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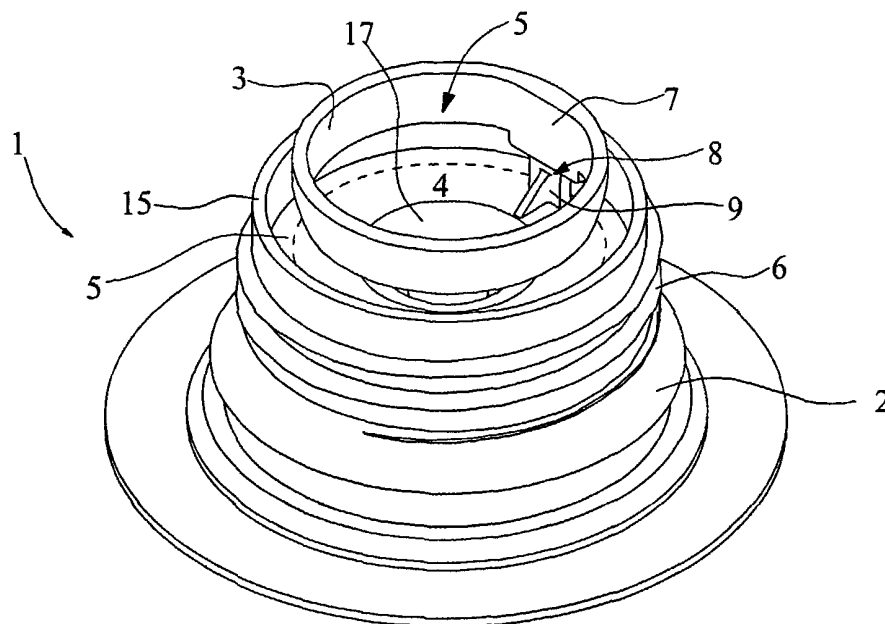
- (51) International Patent Classification⁷: B65D 47/10, 5/74 (74) Agent: FREI, Alexandra, Sarah; Frei Patentanwaltsbüro, Postfach 768, CH-8029 Zürich (CH).
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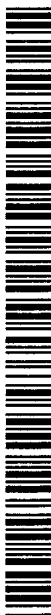
— With international search report.

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: SPOUT FOR CONTAINERS



(57) Abstract: Spout (1) for containers of carton comprising a body (2) with an orifice (10), a removable membrane (4), sealing off the orifice (10), connected to the body (2) by a predetermined breaking line (5) and a tear off handle (3) integrally connected to the membrane (4) by a connecting element (9). The tear off handle (3) may stand taller than the upper rim (15) of the orifice (10) of the spout (1). A lever mechanism helps to reduce the initial opening force to remove the membrane (4).



WO 01/25106 A1

SPOUT FOR CONTAINERS

BACKGROUND OF THE INVENTION

This invention relates to an improved outlet for containers made of carton used for milk, juices etc.

5 DESCRIPTION OF THE PRIOR ART

The use of multi layer paper containers for liquids (milk, juices, etc) is widespread. The containers have the form of pyramid, brick, block etc. A main problem of such containers is that liquid can not be poured out in a controlled manner and most important, the fact that they are not securely reclosable. Safe transportation or shaking
10 after initial opening is not possible. These limitations have been overcome by the use of spouts fitted on an outlet which is cut on the upper part of the container.

From the state of the art different spouts for containers, made out of paper, for beverages and other liquids are known. They all consist of a body of plastic material and a lid of the same or different material. The lid is usually fastened to the body by an
15 engaging thread. Both parts are injection molded. The orifice of such spouts is usually sealed off by a membrane which is connected to the inner wall of the orifice by a thin web which acts as a predetermined breaking line. This membrane indicates temper evidence and is removed while initial opening by pulling a handle which is integrally connected to the membrane. The handle of the spouts known from the state of
20 the art has different shapes and is built in a way that it is not taller than the upper rim

of the orifice. Therefore to remove the membrane a consumer has to stick a finger into the orifice, grab the handle and try to pull it in a way, that the membrane is removed. This procedure has different disadvantages. First it is not very hygienic to stick a finger into the orifice, second said handles positioned inside the orifice are
5 very small due to the narrow space and unsuitable to hold and third a consumer has to apply a significant force to remove the membrane properly. If the force is not applied in the right direction, the handle can easily be destroyed without removing the membrane. It is therefore necessary to use additional tools like knives, screw drivers or pliers to remove the membrane or it's remaining rest. This is not satisfying, but
10 time consuming and dangerous. Due to the high force which has to be applied, spouts known from the state of the art seem to be unsuitable for children, for disabled or for elderly people.

Several types of such pouring spouts are available on the market. An example of such a spout is known from US 5,176,300 which has a tearable membrane, located at
15 the lower end of the orifice.

The idea of an integral membrane, which is removable by a pulling ring, is described in US-3,458,080. US'080 describes a spout with a removable membrane located at the uppermost or lowermost end of the orifice.

In US-5,810,184 a tearable membrane is located in the interior of the spout approximately midway of its height. The membrane is concave and the pulling ring is horizontally disposed and arranged in a way that it stands not taller than the upper rim of the spout.
20

In US 5,301,849 the concavity of a tearable membrane is claimed. Several pulling rings are illustrated parallel or at an angle to the membranes level, the membrane is arranged in about the middle of the spout and the pulling ring does not protrude over
25 the upper end of the spout.

SUMMARY OF THE INVENTION

It is the aim of the present invention to disclose a spout which overcomes such problems of the state of the art as high opening forces, unhygienic operating. This task is solved by the invention as defined in the claims.

5 According to the invention a tearable membrane is located preferably almost on the upper rim of the spout, leaving an only small part of the wall above it for proper airtight resealing with the cap. The pulling ring is located well outside of the cylinder of the spout and is parallel to the membrane. No limitation of its size is given by the diameter of the orifice. The membrane is preferably neither flat nor concave but in-
10 corporates an asymmetric finger shaped depression. The cap is designed in a way as not to compress and deform the pulling ring. The pulling ring remains unobstructed while standing taller than the upper rim of the orifice. During tearing of the membrane the finger touches only a very small part of the inside wall of the spout and the potential contamination from soiled fingers during the tearing of the membrane is
15 minimized. In addition a much smaller inside-surface remains unsterilised in case of hot filling operation.

The spout disclosed in the present invention solves the problems known from the state of the art by a new arrangement and dimensioning of the membrane, the predetermined breaking line, the tear off handle and the orifice. The tear off handle is preferably arranged in a way that it can be easily gripped without the necessity to insert a
20 finger into the orifice. It is positioned above the upper rim of the orifice in a way that the size of the handle is not limited by the diameter of the orifice.

A tear off handle can be preferably built as a ring which is wide enough to be easily engaged with at least one finger. The cross section of the tear off handle is dimensioned in a way that a certain bending stiffness and resistance against mechanical
25 stresses is achieved. By implementing means which influence the local stiffness of the handle, the applied forces are guided in an efficient way and concentrated to reduce the necessary force. By said means and the predetermined position of the tear

off handle with respect to the rim or other suitable elements, a lever mechanism is obtained, which supports reduction of the necessary removing force of the membrane. If necessary, the initial removing force of the membrane is influenced by the design of the predetermined breaking line. By guiding the melt flow of the material and partial cooling of the mold, defined weak-areas are produced to reduce the initial opening force. By adjusting the thickness of the connecting web and the predetermined breaking line, additional influence can be taken.

To obtain a preferred lever mechanism, the handle to remove the membrane is preferably connected to the membrane by an element which comprises a locally bendable, hinge-like element, for example a strap made of highly orientated material. This material orientation helps to increase the mechanical resistancy and durability similar to film hinges of plastic closures.

By the design of the membrane, the position of the injection point, designated means and the local cooling of the mold, the flow of the material is guided and the necessary opening force is predetermined. Areas of defined cold-welding of the material can be obtained on purpose to influence the determined opening force.

DESCRIPTION OF DRAWINGS

Further characteristics and advantages of the present invention will become apparent from the following detailed description of a preferred embodiment of the invention, wherein:

- Figure 1 shows a preferred embodiment of the spout in a perspective view,
- Figures 2 to 5 show the functioning of a spout according to different sections through a spout in a side view,
- Figure 6 shows a section through a membrane and a handle in a perspective view.

Figure 1 shows a spout 1 in a perspective view. The spout 1 consists of a body 2, a tear off handle 3, a membrane 4 and a predetermined breaking line 5. The body 2 has a thread 6 to securely fasten a lid 20 (see Figure 2). It is evident, that the lid 20 can be fastened to the body 2 by any other suitable means such as hinges. The tear of
5 handle 3 of the here shown embodiment has a ring-like shape. It is preferably enforced to obtain stiffness against bending in a rear area 7 where it is connected by region 8 of preferable bending (hinge like behavior) and a connecting element 9 to the membrane 4. It is evident that the tear off handle 2 can have any other suitable design. The membrane 4 is arranged within the opening of an orifice 10 in the region
10 of an upper rim 15. The membrane 4 has a depression 17 for better finger access while operating. A flange 16 is employed for the attachment of the spout to the carton preferably by ultrasonic welding.

Figure 2 shows the spout 1 according to Fig. 1 and a lid 20 in a side view. The front part of the spout 1 and the lid 20 are cut off for better visibility. The lid 20 comprises
15 a thread 11 which is engaged with a thread 6 of the body 2. A temper evidence ring 12 is integrally connected to the lid 20 by predetermined breaking elements 13. The temper evidence ring 12 is engaged with a corresponding rib 14. The predetermined breaking elements 13 are destroyed while first opening the lid 20 of the spout 1. The tear off handle 3 is positioned preferably above the upper rim 15 such that it projects
20 over the upper rim 15. In this position it can easily be held and operated and its size is not limited by the diameter of the orifice 10. In the cut-off view shown here the reinforced rear area 7 is clearly visible. The bendable region 8 and the connecting element 9 connect the tear off handle 3 and the membrane 4 in the embodiment shown here. The membrane 4 is connected to the orifice 10 by the predetermined
25 break off line 5. The lid 20 is formed in a way, that it fits over the tear off element 3 and seals off the spout 1 while transportation after initial opening.

Figure 3 shows the first step of initial opening of the spout 1. After removing the lid 20 (see Figure 2), a consumer grabs the tear off handle 3 and pivotally rotates it in the direction of an arrow R by applying a force, schematically shown by an arrow P.

The tear off handle 3 rotates pivotally around the hinge-like bending region 8 in the embodiment described here. This bending region 8 is formed by a thin area of very durable material which can be obtained by material orientation (according to film hinges of injection molded plastic closures). The tear off handle 3 is rotated pivotally
5 backwards until the reinforced rear area 7 comes in contact with the rim 15 of the spout 1. After initial contact the tear off handle 3 is moved back further in a way that an additional force F1 is built up between the rim 15 and the reinforced rear area 7 (see **Figure 4**). As a result of this a reaction force F2 is implemented, which reduces the necessary tear off force for the membrane significantly. The predetermined
10 breaking line 5 starts to break initially and relieves the orifice 10 in a chain reaction. The predetermined breaking line 5 is made in the here shown embodiment of a thin web of material. To support the above described effect this web can be designed to be less resistant in the region of the connecting element 9. This can be obtained by adjusting the thickness of the structure, the size of the radius and the angles of the
15 cross-section. Another preferred embodiment can be obtained by influencing the flow lines in a way, that a weak spot results (Cold welding spot). Adequate cooling results in a similar effect. It is obvious, that the magnitude of the additional tear off force F2 can be estimated by $F2 = P \frac{B}{A}$. The ration of B/A of a preferred embodi-
ment is typically in the region of 5 to 10.

20 **Figure 5** shows the membrane 4 in a completely removed position above the spout 1. The orifice 10 is now completely open to pour out the stored liquid. The spout 1 can be securely sealed repeatedly by unscrewing the lid 20 (see fig. 2). Due to the preferred position of the membrane 4 in the region of the upper rim 15 of the orifice 10, material reduction and better cycle times while production are obtained.

25

To additionally control the opening force, especially if the spout is made out of soft material, a special design of the membrane 4 and the predetermined breaking line 5 is foreseen if necessary.

Figure 6 shows a membrane 4, a predetermined breaking line 5 and ring-shaped tear off handle 3 in a perspective, cut-off view. The tear off handle 3 is connected to the membrane 4 by a bendable region 8 and a connecting element 9. The predetermined breaking line 5 is formed by two rifts 18.1, 18.2. The depth of rift 18.1 depends on the position. By changing the cross-section, the bottom radius and the depth of the rifts 18.1 and 18.2, the initial opening force is influenced. The depth of the rift 18.1 is in the here shown embodiment deeper in the region of the connecting element 9, such that the thickness of the predetermined breaking line 5 is different and less force has to be applied to initially break the breaking line 5. After initially breaking a chain reaction is started and the rest of the predetermined breaking line is destroyed. An injection point 21 for injecting the material is positioned in the here shown embodiment in the middle of the membrane 4. The flow of the material is guided in a way that weak areas along the predetermined breaking line 5 are produced, whereby the force to remove the membrane 4 is controlled. Additional elements 22 are placed if necessary on the membrane 4 and other elements. These elements 22 have influence on the flow of the material and the mechanical stiffness of the membrane 4. Arrows 23 indicate the guidance of the material. It is self-evident, that these arrows 23 only indicate one possible way to influence the flow of the material. By guiding the material on different paths to the predetermined breaking line 5 and the partial cooling of the mold, areas of cold-welding result.

CLAIMS

1. Spout (1) for containers, said spout (1) comprising a lid (20) and a body (2) with an orifice (10) having an upper rim (15), a removable membrane (4), sealing off the orifice (10) and being connected to the body (2) by a predetermined breaking line (5), a tear-off handle (3) positioned at a distance from and integrally connected to the membrane (4) by a connecting element (9),

wherein

the tear-off handle (3) has a reinforced area (7) and is pivotally connected to the membrane (4) by said connecting element (9) comprising a bendable area (8), such that on pivoting said tear-off handle (3) around said bendable area (8), said reinforced area (7) is temporarily engaged with said upper rim (15) of the orifice (10) producing a force (F2) acting perpendicularly to said membrane.

2. Spout (1) according to claim 1, **wherein** the tear off handle (3) projects above said upper rim (15) of said orifice (10)
3. Spout (1) according to one of the previous claims, **wherein** the diameter of the tear off handle (3) is bigger then the diameter of the orifice (10).

4. Spout (1) according to one of the previous claims, **wherein** the predetermined breaking line (5) is made of at least one rift (18.1, 18.2) forming a thin web of material.

- 5 5. Spout (1) according to claim 4, **wherein** the predetermined breaking line (5) is made of a thin web of material which has a variable thickness.

6. Spout (1) according to one of the previous claims, **wherein** said membrane (4) has a depression (17).

- 10

7. Spout (1) according to one of the previous claims, **wherein** said bendable area (8) is made of oriented material.

8. Method for manufacturing a spout (1) **wherein** melted material is injected
15 through an injection point (22) and guided by means (22) along predetermined flow lines (23) and partial cooling of the mold such that weakened areas result in the region of the predetermined breaking line (5) to reduce the initial opening force.

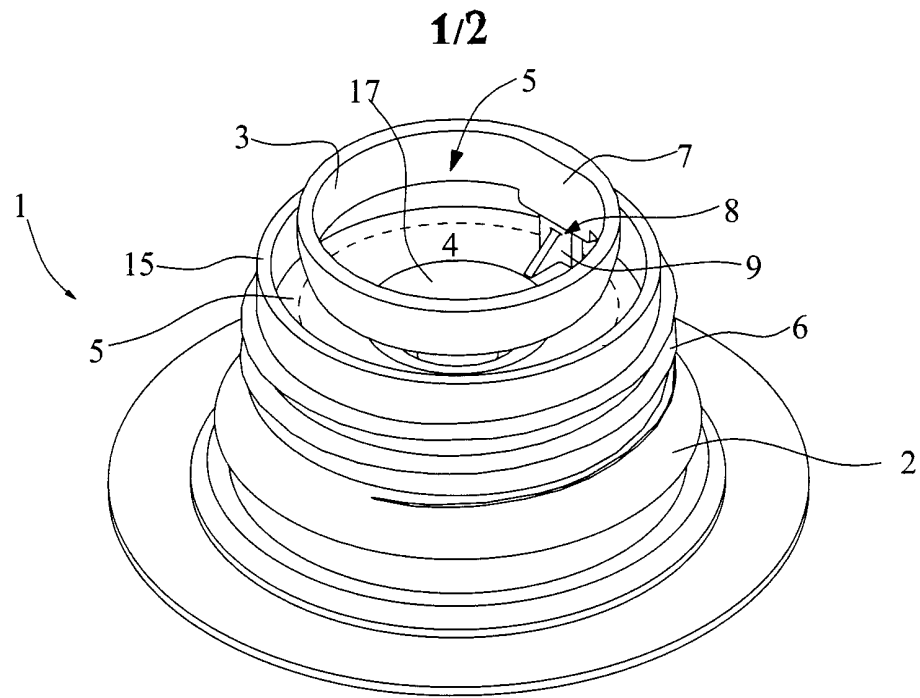


Fig. 1

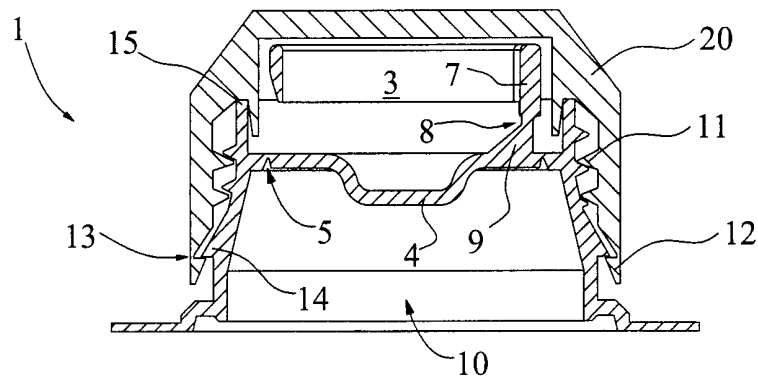


Fig. 2

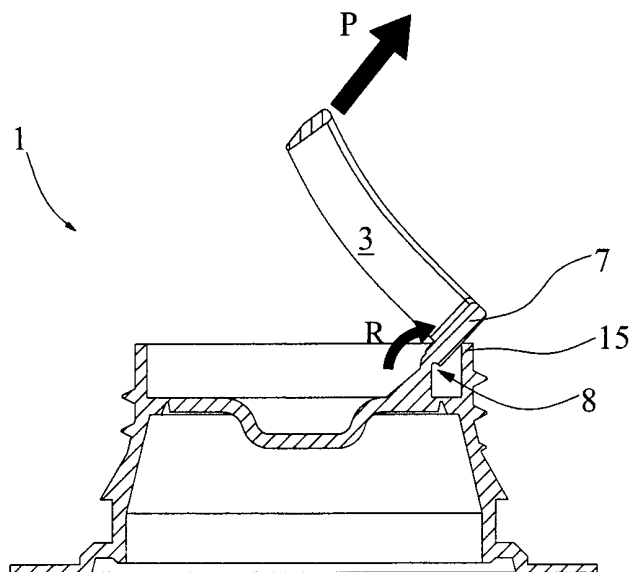


Fig. 3

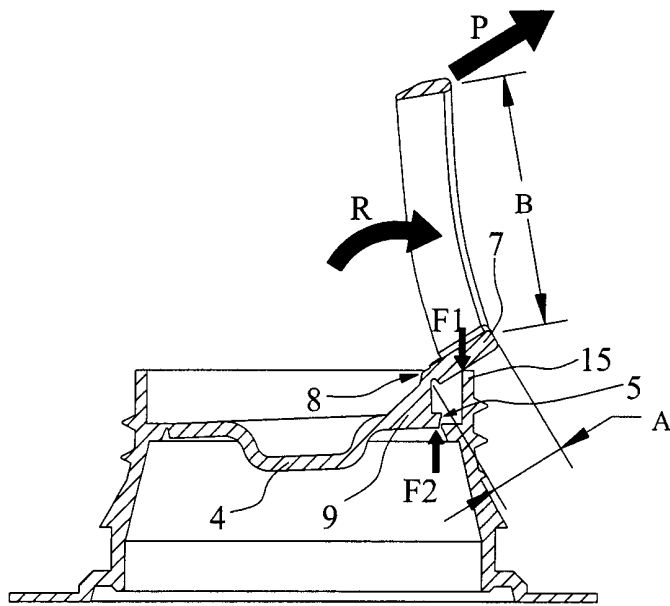


Fig. 4

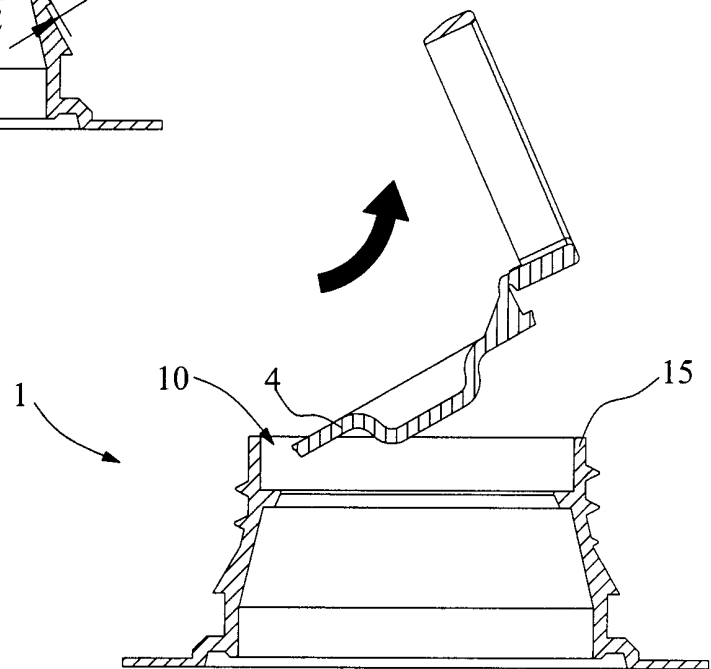


Fig. 5

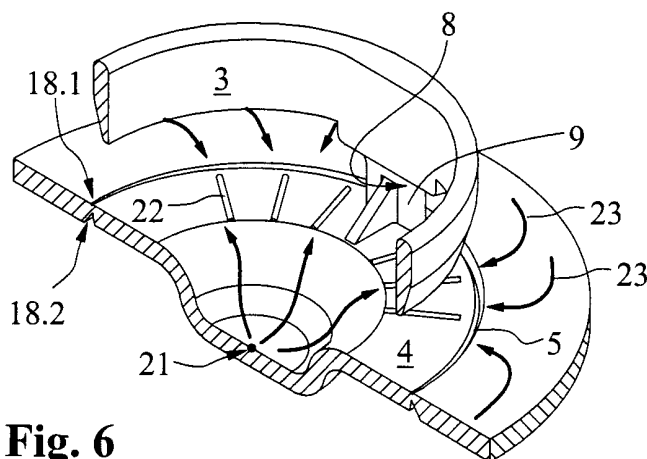


Fig. 6

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 00/09289

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65D47/10 B65D5/74

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B65D

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 755 360 A (ELLIOTT JOHN) 26 May 1998 (1998-05-26) figures 1-3 ---	1,2
A	GB 1 507 349 A (CARNAUD TOTAL INTERPLASTIC) 12 April 1978 (1978-04-12) figure ---	1,2
A	US 3 459 315 A (LABARRE MAURICE) 5 August 1969 (1969-08-05) figure 4 -----	1

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

8 December 2000

Date of mailing of the international search report

03. 01. 2001

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP 00/09289

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

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

2. Claims Nos.: 8
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:
see FURTHER INFORMATION sheet PCT/ISA/210

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

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

1. As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. 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 claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 8

Claim 8 is unintelligible. It refers to undefined features whose mutual relationship is also undefined, such as "means", "the mold", "the predetermined breaking line", and "the initial opening force" (Article 5 and 6 PCT).

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/EP 00/09289

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5755360 A	26-05-1998	NONE	
GB 1507349 A	12-04-1978	FR 2271999 A ES 228938 U	19-12-1975 01-11-1977
US 3459315 A	05-08-1969	BE 710552 A DE 1657145 A DK 121898 B ES 350480 A FR 1523236 A GB 1196053 A LU 55433 A NL 6802329 A NO 120255 B SE 342200 B US RE29850 E	08-08-1968 23-03-1972 13-12-1971 01-05-1969 23-08-1968 24-06-1970 16-04-1968 22-08-1968 21-09-1970 31-01-1972 28-11-1978