EASY-OPENING STOPPER FOR METAL CANS AND THE LIKE

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ABSTRACT

An easy-opening cover for cans wherein the cover is made with an opening hermetically sealed by a stopper formed of a plastic material and molded in situ and retained in position of use by a movable lip extending downwardly from the underside of the stopper at a position located beneath the edge of the can about the opening.

12 Claims, 9 Drawing Figures
Fig. 9

![Diagram with labeled parts: 1, 9, 12, 18, 19, 2]
EASY-OPENING STOPPER FOR METAL CANS
AND THE LIKE

This invention relates to an easy-opening closure or
stopper for metal cans or the like.

It is becoming increasingly common to preserve
beverages and the like food products in metal cans.
This form of packaging has a number of advantages
over the conventional glass bottle such as being lighter
in weight and less fragile. However, problems exist in-
ssofar as an opening for access to the content material
is concerned since it should be easy to open without the
need to make use of special tools.

With this objective in view, it has heretofore been
proposed to make use of covers having a surface pro-
vided with a tear strip, usually consisting of the same
material as the cover itself, and having a tab which is
generally fixed to the tear strip by an integral rivet. The
tensile strength of the rivet used to fix the tear strip and
the uniformity of tear are frequently unsatisfactory,
with the result that the cover has been manufactured
with a cutout in which a plastic stopper, provided with
a tab, is inserted. In instances where the tear line is situ-
nated on the cover, the stopper replaces the rivet. If the
tear line is situated on the stopper itself, the opening is
formed in the stopper. Unfortunately, these embodi-
ments give rise to sealing problems which are very dif-
ficult to overcome, especially when packaging
beverages under gas pressure.

It is an object of this invention to eliminate these
deficiencies by providing a hermetically sealed closure
which can be removed with minimum effort.

These and other objects and advantages of this in-
vention will hereinafter appear and for purposes of il-
lustration, but not of limitation, embodiments of the in-
vention are shown in the accompanying drawings in
which

FIG. 1 is a sectional elevational view taken along the
center of a cover embodying the features of this invention;

FIG. 2 is a top plan view of the cover shown in FIG. 1;

FIG. 3 is a sectional elevational view through a
stopper provided with reinforcing ribs;

FIG. 4 is a sectional elevational view through a
stopper provided with notches;

FIG. 5 is a sectional elevational view through a
stopper having a reinforced center and a peripheral
groove of variable depth;

FIG. 6 is a sectional view showing the stopper in posi-
tion of use on the cover;

FIG. 7 is a sectional view of the stopper in FIG. 6 at
an intermediate stage of removal;

FIG. 8 is a sectional view of the stopper shown in
FIGS. 6 and 7 in a further advanced stage of removal;

and

FIG. 9 is a top plan view of a cover embodying the
features of this invention with two openings.

The invention relates to an easy-opening closure for
metal cans or the like manufactured with an opening in
the cover which is hermetically sealed by a plastic
stopper molded in situ and retained by a replaceable
internal disappearing lip.

The stopper is molded in situ under known tempera-
ture and pressure conditions, for example by injection
molding, by direct pressure molding, or by the total or
partial molding of a preform, etc. The material used is a
plastic, preferably a polypropylene.

The movable disappearing lip rests on the inner sur-
face of the cover along the edge of the opening to be
plugged and extends in a general direction substantially
perpendicular to this surface. When the can is opened,
the movable lip is caused to rotate about an articulation
zone which will hereinafter be defined, its upper side
stopping substantially perpendicularly of the edge of
the opening to enable the cover to be removed without
tearing any of the material.

A second fixed lip is situated concentrically with the
movable lip towards the center of the stopper. The op-
posite surfaces of the two lips may be flat, broken or
curved. The lips define a groove therebetween which
may vary in width and which may vary in depth, de-
pending upon the degree of stiffness desired to be im-
parted to the articulation zone. The shape of the groove
should enable the movable lip to rotate or rock about
the articulation zone through an angle of at least 90°
without interference by the fixed lip.

The size of the fixed lip is also variable depending
upon the requirements. It can be shrunk into a central
inner reinforcement or omitted altogether in certain
special cases.

The articulation zone is determined by a number of
parameters: the distance between the starting point of
the inner surface of the movable lip on the one hand
and the edge of the opening of the cover on the other
hand; the shape of the movable lip; the width of the
groove; the mass of the fixed lip; central reinforce-
ment, if present. By varying these different parameters,
it is possible to use plastic materials differing widely in
grade to obtain the desirable effects.

The depth of the groove separating the two lips can
vary about its periphery, the effect of which is to gradu-
ate the effort required to remove the stopper.

To make the stopper easy to remove, once the mova-
ble lip has been initially displaced, the base of the
stopper can be provided with parallel outer and/or
inner notches, optionally staggered over the two sur-
faces. By contrast, the stiffness of the stopper can be in-
creased by ribs on the central outer portion.

The stopper is provided externally with a grip
member in the form of a tab, usually terminating in a
ring or other readily gripped configuration.

In instances where a liquid is to be packaged under
pressure, such as for example as beer, it can be ad-
vantagous to provide the cover with a second opening
of smaller diameter than the main opening and which is
plugged in substantially the same manner as the main
opening, optionally with a modification of the artica-
lation zone. The two stoppers are connected together by
a bridge and the finger grip should be fixed to the
stopper first to be removed. 2 The configuration of the
lips allows an almost unlimited variation of shapes
without departing from the scope of the invention.

With reference now to the drawings, the dimensions
of the covers are highly exaggerated and do not neces-
sarily show the true dimensional relationships.

In FIG. 1, the cover 1 has an opening which is closed
by the stopper 2. The stopper consists of a diaphragm 3
surrounded by a reinforcing edge 4 of greater cross-
sectional thickness, and having an outer wall formed
with a recessed portion 10° in which the free edge 10 of
the cover 1 is inserted level with the diaphragm 3. The reinforced edge 4, when viewed from the interior of the can, has a groove 5 which separates an outer movable lip 6 from a spaced inner fixed lip 7. The part 8 of the reinforcing edge 4 which is situated above the level of the cover 1 is provided with a grip tab, such as tab 9, extending from the side of a tab 9 extending upwardly from the top surface.

A connecting strip or bridge 12 connects the inner edge of the stopper 2 with a second stopper 18 of the same general construction, which is used when two openings are provided in the cover.

The stopper is formed of a plastic material, preferably a polypropylene, which is unaffected by the content material in the can.

The free edge 10 of the cover 1 can be curved normally upwardly, as at 11, to take into consideration contraction of the plastic material during formation of the stopper into a preferential zone which enables the plastic material to be stopped at the raised edge and contributes towards increasing the fluid-tightness of the closure.

FIG. 3 shows a stopper which can be removed "in one go". The central portion 3 is reinforced by a rib 13 which extends upwardly from the surface in laterally spaced apart relation with the reinforced edge and which, in the example shown, is circular but can be any other form. The stiffening effect produced by the rib or ribs results in immediate detachment of the stopper around its entire periphery when the can is opened.

If the product contained in the can does not have internal pressure and gradual opening is required, the central diaphragm can advantageously be provided with a series of spaced notches 14 on one side or on both sides of the diaphragm portion intermediate the reinforced edge of the stopper. In the latter case, the notches can be provided opposite one another or, in the alternative, they can be staggered relative to one another in the respective surfaces, as shown in FIG. 4.

Another possibility of obtaining gradual opening is illustrated in FIG. 5. In this modification, the diaphragm is highly reinforced with the diaphragm portion having a thickness which can be equal to that of the reinforcing edge. The groove which separates the movable lip 6 from the central inner portion 17, which in this modification replaces the fixed lip 7, is variable in depth around the periphery, gradually diminishing from a maximum depth in the portion 15, where the tear tab 9 is situated, to a minimum depth at the portion 15' situated diametrically opposite.

In FIGS. 6-8, illustrating the different phases involved in the removal of a stopper, the fixed lip has been replaced by a central downwardly extending reinforcement and the upper portion 3' above the can line is substantially the same in the middle as at the edge. FIG. 6 illustrates the closure in position of use on the can.

To begin opening, the tab 9 is gripped by the user and pulled upwardly. In response to this pull, the movable lip 6 begins to turn about its articulation zone into the groove 5 in the direction towards the fixed lip 7. As the applied force increases, the surface 6' which was in contact with the underside of the edge of the cover 1 gradually moves to a position perpendicular to its starting position, as illustrated in FIGS. 7 and 8.

Finally, as shown in FIG. 8, the surface has completed its rocking movement about the edge of the cover and the stopper can be completely disengaged by displacement through the opening.

In this disengaged position, the movable lip has rejoined the central reinforcement 17, the edge 17' of which is designed in such a way as not to interfere with the complete turning of the lip.

A cover with two openings is shown in FIG. 9. A large stopper 2 plugs the opening from which the content material is poured from the can while a smaller stopper 18 plugs the opening through which air can be admitted during removal of the stopper and while content material is being poured from the can. The two stoppers 2 and 18 are joined by a bridging strip 12 with the tab 9 extending from the small stopper to a grip member 19 in the form of a ring.

It will be understood that changes may be made in the details of construction, arrangement and operation without departing from the spirit of the invention, especially as defined in the following claims.

We claim:
1. A container having a cover with an opening, a removable stopper for hermetically sealing the opening formed of a stiff plastic material molded in situ and dimensioned to span the opening and extend a short distance beyond the opening with the stopper having a central body portion and an outer reinforcing portion, a top side facing outwardly of the container and a bottom side facing inside the container, a recessed portion extending inwardly from the outer edge of the stopper in which the edge of the cover about the opening is received in sealing relation, a movable lip extending downwardly from the bottom side of the stopper underlying the edge of the cover for articulation about the edge of the cover in response to an upwardly directed force, a fixed lip extending from the bottom side and spaced laterally inwardly from the movable lip members to define a groove between the movable lip and the fixed lip into which the movable lip is displaced about the edge of the opening in response to a force applied for removal of the stopper, and a tab extending from the outer reinforced portion of the stopper above the recessed portion for application of force to remove the stopper.
2. A stopper as claimed in claim 1 which is integrally molded of a polypropylene plastic.
3. A stopper as claimed in claim 1 in which the movable lip rests on the inner surface of the cover along the edge of the opening and extends in a general direction substantially perpendicular to the surface.
4. A stopper as claimed in claim 1 in which the groove varies in depth and/or in width.
5. A stopper as claimed in claim 1 in which the fixed lip comprises a central reinforcement section of greater thickness.
6. A stopper as claimed in claim 4 in which the groove varies in depth from a maximum depth adjacent the tab to a minimum depth opposite the tab.
7. A stopper as claimed in claim 1 which includes one or more notches in the top side and/or the bottom side of the stopper.
8. A stopper as claimed in claim 7 in which the notches are in both the top side and bottom side surfaces of the stopper with the notches arranged one over the other.
9. A stopper as claimed in claim 7 in which the notches in the top side are staggered with respect to the notches in the bottom side.

10. A stopper as claimed in claim 1 which includes reinforcing ribs extending upwardly from the top side of the stopper.

11. A cover as claimed in claim 1 which includes a second opening and a stopper as claimed in claim 1 for said second opening.

12. A cover as claimed in claim 11 which includes a bridging strip joining the stoppers and a grip tab joined to the edge of the second stopper.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,682,349 Dated August 8, 1972

Inventor(s) Jean Cospen; Bernard Baumann

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Assignee: CEBAL GP, Paris, France

Signed and sealed this 8th day of May 1973.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR. ROBERT GOTTSCALK
Attesting Officer Commissioner of Patents