Dec. 12, 1961 L. L. LERNER 3,012,695

MULTI-COMPARTMENT CONTAINER

Filed July 3, 1959

Fig. 1.

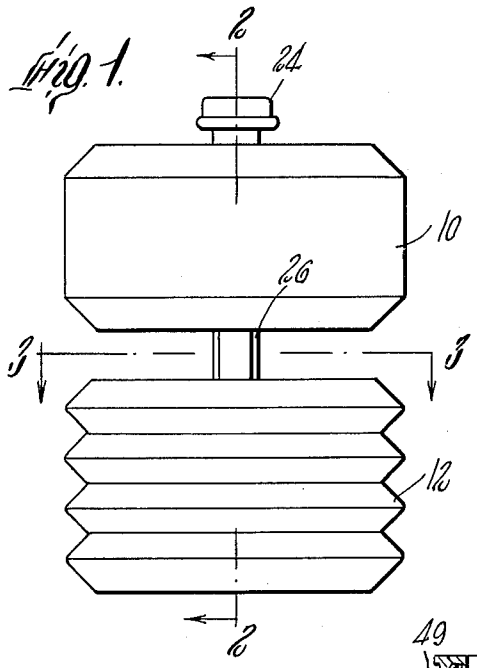


Fig. 2.

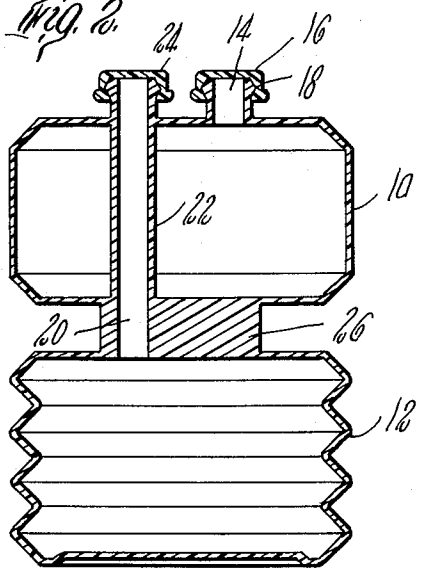


Fig. 3.

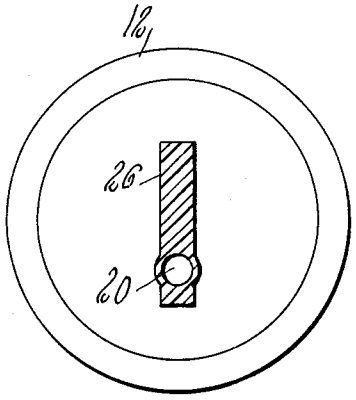


Fig. 4.

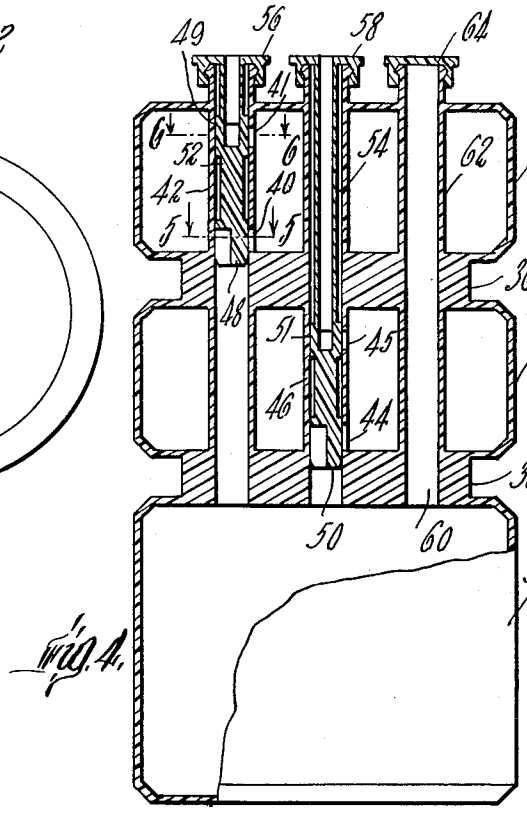


Fig. 5.

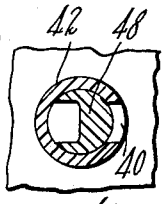
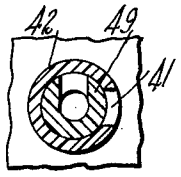


Fig. 6.



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3,012,695
MULTI-COMPARTMENT CONTAINER

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7 Claims. (Cl. 222—129)

This invention relates to a multi-compartment container and pertains more specifically to a multi-compartment container of the squeeze-bottle type having flexible walls.

One object of the invention is to provide a multi-compartment container in which the individual compartments are sealed from each other, but are arranged to deliver their contents at locations adjacent each other to permit the contents to be mixed at the time of delivery.

Another object is to provide a squeeze-bottle-type container having a plurality of individual compartments arranged in series so that each compartment can be collapsed by the application of external pressure independently of the other compartments, the delivery apertures of all compartments being arranged to deliver the contents of all compartments at locations adjacent each other.

Still another object is to provide a multi-compartment container of the squeeze-bottle type having walls of flexible synthetic plastic material, the container being of unitary and simplified construction adapted to be manufactured by a molding or forming operation.

Other and further objects will be apparent from the drawing and from the description which follows.

In a variety of situations, it is desirable that the several ingredients of a composition be kept separate until immediately before the composition is used. This is true, for example, in the case of certain adhesive bonding cements in which a chemical interaction occurs between the several ingredients of a composition to provide a strong and permanent adhesive bond. It is also true in the case of certain compositions for the permanent waving of hair in which a catalyst is employed to promote interaction of the ingredients with each other or with the hair. In addition, there are cosmetic compositions such as hair shampoos in which it is desirable to incorporate a number of different ingredients for their specific effect upon the hair, but which ingredients tend to interact with each other, rendering the composition unstable during storage over prolonged periods of time. In all of these cases as well as in many others which will be apparent to those skilled in the art, it is desirable that the several ingredients of a composition be packaged separately and kept unmixed until the time of use. It is also important in such cases that the relative proportions of the separate ingredients be subject to control so that the finished composition will have the necessary properties. In other cases there may be two or more separate materials which are to be used sequentially in a process, as for example waving lotion for permanent waving of hair and neutralizer therefor, and which must be kept separate during storage because of their tendency to destroy each other.

The container of the present invention makes it possible to maintain measured quantities of two or more ingredients of a composition separate and apart during storage prior to their use and at the same time ensures that they will be available in the proper relative proportion to each other at the desired time.

There are shown in the attached drawings two embodiments of the present invention in which:

FIG. 1 is a view in elevation of a container constructed in accordance with the present invention;

FIG. 2 is a view in vertical section taken along line 2—2 of FIG. 1;

FIG. 3 is a view in horizontal section taken along line 3—3 of FIG. 1;

FIG. 4 is a view in elevation, partly broken away and in section, of another embodiment of the invention;

FIG. 5 is a view in section taken along line 5—5 of FIG. 4; and

FIG. 6 is a view in section taken along line 6—6 of FIG. 4.

As appears from the drawings, one embodiment of the present invention comprises a single unitary container structure which may be and preferably is constructed of a flexible synthetic plastic composition such as polyethylene or a plasticized vinyl resin. In the embodiment shown in FIGS. 1 to 3, there are included two compartments **10** and **12** which are permanently secured together in spaced end-to-end relation. The walls of these containers by reason of their thinness and the flexible nature of the composition from which they are made are readily collapsed by the application of external pressure, as for example by squeezing the compartments manually. It will be noted that because of the spaced relation of the two compartments **10**, **12**, it is possible to squeeze or compress each compartment completely independently of the other compartment, thus making it possible to exercise complete control over the quantity of material expelled from the individual compartments.

In order to facilitate collapse of the compartments, they may have a pleated or bellows-type wall construction, as illustrated in the case of compartment **12**, and this bellows construction is preferred for some purposes.

However, it will be understood that the precise shape or configuration of the compartments and of their walls may be varied over a wide range. Although the compartments of the embodiment illustrated have a circular cross-sectional configuration, it will be appreciated that they may be of rectangular or any other polygonal cross-sectional configuration if desired.

Compartment **10** is provided with an outlet **14** in the end of the compartment remote from compartment **12**. A cover or lid **16**, which may be made of the same flexible synthetic plastic material as the container itself, is provided to close outlet **14**. Cover **16** is of the snap-fitting type which engages a projecting shoulder **18** around the rim of outlet **14**, or it may be hinged or mounted on the outlet in any other conventional manner if desired.

Compartment **12** is likewise provided with an outlet **20** in its corresponding end, i.e., in the end adjacent compartment **10**, as best appears in FIG. 2. A conduit **22** in the form of an imperforate hollow tube which may be made of the same flexible synthetic plastic as the remainder of the container is secured to outlet **20** and extends through compartment **10** to a position adjacent outlet **14**. The open or delivery end of conduit **22** may be sealed by means of a cap **24** in the same fashion as outlet **14** is sealed. Conduit **22** is sealed to the end walls of container **10**, so that there is no communication between the two compartments. Conduit **22** thus serves to maintain the two compartments secured to each other in fixed relation. In addition, there is preferably provided as a supplemental supporting connection a web **26** of synthetic plastic material extending laterally outwardly from conduit **22** in the region between the two compartments **10** and **12** and joining the two opposing end walls together.

As will be clear from the foregoing description, two separate ingredients in liquid or free-flowing powder form may be placed in the separate compartments **10** and **12** of the container and will remain completely separate until

such time as they are to be used. The contents of each compartment may be dispensed simultaneously or sequentially through their respective outlets which are positioned closely adjacent each other to permit mixing of the two compositions at the time of delivery if desired.

The container may readily be constructed by a simple blow-molding operation from a single parison, conduit **22** being maintained in position within the parison during the molding operation by means of an appropriate mandrel. Heat-sealing of the walls of the compartments to the wall of conduit **22** and formation of web **26** by a compression or squeezing of the parison may occur simultaneously with the blowing of the separate compartments.

While the embodiment shown in FIGS. 1 to 3 contains only two compartments, it will be apparent that as many compartments as are desired may be provided, each compartment having an outlet in its corresponding end connected by means of a suitable conduit which extends through all of the compartments ahead of it in the series and terminates adjacent the outlets of all the other compartments at one end of the container.

In FIGS. 4, 5 and 6 of the drawing, there is shown another embodiment of the invention in which the container includes three compartments **30, 32, 34** which are mounted in spaced end-to-end relation, being connected and rigidly held together by means of interposed webs **36, 38** of the same plastic material from which the remainder of the container is constructed. The compartments are of thin-walled construction so that they are flexible and compressible by the application of manual pressure. Compartment **30** is provided with two outlets **40, 41** which open into conduit **42**. This conduit communicates with compartment **34** and has another end extending outwardly beyond compartment **30**. Similarly, compartment **32** has two outlets **44, 45** which open into a conduit **46** which in turn communicates with the same compartment **34** and which has its opposite end extending outwardly beyond compartment **30**. Mounted in conduits **42** and **46** are valve members **48, 49** and **50, 51** which are of molded plastic construction integral with their respective valve stems **52, 54**. The valve stems **52, 54** are hollow at their upper ends so that valve members **49, 51** communicate with the outer ends of the valve stems. Integral with the outer ends of the valve stems **52, 54** are flanges **56, 58** which seat on annular ribs projecting from conduits **42, 46** and which serve to maintain the valve members in proper axial position to mate with their respective apertures **40, 41, 44, 45**. Compartment **34** is provided with an outlet **60** to which is connected conduit **62** which terminates beyond the end face of compartment **30** and is provided with a cap **64** which seals its delivery end.

When the valves are in the position shown in FIG. 4 all of the apertures are closed so that compartments **30** and **32** are sealed. Compartment **34** is also sealed by cap **64**. By turning flanges **56** and **58** in a clockwise direction 90° (as seen from the top), apertures **41** and **45** are opened and the contents of compartments **30** and **32** may be independently dispensed through the hollow portions of valve stems **52, 54** either by inverting the container or by squeezing the flexible compartment walls or both. By turning flanges **56** and **58** an additional 90° in a clockwise direction apertures **40** and **44** are opened while apertures **41, 45** are closed again, permitting the contents of compartments **30, 32** to flow into compartment **34**. This makes it possible to mix immediately before use materials which must be stored separately. Compression of compartments **30, 32** serves to accelerate and facilitate transfer of their contents to mixing compartment **34** where they may be mixed simply by shaking or, if desired, by compressive distortion of the thin-walled compartment **34**. After mixing the material is dispensed through conduit **62** upon removal of cap **64**.

The compartments **30, 32** may readily be filled with the desired materials by means of a conventional vacuum filling machine having an elongated nozzle which may be introduced through the hollow valve stems and valves **49, 51** when the latter are open to communicate through apertures **41, 45** with the interior of compartments **30, 32**.

Although specific embodiments of the invention have been described herein, it is not intended to limit the invention solely thereto, but to include all of the obvious variations and modifications within the spirit and scope of the appended claims.

What is claimed is:

1. A container having a plurality of individual compartments secured together in series, each compartment having a flexible wall and being individually collapsible independently of the others by the application of external pressure, the compartment at one end of said container having an outlet opening directly to the outside of said container, each of the remaining compartments having an outlet in its corresponding end, a conduit connected to each of the last said outlets extending to said one end through each of the intervening compartments, each said conduit having a delivery end opening to the outside of said container adjacent the first said outlet, a conduit also connected to the outlet of the compartment at said one end of the container and communicating with a selected one of the remaining compartments, all of the remaining compartments also communicating with said selected compartment, and means for closing and opening each said outlet to permit mixing of the contents of the several compartments within said selected compartment.

2. A container as defined in claim 1 in which means is provided for maintaining the delivery ends of said conduits closed until said mixing is complete.

3. A container as defined in claim 2 in which said compartments are constructed of flexible synthetic plastic material.

4. A container having two individual compartments arranged in end-to-end relation, each having a thin flexible wall and being individually collapsible independently of the other by the application of external pressure, an outlet in the end of the first compartment remote from the second compartment, an outlet in the corresponding end of the second compartment, and means securing said compartments together in said end-to-end relation, comprising a transverse web extending from the bottom of said first compartment to the top of the second compartment and including a conduit extending from the outlet of said second compartment through the first said compartment and terminating adjacent the first said outlet, said conduit being sealed from the interior of said first compartment, the material of said web being integral with the material from which said compartments are formed, said web and conduit serving to support said first compartment in fixed position on said second compartment.

5. A container as defined in claim 4 in which said compartments are constructed of flexible synthetic plastic material.

6. A container having a plurality of successive individual compartments arranged in end-to-end relation, each having a thin flexible wall and being individually collapsible independently of the other by application of external pressure, a first outlet in the end of the first of said compartments remote from the next successive compartment, means securing all of said compartments together fixed in said end-to-end relation, said means including conduits each communicating with one of the successive compartments and terminating outside the first said compartment adjacent the first said outlet, conduits connecting a selected one of said compartments with all of the remaining compartments, and means for selectively opening and closing each of said conduits.

7. A container having a plurality of individual compartments secured together in series, each compartment having a flexible wall and being individually collapsible independently of the others by the application of external pressure, the compartment at one end of said container having an

outlet opening directly to the outside of said container, each of the remaining compartments having an outlet in its corresponding end, a conduit connected to each of the last said outlets extending to said one end through each of the intervening compartments, each said conduit having a delivery end opening to the outside of said container adjacent the first said outlet, and a transverse web rigidly interconnecting each successive pair of compartments, said

web being integral with each adjacent compartment, whereby each successive compartment serves as the sole support for all the compartments ahead of it in the series.

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