

June 16, 1942.

D. P. LOOMIS

2,286,916

TUBE CLOSURE

Filed Feb. 14, 1939

2 Sheets-Sheet 1

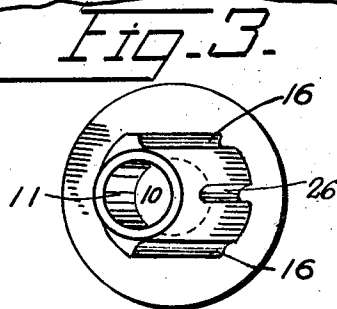
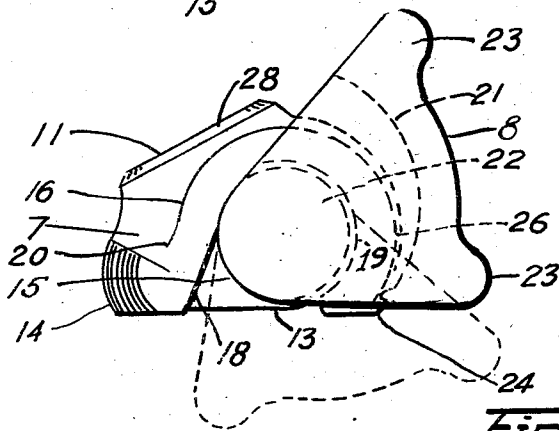
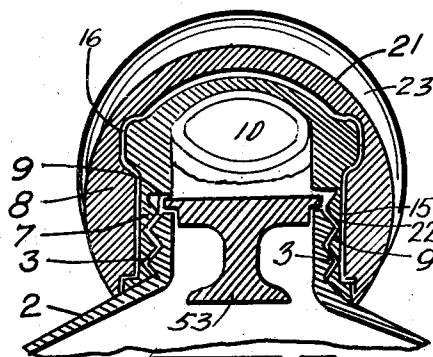
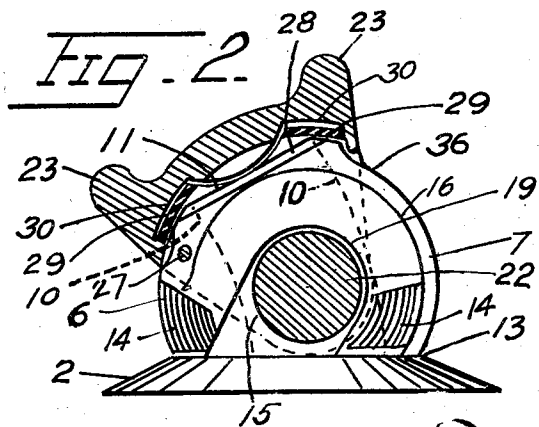


Fig. 4.

Fig. 6.

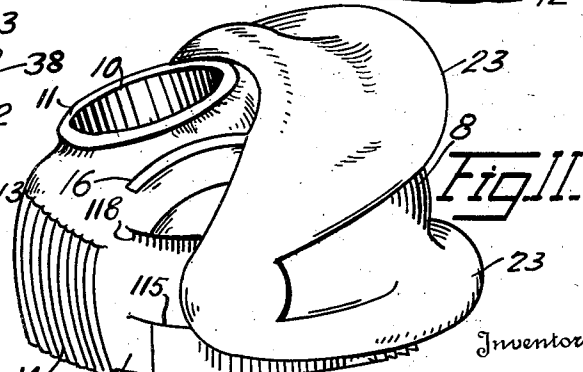
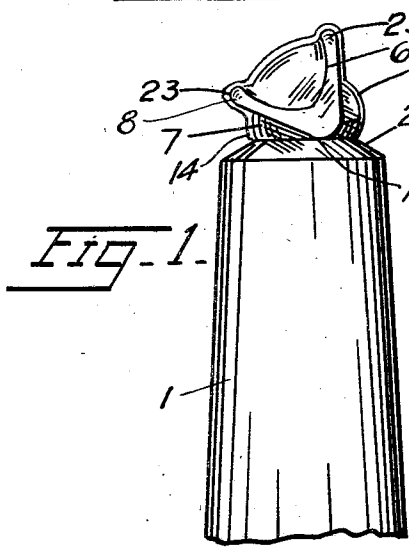
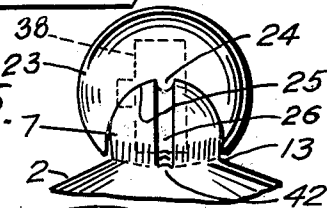


Fig. 1.

Fig. 11.

Inventor

DEMETRIOS PANAYIOTOU LOOMIS.

By Howard J. Whelan.

Attorney

June 16, 1942.

D. P. LOOMIS

2,286,916

TUBE CLOSURE

Filed Feb. 14, 1939

2 Sheets-Sheet 2

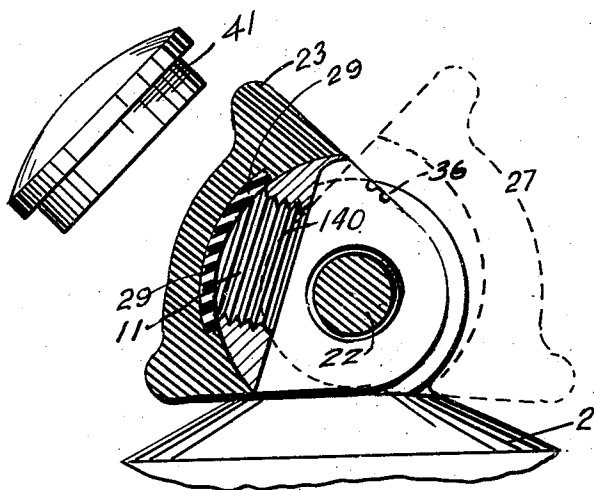


Fig. 9.

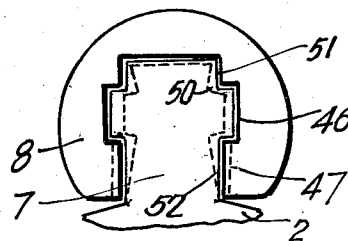


Fig. 10.

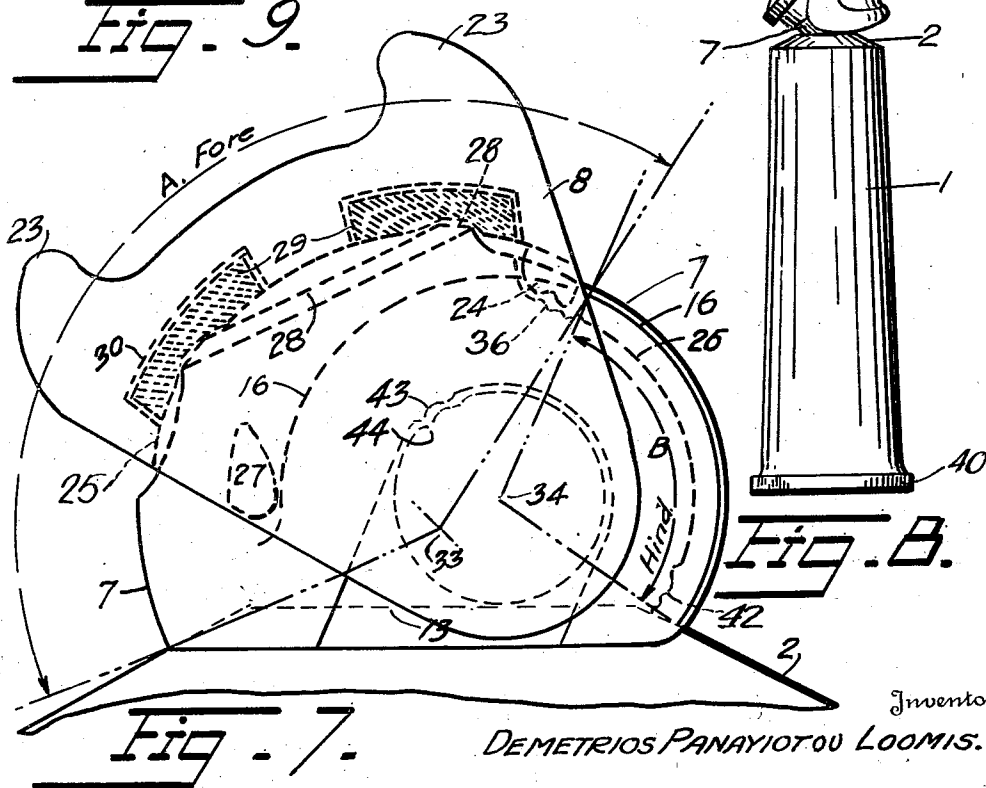


Fig. 7.

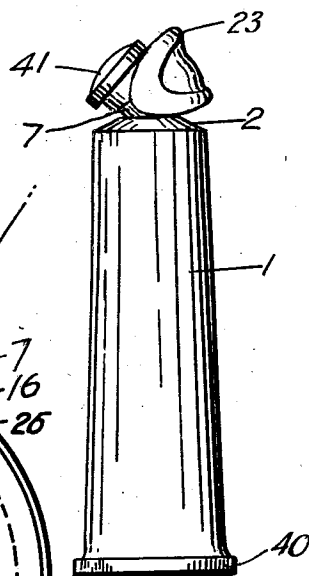


Fig. 8.

Inventor
DEMETRIOS PANAYIOTOU LOOMIS.

By *Howard J. Whelan.*

Attorney

UNITED STATES PATENT OFFICE

2,286,916

TUBE CLOSURE

Demetrios Panayiotou Loomis, Baltimore, Md.

Application February 14, 1939, Serial No. 256,274

3 Claims. (Cl. 221—60)

This invention refers to closures and more particularly to types and kinds usable for compressible or collapsible tube containers, such as are applicable for containing pastes, paints, mucilage, face creams, petrolatum, and substances of a similar nature. It has among its objects to provide a closure of this type that will open promptly and afford adequate orifice opening for the emission of the contents without an action tending to smear same unsuitably on the container; to have the closure available for quick opening; to have the closure adapted for secure and adjustable wedge-like sealing closing of the closure and such that it will not become loose from the container after it has been opened. Another object is to have the closure free from complicated mechanism and yet sufficiently unusual in its operation to make it interesting and attractive to the new user. A still further object is to have the closure so arranged that it may be provided with a temporary cap that will afford the additional protection and appearance considered desirable in such, from a commercial point of view. Another object is the feature of having the whole closure so arranged that it will afford a contour particularly desirable for covering and sealing with a self-tightening evaporative material and preventing unauthorized tampering. Other objects will become apparent as the invention is more fully described.

In the drawings which illustrate a form of this invention:

Figure 1 is a side view of a closure connected with a collapsible tube of conventional form, in closed position,

Figure 2 is a side elevation of the closure on an enlarged scale with its hood sectioned to show the underneath construction, in closed position,

Figure 3 is a sectional elevation along the orifice line of the shell with hood in closed position,

Figure 4 is a detail in open position of the form shown in Figure 1,

Figure 5 is a detail in plan with the closure open with the hood removed.

Figure 6 is a detail rear view of the orifice shell portion of the device mounted on a tube, with the hood on,

Figure 7 is a diagrammatic elevational view of the cap device arranged to indicate the general manner of structurally developing the parts to obtain the desired travel of its hood, in closed position,

Figure 8 is a modified form designed for inte-

gral connection to the container tube and with a cap for initial closure.

Figure 9 is an elevation of a modified form of the hood and shell with the hood sectioned to indicate the construction of the shell underneath,

Figure 10 is an end detail indicating the manner of assembling the hood into engagement with the shell during assembly of the cap device.

Figure 11 is a side detail view of Figure 10 with hood in open position.

Similar reference characters refer to similar parts throughout the drawings.

In the drawings, a tube 1 of conventional collapsible form, the bottom 40 being crimped and the top provided with a bevelled shoulder 2, having a screw-threaded neck 3, is shown. These tubes are usually made of lead suitably hardened and formed to provide a cylindrical type of neck as indicated. In the form shown in Figures 1 to 7 inclusive, a closure device 5, consisting of two elements, 7 and 8 respectively, is attached to the neck 3. The element 7 is termed the orifice shell, and element 8, the hood. The orifice shell is internally screw threaded at 9 to fit closely on the neck of the tube container. It has an internal passage 10 leading from the orifice 11 in the neck of the shell to the top of the tube 1. The shell 7 is formed on a semi-spherical segmental body construction with the orifice 11 circumferentially disposed at an angle of about 30° with the chord bottom line 13 of the element. The body is provided with knurling 14 around the portion adjacent to the base chord line 13. A recessed groove 15 is provided on both sides of the body and has its sides 18 opening on the bottom line 13, running angularly in a direction different from that of the angle of the center line of the orifice and joining in a semi-circular apex line 19 to form the termination of the groove as indicated. In Figure 11 recessed grooves 115 are provided on the sides of the body having its sides 118 opening at the side of the shell 7, running in a direction different from that of the angle of the center line of the orifice and joining in a semi-circular apex line 19 to form the termination of the groove as indicated. A pair of runways 16 are embossed on the side of the orifice element 7 on a curve concentric with the circular line 19. The front bottom terminations 20 of the runways are preferably bent for the purpose to be explained later in these specifications. The hood element is preferably of the form of an arched shape hollowed out at 21 to straddle the orifice element 7 and with abbreviated cylindrical hubs 22 adapted to fit with-

in the grooves 15. Horns or protruding ribs 23 are provided along the face edges of the hood as indicated and rounded to form a convenient edge for manipulating the element 8. A ridge 24 is arranged on the internal surface 25 of the hood and runs in a peripheral groove 26 in the external surface 27 of the shell 7, and serves to guide the two elements in aligned travel on each other. This ridge is a small boss and is preferably raised on the rear portion of the internal surface 25 to keep in contact with the peripheral groove 26 during the whole length of its travel or stroke. The walls of the hood, internally, have cam blocks 27 adapted to coact with the runways 16 and guide the hood through its predetermined travel; as well as guide the closure face of the hood to and from the orifice 11, in the manner to be described. When the hood is brought forward over the orifice, its internal surface travels on a semi-parabolic curve to make close contact over the orifice and close it, both being designed and laid out to produce this effect. To effect a better seal or closure, the orifice portion is surrounded with a bevel edge 28 and the internal surface of the hood with a gasket 29, set in a circular slot 30 in the hood as shown. When in closed position, the hood with its resilient gasket 29 makes the closing tight and complete.

When the hood is brought to open position, the semi-parabolic travel stroke of the hood over the circular or spherical body of the shell 7, makes the front portion of the internal surface of the hood lift with an "up-and-away" movement from the orifice, and the external contour of the element 7, this is produced through the influence and operation of the cam blocks 27 on the runways 16. The back internal portion of the hood keeps close to the body of the orifice element. This is provided for by having the hubs 22 centered on a different point 34 to that of the paraboloid form center line 33 shown in Figure 7. The arrangement of the two elements with their construction and their dual centering 34 and 33 enables the hood to take on an eccentric travel stroke with respect to the orifice and make it approach closely on closure and away from the orifice at open position. The front limit of travel is reached and controlled by the friction and wedging action of the hood gasket surface against the shell surface. The rear limit of travel is reached when the hood hits the tube, or is stopped by the corrugations 42 at the end of the groove 26. These corrugations coact with the ridge 24 to lock same.

The matter of assembling the elements together is performed by holding the orifice shell 7 and inserting the hubs of the hood underneath, through the open end 13 of the groove 15 and raising to a position, where the hubs reach the line 19. The hood is then rotated upwardly along the rear periphery of element 7 far enough to permit the latter to be screwed onto the neck 3 of the tube. The eccentric construction and plural centering enable the hood's internal surface to contact the surface of the shell about its orifice with a wedge-like tightening action, at closing. It will open widely in a quick manner when reversed.

In the case of the modifications indicated in Figures 8 and 9, the orifice itself is in the general angular location shown in the previous figures, but the orifice portion is extended with a screwthreaded projection 149 adapted to receive a conventional cap 41. The cap when in position

keeps the hood back out of the way, but the latter, after the cap is discarded, will rotate and close the orifice in the same manner as heretofore explained for the primary construction mentioned, and its gaskets, etc., provide a resilient and tight bearing for same.

The body of shell 7 is slightly modified to provide for integral attachment of the tube to it, but in general follows the same principles. Corrugations 43 and 44 are respectively provided on the groove surface 13 and hub 22 to assist in gripping both together in closed position.

In the general construction the ridge 24 on the internal surface of the hood, runs in the corresponding corrugations 35 on the surface of the orifice element. The movement of these parts in registry with each other enables the hood to lock in several positions, and restrict the opening of the orifice predeterminedly to suit. In the form, shown in Figure 6, attachment of the closure device is made integral with the tube, instead of being screwed on, as in the primary construction. Another valuable arrangement is afforded by the manner of sealing the hood to prevent its movement and indicate positively should the device be tampered with and at the same time seal in the parts controlling the outflow of the contents. This is afforded by the use of a paper or self-drying and conforming seal 38, of cellulosic basis, which, when applied, will dehydrate and shrink to close tightly and closely about all the contours of the parts within the seal, forming a strong and substantial lock and reinforcement. This keeps the parts in position, during the time it is sealed and affords physical protection against injury. These containers do not anticipate the use of such a seal in conventional practice.

The operation of the contrivance appears obvious from the previous description, since it only requires the movement of the hood to open the orifice, and a reverse movement to close it tightly. The parts are self binding on themselves and thereby avoid the use of pins, keys, screws, or similar parts liable to loss or injury, that might interfere with the working of the device in the proper manner. The elements are of a simple character, even though effective and have nothing to prevent their being constructed on a production basis at an economical cost.

In the modified construction of Figure 11, the assembly is arranged by using an internal method of forcing the hubs outwardly into the grooves provided in the hood, which method enables the pressure to be exerted inside, and thereby force the parts out into the hoods as indicated. Grooves 46, are used in the hood to guide the hubs into place when the parts are inserted. The supplementary grooves 47 permit the hubs to reach the grooves 46.

The form indicated in Figure 10 shows the manner of forming the hubs on the shell, instead of the hood. The original shape of the shell is outlined in dotted lines 50 and when pressed out, forms into the light line form 51 which fits properly into the recesses 52 and other parts of the internal construction. This method enables the hood to hook on very securely.

In Figure 3, the element 53 is a stopper and positioned in the neck of the tube. Its form is preferably as indicated, the upper portion being of relatively large diameter and flanged to rest on the orifice edge of the tube, and to press adjacent to the walls of the orifice. A neck is attached to this upper portion, extends down into

the tube neck, and has a widened base smaller than the upper portion just mentioned. This stopper is held in place by the shell and serves to prevent the material inside the tube from flowing out, even when the hood is opened up. The shell has to be unscrewed to remove this stopper, in order that the contents may be poured out. It has a very unique function and is preferably of any resilient material, since its upper rim serves as a gasket between the shell and tube.

A feature of the operation of the hood, that should be noted, is that the hemispherical segmental construction of the shell and the contour of the bifurcated hood are so adapted to each other, that the internal rearward edge of the latter keeps adjacent and close to the shell in all positions of its travel. This alleviates the stresses on the hubs and affords more supporting surface for the hood, and cooperates actively with the runways and guides provided on these two elements.

While but one general form of the invention is indicated in the drawings, it is not desired to limit this invention to such construction, other than limited by the prior art, as it is appreciated that other forms may be made that would employ the same principles and come within the scope of the appended claims.

Having thus described the invention, what is claimed is:

1. In combination with a container, a closure unit comprising a shell body having an exterior contour created on curves described from plural centers and combined together, with runways, and groove means provided thereon, said shell having a passage therethrough for the egress of contents of the container, an orifice member projecting from the contour of the shell body and connected with said passage, a hood member with its contacting closing portion having a circular slot thereon to accommodate a gasket stuck therein, and having an arcuate travel over the exterior contour aforesaid and adapted to approach in one direction against the same for closing the said orifice member, and away from the same on an eccentric arc when moved in the opposite or opening direction, said hood having circular hubs, formed thereon adapted to coact with the said runways and groove means for guiding the hood in its travel over the shell body and for providing plural point support therefor, and serrations on the hood and shell body for providing means for adjustably locking same together in plural positions.

2. In combination with a container, a closure unit comprising a shell body attached to the

container and having its peripheral portion provided with an external curved contour with the curves generated on plural centers combined together along an outline approximately semi-circular broken by a projecting orifice surrounding the outlet end of the passage in the body for the egress of the contents from the container, the side walls of the body being arranged with grooves circularly curved, spaced away from the orifice and located adjacent to the container, said body having runways and a peripheral groove recess from the orifice to the juncture of body and container, a hood having a U-like form with its contacting closing portion having a circular slot thereon to accommodate a gasket stuck therein, and adapted to straddle the body with hubs thereon adapted to fit into said grooves and rotatably swing thereon and over the said shell's body with a portion adapted for covering the orifice, the center of rotation of the hubs being spaced away from the centers of the hood's body to permit the hood to tightly close its cover portion against the orifice member and curved contour, and a plurality of protruding ribs connected with the hood for the manual handling of same.

3. In combination with a container of the class described, a closure unit comprising, a hollow shell member having a semi-spherical form and provided with a central groove arranged on the rear portion with a pair of side grooves disposed oppositely to each other on either side of the said central groove, said shell having a pair of runways formed thereon and circumscribing the side grooves, an orifice in the shell member for emission of the contents of the container, a U-formed hood member having circular hubs adapted to slide and fit into the side grooves and with arm portions supporting same and straddling the shell, said hood having a ridge formed on the portion between the arms adapted to fit and ride in the central groove to be guided thereby and with cam blocks for engagement in the runways, said runways being curved on a contour with its axis center coincident with that of the side grooves and hubs operatively disposed therein, whereby the travel of the hood over the shell can place its closing portion into contact with the orifice in its front position and spaced away from the peripheral portion of the shell when at its rear or open position, protruding ribs peripherally and radially arranged on the hood for contacting the container at the ends of its travel and for enabling the same to be manipulated by one or more fingers of the user.

DEMETRIOS PANAYIOTOU LOOMIS.