

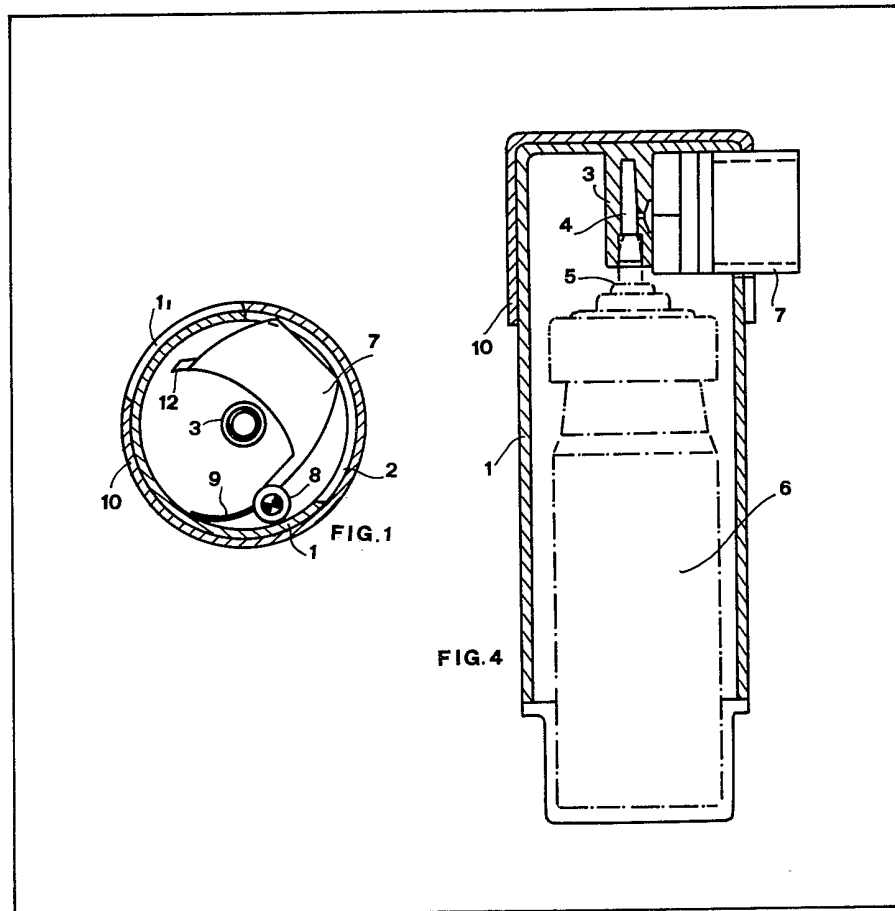
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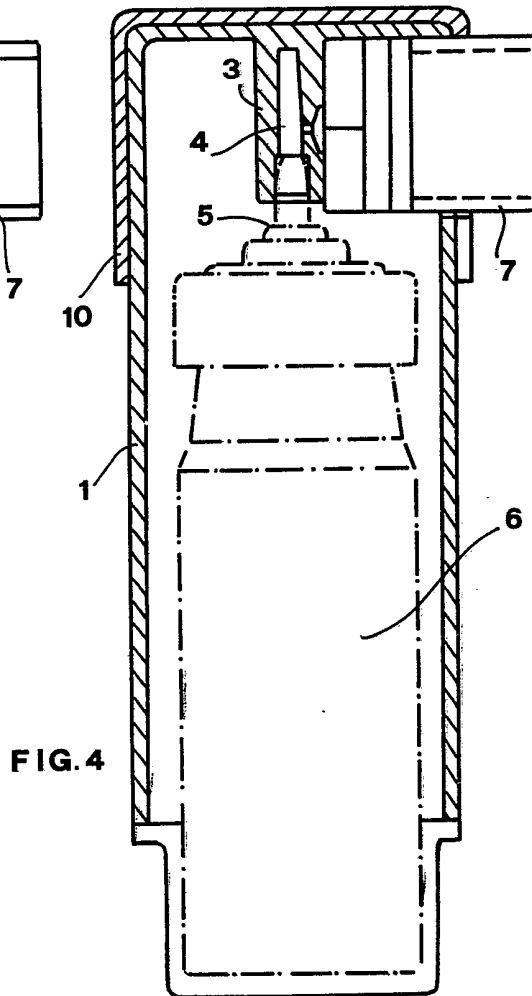
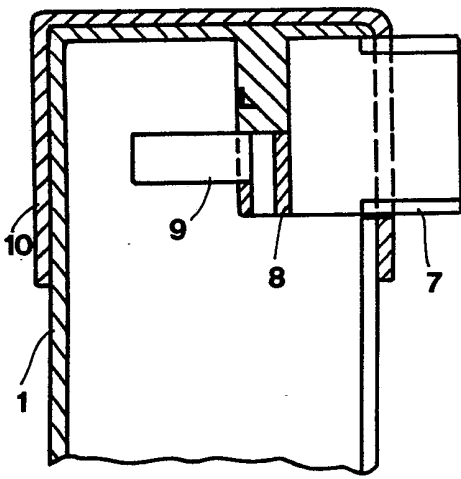
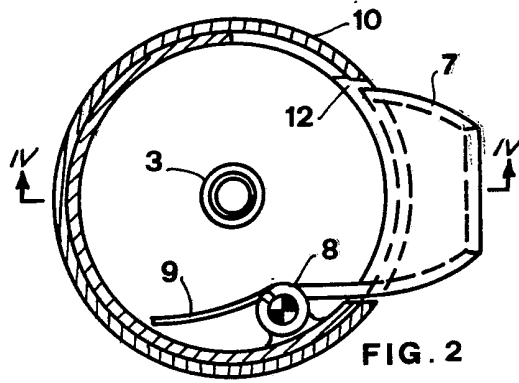
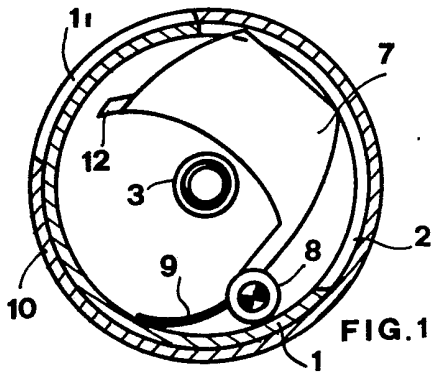
(54) Inhalation device with retractable mouthpiece

(57) An inhalation tube for an aerosol container comprises a tubular body, 1, adapted for detachable fitting to an aerosol container, 6. A delivery mouth-piece, 7, is fitted which is movable between retracted and extracted position. The extraction and retraction of the mouth-piece is brought about by means of a cap, 10, rotatably mounted on the tubular body, which has actuating means, 9, associated therewith. The cap and tubular body

have openings of similar dimensions. Rotation of the cap to bring the openings into register causes the actuating means to move the mouth-piece to an extracted position, whilst rotation of the cap to bring the openings out of register causes the actuating means to move the mouth-piece in a retracted, closed-off position wholly with the tubular body.

Such an arrangement enables simple functioning of the inhalation tube and ensures that hygienic conditions are provided insofar as the mouth-piece is closed-off when not in use.





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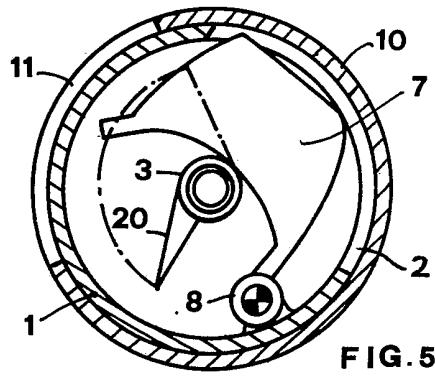


FIG. 5

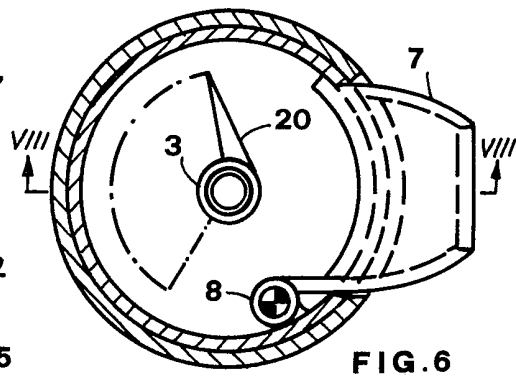


FIG. 6

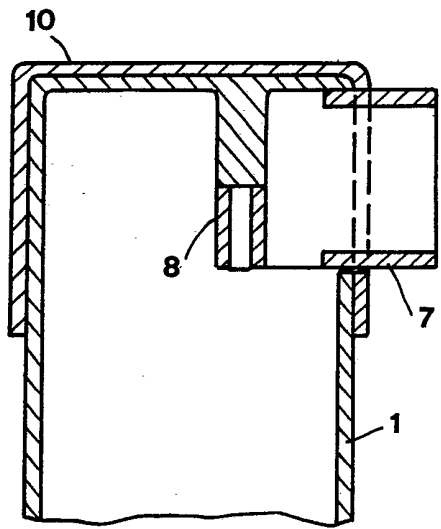


FIG. 7

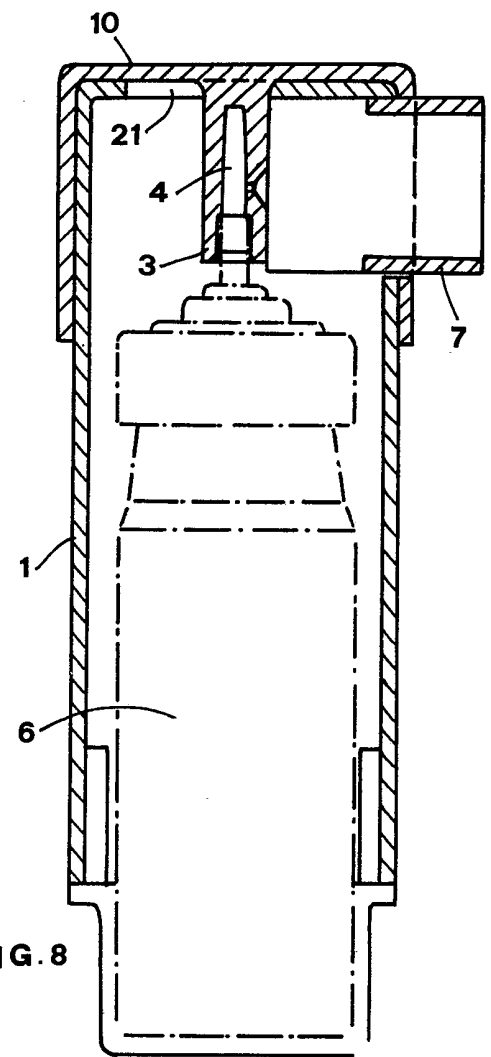


FIG. 8

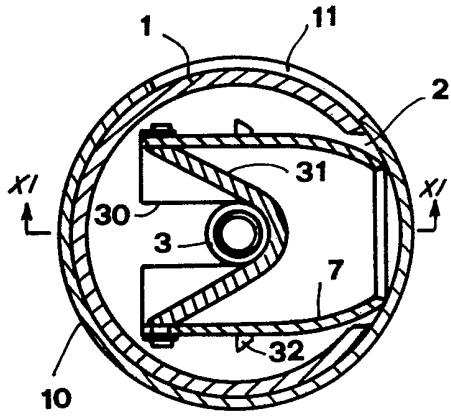


FIG. 9

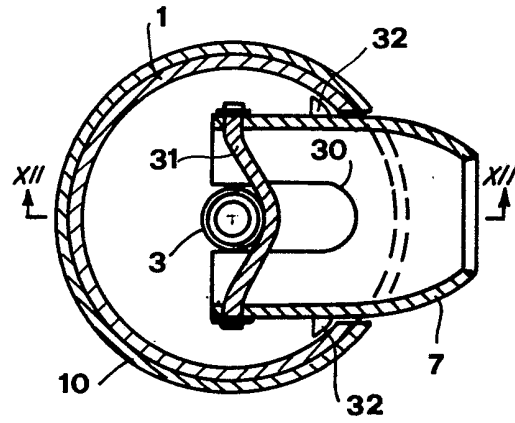


FIG. 10

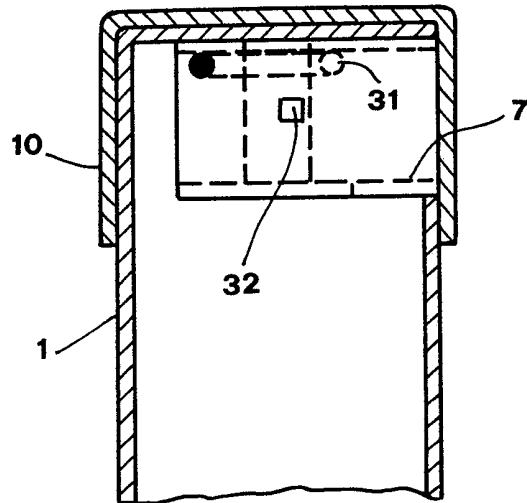


FIG. 11

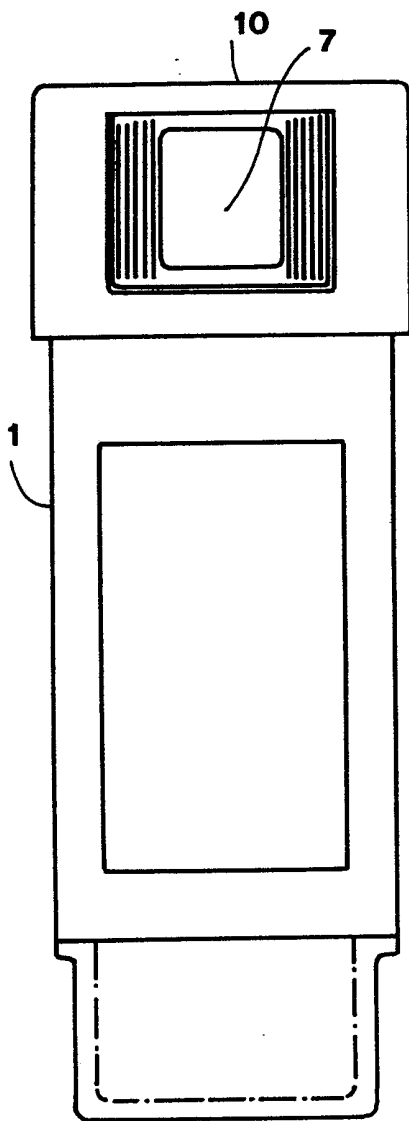


FIG. 13

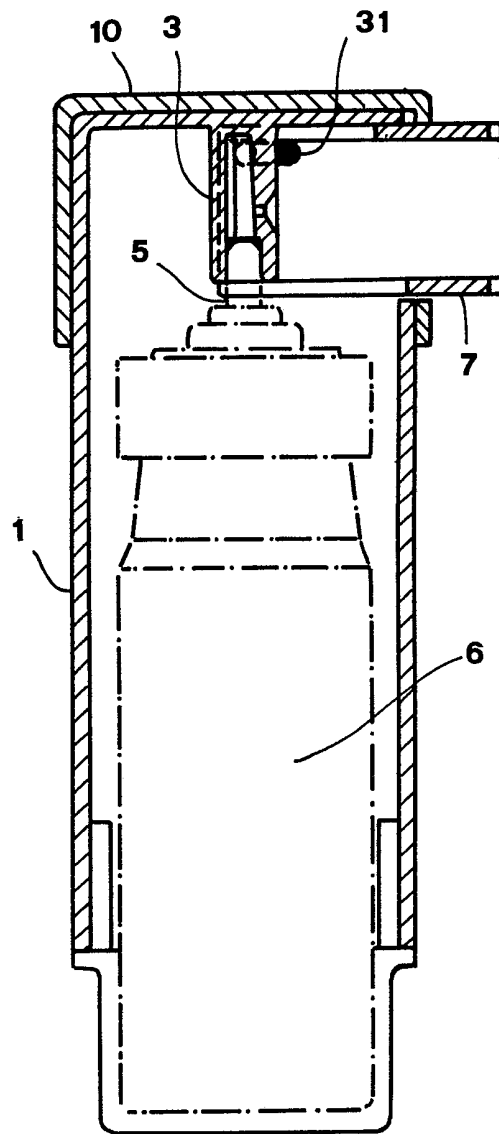


FIG. 12

## SPECIFICATION

**Inhalation tube for an aerosol container**

5 The present invention generally relates to inhalation tubes for aerosol containers, and more particularly to an inhalation tube for inhaling medicinal products which is functional both from an hygienic and aesthetic point of view.

10 As is known, for many years aerosol containers containing medicinal spray products of every type and nature have been available. The product is sprayed through an inhalation tube which is manufactured in a variety of different shapes and conformations, the purpose of the tube being to deliver the sprayed product as a mist (aerosol) or as a wet jet (spray) into the mouth, nose, ear or other appropriate parts of the human body.

Such inhalation tubes are referred to as inhalers and are generally provided with a closure cover for the tube opening through which the product is sprayed, so as to protect the internal orifice of the valve, thereby preventing foreign matter from entering the tube, which is also promoted by the fact that the inner walls of the inhalation tube are generally sprayed with solvents and basic product after every use.

It should be readily understood that the cleanliness of an inhaler is not only a matter of aesthetics, but is also required for hygienic specifications, which must be scrupulously met.

It should also be understood that, for example, in the case of an asthmatic product, the presence in the inhaler of any foreign matter is completely counter-productive to an effective cure.

An object of the present invention is to obviate, or at least substantially reduce, the above mentioned disadvantages by providing an inhalation tube for an aerosol container which permits those parts which come into contact with the sprayed product to be closed-off when not in use, thereby ensuring absolutely hygienic conditions.

Another object of the invention is to provide an inhalation tube which can be moved between open and closed positions without the need for additional closure means separate from the inhalation tube.

A further object of the invention is to provide an inhalation tube with closing and opening means which result in a structurally simple arrangement and which, in addition, does not give rise to any problems in operation.

A further object of the present invention is to provide an inhalation tube which, because of its particular structure, is able to provide the amplest of guarantees for safety and reliability in use.

A further object of the present invention is to provide an inhalation tube which is readily constructed from elements and materials normally available on the market to enable it to be competitive from an economic point of view.

According to the invention, an inhalation tube for an aerosol container comprising a tubular body for detachable fitting to an aerosol container, is characterised in that a cap is mounted on said tubular body for rotation thereabout, that a delivery mouth-piece

is mounted so as to be movable with respect to said tubular body and said cap, the tubular body and the cap each presenting an opening of substantially of the same dimensions, and that the mouth-piece is arranged for movement by actuating means in such a manner that by rotation of the cap to bring said openings into register, the mouth-piece is moved to an extracted position by said actuating means and, by rotation of the cap to bring said openings out of register, the mouth-piece is moved to a retracted closed-off, wholly within the tubular body.

These and other features and advantages of the invention will be readily understood from the detailed description of some preferred embodiments, given by way of example and not intended in a limiting sense, of an inhalation tube with an extractable and retractable mouth-piece with reference to the accompanying drawings, wherein:

Figure 1 is a cross-sectional view of a first embodiment of the inhalation tube with the mouth-piece in a retracted position.

Figure 2 is a cross sectional view of the inhalation tube of Figure 1 with the mouth-piece in an extracted position.

Figure 3 shows the first embodiment sectioned through the hinging pin of the mouth-piece,

Figure 4 is a sectional view taken along the line IV-IV of Figure 2,

Figure 5 is a cross-sectional view of a second embodiment of inhalation tube with the mouth-piece in a retracted position.

Figure 6 is a cross-sectional view of the embodiment shown in Figure 5 with the mouth-piece in an extracted position,

Figure 7 is a sectional view of the embodiment shown in Figure 5, taken through the hinging pin of the mouth-piece.

Figure 8 is a sectional view taken along the line VIII-VIII of Figure 6,

Figure 9 is a cross-sectional view of a third embodiment of inhalation tube with the mouth-piece in a retracted position.

Figure 10 is a cross sectional view of the embodiment shown in Figure 9 with the mouth-piece in an extracted position,

Figure 11 is a sectional view taken along the line XI-XI of Figure 9.

Figure 12 is a sectional view of Figure 10 taken along the line XII-XII showing all the inhalation tube with the mouth-piece in an extracted position, and

Figure 13 is a front elevational view of the various embodiments of inhalation tube.

With reference to the above mentioned figures, there is illustrated an inhalation tube with opening and closing of an extractable and retractable portion, which is shown in three different embodiments, substantially similar to one another.

Referring to Figures 1 to 4 the first embodiment of inhalation tube comprises a tubular body 1 of an elongated, substantially cylindrical shape, defining at its upper portion a first opening 2, extending along a peripheral segment.

From the internal upper wall of the body 1 a hollow shank 3 extends in a substantially axial direction and is provided with a delivery orifice 4 (see Figure

130

4), said hollow shank being detachably fitted on the protruding stem of a valve 5 of an aerosol container 6, which can contain any one of the products normally available on the market including non-medicamentous substances.

At the first above mentioned opening 2 a delivery mouth-piece 7 of a suitable shape is provided.

The delivery mouth-piece 7 is hinged to allow its pivotal movement about a pin 8 secured to the internal wall of said tubular body 1.

In accordance with the invention, the delivery mouth-piece 7 at the region hinged to the pin 8 is provided with a resilient strip 9 which acts by reaction against the internal wall of the tubular body 1 to tend to rotate the mouth-piece 7 to an outward position in a manner which will be described hereinafter.

Associated with the tubular body 1 is a cap 10 which is mounted for rotation about the axis of the body 1 and is provided with a second opening 11 adapted to be brought into register with the first opening 2 in order to permit the extraction of the mouth-piece 7.

In more detail, it can be seen that by rotating the cap 10, once the second opening 11 comes into register with the first opening 2, the mouth-piece 7, is urged by the resilient strip 9, which acts like a spring, to rotate it outwardly to assume the position shown in Figure 2. It is to be noted that the mouth-piece 7, on the side opposite to its hinge axis has a stop projection, adapted to abut the internal wall of the cap 10 to ensure the correct extracted position of the mouth-piece 7.

To retract the mouth-piece 7 all that is necessary is to rotate the cap 10 counterclockwise, so that, by rotating about the pin 8 and overcoming the spring reaction of the resilient strip 9, it retracts into the tubular body 1. When retraction has been completed, the first opening 2 is closed by the internal wall of the cap 10, thus preventing extraction of the mouth-piece, and also preventing the infiltration thereinto of any substance which could contaminate the mouth-piece. Referring to Figures 5 to 8 showing the second embodiment of inhalation tube, those elements which correspond to elements of the first embodiment are given the same reference numbers. In this embodiment the mouth-piece 7 is not provided with a resilient strip but instead its rotation is obtained by a camming means 20 coupled to the cap 10 and passing through a cutout 21 provided in the upper portion of the tubular body 1. Thus, when the cap 10 is rotated to bring the openings 2 and 11 into register, the camming means 20 first acts on the rear portion of the mouth-piece 7 and extraction of the latter is completed by the action of the adjacent side edge of the opening 11.

As shown in the figures, the cutout 21, which is suitably shaped as a circular segment (shown chain-dotted in Figures 5 and 6) acts as a stop at its opposite radial sides for the retracted (Figure 5) and the extracted positions (Figure 6) of the mouth-piece 7. Retraction of the mouth-piece 7 is effected by the action of the other side edge of the opening 11 upon counterclockwise rotation of the cap 10.

Referring to Figures 9 to 13 in the third embodiment of inhalation tube the mouth-piece 7 is not

hinged to the tubular body 1, but is supported therein in such a way that it can be moved in a radial direction with respect to the axis of the tubular body 1, this movement being guided by engagement of the mouth-piece 7 with the hollow shank 3 via a slot 30. The extraction movement is effected by an elastic element 31 which is supported at its opposite ends by the walls of the mouth-piece 7 and engages said hollow shank 3.

In more detail, when the cap 10 is rotated to bring the first and second openings 2, 11 in register, the mouth-piece 7 is urged outwardly by the elastic element 31 until its stop projections 32 abut the internal walls of tubular body 1 to correctly position the mouth-piece 7 in its extracted position and, of course, to prevent it falling out of tubular body 1, which is very undesirable. For retraction, all that is necessary is to rotate the cap 10 so that, taking advantage of the particular rounded shape of the sides of the mouth-piece 7, a radial pushing action is exerted on the mouth-piece 7, which moves the latter inwardly to overcome the spring bias action exerted by the elastic element 31.

From the above, it will be appreciated that for all the described embodiments both the extraction and the retraction of the delivery mouth-piece 7 is achieved in a very simple manner merely by appropriate rotation of the cap 10.

Furthermore, the rotation of cap 10, in addition to controlling the retracted and extracted position of the mouth-piece 7 in to the tubular body 1, also ensures that in the retracted position of the mouth-piece 7, any communication with the exterior of the tubular body 1 is prevented, thus giving the highest guarantees of safety and hygiene.

It will also be appreciated that the embodiments described above achieve the objects discussed hereinbefore. Thus, for example, no separate elements are necessary to close the inhalation tube, since the closing means, as already mentioned, are incorporated in the cap 10.

Of course, the invention can be subjected to many modifications and changes within its scope. Many alterations can be made thereto and all details can be substituted for other technically equivalent elements without departing from scope of the invention.

Practically, the materials used, provided that are suitable to the specific use, as well as the dimensions and shapes can be adapted to meet any particular requirement.

#### CLAIMS

1. An inhalation tube for an aerosol container comprising a tubular body adapted for detachable fitting to an aerosol container, characterised in that a cap is mounted on said tubular body for rotation thereabout, that a delivery mouth-piece is mounted so as to be movable with respect to said tubular body and to the cap, the tubular body and cap each presenting an opening of substantially the same dimensions, and that said mouth-piece is arranged for movement by actuating means in such a manner that, by rotation of the cap to bring said openings into register, said mouth-piece is moved to an extracted position by means of said actuating

means, and, by rotation of the cap to bring said openings out of register, said mouth-piece is moved to a retracted, closed-off, position wholly within the tubular body.

5 2. An inhalation tube as claimed in Claim 1,  
wherein said delivery mouth-piece is hinged at one  
side to the tubular body via a pin and the actuating  
means comprise a resilient strip associated with said  
pin and acting by reaction against the internal wall of  
10 said tubular body so as to automatically rotate said  
delivery mouth-piece outwardly to an extracted posi-  
tion when the opening provided on the tubular body  
is in register with the opening provided on the cap.

3. An inhalation tube as claimed in claim 2,  
15 wherein said delivery mouth-piece on the side oppo-  
site to its hinged side has a stop projection adapted  
to abut the internal part of the cap to act as stop  
element for the correct positioning of said delivery  
mouth-piece in its extracted condition.

20 4. An inhalation tube as claimed in claim 1,  
wherein said actuating means comprise camming  
means carried by said cap and passing through a  
cutout provided in an end of the tubular body, said  
camming means being rotatable by rotation of said  
25 cap to extract and retract said delivery mouth-piece  
in co-operation with the side edges of the cap open-  
ing.

5. An inhalation tube as claimed in claim 4,  
wherein said cutout is shaped as a circular segment,  
30 the opposite radial sides of which are designed to act  
as stops for the camming means corresponding to  
the retracted and extracted positions for said  
mouth-piece.

6. An inhalation tube as claimed in claim 1,  
35 wherein said delivery mouth-piece is supported in  
the tubular body so as to be moved in a substan-  
tially radial direction with respect to the axis of the  
tubular body, said mouth-piece having a guide slot  
which engages a central hollow shank of said tubular  
40 body adapted to be fitted on the protruding stem of  
the delivery valve of the aerosol container, wherein  
said actuating means are formed by elastic means  
engaging the opposite sides of the mouth-piece and  
said hollow shank and arranged to urge the mouth-  
45 piece outwardly when said openings are in register  
with each other, retraction of the mouth-piece being  
obtained by rotating the cap so as a side edge of its  
opening acts on a suitably rounded side of the  
mouth-piece to overcome the action of the elastic  
50 means.

7. An inhalation tube as claimed in Claim 6,  
wherein the mouth-piece has a stop projection on  
each of its sides adapted to abut the tubular body to  
ensure correct positioning of the mouth-piece in its  
55 extracted condition.

8. An inhalation tube constructed, arranged and  
adapted to operate substantially as hereinbefore  
described with reference to Figures 1 to 4, 4 to 8 or 9  
to 12 taken in conjunction with Figure 13.