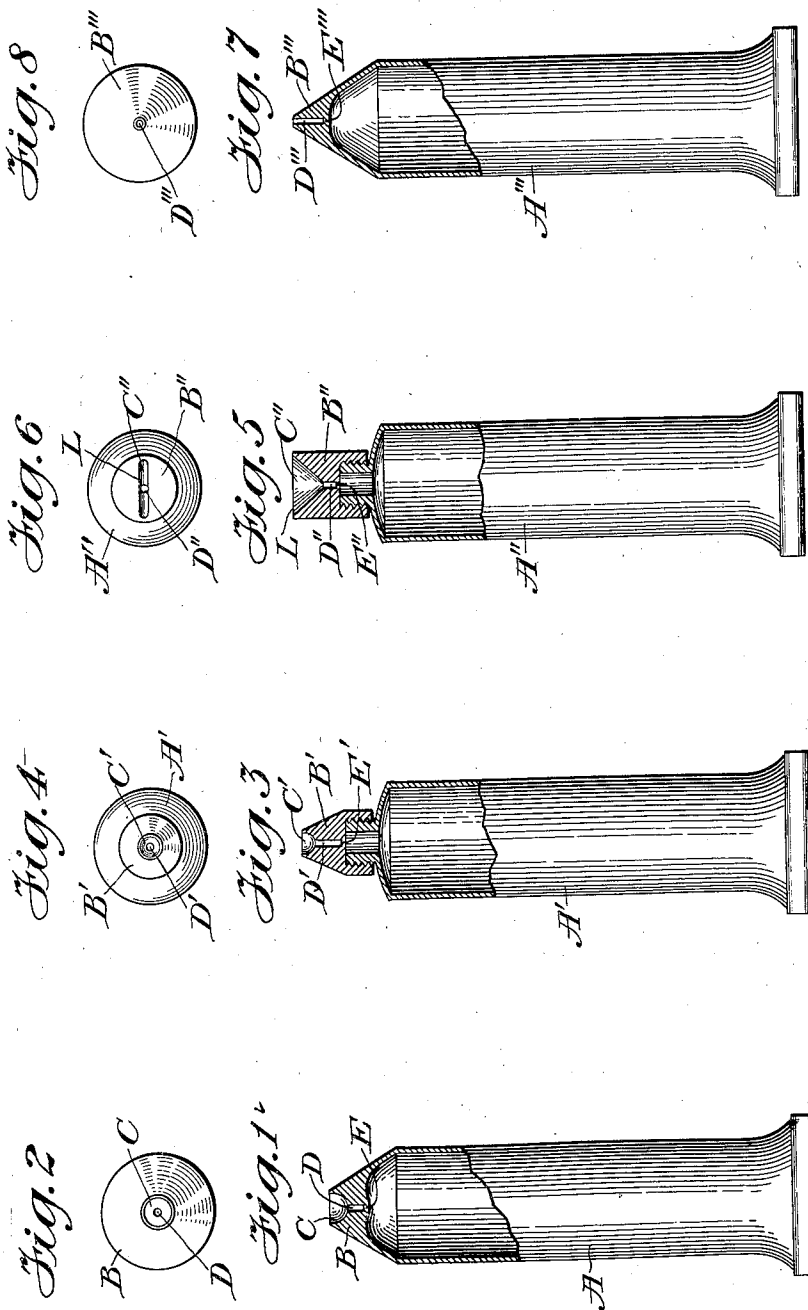


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R. BROOKS.
COLLAPSIBLE TUBE.
APPLICATION FILED MAR. 18, 1904.



Witnesses
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COLLAPSIBLE TUBE.

No. 832,654.

Specification of Letters Patent.

Patented Oct. 9, 1906.

Application filed March 18, 1904. Serial No. 198,772.

To all whom it may concern:

Be it known that I, REUBEN BROOKS, a citizen of the United States, and a resident of Gloucester, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Collapsible Tubes, of which the following is a specification.

This invention relates to collapsible tubes for holding viscous or adhesive substances—such as glue, paint, &c.; and the main object of the invention is to provide a tube of this class which is completely sealed when placed on the market, but has at its discharge end a thin portion or wall which may be punctured by a pin, needle, or similar small article, but which is so protected by a large mass of material constituting the nozzle of the tube that it cannot be reached and enlarged by a puncturing instrument of relatively large size—such, for example, as a knife-blade or similar article.

In a prior patent granted to me June 4, 1901, Serial No. 675,372, there is disclosed a collapsible tube having a thin puncturable wall similar to that just described; but in said patent this wall is not protected from puncture by a knife-blade or similar large article capable of making a large hole in such thin opening. It has been found in practice that when collapsible tubes of the type shown in said patent are put on the market the purchasers do not always break the seal formed by this thin puncturable wall in the manner intended—that is, by making a pin-like puncture or perforation therethrough—but often make an opening much larger than is intended, either by greatly increasing the size of the hole that a pin will normally make or by using a larger puncturing instrument which at the moment of puncturing will form an opening of large area. Unless the opening formed in the puncturable wall of such a tube is of small area or diameter—that is to say, is a pin-like perforation—the contents of the tube will flow through the opening even when no pressure is applied to the walls of the tube. If, however, the puncture is limited to the small diameter or area desired, the contents will not flow out unless such pressure is applied to the collapsible walls. When my improved tube embodies the self-sealing feature disclosed in my prior patent—that is to

say, when it is provided with a cup or cavity at the outside of the puncturable wall, in which cavity a small quantity of the contents may be permitted to dry after the first use of the contents—the opening formed in the puncturable wall will be sealed by the drying of the small quantity permitted to escape into such cavity. On each subsequent use of the contents of the tube the new seal formed by such dried portion of the contents is broken; but in my prior patent each breaking of the seal after the original puncturing of the metal tends to enlarge the opening, waste the contents of the tube, and render it increasingly difficult to effectually seal the enlarged opening. In my present invention, however, the metal adjacent to the puncturable wall is so thick that even the most careless user will be unable to insert any puncturing instrument larger than a pin, needle, or similar article, and hence will be unable to make a large initial opening. Moreover, the resistance opposed by these thick walls to a pin, needle, or like article is so great as to preclude the enlargement of the hole first made in such wall.

In the drawings accompanying this specification and forming part of the present application, Figure 1 is a sectional side elevation of an improved collapsible tube having a self-sealing discharge-nozzle constructed in accordance with my present invention. Fig. 2 is a plan of the same. Fig. 3 is a view similar to Fig. 1 of a modification of the invention, illustrating a removable nozzle. Fig. 4 is a plan of the same. Fig. 5 is a view similar to Fig. 3 of a tube having a wide distributing-opening in its nozzle for applying a wide band of glue, paint, &c., to a surface. Fig. 6 is a plan of the same. Fig. 7 is a view similar to Fig. 1 of a modification of the invention, illustrating a nozzle for applying a narrow thread-like line of glue, paint, &c., to a surface. Fig. 8 is a plan of the same.

Similar characters designate like parts in all the figures of the drawings.

In carrying my invention into effect it may be applied either to collapsible tubes having one of the features illustrated in my aforesaid patent—viz., a discharge-nozzle integral with the body of the tube—or it may be embodied in a modified form of the old type of collapsible tubes, in which the sealing cap

or nozzle is removable from the neck of the tube. In either construction the mere breaking of the seal is sufficient to permit the forcing out of the contents of the tube when the collapsible walls thereof are squeezed, it being unnecessary in my improved type of tube having the detachable cap or nozzle to remove said cap at any time in order to get at the contents of the tube.

Referring first to Figs. 1 and 2, I have illustrated in these views a collapsible tube, the body or barrel of which is designated by A and is substantially similar in construction to tubes as ordinarily made. At its lower end the tube is or may be closed in the usual manner by folding over the flattened edges of the tube to form a seam. The whole body of this tube, including the folded end and the neck with its nozzle, is made from a single piece of material, usually metal, the various parts being so shaped and formed by dies as to leave a relatively large, strong, and unyielding mass of material at the nozzle and merging into the thin, weak, and easily-collapsible walls of the body A. This large mass of material is designated by B and has an opening therein of considerable length, forming an aperture which does not extend entirely through the same, but which extends almost through it, leaving only a thin wall, such as E, to seal the tube. This thin wall is easily punctured by a pin, needle, or like article passed through an aperture in alinement with the wall, and such an aperture is shown at D. This aperture is of relatively small diameter or area and of considerable length as compared with its diameter, its area being just sufficient to admit such a small article as a pin and its length being such as to hold the pin and guide the same positively and prevent enlargement of the opening in the thin wall E.

It will be noticed that there is a large body of metal all around the aperture D, through which the puncturing-pin or other article is passed, and the strength of this solid mass of metal and the resistance offered by it are sufficient to prevent the enlargement of the aperture in the wall E by working the pin around in the aperture D.

In the preferred construction the aperture through which the puncturing instrument is passed is in communication with the exterior of the tube through a cup or cavity of sufficient size to permit a small portion of the contents of the tube to dry out over the outer end of such aperture and seal the same, thus making the tube self-sealing, as in my aforesaid patent. In the present case, however, this automatic resealing of the tube after each use of the same is assured, because the mass of metal around the aperture prevents the same from being enlarged by successive punctures of the seal, and hence the aperture will always remain small enough to be sealed

by the contents until the tube is empty. At C, I have shown such a cup or cavity in which a small portion of the contents of the tube may dry to reseal the tube, as in my prior patent aforesaid.

In Figs. 3 and 4 I have illustrated a modification in which the body A' of a collapsible tube is formed with a threaded neck in the well-known manner, and a removable cap or nozzle is threaded onto such neck to seal the tube. This nozzle as to its large mass of material B' for protecting the puncturable wall E' thereof from enlargement and as to the other principal features thereof—viz., the aperture D' and the sealing cup or cavity C'—is similar in construction to the corresponding features of the integral nozzle shown in Figs. 1 and 2.

In Figs. 5 and 6 I have illustrated another modification of the invention, in which a tube-body A'', similar to that just described with reference to Figs. 3 and 4, also has a removable cap or nozzle; but in this cap the discharge opening or nozzle outlet which communicates with the aperture D'' is a relatively long and narrow outlet, preferably formed by a flaring sealing cup or cavity C'', the outer edges or lips of which are sufficiently close together to permit the rapid and uniform distribution of the contents of the tube in a broad band on any smooth surface over which this spreading-nozzle may be drawn. These lips are designated by L, the mass of metal which surrounds the aperture D'' is designated by B'', and the puncturing-wall by E''.

In Figs. 7 and 8 I have illustrated a modification of the tube similar to that shown in Figs. 1 and 2, except that the body A has a discharge-nozzle which tapers practically to a point and is conical. In this nozzle the puncturable wall E''' has in alinement therewith an aperture D''' somewhat longer than the aperture shown in the other views, this aperture being surrounded by a sufficient mass of metal B''' to prevent the insertion of any large instrument therein. In this tube the increased length of the aperture is for the purpose of assuring the drying of a sufficient quantity of the contents to seal the tube after it has been once used, there being no separate sealing cup or cavity, as in the other views. With this type of discharge-nozzle a very thin thread-like line of glue or other substance may be laid on a surface, as is desirable in doing some kinds of ornamental work.

In all of the various forms of collapsible tubes shown in this case it will be seen that the tube is entirely sealed by the walls of the tube itself until the tube reaches the hands of the consumer, and this is important, as it often happens that a long time elapses after the tube is sent out from the factory before it reaches the consumer, and it is essential that the tube shall be perfectly sealed until

that time. In all of these tubes also the path of communication between the puncturable wall and the outer edges or lips of the nozzle is of sufficient size to permit the re-sealing or self-sealing action of the contents, and the outer edges or lips of the opening at the discharge end of the nozzle are so shaped as to permit the contents to be applied in a broad band or otherwise to a surface, thus adding to the practical value of the nozzle as a means for distributing the contents of the tube. When used as a spreading-nozzle, the narrow slit formed by the walls of the flaring opening permits the contents of the tube to be forced out in a broad thin sheet, as wide as the discharge-outlet is long, when the walls of the tube are squeezed and the nozzle drawn along a suitable surface, the thickness of the coating applied in this manner being determined by the pressure exerted on the walls of the tube and by the position in which the nozzle is held.

What I claim is—

1. A collapsible tube having at its discharge end a thin readily-puncturable wall and an elongated aperture of small and substantially uniform diameter in alinement with said puncturable wall, the said aperture being surrounded by rigid non-collapsible walls.

2. A collapsible tube having at its discharge end a thin readily-puncturable wall and an elongated aperture of small and substantially uniform diameter in alinement with said puncturable wall, the said aperture being surrounded by rigid non-collapsible walls and terminating at its outer end in an enlarged cup-like cavity.

3. A collapsible tube having at its discharge end a removable cap, which cap is formed at its inner part with a thin, readily-puncturable wall, and at the outer side of said thin wall with a narrow elongated aperture of uniform width for guiding a puncturing-tool, said narrow aperture being surrounded with a relatively thick mass of material in which is formed an enlarged cup-like outlet, whereby the puncturing-tool is guided, the area of the puncture limited and the tube made self-sealing by a portion of its contents in said cup-like outlet, substantially as set forth.

Signed at Gloucester, in the county of Essex and State of Massachusetts, this 10th day of March, A. D. 1904.

REUBEN BROOKS.

Witnesses:

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