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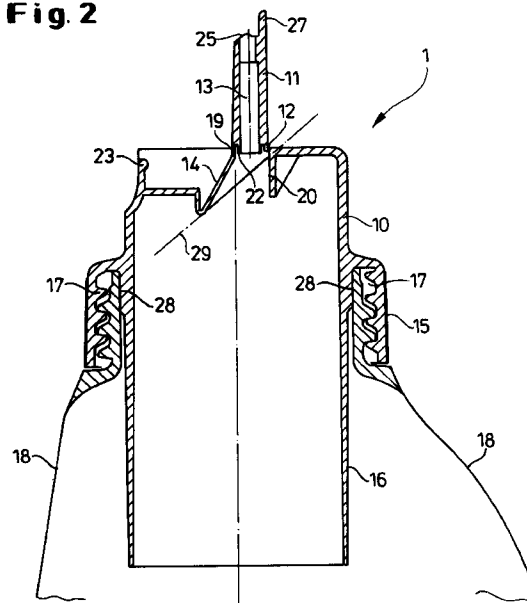
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(54) **Pour spout having dosing means**

(57) The present invention is directed to a one-piece cap (1) comprising a rigid base (10), a dispensing spout (11) defining a dispensing passage (13) through the cap rigid base (10), to which it is hingeably attached by a flexible invertible diaphragm (14), and internal and external closure walls that define respectively internal (16) and external (15) skirts, characterized in that, the internal skirt (16) extends so as to form a dosing volume. The cap (1) is further designed to fit onto the neck of an associated container (18) so that the assembly is leak-proof, and further designed so that the dispensing spout (11) comprises a cup-seal (22) to cooperate with the cap rigid base (10) so that said dispensing spout (11) is leak-proof when in the closed position.

Fig. 2



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Description

Field of the invention

[0001] The present invention relates to a one-piece dispensing cap comprising a dosing means.

Background of the invention

[0002] Dispensing caps for closing plastic bottles of laundry or cleaning products are representative of the various dispensing caps for closing containers, to which the present invention can apply; such dispensing caps typically comprise, for example, a cap solid base, cap external walls that further comprise a means, for example a thread, that allows to fix the cap onto the bottle's neck. Such caps typically further comprise a dispensing nozzle which is pivotally attached to the solid base, for example by the means of a hinge.

[0003] The following references are directed to dispensing caps made out of one piece: *United States Patent n°4.440.327 filed Dec.16, 1981 by R.Dark*. It discloses a unitary dispensing closure and valve having a solid base and a dispensing passage connected to said base by an invertible flexible diaphragm. The dispensing passage is hingeably connected to the base so that the cap can be open and closed. The cap further comprises a means for securing the cap in a tight configuration when it is in the closed position. *PCT Application n° WO94/29182 published Dec. 22,1994, from R. Dark*. It teaches a unitary dispensing closure and valve having a solid base and a dispensing passage connected to said base by an invertible flexible diaphragm. The base comprises an external wall with a means (a thread) for screwing the cap onto a container's neck. The dispensing passage is hingeably connected to the base so that the cap can be open and closed. The cap further comprises an internal wall that partially fits into the bottles neck so as to provide a seal means.

[0004] The one piece dispensing caps as described in the preceding documents are known and used for the closing of bottles of various consumer goods. However and particularly in the field of closures to use with packages of liquid products, more particularly liquid household-cleaning and liquid laundry products, there is still a need for a one piece dispensing cap that also features a dosing means, so that the user can either dispense the product via the dispensing spout, or use the dosing means to dispense a given volume of product.

[0005] It is therefore a main object of the present invention to provide a one-piece cap that comprises a dispensing spout for easy dispensing and reclosing, and mostly to provide a one-piece cap that features a dosing means for easy dosing and dispensing of a given volume of the contents.

Summary of the invention

[0006] The present invention is directed to a one-piece cap comprising a closure base, a dispensing spout defining a passage through the closure base, to which it is hingeably attached by a flexible diaphragm, and internal and external closure walls, characterized in that the internal wall extends so as to form a dosing volume. The cap is further designed to fit onto the neck of the bottle so that the assembly is leak-proof, and further designed so that the dispensing nozzle is leak-proof when in the closed position.

Brief description of the drawings

[0007] The invention will now be explained in detail with reference to the accompanying drawings, in which:

- Figure 1 is a front view of the cap with the dispensing spout in the closed position and showing one embodiment of the present invention where the internal wall extends beyond the external wall so as to define a dosing volume.
- Figure 2 is a profile cut view of one embodiment of the invention where the cap is screwed on a container's neck with the dispensing spout in the open position, and the internal wall that extends beyond the level of the external wall so as to define a dosing volume.
- Figure 3 is a top view of the cap with the dispensing spout in the dispensing position
- Figure 4 is an enlarged perspective view of the dispensing spout showing the cup seal.
- Figures 5a.b.c are perspective partial cut views of the top part of the cap of the present invention, showing how the invertible diaphragm inverts while the opening/closing operations of the dispensing spout.
- Figure 6 is an enlarged profile view of the top part of the cap of the present invention, showing how the cup seal abuts the rigid base seal surface to perform a sealing.
- Figure 7 is a profile cut view showing the cavities of one embodiment of the injection mold used for manufacturing the cap of the present invention.

Detailed description of the invention

[0008] Referring to figures 1 and 2, a cap (1) is shown comprising a rigid base (10), a rigid dispensing spout (11), a rectilinear pivot line (12) in a bi-sector plane (29) hereinafter described, a dispensing passage (13), and a flexible invertible diaphragm (14). The rigid base (10) comprises an external wall and an internal wall that define respectively an external skirt (15) and internal skirt (16). Said external skirt (15) further comprises an attaching means (17) for securing the cap (1) onto an associated container (18), preferably onto the neck of

said associated container (18). Said attaching means (17) can be a bayonet system made out of at least two ribs and/or grooves located on the cap that fit into corresponding ribs and/or grooves located on the neck of the bottle, but preferably, said attaching means (17) comprises at least one thread for screwing the cap (1) onto a corresponding at least one thread located on the neck of a container such as a plastic bottle (see figure 2).

[0009] The container (18) is intended for containing liquids or powders, preferably liquids, and most preferably liquids for household cleaning or laundry purposes. Such liquids can be poured directly onto the surface to clean, in the case they are to be used locally without dilution, or they can also be diluted, for example in water, preferably in the case of use onto large surfaces to clean, or into devices such as washing-machines for example. In the latter, the user needs a dosing volume of reference so as to dose a given volume of contents to be diluted relatively to a given volume of water. Such a dosing means is preferably achieved as shown in figure 2: the internal skirt (16) extends from the rigid base (10), so as to form a substantially cylindrical volume. Any suitable height for the extending internal skirt (16), such that said substantially cylindrical volume can serve as a dosing volume, shall be applied to the present invention, for example, said extending internal skirt (16) extends at the same level than the external skirt (15). However, in a preferred embodiment of the present invention, said extending internal skirt (16) extends beyond the level of the external skirt (15) as shown in figure 2. Further, the extending internal skirt (16) is designed such that when the cap (1) is fixed onto the associated container (18), said extending internal skirt (16) presses against the internal surface of the neck of said associated container (18) along a peripheral cylindrical section (28), in such a way that no liquid can pass between the two, i.e. the surface of contact between the extending internal skirt (16) of the cap (1), and the neck of the associated container (18) is leak-proof.

[0010] The base of the rigid dispensing spout (11) is attached to the invertible diaphragm (14) by integrally formed hinges (21). All other portions of the invertible diaphragm (14) are resilient to enable said invertible diaphragm (14) to invert. The invertible diaphragm (14) is proximate to a bi-sector plane (29) which bisects the angle between an inside surface of the rigid dispensing spout (11), and a rigid base seal surface (20), when the dispensing spout (11) is in the dispensing position (see figure 2) and the invertible diaphragm (14) is in a convex configuration. The rectilinear pivot line (12) lies in the bi-sector plane (29). The invertible diaphragm (14) is connected with the rigid base (10) by the hinge connection (21).

[0011] The hinge (21) and the pivot line (12) lie in the bi-sector plane (29), and in effect form a continuous hinge. The invertible diaphragm (14) is connected with the rigid dispensing spout (11) by the relatively thin hinge (19). Said hinge (19) has sufficient width and flex-

ibility to allow the invertible diaphragm (14) to invert without significantly impeding its movement. During closing of the dispensing spout (11), the movement being accurately governed by pivoting of the dispensing spout (11) about the rectilinear pivot line (12), the invertible diaphragm (14) inverts about the bi-sector plane (29) in the manner shown in figures 5a, 5b, 5c, throughout the extent thereof to a concaved configuration. A cup seal (22) on the inside surface of rigid dispensing spout (11) is thus urged to engage the rigid base seal surface (20) to complete the sealing, as shown in figure 6.

[0012] Whether the invertible diaphragm (14) is in its convex configuration (see figures 2, 10) or its concaved configuration (see figures 11, 12), it is stable and substantially unstressed, only being stressed when it is flexed through the bi-sector plane (29). Dynamic forces, developed during this flexing through the bi-sector plane (29), exert pressure in the closed position to urge the dispensing spout cup seal (22) against the rigid base seal surface (20). Force is required to open the rigid dispensing spout (11), by lifting it past the bi-sector plane (29), whereupon the dynamic forces built up in the invertible diaphragm urge the dispensing spout (11) toward its dispensing position shown in figure 2.

To effect a positive pressure seal, it is preferable that both ends of the spout abut against the rigid base (10) when closing, as shown in figure 6. The cup seal (22) on the inside surface of the rigid dispensing spout (11) compresses and deforms when the dispensing end of the rigid dispensing spout (11) engages the rigid base latch surface (23), the seal acting in the manner of a Belleville spring, thereby providing a firm seating against the rigid base seal surface (20) and positive sealing.

Figures 2, 6 show a preferred embodiment of the present invention wherein the cap comprises a rigid base latch surface (23) and an inclined portion (24) for securing the dispensing spout (11) in the sealed position. The dispensing spout (11) has an inclined surface (25) which serves as a lead-in upon contact with the rigid base latch surface (23) during closing.

Figures 5a, 5b, 5c show a form of the closure of the invention wherein the invertible diaphragm (14), comprising facets (26a), (26b), (26c), (26d), and (26e), has a dispensing spout (11) of rectangular cross-section. The rigid dispensing spout (11) is connected to facets (26b), (26c) and (26d) by the pivot line (12) and to the rigid base (10) by hinge connections. These facets cooperate to define the invertible diaphragm. When closing through the bi-sector plane (29), these facets collectively collapse to a concaved configuration, as is best shown in figures 5a, 5b, and 5c. Figure 5b shows the invertible facets (26a.b.c.d.e) of the invertible diaphragm (14) collapsing collectively through the bi-sector plane (29).

[0013] While an embodiment of the present invention as before described, comprises an invertible diaphragm

(14) which is multi-faced (figures 5a.b.c), other shapes for the invertible diaphragm (14) can be applied to the present invention, for example said invertible diaphragm (14) can be conic-shaped, or dome-shaped, all of which diaphragms operating in the manner hereinbefore described to invert from a convexed to a concaved configuration.

For example, the invertible diaphragm can be in the form of a hollowed conic section. When it is in concaved configuration and the dispensing spout is in sealing position, the geometry is not a mirror image, but has increased surface area on the inside surface. Therefore, when pressure is exerted upon it by the fluid contents within a container, the invertible diaphragm distributes this pressure along the bi-sector plane which increases sealing pressure on the cup seal.

[0014] The cup seal (22), best shown in figure 4, surrounds the dispensing passage (13) and is similar in shape to a suction cup. This type of seal, when abutting the rigid base seal surface (20), is compressed and acts as a Belleville spring to hold the dispensing end of the dispensing spout (11) to the rigid base latch surface (23). Furthermore, figures 1 to 6 show the rigid dispensing spout (11) with a projection (27) to facilitate easy manual movement from the sealing position.

[0015] Now referring to figure 7, the cap (1) is adapted to be molded in the dispensing position and moved to the sealed position during the molding cycle. The molding cycle consists of the mold closing with surface (63) of cavity (60) contacting a stripper plate having a surface (62) and an ejector half surface (64) which contacts an ejector surface (65). In this position plastic is injected into the cavity (59) to form a molded closure. After cooling, the surfaces (62) and (63) separate. Then, plates (54) and (55) move back to separate surfaces (64) and (65) and retract a core (66). A mold wipe (58) traverses the surface of the mold in the direction indicated by the arrow on wipe (58), and contacts the rigid dispensing spout to move the dispensing spout (11) to the sealed position. The stripper plate (57) moves forward and ejects the molded part from the mold and off of the core (56). This eliminates the necessity for any secondary operation to close the rigid dispensing spout (11), and has the additional advantage that the mechanical flexing of the tinged connection at the bi-sector plane (29) and hinge (19) during the molding cycle, orients the molecules of the preferred polyolefin material to insure long hinge life.

[0016] The invention has been described with reference to its illustrated preferred embodiments. Persons skilled in the art of sealing closures may upon exposure to the teachings herein, conceive variations in the mechanical development of the components therein. Such variations are deemed to be encompassed by the disclosure, the invention being delimited only by the appended claims.

Claims

1. A one-piece cap (1) comprising a closure base (10), a dispensing spout (11) defining a dispensing passage (13) through the closure base (10), to which it is hingeably attached by a flexible invertible diaphragm (14), and comprising internal and external closure walls that define respectively internal (16) and external (15) skirts, characterized in that the internal skirt (16) extends so as to form a dosing volume.
2. A one-piece cap (1) according to claim 1, wherein the internal skirt (16) extends at substantially the same level as the external skirt (15).
3. A one-piece cap (1) according to claim 1, wherein the internal skirt extends beyond the level of the external skirt (15).
4. A one-piece cap (1) according to any of the preceding claims, wherein the dispensing spout (11) comprises a cup-seal (22) so that it is leak-proof when in the close position.
5. A one-piece cap (1) according to any of the preceding claims, wherein the outer surface of the extending internal skirt (16) is pressed against the inner surface of the associated container neck when said associated container (18) is closed by said cap (1), so that said closed associated container (18) is leak-proof.
6. A one-piece cap (1) according to any of the preceding claims, which comprises a thread, so that it is to be screwed onto a corresponding thread of an associated container (18).
7. A one-piece cap (1) according to claims 1 to 5, which comprises a baillonnet means, so that it is to be clipped onto a corresponding baillonnet means of an associated container.

Fig. 1

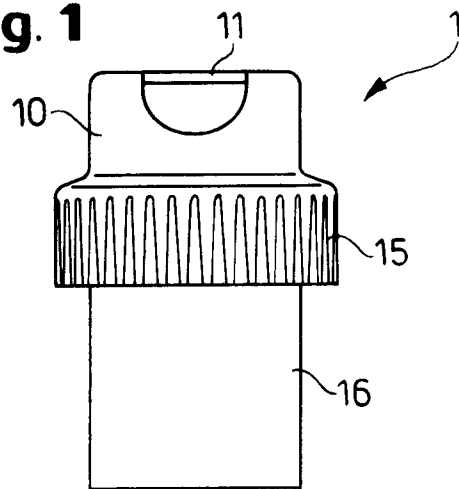


Fig. 2

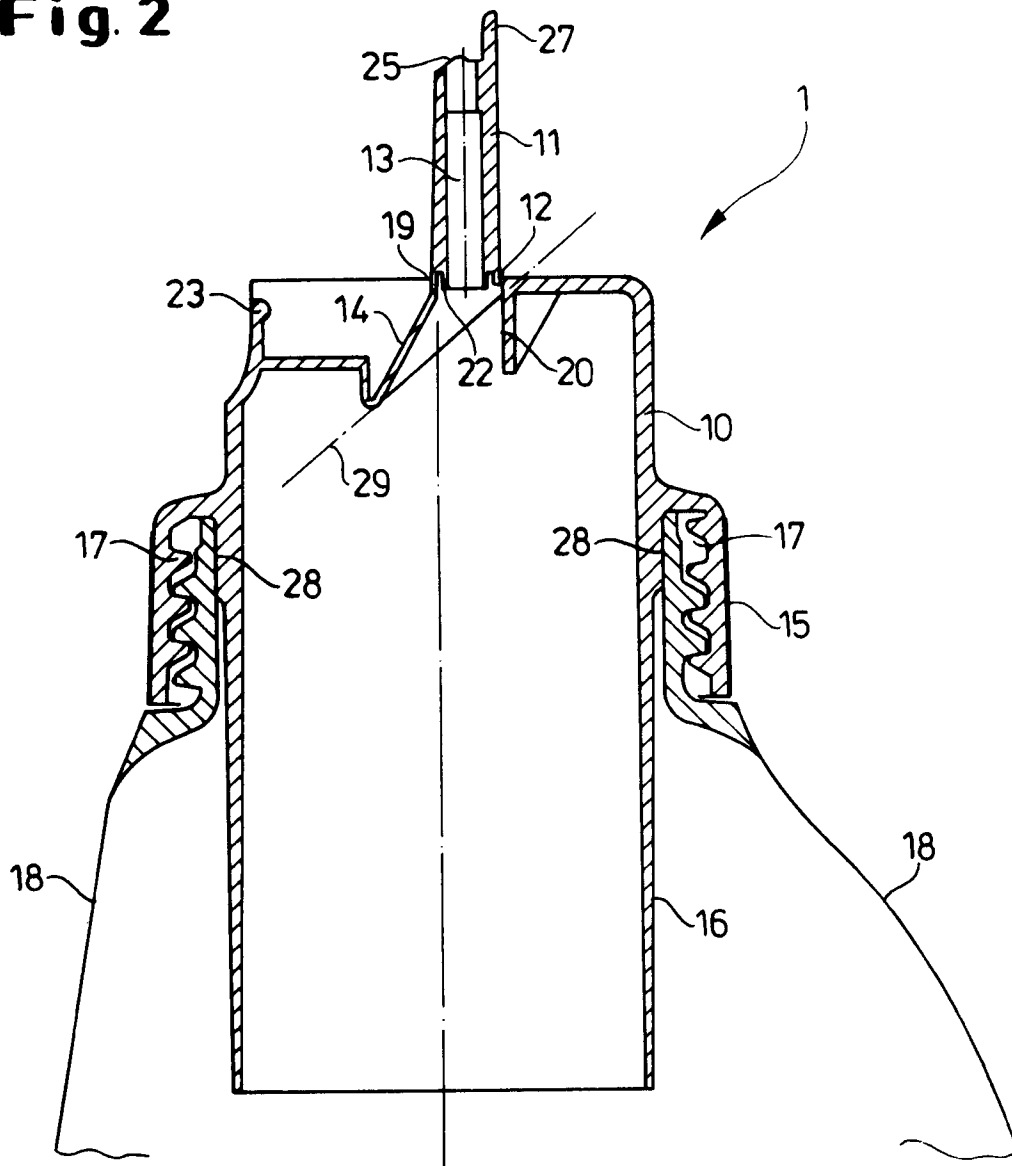


Fig. 3

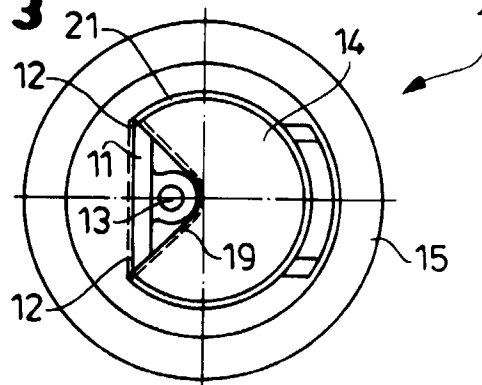


Fig. 4

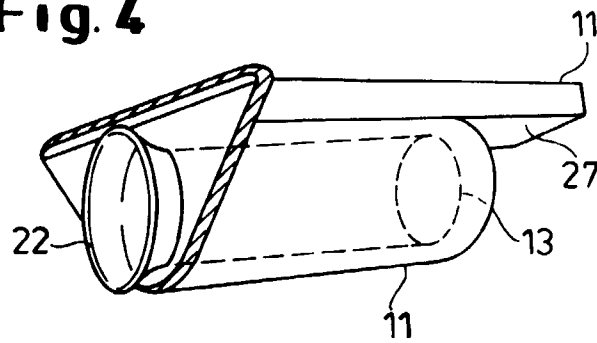


Fig. 5a

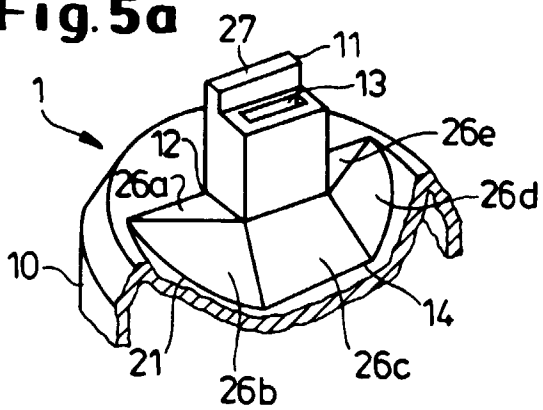


Fig. 5b

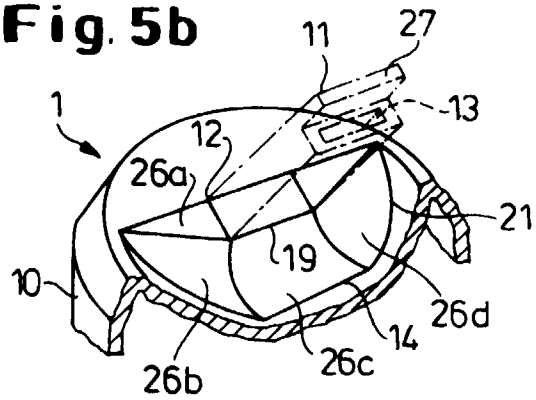


Fig. 5c

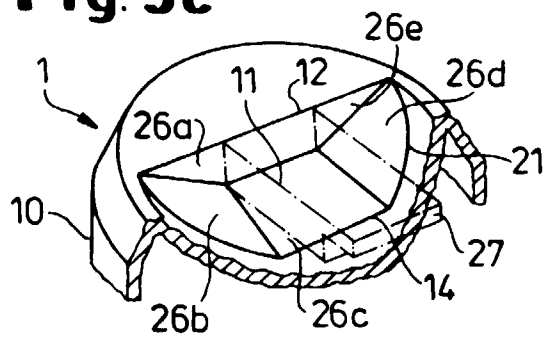


Fig. 6

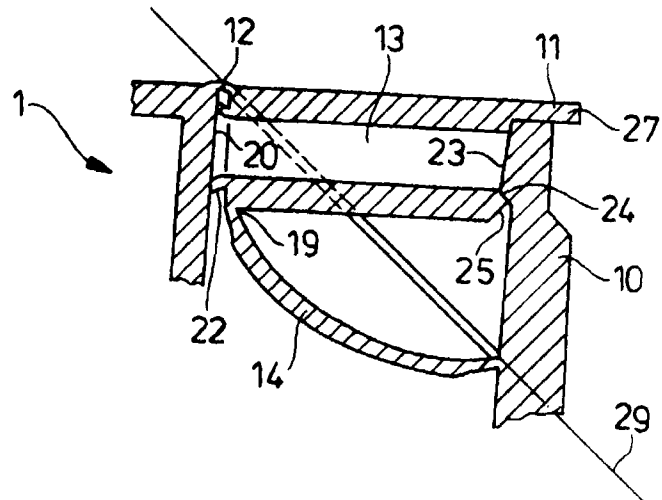
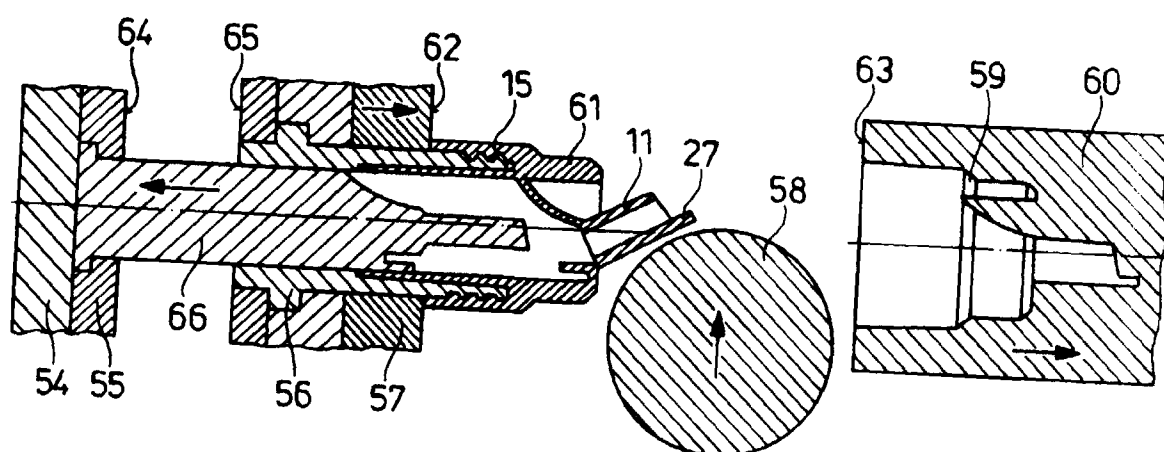


Fig. 7





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EUROPEAN SEARCH REPORT

Application Number
EP 98 20 1577

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)
Y,D	WO 94 29182 A (DARK RICHARD C G) 22 December 1994 * the whole document *	1-7	B65D47/06
Y	WO 94 01339 A (HENKEL KGAA) 20 January 1994 * page 6, paragraph 2 - page 7, paragraph 1; figure 5 *	1-7	
Y	CH 605 308 A (MIGROS) 29 September 1978 * the whole document *	2	
Y	CH 321 464 A (S.GIMELLI) * the whole document *	5	
Y	WO 97 31836 A (BUDEV B V ;PAPING MAX GREGOR (NL)) 4 September 1997 * abstract *	7	
A	FR 2 646 653 A (TAUPIN JEAN PAUL) 9 November 1990 * the whole document *	1-7	TECHNICAL FIELDS SEARCHED (Int.Cl.6) B65D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 7 October 1998	Examiner Pernice, C
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