Feb. 9, 1954 B. B. GILMORE 2,668,637

FLEXIBLE, NONELASTIC CONTAINER OF VISCOUS MATERIAL WITH ROTARY COMPRESS DISCHARGE PUMP

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Fig. 1.

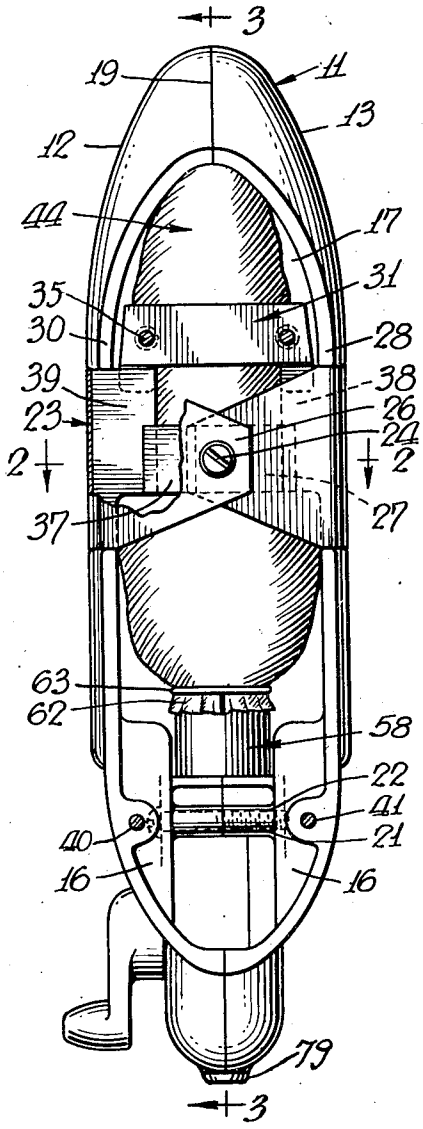

Fig. 2.

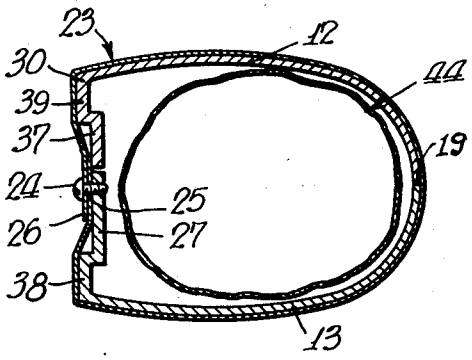

Fig. 5.

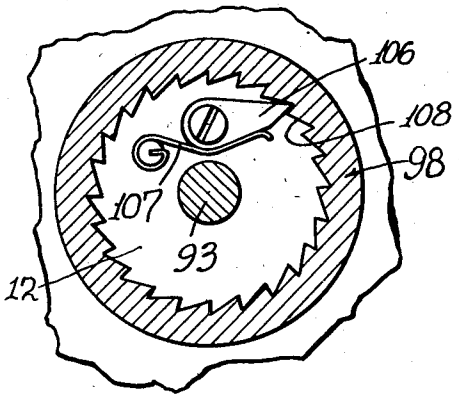

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FIG. 3.

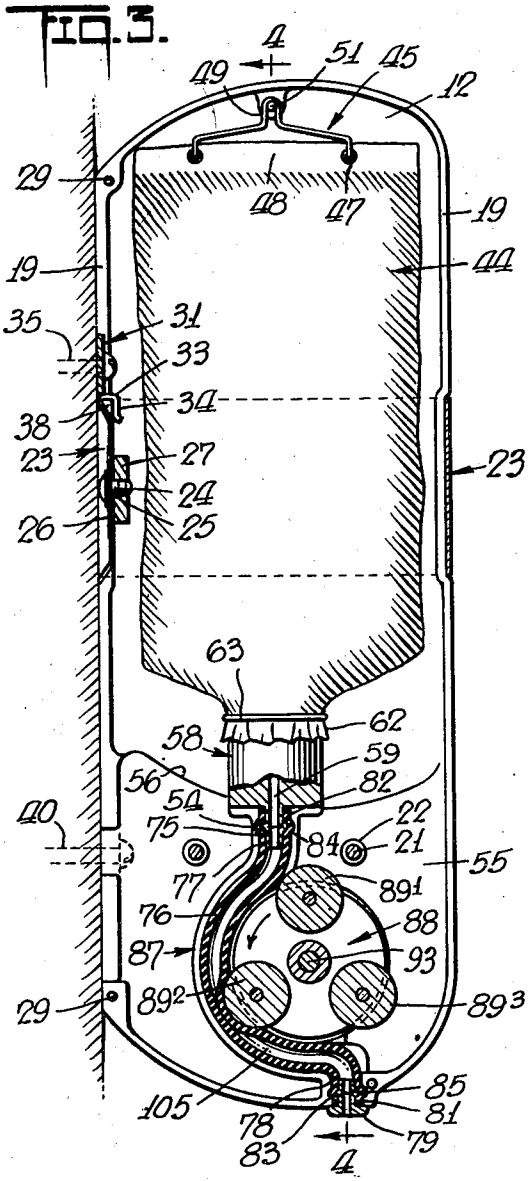


FIG. 4.

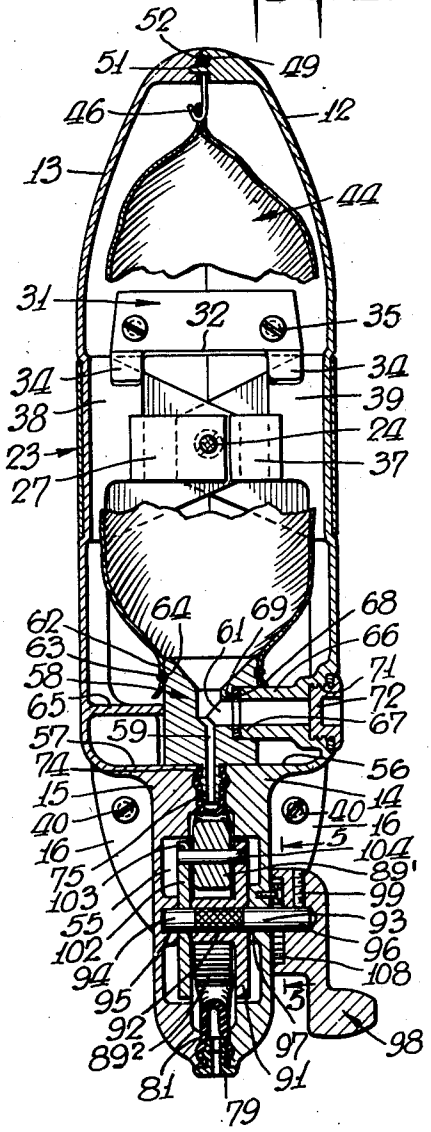
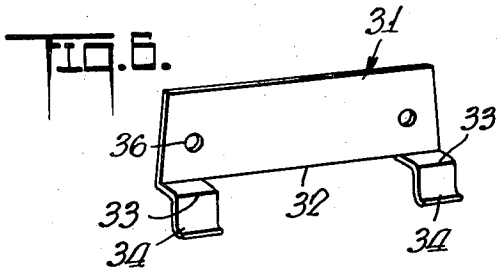


FIG. 6.



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2,668,637

FLEXIBLE, NONELASTIC CONTAINER OF VISCOUS MATERIAL WITH ROTARY COMPRESS DISCHARGE PUMP

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5 Claims. (Cl. 222—95)

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This invention relates to dispensing devices, more particularly for dispensing heavy liquids and creams that do not run or pour freely by gravity.

It is among the objects of the invention to provide a rugged and compact dispensing device of simple, relatively inexpensive construction, that is neat and pleasing in appearance, that is simple to fill without mess or disorder and without exposure of the material to the air, that will keep the contents thereof clean and free from dust and dirt and from exposure to air, and free from clogging, even if left standing idle for relatively long periods of time, that is devoid of valves, plungers or springs, and has few moving parts, none of which is likely to jam or become out of order, and that will dependably dispense desired quantities of viscous material without waste or excessive flow and will not drip while out of use and that is easy to clean and service.

According to a feature of the invention a compressible, self-restoring tube, normally biased to open-bore condition is connected at its inlet end to a container for viscous material. By means of pressure progressively applied to and removed from the tube along the length thereof substantially from the container to the outlet of the tube, the latter may be sealed at the point of compression and the contents of the tube advanced and expelled from the outlet end thereof, and as the pressure is progressively removed from the tube it will return to its normal open-bore condition creating a void therein.

In a preferred construction the pressure is applied to the tube by a rotor coaxial with an arcuate channel upon which the tube is seated, the rotor having a plurality of spaced projections along the periphery thereof, at least one of which normally compresses the tube against the channel to seal the tube and at least one of which is spaced from the tube and movable thereagainst to compress and seal the latter upon turning of the rotor.

The container is constructed and arranged automatically to effect flow of material therefrom into said voided tube to re-charge the latter. While such flow of material could be effected by a follower spring urging a piston in the container against the contents thereof or by pneumatic means, in a preferred embodiment, the container desirably is a flexible collapsible bladder of substantially non-stretching material which conforms to the volume of material therein so that such material substantially completely fills the

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bladder without voids and the outer surface of the bladder is exposed to atmospheric pressure to cause the wall thereof to become displaced in direction to diminish the volumetric capacity of the bladder so that the contents thereof may flow into the voided tube to charge the latter.

In the accompanying drawings in which are shown one or more of various possible embodiments of the several features of the invention,

Fig. 1 is a rear elevational view of the device, with parts broken away,

Fig. 2 is a transverse sectional view taken along line 2—2 of Fig. 1,

Fig. 3 is a longitudinal view partly in cross section taken along line 3—3 of Fig. 1,

Fig. 4 is a longitudinal view partly in cross section with parts broken away, taken along line 4—4 of Fig. 3,

Fig. 5 is a detail sectional view on a larger scale taken along line 5—5 of Fig. 4, and

Fig. 6 is a perspective view on a larger scale of the wall plate.

Referring now to the drawings, in a preferred embodiment herein chosen to illustrate the invention, the dispenser includes a casing 11 which, although it could be of any suitable construction, desirably comprises a pair of complementary, elongated shells 12 and 13. The lower portion 14 and 15 of each of the respective shells 12 and 13 is of reduced width as shown in Fig. 4, each lower portion desirably being conformed to have a laterally extending mounting plate 16 at the rear thereof, preferably formed integrally therewith, the juxtaposed shells being conformed, as shown in Fig. 1, to define an opening 17 at the rear thereof.

The shells are preferably retained together with their rims 19 in engagement, by means of screws 21 threaded into transversely aligned, laterally extending bosses 22 desirably formed integral with each of the shells at the lower portions 14, 15 thereof. A second retaining means is also desirably provided, comprising a band 23, preferably of metal, which girdles the juxtaposed shells 12 and 13. Band 23, which may serve as a name plate, is secured in place at the rear by means of a screw 24 which extends through registering openings 25 in the overlapping tab ends 26 of the band 23 and is threaded into a suitable opening in a recessed mounting bar 27 preferably formed integral with and extending laterally from rim 28 of shell 13, turning of screw 24 pulling tab ends 26 of the band 23 into the recess to tighten the band. A recessed finger 37 which is desirably formed integral with and

extends laterally from rim 30 at the rear of shell 12 is associated with bar 27 and also serves to support the tab ends 26 of the band.

In order to ensure accurate alignment of shells 12 and 13 when they are secured together as above described, a plurality of dowel pins 29 are desirably provided on one of said shells, illustratively shell 12, extending laterally outward from the rim 19 thereof and registering with suitable openings (not shown) in the complementary rim 19 of shell 13.

To mount the casing, a wall plate 31 is provided, the lower edge 32 of which, as shown in Fig. 6, at each end thereof has an ear 33 extending at right angles to the face of plate 31 with a hook 34 depending therefrom.

When the plate 31 is affixed to a wall as by screws 35 which extend through opening 36 in the face of plate 31, the rear of the casing may be positioned against the wall plate with the latter in opening 17 of the casing and with the hooks 34 immediately above the root ends 38 and 39 of mounting bar 27 and finger 37, respectively.

The casing is then slid upwardly so that the hooks 34 engage root ends 38 and 39 as shown in Figs. 1, 3 and 4. While being held securely in the pushed up position, the casing is secured to the wall by screws 40 which extend through openings 41 in the mounting plates 16.

With the mounting construction thus described, the casing is rigidly secured on a wall yet may readily be removed by merely removing screws 40 and pushing downward for disengaging wall plate 31.

As shown in Figs. 1 to 4, a flexible, substantially non-elastic normally collapsed bladder 44, preferably of plastic is positioned in the upper portion of the casing 11. Although the bladder 44 could be supported in any suitable manner, it is desirably suspended from a spring hanger 45. The latter preferably comprises a cross piece, having a hook 46 at each end thereof, which hooks extend through eyelets 47 in a fin 48 desirably formed integral with the top of the bladder. The cross piece has a hair pin bend 49 in the middle thereof through which extends a pin 51 preferably formed integral with the rim 19 of the shell 12 at the top thereof and extending laterally therefrom into a suitable recess 52 in the juxtaposed rim of shell 13. Thus, the bladder is supported in upright position with the exterior face thereof exposed to the outer air through opening 17 in the casing as shown in Fig. 1.

As shown in Fig. 4, the reduced portions of the shells define a cavity 55 when the shells are secured together in which the pump mechanism of the dispenser is located and also form shoulders 56 and 57 which function as a seat for a hub 58.

The hub 58 desirably has a longitudinal bore 59 therethrough and a transverse bore 61 communicating with said longitudinal bore 59. The mouth 62 of the bladder 56 is secured to hub 58 in communication with longitudinal bore 59. Although the mouth 62 could be secured in any suitable manner, as shown in Figs. 3 and 4, it preferably encompasses hub 58 and is affixed thereto by a band 63 which coacts with an annular groove 64 in hub 58 securely to retain the bladder in place.

Means are provided securely yet removably to retain hub 58 on its seat. To this end a laterally extending filling conduit 66 preferably formed integral with shell 12 extends into transverse bore 61 with the end 67 of said conduit pressing against a washer 68 seated on an annular shoulder 69 formed by the reduced innermost portion of said transverse bores 61 and a laterally extending flange 65 preferably formed integral with shell 13 presses against one side of the hub thereby securely to retain end 67 against washer 68 to provide a leak-proof seal. The outer end of conduit 66 is desirably threaded as at 71 to receive a removable closure plug 72.

The juxtaposed shoulders 56, 57 of shells 12 and 13 are so conformed as to define a bore 74 therebetween into which extends a nipple 75 preferably formed integral with hub 58 and having a coaxial bore.

A resilient compressible self-restoring tube 76 desirably of natural or synthetic rubber and having a relatively thick wall and small bore and normally biased to open bore condition has its inlet end 77 encompassing nipple 75 and its outlet end 78 encompassing a discharge nozzle 79 positioned in a bore 81 conformed between the lower ends of reduced portion 14 and 15.

The nipple 75 and nozzle 79 desirably have annular ridges 82 and 83 respectively, which force the wall of the tube outwardly into ridges which seat in annular grooves 84 and 85 respectively in bores 74 and 81 securely to retain the ends of the tube on the nipple and nozzle respectively and lock such parts securely in position in the casing.

Tube 76 which extends through cavity 55 may be seated along substantially its entire length in a channel or raceway 87 desirably arcuate as shown, extending through an arc of approximately 180 degrees and preferably formed integral with the wall of the reduced portion 14 at the lower end of the shell 12.

Associated with tube 76 and channel 87 and rotatably mounted in cavity 55 in the casing, on an axis concentric with the axis of curvature of arcuate channel 87 is a rotor member 88 desirably having a plurality of equally spaced projections on the periphery thereof, illustratively three in number designated 89^1, 89^2 and 89^3.

Although the rotor could be of any suitable construction, it desirably comprises a disc 91 having a hub 92 affixed as by casting on an axle 93 that is desirably knurled as shown. One end 94 of axle 93 is journalled in a bearing socket 95 desirably formed in the side wall of shell 13 and the other end 96 of axle 93 extends through a bearing opening 97 in the opposed side wall of shell 12, the end 96 of said rod desirably having a handle 98 affixed thereto as by set screw 99.

A rotor plate 102 is affixed to rod 94 between bearing socket 95 and hub 92 and has a plurality of equally spaced openings 103 therethrough along the periphery thereof, illustratively three in number, into which respectively extends one end of an associated roller pin 104 the other end of which is desirably affixed in disc 91.

As shown in Figs. 3 and 4 the projections 89 each desirably comprises a roller which is rotatively mounted on the corresponding pin 104 and protrudes beyond the periphery of the disc 91 and the plate 102. The channel 87 and the rotor assembly are so spaced that when the rotor 88 is turned by handle 98 and the rollers are successively brought into engagement with rubber tube 76, pressure will be applied thereagainst to compress the tube against channel 87 so that the bore 105 of the tube is sealed at the point of compression thereof by the rollers.

As shown in Fig. 3, as the arcuate channel 87

backs up the tube for approximately one half cycle or 180 degrees of the rotor 88, at all times at least one of the rollers, i. e., roller 89^1 is spaced from the tube and at least one of the rollers, i. e., roller 89^2 compresses the tube 76, thereby sealing the latter to prevent leakage of the contents of the bladder 44 when the device is idle.

Desirably, means are provided to limit the direction of rotation of rotor 88 so that it will turn only in a counterclockwise direction as shown in Fig. 3. Although any suitable means could be used for the purpose, the arrangement shown in Figs. 4 and 5 is preferred. Thus a pawl 106 is pivotally mounted on the outer wall of shell 12 and normally urged by a spring 107 against the ratchet teeth 108 formed on the wall of a circular cavity in the handle 98.

The bladder 44 may be charged by removing closure plug 72 and affixing to the mouth of the conduit 66 a container such as a grease gun which desirably has a nipple which may be screwed into conduit 66.

The viscous material from the gun which is forced through conduit 66 and through bore 61 will flow both upwardly and downwardly through the longitudinal bore 59 of hub member 58. Inasmuch as one of the rollers on rotor 88, i. e., roller 89^2, as shown in Fig. 3 is compressing tube 76 against channel 87 and closing the same at the point of pressure, the viscous material forced through the conduit will not be able to pass through tube 76 and hence will pass into the bladder 44 which, as it is always collapsed to conform to the volume of material therein, will expand to receive the charge. Desirably, the gun feeds a measured charge, completely to fill the bladder, but not overstressing or rupturing it. When the bladder is charged the grease gun is removed and the closure plug 72 is replaced.

In use, handle 98 is turned, thereby rotating axle 93 in a counterclockwise direction as shown in Fig. 3. As the rotor is turned and roller 89^2 thereon is moved along the tube toward the outlet end 78 thereof, the normally open bore 105 of the tube will be progressively pressed closed to push any material ahead of the roller 89^2 and to expel it from the tube. The tube 76 returns to its normally open condition to the rear of the point of engagement of roller 89^2 with the tube.

As the outer surface of the bladder is under atmospheric pressure, such sustained pressure against the material in the bladder will cause the same to flow through the longitudinal bore 59 in hub 58 into the bore of tube 76 and hence the air void or vacuum in the tube caused by the movement of roller 89^2 will immediately be filled with viscous material from the bladder. As the supply of material in the bladder is gradually reduced, the bladder will progressively collapse under atmospheric pressure so as to follow the material therein and preclude any voids whether of air, gas or empty space between the bladder wall and the remaining viscous material and to avoid any vacuum the presence of which might tend to draw the viscous material away from the tube and inhibit the flow of such material to charge the tube.

As roller 89^1, during continual turning of rotor 88 moves against the now charged tube and compresses the latter against channel 87, it will propel the material in the tube forward, while at the same time creating a void in the tube to the rear of the point of engagement thereof by the roller 89^1 so as again to charge the tube in the manner heretofore described. Thus, as the rotor is turned, the tube is subjected to a "milking" action and the material in advance of the rollers will be forced through the tube to be ejected from the outlet thereof and by reason of the void created to the rear of the rollers, new material will continually flow from the bladder 44 into the tube 76, which material in turn will be ejected from the tube by the succeeding roller.

In the event the rotor could be turned in the wrong direction i. e., in a clockwise direction as shown in Fig. 3, the action of the rollers against the tube would tend to pump air into the bladder 44. This would have no ill effects, for after a few turns of the handle 97 the user, upon seeing that no material was ejected from discharge nozzle 79 would realize that the handle 97 was being rotated in the wrong direction and would thereupon rotate it in the reverse direction. However, as an additional safeguard to prevent excessive rotation in the wrong direction, as by children, the unidirectional mechanism previously described and shown in Fig. 5 is preferred. With the preferred construction thus described, the contents of the bladder is maintained only under atmospheric pressure and undue compression of the viscous material is avoided.

While the container above described is preferred, it is, of course, to be understood that as previously suggested, the invention from its broader aspects could be carried out by storing the viscous material in other type containers. Thus, for example, a rigid cylinder could be used in which a slight pressure is exerted against the material as by a spring urged plunger or a normally open bore resilient sac could be used and a slight pressure could be exerted against the wall of the sac by a spring. In both cases the pressure exerted against the material causes the latter to flow into the voided tube.

As many changes could be made in the above construction, and many apparently widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A dispensing device comprising a flexible, substantially non-elastic normally collapsed bladder, a compressible self-restoring tube normally biased to open bore condition, having an inlet connected to said bladder and having a discharge outlet, the exterior face of said bladder being exposed to the outer air, said bladder being adapted by its flexible nature to follow and remain in contact with the contents thereof, a plurality of compression members associated with said tube and movable thereagainst and therealong progressively to compress the tube and expel the contents thereof from said outlet and seal the tube at the point of compression, at least one of said members being spaced from said tube, and at least one of said members compressing said tube to seal the latter, whereby the tube in automatically restoring itself to its normal open bore condition at the point of compression as said compression member is moved away therefrom will present a void into which material from the bladder will flow to re-charge the voided tube.

2. A dispensing device comprising a flexible, substantially non-elastic normally collapsed blad-

der, a compressible self-restoring tube normally biased to open bore condition, having an inlet connected to said bladder and having a discharge outlet, the exterior face of said bladder being exposed to the outer air, said bladder being adapted by its flexible nature to follow and remain in contact with the contents thereof, a rigid supporting channel for said tube extending substantially the entire length thereof, a plurality of compression members associated with said tube and movable thereagainst and therealong and reacting with said channel, progressively to compress the tube and expel the contents thereof from said outlet and seal the tube at the point of compression, at least one of said members being at all times spaced from said tube, and at least one of said members at all times compressing said tube to seal the latter, whereby the tube in automatically restoring itself to its normal open bore condition at the point of compression as said compression member is moved away therefrom will present a void therein into which material from the bladder will flow to re-charge the voided tube.

3. A dispensing device comprising a casing, a hub member rigidly mounted in said casing and having a longitudinal bore therethrough and a transverse bore leading into said longitudinal bore, a container mounted in said casing, having a mouth affixed to said hub member and in communication with one end of said longitudinal bore, a compressible self-restoring tube normally biased to open bore condition and having an inlet connected to said hub member and in communication with the longitudinal bore therein, a filling aperture on the casing in communication with the transverse bore in said hub member, a rigid, substantially arcuate supporting channel for said tube extending substantially the entire length thereof, a rotor member co-axial with said channel and having a plurality of spaced compression means projecting beyond the periphery thereof, at least one of said compression means at all times compressing said tube against said channel to seal said tube and at least one of said compression means being at all times spaced from said tube and out of engagement therewith, whereby upon turning of said rotor, the compression means will progressively compress the tube against the channel from said inlet to said discharge outlet to expel the contents of said tube, and the tube upon returning to its normal open bore condition at the point of compression as the compression means is removed therefrom will present a void therein, said container being constructed and arranged to effect flow of material therefrom into said voided tube to recharge the latter.

4. A dispensing device comprising a container, a compressible self-restoring tube normally biased to open-bore condition and having an inlet connected to said container and having a discharge outlet, a rigid, substantially arcuate supporting channel for said tube extending substantially the entire length thereof, a rotor member coaxial with said channel and having a plurality of spaced compression means projecting beyond the periphery thereof, at least one of said compression means at all times compressing said tube against said channel to seal said tube and at least one of said compression means being at all times spaced from said tube and out of engagement therewith, whereby upon turning of said rotor, the compression means will progressively compress the tube against the channel from said inlet to said discharge outlet to expel the contents of said tube, and the tube upon returning to its normal open bore condition at the point of compression as the compression means is removed therefrom will present a void therein, said rotor comprising a circular member having an annular groove in the periphery thereof, said compression means comprising a plurality of rollers rotatably mounted on said rotor, spaced therealong and positioned in said groove with the periphery of said rollers extending beyond the periphery of said rotor, said container being constructed and arranged to effect flow of material therefrom into said voided tube to recharge the latter.

5. A dispensing device comprising a container, a compressible self-restoring tube normally biased to open-bore condition and having an inlet connected to said container and having a discharge outlet, a rigid, substantially arcuate supporting channel for said tube extending substantially the entire length thereof, a rotor member coaxial with said channel and having a plurality of spaced compression means projecting beyond the periphery thereof, at least one of said compression means at all times compressing said tube against said channel to seal said tube and at least one of said compression means being at all times spaced from said tube and out of engagement therewith, whereby upon turning of said rotor, the compression means will progressively compress the tube against the channel from said inlet to said discharge outlet to expel the contents of said tube, and the tube upon returning to its normal open bore condition at the point of compression as the compression means is removed therefrom will present a void therein, said rotor having an axle rigid therewith, a handle affixed to said axle to rotate the latter, ratchet means operatively connected to said axle and said handle to limit the direction of rotation of said axle, said container being constructed and arranged to effect flow of material therefrom into said voided tube to re-charge the latter.

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