April 26, 1966 D. R. ADAMS 3,248,012

SLIDE ADAPTERS FOR RESILIENT TUBES

Filed April 22, 1964

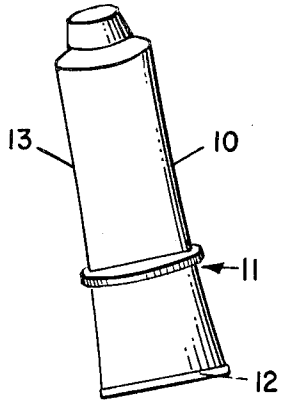


FIG. 1.

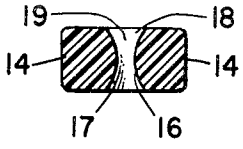


FIG. 3.

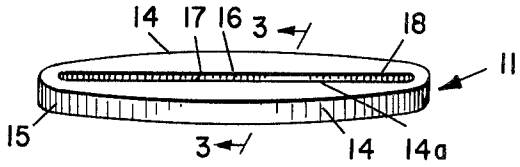


FIG. 2.

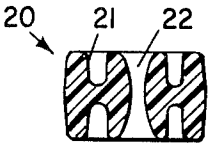


FIG. 4.

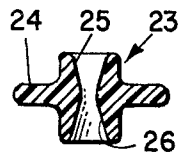


FIG. 5.

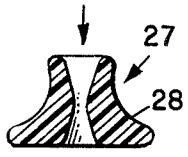


FIG. 6.

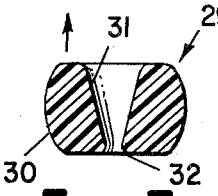


FIG. 7.

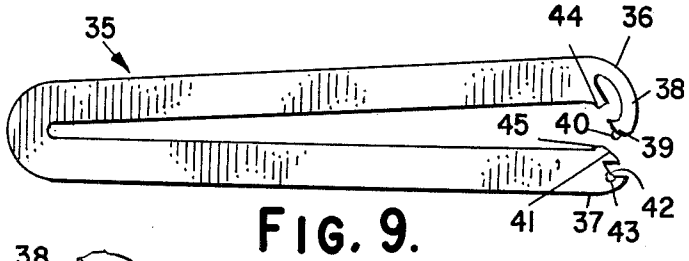


FIG. 9.

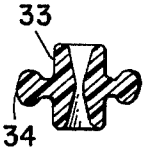


FIG. 8.

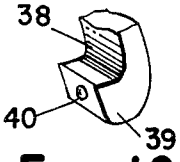


FIG. 10.

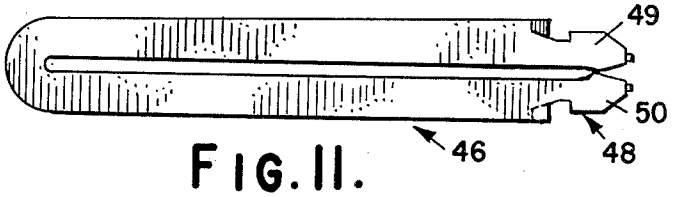


FIG. 11.

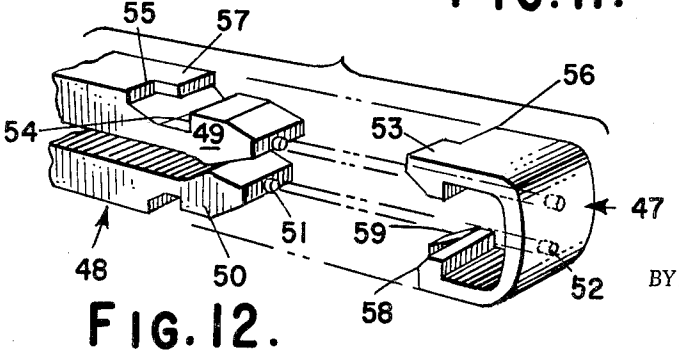


FIG. 12.

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SLIDE ADAPTERS FOR RESILIENT TUBES

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12 Claims. (Cl. 222—95)

This invention generally relates to adapters for resilient tubes, and more particularly concerns novel slide adapters designed to be employed in combination with resilient tubes for positioning contents thereof so as to maintain the optimum content delivery function of such tubes at all times. The tube packaging industry is experiencing a rapidly accelerating conversion to the use of plastic tubes for an ever increasing variety of products.

One intrinsic drawback associated with plastic tubes is that, because of their flexible and elastic qualities, they tend to readily return to their original shape after deformation as differentiated from metal tubes which are permanently deformed in normal use as to be reduced in size as the material is used up.

Of course, from the standpoint of appearance, it is more aesthetically pleasing for plastic tubes to retain their original shape. However, the problem associated therewith is that such tubes, as soon as any appreciable portion of the contents has been extruded therefrom, will act much like a pump or a syringe and will tend to draw in air as they return to their original shape after material is forced therefrom by compression, and before the cap can be replaced. Thereafter, when such a tube is to be used again, the user will oftentimes find that he is merely squeezing out air. When he finally is able to cause the contents of the tube to be squeezed out, the contents will often be forced out in spurts or intermittent squirts of material and air making the tube somewhat difficult to use as well as inconvenient from the standpoint of splattering of material, and the like.

Attempts have been made to solve this problem but no simple direct solution has heretofore resulted. Such attempts have involved built-in diaphragms, roller devices, one-way valves and the like, but have either lacked utility or were too costly.

It is therefore a primary object of the present invention to provide an adapter for a resilient tube which is designed to be fitted thereto for the purpose of positioning the contents thereof and so as to maintain optimum utility of such tube and maximum accessibility of contents therein at all times. Towards this end, said adapter is designed to decrease or flatten out the tube as the material is being used up such that no excess volume is left in the tube to draw in air as material is extruded therefrom.

Another object of the present invention is to provide a slide adapter for a flexible plastic tube wherein the slide adapter is designed to be positioned over the tube at the base end and slid along forwardly at will in encircling relationship about the tube to flatten out the emptied portion thereof as the contents is consumed.

Still another object of the present invention is to provide a slide adapter for plastic tubes, in which the slide adapter is constructed in such a manner relative to the dimensions of the tube that it can be slid along to flatten the tube and extrude the contents from such flattened portion, and which will also substantially seal off the flattened portion from the portion of the tube occupied by the material therein.

Still a further object of the present invention is to provide a slide adapter for plastic tubes, wherein the slide adapter may be very economically manufactured and readily applied to existing tubes, and in which the slide adapter may be incorporated in existing tube production methods.

Still a further object of the present invention is to provide a slide adapter for plastic tubes, in which the adapter does not detract from the appearance of the tubes, and which the tube may still be used in the conventional manner if desired, and which will not add appreciably to the cost of the tubes.

A still further object of the present invention is to provide a slide adapter which, if desired, under certain constructions, may be reused with other like tubes once the initial tube with which it is used is depleated of its contents.

Still a further object of the present invention is to provide a slide adapter for use with resilient tubes in which the slide adapter structure is adaptable to several modifications and variations in its construction to accommodate different methods of attachment of the adapter, and to cofunction with the tube.

These and other objects and advantages of the present invention are generally achieved by providing the combination of a resilient tube and an adapter designed to be mounted thereover for positioning the contents therein such that optimum function and material assessibility occurs and is maintained thereby. The adapter also functions to flatten out a given portion of the tube and substantially seal said portion off so that the remaining portion of the tube containing the then remaining material will be of a minimum volume necessary to accomodate same.

Preferably, the slide adapter comprises a member which is shaped to closely encircle a flattened portion of the tube (initially, the base end portion just above the conventional sealed end closure), and towards this end defines a slot with minimum dimensions substantially equivalent to the flattened portion of the tube. It is also desirable that the slide adapter have comfortable exterior finger gripping surfaces to enable it to be conveniently slid along and over the tube to increase the flattened portion thereof.

A better understanding of the present invention will be had by reference to the drawings, showing several illustrative embodiments of the invention as well as exemplary modifications thereto, it being understood that the modifications may be used with each of the embodiments thus creating a substantial number of variations in the inventive structure.

FIGURE 1 is a perspective view of a resilient tube member having a slide adapter of the present invention mounted thereon;

FIGURE 2 is a perspective view of the slide adapter of FIGURE 1;

FIGURE 3 is a sectional view taken in the direction of the arrows 3—3 of FIGURE 2;

FIGURE 4 is a sectional view of a modified construction of the slide adapter of FIGURES 1 and 2;

FIGURE 5 is a sectional view of another modified construction of the slide adapter shown in FIGURES 1 and 2;

FIGURE 6 is still another sectional view of a slide adapter of the form shown in FIGURES 1 and 2;

FIGURE 7 is still another sectional view of a slide adapter of the form shown in FIGURES 1 and 2;

FIGURE 8 is another sectional view of a slide adapter of the form shown in FIGURES 1 and 2;

FIGURE 9 is a view of another embodiment of the slide adapter according to the present invention, showing an adapter of U-shaped snap-on construction;

FIGURE 10 is an interior end perspective view of a portion of the slide adapter of FIGURE 9 illustrating an optional locking feature thereof;

FIGURE 11 is another embodiment of a slide adapter of the present invention; and,

FIGURE 12 is an exploded perspective view of the end portion of FIGURE 11 and a locking clip designed

to be mounted thereon to form a closed loop at said end portion.

Referring now to FIGURE 1, there is shown a resilient tube 10, which inconventional form is formed of a flexible plastic material. Such tubes are now, for example, used for packaging make-up, suntan lotions, skin lotions, shampoo, first aid creams, and a variety of other products. Disposed about the tube 10 is a slide adapter 11, according to one illustrative form of the present invention. The slide adapter 11 forms the dividing line between a flattened portion 12 of the tube 10 and a filled portion 13 thereof. The slide adapter 11 is shown in its position after a part of the contents of the tube 10 has been extruded therefrom.

Thus, normally, when the tube 10 is first received by the user, the slide adapter 11 will be positioned adjacent the bottom end thereof and the tube 10 will be relatively full, the filled portion 13 of the tube extending throughout substantially the entire length thereof. As the contents are extruded, the slide adapter 11 would be slid along the tube flattening it out and at the same time sealably retaining the material in the portion 13 of the tube. Of course, it is essential that the tube 12 have an initial flattened base portion or at least be designed such that a portion thereof can be flattened so that the member 11, which is relatively rigid, may be mounted. The relative function of the slide adapter 11 and its cooperation with the tube 10 will be better understood as the specification proceeds.

As shown in FIGURE 2, the slide adapter 11 comprises an elongated looped member having exterior finger gripping surfaces 14 and curved end portions 15.

The slide 11 is provided with inner sidewalls 16 and 17 defining an elongated slot designed to receive the flattened portion 12 of the tube 10.

As best seen in the view of FIGURE 3, a slot 18 as defined by the sidewalls 16 and 17 is of an "hour-glass" cross-section such that it includes a necked down section or area 19 which conforms substantially to a dimension proximating the desired thickness of the flattened portion 12 of the tube.

With this type of construction, it will be readily apparent that as the adapter 11 is slid upwardly towards the portion 13 to increase the length of the flattened portion 12, the sidewalls of the tube portion 13 will be forced into the necked down portion 19 of the slot 18 flattening out the sidewalls of the tube 10.

It is important that the dimension of the necked down section 19 of the slot 18 be sufficiently close to the thickness of the flattened portion 12 of the tube so that adequate friction will be exerted by the slot 18 upon the tube portion 13 to maintain the slide adapter 11 in any given position. In other words, the slide adapter 11 should be sufficiently tight about the tube such that the contents of the tube portion 13 will not be able to escape through the contained section and back into the flattened portion 12 of the tube. Also, the adapter 11, as such, must frictionally engage the tube 10 so as to remain in any set position.

It is also desirable that the slide adapter 11 be formed of a clear plastic material such that the adapter 11 will not interfere with reading of any of the instructions on the tube or in seeing the various designs or artwork that may be imposed thereon. For structural purposes, it may sometimes be necessary to thicken the sidewalls of the member 11 in its intermediate portion, for example at 14*a*, relative to thinner cross-sections towards the ends 15 of the member 11.

It will be appreciated that the slide adapter functions to slide along the tube, flatten or thin the tube out, sealably contain the remaining contents, and provide a tight enough frictional grip such that it will maintain any position to which it is set. Thus, the adapter preferably has an outer surface which may be conveniently grasped by the user for effecting sliding motion of the adapter and an inner slot co-functioning with the tube as stated. Towards this end, the adapter may take different forms in its cross-section and a plurality of modifications have been indicated in FIGURES 4 through 8, each of which conforms with the foregoing objectives, although it will be appreciated that certain of the modifications shown in these figures may be more economically manufactured and practical than others.

Referring to FIGURES 4–8, there is shown in FIGURE 4 a slide adapter 20 which is provided with grooves 21 primarily for the purpose of saving material. The slot 22 formed therein may be of similar shape to the slot 18 of the adapter shown in FIGURES 1–3.

In FIGURE 5 there is shown a cross-section of an adapter 23 which is provided with ridges 24 on its exterior surfaces for enabling a convenient gripping structure for the user's fingers. Also, the adapter 23 is provided with opposing triangular shaped sidewalls 25 and 26 each radiused at its apex portion (i.e. 25*a* and 26*a*) to define a slot similar in cross-section to the slot 19 of FIGURE 3.

In the modification of FIGURE 6, there is shown a cross-section of an adapter 27 having concave or arcuate shaped exterior sidewalls 28 acting as a convenient finger gripping surface for the tips of the user's fingers to engage and thereby position the adapter in the direction of the arrow shown along the sidewalls of the tubular container.

FIGURE 7 shows still another modification of an adapter 29 provided with somewhat convex outer sidewalls 30 and inner sidewalls 31 defining a conical cross-section having a necked down section 32. The adapter of FIGURE 7 would be moved in the direction of the arrow shown adjacent thereto such that the necked down portion 32 would follow the relatively widened portion of the slot guiding the sidewalls of the tube 10 down towards the necked down portion 32 for the ultimate flattening thereof. The convex sidewalls 30 merely enable a different type of gripping surface and of course may also yield a magnification of the lettering or artwork on the tube 10 if the material of which the adapter is formed is clear plastic.

In the modification of FIGURE 8, a slide adapter 33 is provided which includes finger gripping ridges 34 of somewhat different shape than the ridges 24 shown in FIGURE 5.

It will be appreciated that the embodiments of FIGURES 5, 6, 7 and 8, as well as FIGURE 4, result in material savings.

It will be appreciated that the slot cross-section may be used with any one of the exterior surface designs shown in FIGURES 4–8 and similarly, that any one of the exterior surface designs may be used with any one of the slot cross-sections. These various modifications are, therefore, merely representative of many variations from the preferred embodiment shown which still conform with the objects of the present invention.

There is shown in FIGURE 9, another embodiment of the slide adapter of the present invention in which an integral member is employed with one end thereof being open, although designed for locking together. Thus, there is shown a slide adapter 35, which is preferably formed of a plastic material and which defines at its open end mating end portions 36 and 37.

The end portion 36 is provided with a finger 38 terminating in a hooked portion 39 having protruding from an intermediate portion thereof a small male dimple 40, as more clearly shown in the view of FIGURE 10.

The hook portion 39 is designed to be forced down over a protruding boss 41 on the end portion 37 to interlock with a groove 42 formed in the end portion 37. Furthermore, the dimple 40 is designed to fit into a recess 43 formed within the groove 42.

In order to have the closed and locked slide adapter of FIGURE 9 conform with the end purposes of the invention, it is necessary to have some means acting as a gauge to make certain that the slot dimensions are consistent throughout the entire length of the slide adapter 35. Towards this end, the end section 36 is provided with a land 44 designed to engage a land 45 provided

on the end portion 37 and thus act as a stop means to keep the width of the slot constant throughout its entire length in the member 35.

It will of course be appreciated that the slide adapter of FIGURES 9 and 10 may be provided with any of the slot cross-sections shown in FIGURES 3–8, as well as any of the exterior designs for the finger gripping surfaces.

In FIGURE 11, there is shown a slide adapter designed for use with an auxiliary clip member in order to close off its open end. Thus, there is shown a slide adapted 46 in FIGURE 11 which also may be constructed of a plastic material, and which is designed for use with a clip 47 (FIGURE 12) and which defines at its open end 48 projecting tongues 49 and 50.

As will be evident from the view of FIGURE 12, the tongues 49 and 50 are of resilient construction such that they are forced together as the clip 47 is forced thereover to close the end of the slide adapter 46.

Considering FIGURE 12 in more detail, it will be noted that the tongues 49 and 50 are provided with projecting pin-like members 51 which are designed to fit into recesses 52 is provided in the spring clip member 47. The lock clip member 47 is provided with a portion 53 designed to be forced over the hook edge 54 of the end portion 48 such that the hook portion 53 will fit within the offset 55 of the end portion 48. Similarly, the end portion 48 is provided with a portion 57 which interlocks with an offset portion 56 in the lock clip 47.

The bottom portion of the end section 48 interlocks with the lock clip 47 in exactly the same manner except that the offset portions are reversed. Thus, the lock clip 47 is provided with an offset portion 58 on the opposite side in its bottom section and a conventional hook section 59 below the upper offset portion 56. The interlocking offset portions are designed to prevent any lateral relative movement between the clip lock portion 47 and the adapter body 46 once the unit has been assembled. However, it will still be appreciated that although the interlocking offset and hook portions couple the clip lock 47 to the body 46 of the adapter and prevent lateral and longitudinal relative movement, it is still conceivable that the two members might become unlocked in the upper portion or lower portion, as such.

Thus, it is desirable to provide interlocking pins or dowels 51 which enter recesses 52. Such pins will give a more secure lateral locking action.

In this regard, it should be noted that the dimple 40 cooperates with the recess 43 in the embodiment of FIGURES 9 and 10 in exactly the same manner, that is, to lock the slide adapter such that its respective end portions 36 and 37 may not laterally move relative to each other.

The embodiments of FIGURES 9–11 are primarily provided in order to allow installation of the adapter on a tube after filling and sealing has taken place, either by the consumer or manufacturer.

From the foregoing, it will be apprecated that the slide adapter of the present invention, as heretofore stated, may take different forms and even these different forms may be provided with different slot cross-sections and different outer surface configurations as well as various locking means in the instance of both the snap-on and two piece embodiments. It is, however, as heretofore stated, essential that the slot be defined such that its dimensions are sufficiently close to the thickness and width of the flattened portion of the tube to frictionally engage the same and yet enable sliding movement of the slide adapter. On the other hand, it is essential that the outer surface be sufficient to support the slot and to be gripped by the fingers of the user to enable movement of the slide adapter towards the filled end of the tube.

As heretofore stated, it is also desirable that the adapter be formed of clear plastic to enable more convenient viewing of the nomenclature and artwork on the tube, although it will be appreciated that translucent or opaque plastic members may be employed, and, indeed, other materials used. It is also desirable that the slide adapter be formed of a relatively rigid plastic material having, however, certain resilient quantities such that it may be sprung into a locked position, if the embodiments of FIGURES 9 and 11 are employed.

With the foregoing embodiments and modifications in mind, the following claims are meant to include same within their scope and to define the scope of applicant's invention.

What is claimed is:

1. A slide adapter for mounting on a resilient tube to perform the primary function of flattening out and substantially sealing off a given portion of said tube, said slide adapted comprising: a member of plastic material which is shaped and dimensioned to closely encircle said given portion of said tube, said member defining a slot with a minimum width substantially equal to the thickness of said given portion of said tube, and said member having exterior sidewalls suitable for gripping by a user's fingers, whereby said member may be slideably urged over said tube, said exterior sidewalls having greater thickness in the intermediate portions thereof relative to the end portions thereof.

2. A slide adapter, according to claim 1, in which said member defines a slot which is not uniform in width throughout the depth thereof, and in which the minimum width of said slot is in an intermediate portion thereof.

3. A slide adapter, according to claim 2, in which said member defines a slot of cross-section defining arcuate opposing inner sidewalls designed to co-function with said given portion of said tube, such that said given portion may be more conveniently drawn through said slot.

4. A slide adapter designed for mounting on a resilient tube, said slide adapter being shaped to closely encircle a flattened portion of said tube, said adapter comprising: a member of plastic material defining a slot having a minimum width dimensioned substantially equal to the thickness of the flattened portion of the tube, such that said adapter may be employed to flatten out and substantially seal off a further portion of said tube; said slide adapter having exterior sidewalls defining at least one projecting portion, said projecting portion acting as a convenient finger gripping structure to enable the user to slideably force said adapter along said tube, said exterior sidewalls having greater thickness in the intermediate portions thereof relative to the end portions thereof.

5. A slide adapter designed for mounting on a resilient tube to perform the function of flattening out and substantially sealing off a given portion of said tube, said slide adapter comprising: a member of plastic material designed to encircle said given portion of said tube, said member having a slot of nonuniform cross-section, said slot having its narrowest width in an intermediate portion thereof, and said tube being designed to be received within said slot; said member having exterior sidewalls defining finger gripping surfaces to enable said slide adapter to be slideably urged over said tube by the user thereof, said exterior sidewalls having greater thickness in the intermediate portions thereof relative to the end portions thereof.

6. A slide adapter, according to claim 5, in which said exterior sidewalls of said slide adapter are shaped to define at least one projecting portion for more convenient finger gripping by the user.

7. A slide adapter designed for mounting on a resilient tube to perform the primary function of flattening out and substantially sealing off a given portion of said tube, said slide adapter comprising: a member of plastic material designed to encircle said given portion of said tube, said member defining a slot of generally hour-glass cross-section, the minimum width of said slot being substantially equal to the thickness of said given portion of said tube; and, said member having exterior sidewalls suit-

able for gripping by fingers of the user for urging said slide adapter over the length of said tube, said exterior sidewalls having greater thickness in the intermediate portions thereof relative to the end portions thereof.

8. A slide adapter, according to claim 7, in which said exterior sidewalls are provided with non-rectilinear surfaces for more convenient gripping thereof by the user's fingers.

9. A slide adapter designed for mounting on a resilient tube to perform the primary function of flattening out and substantially sealing off a given portion of said tube, said slide adapter comprising: a hair pin shaped member of plastic material designed to encircle said given portion of said tube, said hair pin shaped member defining a slot having a minimum width substantially equal to the thickness of said given portion of said tube, and said hair pin shaped member having finger gripping outer sidewalls for convenient grasping by the user's fingers to urge said adapter along the length of said tube; and springably engaging means integral with said member and constituting the free ends of said hair pin shaped member for locking said free ends together once said member is mounted on said tube.

10. A slide adapter, according to claim 9, in which said free ends are provided with opposing surfaces designed to gage the degree to which said free ends are brought together.

11. A slide adapter, according to claim 9, in which said free ends are provided with co-functioning means locking said free ends together against relative lateral movement.

12. A slide adapter, according to claim 11, in which said free ends are provided with co-functioning means limiting the degree and gaging the extent to which said free ends are brought together to maintain the uniform character of said slot throughout the length thereof.

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