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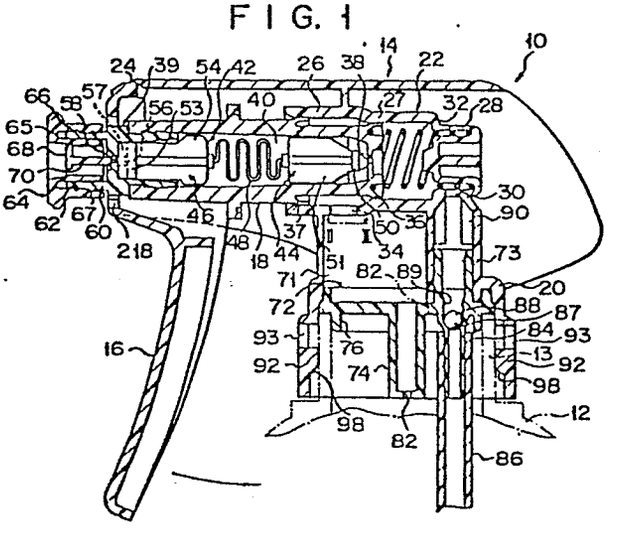
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(54) Manually operated trigger type dispenser.

(57) The dispenser piston (18) has a pair of spaced apart, annular seals (36, 37), which contact the inner wall of the cylinder (22) in a liquid-tight relation. A first vent (34) extending axially of the cylinder (22) and communicating with the interior of the container (12) from which liquid is dispensed is formed in the cylinder (22). When the piston (18) is in the at rest position, the vent (34) communicates with the space defined between the seals (36, 37) and the cylinder (22), and when the piston (18) is in the dispensing position the vent (34) communicates with the atmospheric air to prevent negative pressure being created in the container (12). A circular member (72) for suppressing liquid leakage through the vent (34) is fitted in the container cap (20) and defines a chamber (71). A second vent (82) is formed in the suppressing member (72).

FIG. 1



MANUALLY OPERATED TRIGGER TYPE DISPENSER

This invention relates to a manually operated trigger type dispenser which is adapted to be detachably attached to a liquid container by means of a cap and comprises a piston coupled to a trigger operation of which causes the piston to reciprocate in a cylinder so as to pump up the liquid into the cylinder from the container through a suction tube and compress the liquid and dispense it.

In such a dispenser, liquid suction from the container into the cylinder lowers the liquid level in the container to which the dispenser is attached. Lowering the liquid level creates negative pressure in the container. While the negative pressure state continues, the liquid suction may become impossible. There are many trigger type dispensers designed to prevent negative pressure from building up in the container by supplying atmospheric air into the container according to the pumping action of the piston. For example, the dispenser disclosed in U.S. Patent No. 3,897,006 comprises a piston and an actuator integrated together. Here, when the piston is pushed, the actuator presses a seal member to open a vent. As a result, atmospheric air flows into a container through the vent.

Japanese Utility Model Publication 52-11686 teaches another type which comprises a venting cylinder and a venting piston for preventing negative pressure building up in the container. Pushing the venting piston introduces the air into the container through the venting cylinder. In this dispenser, another piston is integrally formed on the venting

piston and a main body of the dispenser is integrally formed on the venting cylinder.

Because of the integral assembly the pistons and the main bodies of both of the conventional dispensers have complex structures, which makes it difficult to mold these components.

A further type of dispenser is also known in which a pair of spaced apart, annular seals, which contact the inner wall of a cylinder in a liquid-tight relation, are integrally formed on the peripheral surface of the piston, and a vent communicating with the interior of a container is formed in the cylinder. U.S. Patent No. 4,072,252 and U.S. Patent No. 4,365,751 teach such a dispenser. In this type of dispenser, when the trigger is in the at rest position, the vent communicates with the space defined between the seals and the inner wall of the cylinder, and the interior of the container does not communicate with the atomospheric air. But, when the piston is pushed into the cylinder to such an extent that the outer seal moves beyond the vent in the cylinder, communication is provided between the interior of the container and the atmospheric air, thus introducing the air into the container. This arrangement can prevent negative pressure from building up in the container without complicating the structures of the piston and of the main body of the dispenser.

However, in the conventional trigger type dispensers, the vent for negative-pressure prevention is provided on the piston and above the cap, and no means for suppressing liquid leakage through the vent exists between the vent and the container. Therefore, when the piston of the dispenser is pushed into the cylinder with the container tilted, the liquid in the

container may easily reach the opened vent. This will result in some of the liquid leaking from the vent. In addition, because the trigger is located ajdacent to the vent, the leaking liquid may drop onto an operator's hand holding the trigger. Such a liquid leakage is undesirable, especially when the liquid is poisonous or is difficult to clean off, therefore, in this case, the dispenser is preferably not tilted in a spraying operation.

Moreover, the dispenser is attached to the container at its neck portion so that the container extends downward from the dispenser. Thus, when the trigger is pulled, the container may be swung round which probably results in liquid leakage from the vent. In other words, liquid leakage will occur not only when tilting the container to dispense liquid downwardly but also by the possible swinging of the container out of its straight down position.

To help in overcoming this problem of leakage whilst still preventing negative pressure from building up in a container, the present invention proposes that in the type of dispenser which uses a pair of spaced apart annular seals, means for suppressing liquid leakage is fitted in the dispenser cap so that a chamber is defined by the suppressing means, the cap and the cylinder. A second vent is then formed in the suppressing means so as to communicate with the chamber.

With the above arrangement, the suppressing means shields off the liquid, coming out of the container when the piston is pushed with the container being tilted, so the liquid does not immediately reach the first vent. When the liquid reaches the second vent, the liquid flows through the second vent into the chamber defined between the first and second vents and only then

may reach the first vent through which the liquid can leak. In this manner, this invention can effectively suppress liquid leakage when the container is tilted, so that ordinary swinging of the container in an untilted position does not result in liquid leakage.

In the above structure, liquid leakage may be further suppressed by extending a cylindrical portion downward from the suppressing means and forming the second vent in this cylindrical portion. If the cylindrical portion is provided at the center of the suppressing means, it can be used as a holder when automatically assembling the suppressing means in the dispenser, thus facilitating the automatic assembling process of the suppressing means. Furthermore, because the suppressing means is disposed in the cap, provision of a valve seat for a primary valve in the suppressing means can eliminate the need to provide the valve seat for the primary valve in the main body of the dispenser. This simplifies the construction of the main body of the dispenser.

Some ways of carrying out the present invention will now be described in detail by way of example, and not by way of limitation, with reference to drawings showing two specific embodiments of the present invention. In the drawings:

FIG. 1 is a cross-sectional view of a foamer in which a trigger type dispenser according to the first embodiment of this invention is embodied, with its piston being in the at rest position;

FIG. 2 is a bottom plan view of a first vent;

FIG. 3 is a front elevational view of the trigger type dispenser;

FIGS. 4 and 5 are partially cutaway, perspective views showing the interior and exterior of a cap, respectively;

FIG. 6 is a perspective view of a neck portion of a container;

FIG. 7 is a cross-sectional view of the foamer shown in Fig. 1 with the piston in the dispensing position;

FIG. 8 is a cross-sectional view of a sprayer in which a trigger type dispenser according to the second embodiment of this invention is embodied;

FIG. 9 is a front elevational view of a nozzle; and

FIG. 10 is a rear elevational view of a nozzle cap.

As shown in Fig. 1, a trigger type dispenser 10 according to the first embodiment of this invention, which is embodied in a foamer, comprises a main body 14 detachably mounted on a container 12 containing liquid, and a piston 18 which reciprocates in accordance with the movment of a trigger 16. The main body 14 has a cap 20 and a cylinder 22 integrally formed and is made as an injection molding of plastics material. The cap 20 is detachably mounted on a neck portion 13 of the container 12, and the piston 18 slides inside the cylinder 22. The trigger 16 is hingeably integrally formed on the main body 14 at the front, upper portion of the main body through a thin plastics hinge 24. Conventionally, the main body includes only a cylinder, and a cap and the trigger is a separate member, whereas in this embodiment the main body 14 includes all of the cylinder, cap and trigger integrally formed. This integrated assembly reduces the number of separate members, and can thus facilitate the assembly process and reduce the cost of the dispensers.

The cylinder 22 has a stepped shape with a larger diameter portion 26 and a smaller diameter portion 27 at

the rear portion of which a narrow section 28 is provided. A vent is formed below narrow section 28. A compression coil spring 32 is located between the distal end of the piston 18 and the narrow section 28 to hold the piston 18 in its at rest position. An elongated vent 34 (see Fig. 2), extending axially of the cylinder 22, is formed in the larger diameter portion 26 of the cylinder to serve as a first vent, which will be described later.

The piston 18 includes a pair of flared seals 36, 37 axially spaced apart from each other, at the outer periphery. The seal 37 slides along the inner wall of the larger diameter portion 26 of the cylinder 22, and the seal 36 slides along the inner wall of the smaller diameter portion 27 of the cylinder. The shapes of those seals are not limited only to flared shapes, but may be modified in various shapes as long as they assure a liquid-tight condition. The piston 18 is cylindrical, and includes a vent 38 formed in its bottom and an opening in which a nozzle 39 is fitted. A spinner assembly 42 is disposed in a liquid flow passage 40 formed in the piston 18. In this embodiment, the piston 18 and the cylinder 22 have stepped shapes, but they may be shaped to have no stepped portions.

The spinner assembly 42 includes a secondary valve 44 which can close vent 38 in the bottom of the piston 18, a spinner 46 abutting on the rear surface of the nozzle 39, a wave-shaped compression coil spring 48 disposed between the secondary valve and the spinner. These components of the spinner assembly 42 are integrally formed of plastics. This integrated assembly reduces the number of separate members, and simplifies the assembly structure, and facilitates the assembly process. The spring 48 forces the secondary valve 44 to close vent 38 and also forces the spinner 46 to abut on the rear surface of the nozzle 39.

The secondary valve 44 has a valve main body 50

with a circular cross section, which can close the vent 38 of the piston 18, and a guiding section 51 consisting of four wings extending in radial directions. The spinner 46 has a disk-shaped spinner main body 53 and a guiding section 54 consisting of four wings that extend in radial directions. The winged guiding sections 51, 54 permit smooth liquid flow in the passage 40. The spinner main body 53 has a circular recess 58 at its outer section and a pair of parallel passages 57 extending in tangential directions from the recess. In such a spinner, when liquid flows into the recess 56 through the passages 57 from the passage 40, the liquid swirls and is sprayed through an orifice 58 of the nozzle 39.

The nozzle 39 includes a cylindrical projection 60, which extends outward and has a pair of slits formed therein so that the cylindrical projection can be deformed in radial directions. An annular engaging member 62 is formed at the front, outer surface of the projection 60.

A nozzle cap 64 is slidably attached on the cylindrical projection 60 of the nozzle 39. The nozzle cap 64 includes an annular groove 65 into which the cylindrical projection 60 is fitted. A pair of annular engaging holes 66, 67 are formed in the nozzle cap 64 to be engaged with the annular engaging member 62 of the nozzle 39. Of course, the engaging member 62 and engaging holes 66, 67 are not limited to be of annular type, but may have other shapes. The nozzle cap 64 has three barriers 68 (see Fig. 3), which are spaced apart 120° from one another and extend in radial directions. A rod 70 extends toward the nozzle 39 from the jointed section of the barriers 68 and has the distal end shaped to close the orifice 58 of the nozzle 39 in a fit-in position of the nozzle cap 64 where the engaging member 62 engages with the engaging hole 66, as shown in Fig. 1.

A circular suppressing means 72 is fitted into

the cap 20 integrally formed on the main body 14, and defines, with the cap and the cylinder 22, a chamber 71 therebetween. The suppressing means 72 includes a section 73, which extends upward and is fitted into the main body 14, and has at its central portion a cylindrical section 74, which has a bottom and extends downward. The suppressing means 72 further includes a holding section 76 at its ends, which extends downward and holds the neck portion 13 of the container 12 between the holding section and the inner wall of the cap 20. A vent 82 is formed in the bottom of the cylindrical section 74 and serves as a second vent. The suppressing means 72 also includes another extending section 84 onto which a suction tube 86 is fitted. The middle section of extending section 84 has a larger diameter than the other part and forms a valve seat 87. At this middle section is disposed a primary valve 88. To keep primary valve 82 in its proper position, valve stoppers 89 are formed in the suppressing means 72 above the primary valve 88. As an auxiliary valve stopper, ribs 90 are disposed in the main body 14.

Generally, in conventional dispensers, the cap is threaded so that it can be screwed onto the neck portion of the container. In this embodiment, however, the cap 20 is not threaded; it is attached to the neck portion 13 of the container 12 by two pairs of engaging projections. Namely, a pair of engaging projections 92, extending in a circumferential direction, are formed on the inner wall of the cap 20, 180° apart from each other as shown in Figs. 1, 4 and 5. Rectangular windows 93 are formed in the inner wall of the cap 20 above the engaging projections 92. These rectangular windows are provided for the injection molding of the engaging projections 92. A pair of engaging projections 94 are formed on the outer wall of the neck portion 13 of the container 12, as shown in Fig. 6. In this embodiment, the engaging projections 94 have

right-rotated L-shapes, however, they can have left-rotated L-shapes instead.

The cap 20 of main body 14 is mounted to the neck portion 13 of the container 12 as follows. First, the cap 20 is pushed onto the neck portion 13 with the engaging projections 92 being out of alignment with the corresponding engaging projections 94. Then, the cap 20 is rotated in the direction as to permit the engaging projections 92 of the cap 20 to slide under the engaging projections 94 of the neck portion 13. When the cap 20 is rotated to such an extent that the engaging projections 92 abut on the bases 95 of the engaging projections 94, the cap can be mounted to the neck portion 13 of the container 12. At this time, the engaging projections 92 slid under the engaging projections 94 and held there as indicated by the one-dot chain line shown in Fig. 6. Once held in appropriate positions, the engaging projections 92 abut, at their top surfaces, on the bottom surfaces of the engaging projections 94. This restricts the movement of the engaging projections 92 in axial directions and forces the sides of engaging projections 92 to abut on the bases 95 of the engaging projections 94, i.e., those portions of engaging projections 94 which extend in axial directions. As a result, the movement of the engaging projections 92 in circumferential directions will be restricted. To prevent the container 12 from falling off, it is desirable to provide a semicircular protruding section at the bottom surface of each of engaging projections 94. Such a structure facilitates the process for molding the cap 20 as compared with the conventional threaded structure. In addition, it is easy that the dispenser 10 is mounted to the neck portion 13 of the container 12 and it simplifies the assembling process. Instead or using the engaging projections 92, 94, either the cap 20 or the neck portion 13 of the container 12 may be provided with engaging

projections, and the other one with engaging holes. Because a slope 98 is formed at the bottom surface of each engaging projection 92, pressing the cap 20 down, with the engaging projection 92 being aligned with the engaging projections 94, causes the slope to slide on the engaging projections 94 until the engaging projections 92 come under the engaging projections 94. The use of the slope 98 can further simplify the assembly process.

As seen from Fig. 3, the movement of the trigger 16 is restricted by providing a pair of engaging projections 100 on the inner wall of the main body 14 and providing another pair of engaging projections 102 on the inner wall of the trigger 16. The piston 18 is pressed in the direction away from the cylinder 22 by the biasing force of the compression coil spring 32. The at rest position of the piston 18 is limited by mating the engaging projections 100 with the other projections 102 as shown in Fig. 3. That is, the movement of trigger 16 in the direction opposite to the arrow shown in Fig. 1 can be restricted by the engagement of the engaging projections 100, 102. Needless to say, the trigger 16 is free to move in the direction of the arrow (see Fig. 1) or in the direction toward the cylinder 22.

The trigger type dispenser having the above-described structure will be operated as follows.

First, in the at rest position of the piston 18 as shown in Fig. 1, the nozzle cap 64 is pulled out to mate the engaging projection 62 of the nozzle with the engaging window 67 on the nozzle cap (see Fig. 7). When the trigger 16 is actuated in the arrow direction against the biasing force of the spring 32 and then released, the trigger is forced back in the direction opposite to the arrow by the spring 32. This increases the volume inside the cylinder 22 and thus creates negative pressure. The negative pressure in the cylinder 22 forces the primary valve 88

out of the valve seat 87 against the force of gravity, thus opening the primary valve. The negative pressure created in the cylinder 22 sucks up the liquid in the container 78 through the suction tube 86 and the primary valve 88 into the cylinder. When the cylinder 22 is filled with the liquid, the primary valve 88 is pressed down onto the valve seat 87 and is closed.

When the trigger 16 is actuated again in the arrow direction, the piston 18 is plunged into the cylinder 22 as shown in Fig. 7. This movement of the piston 18 toward the dispensing position gradually increases the pressure of the liquid in the cylinder 22, which affects the secondary valve 44 that closes the vent 38. When the liquid pressure on the secondary valve 44 becomes greater than the biasing force of the spring 48, the secondary valve 44 is separated from its valve seat and is opened. When the secondary valve 44 is opened, the pressurized liquid flows into the passage 40 of the piston 18 through the secondary valve 44, and swirls by the spinner 46 and finally flows out from the orifice 58. But, because of the barriers 68 of the nozzle cap 64 which is located in front of the orifice 58, the pressurized liquid hits the barriers and is then mixed with air to become foam.

When the liquid is sucked up into the cylinder 22 from the container 12 and is discharged as foam, negative pressure is created in the container. But, when the piston 18 is in the dispensing position as shown in Fig. 7, the outer seal 37 formed on the piston 18 is located above the first vent 34 so that the interior of container 12 communicates with the atmospheric air. Therefore, the air comes inside the container 12 through the first and second vents 34, 82, thus getting rid of the negative pressure created.

In the above situation, however, as the air can flow into the container 12 through the vents 34, 82, the

liquid in the container can also flow out through the same vents. Consequently, when the trigger 16 is actuated with the container 12 being tilted, or when the container swings and tilts upon actuation of the trigger, the liquid may leak from the container.

However, even when the container 12 is tilted, the suppressing means 72 stops the liquid and prevents immediate liquid leakage, thus suppressing the liquid leakage. In other words, when the container 12 tilts, the liquid inside the container is stopped by the suppressing means 72, so the liquid leakage can be completely prevented until the liquid level reaches the second vent 82. When the liquid level actually reaches the vent 82, the liquid flows in the chamber 71 through this vent, and eventually reaches the first vent 34 and then leaks. In this situation, the farther away from the left end of the suppressing means 72 the second vent 82 is located, the greater the suppressing of the liquid leakage becomes. When the second vent 82 is provided at the location indicated by the one-dot chain line as shown in Fig. 1, the liquid leakage suppression is the greatest. In addition, the liquid leakage can further be suppressed by providing the vent 82 as low as possible at the bottom of the extending section 74 of the suppressing means 72.

In the embodiment, the extending section 74 extends downward from the center of the suppressing means 72 and has the second vent 82 provided at its bottom. This arrangement considerably delays the liquid leakage and serves to suppress it. Moreover, because the extending section 74 is at the center of the suppressing means 72, it can be used as a holder when automatic assembling the dispenser and facilitates the alignment of the suppressing means. This opens up a possibility of mounting the suppressing means 72 onto the cap 20 by machine-automation. Further, because the valve seat 87 for the primary valve

88 and the fitting section 84 for the suction tube 86 are provided at the suppressing means 72, it is not necessary to provide the valve seat and the fitting section in the main body 14, thus simplifying the structure of the main body.

The first vent 34 is extending axially of cylinder 22. Therefore, when the liquid reaches the vent 34 from the tilted container 12, the liquid flow will be suppressed to an extent that a large amount of liquid does not flow out from the vent at a time, thus suppressing the liquid leakage at the vent 34.

Fig. 8 illustrates a dispenser 110 according to another embodiment of this invention. This dispenser is a sprayer for spraying liquid, not a foamer. The dispenser 110 has the same structure as the above-described dispenser 10, except the nozzle and nozzle cap. As shown in Figs. 8 and 9, a nozzle 139 of the dispenser 110 includes a top-open cylindrical section 212 inside a projection 160. The spinner 46 of the spinner assembly 42 abuts on an open section of the cylindrical section 212, so that the pressurized liquid is not swirled by the spinner 46. Because of this fact, a recess 156, passages 157 tangential to the recess and passages 213, which extend axially of the cylindrical section 212 and communicate with the passages 157, are formed on the surface of the cylindrical section 212. A pair of projections 214 is formed at the distal end of the projection 160. In addition, an engaging member 216 is provided below the nozzle 139 and an engaging hole 218 is provided in the trigger 16. Mating the engaging member 216 with the engaging hole 218 prevents the rotational movement of the nozzle.

As is clear from Figs. 8 and 10, tne nozzle cap 164 includes a pair of flared seals 220, 222 separated from each other in a radial direction. The outer seal 220 slides along the inner wall of the projection 160, and the inner seal 222 slides along the outer wall of the cylindrical

section 212. Formed in the seal 222 is a pair of axial passages 224 that can communicate with the axial passages 213 of the nozzle 139. Further, an orifice 158 is formed in the bottom of nozzle cap 164, and a pair of ribs 226, separated 180° from each other, are formed in the back side of the bottom of the nozzle cap 164. These ribs 226 are provided in such a way that they are not aligned with the corresponding projections 214 of the nozzle when mounting the nozzle cap 164 onto the nozzle 139 and that they will abut on the corresponding nozzle projections when the nozzle cap is twisted 90° after mounted on the nozzle. A projection 228 is formed at the lower end of the nozzle cap 164 and nozzle cap 164 will be mounted on the nozzle 139 with the projection 228 being displaced 90°, as viewed from the left side of Fig. 8, from the engaging member 216 of the nozzle.

When the projection 228 of the nozzle cap 164 is displaced 90° from the engaging member 216 of the nozzle 139, the axial passages 213 of the nozzle do not communicate with the passages 224 of the nozzle cap. In other words, an operational off position is set where even actuation of trigger 16 does not permit the pressurized liquid to flow out. When the nozzle cap 164 is twisted 90°, however, the projections 214 of the nozzle 139 abut on the ribs 226 and the projection 228 is aligned with the engaging member 216. In this state, the axial passages 213 of the nozzle 139 communicate with the passages 224 of the nozzle cap 164, thus permitting the spraying action. Because the passages 213 communicate with the passages 224, the pressurized liquid flows into the recess 156 through the passages 213, 224 and tangential passages 157 and the liquid coming in the recess from passages 157 swirls. The liquid is then sprayed from the orifice 158.

As explained above, the liquid leakage can effectively be suppressed by fitting

the suppressing means including the second vent in the cap. Moreover, the suppressing means can be utilized for simplification of the structure of the main body and the automatic assembling process of the dispenser components.

CLAIMS:

1. A manually operated trigger type dispenser comprising:

a main body (14) onto which a trigger (16) is hingeably mounted,

a cap (20) by means of which the main body (14) is adapted to be detachably mounted onto a neck portion (13) of a container (12) containing liquid to be dispensed, and

a piston (18) coupled to the trigger (16) and including a pair of spaced apart, annular seals, the piston (18) being reciprocably slidable in a cylinder (22) in accordance with the movement of the trigger,

the cylinder being formed in the main body (14) and including a first vent to communicate with the interior of a container (12) to which the main body has been mounted, the first vent (34) communicating with atmospheric air when the piston (18) is in a dispensing position and being positioned between the seals (36, 37) of the piston (18)

characterized in that the dispenser further comprises suppressing means (72) for suppressing liquid leakage from such a container (22) through the first vent, said suppressing means (72) being fitted in the cap (20) and defining a chamber (71) in the cap which communicates the first vent (34) with the interior of the container via a second vent (82) in the suppressing means.

2. A dispenser according to claim 1 in which the suppressing means (72) includes a projection (74) extending downward and the second vent (82) is formed in the projection (74).

3. A dispenser according to claim 2 in which the projection (74) is cylindrical and the second vent (82) is formed at the distal end of the projection (74).

4. A dispenser according to any preceding claim in which a fitting section (84) for a suction tube (86) and a valve seat (87) for a primary valve (88) are formed in the suppressing means (72).

5. A dispenser according to any preceding claim in which the first vent (34) is elongated axially of the cylinder (22).

6. A dispenser according to any preceding claim in which the cap (20) is integrally formed on the main body (14).

7. The combination of a container (12) and a dispenser according to any preceding claim mounted by its cap (20) onto the neck portion (13) of the container, the cap (20) having a circumferential engaging projection (92) which mates with an L-shaped engaging projection (94) formed on the periphery of the neck portion (13) of the container (12), the engaging projection (92) of the cap (20) being restricted in an axial movement when the upper surface of the engaging projection (92) of the cap (20) abuts onto the bottom surface of a circumferential portion of the engaging projection (94) of the container (12), and restricted in a circumferential movement when the side of the engaging projection (92) of the cap (20) abuts onto an axial portion of the engaging projection (94) of the container (12).

8. The combination according to claim 7 in which the engaging projection (92) of the cap (20) has a slope at its bottom surface, which permits the engaging projection (92) of the cap (20) to slide along the engaging projection (94) of the container (12).

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FIG. 1

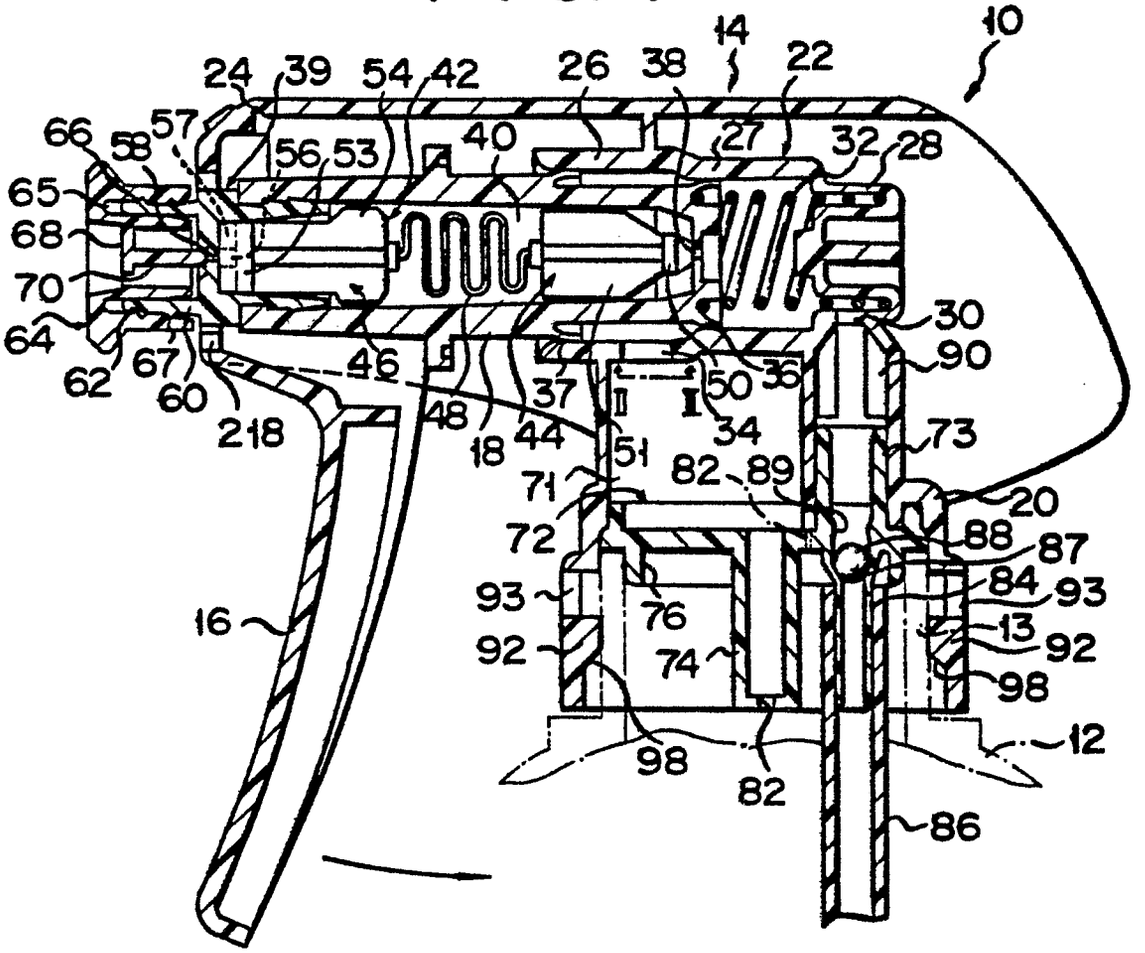


FIG. 3

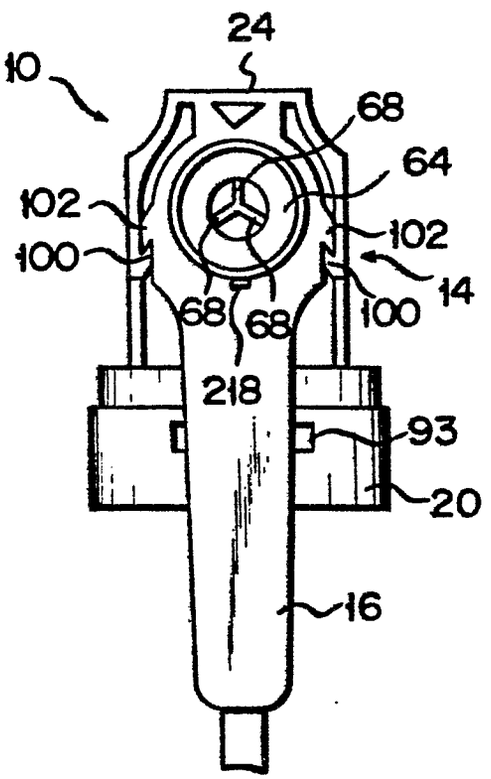


FIG. 2

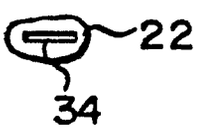


FIG. 4

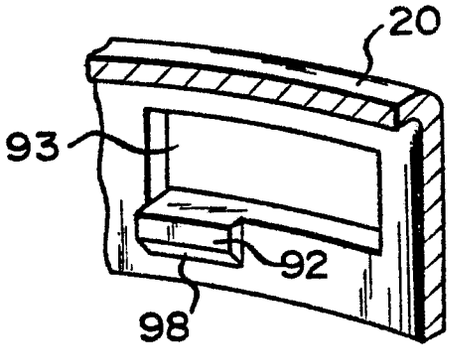


FIG. 5

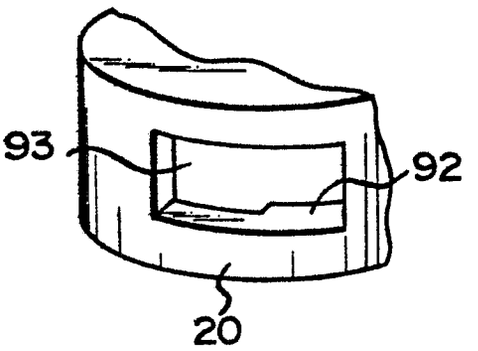


FIG. 6

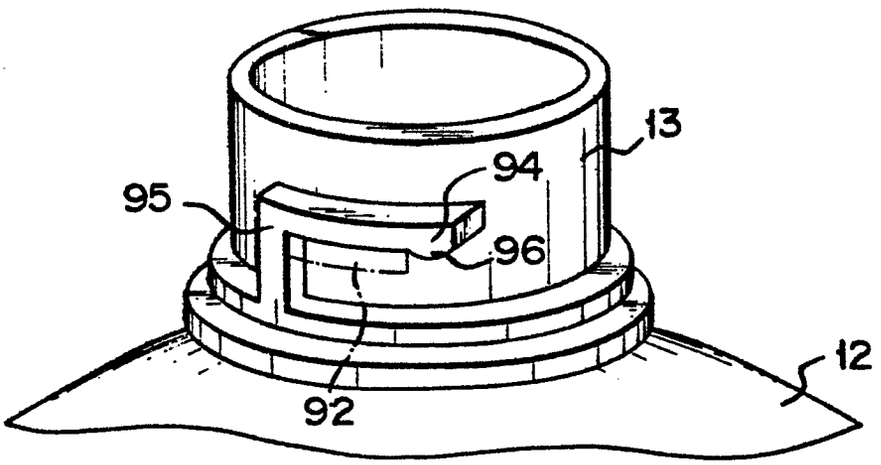


FIG. 7

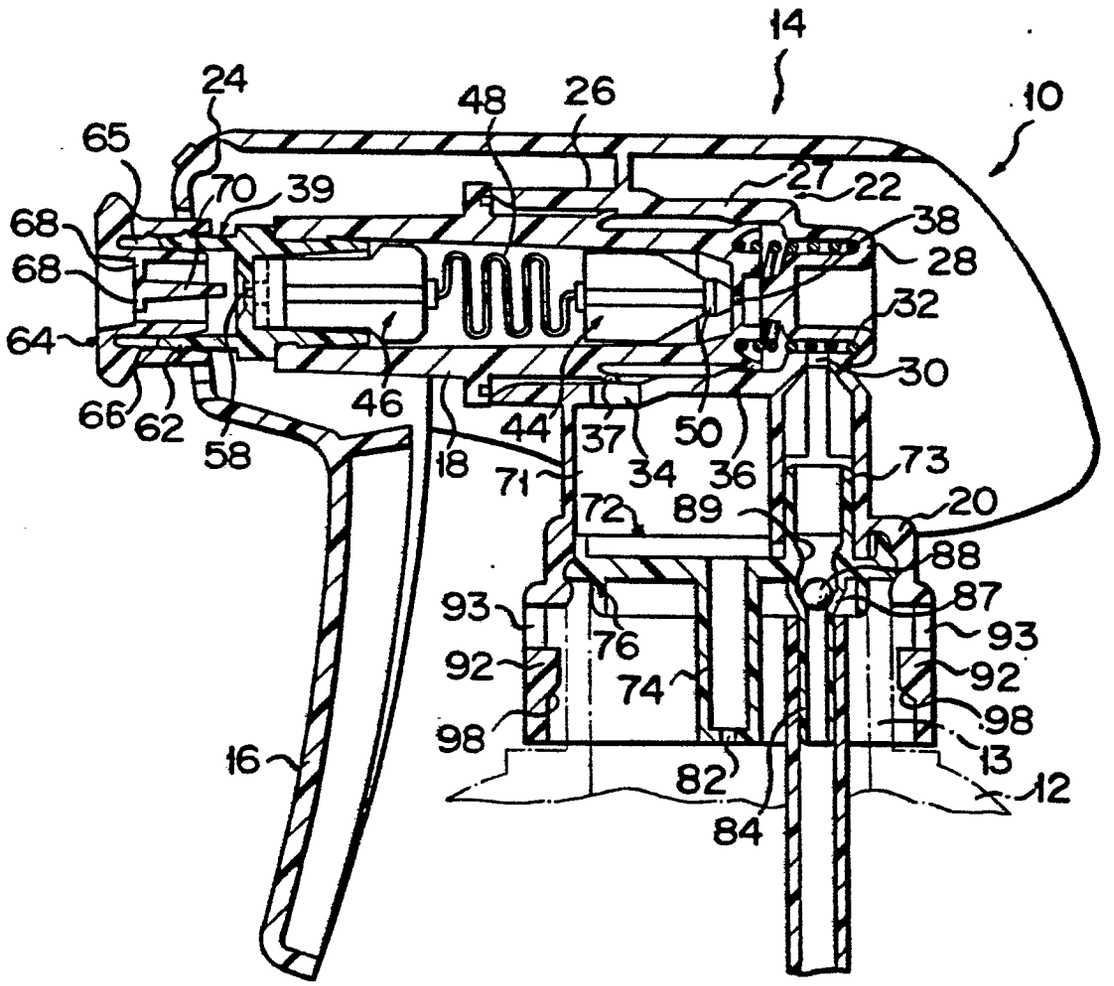

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FIG. 8

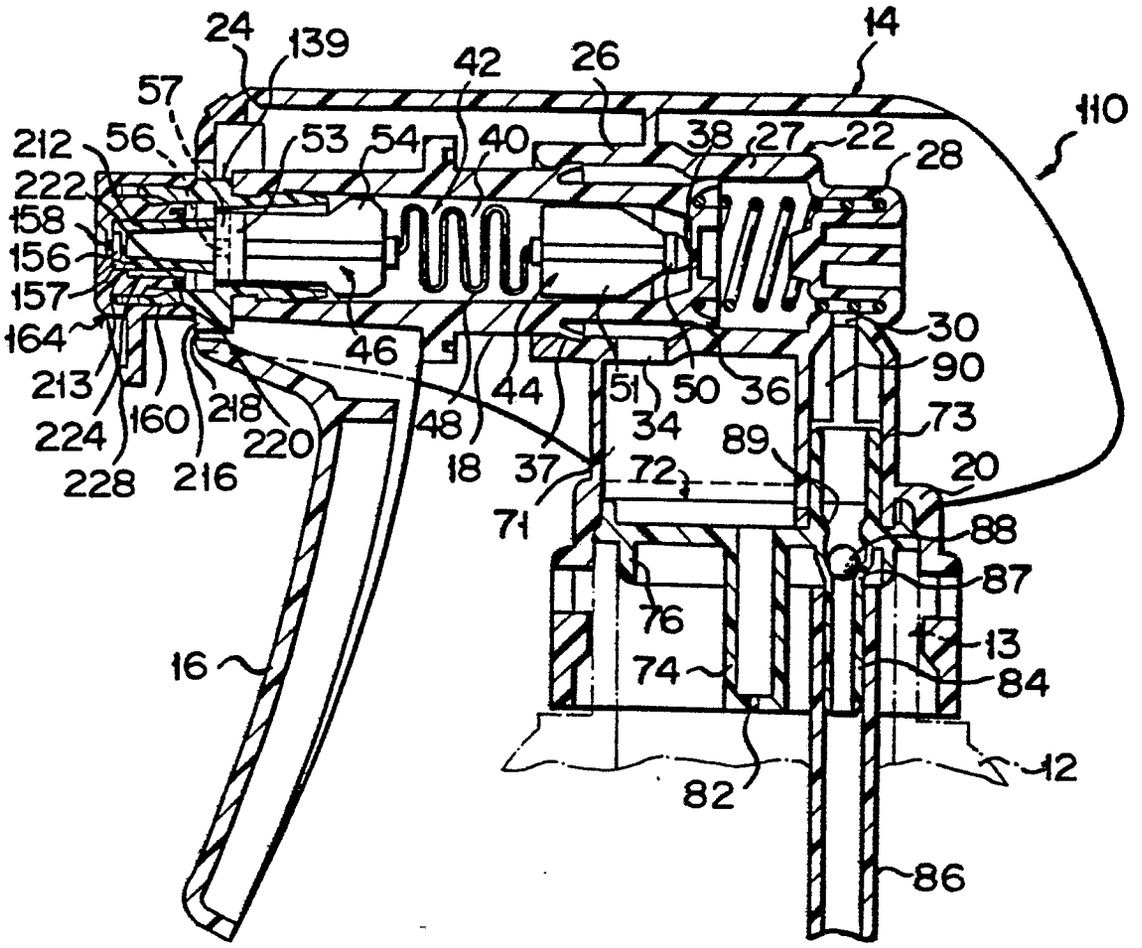


FIG. 9

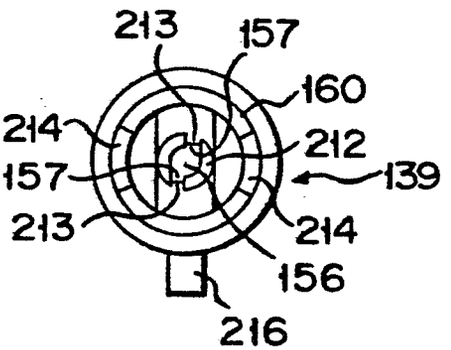
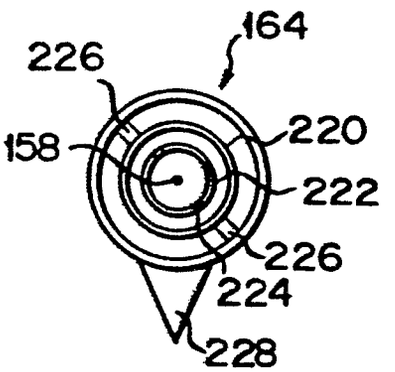


FIG. 10



European Patent Office

EUROPEAN SEARCH REPORT

0202380
Application number

EP 85307258.5

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.4)
D,X	US - A - 4 072 252 (STEYNS et al.) * Totality; especially fig.1, ref.numbers 33,34; column 3, lines 52-68 *	1,4,5	B 65 D 47/34 B 05 B 9/043
X	US - A - 4 480 768 (MARTIN) * Fig.1; column 4, lines 39-52; column 5, lines 43-51 *	1,4,5	
D,X	US - A - 4 365 751 (SAITO et al.) * Fig.1; column 3 line 60- column 4 line 15 *	1,4,5	
A	DE - A1 - 3 341 410 (ČESKOSLOVENSKÁ AKADEMIE VEA) * Fig.1, ref.numbers 20,22 *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

B 65 D 47/00
B 05 B 9/00
B 05 B 11/00
B 67 D 5/00
F 04 B 9/00
F 04 B 33/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	26-08-1986	CZUBA

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
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
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