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COMBINED POURING SPOUT AND CLOSURE STRUCTURES

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This invention relates to new and improved combined pouring spout and closure structures. This application is a continuation-in-part of the co-pending U.S. Patent Application Serial No. 630,398, filed December 24, 1956, entitled, Closures.

A wide variety of different combined pouring spout and closure structures have been developed in the past. A large number of these prior structures have been of commercial character, and many of them are commonly used today on collapsible tubes, bottles, tin cans and other related types of containers. Practically all of these prior structures suffer from at least one or more limitations or defects which tend to limit their commercial application. The usual limitation with respect to a prior combined pouring spout and closure structure is the fact that it is relatively costly. Also many of the prior structures are limited in their application because of the difficulty in forming a satisfactory seal with the spout utilized.

In the aforegoing parent application, a number of different closure structures were disclosed. These closure structures are considered to be more valuable than prior combined pouring spout and closures because of the fact that they are formed out of a single piece of material by a single operation. Thus, the closures described and claimed in the aforegoing patent application can be easily manufactured from such materials as polyethylene, or the like, by simple injection molding techniques at a very small cost. All of the different closures shown in the aforegoing patent application are considered to be of commercial stature. However, these closures suffer from a number of limitations.

One of these limitations lies in the fact that within these closures set forth in the foregoing patent application a rigid spout structure is utilized in such a manner that it is mounted in the center of a flexible membrane or diaphragm. When a closure such as is set forth in this application is deformed to a closed configuration, the membrane bends, and means are provided which serve to latch the spout or hold the spout essentially against the side of this membrane. With this type of construction a comparatively large membrane is required; many types of containers have such small tops that such a membrane cannot be used with them.

A broad object of this invention is to provide combined pouring spout and closure structures which constitute an improvement over the aforegoing and other related types of devices. A more specific object of this invention is to provide structures of this category which can be easily and conveniently formed at a comparatively low cost out of a single, unitary piece of material. A related object of this invention is to provide combined pouring spout and closure structures in which the spout utilized is designed to be rotated from an open position to a closed position. Another object of the invention is to provide structures of this category in which the spout, when in a closed position, is resiliently held in such a manner that an effective seal is formed at each end of this spout.

Because of the nature of this invention it is not considered necessary to set forth in this description a further long list of the various objects and advantages of it. Various other objects and advantages of the invention will be fully apparent to those skilled in the art to which this invention pertains from a detailed consideration of the remainder of this description including the appended claims and the accompanying drawing in which:

Fig. 1 is a perspective view of a combined pouring spout and closure structure of this invention located upon a container in an open position;

Fig. 2 is a top elevational view of the structure shown in Fig. 1;

Fig. 3 is a cross-sectional view taken at line 3—3 of Fig. 2; and

Fig. 4 is a similar cross-sectional view showing the combined pouring spout and closure in a closed position.

In all figures of the drawing like numerals are used to designate like parts wherever convenient for purposes of illustration and explanation. It is to be understood that the accompanying drawing is not to be taken as limiting the invention in any respect inasmuch as a wide variety of differently appearing structures utilizing the essential principles or features of this invention may be readily designed by those skilled in the art to which this invention pertains.

As an aid to understanding the invention, it may be stated in essentially summary form that it involves combined pouring spout and closure structures, each of which is formed so as to include: a peripheral skirt adapted to be attached to a container, said skirt having a top; resilient latch means supported on the top of said skirt and upward projecting from one part of said skirt so as to be spaced from said latch means; a pouring spout mounted on the top of said skirt adjacent to said upward projecting wall; and diaphragm means connecting said spout, part of said peripheral portion of said skirt and said latch means, said diaphragm means being capable of deformation whereby when said spout is moved by virtue of the resiliency of said diaphragm means the base of said spout rests against said upward wall and the skirt end is held by engagement with said latch means. With this construction the latch means serves to resiliently hold the spout in position so as to firmly establish a seal between the end of the spout and the wall and between the portion of the spout engaging this latch means. Thus, a double seal is obtained. With this construction the entire top of the peripheral skirt is closed by various wall means in addition to the diaphragm means specifically indicated in this preceding sentence.

The actual nature of the invention is best more fully explained by referring directly to the accompanying drawing. Here there is shown a combined pouring spout and closure structure 10 of this invention. This closure 10 is adapted to be formed by established manufacturing techniques out of various conventional semi-flexible and flexible materials. Thus, the closure 10 may be conveniently manufactured by a single injection molding operation out of such materials as polyethylene or various similar thermoplastic resins and other similar materials which are capable of deformation. The closure 10 is, in essence, formed to a number of parts even though it is preferably formed out of a single unitary piece of material.

This closure 10 includes a peripheral skirt 12 which is adapted to be connected to a container 14 in an established manner by means of a snap ring or bead 16 formed on the interior of this skirt 12. If desired, the bead 16 may be replaced by screw threads or other types of fastening means. If desired, the entire closure 10 including the
skirt 12 may be formed as an integral part of a collapsible container. Thus, for example, the entire closure 10 can be formed so as to be integral with the walls of a polyethylene tube-like container.

Upon the top edge 18 of the skirt 12 there is located a comparatively short upstanding wall 20. Preferably this wall 20 is, in effect, a continuation of part of the skirt 12 although this is not necessarily the case. In any event, the wall 20 is preferably of a comparatively rigid character; further, within the interior of this wall there is preferably formed a small triangular bead 22 having sloping walls which serves a sealing purpose as will hereinafter be described. Upon the top edge of the wall 20 there is located a short flexible wall section 24 which is adapted to hold an elongated spout 26. This spout 26 has a top 28 and a bottom 30; it will be noted that both the top and the bottom, 28 and 30, respectively, extend from opposite sides of the wall section 24; that a passage 32 extends completely through this spout 26; and that the bottom has a shape corresponding to the shape of the bead 22. Preferably this spout 26 is of a triangular shape so as to have a flat top side 34 and a sloping bottom side 36. The shape of these sides 34 and 36 are important when it comes to the actual use of the closure 10.

Thus, for example, the spout 26 can be of a circular or cylindrical shape; the bead 22 is, in these cases, formed so as to have a shape which corresponds to the shape of the bottom 30 of the spout 26. Preferably the spout 26 is tapered substantially as shown so as to have a comparatively small top. This tapered shape aids in removing the entire closure 10 from a mold after it has been formed.

Certain of the edges of the wall section 24 are attached by means of what may be termed a diaphragm 38 to portions 40 of the top edge of the skirt 12 and to a latch member 42. The shape of the diaphragm 38 is considered to be important in this invention. In the preferred embodiment of the invention shown this diaphragm consists of a depressed shallow portion 44 adjacent to the latch member 42, an upstanding wall 46 and side walls 48 leading to the wall section 24. As will be seen from an examination of the drawing the adjoining edges of all of these portions of the diaphragm 38 are curved so that there are no sharp angles which will tend to give rise to abnormal strains or stress within the closure 10.

The latch member 42 is also important in this invention. Preferably this latch member has essentially the shape of an upstanding bump 45 projection formed upon a comparatively rigid top wall 50 attached to a part of the skirt 12 and to the diaphragm 38. It will be noted that the latch member 42 has essentially a U-shaped cross-sectional configuration so as to be capable of resiliently engaging the spout 26 when this spout 26 is rotated out of the closed position as shown in Fig. 4 of the drawings. If desired, the surface 52 of this latch member 42 may be provided with a small bump 54 which is designed to fit within the top 28 of the spout 26, although this is not necessary. Such a bump 54 normally aids in forming a seal, and serves to add extra rigidity in holding the spout 26 in a closed position as shown in Fig. 4 of the drawing; it preferably has a shape corresponding to the internal shape of the interior of the top 28 of the spout 26.

When the spout 26 is held in this closed position a seal is formed between the spout 26 and the latch member 42 and another seal is formed by means of the bottom 30 of the spout 26 hitting against the bead 22 on the wall 20. As best seen in Fig. 4 of the drawing, the side of the bottom 30 of the spout 26 and the bead 22 fit against one another in the construction shown. If desired, a number of other types of structures can be employed upon the wall 20 so as to form a satisfactory seal. If the bottom 30 of the spout 26 is formed so as to have a configuration corresponding to that of the wall 20, no separate sealing means such as the bead 22 are required if the parts are accurately formed. With the bead structure shown employed sloping walls a wedging action is achieved in forming a seal, even if the parts are not formed to absolute accuracy. If desired, the bead 22 may be located so as to engage the interior of the passage 32 in the spout 26 instead of the exterior of this spout 26. In either event, the latch member 42 serves to resiliently hold or force the spout 26 against the wall 20 so as to form a satisfactory seal.

It will be obvious that in moving the spout 26 to the closed position illustrated in Fig. 4 of the drawing the latch member 42 will be temporarily deformed or spread so as to allow the spout 26 to move into this position. During such deformation of the latch member 42 the spout 26 can be moved to the position indicated. Because of the size of the spout 26 the latch member 42 does not completely return to its initial configuration in the embodiment of the invention shown so long as the spout 26 is in this closed position, but resiliently bears against the top 28 of this spout so as to cause the formation of a seal at both ends of this spout.

If desired, it is possible to modify this closure 10 by inserting within the wall 20 in the area surrounding the bead 22, or adapted to be surrounded by the bottom 30 of the spout 26 by a small slit or hole adapted to let air enter the closure 10 so as to facilitate pouring. A corresponding opening or slit may also be provided within the portion of the surface 52 of the latch member 42 which is adapted to be engaged by means of the spout 26. Such means for entrance of air to the closure 10 are normally not required for most uses of this closure, and are closed off when the spout 26 is in a closed position.

The configuration of the diaphragm 38 is to be especially noted. This diaphragm is capable of bending from the position shown in Figs. 1, 2 and 3 of the drawing to the configuration indicated in Fig. 4 of the drawing by essentially an over-center type of toggle like movement. Thus, in the particular form of the diaphragm 38 shown, the diaphragm is essentially of a metastable category inasmuch as it may be forced into a different configuration without changing its basic character. For example, the shape of the diaphragm 38 and the latch member 42 may obviously be changed at will without changing its overall basic character. Furthermore, the shape of diaphragm 38 shown is capable of being reversed, and this reversed shape can be readily extended to other shapes so as to provide other types of improvements in this field. The shape shown is considered to be the most convenient and practical shape, inasmuch as it provides a comparatively large recessed area beneath the spout 26 when the spout is in a closed position. Those skilled in the art to which this invention pertains will realize that the structure herein described can be modified to a considerable extent, without changing its basic character. For example, the shape of the diaphragm 38 and the latch member 42 may obviously be modified to provide a particular dimension or shape as desired.
be changed without changing the function of these members. Because of the nature of this invention, it is to be considered as being limited only by the appending claims forming a part of this disclosure. Whenever the term "means" is employed in these claims, the term is to be interpreted as defining the corresponding structure set forth in this specification or the equivalent of the same.

1 claim:

1. A combined pouring spout and closure which comprises: a peripheral skirt, said skirt having a top; resilient latch means supported on the top of said skirt; and upstanding relatively rigid wall projecting from one part of said skirt so as to be spaced from said latch means; a relatively rigid pouring spout mounted on said top of said skirt adjacent to said upstanding wall, said latch means and the top of said spout having mutually cooperating portions, and said wall and the bottom of said spout having mutually cooperating portions; and resilient diaphragm means connecting said spout, part of said peripheral portion of said skirt and said latch means whereby said spout may be moved by virtue of the resiliency of said diaphragm means so that the bottom thereof rests against said upstanding wall and whereby the top thereof is held by engagement with said latch means, said latch means serving to resiliently hold said spout in said position so as to establish a seal between said spout and said wall.

2. A combined pouring spout and closure which comprises: a peripheral skirt having a top; means closing the top of said skirt, at least part of said means being resilient; latch means extending from the top of said skirt; relatively rigid wall means formed on said skirt so as to be located on the interior thereof; a relatively rigid spout having a passage found therein extending through said means closing the top of said skirt, said spout having a top and a bottom positioned on opposite sides of said wall means, said latch means and the top of said spout having mutually cooperating portions, and said wall and the bottom of said spout having mutually cooperating portions, said first mentioned means being capable of deformation by virtue of its resiliency so that said spout may be moved so that the top of said spout is held by said latch means and so that the bottom of said spout fits against said wall means.

3. A combined pouring spout and closure as defined in claim 2 wherein said diaphragm means is of a metastable character.

4. A combined pouring spout and closure as defined in claim 2 wherein said means defining an internal surface comprises a wall having a bead formed thereon, the bottom of said spout being designed to wedge against said bead so as to form a seal.

5. A combined pouring spout and closure as defined in claim 2 formed out of a single piece of material having substantially the physical properties of polyethylene as a unitary body.

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