

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 913 335 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

06.05.1999 Bulletin 1999/18

(51) Int Cl.⁶: **B65D 43/08**

(21) Application number: **98811054.0**

(22) Date of filing: **22.10.1998**

(84) Designated Contracting States:

**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**

Designated Extension States:

AL LT LV MK RO SI

(30) Priority: **30.10.1997 GB 9722828**

(71) Applicant: **Alusuisse Technology & Management
AG**

8212 Neuhausen am Rheinfall (CH)

(72) Inventors:

- **Bewick, Michael W.M.**
Leicestershire LE15 7 HL (GB)
- **Warren, John Keith**
Nottinghamshire NG20 0RY (GB)
- **Baird-Smith, Ian George**
Southwell, Nottinghamshire NG25 0JU (GB)
- **Cook, John Alan**
Nottinghamshire NG 19 9EX (GB)

(54) **A container closure and a method of packaging a perishable product**

(57) There is disclosed a container closure comprising a can (10) having a metal wall (17) and terminating in an opening (18) having a first surface (13a); a generally rigid closure (12) including: means (19,21) for securing the rigid closure (12) and the first surface (13a) together; a further surface (28); and a deformable sealing member (16) secured to the closure and engagable with the first surface (13a) to define a seal therewith when the rigid closure (12) and the can (10) are secured together, the seal being adequate to resist pressures generated within the can (10) during heating of its contents.

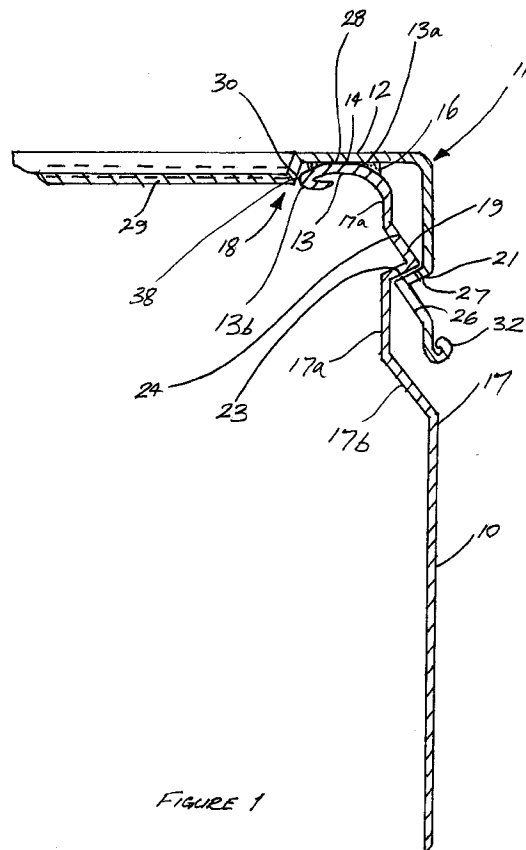


FIGURE 1

EP 0 913 335 A1

Description

[0001] This invention relates to a container closure, and to a method of packaging a perishable product. In particular, the invention relates to a novel closure for metal containers such as food cans.

[0002] Herein, "perishable product" includes but is not limited to foodstuffs, beverages, medicines, pet foods and other substances that generally require sterilisation in situ within a can in order to prevent degradation that would otherwise occur.

[0003] Patent Application No. GB 9711462.3 discloses a container closure for a metal can having an open end terminating in an annular flange extending perpendicular to the wall of the can body. The closure comprises a foil membrane adhesively sealed to the flange, closing the open end. A rigid, threaded cap is screwed onto a thread, forming part of the can end, over the flange and foil membrane. A resiliently deformable member of complementary shape to the flange pinches the foil membrane against the flange, thereby reinforcing the seal between the membrane and the flange.

[0004] The arrangement of GB 9711462.3 permits the formation of a so-called easy open end in a can the contents of which require cooking. The closure of GB 9711462.3 may be temporarily re-closed after opening, by means of the screw cap. Although of some utility in the art of canmaking, the closure of GB 9711462.3 nonetheless suffers some disadvantages.

[0005] Firstly, the need to provide the foil membrane and adhere it to the flange adds to the cost of the can-making operation.

[0006] Also, whilst the closure of GB 9711462.3 can in theory be employed either on two piece cans or three piece cans, in practice it is of limited utility when used on two piece cans. This is because food manufacturers and manufacturers of other perishable products are reluctant to test the seal between the membrane and the flange after fitting. The food manufacturers prefer to receive a three piece can one end of which has been closed and tested by the canmaker, and subsequently apply a prior art closure to the other, open end of the can (after filling of the can with a food product) by a process known as "seaming". Seaming is believed by the food manufacturers to be a thoroughly reliable method of closing a can. The food manufacturers do not need to test can ends that have been closed by seaming.

[0007] Thus the market for closures of the kind described in GB 9711462.3 in two piece cans is limited.

[0008] Therefore there is a need for a container closure that confers "easy open" properties; that optionally may be re-closed following initial opening; that permits in-situ cooking or other heat processing of the can contents; and that obviates the need for testing of the foil membrane seals by the food manufacturers.

[0009] According to a first aspect of the invention there is provided a container closure, comprising:

a can having a metal wall and terminating in an opening having a first surface;
a generally rigid closure;
means for securing the rigid closure and the first surface together, the rigid closure including a further surface and the container closure including a deformable sealing member between the first and further surfaces to define a seal therebetween when the rigid closure and the can are secured together, the seal being adequate to resist pressures generated within the can during heating of its contents.

[0010] This closure dispenses with the foil membrane, thereby obviating the need for testing of the seal between the membrane and the flange.

[0011] The deformable sealing member provides an adequate seal during cooking or other heat or pressure processing of the can contents.

[0012] The use of a rigid closure means that the container closure is re-closable after initial opening.

[0013] Furthermore, the opening step is easier in the closure of the invention than in the closure of GB 9711462.3 since there is no need to remove the foil membrane from the can. When the can contains a liquid product, this feature advantageously minimises spillage.

[0014] Conveniently the first surface is annular. Regardless of the shape of the first surface, the sealing member preferably is of complementary shape to the first surface when engaged therewith to define the seal.

[0015] In practical embodiments, the sealing member will be of approximately complementary shape to the first surface at all times. It is possible, however, to devise embodiments in which the shape of the deformable sealing member changes during securing of the rigid closure onto the can, so that the deformable sealing member adopts the shape of the first surface only on completion of the securing step.

[0016] The annular shape of the first surface is consistent with manufacture of the can as a hollow, cylindrical item.

[0017] Conveniently, the means for securing the rigid closure and the can together includes one or more members engagable with the can for urging the rigid closure and the can together. In preferred embodiments, the means for securing includes one or more pairs of mutually engaging, screw threads formed respectively on the rigid closure and the can.

[0018] The use of screw threads means that the rigid closure is rapidly applied during a canmaking operation. It also ensures that the deformable member is urged into sealing contact with the flange.

[0019] The use of threads also advantageously assists in removal of the rigid closure on opening of the closure.

[0020] Preferably the first surface extends perpendicular to the wall of the can. Thus the first surface is easily formed as a rolled flange, using conventional canmak-

ing techniques.

[0021] Preferably the flange projects from the metal wall to define the first surface.

[0022] In such embodiments, it is preferable that the first surface is annular, especially if the end of the can is also annular.

[0023] The use of an annular end to the can does not preclude the presence of a can body of other shapes.

[0024] Preferably the first surface is annular. The deformable sealing member also is preferably annular.

[0025] In preferred embodiments, the deformable member is formed of a sealing compound which may be formed from a polymeric material and which could be foamed. The material could be a PVC containing plastisol or could be any elastomeric material eg. rubber or other resilient material.

[0026] Such a material provides good sealing properties and is inert to the majority of food products that may be packed within the can.

[0027] Preferably the can narrows in the vicinity of the closure. More preferably, the can is a hollow cylinder whose diameter reduces in the vicinity of the closure.

[0028] This feature advantageously strengthens the can in the vicinity of the closure and also allows the can neatly to accommodate a preferred form of rigid closure including a skirt projecting from the further surface.

[0029] When the can includes a reduced diameter portion and the rigid closure includes the skirt, the skirt preferably lies generally in the reduced diameter portion of the can, thereby conferring a neat appearance on the can including the closure of the invention.

[0030] The rigid closure may preferably include an annular portion of substantially the same diameter as the widest part of the can body, thereby permitting a can including the closure to roll freely. One method of achieving this is to provide on the rigid closure a rolled rib that is of the same diameter when the rigid closure is applied to the can as the diameter of the widest portion of the can body. In a three piece can, the widest portion of the can body is usually the flange by means of which the flanged end is secured. In a two piece can, the can body may be generally of uniform width over the majority of its length. Alternatively, in such cans there may be variations in the width of the body over its length, eg. as a result of the formation of rolling beads or other features.

[0031] Regardless of the precise design of can and rigid closure, it is desirable that the rigid closure includes a shoulder juxtaposed to an edge of the first surface, thereby strengthening the can in the vicinity of the first surface. Preferably the shoulder is defined by a countersink forming part of the rigid closure.

[0032] This feature advantageously allows the mass-production of rigid closures that strengthen the closure in the vicinity of the first surface.

[0033] Conveniently the engaging face of each thread, when present, extends at an acute angle to the surface on which the thread is formed; and the non-en-

gaging face of each thread extends at an obtuse angle thereto to reinforce the engaging part.

[0034] This arrangement allows the manufacture of strong threads even when the material of the can body and closure is a thin metal, typically less than 1mm thick.

[0035] Preferably the rigid closure and/or the can includes one or more embossments defining the respective threads.

[0036] This feature also assists in the manufacture of a can including a closure according to the invention, using known canmaking techniques.

[0037] According to a second aspect of the invention there is provided a rigid closure for a container closure as defined hereinabove, wherein the rigid closure includes a surface having secured thereto a deformable sealing member for engaging a said first surface; and means for co-operating with a said can to secure the rigid closure and a said can together.

[0038] Such a rigid closure is particularly suited for use in the container closure of the invention.

[0039] Conveniently the rigid closure includes a shoulder that in use lies juxtaposed to an edge of a said first shoulder.

[0040] Thus preferred embodiments of the rigid closure according to the invention are particularly suited for strengthening the open end of a can.

[0041] According to a third aspect of the invention there is provided a method of packing a perishable product comprising the steps of:

placing the perishable product in a hollow can closed at one end and open at an end spaced from the closed end and securing to the open end a sealing closure, wherein one of the ends of the can is closed by a container closure according to any of Claims 1 to 19; and heating the contents of the can thereby to sterilise them.

[0042] This method is simpler than the prior art methods of packaging a perishable product requiring sterilisation in a container having an easy-open end.

[0043] There now follows a description of a preferred embodiment of the invention, by way of example, with reference being made to the accompanying drawing figure which is a cross-sectional view of part of a container including a container closure according to the invention.

[0044] Referring to the drawing figure, there is shown a container in the form of can 10 including a closure indicated generally by the numeral 11.

[0045] Closure 11 comprises a rigid closure 12 and a flange 13 defining a first surface 14. A resiliently deformable sealing member in the form of an annulus 16 of a deformable sealing material such as "plastisol" or any of a wide range of other elastomers, or similar, resiliently deformable materials such as foamed materials and rubbers, is sandwiched between rigid closure 12 and first surface 14 when the closure 11 occupies its closed

position as shown in the drawing figure.

[0046] The sealing member may take other shapes if desired, such as squares, rectangles, spirals, ovals, triangles and other regular and irregular shapes. The sealing member need not be endless.

[0047] Describing the invention in more detail, can 10 may be a two piece or three piece can, made eg. from aluminium, tinplated steel or tin free steel, formed into a hollow, elongate cylinder as shown. Laminated and composite materials may alternatively be employed. The precise choice of material for the can 10 is determined in part by the product to be packed in it.

[0048] Regardless of the precise material chosen, can 10 includes a metal wall 17 the thickness of which is determined largely by the manufacturing process for the can 10. In two piece (drawn and wall ironed) and three piece cans, metal wall 17 is typically less than 0.25mm thick.

[0049] The diameter of metal wall 17 reduces in the vicinity of the open end 18 thereof that is closed by closure 11. In the case of a cylindrical can 10, this is achieved through "necking" of the wall 17, ie. the provision of a reduced diameter portion 17a of wall 17 that is continuous with the remainder of wall 17 by virtue of a bevelled annular portion 17b of wall 17.

[0050] At its free end, reduced diameter portion 17a terminates in flange 13 that extends inwardly of wall 17. In order to provide a smooth terminus to flange 13, an annular portion 13b thereof is rolled or folded under flange 13 to define a smooth, rounded edge at the opening indicated by reference numeral 18.

[0051] Reduced diameter portion 17a of metal wall 17 includes formed therein an outwardly projecting embossment that defines a screw thread 19. Thread 19 is formed by a conventional canmaking technique, that involves impressing a tool into the inner surface of wall portion 17a, whereby to deform the material of wall portion 17a and form the thread 19.

[0052] Other thread forming techniques may be employed. Furthermore, thread 19 need not project outwardly as an embossment, but may be instead project inwardly as a depression. In the latter case the thread forming tool would most probably be impressed on the outer surface of wall portion 17a.

[0053] Thread 19 extends along a length of the circumference of wall portion 17a and is inclined at an angle to flange 13 so that a further thread portion 21 formed similarly in a downwardly depending skirt 20 forming part of rigid closure 12 may engage therewith to permit screwing of rigid closure 12 onto the end of can 10.

[0054] Thread 19 includes an engaging surface 23 extending radially and inclinedly outwardly of wall portion 17a on the underside of thread 19. Engaging surface 23 preferably is at an acute angle to a normal to wall portion 17a, since this provides a maximal area of contact with the corresponding surface 27 of thread 21. (In theory the engaging portions 23 and 27 should be horizontal in order to provide maximum contact and hence the great-

est mechanical advantage when the rigid closure 12 is screwed onto the can 10. However, in practice it is impossible to achieve horizontal surfaces.)

[0055] The non-engaging portion 24 of thread 19 interconnects the part of wall portion 17a lying above thread 19, and engaging surface 23. Non-engaging portion 24 extends at a less acute angle to a normal to wall portion 17a in order to minimise the risk of bending of thread 19 during tightening of rigid closure 12 onto can 10.

[0056] Thread 21 in skirt 20 is of generally complementary shape to thread 19. Therefore the non-engaging portion 26 of thread 21 extends at a similar angle to that of non-engaging portion 24.

[0057] In practice, a plurality of threads 19 would be provided, with each thread extending over a short length of portion 17a to provide a plurality of thread starts for engagement by a corresponding number of threads 21 formed in rigid closure 12.

[0058] An annulus 16 of resiliently deformable, sealing material is secured to a downwardly facing surface 28 defining part of the underside of the rigid closure 12. Annulus 16 is adhesively secured to surface 28. Thus on tightening of rigid closure 12 onto can 10 by means of threads 19 and 21, annulus 16 is urged into sealing engagement with upper face 13a of flange 13.

[0059] As shown, upper face 13a is convexly curved in order to provide a region of maximum pressure in annulus 16, thereby improving the seal between flange 13 and closure 12. This is shown by the deformation of annulus 16 in Figure 1. In alternative embodiments (not shown in the drawing) a flat or other shaped flange 13 may be used.

[0060] Rigid closure 12 includes in its central portion a disc-like portion 29 that is spaced from the outer peripheral portion of rigid closure 12 by means of a countersink. The countersink defines an inclined shoulder 30 interconnecting the disc-like portion 29 and the outer part of rigid closure 12.

[0061] The diameter of disc-like portion 29 is such that inclined shoulder 30 is juxtaposed to the edge of flange 13 denoted by reference numeral 38. If the dimensions of the components of the closure 11 are judiciously chosen, shoulder 30 may abut edge 38, thereby strengthening flange 13 on tightening of rigid closure 12 onto the end of can 10. This is of particular benefit in 3 piece cans, before they are sealed.

[0062] Rigid closure 12 includes at the lower, free edge of skirt 20 a so-called rolled portion 32 that provides a smooth terminus to skirt 20. The width of rolled portion may be chosen such that it constitutes the largest-diameter part of rigid closure 12. In particularly preferred embodiments, the diameter of rolled portion 32 equals that of the widest part of can body 10, so that the closed can including the rigid closure 12 may roll easily, eg. in a production environment.

[0063] Closure 12 may include annular ribs, or other embossments or depressions, that permit expansion of

closure 12 in the longitudinal direction of the can 10 during cooking or other heat and/or pressure treatment of the can contents. Such ribs, etc., are known in the art.

[0064] A method of packaging a food or other perishable product in a two-piece can having a closure according to the invention involves, simply, placing the food product within the body of can 10, together with any preservatives or modified atmosphere gases that are desired, followed by screwing of closure 12 onto can 10 using the threads 19,21. This brings annulus 16 into contact with surface 30a, thereby sealing the open end of can 10. At this time, inclined shoulder 30 may simultaneously reinforce can 10 in the vicinity of flange 13.

[0065] Thus if the can 10 is a two piece can, the rigid closure 12 having the annulus 16 secured thereto may be supplied separately, for subsequent securing in a closing operation.

[0066] In the case of a three piece can, the closure of the invention may be applied before the empty can is delivered, with one open end, for filling. Following filling, the open end may be closed by conventional seaming.

[0067] Whether can 10 is a two-piece or three-piece can, its contents may be heated using *per se* known methods to cook and/or sterilise the contents, with the closure of the invention in situ.

[0068] Following distribution of the can 10 including the closure 11, a user thereof may simply unscrew closure 12, thereby releasing the seal between annulus 16 and surface 13a and permitting access to the contents of the can 10.

[0069] Rigid closure 12 may subsequently be re-applied to close the open end of can 10. Under such circumstances the interior of can 10 may no longer be sterile.

[0070] The components of the invention shown in Figure 1 may of course take a variety of forms. Thus, for example, it is not essential that either the can 10 or the reduced diameter portion 17a thereof possess a circular cross-sectional shape. Nonetheless, cylindrical, circular cans have been found easy to manufacture in a mass production environment.

[0071] As previously mentioned, the materials of the components of the can may be varied.

[0072] The rigid closure 12 may be manufactured from a variety of materials such as metals (eg. tin plated steel, tin free steel, aluminium); plastics (eg. polymers and copolymers); composite materials; and laminates of eg. metals in combination, or metals with plastics.

[0073] The components of the can and/or closure may be coated internally and/or externally with eg. lacquers, inks or paints, or may be subject to other surface treatments.

[0074] The material of annulus 16 may also be varied. It is essential simply that the material 16 is inert to the contents of the can; that it is resiliently deformable; and that it is impermeable both to the contents of the can and to the ingress of substances from outside the can, after the rigid closure has been tightened onto the can

10.

[0075] A further variant on the closure of the invention is one in which the annulus 16 is adhesively secured to the surface 13a of flange 13. Such a closure would function similarly to that shown in Figure 1, except that on removal of the rigid closure 12 the annulus 16 of deformable, sealing material would remain attached to flange 13.

[0076] Yet a further possibility is for annulus 16 to be secured to neither rigid closure 12 nor flange 13. Such an annulus could then be discarded on opening of the can, or re-used as desired.

[0077] The last mentioned embodiment of the invention is, however, less preferred than the other embodiments because of the risks of the annulus falling into the can before sealing thereof.

Claims

1. A container closure, comprising:

a can having a metal wall and terminating in an opening having a first surface;
a generally rigid closure;
means for securing the rigid closure and the first surface together, the rigid closure including a further surface and the container closure including a deformable sealing member between the first and further surfaces to define a seal therebetween when the rigid closure and the can are secured together, the seal being adequate to resist pressures generated within the can during heating of its contents.

2. A container closure according to Claim 1 wherein the first surface is annular.

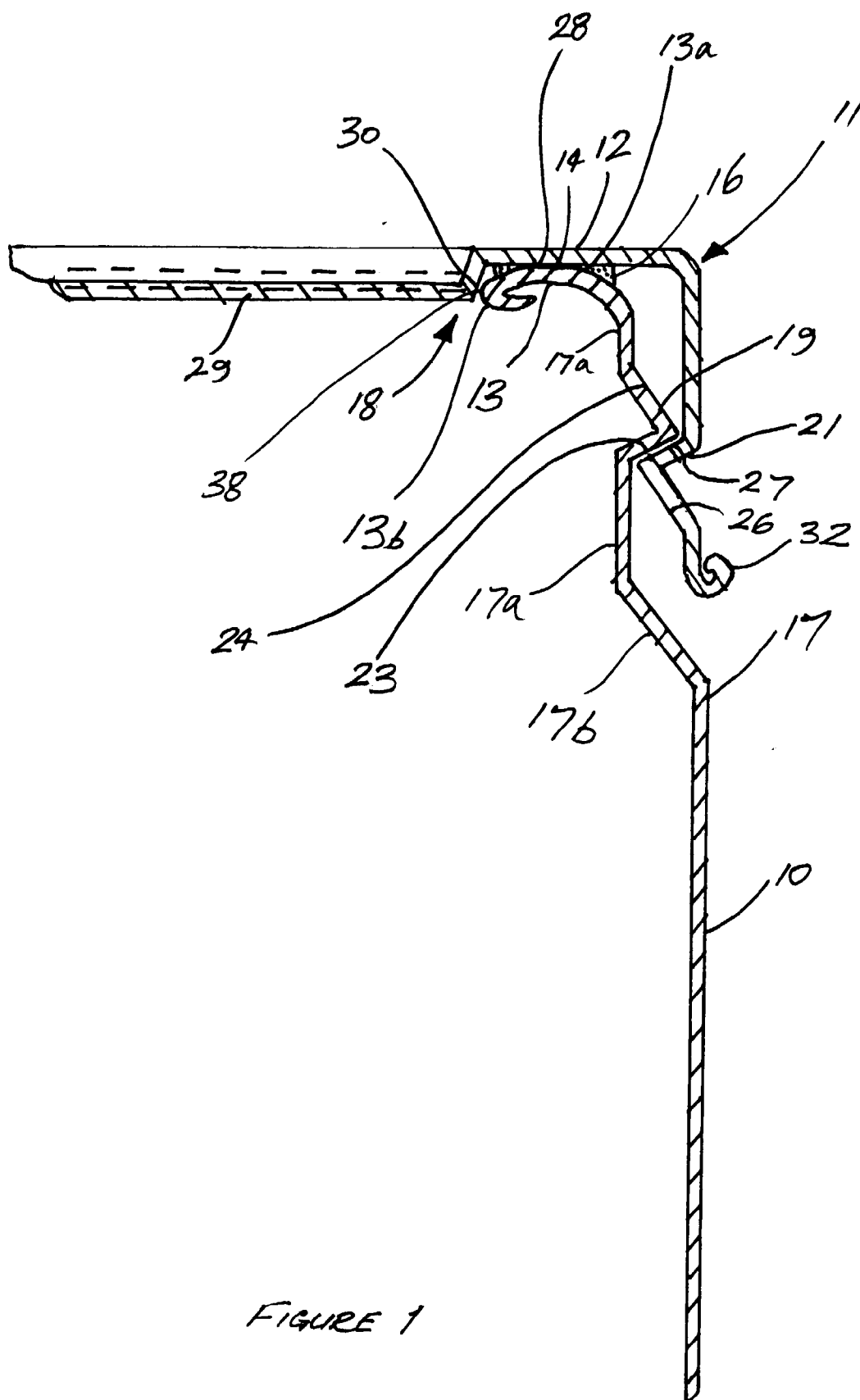
3. A container closure according to Claim 1 or Claim 2 wherein the sealing member is of complementary shape to the first surface when engaged therewith to define the seal.

4. A container closure according to any preceding claim, wherein the means for securing the rigid closure and the can together includes one or more members engagable with the can for urging the rigid closure and the can together.

5. A container closure according to any preceding claim wherein the means for securing the rigid closure and the can together includes one or more pairs of mutually engaging, screw threads formed respectively on the rigid closure and the can.

6. A container closure according to any preceding claim wherein the first surface extends perpendicular to the wall of the can.

7. A container closure according to Claim 6 including a flange projecting from the metal wall to define the first surface.
8. A container closure according to any preceding claim wherein the first surface is annular.
9. A container closure according to any preceding claim wherein the deformable sealing member is annular.
10. A container closure according to any preceding claim wherein the deformable member is formed of an elastomer such as plastisol.
11. A container closure according to any preceding claim wherein the can narrows in the vicinity of the closure.
12. A container closure according to Claim 11, wherein the can is a hollow cylinder whose diameter reduces in the vicinity of the closure.
13. A container closure according to any preceding claim, wherein the rigid closure includes a skirt projecting from the further surface.
14. A container closure according to Claim 14 when dependent from Claim 13, wherein the skirt lies generally in the reduced diameter portion of the can.
15. A container closure according to Claim 12 or any claim dependent therefrom, wherein the rigid closure includes an annular portion of substantially the same diameter as the widest part of the can, thereby permitting a can including the closure to roll freely.
16. A container closure according to any preceding claim wherein the rigid closure includes a shoulder juxtaposed to an edge of the first surface, thereby strengthening the can in the vicinity of the first surface.
17. A container closure according to Claim 16 wherein the rigid closure includes a countersink defining the shoulder.
18. A container closure according to Claim 5 or any claim dependent therefrom, wherein the engaging face of each thread extends at an acute angle to the surface on which the thread is formed; and the non-engaging face of each thread extends at an obtuse angle thereto to reinforce the engaging part.
19. A container closure according to Claim 5 or any claim dependent therefrom, wherein the rigid closure and/or the can includes one or more emboss-
ments defining the respective threads.
20. A container closure according to any preceding claim wherein the first surface is shaped to provide one or more variations in the pressure exerted on the deformable member on closing of the closure.
21. A container closure according to Claim 20 wherein the first surface includes a convexly curved portion.
22. A container closure according to any preceding claim, wherein the deformable member is resiliently deformable.
23. A rigid closure for a container closure according to any preceding claim, wherein the rigid closure includes a surface having secured thereto a deformable sealing member for engaging a said first surface; and means for co-operating with a said can to secure the rigid closure and a said can together.
24. A rigid closure according to Claim 20 including a shoulder that in use lies juxtaposed to an edge of a said first shoulder.
25. A method of packing a perishable product comprising the steps of:
placing the perishable product in a hollow can closed at one end and open at an end spaced from the closed end and securing to the open end a sealing closure, wherein one of the ends of the can is closed by a container closure according to any of Claims 1 to 22; and heating the contents of the can thereby to sterilise them.
26. A container closure generally as herein described, with reference to or as illustrated in the accompanying drawing.
27. A rigid closure generally as herein described, with reference to or as illustrated in the accompanying drawing.
28. A method generally as herein described, with reference to or as illustrated in the accompanying drawing.



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 81 1054

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.6)	
X	WO 92 08656 A (EFFEM GMBH) 29 May 1992 * page 3, paragraph 2; claim 7; figures 1,2 *	1-4,8,9,11,13-17,20-25	B65D43/08	
Y	---	5-7,10,12,18,19		
Y	WO 96 09968 A (COCA COLA CO) 4 April 1996 * the whole document *	5,12,18,19		
A	---	1		
Y	GB 374 702 A (CROWLEY) * figures 1-4 *	6,7		
A	---	1		
Y	DE 11 76 014 B (CROWN CORK & SEAL) * column 1, paragraph 1 - paragraph 3; figure 4 *	10		
A	---	1		TECHNICAL FIELDS SEARCHED (Int.Cl.6)
A	GB 194 670 A (PASSAIC METAL WARE)			B65D
A	US 2 257 715 A (HOPKINS) 30 September 1941			
A	CH 684 077 A (FREI SIEGFRIED) 15 July 1994			
The present search report has been drawn up for all claims				
Place of search BERLIN		Date of completion of the search 4 February 1999	Examiner Spettel, J	
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				

EPO FORM 1503 03/82 (P04001)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 98 81 1054

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

04-02-1999

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9208656 A	29-05-1992	DE 4035769 A AU 8735491 A	21-05-1992 11-06-1992
WO 9609968 A	04-04-1996	AU 3683695 A US 5711447 A	19-04-1996 27-01-1998
GB 374702 A		NONE	
DE 1176014 B		BE 553037 A GB 810786 A NL 105243 C NL 212551 A	
GB 194670 A		NONE	
US 2257715 A	30-09-1941	NONE	
CH 684077 A	15-07-1994	NONE	