

Oct. 4, 1960

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2,954,904

GAS PRESSURE TYPE DISPENSING CONTAINER CAP

Filed Oct. 13, 1958

3 Sheets-Sheet 2

Fig. 6

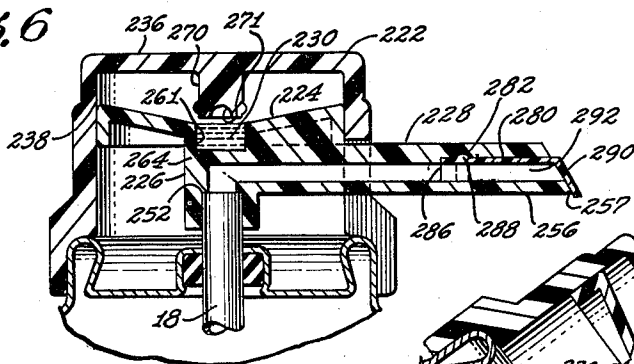


Fig. 7

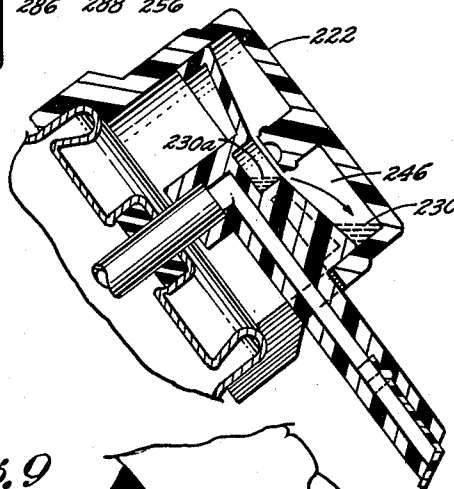


Fig. 8

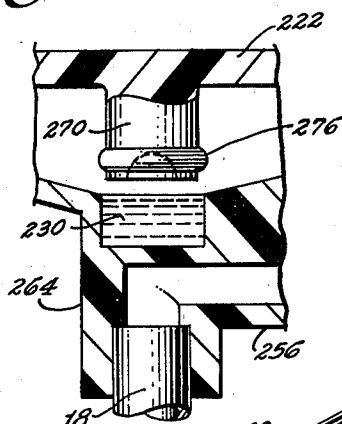


Fig. 9

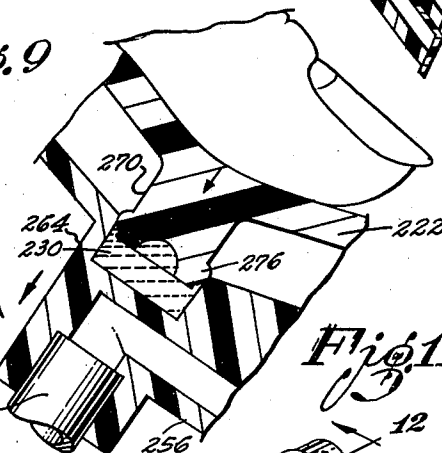


Fig. 10

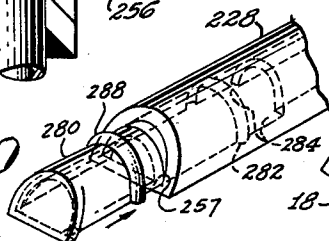


Fig. 11

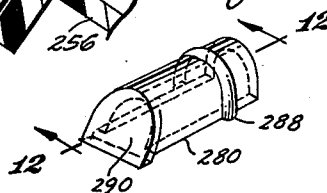


Fig. 5

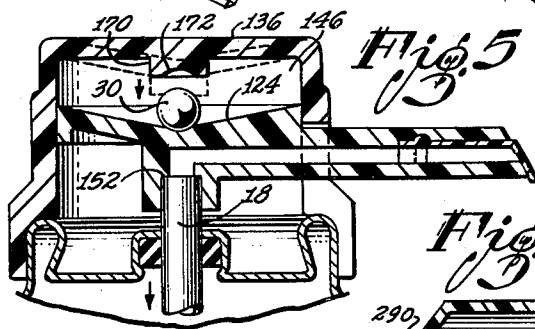
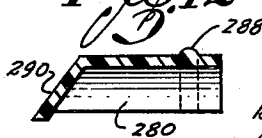


Fig. 12



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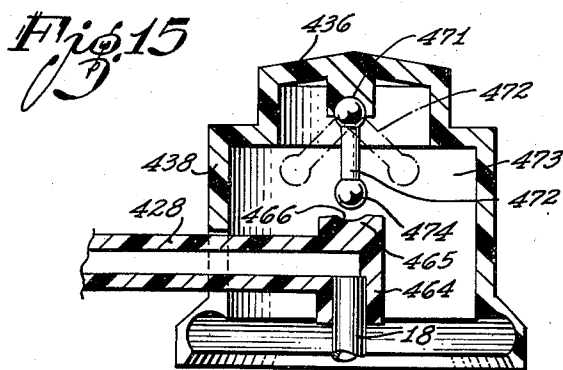
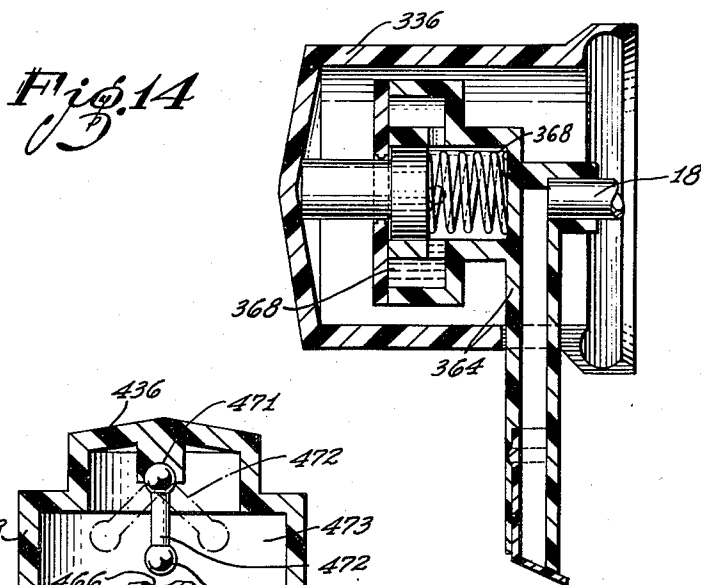
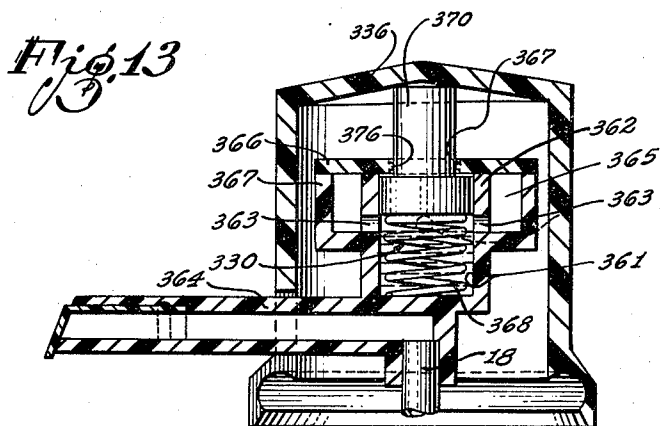
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3 Sheets-Sheet 3



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1

2,954,904

GAS PRESSURE TYPE DISPENSING
CONTAINER CAP

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Filed Oct. 13, 1958, Ser. No. 767,060

21 Claims. (Cl. 222—394)

This invention relates to valve actuators, and particularly to that type of actuator which is adapted for use with a container of a fluid material dispensed through a projecting tube by means of gas under pressure in the container. The present application is a continuation-in-part of application Serial No. 720,606, filed March 11, 1958, which is now abandoned.

One of the principal difficulties with containers of this type has always been the possibility that a user might attempt to, or might inadvertently press the dispensing valve mechanism when the container was on its side or inverted. In this posture, the gas compound in the container may be brought into direct contact with the entrance of the dispensing tube with the result that the gas may rush out through the tube directly without forcing out any of the product in the container. If too much of the gas escapes in this manner, the product impelling "charge" may be wholly lost and, since there is no practical way for the consumer to recharge the container so as to induce further flow of the fluid product therefrom must be wasted. This disadvantage has been one of the principal drawbacks to the unqualified acceptance by the public of this type of dispensing means for many fluid products.

Another problem of gas impelled dispensing containers arises from the fact that, because of the ease with which dispensing hitherto may be accomplished from any position, there is always a danger, where the product in the container is a poison or other deleterious substance, that, should it fall into the hands of small children, they may readily learn how to press the valve and dispense the poison upon themselves, or upon some surface which it may harm. It is desirable, therefore, to provide a valve mechanism which would only operate in a predetermined position which would be less likely to be stumbled upon by children or others for whose use the container is not intended.

Any device which may be offered to solve these problems must be simple and inexpensive, since the public is not usually interested in paying too much greater a price for mere convenience in dispensing the product.

The present invention solves the problems above indicated, and by means which meet the requirements of simplicity and inexpensiveness.

Briefly, the invention comprises means which may be secured to the container and operatively connected to the valving mechanism of the container, such means permitting the valving mechanism to be actuated only when the container is disposed in a preselected attitude.

In one of the particular embodiments illustrated, there is shown a molded plastic cap for a typical metal container which has an upwardly projecting tube fulfilling the dual function of conducting the fluid product upward from the container to the actual dispensing nozzle or spout, and of serving as a valve means when depressed. The cap is generally formed as a covered cylinder and includes a pair of conical walls coaxial with the cylinder, but spaced from each other axially. The upper conical wall preferably forms a transverse closing wall and both walls have sufficient resiliency to permit them to be depressed as

2

diaphragms in their respective central areas. The lower conical wall is provided on its underside with a fitting to grip the top of the container tube in such a manner that the application of any pressure to the central area of the lower conical wall results in depressing the tube with consequent valving action. The fitting further includes duct means which serve to conduct the fluid from the uppermost extremity of the tube to a point outside the cap where it may be dispensed.

In the space between the two conical walls, there is provided a sphere of hard material, preferably metal, and of such diameter as to enable it to roll in said space. Whenever the container and its cap are disposed in such a manner that the common axis of the cones is vertical and their apexes are directed downwardly, the sphere will roll into and seat within the apex of the lowermost conical surface. In this attitude, the application of any pressure to the outside of the upper resilient conical surface in its central region, results in the transmission of such pressure via the metal ball and the lower resilient conical wall to the valve stem, to depress the same, thereby allowing the fluid product under the gas pressure to flow up the tube and out of the duct means for dispensing.

In the now preferred embodiment of the invention, the outer wall is flat but resilient, having molded to its side, facing the conical wall, a cylindrical boss with a concave head. When the container is properly oriented, the spherical element seats in the lower conical wall in the common axis of the latter and of the concave headed cylindrical boss, so that the application of any pressure to the outer wall causes the wall to move the boss in such axis to where the concavity of the boss grips the spherical element. Any further pressure so applied to the wall will be transmitted via the fitting on the underside of the conical wall, to the valve stem to actuate the same.

In another embodiment utilizing fluid to furnish the linkage between the member to which pressure is applied externally and the resilient wall which grips the container valve, a cylinder is constructed to arise from the latter wall, with the cylinder walls orificed above a predetermined level to drain the fluid into a receiving chamber upon tilting of containers from the attitude which disposes the axis of the cylinder vertically.

In a still further embodiment of the invention, a rigid elongate linkage element is disposed universally pivotable in the roof of the outer yieldable wall. This linkage is of a length just short of the distance between the latter wall and the lower wall which is in contact with the valve. When the container cap is properly oriented, the linkage element falls into its bridging position, thereby to transmit pressure to the lower wall. In any other position, the linkage pivots out of the bridging position.

In a still further embodiment, the lower conical wall funnels into a cylinder, disposed at the cone apex. A co-operating piston spaced slightly from the cylinder and disposed coaxially therewith in the resilient outer wall of the cap, spaced from the conical wall, moves into the cylinder when the outer wall is depressed in the cylinder-piston axis. A limited amount of fluid is sealed into a chamber in the cap, which chamber is partially defined by the spaced conical and outer walls. In a predetermined attitude of the cap, the fluid flows into the cylinder and fills the same so that any pressure applied to the resilient outer wall is transmitted through its piston moving against the fluid in the cylinder to the resilient inner conical wall, thereby to operate the valve stem. In any attitude of the container in which the fluid fails to fill the cylinder, the piston will move in the cylinder without effecting a pressural fluid contact with the conical wall.

While certain of the illustrated embodiments of the invention contemplate disposing the conical surface in such a manner that dispensing is possible only when the con-

tainer is maintained in its intended upright position, it may readily be adapted to permit dispensing to occur only when the container is held upside down in a vertical position. This latter effect is accomplished by inverting the lower conical surface so that its apex is directed upwardly when the container is in its usual upright position. No seating of the ball or other bridging means in the central region of the conical surface therefore occurs until the container is turned upside down. This embodiment may have particular utility for dispensing poisonous substances by gas impulsion where means are provided in the container to prevent the gas from passing upwardly through the product to the mouth of the dispensing tube when the container is in such inverted position.

It would also be possible to dispose the lower cone with its axis outside of the vertical axis of the container so that the container would have to be tilted until the cone axis is disposed vertically in order to seat the sphere or other means and permit valving.

The duct means may also be provided at its dispensing end with a slit opening which is normally closed, but the wall defining which slit yields under pressure created within the duct to open the slit and permit fluid to flow therethrough—so long as such pressure is maintained. When the fluid pressure is cut off, the wall defining the slit opening, recloses to prevent air from having access to the fluid remaining in the duct which might cause caking, and to prevent dripping.

For ease of manufacture, the dispensing duct means may be made as a semi-cylindrical open-ended piece into which is inserted a special plug which includes the slit resilient wall. The latter spreads about the slit under fluid pressure to allow the fluid to pass therethrough, closing when the fluid in the duct is relieved of pressure.

The invention is more fully detailed hereinafter with reference to the accompanying drawings, in which:

Fig. 1 is a side elevation of the upper portion of a typical Freon container for which a cap according to the present invention has been provided;

Fig. 2 is an enlarged section taken on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary view of the nozzle or dispensing end of the duct means shown in Fig. 2;

Fig. 4 is a view similar to that of Fig. 2 in an embodiment in which the conical surfaces have been inverted to permit dispensing only when the container is turned upside down;

Fig. 5 is a view similar to Fig. 2 of a modified embodiment of the invention in which the upper wall of the cap has been modified to eliminate the conical structure of Fig. 2;

Fig. 6 is a view similar to that of Fig. 2 showing a still further modified embodiment of the invention in which a liquid is employed in lieu of the spherical element in the Figs. 2, 4 and 5 embodiments;

Fig. 7 is a view similar to that of Fig. 6 in which the cap has been tilted so that the liquid no longer fully occupies the cylinder at the apex of the cone;

Fig. 8 is a fragmentary detail of the piston and cylinder combination of the Fig. 6 embodiment;

Fig. 9 is a fragmentary detail similar to that of Fig. 8 showing the manner in which Fig. 6 embodiment operates upon the application of pressure to the outer transverse wall of the cap;

Fig. 10 is a perspective view of a spout arrangement shown in Figs. 5, 6 and 7;

Fig. 11 is a partial view similar to that of Fig. 10 showing the plug removed from the duct;

Fig. 12 is a section taken on the line of 12—12 of Fig. 11;

Fig. 13 is a partial section similar to Fig. 2 showing a further embodiment of the invention;

Fig. 14 is a fragmentary view similar to Fig. 10 in which the cap has been tilted; and

Fig. 15 is a partial section similar to Fig. 2 of a still further embodiment of the invention.

Referring to Fig. 1, there is illustrated the manner in which one embodiment of the invention may be adapted to fit onto the top of a typical Freon type fluid product container 10, which may be in the form of a cylinder 12 having a cover 14. The latter is orificed at 16, as shown in Fig. 2, to permit to be passed therethrough a tube 18 which extends in the axis of the container 10 down to the product 20 to be dispensed.

In the containers of this type, depressing of the tube 18 will be found to cause a flow of the fluid product 20 up the tube 18, to the point of dispensing. So much of the container as has been thus described and the details of construction and operation are well known in the art, and per se form no part of the present invention. It is to be understood that the latter may be applied to any container arrangement by which flow of a fluid product to be dispensed through a tube is induced by depressing the tube itself, or some other valving means.

For the type of container in which fluid flow is induced by depressing a tube in the manner illustrated in the drawings, the embodiment of the present invention illustrated in Fig. 1 comprises a cap 22, preferably molded of a resilient plastic such as polyethylene, an inner lower conical plate 24, the underside of which is provided with a tube cap 26 and duct fitting 28, and a metal ball or sphere 30. The cap 22 is formed to a general cylindrical configuration, the lowermost portion, however, being widened and flanged at 32 to afford means to slip over and grasp the upper rim 34 of the metal container. The top of the cap 22 is closed by a thin transverse wall 36 of conical configuration, such wall being capable of being flexed to a limited degree in the manner of a diaphragm.

Both the side wall 38, defining the cylindrical portion of the cap 22 and the flanged portion 32 are slotted at 40 to permit the duct 42 of the fitting 28 to be brought out from the tube cap 26 through the wall 38. The inner lower conical plate 24 may be molded as a separate element which is slidably received within the upper portion of the cylindrical cavity defined by the wall 38. The inside of the latter wall is provided with an annular rib or bead 44 to prevent the plate 24 from slipping out of the cap 22 after it is once installed therein, and to provide means for seating the plate 24 on a desired level. The rib or bead 44 is so located in relation to the inside of the transverse wall 36 as to allow the plate 24 to be spaced axially from the wall 36 by a distance slightly in excess of the diameter of the metal ball or sphere 30, thereby permitting the latter to roll around in the space 46 between these two conical surfaces. The cone angle of the wall 36 is preferably slightly less than the cone angle of the plate 24 so that there is more space for the ball further radially outwardly from the axis of the cones.

The tube cap 26 and duct fitting 28, which are molded to the underside of the plate 24, perform the dual function of providing means whereby the tube 18 may be depressed for valving action, and at the same time, means to conduct the fluid product, the flow of which is induced by such action, from the tube outlet to the desired point of dispensing. To accomplish these objects, the cap is formed of a cylindrical wall member 48, the inside diameter of the lower portion of which is such as to receive the tube 18 in a snug fit. The inside diameter of the upper portion of the member 48, beginning below the level of the duct 42, is abruptly decreased at 50 to the same inside diameter as that of the tube 18, thereby to form an annular shoulder 52 which seats over the top rim 19 of the tube 18.

From the thus constricted passage 50, the duct fitting 28 is turned to a horizontal direction below the underside of the plate 24, and is brought out through the slotting 40 in the wall 38. The actual fluid nozzle for the fitting 28 may be of any type, but if the product being

5

dispensed is liable to cake upon exposure to atmosphere, some means should be provided to close the nozzle after each dispensing. In the embodiments illustrated in the drawings, the means adopted comprises a simple slit 54 in the underside of the flexible wall 56 defining the duct 42.

To assemble the Fig. 1 embodiment of the invention, the molded cap 22 is first inverted and the sphere 30 is dropped onto the inside of the transverse wall 36. Next, the separately molded resilient plate 24 is slipped into the cavity 45 and forced over the rib 44, the duct fitting 38 being inserted into and allowed to protrude through the slotting 40. The cap 22 may then be turned upright, and the plate 24 is seated upon the rib 44 by moving the integrally molded plate-cap-duct element by means of the protruding duct fitting 28 until the element is level and the ball 30 may be heard or felt to roll on the conical surface of the plate 24. The inner cap 26 is then brought over the upper end of the tube 18, and the flanged wall 32 is pressed down over the rim 34. If necessary, the plate 24 may then be releveled by moving the duct element 28.

In this assembled position, it may now be seen that the tube 18 can be depressed to initiate and maintain flow of fluid only when the container is in a substantially upright position. Only in this posture will the metal sphere 30 seat in the apex 60 of the conical surface of the plate 24, and bridge the space between the upper cone wall 36 and the area of the lower plate 24 which forms the cover 64 of the cap 26, so that when sufficient downward pressure is exerted upon the dome 62 of the cap wall 36, such pressure will be transmitted via the sphere 30, upper wall 64 and shoulder 52 of the tube cap 22 to the rim 19 of the tube 18, thereby depressing the latter and inducing flow of the fluid product. In any other attitude of the container 10, the ball 30 simply rolls to the side of the space 46 radially outwardly of the axis, so that the application of pressure to the dome 62 fails to depress the wall 36 sufficiently to result in any pressure being passed onto the cap cover 64.

The amount of tilting of the container about its vertical axis which may be tolerated and still permit valving of the product is determined by the cone angle of the plate 24. If this cone angle is almost 180 degrees, as is shown in Fig. 2, obviously any slight tilting of the container will cause the ball to roll out of the apex 60. On the other hand, should the cone angle be made more acute, a considerable degree of tilting may be required to roll the ball 30 out of its seated position in the cone apex 60.

The embodiment of Fig. 4 is adapted to permit valving of the product only when the container is in a substantially inverted position. In all other positions, the ball 30 fails to seat and bridge the space between the two conical surfaces in the area where the application of pressure to the outer cone will result in the transmission of that pressure to the cap roof (or floor in this instance), so as to effect sliding movement of the tube, and hence valving action. Obviously, the cones could be arranged in many positions intermediate the two which are illustrated, to permit valving only at a predetermined disposition of the container about the vertical axis.

In the embodiment of Fig. 5, the upper transverse wall 136 is flat instead of conical as in the embodiments of Figs. 2 and 4. To enable the lower wall 124 to be depressed by the application of pressure upon the outer wall 136, there is integrally molded to the underside of the transverse wall 136 a cylindrical piston 170 which extends down into the cavity 146 to a point slightly above the surface of the spherical element 30, when the latter is disposed in the apex of the conical surface 124. This piston 170 is preferably shaped with a slight concavity 172 in the underside of its head which confronts the spherical element 30. As may be seen from the dotted line positioning of the wall and piston in Fig. 5,

6

when the resilient wall 136 and the piston 170 are depressed in the axis of the cone, the spherical element 30 is gripped within the concavity 172 of the piston 170, so that further pressure applied to the wall 136 is then transmitted through the element 30 and lower wall 124 to the shoulder 152, to depress the valve stem 18 in the same manner as in the Fig. 2 and Fig. 4 embodiments.

As may be seen from Figs. 6-9, inclusive the present invention is not limited to an arrangement which employs a spherical or even a solid element to bridge the space between the upper and lower resilient walls.

Thus, in the Figs. 6-9 embodiment, the lower conical wall 224 is constructed to define a cylindrical recess 261 which is deposited at the apex of the cone, coaxial with the latter. A small amount of fluid 230 is poured into the cylinder 261 and the conical wall 224 is sealed to the inner surface 238 of the cylindrical side wall of the cap 222. As in the Fig. 5 embodiment, a piston 270 having a concave head 271 confronting the cylinder is molded integrally with the upper transverse wall 236. Preferably, an annular sealing rib 276 (best shown in Figs. 8 and 9) is molded integrally in the side wall of the piston 270.

When the embodiment of Fig. 6 is oriented with a vertical axis, the liquid 230 flows down the conical walls to fill the cylinder 261. Depressing the resilient upper transverse wall 236 in the piston axis causes the piston 270 to move down to the liquid level, as best shown in Fig. 9. Any further downward movement of the wall 236 and piston 270 in the axis of the piston results in hydraulically transmitting the pressure causing such movement via the fluid 230 to the lower wall 224 and its integral tube cap 222 to depress the valve stem 18, exactly as in all other embodiments heretofore discussed.

As may be seen from Fig. 7, however, if, prior to depressing the piston 270 in its axis, the cap 222 is tilted, a substantial portion of the liquid 230 flows out of the cylinder 261 and into a side area of the chamber 246, defined by the cap walls. When the fluid 230 has thus flowed out of the cylinder 261, depressing the piston 270 into the cylinder results in no transmission of pressure to the lower conical wall 224 until the piston actually moves far enough into the cylinder to act upon the small remaining amount of liquid 230a in the cylinder. However, the cap 222 can be molded in such a manner that the elastic limit of the wall 236 is reached before the piston moves far enough into the cylinder 261 to apply pressure to the lower wall 224 where only a small predetermined amount of liquid 230a remains in the cylinder. The amount so remaining is determined by the extent of tilting of the container.

To avoid the application of any undesired force to the wall 224 when the cylinder 261 has been drained of liquid 230 by tilting of the container, it is advisable to make the annular sealing rib 276 of an outside diameter just about equal the inside diameter of the cylinder 261.

The embodiment of Fig. 6 includes a novel plug 280 in the spout 228. The latter is formed as a semi-cylindrical tube which is provided with a semi-annular recess 282 and a pair of diametrically opposed guide slots 284. The plug 280 is in the form of a small tube segment open at its inner extremity 286 with a semi-annular rib 288 adapted to fit the recess 282, and an end closure wall 290 as best seen in Fig. 12.

The plug 280 is inserted in the open extremity of the spout 228, and pressed into the spout passage until the rib 288 locks in the recess 282. At this point, the plug wall 290 will abut the tapered extremity 257 of the lower flat wall 256 of the spout. The wall 290 is thin and resilient, as is also the extremity 257 of the lower wall 256.

When fluid under pressure is released from the valve stem 18, the wall 290 and extremity 257 of the wall 256 will be found to separate sufficiently from each other to permit the discharge of the fluid. Upon the release of pressure, however, the wall 290 and the extremity 257

will tend to close thereby to prevent the admission of air into the tube passage 292 to cause caking of the fluid container therein.

The advantage of this plug type construction lies in the fact that the cap may be more readily molded as two separate pieces.

The embodiment of the invention illustrated in Fig. 13 is constructed to provide a cylinder 361 the wall 362 of which arises from the transverse fitting wall 364 in the manner shown. The latter is formed to grip the rim of the tube 18 in the manner of the previously described embodiments. The cylinder wall 362 is orificed laterally at four points 363 to place the cylinder 361 in communication with an annular chamber 365 which serves to receive fluid 330 from the cylinder 361 whenever the container cap is tilted in the manner shown in Fig. 14.

The chamber 365 and cylinder 361 are closed by a transverse circular plate 366 which is sealed onto the vertical walls 367 and 362, defining the chamber and the cylinder, respectively. The plate 366 is centrally orificed at 367 in the axis of the cylinder to permit a piston 370 to be passed therethrough. The vertical wall of the plate 366, which wall defines the orifice 367, is annularly beaded at 376 to seal the piston 370 against fluid leakage through the orifice 367 in the manner of an O-ring.

The piston 370 extends upwardly to the underside of the resilient outer closure wall 336. A spring 368 is provided in the cylinder to maintain the piston at the upper extremity of its stroke until the force of the spring is overcome by a force applied to the outside of the wall 336. The volume of the cylinder 361 and quantity of liquid provided therein is determined in relation to the volume of the chamber 365 so that, upon the tilting of the cap in the manner shown in Fig. 14, the liquid 330 quickly escapes through the orifices 363 into the chamber 365, and, therefore, provides no medium in such tilted position by which force applied to the outer end of the piston may be transmitted to the fitting wall 364 to cause actuation of the valve 18.

It will be readily perceived that the Fig. 13 embodiment operates quite similarly to the embodiment of Fig. 6 in that only when the container is maintained in the vertical axis the piston 370, upon being depressed, will be met by the fluid 330, which because of its incompressibility, transmits force applied thereto by the piston to the movable fitting wall 364, thereby to actuate the valve 18.

In the embodiment of Fig. 15, the underside of the resilient closure wall 436 is constructed to provide a socket 471 for universally pivotably mounting an elongate linkage element 472 to enable the latter to pivot within a conical surface 473. The element 472 is preferably made of a heavy metal so that it tends to dispose itself in a vertical axis irrespective of the position of the cap. A fitting 464 is provided over the upwardly projecting end valve stem 18. This fitting should include a cylindrical stumplike portion 465, which is centrally recessed at 466 to receive the ball-like end 474 of the element 472. The spout 428 extends through the cap wall 438 in the manner shown.

As may be seen from the dotted position of the element 472, whenever the cap is tilted and the element 472 swings laterally to maintain its vertical orientation, the ball-like end 474 is removed from possible contact with the stump 465. In this attitude, depressing the resilient closure wall 436 effects no contact with the fitting 464 to actuate the valve stem 18. However, when the cap is vertically disposed and the element 472 aligns itself in the axis of the stump 465, the application of pressure to the central portion of the transverse wall 436 results in first seating the ball-like extremity 474 in the recess 466, and then transmitting further force applied to the wall 436 to the stump 465, to cause the fitting 464 to depress and actuate the valve stem 18.

A consideration of the foregoing illustrated and described embodiments in the present invention will suggest numerous other ways in which a valve cap may be constructed to accomplish the results obtained by the present invention. All such possible embodiments, insofar as they utilize its basic principle, are intended to be comprehended within the scope of the present invention.

I claim:

1. A device for actuating a valve, operable in response to the application of a predetermined force on said valve, said device comprising: a member, said member being spaced from said valve and movable toward said valve upon the application of pressure on said member; and means interposable between said valve and said member only in a predetermined attitude of the device, whereby when said device is arranged in such attitude, pressure applied to said member is transmitted via said means to said valve, thereby to actuate the valve.

2. A device for actuating a valve, operable in response to the application of a predetermined force on said valve, said device comprising: a member, said member being spaced from said valve and movable toward said valve upon the application of pressure on said member; and means gravitationally interposable between said valve and said member only in a predetermined attitude of the device, whereby when said device is arranged in such attitude, pressure applied to said member is transmitted via said means to said valve, thereby to actuate the valve.

3. A valve cap for a gaseous pressure type fluid product dispensing container, said container having an actuating tube projecting from the container, the fluid product flowing through said tube upon the application of a predetermined force to a given area of the tube, said cap comprising: a member spaced from said area and movable toward said area upon the application of pressure on said member; and means interposable between said area and said member only in a predetermined attitude of the cap, whereby when the cap is arranged in such attitude, pressure applied to said member is transmitted via said means to said area, thereby to actuate the valve.

4. A valve cap for a gaseous pressure type fluid product dispensing container, said container having an actuating tube projecting from the container, the fluid product flowing through said tube upon the application of a predetermined force to a given area of the tube, said cap comprising: a member spaced from said area and movable toward said area upon the application of pressure on said member; and means gravitationally interposable between said area and said member only in a predetermined attitude of the cap, whereby when the cap is arranged in such attitude, pressure applied to said member is transmitted via said means to said area, thereby to actuate the valve.

5. A valve cap for a gaseous pressure type fluid product dispensing container, said container having an actuating tube projecting from the container, the fluid product flowing through said tube upon the application of a predetermined force to the tube, said cap comprising: a conduit; a coupling element, said element being adapted communicably to join said tube with said conduit and to constitute means via which the requisite force to actuate the valve may be applied to the tube; a member spaced from said element and movable toward said element in a direction of the force required to be applied to said tube to cause the fluid to flow; and means interposable between said element and said member only in a predetermined attitude of the cap, whereby the application of any force to the member to cause the same to move toward the element, will be communicated to said element, thereby to cause fluid to flow through the tube.

6. A valve cap for a gaseous pressure type fluid product dispensing container, said container having an actuating tube projecting from the container, the fluid product flowing through said tube upon the application of a predetermined force to the tube, said cap comprising: a con-

duit; a coupling element, said element being adapted communicably to join said tube with said conduit and to constitute means via which the requisite force to actuate the valve may be applied to the tube; a member spaced from said element and movable toward said element in a direction of the force required to be applied to said tube to cause the fluid to flow; and means gravitationally interposable between said element and said member only in a predetermined attitude of the cap, whereby the application of any force to the member to cause the same to move toward the element, will be communicated to said element, thereby to cause fluid to flow through the tube.

7. A dispensing cap for aerosol containers having a tubular discharge valve stem which actuates the valve when the stem is depressed inwardly of the container, said cap comprising: a conduit, a coupling element for the outwardly projecting stem extremity, whereby the flow of the fluid discharged by the stem may be continued through the conduit for ultimate discharge thereby; and means for depressing the stem via said coupling element in a predetermined attitude of the cap, said means including a side wall, and a pair of transverse walls spaced from each other, said three walls defining a cavity, the side wall being fixedly engaged with the container; the lower transverse wall converging toward a limited area above said coupling element, and said lower wall being depressible at said area with said element to actuate the valve stem; the upper wall being depressible in the region above said area; and said means further including an element adapted to move about in said cavity upon changing the attitude of the container and to seat in said area only in a predetermined attitude thereof, the spacing between said pair of walls in said area and region closely approximating the vertical dimension of said rolling element when so seated in said area, whereby only when the container is disposed in said predetermined attitude can the valve be actuated.

8. A dispensing cap for aerosol containers having a tubular discharge valve stem which actuates the valve when the stem is depressed inwardly of the container, said cap comprising: a conduit; a coupling element, said coupling element being adapted to engage the outwardly projecting stem extremity and to couple thereto, said conduit, whereby the flow of the fluid discharged by the stem may be continued through the conduit for ultimate discharge by the latter; and means for depressing the stem via said coupling element, said means including a housing defining a cavity; a first portion of said housing being in contact with said stem and being depressible therewith, and a second portion of said housing being movable in the direction in which said first portion and said stem are depressible; said housing further containing in said cavity means interposable between said first and second housing portions only in a predetermined attitude of the housing; whereby force applied to the second portion to move the same toward the first portion is transmitted to the first portion and thereby, to the valve stem, to actuate the valve.

9. A dispensing cap for aerosol containers having a tubular discharge valve stem which actuates the valve when the stem is depressed inwardly of the container, said cap comprising: a conduit; a coupling element, said coupling element being adapted to engage the outwardly projecting stem extremity and to couple thereto, said conduit, whereby the flow of the fluid discharged by the stem may be continued through the conduit for ultimate discharge by the latter; and means for depressing the stem via said coupling element, said means including a housing defining a cavity; a first portion of said housing being in contact with said stem and being depressible therewith, and a second portion of said housing being movable in the direction in which said first portion and said stem are depressible; said housing further containing in said cavity means gravitationally interposable between

said first and second housing portions only in a predetermined attitude of the housing; whereby force applied to the second portion to move the same toward the first portion is transmitted to the first portion and thereby, to the valve stem, to actuate the valve.

10. The device as described in claim 9 wherein the first portion of the housing includes a cylinder with walls converging toward said cylinder; the second portion includes a piston spaced from the bottom wall of the cylinder; and the interposable means is a fluid which flows into the cylinder to occupy the space between the piston and the bottom wall in the predetermined attitude of the housing.

11. The device as described in claim 9 wherein the first portion of the housing includes a wall which converges to a point most proximate said valve stem, and the means is a rolling element.

12. The device as described in claim 9 wherein the first portion of the housing includes a wall which converges to a point most proximate said valve stem, and the means is a ball element.

13. A valve cap for a gaseous pressure type fluid product dispensing container, said container having an actuating tube projecting upwardly from the container, the fluid product flowing through said tube upon the application of a predetermined downward force on the tube wall in the direction of tube axis, said cap comprising: a conduit disposed at an angle relative to the tube, said conduit including a coupling element for the tube extremity which the flow of the fluid discharged by the tube may be continued through the conduit for ultimate discharge thereby; and means for applying actuating force to the tube via said coupling element, said means including a side wall and a pair of transverse walls spaced from each other to define a cavity, the lower wall converging toward an area disposed above said coupling element and said lower wall at said area being depressible with said element; and the upper wall being flexible; an element adapted to roll about in said cavity and to seat in said area in a predetermined attitude of said container, whereby only when the container is disposed in such attitude can the valve be actuated by forcefully depressing said flexible upper wall.

14. A dispensing cap for aerosol containers having a tubular discharge valve stem which actuates the valve when the stem is depressed inwardly of the container, said cap comprising: a conduit disposed at an angle relative to said stem, a coupling element associated with said conduit and adapted to connect said conduit to said stem, whereby the flow of the fluid discharged by the stem may be continued through the conduit for ultimate discharge thereby; and means for depressing the stem via said coupling element, said means including a pair of transverse walls spaced from each other and disposed substantially normally to the axis of the valve stem, both of said walls being depressible toward said valve stem extremity in the regions of said walls intersected by said stem axis, and means contained between said walls but interposable between said regions only in a predetermined range of attitudes of said container, thereby to bridge said regions so that the application of any force to the outer wall in the direction of the valve stem, is transmitted to the latter via the coupling to actuate the container valve.

15. For use with a container holding a liquid product which is to be dispensed, said container having an element projecting therefrom and valve means actuated by depressing said element; second means to permit said valve means to be actuated only when the container is disposed in a predetermined position, said second means comprising: a plate, said plate being of flexible material and having a surface which converges to a predetermined point, the underside of said plate being operatively connected in the immediate region below said point to said element; a sphere of hard material, said sphere being disposed on said plate; and a cap, said cap having side walls

11

and a transverse closure wall and being adapted to house and hold said plate, said cap further being affixed to the container in such a manner as to dispose said plate normally to the vertical when the container is set in the desired dispensing position, said transverse wall being disposed over said plate and spaced therefrom a distance slightly greater than the diameter of the sphere above said point, and at least the same distance elsewhere, said transverse wall further being at least partially movable relative to the plate in the area over said point, whereby only when the container is disposed in the desired dispensing position is the sphere seated on the said point and the space between said point and the transverse wall substantially bridged so that the application of pressure to the area of the transverse wall over said point results in the transmission of such pressure via the sphere and said plate to the valve actuating element to cause action of the valve means.

16. For use with a container holding a liquid product which is to be dispensed, said container having an element projecting therefrom and valve means actuated by depressing said element; second means to permit said valve means to be actuated only when the container is disposed in a predetermined position, said second means comprising: a plate, said plate being of flexible material and having a surface which converges to a predetermined point, the underside of said plate being operatively connected in the immediate region below said point to said element; a sphere of hard material, said sphere being disposed on said plate; and a cap, said cap having side walls and a transverse closure wall and being adapted to house and slidably hold said plate, said cap further being affixed to the container in such a manner as to dispose said plate normally to the vertical when the container is set in the desired dispensing position, said transverse wall being of flexible material, disposed over said plate, and spaced therefrom a distance slightly greater than the diameter of the sphere above said point, and at least the same distance elsewhere, whereby only when the container is disposed in the desired dispensing position is the sphere seated on the said point and the space between said point and the transverse wall substantially bridged so that the application of pressure to the area of the transverse wall over said point results in the transmission of such pressure via the sphere and said plate to the valve actuating element to cause actuation of the valve means.

17. For use with a container, said container holding a liquid product which is to be dispensed, and said container having an element projecting therefrom and valve means actuated by depressing said element; second means to permit said valve means to be actuated only when the container is disposed in a predetermined position, said second means comprising: a plate, said plate being of flexible material and having a conical surface which converges to a predetermined point, the underside of said plate being operatively connected in the immediate region below said point to said element; a sphere of hard material, said sphere being disposed on said plate; and a cap, said cap having side walls and a transverse closure wall and being adapted to house and slidably hold said plate, said cap further being affixed to the container in such a manner as to dispose said plate normally to the vertical when the container is set in the desired dispensing position, said transverse wall also being conical with a cone angle not greater than that of the plate, said transverse wall further being of flexible material and disposed over said plate and spaced therefrom a distance slightly greater than the diameter of the sphere above

12

said point and at least the same distance elsewhere, whereby only when the container is disposed in the desired dispensing position is the sphere seated on the said point and the space between said point and the transverse wall substantially bridged so that the application of pressure to the area of the transverse wall over said point results in the transmission of such pressure via the sphere and said plate to the valve actuating element to cause actuation of the valve means.

18. A fluid dispensing spout, said spout comprising: a semi-cylindrical tube, said tube being closed by a flat wall extending axially substantially the entire length of the tube, said tube having openings at both ends through which the fluid flows from a source thereof, the semi-cylindrical wall of said tube being internally grooved, said grooving lying in a plane normal to the axis of the tube and disposed adjacent to, but spaced from, the outlet end of said tube; and a nozzle element, said element being formed as a semi-cylindrical sleeve of resilient material, said sleeve being shaped to fit snugly within said grooved end of the tube, said element including at one extremity a radially outwardly projecting semi-annular boss which mates with said tube grooving, the opposite extremity of said element being provided with a thin transverse resilient wall, said sleeve being of such length as to dispose the last said wall to abut the adjacent extremity of the flat closure wall of the tube, whereby when fluid under pressure flows through the tube, the thin wall yields to separate from the said flat wall extremity along the line of its abutment with the said flat wall extremity to permit discharge of the fluid therebetween, but with the release of pressure upon the fluid in the tube, the resilient wall moves back to abut the said flat wall extremity to close the tube end.

19. The spout as described in claim 18 wherein the tube is also made of resilient material.

20. The spout as described in claim 18 wherein both the tube and the sleeve are molded of polyethylene.

21. A valve cap for a gaseous pressure type fluid product dispensing container, said container having an actuating valve stem projecting from the container, the fluid product flowing through said stem upon the application of a predetermined force to the valve stem, said cap comprising: a fitting, said fitting including a portion on the end of the valve stem whereby the requisite force may be applied to the valve stem to actuate the valve; a member spaced from said fitting and movable toward said fitting substantially in the direction of said force, said member including socket means disposed in line of said force; and an elongate element, one end of said element being disposed to pivot in said socket means, and said element, only when the cap is oriented in a predetermined attitude, pivoting to assume a position substantially in said line of force with its opposite end almost abutting said fitting, whereby in such attitude the application of force to the member to move the same in said line of force, results in transmitting such force to said fitting via said element to actuate the valve, but in other attitudes of the cap, the element is swung away from said fitting to avoid contact therewith.

References Cited in the file of this patent

UNITED STATES PATENTS

2,513,272	Bowen	July 4, 1950
2,585,286	Tubbs	Feb. 12, 1952
2,643,799	Countryman	June 30, 1953
2,723,055	Beard	Nov. 8, 1955
2,753,214	Abplanalp	July 3, 1956
2,772,819	Poarch et al.	Dec. 4, 1956