched to the piston 14, which is automatically released from the container wall 15, and the piston moving forwardly with the rod to dispense a portion of the fluent mass through the spout. The amount of material M dispensed from the container corresponds to the distance that the plunger 25 is depressed, since the spring 19 will expand and move the piston 14 forwardly to its initial position by the amount of depression of the plunger.

Each depression of the plunger 25, as by the hand of the person or by one of the fingers of the hand, will result in rearward movement of the rod 20 without effecting any dispensing, the rod merely moving freely in a rearward direction through the piston. The release of the depressing force on the plunger 25 will allow the spring, in which energy has been stored as the result of depressing the plunger, to expand, the rod 20 automatically becoming coupled to the piston 14 and moving the piston forwardly in the container 10 to dispense an additional mass of the fluent substance M in the container. With each depression of the plunger, the spring 19 is energized, the rod moving freely through the piston 14, and with each release of the plunger the energized spring expands to effect additional forward movement of the piston within the container to dispense a portion of the mass through the outlet or spout 13. The piston 14 will be moved progressively in a forward direction only until substantially all of the mass in the container has been discharged through the nozzle or spout.

Another embodiment of the invention is illustrated in FIG. 4. As disclosed, the container 10*a* has a longitudinally movable piston 14 therein, the periphery of which sealingly engages the inner wall 15*a* of the container. A power actuating rod 20*a* extends centrally through the piston, the rod being capable of moving rearwardly within the piston, but being automatically coupled to the piston by the couplying or latch fingers 30 of the latch mechanism 29, 16 secured to the piston by the rivets 17, or the like. Rearward movement of the piston in the container is prevented by the one-way gripper or brake fingers 18 on the latter engaging the wall 15 of the container 10*a* rearwardly of the piston, such fingers 18 automatically releasing from the container wall to allow forward movement of the piston in the container.

The forward end of the container is closed by an elastomeric head 12*a* disposed over the end of the container 10*a* and which is secured thereto, as by means of an external rib or flange 70 of the container being received within a companion internal groove 71 in the skirt portion 72 of the head. Integral with the head 12*a* is a discharge nozzle or spout 13*a* establishing communication between the interior of the container at its forward end and the exterior of the container.

The forward end 73 of the power rod 20*a* extends into a central socket 74 in the head to which it is suitably secured as, for example, by means of a rib 75 on the rod received within an internal groove 76 within the wall of the socket. The rearward end 77 of the rod bears against the base 78 of a shallow central socket 79 in a thrust plate 80 which is urged in a forward direction by a helical compression spring 19*a* bearing thereagainst, and also against a spring seat 81 disposed within an enlarged diameter rearward portion 82 of the container and bearing against an internal flange 83 at the rear end of the latter. Forward movement of the thrust plate 80 is limited by its engagement with a rearwardly facing container shoulder 84. Air at atmospheric pressure is permitted to enter the container through vent holes 85 extending through both the spring seat 81 and the thrust plate 80.

The piston 14 is disclosed in an intermediate position in FIG. 4, in which a substantial portion of the mass M in the container forwardly of the piston has already been dispensed through the spout 13*a*. The operation of the device illustrated in FIG. 4 is essentially the same as the one illustrated in FIGS. 1 to 3. Depression of the elastomeric head 12*a* will shift the power rod 20*a* in a rearward direction through the piston 14, such rearward motion being transmitted to the thrust plate 80, which will compress the helical spring 19*a* and store energy therewithin. The rod 20*a* automatically releases from the piston 14, but the latter cannot move in a rearward direction because of the gripping action of its one-way latch fingers 18 against the wall 15*a* of the container. Upon release of the finger or other pressure upon the elastomeric head, the latter inherently tends to expand and return to its initial position, and the spring 19*a* also expands to shift the rod 20*a* in a forward direction, the one-way clutch 29 automatically coupling the rod to the piston 14 and causing the piston to move forwardly with the rod to dispense a portion of the mass M through the nozzle or spout 13*a* to the exterior of the container.

Each depression of the head 12*a* will store energy in it as well as in the compression spring 19*a*, the rod 20*a* moving freely in a rearward direction through the piston, whereas release of the depressing force on the head 12*a* will allow the latter to expand to its initial position and also allow the spring 19*a* to expand, moving the power or force-transmitting rod 20*a* in a forward direction and, through the one-way clutch or coupling 29, correspondingly moving the piston in a forward direction within the container.

If the elastomeric head 12*a* possesses sufficient spring force to actuate the mechanism, the spring 19*a*, seat 81 and thrust plate 80 can be omitted, release of the inward pressure on the head causing the latter to return inherently to its initial position and shifting the power rod 20*a* forwardly with it, the one-way clutch 29 causing the piston 14 to move forwardly with the power rod and dispense a portion of the fluent mass through the outlet or nozzle 13*a*.

In the form of invention disclosed in FIG. 5, a cylindrical container 10*b* has a forward end wall 12*b* containing a discharge nozzle or spout 13*b* disposed axially thereof and having an outlet surrounded by a tapered valve seat 90. The power or force transmitting rod 20*b* extends through the piston 14 disposed in the container 10*b*, there being the same type of one-way clutch 29 and one-way or unidirectional gripper or brake 16 between the rod 20*b* and piston 14, and between the piston and the inner wall 15*b* of the container, as in the other forms of the invention. The container is open at its rear end 11*b* to the atmosphere and the rear end of the rod 22*b* terminates adjacent to the open rear end of the container.

The rod 20*b* is shifted longitudinally of the container by a bell-crank lever 91 which extends through an aperture 92 in the rear portion of the container, being pivoted therein. One arm 93 of the bell crank lever is bifurcated, the bifurcations straddling the rod and extending into a groove 94 in the latter. The other arm 95 of the lever is disposed externally of the container and extends along its periphery, there being a leaf spring 96 or power spring suitably secured to the external lever arm 95 with a free end 97 of the leaf spring bearing against the exterior of the container. The spring 96 normally urges the external arm 95 laterally outwardly and the inner arm 93 of the lever upwardly, to shift the rod 20*b* upwardly and engage a forward valve head 98 provided by the upper end of

the rod against the valve seat **90**, to close the outlet from the container.

The dispenser device illustrated in FIG. 5 operates generally in the same manner as the other forms of the invention. The piston **14** is disclosed in an intermediate position within the container, from which a substantial portion of the fluent mass has already been dispensed. Initially, the piston would be located in the rearward portion of the container adjacent to the bifurcated bell crank arm **93**. When it is desired to dispense a portion of the mass through the container outlet, the outer arm **95** of the bell-crank lever is moved laterally inwardly against the force of the leaf spring by hand or finger pressure, which causes the rod **20***b* to be shifted rearwardly and slide through the piston **14**, which is prevented from moving rearwardly by the one-way brake device **16**. Such rod shifting also removes the valve head **98** from the valve seat **90**, thereby opening the container outlet. When the pressure on the outer arm **95** is released, a leaf spring expands or returns to its initial position, shifting the outer arm **95** laterally away from the exterior of the container and the bifurcated arm **93** upwardly to shift the rod **20***b* upwardly in the container, and because of the one-way clutch **29** becoming automatically coupled thereto, shift the piston **14** upwardly in the container. The piston **14** and rod **20***b* move upwardly to effect a dispensing of the fluent mass M through the outlet **13***b* until the valve head **98** engages the valve seat **90**, thereby closing the outlet. The engagement of the valve head with the valve seat limits the extent of the lateral outward movement of the bell-crank external arm **95** and upward shifting of the rod **20***b* and the piston **14**.

I claim:

1. In a dispenser for a fluent mass: a container for the mass having an outlet opening directly to the exterior of said container, said container being of a size to be held in a person's hand; piston means in said container movable in a forward direction toward said outlet and against the mass in the container; means for resisting movement of said piston means in said container in a rearward direction while permitting movement of said piston means in a forward direction; hand-operated actuating means in said container and disposed to one side of said outlet to avoid interference with the mass flowing through said outlet; spring means for shifting said actuating means in a forward direction in said container; and clutching means for coupling said piston means to said actuating means for forward movement therewith while permitting rearward movement of said actuating means relative to said piston means.

2. In a dispenser for a fluent mass: a container for the mass having an outlet opening directly to the exterior of said container, said container being of a size to be held in a person's hand; a piston in said container movable in a forward direction toward said outlet and against the mass in the container; one-way gripper means on said piston engageable with the wall of said container to resist rearward movement of said piston in said container while permitting forward movement of said piston in said container; a hand-operated actuating rod in said container extending through said piston and disposed to one side of said outlet to avoid interference with the mass flowing through said outlet; spring means for shifting said rod in a forward direction in said container; and one-way clutching means on said piston engageable with said rod to couple said piston to said rod for forward movement therewith, said clutching means releasing from said rod to permit rearward movement of said rod within and relative to said piston.

3. In a dispenser for a fluent mass: a container for the mass having a forward end wall and an outlet at said end wall opening to the exterior of said container, said container being of a size to be held in a person's hand; piston means in said container movable in a forward direction toward said end wall and outlet and against the mass in said container; means for resisting movement of said piston means in said container in a rearward direction while permitting movement of said piston means in a forward direction toward said end wall; actuating means having a first portion in said container and a hand-operated second portion externally of said container; spring means externally of said container engaging said second portion and container for shifting said first portion in a forward direction in said container; and clutching means for coupling said piston means to said first portion for forward movement therewith toward said end wall while permitting rearward movement of said first portion relative to said piston means.

4. In a dispenser for a fluent mass: a container for the mass having a forward end wall and an outlet at said end wall opening to the exterior of said container, said container being of a size to be held in a person's hand; a piston in said container movable in a forward direction toward said end wall and outlet and against the mass in said container; one-way gripper means on said piston engageable with the wall of said container to resist rearward movement of said piston in said container while permitting forward movement of said piston in said container toward said end wall; an actuating rod in said container extending through said piston; spring operated means externally of said container adapted to be actuated by the person's hand while the container is held in the person's hand for shifting said rod in a forward direction in said container; and one-way clutching means on said piston engageable with said rod to couple said piston to said rod for forward movement therewith toward said end wall, said clutching means releasing from said rod to permit rearward movement of said rod within and relative to said piston.

5. In a dispenser for a fluent mass: a container for the mass having a forward end wall and an outlet at said end wall opening to the exterior of said container, said container being of a size to be held in a person's hand; a piston in said container movable in a forward direction toward said end wall and outlet and against the mass in said container; one-way gripper means on said piston engageable with the wall of said container to resist rearward movement of said piston in said container while permitting forward movement of said piston in said container toward said end wall; an actuating rod in said container extending through said piston; spring operated means externally of said container bearing against said end wall and engaging said rod for shifting said rod in a forward direction in said container toward said end wall; and one-way clutching means on said piston engageable with said rod to couple said piston to said rod for forward movement therewith toward said end wall, said clutching means releasing from said rod to permit rearward movement of said rod within and relative to said piston.

6. In a dispenser for a fluent mass: a container for the mass having a forward end wall and an outlet at said end wall opening to the exterior of said container, said container being of a size to be held in a person's hand; a piston in said container movable in a forward direction toward said end wall and outlet and against the mass in said container; one-way gripper means on said piston engageable with the wall of said container to resist rearward movement of said piston in said container while permitting forward movement of said piston in said container toward said end wall; an actuating rod in said container extending through said piston; actuating means including a compression spring bearing against the exterior of said container for shifting said rod in a forward direction in said container toward said outlet and forward end wall; and one-way clutching means on said piston engageable with said rod to couple said piston to said rod for forward movement therewith toward said end wall, said clutching means releasing from said rod to permit

rearward movement of said rod within and relative to said piston.

7. In a dispenser for a fluent mass: a container for the mass having a forward end wall and an outlet at said end wall opening to the exterior of said container, said container being of a size to be held in a person's hand; a piston in said container movable in a forward direction toward said end wall and outlet and against the mass in said container; one-way gripper means on said piston engageable with the wall of said container to resist rearward movement of said piston in said container while permitting forward movement of said piston in said container toward said end wall; an actuating rod in said container extending through said piston; a hand-operated plunger secured to said rod externally of said end wall; a compression spring bearing against said end wall and plunger for shifting said rod in a forward direction in said container toward said forward end wall; and one-way clutching means on said piston engageable with said rod to couple said piston to said rod for forward movement therewith toward said end wall, said clutching means releasing from said rod to permit rearward movement of said rod within and relative to said piston upon depression of said plunger toward said end wall.

8. In a dispenser for a fluent mass: a container for the mass having a forward elastic end wall and an outlet; a piston in said container movable in a forward direction toward said end wall and outlet and against the mass in said container; one-way gripper means on said piston engageable with the wall of said container to resist rearward movement of said piston in said container while permitting forward movement of said piston in said container toward said end wall; an actuating rod in said container extending through said piston and connected to said elastic end wall, depression of said end wall toward said piston shifting said rod in a rearward direction in said container and release of pressure on said end wall allowing its expansion and shifting of said rod in a forward direction in said container; and one-way clutching means on said piston engageable with said rod to couple said piston to said rod for forward movement therewith toward said end wall, said clutching means releasing from said rod to permit rearward movement of said rod within and relative to said piston.

9. In a dispenser for a fluent mass: a container for the mass having a forward elastic end wall and an outlet; a piston in said container movable in a forward direction toward said end wall and outlet and against the mass in said container; one-way gripper means on said piston engageable with the wall of said container to resist rearward movement of said piston in said container while permitting forward movement of said piston in said container toward said end wall; an actuating rod in said container extending through said piston and connected to said elastic end wall, depression of said end wall toward said piston shifting said rod in a rearward direction in said container and release of pressure on said end wall allowing its expansion and shifting of said rod in a forward direction in said container; spring operated means engaging a rear portion of said rod for shifting said rod in a forward direction in said container; and one-way clutching means on said piston engageable with said rod to couple said piston to said rod for forward movement therewith toward said end wall, said clutching means releasing from said rod to permit rearward movement of said rod within and relative to said piston.

10. In a dispenser for a fluent mass: a container for the mass having a forward end wall and an outlet; a piston in said container movable in a forward direction toward said end wall and outlet and against the mass in said container; one-way gripper means on said piston engageable with the wall of said container to resist rearward movement of said piston in said container while permitting forward movement of said piston in said container toward said end wall; an actuating rod in said container extending through said piston; a lever pivoted on said container and connected to said rod; a spring engaging the side of said container and lever for shifting said rod in a forward direction in said container; and one-way clutching means on said piston movable with said rod to couple said piston to said rod for forward movement therewith toward said end wall, said clutching means releasing from said rod to permit rearward movement of said rod within and relative to said piston.

11. In a dispenser for a fluent mass: a container for the mass having a forward end wall and an outlet; a piston in said container movable in a forward direction toward said end wall and outlet and against the mass in said container; one-way gripper means on said piston engageable with the wall of said container to resist rearward movement of said piston in said container while permitting forward movement of said piston in said container toward said end wall; an actuating rod in said container extending through said piston; spring operated means externally of said container for shifting said rod in a forward direction in said container; one-way clutching means on said piston engageable with said rod to couple said piston to said rod for forward movement therewith toward said end wall, said clutching means releasing from said rod to permit rearward movement of said rod within and relative to said piston; said rod having valve means thereon engageable with said container to close said outlet upon forward movement of said rod in said container.

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RAPHAEL M. LUPO, *Primary Examiner.*

HADD S. LANE, LOUIS J. DEMBO, *Examiners.*