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G. K. GEERLINGS

1,978,455

CONTAINER AND CLOSURE THEREFOR

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Fig. 1

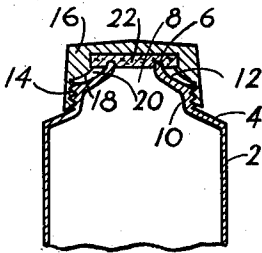


Fig. 2

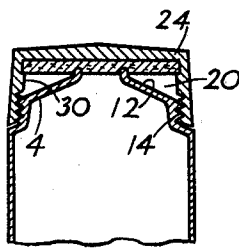


Fig. 3

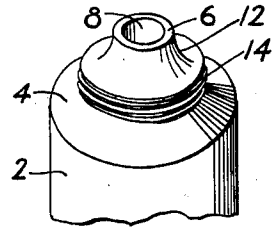


Fig. 4

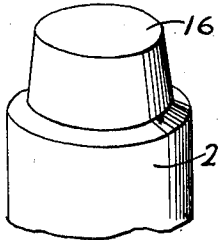


Fig. 5

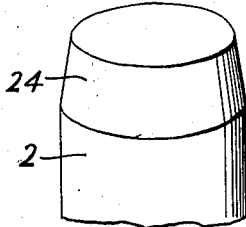


Fig. 6

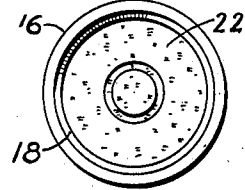


Fig. 7

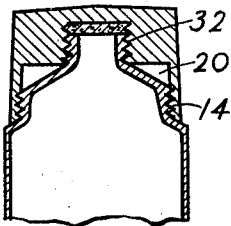


Fig. 8

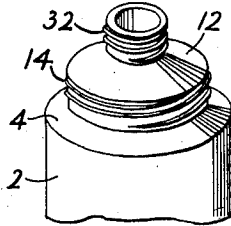
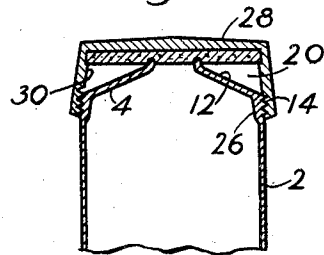


Fig. 9



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1,978,455

CONTAINER AND CLOSURE THEREFOR

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Application February 11, 1933, Serial No. 656,257

5 Claims. (Cl. 221—60)

My invention relates to containers and closures therefor, and particularly to containers such as collapsible tubes for holding and dispensing plastic substances such as creams, pastes, paints and the like.

Containers of this type are commonly provided with a threaded neck to which a cap is applied to close the outlet opening in the neck. However, when the material in the tube is very fluid or contains a separable liquid, there is a tendency for the liquid or material to leak out of the tube and come into contact with the threads on the neck of the tube. The threads are not usually fluid-tight and in some cases the leakage is so great that the whole top of the tube, as well as the package in which the tube is packed, becomes smeared and discolored by the liquid.

Furthermore, the tube contents on being used tend to become smeared over the neck and threads of the tube and over the interior of the cap, so that when the cap is applied the material is squeezed out between the cap and the neck and forced down over the threads on the tube. This extruded paste forms a film or ring about the top of the tube which becomes darkened and discolored by its contact with the threads rendering the tube extremely unsightly. The discolored material also tends to contaminate paste subsequently discharged from the tube and is therefore unsanitary, a feature which is especially objectionable with pharmaceutical products which should be absolutely pure. The dark ring or film of paste thus formed is commonly known in the trade as "black neck" and because it is both unsightly and unsanitary it constitutes a serious handicap to the sale and use of tubes for dispensing many products.

While it is possible to wipe off the neck of a tube of this type, the user seldom takes this trouble because it is difficult to remove the material remaining in the threads on the neck. As a result, the material often dries and hardens about the threads making it difficult to apply and remove the cap. When such products as water color or oil paints are dispensed in tubes of this character, the paint adhering to the threads after use frequently hardens so that the cap "freezes" onto the tube. In order to remove the cap it is then necessary to heat the top of the tube either in hot water or over a low flame, in which case the label often comes off or the whole neck of the tube is melted or loosened and the tube rendered useless.

Moreover, in many instances, especially when the neck of the tube is comparatively long, it

is impossible to extrude all of the contents from the tube even when the sides of the tube are pressed against the top thereof, and therefore a substantial amount of the contents is wasted when the tube is thrown away.

In the manufacture of tubes such as are commonly employed, the material which forms the neck of the tube is formed with a relatively long tip, a portion of which is subsequently cut off and the threads are rolled into the neck of the tube. In forming the neck of the tube and the elongated tip, it is necessary to use dies which because of the structure of the neck are subject to considerable breakage so that new dies are constantly required. This difficulty increases the cost of manufacture considerably and therefore is highly objectionable.

In accordance with my invention, the foregoing difficulties and disadvantages presented by structures of the prior art are overcome, and a container is provided which precludes the passage of material from the outlet opening into engagement with the threads or other means provided for securing the cap to the container. I prefer to obtain this result by spacing the thread or other holding means for retaining the cap on the container, a substantial distance from the outlet opening in the top thereof.

I prefer to employ a cap formed with a space therein between the outlet opening and thread on the container which serves to collect and retain any material extruded from the container whereby application of the cap will in no case force the material down over the threads by which the cap is secured to the container. I provide two spaced points of contact between the cap and tube and provide a recess which serves to collect any material which may leak past the top of the neck and prevent the same from passing into engagement with the threads or onto the exterior of the tube. The neck of the container may then be made smooth adjacent the outlet opening, so that it can easily be kept clean and the contents will not become contaminated or unsanitary and "freezing" of the cap onto the tube is avoided.

I may also provide the cap with a packing which is of larger diameter than the portion of the neck engaged thereby, so that on being compressed the packing not only engages the top of the neck but also extends downwardly, adjacent both the inner and outer sides of the neck so that an effective seal is obtained between the cap and the container.

By forming the tube with a comparatively short

neck or with substantially no neck at all, and by spacing the threads a substantial distance from the outlet opening, it is possible to modify the structure of the dies employed so as to reduce the breakage thereof and to eliminate or modify the operation of cutting off the extremity of the neck of the tube. Furthermore, the threads may be rolled into the top of the tube without danger of collapsing the neck or injuring the tube. The amount of metal required for making the tube is little or no greater than is used at present and in some instances may even be reduced.

One of the objects of my invention is to overcome disadvantages and objections presented by the prior art and to provide a structure which obviates leakage which commonly occurs in such containers.

Another object of my invention is to provide a container in which the threaded portion of the neck is spaced a substantial distance from the outlet opening.

A further object of my invention is to prevent the condition commonly known as "black neck", in which discolored paste or hardened material is formed about the neck and over the threads thereon.

Another object of my invention is to provide a collapsible tube that may be easily and economically produced and which is constructed to permit the removal of substantially all of the tube contents.

Other objects of my invention are to facilitate the removal of caps from collapsible tubes, to provide a cap for collapsible tubes which is adapted to retain material extruded from the tube within the cap and out of engagement with the threads on the neck of the tube, to provide a cap and container with two points of contact with a space between the same for receiving and holding material that may leak from the outlet opening, and to provide a seal about the top and sides of the neck of the container.

These and other objects and features of my invention will appear from the following description thereof, in which reference is made to the accompanying figures of the drawing illustrating preferred embodiments thereof.

In the drawing:

Fig. 1 is a vertical sectional view through a collapsible tube and cap therefor, embodying my invention;

Fig. 2 is a vertical sectional view through an alternative form of collapsible tube and cap.

Fig. 3 is a perspective of the upper end of a tube of the type illustrated in Fig. 1 with the cap removed.

Figs. 4 and 5 are perspectives of the forms of tube illustrated in Figs. 1 and 2 respectively, with the caps applied thereto.

Fig. 6 is a view looking upwardly into the form of cap shown in Fig. 1.

Fig. 7 is a vertical sectional view of an alternative form of cap and tube embodying my invention, and

Fig. 8 is a perspective of the form of tube illustrated in Fig. 7.

Fig. 9 is a vertical sectional view of still another modification of tube and cap embodying my invention.

While my invention is illustrated in the figures of the drawing and will hereafter be described as applied to collapsible tubes, it will be apparent that the novel features of my invention are also applicable for use on bottles, cans or other containers besides collapsible tubes, and therefore I

wish it to be understood that my invention is not limited to the particular forms thereof herein set forth.

In the form of the invention illustrated in Fig. 1 a collapsible tube 2 of substantially cylindrical shape is provided with a top 4 of generally conical form terminating in a neck 6, having an outlet opening 8 in the center thereof at the top of the neck. Although the interior of the cap and neck of the tube may be formed with the lower surface in a continuous rounded curve, I prefer to form the same with an angularly formed lower surface 10 for simplicity in manufacture.

The exterior of the top of the tube slopes downwardly and outwardly from the outlet opening and neck, providing a smooth uninterrupted surface at 12 capable of being easily wiped off and kept free of dirt and accumulated material extruded from the tube. A thread 14, or other means for securing a cap to the tube, is formed on the top thereof concentric with the neck and spaced a substantial distance therefrom, both horizontally and vertically. The thread is substantially larger in diameter than the neck 6 and is located in a circular zone substantially concentric with the external surface of the neck of the tube and below the same.

As shown in Fig. 1 the thread 14 is spaced inwardly from the outer edge of the top a sufficient distance to permit the application of a threaded cap 16 thereto which is of smaller diameter than the tube. As illustrated in Fig. 1 the walls of the cap 16 may be comparatively thick and formed to fit rather closely to the top of the tube about the neck 6. In this construction the cap is provided with inwardly sloping inner walls 18, which conform in general to the shape of the portion of the top of the tube above the thread 14. However, I prefer to leave a space 20 between the smooth portion of the neck above the thread and the inner surface of the cap so as to prevent material being forced down over the thread 14, in applying the cap to the tube. A space is thus provided below the outlet opening and above the thread 14 on the top of the tube for receiving and retaining any material that may be extruded from the tube. This construction prevents the paste or other contents of the tube from coming into contact with the thread 14, and thus precludes "freezing" of the cap onto the tube. Furthermore, in the event the material has been squeezed some distance out of the tube when the cap is applied, the material pressed outwardly by the cap in engaging the neck of the tube is received and held in the space between the sides of the neck and the cap and is not forced downward over the threads 14 as in the structures of the prior art.

The cap 16 is preferably provided with a packing 22 which is formed of relatively soft material such as cork, rubber or other composition, and is of considerably larger diameter than the neck 6 of the tube, so that on applying the cap the packing is compressed against the top of the neck and extends downwardly a short distance within the inside of the neck and about the outside thereof. In this way the tube is sealed about three sides of the top of the neck so that escape of the material from the tube is prevented even when the tube is subjected to considerable pressure. In actual practice the packing, after being applied a short time, takes up a more or less permanent form with a portion thereof extending downwardly both inside and outside of

the neck as shown in Figs. 1 and 6, insuring an effective seal of the tube. The outer circumference of the cap being substantially larger than that of the caps used in the prior art affords a better gripping surface for the cap, permitting it to be screwed on considerably tighter and removed with less effort than heretofore. The threads may also be heavier than in those of the tubes now in use if desired.

The tube construction illustrated in Fig. 2 is provided with a thread 14 positioned closer to the outer edge of the top of the tube than in the construction of Fig. 1 and is adapted to receive a cap 24, the lower portion of which is of substantially the same diameter as the tube itself. The positioning of the thread with reference to the outer edge of the top of the tube may be varied to accommodate caps of different shape and size, but in any case the thread is spaced a substantial distance outwardly from and below the neck 6, on the top of the tube. In Fig. 9 the upper extremity of the tube at the outer edge of the top is thickened to provide a threaded portion 26, and a cap 28 of larger diameter than the tube itself is employed.

The forms of caps illustrated in Figs. 2 and 9 are substantially hollow with the inner side walls thereof approximately parallel with the outer surface of the cap. A thread for engaging the thread 14 on the tube is formed on the inner surface of the cap. The inner surface of the cap is thus spaced a substantial distance from the top 4 of the tube providing a space 20 for receiving and retaining contents of the tube as in the form of the invention shown in Fig. 1. Substantially no neck is required on tubes of this type, the top of the tube being formed as a cone with a large included angle at the top and provided with an outlet opening in the center thereof.

By providing a space between the outer surface of the top of the tube and the inner surface of the cap, I may employ a packing which, like that of the form of the invention shown in Fig. 1, is of larger diameter than the neck 6 or outer opening, so that a seal is provided over the top and the adjacent portion of both the inside and outside of the top or neck of the tube adjacent the outlet opening.

In the form of the invention illustrated in Figs. 7 and 8, the neck of the tube is provided with a thread 14, similar to that employed in the forms of the invention described above. However, the neck of the tube is somewhat longer and is provided with a second thread 32 adjacent the outlet opening and of smaller diameter than the thread 14. The threads 14 and 32 are so formed that the initial point of engagement of the cap therewith will enable both threads to engage simultaneously the corresponding threads formed in the cap. I prefer to provide a space 20 on the inner surface of the cap between the threads 14 and 32 to receive and retain any material which may pass downwardly from the outlet opening toward the thread 14.

In each of the forms of the invention described herein the cap and tube provide two distinct points of engagement, each of which serves to prevent leakage of liquid or other material from the tube. Furthermore, in each case a space is provided between the successive points of engagement of the cap and tube which serves to receive and retain any material extruded from the tube. Caps used in connection with these tubes in each instance are of relatively large diameter thus providing a better gripping surface

for removal of the cap from the tube and have the further advantage that they give the tube itself an appearance of being substantially larger in size which is of considerable sales value. The caps are also capable of adaptation to artistic and modernistic design which is in marked contrast to the form of cap ordinarily employed on tubes of this character.

The forms of my invention illustrated in Figs. 1, 2, 3 and 9 have the additional advantage of providing a smooth surface adjacent the outlet opening in the neck of the tube which is comparatively easy to maintain clean and free from material which tends to become discolored and contaminate the contents of the tube. Furthermore these constructions are characterized by a relatively short neck or none at all so that the side of the tube may be forced all the way up to the top of the tube extruding all of the contents thereof and avoiding waste of the material.

The tube in each instance may be formed by simple die stamping operations and in forms of the invention such as those illustrated in Figs. 1, 2, 3 and 9 the neck of the container may be made somewhat thinner than is possible when threads are provided on the neck of the tube, with the result that substantially no more material is required to form the tube than is used in the structures of the prior art and in some instances there is some saving in the amount of material used.

As indicated above, the features of my invention are not confined to their use with collapsible tubes but may be employed on other containers such as bottles, and the like. While I have shown the containers as provided with threads for retaining the cap on the tube, any other suitable means may be employed for this purpose. It will also be appreciated that various other changes in the form and shape of both the cap and tube may be made without departing from the spirit of my invention and therefore I do not wish to be limited to the specific forms of my invention herein set forth except as defined by the appended claims.

I claim:

1. A collapsible tube having a top of generally conical form provided with an outlet opening in the top with a thread for engagement with a cap for sealing the tube, said thread being located on the top of the tube between the outlet opening and the base of the conical top, that portion of the tube above the thread sloping inwardly and upwardly in a substantially unbroken line to the outlet opening.

2. A collapsible tube having a top of generally conical form provided with an outlet opening in the center of the top with a thread for engagement with a cap for sealing the tube, said thread being located on the top of the tube between the outlet opening and the base of the conical top, that portion of the tube above the thread sloping inwardly and upwardly in a substantially unbroken line to the outlet opening and that portion of the tube below the thread sloping outwardly and downwardly to the base of said conical top.

3. A collapsible tube having a top of generally conical form provided with an outlet opening in the top with a thread for engagement with a cap for sealing the tube, said thread being located on the top of the tube between the outlet opening and the base of the conical top, that portion of the tube above the thread sloping inwardly and upwardly in a substantially unbroken line to the

outlet opening, in combination with a cap for the tube having a thread for engagement with the thread on the top of the tube, said cap being formed to provide a space between the top of the tube and the inner surface of the cap above the thread.

4. A collapsible tube having a top of generally conical form provided with an outlet opening in the top and with a thread on said top for engagement with a cap for sealing the tube, said thread being located substantially mid-way between parallel planes in which lie said outlet opening and the base of the top of the tube, that portion of the top of the tube above the thread

extending inwardly and upwardly from the thread to the outlet opening.

5. A collapsible tube having a top of generally conical form provided with an outlet opening in the top and with a thread on said top for engagement with a cap for sealing the tube, said thread being spaced outwardly from the outlet opening and located substantially mid-way between the axis of said conical top and the periphery of the base of said top, that portion of the top of the tube above the thread extending inwardly and upwardly from the thread to the outlet opening.

GERALD K. GEERLINGS.

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