Feb. 7, 1961 V. FLAX 2,970,723

MANUFACTURE OF COLLAPSIBLE TUBULAR CONTAINERS MADE OF FLEXIBLE MATERIALS

Filed April 6, 1953

Fig. 1.

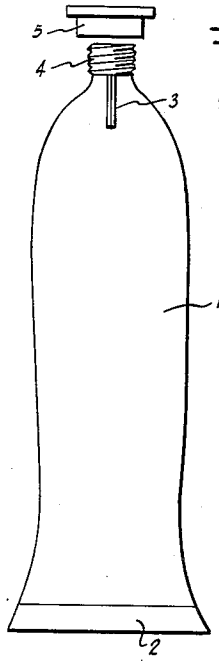


Fig. 2.

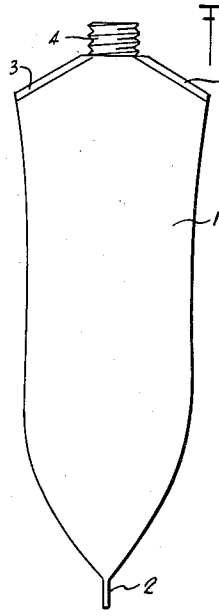
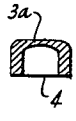


Fig. 3.



Fig. 3A.



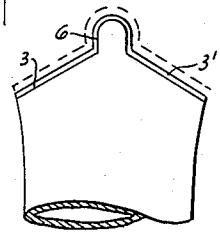


Fig. 4.

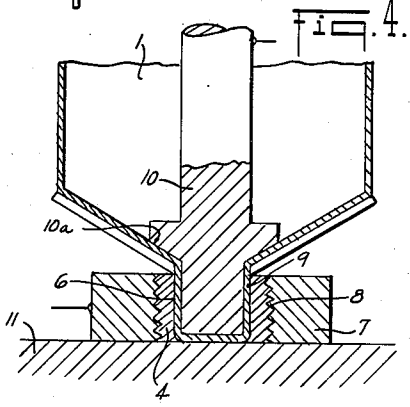


Fig. 5.

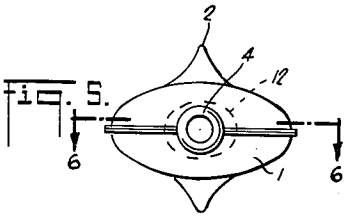


Fig. 6.

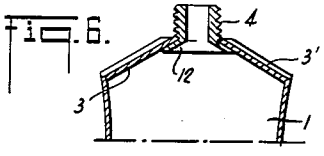
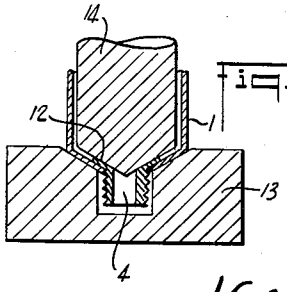


Fig. 7.



INVENTOR.

Valen Flax

BY

ATTORNEY

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MANUFACTURE OF COLLAPSIBLE TUBULAR CONTAINER MADE OF FLEXIBLE MATERIALS

Valer Flax, Place Mahomme, Vic-Fezance, France

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5 Claims. (Cl. 222—107)

The purpose of this invention is improvements in collapsible tubular containers made of a flexible material.

All the containers of this type now known consist of a tube of flexible material joined at one end to the edge of a circular, rigid conical shoulder of the proper diameter, having at the top the customary threaded tip. Such a manufacturing process leads to a relatively high cost price and prevents the tube from being completely emptied by squeezing.

The purpose of the invention is to improve the collapsible tubes of flexible and pliable material that are designated to contain fluid substances, particularly pastes or semifluids. The invention provides at one end of the tube a tip with an opening for filling and emptying, the latter being effected by the gradual reduction of the volume of the tubular body, whose lower end will be flattened and/or rolled up.

The present invention aims at a tube of flexible and pliable material, such as thermoplastic synthetic resin, in which the tube itself is fastened directly onto the threaded tip without the interposition of a shoulder or, in any case, with a shoulder greatly reduced in size and itself pliable, while not increasing the obstruction in the tube or impeding its emptying.

This product, much less expensive than the usual products, was made possible by the following surprising discovery, namely: The upper end of the tube, to which the tip is fastened, acquires, when the tube is filled with a paste or liquid, sufficient rigidity to enable the user to grasp it with one hand while the other hand is unscrewing the threaded cap from the tip, and consequently to permit, with no disadvantage, the elimination of the customary shoulder made of rigid material. This rigid effect can, as a result of this invention be accentuated by intentionally increasing the pressure of the enclosed substance against the interior surfaces of the shoulder; and the effect of inertia in the mass of this substance can be accentuated by making it flow to the top under the temporary pressure applied to the tubular body at the moment of screwing or unscrewing the cap.

In one special application of the invention the tube is, in the portion where the tip is attached, flattened and sealed edge to edge, being cut along two lines forming an obtuse angle with each other, the top of which is sealed directly to the plastic tip, in which threads can be formed under high temperature at the moment of sealing.

Other features of the invention will be evident from the following description and from the attached drawing, which gives examples of a few applications of the invention.

In this drawing:

Figures 1 and 2 show the first finished tube produced. It presents two vertical sections in two planes, one perpendicular to the other.

Figure 3 shows how the tube and tip look before being assembled.

Figure 3*a* shows a variation of the tip.

Figure 4 shows a cross section of the two parts while they are being assembled.

Figures 5 and 6 show, respectively, in a plane and in a cross section (VI—VI, Figure 5) the upper end of a variation of the tube invented.

Figure 7 shows, in a cross section, how this tube is put together.

Tube 1 shown in Figure 1 is composed of a flexible tubular part made of artificial resin, such as resin with a basis of plasticized polyvinyl chloride, which can be sealed by a high-frequency current. This tube is, during the manufacturing processed, flattened and sealed along two lines, 2 and 3, drawn in two perpendicular planes.

The seam of 2 is straight, in the conventional manner. The seam of 3, on the other hand, is of a special type, that is to say, it follows the two lines 3 and 3', which are inclined upwards toward each other at an obtuse angle to whose apex is fitted a threaded tip 4, upon which is screwed a cap 5, in the usual manner.

Experience has shown that, when filled with a paste, liquid or even air, the tube thus formed offers sufficient rigidity to enable the two seams 3 and 3' to act as a shoulder stiff enough to permit the user to grasp it in one hand while resisting the rotary effort resulting from screwing or unscrewing cap 5 on threaded tip 4.

It will be observed, on the other hand, that the arrangement of the folds 2 and 3—3' in two perpendicular planes increases the capacity of the tube and improves its appearance. This condition, however, is not indispensable for the operation of the invention, as seam 2 may also be placed in the same plane as 3—3'.

Figs. 3 and 4 show a method of producing very simply and economically the tube that has just been described.

By a method to be described later, the tubular part is previously prepared as shown in Fig. 3. That is to say, being left open at the lower end corresponding to seam 2, it is cut at the top in such a way that the oblique seams 3 and 3' may be united by prolongation 6, placed approximately in the axis of the tube. It is by means of this prolongation 6 that tip 4 is attached. This tip is, for example, made of a simple cylindrical piece bored out in the middle and cut out from a continuous tube, preferably of plastic material like that of the flexible container itself, but having the advantage of being more rigid.

Part 4 is not necessarily open at both ends. It may be shaped into a sort of thimble, as in Figure 3*a*, with a blind bore (a bore closed at one end).

In either case, the joining of tube 1 and tip 4 by means of prolongation 6 may be accomplished as illustrated in Figure 4. Tip 4 is placed beforehand in a matrix 7 which has a bore approximately equal to the diameter of tip 4, but threaded inside, as in 8. Into the bore 9 of tip 4, when the latter has thus been put in place, is inserted the prolongation or nipple 6 of part 1, previously prepared. Then into the interior of this prolongation 6 is inserted an electrode 10, shaped in such a way as to form shoulder 10, which lies on the seams of 3 and 3', thus holding prolongation 6 inside of bore 9. Matrix 7 is itself an electrode fed by a high-frequency current.

The establishment of a high-frequency current between electrodes 10 and 7 results in the sealing of nipple 6 to the inner surface of bore 9 in tip 4. The heat developed by the high-frequency current produces at the same time a softening or fusion of the whole mass of tip 4, which causes the peripheral surface to enter the threads 8 and assume their shape. Furthermore, it will be noted that if one should wish to produce inside threads, it would suffice to provide electrode 7 with a smooth bore and conversely a male electrode that is threaded.

After removal of electrodes and cooling, the whole

may be disengaged from electrode 7 by unscrewing tip 4 from threading 8.

In case a tip of the type of Figure 3*a* is used, the blind bore of this tip is removed after the sealing is completed.

The tube is now ready for use, that is to say, it may be filled through its lower end and afterwards closed and sealed along seam 2.

The preparation of tubular part 1, illustrated in Figure 3, can be done as follows:

The tubular portions designated as part 1 are cut from a continuous tubing preferably inflated beforehand, in such a way that, just below the oblique seams 3 and 3', they present a certain curvature which increases the capacity of the tube and improves its appearance. The seam following line 3—6—3' can be made edge to edge and flat, according to the conventional methods, but this leads to the necessity of cutting out excessive material on account of the seam (as indicated in the broken line in Figure 3). Therefore it is better to use the special sealing method described in the application for the patent filed in France by the applicant, patented under No. 1,068,972, having a filing date of October 10, 1952; a granting date of February 10, 1954; and a publication date of July 2, 1954; said patent being entitled "Improvements in the Manufacture of Flexible Plastic Containers," for a method which permits direct edge-to-edge sealing without a sealing strip or with one of negligible size.

The tubular lengths designated as part 1, cut out of a continuous tubing, can obviously be arranged one behind another in the same direction, that is to say, the rear, open end of one length being followed by the finished end 3—6—3' of the following length.

A more interesting way, however, is to prepare the lengths side by side, "top-to-bottom," in accordance with the inventor's suggestion, that is to say, the prepared part 3—6—3' of one length is placed opposite part 3—6—3' of the preceding length. Thanks to this arrangement, it is possible to seal simultaneously part 3—6—3' of two successive lengths, the inflation of the tubing insuring at the same time the curvature of the two lengths, placed in a position facing each other and welded simultaneously.

Figures 5 and 7 show another manufacturing process applicable more especially to tubes made of material such as polyethylene, which cannot be sealed by a high-frequency current.

In this case, tip 4 should preferably be provided with a small flange (or collar) 12, as shown in Figure 5, in such a way as not to increase the thickness of the tube. To this flange will be sealed the ends of the two shoulders 3—3' of the tube, prepared in advance. And in this case the prolongation 6 will be eliminated, the two shoulders 3—3' being separated from each other by an opening into which will be inserted tip 4 as far as flange 12.

This tip, likewise, will be preferably threaded on the outside. The sealing of the shoulders 3—3' to shoulder 12 of tip 4 will then be effected, as shown in Figure 7, by means of two heated matrices 13 and 14, pressing respectively against shoulders 3 and 3' externally, and against flange 12 externally.

It will be noted that the finished tube, after seam 2 is sealed, is watertight and airtight. This property permits the tube to be filled under conditions that are particularly advantageous, that is to say, through the tip and no longer through the bottom in the usual manner, the tubes in this case being delivered to the user completely finished at the bottom as well as at the top.

This filling through the tip will be done by a feed-pipe fitted to the threaded tip, in two operations, the first creating a vacuum with consequent complete flattening of the tube, the second letting the material into the empty tube.

Of course, the invention is not limited to the applications described and illustrated here. It may be extended particularly to tubes whose cylindrical body is prolonged at one end by a sealing surface of approximately the same thickness and joined to the tip by methods similar to those described, this sealing surface being possibly provided with reinforcing ribs.

Furthermore, the invention is not limited to any special constituted material for the tube, which may be made just as well of soft metal as of plastic gelatine or of material with a synthetic-resin basis, possibly with a metallic coating. Finally, as in Figures 1 to 4, the tip may be fitted into the interior of the axial prolongation of the tube.

I claim:

1. A tubular container for fluid substances formed of thermoplastic material, said container at one end being flattened and heat sealed edge to edge along a straight line to form a reinforcing seam in one plane, and being at the other end flattened and heat sealed edge to edge along an irregular sealing line to form a reinforcing seam in a plane transverse to that at the first end, said last-named reinforcing seam having a central axially extending nipple and two opposing angular shoulders extending from the periphery of the nipple to the respective edges of the other end and a cylindrical tip having an interior bore juxtaposed and heat sealed onto the exterior surface of the nipple.

2. A method for making a container for fluid substances from a tube of thermoplastic resin material, which comprises flatening the tube at a free end thereof and heat sealing the same along an irregular line to define an axially extending nipple connected by angularly extending shoulder portions, and heat sealingly applying to the thus-formed nipple portion a hollow cylindrical tip, the interior wall of which is adhered to the nipple walls, and the exterior of which is threaded by the heat during the heat sealing step.

3. A collapsible tubular container for fluid substances formed of thermoplastic material and having discharge and filling ends, the filling end comprising walls flattened and heat sealed to form a reinforcing seam extending in a straight line, and the discharge end comprising walls flattened and heat sealed to form a reinforcing seam contoured to provide an axially extending nipple and angularly downward extending edge portions leading therefrom; and a tip of thermoplastic material and having an axial bore juxtaposed and adheringly heat sealed along the interior of its bore onto said nipple along the exterior axially extending surfaces thereof.

4. A collapsible tubular container for fluid substances formed of thermoplastic material and having discharge and filling ends, the filling end comprising walls flattened and heat sealed to form a reinforcing seam extending in a straight line, and the discharge end comprising walls flattened and heat sealed to form a reinforcing seam contoured to provide axially extending nipple and angularly downward extending edge porions leading therefrom; and a tip of thermoplastic material and having an external thread and an internal bore juxtaposed and adheringly heat sealed at its internal bore onto the exterior axial surface of said nipple.

5. A method of forming a tubular container of thermoplastic material from a length of tubing which comprises flattening the tube at opposing ends but at planes transverse one to the other, forming by heat sealing at one end an edge to edge straight line reinforcing seam, forming by heat sealing at the other end an irregular contoured seam, said last named seam providing an axially extending nipple from the periphery of which reinforcing shoulders extend downwardly and angularly to the respective edges of the other end; mounting on the axially extended nipple an axially bored tip of thermoplastic material, disposing the thus tipped nipple within a mold having an internally threaded conformation, inserting a mandrel in the nipple, and applying heat to the mold and mandrel

to adhere the interior of the tip to the nipple and to form a thread on the exterior of the tip.

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