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(54) Aerosol spray mechanism

(57) A container 1 containing the liquid to be sprayed and a propellant gas is provided with a control member 2 having a spray hole 7. When the control member 2 is manipulated, the liquid is sprayed by the gas pressure. A sliding member 5 is provided in the control member 2 and applies pressure to a pool 42b to which the pressurised liquid and gas is supplied. When the pressure in the pool 42b reaches a specified pressure, the sliding member 5 works to cut off the supply, and when the gas pressure in the pool 42b drops, the supply is resumed. As a result, the liquid and gas are temporarily stored in the pool 42b until raised to the specified pressure, at which they escape to the spray hole 7, so that the spray liquid is always sprayed from the spray hole 7 at a specific pressure, and a specific spray state and atomization state may thereby be maintained.

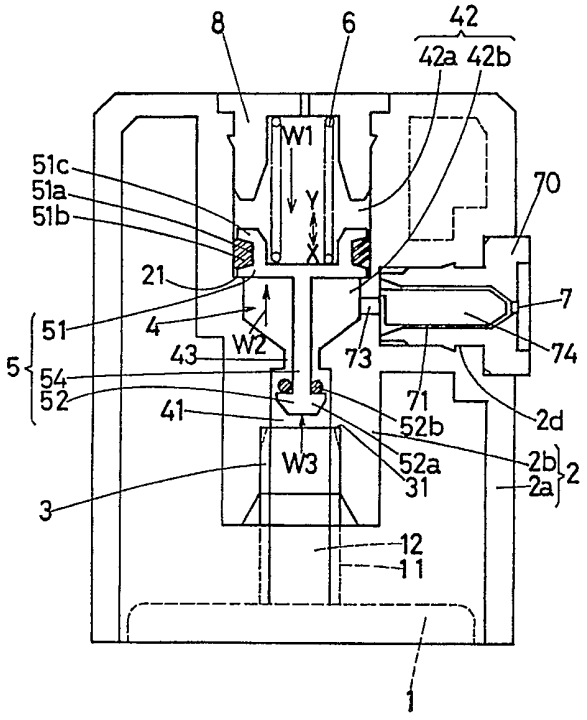

FIG. 1

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FIG. 1

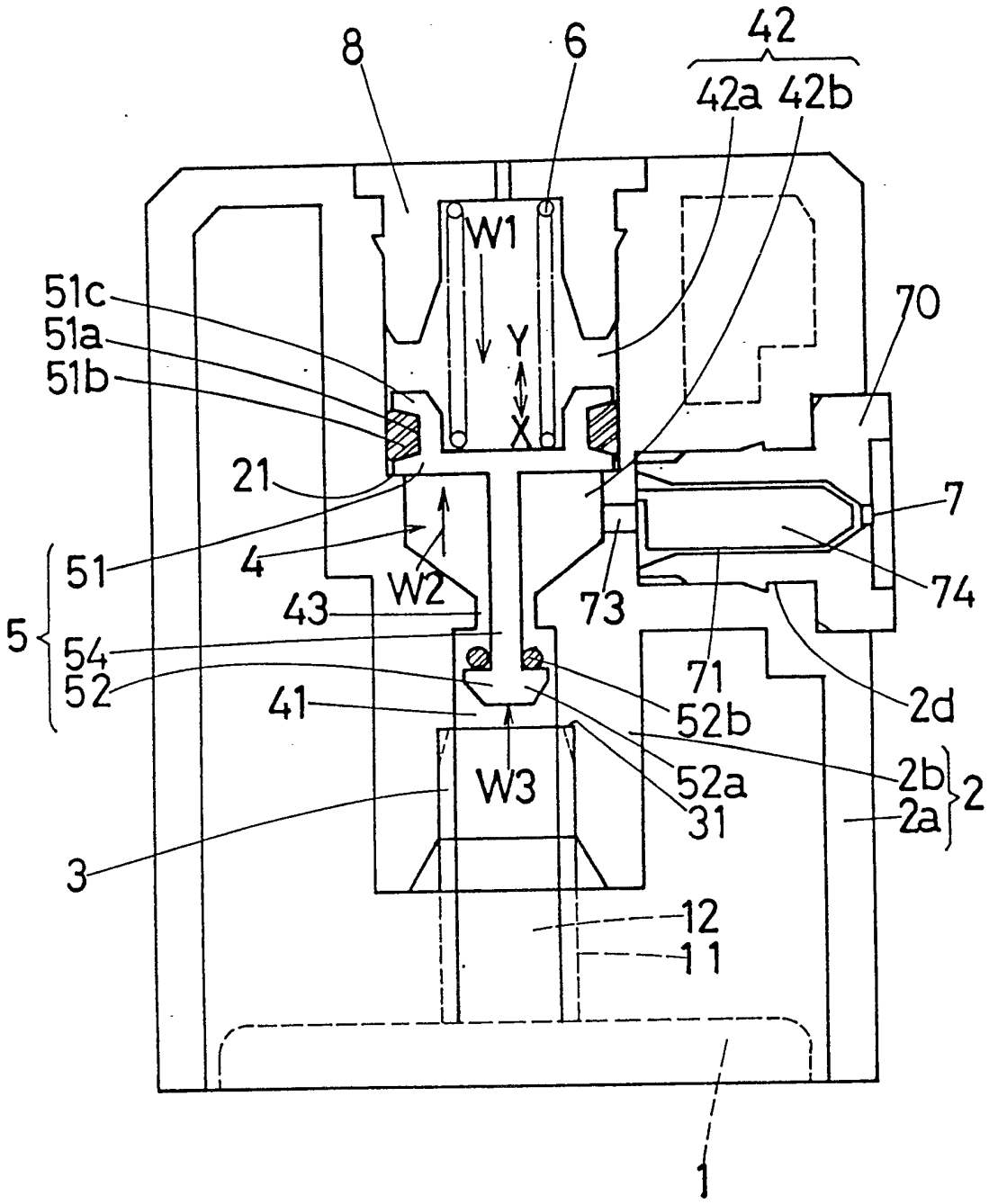

8
6
42
42a
42b
W1
Y
X
51c
51a
51b
70
21
7
51
4
W2
43
73
74
5
54
52
71
41
52b
2d
W3
52a
2b
2
31
2a
3
12
11
1

FIG. 2

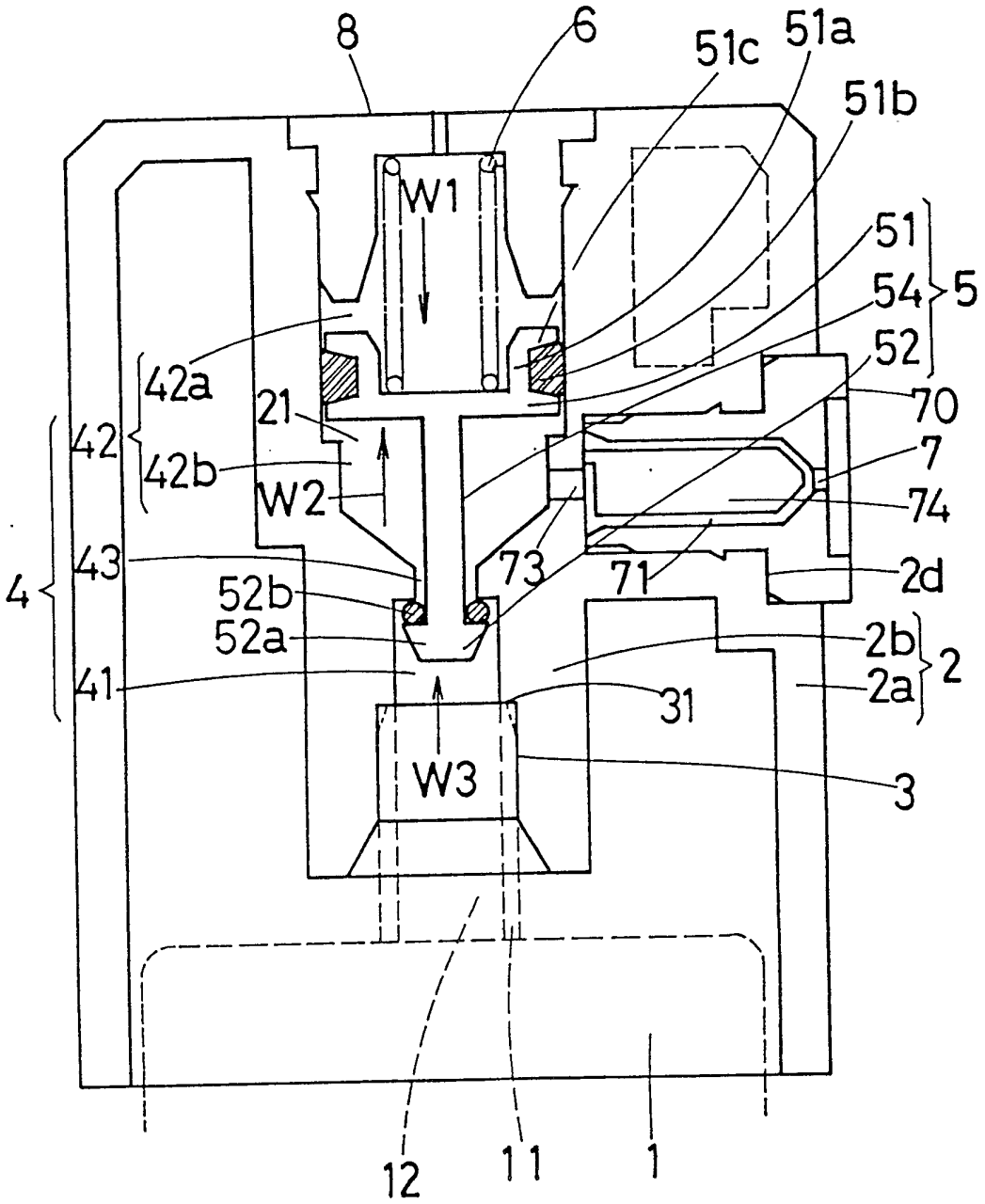

8
6
51c
51a
51b
W1
51
54
5
52
42a
21
70
42
42b
W2
7
74
4
43
73
71
2d
52b
52a
2b
2
41
31
2a
W3
3
12
11
1

FIG. 3

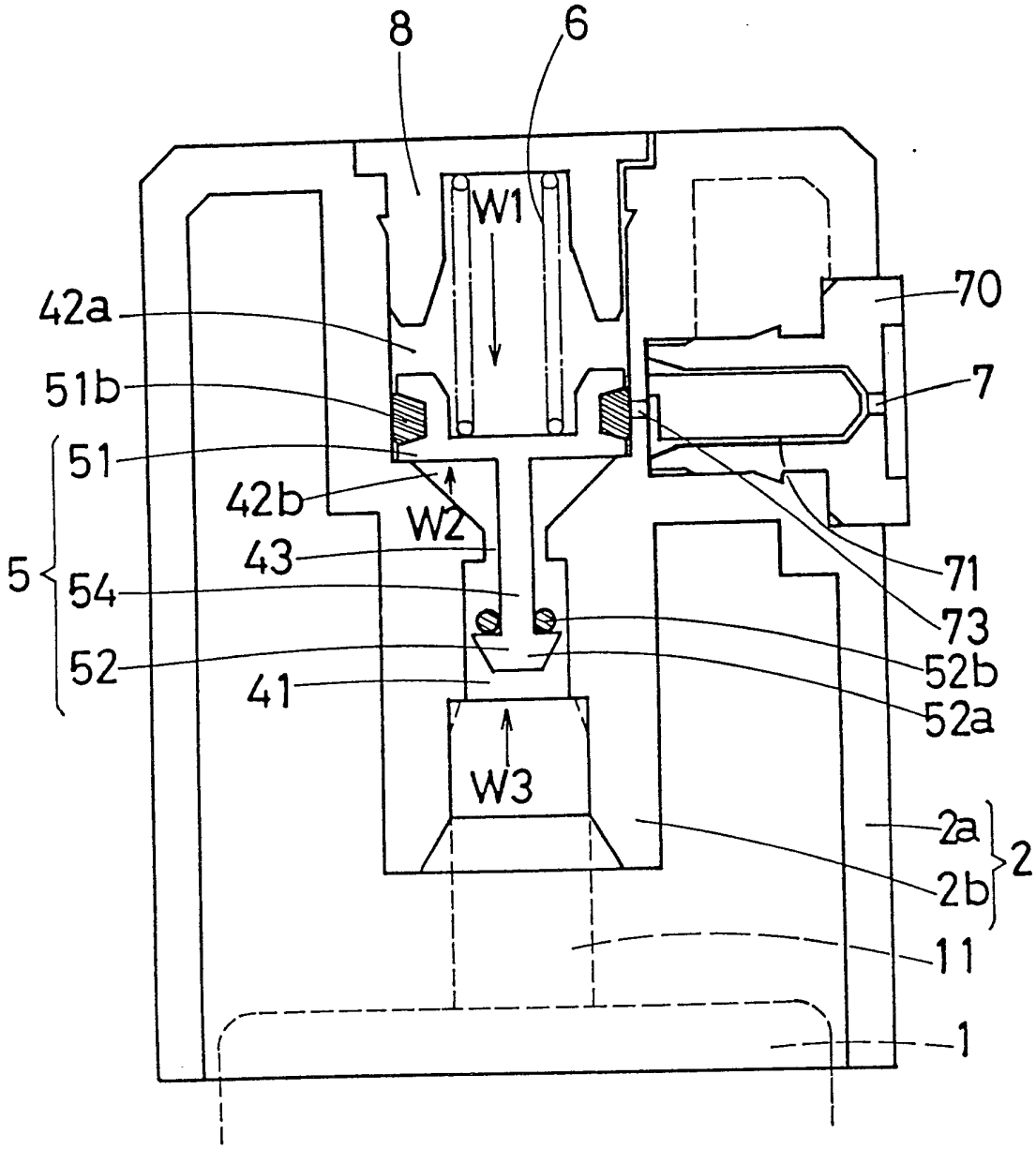


FIG. 4

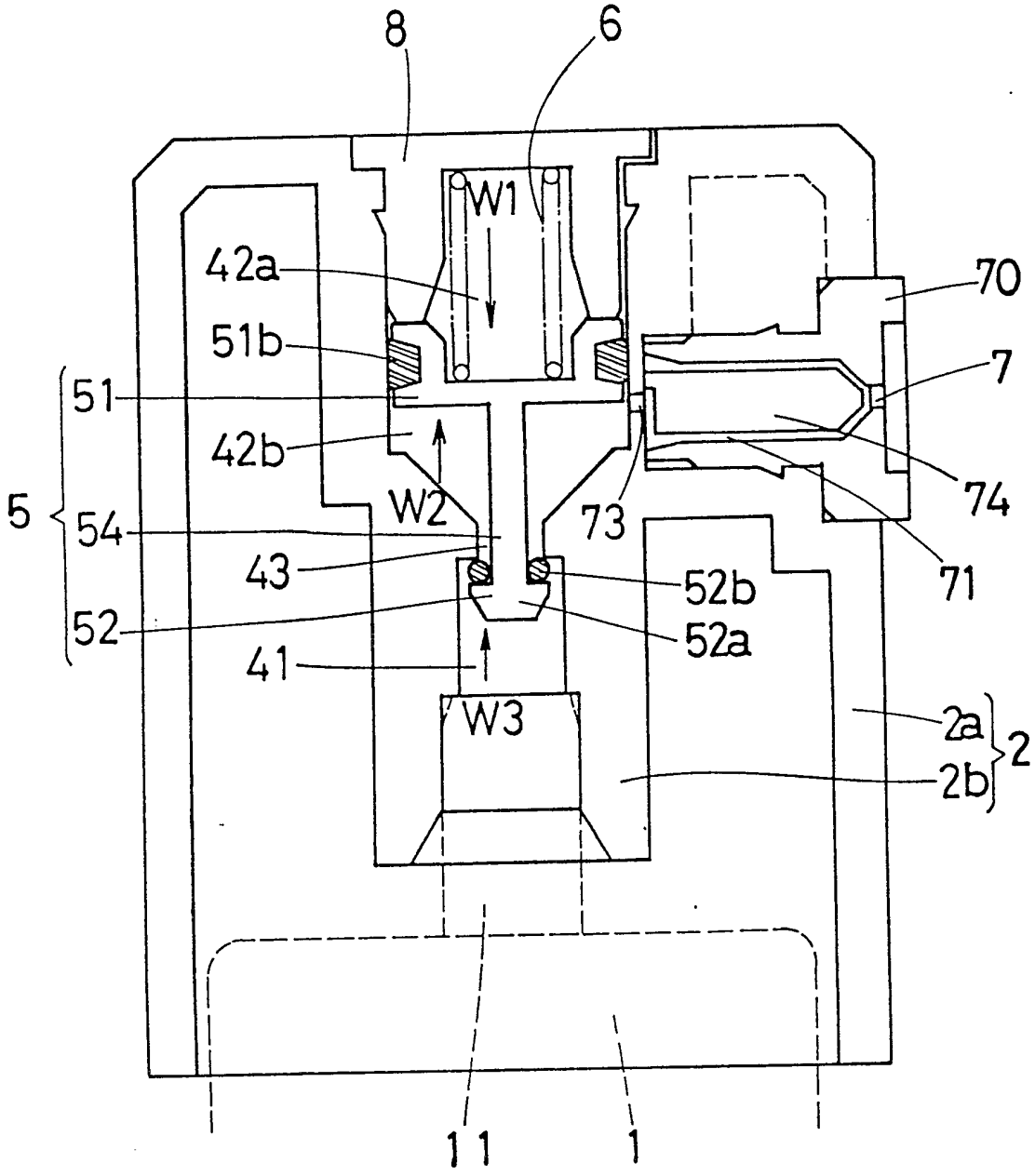

8
6
W1
42a
70
51b
7
51
42b
74
5
54
W2
73
43
71
52b
52
52a
41
W3
2a
2
2b
11
1

FIG. 5

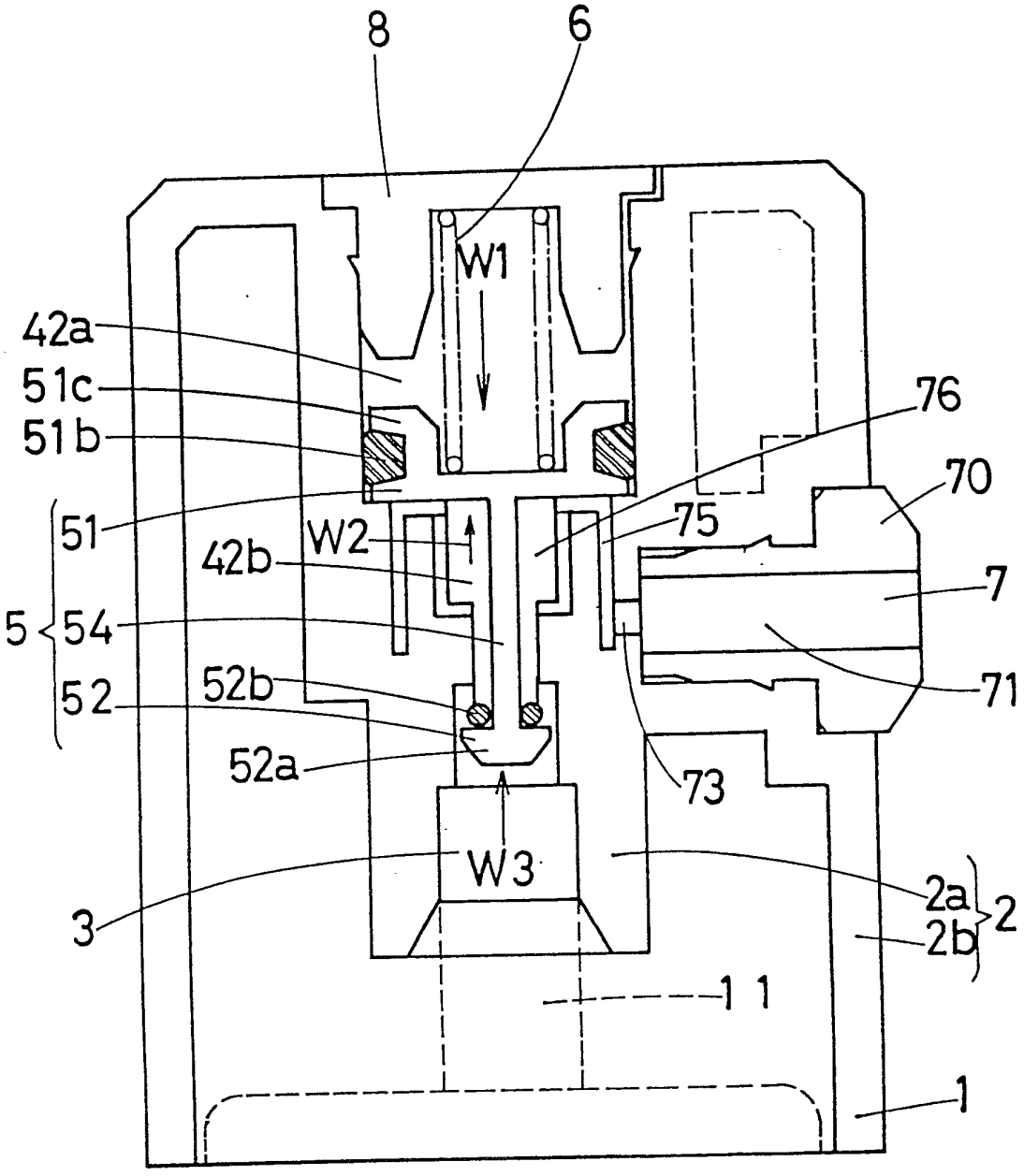

8
6
W1
42a
51c
51b
51
5
54
52
42b
W2
52b
52a
W3
3
76
70
75
7
71
73
2a
2b
2
11
1

FIG. 6

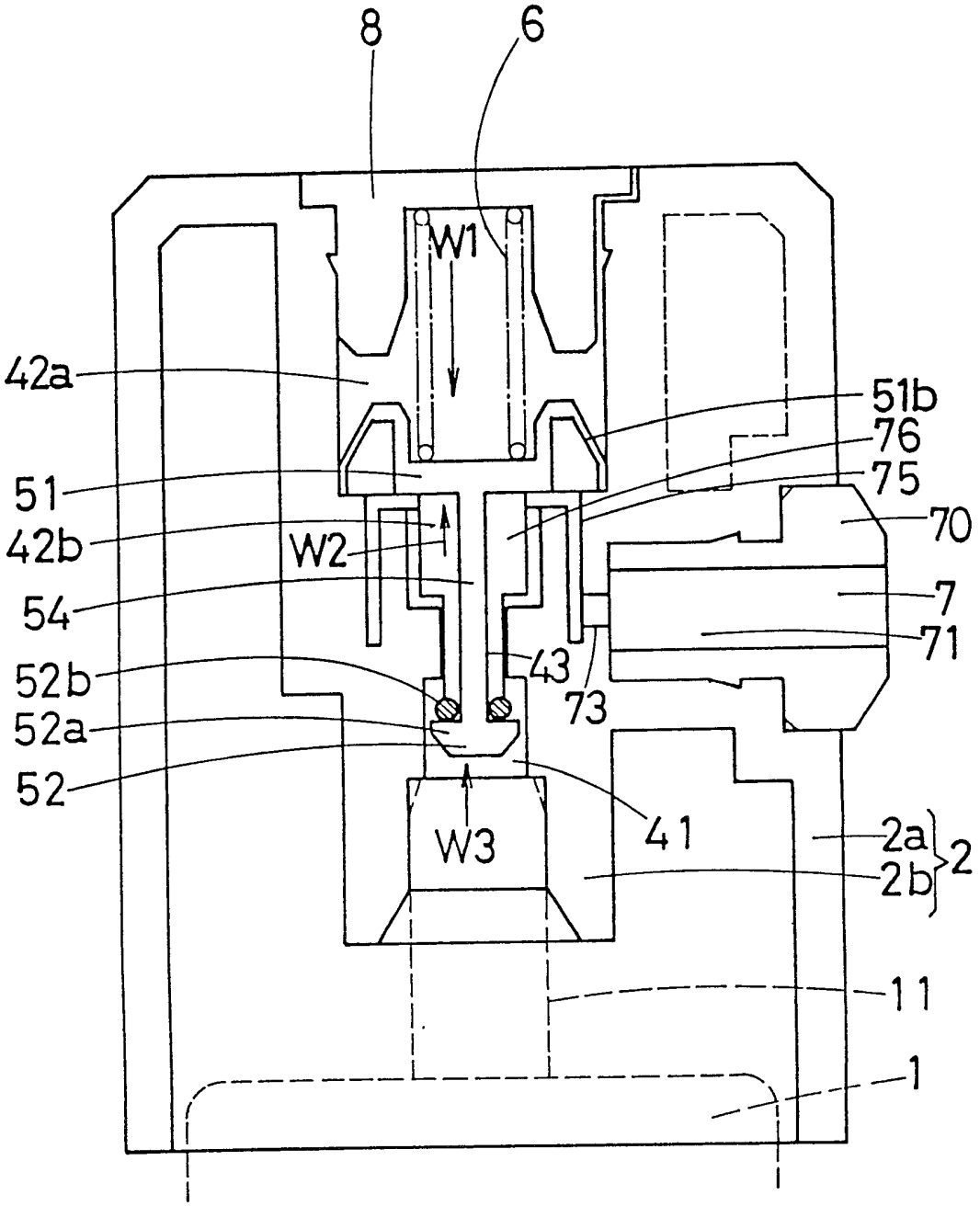
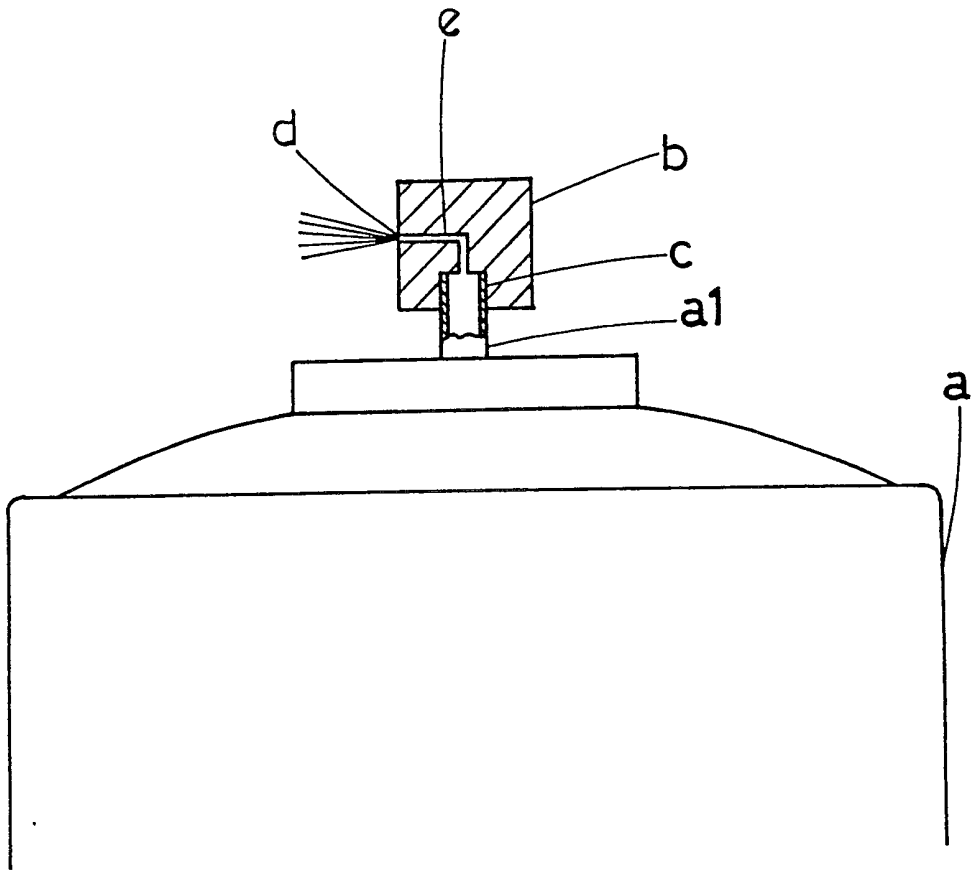

8
6
W1
42a
51b
76
75
51
42b
W2
70
54
7
71
52b
43
73
52a
52
41
W3
2a
2b
2
11
1

FIG. 7



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Aerosol spray mechanism

The present invention relates to a spray mechanism of aerosol product for ejecting the spray liquid from the container by a gas pressure by means of a vaporizing gas for spraying.

As the spraying mechanism of aerosol product using vaporizing gas as spraying gas, and ejecting the spray liquid from the container by the gas pressure of this spraying gas, for example, the construction as shown in Fig. 7 has been hitherto known.

Comprising a container a and a control member b, the control member b is provided with a nozzle fitting hole c for fitting with the front end of a nozzle a1 of the container a, an ejection hole d, and a leading path e for communicating with the nozzle fitting hole c and ejection hole d, and by pressing down the control member b engaged with the front end of the nozzle a1 of the container a, the spray liquid in the container a moves from the nozzle a1 to the leading path e, and is ejected from the spray hole d.

In the constitution in Fig. 7, when the spray liquid decreases in the container a by consumption, the gas space increases accordingly, and the internal pressure in the container decreases. As a result, initially when the container a is filled with the spray liquid and gas, the spray liquid is abundantly ejected forcibly from the spray

hole d, but when the remainder of the spray liquid becomes less than half, the ejection of the spray liquid is no longer forcible, and a sufficient amount of spray liquid cannot be ejected, and the state of atomization is poor at the same time.

Although not shown, as other spray mechanism of aerosol product, aside from the type shown above, the so-called tilt type is widely used hitherto, in which the liquid is ejected from the spray hole by tilting the nozzle of the container.

In this tilt type, same as in the above type, the spray liquid forced out from the nozzle a1 by gas is ejected from a spray hole by way of a leading path. Therefore, in this tilt type, too, as compared with the initial state, the ejection force and atomization state of the spray liquid are poor near the end of the content, and the same problems as above are present.

On the other hand, the conventional spray mechanism of aerosol product was developed on the basis of using liquefied gas represented by chlorofluorocarbons as the spraying gas. Such liquefied gas is gradually vaporized in the container a by proper amounts, so that the pressure in the container is kept almost constant from the beginning to end of use, and the problems of deterioration of ejection force and worsening of atomization state were not

apparently obvious.

However, disuse of chlorofluorocarbons has been decided from the viewpoint of environmental protection, and use of other liquefied gas such as LPG is difficult from the standpoint of safety. Hence, today, it is attempted to use CO_2 , N_2 , O_2 and other vaporized gases as the spraying gas.

These vaporized gases (especially N_2) are not dissolved well in spray liquid, and are mostly contained in the container a in a vaporized state. Accordingly, when used in the conventional spraying mechanism of aerosol product, initially, the spray liquid is released at a high pressure, but as continuing to use, the gas space increases, and the gas pressure in the container drops, and the container pressure is extremely low near the end of the content. As a result, the problems of deterioration of ejection force and worsening of atomization state become manifest.

Still more, when liquefied gas is used, a part of the liquefied gas is injected together with the spray liquid. Hence, a part of the liquefied gas is vaporized the moment it leaves the nozzle a1, and acts to transform the spray gas into a fine mist, but in the case of vaporized gas, since it is not dissolved smoothly in the spray liquid, ejection in such fine mist state is not expected.

It would therefore be desirable to be able to provide a spray

mechanism of aerosol product capable of maintaining always a specific spray state and mist state from beginning till end of use even by using vaporized gas.

It is other object of the invention to present a spray mechanism of aerosol product capable of ejecting a favorable fine mist even by using vaporized gas.

The invention provides a spray mechanism as set forth in claim 1.

In a preferred embodiment of the present invention, a container 1 containing at least a spray liquid and a spraying gas in its inside is provided with a control member 2 possessing a spray hole 7, and as the control member 2 is manipulated, the spray liquid is sent into the spray hole 7 by the gas pressure of the spraying gas from a nozzle hole 12 of a nozzle 11 provided in the container 1, so that the spray liquid is ejected from the spray hole 7.

The control member 2 comprises a control part 31 for manipulating the nozzle 11 so as to eject the spray liquid from the nozzle hole 12, a regulator mechanism unit communicating with the nozzle hole 12, and the spray hole 7 communicating with the regulator mechanism unit.

The regulator mechanism unit comprises a space 4 formed at the front end side of the nozzle 11 in the control member 2, a sliding member 5 provided slidably in the space 4, and thrusting means 6 for thrusting the sliding member 5 always to the nozzle 11 side.

The space 4 possesses a nozzle opening 41 formed at the front end side of the nozzle 11 so as to communicate with the nozzle hole 12, a communicating part 41 to communicate with the nozzle opening 41, and a connection hole 43 disposed between them to communicate between the two.

The sliding member 5 possesses a partition wall 51 disposed in the communicating part 42, and a shielding part 52 disposed in the nozzle opening 41 and connected to the partition wall 51 to be movable together with the partition wall 51. The sliding member 5 is intended to slide in the direction resisting the thrusting force W1 of the thrusting member 6 by receiving pressures (W2, W3) more than the thrusting force W1 of the thrusting means by the spray liquid and gas released from the nozzle hole 12.

The shielding part 52 is to shield the connection hole 43 by clogging from the nozzle side along with the sliding motion of the sliding member 5 in the direction resisting the thrusting force W1 of the thrusting means.

As the partition wall 51 slidably contacts with the inner circumference of the communicating part 42, it

communicates with the nozzle opening 41 in the communicating part 42, thereby forming a pool 42b for temporarily storing the spray liquid flowing in from the nozzle opening 41 and the gas dissolved partly in the spray liquid.

The pool 42b has communicating means 71, 73 for communicating between the pool 42b and the spray hole 7, and the spray liquid and gas reserved in the pool 42b until raised to the specified pressure are sent into the spray hole 7 through the communicating means 71, 73, 75.

The invention further presents a spray mechanism of aerosol product in which the communicating means 71, 73 are composed of a communicating hole 73 communicating with the pool 42b, and a narrow communicating path 71 for linking the communicating hole 73 and the spray hole 7.

The invention also presents a spray mechanism of aerosol product in which the communicating means 71, 73, 75 are composed of a narrow leading path 75 communicating with the pool 42b, a communicating hole 73 connected with the leading path 75, and a wide communicating path 71 for communicating with the communicating hole 73 and spray hole 7.

The invention still more presents a spray mechanism of aerosol product in which the container contains a spray liquid, an arbitrary liquefied gas dissolved in the spray liquid, and a vaporized gas agent for spraying.

In the invention, the control member is provided with a regular mechanism unit for partitioning the pool for temporarily storing the spray liquid delivered at an adequate pressure from the nozzle hole, and communicating means for storing the spray liquid and gas in the pool so as to raise to a specific internal pressure inside the pool, while sending the spray liquid stored in the pool to the spray hole at the specific internal pressure.

As a result, the spray liquid sent out of the nozzle hole at a proper pressure is once stored in the pool, and is then forwarded into the spray nozzle after reaching the specific pressure.

Therefore, regardless of the internal pressure of the container by the spraying gas, the spray liquid can be ejected from the spray hole at the specific pressure always maintained in the pool.

Furthermore, by dissolving a desired liquefied gas in the spray liquid, when the spray liquid is ejected, the liquefied gas is vaporized, and the spray liquid is ejected in a fine mist.

Brief Description of the Drawings

Fig. 1 is an explanatory diagram of internal structure of an embodiment of the invention;

Fig. 2 is an explanatory diagram of internal structure

showing an ejection state in an embodiment of the invention;

Fig. 3 is an explanatory diagram of internal structure of another embodiment;

Fig. 4 is an explanatory diagram of internal structure showing an ejection state in the embodiment in Fig. 3;

Fig. 5 is an explanatory diagram of internal structure of another embodiment;

Fig. 6 is an explanatory diagram of internal structure of a different embodiment;

Fig. 7 is a sectional view of a prior art.

Referring now to the drawings, some of the preferred embodiments of the invention are described in detail below.

Fig. 1 is a fragmentary enlarged sectional view of an embodiment of the invention, and Fig. 2 is a fragmentary enlarged sectional view of an ejection state.

The spray mechanism of aerosol product shown in Fig. 1 comprises an actuator or control member 2 mounted on a container 1.

The container 1 for mounting the control member 2 is same as in the prior art, and is filled with vaporized gas as spraying gas, such as air, carbon dioxide, nitrogen, laughing gas, or oxygen, together with any spray liquid, such as perfume, insecticide, or paint. In the upper part

of the container 1, a tubular nozzle 11 possessing a bore or hole 12 is provided. The nozzle 11 in the embodiment is designed to eject the spray liquid from the nozzle hole 12 by pressing down the nozzle 11, and to stop the spray liquid by releasing the nozzle so as to be pushed up by thrusting means attached to the nozzle 11, but, instead, the tilt type ejecting the spray liquid by pressing and tilting the nozzle 11 may be equally employed.

The control member 2 comprises an operation part, a regulator mechanism unit, and a spray hole 7. In this embodiment, the control member 2 is formed as a double cylindrical wall structure consisting of an outer wall 2a for forming an outer peripheral wall and an inner wall 2b for forming an inner peripheral wall as shown in Fig. 1, and the operation part and the regulator mechanism unit are provided inside the inner wall 2b, and the spray hole 7 is provided on the periphery of the outer wall 2a.

The operation part has a nozzle fitting hole 3 formed in the lower part of the inner periphery of the inner wall 2b. This nozzle fitting hole 3 has a nozzle upper end abutting part 31 provided by forming a step by reducing the inner diameter of the inner wall 2b in the portion of a specific depth from the lower end in its upper part, and when the upper end of the nozzle 11 of the container 1 abuts against the nozzle upper end abutting part 31, only the

upper part of the nozzle 11 is fitted, and as the nozzle upper end abutting part 31 descends with the control member 2, the nozzle 11 is pushed downward.

The regulator mechanism unit comprises a space 4 inside of the inner wall 2b formed in the middle of the container 2, a sliding member 5 disposed in the space 4 so as to slide in the axial direction (the X-Y direction in the drawing) of the nozzle 11 inside the space 4, and thrusting means 6 for thrusting the sliding member 5 always to the nozzle 11 (the X-direction in the drawing) side.

The space 4 is closed by an upper lid 8 provided in engagement with the inner circumferential upper part of the inner wall 2b in its upper part, and the space 4 comprises, in its inside, a nozzle opening 41 or inlet at the end facing the nozzle 11, a communicating part 42 communicating continously with the nozzle opening 41, and a connecting hole 43 for communicating the two. In this embodiment, the connecting hole 43 is provided above a certain distance from the nozzle fitting hole 3 in the inner circumference of the inner wall 2b, the inner diameter of the inner wall 2b is smaller than the diameter of the nozzle fitting hole 3, and a step is formed in the boundary to the nozzle opening 41, so that the nozzle opening 41 and the communicating part 42 are formed in mutual communication.

The sliding member 5, in this embodiment, comprises

a piston or disc-shaped partition wall 51, a protrusion 54 projecting downward from the lower surface of the partition wall 51, and an obturator or shielding part 52 at the end of the protrusion 54, which are formed in one body.

The partition wall 51 comprises a disc-shaped partition wall main body 51c, a groove 51a formed along the whole circumference of the partition wall main body 51c, and a ring-shaped enclosing member 51b as means for sealing to be fitted into the groove 51a. The partition wall 51 is disposed in the communicating part 42 so as to divide the communicating part 42 into the upper thrusting means disposing compartment 42a and lower pool 42b. The plenum chamber constituted by the pool 42b is completely separated from the thrusting means disposing compartment 42a by tightly closing the whole internal circumference of the partition wall 51 and inner wall 2b by the enclosing member 51b, and the spray liquid in the container 1 getting in the pool 42b does not escape into the thrusting means disposing compartment 42a, and the spray liquid discharged from the nozzle hole at a proper pressure is temporarily stored. The pool 42b is also equipped with communicating means for communicating between the pool 42b and the spray hole 7.

The communicating means holds the spray liquid and gas in the pool 42b so that the internal pressure in the pool 42b may be raised to a specified value, and with this

specified internal pressure, the spray liquid staying in the pool 42b is sent into the spray hole 7. In this embodiment, this communicating means is composed of communicating hole 73 opened in the inner circumference of the pool 42b, a leading path 71 for connecting the communicating hole 73 and spray hole 7 which is described later, and the spray hole 7.

The protrusion 54 is a round bar, whose diameter is smaller than the diameter of the connecting hole 43 formed between the nozzle opening 41 and the communicating part 42, and its front end side is extended into the nozzle opening 41 by communicating through the connecting hole 43.

The shielding part 52 is disposed in the nozzle opening 41, and has a flange 52a supporting a sealing or shielding member 52b. The flange 52a has its upper outer diameter larger than the diameter of the connecting hole 43, and smaller than the diameter of the nozzle opening 41, and its lower surface is a flat plane, and it is disposed so that the entire lower surface may be orthogonal to the axial direction of the nozzle 11, so that the spray liquid and gas in the container 1 delivered through the nozzle hole 12 may contact with this lower surface. On the other hand, the shielding member 52b is made of an elastic ring-shaped material, and is wound around the protrusion 54 in the upper part of the flange 52a. The outer diameter of the shielding member 52b is larger than the diameter of the

connecting hole 43 in the state being wound on the protrusion 54, thereby clogging the connecting hole 43.

As the thrusting means 6, in the embodiment, a cylindrical coil spring 6 is used, and is set between the partition wall 51 and upper lid 8 so that the lower end may abut against the upper surface of the partition wall 51 and the upper end against the lower surface of the upper lid 8, and is disposed in the thrusting means disposing compartment 42a, and normally when the spray liquid and gas are not supplied into the pool 42b from the nozzle 11 as shown in Fig. 1, it is stopped in the thrust state by pushing from above to the partition wall stopping part 21 provided in the inner peripheral wall in the upper part of the communicating hole 73.

The spay hole 7 is, in this embodiment, provided in a spray member 70 made separately from the control member 2, and is composed as the spray member 70 is mounted on the control member 2. The spray member 70 possesses a leading path 71 communicating with the pool 42b in the regulator mechanism unit being disposed in the left part, and the spray hole 7 formed at the right end of the leading path 71. The leading path 71 is **defined by** a hole formed in the left part of the spray member 7, and a cylindrical chip **insert** 74 disposed in this hole, and the narrow gap formed between the hole and the outer circumference of the

insert 74 fo.ms the leading path 71. The spray hole 7 is a tiny hole, and injects the spray liquid forced out from the leading path 71 in a mist state through the spray hole 7. This spray member 70 is engaged with spray member fitting hole 2d provided in the outer wall 2a of the control member 2 so that the communicating hole 73 of the control member 2 and the leading path 71 communicate with each other, but since the leading path 71 is narrow and the spray hole 7 is tiny, the spray liquid and the gas to be delivered are limited until ejected from the communicating hole 73, thereby functioning as the communicating means.

The operation of the spray mechanism is described below.

First, the nozzle 11 of the container 1 is inserted into the nozzle fitting hole 3 of the control member 2 as the control member 2 is attached to the container 1. In this installed state, as shown in Fig. 1, the sliding member 5 is thrust by the cylindrical coil spring 6, and the lower end outer periphery of the partition wall 51 of the sliding member 5 is stopped on the partition wall stopping part 21 of the inner wall 2b in a state of being pushed down, while the shielding part 52 is positioned nearly in the middle in the vertical direction of the nozzle opening 41, thereby keeping open the connecting hole 43.

Subsequently, the top of the control member 2 is

pressed down by hand. As a result, the nozzle 11 is pushed down by the nozzle upper end abutting part 31 of the nozzle fitting hole 3, and the spray liquid in the container 1 is ejected from the nozzle hole 12 by the pressure of the vaporized gas in the container 1. The ejected spray liquid hits against the lower surface of the shielding part 52, and is loaded with a pressure W3 in the upward direction, and gets into the pool 42b through the connecting hole 43 in the open state from the gap between the outer circumference of the shielding part 52 and inner circumference of the nozzle opening 41. When a certain amount of spray liquid and gas gets into the pool 42b, the internal pressure W2 in the pool 42b is raised by the spray liquid pushed out by the gas. At this time, the spray liquid getting into the pool 42b also flows into the leading path 71 of the spray member 7 from the communicating hole 73, but since the amount is smaller than the volume getting into the pool 42b from the nozzle 11, the internal pressure W2 in the pool 42b is increased instantly.

When the internal pressure W2 further climbs until the sum W2 + W3 of the internal pressure W2 applied on the partition wall 51 of the sliding member 5 forming the upper surface of the pool 42b and the pressure W3 applied on the lower surface of the shielding part 52 becomes larger than the thrusting force W1 for thrusting down the sliding member

5 by the cylindrical coil spring 6, the sliding member 5 is pushed upward. At this time, successively, the spray liquid in the pool 42b is sent into the leading path 71 of the spray member 7 through the communicating hole 73. When the sliding member 5 is pushed up, as shown in Fig. 2, the shielding member 52b of the shielding part 52 closes the communicating hole 43 from beneath, thereby setting in a closed state. Therefore, inside the pool 42b, the internal pressure W2 is no longer elevated, and the spray liquid is sent into the leading path 71 of the spray part 7 at this internal pressure W2.

When the spray liquid is sent into the leading path 71 to a certain extent, the internal pressure W2 in the pool 42b begins to drop gradually until the sum pressure W2+W3 is lower than the thrusting force W1 of the cylindrical coil spring 6, and then the sliding member 5 slides down, substantially stopping the feed of spray liquid and gas into the leading path 71 of the spray member 7, while the connecting hole 43 is opened again. Consequently, the spray liquid begins to enter the pool 42b again and the sum pressure W2+W3 builds up, and the spray liquid in the pool 42b is sent from the communicating hole 73 into the leading path 71 of the spray member 70, while the sliding member 5 is pushed upward at the same time. Thereafter, by repeating this process instantly, the spray liquid is ejected from

the spray hole 72 in a mist state always at the internal pressure W2. Therefore, from beginning till end of use, the spray liquid is sent out always at a constant pressure of W2, and a constant spray state and mist state may be maintained. Incidentally, by using various cylindrical coil springs 6 with different thrusting forces, an appropriate pressure may be easily adjusted.

Referring then to Figs. 3 to 6, other embodiments are described below.

In the embodiment shown in Fig. 3, the nozzle fitting hole 3 as the operation part of the control member 2, regulator mechanism unit, and spray member 70 are same as in the foregoing embodiment. What is different is that the partition wall stopping part 21 for stopping the partition wall 51 of the sliding member 5 is disposed below the communicating hole 73 for communicating between the pool 42b and the leading path 71 of the spray member 7. As shown in Fig. 3, in the state of not operating the nozzle 11, that is, in the state in which the sliding member 5 receives only the thrusting force W1 of the cylindrical coil spring 6, the communicating hole is closed by the enclosing member 51b of the sliding member 5, by installing communicating means.

Consequently, as shown in Fig. 4, the spray liquid is

pushed up by the pressure of the vaporized gas, and only when the pool 42 achieves a specific pressure, the communicating hole is connected with the pool 42b, so that the spray liquid may be sent into the spray part 7 at the specific pressure. As the spray liquid is sent forth, the internal pressure in the pool 42b drops from the specific level, then the communicating hole 73 is closed by the enclosing member 51b. Therefore, until the internal pressure in the pool 42b reaches the specified level, the spray liquid in the pool 42b is prevented securely from flowing into the spray member 70, so that the spray liquid may be ejected always at the specific pressure only.

In the embodiment shown in Fig. 5, the leading path 71 of the spray member 70 and the spray hole 7 have a large diameter, and a narrow guide path 75 is disposed in the outer part of the pool 42b consecutively to the communicating hole 73. As in the preceding embodiments, in the case of the spray member 70 of so-called break-up type having the leading path 71 of the spray member 70 and the spray hole 7 in a smaller diameter, the amount sent into the leading path 71 from the pool 42b is smaller than the quantity collected in the pool 42b as mentioned above, and therefore the internal pressure is instantly built up in the pool 42b. However, in the case of this embodiment employing the spray member 70 of the so-called straight type,

the spray liquid is sent out from the pool 42b to the leading path 71 while the internal pressure is built up in the pool 42b. Accordingly, the guide path 75 is provided in the pool 42b to restrict such flow, so that the specified internal pressure may be built up in the pool 42b. In the drawing , numeral 76 denotes a plate member. A plurality of such plate members 76 are provided at equal intervals in the circumferential direction so as to project outward in the radial direction from the outer circumference of the sliding member 5, thereby preventing swaying of the sliding member 5 when the sliding member 5 moves up and down and guiding the sliding member 5 smoothly up and down.

In the embodiment shown in Fig. 6, same as the embodiment shown in Fig. 5, the spray member 70 of straight type is used, and a guide path 75 is provided in the pool 42b. The sealing or enclosing member 51b of the sliding member 5 is formed integrally with the sliding member 5. Hence, the job efficiency in assembly may be enhanced, and the manufacturing cost is lower.

Thus, as the spraying gas, various vaporized gases may be used. These vaporized gases (especially N_2) are hardly dissolved in the spray liquid, and the spray liquid is hardly atomized at the time of spraying, and it is difficult to obtain a fine mist.

Hence, only the spray liquid and the vaporizing gas may

be contained in the container 1, but preferably, a slight amount of liquefied gas is dissolved in the spray liquid and contained in the container.

As the liquefied gas, LPG, DME (dimethyl ether), or other desired gases may be used.

The liquefied gas is easily dissolved in the spray liquid, and is ejected into the atmosphere together with the spray liquid from the spray hole 72. Since the liquefied gas is abruptly vaporized and expanded, the spray liquid also becomes a fine mist.

Thus, the liquefied gas should be used for forming the spray liquid in a fine mist after ejection, and the injection of the spray liquid itself is done by the pressure of the vaporized gas, the blending amount in the spray liquid may be only very slight. Incidentally, the LPG is dissolved in alcohol, but is hardly dissolved in water, and the possible range of the dissolved amount varies with the ejection set pressure, that is, the pressure in the container 1 by the vaporized gas.

A practical example of the relation between the spray liquid, liquefied gas and ejection set pressure, that is, the pressure in the container by the vaporized gas, is shown in Table 1. Table 1 shows the possible range of the dissolved amount of liquefied gas in the case of application of spray liquid and ejection set pressure.

Table 1

	Ejection Set Pressure	Spray Liquid	Liquefied Gas
(A)	1 kg/cm ^{2}	99% alcohol 100 wt	LPG 5.26 wt
(B)	2 kg/cm ^{2}	same as (A)	LPG 10.87 wt
(C)	3 kg/cm ^{2}	same as (A)	LPG 20.67 wt
(D)	1 kg/cm ^{2}	same as (A)	DME 11.36 wt
(E)	2 kg/cm ^{2}	same as (A)	DME 27.03 wt
(F)	3 kg/cm ^{2}	same as (A)	DME 52.08 wt
(G)	1 kg/cm ^{2}	refined water 100 wt	DME 4.79 wt
(H)	2 kg/cm ^{2}	same as (G)	DME 9.50 wt
(I)	3 kg/cm ^{2}	same as (G)	DME 14.60 wt
(J)	1 kg/cm ^{2}	99% alcohol 50 wt refined water 50 wt	LPG 0.50 wt
(K)	2 kg/cm ^{2}	same as (J)	LPG 1.00 wt
(L)	3 kg/cm ^{2}	same as (J)	LPG 1.60 wt
(M)	1 kg/cm ^{2}	same as (J)	DME 8.92 wt
(N)	2 kg/cm ^{2}	same as (J)	DME 20.01 wt
(O)	3 kg/cm ^{2}	same as (J)	DME 34.51 wt
(P)	1 kg/cm ^{2}	99% alcohol 30 wt refined water 70 wt	LPG 0.27 wt
(Q)	2 kg/cm ^{2}	same as (P)	LPG 0.57 wt
(R)	3 kg/cm ^{2}	same as (P)	LPG 0.95 wt
(S)	1 kg/cm ^{2}	same as (P)	DME 6.53 wt
(T)	2 kg/cm ^{2}	same as (P)	DME 14.51 wt
(U)	3 kg/cm ^{2}	same as (P)	DME 26.79 wt

wt = parts by weight

In the case of (A) in Table 1, for example, when the ejection set pressure, that is, the pressure in the container 1 by the vaporized gas is 1 kg/cm ^{2} , in 100 wt of spray liquid composed of 99 % alcohol, the LPG can be dissolved by up to 5.26 wt. That is, a proper amount of LPG less than 5.26 wt is dissolved in 100 wt of spray liquid of 99 % alcohol, and is contained in the container 1. In Table 1, meanwhile, the temperature of the spray liquid and liquefied gas is 25 ℃, and the LPG at this temperature possesses a pressure of 4.4 kg/ cm^2, while DME, 4.7 kg/ cm^2.

Thus, in the invention, the spray liquid to be ejected from the nozzle hole at an adequate pressure from the pool is once stored in the pool, and is sent into the spray hole after being raised to the specified pressure, and therefore the spray liquid can be ejected from the spray hole always at a specific pressure in the pool, regardless of the internal pressure in the pool.

Hence, the spray liquid can be sent out at a specific pressure staying always in the pool from beginning till end of use, and constant spray state and mist state can be maintained.

Furthermore, by dissolving a desired liquefied gas in the spray liquid, the liquefied gas is vaporized when the spray liquid is ejected, and the spray liquid is formed in a fine mist, so that a favorable atomization state may be

achieved.

Accordingly, the above-described spray mechanisms are capable of maintaining substantially constant spray state and mist state from beginning to end of use of a pressurised container, even when the spray liquid is propelled by compressed gas which is not liquefied.

Claims:-

1. A spray mechanism for ejecting an aerosol from a container having a nozzle which is actuable to cause release of the pressurised contents through the nozzle, the spray mechanism comprising a control member for actuating the nozzle, the control member including an inlet for receiving pressurised fluid from the nozzle, an intermediate chamber, a connecting hole providing communication between the inlet and the intermediate chamber, a spray hole, communicating means for communicating between the intermediate chamber and the spray hole, the intermediate chamber having a wall which is movable to vary the volume of the chamber, means for urging the movable wall to apply pressure to fluid in the intermediate chamber, and means for obstructing the connecting hole in response to excessive pressure in the intermediate chamber.

2. A spray mechanism as claimed in claim 1, in which the movable wall constitutes a piston.

3. A spray mechanism as claimed in claim 2, in which the piston is urged by the urging means to a position in which it cuts off communication between the intermediate chamber and the spray hole.

4. A spray mechanism as claimed in any preceding claim, in which the obstructing means comprises an obturator linked to the movable wall.

5. A spray mechanism as claimed in any preceding claim, in which the communicating means includes a restriction for

resisting the flow of pressurised fluid from the intermediate chamber to the spray hole.

6. A spray mechanism as claimed in claim 5, in which the communicating means comprises a communicating hole opening into the intermediate chamber and a restricted communicating path between the communicating hole and the spray hole.

7. A spray mechanism as claimed in claim 5, in which the communicating means comprises a restricted path communicating between the intermediate chamber and a wider communicating path which leads to the spray hole.

8. A spray mechanism as claimed in any preceding claim, in combination with a container having a nozzle which is actuable to cause release of the pressurised contents through the nozzle, the inlet of the control member being connected to the nozzle.

9. A spray mechanism as claimed in claim 8, in which the nozzle is actuable by pressing and/or tilting.

10. A spray mechanism as claimed in claim 8 or 9, in which the container contains a liquid which is to be sprayed, a liquefied gas dissolved in the spray liquid, and a gaseous propellant.

11. A spray mechanism substantially as described with reference to, and as shown in, Figures 1 and 2, Figures 3 and 4, Figure 5, or Figure 6 of the accompanying drawings.

12. An aerosol spray mechanism comprising a container (1) containing at least a spray liquid and a spraying gas, provided with a control member (2) possessing a spray hole (7), whereby as

the control member (2) is manipulated, the spray liquid is sent to the spray hole (7) by the gas pressure of the spraying gas from a nozzle hole (12) of a nozzle (11) provided on the container (1), so that the spray liquid is ejected from the spray hole (7), wherein:

the control member (2) comprises a control part (31) for actuating the nozzle (11) so as to release the spray liquid from the nozzle hole (12), regulator means communicating with the nozzle hole (12), and the spray hole (7) communicating with the regulator means,

the regulator means comprises a space (4) aligned with the nozzle (11), in the control member (2), a sliding member (5) in the space (4), and thrusting means (6) for urging the sliding member (5) towards the nozzle (11),

the space (4) comprises a nozzle opening (41) which communicates with the nozzle hole (12), a communicating part (42) to communicate with the nozzle opening (41), and a connection hole (43) disposed between them to communicate between them,

the sliding member (5) comprises a partition wall (51) disposed in the communicating part (42), and a shielding part (52) disposed in the nozzle opening (41) and connected to the partition wall (51) to be movable together with the partition wall (51), and

the sliding member (5) slides in the direction opposite to that of the thrusting force (W1) of the thrusting means (6) when it receives a counter-force exceeding the thrusting force (W1) of

the thrusting means, due to the pressure (W_2,W_3) exerted by the liquid and gas released from the nozzle hole (12),

the shielding part (52) obturates the connection hole (43) by blocking from the nozzle side along with the sliding motion of the sliding member (5) in the direction opposite to that of the thrusting force (W1) of the thrusting means (6),

the partition wall (51) delimits in the communicating part (42) a pool (42b) for temporarily storing the spray liquid flowing in from the nozzle opening (41), and the gas dissolved partly in the spray liquid, and

communicating means (71,73) communicate between the pool (42b) and the spray hole (7), the spray liquid and gas remaining in the pool (42b) until a given pressure is reached.

Patents Act 1977
Examiner's report to the Comptroller under Section 17
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Databases (see below)
(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii)

Documents considered relevant following a search in respect of Claims :-
1-12

Categories of documents

X: Document indicating lack of novelty or of inventive step.

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A: Document indicating technological background and/or state of the art

P: Document published on or after the declared priority date but before the filing date of the present application.

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&: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	EP 0315779 A2	(FPD) note diaphragm 33 which appears to apply spring force to pressurise the fluid in the intermediate chamber	1 at least

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