CONTAINERS AND CLOSURES THEREFOR

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This invention is concerned with a modification of thin-walled containers or closures of the kind forming the subject of United States patent application 853,869.

In a thin-walled container or a thin-walled closure for a container forming the subject of the above application the wall of the container or closure is formed with a protrusion so shaped that the base profile thereof includes a corner such that when pressure is applied to the protrusion a concentrated load is transmitted to a localized area or point of the wall adjacent to the corner which is thus ruptured, and in a preferred arrangement described in the specification of the above application the protrusion comprises two flat sides which intersect on a line or edge which is inclined at a substantial angle to the general plane of the wall adjacent to the protrusion, the edge formed by the intersection of the two flat sides making an angle with the plane in which the base profile of the protrusion lies of not less than 60° and preferably about 90°.

It is an object of the present invention to provide a modification of a thin-walled container or closure of the kind forming the subject of the above application which will be particularly adapted not exclusively for application to containers or closures for containers which are to be contained powdery or granular fluid substances.

In the modification of a container or a closure for a container as claimed in the above application according to the present invention the protrusion is so shaped that the corners of the protrusion or the base profile of the protrusion when a force is applied to the end of the protrusion in a direction towards the base of the protrusion a concentrated load is applied simultaneously and substantially similarly to each of the localized areas or parts of the wall adjacent to the corners whereby the wall will be ruptured at two or more points around the base of the protrusion to provide two or more apertures for discharge of the contents of the container. Thus each of the corners will lie at the inner end of an edge formed where two sides of the protrusion meet and lying at a substantial angle (preferably between 60° and 90°) to the plane in which the base profile of the protrusion lies.

In most cases the protrusion provided in the wall of a container or closure for a container according to the present invention will have a base profile having three or more corners and these corners will be equally angularly spaced around the circumference of the container. It will also be preferable when the protrusion projects outwardly to form part of the wall around the protrusion for the protrusion to lie wholly or partly below the level of a raised part or parts so formed as to prevent a flat surface against which such part or parts may rest also bearing upon the protrusion. Thus risk of the protrusion being inadvertently damaged or depressed will be reduced.

The junction between the protrusion and the part of the wall immediately surrounding it is conveniently such that each of the parts of the wall of the protrusion which extends between two of the corners runs smoothly at the base of the protrusion into the adjacent part of the surrounding wall, as by the provision of a "radius," since it has been found that this tends to ensure that when the protrusion is forced to its fullest extent through the wall on which it is formed, that is to say beyond the plane in which the base of the protrusion originally lay, the part which then extends between the apertures thus formed acts as struts to maintain what was the end of the protrusion in position and hence maintain the apertures in their open condition.

While in most cases the protrusion may project outwardly from the wall of the container or the wall of the closure for the container so that it can be depressed by the application of an inward force thereto, in some cases it may be convenient or desirable for the protrusion to project inwardly, in which case a tab or other part will be provided projecting outwardly from the end of the protrusion and capable of being gripped and pulled outwardly for the purpose of applying the required force to the end of the protrusion to cause rupture of the localized areas adjacent to the corners of the base profile of the protrusion.

Two constructions according to the invention are shown by way of example in the accompanying drawings, in which:

FIGURE 1 is a perspective view from above of one form of closure for a container according to the invention with the protrusion in its original form;

FIGURE 2 is a cross-section on the line 2—2 of FIGURE 1;

FIGURE 3 is a similar view to FIGURE 2 but showing the condition when the end of the protrusion has been pressed inwardly to rupture the material of the closure and thus provide apertures for the discharge of the contents of the container to which the closure has been applied;

FIGURE 4 is a plan view of the closure in the condition shown in FIGURE 3, and

FIGURES 5, 6, 7 and 8 are similar views respectively to FIGURES 1, 2, 3 and 4 of an alternative form of closure for a container according to the invention, the cross-section of FIGURE 6 being taken on the line 6—6 of FIGURE 5.

In the construction shown in FIGURES 1 to 4, the closure is in the form of a disc 1 of thin synthetic plastic material of a moderately brittle nature, for example polyethylene, having a rim portion 2 formed for application and sealing to the edge of a container of known general form, the part of the disc 1 within the rim 2 lying as shown substantially below the plane of the upper edge of the rim 2. Formed in the central part of the disc 1 is a circular annular groove-like depression 3 with a six-sided protrusion 4 projecting from its centre. As shown the sides of the protrusion 4 are flat and each pair of adjacent sides meets at an edge 5 so that the base profile of the protrusion is of hexagonal form with each of the corners of the hexagon lying at the inner end of one of the edges 5. As will be seen from FIGURE 2, the formation is arranged so that the depression 3 extends into the adjacent part of the depression 3 as shown at 6.

When the protrusion, which has the initial form shown in FIGURES 1 and 2, has a force applied to its outer end 6a so as to force that outer end towards the base of the protrusion, and eventually beyond the plane in which the base profile originally lay into the position shown in FIGURES 3 and 4, the concentrated load thus initially similarly applied at each of the corners where an edge 5 joins the depression 3, causes rupture of the material adjacent to these corners, after which movement of the end wall 6a through the plane in which the base profile originally lay into the position shown in FIGURES 3 and 4 causes the parts between the apertures 6a thus formed where the edges 5 originally existed to act as struts preventing the return movement of the end wall 6a so that
the closure is maintained automatically in the "open" condition shown in FIGURES 3 and 4. It will be apparent that the protrusion 4 lies wholly below the rim 2 of the closure and thus tends to be protected from unintentional depression by a flat surface which may rest upon the closure or upon which the closure may rest when applied to a container.

It will also be seen that the protrusion 4 is of slightly tapered form from its base to its end 6a so that a number of closures of the form shown can be "nested" on top of one another without becoming jammed one upon another.

In the alternative construction shown in FIGURES 5, 6, 7 and 8 the closure, which is also formed of a thin synthetic comparatively brittle plastic material such as polystyrene, comprises an approximately flat rim portion 7 having a shallow external flange 8 to serve to locate the closure on the open end of a container prior to sealing, a tapered upwardly projecting part 9 which extends inwards and upwards from the rim 7 after the manner of the base part of a pyramid, and a flat depressed inner portion 10 united to the inner edge of the portion 9 by an inner rim portion 10a of the formation shown. Formed in the centre part of the flat portion 10 is a protrusion 11 of square cross-section as shown so that each pair of adjacent sides meet at an edge 12 terminating at the appropriate one of the four corners of the base profile of the protrusion.

As in the construction shown in FIGURES 1 to 4, each of the sides of the protrusion 11 preferably run smoothly into the wall 10 as shown at 13 in FIGURE 6.

It will be seen that the protrusion 11 lies wholly below the upper edge of the part 9 so as to be protected from contact with any flat surface which may rest upon this upper edge or upon which this upper edge may rest.

When the protrusion 11 is pressed inwards towards its base and eventually beyond the plane in which its base profile lay into the position shown in FIGURES 7 and 8, parts adjacent to the corners formed where the edges 12 meet the wall part 10 are first ruptured owing to the load concentration adjacent to such corners so as to provide four apertures in the closure, after which further movement of the end of the protrusion into the position shown in FIGURES 7 and 8 brings the parts between the apertures into a position in which they act as struts to prevent the return movement of the end 11a of the protrusion so that the closure is automatically then maintained in the condition shown in FIGURES 7 and 8 with the apertures indicated at 12 permanently open.

It will be appreciated that similar forms of protrusion to those shown in the drawings might be arranged to project inwardly from their surrounding walls, and a tab or the like be formed thereon or secured thereto projecting outwardly from their ends so as to enable the tab or the like to be gripped and pulled to effect the conversion from a "closed" condition similar to that shown in FIGURES 1 and 5, to an "open" condition as shown, for example, in FIGURES 3 and 7 but with the "protrusion" in its final state projecting outwardly instead of inwardly. It will further be appreciated that although the invention has been described with particular reference to a closure for a container, it may also be applied to the wall of a container itself. For example, a construction and arrangement of protrusion similar to that described with reference to FIGURES 1 and 2 or to FIGURES 5 and 6 could be applied to an end wall constituting part of a tubular container the opposite end of which is closed by application of a closure thereto.

What we claim as our invention and desire to secure by Letters Patent is:

1. A thin walled container element for flowable substances wherein the wall of said element includes a part constituting a protrusion comprising a side wall and an end, the base profile of which protrusion includes at least two corners while the side wall of the protrusion comprises parts which meet at edges one end of each of which lies at one of said corners while its other end lies adjacent to said end of the protrusion, said edges forming parts through which, when a load is applied to the end of the protrusion in a direction towards the base of the protrusion, concentrated loads are applied simultaneously and substantially similarly to each of the localized areas or parts of the wall adjacent to said corners to rupture the wall at points adjacent to said corners and thereby provide apertures adjacent to the corners for discharge of the contents of the container.

2. A thin walled container element as claimed in claim 1 in which the side wall of the protrusion comprises at least three edges each terminating at one end adjacent one of said corners.

3. A thin walled container element as claimed in claim 2 in which said corners and edges are substantially equally angularly spaced around the protrusion.

4. A thin walled container element as claimed in claim 3 in which the part of the wall surrounding the protrusion includes at least one raised part below which the protrusion lies, said raised part preventing a flat surface against which such part rests bearing upon the protrusion.

5. A thin walled container element as claimed in claim 1 in which each of the parts of the wall of the protrusion which extends between two of the said corners runs smoothly at the base of the protrusion into the adjacent part of the surrounding wall.

6. A thin walled container element as claimed in claim 3 in which the base profile of the protrusion is approximately hexagonal.

7. A thin walled container element as claimed in claim 3 in which the base profile of the protrusion is approximately square.

8. A thin walled container element as claimed in claim 1 in which the said end of the protrusion is of substantial area.

9. A thin walled container element as claimed in claim 3 in which the said end of the protrusion is of substantial area.

No references cited.