Aug. 26, 1924. 1,506,413

H. S. DARLINGTON

LEAKPROOF TUBE SEAL

Filed Feb. 25, 1922

Fig. 1.

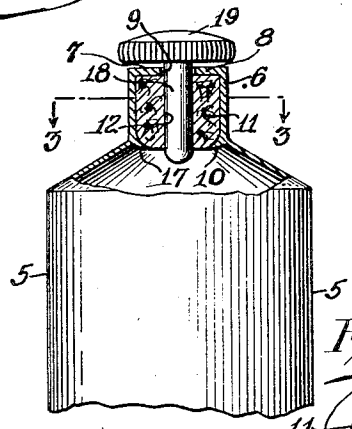


Fig. 2.

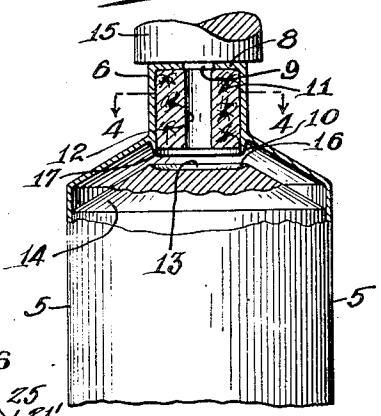


Fig. 9.

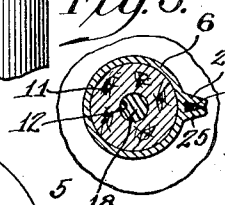


Fig. 3.

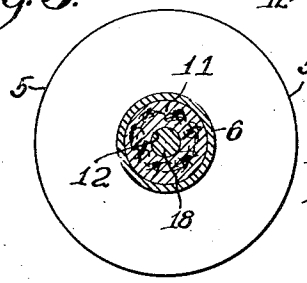


Fig. 4.

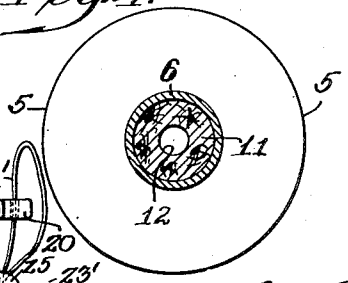


Fig. 10.

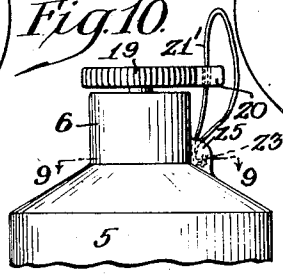


Fig. 5.

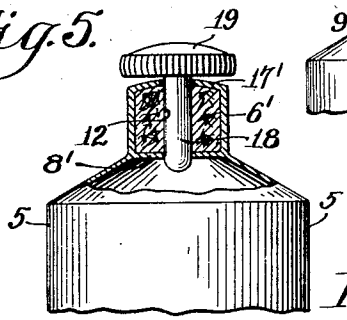


Fig. 6.

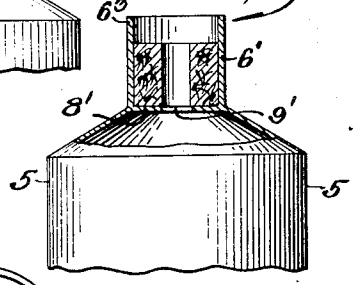


Fig. 7.

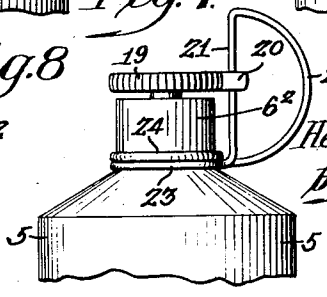
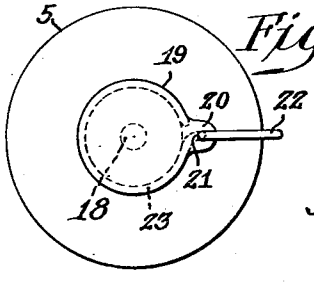


Fig. 8.



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by C. Stell Jackson
Attorney.

Patented Aug. 26, 1924. 1,506,413

UNITED STATES PATENT OFFICE.

HENRY SAULNIER DARLINGTON, OF MEDIA, PENNSYLVANIA, ASSIGNOR TO A. H. WIRZ, INC., OF CHESTER, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

LEAKPROOF TUBE SEAL.

Application filed February 25, 1922. Serial No. 539,100.

To all whom it may concern:

Be it known that I, HENRY SAULNIER DARLINGTON, a citizen of the United States, residing at Media, in the county of Delaware and State of Pennsylvania, have invented a certain new and useful Leakproof Tube Seal, of which the following is a specification.

My invention relates to the seals or closures used upon or for collapsible tubes extruded from tin, lead, aluminum and other metals.

The purpose of my invention is to seal a tube by the pressure of a plug against side walls of an apertured cork.

A further purpose is to carry the cork of a cork-and-plug seal within the tube and to support the cork therein against displacement.

A further purpose is to provide a compartment within the end of a tube and to secure an annular cork within the compartment.

A further purpose is to simplify the sealing operation.

A further purpose is to form a tube with a cylindrical compartment open at one end adjoining the intended outlet, to place a cork within the compartment and to seal the cork therein by closing a wall of the compartment against the cork. I claim both the article and the processes involved.

Further purposes will appear in the specification and in the claims.

I have preferred to illustrate my invention by but one general form, shown in slightly different embodiments, selecting a form which in use has proved to be practical, efficient, inexpensive and very reliable, and which at the same time well illustrates the principles of my invention.

Figure 1 is a broken elevation partly in longitudinal section, showing my preferred form of completed tube closure.

Figure 2 is a corresponding view showing an intermediate condition of manufacture, with mandrels in place for the fastening of the cork.

Figures 3 and 4 are sections of Figures 1 and 2 upon lines 3—3 and 4—4 respectively.

Figure 5 is a section corresponding to Figure 1 showing a completed closure of modified form.

Figure 6 is a view corresponding generally to Figure 2 but of the structure of Figure 5.

Figures 7 and 10 are side elevations of two different forms of retaining devices for the plug of the closure.

Figure 8 is a top plan view of the structure seen in Figure 7.

Figure 9 is a section taken upon line 9—9 of Figure 10.

In the drawings similar numerals indicate like parts.

In the manufacture of collapsible tubes from any suitable material, various forms of closure have been proposed. Where the content is a paste, the ordinary plug affords sufficient protection. Where the content is a liquid or semi-liquid, the closure which probably has come nearest to affording an effective seal uses a screw cap in conjunction with a cork insert bearing against the outer face of the nozzle about the outlet. This is open to serious objections, among which are the defects of the cork. These defects become of exaggerated importance because of the necessarily thin character of the insert provided.

I have aimed to overcome these objections by using a plug closure in conjunction with an annular seal of cushion material about the plug, which cushion material I refer to generically herein as cork. I secure sliding movement of the plug with a quicker and easier sealing movement than that of screwing on the cap.

In the forms shown I have illustrated conventional tubes 5 having reduced tubular and outlets 6, 6′, 6², corresponding, except for my invention, with the outlets at present in use for paste-like products.

I provide an apertured cork carried by the tube, which is engaged by a plug closure. Though the cork could, of course, be held in place by cement to come within my broad invention, I will proceed to describe the best means known to me for effecting this seal as required by the statute.

In the extrusion of the tube I provide not only the cylindrical extension before mentioned, forming a small chamber adjacent the outlet opening, but in my preferred embodiment I form the usual initially closed end 7, which when apertured may be regarded as presenting a radially-directed annular flange 8. Though the outlet opening

9 may be provided for in the extrusion I prefer to cut it separately.

Within the tube I also provide a cylindrically extending flange 10 preferably in line with the walls of the outlet 6 and which is adapted to be inwardly turned so as to hold a cork 11 between this flange and the flange 8. The cork is apertured at 12.

Through the rear end of the tube I insert the cork within the cylindrical space provided and close the annular flange 10 about the cork to retain the cork in position and preferably to place the cork under compression. I show a convenient means for effecting this, placing the cork fully within the space, or supporting it upon the end 13 of a mandrel 14, while the tube and mandrel are rotated relatively to turn the annular flange 10 inwardly about the end of the cork. In the form shown the cork is pushed to place and the mandrel is rotated while the stationary tube is pushed toward it by the stationary die 15 so that the curved walls 16 of the mandrel spin the flange inwardly to some such position as shown at 17 in Figure 1. The cork is held firmly between the two flanges and the aperture of the cork is accessible through the opening 9.

The plug 18 carried by cap 19 forms an effective seal against the interior walls of the opening in the cork.

In the form shown in Figures 5 and 6 the same general character of closure and method of assemblage is shown, to retain the cork between two flanges, with the difference, however, that the initial flange 8′ is formed within the tube. As the metal is extruded this "flange" is preferably closed completely and subsequently apertured at 9′, though the aperture could be put in it during the extrusion shown.

The upper end of the cylindrical side piece 6′ is extended at 6^3 so that when the cork is in place and resting upon the flange 8′ the projecting upper portion 6^3 may be spun against the cork to hold the cork in position and preferably to compress the cork. During this spinning operation the flange 8′ should be supported from within, as by a die not shown. If desired a different contour can be given the top either during the spinning or by subsequent die operation.

In Figure 7, I show a means for preventing loss of the plug closure, in which the cap 19 is extended at 20, if necessary to secure the diameter desired, and is apertured to receive a wire, cord, strip or other guide 21 which is downwardly turned at one end at 22, to prevent removal of the cap, and at the other end is encircled at 23 about the upper part of the tube adjacent the outlet. The bead 24 retains the turned end against slipping from the tube. Preferably the guide is of spring material held about the tube by the spring of the material.

In Figures 9 and 10 the retaining devices differ from those of 7 and 8 in two particulars; in that the retaining member is flexible and in the manner of holding it to the tube.

The retaining member 21′ is shown as a loop or cord whose ends, preferably knotted, are secured to ear or ears 25 integral with the tube. The easiest, neatest and most convenient way to hold the end of the loop, which I have found, is by the formation of two ears which are pinched together about the knot to retain the loop.

It will be evident that my disclosure will suggest other forms of the invention to those skilled in the art, carrying out all or a part of my invention, and differing from mine according to the individuality or whim of the designer or the extent of his desire to obtain the benefit of my invention without copying it; and it is my purpose to include herein all such forms as come within the reasonable spirit and scope of my invention.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:—

1. A collapsible tube for holding liquids and semi-liquids, having the outer end formed as a chamber, an apertured cork in said chamber, under compression axially of the cork and a plug fitting the aperture and closing the tube by engagement of the walls of the cork.

2. As an intermediate article of manufacture, a collapsible tube having a passage, a flange substantially transverse to the passage at one end thereof and material for a flange substantially parallel with the passage at the other end thereof.

3. A collapsible tube for holding liquids and semi-liquids, a tube having an outlet approximately straight passage, a flange transverse to the passage at the outer end thereof and a flange substantially parallel with the passage extending into the tube at the inner end thereof.

4. The process of forming an outlet for a collapsible tube which consists in forming an interior flange within the outlet passage and material for a second flange at a distance therefrom, placing an apertured cork within the outlet and against the flange and turning the material for the second flange inwardly against the cork to retain it between the two flanges.

5. The process of forming an outlet for a collapsible tube which consists in forming an interior flange within the outlet passage, at the outer end of the passage and a second flange within the tube extending axially of the passage, placing an apertured cork

against the first flange but terminating short of the end of the second flange and in turning the end of the second flange toward the axis of the passage to retain the cork in position.

6. The process of forming an outlet for a collapsible tube which consists in forming an interior flange within the outlet passage adjacent the inner end of the outlet passage, in placing in the outlet passage beyond the flange an apertured cork shorter in length than the length of the passage beyond the flange and in turning the end of the outlet passage inwardly toward the axis of the passage to confine the cork in the passage.

HENRY SAULNIER DARLINGTON.