

Nebuliser

The present invention relates to a nebuliser according to the preamble of claim 1.

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The starting point for the present invention is a nebuliser sold under the brand name "Respimat" in the form of an inhaler, as illustrated in its basic structure in WO 91/14468 A1 and in a specific embodiment in WO 97/12687 A1 (Figs. 6a, 6b) and in Figs. 1 and 2 of the accompanying drawings. The nebuliser has, as a reservoir for fluid which is to be atomised, an insertable rigid container having an inner bag containing the fluid and a pressure generator with a drive spring for delivering and atomising the fluid.

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To supplement the disclosure of the present application reference is made to the complete disclosure of both WO 91/14468 A1 and WO 97/12687 A1. Generally, the disclosure contained therein preferably relates to a nebuliser with a spring pressure of 5 to 200 MPa, preferably 10 to 100 MPa on the fluid, with a volume of fluid delivered per stroke of 10 to 50 μl , preferably 10 to 20 μl , most preferably about 15 μl . The fluid is converted into an aerosol the droplets of which have an aerodynamic diameter of up to 20 μm , preferably 3 to 10 μm . Furthermore, the disclosure contained therein preferably relates to a nebuliser of cylindrical shape about 9 cm to about 15 cm and about 2 cm to about 5 cm wide and with a jet spray angle of 20° to 160°, preferably 80° to 100°. These values also apply to the nebuliser according to the teaching of the present invention as particularly preferred values.

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Before being used for the first time the nebuliser is opened by undoing a lower housing part and the sealed container is inserted in the nebuliser. The container is opened by a delivery tube which is inserted into the inner bag as the container is put in. Then the lower housing part is pushed on again.

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By rotating the lower housing part of the nebuliser the drive spring can be put under tension and fluid can be sucked into a compression chamber of the pressure generator. As it is tensioned the container is moved into the lower housing part in a single movement within the nebuliser and when tensioned

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for the first time it is pierced through its base by a piercing element in the lower housing part to allow air in or out. After manual operation of a locking element the fluid in the pressure chamber is put under pressure by the drive spring and is delivered through a nozzle into a mouthpiece as an aerosol,
5 without the use of propellant gas.

After opening the nebuliser the empty container can be replaced by a full one and the nebuliser can then be used again.

10 Object of the present is to provide a nebuliser which is easier to operate and has improved operational reliability.

The object is achieved by a nebuliser according to claim 1. Advantageous further features are the subject of the subsidiary claims.

15 A basic idea of the present invention is that even in its delivered state the nebuliser has a sealed container provided therein and the nebuliser is constructed so that the container is opened inside the nebuliser before or during the first use of the nebuliser. This basic idea is hereinafter referred to
20 as "pre-installed container" for short. This makes operation easier as there is no need to open the nebuliser, insert the container and close the nebuliser. Moreover, undesirable soiling or damage to the nebuliser caused by incorrect handling when inserting the container can thus be ruled out. Accordingly, there is better operational safety as it is impossible for the container to be
25 wrongly inserted or otherwise misused during insertion.

Another aspect of the present invention which can also be implemented independently consists in constructing the nebuliser so that the container is not replaceable and in particular cannot be removed. This rules out replacement
30 of the container. This again leads to easier operation and hence improved operational reliability. This also prevents the nebuliser from being used or re-used in an undesirable or unauthorised manner.

In particular, the nebuliser cannot be opened and the lower housing part
35 cannot be removed in order to replace the empty container with a full one in an undesirable manner.

5 The combination of the pre-installed container and the construction which makes the container non-replaceable results in particularly easy operation and high operational reliability as the user can only use the nebuliser as a single-use item until the container is empty, and undesirable or unauthorised further use of the nebuliser is prevented by the fact that the container cannot be replaced.

10 However, correspondingly easy operation and improved operational reliability for the user can also be achieved if the container is pre-installed at the pharmacy, for example, i.e. by trained staff, and optionally opened at the same time provided that the container is made non-exchangeable, in particular the nebuliser cannot be opened by the user.

15 Further advantages, features, characteristics and aspects of the present invention will become apparent from the claims and the following description of some preferred embodiments with reference to the drawings, wherein:

20 Fig. 1 shows a non-schematic section through a known nebuliser in the non-tensioned state;

Fig. 2 shows a schematic section, rotated through 90° compared with Fig. 1, through the known nebuliser in the tensioned state;

25 Fig. 3 is a schematic section through a proposed nebuliser according to a first embodiment in the delivered state with a sealed container incorporated therein;

30 Fig. 4 is a schematic section through the nebuliser according to Fig. 3 in the activated state or with the container open;

Fig. 5 shows a schematic section through a proposed nebuliser according to a second embodiment in the delivered state with a sealed container incorporated therein;

- Fig. 6 shows a detail from Fig. 5 along the broken line, in an enlarged view;
- Fig. 7 shows a schematic section through the nebuliser according to Fig. 5 in the activated state or with the container open;
- Fig. 8 shows a schematic section through a proposed nebuliser according to a third embodiment in the delivered state with a sealed container incorporated therein;
- Fig. 9 shows a detail from Fig. 8 on the broken line in an enlarged view;
- Fig. 10 shows a schematic section through the nebuliser according to Fig. 8 in the activated state or with the container open and with an actuating member pushed onto it;
- Fig. 11 shows a nebuliser according to Fig. 10 without the actuating member;
- Fig. 12 shows a diagrammatic perspective view of a proposed nebuliser according to a fourth embodiment having an actuating member similar to the third embodiment, but not pushed on;
- Fig. 13 shows a schematic section through a proposed nebuliser according to a fifth embodiment in the delivered state with a sealed container incorporated therein;
- Fig. 14 shows a schematic section through the nebuliser according to Fig. 13 in the activated state or with the container open;
- Fig. 15 shows a schematic section through a proposed nebuliser according to a sixth embodiment in the delivered state with a sealed container incorporated therein;

- Fig. 16 shows a schematic section through the nebuliser according to Fig. 15 in the activated state or with the container open;
- 5 Fig. 17 shows a schematic section through a proposed nebuliser according to a seventh embodiment in the delivered state with a sealed container incorporated therein;
- Fig. 18 shows a schematic section through the nebuliser according to Fig. 17 in the activated state or with the container open;
- 10 Fig. 19 shows a schematic section through a proposed nebuliser according to an eighth embodiment in the delivered state with a sealed container incorporated therein;
- 15 Fig. 20 shows a schematic section through the nebuliser according to Fig. 19 in the activated but non-tensioned state or with the container open;
- Fig. 21 is a view of the nebuliser corresponding to Fig. 20 but in the tensioned state;
- 20 Fig. 22 is a detail from Fig. 21 along the dotted line, in enlarged view;
- Fig. 23 is a schematic section through a proposed nebuliser according to a ninth embodiment in the delivered state with a sealed container incorporated therein;
- 25 Fig. 24 is a schematic section through the nebuliser according to Fig. 23 in the activated but non-tensioned state or with the container open;
- 30 Fig. 25 is a view of the nebuliser corresponding to Fig. 24 but in the tensioned state;

- Fig. 26 is a detailed perspective view of a transportation lock for the container in the nebuliser according to the ninth embodiment in the secured state;
- 5 Fig. 27 is a side view, partly in section, of the transportation lock according to Fig. 26 in the secured state;
- Fig. 28 is a view of the transportation lock, corresponding to Fig. 27, in the open state;
- 10 Fig. 29 is a schematic axial view of the transportation lock in the open state;
- Fig. 30 is a perspective view of an inner part of the nebuliser according to the ninth embodiment;
- 15 Fig. 31 is a schematic view of a housing part of the nebuliser according to the ninth embodiment;
- 20 Fig. 32 is a side view, partly in section, of a transportation lock for a nebuliser according to a tenth embodiment in the secured state;
- Fig. 33 is a view of the transportation lock corresponding to Fig. 32, in the opened state;
- 25 Fig. 34 is a schematic section through a lower part of a proposed nebuliser according to an eleventh embodiment in an intermediate state;
- 30 Fig. 35 is a schematic axial section through the nebuliser according to Fig. 34 in the area of overlap of a housing part with an inner part in the delivered state;
- 35 Fig. 36 is a schematic axial section through the nebuliser according to Fig. 34, corresponding to Fig. 35, in the intermediate state;

- Fig. 37 is a side view, partly in section, of the housing part with a container and a transportation lock for the nebuliser according to Fig. 34;
- 5 Fig. 38 shows a side view, partly in section, of the housing part of the nebuliser according to Fig. 34 with the inner part partially pushed in;
- 10 Fig. 39 shows a side view, partly in section, of the housing part of the nebuliser according to Fig. 34, with the inner part totally pushed in;
- 15 Fig. 40 is a side view, partly in section, of the housing part of the nebuliser according to Fig. 34 with the container opened or pierced at the base;
- 20 Fig. 41 is a schematic section through a proposed nebuliser according to a twelfth embodiment in the delivered state with a sealed container incorporated therein; and
- Fig. 42 is a schematic section through the nebuliser according to Fig. 41 in the activated tensioned state or with the container opened.

25 In the Figures, the same reference numerals have been used for identical or similar parts, resulting in corresponding or comparable properties and advantages, even if the associated description is not repeated.

30 Figs. 1 and 2 show a known nebuliser 1 for atomising a fluid 2, particularly a highly effective pharmaceutical composition or the like, diagrammatically shown in the non-tensioned state (Fig. 1) and in the tensioned state (Fig. 2). The nebuliser 1 is constructed in particular as a portable inhaler and preferably operates without propellant gas.

35 When the fluid 2, preferably a liquid, more particularly a pharmaceutical composition, is nebulised, an aerosol is formed, which can be breathed in or inhaled by a user (not shown). Usually the inhaling is done at least once a

day, more particularly several times a day, preferably at set intervals, depending on the complain from which the patient is suffering.

5 The known nebuliser 1 has an insertable and preferably exchangeable container 3 containing the fluid 2. The container thus forms a reservoir for the fluid 2 which is to be nebulised. Preferably, the container 3 contains an amount of fluid 2 or active substance which is sufficient to provide up to 200 dosage units, for example, i.e. to allow up to 200 sprays or applications. A typical container 3, as disclosed in WO 96/06011 A1, holds a volume of about
10 2 to 10 ml.

The container 3 is substantially cylindrical or cartridge-shaped and once the nebuliser 1 has been opened the container can be inserted therein from below and changed if desired. It is preferably of rigid construction, the fluid 2 in
15 particular being held in a collapsible bag 4 in the container 3.

The nebuliser 1 also has a pressure generator 5 for conveying and nebulising the fluid 2, particularly in a preset and optionally adjustable dosage amount. The pressure generator 5 has a holder 6 for the container 3, an associated drive
20 spring 7, only partly shown, with a locking element 8 which can be manually operated to release it, a conveying tube 9 with a non-return valve 10, a pressure chamber 11 and an expulsion nozzle 12 in the region of a mouthpiece 13. The container 3 is fixed in the nebuliser 1 via the holder 6 such that the conveying tube 9 penetrates into the container 3. The holder 6 may be
25 constructed so that the container 3 is able to be exchanged.

As the drive spring 7 is axially tensioned the holder 6 with the container 3 and the conveying tube 9 is moved downwards in the drawings and fluid 2 is sucked out of the container 3 into the pressure chamber 11 of the pressure
30 generator 5 through the non-return valve 10.

During the subsequent relaxation after actuation of the locking element 8 the fluid 2 in the pressure chamber 11 is put under pressure as the conveying tube 9 with its now closed non-return valve 10 is moved back upwards by the
35 relaxation of the drive spring 7 and now acts as a pressing ram. This pressure forces the fluid 2 through the expulsion nozzle 12, whereupon it is nebulised

into an aerosol 14, as shown in Fig. 1. The droplet size of the particles for a device of the Respimat type has already been discussed hereinbefore.

5 A user (not shown) can inhale the aerosol 14, while an air supply can be sucked into the mouthpiece 13 through at least one air supply opening 15.

10 The nebuliser 1 comprises an upper housing part 16 and an inner part 17 which is rotatable relative thereto (Fig. 2) having an upper part 17a and a lower part 17b (Fig. 1), while an in particular manually operable housing part 18 is releasably fixed, particularly fitted onto the inner part 17, preferably by means of a retaining element 19. In order to insert and/or replace the container 3 the housing part 18 can be detached from the nebuliser 1.

15 The housing part 18 can be rotated relative to the upper housing part 16, carrying with it the part 17b of the inner part 17 which is lower down in the drawings. As a result the drive spring 7 is tensioned in the axial direction by means of a gear (not shown) acting on the holder 6. During tensioning the container 3 is moved axially downwards until the container 3 assumes an end position as shown in Fig. 2. In this state the drive spring 7 is under tension.
20 During the nebulising process the container 3 is moved back into its original position by the drive spring 7. Thus the container 3 executes a lifting movement during the tensioning process and during the atomising process.

25 The housing part 18 preferably forms a cap-like lower housing part and fits around or over a lower free end portion of the container 3. As the drive spring 7 is tensioned the container 3 moves with its end portion (further) into the housing part 18 or towards the end face thereof, while an axially acting spring 20 arranged in the housing part 18 comes to bear on the base 21 of the container and pierces the container 3 or a base seal thereon with a piercing
30 element 22 when the container makes contact with it for the first time, to allow air in.

35 The nebuliser 1 comprises a monitoring device 23 which counts the actuations of the nebuliser 1, preferably by detecting the rotation of the inner part 17 relative to the upper part 16 of the housing.

The construction and mode of operation of twelve embodiments of a proposed nebuliser 1 will now be described in more detail, referring to Figures 3 to 42, but emphasising only the essential differences from the nebuliser 1 according to Figs. 1 and 2. The remarks relating to Figs. 1 and 2 thus apply accordingly or in a supplementary capacity, while any desired combinations of features of the nebuliser 1 according to Figs. 1 and 2 and the nebuliser 1 according to the embodiments described below or with one another are possible.

Fig. 3 and 4 show, in a diagrammatic sectional views, a first embodiment of the proposed nebuliser 1. Fig. 3 shows the delivered state with the container 3 sealed. Fig. 4 shows the activated state, i.e. after the container 3 has been opened.

As proposed, the (still) closed container 3 is already mounted in the nebuliser 1 in its delivered state, as shown in Fig. 3. In the closed state, in the embodiments shown, an outer seal 24 on the head end of the container 3 and a septum 25, a membrane, a plastic seal or the like provided inside the container 3 (only partly shown in the drawings) have not yet been opened. Moreover, in the closed state, in the embodiments shown, a vent opening 26 in the base of the container 3, which can be opened by means of the piercing element 22, is sealed, i.e. not yet pierced. It should be noted that the container 3 may also have fewer and / or different opening possibilities depending on the particular construction.

In all the proposed embodiments the nebuliser 1 is constructed so that the container 3 is or can be opened inside the nebuliser 1 before or during the first use of the nebuliser 1. The container 3 has already been opened, in particular, when the seal 24 and the septum 25 or the like have been opened. This is also referred to hereinafter as the activated state, for short. The piercing or opening of the vent opening 26 may be carried out separately, particularly later on when the nebuliser 1 is tensioned (for the first time).

It is proposed that the opening of the container 3 is carried out in particular by means of a delivery element, particularly conveying tube 9 or the like, preferably by piercing the container 3 or insertion into the container 3. By a suitable relative movement, particularly in the longitudinal direction or

direction of lifting of the container 3 relative to the conveying tube 9, the conveying tube 9 pierces the seal 24 and is inserted through the septum 25 into the interior of the container 3, particularly into the bag 4, whereby the container 3 is opened, i.e. a fluid connection is formed for the fluid 2 to escape
5 from the container 3. The container 3 is thus opened at the head end, in particular.

During the normal tensioning and atomising strokes the container 3 is then preferably moved together with the conveying element or conveying tube 9 by
10 means of the holder 6, whereby the fluid connection produced is maintained and the container 3 is preferably thus constantly open.

The ventilation provided, preferably at the base, as mentioned above by opening the vent opening 26 may be carried out before or during or after the
15 above mentioned opening of the container 3, particularly at the head end, depending on the particular embodiment or requirements.

In the first embodiment the container 3 is preinstalled and the housing part 18 in the delivered state has not been fully pushed on in the axial direction.
20 Rather, a securing member 27 is mounted between the housing part 18 and the upper housing part 16, so that the housing part or lower part 18 is pressed far enough away from the upper housing part 16 to be able to hold the (still) sealed container 3 axially away from the conveying tube 9.

25 In the non-activated distant position the housing part 18 is preferably secured by means of at least one latching arm 28 mounted on the upper housing part 16 or inner part 17, so that it cannot be lost and in particular cannot be released. Preferably, the latching arm 28 engages with a latching lug 29 in a latching recess 30 in the housing part 18 and thereby secures the housing part
30 18 against total axial removal by interlocking engagement. However, other constructional solutions are also possible.

In particular, the housing part or lower part 18 of the nebuliser 1 can no longer be detached from the nebuliser 1 after it has been (partially) axially pushed on
35 for the first time, i.e. the nebuliser 1 cannot be opened any longer, with the result that the container 3 cannot be changed, i.e. cannot be removed again.

In the first embodiment the securing member 27 is at least substantially hollow cylindrical and is disposed axially between the housing part 18 and the upper housing part 16. To activate the nebuliser 1, i.e. push the housing part 18 fully on in the axial direction and thereby open the container 3, the securing member 27 first has to be removed. In the first embodiment the securing member 27 is constructed in the manner of a banderol or the like, made of plastics, for example, and can be manually opened, removed or destroyed. The securing member 27 may alternatively or simultaneously form or constitute a seal of origin. However, other embodiments of the securing member 27 are also possible, e.g. in the form of a security tag or the like.

Once the security member 27 has been removed a user (not shown) can push the housing part 18 fully on in the axial direction and thereby bring about the activated state of the nebuliser 1, i.e. open the container 3 by inserting the conveying element or conveying tube 9. Fig. 4 shows this activated state with the housing part 18 pushed fully on. In this pushed on state the housing part 18 is preferably secured or held again by interlocking engagement, particularly by the engagement of the latching arm 28 or latching lug 29 in a corresponding further latching recess 31 or by means of some other mechanical securing device.

Fig. 4 shows the nebuliser 1 or container 3 in the activated state, the container 3 is already open and the housing part 18 has been pushed fully on in the axial direction. In order to bring the holder 6 into engagement with the container 3 at the head end and then be able to move the container 3 over it for the tensioning and pressing strokes, it may be necessary to tension the nebuliser 1 for the first time. During this tensioning process the holder 6 is moved together with the conveying tube 9 axially towards or into the housing part 18, thus bringing the holder 6 into engagement with the container 3 and preferably also pressing the container 3 against the piercing element 22 in the region of the base of the housing part 18 and thereby piercing or opening the vent opening 26. Fig. 4 shows the nebuliser 1 in the relaxed state, i.e. after the first atomisation, in particular. The holder 6 is engaged with the container 3 and the conveying tube 9 has been fully inserted into the container 3.

In the delivered state shown in Fig. 3, i.e. with the container 3 (still) closed, the nebuliser 1 can be put into storage. In particular, the closed seal 24 ensures that any solvent contained in the fluid 2 cannot escape or in any case can only escape in very tiny amounts.

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To prevent unwanted opening of the container 3, particularly the seal 24 or the vent opening 26, in the delivered state of the nebuliser 1, the nebuliser 1 preferably has a transportation lock which is not shown in the first embodiment. By frictional, forcible or interlocking engagement, for example,
10 the transportation lock prevents the container 3 from undesirably moving axially in the nebuliser 1, e.g. during transportation, in the event of accidental dropping of the nebuliser 1 or the like, and thereby accidentally coming open. Some possible way of securing it in transit are described in more detail with reference to other embodiments.

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It should be noted that the opening of the container 3 is preferably carried out exclusively by mechanical means and / or manual actuation. However, it is additionally or alternatively possible to open it in other ways, e.g. by
20 chemical, electrical, magnetic, pneumatic, hydraulic or similar means.

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The proposed nebuliser 1 is activated after the removal of the securing member 27 and (total) axial pushing on of the housing part 18 and can be used in the same way as the nebuliser 1 shown in Figs. 1 and 2. As previously the nebuliser had to be opened by removing the housing part 18, putting in the
25 container 3 and then closing the nebuliser 1 by pushing on the housing part 18, the process is now easier to carry out and more reliable in operation. In particular it prevents the wrong container 3 or used containers 3 from being inserted in the nebuliser 1 by the user. Additionally it ensures that a separately supplied container 3 is not accidentally opened before being
30 inserted in the nebuliser 1. Additionally the proposed solution prevents possible soiling or damage to the nebuliser 1, e.g. the conveying tube 9 or the like, when the nebuliser 1 is opened and the container 3 is used improperly.

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As preferably the container 3 cannot then be removed, especially because the nebuliser 1 cannot be opened and the housing part 18 cannot be removed again, undesirable replacement of the container 3 by the user and in particular

undesirable interim or subsequent opening of the nebuliser 1 by the user can be prevented.

5 The other embodiments will now be described in more detail with reference to Figs. 5 to 35. The relevant explanations are restricted to essential differences from the first embodiment mentioned above and from the known nebuliser 1 according to Figs. 1 and 2. The remarks and explanations given regarding the first embodiment and the known nebuliser 1 thus apply accordingly or in supplementary fashion, even if they have not been repeated, for reasons of
10 simplicity.

Figs. 5 to 7 show a second embodiment of the proposed nebuliser 1. Fig. 5 shows the nebuliser 1 in the delivered state, i.e. with the container 3 inserted therein but still sealed. Fig. 6 shows a magnified detail from Fig. 5. Fig. 7
15 shows the nebuliser 1 in the activated state, i.e. with the container 3 open.

In the second embodiment the nebuliser 1, preferably the housing member 18 is of telescopic construction and can be pushed together or axially shortened. In particular the housing part 18 according to the second embodiment
20 comprises two axially insertable telescopic parts 32 and 33 and an axially insertable base part 34.

Fig. 5 shows the nebuliser 1 or the housing part 18 in the telescopically extended, non-activated state. In this state the 2 telescopic parts 32, 33 and
25 the base part 34 are preferably secured against unwanted axial insertion by means of latching engagements and / or a frictional securing. In particular the forces required or having to be overcome for the axial insertion are matched to one another such that when axial pressure is applied to the base part 34, initially the first telescopic part 32 is pushed into the housing part 18, then the
30 second telescopic part 33 is pushed into the first telescopic part 32 and finally the base part 34 is pushed axially into the second telescopic part 33.

Fig. 7 shows the axially pushed-in activated state. In this state the telescopic parts 32, 33 and the base part 34 are preferably axially secured in their axial
35 positions by latching engagement, frictional locking or, in particular, interlocking engagement.

For example, for axially securing the telescopic parts 32 and 33 relative to the housing part 18, corresponding latching lugs 29 engage in latching recesses 30 and 31 in order to obtain the desired securing in the axially extended position on the one hand and in the axially pushed-in position on the other hand.

The magnification of a detail from Fig. 5 shown in Fig. 6 illustrates a transportation lock 36 for the nebuliser 1 for axially securing or fixing the container 3 in the delivered state of the nebuliser 1. In the embodiment shown the transportation lock 36 has an encircling retaining bead or at least one retaining arm 37. The retaining bead or retaining arm 37 co-operates with the radially somewhat widened container base 21 such that the container 3 in the delivered state is securely held in an axially defined manner on an annular shoulder or an annular flange 38 or some other abutment.

In the delivered state the base part 34 in the embodiment shown is secured in the telescopically or axially extended position by at least one radial projection or encircling bead 35 which engages radially behind complementary structures on the telescopic part 33. These securing forces can only be overcome by the application of sufficiently forceful axial pressure, for example as a result of plastic or elastic deformation and / or radial yielding of the projections / beads 35. During the subsequent axial pushing in of the base part 34 relative to the telescopic part 33 the piercing element 22 preferably provided on the base part 34 pierces the vent opening 26 and opens it up. In addition, the base part 34 comes into contact with the container base 21 and forces the container 3 axially out of the transportation lock 36 and presses it with the container head against or into the holder 6 in the nebuliser 1 (with the nebuliser 1 under tension). Thus the axial retaining force of the transportation lock 36 is overcome by means of the base part 34. In particular, the retaining bead or retaining arm 37 is constructed to be sufficiently elastically or plastically deformable in the radial direction for this purpose.

After the base part 34 has been pushed fully into the second telescopic part 33 the base part 34 is preferably secured again against axial displacement or outward movement by radial engagement and / or frictional engagement with the telescopic part 33.

Figs. 8 to 11 show a third embodiment of the proposed nebuliser 1. Fig. 8 shows the nebuliser 1 in the delivered state with the container 3 sealed. Fig. 9 shows a magnified partial view from Fig. 8. Fig. 10 shows the nebuliser 1 in the activated state, i.e. with the container 3 open. Fig. 11 shows the nebuliser 1 in the activated state as in Fig. 10, but without an actuating member 39.

In the second embodiment the nebuliser 1 comprises in addition to the housing part 18 the actuating member 39 which is preferably in the form of a cap, quiver or cup. The actuating member 39 is only partially fitted or pushed onto the housing part 18 in the delivered state and holds the container 3 axially at a distance from the conveying tube 9 in the nebuliser 1, as shown in Fig. 8. The housing part 18 is accordingly constructed to be open at its base.

Optionally, a guide sleeve 40 for radially guiding the container 3 is arranged in the region of the base opening in the housing part 18. The guide sleeve 40 projects axially beyond the end of the housing part 18, particularly in the delivered state, and can be pushed axially into the housing part 18 on activation by pushing the actuating member 18 (fully) in in the axial direction. Depending on the configuration of the housing part 18, particularly depending on the degree of radial play with the container 3, the guide sleeve 40 may also be omitted.

The base part 34 with the piercing element 22 as in the second embodiment and an insertion part 41 are preferably mounted in the actuation member 39.

The insertion part 41 is constructed in a similar manner to the second telescopic part 33 according to the second embodiment. As can be seen from the magnified detail shown in Fig. 9 the base part 34 and the insertion member 41 engage radially behind one another, as already explained with reference to the second embodiment in the relationship between the second telescopic part 33 and the base part 34, and reference is therefore made to the remarks made at that point.

The insertion member 41 also forms a transportation lock 36, as already described in connection with the second embodiment, and reference is therefore made to the explanations given there.

5 In the delivered state the base part 34 is held axially by preferably radial engagement and / or frictional locking by the actuating member 39. The base part 39 in turn holds the insertion member 41 axially and this in turn axially secures the container 3 via the transportation lock 36.

10 To activate the actuating member 39 it is pushed fully onto the housing part 18 in the axial direction until the actuating member 39 receives or encloses the nebuliser 1 and particularly the housing part 18, preferably in the manner of a cap or hat, as shown in Fig. 10.

15 During the axial pushing on of the actuating member 39 the container 3 is first of all pushed onto the conveying tube 9, i.e. it is opened by the conveying tube 9.

20 The further pushing of the actuating member 39 onto the housing part 18 causes the insertion member 41 to come into engagement with the housing part 18, and in particular latching arms 28 with latching lugs 29 engage in corresponding latching recesses 31 in the housing part 18 and thereby secure the insertion member 41 axially to the housing part 18.

25 In the course of the last part of the axial movement the base part 34 is finally pressed axially into the insertion part 41, as a result of which the piercing element 22 pierces or opens up the vent opening 26 and the base part 34 axially released the container 3 from the transportation lock 36 and - with the nebuliser 1 or pressure generator 5 under tension - presses it axially towards
30 or into the holder 6 in order to bring the holder 6 into engagement with the container 3. This position is shown in Fig. 10.

In the fully pushed-on state, as shown in Fig. 10, the nebuliser 1 can be used by means of the actuating member 39. In particular, the nebuliser 1 or its
35 pressure generator 5 can be tensioned in the usual way by rotating the actuating member 39 accordingly.

However, the actuating member 39 is not needed for (further) use of the nebuliser 1. Rather, depending on the design of the nebuliser 1, the actuating member 39 can or must be removed again after the activation (full insertion), and in particular must be pulled away axially. Preferably, the nebuliser 1 is constructed such that the axial detachment or removal of the actuating member 39 is only possible after previously being pushed fully onto the housing part 18 or after activation of the nebuliser 1. A suitable locking or release mechanism may be provided for this purpose, but is not shown here.

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Fig. 12 shows in a schematic exploded view a fourth embodiment of the proposed nebuliser 1. In this alternative embodiment which is similar to the third embodiment the actuating member 39 can be used to secure the nebuliser 1 and for this purpose has a preferably clip-like resilient holding bar or holding clip 42 or the like on the outside. The actuating member 39 and hence the nebuliser 1 can if necessary be attached to a belt, waistband, pocket or the like by means of the retaining bar or clip 42.

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As in the third embodiment the actuating member 39 can be removed from the nebuliser 1 as necessary - once the nebuliser 1 has been activated or the container 3 has been opened. In particular, the actuating member 39 according to the fourth embodiment can be used as necessary to secure the nebuliser 1, as desired. In order to obtain the optimum securing of the nebuliser 1 the actuating member 39 is preferably releasably connectible to the nebuliser 1 by clamping and / or latching, and in particular the nebuliser 1 can be inserted in a preferably at least substantially hollow cylindrical portion of the actuating member 39.

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The construction and use of the actuating member 39 as a holder for the nebuliser 1 can also be designed irrespective of the preinstalled container 3, i.e. in general for any type of nebuliser 1. Other constructions are then possible, in particular; for example the actuating member 39 may be merely clamped to the nebuliser 1.

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Figs. 13 and 14 are schematic sections illustrating a fifth embodiment of the proposed nebuliser 1. Fig. 13 shows the nebuliser 1 in its delivered state (with

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a preinstalled sealed container 3). Fig. 14 shows the nebuliser 1 in the activated state, i.e. with the container 3 open.

5 The fifth embodiment is substantially similar to the third embodiment. The nebuliser 1 can be activated by pushing on the actuating member 39 which is preferably cap-, quiver- or cup-shaped. Only essential differences between this and the third embodiment will be described hereinafter.

10 The insertion member 41 is not provided with latching arms 28, but for fitting onto the housing part 18 it is preferably in the shape of a hat, quiver, cup or cap. In the activated state the insertion member 41 sits around or over an annular portion 43 which is formed in the region of the free end of the housing part 18 and in particular surrounds or forms the through-opening for the axial insertion of the container 3. In particular, the insertion member 41 is
15 connected to the housing part 18 axially in frictional or interlocking engagement in the activated state.

20 Preferably the insertion member 41, as in the third embodiment, forms the smoothest possible outer contour in the activated state or when connected to the housing part 18, so as to give the nebuliser 1 a pleasant surface feel and ease of handling even with the actuating member 39 removed. In accordance with the third embodiment, the actuating member 39 in the fifth embodiment can in fact be fully removed or axially pulled off after activation as well.

25 In the fifth embodiment the nebuliser 1 may comprise the guide sleeve 40 according to the third embodiment for radially centring or securing or supporting the container 3 in the delivered state, particularly in order to be able to prevent unwanted detachment from the transportation lock 36 by tilting the container 3 to one side. However, no guide sleeve 40 is provided in
30 the embodiment shown. Instead, the through-opening for the container 3 is formed at the free axial end of the housing part 18 or is provided with slight radial play relative to the container 3, for example in the region of the annular portion 43, such that there is no need for a separate component such as the guide sleeve 40.

Another constructional difference between the third embodiment and the fifth embodiment is that, in the fifth embodiment, the base part 34 is held axially by the actuating member 39, as an alternative or in addition to the radial clamping in the delivered state, as show in Fig. 13. Preferably for this purpose the actuating member 39 engages axially with a preferably nipple-, pin- or bolt-shaped projection 44 in a corresponding recess in the base of the base part 34, so that the base part 34 is axially secured to the actuating member 39.

In the activated state the actuating member 39 can be released from the base part 34 to allow the actuating member 39 to be removed axially if necessary. Preferably the interlocking or frictional engagement and the material forces are designed such that the base part 34 is held by the insertion member 41 in the pressed-in or retracted piercing position shown in Fig. 14, even when the actuating member 39 is pulled away axially. For example, when the actuating member 39 is pulled away axially, the projection 44 is broken off and remains on or in the base part 34.

The construction of the transportation lock 36 and the release of the container 3 from the transportation lock 36 during activation preferably correspond to the third embodiment. Preferably, activation takes place even with the nebuliser 1 or pressure generator 5 under tension, so that when the actuating member 39 is pushed fully on in the axial direction the container 3 is not only opened and pierced at its base by the insertion of the conveying tube 9 but is also brought into engagement at the head end with the holder 6.

Fig. 15 and 16 show diagrammatic sections through a sixth embodiment of the proposed nebuliser 1. Fig. 15 shows the nebuliser 1 in the delivery position. Fig. 16 shows the nebuliser 1 in the activated position, i.e. ready for use with the container 3 open.

In the sixth embodiment, in a similar manner to the third embodiment, an insertion member 41 and a base part 34 are provided which can be inserted for activation into the correspondingly axially open housing part 18. In contrast to the third embodiment a separate or additional actuating member 39 is not needed. Instead, the insertion member 41 is constructed in the manner of a

sleeve and is guided or held by a hollow cylindrical portion 45 which is formed, particularly moulded, on the housing part 18, especially in the delivered state and during the axial insertion into the nebuliser 1 or the housing part 18. In the pushed-in or activated state the insertion part 41
5 together with the base part 34 terminates the hollow cylindrical portion 45, thus forming an at least substantially smooth outer contour for the nebuliser 1.

In the sixth embodiment the base part 34 is held by the insertion member 41, preferably in a defined manner by radial engagement in an axial position in
10 which the piercing element 22 is axially spaced from the base seal, i.e. the vent opening 26 in the container 3.

To activate it, pressure is applied to the base part 34. As a result the base part 34 is inserted or pushed axially (further) into the insertion part 41, as a result
15 of which the piercing element 22 pierces or opens the vent opening 26. At the same time, beforehand or afterwards, the insertion member 41 with the container 3 essentially arranged therein is pushed into the nebuliser 1 or housing part 18 and as a result the conveying tube 9 is axially inserted in the container 3 and the container 3 is thus opened. With the nebuliser 1 or
20 pressure generator 5 under tension the container 3 is finally brought into engagement with the holder 6 at the head end. In the pushed-in activated position shown in Fig. 16 the insertion member 41 and the base part 34 are preferably secured in axially latching and / or clamping manner on the housing part 18 or hollow cylindrical section 45.

25 To prevent unwanted withdrawal of the insertion member 41 during insertion, e.g. from a half-inserted position or from the fully inserted position, the nebuliser 1 according to the sixth embodiment preferably comprises a progressive, preferably saw tooth-like latching 46 or the like between the
30 housing part 18 and the insertion member 41 so that the insertion member 41 is only axially insertable but cannot be axially withdrawn in the opposite direction. In the embodiment shown the latching 46 is formed on the outside in a longitudinal direction over a sleeve portion of the insertion member 41. Then at least one latching arm 28 arranged on the nebuliser 1, particularly on
35 the housing part 18 in the hollow cylindrical section 45 engages in the latching member 46. Figs. 15 and 16 show two axially extending latching

arms 29 which are elastically biased in the radial direction towards the insertion member 41.

5 To form a transportation lock to prevent accidental pushing in of the insertion member 41 in the delivered state of the nebuliser 1, according to the sixth embodiment a securing member 27 is preferably provided in the form of or comprising a safety tag, as show in Fig. 15. The safety tag is, for example, arranged or inserted radially on the outside between at least one latching arm 28 and a wall of the hollow cylindrical section 45, in order to block the
10 minimum of one latching arm 28 or several or all of the latching arms 28 against radially springing out and thereby to prevent the axial movement inwards of the insertion member 41. Only after the removal, particularly the axial withdrawal, of the safety tag are the latching arm or latching arms 28 and hence the latching member 46 released and the insertion member 41 is
15 able to be axially pushed in and the nebuliser 1 thereby activated.

Fig. 17 and 18 show schematic sections through a seventh embodiment of the proposed nebuliser 1. Fig. 17 shows the nebuliser 1 in the delivered state. fig. 18 shows the nebuliser 1 in the activated state.

20

The seventh embodiment is very similar to the sixth embodiment. However, in the sixth embodiment no insertion member 41 is provided. Instead, in the delivered state the housing part 18 is axially pushed only partially onto the nebuliser 1, particularly the inner part 17 or a retaining portion 47 provided
25 thereon. The retaining portion 47 is provided, for example, in the lower part 17b of the inner part 17. The retaining portion 47 is axially extended beyond the end of the inner part 17 to enable the housing part 18 to be held in a sufficiently axially displaced position in the delivered state so that the container 3 preinstalled in the housing part 18 is still axially spaced from the
30 conveying tube 9. Preferably, by means of a suitable engagement, latching or similar, the housing part 18 can no longer be axially withdrawn or removed once it has been axially (partially) pushed onto the retaining portion 47.

35 The housing part 18 in the seventh embodiment holds the base part 34 in a manner corresponding or similar to the way in which the insertion member 41 holds the base part 34 in the sixth embodiment. For activation, with the

nebuliser 1 or pressure generator 5 preferably under tension, the base part 34 is axially pressed again. As a result the housing part 18 is pushed (fully) onto the nebuliser 1 or the inner part 17 in the axial direction. The container 3 is opened by the axial insertion of the conveying tube 9. Axially pressing the
5 base part 34 into the housing part 18 - in particular until the base part 34 is just flush with the axial end of the housing part 18 - finally results in the piercing of the base of the container 3, the release of the container 3 from the axial transportation lock 36 at the base, which is formed by the housing part 18 in the seventh embodiment, and axial insertion of the container 3 into the
10 holder 6.

Preferably, between the housing part 18 and the nebuliser 1 or inner part 17, there is provided a device (not shown) such as the latching member 46 in the sixth embodiment having at least one associated latching arm 28 or the like,
15 exclusively to enable the housing part 18 to be pushed onto the nebuliser 1 but prevent axial withdrawal or movement in the opposite direction. According to the sixth embodiment a securing member 27 (not shown) in the form of or comprising a safety tag or the like may also be provided to prevent the housing part 18 from being pushed in, in the delivered state, if the securing
20 member 27 has not been removed.

Fig. 19 to 22 show schematic sections through an eighth embodiment of the proposed nebuliser 1. Fig. 19 shows the nebuliser 1 in its delivered state. Fig. 20 shows the nebuliser 1 in the activated state, i.e. with the container 3 already
25 open, but with the nebuliser 1 or pressure generator 5 not yet under tension. Fig. 21 shows the nebuliser 1 in the activated and tensioned state. Fig. 22 shows, in a magnified detail, part of Fig. 21 and illustrates the transportation lock 36 in the eighth embodiment.

30 In the eighth embodiment, in a similar manner to the seventh embodiment, the housing part 18 is axially pushed on only partly in the delivered state. In contrast to the seventh embodiment, the housing part 18 in the eighth embodiment is closed at its base, i.e. no separate base part 34 is provided. Instead, the piercing element 22 is provided on the inside of the base of the
35 housing part 18 and in the delivered state the container 3 is held at an axial

spacing from the correspondingly constructed transportation lock 36 to prevent opening or piercing of the vent opening 26 at the bottom.

5 In the example shown the transportation lock 36 is preferably held in axially movable manner in or by the housing part 18 to allow the base of the container 3 to be pierced on activation.

10 In the embodiment shown the transportation lock 36 comprises at least one gripping arm 48, preferably a plurality of gripping arms 48, before axially holding the container 3 in the delivered state by engaging around its preferably radially expanded base end, as show in Fig. 19 for one gripping arm 48.

15 As in the seventh embodiment, the eighth embodiment preferably comprises a device such as the latching element 46 having at least one associated latching arm 28 between the housing part 18 and the nebuliser 1 or inner part 17, to allow the housing part 18 only to be pushed axially on but not axially moved back. The latching element 46 is preferably formed on the inside of the housing part 18, as indicated in Figs. 19 to 21. A latching arm 28 with a
20 latching lug 29 engages in the latching element 46. In contrast to the sixth embodiment, a coarser latching element 46 is provided here. In addition it is also possible to block the axial pushing-on movement by blocking the latching arm 28 using a securing member 27 (not shown), particularly in the form of or comprising a safety tag or the like.

25 In the eighth embodiment the activation is preferably carried out in the non-tensioned state of the nebuliser 1. After the removal of the safety tag or the like which is optionally provided, the housing part 18 is pushed onto the nebuliser 1, particularly the inner part 17. At the same time the conveying
30 tube 9 is axially inserted in the container 3 and the container 3 is thus opened.

In the fully pushed-on state the container 3 is pushed axially further or deeper into the housing part 18, so that the piercing element 22 has pierced or opened the vent opening 26, and the transportation lock 36 is released.

The transportation lock 36 is opened in particular by at least one axial arm or projection 49, which is formed on the inner part 17 or preferably the retaining portion 47. In the embodiment shown a plurality of axial arms 49 corresponding to the gripper arms 48 are provided, which pivot or swing out the gripper arms 48 when the housing part 18 is pushed on fully and thereby open the transportation lock 36, as shown in Fig. 20 and 21 and particularly in Fig. 22.

Opening the transportation lock 36 or gripper arms 48 preferably requires a force such that first of all the transportation lock 36 is moved axially towards the base of the housing part 18 and as a result the base of the container 3 is opened. This is achieved by correspondingly matching the force ratios between the axial securing of the transportation lock 36 in or on the housing part 18 and the necessary opening force for swivelling the gripper arms 48. Only after the axial end position of the transportation lock 36 in the housing part 18 has been reached are the gripper arms 18 and hence the transportation lock 36 opened in order to release the container 3 axially.

During the subsequent first tensioning, the conveying tube 9 is moved further into the container 3 and the holder 6 is brought into engagement with the container 3. Fig. 21 shows this position. During the subsequent release of the nebuliser 1 the container can be axially moved by the holder 6 in the usual way during the nebulising process, as the transportation lock 36 remains open and frees the container 3 for axial movement.

Fig. 23 to 31 show a ninth embodiment of the proposed nebuliser 1. Fig. 23 shows the nebuliser 1 in the delivered state. Fig. 24 shows the nebuliser 1 in the activated but not yet tensioned state. Fig. 25 shows the nebuliser 1 in the activated and tensioned state. Fig. 26 shows in a detailed perspective view the transportation lock 36 with a securing element mounted on the container 3, such as a cartridge element 50 and a base element 51 formed or mounted on the housing part 18. Fig. 27 shows in side view the cartridge element 50 in the position where it is axially raised from the base element 51, which is shown partly in section, for clarification. Fig. 28 shows in a view corresponding to Fig. 27 the cartridge element 50 in the lowered state. Fig. 29 shows a schematic axial view of the transportation lock 36 in the opened state. Fig. 30

shows the inner part 17 of the nebuliser 1 in perspective view. Fig. 31 shows the housing part 18 in a schematic perspective view.

5 The ninth embodiment is basically similar to the eighth embodiment in construction and design. The description that follows will mention only the essential differences. The remarks made regarding the eighth embodiment and the other embodiments also supplement one another, in particular.

10 In the ninth embodiment the housing part 18 has not been fully pushed on, in the delivered state. The transportation lock 36 fixes the container 3 to the base of the housing part 18 in the delivered state.

15 In the ninth embodiment the axial movement is preferably converted on activation into a rotary movement, in order to open the transportation lock 36 or axially free the container 3. In particular, the freeing or release is effected over a diagonal plane. The uncoupling of the movements of axial pushing on and release of the transportation lock 36 by a rotary movement allows optimum axial fixing of the container 3 in the secured state and relatively easy opening of the transportation lock 36 in order to release the container 3 axially. This is explained below with reference to the embodiment shown.

20 The cartridge element 50 is connected for rotation with the container 3, particularly formed, stuck or injection moulded thereon, and encloses the rim or edge of the radially widened container base 21. In the delivered state, as shown in Fig. 23, 26 and 27, the cartridge element 50 with the container 3 is axially and non-rotatably secured to the base element 51, more specifically at an axial spacing from the base element 51, so that the piercing element 22 on the base element 51 does not open or pierce the base of the container 3.

30 Rigid gripper arms 48 are mounted, particularly formed, on the base element 51, these arms 48 engaging over radial projections 52 of the cartridge elements 50 in the rotational position specified and thereby securing the cartridge element 50 against moving axially away from the base element 51. Locking arms 53 on the base element 51 block radial stops 54 of the cartridge element 50 and thereby prevent rotation of the cartridge element 50 (in the clockwise direction, in the embodiment shown). Rotation in the opposite

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direction is blocked by a suitable design of the gripper arms 48 and/or co-operation with sliding slopes 55 on the cartridge element 50 and ramps 56 on the base element 51.

5 The sliding slopes 55 and ramps 56 extend circumferentially and are inclined in the circumferential direction and matched to one another such that the cartridge element 50 in the (blocked) rotational position specified is held at an axial spacing or raised from the base element 51 in the delivered state, as can be seen from Fig. 27 in particular.

10

In order to activate the nebuliser 1 and open the container 3 the housing part 18 is fully pushed on in the axial direction. The inner part 17 comprises axial arms or projections 49 shown in Fig. 30, which in the activated state, or when the housing part 18 is fully pushed on, pivot the blocking arms 53 and thereby
15 open the transportation lock 36 or at least undo or unlatch it. The blocking arms 53 or the sections of the blocking arms 53 blocking the radial abutments 54 are swung radially outwards and thereby allow the cartridge element 50 to be rotated relative to the base element 51.

20

Fig. 24, 25, 28 and 29 show the cartridge element 51 already rotated clockwise. The rotation is carried out by the sliding of the sliding slopes 55 over the ramps 56, particularly during the tensioning of the pressure generator 5 or the pressing down of the container 3 by the holder 6. During this sliding movement the cartridge element 50 is moved axially with respect to the base
25 element 51 and the base of the container 3 is pierced by the piercing element 22 on the base element 51. Moreover, the rotation axially frees the cartridge element 50 with the container 3, as the radial projections 52 are moved out underneath the gripper arms 48 and thereby freed axially. The rotation of the cartridge element 50 for optionally piercing the container 3 and axially releasing it is preferably about 5 to 10°.

30

Naturally, the transportation lock 36 may also be of a different construction but with a comparable function; in particular, it should allow for the opening or at least undoing or releasing of the transportation lock 36 by rotating the
35 cartridge element 50 relative to the base element 51 in the anti-clockwise direction.

5 The principle described above or the specific construction of the transportation lock 36 according to the ninth embodiment may if necessary also be implemented in the other embodiments, particularly in the eighth embodiment.

10 The base element 51 preferably has retaining arms 57, which engage in corresponding pouches 58 on the housing part 18 for attachment to said housing part 18. In particular, during assembly, the base element 51 is clipped into the housing part 18, preferably together with the container 3 and the cartridge element 50. This allows easy assembly. However, the base element 51 may also be attached to the housing part 18 in some other way and/or be formed thereby.

15 In the embodiment shown, the inner part 17 comprises several, particularly three, latching arms 28 distributed over the circumference. The housing part 18 shown by way of example in Fig. 31, however, preferably has only one latching member 46 on the inside, into which accordingly only one associated latching arm 28 engages with its latching lug 29. The function of this engagement has already been discussed with reference to the sixth and eighth
20 embodiments, in particular, and there is therefore no need to go into it again at this point.

25 The other latching arms 28 engage in latching recesses 30 and 31 on the housing part 18, the recesses 30 corresponding to the axial position in the delivered state and the recesses 31 corresponding to the axially fully inserted position of the housing part 18. This results in a particularly durable securing of the housing part 18 in both positions, to rule out the possibility of the housing part 18 being detached from the nebuliser 1 by a user or of
30 unauthorised partial axial removal of the housing part 18 from the fully pushed-on position.

In the ninth embodiment the housing part 18 is preferably mounted in non-rotatable manner on the nebuliser 1 or inner part 17 as in the other
35 embodiments.

In the ninth embodiment the activation is preferably carried out with a non-tensioned nebuliser 1 or pressure generator 5. Accordingly, after activation by axial insertion of the housing part 18, a first tensioning is still required in order to bring the holder 6 into engagement with the container 3, as indicated in Fig. 25.

However, the nebuliser 1 or pressure generator 5 may also already be tensioned in the delivered state. This is the case particularly in the first, second, third, fifth, sixth and seventh embodiments.

According to a particularly preferred alternative embodiment the cartridge element 50 and the container 3 are inseparably attached to one another. Preferably the cartridge element 50 serves to code the container 3 or the fluid 2 or drug contained therein. The coding may vary for example depending on the particular active substance and/or the dosage. The coding by the cartridge element 50 ensures that the container 3 with the cartridge element 50 can only be used in conjunction with a specific nebuliser 1, particularly only with a specific or matching housing part 18 or base element 51. This is a way of ensuring that only the correct container 3 or the correct fluid 2 is used with the relevant nebuliser 1.

The coding is, in particular, a corresponding adaptation or complementary structure of projections, recesses, undercuts, arrangement and number of arms or the like, to ensure that the container 3 in question with the cartridge element 50 can only be inserted in the nebuliser 1 if the coding matches, i.e. if the parts fit.

With regard to the cartridge element 50 it should generally also be pointed out in connection with the ninth embodiment that it does not necessarily have to be of continuous peripheral construction. Rather, it may if necessary also extend only over part of the circumference of the container 3, especially along the container base 21. However, the container 3 instead of the cartridge element 50 may also be provided with, or may form, some other securing element or the like (not shown) which cooperates in particular only mechanically with the base element 51, for example by a correspondingly

suitable design of the container rim in the region of the container base 21 or the like.

5 A tenth embodiment of the nebuliser 1 or transportation lock 36 will now be explained in more detail with reference to Fig. 32 and 33. Fig. 32 corresponds to the view in Fig. 27. Fig. 33 corresponds to the view in Fig. 28.

10 The tenth embodiment differs from the ninth embodiment essentially only in its somewhat simpler construction of the transportation lock 36. Compared with the ninth embodiment the gripper arms 48 are missing from the tenth embodiment. Instead, the blocking arms 53 in the secured state additionally serves to fix or secure the cartridge element 50 axially to the base element 51 or housing part 18. In particular, the blocking arms 53 engage with
15 corresponding, preferably angled sections, over the cartridge element 50 or suitable projections of the cartridge element 50, such as the radial projections 52, to secure the cartridge element 50 against being lifted radially out of the position shown in Fig. 32.

20 Fig. 33 shows the already unsecured state or the already opened transportation device 36. The blocking arms 53 are deflected, particularly pivoted radially outwards, in order to release the cartridge element 50 and hence the container 3 axially. Moreover, in the position shown in Fig. 33, the cartridge element 50 together with the container 3 has already been placed on the base element 51; this is done by the action of the holder 6 during the tensioning of the nebuliser
25 1 with the transportation lock 36 open. The container 3 has thus been pierced in the base in this state.

30 The other explanations and aspects relating to the ninth embodiment also fundamentally apply accordingly or at least in supplementary fashion to the tenth embodiment as well.

Fig. 34 to 40 show an eleventh embodiment of the proposed nebuliser 1.

35 Fig. 34 shows the nebuliser 1 – or, more precisely, a lower part of the nebuliser 1 – in a schematic, partially transparent side view in an intermediate state. A container 3 provided therein is not shown. The housing part 18 is in

the lower or first position, in which the housing part 18 is held at an axial spacing from the inner part 17 by the upper housing part 16, so that a container 3 located in the housing part 18 is still spaced from the conveying element or conveying tube 9, i.e. has not yet been opened or pierced.

5

Fig. 35 shows in axial section the relative rotary position of the housing part 18 from the inner part 17 in the delivered state. Fig. 36 shows the rotary position of the housing part 18 to the inner part 17 in the intermediate state shown in Fig. 34. Here, the housing part 18 is rotated relative to the inner part 17 or to the delivered state. Fig. 37 shows, in a partially sectional side view, the housing part 18 without the inner part 17, but with the container 3 and a transportation lock 36 holding the container 3 in the housing part 18. Fig. 38 to 40 show partially sectional side views of the housing part 18 in various states.

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The eleventh embodiment is basically very similar to the seventh, eighth, ninth and/or tenth embodiment, and we therefore refer you to the remarks and explanations and illustrations provided in relation thereto, which apply accordingly or in a supplementary capacity. Only essential differences or new aspects of the eleventh embodiment will be described in more detail below.

20

In the delivery position shown in Fig. 35 the housing part 18 is prevented, preferably by interlocking engagement, from being pushed axially (further) onto the inner part 17 or from moving closer to the upper housing part 16. Only after rotation of the housing part 18 relative to the inner part 17 – preferably through about 10° to 20° – into the intermediate position shown in Fig. 34 and 36 can the (further) axial insertion or the activation of the nebuliser 1 take place, and only then is the container 3 opened and fluidically connected, as already explained in the other embodiments.

30

The above-mentioned rotary movement of the housing part 18 relative to the inner part 17 from the delivery position into the intermediate position is essential to enable the housing part 18 to be axially pushed on afterwards or the nebuliser 1 to be activated. The axial blocking of the housing part 18 in the delivery position thus constitutes a protection against accidental activation of

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the nebuliser 1. For example, this prevents the nebuliser 1 from being accidentally activated when dropped.

5 During assembly, the housing part 18 together with the container 3 located therein, held by the transportation lock 36, is initially pushed onto the inner part 17 or the lower part 17b of the inner part 17 only until the housing part 18 is inseparably attached, particularly latched and secured to the inner part 17. Particularly preferably in the delivered state latching arms 28 with latching lugs 29 engage in first latching recesses 30, so that the housing part 18 can no longer be detached or pulled away from the inner part 17. In this delivered state the housing part 18 is then at least initially protected by interlocking engagement from any further axial pushing.

15 The locking to prevent any further axial pushing in the delivered state is preferably achieved in the embodiment shown by provision on the housing part 18 of at least one axial abutment 59, in particular at least two axial abutments 59 on opposite sides, which butt up against at least one preferably radial projection 60 on the inner part 17 in the delivered state. The abutments 59 are most clearly shown in the end view according to Fig. 36. Here, the housing part 13 has already been rotated into the intermediate position, so that the projections 60 no longer axially overlap the abutments 59, but engage in adjacent axial recesses 61.

25 The rotation of the housing part 18 relative to the inner part 17 from the delivery position into the intermediate position is possible, *inter alia*, because the latching recesses 30 have a corresponding peripheral extent, so that the latching lugs 29 are able to slide or move along the circumference in the inner wall of the housing part 18, more precisely in the intermediate position shown in Fig. 34.

30 Locking against further axial pushing of the housing part 18 in the delivered state can also be achieved by other constructional means.

35 On rotating the housing part 18 from the delivery position into the intermediate position a certain resistance preferably has to be overcome. The rotary action may be made stiff for this purpose. In the embodiment shown the

housing part 18 moves into the delivery position and the intermediate position in a virtually latching manner (in the delivery position the radial projections 59 engage in radial recesses 62 and in the intermediate position they engage in the adjacent axial recesses 61 in the housing part 18, so that a certain latching resistance has to be overcome when moving from the delivery position into the intermediate position, while the housing part 18 and/or inner part 17 are preferably radially elastically deformed accordingly or cause corresponding portions to yield resiliently.

Preferably a locking device is also provided, so that the housing part 18 cannot be rotated back out of the intermediate position into the delivery position. In the embodiment shown, on the inner part 17 is provided at least one preferably radially acting locking latch 63, which initially engages in the delivery position in a first axially extending latching notch 64 in the housing part 18 and in the intermediate position in a second axially extending latching notch 65. During the transition from the delivery position into the intermediate position - i.e. from the first latching notch 64 into the second latching notch 65 - the locking latch 63 can yield radially inwards. In the embodiment shown, two locking latches 63 are provided on opposite sides together with associated latching notches 64 and 65. Rotation back from the intermediate position into the delivery position can also be prevented by other constructional means.

In the eleventh embodiment the activation of the nebuliser 1 requires a combination of a rotary and a translatory movement. This combined movement results in particularly good securing against accidental activation of the nebuliser 1.

Preferably, in the non-activated state, i.e. when the housing part 18 has not been pushed on fully - the nebuliser is locked to prevent tensioning of the pressure generator, i.e. in particular to prevent rotation of the inner part 17 relative to the upper housing part 16. This is particularly important when the nebuliser 1 is supplied in the delivered state with the pressure generator 5 not under tension. Accordingly, the inhaler 1 has a barrier, so that the inner part 17 can only be rotated relative to the upper housing part 16 when the housing part 18 has been pushed fully on. This rotation barrier which is effective particularly in the delivered state may also be used independently of the

eleventh embodiment in the other embodiments in which the nebuliser 1 is delivered in the non-tensioned state.

5 The direction of rotation when moving the housing part 18 from the delivery position into the intermediate position preferably extends in the opposite direction to the direction of rotation when tensioning the pressure generator 5 or nebuliser 1 by rotating the housing part 18 in the activated state. However, the rotation from the delivery position into the intermediate position may alternatively also be carried out in the direction of tensioning, in order to
10 tension the nebuliser 1 or pressure generator 5 at the same time, if desired.

In the embodiment shown one of the radial projections 60 preferably forms a bearing for the counting or monitoring device 23, particularly for a threaded spindle 66 of the device 23, shown in Fig. 34. The spindle 66 is preferably a
15 slider (not shown) for indicating the number of doses which have already been taken or which are still available to take. By rotating the spindle 66 the slider can be moved along the spindle 66. Preferably a window 67 (c.f. Figs. 35 and 36) is formed in the housing part 18 so that the axial position of the slider can be seen, even if the housing part 18 is not otherwise transparent in
20 construction.

The eleventh embodiment has a transportation lock 36 which is rather different in construction from those in the previous embodiments. The function of the transportation lock 36, however, corresponds to the remarks
25 made previously, and therefore only the essential differences in the transportation lock 36 will be discussed hereinafter.

Fig. 37 illustrates the preferred structure of the transportation lock 36. A base element 51 is inserted in the housing part 18 and held by retaining arms 57.
30 The transportation lock 36 or the base element 51 comprises gripper arms 48 which fix the container 3 in the transportation state shown. In particular the gripper arms 48 engage radially and / or axially on the container 3 or the transition to its base 21 in this state, in order to secure the container 3 by frictional or, more particularly, interlocking engagement. The gripper arms 48
35 are distributed around the circumference of the container 3.

The transportation lock 36 also has a preferably annular securing element 68 which is provided with, in particular, radially extending locking elements 69 which prevent the gripper arms 48 from springing radially outwards in the secured state or transportation state shown. In particular, the locking elements 69 for this purpose engage on peripheral or lateral (hammer-like) projections 70 on the gripper arms 48 radially from the outside.

Preferably the locking elements 69 are supported radially on the outside on the inner wall of the housing part 18 (this prevent radial deflection and correspondingly ensures blocking or locking of the gripper arms 48, by interlocking engagement, in the transporting position which holds the container 3 by interlocking engagement; and are preferably axially held on the radial exterior by a peripheral groove 71 and an associated peripheral bead 72 on the housing part 18, as indicated in Fig. 38, or in some other way. Thus the securing element 68 is axially fixed or held in the transportation state. However, the securing element 68 may also be axially held directly or in some other way.

The locking elements 69 are preferably connected to the securing element 68 by axial bars 73, so as to form between them spaces which are large enough to enable the gripper arms 48 to yield outwards when the transportation lock 36 is opened and in the axial direction, particularly with the securing element 68 pushed towards the base of the housing part 18, as will be described hereinafter.

Fig. 38 shows the housing part 18 with the inner part 17 already partly inserted, so that axial arms or projections 49 of the inner part 17 are already abutting on the end faces of the locking elements 69. Starting from the intermediate position the container 18 has not yet been pushed fully onto the inner part 17 or nebuliser 1.

Fig. 39 shows the position with the housing part 18 fully pushed on. The inner part 17 has pushed the securing element 68 out of the securing or transportation position shown in Figs. 37 and 38 axially towards the base of the housing part 18, so that the locking elements 69 no longer secure the gripper arms 48 against axial deflection. During the axial displacement the

inner part 17 has overcome or cancelled the interlocking engagement which is preferably provided between the housing part 18 and the locking elements 69.

Moreover, on reaching the position shown in Fig. 39 the inner part 17 has
5 radially deflected the gripper arms 48 by corresponding axial engagement and thereby opened the transportation lock 36. In this position the container 3 is already held at the head end by the holder 6, even if the container 6 has possibly not yet fully engaged in the holder 6.

10 During the subsequent tensioning of the nebuliser 1 or pressure generator 5 for the first time the holder 6 is moved further axially in the direction of the housing part 18, as a result of which the container 3 is latched at its head end to the holder 6, in the desired manner, unless this has already occurred, and the container 3 is moved into its lower axial end position, so that it is opened
15 or pierced at the base by the piercing element 22, as indicated in Fig. 40.

The nebuliser 1 preferably has an indicator device for indicating the activated state or the opened state of the transportation lock 36. In the embodiment shown this is achieved by the fact that the housing part 18 has a lateral
20 inspection window 74 in its base region. A peripheral, preferably differently coloured part of the securing element 68, particularly of a locking element 69, is visible through the inspection window 74 only when the transportation lock 36 is open or the inner part 17 is fully engaged.

25 The transportation lock 36 allows easy assembly, particularly easy insertion of the container 3 into the housing part 18, very secure holding of the container 3 in the transportation position and easy reliable opening by the inner part 17 or the like.

30 The transportation lock 36 according to the eleventh embodiment can also be used in the other embodiments.

Figs. 41 and 42 are schematic sections through a twelfth embodiment of the proposed nebuliser 1. Fig. 41 shows the delivered state. Fig. 42 shows the
35 activated state with the container 3 open.

In contrast to the other embodiments, in the twelfth embodiment the nebuliser 1 is totally closed, and in particular there is no need to push in, push on or otherwise mechanically (additionally) actuate an element, component or the like in order to activate or open the container 3. Instead, the activation of the nebuliser 1 or the opening of the container 3 occurs when the nebuliser 1 or pressure generator 5 is tensioned for the first time.

In the twelfth embodiment the container 3 and the conveying device for the fluid 2 in the nebuliser 1 are preferably matched to one another such that the conveying tube 9 or some other conveying element has not yet pierced the container 3 in the non-tensioned deliver state of the nebuliser 1. Only during the tensioning is the conveying tube 9 axially inserted into the container 3, thereby opening the container 3, and the holder 6 is brought into engagement with the container 3. The advantage for the user is that he does not have to take any special action in order to activate the device. Rather, the nebuliser 1 is automatically activated during normal use, i.e. when it is tensioned for the first time. The pre-installed container 3 thus results in a particularly simple and hence reliable means of operation for the user.

Preferably, in the twelfth embodiment, as in most of the other embodiments, the housing part 18 cannot be detached from the nebuliser 1. In particular, the housing part 18 is latched in position and is held so as to be non-removable, for example, in the pushed-on position by the latching arms 28 shown in the Figures 41 and 42.

Generally, it should be pointed out that in the proposed nebuliser 1 the container 3 can preferably be inserted, i.e. incorporated in the nebuliser 1. Consequently, the container 3 is preferably a separate component. However, the container 3 may theoretically be formed directly by the nebuliser 1 or part of the nebuliser 1 or may otherwise be integrated in the nebuliser 1.

As already mentioned, individual features, aspects and / principles of the embodiments described may also be combined with one another as desired and may be used particularly in the known nebuliser according to Figs. 1 and 2 but also in similar or different nebulisers.

Unlike freestanding equipment or the like the proposed nebuliser 1 is preferably designed to be portable and in particular is a mobile hand operated device.

- 5 The proposed solution may, however, be used not only in the nebulisers 1 specifically described here but also in other nebulisers or inhalers, e.g. powder inhalers or so-called metered dose inhalers.

10 Preferably, the fluid 2 is a liquid, as already mentioned, especially an aqueous pharmaceutical formulation. However, it may also be some other pharmaceutical formulation, a suspension or the like.

15 According to an alternative embodiment the fluid 2 may also comprise particles or powder. In this case, instead of the expulsion nozzle 12, some other kind of supply device may be provided, especially an expulsion opening (not shown) or a supply channel (not shown) for supplying the fluid to or powder or the like into the mouthpiece 13. The optional air supply opening 15 then serves to supply ambient air preferably in parallel so as to general or allow an airflow with a sufficient volume for breathing in or inhaling through the mouthpiece 13.

20 If necessary the fluid 2 may also be atomised by means of a propellant gas.

25 Preferred ingredients and / or formulations of the preferably medicinal fluid 2 are listed hereinafter. As already stated, these may be aqueous or non-aqueous solutions, mixtures, formulations containing ethanol or free from solvent, or the like. It is particularly preferable for the fluid 2 to contain:

30 As pharmaceutically active substances, substance formulations or substance mixtures, all inhalable compounds are used such as, for example, inhalable macromolecules as disclosed in EP 1 003 478. Preferably, substances, substance formulations or substance mixtures for treating respiratory complaints and administered by inhalation are used.

35 Particularly preferred pharmaceutical compositions in this context are those which are selected from among the anticholinergic, betamimetics, steroids,

phosphodiesterase IV inhibitors, LTD4 antagonists and EGFR kinase inhibitors, antiallergics, derivatives of ergot alkaloids, triptans, CGRP antagonists, phosphodiesterase V inhibitors, and combinations of such active substances, e.g. betamimetics plus anticholinergics or betamimetics
 5 plus antiallergics. In the case of combinations, preferably at least one of the active substances comprises chemically bound water. Preferably, anticholinergic-containing active substances are used, as monopreparations or in the form of combined preparations.

10 The following are specifically mentioned as examples of the active ingredients or the salts thereof:

Anticholinergics which may be used are preferably selected from among tiotropium bromide, oxitropium bromide, flutropium bromide, ipratropium
 15 bromide, glycopyrronium salts, trospium chloride, tolterodine, tropenol 2,2-diphenylpropionate methobromide, scopine 2,2-diphenylpropionate methobromide, scopine 2-fluoro-2,2-diphenylacetate methobromide, tropenol 2-fluoro-2,2-diphenylacetate methobromide, tropenol 3,3',4,4'-tetrafluorobenzilate methobromide, scopine 3,3',4,4'-tetrafluorobenzilate
 20 methobromide, tropenol 4,4'-difluorobenzilate methobromide, scopine 4,4'-difluorobenzilate methobromide, tropenol 3,3'-difluorobenzilate methobromide, scopine 3,3'-difluorobenzilate methobromide, tropenol 9-hydroxy-fluorene-9-carboxylate methobromide, tropenol 9-fluoro-fluorene-9-carboxylate methobromide, scopine 9-hydroxy-fluorene-9-carboxylate
 25 methobromide, scopine 9-fluoro-fluorene-9-carboxylate methobromide, tropenol 9-methyl-fluorene-9-carboxylate methobromide, scopine 9-methyl-fluorene-9-carboxylate methobromide, cyclopropyltropine benzilate methobromide, cyclopropyltropine 2,2-diphenylpropionate methobromide, cyclopropyltropine 9-hydroxy-xanthene-9-carboxylate methobromide,
 30 cyclopropyltropine 9-methyl-fluorene-9-carboxylate methobromide, cyclopropyltropine 9-methyl-xanthene-9-carboxylate methobromide, cyclopropyltropine 9-hydroxy-fluorene-9-carboxylate methobromide, cyclopropyltropine methyl 4,4'-difluorobenzilate methobromide, tropenol 9-hydroxy-xanthene-9-carboxylate methobromide, scopine 9-hydroxy-xanthene-9-carboxylate methobromide, tropenol 9-methyl-xanthene-9-carboxylate
 35 carboxylate methobromide, scopine 9-methyl-xanthene-9-carboxylate

methobromide, tropenol 9-ethyl-xanthene-9-carboxylate methobromide, tropenol 9-difluoromethyl-xanthene-9-carboxylate methobromide and scopine 9-hydroxymethyl-xanthene-9-carboxylate methobromide, optionally in the form of the racemates, enantiomers or diastereomers thereof and optionally in
 5 the form of the solvates and/or hydrates thereof.

Betamimetics which may be used are preferably selected from among albuterol, bambuterol, bitolterol, broxaterol, carbuterol, clenbuterol, fenoterol, formoterol, hexoprenaline, ibuterol, indacaterol, isoetharine, isoprenaline,
 10 levosalbutamol, mabuterol, meluadrine, metaproterenol, orciprenaline, pirbuterol, procaterol, reproterol, rimiterol, ritodrine, salmeterol, salmefamol, soterenot, sulphonterol, tiaramide, terbutaline, tolubuterol, CHF-1035, HOKU-81, KUL-1248, 3-(4-{6-[2-hydroxy-2-(4-hydroxy-3-hydroxymethyl-phenyl)-ethylamino]-hexyloxy}-butyl)-benzolsulphonamide, 5-[2-(5,6-
 15 diethyl-indan-2-ylamino)-1-hydroxy-ethyl]-8-hydroxy-1*H*-quinolin-2-one, 4-hydroxy-7-[2-{[2-{[3-(2-phenylethoxy)propyl]sulphonyl}ethyl]-amino}ethyl]-2(3*H*)-benzothiazolone, 1-(2-fluoro-4-hydroxyphenyl)-2-[4-(1-benzimidazolyl)-2-methyl-2-butylamino]ethanol, 1-[3-(4-methoxybenzyl-amino)-4-hydroxyphenyl]-2-[4-(1-benzimidazolyl)-2-methyl-2-
 20 butylamino]ethanol, 1-[2*H*-5-hydroxy-3-oxo-4*H*-1,4-benzoxazin-8-yl]-2-[3-(4-*N,N*-dimethylaminophenyl)-2-methyl-2-propylamino]ethanol, 1-[2*H*-5-hydroxy-3-oxo-4*H*-1,4-benzoxazin-8-yl]-2-[3-(4-methoxyphenyl)-2-methyl-2-propylamino]ethanol, 1-[2*H*-5-hydroxy-3-oxo-4*H*-1,4-benzoxazin-8-yl]-2-[3-(4-*n*-butyloxyphenyl)-2-methyl-2-propylamino]ethanol, 1-[2*H*-5-hydroxy-3-
 25 oxo-4*H*-1,4-benzoxazin-8-yl]-2-{4-[3-(4-methoxyphenyl)-1,2,4-triazol-3-yl]-2-methyl-2-butylamino}ethanol, 5-hydroxy-8-(1-hydroxy-2-isopropylaminobutyl)-2*H*-1,4-benzoxazin-3-(4*H*)-one, 1-(4-amino-3-chloro-5-trifluoromethylphenyl)-2-*tert.*-butylamino)ethanol and 1-(4-ethoxycarbonyl-amino-3-cyano-5-fluorophenyl)-2-(*tert.*-butylamino)ethanol, optionally in the
 30 form of the racemates, enantiomers or diastereomers thereof and optionally in the form of the pharmacologically acceptable acid addition salts, solvates and/or hydrates thereof.

Steroids which may be used are preferably selected from among prednisolone,
 35 prednisone, butixocortpropionate, RPR-106541, flunisolide, beclomethasone, triamcinolone, budesonide, fluticasone, mometasone, ciclesonide, rofleponide,

ST-126, dexamethasone, (S)-fluoromethyl 6 α ,9 α -difluoro-17 α -[(2-furanylcarbonyl)oxy]-11 β -hydroxy-16 α -methyl-3-oxo-androsta-1,4-diene-17 β -carbothionate, (S)-(2-oxo-tetrahydro-furan-3S-yl) 6 α ,9 α -difluoro-11 β -hydroxy-16 α -methyl-3-oxo-17 α -propionyloxy-androsta-1,4-diene-17 β -carbothionate and etiprednol-dichloroacetate (BNP-166), optionally in the form of the racemates, enantiomers or diastereomers thereof and optionally in the form of the salts and derivatives thereof, the solvates and/or hydrates thereof.

PDE IV-inhibitors which may be used are preferably selected from among enprofyllin, theophyllin, roflumilast, ariflo (cilomilast), CP-325,366, BY343, D-4396 (Sch-351591), AWD-12-281 (GW-842470), N-(3,5-dichloro-1-oxo-pyridin-4-yl)-4-difluoromethoxy-3-cyclopropylmethoxybenzamide, NCS-613, pumafentine, (-)p-[(4 α R*,10 β S*)-9-ethoxy-1,2,3,4,4a,10b-hexahydro-8-methoxy-2-methylbenzo[s][1,6]naphthyridin-6-yl]-N,N-diisopropylbenzamide, (R)-(+)-1-(4-bromobenzyl)-4-[(3-cyclopentyloxy)-4-methoxyphenyl]-2-pyrrolidone, 3-(cyclopentyloxy-4-methoxyphenyl)-1-(4-N'-[N-2-cyano-S-methyl-isothioureido]benzyl)-2-pyrrolidone, cis[4-cyano-4-(3-cyclopentyloxy-4-methoxyphenyl)cyclohexane-1-carboxylic acid], 2-carbomethoxy-4-cyano-4-(3-cyclopropylmethoxy-4-difluoromethoxyphenyl)cyclohexan-1-one, cis[4-cyano-4-(3-cyclopropylmethoxy-4-difluoromethoxyphenyl)cyclohexan-1-ol], (R)-(+)-ethyl[4-(3-cyclopentyloxy-4-methoxyphenyl)pyrrolidin-2-ylidene]acetate, (S)-(-)-ethyl[4-(3-cyclopentyloxy-4-methoxyphenyl)pyrrolidin-2-ylidene]acetate, CDP840, Bay-198004, D-4418, PD-168787, T-440, T-2585, arofyllin, atizoram, V-11294A, Cl-1018, CDC-801, CDC-3052, D-22888, YM-58997, Z-15370, 9-cyclopentyl-5,6-dihydro-7-ethyl-3-(2-thienyl)-9H-pyrazolo[3,4-c]-1,2,4-triazolo[4,3-a]pyridine and 9-cyclopentyl-5,6-dihydro-7-ethyl-3-(*tert*-butyl)-9H-pyrazolo[3,4-c]-1,2,4-triazolo[4,3-a]pyridin, optionally in the form of the racemates, enantiomers or diastereomers thereof and optionally in the form of the pharmacologically acceptable acid addition salts, solvates and/or hydrates thereof.

LTD4-antagonists which may be used are preferably selected from among montelukast, 1-(((R)-(3-(2-(6,7-difluoro-2-quinolinyl)ethenyl)phenyl)-3-(2-(2-hydroxy-2-propyl)phenyl)thio)methylcyclopropane-acetic acid, 1-(((1(R)-3(3-

(2-(2,3-dichlorothieno[3,2-b]pyridin-5-yl)-(E)-ethenyl)phenyl)-3-(2-(1-hydroxy-1-methylethyl)phenyl)propylthio)methyl)cyclopropane-acetic acid, pranlukast, zafirlukast, [2-[[2-(4-tert-butyl-2-thiazolyl)-5-benzofuranyl]oxymethyl]phenyl]acetic acid, MCC-847 (ZD-3523), MN-001, MEN-91507 (LM-1507), VUF-5078, VUF-K-8707 and L-733321, optionally in the form of the racemates, enantiomers or diastereomers thereof, optionally in the form of the pharmacologically acceptable acid addition salts thereof and optionally in the form of the salts and derivatives thereof, the solvates and/or hydrates thereof.

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EGFR-kinase inhibitors which may be used are preferably selected from among cetuximab, trastuzumab, ABX-EGF, Mab ICR-62, 4-[(3-chloro-4-fluorophenyl)amino]-6-{[4-(morpholin-4-yl)-1-oxo-2-buten-1-yl]amino}-7-cyclopropylmethoxy-quinazoline, 4-[(R)-(1-phenyl-ethyl)amino]-6-{[4-(morpholin-4-yl)-1-oxo-2-buten-1-yl]amino}-7-cyclopentylmethoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-{[4-((R)-6-methyl-2-oxo-morpholin-4-yl)-1-oxo-2-buten-1-yl]amino}-7-[(S)-(tetrahydrofuran-3-yl)oxy]-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-[2-((S)-6-methyl-2-oxo-morpholin-4-yl)-ethoxy]-7-methoxy-quinazoline, 4-[(3-chloro-4-fluorophenyl)amino]-6-({4-[N-(2-methoxy-ethyl)-N-methyl-amino]-1-oxo-2-buten-1-yl}amino)-7-cyclopropylmethoxy-quinazoline, 4-[(R)-(1-phenyl-ethyl)amino]-6-({4-[N-(tetrahydropyran-4-yl)-N-methyl-amino]-1-oxo-2-buten-1-yl}amino)-7-cyclopropylmethoxy-quinazoline, 4-[(3-chloro-4-fluorophenyl)amino]-6-({4-[N-(2-methoxy-ethyl)-N-methyl-amino]-1-oxo-2-buten-1-yl}amino)-7-cyclopentylmethoxy-quinazoline, 4-[(3-chloro-4-fluorophenyl)amino]-6-{[4-(N,N-dimethylamino)-1-oxo-2-buten-1-yl]amino}-7-[(R)-(tetrahydrofuran-2-yl)methoxy]-quinazoline, 4-[(3-ethynyl-phenyl)amino]-6,7-bis-(2-methoxy-ethoxy)-quinazoline, 4-[(R)-(1-phenyl-ethyl)amino]-6-(4-hydroxy-phenyl)-7H-pyrrolo[2,3-d]pyrimidine, 3-cyano-4-[(3-chloro-4-fluorophenyl)amino]-6-{[4-(N,N-dimethylamino)-1-oxo-2-buten-1-yl]amino}-7-ethoxy-quinoline, 4-[(R)-(1-phenyl-ethyl)amino]-6-{[4-((R)-6-methyl-2-oxo-morpholin-4-yl)-1-oxo-2-buten-1-yl]amino}-7-methoxy-quinazoline, 4-[(3-chloro-4-fluorophenyl)amino]-6-{[4-(morpholin-4-yl)-1-oxo-2-buten-1-yl]amino}-7-[(tetrahydrofuran-2-yl)methoxy]-quinazoline, 4-[(3-ethynyl-phenyl)amino]-6-({4-(5,5-dimethyl-2-oxo-morpholin-4-yl)-1-oxo-2-buten-1-yl]amino}-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-{2-[4-(2-oxo-morpholin-

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4-yl)-piperidin-1-yl]-ethoxy}-7-methoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-(trans-4-amino-cyclohexan-1-yloxy)-7-methoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-(trans-4-methanesulphonylamino-cyclohexan-1-yloxy)-7-methoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-(tetrahydropyran-3-yloxy)-7-methoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-{1-[(morpholin-4-yl)carbonyl]-piperidin-4-yloxy}-7-methoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-(piperidin-3-yloxy)-7-methoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-[1-(2-acetylamino-ethyl)-piperidin-4-yloxy]-7-methoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-(tetrahydropyran-4-yloxy)-7-ethoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-{trans-4-[(morpholin-4-yl)carbonylamino]-cyclohexan-1-yloxy}-7-methoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-{1-[(piperidin-1-yl)carbonyl]-piperidin-4-yloxy}-7-methoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-(cis-4-{N-[(morpholin-4-yl)carbonyl]-N-methyl-amino}-cyclohexan-1-yloxy)-7-methoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-(trans-4-ethansulphonylamino-cyclohexan-1-yloxy)-7-methoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-(1-methanesulphonyl-piperidin-4-yloxy)-7-(2-methoxy-ethoxy)-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-[1-(2-methoxy-acetyl)-piperidin-4-yloxy]-7-(2-methoxy-ethoxy)-quinazoline, 4-[(3-ethynyl-phenyl)amino]-6-(tetrahydropyran-4-yloxy)-7-methoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-(cis-4-{N-[(piperidin-1-yl)carbonyl]-N-methyl-amino}-cyclohexan-1-yloxy)-7-methoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-{cis-4-[(morpholin-4-yl)carbonylamino]-cyclohexan-1-yloxy}-7-methoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-{1-[2-(2-oxopyrrolidin-1-yl)ethyl]-piperidin-4-yloxy}-7-methoxy-quinazoline, 4-[(3-ethynyl-phenyl)amino]-6-(1-acetyl-piperidin-4-yloxy)-7-methoxy-quinazoline, 4-[(3-ethynyl-phenyl)amino]-6-(1-methyl-piperidin-4-yloxy)-7-methoxy-quinazoline, 4-[(3-ethynyl-phenyl)amino]-6-(1-methanesulphonyl-piperidin-4-yloxy)-7-methoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-(1-methyl-piperidin-4-yloxy)-7-(2-methoxy-ethoxy)-quinazoline, 4-[(3-ethynyl-phenyl)amino]-6-{1-[(morpholin-4-yl)carbonyl]-piperidin-4-yloxy}-7-methoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-{1-[(N-methyl-N-2-methoxyethyl-amino)carbonyl]-piperidin-4-yloxy}-7-methoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-(1-

ethyl-piperidin-4-yloxy)-7-methoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-[cis-4-(N-methanesulphonyl-N-methyl-amino)-cyclohexan-1-yloxy]-7-methoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-[cis-4-(N-acetyl-N-methyl-amino)-cyclohexan-1-yloxy]-7-methoxy-quinazoline,
5 4-[(3-chloro-4-fluoro-phenyl)amino]-6-(trans-4-methylamino-cyclohexan-1-yloxy)-7-methoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-[trans-4-(N-methanesulphonyl-N-methyl-amino)-cyclohexan-1-yloxy]-7-methoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-(trans-4-dimethylamino-cyclohexan-1-yloxy)-7-methoxy-quinazoline,
10 4-[(3-chloro-4-fluoro-phenyl)amino]-6-(trans-4-{N-[(morpholin-4-yl)carbonyl]-N-methyl-amino}-cyclohexan-1-yloxy)-7-methoxy-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-[2-(2,2-dimethyl-6-oxo-morpholin-4-yl)-ethoxy]-7-[(S)-(tetrahydrofuran-2-yl)methoxy]-quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-(1-methanesulphonyl-piperidin-4-yloxy)-7-methoxy-
15 quinazoline, 4-[(3-chloro-4-fluoro-phenyl)amino]-6-(1-cyano-piperidin-4-yloxy)-7-methoxy-quinazoline, and 4-[(3-chloro-4-fluoro-phenyl)amino]-6-{1-[(2-methoxyethyl)carbonyl]-piperidin-4-yloxy}-7-methoxy-quinazoline, optionally in the form of the racemates, enantiomers or diastereomers thereof, optionally in the form of the pharmacologically acceptable acid addition salts
20 thereof, the solvates and/or hydrates thereof.

By acid addition salts, salts with pharmacologically acceptable acids which the compounds may possibly be capable of forming are meant, for example, salts selected from among the hydrochloride, hydrobromide, hydriodide,
25 hydrosulphate, hydrophosphate, hydromethanesulphonate, hydronitrate, hydromaleate, hydroacetate, hydrobenzoate, hydrocitrate, hydrofumarate, hydrotartrate, hydrooxalate, hydrosuccinate, hydrobenzoate and hydro-p-toluenesulphonate, preferably hydrochloride, hydrobromide, hydrosulphate, hydrophosphate, hydrofumarate and hydromethanesulphonate.

30 Examples of antiallergics are: disodium cromoglycate, nedocromil.

Examples of derivatives of the ergot alkaloids are: dihydroergotamine, ergotamine.

For inhalation it is possible to use pharmaceutical compositions, pharmaceutical formulations and mixtures including the above-mentioned active substances, as well as the salts, esters and combinations of these active substances, salts and esters.

List of reference numerals

	1	nebuliser		37	retaining bead/retaining arm
	2	fluid		38	annular shoulder
5	3	container		39	actuating member
	4	bag	45	40	guide sleeve
	5	pressure generator		41	insertion member
	6	holder		42	retaining bar/retaining clip
	7	drive spring		43	annular portion
10	8	locking element		44	projection
	9	conveying tube	50	45	hollow cylindrical portion
	10	nonreturn valve		46	latching element
	11	pressure chamber		47	retaining portion
	12	expulsion nozzle		48	gripper arm
15	13	mouthpiece		49	axial arm/projection
	14	aerosol	55	50	cartridge element
	15	air supply opening		51	base element
	16	upper housing part		52	radial projection
	17	inner part		53	locking arm
20	17a	upper part of the inner part		54	radial abutment
	17b	lower part of the inner part	60	55	sliding slope
	18	housing part (lower part)		56	ramp
	19	retaining element		57	retaining arm
	20	spring (in the lower housing part)		58	pouch
25	21	container base	65	59	axial abutment
	22	piercing element		60	radial projection
	23	monitoring device		61	axial recess
	24	seal		62	radial recess
30	25	septum		63	locking latch
	26	vent opening	70	64	first latching notch
	27	securing member		65	second latching notch
	28	latching arm		66	spindle
	29	latching lug		67	window
35	30	latching recess		68	securing element
	31	latching recess	75	69	locking element
	32	first telescopic part		70	peripheral projection
	33	second telescopic part		71	peripheral groove
	34	base part		72	peripheral bead
40	35	bead		73	axial bar
	36	transportation lock		74	viewing window

Claims:

1. Nebuliser (1) for a fluid (2) having a preferably insertable container (3) containing the fluid (2), which is closed off, in particular sealed, in the delivered state,

characterised in

that the sealed container (3) is already disposed in the nebuliser (1) in the delivered state of the nebuliser (1) and the nebuliser (1) is constructed so that the container (3) is opened inside the nebuliser (1) before or during the first use of the nebuliser (1), and / or

that the nebuliser (1) is constructed so that the container (3) cannot be replaced and in particular cannot be removed.

2. Nebuliser according to claim 1, characterised in that the nebuliser (1) comprises a conveying element, in particular a conveying tube (9) for conveying the fluid (2) from the container (3).

3. Nebuliser according to claim 1 or 2, characterised in that the nebuliser (1) comprises a pressure generator (5), particularly with a conveying element such as a conveying tube (9) for conveying and / or nebulising the fluid (2).

4. Nebuliser according to claim 2 or 3, characterised in that the container (3) can be opened by means of the conveying element, particularly by piercing or insertion.

5. Nebuliser according to one of the preceding claims, characterised in that the container (3) can be moved preferably in a stroke action during the conveying of the fluid, pressure generation and / or nebulisation.

6. Nebuliser according to one of claims 2 to 4 and claim 5, characterised in that the container (3) can be moved together with the conveying element.

7. Nebuliser according to claim 4 and according to claim 5 or 6, characterised in that the piercing or insertion take place in the direction of movement of the container (3).

5 8. Nebuliser according to one of the preceding claims, characterised in that the container (3) can be opened at the head end.

9. Nebuliser according to one of the preceding claims, characterised in that the container (3) can be vented preferably at the base before or during the first
10 use of the nebuliser (1) inside the nebuliser (1), and in particular can be pierced in order to vent it, and in particular the venting or piercing takes place before or during or after the opening of the container (3).

10. Nebuliser according to one of the preceding claims, characterised in that
15 before or during the opening of the container (3) a securing member (27), particularly a seal of origin, a banderol and / or a safety tag, has to be manually opened and / or removed.

11. Nebuliser according to one of the preceding claims, characterised in that
20 the container (3) can be opened by a preferably exclusively mechanical action and / or manual operation.

12. Nebuliser according to one of the preceding claims, characterised in that the container (3) can be opened by in particular telescopically pushing in the
25 nebuliser (1), preferably a housing part (18) of the nebuliser (1).

13. Nebuliser according to one of the preceding claims, characterised in that the container (3) can be opened by pushing on or pushing in a housing part (18), actuating member (39) or insertion member (41) which is preferably in
30 the shape of a hat, quiver or cup.

14. Nebuliser according to claim 12 or 13, characterised in that the housing part (18) can be rotated from a transporting position into an intermediate position and can only be pushed on, in or together from the intermediate
35 position.

15. Nebuliser according to one of the preceding claims, characterised in that the container (3) can be opened by a preferably combined, particularly rotary and / or translatory movement and / or by two successive movements in different directions, particularly perpendicular to one another, particularly of a housing part (18).

16. Nebuliser according to one of claims 12 to 15, characterised in that in the position of use the nebuliser (1), particularly with the container (3) open and / or with the housing part (18) pushed on or in, can be tensioned by means of the housing part (18), preferably by turning the housing part (18).

17. Nebuliser according to claim 13, characterised in that the actuating member (39) can be removed, particularly pulled off, after the container (3) has been opened.

18. Nebuliser according to claim 13 or 14, characterised in that the actuating member (39) is designed to hold the nebuliser (1), particularly in the delivered state and / or with the container (3) open.

19. Nebuliser according to one of the preceding claims, characterised in that the container (3) can be opened by the first tensioning of the nebuliser (1), particularly a pressure generator (5) of the nebuliser (1), in order to convey and / or nebulise the fluid (2).

20. Nebuliser according to one of the preceding claims, characterised in that in the closed delivered state the container (3) occupies a first position and in the opened state occupies a different second position in the nebuliser (1) or at least relative to an opening device such as a conveying element, particularly a conveying tube (9), in the nebuliser (1).

21. Nebuliser according to claim 20, characterised in that the container (3) is spaced from a holder (6) of the container (3) in the first position or is disengaged therefrom and / or the container (3) is preferably held at the head end by the holder (6) in the second position.

22. Nebuliser according to claim 20 or 21, characterised in that the container (3) is secured in the first position, and in particular the container (3) can only be transferred or moved from the first into the second position after a housing part (18) has been rotated.

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23. Nebuliser according to one of the preceding claims, characterised in that the nebuliser (1) comprises a transportation lock (36) for the container (3), which preferably acts on the base of the container (3), in the sealed delivered state.

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24. Nebuliser according to claims 20 and 23, characterised in that the transportation lock (36) holds the container (3) in the first position.

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25. Nebuliser according to claim 23 or 24, characterised in that the transportation lock (36) can be released, opened or unlocked before or during the opening of the container (3).

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26. Nebuliser according to claim 25, characterised in that the transportation lock (36) after unlocking converts a linear movement into a rotary movement in order to free the container (3) for a subsequent stroke action during the atomisation of fluid (2) and / or to allow opening and / or venting of the container (3).

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27. Nebuliser according to one of claims 23 to 26, characterised in that the transportation lock (36) comprises a securing element, particularly a cartridge ring (50), which is preferably non-rotationally mounted on the container (3).

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28. Nebuliser according to one of claims 23 to 27, characterised in that the transportation lock (36) is arranged in a housing part (18) of the nebuliser (1).

29. Nebuliser according to one of the preceding claims, characterised in that the nebulising is carried out purely mechanically, in particular without the use of propellant gas, preferably by spring force.

30. Nebuliser according to one of the preceding claims, characterised in that the nebuliser (1) is constructed as an inhaler, particularly for medical aerosol treatment.