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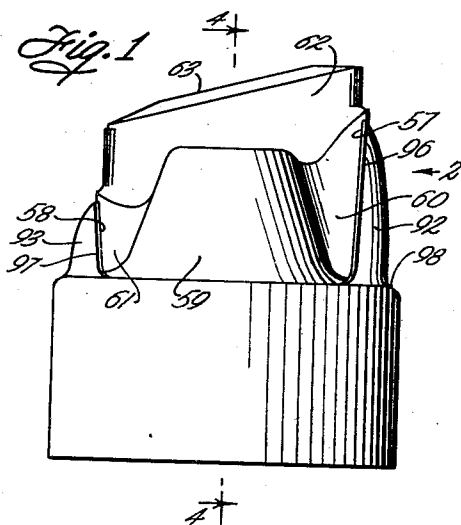
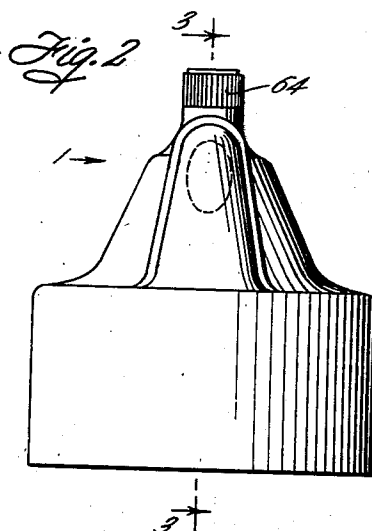
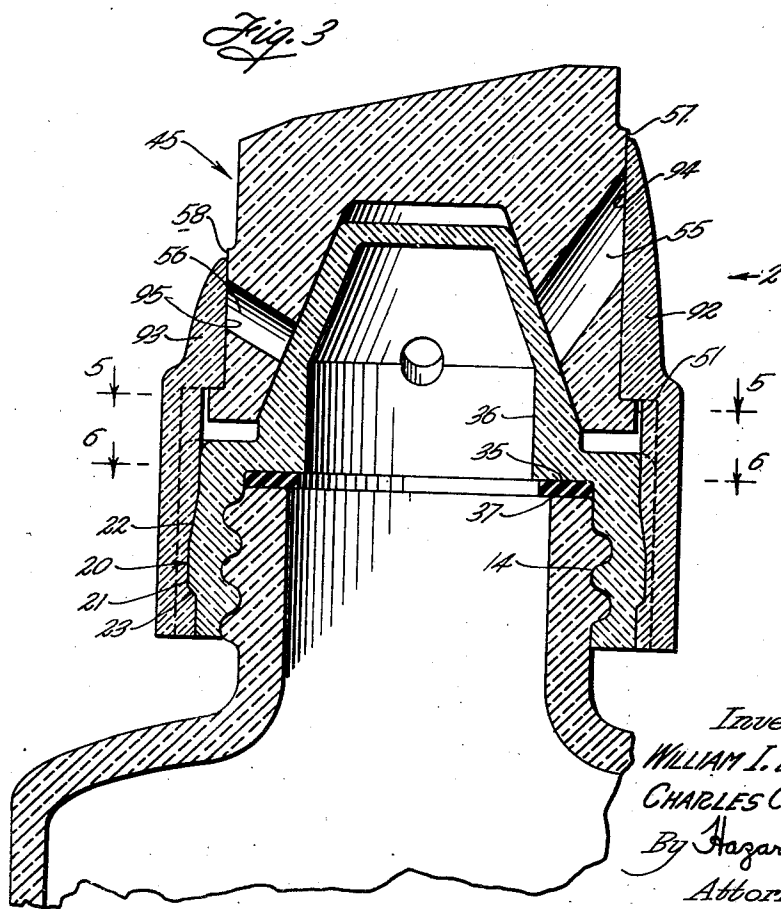
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CONTAINER CLOSURE

Filed April 22, 1940

2 Sheets-Sheet 1



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CONTAINER CLOSURE

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7 Claims. (Cl. 215—76)

Our invention pertains to closures for containers of a type to permit and to control the pouring or expulsion of the materials confined by the container whether such materials be liquid, solids in the form of granules or pastes. In these types of valve closures many attempts have been made to present devices which may be used as bottle tops or closures, devices for containers for granular material and for the extrusion of pastes or the like from collapsible tubes in which by aligning ports of a valve structure and a device attached to the container, the openings may be made for the passage of the materials from the container. Some of these are provided with inlet air openings or vents so that for instance when a liquid is poured air enters the container and also there are constructions in which the degree of opening of the ports may be readily manually controlled and thus regulate the rapidity of flow for instance of the liquid. Where such type of valve closure is used in connection with collapsible tubes used for pastes, creams or the like, it is not necessary to have the air inlet vent, however with all of these constructions as far as known to us, there is still the disagreeable feature of the outside of the container becoming soiled from the drip of for instance liquids after the ports are closed or if the container is tilted upwardly to stop the pouring with the ports still open, there is even greater danger of the drip flowing down the side of the container giving a very disagreeable appearance. This feature of the drip is particularly objectionable where the liquid is of a viscous nature and particularly as it has a sweet characteristic as the sticky material on the outside of the container collects dust and attracts insects.

One of the objects and features of our invention is the construction of a sanitary type of closure valve for container caps or the like which when the valve is open aligns certain ports which allow a free flow or dispensing of the liquid but when the valve element is moved to the closed valve position we provide a seal or closure for the outlet port. A characteristic of this seal is that if a liquid is being poured and the valve is closed, then the liquid in the nozzle or spout passage may drain out and when completely closed, there is a cutting off action, therefore assuring that there is no liquid left on the valve cap which may drain downwardly when the container is placed in upright position.

A further characteristic and feature of the cut-off closure for the valve nozzle or spout outlet

is that this forms a complete cover for the open end of the valve outlet port when the same is in the complete closed valve position, thus preventing entrance of dust, insects or the like which in the present type of valve container cap closures may have access to the outer of two registering ports. In our construction, especially as designed for dispensing liquid, we therefore provide a valve structure preferably of the rotary type having a port-like spout forming a nozzle and a complementary air inlet port or vent, these being located to align with complementary ports in a fixed cap attached to the container. Therefore on aligning these in open valve position, the liquid may be poured and free entry of air permitted to the container, however when the valve is turned to the closed valve position which manifestly brings the ports out of alignment, the spout and the air vent in the rotatable valve structure are brought behind a cut-off sealing device in the form of lugs forming a closure for the outer end of these and therefore preventing entry of dust or insects. The sealing lug at the liquid spout also is operative to cut off any clinging drops while the container is inverted so that these will not run down on the outside of the container.

In the employment of our invention as applied to collapsible tubes or containers for pastes, creams or the like, we utilize a similar cut-off device or sealing lug. In this case it is only necessary to have the valve provided with an outlet port registering with a fixed port on the cap in open valve position and on rotation brought in registry with the cut-off sealing lug. While this usually traps a small amount of the paste or cream in the port of the rotatable valve, such small portion is kept clean as it cannot become contaminated and also is protected from drying action.

Another feature of our invention relates to the manner of assembling the various elements entering therein designed especially for use of certain of the plastics molded cold or under the action of heat and pressure. With our construction therefore we provide a tightly connected stationary element which may be attached to the container top and forms the ported cap of the closure and a retainer for the rotating valve element which latter is likewise ported. We provide an inner structure or closure cap having means for attaching directly to the container. The ported valve element is seated thereon for rotary motion and these two elements are held together by a retainer collar, which incidentally

also forms a mounting for the cut-off or sealing lugs.

In order to facilitate assembly of the collar and the cap and prevent rotation thereof, these are provided with interfitting grooves and keys with complementary wedging and locking surfaces. This requires the collar to be stretched to fit over the interlocking wedge structure of the cap and when so placed, the two elements become tightly fitted and interlocked and can neither be removed nor rotated one in relation to the other. A characteristic of the interlocking grooves and lugs provides preferably in having diametrically opposite pairs each having external surfaces concentric with the axis of the assembly and also outwardly an expanded section formed on a radius less than that of the said concentric surfaces terminating at the edge of the groove or the edge of the key. A gradual slope in the side of the cone cap and valve joins this expanded surface and the steep locking surface extends in the opposite direction, thus when the cap and the retaining collar are pressed together, the wedge surfaces cause an expansion of the retaining collar until the locking shoulders or surfaces engage. There is then a snug fit of complementary surfaces on the grooves of the lugs. The cap and the retainer collar for their functional purposes operate as a unit, thus retaining the rotatable valve in proper position as to the ported container cap and the sealing cut-off lugs which as above mentioned are preferably formed integral with the retainer collar.

Our invention also includes a special relationship on the slope of the ports of the cap and the pouring spout of the rotatable valve one in relation to the other and to the axis of the assembly and also the inlet duct and port for air. By our construction liquid such as from medicine bottles may be poured drop by drop with a continuity of the liquid from the bottle through the duct and the pouring spout, then when the container is tilted from a pouring to a non-pouring position, the continuity of the liquid is maintained, hence maintaining the surface tension of the liquid so that the drop of the liquid at the outside of the pouring spout is sucked back into such spout instead of running down the container. The container may then be held vertically and such drops retained in the spout will drain back to the container. Thus with proper manipulation there is but little danger of any drops even of viscous liquids being trapped outside of the rotatable valve, however should this be the case by careless handling of the container in pouring, the drops may be cut-off in closing the valve by the sealing lugs and such drops either washed or wiped off before the container is put away until further use. Our invention also comprises other detail features described in the specification and set forth in the claims.

Our invention is illustrated in connection with the accompanying drawings, in which:

Fig. 1 is a side elevation taken in the direction of the arrow 1 of Fig. 2.

Fig. 2 is a front elevation taken in the direction of the arrow 2 of Fig. 1 in the closed valve position.

Fig. 3 is a vertical section on the line 3—3 of Fig. 2 in the direction of the arrows illustrating the cap connected to a conventional threaded bottle.

Fig. 4 is an expanded section on the line 4—4

of Fig. 1 with the cap shown in elevation in the direction of the arrows.

Fig. 5 is a transverse section on line 5—5 of Fig. 3 in the direction of the arrows.

Fig. 6 is a transverse section on the line 6—6 of Fig. 3 in the direction of the arrows.

Fig. 7 is a vertical section of a modification suitable for dispensing from a collapsible tube, the cap being shown in elevation and the valve being in the closed position.

Referring first to the construction of Figs. 1 through 6, a cap structure 11 is indicated as having an internally threaded skirt 12 with a one structure 13 extending thereabove. The skirt has the internal threads 14, note Fig. 3, conforming to a conventional thread on the neck of bottles or the like. The main portion of the periphery 15 is cylindrical except for two diametrically opposite recesses 16. These are each characterized by vertical parallel edges 17. The lower and upper surfaces 18 and 19 are cylindrical and concentric with the center of the cap. Between these concentric portions there is an outward expansion portion 20 of which at the maximum portion 21 the curve extends from the innermost portion of the edges 17 and expands outwardly in an arc of less radius than that of the surfaces 18 and 19, note Fig. 6 but this surface at the maximum expansion is preferably cylindrical. Above this surface 20 there is a sloping wedge surface 22 merging at the top with the surface 19 and at the bottom with the upper edge of the surface 20 and below the surface 20 there is a steeply sloped locking surface 23, this being illustrated substantially at 45 degrees with the lower portion of the surface 20 merging therewith and with the lower cylindrical surface 23. This recess 16 as hereabove described not only forms a keyway but also a locking device for the assembly.

The cone structure 13 is illustrated as having a flat apex 25, a conical sloping wall 26, a cylindrical neck portion 27 which merges with the shoulder 28 transverse to the axis of the cap. The cap has an inclined liquid port 30 and diametrically opposite an inclined air vent port 31. These ports converge towards the axial center but they are not of the same slope. The liquid port is preferably considerably steeper than the air vent port. The cap is illustrated as having a bottom shoulder 35 and a cylindrical inner portion 36 extending upwardly and merging with an inside cone and top surface parallel to the cone 26 and the top 25. A sealing gasket 37 is utilized at the base of the threads 14 to seat on top of a bottle or other structure.

The complementary valve 45 to engage the cone has a complementary internally coned surface 46 to have a rotational working fit with the exterior cone 26 of the cap element. The underside 47 of the top is designed to be slightly spaced from the top 25 of the cap cone. The bottom 48 is transverse to the axis and above this is a cylindrical periphery 49 with a shoulder 50 thereabove. There are a pair of arcuate projections 51 on diametrically opposite sides, note Figs. 3 and 5 which are operative as stop elements to restrict the turning motion of the valve from its open to its closed position. Each end of the valve has a cylindrical surface. The valve is provided with a liquid spout 55 and an air vent duct 56 (note Fig. 3), the liquid spout being the largest cross sectional area. These are designed to be respectively of the same contour and cross section as the ports 30 and 31 in

the cone of the cap. They likewise have the same slope towards the axis of the assembly and therefore correctly align when the device is in the open valve position. Our invention is characterized that the spout and the duct 55 and 56 both terminate at cylindrical surfaces 57 and 58 on the exteriors of the valve unit and at diametrically opposite sides. The surface 57 through which the spout passes is larger than the surface 58 through which the duct 56 has its opening. These are to cooperate as cut-off structures as hereunder described. From these two cylindrical surfaces 57 and 58 there is illustrated on opposite sides an exteriorly coned surface 59 with merging surfaces 60 and 61. These extend upwardly to the index top 62 which is illustrated as having parallel sides, a slope 63 on the upper surface, this extending upwardly from the low side adjacent the cylinder 58 to the high side having the discharge spout 55. The ends are preferably knurled as indicated at 64 to facilitate gripping and rotating the valve. The upper surface of the slope 63 preferably has an arrow pointer or the like imposed thereon showing the direction of pouring to the spout 55.

The retaining collar assembly 75, has a clamping collar wall 76 which is cylindrical on the main portion of the inside surface 77 except for the projecting key 78. This key is characterized by parallel edges 79. A cylindrical upper surface 80 and a cylindrical lower surface 81 are each concentric with the axial center and with a cylindrical expanded surface 82 formed on a lesser radius than that of the surfaces 80 and 81 and being complementary to the expanded cylindrical surface 21 on the skirt of the cap. There is an upper wedging surface 83 merging with the cylindrical surfaces 80 and the expanded cylindrical surface 82 and a sharply inclined locking surface 84 merging with the expanded cylinder 82 and the concentric lower cylinder 81. This surface 82 is formed on substantially 45 degrees and complementary to the locking surface 23 of the skirt of the cap. These various surfaces in fact interfit and form a lock with the complementary surfaces on the outside of the skirt of the cap. For instance when assembled together the surfaces 18, 20, 22 and 19 on the recessed portion of the cap interfit with the surfaces 81, 82, 83 and 80 respectively of the projection key 78 of the retainer collar assembly.

The retainer collar has an upward inwardly turned flange 90 with a cylindrical inner edge or opening 91. Extending upwardly from the collar there are two cut-off lugs 92 and 93 of which the lug 92 is the highest and each has an inside cylindrical surface 94 for the lug 92 and 95 for the lug 93. These merge with and are concentric with the cylindrical inner edge 91 of the peripheral rim 90. These cylindrical surfaces 94 and 95 also interfit respectively with the outside cylindrical surfaces 57 and 58 on the opposite ends of the rotatable valve structure. Each of the cut-off lugs has relatively sharp edges 96 for the lug 92 and 97 for the lug 93. These sharp edges are formed by the inside cylindrical surface of the respective lugs and the outside curved surfaces. There is a slight molded curve 98 where each of the cut-off lugs merges with the outside wall of the collar 76.

The edges 79 of the key 78 also form stops engaging the opposite ends of the arcuate projections 51 on diametrically opposite sides of the rotatable valve element and limit the motion from a full open to a full closed valve position.

The space 100, note Fig. 5, formed by the cylindrical inside wall 77 gives an arcuate path for the travel of the lugs 51 in the movement of the rotatable valve element 45 between the open valve and the closed valve position.

The manner of assembling is as follows: the internally cone shaped valve 45 is seated on the external cone of the cap element 11 and preferably so rotated that the spout 55 and the air duct 56 are slightly out of registry with the ports 30 and 31 of the cap. The retainer collar unit 75 is then placed over and centered as to the cap so that the internal keys or projections 78 of the retaining collar align with the corresponding diametrically opposite recesses 16 on the external wall of the periphery 15 of the cap. The cap and the retainer collar are then pressed together, the cylindrical surfaces 15 of the cap and 77 of the collar interfitting, the upper wedge surface 22 on the cap engages the lower cylindrical surface 81 of the collar and causes the collar to stretch or expand. This expansion is carried through, the surface 81 of the retainer riding on the outwardly expanded cylindrical surface 21 of the cap and the two elements snapping together bringing the 45 degree lock surface 23 of the cap into engagement with the corresponding lock surface 84 of the retainer collar. Where these two elements, the cap and the collar, are made of plastics, there is sufficient stretch for expansion of the material to allow this manner of interfitting and assembly and when so assembled the parts cannot be separated without thorough destruction. The steep locking shoulders 23 and 84 being at too great an angle to permit the pulling apart of the cap and the retainer collar, the rotatable valve element 45 is also preferably made of plastics of the same type but this is not subject to any distortion in the assembly. The corresponding key projection 78 of the collar and recess 16 of the cap also have the function of a locking key and groove preventing the cap and the retaining collar from rotation when assembled.

The construction of Fig. 7 is designed especially for dispensing materials of the type of pastes, soft plastic materials or paints from collapsible tubes. The general construction is substantially the same as that above described except that it is not necessary to have any air vent as the collapsing of the tube displaces the material contained therein. There is only the discharge duct port or spout.

In this illustration the cap is designated by the assembly numeral 125. This has the internally threaded skirt 126 and the cone 127, the cone however only having one port 128. The threads of course are of a type to engage on the threaded neck 129 on the head of a collapsible tube 130. By this means the cap and the entire assembly may be removed when the tube is empty and replaced on another tube. The valve element 135 has an internal cone 136 and leading therefrom an outlet spout or complementary port 137. This is at the same inclination as the port 128. This valve element may be of any suitable space on the outside except that at the discharge portion of the port there is a cylindrical surface 138. The retainer collar assembly 145 has a cut-off lug 146 cylindrical on the inside surface and registering with the cylinder 138 of the valve. This is made in such a manner as to have relatively sharp edges to give a clear cut to the paste or the like being extruded from the aligned ports. The retainer collar and cap have the same type of locking and retaining structure with the slip-fit

wedging surfaces and locking shoulder as above detailed. The valve element is also retained in position in the same manner. The internal opening 147 of the retainer is cylindrical and aligns with the inside cylindrical surface 148 of the lug and thus contacts the cylindrical surface 149 formed on the lower portion of the valve element, this being enlarged to form the cylindrical surface 138. The plug is thus held centered and is freely rotatable on the cone.

In the use of this type of closure for collapsible tubes, it is manifest that when the port 128 of the cap and the spout or duct 137 on the rotatable valve are aligned, that the paste or other material may be extruded by the usual procedure of collapsing the tube. When the valve is turned from the open towards the closed valve position it cuts off the ribbon of paste trapped in the aligned ports leaving some of this in the port, 128, of the fixed cap. The cut-off lug is then operative to sever the ribbon of paste at the outer end of the discharge spout 137 as the valve is brought into the closed valve position. This leaves a small portion of the base trapped in this duct between the cone 127 of the cap and the inside surface of the cut-off lug 146, however this small portion is sealed from contact with air and thus does not dry or harden. The paste in the port 128 of the cap is also sealed from contact with external air and is thus maintained in its plastic condition, therefore when it is again desired to use the tube, the material discharged therefrom has had no chance to deteriorate by exposure to air and thus is in good condition.

In the closure and cap for dispensing liquids we have found it satisfactory to position the pouring spout 55 and the complementary port in the cap at an angle of about 35 degrees to the longitudinal axis and the duct 56 connecting with the air vent port at an angle of about 45 degrees. These of course vary depending upon the type of the liquid with which the device is to be used, the angle of the pouring spout being such that the discharge from the orifice is satisfactory and maintains continuity of liquid during the pouring from the container through the port into the spout so that on discontinuing the pouring by tilting the container with the top upwardly, the drop or drops suspended at the outlet are drawn back into the spout 55 and hence drained through the duct in the cap to the container.

Various changes may be made in the details of the construction without departing from the spirit or scope of the invention as defined by the appended claims.

We claim:

1. A container closure including a cap having a skirt portion adapted for attachment to a container and having an upwardly extending cone thereabove, said cone being provided with one or more ports, a rotatable valve element mounted on the cone for rotation and having a complementary internal surface, there being one or more spouts or ducts to align with the said ports, the valve adjacent the outer end of the ducts having cylindrical surfaces and fixed cut-off lugs with means securing same to the cap and provided with internal cylindrical surfaces to form a sealing closure for the said ducts when the valve is in its shut-off position, the said cylindrical surfaces of the valve and lugs then interfitting.

2. A container closure including a cap element having means for attachment to a container and provided with a port, a rotatable valve mounted thereon and having a complementary spout for

alignment with the port, a fixed cut-off sealing closure positioned to cover the outer end of the spout when in the closed valve position relative to the port of the cap, a retainer collar having the cut-off sealing closure attached thereto, interconnecting means between the retainer collar and the cap restraining longitudinal and rotational motion, the retainer collar having means to interengage with the valve.

3. A container closure including a cap having a lower portion for attachment to a container and having a conical upper portion with one or more ports, a rotary valve element having a complementary inner surface to the cone of the cap and riding thereon, one or more ducts in the valve to align with the ports, a retainer collar fitted over the portion of the cap below the cone and secured thereto, the collar having means to engage and retain the rotatable valve, one or more cut-off lugs secured to the retainer collar and adapted to register with the duct or ducts when the valve is located in the closed valve position.

4. A container closure including a cap for attachment to a container and having one or more ports, a retainer collar mounted on the cap and having one or more cut-off lugs, a rotatable valve element mounted on the cap and held in place by the retainer collar, said valve element having one or more ducts alignable with the ports of the cap in open valve position and alignable with the said lugs in the closed valve position.

5. A container closure including a cap for attachment to a container and having one or more ports, a retainer collar mounted on the cap and having one or more cut-off lugs, a rotatable valve element mounted on the cap and held in place by the retainer collar, said valve element having one or more ducts alignable with the ports of the cap in open valve position and alignable with the said lugs in the closed valve position, the cap and retainer collar having complementary longitudinal grooves and keys, each having complementary wedging surfaces facing towards the valve and complementary locking shoulders facing in the opposite direction, the grooves and keys interlocking the cap and the retainer collar.

6. A container closure comprising a ported cap applicable to the mouth of a container, a valve rotatable thereon having one or more ports adapted to be brought into and out of registry with the ports in the cap, said valve having cylindrical surfaces on which the ports therein terminate, and means disposed out of alignment with the ports in the cap engageable by said cylindrical surfaces serving to close the outer ends of the ports when the valve is turned to closed position and exposing the outer ends of the ports when the valve is turned to open position.

7. A container closure comprising a ported cap applicable to the mouth of a container, a valve rotatable thereon having one or more ports adapted to be brought into and out of registry with the ports in the cap, said valve having cylindrical surfaces on which the ports therein terminate, and retaining means on the cap for retaining the valve thereon carrying means disposed out of alignment with the ports in the cap engageable by said cylindrical surfaces serving to close the outer ends of the ports when the valve is turned to closed position and exposing the outer ends of the ports when the valve is turned to open position.

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