(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 688 727 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **95810392.1**

(22) Date of filing : **13.06.95**

(51) Int. Cl.[6] : **B65D 83/00**

(30) Priority : **22.06.94 US 264138**

(43) Date of publication of application :
27.12.95 Bulletin 95/52

(84) Designated Contracting States :
CH DE FR GB LI

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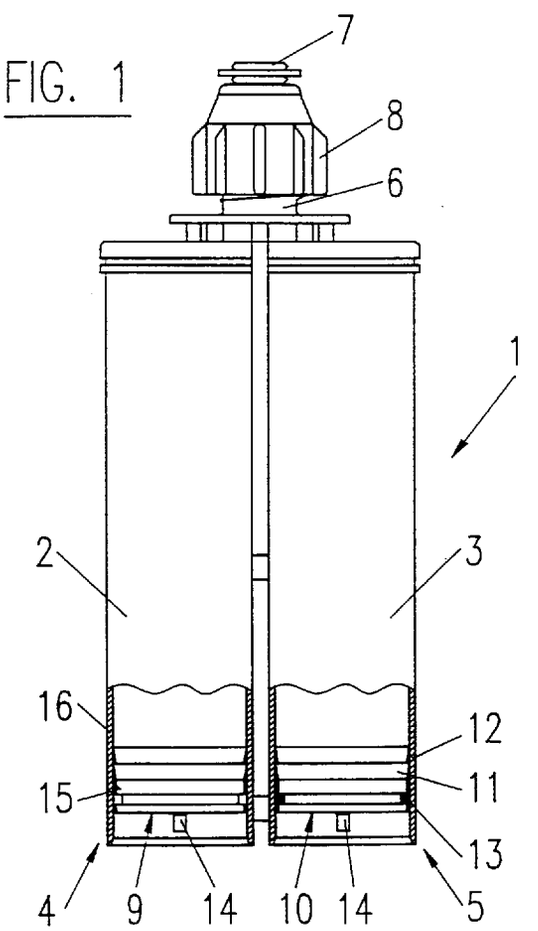
(54) Process for assembling a cartridge having a piston

(57) In the process for assembling a cartridge with at least one container (2, 3) and each container having a piston, after having introduced the piston (9, 10) into the container (2, 3), at least one retaining means (14, 17) with a retaining edge (A - F) is formed into the inner surface (15) of the end portion of the wall (16) of the container, in a position between the rim of the container wall (16) and the rear surface of the piston.

Such retaining means improve security of the cartridge and prevents the piston to be expulsed, even under the added difficulties of air transport.

FIG. 1



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Single and two-component cartridges are well known as a convenient method for the storage and the dispensing of sealants and adhesives. Their design incorporates the principle of a piston, which both seals within a cylinder when the piston is stationary during storage as well as when the piston is moving during displacement of the cylinder content. When the cartridge is fully loaded, the rear of the piston is usually set close to the end of the cylinder. The distance between the two was hitherto used as a safety factor for any possible backward movement of the piston.

For instance, a cartridge may be exposed to considerable cycles of temperature changes during storage and transport which can affect both the cartridge materials of construction and the chemical within the cartridge, especially if the chemical is highly volatile or contains air. These cyclic changes can cause a pumping action whereby the piston fails to return to its own original position when the temperature falls. Thus, any inner cartridge volume expansion and resultant pressure differential is capable of acting against the front of the piston and a typical piston lip seal is designed to become more effective in these circumstances. Whereas, as such a pressure differential begins to return to its normal equilibrium, air may be drawn in past the piston seal into the area in front of the piston since the lip seal faces the wrong way.

Another contributory factor is the basic resistance of sealing lips. Such lips tend to work as a one-way ratchet when the piston is pushed backwards, since the lip allows the piston to slip backwards easier than to return, hence, the cartridge content may push out the piston. Such a pumping action can cause the complete expulsion of the piston out of the rear of the cartridge and the dumping out of the chemical content. With the increased use of air transport, there is the additional factor of atmospheric pressure changes as well as extreme temperature changes, hence there has been considerable concern over the spilling out of chemical contents from cartridges.

US-A-1,535,994 discloses a metal oil can with a washer having stops preventing the washer and parts associated therewith from being wholly drawn from the can. This patent is silent about the manufacture of the stops and there is no hint to produce these stops after having introduced the washer.

It is the purpose of this invention to improve the security of plastic material cartridges, and in particular to prevent the expulsion of its piston. This purpose is achieved with a process of assembling a cartridge having a piston and an assembled cartridge according to the independent claims.

The invention is explained in more detail hereinafter with reference to a drawing of embodiments.

Fig. 1 shows schematically and in a partial section a two-component cartridge according to the invention,

Fig. 2 shows the cartridge of Fig. 1 in a partial section and at 90° thereto,

Fig. 3 shows a section according to line II-II in Fig. 1,

Figures 4-6 show a variant of the embodiment of Figures 1-3,

Fig. 7 shows a detail of a third embodiment of the invention, and

Fig. 8 shows in detail several forms of retaining means.

Fig. 1 shows a two-component cartridge system 1 comprising two cartridge cylinders 2 and 3 with one open end 4, 5 and combining together at the closed end into a twin outlet 6, the latter being completely sealed by a twin nose plug 7 secured by and tensioned by a retaining nut 8. Two pistons 9 and 10 are positioned inside the cylinders, each shown with two piston lip seals 11 and 12. Piston 10 is shown with an optional secondary "O" ring type seal 13.

In order that either pistons cannot be forced backwards and out of the cartridge by the action of any form of pressure differential on either side of each piston, a piston retaining means 14 is formed on the inner surface 15 of the cylinder wall 16 of the cartridge, in this example at two places, at 180° to each other immediately behind each piston. The retaining means are formed after the piston is in position within the cylinder, for example by the use of a special tool. In general, the retaining means is a flap-like deformation with an open edge spaced from the wall.

The deformation and retaining edge thus formed may take several forms as shown but the underlying principle is that of the protrusion of a face at 90° to the wall of the cartridge of sufficient depth to retain and withstand the force of any possible backward movement of the piston rim. As can be appreciated the retaining edge is positioned between the rim of the cartridge cylinder and the rear surface of the piston when the piston is in the cartridge.

In the first embodiment according to Figs. 1-3 the retaining means is formed by pressing out of the cylinder wall, into the inside of the cylinder, a rectangular piece in a movement which is essentially parallel to the rear surface of the piston, corresponding to Fig. 8B, see also Fig. 3.

A variant of the embodiment according to Figs. 1-3 is shown in the Figs. 4-6, with the same two-component cartridge system, and other retaining means 17. For forming said retaining means 17 a rectangular piece is pressed out of the cylinder wall, into the inside of the cylinder, in a movement which is essentially perpendicular to the rear surface of the piston, corresponding to Fig. 8A and B, see also Fig. 6.

Fig. 7 shows a third embodiment of the invention, incorporating a disc or ring 18 between the rear surface of the piston and the retaining edge of the retaining means in order to prevent concentration of any forces where a piston has a rounded edge, or/and is

made of soft material and has a clearance between the piston and the cylinder.

Figs. 8 C-F show further variants of the shape of the retaining means, for illustrating that a multitude of different shapes are possible within the scope of this invention, for instance semi-circular (C), triangular (D) or trapezoidal (E, F).

It is also evident that the invention is not limited to the embodiments shown. The invention also applies to one component cartridges as well as to multi-component cartridges, e.g. side by side, concentric or cylindrical cartridges having a dividing wall,and the cartridges need not necessarily have a cylindrical form. Furthermore, the number of retaining means may vary from one to several, for example two, three or four.

The depth of the retaining means must be thus that it is effective for the permanent retention of the piston while allowing for both a filling nozzle to enter the container without any interference as well as the drive plunger of a dispensing gun. Also, such a retaining means is designed so as not to interfere with the external dimensions of a cartridge and thus, not disturb the cartridge outer dimensions and the fit within a dispenser frame.

Claims

1. A process for assembling a cartridge with at least one container (2, 3), each container having a piston, wherein, after having introduced the piston (9, 10) into the container (2, 3), at least one retaining means (14, 17) with a retaining edge (A - F) is formed into the inner surface (15) of the end portion of the wall (16) of the container, in a position between the rim of the container wall (16) and the rear surface of the piston

2. A process according to claim 1, wherein said retaining edge (B) of the retaining means (14) is open and said open edge is formed in a movement which is essentialy parallel to the rear surface of the piston.

3. A cartridge according to claim 1, wherein said retaining edge (A, B) of the retaining means (17) is open and said open edge is formed in a movement which is essentialy perpendicular to the rear surface of the piston.

4. A cartridge with at least one container, each container having a piston (9, 10), assembled according to the process of claim 1, wherein the inner surface (15) of the end portion of the wall (16) of the container (2, 3) of the cartridge (1) is provided with at least one retaining means (14, 17) with a retaining edge (A - F) positioned between the rim of the container wall (16) and the rear surface of the piston (9, 10) .

5. A cartridge according to claim 4, wherein said retaining means (17) has the shape of a flap-like deformation of the container wall (16).

6. A cartridge according to claim 4, wherein said retaining edge of the retaining means (14, 17) has a rectangular (B), semi-circular (C), triangular (D) or trapezoidal (E, F) form.

7. A cartridge according any one of claim 4 to 6, further comprising a disc or ring (18) between the retaining edge (A-F) of the retaining means (14, 17) and the rear surface of the piston.

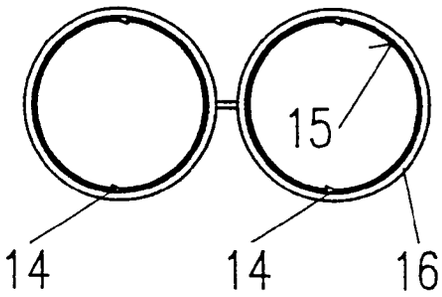


FIG. 3

FIG. 1

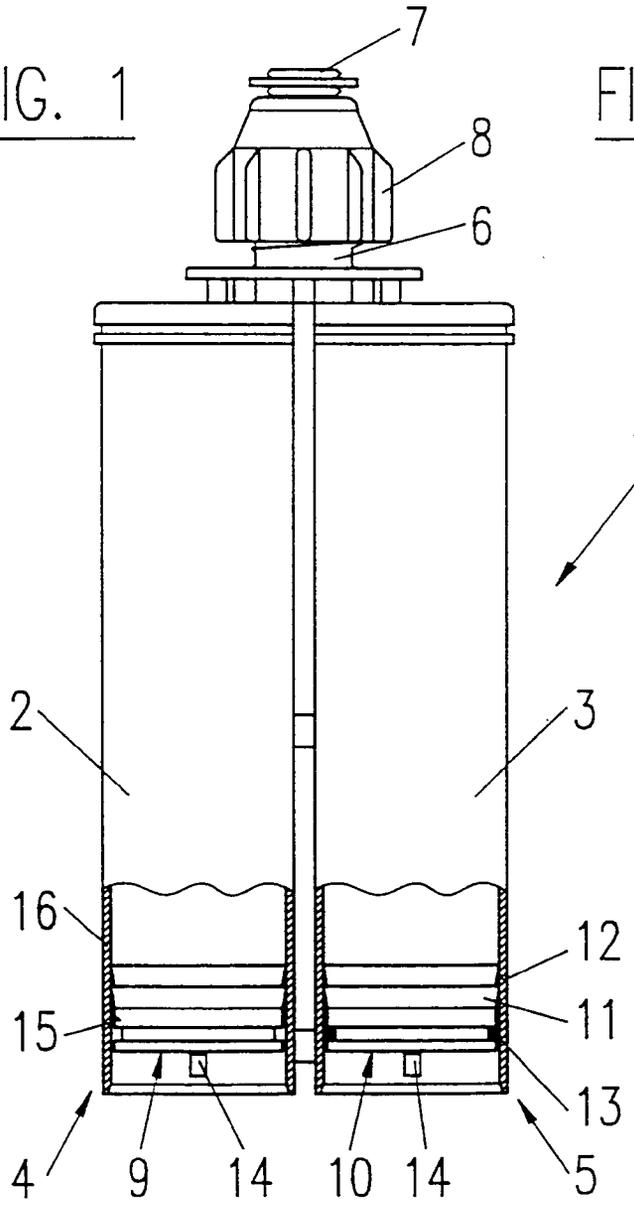
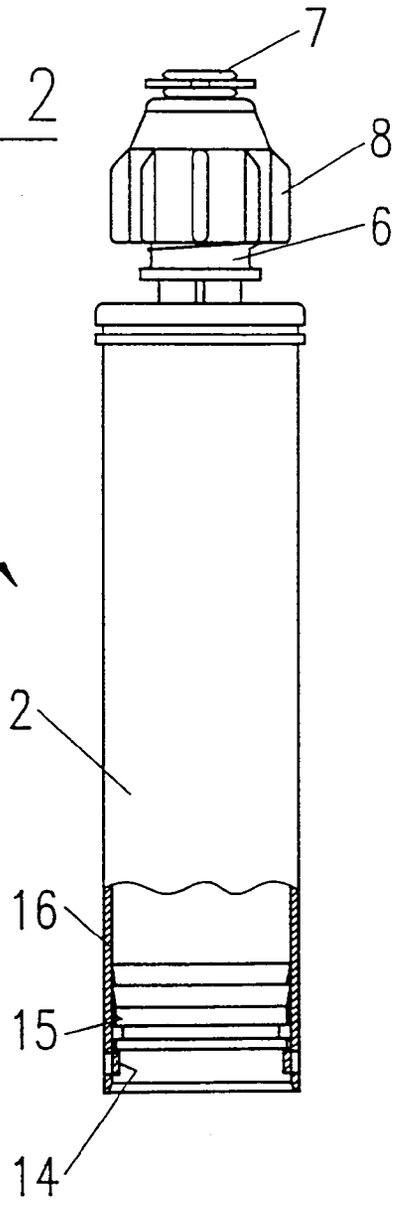


FIG. 2



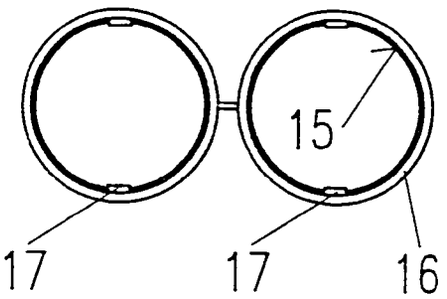


FIG. 6

FIG. 4

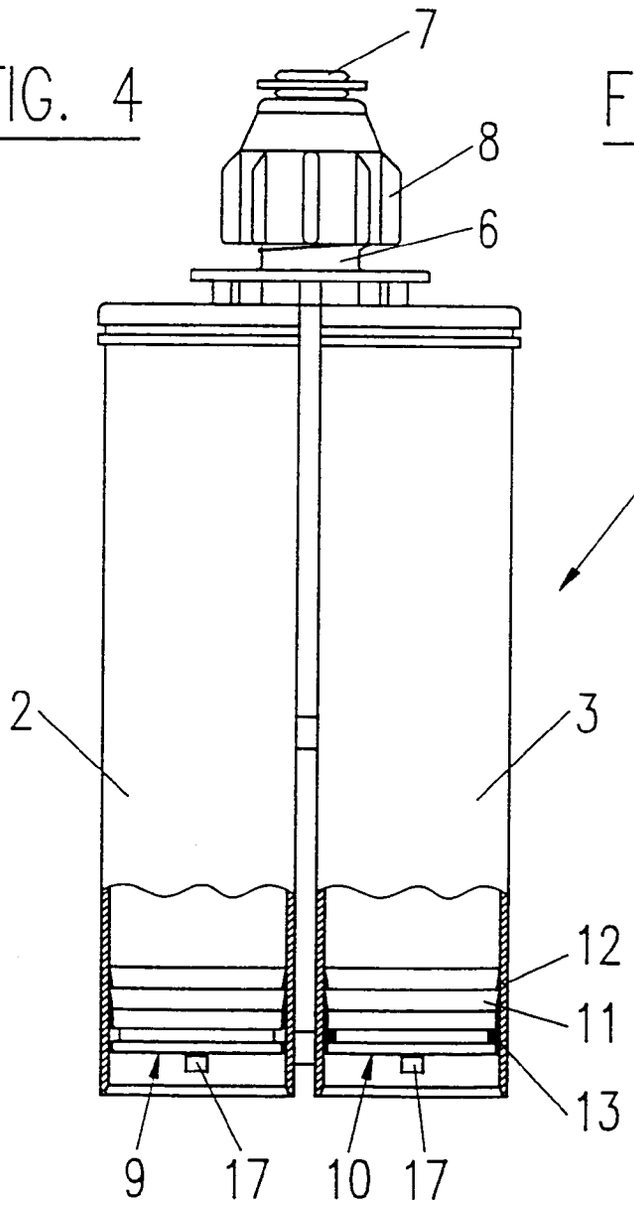


FIG. 5

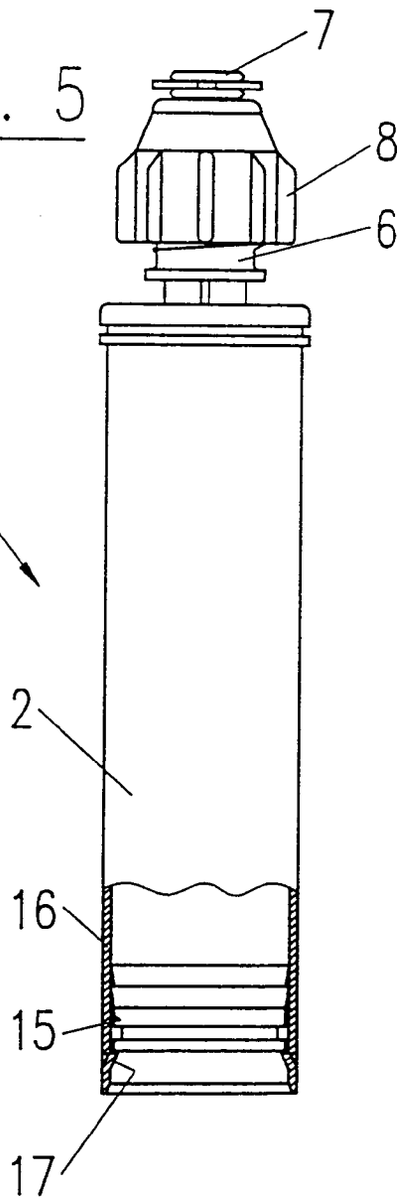


FIG. 7

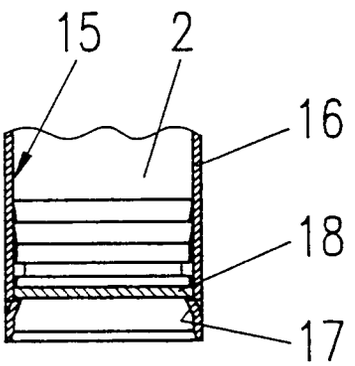
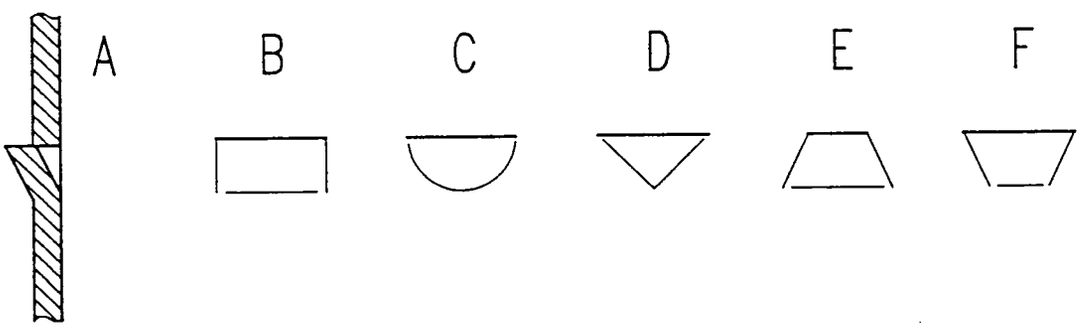


FIG. 8



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EUROPEAN SEARCH REPORT

Application Number
EP 95 81 0392

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X A	DE-U-90 06 122 (GÜNZEL) * claims 1,8; figure 1 *	1,3-6 2	B65D83/00
X A	EP-A-0 351 441 (BRÜNING) * column 3, line 11 - column 4, line 2; figure *	1,3-6 2	
X A	FR-A-2 355 727 (VOPLEX) * page 3, line 13 - page 5, line 23; figures 1-6 *	1,2,4-6 3	
X A	DE-A-22 17 071 (ALSLEBEN) * page 11, line 1 - line 13; figure 1 *	1,4,7 2,3,5	
X A	FR-A-2 350 278 (LORSCHEIDT) * page 5, line 28 - page 6, line 21; figures 1,2 *	1,4,7 2,3	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6) B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	17 October 1995	Vantomme, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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