



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
22.08.2001 Bulletin 2001/34

(51) Int Cl.7: **B65D 5/74**

(21) Application number: **00200319.2**

(22) Date of filing: **31.01.2000**

(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

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(54) **Anti-clog pouring spout**

(57) A pouring spout for a liquid packaging container has a pouring passage (3) extending from an upstream end (30) through said pouring spout (1) for co-operation with an opening (23) in the container (20) and a pouring surface (5) having a downstream end. The pouring surface (5) extends smoothly and continuously from the up-

stream end of the pouring passage to the downstream end.

Thus clogging up of the pouring spout with dried up constituents of the liquid is counteracted. A mould specifically adapted for moulding such a pouring spout and a container including such a pouring spout are described as well.

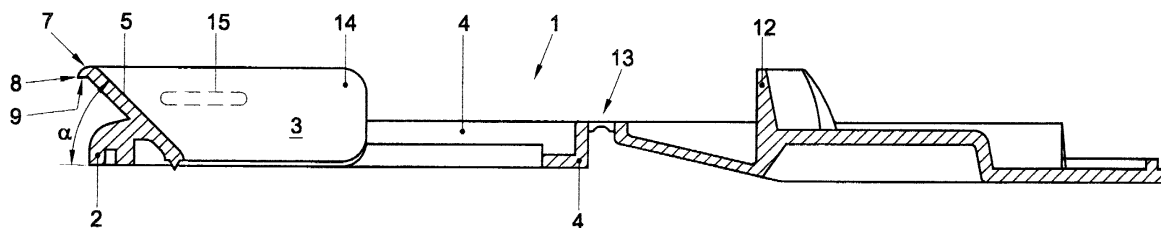


Fig. 1

Description

[0001] The invention relates to a pouring spout according to the introductory portion of claim 1. The invention also relates to a mould for moulding such a pouring spout and to a container including such a pouring spout.

[0002] Pouring spouts of the above-identified type are known from the European Patent Application 0 686 568. Such spouts are typically arranged on laminated carton containers for packaging for example fruit juice or milk.

[0003] A problem of such pouring spouts is, that after pouring liquid out of the container through the spout and returning the container to an upright position, usually some liquid is left on the spout. Especially if the container contains viscous liquids such as cream, coffee creamer and condensed milk cake formations in the area of the spout create an unhygienic and unsightly situation. Also the consequent pouring performance will be negatively influenced by the clogging.

[0004] It is an object of the present invention to provide a pouring spout which has an at least substantially reduced tendency of clogging.

[0005] According to the invention this object is achieved by providing a pouring spout according to claim 1.

[0006] By providing a smooth pouring surface extending from an upstream end to a downstream end of the pouring spout, liquid shows a substantially reduced tendency of clinging to the spout each time after pouring of a desired dose has been completed and the container is brought back in a neutral standing position. When the container is returned from a tilted pouring orientation to an upright orientation, all or at least more liquid in the area of the spout which has not been dispensed flows back into the container.

[0007] The invention also provides a mould according to claim 8 which is specifically adapted for manufacturing a pouring spout according to the invention with a particularly smooth pouring surface free of seams, edges, ridges and the like.

[0008] The invention further provides a liquid packaging container according to claim 12 in which a pouring spout according to the invention is incorporated in a particularly advantageous manner, because the recessed location of the edge of the pouring passage in the wall of the container relative to upstream continuation projections of the pouring trajectory prevents the edge from disturbing the pouring behaviour and further reduces the tendency of clogging and soiling of the package in the area of the pouring spout.

[0009] Particularly advantageous embodiments of the invention are set forth in the dependent claims.

[0010] Further objects, features, effects and details of the invention are set forth below in the description of a presently most preferred embodiment of the invention. In the description, reference is made to the accompanying drawings in which:

Fig. 1 is a view in cross section along the line I-I of a pouring spout according to the invention,

Fig. 2 is a top view of the pouring spout shown in Fig. 1,

Fig. 3 is a bottom view of the pouring spout shown in Figs. 1 and 2,

Fig. 4 is an enlarged view in cross section along the line I-I in Fig. 1 of opposite end portions of the pouring spout shown in Figs. 1-3 in combination with a container which is shown schematically only, and Fig. 5 is a view in cross section of a portion of a mould according for moulding the pouring spout shown in Figs. 1-4.

[0011] The pouring spout according to the example shown in Figs. 1-4 has a base plate 2 portion through which a pouring passage 3 extends. Seen in top view as in Fig. 2, the passage 3 is wide at one end of the base plate 2 and tapers towards the other end of the base plate 2.

[0012] Near its wide end, the passage 3 is surrounded by a ridge 4 projecting from the base plate 2. In a section at its narrow end, the passage 3 is surrounded by a flange 14 projecting from the base plate 2 as well. At the narrow end of the tapered section, the flange 14 is flared outwardly in a pouring direction (arrow A in Fig. 2), thereby forming a pouring surface 5.

[0013] The upstream edge 30 of the flange 14 is substantially located in the plane of the base plate 2. Along the outside of the upstream edge 30 of the flange 14 and spaced from the upstream edge 30, a tearing ridge 31 extends.

[0014] In top view, the base plate 2 has a substantially rectangular shape. The bottom side or base surface of the base plate 2, as shown in Fig. 3, is provided with circumferential connection surfaces 35, 36, 37. These surfaces are substantially flat and adapted to be glued or sealed onto a top surface of a container.

[0015] The passage 3 and the pouring surface 5 form a smooth pouring trajectory surface, from an upstream edge 30 to a downstream end 8 of the pouring surface 5.

[0016] A lid 12 is hinged to the spout 1 along a flexible hinge 13. In a closed position (not shown), the lid 12 closes off the spout 1 and locks to the flange 14 by means of a snap lock connection. This snap lock connection in closed condition is provided between projections 15, 16 on the outside of the flange 14 and recesses in ribs 17, 18 projecting from the lid 12 that engage the respective projections 15 and 16. From the closed condition, the lid 12 is pivotable into an open position shown in Figs. 1-4.

[0017] In Fig. 4, the pouring spout 1 is shown in a condition forming part of a container 20, to a top wall 21 of which the pouring spout is fixed. The container 20 is of a coated cardboard type which is typically employed for packaging liquids such as milk or coffee cream, although the pouring spout can also be employed advantageously in combination with other packaging types

such as metal cans and blown plastic containers with which the pouring spout can be formed integrally. The container 20 as shown has a substantially flat top wall 21 to which the connection surfaces 35, 36, 37 of the spout 1 are glued.

[0018] The top wall 21 is provided with a pouring passage 23, in-line with the passage 3 in the pouring spout 1. The location, size and shape of the pouring passage 23 are such, that when a pouring spout 1 is connected to the wall section 21, in particular in the area of the flange 14, the pouring opening 23 is wider than the passage 3 of the spout 1, i.e. the edge of the pouring passage 23 in the container is recessed relative to imaginary upstream continuations 25 of the pouring surface 5. In the wider section of the passage 3 remote from the pouring surface 5, the opening 23 can be flush with the flange 4 of the spout 1 or to wall sections surrounding the opening may even project inwardly relative to the pouring passage 3 in the pouring spout 1.

[0019] In manufacturing the container 20, first the opening 23 is cut into a section of the coated cardboard which is to form the top wall section 21. Then the opening 23 is sealed from both the outside and the inside with thin sealing foil layers 40 and 41 covering the area of the opening 23 and adjacent portions of the wall material. Within the area of the opening 23 the foil layers 40, 41 are connected to each other. The end section of outer foil layer 41 near the wider section of the passage 3 is folded upwards, forming a pull tab 39, as shown in fig. 4. Subsequently, the spout 1 is glued to the section 21 of wall material 21.

[0020] When a package is to be opened, first the lid 12 is pivoted from its closed position into its opened position. Then, the pull tab 39 is pulled away from the container 20, causing the combined foil layers 40, 41 to be forced against the sharp ridge 31. In turn, the ridge 31 then causes the foil layers 40, 41 to tear along the ridge 31.

[0021] After complete removal of the pull tab 39 and the attached sections of the foil layers 40, 41, the pouring opening 23 is opened. In the opened condition, the opened up area of the opening 23 in the area of the pouring surface is slightly larger than the pouring passage 3 because the layers of foil 40, 41 are torn along the ridge 31 outwardly spaced away from the upstream edge of the pouring surface 5. Thus, the torn edges in the pouring area are located under the pouring spout, so that it is avoided that torn edge portions of the foil layers 40, 41 project into the pouring passage 3. Disturbance of the pouring behaviour and the formation of locations where drops of liquid not poured out can easily cling after pouring and form unsightly and unhygienic cake formations is thus avoided.

[0022] In opened condition, liquids can be poured out of the container 20 through the pouring spout 1 by tilting the container 20 in the direction indicated with an arrow in Fig. 4. This causes the liquid to flow through the pouring passage 23 and subsequently through the pouring

passage 3, which leads the liquid along the pouring trajectory surface in a downstream direction over a rounded area 7 to the downstream end of the pouring trajectory surface formed by a sharp edge 8.

[0023] Due to the rounded edge 7 of the pouring trajectory surface that ends in a sharp edge 8, the pouring performance of the spout is such that normally the area beyond the sharp edge remains free from drops, thus cake formation on the outside of the flange 14 is counteracted. This beneficial effect occurs both if the container is full, i.e. when the tilting angle during pouring is small, and if the container is nearly empty, i.e. when the tilting angle during pouring is large.

[0024] After pouring, liquid in the pouring passage 3 which has not been poured out reliably returns to the package under the influence of gravity without leaving drops behind, because the pouring surface extends smoothly and continuously from the upstream end of the pouring passage to the downstream end.

[0025] Moreover, drops of liquid in the area of the rounded area 7 are not left hanging down from the edge 8 and do not run down along the outer surface 9, but are pulled back from the edge 8 over the rounded area 7 due to surface tension of the liquid flowing back along the smooth and continuously extending pouring surface 5.

[0026] Most of the liquid flowing back along the pouring trajectory surface will drain back directly into the container 20. The last remaining liquid will collect in drops on the underside of the upstream edge 30 of the flange 14. Most of the collected drops will release from the edge 30 under influence of gravity and the surface tension breaking properties of the sharp ridge 31. Thus released drops generally fall back into the container 20 or are left on the container side of the pouring spout or of wall material of the packaging container.

[0027] The smooth and continuous pouring surface forms a drain back path to which normally no liquid clings after pouring so that clogging and cake formation on the pouring spout are at least substantially reduced.

[0028] Within the context of this description smooth is considered to indicate absence of irregularities like fins or burrs, and of any ridges or ledges due to which liquid can cling to the pouring surface. Also concave or convex sections with a small curvature radius can disrupt this smooth path and increase the likelihood of drops clinging to the pouring area after pouring. Preferably, the pouring surface is provided with a liquid repelling surface finish, especially suited for repelling the liquid that has to be poured. This surface finish can be achieved by for example coating, selecting a suitable surface roughness control and/or making the surface from a liquid repelling material. The requirements for smoothness are dependent on the specific properties of the respective liquids, including the viscosity.

[0029] An upstream portion of the pouring surface 5 extends upwards from the level of the base plate 2 and continues contiguously into a downstream section of the

pouring surface 5 that is curved through the rounded area 7 to a downward sloping orientation terminating at the sharp edge forming the downstream end 8. To obtain an effective withdrawal of liquid from the rounded area after pouring on the one hand and, a pouring behaviour allowing precise dose of the liquid to be poured on the other hand, the radius of curvature in pouring direction is preferably between 0.5 to 1.0 mm while the length of the rounded area 7 in pouring direction is preferably 1.0 to 2.0 mm.

[0030] For allowing dosing of liquid in small quantities to be carried out precisely, which is for instance of importance when dosing coffee creamer or seasonings, while at the same time ensuring a reliable backflow of liquid in the pouring passage after pouring to counteract clogging and cake formation, it is advantageous if, at least in a central lower section of the pouring surface 5, the pouring surface 5 is inclined at an angle α to the base plate 2 of about 45°. Angles in the order of 30° to 60°, and preferably between 40° and 50° are particularly advantageous for obtaining a well controllable pouring behaviour with little tendency of clogging.

[0031] The opening 3 tapers towards the narrow section; the angle of tapering is indicated with β in fig. 2. The angle β is preferably in the order of 5° to 90°; a further improved pouring performance is achieved with an angle β between 15° and 25°; these angles limit the flow of liquid through the opening so that small quantities of liquid can be easily dosed. The upstream edge 30 has a curvature in the plane of the base plate 2 which is indicated with R in fig. 2. A radius of R in the order of 1.5 mm to 7.5 mm, and preferably between 2.5 mm and 4.5 mm is particularly advantageous for obtaining a well controllable pouring behaviour, especially when pouring and dosing small quantities of viscous liquids like coffee cream. The sharp edge 8 bounds on a surface 9 facing away from the pouring trajectory surface and extends substantially parallel to the connection surfaces. This advantageous for manufacturing efficiency, because a front forming slide element along a top end of which the sharp edge 8 is formed can thus be of a constant thickness.

[0032] From the sharp edge 8 an outside surface portion 9 of the flange 14 extends substantially horizontally. From the topmost point of the rounded area 7, the pouring surface 5 descends toward the sharp edge 8. In order to reliably prevent liquid from reaching the outside surface portion, while ensuring that liquid is reliably pulled back from the rounded area when pouring is stopped and liquid in the pouring passage 3 flows back into the container, the height difference between the topmost portion of the rounded area 7 and the edge 8 is preferably 0.3 to 1.0 mm.

[0033] In Fig. 5 a portion of a mould 50 for moulding the pouring spout according to Figs 1-4 is shown. Only the portion of the mould forming the pouring area of the spout is shown. The other parts of the mould can be formed by any known and suitable means as will be ap-

parent to the expert.

[0034] The mould 50 has a core element 51, a front moulding slide element 52 and a base moulding element 53. In assembled condition as shown in Fig. 5 these three elements 51, 52, 53 bound a moulding cavity 54 for the front portion of the pouring spout 1.

[0035] An end portion of the cavity 54 forms a rounding 56 leading to a sharp internal edge 55. This edge 55 coincides with a seam along which mould elements 52 and 51 meet. A fin or seam which is typically formed on a product formed in the moulding cavity 54 will project away from the flange 14 and contributes to the formation of a sharp edge 8 at the downstream end of the pouring surface 5. Furthermore, the seam where the core element 51 and the front moulding element 52 meet is not located in an area of the cavity 54 for forming the pouring surface, so that the smoothness of the pouring surface is not interrupted by any seams or the like resulting from the injection moulding process.

[0036] For producing a spout in for instance an injection moulding apparatus, the mould 50 is closed and molten or plasticized material for forming a spout is injected into the cavity 54 of the mould 50, such as molten plastic, for forming the spout. After the product has become sufficiently rigid to be taken out of the mould 1, the mould element 52 is removed by sliding it essentially horizontally outward in the direction indicated by the arrow B in Fig. 5. During this motion, the underside of the edge 55 of the spout, which is formed by a substantially horizontal section of the mould element 52, can be further sharpened, depending on the material used for the spout. Also, depending on the material used, the edge 55 can bend slightly downwards after the mould element 52 has been fully retracted. This sharpening and/or bending of the edge 55 further improves the performance of the finished product in prohibiting sticking of liquid to the pouring surface.

[0037] The front forming element 52 is also formed for forming the snap lock members 15, 16 on outside surfaces of the pouring spout 1. Since the front forming element 52 opens up in a direction B in which the outside of the flange 14 tapers towards its narrow end, the snap lock members 15 and 16 are not deformed when the mould is opened and the shape thereof is reliably maintained during opening.

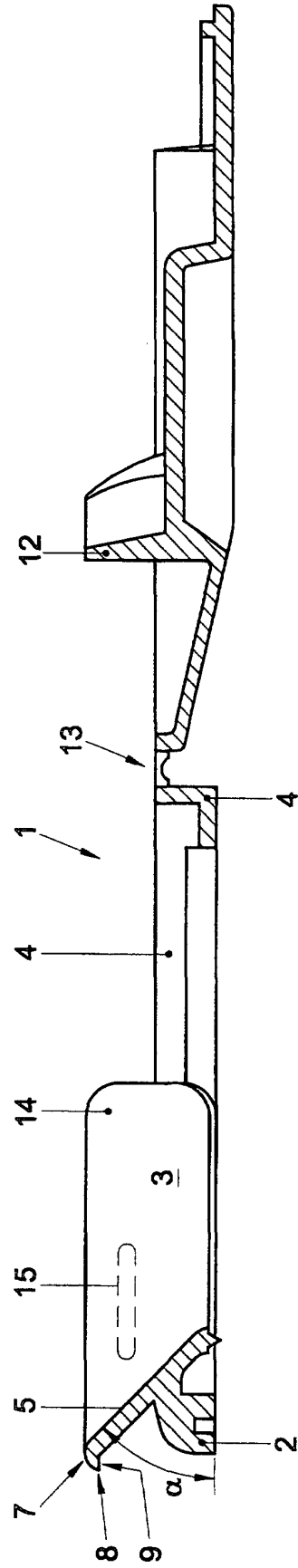
Claims

1. A pouring spout for a liquid packaging container, comprising: a pouring passage (3) extending from an upstream end (30) through said pouring spout (1) for co-operation with an opening (23) in said container (20), and a pouring surface (5) having a downstream end,

characterised in that said pouring surface (5) extends smoothly and continuously from said upstream end of said pouring passage (3) to said

downstream end.

2. A pouring spout according to claim 1, wherein, in a condition in which a base surface of said pouring spout is in a horizontal orientation facing downwards, said pouring surface (5) has an upstream portion extending upwards from said upstream end of said pouring passage (3) and a rounded downstream portion (7) contiguous to said upstream portion, said rounded portion (7) being curved past a topmost area to a downward sloping orientation and terminating at a sharp edge (8). 5
3. A pouring spout according to claim 2, wherein said rounded portion (7) of said pouring trajectory (5) has a radius of curvature in pouring direction of 0.5-1.0 mm. 10
4. A pouring spout according to claim 3, wherein said rounded portion (7) has a length of the curvature along the pouring surface in pouring direction of 1.0 to 2.0 mm. 15
5. A pouring spout according to any one of the claims 2-4, wherein said sharp edge (8) bounds on a surface (9) facing away from said pouring surface (5) and extends substantially parallel to a base surface of said pouring spout 20
- (1). 25
6. A pouring spout according to any one of the claims 2-5, wherein said upstream portion of said pouring surface (5) extends at an angle of 30° to 60° and preferably 40° to 50° to a base surface of said pouring spout (1). 30
7. A pouring spout according to any one of the preceding claims, wherein at least part of said pouring surface (5) has a liquid repelling surface finish. 35
8. A mould for moulding a pouring spout, comprising a core element (51) and a hollow forming element (52), said elements (51, 52) bounding at least a portion of a mould cavity (54) for forming a pouring spout for a liquid packaging container, comprising: a pouring passage (3) extending from an upstream end (30) through said pouring spout (1) for co-operation with an opening (23) in said container (20), and a pouring surface (5) having a downstream end, wherein said core element (51) bounds a portion (57) of said mould cavity (54) defines said pouring surface (5) such that said pouring surface (5) extends smoothly and continuously from said upstream end of said pouring passage (3) to said downstream end. 40
9. A mould according to claim 8, wherein said mould cavity (54) is formed for moulding a pouring spout of which, in a condition in which a base surface of said pouring spout (1) is in a horizontal orientation facing downwards, said pouring surface (5) has an upstream portion extending upwards from said upstream end of said pouring passage (3) and a curved downstream portion (7) contiguous to said upstream portion, said downstream portion (7) being curved past a topmost portion to a downward sloping orientation and terminating at a sharp edge (8), wherein in closed condition of said mould a seam between said front forming element (52) and said hollow element (51) forms a portion of said mould cavity (54) for forming said sharp edge (8). 45
10. A mould according to claim 9, wherein said mould cavity (54) is formed for moulding a pouring spout wherein said sharp edge (8) bounds on a surface (9) facing away from said pouring surface (5) and extends substantially parallel to a base surface of said pouring spout (1), wherein said hollow element is formed by a front forming (52) element retractable relative to said core element (51) in a direction parallel to a portion of said mould cavity (54) for forming said surface (9) facing away from said downstream portion of said pouring surface (5). 50
11. A mould according to claim 10, wherein said front forming (52) element is formed for forming snap lock members on outside surfaces of said pouring spout. 55
12. A container for packaging a liquid, comprising a pouring spout according to any one of claims 1-7, and a wall (21) having a pouring passage (23) upstream of said pouring passage (3) extending through said pouring spout (1), when in opened condition, said pouring passage (23) in said wall (21) having an edge recessed from upstream continuation projections of said pouring surface (5), when in opened condition.
13. A container according to claim 12, containing a cream or creamlike product.
14. A container according to claim 13, wherein said cream or creamlike product is a coffee creamer.



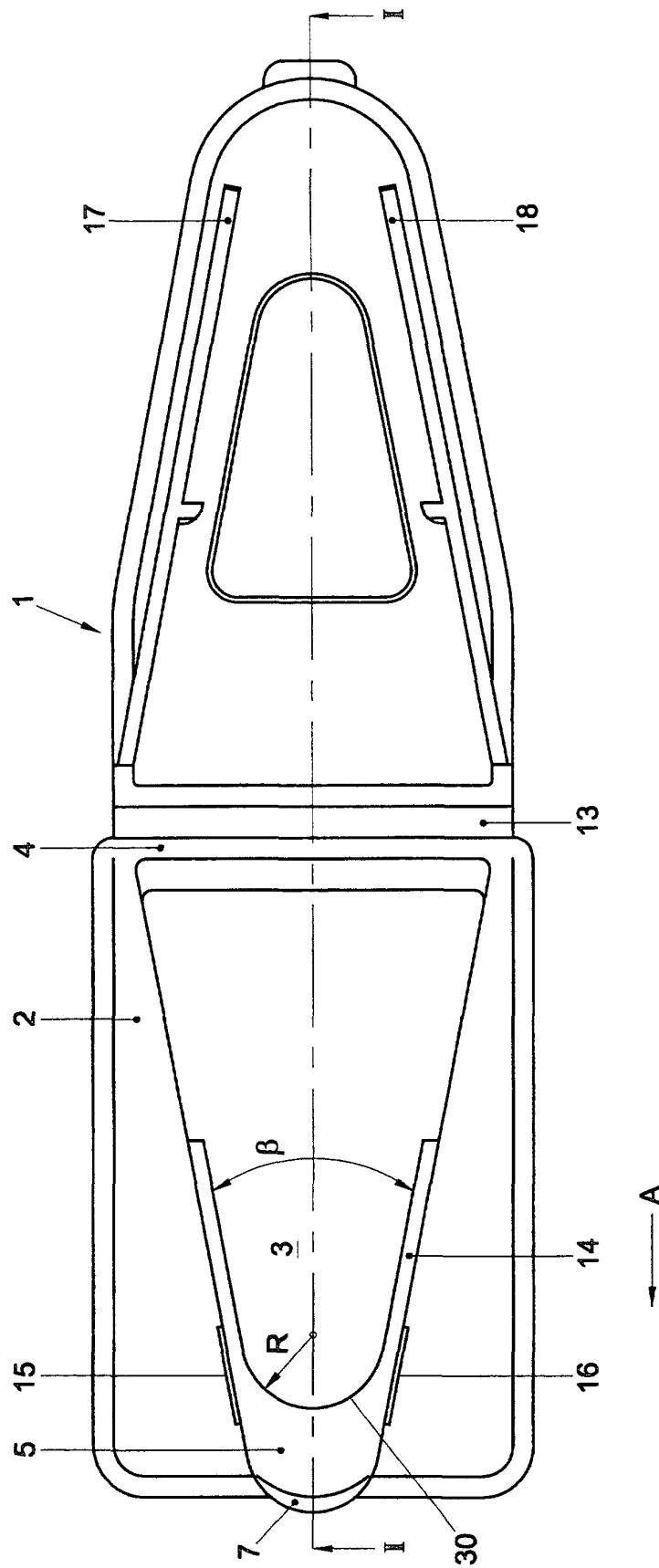


Fig. 2

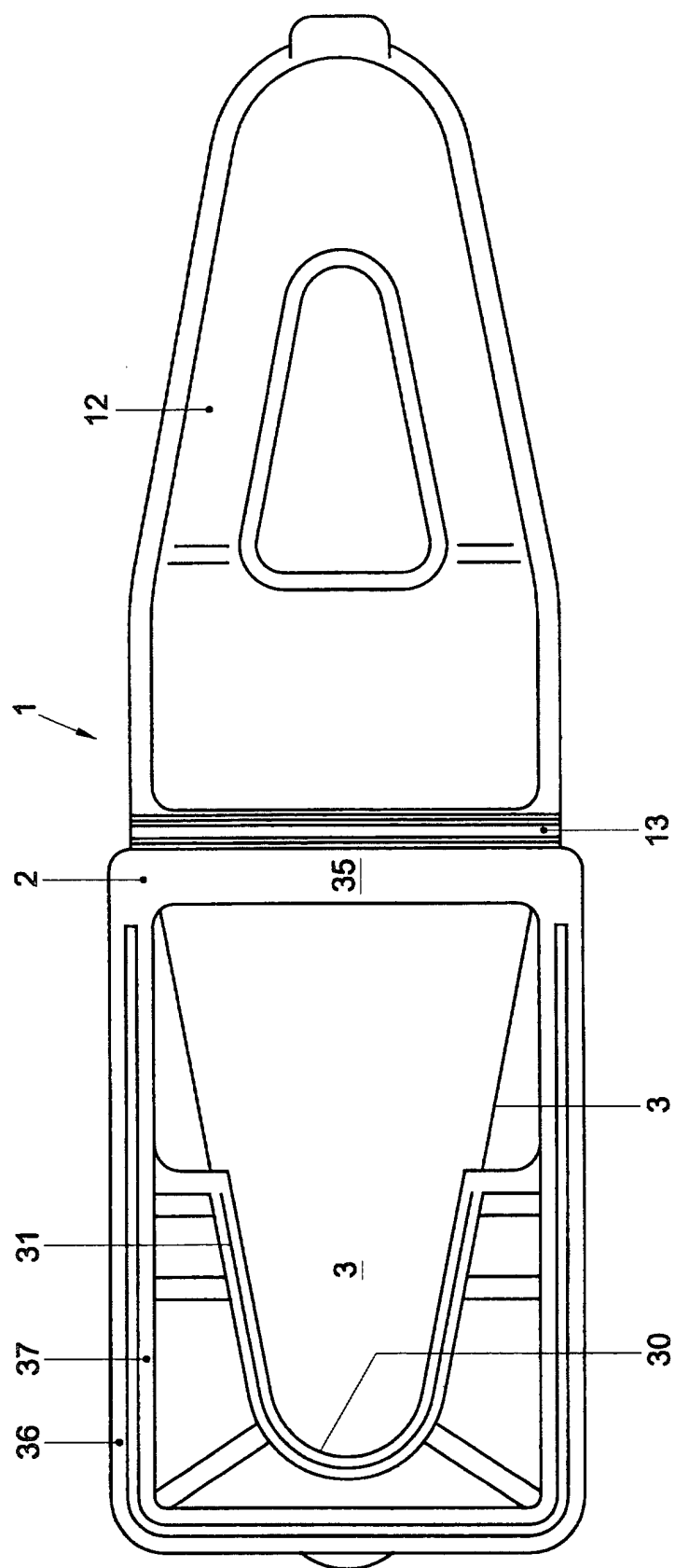
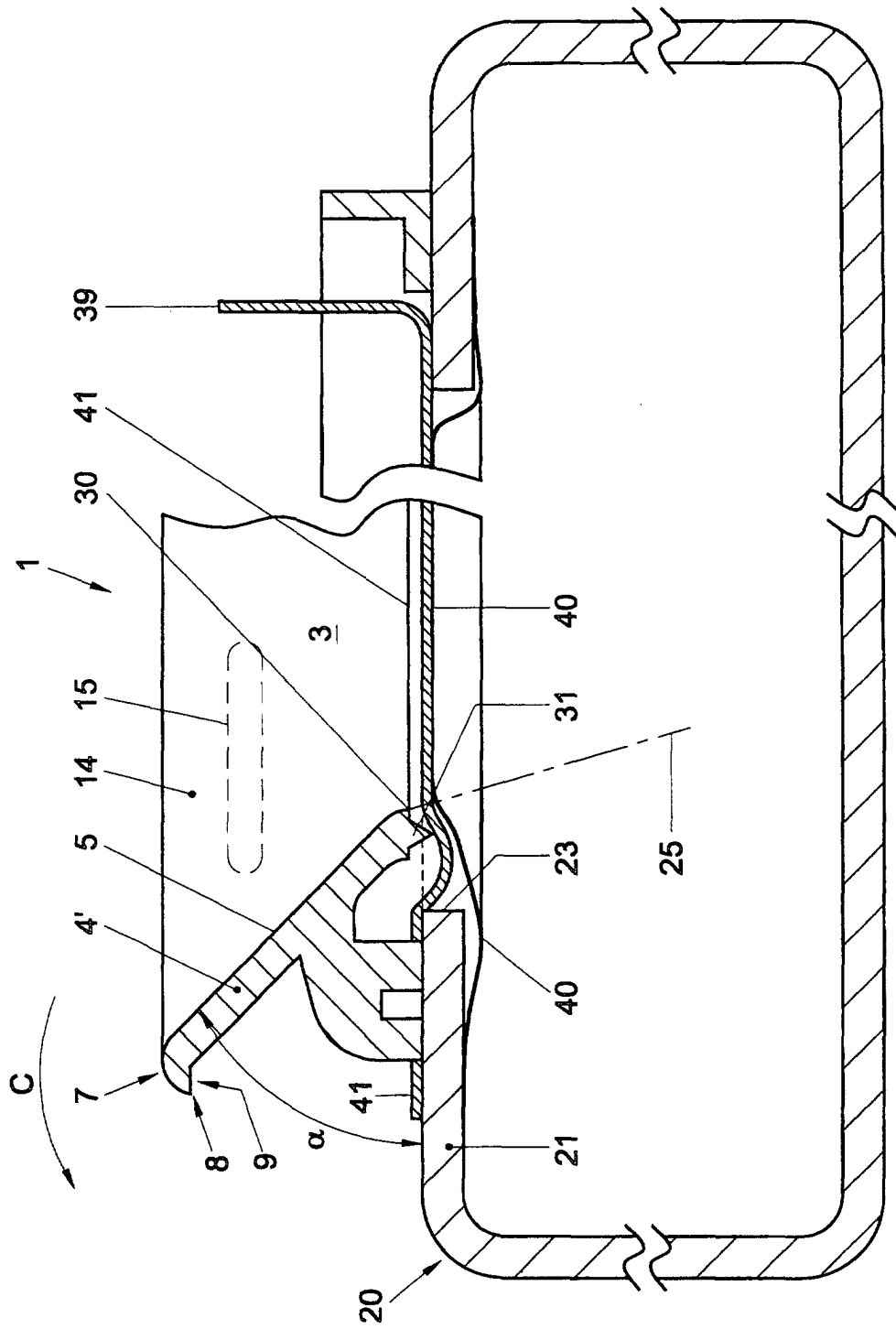


Fig. 3



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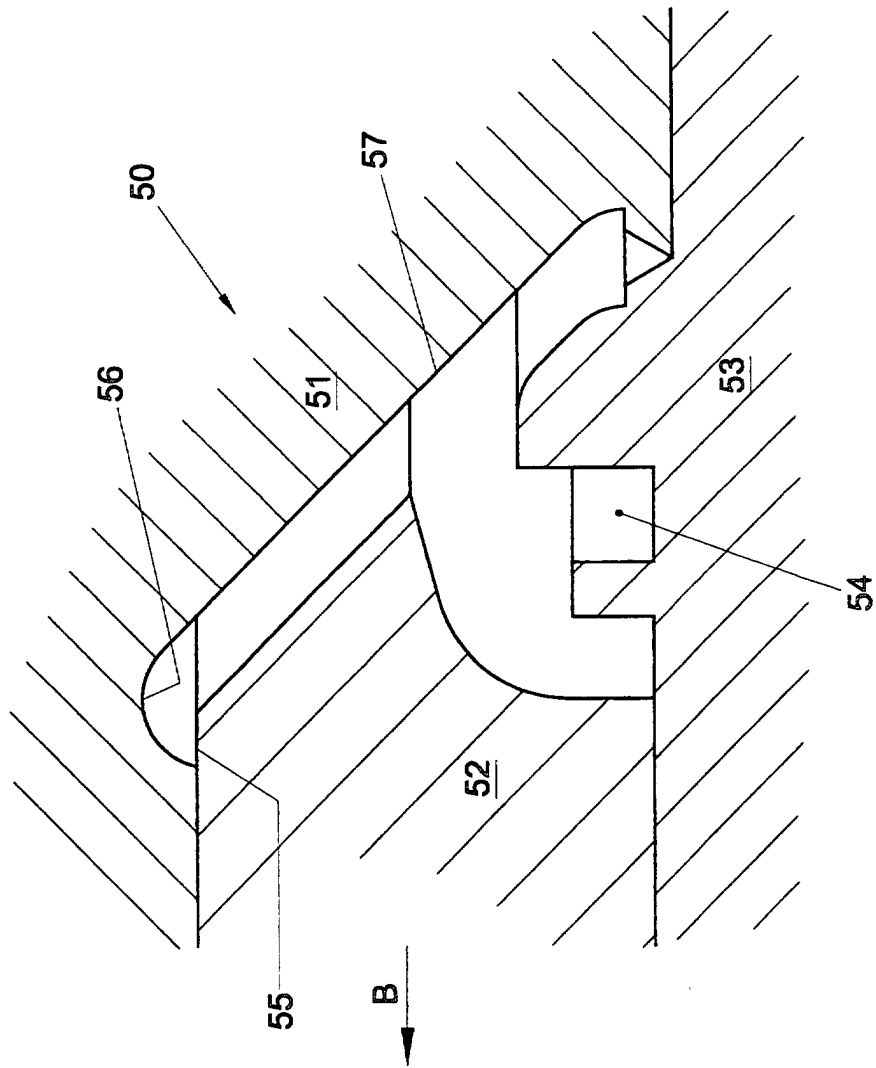


Fig. 5



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Application Number
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Y	* column 3, line 40 - column 4, line 51; figures 4,5 *	2-14	
Y	FR 2 738 552 A (RICAL SA) 14 March 1997 (1997-03-14) * page 6, line 8 - line 22; figure 1 *	2-14	
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A,D	EP 0 686 568 A (TETRA LAVAL HOLDINGS & FINANCE) 13 December 1995 (1995-12-13) * page 5, line 20 - line 42; figure 7 *	1-14	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B65D
Place of search		Date of completion of the search	Examiner
BERLIN		5 October 2000	Olsson, B
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