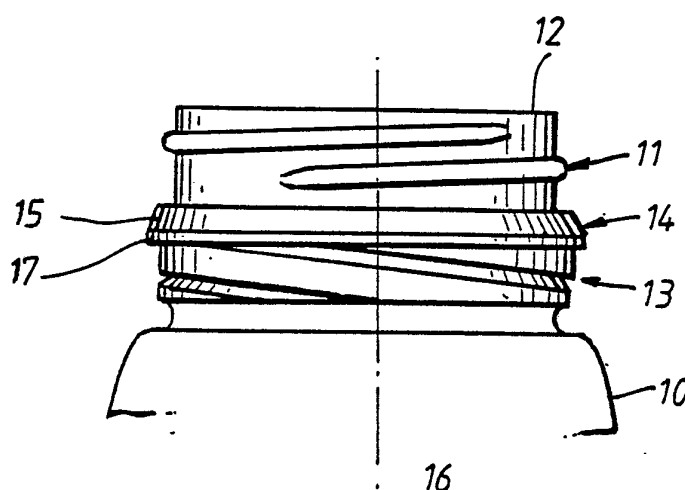




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification<sup>4</sup> : B65D 23/00, 41/34, 55/12</p>	A1	<p>(11) International Publication Number: WO 87/ 02009 (43) International Publication Date: 9 April 1987 (09.04.87)</p>
<p>(21) International Application Number: PCT/AU86/00289 (22) International Filing Date: 2 October 1986 (02.10.86) (31) Priority Application Number: PH 2731 (32) Priority Date: 3 October 1985 (03.10.85) (33) Priority Country: AU</p> <p>(71) Applicant (for all designated States except US): DAWSON ELECTRICS PTY. LTD. [AU/AU]; 35 Holloway Drive, Bayswater, VIC 3153 (AU).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only) : DAWSON, Robert, James [AU/AU]; 35 Holloway Drive, Bayswater, VIC 3153 (AU).</p> <p>(74) Agent: SANDERCOCK, SMITH &amp; BEADLE; 207 Riversdale Road, Hawthorn, VIC 3122 (AU).</p>		<p>(81) Designated States: AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US.</p> <p>Published With international search report.</p>

(54) Title: IMPROVEMENTS IN OR RELATING TO TAMPER EVIDENT CLOSURES



## (57) Abstract

A container for use with a tamper evident closure (18) has a neck (10) with first (11) and second (13) opposed thread portions spaced apart and adapted to respectively engage the cap (19) and interconnected ring (20) of the closure when it is initially installed on the container. When the closure is first rotated to remove the cap the ring is caused to rotate therewith and because the thread portions are opposed the cap and ring move in opposite axial directions, that is, in opposite directions along the axis of rotation. This axial movement causes the interconnection to fracture and subsequent tightening of the cap leaves a readily discernible gap between the cap and ring. A stepped ledge (14) between the two thread portions prevents removal of the ring after initial installation.

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.1.

## IMPROVEMENTS IN OR RELATING TO TAMPER EVIDENT CLOSURES

1 This invention relates to containers for tamper evident  
2 closures and in particular to the neck portion of a  
3 container for a tamper evident closure. The invention also  
4 relates to the combination of a neck portion of a container  
5 and a cap for use therewith.

6 Tamper evident closures enable a consumer to determine  
7 whether the closure has been previously removed and replaced  
8 with the possibility that the goods have become  
9 contaminated.

10 Closures of the general kind in question here, are well  
11 known and have been in use for a number of years on milk  
12 bottles, fruit juice containers, containers for motor oils  
13 and many other types of containers.

14 The closures consist of a cap which seals the container  
15 and a tear-off ring which is initially connected to the cap  
16 by thin joining members spaced around the circumference of  
17 the ring. The joining members fracture when the cap is  
18 rotated due either to the rotational movement of the cap or  
19 the axial movement of the cap away from the ring. The ring  
20 is retained against rotation by a ratchet arrangement  
21 between the neck of the container and the ring or against  
22 axial movement on the neck of the container by a ridge  
23 around the neck which engages inwardly directed ledge  
24 members on the ring. In the case of the ratchet arrangement  
25 the ring may be removed from the container neck after the  
26 cap has been removed but in the other case the ring  
27 usually remains on the neck of the container. However, a  
28 problem occurs with the known tamper evident closures in the  
29 that it is often not clearly evident, without close  
30 inspection, that the closure has been removed and replaced  
31 on the container because when it is replaced the two parts  
32 come again into close proximity with each other. Thus there  
33 is an increasing number of occasions where a consumer has  
34 unknowingly used contaminated goods because of a failure to  
35 recognize that the closure had been previously removed.

36 Accordingly, it is an object of this invention to  
37 provide a container having an improved neck of the kind  
38 adapted for use with tamper evident closures, whereby

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1 recognition that the closure has been removed and replaced  
2 is made easier.

3 Thus the invention provides a container having a neck  
4 of the kind for use with a tamper evident closure, which  
5 closure comprises a cap and an interconnected ring,  
6 characterized in that, said neck has first and second thread  
7 portions spaced axially on said neck for engagement by said  
8 cap and ring, respectively, whereby initial rotation of the  
9 cap in a direction of removal causes said ring to rotate  
10 therewith and move axially on said neck in the opposite  
11 axial direction to said cap thereby causing fracturing of  
12 the interconnection, such that subsequent tightening of the  
13 cap leaves a readily discernible gap between said cap and  
14 said ring.

15 In order that the invention may be more readily  
16 understood, one particular embodiment will now be described  
17 with reference to the accompanying drawings wherein:

18 Figure 1 is a perspective view of a cap for use with  
19 the neck portion of a container according to the invention;

20 Figure 2 is a side view of the neck portion of a  
21 container according to the invention;

22 Figure 3 is a cross-sectional view of the cap of Figure  
23 1;

24 Figure 4 is an enlarged perspective view of the neck  
25 portion of the container shown in Figure 2 with tamper  
26 evident closure in place thereon;

27 Figure 5 is a view similar to Figure 4 but showing the  
28 closure in the first stage of removal; and

29 Figure 6 is a view similar to Figures 4 and 5 but  
30 showing the closure in a second stage of removal.

31 Referring now to the drawings, the neck portion 10 of a  
32 container is shown to have a first threaded portion 11  
33 adjacent the mouth 12 and a second threaded portion or ramp  
34 13 which is arranged on the neck portion 10 away from the  
35 mouth 12 by a distance slightly greater than the extent of  
36 the first threaded portion 11. The first and second  
37 threaded portions are separated by a tapered ledge 14 which  
38 has an inclined surface 15 angled at about 60° to the axis

1 16 of the neck portion 10 and an abutment surface 17 which  
2 is normal to the axis 16.

3 As is evident in Figure 2 of the drawings, the first  
4 threaded portion 11 is a conventional right-hand thread and  
5 the second threaded portion or ramp 13 is an opposite  
6 thread, that is, a left-hand thread. Furthermore, the  
7 second threaded portion 13 is a dual flight thread. In  
8 other words, the second threaded portion has two starts or  
9 two separate ramps.

10 The closure 18 comprises a cap 19 and ring 20 which are  
11 initially joined together by a plurality of joining members  
12 21 which are wedge shaped and at their thin end are  
13 connected to the outer perimeter of the cap 19. As is  
14 evident in the drawings the ring 20 is castellated so as to  
15 define openings 22 between the cap and ring when they are  
16 joined together and the openings provide inwardly directed  
17 ledge members 23 which, after initial installation of  
18 the closure, engage the abutment surface 17 to prevent  
19 removal of the ring 20 from the neck portion 10. The ledge  
20 members 23 are able to distort slightly and cam up the  
21 inclined surface 15 so as to pass over the tapered ledge 14  
22 during initial installation of the closure 18 on the neck  
23 portion 10.

24 Although it is not clearly evident in Figure 2, the two  
25 separate flights of the second threaded portion 13 commence  
26 at the abutment surface 17 of the tapered ledge 14. Thus,  
27 when the cap 19 is rotated anti-clockwise, that is, in a  
28 direction to unscrew the cap from the neck portion 10, the  
29 ledge members 23 engage the inclined surfaces of the flights  
30 of the second threaded portion 13 which, because they run in  
31 a counter direction to the first threaded portion 11, cause  
32 the ring 20 to move axially on the neck portion 10 in the  
33 opposite direction to the cap 19. Also, the dual flights of  
34 the threaded portion 13 provide a coarse pitch thread  
35 relative to the first threaded portion 11 which causes the  
36 axial movement of the ring 20 to be at a greater rate than  
37 the axial movement of the cap 19. As is evident in Figure  
38 5, this opposed axial movement causes a rupturing of the

- 4 -

1 joining members 21 progressively as the ring moves away from  
2 the cap such that when the last joining member 21 has  
3 ruptured, the ring 20 has moved a discernible distance away  
4 from the tapered ledge 14. In other words, rotation of the  
5 cap 19 to remove it from the neck portion 10 causes axial  
6 movement of the ring 20 in a direction away from the mouth  
7 12 of the neck portion 10. Thus, when the cap is  
8 subsequently replaced on the neck portion 10, there is a  
9 noticeable spacing between the lower edge of the cap and the  
10 upper edge of the ring, that is, the adjacent surfaces of  
11 the two parts. It is therefore clearly evident that the  
12 closure has been removed from the container in question.

13 It should be evident from the description hereinabove  
14 that the neck portion described provides an improved  
15 arrangement for use with tamper evident closures. Rather  
16 than the ring of the closure remaining in the same axial  
17 position such that replacement of the cap makes it difficult  
18 to discern that the connection between the two parts has  
19 been severed, the neck portion according to this invention  
20 causes the ring to move in an axial direction away from the  
21 cap such that replacement of the cap leaves a very  
22 noticeable spacing between the two parts. Whilst the second  
23 threaded portion 13 is described as being a dual start  
24 thread, this is clearly not essential to the invention since  
25 a single start thread may still work effectively. Also,  
26 whilst one particular closure has been shown in the  
27 drawings, the invention could be clearly adapted for use  
28 with other types of closures.

- 5 -

- 1
- 2 1. A container having a neck (10) of the kind for use  
3 with a tamper evident closure (18), which closure comprises  
4 a cap (19) and an interconnected ring (20), characterized in  
5 that, said neck (10) has first (11) and second (13) opposed  
6 thread portions spaced axially on said neck for engagement  
7 by said cap and ring, respectively, whereby initial rotation  
8 of the cap in a direction of removal causes said ring to  
9 rotate therewith and move axially on said neck in the  
10 opposite axial direction to said cap thereby causing  
11 fracturing of the interconnection, such that subsequent  
12 tightening of the cap leaves a readily discernible gap  
13 between said cap and said ring.
- 14 2. A container as defined in claim 1, characterized in  
15 that, a circumferential ledge (14) is provided around said  
16 neck in an axial position between said first and second  
17 thread portions, said ledge is tapered (15) towards said  
18 first thread portion and stepped (17) towards said second  
19 thread portion and said ring has inwardly directed lugs (23)  
20 which engage the step of said ledge to prevent removal of  
21 said ring from said neck after initial installation thereon.
- 22 3. A container as defined in claim 2, characterized in  
23 that, said second thread portion is a dual flight thread  
24 whereby said axial movement of said ring during said  
25 rotation occurs at a greater rate than the axial movement of  
26 said cap.
- 27 4. A container as defined in claim 3, characterized in  
28 that, said neck has a greater diameter at said second thread  
29 portion than at said first thread portion.
- 30 5. A cap arrangement for use in combination with the  
31 container of claim 4, characterized in that said ring has a  
32 greater diameter than said cap, and said ring and cap are  
33 interconnected by means of spaced wedge shaped joining  
34 members (21) which have their thin ends connected to said  
35 cap whereby the joining members separate from said cap  
36 during said axial movement to cause said fracturing of the  
37 interconnection.
- 38 6. A cap arrangement as defined in claim 5, characterized

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1 in that, said ring is of castellated construction defining  
2 openings (22) in the ring, which openings are directed  
3 towards said cap, and said lugs are formed at said openings,  
4 said lugs are adapted to distort slightly and have an  
5 inclined surface for engaging the taper of said ledge to  
6 cause distortion of the lugs when said cap and ring are  
7 first installed on said neck whereby said lugs pass over  
8 said ledge and thereafter prevent removal of said ring.

1/2

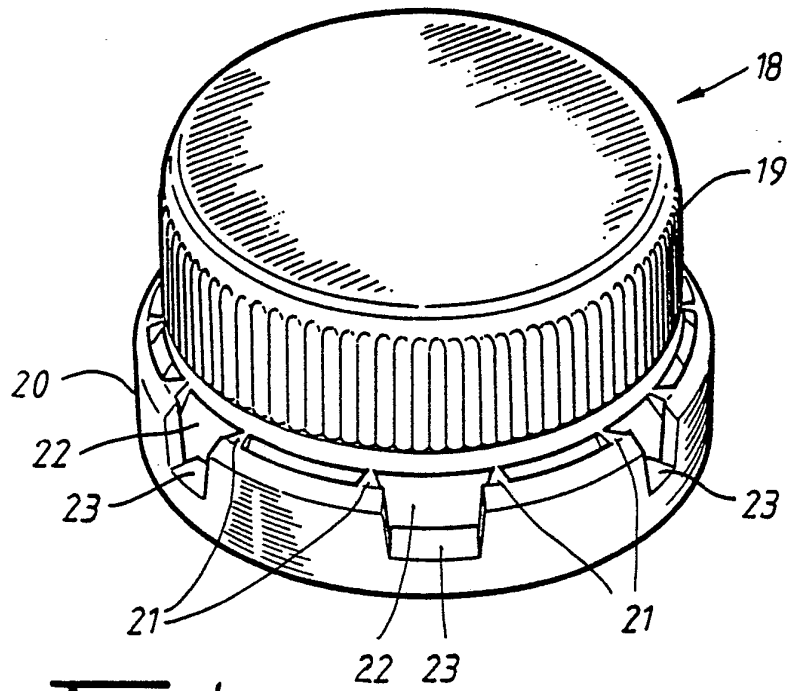


FIG. 1.

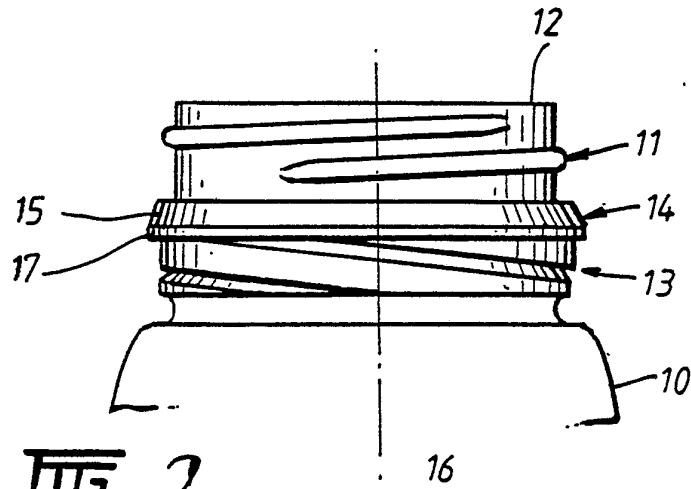
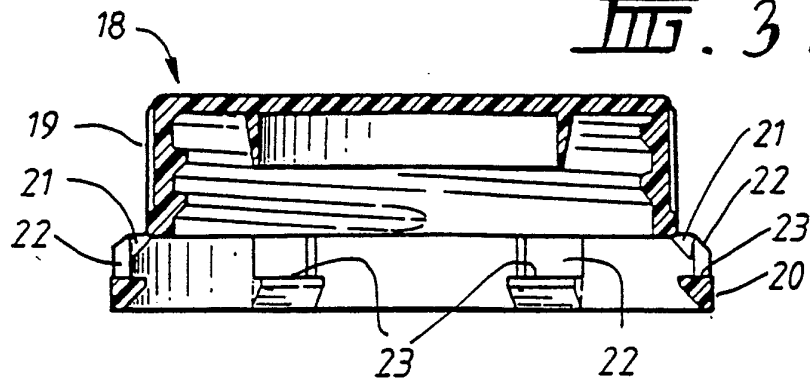
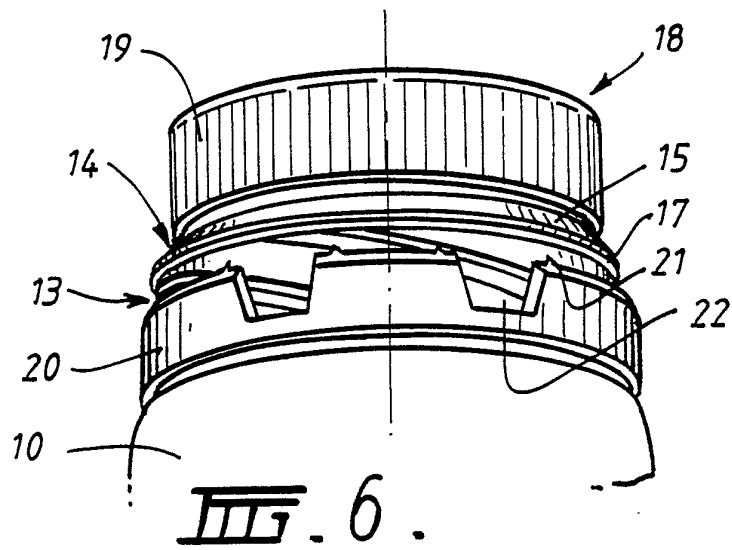
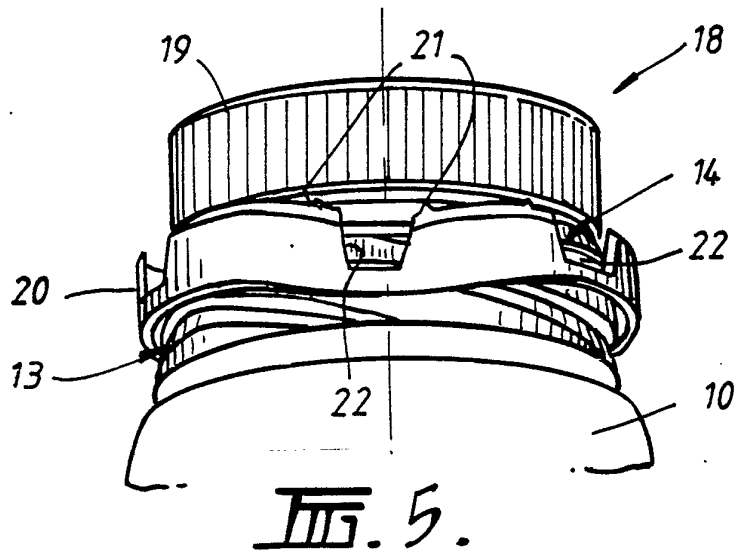
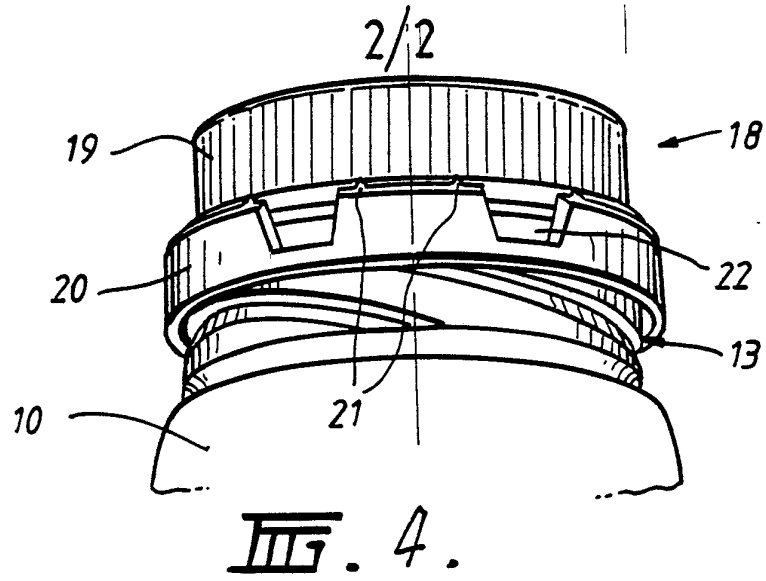


FIG. 2.

FIG. 3.





# INTERNATIONAL SEARCH REPORT

International Application No PCT/AU 86/00289

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply indicate all) <sup>8</sup> According to International Patent Classification (IPC) or to both National Classification and IPC <div style="text-align: center; font-size: 1.2em;">Int. Cl.<sup>4</sup> B65D 23/00, 41/34, 55/12</div>																			
<b>II. FIELDS SEARCHED</b> <div style="text-align: right; font-size: 0.8em;">Minimum Documentation Searched<sup>7</sup></div> <table style="width: 100%; border: none;"> <tr> <td style="width: 30%; border: none;">Classification System</td> <td style="border: none;">Classification Symbols</td> </tr> <tr> <td style="border: none;">IPC (AU search base)</td> <td style="border: none;">B65D 55/12  (PCT/INT/5 Chapter IV paragraph 2.8 followed)</td> </tr> </table> <div style="text-align: center; font-size: 0.8em; margin-top: 5px;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched<sup>9</sup></div> <div style="text-align: center; margin-top: 10px;">AU: IPC B65D 23/00, B65D 41/34, 55/02, 55/06</div>		Classification System	Classification Symbols	IPC (AU search base)	B65D 55/12  (PCT/INT/5 Chapter IV paragraph 2.8 followed)														
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<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>5</sup></b> <table style="width: 100%; border: none;"> <tr> <td style="width: 10%; border: none;">Category<sup>6</sup></td> <td style="width: 70%; border: none;">Citation of Document,<sup>11</sup> with indication, where appropriate, of the relevant passages<sup>12</sup></td> <td style="width: 20%; border: none;">Relevant to Claim No.<sup>13</sup></td> </tr> <tr> <td style="border: none;">X,Y</td> <td style="border: none;">AU,B, 23624/77 (504389) (PROT S.r.1.) 28 September 1978 (28.09.78)</td> <td style="border: none;">(1-5)</td> </tr> <tr> <td style="border: none;">X,Y</td> <td style="border: none;">AU,A, 51954/79 (KONINKUJKE EMBALIAGE INDUSTRIE VAN LEER BV) 1 May 1980 (01.05.80)</td> <td style="border: none;">(5,6)</td> </tr> <tr> <td style="border: none;">Y</td> <td style="border: none;">AU,A, 32652/84 (NYLEX CORPORATION LIMITED) 14 March 1985 (14.03.85) See bridges 11</td> <td style="border: none;">(5)</td> </tr> <tr> <td style="border: none;">Y</td> <td style="border: none;">EP 137352 (ZELLER PLASTIC KOEH) 17 April 1985 (17.04.85) See bridges 38</td> <td style="border: none;">(5)</td> </tr> <tr> <td style="border: none;">Y</td> <td style="border: none;">AU,B, 47058/79 (524714) (PLASTIVIT, SA) 29 November 1979 (29.11.79)</td> <td style="border: none;">(1-5)</td> </tr> </table>		Category <sup>6</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>	X,Y	AU,B, 23624/77 (504389) (PROT S.r.1.) 28 September 1978 (28.09.78)	(1-5)	X,Y	AU,A, 51954/79 (KONINKUJKE EMBALIAGE INDUSTRIE VAN LEER BV) 1 May 1980 (01.05.80)	(5,6)	Y	AU,A, 32652/84 (NYLEX CORPORATION LIMITED) 14 March 1985 (14.03.85) See bridges 11	(5)	Y	EP 137352 (ZELLER PLASTIC KOEH) 17 April 1985 (17.04.85) See bridges 38	(5)	Y	AU,B, 47058/79 (524714) (PLASTIVIT, SA) 29 November 1979 (29.11.79)	(1-5)
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<table style="width: 100%; border: none;"> <tr> <td style="width: 60%; border: none;"> <sup>10</sup> 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         </td> <td style="width: 40%; border: none;">           "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            "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.            "A" document member of the same patent family         </td> </tr> </table>		<sup>10</sup> 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 "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. "A" document member of the same patent family																
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<b>IV. CERTIFICATION</b> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">Date of the Actual Completion of the International Search 28 October 1986 (28.10.86)</td> <td style="width: 50%; border: none;">Date of Mailing of this International Search Report (13.11.86) 13 NOVEMBER 1986</td> </tr> <tr> <td style="border: none;">International Searching Authority Australian Patent Office</td> <td style="border: none;">Signature of Authorized Officer  R. KIRBY</td> </tr> </table>		Date of the Actual Completion of the International Search 28 October 1986 (28.10.86)	Date of Mailing of this International Search Report (13.11.86) 13 NOVEMBER 1986	International Searching Authority Australian Patent Office	Signature of Authorized Officer R. KIRBY														
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International Searching Authority Australian Patent Office	Signature of Authorized Officer R. KIRBY																		

## FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

V.  OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE <sup>1</sup>

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1.  Claim numbers ..... because they relate to subject matter not required to be searched by this Authority, namely:

2.  Claim numbers ..... because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3.  Claim numbers ..... because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI.  OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING <sup>2</sup>

This International Searching Authority found multiple inventions in this international application as follows:

Claims 1-4 directed to a container and  
 Claims 5,6 directed to a cap arrangement  
 between which there is no single general inventive concept.

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4.  As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

## Remark on Protest

The additional search fees were accompanied by applicant's protest.

No protest accompanied the payment of additional search fees.

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON  
INTERNATIONAL APPLICATION NO. PCT/AU 86/00289

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report	Patent Family Members			
AU 23624/77	AT 6898/76	BE 846456	CA 1089414	
	CH 610567	DE 2638351	FR 2352719	
	GB 1531783	IT 1061392	NL 7610301	
	PT 65598	SE 7609478	US 4156490	
AU 51954/79	BE 879521	DE 2942068	DK 4435/79	
	FR 2439138	GB 2034674	JP 55097354	
	LU 81790	NL 7810527	ZA 7905489	
EP 137352	DE 3336908	JP 60099860	US 4562931	
AU 47058/79	GB 2022063	MX 148326	ES 470243	
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END OF ANNEX