(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
6 August 2009 (06.08.2009)

PCT

(10) International Publication Number
WO 2009/095672 A1

(51) International Patent Classification:
B65D 17/32 (2006.01)

(21) International Application Number:
PCT/GB2009/000251

(22) International Filing Date: 30 January 2009 (30.01.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
08001985.4 2 February 2008 (02.02.2008) EP

(71) Applicant *(for all designated States except US)*: **REXAM BEVERAGE CAN EUROPE LIMITED** [GB/GB]; 100 Capability Green, Luton, Bedfordshire LU1 3LG (GB).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **THIBAUT, Michael** [FR/FR]; Parc le Bilaa, 5 Rue Gui de Lons, Lescar 64230 (FR). **CANDILLON, Stephane** [FR/FR]; 4 Rue Saint Exupery, Jurancon 64110 (FR). **ROHR, Rainer** [DE/DE]; Haednackeeweg, 3, 44388 Dortmund (DE).

(74) Agent: **DUNLOP, BKC**; Wynne-Jones, Laine & James LLP, Essex Place, 22 Rodney Road, Cheltenham, Gloucestershire GL50 1JJ (GB).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

(54) Title: CAN END

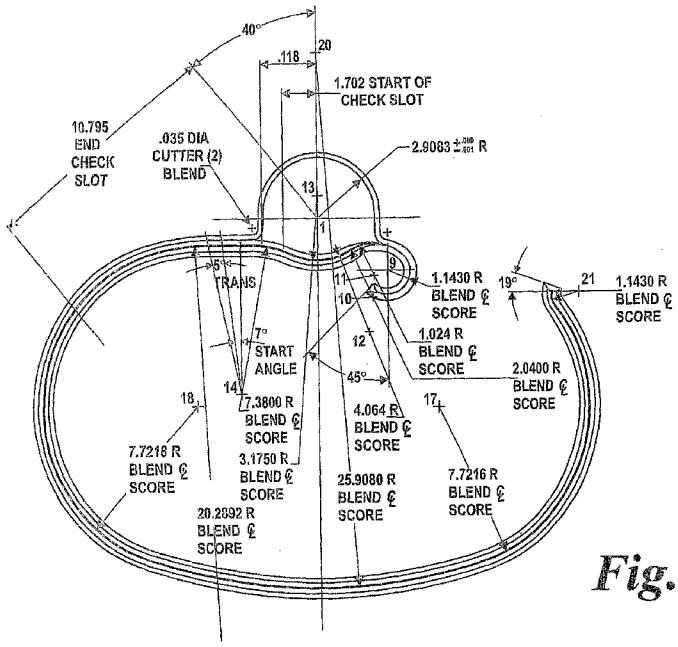


Fig. 2

(57) Abstract: A can end (10) having an end panel (12), an openable non-removable panel (15) defined by a score line (14) in the end panel (12) and a non-removable tab (13) attached to the end for acting 'on the openable panel (15) to cause it to pivot out of the plane of the end panel (12) to provide an opening, the opening being generally oblate with its minor axis passing through the tab characterised in that the ratio of the dimension of the opening on its major axis to the dimension of the opening on its minor axis is greater than 1.7 and the opening area is greater than 350mm2.

WO 2009/095672 A1

Can End

This invention relates to can ends of the type which include an openable non-removable panel defined by a score line and an non-removable tab attached to the end for acting on the openable panel to cause it to pivot to provide an opening through which the contents may be poured or drunk.

European Patent 1136300 describes such a can end and seeks to provide a non-removable openable panel, which it describes as a "tear panel" of non-circular form. It defines certain characteristics of this panel and in particular the aspect ratio (major axis: minor axis). It states that this aspect ratio must be between 1.3 and 1.7 and describes any can end having a ratio of above 1.7 as being unacceptable due to flow rate characteristics. The suggestion of the specification is that an aspect ratio of about 1.5 with a reduced opening area of less than 323mm^2 is preferred. The flow characteristics would be expected to be even more problematic for cans with end panels of relatively small diameter i.e. <47mm.

From one aspect the present invention consists of a can end having an end panel with a diameter less than 47mm, an openable non-removable panel defined by a score line in the end panel and a non-removable tab attached to the end for acting on the openable panel to cause it to pivot out of the plane of the end panel to provide an opening, the opening being generally oblate with its minor axis passing through the tab characterised in that the ratio of the dimension of the opening on its major axis to the dimension of the opening on its minor axis is greater than 1.7 and the opening area is greater than 350mm^2 and the opening is generally symmetrical about the minor axis.

The Applicants have discovered that, contrary to the teaching of EP 1136300, by increasing both the ratio and the opening area one can provide an opening which not only provides suitable flow characteristics, it is particularly desirable to soft drinks, where the user often wants to quench their thirst rather quickly. Particularly surprisingly these are suitable for smaller diameter cans i.e. those with an end panel <47mm.

The Applicants have further determined that, when, as in most cases, the score line does not extend the whole way around the opening, and thus defines a hinge in the end panel, the hinge width needs to be rather wider than usual in order to resist the increased forces at the hinge arising from the length of the major axis, whilst not being so large that it will resist the tearing of the openable panel at the score line. Specifically they have determined that a hinge width of between 6.5mm and 7.6mm in width is appropriate.

The Applicants have also determined the operations of such an openable panel is particularly efficacious, if the various portions of the panel are formed of parts of notional circles. It is particularly desirable for the portion of the score line that passes through the minor axis and is spaced from the tab forms part of a notional circle having a diameter of between 20mm and 30mm. This means that the centre of the circle is positioned some distance on the other side of the tab from the openable panel.

Similarly the portions of the score lines that pass through the major axis may form parts of respective notional circles and these preferably have diameters of between 7.6mm and 7.75mm.

Although the invention has been defined above it is to be understood it includes any inventive combination of the features set out above or in the following description.

An embodiment of the invention will now be described with reference to drawings, in which:

Figure 1 illustrates an conventional can end; and

Figure 2 illustrates a score panel of the type falling within the invention.

In Figure 1 a can end, generally indicated at 10 includes a rim 11, an end panel 12 (with a diameter of less than 47mm), an opening tab 13 and a score line 14 defining an openable non-removable panel 15. The opening operation using the tab 13 to displace the score panel 15 is well known to persons skilled in the art. A hinge for retaining the panel 15 on the end panel 12, whilst allowing inward pivoting, is indicated at 16.

Turning to Figure 2 the shape of the score panel 15, and hence the opening that it provides is defined by the score line 14a. The score line has three major portions, which the industry would define as occurring in the three o'clock, six 'clock and nine o'clock regions of the score, with the twelve o'clock position being aligned with the centre point of the tab rivet 17.

In the Figure 2 arrangement each of the three o'clock, six o'clock and nine o'clock portions are formed by parts of respective notional circles. Thus the three and nine o'clock regions are based on circles having radiuses of 7.7216mm, in the specific embodiment, whilst the six o'clock region a notional circle having a radius of 25.9080mm. It will be noted that these dimensions provide for smooth transitions between the portions of the score line.

It is believed that the preferred range for the diameter for the three and nine o'clock regions is between 7.6mm and 7.75mm, whilst for the six o'clock region the preferred range is between 20mm and 30mm.

The width of the hinge 17 should preferably be between 6.5mm and 7.6mm.

The lines that are broken in the informal drawing are in reality smooth curves or straight lines.

For the purposes of this specification the minor axis runs between the twelve o'clock and six o'clock positions whilst the major axis runs between the three o'clock and nine o'clock positions.

The area of opening formed when the score panel 15 is opened is 381.5mm^2 for the illustrated embodiment and preferably should be in the range 350mm^2 – 400mm^2.

Claims

1. A can end (10) having an end panel (12) with a diameter less than 47mm, an openable non-removable panel (15) defined by a score line (14) in the end panel (12) and a non-removable tab (13) attached to the end for acting on the openable panel (15) to cause it to pivot out of the plane of the end panel (12) to provide an opening, the opening being generally oblate with its minor axis passing through the tab characterised in that the ratio of the dimension of the opening on its major axis to the dimension of the opening on its minor axis is greater than 1.7 and the opening area is greater than 350mm^2 and the opening is generally symmetrical about the minor axis.

2. A can end wherein the ratio is between 1.7 and 1.8.

3. A can end as claimed in claim 1 or 2 wherein the score line (14) does not extend the whole way around the opening, and thus defines a hinge (17) in the end panel (12), wherein the hinge is between 6.5mm and 7.6mm in width.

4. A can end as claimed in any preceding claim wherein the portion of the score line (14) that passes through the minor axis and is spaced from the tab (13) forms part of a notional circle having a radius of between 20mm and 30mm.

5. A can end as claimed in any are of the preceding claims wherein the portions of the score line (14) that pass through the major axis from part of respective notional circles having radiuses of between 7.6mm and 7.75mm.

6. A can end as claimed in claim 5 wherein the portions of the score line (14) are dimensioned to provide smooth transitions between them.

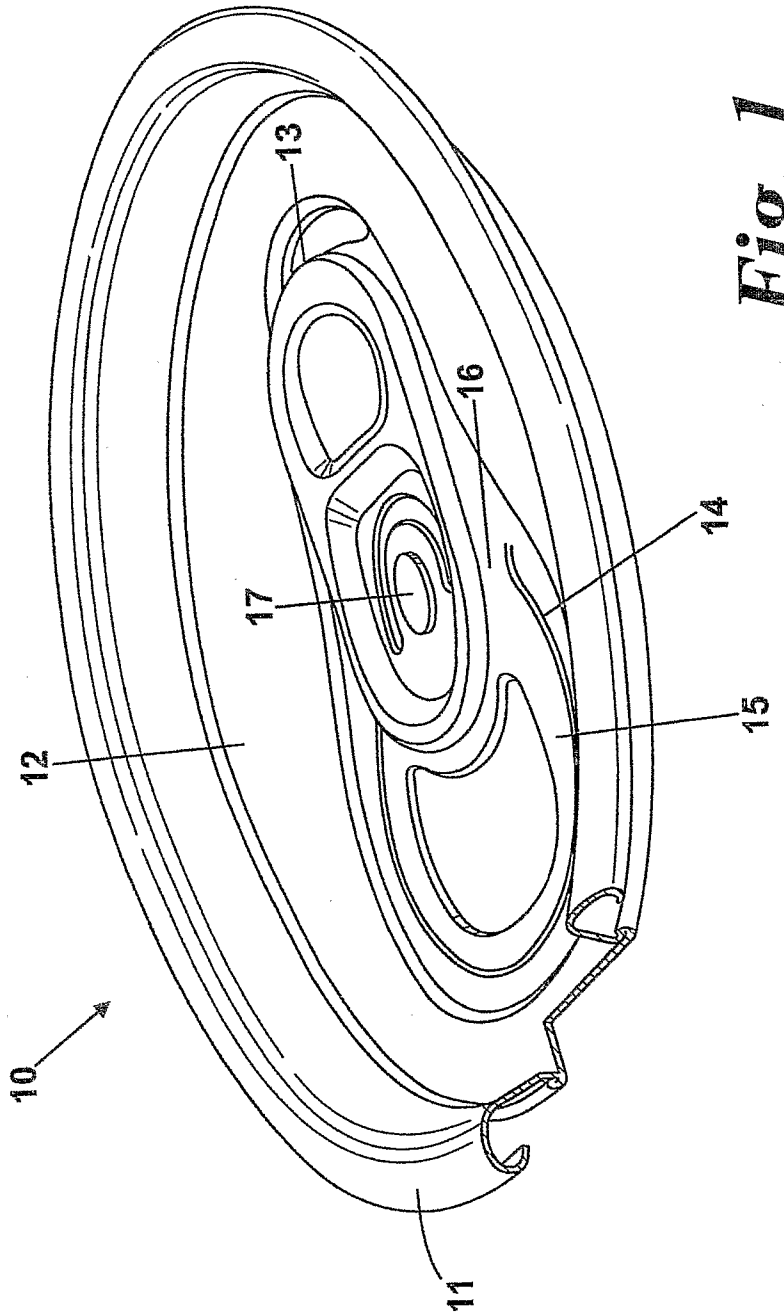


Fig. 1

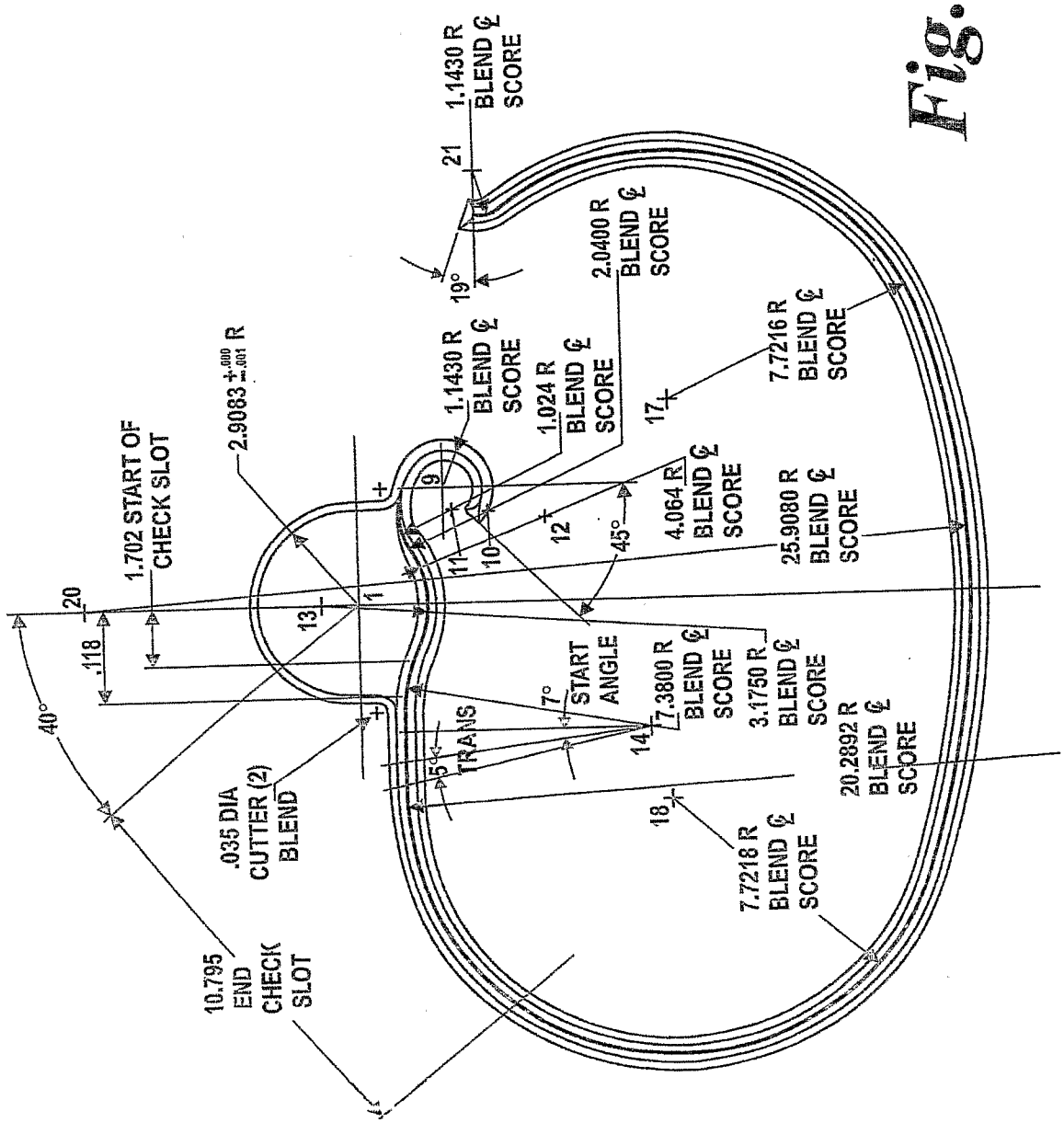

1.1430 R
BLEND ℄
SCORE
21
19°
2.0400 R
BLEND ℄
SCORE
1.1430 R
BLEND ℄
SCORE
1.024 R
BLEND ℄
SCORE
2.9083 +.000 -.001 R
1.702 START OF
CHECK SLOT
7.7216 R
BLEND ℄
SCORE
17
4.064 R
BLEND ℄
SCORE
25.9080 R
BLEND ℄
SCORE
20
.118
13
1
9
10
11
12
45°
40°
7°
START
ANGLE
7.3800 R
BLEND ℄
SCORE
3.1750 R
BLEND ℄
SCORE
TRANS
14
5
.035 DIA
CUTTER (2)
BLEND
18
7.7216 R
BLEND ℄
SCORE
20.2892 R
BLEND ℄
SCORE
10.795
END
CHECK
SLOT

Fig. 2

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2009/000251

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65D17/32

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2004/099664 A1 (HARTMAN WILLIAM H [US]) 27 May 2004 (2004-05-27) page 4, paragraph 34 page 5, paragraph 43 figures 7,8	1-6
Y	US 6 234 336 B1 (NEINER CHRISTOPHER G [US]) 22 May 2001 (2001-05-22) column 7, lines 44-48 figures 5a,5b	1-6
Y	DE 89 15 716 U1 (SCHMALBACH-LUBECA AG, 3300 BRAUNSCHWEIG, DE) 14 March 1991 (1991-03-14) page 6, paragraph 2 figure 2	1-6

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
3 April 2009	15/04/2009

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Piolat, Olivier

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2009/000251

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 1 135 300 A (CROWN CORK & SEAL TECH CORP [US]) 26 September 2001 (2001-09-26) the whole document	1-6

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/GB2009/000251

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004099664 A1	27-05-2004	AU 2003295772 A1	18-06-2004
		BR 0316736 A	18-10-2005
		EP 1601580 A1	07-12-2005
		MX PA05005368 A	05-10-2005
		RU 2335441 C2	10-10-2008
		WO 2004048215 A1	10-06-2004
US 6234336 B1	22-05-2001	US 6405889 B1	18-06-2002
DE 8915716 U1	14-03-1991	NONE	
EP 1135300 A	26-09-2001	AT 221492 T	15-08-2002
		AU 762618 B2	03-07-2003
		AU 1283500 A	26-06-2000
		BR 9915892 A	21-08-2001
		CA 2352764 A1	15-06-2000
		CN 1329559 A	02-01-2002
		DE 69902404 D1	05-09-2002
		DE 69902404 T2	14-11-2002
		DK 1135300 T3	28-10-2002
		ES 2179685 T3	16-01-2003
		WO 0034137 A1	15-06-2000
		JP 2002531345 T	24-09-2002
		MX PA01005571 A	24-04-2002
		PL 348032 A1	06-05-2002
		PT 1135300 E	29-11-2002
		ZA 200104181 A	22-08-2002