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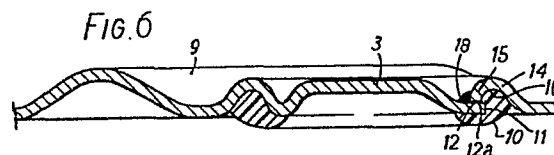
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54 Improvements in easy-opening ends for cans and the like.

57 A can end closure of the type having at least one aperture therein closed by means of a button integral with said can end closure and hingedly connected thereto, said button (3) being of larger size than said aperture. A ring (10) of plastic sealing composition being applied to the underside of said can end closure. A downwardly curled lip (15) is formed at the periphery of each aperture to bring the cut edge (12) of the lip to an acute angle in relation to the upper surface of the adjacent peripheral portion of the button. The cut edge (12) of the lip (15) conveniently lies parallel with the upper surface of the button and its surface is covered by means of plastic sealing composition which is continuous from a small ring (18) on the top of the button at a position radially inwardly from the lip to the main ring (10) on the underside of the can end.



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"IMPROVEMENTS IN EASY-OPENING ENDS FOR CANS AND THE LIKE"

The present invention relates to end closures for cans and like containers, for convenience herein referred to as "can end closures" and in particular to easy-open can end closures for cans for beverages. The type of can end closure, to which the present invention is directed, is intended primarily, but not exclusively, for application to cans for carbonated beverages and is formed from sheet metal, in which one or more apertures are formed and are each closed by a tab or button, connected to the can end only by a small hinge connection, but otherwise severed from the remainder of the sheet metal of the can end. In this type of can end closure the sheet metal is worked so that the edge of the button overlaps the edge of its aperture by a substantial amount to enable it to resist the force of the gas pressure due to the carbonated beverage contained in the can. Without a substantial overlap there is a real risk that the button will be burst outwardly through the aperture. A ring of a heat-curable plastic composition is applied to the underside of the closure overlying the periphery of the button so as to form a gas-tight seal at the periphery of the button, which is ruptured when the button is depressed to open the aperture.

While it has already been proposed to produce a closure of the present kind from sheet steel, it has heretofore only been produced in aluminium in a commercially acceptable form.

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There would however be a number of very significant advantages in producing the closure in steel sheet. Not only is steel sheet significantly cheaper than aluminium but also there are substantial ecological objections to the use of an aluminium end closure on a steel can.

Suitable steel sheet for the ends of beverage cans is either tinplate or lacquered (tin-free) steel, depending upon the beverage to be contained. Such steel is protected from corrosion by its tin or lacquer coating. However a raw, unprotected metal edge is formed at the periphery of each aperture in the can end when the steel is cut to form an integral button. Such unprotected edge does not give rise to any special problem when the can end is formed of aluminium, but may give rise to a corrosion problem when the can end is made from steel plate. Any visible corrosion at the cut edge of the aperture may lead to a reduction in acceptability by customers.

In the already known commercially employed designs of can end closure of the type under consideration the upper surface of the button lies flat against the undersurface of the can end, so that the can end presents an unprotected surface at the edge of the aperture, extending substantially perpendicular to the plane of the can end.

It is well known in can end technology to apply a so-called repair lacquer to prevent rusting

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during pasteurisation, storage, etc. However this invention relates to a method of minimising the quantity of repair lacquer and may eliminate altogether the necessity of applying a repair
5 lacquer to a steel can end closure of the present type. This is of advantage to production of steel ends of this type, particularly because of the adverse effects of the lacquer solvents on the plastic sealing composition when a heavy application
10 of repair lacquer is employed.

The repair lacquer is applied to the end closure after the application of the sealing composition but before curing, so that a single stoving cures the sealing composition and drives off the
15 volatiles from the lacquer.

In the subsequent stoving the volatile solvents, which form about 80% of the lacquer composition, tend to penetrate the sealing composition and may result in some porosity of the sealing
20 composition. Reduction of the amount of lacquer required to seal off the raw steel edge at the aperture thus has the advantage of reducing the risk of porosity in the sealing ring with possible loss of gas pressure.

25 According to the present invention a downwardly curled lip is formed at the periphery of each aperture in the can end closure so that the cut edge lies at an acute angle to the upper surface of

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the adjacent peripheral portion of the button. It is preferred that the surface of the raw cut edge at the periphery of the aperture lies at an angle not exceeding 60° to the surface of the related button.

5 This greatly reduces the amount of somewhat mobile repair lacquer required to be applied in the annular space between the top of the button and the raw edge of the aperture to ensure coating of the raw edge with repair lacquer. The application of large
10 quantities of repair lacquer to can end closures of the type to which the present invention applies may lead to undesirable penetration of the sealing composition by solvent volatiles during stoving of the repair lacquer.

15 More preferably, however, the metal at the edge of the aperture is curled over to such an extent that the surface of the raw edge is substantially parallel to the corresponding portion of the top surface of the button. In this more preferred
20 construction the quantity of repair lacquer required to flood the raw edge at the periphery of the aperture or apertures is greatly reduced and in some circumstances the use of repair lacquer may be entirely avoided with consequent reduction of the
25 adverse effect of the repair lacquer solvents on the sealing composition during stoving. Where the shelf life of the package is relatively short any slight rusting of the raw edge of the aperture is masked and

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is thus not the subject of adverse comment by customers.

In a further development the sealing composition is allowed to penetrate the button and the edge of the aperture while the sealing composition is quite mobile before curing. This is achieved by slight displacement of the button from its seating against the underside of the can end closure and consequent penetration of the uncured sealing composition by capillary action. In consequence a very small ring of sealing composition becomes positioned on the top of the button and is located against the raw edge of the aperture, thus acting to coat the whole or at least a part of the raw edge.

Reference is now made to the accompanying drawings for further explanation of the invention.

Figure 1 is a top plan view of a known construction of can end closure of the type to which the present invention relates,

Figure 2 is a part section on an enlarged scale of the closure of Figure 1,

Figure 3 is a comparable part section of a closure modified in accordance with the present invention, and

Figure 4 is a part section of a further modified closure in accordance with the present invention.

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Figures 5 and 6 correspond to Figures 3 and 4 and respectively show slightly modified forms of the constructions of Figures 3 and 4.

5 The closure of Figure 1 is described in co-
pending British Patent Application No. 33204/77 and
comprises a central panel 1, which has a peripheral
flange structure 2, which carries sealing material and
is adapted to be crimped to a cylindrical can body to
10 secure the can end in known manner. In the known
construction, shown in Figure 1, the panel 1 is
provided with buttons 3 and 4, which are respectively
secured to the panel by hinge portions 5 and 6, but
are otherwise completely severed from the panel 1.
15 The buttons 3 and 4 respectively close a vent
aperture 7 and a pour aperture 8 of different diameters.
The tab 3 is smaller than the button 4 and may therefore
be unseated by a smaller force against internal gas
pressure in the can. The button 3 is partially
20 surrounded by a horse-shoe ridge 9 to protect it
against accidental depression by contact with rigid
objects. The edge region of each button and the
corresponding peripheral region of the panel
surrounding each aperture are brought into overlapping
25 relation by appropriately working the metal and a gas-
tight seal is formed by laying down a ring of flowable
sealing composition (subsequently stoved) to cover the
edge of each button. The ring formed from the sealing

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composition is shown at 10 in the known can end closure of Figure 2. It will be seen that this protects the cut edge surface 11 of the button 3 against contact with the liquid contents of the can. It will be
5 noticed in Figure 2 that the top surface of button 3 lies flat against the bottom of the panel 1 and thus minimises the amount of plastic sealing composition in the ring 10. However as will be understood from the foregoing discussion a relatively large amount of
10 repair lacquer would be required to flood the raw edge surface 12 of the aperture 7 if the can end closure were to be made in steel.

The amount of repair lacquer required is estimated at 20 mgms of solids at the large button 4
15 and this would give rise to approximately 80 mgms of solvent volatiles. A correspondingly smaller amount of repair lacquer would be required at the small button 3.

This difficulty may be overcome, according
20 to the present invention, by adopting the modified structure of Figure 3 in which a rib 14 is formed in the panel 1 immediately adjacent the edge of the aperture 7, so as to form a downturned lip 15 which presents the raw edge surface 12 of the aperture
25 periphery at an angle of approximately 45° to the surface of the button 3. There is thus a V-shaped annular space between the edge surface 12 and the top of button 3, which may be flooded by application of a

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much smaller quantity of repair lacquer than in the case of the construction of Figure 2. The rib 14 also results in a curved recess 16 on the underside of the panel 2. This in turn results in an improved sealing of the cut edge surface 11 of the button 3 by the plastic composition of the ring 10. Although not shown, a similar rib and downwardly extending lip are formed for the purpose in the panel 1 around the periphery of the pour aperture 8.

Figure 4 shows a modified construction of can end closure in accordance with the invention, in which the rib 14 is made somewhat larger so that the edge surface 12 lies parallel to and is almost abutting on the upper surface of the button 3.

It will be noticed that in both Figures 3 and 4 the outer edge 12a of the surface 12 (at the edge on the lower surface of the panel 1) is smaller in diameter than the edge of the button 3 so as to leave a small peripheral land 17 on the upper surface of the button 3. This allows the sealing composition of the ring 10 to wrap around the edge surface 11, as it flows into the recess 16 at the underside of the rib 14, so that the sealing ring 10 is more securely anchored to the closure than in the construction of Figure 2. It will also be seen that the vertical distance between the inner (in terms of diameter) and upper edge 12 of the aperture periphery and the top

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surface of the button 3 is similarly greatly reduced as compared with Figure 2.

In the modified constructions illustrated in Figures 5 and 6 the sealing composition is
5 allowed to leak through between the button and the edge of the aperture so as to form a very slight additional ring 18 on the upper surface of the button.

In the construction of Figure 6 the sealing composition of the ring 18 is continuous with the
10 composition of ring 10 and completely cover the raw edge surface 12, so that no application of repair lacquer is required.

In the construction of Figure 5, it is not found practicable to achieve sufficient leakage by
15 capillary movement to ensure reliable complete coverage of the surface 12 and it is still felt necessary to employ a small amount of repair lacquer in order to avoid corrosion. However the amount of repair lacquer employed is now typically reduced from
20 20 mgms solids to 5 mgms solids. The deleteriousness of the solvents on the sealing composition is accordingly reduced and is considered no longer to constitute any problem to the satisfactory operation of the end closure.

25 For the production of end closures of the present invention one typical sealing composition is a high-solids p.v.c. plastisol marketed by W. R. Grace Limited under the designation 6546-E-12.

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A typical repair lacquer, the use of which may be obviated by the use of the invention, is marketed by The International Paint Co. Ltd. under the designation 0854 C. 8698.

5 Although the invention has been described in relation to a can end closure in which two buttons are provided at separate locations it is equally applicable to can end closures of the type in which a small button is provided to seal off an
10 aperture in a larger button as described in United States Patent No. 4,105,134. In this type of closure the smaller button closes a vent aperture formed in the larger button. When the internal gas pressure has been vented, the larger button can
15 easily be depressed to open the pour opening.

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CLAIMS:

1. A can end closure of the type having at least one aperture therein closed by means of a button integral with said can end closure and hingedly connected thereto, said button being of larger size than said aperture so as to overlap the periphery of said aperture and to lie in abutting relation with the underside of the end closure, a ring of plastic sealing composition being applied to the underside of said can end closure and overlapping the periphery of said button to act as a seal between the button and the portion of the underside of the closure surrounding said aperture characterised in that a downwardly curled lip is formed at the periphery of each aperture to bring the cut edge of the lip to an acute angle in relation to the upper surface of the adjacent peripheral portion of the button.

2. A can end closure according to claim 1 further characterised in that the cut edge of the lip lies at an angle not exceeding 60° to the surface of the adjacent peripheral portion of the button.

3. A can end closure according to claim 1 further characterised in that the cut edge of the lip lies substantially parallel to the surface of the adjacent peripheral portion of the button.

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4. A can end closure according to any of claims 1 to 3 further characterised in that said downwardly curled lip forms part of an upwardly directed recess in the underside of the closure and that said plastic sealing composition fills said recess to contact the upper surface of the peripheral portion of said button and the edge of said button in addition to contacting the undersurface of said button.

5. A can end closure according to claim 4 further characterised in that an additional ring of sealing material is provided on the upper surface of said button and located radially inwardly from the cut edge of said downwardly curled lip, the sealing composition of said additional ring being continuous with said ring of plastic sealing composition on the underside of said end closure.

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FIG. 1

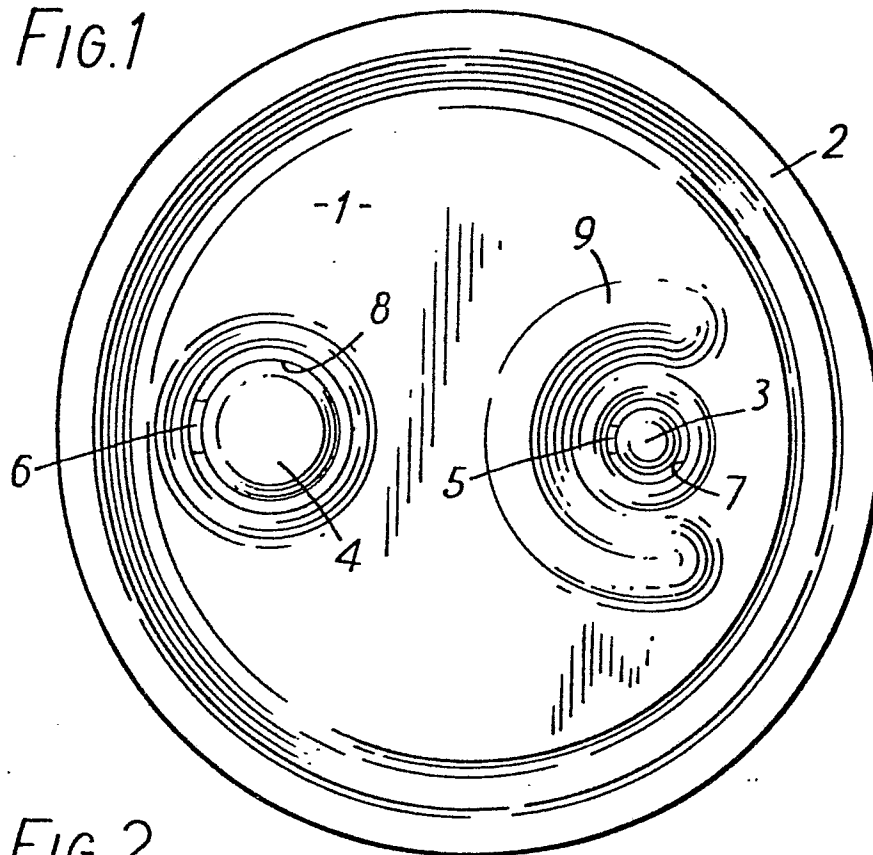


FIG. 2

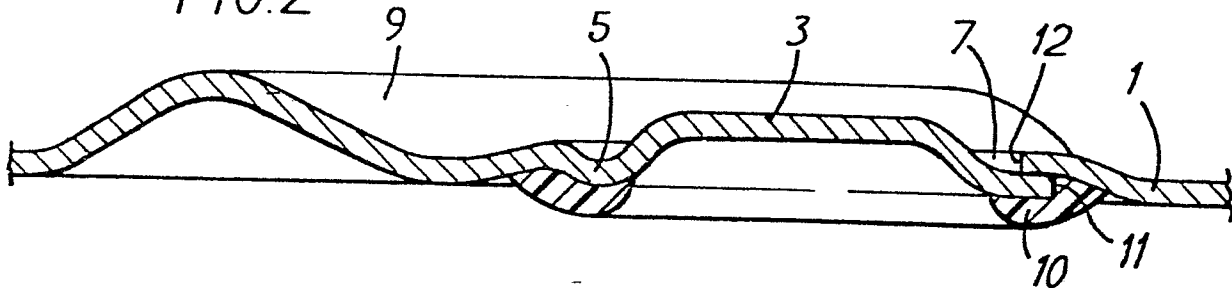


FIG. 3

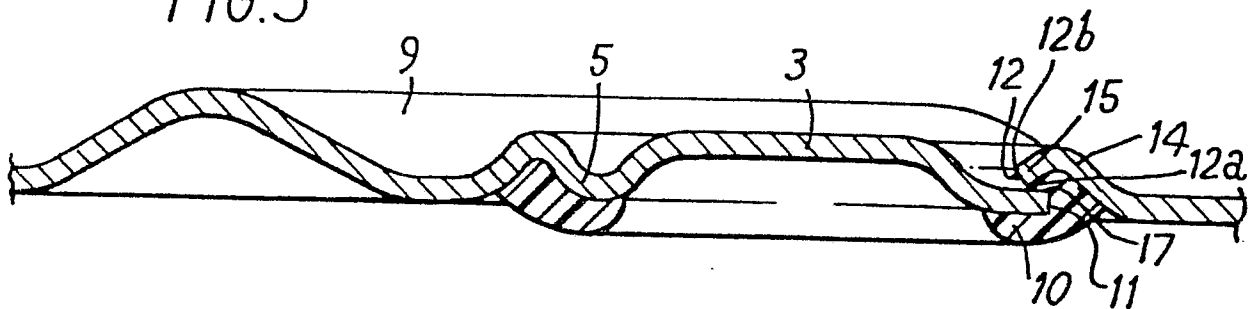
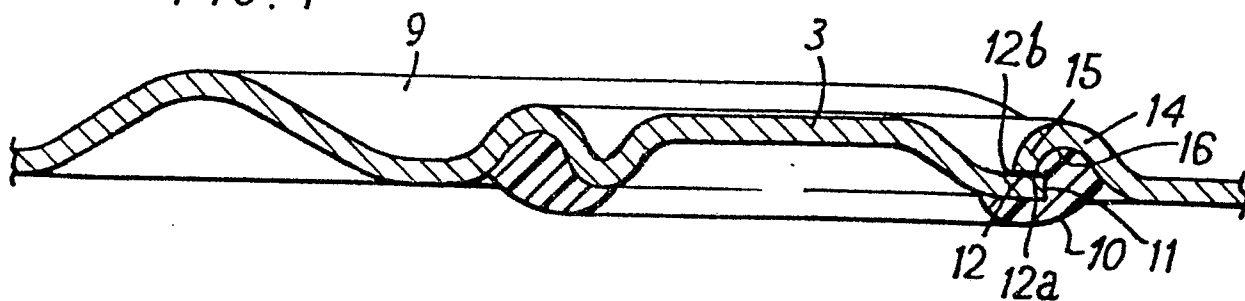


FIG. 4



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FIG. 5

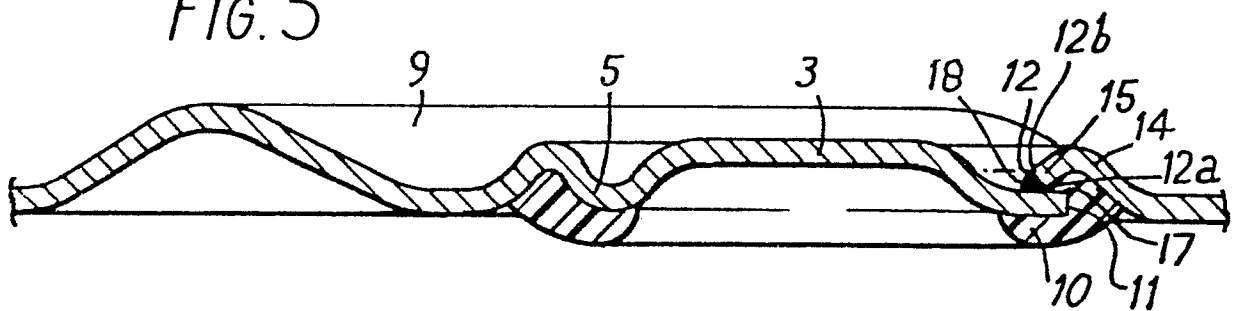
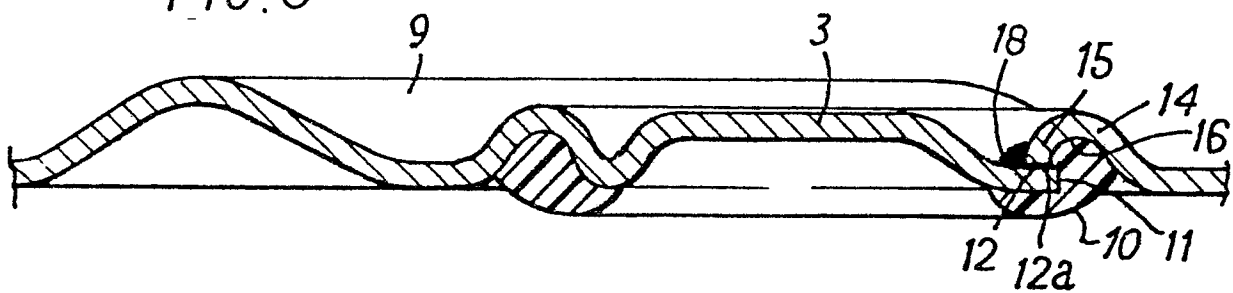


FIG. 6





European Patent
Office

EUROPEAN SEARCH REPORT

0021843

Application number
EP 80302176.5

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	US - A - 3 972 445 (THE BROKEN HILL PROPRIETARY COMPANY LTD.) + Totality + --	1,3	B 65 D 17/28
A	US - A - 3 948 415 (THE BROKEN HILL PROPRIETARY COMPANY LTD.) + Totality + --		
X	US - A - 3 958 717 (JOS.SCHLITZ BREWING COMPANY) + Totality + --		TECHNICAL FIELDS SEARCHED (Int.Cl. ³)
D,A	US - A - 4 105 134 (THE BROKEN HILL PROPRIETARY COMPANY LTD.) ----		B 65 D 17/00 B 65 D 41/00 B 65 D 47/00
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
X	The present search report has been drawn up for all claims		&: member of the same parent family, corresponding document
Place of search VIENNA		Date of completion of the search 18-09-1980	Examiner MELZER