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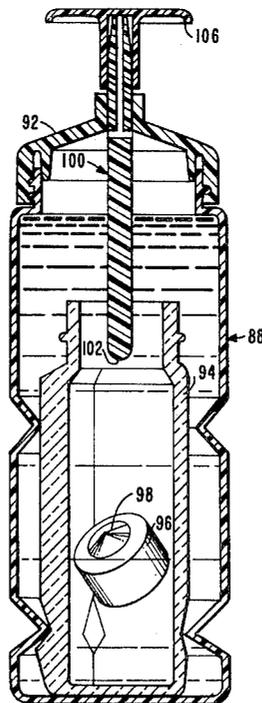
[54] **TWO-COMPARTMENT MIXING AND DISPENSING DEVICE**
5 Claims, 18 Drawing Figs.

[52] U.S. Cl..... 222/94,
222/90
[51] Int. Cl..... B65d 35/22
[50] Field of Search..... 222/5, 83.5,
92, 94, 90; 132/67; 251/339; 206/47 A

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ABSTRACT: This patent describes a self-contained, two-compartment mixing device comprising an outer container adapted to contain a fluid, and having a fluidtight end closure, an inner container received in said outer container, said inner container having an end closure, said end closure of said inner container facing said end closure of said outer container to isolate the contents of the inner container from the contents of the outer container. In a preferred embodiment of this invention, the end closure of the outer container is provided with a projection having cutting terminal surfaces extending from said end closure inwardly into said outer container, said sharp projection having cutting terminal surfaces being adapted to be compelled toward and through the end closure of said inner container by longitudinal compression of said outer container to establish fluid communication between said inner and outer containers.



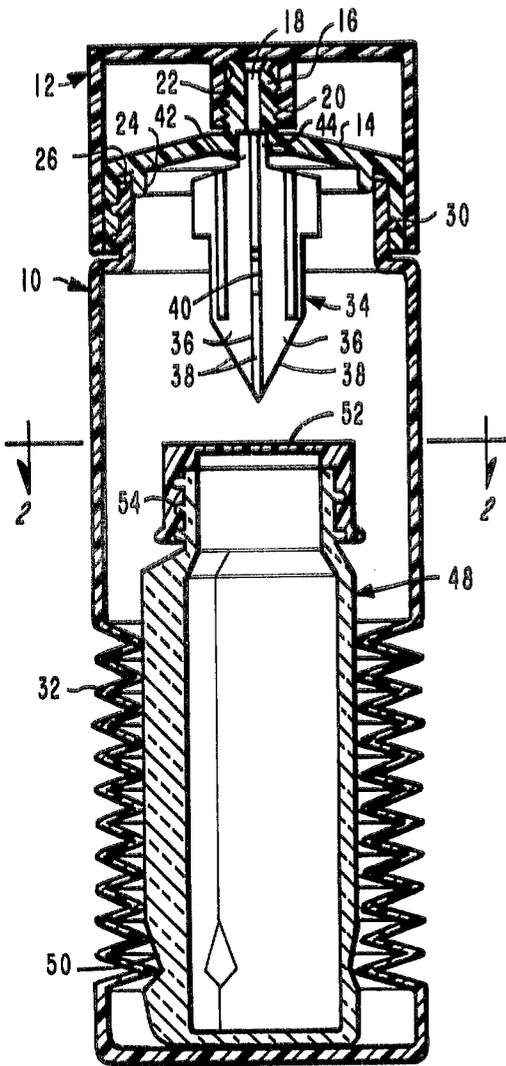


FIG. -1

FIG. -6

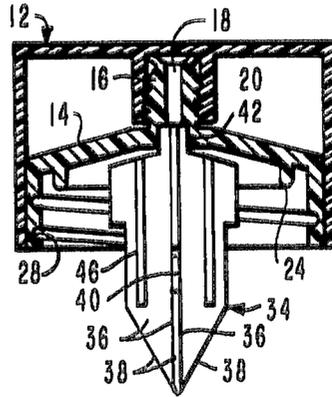


FIG. -7

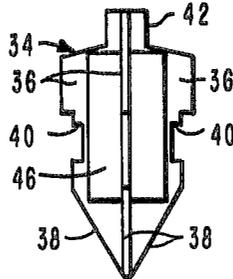


FIG. -8

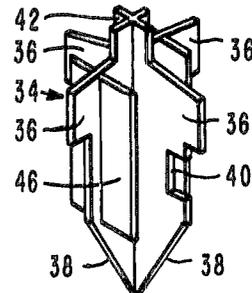


FIG. -5

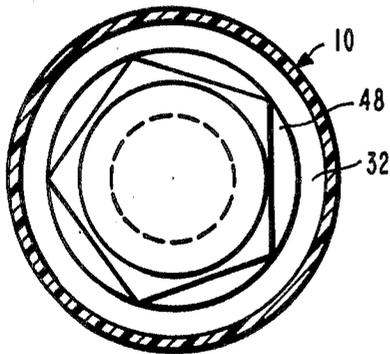
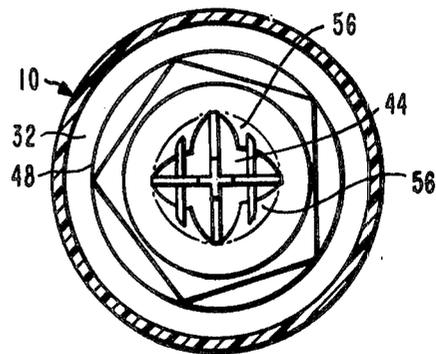


FIG. -2

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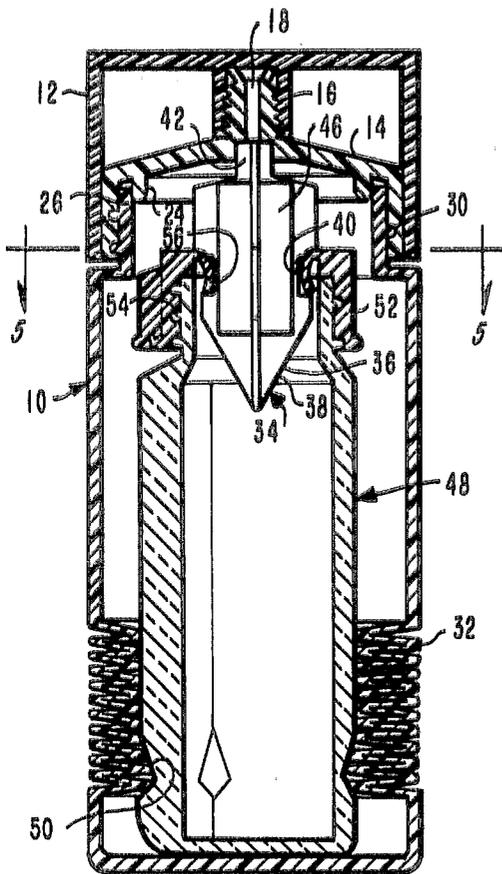


FIG. - 3

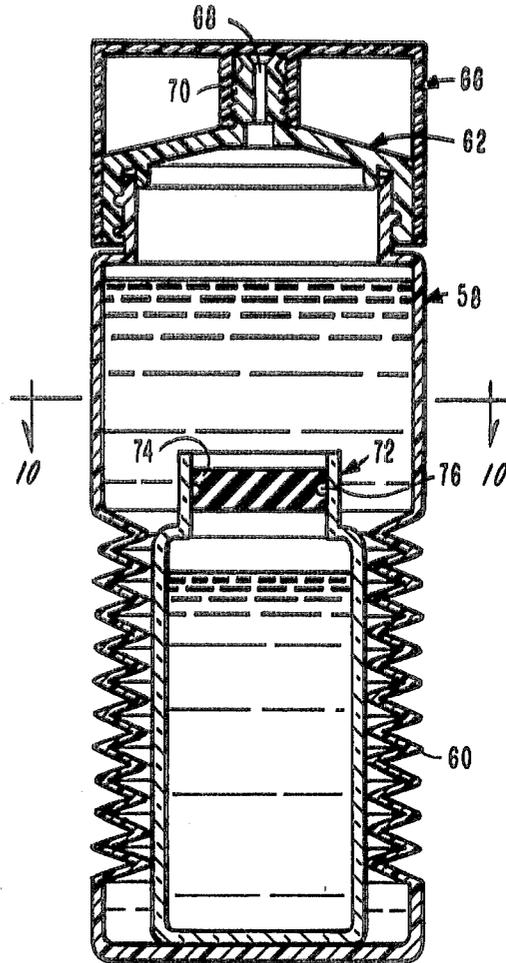


FIG. - 9

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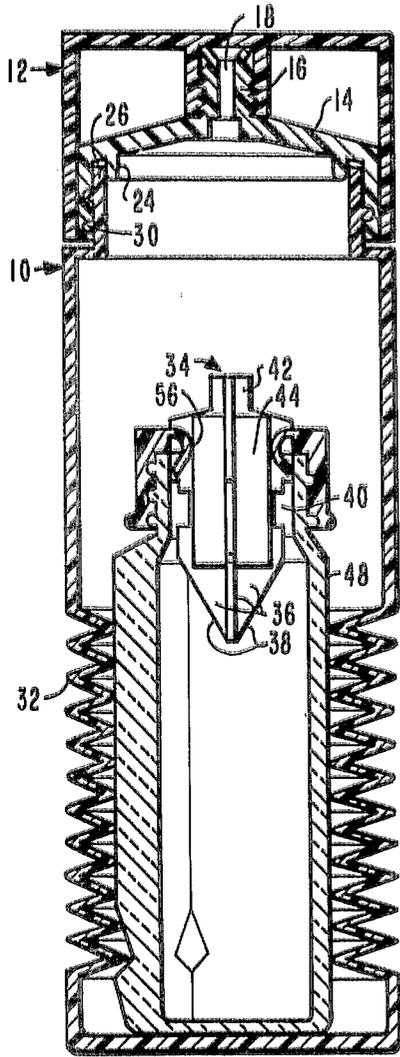


FIG.-4

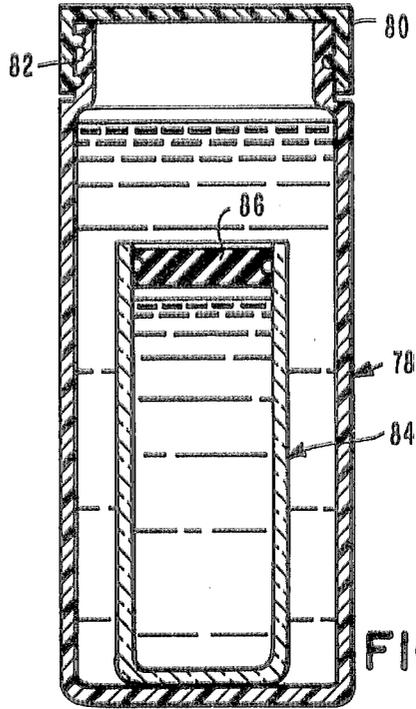


FIG.-13

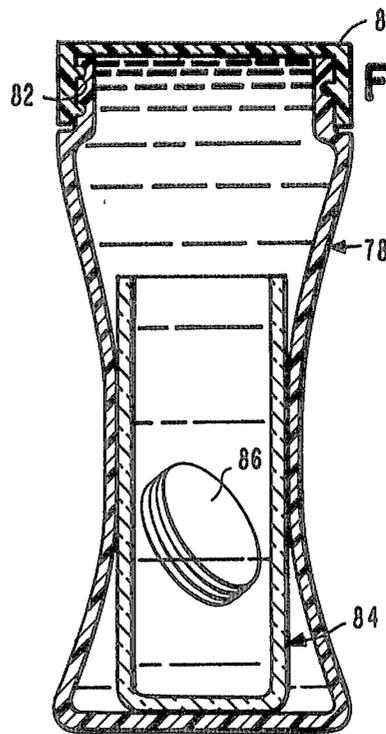


FIG.-14

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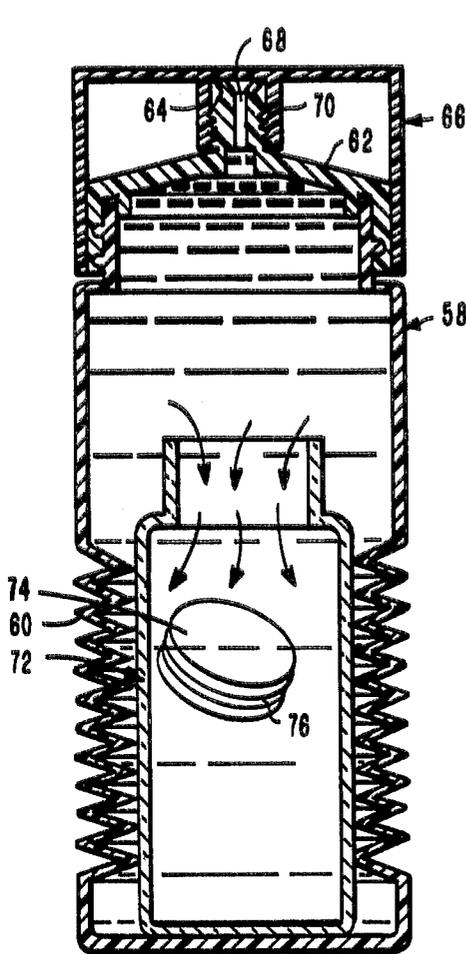


FIG. - II

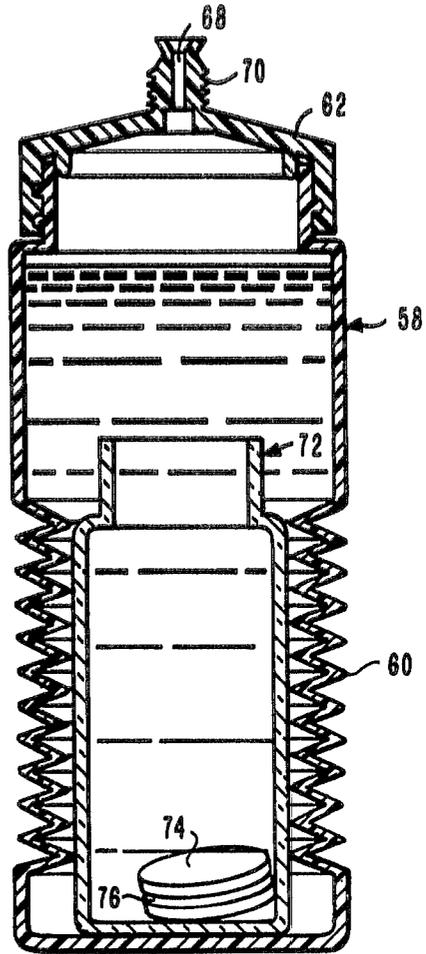


FIG. - 12

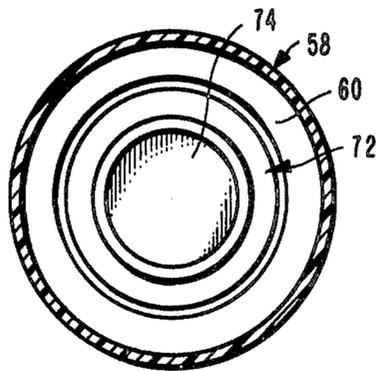


FIG. - 10

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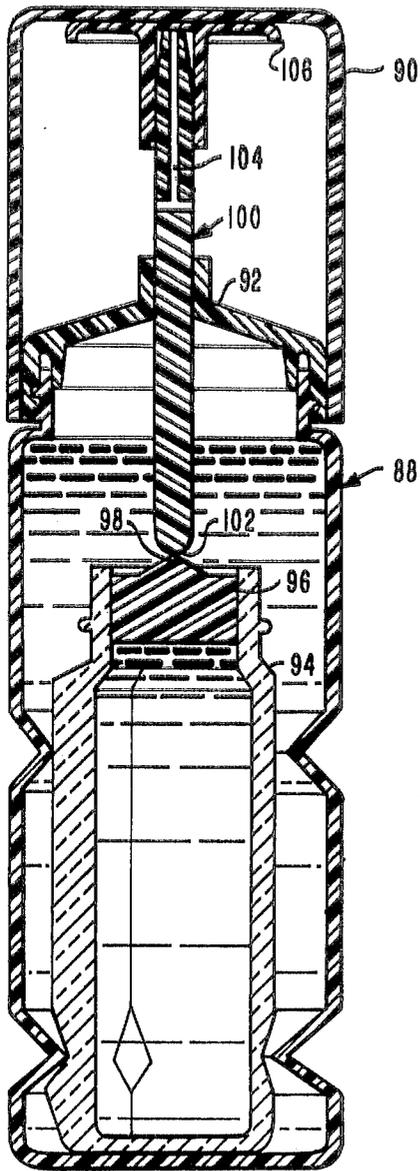


FIG. - 15

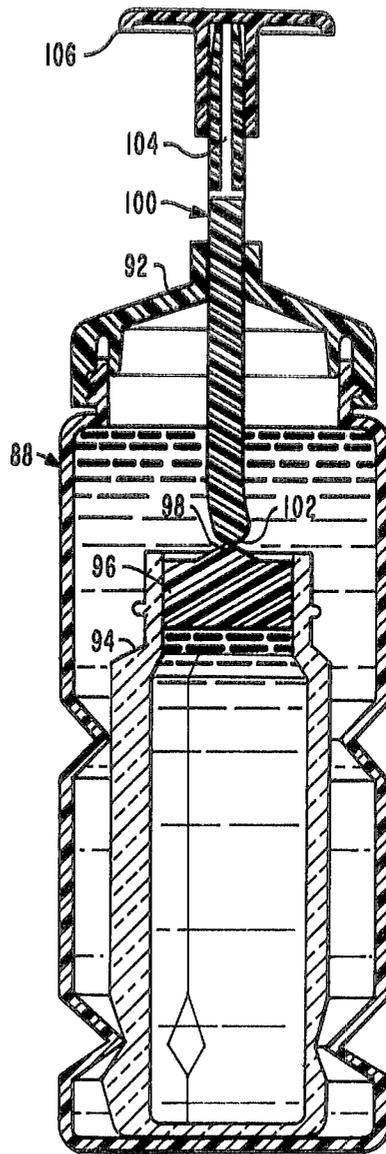


FIG. - 16

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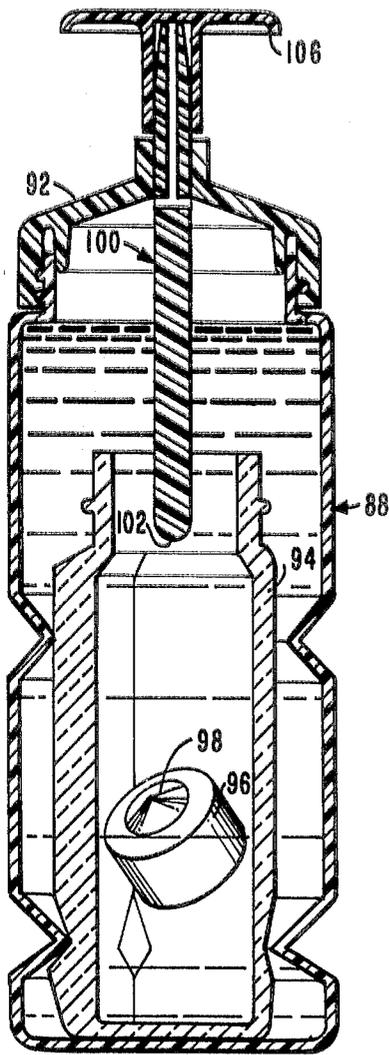


FIG.-17

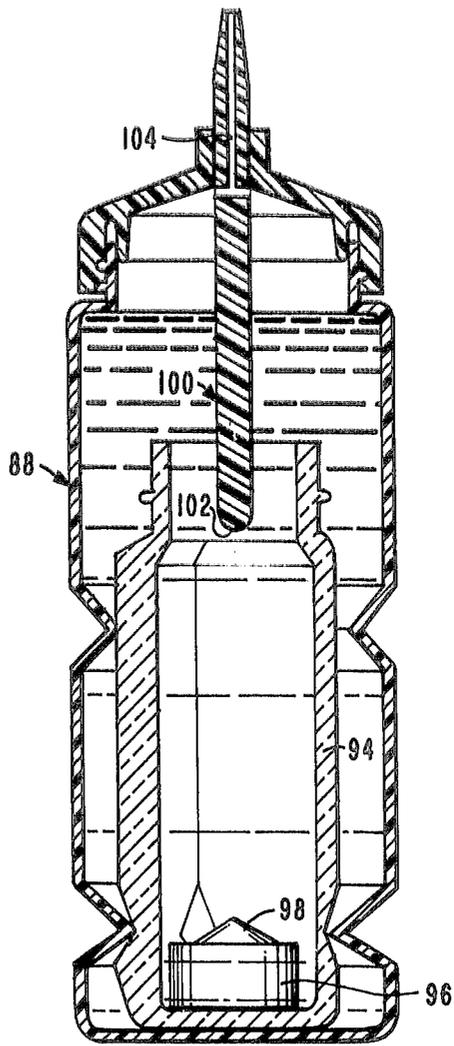


FIG.-18

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TWO-COMPARTMENT MIXING AND DISPENSING DEVICE

BACKGROUND OF THE INVENTION

The field of this invention relates to self-contained, two-compartment mixing devices particularly adapted for use in the mixing of two normally chemically reactive hair-dye ingredients. However, the device of the present invention is generally applicable to the storage and mixing at the time of use of any two reactive or nonreactive liquids or to the mixing of any liquid and solid.

The most common self-administered type of hair dye on the market at the present time includes an oxidizable dye component. The oxidizable dye component is sold in its unoxidized form and it is necessary just prior to use that an oxidizing agent be admixed with the dye in order to activate the same and render it ready for administration to the hair. Generally, the other dyes available are substantially less reactive with the carotene of the human hair and, therefore, are less effective in dyeing the hair. For this reason, best results are obtainable only by the use of the oxidizable dye and an oxidizing agent therefor. The need for these two reactive chemicals normally requires two separate storage containers in the package since the materials are not compatible for long periods of time when mixed. At the present time, the two materials are sold in separate bottles. Also provided in the package along with the bottles are directions for the mixing of the contents of the two bottles prior to use. The mixing must be accomplished by the ultimate user who is frequently a person unfamiliar with the handling of reactive chemicals. Still further, the customer for this type of product is normally not attracted to and, in fact, may be repelled by the need for the mixing and handling of such materials. Still further, there are certain hazards present including the splashing of the oxidizing agent on the clothing, into the eyes, and the like. For all of these reasons, there has been a long-recognized and unsatisfied need for a simple-to-operate, self-contained, two-compartment mixing device particularly adapted for the handling of an oxidizable dye and the oxidizing agent. The present invention, it is believed, fulfills this need by providing a device which is easy to operate, inexpensive to manufacture, and completely eliminates the need for the handling of reactive chemicals by inexperienced persons thereby doing away with the hazards discussed above.

SUMMARY OF THE INVENTION

Briefly, the present invention comprises a novel self-contained, two-compartment mixing device comprising an outer container adapted to contain fluid and having a fluidtight end closure, an inner container received in said outer container, said inner container having an end closure, said end closure of said inner container facing said end closure of said outer container to isolate the contents of the inner container from the contents of the outer container, means associated with said outer container for establishing fluid communication between said inner and outer containers to provide mixing of the contents of said containers without removing said end closure of said outer container.

In one preferred embodiment of this invention, the end closure of the outer container is provided with a spout means slidable therethrough, the inner end of said spout means being adapted to dislodge the end closure of said inner container and the opposite end of said spout means has fluid passages therein.

In another embodiment, the present invention comprises a novel self-contained, two-compartment mixing device comprising an outer container adapted to contain fluid and having a fluidtight end closure, an inner container received in said outer container, said inner container having an end closure, said end closure of said inner container facing said end closure of said outer container to isolate the contents of the inner container from the contents of the outer container, the walls of

said outer container being longitudinally and/or laterally compressible whereby upon compression of said outer container, fluid communication is established between said inner and outer containers to provide mixing of the contents of said containers. In yet another embodiment of this invention, the end closure of the outer container is provided with a sharp projection having cutting terminal surfaces extending from said end closure inwardly into said outer container, said sharp projection having cutting terminal surfaces being adapted to be compelled toward and through the end closure of said inner container by longitudinal compression of said outer container to establish fluid communication between said inner and outer containers.

It is an object of the present invention to provide a self-contained, two-compartment mixing device particularly adapted for the handling of reactive, toxic and/or noxious chemicals.

More specifically it is an object of the present invention to provide a novel self-contained, two-compartment mixing device adapted to contain an oxidizable hair dye and the oxidizing agent therefor wherein these two materials can be separately stored for prolonged periods and simply mixed at the time of use without the need for any exposure of either material to the danger of spillage or splashing.

Still another object of the present invention is the provision of a two-compartment mixing device which permits the ready mixing of reactive chemicals in a closed system to thereby appeal to inexperienced users of such materials.

These and other objects and advantages of this invention will be apparent from the more detailed description which follows taken in conjunction with the accompanying drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turning to the drawings:

FIG. 1 is a sectional side view of the preferred embodiment of the present invention;

FIG. 2 is a cross section taken along the line 2—2 in FIG. 1;

FIG. 3 is a sectional side view of the device of FIG. 1 after the outer container has been longitudinally compressed to communicate the contents of the inner and outer container;

FIG. 4 is a sectional view of the device of FIG. 1 after communication has been established between the inner and outer containers;

FIG. 5 is a cross section taken along the line 4—4 in FIG. 4;

FIG. 6 is a separate partially sectioned view of the end closure and projection for the outer container of the device shown in FIG. 1;

FIG. 7 is a side view of the projection from the closure for the outer container;

FIG. 8 shows the projection of FIG. 7 rotated approximately 45°;

FIG. 9 is a sectional side view of another embodiment of the present invention;

FIG. 10 is a cross section taken along the line 10—10 in FIG. 9;

FIG. 11 shows the device of FIG. 9 in longitudinal compression to dislodge the end closure on the inner container;

FIG. 12 shows the device of FIG. 9 after fluid communication has been established between the inner and outer containers;

FIG. 13 shows a sectional side view of yet another embodiment of this invention;

FIG. 14 shows the device of FIG. 13 in lateral compression to establish fluid communication between said inner and outer containers;

FIG. 15 shows a sectional side view of another embodiment of the present invention;

FIG. 16 shows the operation of the device of FIG. 15 in an initial stage;

FIG. 17 shows the device operation; FIGS. 15 and 16 in a subsequent stage of operation; and

FIG. 18 shows the operation of the device of FIGS. 15-17 with the parts disposed in a manner adapted for dispensation of the fluid contents.

Turning to the drawings in greater detail, the outer container 10 is provided with an outer cover 12. Within the cover 12 is end closure 14. Closure 14 is provided with dispensing spout 16 having a fluid passage 18. The external threads 20 on spout 16 engage internal threads 22 inside cover 12. Closure 14 also has a lip 24 which engages and forms a seal on the upper end 26 of container 10. The closure 14 has female threads 28 which make up with the male threads 30 on the exterior of container 10. The outer container 10 is longitudinally compressible as a result of the plurality of accordionlike undulations 32, and is normally made of a resilient plastic such as polyethylene. The end closure 14 is provided with projection 34 having four cutting blades 36 each having terminal sharp edges 38. Each blade 36 also has notches 40 therein which engage flaps formed by the blade 36 and retains the blade after fluid communication has been established, as is more fully hereinafter explained. The upper extension 42 on projection 34 is received in opening 44 of closure 14 with a snug, slip fit so that a relatively slight force can remove projection 34 from closure 14. The projection 34 is also provided with four flap restraining or depressing means 46. The inner container 48 is normally made of glass or a plastic. As can be seen in FIG. 2, the container 48 is preferably pentagonal in cross section. However, the cross-sectional configuration of the inner container is by no means critical. Container 48 is provided in proximity to its closed end with indentations 50 in each of its five longitudinal edges. The indentations 50 are adapted to receive the inner edge of the bottom most of the accordionlike undulations 32 with a snap fit. In this way the container 48 is restrained from longitudinal movement with respect to the outside container 10 during handling and shipping. Inner container 48 is provided at its opened end with pierceable cap 52 held in place by threads 54.

In the operation of the device shown in FIGS. 1 through 8, the hair dye is normally stored in one container and the oxidizing agent in the other container and the parts assembled in the fashion as shown in FIG. 1. When it is desired to admix the two ingredients, the user simply compresses the package in an accordionlike fashion as shown in FIG. 3 to cause the projection 34 with its sharp cutting edges 38 to pierce the cap 52 on the inner container 48. The flap-restraining means 46 hold the flaps 56 cut out by the sharp projection in an open position as shown in FIG. 3 to permit good fluid communication and mixing of the contents of the inner and outer containers. The notches 40 on blades 36 can engage flaps 56 so that when the longitudinal compression force is released as shown in FIG. 4, the extension 42 slips from opening 44 and the projection 34 remains in the inner container 48. Hereafter, the end closure 14 is removed and the contents of the device dispensed through the fluid passage 18 in spout 16.

Turning to the alternate embodiment shown in FIGS. 9 through 12, the outer container 58 is provided with accordionlike undulations 60. The container 58 is provided with end closure 62 covered by outer cap 66. The closure 62 is provided with a fluid passage 68 in the threaded connection 70. The inner container 72 is provided with a plug 74 provided with sealing ring 76. In the operation of this device, when the outer container is partially or totally filled with fluid, the plug 74 may be dislodged from the inner container 72 in the manner shown in FIG. 11 simply by applying a longitudinally compressive force to the outer container 58. The hydraulic action of the fluid in the outer container on the plug dislodges the plug. Thereafter the outer cap 66 is removed and the mixed contents of the device dispensed through fluid passage 68.

The device of FIGS. 13 and 14 represent a much simplified form of the invention which is adequate for the simple mixing of many chemicals, although it obviously cannot perform all of the functions of the devices previously discussed. In FIGS. 13 and 14, laterally compressible container 78 is provided with end closure 80. The fluidtight seal is provided by complementary threads 82. The inner rigid container 84 has a sealing plug 86 which is dislodgable into the container 84 by hydraulic pressure. Fluid communication is established simply by squeezing container 78 as shown in FIG. 14.

In FIGS. 15 through 18, inclusive, there is shown still another and preferred embodiment of this invention. In these Figures, the outer container 88 is provided with an outer cover 90 and an end closure 92. The inner container 94 is provided with an end closure 96 having a centrally located raised portion 98. Passing through end closure 92 is spout means 100, the lower rounded end 102 thereof being adapted to contact said raised portion 98 of said closure 96. The other end of said spout means is provided with fluid passages 104. The spout means 100 fits snugly but slidably in the opening in end closure 102. The fit is snug enough to provide a fluidtight seal, and yet permit downward movement through end closure 102 under a reasonable force. The spout means 100 will not slide through end closure 102 under gravitational force alone, and hence the fit may be referred to as a "force fit." During the storage and in the initial phase of operation, the end of spout means 100 is provided with a plunger cap 106. Initially, the device has the appearance shown in section in FIG. 15. In operation, the outer cover 90 is first removed and downward pressure is applied on the plunger cap 106 to cause the end 102 of spout 100 to contact the raised portion 98 and dislodge the plug 96 into the interior of container 94 as shown in FIG. 17. Thereafter, the plunger cap 106 is removed leaving the fluid passages 104 in contact with the interior of the outer container. In this way, the mixed fluid contents can be dispensed through passages 104.

Those skilled in the art will immediately recognize that the device of the present invention is applicable to the mixing of a wide variety of liquid and liquid-solid combinations of reactive and nonreactive materials. Accordingly, while the invention has been described with particular reference to the application of the mixing of an oxidizable dye with an oxidizing agent it is to be understood that the invention is not limited thereto but envisions the use of the device in the mixing of a wide variety of chemicals, medicaments, and other consumer and industrial products.

The rigid and compressible containers which have been described can be molded or otherwise formed from a wide variety of materials which will be evident to those skilled in the art.

The outer container of this invention is compressible longitudinally or laterally, preferably the former. As will be evident from the foregoing, the outer container may at once be both longitudinally and laterally compressible.

Having fully described the invention it is intended that it be limited only by the lawful scope of the appended claims.

I Claim:

1. A self-contained, two-compartment mixing device comprising an outer container adapted to contain fluid having a fluidtight end closure, an inner container completely received in said outer container, said inner container having an end closure, said end closure of said inner container facing said end closure of said outer container to isolate the contents of the inner container from the contents of the outer container, the end closure of said outer container being provided with a spout means slidable therethrough whereby upon said spout means being slid through said end closure of said outer container, the end closure of said inner container is at least partially dislodged into the interior of said inner container and fluid communication is established between said inner and outer containers to provide mixing of the contents of said containers.

2. A self-contained, two-compartment mixing device comprising an outer container adapted to contain fluid having a fluidtight end closure, an inner container completely received in said outer container, said inner container having an end closure, said end closure of said inner container facing said end closure of said outer container to isolate the contents of the inner container from the contents of the outer container, a dispensing spout slidably disposed through said end closure, an outer cover on said dispensing spout and said end closure and sealing on said outer container, the outer end of said dispensing spout being covered by a removable plunger cap, said spout being adapted to be downwardly slid through said

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end closure by pressure on said plunger cap whereby the lower end of said spout at least partially dislodges the closure of said inner container into the interior of said inner container to establish fluid communication between said inner and outer containers to provide mixing of the contents of said containers, said plunger cap being removable to permit the dispensation of the mixed contents through said dispensing spout.

3. A self-contained, two-compartment mixing device comprising an outer container adapted to contain fluid having a fluidtight end closure, a projection having cutting terminal surfaces and flap-restraining means extending from said end closure inwardly into said outer container, an inner container completely received in said outer container, said inner container having an imperforate end closure, said end closure of said inner container facing said end closure of said outer container to isolate the contents of the inner container from the contents of the outer container, the walls of said outer container being longitudinally compressible whereby upon compression of said outer container said sharp projection is compelled toward and into said imperforate end closure and said restraining means holds open flaps cut in said end closure causing said flaps to project downwardly into the interior of said inner container, said flaps being cut by terminal surfaces of said projection to establish fluid communication between said inner and outer containers to provide mixing of the contents of said containers.

4. A self-contained, two-compartment mixing device comprising an outer container adapted to contain fluid having a fluidtight end closure, a projection having cutting terminal surfaces and flap-restraining means extending from said end closure inwardly into said outer container, said end closure also being provided with an outwardly extending dispensing tip, threadably connected to said tip a removable cap which also forms a seal on said outer container, an inner container completely received in said outer container, said inner container having an imperforate end closure, said end closure of

said inner container facing said end closure of said outer container to isolate the contents of the inner container from the contents of the outer container, the walls of said outer container being longitudinally compressible whereby upon compression of said outer container said sharp projection is compelled toward and into said imperforate end closure and said restraining means holds open flaps cut in said end closure causing said flaps to project downwardly into the interior of said inner container, said flaps being cut by terminal surfaces of said projection to establish fluid communication between said inner and outer containers to provide mixing of the contents of said containers.

5. A self-contained, two-compartment mixing device comprising an outer container adapted to contain fluid having a fluid tight end closure, a dispensing spout extending from said end closure, a cover encasing said spout and said end closure and joined to said spout by a threaded connection, a projection comprising blades having cutting terminal surfaces and retaining notches, and flap-restraining means, said projection extending from said end closure inwardly into said outer container, an inner container completely received in said outer container, said inner container having an imperforate end closure, said end closure of said inner container facing said end closure of said outer container to isolate the contents of the inner container from the contents of the outer, the walls of said outer container having a series of flexible undulations in proximity to its closed end to provide longitudinal compressibility of said outer container, whereby upon compression of said outer container said sharp projection is compelled toward and said blades pierce said imperforate end closure, said restraining means holds open flaps cut in said end closure by said cutting terminal surfaces to cause said flaps to project downwardly into said inner container and establish fluid communication between said inner and outer containers to provide mixing of the contents of said containers, and said retaining notches hold said projection in said end closure after release of compression.

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