

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



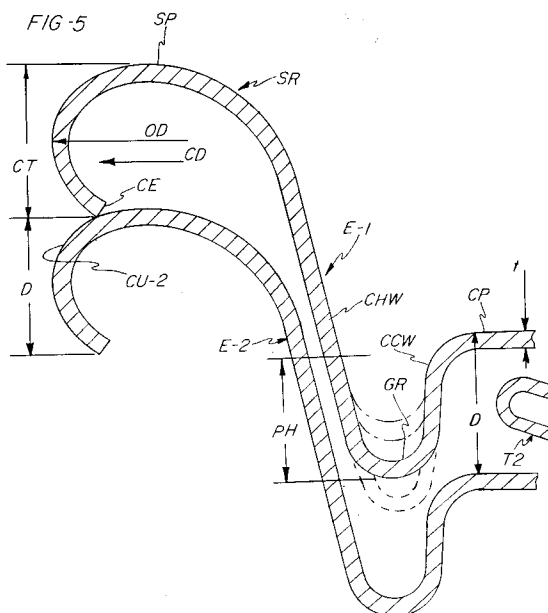
(11) Publication number:

0 595 174 A1

(12)

EUROPEAN PATENT APPLICATION(21) Application number: **93116936.1**(51) Int. Cl.⁵: **B65D 8/20, B21D 51/38**(22) Date of filing: **20.10.93**(30) Priority: **28.10.92 US 967394**(43) Date of publication of application:
04.05.94 Bulletin 94/18(84) Designated Contracting States:
**AT BE CH DE DK ES FR GB GR IE IT LI LU MC
NL PT SE**(71) Applicant: **DAYTON RELIABLE TOOL & MFG.
CO.
618 Greenmount Blvd.
Dayton, OH 45419(US)**(72) Inventor: **Gantz, Vernon C.
1301 Ridgeview Avenue
Kettering, Ohio 45409(US)**(74) Representative: **Weber, Dieter, Dr. et al
Patentanwälte
Dr. Weber, Seiffert, Dr. Lieke
Postfach 61 45
D-65051 Wiesbaden (DE)**(54) **Easy-open can end.**

(57) The invention provides a shell for a can end, and a can end made from such a shell, wherein the size and shape of the curl (CU-2) affords spacing of predetermined depth (D) between the product side of the central panel and the public side of the central panel on an adjacent stacked end or shell. This predetermined depth (D) is greater than the height of a tab (T2) secured to and extending over the public side of the central panel. Such a shell can be seamed to a can body with tools (e.g. seaming rolls) that also will operate upon ends made from standard shells, and the improved shell and end fall within presently accepted industry specifications.

**EP 0 595 174 A1**

This invention relates to improvements in self-opening (easy open) ends for containers, principally metal cans and the like used for packaging beverage and food products.

Background of the Invention

Self-opening or "easy open" ends for cans consist essentially of two parts, a shell which is the major element, and a tab which is the operating part during the self-opening procedure. These ends are produced by first manufacturing a shell by shaping a metal blank of thin sheet metal to a desired configuration. In cylindrical cans this is a round disc-like element, in other cans as for foods this shell may have oblong or elliptical shapes. U.S. Patents Nos. 4,637,961, 4,704,887, 4,735,863 and 4,862,722, all assigned to the assignee of this application, disclose methods and apparatus for making typical such shells. These shells are then scored to define the ultimate opening panel which is to be at least partially separated from the shell material during opening action. The scoring generally occurs in a separate or conversion operation, during which the operating tab is also formed, and is attached to the shell, located with respect to the opening panel, with an integral rivet. U.S. Patents Nos. 4,024,981, Re. 31,702, and 4,286,728, all assigned to the assignee of this application, disclose typical tab constructions, and U.S. Patent No. Re. 33,061 discloses a typical conversion system. Terminology of the industry defines the side of the end to be exposed to the container contents as the "product side" and the side to which the tab is attached as the "public side".

The ends are also provided with what is known in the art as a "curl", which is a wing-like configuration around the periphery of the end. The curl cooperates with the lip region of a container to provide the necessary material for the known double roll seam by which the ends are attached to the container body.

The so-constructed ends are then assembled and usually passed through a device which adds a sealing compound to an area of the product side of the end, usually to the under or product side of the curl. Then the ends are supplied to a filling machine where they are roll seamed onto filled cans (containers), with the compound included within the seam.

As part of tab formation in the conversion operation, a lubricant is added to the metal strip (tab stock) as part of the tab forming operations, and this remains on the completed tab when it is riveted to the end. This and other lubricants and small debris particles appear at the public side of the completed end, particularly on the outward (public) facing areas of the tabs. When the ends

are stacked, there is a tendency for some of this contaminant to offset onto the product side of the next adjacent end in the stack, and thence to be carried into the filling operation.

This is caused to a large extent by the aforementioned public side areas of the tabs coming into contact with the product side of the central panel of the next adjacent end in the stack. Resulting contamination of the packaged product has brought about considerable objection from users, and various efforts, including legislation in some countries, have been made to avoid this occurrence. Changes in the tab structure and its attachment to the end have progressed to the point where there is little practical change which can be made in that region of the end.

Aside from the contamination considerations, there are other benefits obtainable from a more consistent stacking dimension of both the shells and the completed ends. Closer attention to a precise stacking/spacing relationship of the shells, and the ends made from them, provides for better stacking and a more consistent "stick" length when the shells or ends are stacked during manufacture and/or storage, and for easier separation of the shells or ends from such a stack. Also, the more uniform spacing of the shells results in more consistent feeding conditions, as when the shells are fed from the stack into compounders, balancers, or into conversion presses. The consistent spacing also permits more accurate counting of ends in sticks or bags (wrapping), and it has been observed that strings of converted ends stacked "curl to curl" according to the invention will not exhibit a "spongy" characteristic, as happens with stacks of some prior art ends.

Changes in the dimensions of the end must always undergo scrutiny from the standpoint of economics, as a very small amount of additional metal can cause substantial cost increases at the volumes in which ends are produced and used. Further, changes in end structure must not interfere with the operations in which the ends are used, particularly the roll seaming operation which has critical dimensional demands and certain limits as to range of adjustment of the seaming equipment.

Summary of the Invention

To aid in explanation of the invention, it is desirable to review terminology used in the art to describe and define parts of an easy open end. Thus, the major element of an end is a shell, which includes a central panel and a countersink wall surrounding and extending downward from the panel and joined to it by a panel radius. In turn, a countersink radius at the outer part of the countersink wall joins it to the chuck wall, which extends

upward at an angle from the countersink wall, and provides a surface which is engaged by a roll seaming chuck in the seaming operation. A seaming panel surrounds and projects outwardly from the chuck wall, and the curl portion of the end extends in a curve away and down from the seaming panel so as to be disposed for tucking or folding inward during the seaming operation. The curl terminates in a cut edge which has a predetermined cut edge diameter, somewhat less than the outside diameter of the curl, which is the maximum diameter of the end.

Such shells are converted into easy-open ends by addition of known forms of scoring and the attachment of a tab used to partially (or in some cases fully) separate an opening panel from the end. The tab is attached by the integral rivet formation to the public side of the central panel, and rests slightly above the panel wall and generally within the vertical and lateral confines of the chuck wall and seaming panel. Typically, the tab is within the depression at the public side of the finished container, beneath the rim of the finished end seam.

When the shells or the ends are stacked, the cut edge of one end rests upon the seaming panel (public side) of an adjacent identical end beneath the one end, etc. The space defined by the product side of the central panel, the countersink wall, the panel radius, the lowermost edge of the countersink radius, and the public side of the central panel of the next shell or end in the stack, receives the tab of such adjacent end. A substantial part, but not all, of this space includes what is known as the panel height; panel height in turn is the vertical distance between the product side of the central panel and the product side of the countersink radius. In the case of ends, if the top or public side of the tab exceeds the height of this space, it will touch the product side of the central panel of the overlying end, and transfer contaminant thereto.

The present invention recognizes that the product side of the shell and end is spaced from the public side of an adjacent underneath shell or end in a stack by a predetermined distance, measured along a plane extending transversely through the end and perpendicular to its central panel, between the inner curl diameter of one end and the corresponding diameter on the public side of the seaming panel of the next end. That predetermined distance determines the spacing of the product side of the central panel from surfaces of the tab (once they are attached) to such other end. In accordance with the present invention, the curl is of sufficient length and curved shape from its cut edge to the seaming panel, and the seaming panel is of such curvature and length from the chuck wall, as to produce a spacing distance sufficiently

greater, e.g. in the order of 0.002 inches, than the spacing between like surfaces of the central panels of adjacent ends, less the thickness of the tab, whereby all parts of tabs in the stacked ends will be entirely spaced from adjacent central panels when the ends are stacked. The curl diameter of one end (or shell) thus forms the sole line of contact between next adjacent shells or ends in a stack, and all other regions of the adjacent ends are spaced apart.

The principal object of the invention, therefore, is to provide a shell, and an end made from such a shell, wherein the size and shape of the curl affords spacing of predetermined depth between the product side of the central panel and the public side of the central panel on an adjacent stacked end or shell; to provide an end construction in which such predetermined depth is greater than the height of a tab secured to and extending over the public side of the central panel; to provide a shell having this feature which can be seamed to a can body with tools (e.g. seaming rolls) that also will operate upon standard shells or ends; and to provide such a shell and end which falls within presently accepted industry specifications.

Other objects and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claims.

Brief Description of the Drawings

Fig. 1 is an enlarged broken away perspective view of a portion of a can top and attached end; Fig. 2 is a broken cross-sectional view of a typical end, omitting the tab; Fig. 3 is an enlarged view of the end, from the panel radius outward, showing the parts thereof; Fig. 4 is a plan view of a typical end including a tab; and Fig. 5 is a greatly enlarged view of two ends, configured according to the invention, and arranged in stacked relationship.

Description of the Preferred Embodiment

In Fig. 1 the seam between a typical end and a can body is seen to include the body hook BH and the end or cover hook CH, and the region of overlap between these two is indicated at OL. A quantity of sealing compound (later described) is located in the area between the top of the body hook and the undersurface of the curl in the end. End E-1 (Figs. 2 and 3) is formed from an integral metal blank member having a product side, facing downward, and a public side, facing upward. The end includes a central panel CP, a countersink wall CCW surrounding and extending downward from the product side of panel CP, and joined thereto

along a panel radius PR. A chuck wall CHW surrounds and extends upward from countersink wall CCW and is joined thereto along a countersink radius CR. The distance from the product side of central panel CP to the product side of countersink radius CR is commonly referred to as the panel height dimension of the end. A seaming panel SP surrounds and extends outward from chuck wall CHW and is joined to the chuck wall along a seaming panel radius SR. Prior to seaming the end to a container body, usually in a separate coating operation which is well known, a quantity of seaming compound SC may be applied to the underside of seaming panel SP, as shown in Fig. 3.

A curl CU surrounds and extends outward and downward from seaming panel SP and terminates in a curl diameter CD which is the location of the cut edge of the blank from which the shell is fabricated. The dimension of the curl diameter is (as shown) less than the outside diameter OD of the end. A self-opening tab T (Fig. 4) is joined to the public side of central panel CP by an integral rivet R, and extends over and along the public side of the central panel, as seen in Fig. 4.

Fig. 5 shows two ends constructed and stacked according to the invention, and like reference numerals with the suffixes 1 and 2 are used to denote corresponding parts of the two ends E-1 and E-2. The inner curl diameter CD-1 is arranged for supporting the uppermost end E-1 stacked on another identical lower end E-2, with curl diameter CD-1 contacting the public side of the curl CU-2 of such other end along the cut edge diameter. Thus, the product side of end E-1 is spaced from the public side of the other end E-2 by a predetermined distance D between its inner curl diameter CD-1 and the diameter on the public side of curl CU-2 against which curl diameter CD-1 rests. That distance D is measured along a plane P extending transversely through the end and perpendicular to its central panel, and that predetermined distance determines the spacing of the product side of central panel CP-1 from surfaces of the tab T-2 on the lower end E-2. The tab on end E-1 is omitted from Fig. 5.

The curl is designed to be of sufficient length and curved shape from its inner curl diameter CD to the seaming panel SP, as to produce a spacing distance D, less the thickness t of the material of panels CP, which is greater by at least 0.002 inch than the height of the upper edge of tab T-2 above the public side of central panel CP-2. The cut edge therefore provides the sole contact (along a line) between successive ends in a stack thereof, and all other regions of the adjacent ends are spaced apart. This spacing distance D may be defined as the "stacking pitch" of the ends. Thus, contaminant on the tabs will not transfer to the product side of

the central panels when the ends are stacked one upon the other, and the spacing of the ends in a stack thereof is regular and consistent. It should be noted that the panel height PH of the ends does not play a part in the determination of the spacing distance or stacking pitch D. To illustrate this, dash lines in Fig. 5 show a range of possible greater or less panel heights for the ends, while still providing the features of the invention.

While the form of apparatus herein described constitutes a preferred embodiment of this invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

Claims

1. In an easy-open end for a container, said end being formed from an integral metal blank member having a product side and a public side and including a central panel, a countersink wall surrounding the product side of said central panel and joined to said central panel along a panel radius, a chuck wall surrounding said countersink wall and joined to said countersink wall along a countersink radius, a seaming panel surrounding and extending outward from said chuck wall and joined to said chuck wall along a seaming panel radius, a curl surrounding and extending outward and downward from said seaming panel and terminating in an inner curl diameter, a self-opening tab extending over and along the public side of said central panel and joined to said central panel by an integral rivet means, and said end being arranged for stacking with like said ends wherein said inner curl diameter is arranged for contacting the public side of the seaming panel of another identical end along the inner curl diameter, whereby the product side of said end is spaced from the public side of such other end by the predetermined distance between said inner curl diameter and the same diameter on the public side of said seaming panel, said predetermined distance thereby determining the spacing of the product side of said central panel from surfaces of the tab on such other end;

the improvement comprising

said curl being of sufficient length and curvature from its said inner curl diameter to said seaming panel such that adjacent ends in a stack thereof contact each other only where the inner curl diameter of one end engages the public side of the seaming panel of the next adjacent end.

2. An easy-open end for a container, as defined in claim 1,

said curl being of sufficient length and curvature from its said inner curl diameter to said seaming panel to produce a spacing distance in the order of at least 0.002 inch between the product side of the central panel and the tab on the other end whereby contaminant on the tab will not transfer to the central panel when the ends are stacked one upon the other.

3. An easy-open end for a container, as defined in claim 1,

said curl being of sufficient length and curved shape from its said inner curl diameter to the same diameter on the public side of the seaming panel as to produce a spacing distance between facing side of the central panels of the two adjacent ends, which distance is greater by at least 0.002 inch than the height of the tab above its corresponding central panel,

whereby contaminant on said tab will not transfer to the product side of the adjacent central panel when the ends are stacked one upon the other.

4. A shell for an easy-open end for a container, said end being formed from an integral metal blank member having a product side and a public side and including

a central panel, said central panel being adapted to receive a self-opening tab joined to the public side of said central panel and extending over and along the public side of said central panel;

a countersink wall surrounding and extending downward from the product side of said central panel and joined to said central panel along a panel radius,

a chuck wall surrounding and extending upward from said countersink wall and joined to said countersink wall along a countersink radius,

a seaming panel surrounding and extending outward from said chuck wall and joined to said chuck wall along a seaming panel radius,

a curl surrounding and extending outward and downward from said seaming panel and terminating in an inner curl diameter which is less than the outside diameter of said curl;

said inner curl diameter being arranged for stacking on another identical shell with said inner curl diameter contacting the public side of the seaming panel of such other shell,

whereby the product side of said shell is spaced from the public side of such other end by the predetermined distance, measured

along a plane extending transversely through said shell and perpendicular to said central panel, between said inner curl diameter and the same diameter on the public side of said seaming panel, said predetermined distance thereby determining the spacing of the product side of said central panel from surfaces of a tab attached to such other shell;

the improvement comprising

said curl being of sufficient length and curved shape from its said inner curl diameter to the same diameter on the public side of said seaming panel as to produce a predetermined spacing distance between central panels of adjacent stacked shells which prevents contact between the shells except along the inner curl diameter,

whereby a tab attached to the central panel of one shell will not touch the central panel of an adjacent shell when the shells are stacked one upon the other.

5. A shell for an easy-open end for a container, as defined in claim 1,

said curl being of sufficient length and curvature from its said inner curl diameter to said seaming panel to produce a spacing distance in the order of at least 0.002 inch between the product side of the central panel and the public side of the central panel of the other shell.

FIG -1

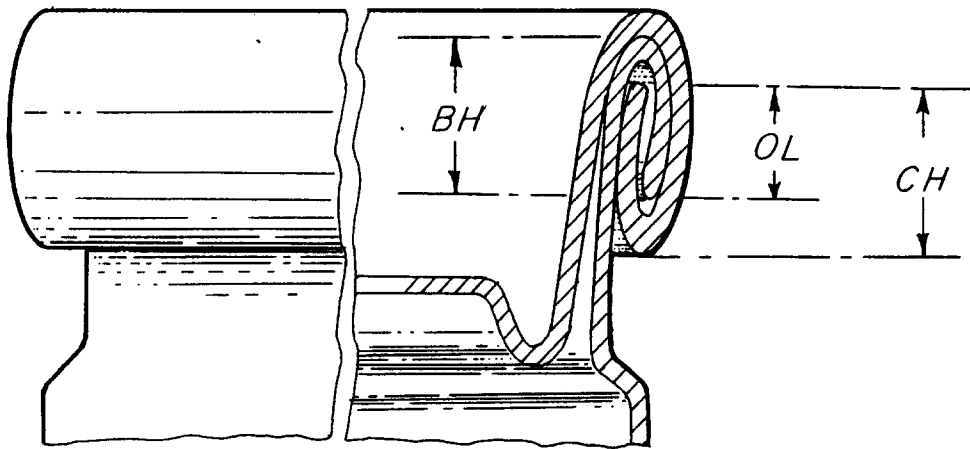


FIG-2

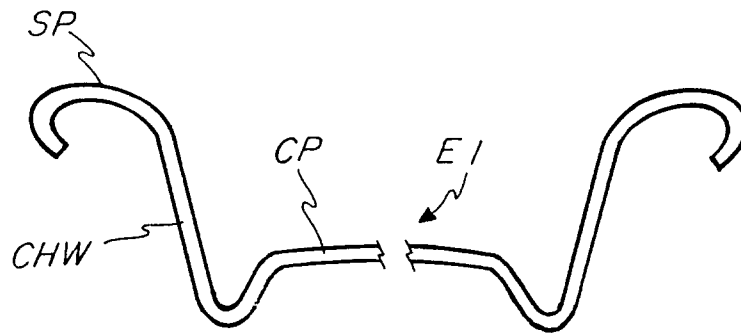
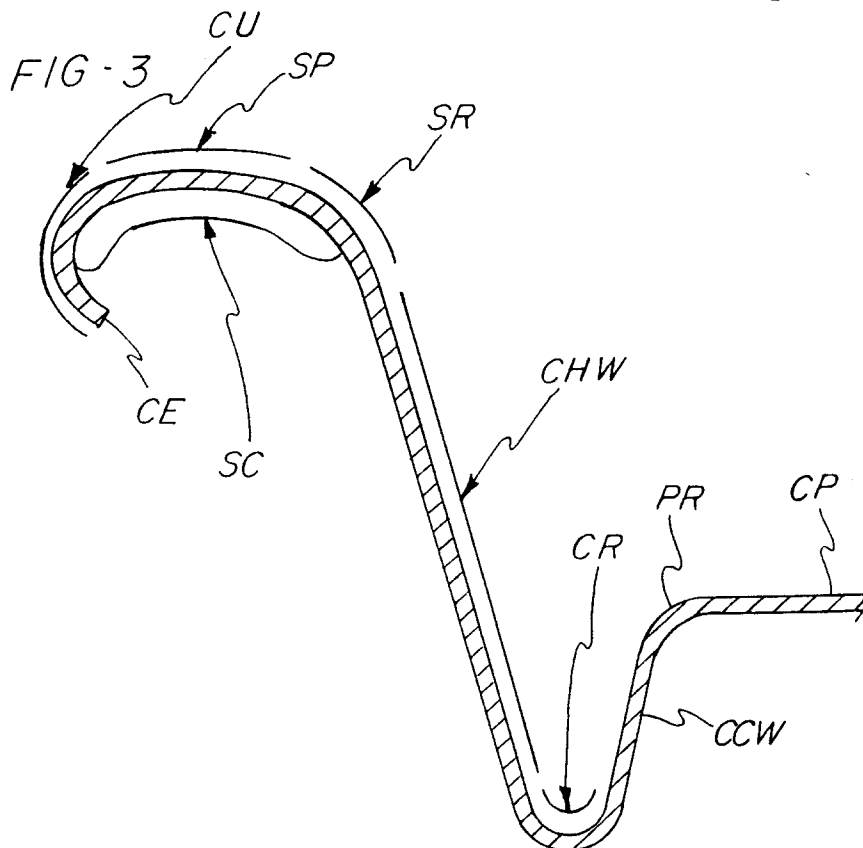
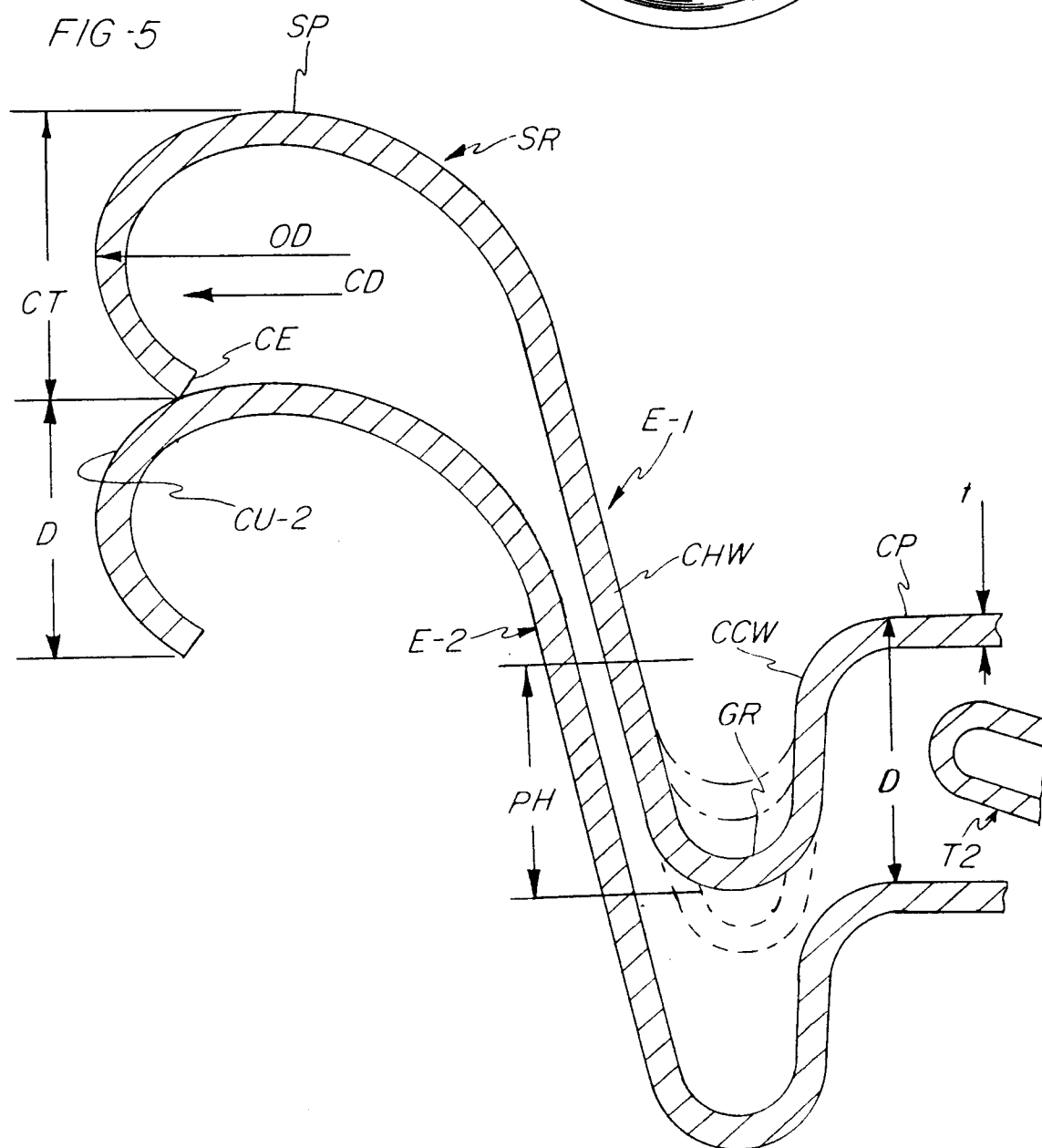
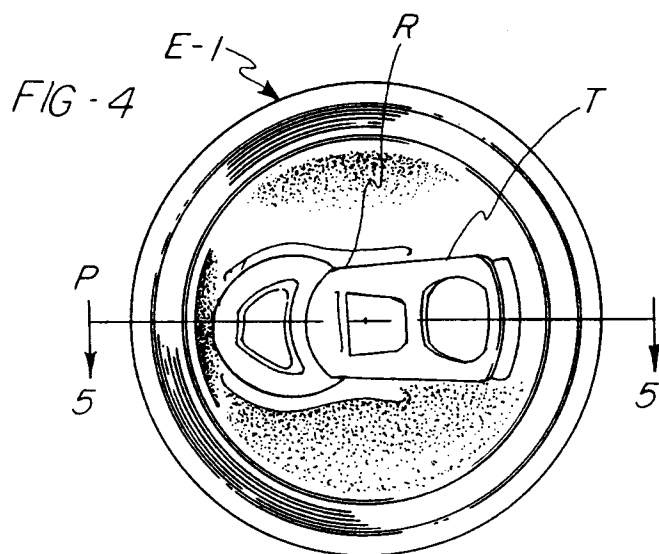


FIG -3







European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 93 11 6936

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X	EP-A-0 088 968 (BALL CORPORATION) * page 5, line 35 - page 6, line 11 * * page 11, line 21 - page 12, line 13; figures 1,8 * ---	1,4	B65D8/20 B21D51/38
X	US-A-4 503 989 (OMAR L. BROWN ET AL) * column 2, line 33 - line 45 * * column 6, line 46 - line 52; figure 2 * ---	1,4	
A	CH-A-642 316 (BMW-VOGEL AG.) * page 2, right column, line 27 - line 46 * * page 2, right column, line 64 - page 3, left column, line 25; figure 1A * -----	1,4	
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			B65D B21D
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 1 February 1994	Examiner Deprun, M
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			