(12) # EUROPEAN PATENT APPLICATION

(54) **Easy opening closure for cans.**

(57)   Easy-opening closure for container lids in
stamped metal sheet on cars or for the bottom
of a drawn can of the type including on the lid or
on the bottom a score line (6) and a groove (7)
to be levered by a teaspoon (12) to provide the
opening of the can characterized by the fact
that the groove is U-shaped with an external
wall (10) placed in the proximity of the seam and
that on said external wall is realized a V-shaped
bead or protrusion (11) which faces the inner
wall (8) and that the score line (6) is placed at
the bottom of the groove (7) or, alternately, at
the upper side of the bead (11) which is, with the
external wall on the whole, step-shaped.

FIG 1
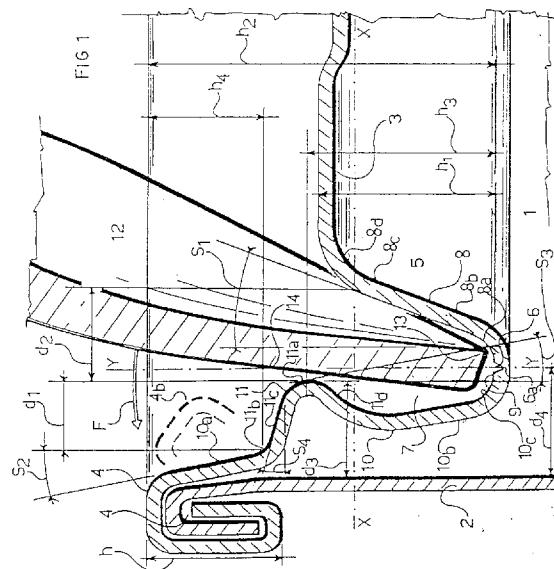
EP 0 553 514 A1

The present invention relates to an easy-opening closure solution to be realized on a stamped sheet metal lid secured by seaming to a container body can or to be realized on the bottom of a drawn metal can.

The easy-opening solution is of the type with a circular score and a circular groove on the lid, substantially to be levered by pressure of teaspoon tip to provide the laceration of the line of weakening (score line) and determining the opening of the can.

This easy-opening solution is simple in structure in respect to those with a ring tab and it should easy to open and not having undesired opening when accidentally knocked.

This type of easy-opening solutions having an anular channel and a line of weakening are known but up to now only one of them is manufactured, which is based on the score line breakage by the teaspoon insert in the groove and making with it a certain pressure on the groove bottom in the proximity of the score line, which is at the base of the internal wall of the groove; this groove has U-shapep section so making leverage towards the outside and having as a fulcrum the internal top rim of the seam, which is vertical.

This already manufactured easy-opening solution works substantially well, even if not always every consumer finds it easy to open because it is necessary to exert with the teaspoon an initial vertical pressure together the outer-side leverage to obtain a ready can opening; moreover this easy-opening solution does not give a self-contained safety features in opposition to finger cuts due to the free metal edge of the seam after the opening or against lid explosion.

Further more it is not known the idea to realize the easy-opening solution with anular groove and score line at its bottom on the so called twopiece cans, that is to say having body and bottom made by drawing in one single piece. The basic features regarding the present invention allow to open and empty the can without danger and, at the same time, to offer an high resistance in opposition to accidental opening due to knocking and to permit an easy-opening also to a not particularly skilled user; all this is resolved by an easy-opening container lid of the type specified which is characterized by the fact that the groove has U section with an inner wall, a base, an external wall having a particular shape because more or less in central position a bead or protrusion, facing the inner wall, is made on it so forming at its apex an opening fulcrum having a particular efficacy, and moreover characterized by the fact that the score line is placed at the bottom of the groove.

One of the variants in these main features is that the bead or protrusion on the external wall can have a shape similar to a step and in this case the line of weakening will be realized on it in a central position.

Further specifications and advantages of the easy open solution according to the present invention will be more fully understood from the following description of one of its prefered realization and of one variant, given as indicative and not limiting, upon reference to the accompanying drawings in which:

- Figure 1 is a sectional view of an easy opening container lid according to the main realization of the present invention.
- Figure 2 is a sectional view according to the variant.

Referring to the drawings and particularly to the fig. 1 it is noted that with 1 is showed a can including the easy opening solution having horizontal axis x-x and vertical axis y-y.

The can includes a container body, identified by its vertical wall 2, which is, in this example circular and with a diameter of 73 mm and of an axis y-y, as well as it includes a lid 3 in metal sheet, that is to say steel or aluminium.

The lid 3 is secured to the container 2 by a circular seam 4 of about 2.5 mm height, measured starting from its top rim 4a.

In corrispondence to the lid 3, the can 1 is fitted with an easy-opening closure 5, which includes a circular score line and a groove 7, both of axis y-y.

The anular groove 7 has a substantially U-shaped section with an inside wall 8, a flat bottom 9 and an external wall 10 which is particularly characterized since its central portion is bead or protrusion-shaped 11 in the direction of the centre of the lid.

The groove 7 is to be levered by a teaspoon 12, with a point 13 and extrados 14; the spoon beeing applied so that its point 13 presses the groove 7 and its extrados faces the seam.

The internal wall 8 of the groove is inclined particularly at his basis, with a limited clearance angle S_1 chosen between 1° and 25° and has an height h_1 chosen between 1.5 and 3.2 mm and it is linked to the horizontal plane of the lid 3 by a joint 8d which has predetermined limited joint radius chosen between 0.6 and 1.3 mm and to the bottom 9 by the joint 8a having predetemined limited radius chosen between 0.3 and 0.6 mm.

The external wall 10 of the groove has a total height h measured from the top rim 4a of the seam and the bottom 9, chosen betwwen 4.5 and 6.5 mm, in preference 5.4 mm.

Along the external wall 10, placed between its two terminal portions 10b and 10a, respectevely joined with the bottom 9 and the seam 4, a bead or protrusion 11 is carried out, according to weel kown manufacture engeneering like with rolls during the curling or the seaming, or by stamping in a press; the bead II is a protrusion V-shaped which apex 11a faces the centre of the lid 3, in such a way as to have a predetermined and limited depth chosen between 0.6 and 1.7 mm, measured between the perpendicular of a median point 11b, which links the bead 11 with the upper portion 10a of the external wall, and the per-

pendicular of the point 11a which is the external apex of the bead or protrusion. It should be noted that the bead II is placed along the external wall 10 so its external apex 11a has a predetermined distance h_3, from the bottom, chosen between 2.5 and 6 mm.

The portion 10a of the external wall, which links the closure to the seam is inclined with a limited clearance angle chosen between 2° and 15°, whereas the lower portion 10b, according to the features of the bead 1I, will be curve or curve/rectilinear-shaped.

It should be noted that the rectilinear portion 10a of the external wall, which have to contain the seaming chuck, has a predetermined height h_4 chosen between 1.7 and 2.5 mm, measured between the upper seam rim 4a and the median point of the joint 11b.

The bead 11 is basically V-shaped, so it consists of two opposite sides 11c and 11d both converging on the joint 11a with a circular arc, which is the apex of the bead; this joint with a circular arc has a radius value chosen between 0.3 and 0.9 mm.

The upper side 11 is inclined with a clearance horizontal angle S_4, chosen between 0° and 25°.

The apex 11a of the bead makes up a shoulder as better support for the extrados 14 of the teaspoon 12.

It should be noted that the groove 7 has a predetermined width d_2, measured between the perpendiculary of the external wall at the external apex 11a of its bead and of a point placed at the beginning of the joint 8d between internal wall and horizontal side 3 of the lid, chosen between 1 and 1.8 mm and preferably and advantageously, the lowest possible, but obviously such as to permit the point 13 of the teaspoon 12 its free insert in the groove until to get in touch with the bottom 9.

Thanks to the bead 11 which profitably reduces the width of the groove in a predetermined point and thanks to the particular dimensions of the groove, an efficient leverage effect is carried out, the result of which is an adeguate breaking pressure exerted by the point 13 of the teaspoon 12 on the joint 8a, with circular arc, between the bottom 9 and the internal wall 8, this joint 8a of course has a particularly reduced radius value.

This efficacious leverage effect, which means that the joint 13 of the teaspoon grips without slipping on the joint 8a, is identified by the angle S_3 between the perpendicular passing on the apex 11a of the bead and an ideal straight line passing trough this apex 11a and a median point on the joint 8a; the said angle S_3 has to be as reduced as possible, anyhow chosen between 0° and 22°. It should be noted that when the angle S_3 is near to 0° the distance d_3 between the wall 2 of the container and a perpendicular passing trough the apex 11a is higher than the distance d_4 between the wall 2 and a perpendicular passing trough the score line, which is so more external; this fact can be advantageous in case of excess

of pressure inside the can, in fact the lid area placed within the score line can be more or less holded back by the bead II in case of explosion even permitting the total opening of the lid because the localized leverage effect is sufficient to give enough deformation of the lid portion to be removed.

The lower portion 8b of the inner wall, starting from its middle point is inclined if necessary with a clearance angle value lower than the upper portion 8c.

Between the lower portion 10b of the external wall and the bottom 9 of the groove there is a joint 10c with a circular arc, of an advantageously predetermined radius chosen between 0.4 and 0.85 mm.

It should be noted that the bottom 9 of the groove consists of a substantially flat portion placed between the two joints 10c and 8a and its lenght is chosen between 0.1 and 0.9 mm.

The score line 6 is placed in correspondence to the bottom 9 of the groove and its position is the nearest tecnically possible to the joint 8a, that is to say that it aims to coincide with the tangency point between the joint with circular arc 8a and the flat bottom 9; more precisely the distance from the tangency point is chosen between 0.01 and 0.25 mm.

The score line 6 forms an incision having a V-shaped section, with axis y-y, made in the flat plate blank starting from its external face, with a depth such to leave a residual bridge of thickness chosen between 0.045 and 0.068 for steel or proportionate for aluminum.

The score line 6 can be circularly not complete, that is to say that at the bottom 9 of the groove 7 there is a portion of predetermined lenght of it, chosen between 0.1 and 10 mm, in which the score is missing, this is for obtaining that the part of the lid which is on the inside of the score line remains restrained to the seam and of course to the can, after opening or explosion.

It should be noted that in this case of lack of score the two tip portions of the score , which face each other, are circular arc-shaped curled towards the outside; furthermore for permitting the vertical lifting of the area on the inside of the score line during the opening, the height of the inner wall 8, along a perimetric portion chosen between 10 mm and 100 mm is suitably reduced.

It should be eventually noted that the opposite sides of the score 6 which is V-shaped, are feared with an angle chosen between 55° and 68°, this for aiding the laceration of the residual metal bridge 6 .

In case of difficulty for tecnical problems or other to made the bead or protrusion II along the external wall, in place of the afore said bead is possible to provide a shoulder as better support for the teaspoon extrados by bending the seam towards the inside of the can, in example with rolling operation, according to an angle value, compared with a perpendicular, chosen

between 5° and 45°, in order to provide that the inside upper rim 4a of the seam 4 moves to a more internal position, in example the 4b.

It should be noted that when the present invention is applied to the bottom of a drawn can of course there is not the seam and the external wall 10 is connected without interruption with the wall 2 of the container; in this case the bead 11, if necessary, can be moved towards an upper position, that is to say at an higher distance from the bottom 9, if necessary until to reduce at the minimum value the height h_4 of the portion 10a, in this case the clearance angle of the internal wall 8, like in the aforesaid case of the re-entering (bent) seam 4b, has a more reduced value in order to assure the grip of the teaspoon on the joint 8a.

To open the can 1 it is sufficient to insert the teaspoon 12 in the groove 7 so that its tip 13 is in correspondence with the joint 8a and its extrados 14 is in contact with the apex 11a of the bead making up the shoulder.

Making leverage with the teaspoon in the direction indicated by the arrow F and thanks to the presence of the bead and to the suitable dimentioning of the groove, a force localized at a median point of the joint 8a is exerted, which has perpendicular or almost perpendicular initial direction compared with the inner wall 8, so substantially energically active on the score 6 which is, as already seen, in the immediate vicinity.

This said localized and directed force overcomes the resistance offered by the residual bridge 6a and tears it; having begun in this way laceration continues easily determining the removal of that part of the lid which is inside the score line 6 and of course the opening of the can. It should be noted that, thanks to the presence of the bead 11 or of the bent seam 4b, the user is protected against cuts in the fingers if after the opening, during the empting they go in touch with the remaining free sharp edge of the botttom 9.

In case of difficulty to obtain a suitable bead 11 or if its dimentions are not suitable to permit the opening with the teaspoon only by leverage effect, it is also predisposed to reduce at the minimum the measure value of the bottom 9 of the groove 7 as well the radius values of the joints 8a and 10c so the tip of the teaspoon 13, in this case pressed with force at the beginning into the groove and then on the bottom 9 before to get to the bottom, touches the joints 8a and 10c or the lowest part of the portions 10b and 8b so obtaining an initial spreading side thrust suitable to induce the starting of the laceration effect on the score line; this laceration will be completed by a further pressure.

In this case a bead have to be predisposed along the vertical wall 2 of the can scantily below the bottom 9 of the groove directed to the inside of the can in order to stop the penetration of the teaspoon tip.

Referring particularly to the fig 2 a possible variant to the solution of fig 1 is now described; this variant is different from the solution of fig 1 since the score line 6 instead of to be placed at the bottom 9 of the groove 7, is placed along the external wall 10 and more precisely on the bead 11.

But in this case the bead 11 integrates itself in a different way with the said external wall, assuming with it on the whole section, a step-shape.

This step 11 has its horizontal plane coming off from the external wall 10 at an height h_5 chosen between 2.5 and 6 mm measured between the bottom 9 and a median point of the step 11.

It should be noted that the plane of the step is characterized by the fact that it is bent at a median point, in fact it is composed by two rectilinear portions 11c and 11d, respectively joined by the joints with circular arc 11b and 11a with the upper potion 10a and the lower portion 10b of the external wall 10.

The two rectilinear portions 11c and 11d, which compose the plane of the step, lies upward inclined of a same angle value, which is upside down-shaped, that is to say like a little convex protrusion upward directed; this angle S_4, measured in comparison with a parallel to the axis x-x has a value chosen between 3° and I8°.

The width d_1 of the afore said step 11, measured between the perpendiculars of the median points of the joints IIa and 11b is predetermined and it has a value chosen between 1 and 2.5 mm.

At the median point of the step 11, placed between the two portions 11c and 11 d there is a score line 6, which is an incision in the metal plate.

The bottom of the groove will be of dimensions suitable to permit the free insert of the tip 13 of the teaspoon 12. It should be noted that between the bottom 9 and the internal wall 8 there is a joint 8a with a predetermined circular arc of radius value chosen between 0.3 and 0.55 mm; moreover the clearance angle of the internal wall 8 has a predetermined value chosen between 1° and 10°.

The height h_4 of the portion 10a of the external wall 10, which joins the bead or step 11 with the seam by the joint 11b, measured from the upper rim 4a and a median point of the same joint 11b is chosen between 0.5 and 2.5 mm.

The height h_6 of the internal wall of the groove is chosen between 1 and 3 mm.

To open the can it is sufficient to insert the tip 13 of the teaspoon 12 in the groove 7 until the tip 13 touches the bottom 9; then making leverage to the outside as indicated by the arrow F the tip I3 touches the joint 8a, between the bottom 9 and internal wall 8, while the extrados I4 goes in touch with the step or bead, more precisely with the apex 11a of the same bead making up a shoulder. It is so exerted a sustantially horizontal force at the joint 11a and consequently at the two rectilinear portions 11c and 11a of the step; thanks to the fact that these portions lie advantageously upward inclined and moreover thanks to

the presence between them of the score line 6, they bend furtherly upward at acute angle as indicated by the arrow G so causing, for this sharp bending until 90° approximately, the breakage for vertical laceration of the bridge 6a residual after the incision.

A further rotation to the outside permits to complete the laceration of the residual bridge 6a and so to open the can.

The easy-opening closures according to the present invention offers the advantage to allow an easy opening of the can with a teaspoon or similar instrument and at the same time, particularly thanks to the shape of the external wall of the groove, that is to say thanks to the protruding bead like in the main solution, to assure to the can a good safety against cuts in the fingers during the opening and empting; moreover in these closures casual knocking along the more external part of the can, which is the seam, cannot break the score line as the knocking action is adsorbed by the external wall with its bead.

The container lid according to the present invention can be mass-produced at a low cost, because a thinner plate can be used.

Obviously, a tecnician in this field, in order to satisfy specific and contingant needs, can make numerous modifications and variations to the container closures described above, all contained moreover within the protection of this invention as defined by the following claims.

Claims

I. An easy-opening closure for container lids in stamped metal sheet secured by seaming to container bodies like cans or for bottom of drawn metal cans, of the type which includes on the lid or on the can bottom a scored line and a groove, to be placed under pressure exerted by a teaspoon or similar instrument to provide the complete opening of the can, characterized by the fact that the groove has a sustantially U-shaped section, with an inside wall, a bottom, and an external wall placed in proximity of the seaming and that on this external wall a bead or protrusion V-shaped faced to the inside wall of the groove is carried out and that, alternatively,it is placed on the upper side of the bead, which consequently is, on the whole with the external wall, step-shaped.

2. An easy-opening closure as claimed in claim 3 characterized by the fact that it and every other having a scored line in a groove is realized on the bottom of a drawn can.

3. An easy-opening closure as claimed in claim 2 characterized by the fact that the external wall of the groove has an height on the whole, measured between the upper rim of the seam and the bottom of the groove chosen between 4.5 and 6.5.

4. An easy-opening closure as claimed in claim 3 characterized by the fact that the bead or protrusion is made along the external wall so that its external apex is situated at an height, measured from the bottom of the groove, chosen between 2.5 and 4 mm when there is the seam, and between 2.5 and 6 mm in the case of a drawn can, the said apex making up a better shoulder for the teaspoon.

5. An easy-opening closure as claimed in claim 4 characterized by the fact that the upper portion of the external wall, which links up the bead with the seam has an height chosen between 0.5 and 2.5 mm and a clearance angle chosen between 2° and 15°.

6. An easy-opening closure as claimed in claim 5 characterized by the fact that the bead is substantially V-shaped, that is to say formed by two opposite flared sides, the upper side of which is rectilinear and is inclined with an horizontal clearance angle chosen between 0° and 25°, and that a mutual joint with circular arc of radius chosen between 0.3 and 0.9 mm links up the two said bead sides, and that the said bead protrudes into the groove with a depth value chosen between 0.6 and 1.7 mm measured between the perpendicular of the median point of the joint which links the bead with the upper part of the external wall and the perpendicular passing through the external apex of the bead.

7. An easy-opening closure as claimed in claim 6 characterized by the fact that the bottom of the groove is flat and has a limited width chosen between 0.1 and 0.9 mm, and it is joined with the walls of the groove.

8. An easy-opening closure as claimed in claim 7 characterized by the fact that between the bottom and the internal wall there is a joint, with circular arc of predetermined radius chosen between 0.3 and 0.6 mm, the joint between bottom and external wall has a value of 0.4 and 0.85 mm.

9. An easy-opening closure as claimed in claim 8 characterized by the fact that the inner wall has an height chosen between 1.5 and 3.2 mm.

I0. An easy-opening closure as claimed in claim 9 characterized by the fact that the internal wall, particularly at its lower portion, is inclined with a limited clearace angle chosen between 2° and 25°.

II. An easy-opening closure as claimed in claim 10 characterized by the fact that the score line is placed at the bottom of the groove at a predetermined distance from the tangency point between the flat bottom and the joint, which links up the bottom with the inner wall, chosen between 0.01 and 0.25 mm.

I2. An easy-opening closure as claimed in claim 11 characterized by the fact that the groove has a limited width, measured between the perpendicular through the external apex of the bead and the perpendicular passing through the tangency point which links up the inner wall with the joint between inner wall and a flat portion of the lid, chosen between 1 and 1.8 mm, however having a value as reduced as

possible provided that to not obstruct the insert of the teaspoon as far as the bottom of the groove.

13. An easy-opening closure as claimed in claim 12 characterized by the fact that the obstructing created by the bead and the particular groove dimentioning produce a better grip or clasping angle of the teaspoon tip at the joint between bottom and inner wall, of limited value chosen between 0° and 22°, measured between the perpendicular passing through the apex of the bead and an ideal straight line which joins this apex with the median point of the joint between bottom and inner wall.

14. An easy-opening closure as claimed in claim 13 characterized by the fact that the distance between the score line and the vertical wall of the container body is shorter than the distance between the aforesaid wall and the apex of the bead, this is an improving leverage effect at the opening and moreover a protection element against explosions of the lid.

15. An easy-opening closure as claimed in claim 14 characterized by the fact that the production of the bead along the external wall can be made also with the tools which provide the seam or like tools, that is to say that a tool like roll presses the container wall below the seam so forming the bead at the beginning on the container wall and almost contemporary on the external wall of the groove according with the predetermined features.

16. An easy-opening closure as claimed in claim 15 characterized by the fact that instead of having the bead, the seam is bent (re-entering) towards the centre of the lid with an angle value chosen between 5° and 45°, measured in comparison with the vertical axis of the can.

17. An easy-opening closure as claimed in claim 16 characterized by the fact, eventually, the width of the flat bottom and the radius of the joints between it and the walls of the groove have lowest possible value, that is to say that the tip of the teaspoon when pressed with force at the beginning in the groove and then on the bottom, cames to the bottom after causing an advantageous spreading side thrust at the base of the walls of the groove, so inducing the breakage and the perforation of the score line.

18. An easy-opening closure as claimed in claim 17 characterized by the fact that along the vertical body of the can, just below the bottom of the groove, a bead or protrusion is obtained directed towards the inside of the can, suitable to stop the tip of the teaspoon subsequently to perforation of the score line.

19. An easy-opening closure as claimed in claim 18 characterized by the fact that the external wall with the bead as a whole, 8a a step-shaped section, which is so consisting of the upper portion of the external wall, joined with the seam, which has an height chosen between 0.5 and 2.5 mm, of a sustantially flat plane having width chosen between 1 and 2.5 mm measured between the perpendiculars passing

through the median point of the two joints linking the aforesaid plane with upper and the lower portions of the external wall, this lower portion of height chosen between 2.5 and 6 mm.

20. An easy-opening closure as claimed in claim 19 characterized by the fact that the substantially horizontal flat of the step more precisely consists of two rectilinear portions upwards inclined having an horizontal clearance angle chosen between 3° and 18°, joined with the upper and lower portion of the external wall by two circular arcs of radius chosen between 0.4 and 0.8 mm.

21. An easy-opening closure as claimed in claim 20 characterized by the fact that on the step, in a sustantially middle position, that is to say between the two inclined sides, there is a score line.

22. An easy-opening closure as claimed in claim 21 characterized by the fact the external wall step-shaped is linked to the bottom of the groove which is linked by a joint with circular arc of limited value chosen between 0.3 and 0.5 mm to the internal wall which has a clearance angle chosen between 1° and 10°.

23. An easy-opening closure according to the preceeding claim characterized by the fact that the score line is formed by a V-shaped incision made in the metal sheet with an angle, between the opposite flared sides, chosen between 55° and 67° and made, starting from its outer , facing until a residual bridge of thickness chosen between 0.045 and 0.065 mm if steel or proportionate if aluminium.

24. An easy-opening closure as claimed in claim 23 characterized by the fact that the scored line is not circularly completed, that is to say that it is lacking of incision on a perimetric portion which lenght is chosen between 0.1 and 10 mm.

25. An easy-opening closure as claimed in claim 24 characterized by the fact that the two tips of the incision are circular arc-shaped curled towards the outside of the can.

26. An easy-opening closure as claimed in claim 25 characterized by the fact that the height of the internal wall along a perimetric portion of it which lenght chosen between 10 and 100 mm, is suitably reduced in order to permit the free lifting of the area placed inside the incision.

FIG 1

FIG 2
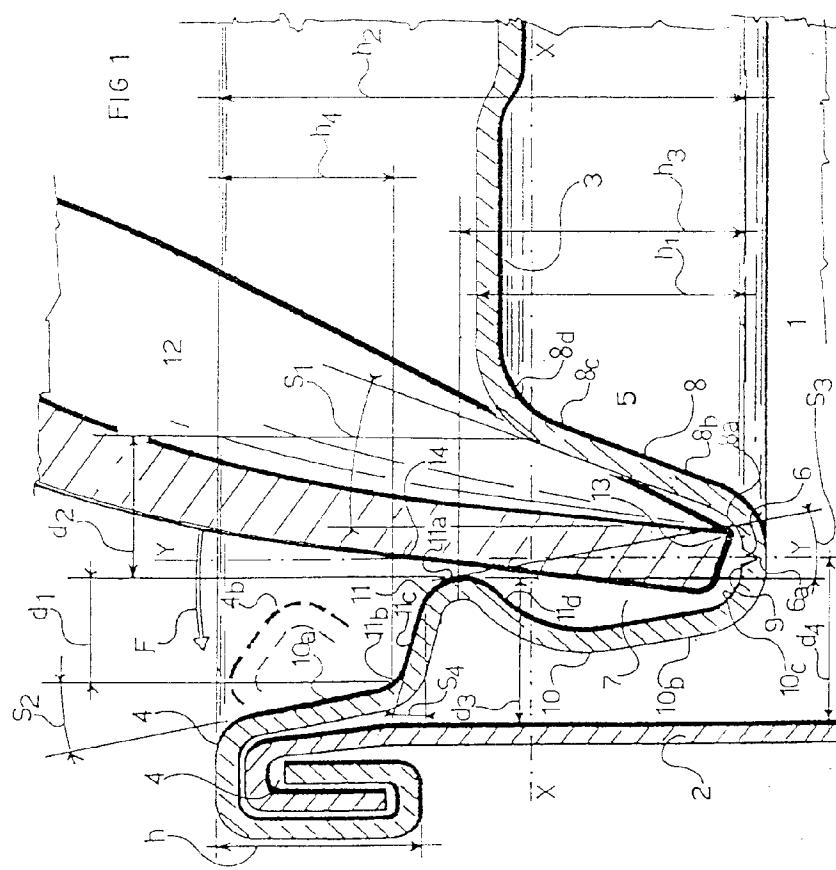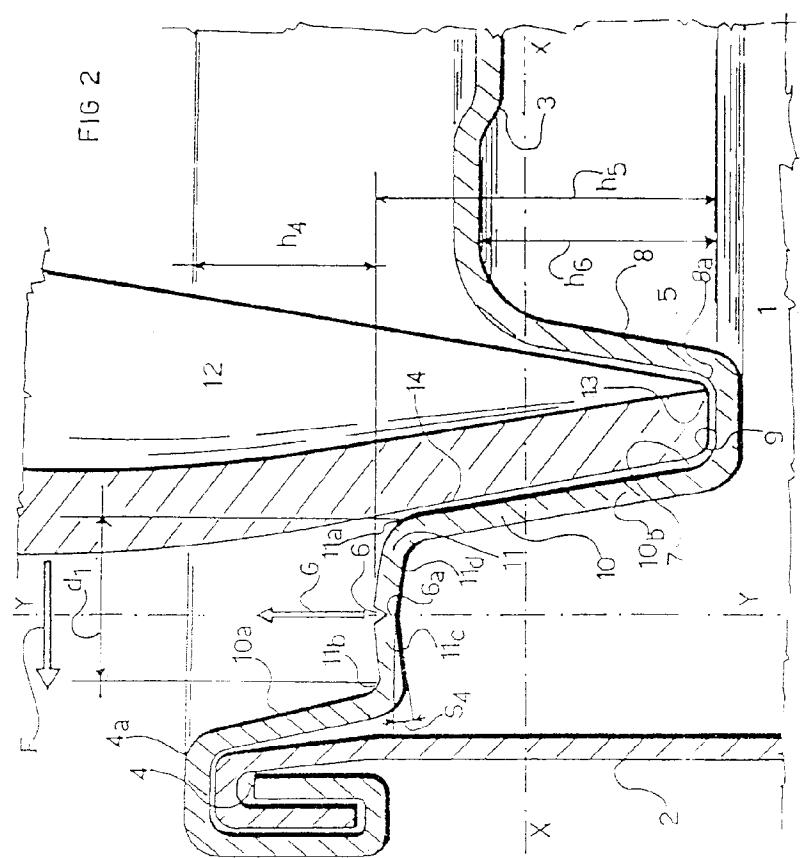
European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 20 4054

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	US-A-3 362 570 (GEIGER) * figure 2 * ---	1	B65D17/40
Y	EP-A-0 377 788 (QUAKER.CHIARI & FORTI) * the whole document *	1,3	
A	---	8-10,23	
Y	US-A-4 003 495 (GRISE) * column 3, line 27 - line 29; figure 7 * ---	1,3	
A	US-A-4 397 402 (KEIJI) * figures 5-6 * ---	1	
A	US-A-3 894 652 (BROWN) * figure 2 * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5) B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	27 MAY 1993	Alain BRIDAULT

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