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

(11) Publication number: **0 451 391 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **90303928.7**

(51) Int. Cl.5: **B65D 55/02**

(22) Date of filing: **11.04.90**

(43) Date of publication of application:
16.10.91 Bulletin 91/42

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IT LI LU NL SE

(71) Applicant: **NOMIX-CHIPMAN LIMITED**
Portland Building, Portland Street
Staple Hill, Bristol BS16 4PS(GB)

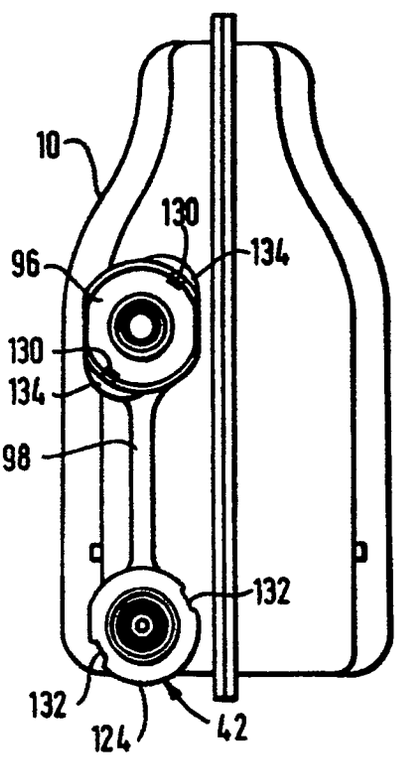
(72) Inventor: **Ali, Eren**
6 Gordon Road Clifton
Bristol BS8 1AP(GB)

(74) Representative: **Cheyne, John Robert Alexander Mackenzie et al**
HASELTINE LAKE & CO. Hazlitt House 28, Southampton Buildings Chancery Lane
London WC2A 1AT(GB)

(54) A closure.

(57) A closure, for example for use on a liquid-filled container (10) comprises a collar (42) having a flange (124). A cap (96) is attached to the collar (42) by a strap (98). The cap (96) has barbs (130), and the flange (124) has notches (132). When the cap is fitted to the collar 42, the barbs (130) engage the flange (124) to prevent removal of the cap (96). The resilience of the strap (98) tends to retain the cap (96) in a predetermined orientation about the central axis of the collar (42). In this predetermined orientation, the barbs (130) are out of alignment with the notches (132). To release the cap (96), it must first be turned, against the restoring force exerted by the strap (98), to bring the barbs (130) into line with the notches (132). The cap can then be removed by pulling on a lug (134), causing disengagement of the barbs (130) from the flange (124) at the notches (132). The manipulation of the cap (96) which is necessary before it can be removed serve to resist opening of the container (10) by, for example, young children.

FIG. 10



EP 0 451 391 A1

This invention relates to a closure with a releasable cap, and particularly, although not exclusively, to a closure for use at the outlet of a liquid container.

A closure is known which comprises a collar defining a flow passage and a cap attached to the collar by a flexible strap which, when the cap is presented to the collar, biases the cap to a predetermined orientation relative to the collar about an axis aligned with the flow passage. Such closures, however, are easily opened by children, and consequently are not suitable for use in circumstances where a child-proof closure is required.

According to the present invention, the cap engages the collar more securely in the predetermined orientation than in a release orientation.

Thus, the present invention provides a closure in which the cap needs to be turned relatively to the collar, against the restoring force of the flexible strap, to the release orientation at which removal of the cap from the collar is possible. The manipulation required means that the cap is difficult for a child to remove.

In a preferred embodiment, the release orientation is approximately 60° from the predetermined orientation.

The cap is preferably a snap fit on the collar, for example the collar may have a flange engaged by a barb on the cap. To provide the easier release of the cap in the release orientation, the flange may be notched at a position with which the barb is aligned when the cap is in the release orientation.

In order to provide for the necessary rotation of the cap relatively to the collar, the strap may have a length greater than is conventional in known closures. For example, the strap may have a length greater than the maximum diameter of the collar. The strap may be in the form of a flat strip, and the collar, the cap and the strap may be formed as a one-piece moulding.

To assist in removing the cap from the collar when in the release orientation, the cap may be provided with a lug positioned adjacent the barb.

For a better understanding of the present invention, and to show how it may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

Figure 1 shows a herbicide applicator;

Figure 2 shows a handset and herbicide container of the applicator shown in Figure 1, with the container detached from the handset;

Figure 3 corresponds to Figure 2, but shows the container fitted to the handset;

Figure 4 is a view, on an enlarged scale, of part of Figure 2;

Figure 5 is a view, on an enlarged scale, of part of Figure 3;

Figure 6 is a sectional view of an outlet fitting of the container;

Figure 7 shows the container with a cap fitted to the outlet;

Figure 8 shows the container with the cap released from the outlet;

Figure 9 is an end view of the container with the cap fitted; and

Figure 10 corresponds to Figure 9, but shows the cap removed.

Figure 1 shows a herbicide applicator having a handset 2 and a delivery head 4 which is connected to the handset 2 by a support tube 6. The delivery head 4 accommodates an electric motor (not shown) which drives a spinning disc 8.

The handset 2 receives a container 10 of herbicide, and also accommodates one or more batteries (not shown). A supply duct and electrical leads extend along the support tube 6 to supply herbicide and electrical power to the delivery head 4. A control valve 12 (Figure 2) is provided in the handset 2 for controlling the flow of herbicide from the container 10 to the delivery head 4. The valve 12 is operated by means of a trigger 14 on the handset. The trigger 14 also controls an electrical switch (not shown) for controlling the supply of electrical current to the motor in the delivery head 4.

In use, the applicator is carried by a walking operator, in order to dispense herbicide over plants, or areas of ground, to be treated. With the container 10 fitted to the handset 2, operation of the trigger 14 opens the valve 12, allowing the herbicide to flow from the container 10 to the spinning disc. Operation of the trigger 14 also actuates a switch (not shown) in the handset, so that electric current flows to the motor in the head 4, which rotates the disc 8. The herbicide is thus discharged from the disc 8 in the form of droplets.

The handset 2 and the container 10 are shown in greater detail in Figures 2 and 3. It will be appreciated from Figures 2 and 3 that the trigger 14 is provided at one end of an operating lever 16 which is pivotally connected to the body of the handset for movement about a pivot axis 18. A cranked operating rod 20 is connected at one end 22 to the lever 16 and at the other end 24 to an operating stem 26 of the valve 12. A slide 28 is provided for retaining the trigger 14 in an operating position.

The handset 2 has a recess 30 for receiving a leading end of the container 10. A latching member 32 is pivotally connected to the handset 2 and has a cam portion 34 and a detent portion 36. As the container 10 is inserted into the recess 30, a leading face of the container 10 engages the cam portion 34, causing the latching member 32 to pivot upwardly, as viewed in Figure 2, to bring the detent portion 36 into engagement with a recess 38 in the

container. The latched position is shown in Figure 3.

The valve 12 has an inlet spigot 40 which projects into the recess 30. The container 10 has an outlet fitting 42 which, when the container 10 is latched within the recess 30, engages the inlet spigot 40.

Figure 4 shows the valve 12 in the condition corresponding to Figure 2, while Figure 5 shows the valve 12 and the outlet fitting 42 in the condition corresponding to Figure 3. The valve 12 comprises a valve body 44 having an outlet 46. Within the valve body 44 there is a valve seat 48 which, in the condition shown in Figure 4, is engaged by a valve head 50 of a valve closure element 52, which thus, prevents communication between the inlet spigot 40 and the outlet 46. The valve head 50 is maintained against the valve seat 48 by a spring 54. The closure element 52 is a one-piece moulded component, for example of plastics material, comprising both the valve head 50 and the operating stem 26. The operating stem 26 extends from the valve head 50 through the valve seat 48 and through a guide passage 56 formed in a collar 58 which is set into a bore 60 in the valve body 44. A sealing ring 62 is provided between the operating stem 26 and the bore 56. A further sealing ring 64 is provided to ensure a reliable seal between the valve head 50 and the seat 48, when the valve is closed.

It will be appreciated from Figure 3 that the portion of the operating rod 20 which engages the operating stem 26 extends parallel to the movement direction of the valve element 52, the rod 20 extending in the direction from the free end of the operating stem 26 towards the valve head 50. Thus, the line of action of operating force applied to the rod 20 is in the same direction as the operating direction of the closure element 52, with the result that sideways forces are not applied to the closure element 52 during operation.

At a position away from the outlet 46, the valve body 44 has an insertion aperture 66. This insertion aperture 66 is partially closed by a plug 68, in which an inlet passage 70 is formed. The plug 68 is retained within the insertion aperture 66 by the spigot 40, which is welded, or otherwise secured, to the valve body 44. The spigot 40 is provided with a bulkhead mounting 72, by which the valve 12 is secured within the handset 2. A further partition 74 engages the outlet 46 to ensure a firm location for the valve 12.

An abutment 76 is supported within the spigot 40 by radial webs 78. At its end facing away from the valve 12, the abutment 76 has a conical recess 80.

The valve body 44 can be produced from plastics material by a moulding operation in a relatively simple manner. Thus, the insertion aperture and the part of the interior of the valve body 44 which accommodates the valve head 50 can be formed by means of a first core, the interior of the outlet 46 can be formed by means of a second core, and the bore 60 and the circumferential wall of the valve seat 48 can be formed by means of a third core. After moulding of the valve body 44, the collar 58 is inserted into the bore 60. Then the closure element 52, with the seals 62 and 64 and the spring 54 mounted on it, is inserted, operating stem 26 first, into the insertion aperture 68 in a direction generally parallel to that of the outlet. The closure element 52 can then be tilted to direct the operating stem 26 through the guide passage 56. Subsequently, the plug 68 is inserted and the spigot 40 is fitted to the valve body 44 and secured, for example by welding.

The outlet fitting 42 of the container 10 is shown in greater detail in Figure 6. The fitting 42 comprises a seat element 82 and a valve element 84, both of which are made from plastics material. The seat element 82 comprises inner and outer walls 86, 88 respectively which defines between them an annular recess 90. The inner and outer walls 86, 88 are connected together at one end by an annular web 92. This annular web 92 projects inwards beyond the inner wall 86 and terminates at a frusto conical seating face 94. At its end away from the web 92, the seal element 82 has an outwardly projecting flange 124. A cap 96 (Figures 7 to 10) is moulded integrally with the seat element 82, and is connected to the flange 124 by a strap 98.

The valve element 84 comprises a sealing body 100 which has a frusto conical sealing face 102 and a projecting pin 104. A frusto conical transitional region 103 is provided between the sealing face 102 and the pin 104. The pin 104 terminates at a conical surface 106 which is complementary to the conical recess 80 at the end of the abutment 76. The sealing body 100 is surrounded by a skirt 108 which is connected to the sealing body 100 by a cylindrical portion 112 and by five flexible straps 116, which are flexed through an angle of 180°.

As shown in Figure 5, the fitting 42 is received in a boss 118 formed on the end of the container 10. At its inner end, the boss 118 terminates at a shoulder 120 against which abuts the transition between the skirt 108 and the cylindrical portion 112. The outer wall 88 of the seat element 82 is received within the skirt 108, and the seat element 82 is secured within the boss 118, for example by welding.

As shown in Figure 6, the seating face 94 of the seat element 82 engages the sealing face 102 of the sealing body 100, and deflects the sealing

body 100 slightly to the left relatively to the unstressed configuration of the valve element 84. Thus, the sealing body 100 is biassed into contact with the seating face 94 by the resilience of the flexible straps 116. Consequently, the fitting 42 normally prevents outflow of the contents of the container 10. However, as shown in Figure 5, insertion of the container 10 into the recess 30 in the handset 2 results in contact between the conical surface 106 of the pin 104 and the conical recess 80 of the abutment 76. This causes the sealing face 102 to be retracted, against the resilient force applied by the flexible straps 116, away from the seating face 94, permitting flow through the fitting 42, via the gaps between the straps 116. Removal of the container 10 from the recess 30 results in the automatic closing of the valve constituted by the sealing body 100 and the seat element 82.

It will be appreciated from Figure 5 that, as the fitting 42 moves towards the spigot 40, the extreme end of the spigot 40 will initially enter the annular recess 90 in a sealing-tight manner before the pin 104 engages the abutment 76. Consequently, no flow will take place through the fitting 42 before the spigot 40 and the fitting 42 have made sealing engagement with each other. Also, because the pin 104 is accommodated within the inner wall 86 of the seat element 82, and because the surface 106 is conical, accidental opening of the valve in the fitting 42 is avoided. Furthermore, the valve within the fitting 42 has a degree of child resistance. Any attempt by a child to push the pin 104 inwards by finger pressure will be painful as a consequence of the point at the end of the conical surface 106. Similarly, the provision of the conical surface prevents operation of the valve by an implement such as a pencil, since the implement will merely slide sideways off the conical surface 106.

Further resistance to accidental spillage of the contents of the container 10 is achieved by the cap 96. As shown in Figures 7 and 8, the cap 96 comprises an outer skirt 122 for engagement over a flange 124 of the seat element 82, an intermediate skirt 126 for engagement in the annular recess 90, and an inner skirt 128 for engagement with the inner surface of the inner wall 86. Consequently, when the cap is fitted, as shown in Figure 7, secure sealing engagement with the fitting 42 is made.

The outer skirt 122 is provided with two oppositely disposed barbs 143. The flange 124 of the seating element 82 has two corresponding oppositely disposed notches 132. As will be appreciated from Figure 10, the barbs 130 and the notches 132 do not coincide respectively with one another when the cap is placed over the fitting 42 in a manner which creates least torsional stress in the strap 98 about the axis of the fitting 42. Nevertheless, in this position of lease torsional stress, the cap can be snapped over the fitting 42, with the barbs 130 engaging the flange 124.

The barbs 130 engage the flange 124 sufficiently firmly in this position to prevent removal of the cap from the fitting 42. To remove the cap 96, it must first be rotated relatively to the container 10 in the direction of the arrow A in Figure 9 until the barbs 130 coincide with the notches 132. Even in this position, the barbs 130 still engage beneath the flange 124, but the reduced extent of the flange 124 at the notches 132 makes it possible to disengage the barbs 130, one at a time, by pulling outwardly on lugs 134 on the cap 96.

It will be appreciated that rotation of the cap 96 in the direction of the arrow A will induce torsional stress in the strap 98, so as to resist such turning. This factor, combined with the need to align the barbs 130 correctly with the notches 132, improves the resistance of the cap to opening by children.

Containers 10 of herbicide for use with the applicator shown in Figure 1 will be supplied with the cap 96 fitted, and possibly retained in place by some auxiliary means, such as adhesive tape. The operator then removes the cap by rotating it in the direction A as shown in Figure 9 until the barbs 130 are aligned with the notches 132, and then pulls off the cap by tugging on one or other of the lugs 134. Even though the cap is removed, flow from the container 10 is still prevented by the valve provided in the fitting 42.

With the cap 96 removed, the container is inserted into the recess 30 in the handset, as shown in Figure 2. This causes the end of the spigot 40 to enter the annular recess 90, so creating a seal between the fitting 42 and the spigot 40. After the creation of this seal, the abutment 76 is engaged by the pin 104, and subsequent movement of the container 10 to the fully engaged position in the handset 2 causes the sealing body 100 to be displaced from the seating face 94, permitting flow from the container 10 through the spigot 40 to the valve 12.

When the container 10 is inserted into the recess 30, the cap is accommodated within a clearance provided between the front face of the container 10 and an adjacent wall of the recess 30, as shown in Figure 3.

For operation, the operator depresses the trigger 14, so energising the motor in the delivery head 4 and, via the lever 16 and the operating rod 20, opening the valve 12. Flow of herbicide then takes place through the valve 12 to the outlet 46, and thence, through the supply duct in the support tube 6, to the distribution head 4.

When a treatment operation is completed and the trigger 14 released to close the valve 12, the container 10 is ejected from the handset 2 by lowering the latching member 32 to the position

shown in Figure 2. The resulting movement of the cam 34 pushes the container 10 away from the valve 12, so disengaging the pin 104 from the abutment 76, and finally disengaging the spigot 40 from the annular recess 90. During this operation, the sealing body 100 is returned, under the resilient forces applied by the flexible membrane 110, into sealing engagement with the seating face 94, so preventing further flow from the container 10. Added safety is then achieved by refitting the cap 96 by merely snapping it over the flange 124.

Claims

1. A closure comprising a collar (42) defining a flow passage and a cap (96) attached to the collar (42) by a flexible strap (98) which, when the cap (96) is presented to the collar (42) biases the cap (96) to a predetermined orientation relative to the collar (42) about an axis aligned with the flow passage,
characterised in that the cap (96) engages the collar (42) more securely in the predetermined orientation than in a release orientation.

2. A closure as claimed in claim 1, characterised in that the release orientation is offset from the predetermined orientation by approximately 60°.

3. A closure as claimed in claim 1 or 2, characterised in that the cap (96) is a snap fit on the collar (42).

4. A closure as claimed in claim 3, characterised in that the collar (42) has a flange (124) which is engaged by a barb (130) on the cap (96).

5. A closure as claimed in claim 4, characterised in that the flange (124) is notched (132) at a position adjacent the barb (130) when the cap (96) is in the release orientation.

6. A closure as claimed in any one of the preceding claims, characterised in that the strap (98) has a length greater than the maximum diameter of the collar (42).

7. A closure as claimed in any one of the preceding claims, characterised in that the strap (98) comprises a flat strip.

8. A closure as claimed in any one of the preceding claims, characterised in that the cap has a projecting lug (134) adjacent the barb (130).

9. A liquid-filled container provided with a closure in accordance with any one of the preceding claims.

FIG.1

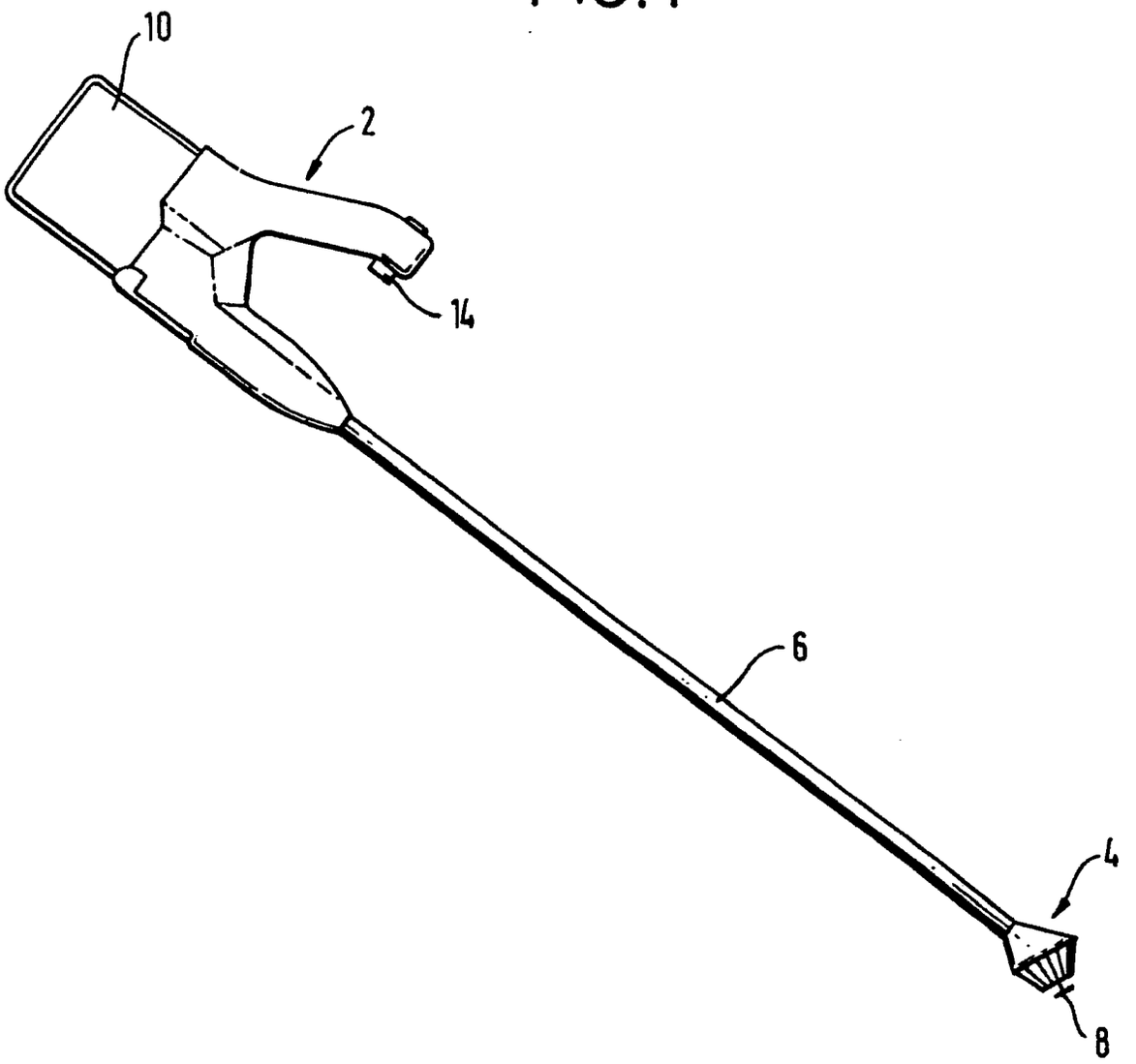
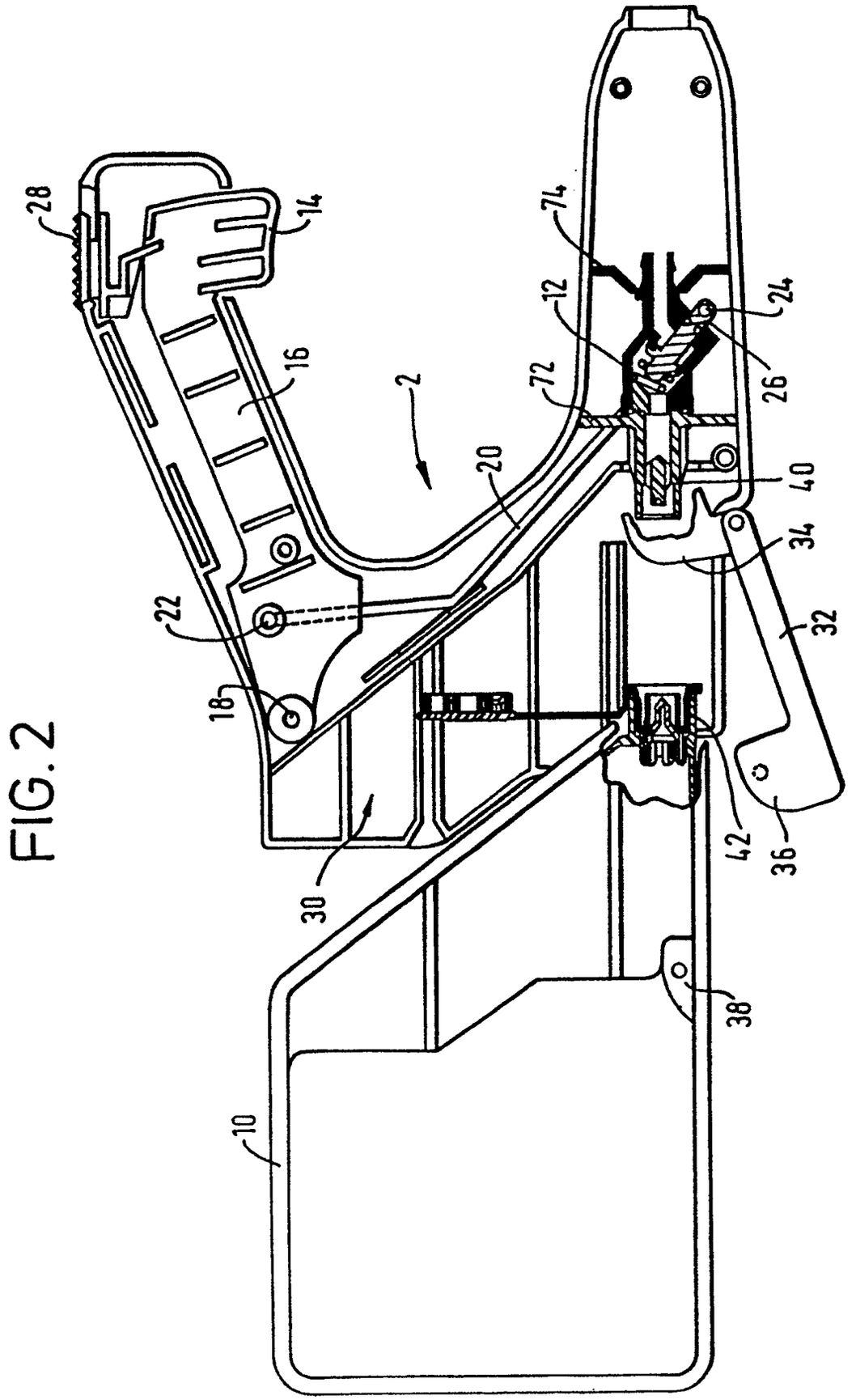


FIG. 2



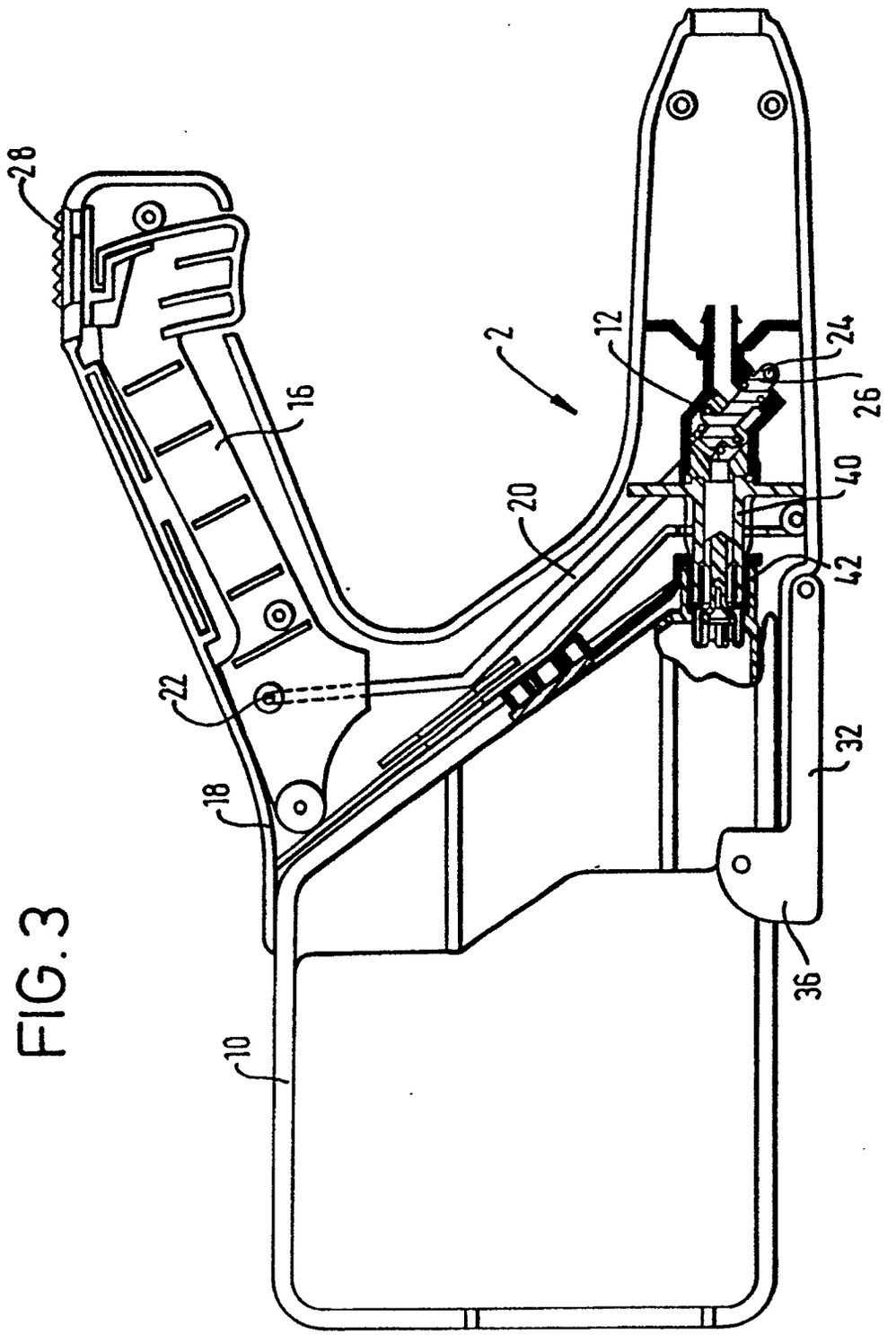


FIG.3

FIG. 4

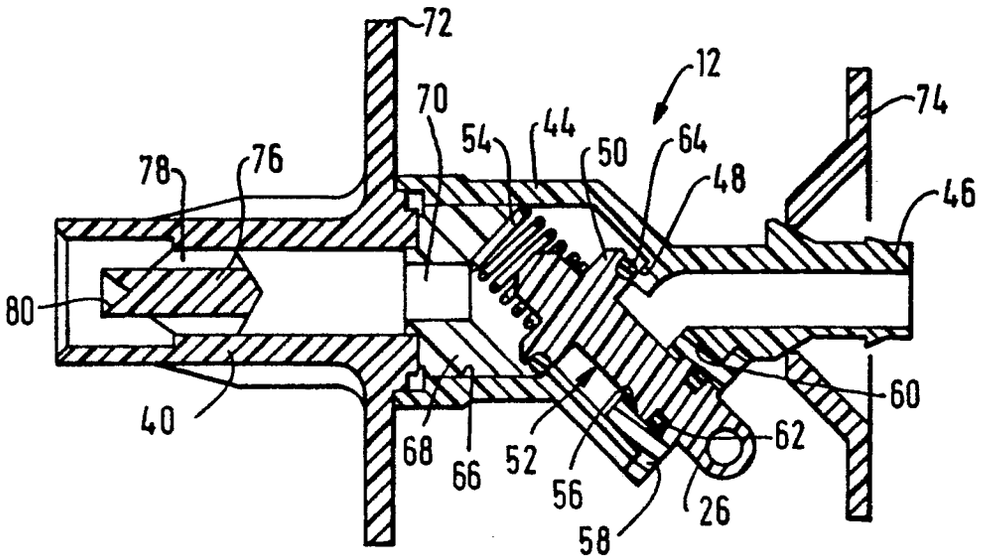

72
12
70
74
54
44
50
64
78
76
48
46
80
60
40
62
68
66
52
56
26
58

FIG. 5

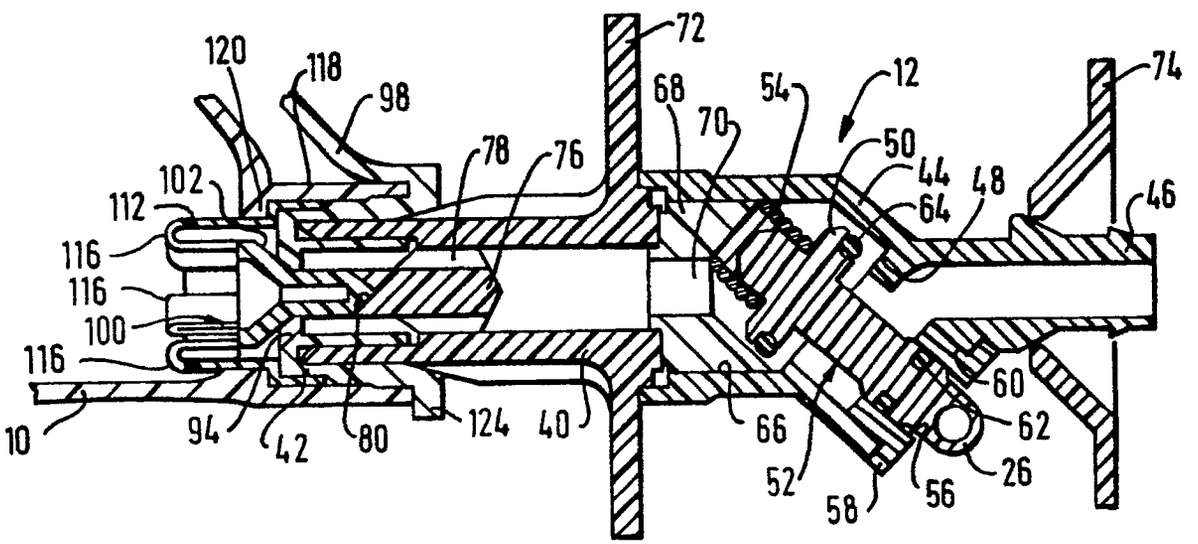

120
118
72
98
68
54
12
74
78
76
70
50
102
44
48
112
64
46
116
116
100
116
60
62
10
94
42
80
124
40
66
52
58
56
26

FIG.6

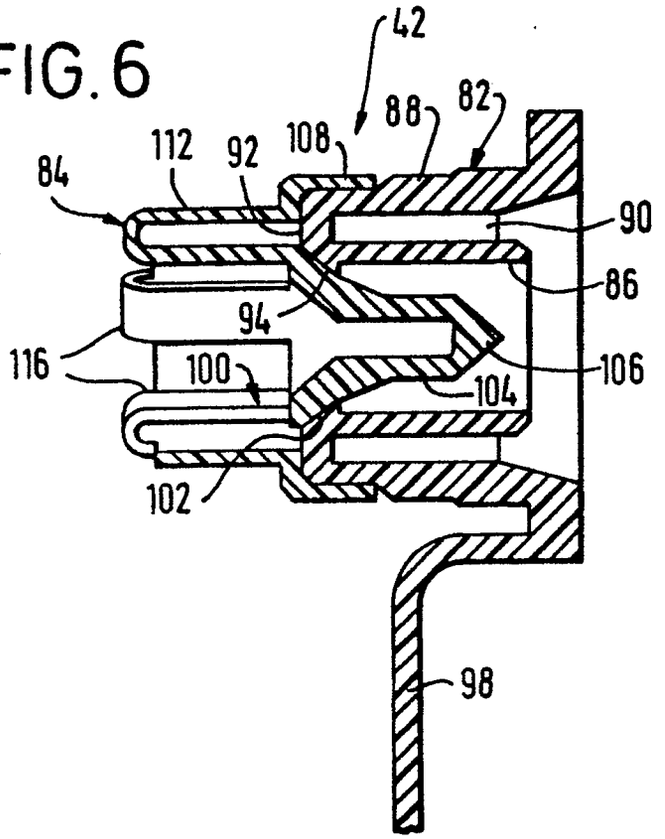


FIG.9

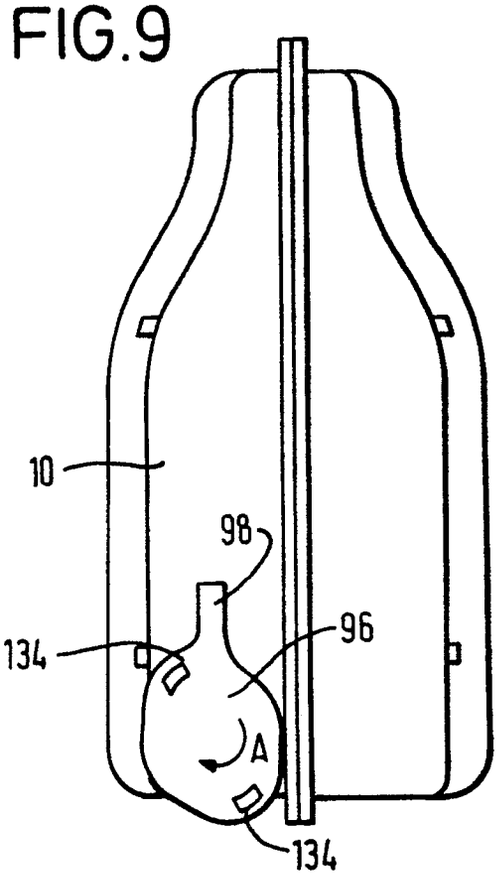


FIG.10

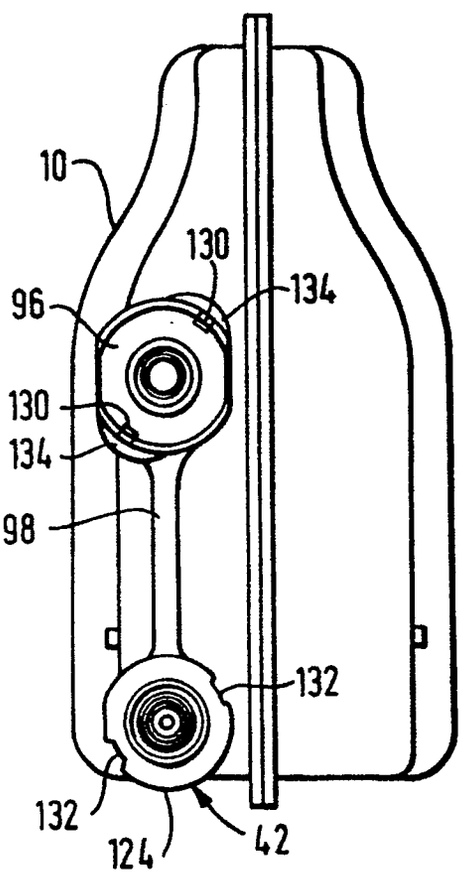


FIG. 7

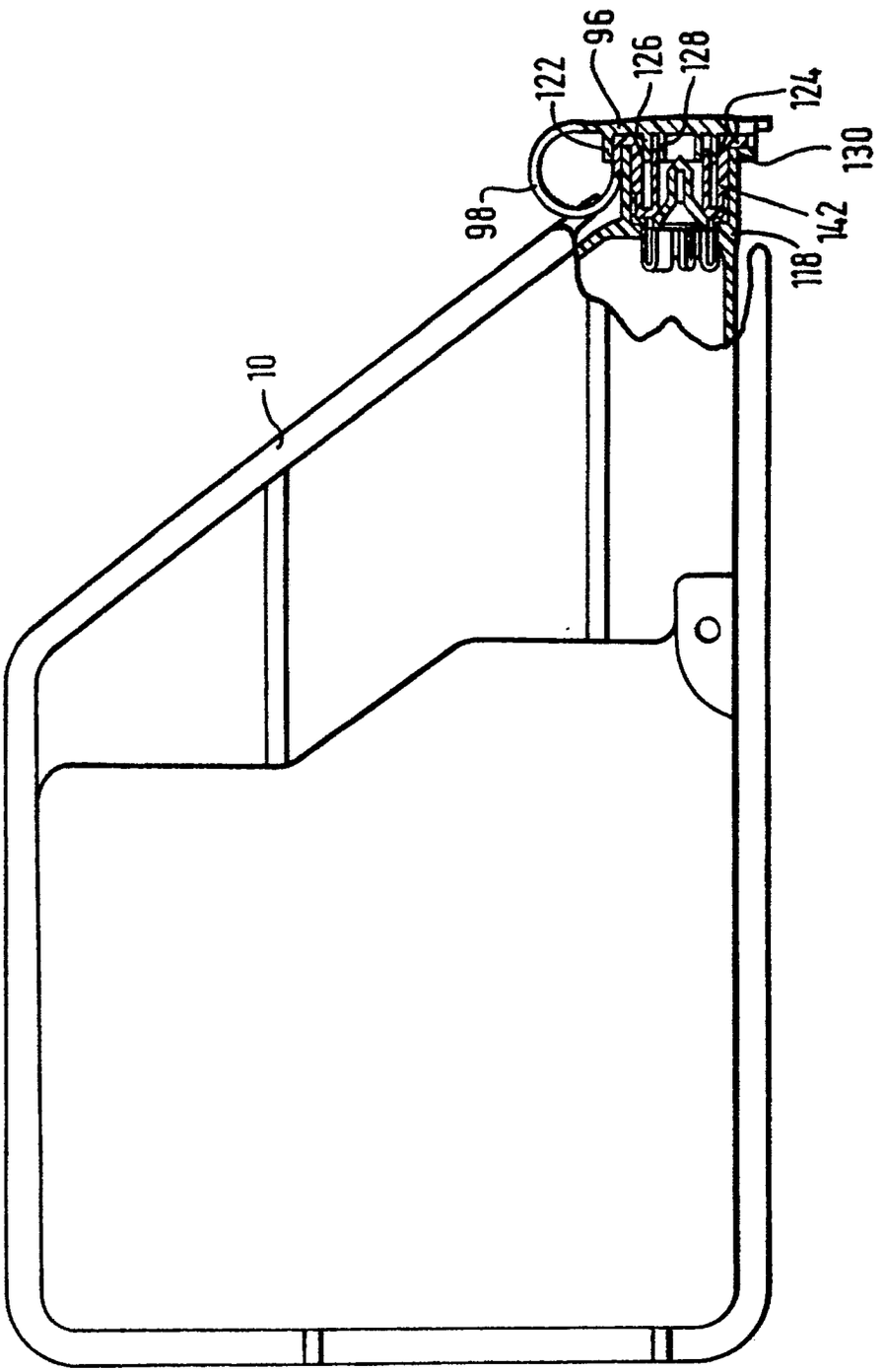
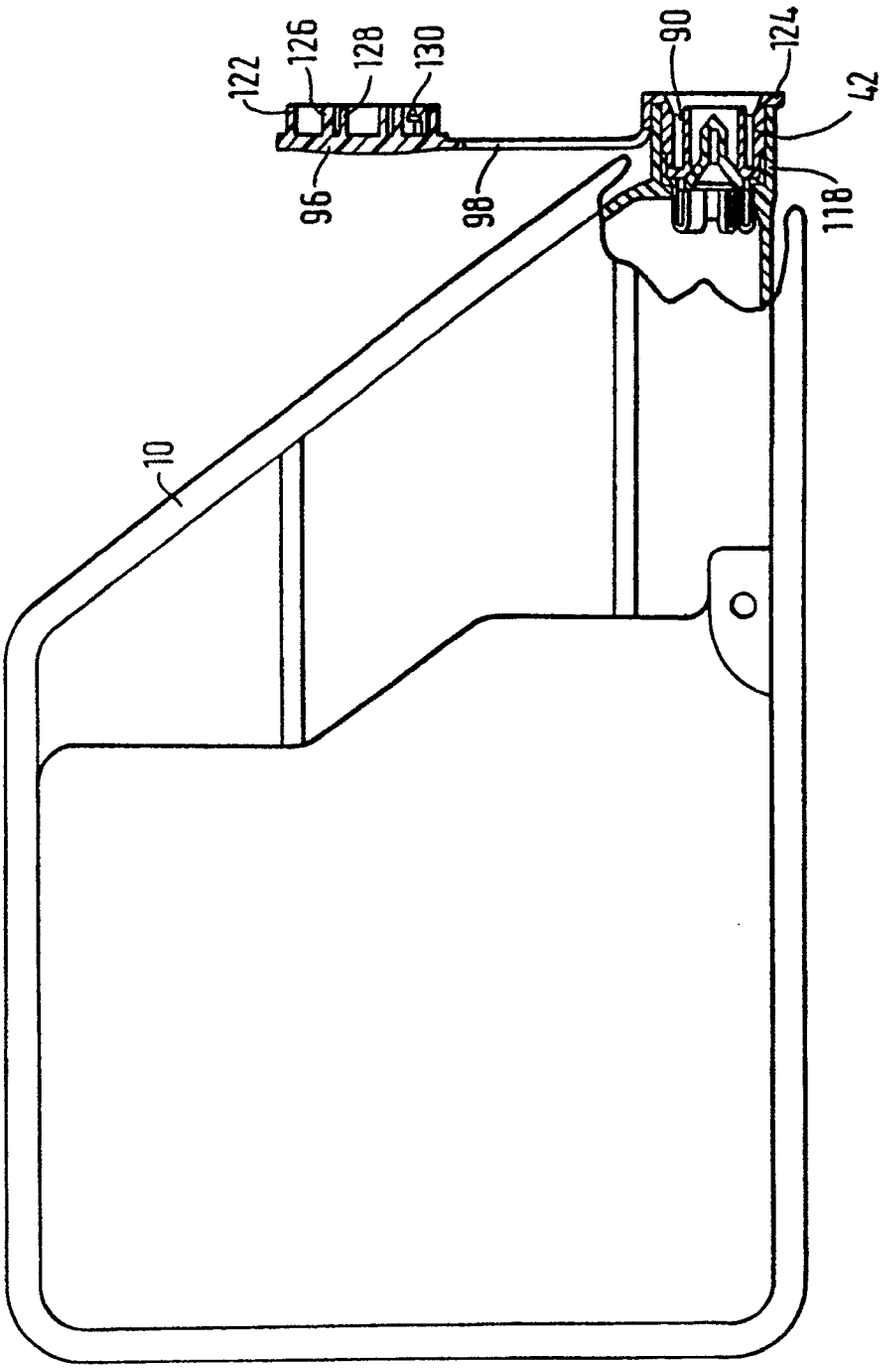


FIG.8



European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 30 3928

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-4 002 275 (CROWLE) * Column 3, line 3 - column 5, line 11; figures 1-6 *	1,2,3,6,7, 9	B 65 D 55/02
Y		4,5,8	
X	US-A-4 334 639 (GACH) * Column 2, line 50 - column 4, line 9; figures 1-8 *	1,2,3,7,9	
Y	US-A-3 812 989 (HORVATH) * Column 2, lines 39-68; column 4, lines 58-66; figure *	4,5,8	
A	US-A-3 765 578 (STULL)		
A	GB-A-2 138 780 (SUNBEAM)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)
B 65 D

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	24 May 91	MARTENS L.G.R.

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
Y: particularly relevant if combined with another document of the same catagory
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention

E: earlier patent document, but published on, or after the filing date
D: document cited in the application
L: document cited for other reasons

&: member of the same patent family, corresponding document