

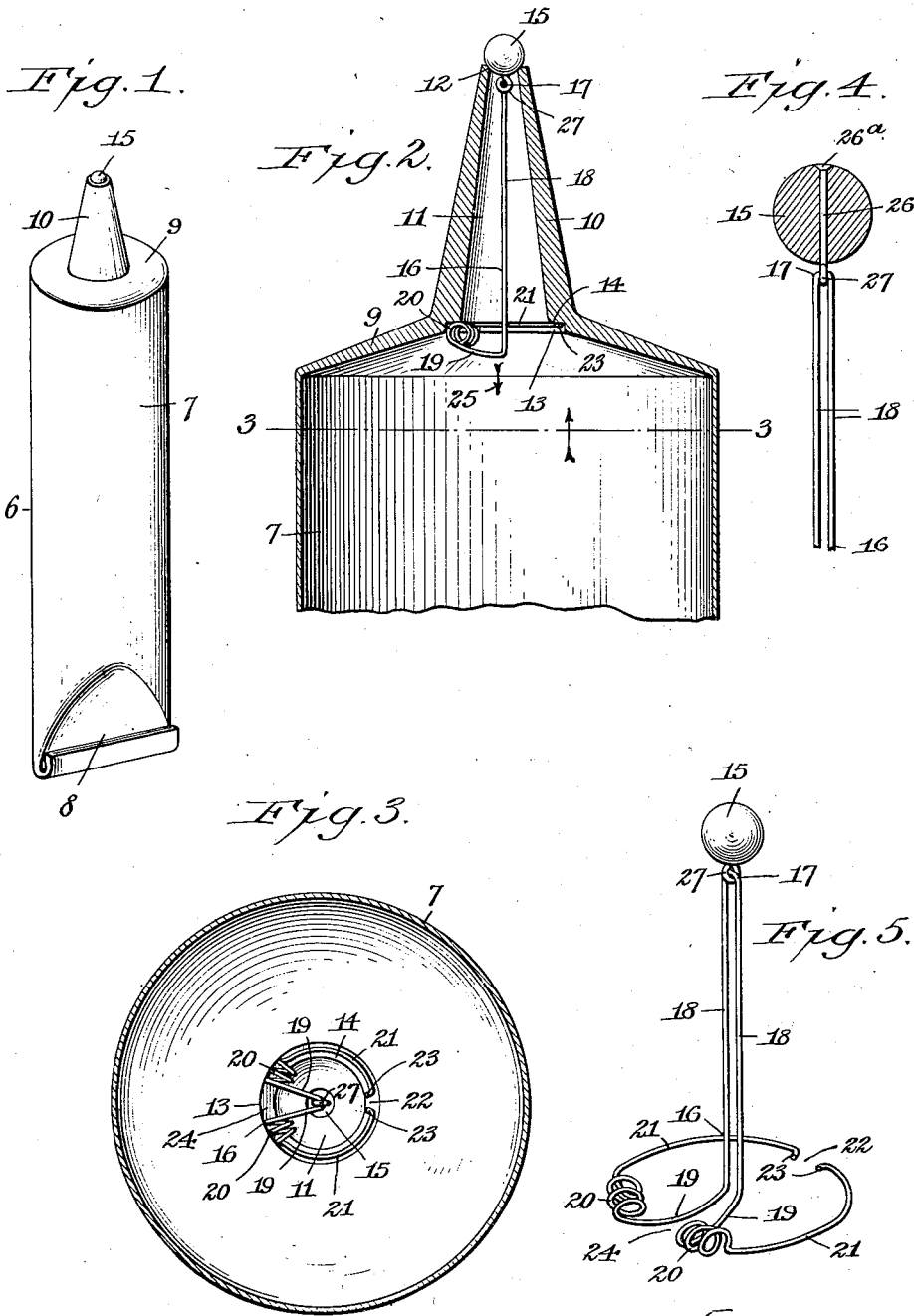
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CLOSURE FOR CONTAINERS

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CLOSURE FOR CONTAINERS

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6 Claims. (Cl. 221-60)

This invention relates to improvements in closures for containers, and more particularly for self-sealing closures applied to collapsible tubes of the kind containing creams of various kinds, tooth pastes, artists' paints, and various other fluent commodities.

The primary object of my invention is to provide a collapsible or compressible container, such as a tube, with an improved self-closing or self-sealing closure actuated under spring force to seat the closure under quick action at all points in the circumference of its contact or sealing area.

Another object of my invention is to provide a closure in association with a passage leading from the body-portion of the container, which will assure unrestricted and equal pressure of the contents of the container against the closure in the act of forcing the contents, or a portion thereof, out of the container.

Another object of my invention is to provide a closure associated with an endless closure-seat having an exceedingly narrow contact-region so as to guard against the permanent sealing of the closure in the event that the nature of the contents is such as to form a binding film capable of hardening at the region of contact of the closure with its seat.

A further object of this invention is to provide a closure of spherical formation which is spring-closed and which is seated against a circular closure-seat formed on the container, or more particularly the neck of the container, and which seat is comparatively narrow so that pressure from within the container, introduced by collapsing of the tube, will be sufficient to force the closure from its seat, even though a binding-film formed between the closure and seat is hardened to the extreme.

A still further object of my invention is to provide spring force through the medium of a new and forceful balanced spring, whereby assurance is had that the closure will be drawn into closing position with equal pressure at all points of its circular contact area; and also to provide a spring of such character which will have free yielding extremities in contact with a bearing or seat disposed at a right angle to the direction of movement of the closure.

With the above and other objects in view to appear hereinafter, my invention consists in the novel features of construction and in the arrangement and combination of parts to be hereinafter described and more particularly pointed out in the subjoined claims.

In the drawing,

Fig. 1 is a perspective view of a collapsible tube or container of the conventional type, equipped with my improved invention.

Fig. 2 is an enlarged longitudinal section taken through the upper end of a collapsible tube of the kind shown in Fig. 1.

Fig. 3 is a cross section taken on line 3-3, Fig. 2, looking in the direction of the arrow crossing said line.

Fig. 4 is a central section through the preferred form of closure and the adjacent portion of the spring whereby the closure is drawn into sealing position.

Fig. 5 is a detached perspective view of the closure and the spring associated therewith which, when properly positioned in the collapsible tube or container, serves to self-seal the closure and permit the latter to open under pressure applied by the contents of the tube or container when collapsing the wall of the latter.

Reference now being had to the drawing in detail, the numeral 6 designates the container which comprises a cylindrical body portion 7 collapsed and closed in the usual manner at its lower end, as at 8, and provided with the usual upwardly-inclined shoulder-wall 9, from which extends the neck 10, which in this instance is upwardly tapered externally, and also internally to provide a gradually restricted exit passage 11.

The upper edge of the wall of the neck is slightly concaved, as at 12, to form a closure-seat, and this concaved portion is therefore circular and connects the upper edge surface of the wall of the neck with the circular wall of the exit passage 11.

It is essential to the perfect operation of my invention that a spring-seat be provided which is disposed at a right-angle to the axis of the exit-passage 11, and for this purpose I have enlarged the lower end of the exit-passage, as at 13, to form a downwardly-facing shoulder 14, which serves as the spring-seat referred to. The upper end of the exit-passage 11 is closed by a spherical closure 15 which is firmly seated against the concaved closure-seat 12, said closure being maintained in sealing relation to said closure-seat by means of a pull or draw spring 16.

The spring 16 is constructed of a single sheet of wire bent between its ends, as at 17, to form two substantially parallel pull-strands 18. The wire is directed radially from the lower ends of these strands, as at 19, and coiled at the outer ends of said radial portions, which may be referred to as radial arms, as at 20, and these arms

are preferably curved upwardly from their inner ends, as best shown in Fig. 2.

From the coils 20, the strands are directed in an arcuate manner in opposite directions to form curved bearing-arms 21, said bearing arms having their terminals normally spaced apart, as at 22, and directed inwardly, as at 23. The arcuate bearing arms 21 and the coils 20 form a substantially circular bearing-member, separated at 22, and at 24 between the outer ends of the radial arms 19, or in other words between the two coils. This bearing-member therefore comprises two separated semi-circular portions spaced apart and seated against the shoulder or inwardly-facing bearing seat 14, as best shown in Fig. 2. The coils 20 tend to move the radial arms downwardly, as indicated by the arrow 25 in Fig. 2, with the result that the pull-strands 18 are drawn downwardly, and by reason of their connection with the closure 15, assure a thorough sealing of the container.

The closure preferably has a wire 26 passed therethrough which is headed at one end, as at 26^a, and formed into an eye 27 at its other end, the eye extending from the closure and having the pull or draw spring passed therethrough. More particularly defined, the bent portion 17 of the wire forming said spring is positioned within the eye 27 so that a flexible connection is provided between the closure and the spring.

The tension of the spring may be governed by the gauge of the wire employed to form the same, or both by the gauge of the wire employed and the number and/or size of convolutions in the coils 20; it being of course understood that the tension of the spring is always in accordance with the fluidity of the contents of the container. It will therefore be apparent that a liquid or other more or less free flowing substance will be effectively controlled by a spring having less tension or power than a spring used in a container filled with a heavy substance.

By reason of the bearing-seat for the bearing-member of the spring being disposed at a right angle to the axis of the exit-passage 11, and particularly at a right angle to the movement of the closure with respect to its seat, the two coils 20 of the spring exert their force equally on both pull-strands 18, and therefore assurance is had that the closure will be drawn downwardly with even contact at all points of its co-operating seat; and by reason of this seat being circular and comparatively narrow, a sealing region is provided between the spherical closure and the closure-seat which has a minimum area so as to guard against the lodgment of sufficient material on the seat and the closure to form a lock for the closure when such material, in film form, dries in contact with the closure and seat. It is of course understood that this does not occur with all substances that may be placed within containers equipped with this invention, yet, when using paints within such a container, the possibility of permanently sealing the closure is avoided, since any pressure exerted on the collapsible wall of the container will cause the contents, or at least a portion of the contents, to be moved against the closure under considerable pressure, with the result that paint, or any other substance possessing bonding qualities, would, when dried and forming a lock between the closure and seat, become loosened.

It is considered that the concaved closure seat need not exceed one thirty-second of an inch, and may even be less, and it has been found that for

some substances the spherical closure will properly seal the container even though the wall of the exit opening meets the outer edge of the neck at a right angle. I have, however, discovered by many experimentations, that a slight concaved seat for the closure will form a circular sealing region of sufficient width to properly seal all forms of substances without locking or bonding the closure to its seat when the container is not frequently in use, and that the pressure exerted from within by a mere collapsing of the wall of the container will be sufficient to open the closure.

It is to be noted that the enlarged lower end of the exit passage 11 is comparatively shallow and that it opens directly into the interior of the body portion of the tube or container. It may consequently be as readily considered a part of the chamber within the body portion as a part of the neck of the tube or container. From this shallow enlargement of the neck the interior of the neck is smooth and gradually tapers to the closure seat, so that the contents has a perfectly free escape under pressure applied by collapsing of the wall of the container.

When pressure is applied to the wall of the container to crowd the contents toward the exit opening at the closure, the closure is forced upwardly against the action of the pull or draw spring, with the result that each of the coils 20 is slightly coiled up or strained, thereby causing the inwardly-directed terminals 23 of the spring to approach each other and possibly the radial arms 19 to move into closer relation. It will therefore be seen that the spacing of the radial arms, as well as the spacing of the terminals of the spring, permit such movement of the spring parts to take place upon the straining of the curved radial arms 19 and/or the coils 20, and therefore under all conditions of use, a straight-lined pull on the closure takes place to assure a seal with equal pressure at all points in the sealing region thereof.

It is to be noted that the neck of the container is tapered upwardly or outwardly, and that the exit passage 11 therein is similarly tapered. This therefore results in a comparatively large inner receiving end for the material from the container which gradually becomes restricted in diameter to the exit or discharge end thereof, thus providing free flow for the contents through the exit passage and a means of discharging the contents in smaller quantities when desired. By this means a more effective control of the discharge is provided, particularly since the interior of the neck or wall of the exit passage is smooth from end to end.

Having thus described my invention, what I claim is:

1. A closure for collapsible containers for fluent material, comprising a member having an elongated passage equipped with an inwardly-facing bearing-seat, a closure for closing the outer end of said passage, and a spring connected to said closure and having a divided bearing-member comprising two parts relatively movable and arms extending from said bearing-member through said passage for connection with said closure.

2. A closure for collapsible containers for fluent material, comprising a member having an elongated passage equipped with an inwardly-facing bearing-seat at its inner end, a closure for closing the outer end of said passage, and a spring connected with said closure and having a divided bearing-member comprising two parts relatively movable and provided with coils and arms ex-

tending from said coils toward the longitudinal center of said passage, and pull elements extending from said arms to said closure and flexibly connected therewith.

- 5 3. A closure for collapsible containers for fluent material, comprising a member having an elongated passage equipped with an inwardly-facing bearing-seat at its inner end, a closure for closing the outer end of said passage, and a spring connected with said closure and having a bearing-member seated against said bearing-seat comprising two substantially semi-circular portions separated at opposite ends, each of said semi-circular bearing-portions including a spring coil at one end and arms extending from said coil toward the longitudinal center of said passage, and wire strands continued through said passage from the ends of said curved arms for connection with said closure.
- 10 4. A container having a body portion provided with a collapsible wall and a neck having a passage therethrough associated with the interior of said body portion to form a bearing seat, an outwardly-opening closure for closing the outer end of said passage, and means to retain said closure in closed position formed of a single piece of wire fashioned into spaced-apart curved elements serving as a bearing member seated against said bearing seat and each having a spring coil at one end thereof and connections from said spring coils to said closure.
- 15 5. A container having a body portion provided

with a collapsible wall and a neck having a passage therethrough associated with the interior of said body portion in a manner to form an inwardly-facing bearing seat, an outwardly-opening closure for closing the outer end of said passage and means to retain said closure in closed position formed of a single piece of wire bent between its ends for attachment to said closure and to form substantially parallel strands extending inwardly through said passage, radiating arms extending from the inner ends of said strands, and semi-circular bearing arms seated against said bearing seat, said wire being further fashioned to normally effect an inward pull upon said substantially parallel strands.

15 6. A container having a body portion provided with a collapsible wall and a neck having a passage therethrough associated with the interior of said body portion in a manner to form an inwardly-facing bearing seat, an outwardly-opening spherical closure for closing the outer end of said passage, an eye secured to said closure, and means to retain said closure in closed position formed of a single piece of wire passed through said eye and directed inwardly to form substantially parallel strands extending inwardly through said passage, radiating arms extending from the inner ends of said strands, oppositely-curved bearing arms seated against said bearing seat and spring coils connecting said oppositely-curved arms with said radiating arms.

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