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Gouget

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[54] **CONTAINER WITH UNSTOPPERING SYSTEM AND MEANS FOR ITS MANUFACTURE**

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Apr. 16, 1973 France 73.13624

[52] **U.S. Cl.** **215/33;** 215/253
[51] **Int. Cl.** **B65d 1/02;** B65d 17/24
[58] **Field of Search** 215/2, 32, 33, 34, 252, 215/253

[56] **References Cited**

UNITED STATES PATENTS

832,452	10/1906	Bloom	215/33
955,309	4/1910	Bebler	215/33
1,012,319	12/1911	Bley	215/33
2,324,237	7/1943	Reichel	215/32
2,806,620	9/1957	Blanch	215/251
3,083,858	4/1963	Biedenstein	215/32

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[57] **ABSTRACT**

A container of plastic material made in one piece with its neck, the neck being adapted for cooperation with a stopper to be irremovably inserted therein. The neck is provided with incorporated means to weaken its strength along a section whereby the section may be severed by hand to permit removal of the stopper from the neck portion located beneath the section.

12 Claims, 14 Drawing Figures

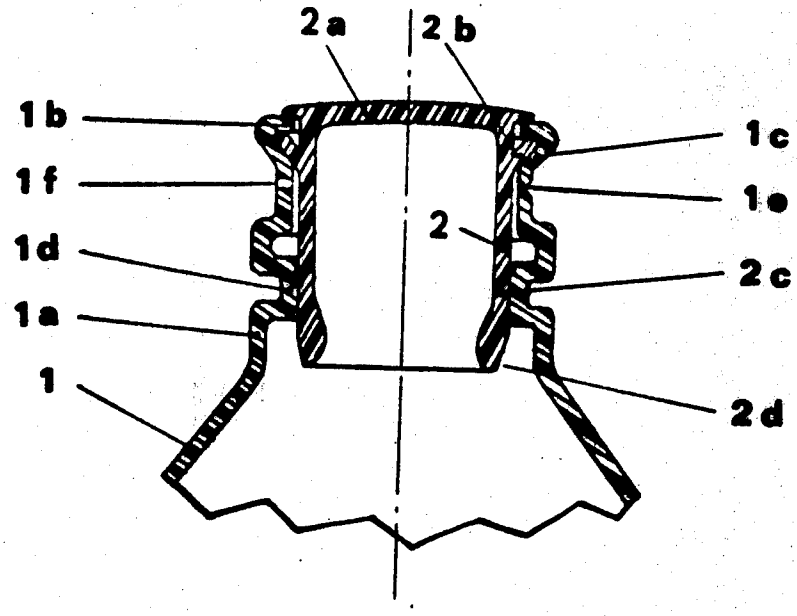


Fig. 1

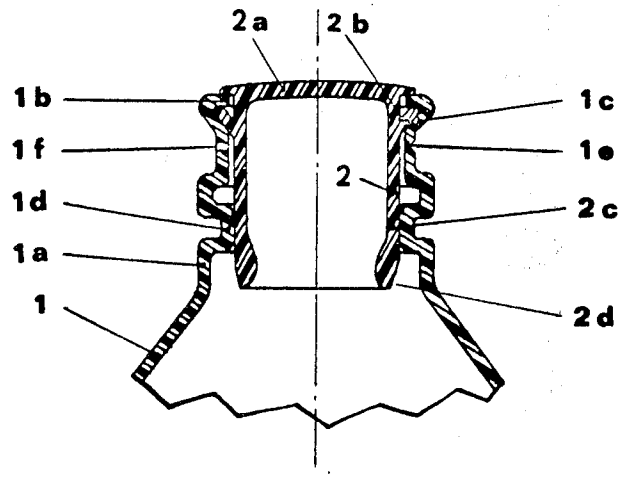


Fig. 2

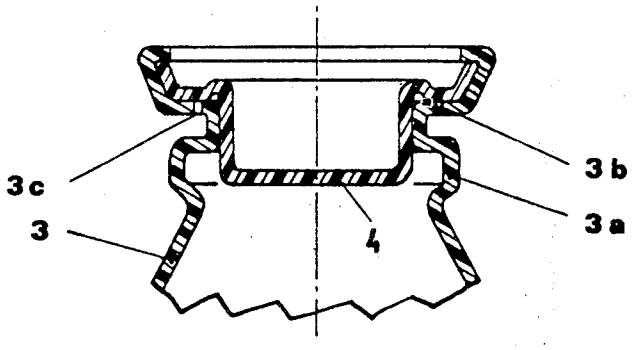


Fig. 3

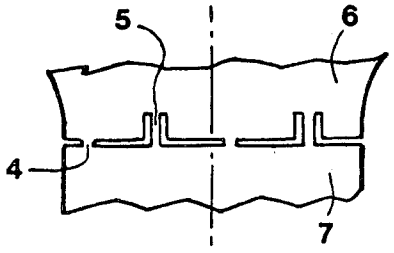


Fig. 4

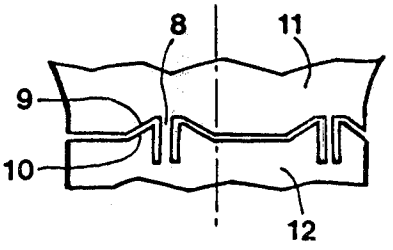


Fig. 5

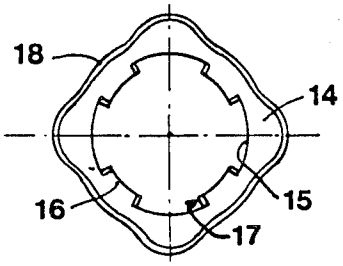


Fig. 6

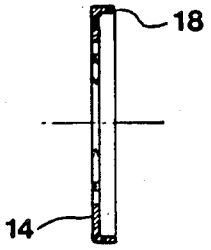


Fig. 7

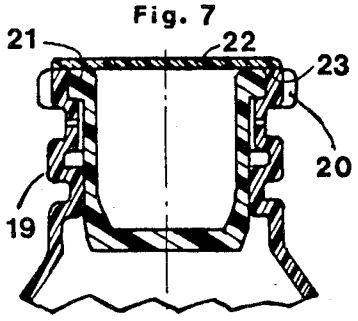


Fig. 8

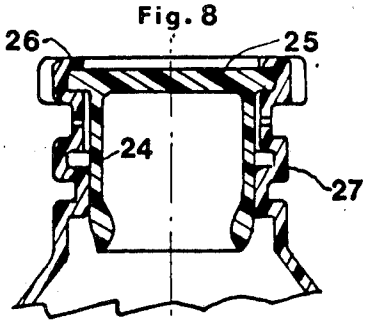


Fig. 9

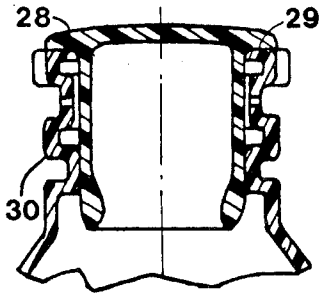


Fig. 10

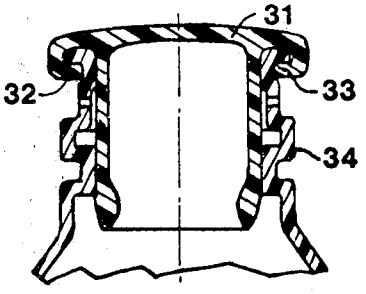


Fig. 11

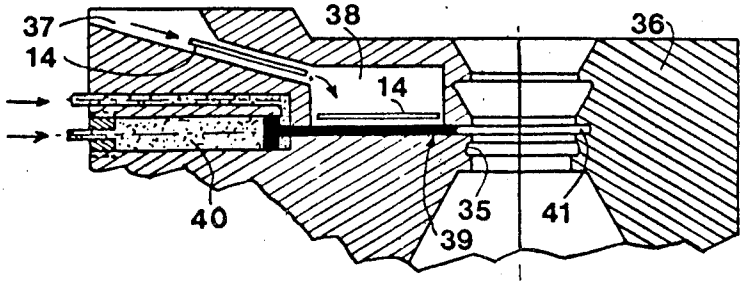


Fig. 13

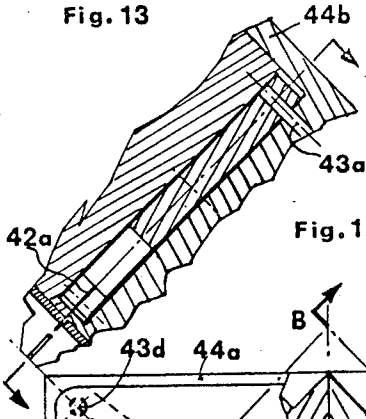


Fig. 14

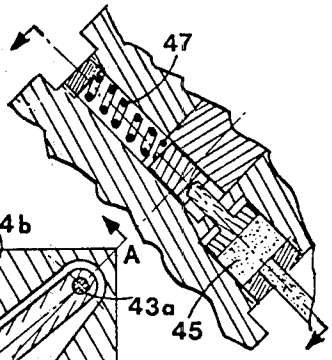
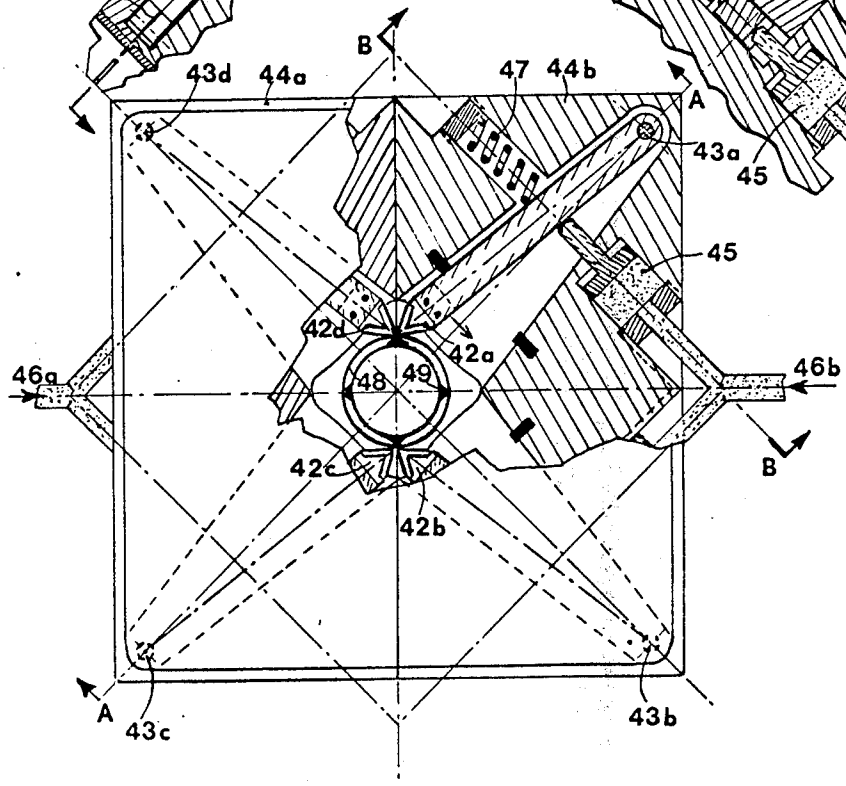


Fig. 12



CONTAINER WITH UNSTOPPERING SYSTEM AND MEANS FOR ITS MANUFACTURE

This invention relates to containers, for example, bottles, flagons, cans and other vessels made in one piece with their necks in plastic material, and to apparatus for their manufacture.

In known containers of this kind, a stopper plugs the neck of the container and an encapsulating system crimps a part of the neck to seal the stopper. With these arrangements, a portion of the capsule which caps the stopper or which is integral with it has to be destroyed in order to unstopper the neck.

These sealed stoppering systems are expensive and lack simplicity. The user must exercise a certain amount of care to avoid cutting himself with metal capsules. In addition, stoppers topped by capsules offer little grip for holding, which makes it difficult to remove the stoppers.

In accordance with the present invention, there is provided a container of plastic material made in one piece with its neck, the neck being adapted for cooperation with a stopper to be irremovably inserted in the neck and having a weaker section whereby the severing by hand of the neck portions on either side of the weaker section permits to remove the stopper.

In a preferred embodiment the weaker section of the neck is provided by slots and/or grooves and/or apertures in the neck.

The means for non-removably retaining the stopper and the weaker neck section are located above the level at which the stopper seals with the container neck.

The parts of the neck on either side of the weaker section are connected together by bridge pieces located between the apertures and/or slots defining the said section. One method of severing these bridge pieces to release the sealing stopper consists of holding the container in one hand and holding the neck portion above the weaker section with the other, then applying a relative twisting action between the two which breaks the bridge pieces, the strength of which has been calculated for this purpose.

The severing of these bridge pieces is facilitated by having bridge pieces of at least two different lengths, so that the shorter bridge pieces are severed first, followed by the longer bridge pieces.

The severing of these bridge pieces is also facilitated by having the bridge pieces arranged between longitudinal apertures which are inclined to the horizontal. In this case the twisting action is transformed into a pulling action when the opposite aperture edges slide one on top of the other. An optimum choice of inclination results in a large pulling force for fracturing the bridge pieces.

In a further preferred embodiment, the container is made in a mould designed to suit a blown air extrusion machine having a calibrating mandrel. A crown is incorporated into the container neck during the moulding process to provide the weaker neck section. The crown can produce a peripheral groove in the neck and may have inwardly directed projections which totally pierce the neck wall with the cooperation of the calibrating mandrel. The crown is preferably of metal and may be coated with silicon to prevent it sticking to the plastic material of the neck.

A twist with the hand on the top part of the neck while holding the container firmly is sufficient to sever the bridge pieces in the weaker part of the neck defined by the crown.

The severing of the neck by a twisting action is facilitated by forming the neck above the weaker section with a rough or wave form periphery rather than smooth cylindrical, so that it becomes easier to grip.

The projections in the crown are advantageously provided with sharp radial edges and the crown given a wave form flanged periphery so that the crown may be easily gripped and rotated relative to the neck to sever the neck by the sharp edges of the crown projections cutting through the bridging pieces.

In an alternative embodiment, two lines of weakness separated by an intermediate neck portion are provided around the neck, a pull-tab being provided integrally with the intermediate neck portion. A pull on the tab causes the neck to split along the weaknesses to sever the neck, the intermediate neck portion being torn away from the neck.

Two possible methods of providing a pull-tab proud of the neck surface so that a double split is initiated are as follows:

a. In each half mould designed to cooperate with a blown air extrusion machine, two semi-circular bosses work together with the calibrating mandrel to form grooves and apertures around two parallel weaker sections of the neck of a moulded container. Between the two groups of bosses a localised boss is provided in each half mould, starting at the mould opening joint face. When the mould is closed, these two bosses become joined side-by-side and thus work in conjunction with the calibrating mandrel to pierce the neck wall before the mould is opened.

In practice, on opening the mould, one of the bosses deep in the neck wall momentarily holds the container, the other boss, suitably hook-shaped, pulls the plastic material which severs the intermediate neck portion a short distance along each side following each line of weakness and forms the pull-tab which later on can be continued to be pulled by hand in order to split the neck by double rupturing of its wall along the two weaker sections.

b. In the injection mould designed for a blown air injection machine, a boss produces an aperture in the intermediate portion of the neck located between the two weaker sections. An impression of the pull-tab is made in the neck die at the bottom of the aperture producing boss. Thus the moulded container is provided with a pull-tab located between the weaker sections in the neck. A pull on this pull-tab is sufficient to cause a double rupturing of the neck wall along the two weaker sections.

In an alternative embodiment, the weaker neck section is provided by destroying partly and/or by transforming totally or partly the structure and/or the nature of the plastic material of the container neck along this section to make it weaker and to permit to sever it by hand subsequently.

For this purpose, this section of the container neck is subjected to the effects of carefully selected and arranged sources, the intensity of which has been calculated accordingly.

In preferred embodiments and according to the nature of the plastic material constituting the neck, the selected sources are calorific (infra red radiancy or

high frequency) and/or acoustic (effect of resonance), and/or ultra sonic, and/or of laser radiancy, and/or maser, and/or of ionic radiancy, and/or of luminous or ultra violet radiancy, and/or of electromagnetic radiancy such as microwaves of the order of 2450 megahertz and/or capable of bombarding particles at very high speed.

After it has been subjected to the effect of one of these sources, the strength of the neck section is weakened. It is then sufficient to hold this neck by hand on either side of the said section and twist it to sever the neck and to permit to open and close the container.

To ensure that a stopper is irremovable once pressed into the container neck, the end of the neck may have an inwardly directed flange below which a shoulder on the stopper lodges. The stopper or the neck must be of elastic material to permit the stopper to be pressed into the neck to locate the shoulder below the flange. The stopper may additionally have a flange which abuts the neck mouth or a shoulder formed in the neck to restrict the entry of the stopper into the neck.

Alternatively, the stopper may be held in position in the neck by a cap fastened to the neck or crimped in the neck, by welding or thermal welding part of the stopper to the neck, or by gripping the edge of the stopper in a groove running round the outside at the end of the neck in order that the said unit cannot be removed from the neck.

These and other features of the present invention will become apparent from the following description, given by way of example and with reference to the accompanying drawings, in which:

FIG. 1 is an axial cross-section through a container neck and stopper;

FIG. 2 is an axial cross-section through a different neck and stopper;

FIG. 3 is a side view illustrating a weakened neck portion;

FIG. 4 is a side view illustrating an alternative weakened neck portion;

FIG. 5 is a plan view of a crown designed to be partly inserted at the level of the weaker section of a container neck;

FIG. 6 is a side elevation of the crown shown in FIG. 5;

FIG. 7 is an axial cross-section through an alternative neck and stopper;

FIG. 8 is an axial cross-section through a further neck and stopper;

FIG. 9 is an axial cross-section through a yet further neck and stopper;

FIG. 10 is an axial cross-section through a still further neck and stopper;

FIG. 11 is a fragmentary cross-section of moulding apparatus;

FIG. 12 shows a moulding apparatus with portions thereof shown in cross-section;

FIG. 13 is a fragmentary cross-section taken along the line A—A of FIG. 12; and

FIG. 14 is a fragmentary cross-section taken along the line B—B of FIG. 12.

Referring to FIG. 1, a container 1 comprises a neck 1*a* having a flange 1*b*, an inner seat 1*c*, a collar 1*d*, a groove 1*e* and apertures 1*f*. The groove and apertures define a weaker section of the neck. A stopper 2 is elastically deformed by pressing into the neck 1*a* and is non-removably retained therein by a shoulder 2*b* abutting upwards against flange 1*b* and downwards against seat 1*c*. The stopper has a crown 2*a* and a skirt 2*c* which cooperates with collar 1*d* to ensure sealing of the stopper. A chamfer 2*d* on the end of the skirt assists in the insertion of the stopper into the container neck. The grooves 1*e* and apertures 1*f* are arranged to provide a weakness in the neck such that if the container is held in one hand and the other is used to impart a twisting action to the top part of the neck, the bridge pieces between the apertures and grooves are severed. The stopper then becomes detachable together with the upper part of the neck from that part of the neck which remains integral with the container.

In the arrangement shown in FIG. 2 a container 3 comprises a neck 3*a* to which a stopper 4 is elastically deformed and is non-removable. Grooves 3*b* and apertures 3*c* are provided but are located differently from the embodiment shown in FIG. 1. The grooves and apertures define a weaker section at which the neck may be severed in the same way as in the previous embodiment.

FIG. 3 shows parts 6 and 7 of a neck located on either side of a weaker section formed by apertures arranged to leave short bridge pieces 4 and long bridge pieces 5 connecting the portions 6 and 7 of the neck. When portion 7 is firmly held and a twisting action is applied to neck portion 6, shorter bridge pieces 4 are ruptured first of all, followed by the rupture of the longer bridge pieces 5. In conjunction, these two types of bridge piece limit the degree of severing effort required to split around the neck.

In an alternative arrangement of apertures shown in FIG. 4, parts 11 and 12 of the neck are located on either side of the weaker section formed by the apertures which are arranged to leave vertical bridge pieces 8 and which are formed with portions having inclined sides 9 and 10. When a twisting action is applied to neck section 11 and neck section 12 is firmly held, the inclined sides 9 and 10 rub together and transform the twisting action exerted to a pulling action, pulling apart the neck parts 11, 12 and consequently fracturing the connecting bridges 8.

A crown 14, FIGS. 5 and 6, may be inserted in the blown air mould of a blown air extrusion machine having a calibrating mandrel. This crown 14 may equally be inserted in a blown air mould of a blown air injection machine to be incorporated into the container neck during moulding of the latter. The crown edge 15 produces a groove round the container neck and carefully dimensioned projections 16 produce hollows in the plastic material in the neck wall in the area of the weaker section. A weakness is thus created by lack of plastic material in the neck wall which is easily split by applying a twisting action at its upper part.

The projections 16 on the crown may be provided with bevel edges 17 and the crown itself with a waveform periphery 18 such that it is sufficient just to hold the container firmly and apply a twisting action to the crown in order to cut through the neck wall and split it across. In this case the edges 17 are rotated to cut through the neck.

The arrangement of container neck and stopper shown in FIG. 7 is similar to that shown in FIG. 1 except that the upper part of the neck has a waveform periphery 20 and that the stopper 21 is irremovably retained in the neck by a cap 22 secured to the neck at 23.

In a further embodiment, shown in FIG. **8**, the stopper **24** is irremovable because its crown **25** is held by an integral flange **26** on the neck which is hot formed over the stopper.

Stopper **28** in the embodiment shown in FIG. **9**, is irremovable because a part of its crown is secured at **29** by welding, adhesion or thermal welding to neck **30.**

Stopper **31**, FIG. **10**, is irremovable because an integral inwardly directed flange is held in groove **33** of a neck **34.**

The stoppering system is preferably manufactured with apparatus designed specifically for the purpose.

In order to reduce the strength at one section of the neck, various methods may be used in the manufacture, and in particular the methods involving the use of the following apparatus:

a. A number of fixed or retractable projections are arranged in the impression of the neck in the mould to provide grooves or apertures in the neck wall which thereby renders the neck fracturable by hand at its weaker section.

b. Projections are made in the neck impression of a mould designed to suit a blown air extrusion machine for working together with the machine's calibrating mandrel. The mandrel penetrates the neck of the container, forcing back the plastic material on either side of the projections. The projections which are tangential to the mandrel produce apertures in the neck wall of the container and those which fail to reach it produce grooves.

c. Projections arranged in the impression of the neck of a mould designed to fit a blown air injection moulding machine, which produce grooves and/or apertures in the neck wall the moment the plastic material is injected. The groove and the aperture shown in FIG. **1** can be produced in this way.

d. A mould designed to suit a blown air extrusion machine having a special mandrel fitted near its end with a crown covered with projections arranged to cooperate with a shoulder in the impression of the neck of the mould to produce a weaker section in the neck with grooves and apertures arranged, for example, as shown in FIG. **2.**

e. A mould designed to suit a blown air extrusion machine having a calibrating mandrel, a groove being provide in the impression of the neck of the mould, and a crown of the type shown in FIGS. **5** and **6** being provided in this groove, such that the calibrating mandrel forces the plastic material against the sides of the impression, the carefully dimensioned projections in the crown produce grooves and/or apertures in the neck wall to define a weaker section. FIG. **11** shows a system for inserting the crowns **14** in the neck impression **35** in the opening of mould **36.** A loading chute **37** leads to a chamber **38** where a plunger **39** operated by a double-acting jack **40** pushes the crowns into a groove **41** in the neck impression **35.** The plunger supplies one crown during each cycle, at the same time cutting off the supply of the following crowns until the next cycle starts. Crown **14** rests in groove **41** with a certain amount of play. It automatically centres itself round the mandrel (not shown) which is provided with a chamfered end.

f. A mound designed to fit a blown air machine in which it is not intended to use a calibrating mandrel or in which one is not fitted, slots being provided in the impression of the neck wall to allow a system of mobile cutting blades moving in limited rectilinear or arcuate fashion to pass through, which, after the air blowing, enable the neck wall to be cut to produce slots therein to define the weaker section.

FIGS. **12, 13** and **14** show as an example a method of application of this particular tooling system.

This tooling system is arranged in the mould round the impression of the neck and comprises four blades **42***a* - **42***b* - **42***c* and **42***d* pivoted about axes **43***a*, 43*b*, 43*c* and **43***d* and mounted with the mould parts **44***a* and **44***b*. The blades are operated by jacks **45** driven by a fluid entering at **46***a* and **46***b* during each cycle of container manufacture. Springs **47** return the blades to their initial positions when the fluid has ceased to act on the four jacks. The neck wall becomes slit along four sectors **48** between which plastic material **49** remains uncut.

The described stoppering systems can be advantageously employed in all cases where containers in plastic material such as bottles, cans, etc., used as non-returnable items, have to guarantee the origin of their contents by the provision of a sealed stopper and which can be temporarily restoppered by the user. After the stoppering of the container has been completed at the bottling plant, the stopper sealing is ensured by the necessity to sever the neck in order to detach the stopper from the container. This system of sealed stoppering without a stoppering capsule is very economical and particularly easy to unstopper and then to restopper. It provides absolute safety and is specially suited to stoppering bottles and cans containing mineral water, wine, edible oils, mineral oils, etc.

I claim:

1. A container having a neck comprising a weakened section separating said neck into a portion above said weakened section and a portion below said weakened section; said portion above said weakened section comprising a flange and an inner seat, said flange situated above said inner seat; said portion below said weakened section comprising a collar; said container being fitted with a one piece stopper inserted within said neck and having a skirt and a shoulder, said skirt cooperating with said collar to ensure sealing of the stopper in that portion of the neck below the weakened section, said shoulder abutting upwards against said flange and downward against said inner seat so as to make the stopper irremovable from that portion of the neck above the weakened section; said weakened section capable of being severed by hand to permit removal of the stopper from that portion of the neck below the severed weakened section.

2. A container fitted with a stopper as claimed in claim **1** wherein the skirt of said stopper cooperates with said collar of said container neck permitting said container to be opened and closed subsequent to the severing of said weakened section.

3. A container fitted with a stopper as claimed in claim **1** wherein said weakened section is provided with elongated aperture portions and wherein the portion of the neck on either side of the weakened section is interconnected by a plurality of bridging pieces, each of said bridging pieces arranged between a pair of elongated aperture portions.

4. A container fitted with a stopper as claimed in claim **3** wherein said plurality of bridging pieces consist of a first plurality of bridging pieces of a first length and a second plurality of bridging pieces of a second length.

5. A container fitted with a stopper as claimed in claim 3 wherein the elongated aperture portions consist of sections on either side of the bridging piece which are inclined.

6. A container fitted with a stopper as claimed in claim 1 wherein said weakened section is provided with grooves.

7. A container fitted with a stopper as claimed in claim 1 wherein the neck portion above the weakened section is provided with a non-circular external shape.

8. A container fitted with a stopper as claimed in claim 1 wherein said weakened section is provided with an auxiliary crown-shaped member, the internal edges thereof having projections which totally pierce the neck at said weakened section.

9. A container fitted with a stopper as claimed in claim 8 wherein said projections have sharpened radial edges.

10. A container fitted with a stopper as claimed in claim 8 wherein said auxiliary crown-shaped member is provided with a noncircular external shape.

11. A plastic container having a neck comprising a weakened section, an outwardly extending flange, and a collar, said weakened section being located below said flange and above said collar; said container being fitted with a one piece stopper inserted within said neck and having a skirt and an inwardly extending lip, said skirt cooperating with said collar to ensure sealing of the stopper in that portion of the neck below the weakened section, said lip interlocking said flange, said lip located below said flange and securing said stopper in the neck of said container; said weakened section capable of being severed by hand to permit removal of the stopper from that portion of the neck below the severed weakened section.

12. A container having a neck comprising a weakened section, an inner seat, and a collar, said weakened section being located below said inner seat and above said collar; said container being fitted with a one piece stopper inserted within said neck and having a skirt and a shoulder, said skirt cooperating with said collar to ensure sealing of the stopper in that portion of the neck below the weakened section; said shoulder abutting said inner seat to limit the insertion of the stopper into the container neck; a cap fitted over and secured to said stopper and said neck, said cap making said stopper irremovable from that portion of the neck above the weakened section; said weakened section capable of being severed by hand to permit removal of the stopper from that portion of the neck below the severed weakened section.

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