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(54) **Automatic dispenser device for liquids or gels in toilet bowls**

(57) A dispenser device comprising at least one cartridge (4, 48, 480) containing at least one liquid or gel (8) and a support body (1, 110) for the cartridge (4, 48, 480) which is provided with a bottom mouth (9, 56, 62) for the outflow of liquid or gel (8), at least one first valve (17, 170, 65) urged to close a first section (18, 256, 162) of the mouth (9, 56, 62) from the outside and control means (3, 39, 60) responsive to each water flow (19) to open said first valve (17, 170, 65). The dispenser device comprises at least one second valve (25, 250, 55, 65) for closing a second section (29, 156, 262) of said mouth (9, 56, 62) during each water flow (19). The at least one second valve (25, 250, 55, 65) is spaced from said at least one first valve (17, 170, 65) so as to define between said first (18, 256, 162) and second (29, 156, 262) sections of the mouth (9, 56, 62) a quantity of said liquid or gel (8) which is delivered by the dispenser device upon each water flow (19). There are provided valve connecting means (26, 47, 54) for causing said at least one second valve (25, 250, 55, 65) to open said second section (29, 156, 262) of the mouth (9, 56, 62) when said at least one first valve (17, 170, 65) is closed and to close said second section (29, 156, 262) of the mouth (9, 56, 62) when at least one first valve (17, 170, 65) is open.

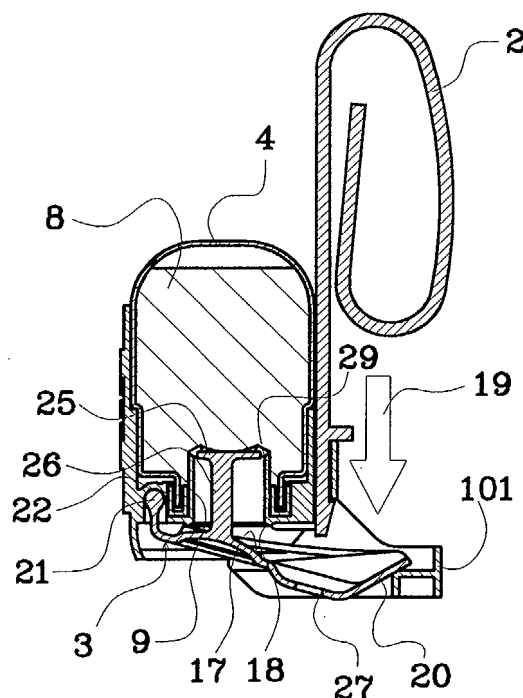


Fig. 9

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Description

[0001] The invention refers to an automatic dispenser device for liquids or gels in toilet bowls.

[0002] It is known that toilet bowls are cleaned and deodorized by using products in solid, gel or liquid form. Such products are placed in appropriate containers arranged in the flushing cistern in a way to be hung from the rim of the bowl. Also these containers are arranged in order to be exposed to the flow of the flushing water.

[0003] At each water flow such products release into the water their active principles, such detergents, disinfectant and perfuming agents, and diffuse fragrances into the surrounding environment.

[0004] Actually the liquid or gel containers are arranged with the output mouth facing downward and the dispensation of the product occurs by simple drop. Such containers are not provided with a closure device for the output mouth which assures the control of the outflow of the product in a way independent of the duration of the water flow.

[0005] In fact, in this way inconstant and non-controllable outflows of the products occur from the output mouth during each water flow.

[0006] In view of the art described, it is an object of the present invention to provide an automatic dispenser device for liquids or gels in toilet bowls which overcomes the aforementioned disadvantage.

[0007] According to the present invention, such object is obtained by means of a dispenser device comprising at least one cartridge containing at least one liquid or gel and a support body for said cartridge which is provided with a bottom mouth for the outflow of liquid or gel, at least one first valve urged to close a first section of said mouth from the outside and control means responsive to each water flow to open said first valve, characterized by comprising at least one second valve for closing a second section of said mouth during each water flow, said at least one second valve being spaced from said at least one first valve so as to define between said first and second sections of the mouth a quantity of said liquid or gel which is delivered by the dispenser device upon each water flow, there being provided valve connecting means for causing said at least one second valve to open said second section of the mouth when said at least one first valve is closed and to close said second section of the mouth when at least one first valve is open.

[0008] Thanks of the present invention is possible to provide a dispenser device for liquids or gels of the automatic type because its operation occurs by means of a water flow used for cleaning the toilet bowl. Also the quantity of the liquid or gel to deliver is determined by the volume intercepted in the mouth between the two valves.

[0009] The device can be made so as to allow the single or simultaneous delivery of several products; in such case the dispenser device comprises several cartridges

and double valves units in measure equal to the cartridges being used.

[0010] Moreover for making uniform the delivery outflow while maintaining for the entire time of use of the device the atmospheric pressure inside the air bubble of the cartridge in the cases of use of the type with additional hole.

[0011] The features and the advantages of the present invention will be made evident by the following detailed description of its particular embodiments, illustrated as not limiting examples in the annexed drawings, wherein:

Figures 1 and 2 show two types of cartridges of the automatic dispenser device according to invention; Figures 3 and 4 are perspective views of a body belonging to the dispenser device according to invention;

Figure 5 shows a dispenser device unit belonging to the dispenser device according to a first embodiment of the invention;

Figure 6 is a vertical section central view of the dispenser device according to the first embodiment of the invention before the fastening to a toilet bowl;

Figure 7 is a vertical section central view of the dispenser device according to the first embodiment of the invention which is fastened to the toilet bowl;

Figure 8 is a vertical section central view of the dispenser device according to the first embodiment of the invention at rest;

Figure 9 is a view similar to that in Figure 8 but with the dispenser device in working phase;

Figure 10 is a vertical section lateral view of the dispenser device according to the first embodiment of the invention at rest;

Figure 11 is a view similar to that in Figure 8 but with the dispenser device in working phase;

Figure 12 is a vertical section central view of the dispenser device according to a second embodiment of the invention at rest;

Figure 13 is a view similar to that in Figure 8 but with the dispenser device in working phase;

Figure 14 is a vertical section central view of the dispenser device according to a third embodiment of the invention at rest;

Figure 15 is a view similar to that in Figure 8 but with the dispenser device in working phase;

Figure 16 is a vertical section central view of the dispenser device according to a fourth embodiment of the invention at rest;

Figure 17 is a view similar to that in Figure 8 but with the dispenser device in working phase;

Figure 18 is a vertical section central view of the dispenser device according to a fifth embodiment of the invention at rest;

Figure 19 is a view similar to that in Figure 8 but with the dispenser device in working phase;

Figure 20 is a vertical section central view of the

dispenser device according to a sixth embodiment of the invention at rest;

Figure 21 is a view similar to that in Figure 8 but with the dispenser device in working phase;

Figure 22 is a vertical section central view of the dispenser device according to a seventh embodiment of the invention at rest;

Figure 23 is a view similar to that in Figure 8 but with the dispenser device in working phase;

Figures 24-26 show perspective views of elements belonging to a dispenser device according to an eighth embodiment of the invention;

Figure 27 shows an alternative embodiment of the cartridge in Figure 24;

Figure 28 is another type of a body belonging to dispenser device according to invention;

Figure 29 is a vertical section central view of a dispenser device comprising the body in Figure 28.

[0012] A dispenser device according to the invention comprises a cartridge 4 (Figure 1) containing a product, liquid or gel, to deliver inside a toilet bowl. The cartridge can comprise a hole 12 in the upper part (Figure 2) for putting into communication an air bubble 13 (Figure 7) formed inside the cartridge 4 with the outside in order to assure the atmospheric pressure inside the cartridge 4. The cartridge 4 is provided in the bottom with a plug 5. When the dispenser device is sold, the hole 12 is closed by suitable means, for example by an adhesive label or by a removable plug.

[0013] The dispenser device comprises a support body 1 (Figures 3 and 4) on which the cartridge 4 should be inserted. The body 1 is provided with an additional hook 2 adapted for the fastening to a rim of the toilet bowl and with an element 101 for spacing it from the wall of the toilet bowl.

[0014] The dispenser device comprises a unit 3 (Figure 5) according to a first embodiment of the invention which should be inserted in the body 1. The unit 3 is coupled with the body 1 by rotatably coupling of ends 21 of the unit 3 in suitable housings 22 in the body 1. The unit 3 comprises leaf springs 14 operating by means of projections 15 on the striker plates 16 of the body 1, an upper valve 25 adapted to be inserted in the mouth 9 of the body 1 and a lower valve 17 adapted for closing the output section 18 of the mouth 9; the valves 17 and 25 are spaced from each other and are united with each other by means of a tang 26. The dispenser device unit 3 comprises also a hole 27 placed on a spoon shape plate 20 next the valve 17.

[0015] The operation of inserting of the cartridge 4 in the body 1 provides the cutting of a closing diaphragm 555 of the plug 5 by means of teeth 6 belonging to a mouth 9 of the body 1 which is provided with an input section 29 and the output section 18; in this way, while the diaphragm 555 floats in the product 8, the product 8 contained in the cartridge 4 can go out from the cartridge 4 through the mouth 9 to deliver it into the toilet

bowl. The dispenser device so obtained can be fastened to the rim 100 of the toilet bowl 200 by means of the hook 2, as shown in Figure 7.

[0016] At rest (Figures 8 and 10) the dispenser device unit 3, for effect of the leaf springs 14, keeps the mouth 9 closed by means of the lower valve 17 that intercepts the output section 18 of the mouth 9.

[0017] The arrival on the dispenser device of the water flow (indicated in Figures 9 and 11 with an arrow 19), which is employed for cleaning the toilet bowl, determines the working phase of the dispenser device. In fact the water flow 19 generates a thrust on the spoon-shape plate 20 of the unit 3; the thrust causes a rotation of the dispenser device unit 3 around the ends 21 placed in the housing 22 of the body 1. The stop of the rotation is defined by the contact of the ends 23 (opposite to the ends 21) with the projections 24 of the element 101 belonging to the body 1. In this position the leaf springs 14 are additionally loaded. The lower valve 17, by detaching itself from the outflow section 18 of the mouth 9, opens the same mouth 9 thus allowing the output of a part of the product 8 into the spoon-shape plate 20; the part of the product 8 is diluted by the water flow.

[0018] The upper valve 25, which is integral with the lower valve 17 and located upstream of it, by resulting immersed in the product inside the cartridge 4, facilitates the dragging of the part of the product towards the mouth 9.

[0019] At the end of the stroke the upper valve 25, by placing itself inside the mouth 9 and because of the viscosity of the product 8, interrupts the output of the product 8 from the cartridge 4. Therefore only a certain quantity or a dose of the product 8 can outflow from the cartridge 4.

[0020] The dispenser device unit 3 also provides a dose of the product 8 contained in the cartridge 4 at each water flow; this dose does not depend on the time period wherein the water flow 19 is present inside the toilet bowl 200 but it depends on the distance between the input 18 and output 29 section of said mouth 9 and also on the size of the mouth 9, that is on the quantity of the product 8 intercepted in the mouth 9 between the valves 17 and 25.

[0021] When the water flow 19 stops the leaf springs 14 loaded by the water flow provide to the returning action of the dispenser device unit 3 that, by returning in the rest position, restores the closing of the lower valve 17 on the output section 18 of the mouth 9 and the opening of the upper valve 25 which closed the mouth 9. This allows the air entrapped inside the mouth 9 after the outflow of the product 8 to go up into the air bubble 13 and the product 8 to flow into the mouth 9 in order to predispose the dispenser device for newly dispensing.

[0022] The hole 27 of the spoon-shape plate 20 allows that the water accumulated during the working phase outflows through.

[0023] A dispenser device according a second embodiment of the present invention is shown in Figures

12 and 13. The dispenser device of the second embodiment differs from the dispenser device of the first embodiment for the introduction of at least one contrast spring 32 in the place of the leaf springs 14. This at least one contrast spring 32 is arranged in a suitable cavity 34 formed in the element 101 of the body 1 and it is engaged with pins 35 of the element 101 and with pins 330 of the end part 33 of the spoon-shape plate 20 of the unit 3. As the leaf springs 14, the spring 32 operates for closing the valve 17 on the output section of the mouth 9 after each water flow. The spring 32 therefore is further loaded when the water flow acts on the unit 3 and the valve 17 is opened for the outflow of the product 8 (Figure 13) while the spring 32 acts on the valve 17 for closing it in absence of the water flow (Figure 12).

[0024] A dispenser device according a third embodiment of the present invention is shown in Figures 14 and 15. The dispenser device of the third embodiment differs from the dispenser device of the first embodiment for the introduction of a traction spring 36 in the place of the leaf springs 14 and of a support 37 integral with the body 1 and arranged inside the cartridge 4. The support 37 is provided with openings 38 for the passage of the product 8 through them. The spring 36 is hinged with the upper part of the support 37 and with the valve 25 of the dispenser device unit 3. As the leaf springs 14, the spring 36 operates for closing the valve 17 on the output section of the mouth 9 after each water flow. The spring 36 therefore extends when the water flow acts on the unit 3 and the valve 17 is opened for the outflow of the product 8 (Figure 15) while it acts on the valve 17 for closing it by retraction in absence of the water flow (Figure 14).

[0025] A dispenser device according a fourth embodiment of the present invention is shown in Figures 16 and 17. The dispenser device of the fourth embodiment differs from the dispenser device of the first embodiment for a new type of dispenser device unit 39; the last is not hinged rotatably with the body 1, as the unit 3 of the preceding embodiments, but is hinged with at least two springs 40 arranged in lower projections 42 of the body 1 and engaged with pins 420 thereof and with pins 410 of the unit 39. These projections 42 are formed respectively in the element 104 and in the end 41 of the lower part of the body 1 which is opposite to the element 104. The dispenser device unit 39 is provided with a the spoon-shape plate 43. The springs 40 operate for closing the valve 170 on the output section of the mouth 9 after each water flow. The springs 40 therefore are loaded when the water flow 19 acts on the unit 39 and a lower valve 170 (which is similar to the valve 17 and has the same function) is opened for the outflow of a certain quantity of the product 8 (Figure 17) while an upper valve 250 (which is similar to the valve 25 and has the same function) closes the mouth 9. The springs 40, which are loaded by the water flow 19, act on the lower valve 170 for closing it in absence of the water flow (Figure 16).

[0026] A dispenser device according a fifth embodiment of the present invention is shown in Figures 18 and 19. The dispenser device of the fifth embodiment differs from the dispenser device of the first embodiment for the introduction of an upper valve 46 in the place of the valve 25. This valve 46 is connected with the valve 17 in a non-rigid way, in fact the valves 46 and 17 are connected with each other by means of a flexible cord 47. The upper valve 46 is made up of a half cap shape element having a specific weight lower than the product 8 to deliver; in this way the upper valve 46 floats in the product 8 inside the cartridge 4 (Figure 18). Therefore when the lower valve 17 is opened for the outflow of the product 8 (Figure 19) the upper valve 46 covers an optimal vertical movement for the transfer operation of the product 8 from the cartridge 4 to the mouth 9.

[0027] A dispenser device according a sixth embodiment of the present invention is shown in Figures 20 and 21. The dispenser device of the sixth embodiment differs from the dispenser device of the first embodiment for the introduction of an upper valve 55 in the place of the valve 25 and for the introduction of a mouth 56 different with respect to the mouth 9. In fact the input section 156 of the mouth 56 is shaped in a such way that the valve 55 can carry out a mechanical closure of the mouth 56 in the working phase. The valve 55 is coupled with the valve 17 by means of a projection 54 of the dispenser device unit 3 in the central part of the lower valve 17. When the lower valve 17 is opened for the outflow of the product 8 from the output section 256 of the mouth 56 (Figure 21), the upper valve 55 closes hermetically the mouth 56 while at rest the leaf springs 14 allow the valve 17 to close the lower section 256 of the mouth 56 for preventing the outflow of the product 8 (Figure 20).

[0028] A dispenser device according a seventh embodiment of the present invention is shown in Figures 22 and 23. The dispenser device of the seventh embodiment differs from the dispenser device of the first embodiment for the introduction of an different type of a mouth 62 and of a dispenser device unit 60 always movable between the rest and working phases by means of the water flow 19. The unit dispenser device 60 is provided with a vertical projection 61 (which is transversal to the spoon shape plate 59 of the unit 60) acting on a ball 65. The mouth 62 is provided with upper horizontal projections 63 on the input section 162 and lower horizontal projections 64 on the output section 262. The projections 63 and 64 are transversal to the flow of the product 8 through the mouth 62 and are adapted for coupling with the ball 65 on which the projection 61 acts; the ball 65 acts as a shutter for the input and output section of the mouth 62. Therefore the coupling of the upper horizontal projections 63 with the ball 65 allows the ball 65 itself to act as a valve for the closure of the cartridge 4 at rest phase (Figure 22) while the coupling of the lower horizontal projections 64 with the ball 65 allows the ball 65 itself to act as a valve for the closure of the cartridge 4 in the working phase (Figure 23). The quantity of the

product 8 which outflows from the cartridge 4 is defined by the distance between the input and output sections of the mouth 62 and by the change of position of the ball 65 between the rest phase and the working phase. However, in this case, a part of the product 8 is delivered by the cartridge 4 in the passage between the rest phase and the working phase for emptying the mouth 9 and said part of the product 8 can outflows from the mouth 62 at the successive rest phase when the projection 61 of the control means 60 acts (by means of elastic means as leaf spring which are not shown in Figures 22 and 23 but which are similar to the leaf spring 14 in Figure 5) on the ball 65 to open the section 262 and to close the section 162. The ball 65, which has a weight higher than the product 8, goes down for gravity during the working phase in presence of the water flow 19. The spoon shape plate 59 of the unit 60 is not provided with a hole because the quantity of the product 8 which is delivered at rest remains on the spoon shape plate 59 for carrying out a perfuming action between a water flow and one following.

[0029] A dispenser device according an eight embodiment of the present invention is shown in Figures 24-27. The dispenser device of the eight embodiment differs from the dispenser device of the first embodiment for the possibility of delivering more products. Therefore the dispenser device of this eight embodiment comprises two cartridges 48 containing different products to deliver (Figure 24), or alternately a single cartridge 480 provided with two chambers 481 containing two different products to deliver (Figure 27). Said dispenser device comprises a body similar to the body 1 and provided with two mouth 9 one for each cartridge 48 or for each chamber 481 and a dispenser unit similar to the dispenser unit 3 provided with two lower valves 17 and two upper valves 25 for the mouths 9 and with a single spoon shape plate 20. Also the chambers 481 are provided with plugs 5 with closing member 482 which are pushed inside the chambers 481 by engaging with the mouths 9. The meaning of the dispenser device of this eight embodiment is similar to the meaning of the dispenser device of the first embodiment unless, in this case, two quantity of different products contained inside the two cartridges 48 are delivered. The feature of delivery more products by using two cartridges and a dispenser unit with two upper valves and two lower valves which belonging to this eight embodiment, which is substantially represented as a variant of the first embodiment, can be applied to all the preceding embodiments.

[0030] In Figures 28 and 29 a new type of body 110 for the dispenser device according to invention is shown. The body 110 is different from the bodies of the aforementioned embodiments because it comprises a conveyor 111 for the water flow 19. This conveyor 111 is advantageous above all in the case of the water flow inside the toilet bowl 200 occurs in tangential to its internal walls.

Claims

1. Dispenser device comprising at least one cartridge (4, 48, 480) containing at least one liquid or gel (8) and a support body (1, 110) for said cartridge (4, 48, 480) which is provided with a bottom mouth (9, 56, 62) for the outflow of liquid or gel (8), at least one first valve (17, 170, 65) urged to close a first section (18, 256, 162) of said mouth (9, 56, 62) from the outside and control means (3, 39, 60) responsive to each water flow (19) to open said first valve (17, 170, 65), **characterized by** comprising at least one second valve (25, 250, 55, 65) for closing a second section (29, 156, 262) of said mouth (9, 56, 62) during each water flow (19), said at least one second valve (25, 250, 55, 65) being spaced from said at least one first valve (17, 170, 65) so as define between said first (18, 256, 162) and second (29, 156, 262) sections of the mouth (9, 56, 62) a quantity of said liquid or gel (8) which is delivered by the dispenser device upon each water flow (19), there being provided valve connecting means (26, 47, 54) for causing said at least one second valve (25, 250, 55, 65) to open said second section (29, 156, 262) of the mouth (9, 56, 62) when said at least one first valve (17, 170, 65) is closed and to close said second section (29, 156, 262) of the mouth (9, 56, 62) when at least one first valve (17, 170, 65) is open.
2. Dispenser device according to claim 1, **characterized in that** said second section (29, 156) is the input section of the mouth (9, 56) and the first section (18, 256) is the output section of the mouth (9, 56), said at least one second valve (25, 250, 55) being placed inside said at least one cartridge (4, 48, 480) and said at least one first valve (17, 170) being integral with said control means (3, 39).
3. Dispenser device according to claim 2, **characterized in that** said control means (3) are rotatably connected with the dispenser device.
4. Dispenser device according to claim 3, **characterized in that** said control means (3) comprises a spoon shape plate (20) adapted to collect the quantity of liquid or gel (8) delivered by the at least one cartridge (4, 48, 480).
5. Dispenser device according to claim 3, **characterized in that** said control means (3) comprises elastic means (14, 32, 36) which are loaded by the water flow (19) and which act on the said at least one first valve (17) for placing it to close said mouth (9, 56) when the water flow (19) stops.
6. Dispenser device according to claim 5, **characterized in that** said elastic means (14) are leaf springs in contrast with a fixed part (16) of the dispenser

device.

7. Dispenser device according to claim 5, **characterized in that** said elastic means (32) is a contrast spring in contrast with a fixed part (101) of the dispenser device. 5
8. Dispenser device according to claim 5, **characterized by** comprising a support (37) integral with the dispenser and arranged inside the at least one cartridge (4, 48, 480) in a position over the mouth (9), said at least one second valve (25) being integral with at least one first valve (17) and said elastic means (36) being a traction spring (36) hinged to the support (37) and the at least one second valve (25). 10
9. Dispenser device according to anyone of the claims from 2 to 8, **characterized in that** said second valve (25, 46) closes said mouth (9) placing itself inside said mouth (9), said liquid or gel (8) being of the viscous type. 15
10. Dispenser device according to claim 9, **characterized in that** said second valve (25) is integral with the at least one first valve (17). 20
11. Dispenser device according to claim 9, **characterized in that** said second valve (46) has a specific weight lower than the liquid or gel of the cartridge (4) for floating inside it, the second valve (46) being connected with at the least one first valve (17) by means of a flexible cord (47). 25
12. Dispenser device according to anyone of the claims from 1 to 8, **characterized in that** said second valve (55) is integral with said at least one first valve (17) and closes said mouth (56) by placing itself in contact with the second section (156) of the mouth (56). 30
13. Dispenser device according to claim 2, **characterized in that** said control means (39) is engaged with the dispenser device by means of elastic means (40) arranged in lower projections (42) of the dispenser device, said at least one second valve (250) being integral with said at least one first valve (170), said elastic means (40) being loaded by the water flow (19) and acting on the said at least one first valve (170) for placing it to close said mouth (9) when the water flow (19) stops. 35
14. Dispenser device according to claim 13, **characterized in that** said second valve (250) closes said mouth (9) placing itself inside said mouth, said liquid or gel being of the viscous type. 40
15. Dispenser device according to claim 14, **characterized in that** said control means (39) comprises a spoon shape plate (43) adapted to collect the quantity of liquid or gel (8) delivered by the at least one cartridge (4, 48, 480). 45
16. Dispenser device according to claim 4 or 15, **characterized in that** said spoon shape plate (20, 43) is provided with a hole (27, 270) for the outflow of the water accumulated during the water flow (19). 50
17. Dispenser device according to claim 4 or 15, **characterized in that** said support body (110) comprises a conveyor (111) of the water flow (19) into said spoon shape plate (20, 43).
18. Dispenser device according to claim 1, **characterized in that** said first section (162) is the input section of the mouth (62) and the second section (262) is the output section of the mouth (62), said first (162) and second (262) sections of the mouth (62) being provided with projections (63, 64) for coupling with a shutter (65) acting as first valve in absence of the water flow (19) and as second valve in presence of the water flow (19).
19. Dispenser device according to claim 18, **characterized in that** said control means (60) comprises elastic means loaded by the water flow (19) and acting on the shutter (65) for placing it to close said first section (162) of the mouth (62) when the water flow (19) stops in order to allow the delivery of said quantity of liquid or gel (8) contained in the mouth (62).
20. Dispenser device according to claim 19, **characterized in that** said control means (60) comprises a projection (61) adapted for acting on the shutter (65) for closing said first section (162) of the mouth (62) in absence of the water flow (19), this control means (60) allowing the shutter to go down for closing the second section (262) in presence of the water flow (19).
21. Dispenser device according to claim 20, **characterized in that** said control means (60) are rotatably connected with the dispenser device and comprise a spoon shape plate (59) for collect the quantity of liquid or gel delivered by the cartridge (4, 48, 480).
22. Dispenser device according to claim 1, **characterized in that** said at least one cartridge (480) is a single cartridge provided with two chambers (481) containing two liquids or gels which are delivered, and by comprising two mouths (9) each one for each chamber (481) of said cartridge (480).
23. Dispenser device according to claim 1, **characterized by** comprising two cartridges (48) containing two liquids or gels which are delivered, and by com-

prising two mouths (9) each one for each cartridges (481).

24. Dispenser device according to claim 1, **characterized in that** said cartridge comprises a hole (12) 5
formed in the upper part thereof, said hole (12)
putting into communication an air bubble (13)
formed inside the cartridge with the outside.

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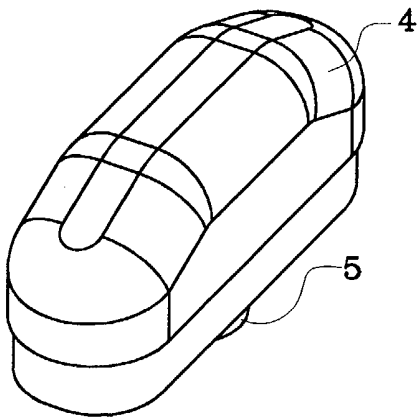


Fig.1

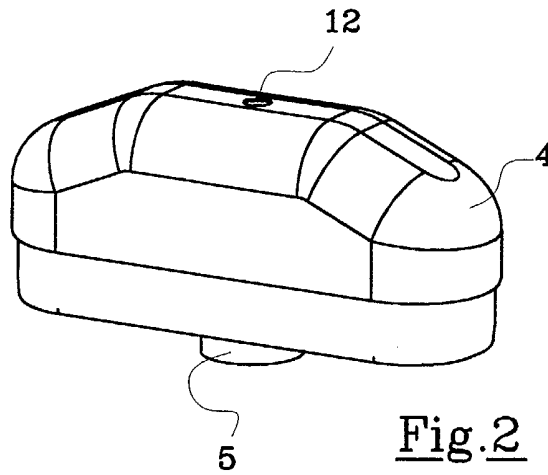


Fig.2

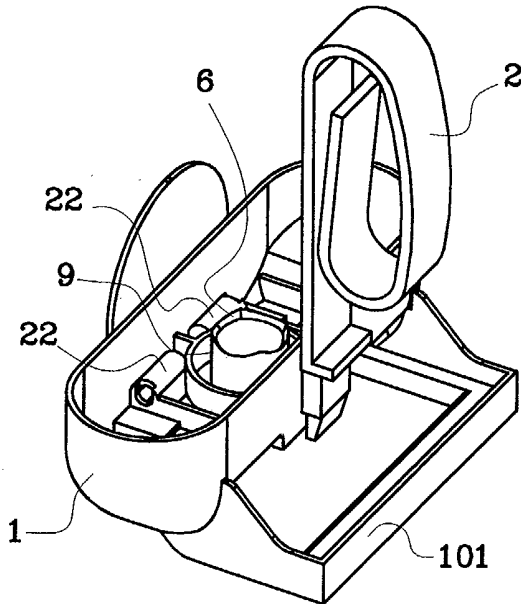


Fig.3

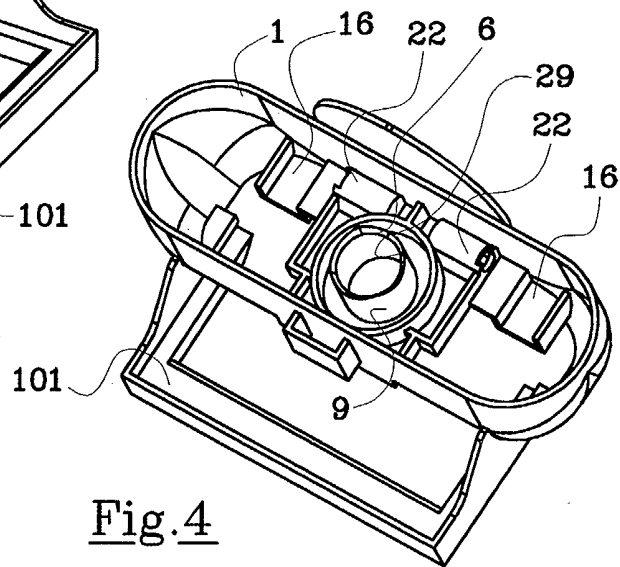


Fig.4

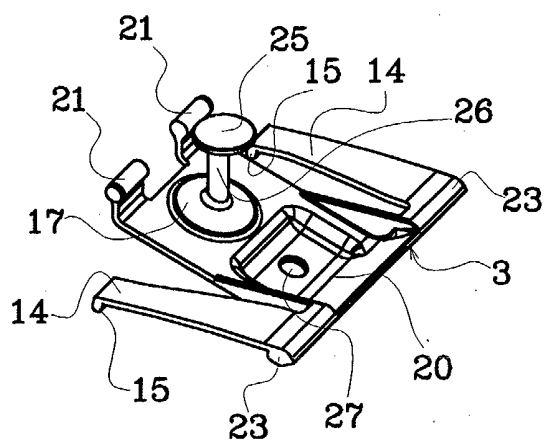


Fig.5

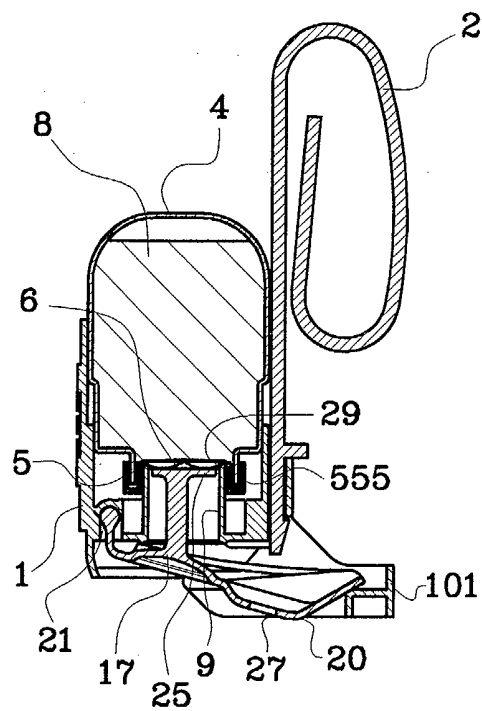


Fig.6

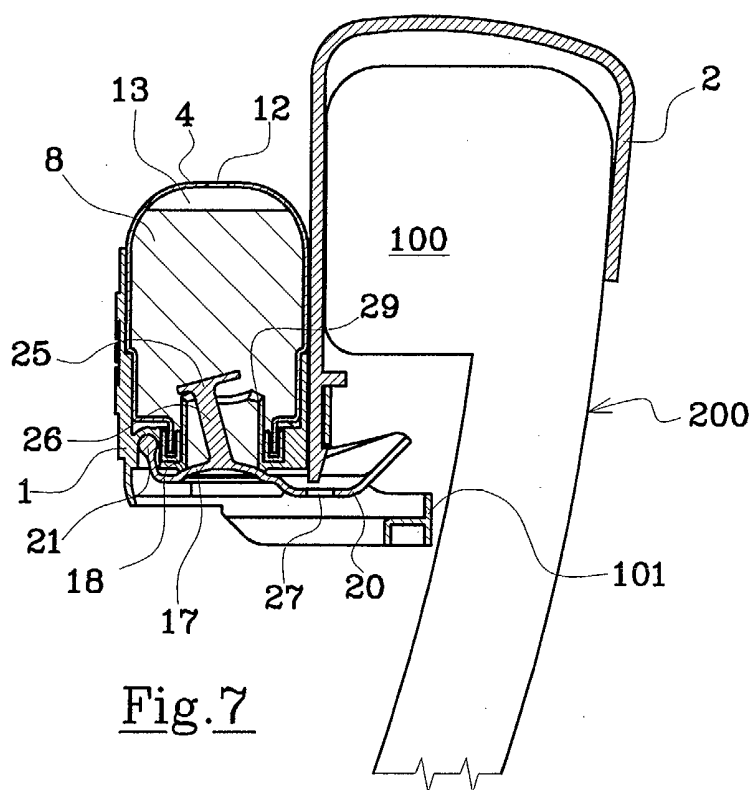


Fig.7

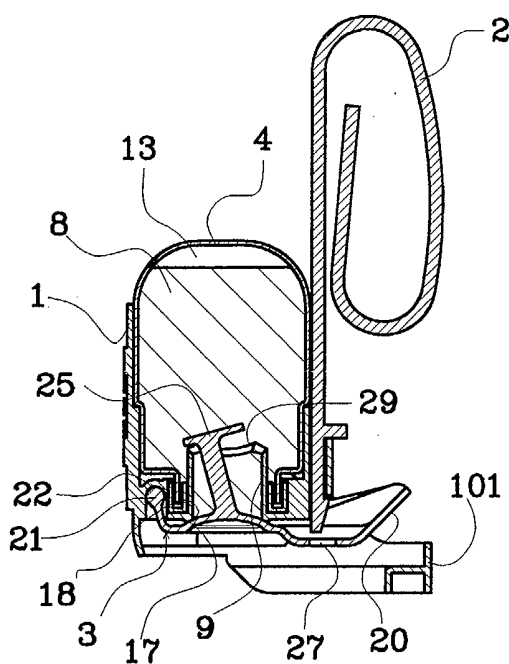


Fig. 8

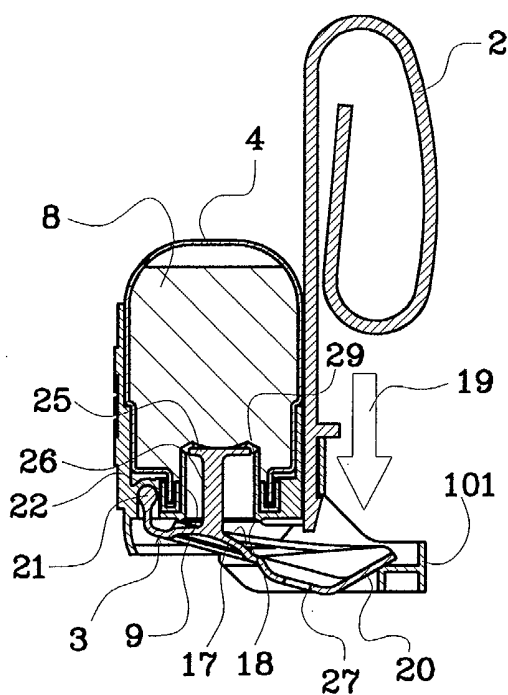


Fig. 9

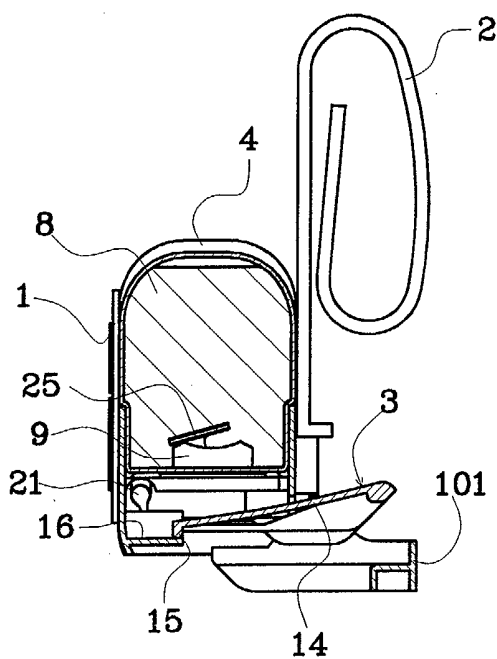


Fig. 10

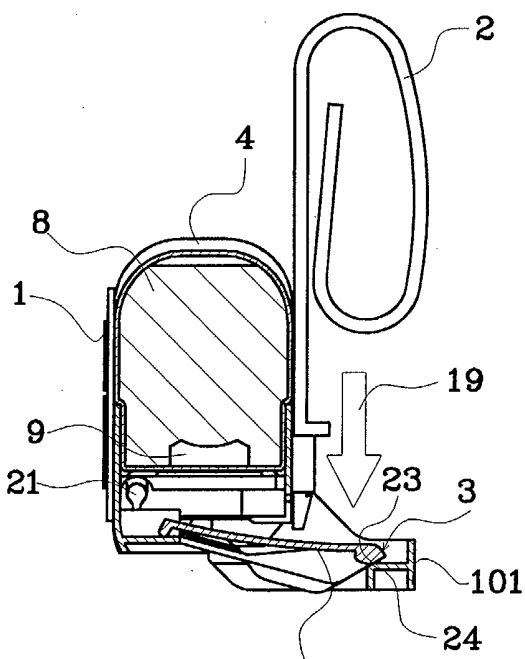


Fig. 11¹⁴

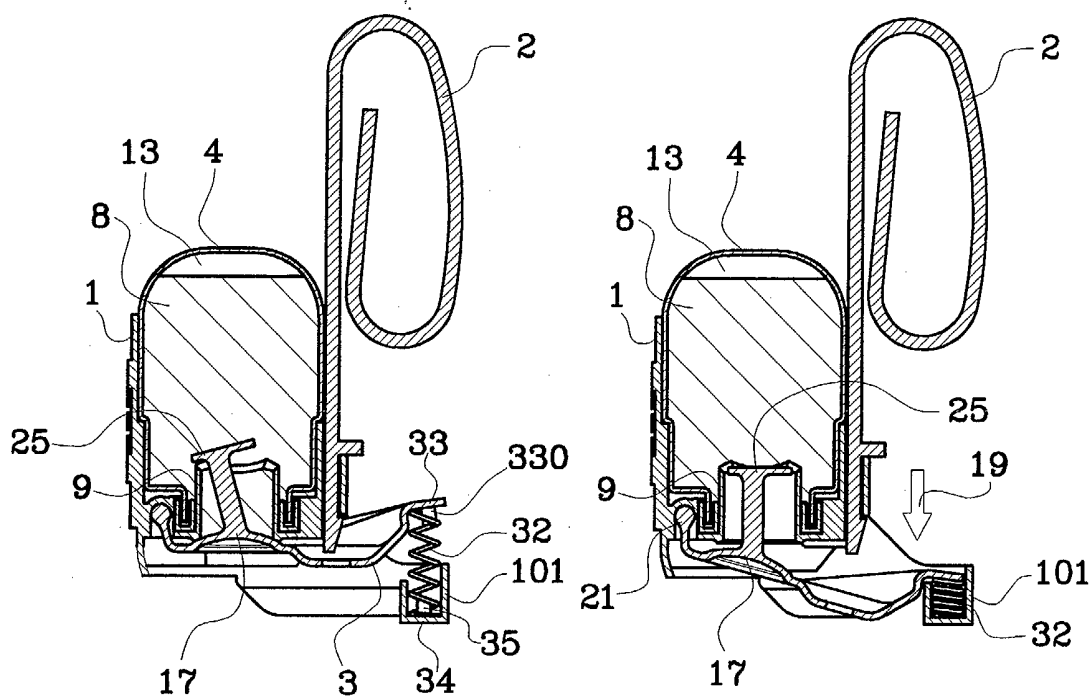


Fig.12

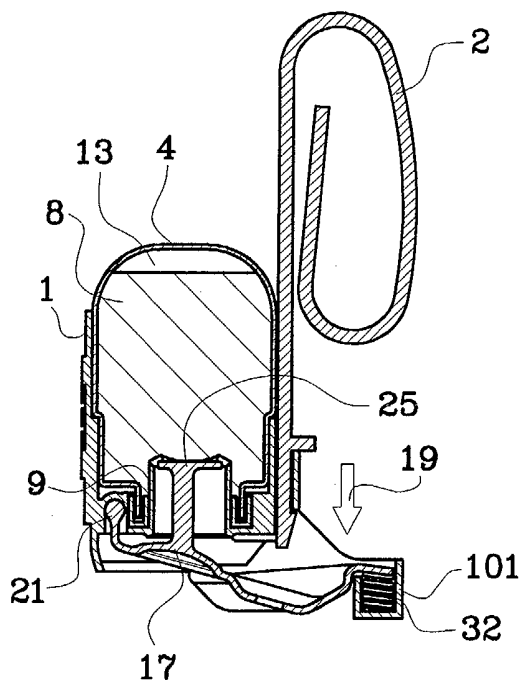


Fig.13

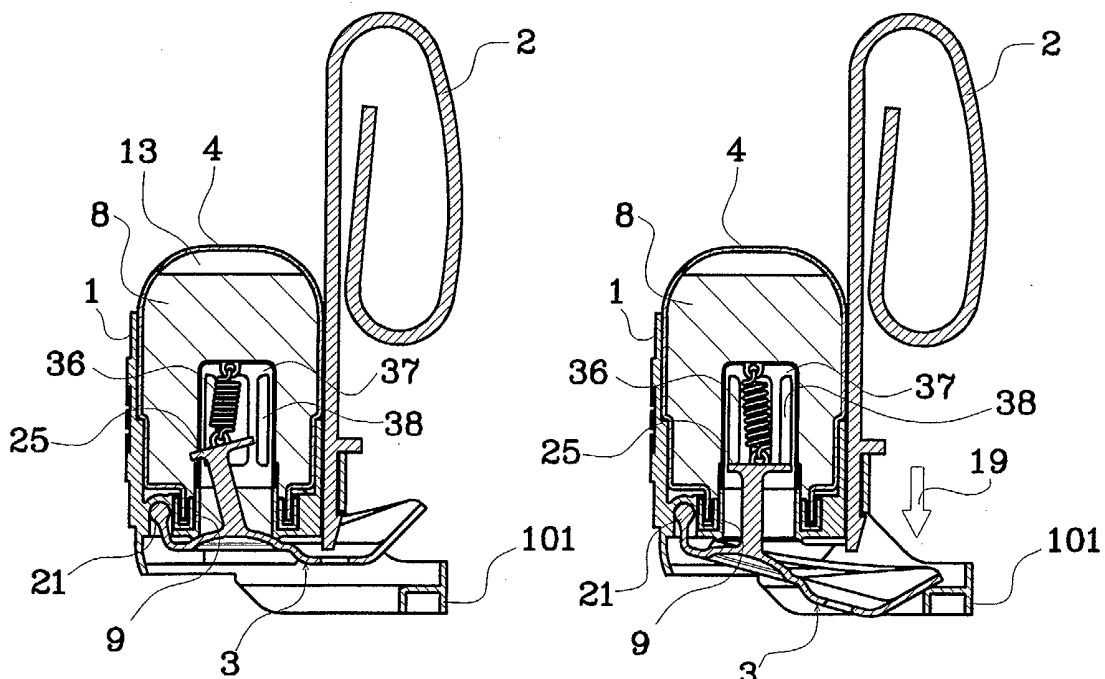


Fig.14

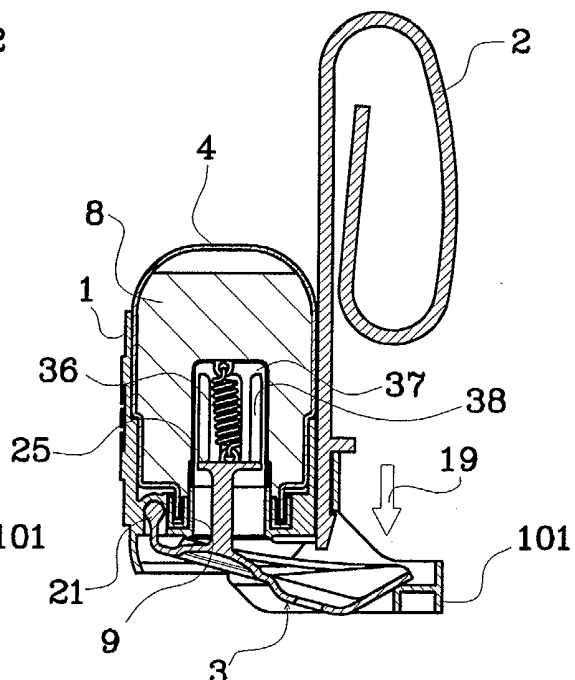


Fig.15

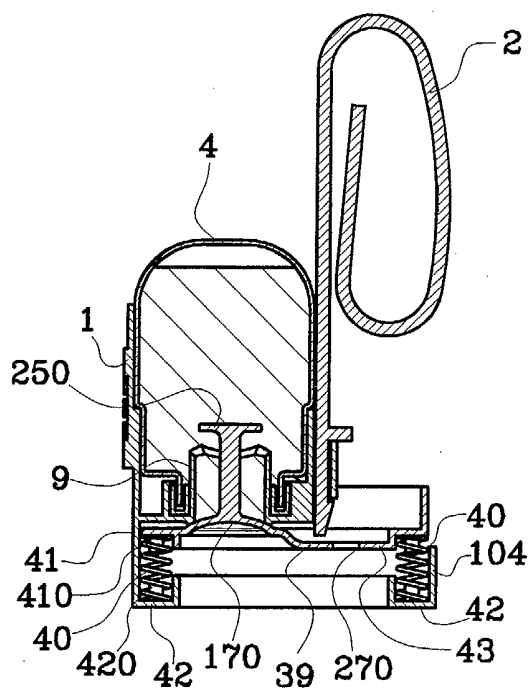


Fig.16

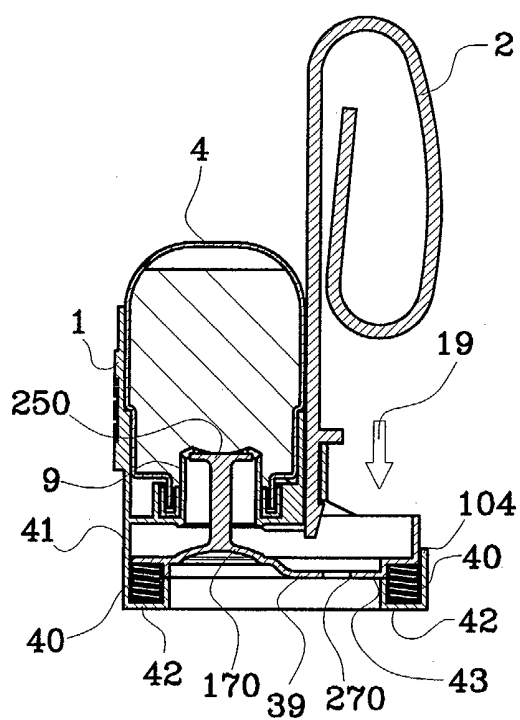


Fig.17

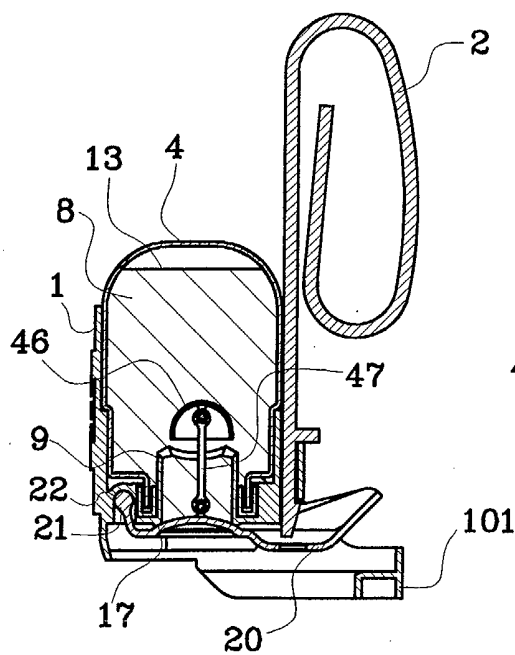


Fig.18

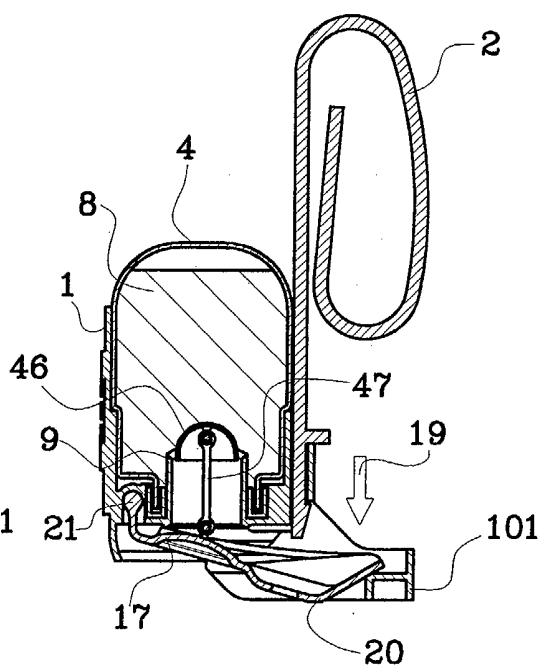


Fig.19

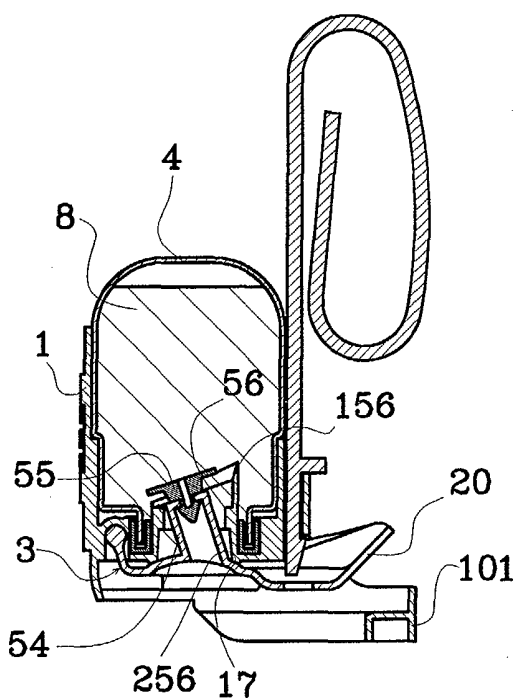


Fig. 20

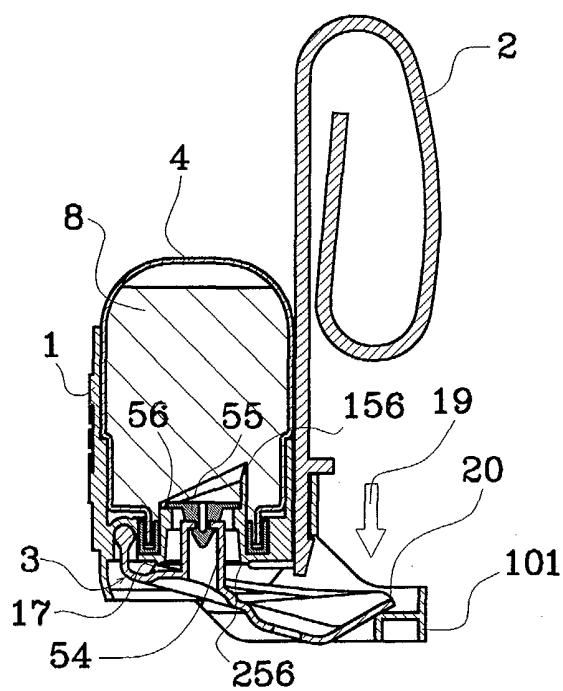


Fig. 21

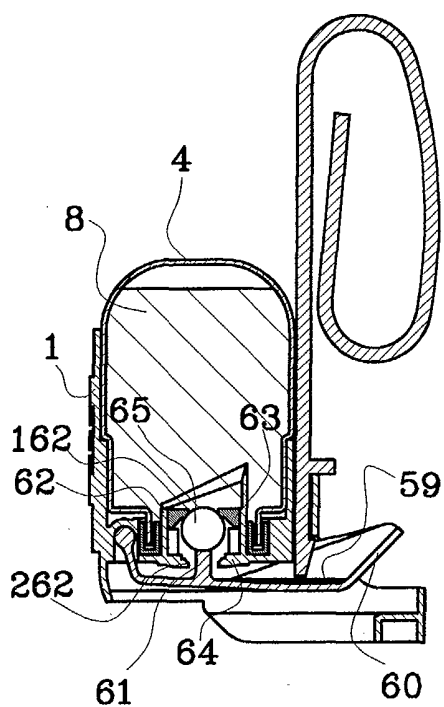


Fig. 22

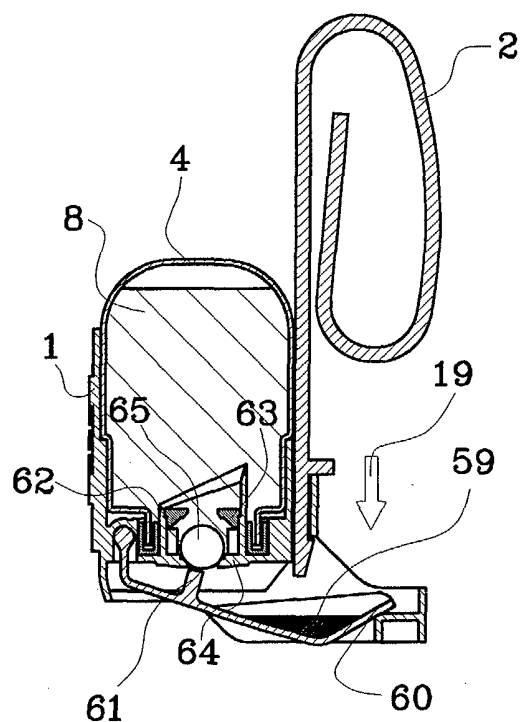


Fig. 23

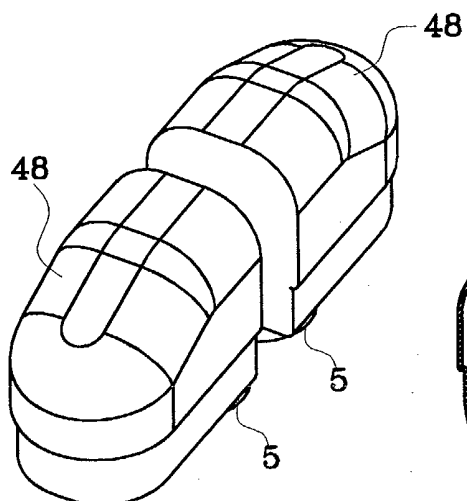


Fig. 24

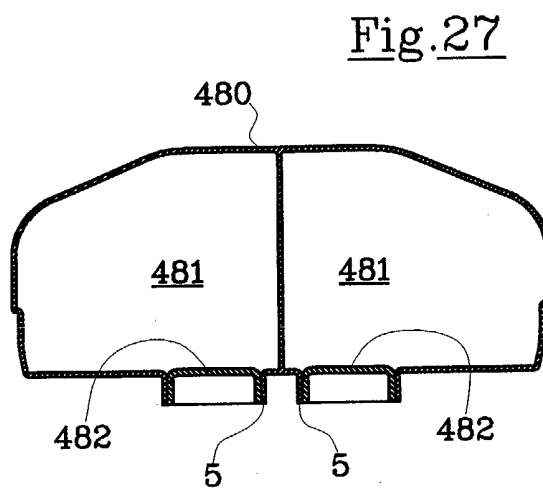


Fig. 27

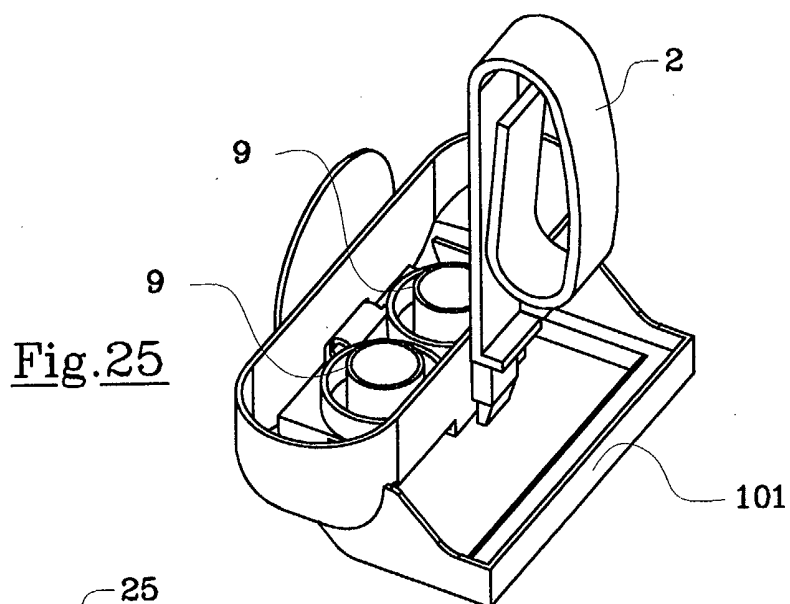


Fig. 25

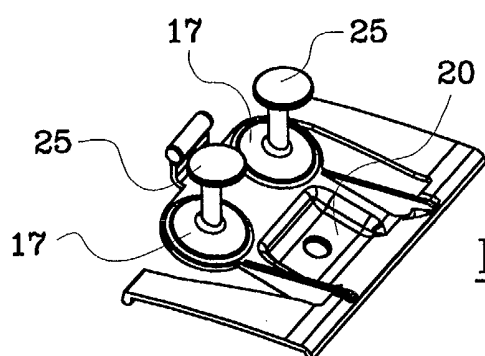


Fig. 26

