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(54) **An aerosol can**

(57) An aerosol can has the upper end of a valve housing sealingly held in a central dome 16 of a cover 1 and an annular groove 20 surrounds the dome 16, has a substantially U-shaped cross-section and its bottom 21, is provided with an outwardly convex ridge 22, running in the peripheral direction, so that, when filling the aerosol can and when the can is in the upside-down spray position, the ball 11 of a ball valve rests against the inner, non-deformed part 23, located below the dome 16, of the bottom 21 of the annular groove.

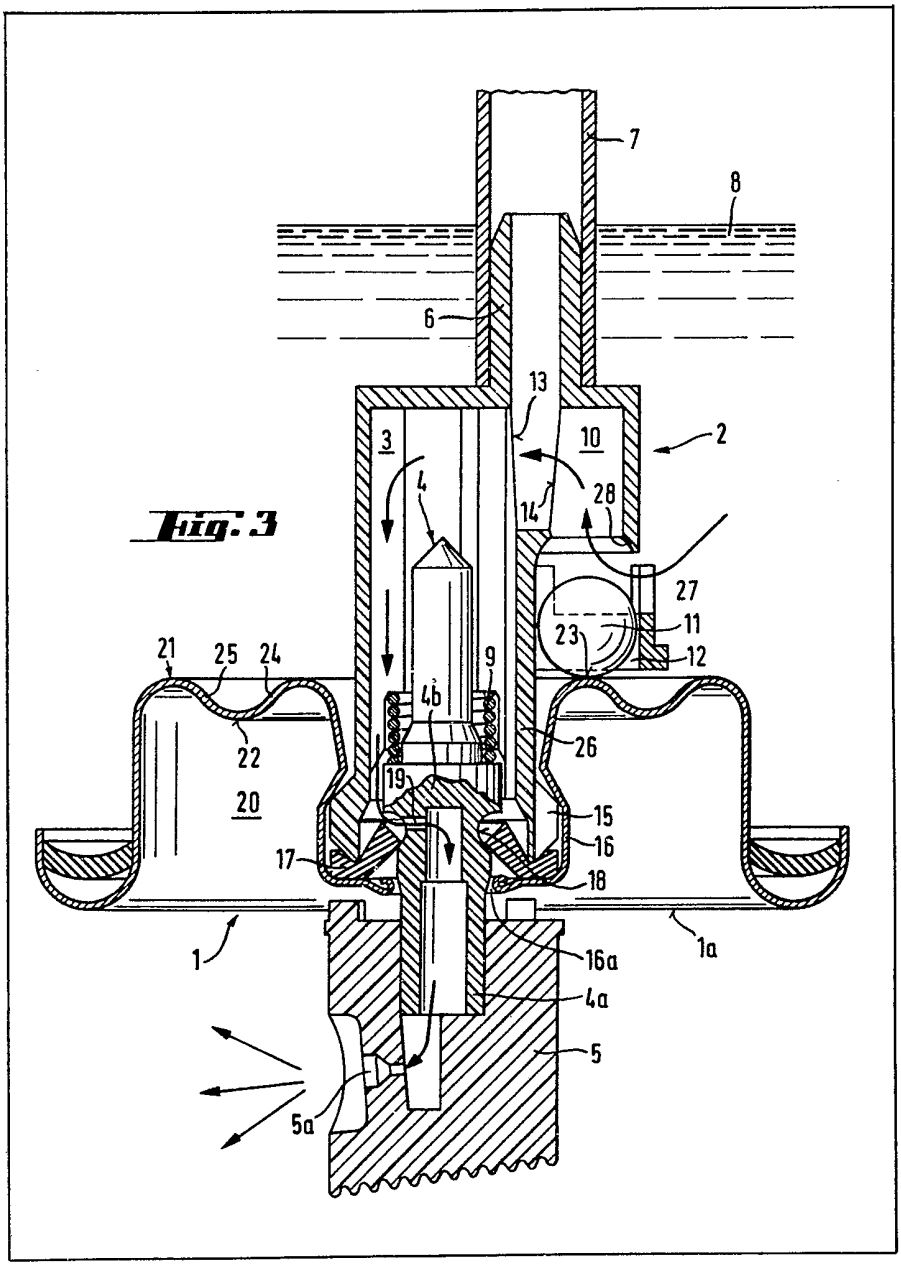

Fig. 3

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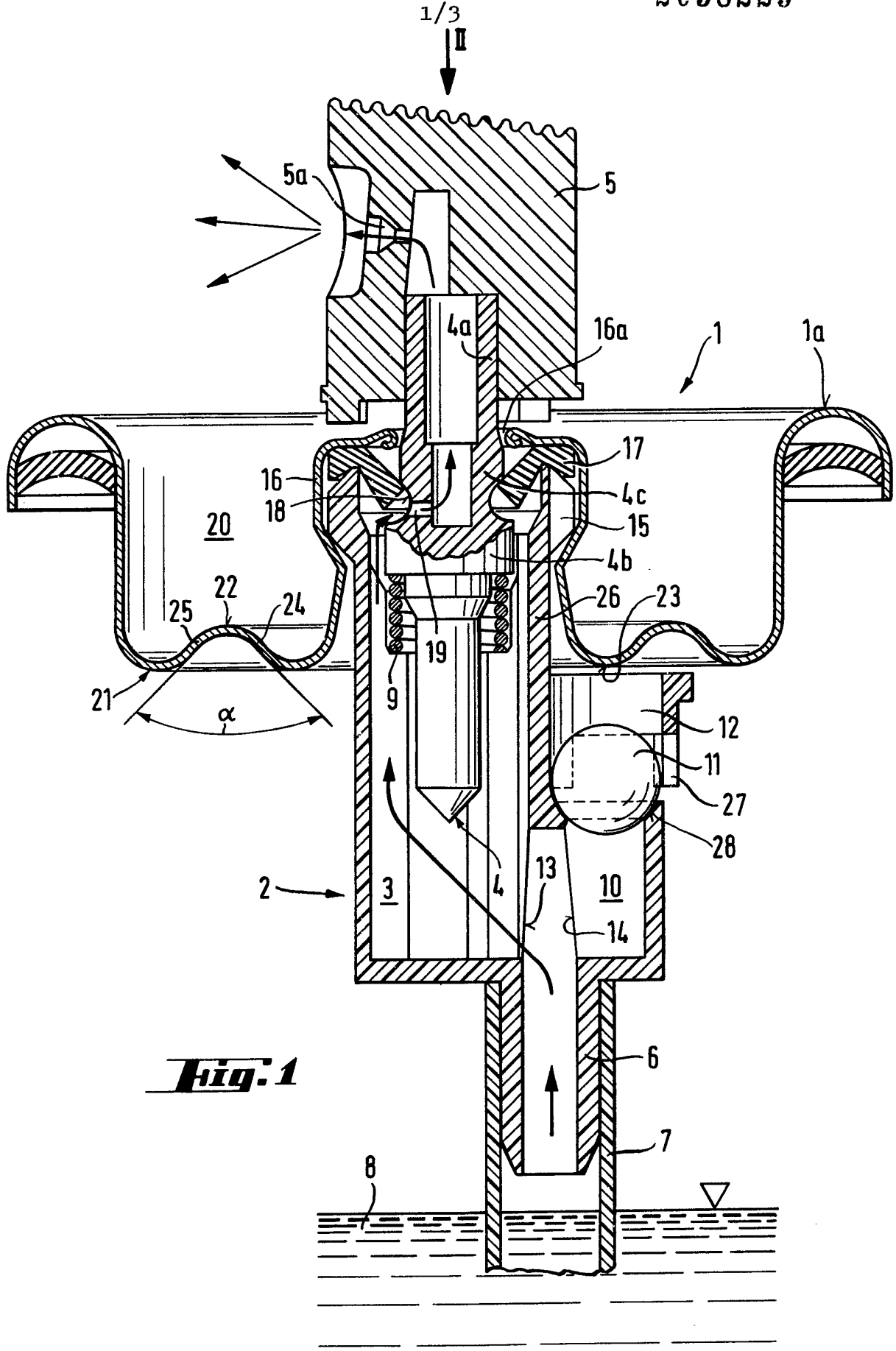
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Fig. 1

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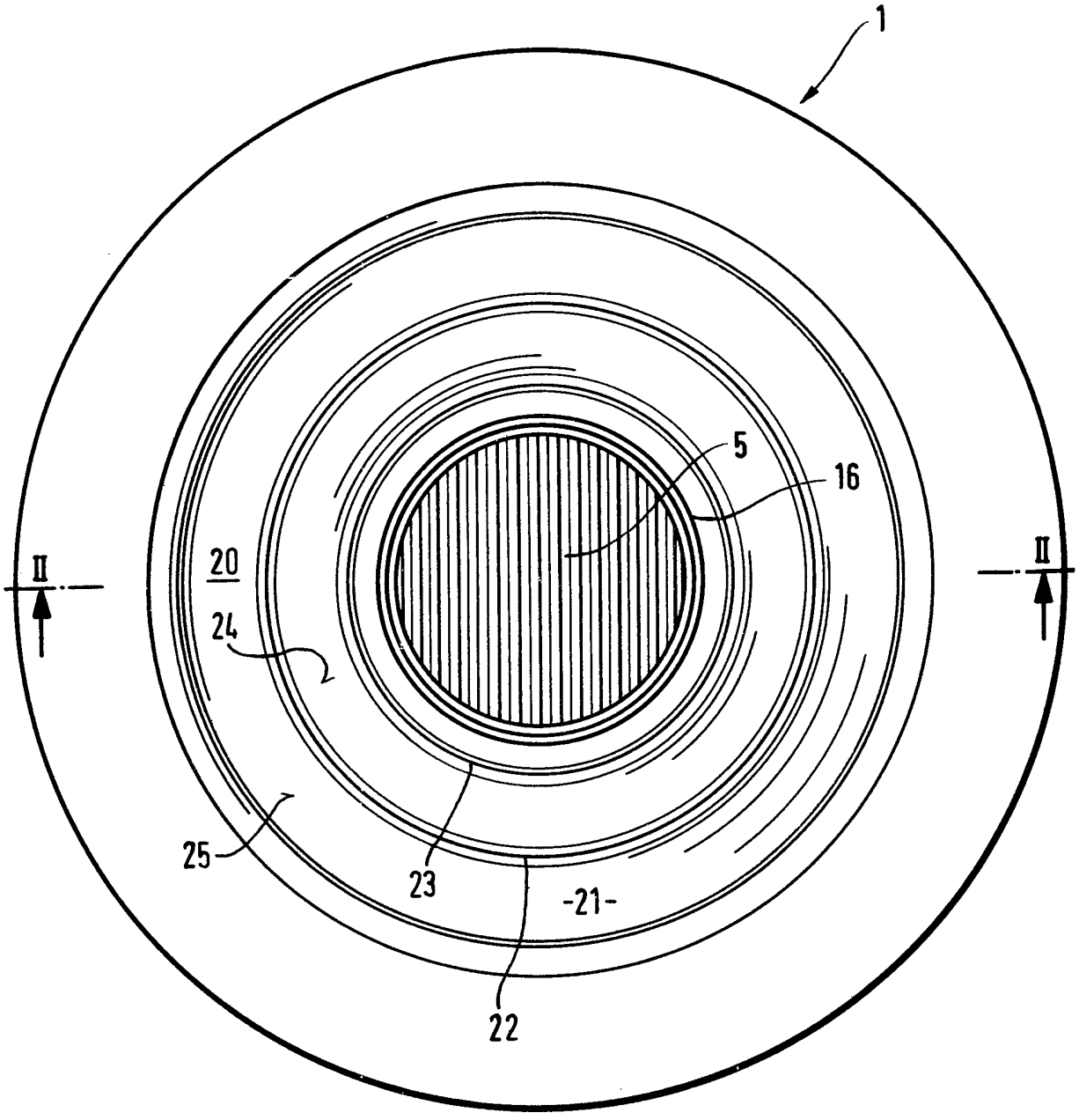
Fig. 2



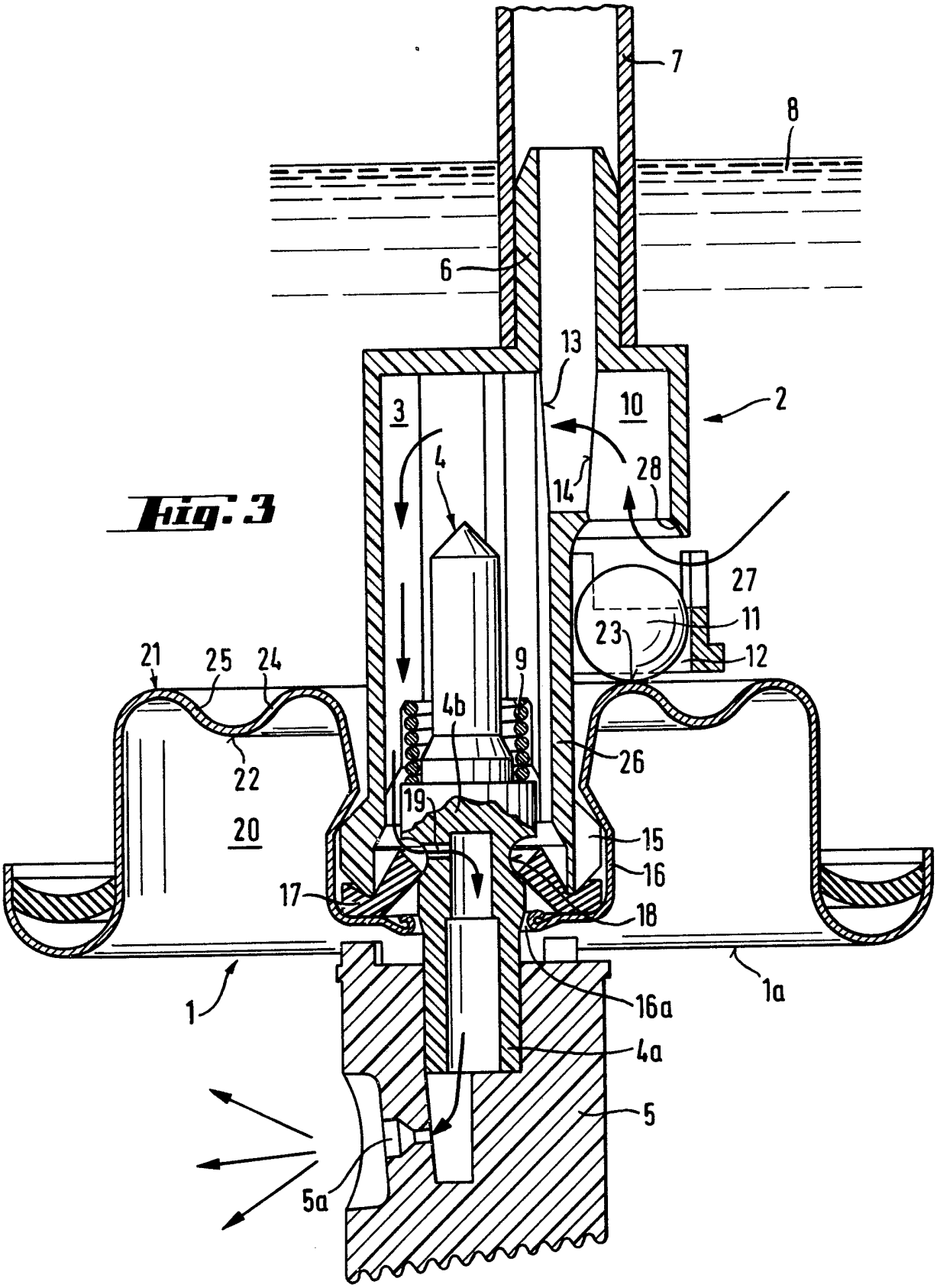

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Fig. 3

SPECIFICATION
An aerosol can

The present invention relates to an aerosol can.

If relatively high pressures, from about 4 bar upwards, are used in an aerosol can, and an annular groove surrounding the dome of the aerosol container cover has a flat or plane-surfaced bottom, deformations can occur which affect both the leaktightness of the aerosol can and the extent to which the valve shaft projects beyond the upper rim of the can. This effect is important if dispensing heads or spray caps are used which not only rest on the valve shaft but also are supported on the rim of the can cover and on the can itself.

In order to prevent the can cover from giving way under pressure, it is known to use a can cover whose annular groove having a bottom which is in the shape of an inwardly and outwardly conically tapering surface or of a shell in the shape of a spherical cap. When using a ball valve in conjunction with such a can cover, the ball is not held by the can cover when the can is inverted and, during filling of the aerosol can, the ball is projected upwardly and remains there.

It is an object of the invention to provide an improved aerosol can having a cover for accommodating a ball valve housing, so as to ensure reliable functioning of the ball valve during filling of the aerosol can and in an upside-down spraying position.

According to the present invention there is provided an aerosol can in which the upper end of the valve housing is sealingly held in the interior of a dome, which is located outwardly projecting in the centre of the can cover and forms part of an annular groove, which surrounds the dome, which is outwardly open in the direction of the can axis and which has substantially U-shaped cross-section, the bottom of the annular groove, which groove is of substantially U-shaped cross-section, being provided with an outwardly convex ridge, running in the peripheral direction, so that, when filling the aerosol can and when the can is in the upside-down spray position, the ball of the ball valve rests agains the inner, non-deformed part, located below the dome, of the bottom of the annular groove. Such an aerosol can generally has a cover for accommodating a ball valve housing which, in its main channel accommodates, in an outwardly sealing and axially movable manner, a valve shaft onto which a dispensing head can be mounted and which, at its other end, merges into a riser tube nipple with dip tube, a spring resting against the valve shaft and against the valve housing pressing the valve shaft into the closed position in which the main channel is sealingly closed in the direction of the dispensing head, the ball valve housing further having a side channel, which is moulded onto the valve housing, which opens into the main channel before the sealing position and which possesses a ball valve, the ball of which ball valve, when the can is standing upright, rests in a conical valve seat and closes the side channel whilst, when the can is inverted, the ball leaves the side channel and is held in a ball cage of the side channel, bounded by the can cover, the main channel and the side channel being arranged axially parallel and facing one another on either side of the dip tube axis and each opening into the dip tube via a connecting orifice.

During filling of an aerosol can in accordance with the invention and during spraying through the dispensing valve with the can in the upside-down position, the ball presses against the inner face of the can cover below the dome, preferably against the lowest, rib-shaped portion, of the cover, so that the ball only rests by point contact against the can cover. At the same time, the ridge provides greater rigidity to the bottom of the annular groove of the can cover so that, for pressures of up to 12 bar, the height of the dome only changes very slightly relative to the can rim; thus, the leaktightness of the aerosol can is maintained more securely.

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

Figure 1 shows an axial sectional view of a cover for an aerosol can, with a ball valve housing fixed therein, the aerosol can being in the upright position,

Figure 2 shows a plan view, in the direction of arrow II corresponding to Figure 1, and

Figure 3 shows an axial sectional view of the cover of Figure 1 with ball valve in the dispensing position with the aerosol can inverted.

Referring now to the drawings, there is shown a cover 1 for an aerosol can, itself not shown, which cover accommodates a ball valve housing 2, the main channel 3 of which accommodates a tubular valve shaft 4. A dispensing head 5 is mounted on an outer, tubular end 4*a* of the valve shaft 4. The other end of the valve housing 2 merges into a dip tube nipple 6 onto which is pushed/fitted a dip tube 7. The dip tube 7, when the aerosol can is upright, dips into liquid 8 present in the can. A compression spring 9, which bears against the valve shaft 4 and the valve housing 2, biases the valve shaft 4 into the closed position, in which the main channel is sealingly closed in the direction of the dispensing head 5. The valve housing 2 is furthermore provided with a side channel 10, which is moulded onto the valve housing 2 and which opens into the main channel 3. The side channel 10 contains a ball valve, ball 11 of which rests in a conical valve seat 28 and closes the side channel 10, when the can is upright as shown in Figure 1. When the aerosol can is inverted, the ball 11 opens the side channel 10 and is held in a ball cage 12 of the side channel, bounded by the cover 1. The main channel 3 and the side channel 10 are arranged axially parallel and facing one another, on either side of the dip tube axis and each opening into the dip tube *via* a connecting orifice 13 and 14, respectively. The upper end of the

valve housing 2 is provided, over part of the periphery thereof, with a bead 15 which is enclosed, by crimping, by the outer wall of a dome 16, in such a way that the valve housing is in a fixed position in the direction of the can axis. The end face of the upper end of the valve housing 2 is pressed against the outer rim of a resilient sealing disc 17, the upper face of which rests against the underside of the dome 16. The rim of the hole of the sealing disc engages, under a certain amount of radial prestress, in an annular groove 18 in the region of the lower end 4*a* of the tubular valve shaft 4, in such a way that, in the open position of the valve (shown in Figure 1), the rim of the hole of the sealing disc 17 leaves free a radical passage orifice 19 of the tubular valve shaft 4*a*. Fluid 8 can thus flow out of a dispensing orifice 5*a* of the dispensing head, in the direction of the arrows shown in Figure 1. In the closed position, an annular shoulder 4*b* of the valve shaft 4 presses the sealing disc 17 against the underside of the dome 16, as a result of which the inner rim of the hole of the sealing disc closes the radial passage orifice 19 and hence seals the inner space of the can, which is under superatmospheric pressure, from the exterior. In the region above the annular groove 18, which groove is approximately arc-shaped in profile, the tubular valve shaft 4 is provided with an enlarged portion 4*c*, approximately corresponding to the diameter of hole 16*a* in the dome. The portion 4*c* merges conically into the tubular shaft 4*a* in such a way that, in the open position (shown in Figure 1), an annular gap is formed between the valve shaft 4*a* and the rim of the hole of the dome 16, thereby permitting more rapid high pressure filling of the aerosol can.

The dome 16 projects outwardly in the centre of the can cover 1, but the upper end face thereof lies below the upper rim 1*a* of the can cover. The outer wall of the dome 16 forms part of an annular groove 20 which surrounds the dome and is open outwardly, in the direction of the can axis; as shown in Figures 1 and 3, the annular groove 20 has a substantially U-shaped cross-section.

In accordance with the present invention, the bottom 21 of the annular groove 20, which is of substantially U-shaped cross-section, is provided with an outwardly convex, peripheral ridge 22 and, when filling the aerosol can and when the can is in the upside-down spraying position, the ball 11 of the ball valve rests against an inner, non-deformed rib 23, located below the dome 16, of the bottom 21 of the annular groove 20 (see Figure 3). The apex line of the ridge is located on a circle whose diameter is somewhat larger than that of the circle which surrounds the mean width of the bottom of the annular groove 20. Walls 24 and 25 of the ridge 22 form an angle α in the direction of the interior of the container, which angle α is preferably 100°. The internal height of the ridge is advantageously about 1.5 mm. It can be seen that, with the aerosol can inverted as shown in Figure 3, the fluid 8 contained therein can flow out, in the direction of the arrows shown in the Figure, from the dispensing orifice 5*a* of the dispensing head 5, having travelled *via* the side channel and the two connecting orifices 13 and 14.

As is shown clearly in Figure 3, the ball 11 of the ball valve rests, approximately in point contact, on the inner rib 23, formed by the ridge 22, of the bottom 21 of the can cover. The ball 11 is held laterally by a wall 26 of the valve housing, which wall separates the main channel from the side channel, and by lateral webs 27, located at intervals from one another in the circumferential direction of the side channel, of the ball cage. The webs 27 run in the direction of the valve seat 28 for the ball 11, but terminate at a distance from the valve seat 28.

CLAIMS

1. An aerosol can in which the upper end of the valve housing is sealingly held in the interior of a dome, which is located outwardly projecting in the centre of the can cover and forms part of an annular groove, which surrounds the dome, which is outwardly open in the direction of the can axis and which has substantially U-shaped cross-section, the bottom of the annular groove, which groove is of substantially U-shaped cross-section, being provided with an outwardly convex ridge, running in the peripheral direction, so that, when filling the aerosol can and when the can is in the upside-down spray position, the ball of the ball valve rests against the inner, non-deformed part, located below the dome, of the bottom of the annular groove.

2. An aerosol can according to Claim 1, which has a cover for accommodating a ball valve housing which, in its main channel accommodates, in an outwardly sealing and axially movable manner, a valve shaft onto which a dispensing head can be mounted and which, at its other end, merges into a riser tube nipple with dip tube, a spring resting against the valve shaft and against the valve housing pressing the valve shaft into the closed position in which the main channel is sealingly closed in the direction of the dispensing head, the ball valve housing further having a side channel, which is moulded onto the valve housing, which opens into the main channel before the sealing position and which possesses a ball valve, the ball of which ball valve, when the can is standing upright, rests in a conical valve seat and closes the side channel whilst, when the can is inverted, the ball leaves the side channel and is held in a ball cage of the side channel, bounded by the can cover, the main channel and the side channel being arranged axially parallel and facing one another on either side of the dip tube axis and each opening into the dip tube via a connecting orifice.

3. An aerosol can according to Claim 1 or 2, wherein the apex line of the ridge is located on a circle whose diameter is somewhat larger than that of the circle which surrounds the mean width of the bottom of the annular groove.

4. An aerosol can according to Claim 1, 2 or 3, wherein arms of the ridge form an angle (α) in the direction of the interior of the can.

5. An aerosol can according to Claim 4, wherein the angle (α) formed by the arms of the ridge is approximately 100°.

6. An aerosol can according to any one of Claims 1 to 5, wherein the internal height of the ridge is about 1.5 mm.

7. An aerosol can, substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.

8. Any novel feature or combination of features described herein.

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