

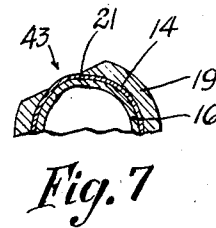
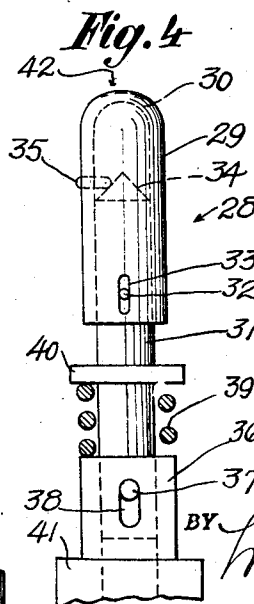
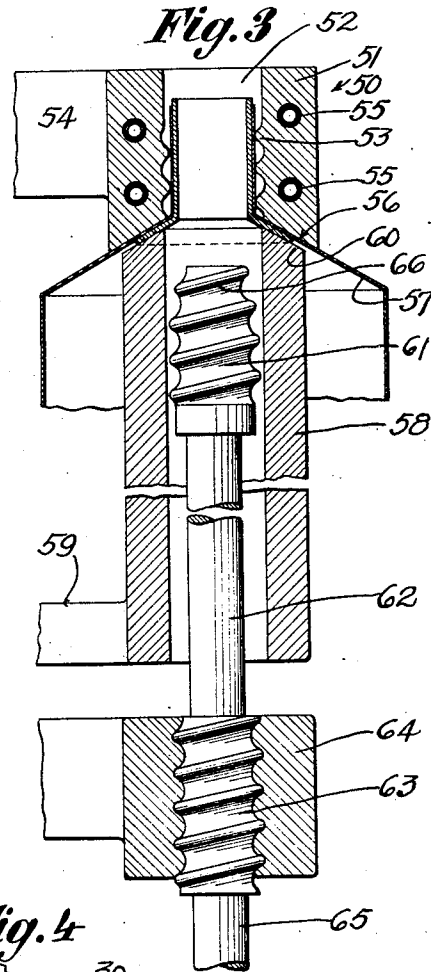
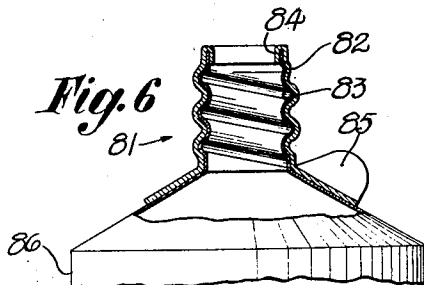
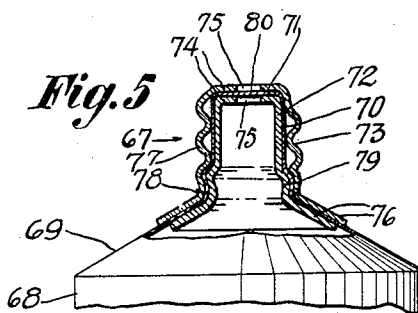
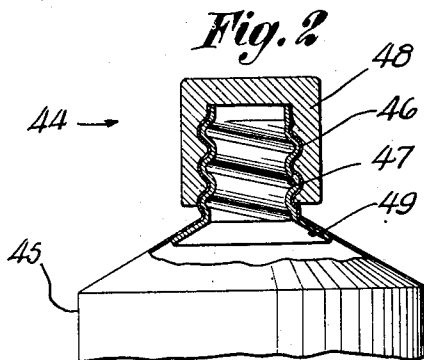
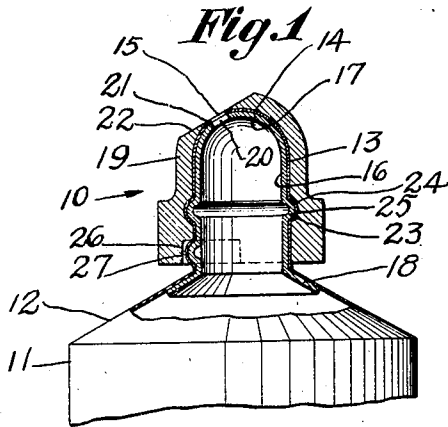
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CLOSURE

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CLOSURE

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7 Claims. (Cl. 221—60)

This invention relates to closures.

One object of this invention is to provide an improved closure means, especially applicable to containers made of a thin pliable material such as a metallic or non metallic material, particularly the latter.

One possible application of the invention is in connection with collapsible containers or tubes made of celluloid, cellophane, or the like, which possesses the advantage that the contents are visible. Such containers may be made of thin sheet material, which, while having ample tensile strength, possesses very little body or stiffness. The problem in containers of this type is to provide a reliable and easily controlled closure which can be repeatedly opened and closed and which will retain the tube contents without leakage or loss of moisture. One manner of effecting the desired results, is to utilize a substantially conventional type of closure and provide an improved manner of inexpensively reliably connecting the same to the celluloid tube. It is therefore an object of the invention to provide an improved device of the type mentioned and an improved method and apparatus for making the same.

Another object of the invention is the provision of a device of the nature set forth having relatively few and simple parts, and which may be of unitary construction, durable, neat, reliable, and efficient to a high degree in use.

Other objects and advantages of the invention will become apparent as the specification proceeds.

With the aforesaid objects in view, the invention consists in the novel combinations and arrangements of parts hereinafter described in their preferred embodiments, pointed out in the subjoined claims, and illustrated on the annexed drawing, wherein like parts are designated by the same reference characters throughout the several views.

In the drawing:

Figure 1 is a fragmentary view in elevation with parts in section showing a device embodying the invention.

Fig. 2 is a similar view showing a modification of the invention.

Fig. 3 is a fragmentary vertical sectional view showing an apparatus and method for making the device of Fig. 2.

Fig. 4 is a fragmentary view showing an apparatus and method for making the device of Fig. 1.

Fig. 5 is a fragmentary view in elevation with parts in section showing a modification of the closure means.

Fig. 6 is a similar view showing a further modification of the same.

Fig. 7 is a fragmentary vertical sectional view of the device shown in Fig. 1 in closed position.

The terms celluloid and cellophane are used herein as the full equivalents of each other, and

are also intended to cover other synthetic resinous compositions.

The advantages of the invention as here outlined are best realized when all of its features and instrumentalities are combined in one and the same structure, but, useful devices may be produced embodying less than the whole.

It will be obvious to those skilled in the art to which this invention appertains, that the same may be incorporated in several different constructions. The accompanying drawing, therefore, is submitted merely as showing the preferred exemplification of the invention.

Generally described, this invention relates to the provision of closure means for collapsible tubes and has general application to any connections for tubular members having pliable walls. The tubular members may consist of a soft thin metal, or of fibrous material, or of compositions in the nature of celluloid, cellophane and the like. I have found that celluloid possesses a high degree of tensile strength, and is easily worked. Accordingly I associate with said material a member or members of rigid or less pliable metal, or composition material and form a uniform strong engagement therebetween. The engagement may be along an angular or curved surface to afford an interlock. For example, a means such as a closure device may be used having interrelatively movable inner and outer members, between which a portion of the tubular member or container is fixed and reliably interlocked as by a spinning, forcing, or resilient snap action. Then again, a soft metal sleeve, having more stiffness than the celluloid may have threaded engagement therewith so that a conventional removable threaded cap or plug may be employed. Such threaded engagement may be provided by simultaneously forcing a thread in the celluloid member and in a soft metal sleeve, to thereby provide an interlock. Heat may at the same time be applied to increase pliability of the celluloid, and when the celluloid contracts on cooling, it may snugly grip the sleeve if the latter be internally placed.

Referring in detail to the drawing, 10 denotes a device embodying the invention. The same may include a tubular member such as a collapsible container 11 made of a soft metal such as lead, or of a fibrous or composition material, preferably such as celluloid, or other transparent material. The lower end of the container may be closed in any suitable manner and need not be shown. The upper end of the container may be variously formed, as by terminating in a conical portion 12 which may have a neck 13. The latter may have the end 14 of such shape, preferably hemispherical, as to afford a suitable seating surface. Coacting with the neck, one or more members may be provided adapted to afford a suitable degree of support thereto, and preferably to co-operate in

closure relation therewith, as at an opening 15 that may be formed in the neck. One of the members 16 may be in the nature of a sleeve of a soft metal seated in the neck 13. This sleeve may have

5 a curved upper portion 17 cooperating in snug engagement with the portion 14 of the neck. At its lower end the sleeve may have a skirt portion 18 extending under and reinforcing the conical portion 12. Disposed on the outside of the neck

10 13, a movable closure member or cap 19 may snugly uniformly embrace the same. The member 19 may be of a rigid construction, and may be made by casting, stamping or molding the same of metal or synthetic resinous materials. Mem-

15 bers 16 and 19 may have openings 20, 21 of which the former may be in permanent register with opening 15 of the neck, while opening 21 may be movable into and out of register with opening 15. The member 19 may also have a bevel or cut off at

20 22 to afford a thin edge for its opening 21.

A simple interlock between members 16 and 19 with the neck 13 may be provided, especially if the member 19 be rotatable for opening and closing. For instance, the inner member 16 may have

25 a projection or an annular ridge 23 outwardly pressed therein, and the outer member 19 may have a groove 24 adapted to mate with said ridge. The intermediate portion of the neck 13 is correspondingly pressed or deformed at 25 as shown.

30 The precise mode of cooperation of the elements 13, 16 and 19 will be more readily perceived on contemplating the mode of manufacture of the device as hereinafter described.

If a stop engagement be desired to limit the

35 degree of rotation of the closure member 19, the latter may have an elongated recess 26, into which may extend a projection or stop 27.

For making the device 10, an apparatus 28 or the equivalent within the broad principles of the

40 invention, may be employed. Thus the apparatus may include a tool head 29 having a curved, or otherwise shaped spinning end 30. This head may be hollow for receiving a spindle 31 which may be connected thereto by a pin and slot connection 32,

45 33. The inner end of the spindle may have a wedge shaped or conical end 34 that may bear against a pin 35 slidably mounted in an opening in the head 29. The spindle 31 may be rotated and axially moved by a suitable head 36 which may

50 be rotated in any desired manner. For movably interconnecting the head 36 with the spindle the latter may have a pin 37 engaged in a slot 38 of the head. If it be desired to exert a resilient axial force on the spindle, an expansion coil spring 39

55 may be provided acting between the head 36 and a shoulder 40 on the spindle.

The manner of operation of the device 28 will now be described. The tool head 29 being

60 inserted into a device to be worked, rotation of the head 36 is begun and simultaneously an axial force is exerted thereon. Such combined rotary and axial movement may be caused by any suitable device 41. As a result the spindle 31 rotates

65 and moves axially relative to head 36 and the spring 39 is tensioned, exerting a resilient axial force on the tool head 29 by reason of the pressure of the conical portion 34 against pin 35, the latter being confined against the wall of the

70 article being worked, to form a groove therein as shown in the device 10 while the curved end 30 performs a spinning operation for a wall of the article. It will be appreciated that various parts of the apparatus 29 may be omitted, and others

75 substituted therefor. Thus the pin 35 may be

eliminated and the spring 39 may act directly on the tool head.

The manner of making the device 10 will now be briefly described. The sleeve 16 is placed in the neck 13, and the cap 19 is superimposed upon the neck. Then the tube 11 being open at its

80 lower end, the tool 29 is inserted into the sleeve, while the cap 19 is securely gripped and held stationary in any suitable manner. Then the axial force is applied to the rotary tool head 29,

85 causing the same to spin and expand the sleeve into snug engagement with the neck 13, while the end portion 30 causes a uniform seating engagement to be spun between the ends 14 and 17

90 of the neck and sleeve and so that a uniform closure is afforded between the corresponding end portions of the cap, tube and sleeve about the openings at 15, 20 and 21. Simultaneously, the ridge 23 is outwardly pressed to form a permanent interconnection between the several parts

95 of the closure. If increased pliability or plasticity be desired for the portion 25 of the neck, heat may be applied thereto in any suitable manner, or the tool may frictionally generate sufficient heat. The projection 27 may be sub-

100 sequently formed in any suitable manner.

Due to the resilient or yielding pressure of the apparatus 28, the pressure on the end of the closure at 17 is controlled so that possible distortion of the celluloid neck is avoided.

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If it be desired that a maximum pressure be exerted on that spherical zone of the closure determined by the opening 20, the tool head may be shaped correspondingly, as by using a slightly

110 flattened curved end portion 30, the flattened part being at the extreme end at 42. This will also cause a part of the neck and sleeve member to be bulged slightly outward at 43 into opening

115 21, if the latter is out of register with the openings 15, 20 in the spun position, and with the bulge aligned with said opening 21. Such slight bulge will in operation snap into the opening 21, but the closure or bulge part will yield slightly to

120 move out of opening 21 when the closure is opened and moved so that openings 15, 20, 21 are in register. The bulge will thus assure that the opening can be closed in an absolutely liquid tight manner. The openings 15, 20, 21 may, however, be formed, as by drilling, subsequently to the spinning operation.

125

It will be noted that the celluloid neck 13 may constitute a sealing liner between the parts 16 and 19 of the closure.

In Fig. 2 is shown a modification of the invention including a device 44. The same may

130 embody various principles hereinbefore described, and may include a celluloid tube or container 45 that may have a neck 46 and an internal soft metal sleeve 47 therein, arranged to have a thread for engagement with a closure member

135 such as a cap 48. The members 46, 47, 48 may be made of any of the materials hereinbefore mentioned. The sleeve and neck may have an opening or be open ended, and the sleeve may have a bottom re-enforcement flange 49. The

140 thread may be of any desired pitch or character, but, preferably the teeth thereof are rounded as shown. A snug and reliable interengagement is provided between the neck and sleeve by the thread, the sleeve affording a stiffener for the

145 celluloid neck. Upon the tubular or neck structure thus provided, the cap may be screwed and unscrewed as desired, the thread of the cap directly engaging the celluloid. It will be appreciated that this device involves generally the

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interlocking thread between a collapsible and a re-enforcing wall regardless which is interiorly disposed.

An apparatus for making the device 44 is shown at 50. The same includes a plurality of external and internal thread forming members, either of which may be movable with respect to the other, for rolling or pressing out the thread. For example, a female die member 51 may have an opening 52 provided with an internal thread 53. This die may be suitably fixedly mounted at 54, and may have associated heating means such as electrical heating coils 55. At its lower end, the die may be provided with a seat 56 that may be of conoidal or other form to afford a rest for the adjacent part 57 of the tube 45. Alined with the die 51, is a clamping member such as a sleeve 58, that may be movably carried by an arm 59. The sleeve 57 may have a seat 60 corresponding to that at 56 so as to clamp with the latter the flange 49 and tube portion 57 therebetween. The seat 60 may be of irregular or rough character to securely grip the flange 49 and prevent the sleeve 47 from accidentally turning. A similar holding arrangement may be used in Fig. 4 together with a device for holding the closure cap. Extending through the clamping sleeve 58 is a male die or tap 61 carried by a shaft 62 having a feed part 63 threaded with a pitch equal to that of the tap. This feed part 63 is threaded through a fixed member 64, and rotation may be imparted to the shaft 62 as at 65 to cause the tap to cooperate with the female die.

In operation, with the tube and sleeve 47 clamped as shown, the tap enters and creates a thread in the walls of the neck 46 and sleeve 47 by pressure, while heat is simultaneously applied to the neck. The end portion 66 of the tap may be slightly tapered to facilitate the start of the thread. A single operation is sufficient to complete the thread and interlock the parts of the neck of the closure. Due to the high expansibility of celluloid, when the device is cooled, the celluloid neck contracts tightly about the sleeve 47 and affords a positive reliable engagement which cannot be separated.

In Fig. 5 is shown another modification of the invention, including a closure means 67 having a tube 68 of celluloid or other pliable material, said tube having a conical shoulder 69 and a neck 70. Coacting with the neck is a means for releasable engagement with a closure, and, if desired, an associated means may be employed for supporting a portion of the neck and facilitating the formation of a puncture therein. Thus the neck may have an initially imperforate end wall 71. The supporting means therefor may include inner and outer tubular members 72, 73 respectively, which may snugly embrace the neck therebetween, and may have end walls 74 formed with registering openings 75. Said members may also have depending skirt portions 76 for reenforcing therebetween a part of the conical shoulder 69. The outer member 73 may have a threaded portion 77 for engagement with a screw cap, while the inner member may be engaged in the neck in any suitable manner as by a press fit, or with adhesive or the like, it being understood that members 72, 73, or either of them, may be made of any desired material whatever. A simple form of connection, is to provide an annular recess 78 in the outer member and a corresponding ridge 79 on the inner member so as to adapt the latter to be sprung or snapped into position, the neck

yielding sufficiently under the effect of heat, or pressure or other conditions. If the container is to be opened, the part 80 of the neck is punctured, after which the device may be opened and closed in the usual manner.

In Fig. 6 is shown a modification of the invention including a closure means 81, which may differ from those previously described in that the reenforcement 82 for the neck 83 may be sleeved externally thereon and formed with a common thread therewith, the edge portion of the tubular member 82 having connection with the neck as by an inturned clamping flange 84. The member 82 may also have a finger piece 85 whereby a grip may be maintained so that a closure cap may be operated without strain on the collapsible container 86. A similar finger piece may be provided in Fig. 5.

It will be appreciated that various changes and modifications may be made in the device as shown in the drawing, and that the same is submitted in an illustrative and not in a limiting sense, the scope of the invention being defined in the following claims.

I claim:

1. A device including a tubular substantially cylindrical element of pliable material, a stiffener sleeve fitted within a portion of the tubular element, the latter and the stiffened sleeve having peripherally disposed interengaging formations, and a member movably seated on the stiffened portion of the tubular element.

2. A collapsible tube having a neck of thin collapsible sheet material, a hollow stiffening member in the neck, and a movable closure on said neck, said neck constituting a liner between the stiffening member and the closure.

3. A device including a tubular element of thin pliable sheet material, a stiffener sleeve fitted within a portion of the element, and a member externally movably mounted upon the stiffened portion of said element, said sleeve and member having openings controlled by interrelative movement therebetween, said sleeve, member and stiffened portion of the tubular element having deformed interengaging portions for controlling relative movement therebetween.

4. A device including interrelatively movable hollow members fitted one within the other and having openings controlled by said interrelative movement, a liner of thin sheet material between said members and secured to one of them, and one of the members having a slight yielding bulge portion adapted to register with the opening in the other member in the closed position of the device.

5. A device including a tubular element of thin pliable collapsible sheet material, and a tubular stiffener member, the element and member being snugly fixedly fitted together side by side and having a common thread formed in both of them.

6. A collapsible container having a neck and a tubular element expansively fitted therein and having a common thread whereby the neck and element are interconnected together and a closure can be threadedly connected with the neck.

7. A collapsible container consisting of cellulose material and having a neck, and a soft metal tubular member fitted within the neck and threadedly connected therewith for interlocking the member and neck, and a closure member removably engaged with said thread.

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