one another with regard to their receiving volume for the substance. A medicament dosage of virtually the same level results accordingly in response to every inhalation. An evacuation, which is as complete as possible, of the active chamber, i.e. which is located in the emptying position, is sought for this purpose. This evacuation preferably takes place only as a result of the air flow, which permeates the chamber. The air flow can be created by the user, as forced flow, with the help of a manual pump impact.

[0027] A pump wall is present on the device side, by means of which the forced air flow, preferably a compressed air flow, can be created in the device, for evacuating the activated chamber and for blowing out the air-substance mixture, for example air-medicament mixture, through the discharge nozzle. The forced air flow alone can be sufficient to carry out a proper inhalation. However, it can also be supported by an additional suction air flow, i.e. a suction pressure of the air, for instance as a result of the user breathing in.

[0028] The pump wall can have several convex regions, which, in preferred embodiment, are embodied in such a way that in response to a displacement of the pump wall to create the compressed air, a force threshold (which is preferably of the same level in the case of every inhalation process), has to be overcome initially. After overcoming this force threshold, only a smaller force is preferably still required to press down and thus blow the air through the chamber. In the context of the invention, this characteristic of the pump wall is also identified as collapse effect.

[0029] The user can accordingly only cause the pump operation, if he exerts a force, which is so high that the force threshold is overcome. A sudden pump movement results automatically hereafter, which is so strong that the

pump wall fastening edge, respectively, the pressure region lends itself in the center with regard to the layout.

[0037] In a cross section, the fastening edge also preferably runs at an angle to the pressure region. In relation to an extension of the pressure region, an obtuse or right angle, which is drawn between the fastening edge and the pressure edge is preferred. The angle can extend for example between 80 and 120°, preferably approx. 90°.

[0038] In response to a pump movement, a convex region can be uninfluenced with respect to its length and width. Different convex regions can also be provided. In addition to the already-described convex region, which is virtually undeformed in response to an operation, one or several buckling convex regions can be provided.

[0039] The convex regions and the buckling convex regions can also be provided so as to be mounted side by side. In particular in such a way that a buckling convex region is embodied for the end region of a convex region, which is assigned to the pressure region. More preferably, this buckling convex region can have a significantly smaller length than the initially described convex region in a direction - viewed from the fastening edge to the pressure region.

[0040] In the case of an exemplary, as well as preferred, basic contour of the pump wall, which is circular with respect to its layout, several such convex regions are provided, which are preferably oriented radially, preferably spaced apart evenly to one another in the circumferential direction. Viewed over the circumference, six or more, up to thirty such convex regions can thus be provided.

[0078] With reference to Figure 1, what is initially illustrated and described is a device 1 for the portioned dispensing of a substance 27, in particular of a powdery medicament. The device 1 can serve for the oral and/or nasal inhalation.

[0079] A pot-shaped device housing 2 is provided, comprising a housing bottom 3 and a housing wall 4, which is circumferential in the sense of a pot wall. The device housing 2 determines form and, in the illustrated embodiment, has a, as well as preferably, substantially circular layout. The diameter and width d of the device housing 2 resulting therefrom corresponds approximately to 5-times the thickness e, viewed perpendicularly to the broad side.

[0080] In relation to Figure 3, the width d is provided with regard to the broad side of the device, which is visible there. Figure 3 represents a top view onto this broad side. As can be seen, the device also has two essentially congruent broad sides, on the one hand essentially provided by the housing bottom 3 and, on the other hand, essentially provided by the pump wall 32. These broad sides are also provided so as to point away from one another. The measure d is taken along a straight line through the center of area, wherein the center of area with regard to the broad side, which is provided in Figure 3 (but also with regard to the opposite broad side) is provided by the device axis x, which is illustrated in a punctiform manner in this illustration.

[0081] A support wall 5 can be provided at a radial distance, offset inwardly to the housing wall 4, coaxially to the housing wall 4 and extending from the same broad side of the housing bottom 3. The free outer edge thereof, viewed in the axial direction, preferably ends in the same plane as the free outer edge of the housing wall 4.

edge forms a further limitation of the buckling convex region 36. The outer edges extend approximately in the circumferential direction to the pressure region.

[00115] The buckling convex region 36 is concretely formed by a convexly formed bottom region, as already mentioned, between the front face and the outer edge, comprising a theoretical central axis of curvature, which extends on the inner side of the pump wall, and which, in turn, extends from the fastening edge in the direction of the pressure region. Preferably viewed from the fastening edge, a transition region 52 is formed so as to taper towards the pressure region, accompanied by a widening of the convex region 35.

[00116] More preferably, radially on the outside upstream of the fastening edge, the transition region 52 transitions into a surface, which is continuous in the circumferential direction. Preferably viewed from the fastening edge in the direction of the pressure region, a depth of the convex region 35 is initially also embodied so as to increase, with a largest depth approximately in the vicinity of the circumference or, viewed radially from the outside, just upstream of the buckling convex region, respectively. The largest depth can be provided approximately by 0.5-times to 2-times of a radial dimension of the buckling convex region upstream of a lowest position of the buckling convex region.

[00117] While a bottom of a convex region 35 runs continuously concavely, namely in a transverse as well as in a longitudinal direction, a bottom region of a buckling convex region, in contrast, runs convexly, almost in a saddle-like manner.

[00118] An air volume results between the pump wall 32 and the housing cover 24, which, in the course of a pump

[00133] In the case of the proposed device 1, the forced air flow is achieved by means of a surge-like pressurization. It is thus a compressed air blow-out of the chamber 26, after which the air, which is subjected to the forced flow, is loaded with substance 27, which is evacuated from the chamber 26. Preferably, a swirling of the substance in the air results as well. Swirled in the blow-out air in this way, the substance can be inhaled through the discharge nozzle 15.

[00134] The compressed air pressurization takes place by means of the bellows-like pump device 31, in response to which, upon operation by the user, a force threshold has to be overcome initially, as a result of the above-described convex embodiments in the region of the pump wall 32. They work in the manner of a clicker, so that a blow-through of the chamber 26, which starts almost abruptly, takes place.

[00135] As a result of the force threshold, which needs to be overcome initially, it is ensured that a sufficiently high flow speed for the complete evacuation of the chamber 26 is reached.

[00136] To overcome the force threshold in response to the operation of the pump device 31, a force introduction essentially in the direction of extension of the axis x radially to the inside of the device housing 2 amounting to several Newtons is required. The hereby triggered impact can lead to a significant air flow speed, in particular in the region of the chamber 26 to be evacuated. Such a speed and also the created amount of air are insufficient to safely and completely empty the chamber 26 and to remove the substance 27, in particular the powdery medicament, through the replacement cover 39.

to the above-described embodiments. Only the discharge nozzle 15 is embodied here as mouthpiece. It serves to be used for inhaling by breathing in via the mouth of a user. The large width resulting from the top view according to Figure 40 as compared to a small thickness, as it can be gathered from Figure 41, is essential.

[00165] With reference to Figures 28 and 29, and in particular also Figures 1, 2, 7, 8, 12, 23 and 32, the following results in response to a use:
In an initial state, the device for instance according to Fig. 1 is provided for a user. The strip-shaped element 25 is located in the device 1 and is inserted through the slit formation 30 by means of the handling section 29 and is thus caught on the transport wheel 20.

[00166] A person using the device initially removes the cap 16 from the discharge nozzle 15 and then moves the operating section 11 in the region of the boundary wall 12 by a possible angular amount and back again. A partial region of the strip-shaped element 25 is thereby moved out of the reservoir 45 into the emptying region 46, so that a chamber 26 is located in the position according to Figure 12 or Fig. 32, respectively. As a result of its fastening to the transport wheel 20 by means of the handling section 29 in the course of the movement, the second layer 28 has been removed from the chamber 26, which is then located in the emptying region 46.

[00167] In detail, the joining pins 8 thereby rotate the follower 17, which is joined thereto in a rotationally fixed manner, which, in turn rotates the transport wheel by a corresponding angular amount by means of the impact on the teeth 19' of the toothed ring 19 of the transport wheel 20. On the one hand, the second layer 28 is hereby removed from the first layer 43 by means of the handling section 29, which is formed from the second layer 28, and the

(first) chamber 26, which is exposed accordingly in the opening plane O as a result of the removal of the second layer 29, is simultaneously transferred into the emptying position according to Fig. 11 or Fig. 12, respectively. In response to the backward movement of the operating section 11 and thus of the lever arm 10, the latching fingers 18 run over the teeth 19', because the transport wheel 20 is prevented from a return movement as a result of the retaining fingers 23, which engage with the locking toothing 6 of the housing bottom 3.

[00168] In the case of the special embodiment, the chamber 26 is then covered by the replacement cover 39 in the emptying region 46. A user then needs to surround the discharge nozzle 15 with his mouth. As a result of the pressurization of the pressure region 34, the user can subsequently move the pump wall from the initial position into the pump position (see Figs. 8 and 11, 12) and can thereby create an unstoppable and comparatively large and strong air flow as a result of the described invasion effect.

[00169] The air flow flows from the region between the pump wall 32 and the housing cover 24 through the perforation 37 into a first region of the air guiding channel 14, which leads all the way to the strip-shaped element 25. The air guiding channel is then continued by the chamber 26, which is to be emptied, preferably by interpositioning and also by flowing through the replacement cover 39. The substance from the chamber 26 is thereby entrained.

[00170] After flowing through the chamber 26, the air flow, now loaded with substance, passes through a further section 14 of the air guiding channel and into the discharge nozzle 15 under sharp deflection, and thus reaches into the mouth of the user.

CLAIMS

1. A device (1) for dispensing a substance (27), which can be discharged by air,

comprising

a discharge nozzle (15), through which air, which is loaded with substance (27) can escape,

a pump device (31) for creating air subjected to a forced flow,

wherein the pump device (31) for creating the forced flow has a pump wall (32), which can be moved between an initial position and a pump position and which can be automatically returned from the pump position into the initial position,

an air guiding channel (14), which joins the pump device (31) to the discharge nozzle (15) and through which the air subjected to the forced flow can be guided, and

wherein

the pump wall (32) has a fastening edge (33), by means of which it is fastened to a housing of the device so as to form a seal, an application region (34), and several convex regions (35, 36) outside of the application region (34), wherein the application region (34) can be moved to carry out a pumping process by reducing an air volume located between the pump wall (32) and the device housing, and the convex regions (35, 36) remain essentially undeformed in response to a movement of the pump wall (32) from the initial position into the pump position.

2. The device according to claim 1, characterized in that the convex region (35) has a convex edge and/or that the convex region (35) is formed from the pump wall (32) itself with essentially a same thickness (f) as the pump wall (32) outside of the convex region (35)and/or that each of the convex regions (35) has a largest extension dimension (E) measured between two edge points of its convex edge located farthest away from one another, and the thickness (f) of the pump wall (32) is one-tenth or less of the largest extension dimension (E) of the convex

region and/or that the convex region (35) remains uninfluenced with regard to its length (g) and width (m) in response to a movement in the course of a pumping process.

3. The device according to one of the preceding claims, characterized in that the convex region (35) is embodied so as to be elongated, comprising a longitudinal direction, a length (G) and a width (m), wherein the longitudinal direction runs from the fastening edge (33) in the direction of the application region (34) and wherein, preferably, two convex regions (35, 36) are arranged next to one another in the longitudinal direction of the convex region.

4. The device according to one of the preceding claims, characterized in that a buckling of the pump wall (32) occurs in a buckling convex region (36) in response to a pump movement, wherein, preferably, the convex region (35) and the buckling convex region (36) have different lengths (g, h), wherein, further preferably, the buckling convex region (36) has a smaller length (h) than the convex region (35), wherein, further preferably, the smaller length (h) corresponds to 1/50 to 1/3 of the larger length (g) of the convex regions (35, 36), which are embodied one behind the other.

5. Device according to one of the preceding claims, characterized in that in the device a strip-shaped element (25) is arranged, which has a length and a width (c), wherein the length is several times larger than the width (c), and wherein chambers (26) are provided for, which are embodied successively over the length in the strip-shaped element (25) and in which substance (27) is received, that the device has a reservoir (45), in which the strip-shaped element (27) can be received, and an emptying region (46), in which a partial region of the strip-shaped element (27) can be moved out of the reservoir (45) in the direction of the length, for discharging substance (27) from a chamber (26) by means of the air subjected to the forced flow, wherein the strip-shaped element (27) has a first layer (43) and a second layer (28), which layers (43, 28) are aligned with each other and run so as to overlap one another, wherein further in the first layer (43) a plurality of chambers (26) is provided for, to which a partial region is assigned in each case, is embodied in the first layer (43), the chambers (26) are protected by the second layer (28) against a loss of substance (27), and the second layer (28) can be removed from the first layer (43) whereupon a chamber (26) is exposed in

an opening plane (O), which corresponds to a joining plane between the first (43) and the second layer (28), and wherein in case of a chamber (26) being located in the emptying region (46), the second layer (28) is already removed from the partial region having this chamber (26) and the air subjected to the forced flow flows through the air-guiding channel merging into the chamber in the opening plane (O) so as to be directed into the chamber (26).

6. Device according to claim 5, characterized in that the strip-shaped element (27) can be moved gradually into the emptying region (46) by a partial region, in which a chamber (26) is embodied, out of the reservoir (45) in the direction of the length, for discharging substance from the chamber (26) by means of air subjected to the forced flow, and that a receiving region is provided for, into which the partial region can be moved directly downstream from the emptying region (46) in response to a following gradual movement, wherein the receiving region is set up as closed receiving chamber (48) within the device and the partial region, which had been located in the emptying region (46) in response to the preceding movement, forms a movable part of a wall (49) of the receiving chamber (48), which cooperates with stationary parts of the wall (49) of the receiving chamber (48) so as to form a seal.

7. Device according to one of the preceding claims, characterized in that a device housing (2) has a first and a second broad side, which are located opposite one another with outer surfaces formed so as to face away from one another and which are essentially congruent in a top view onto one of the broad sides and are spaced apart by a narrow side, wherein the first and the second broad side further have a corresponding smallest width dimension (d), which is measured along a line through a center of an area of the broad side based on the top view, and wherein the narrow side determines a thickness (e) of the device housing (2), wherein the pump wall (32) furthermore forms a part of the first broad side, the thickness (e) is smaller than the smallest width dimension (d), and the discharge nozzle (15), viewed in the top view, appears as a formation of the broad side, which protrudes in a tip-shaped manner.

8. Device according to one of the claims 5 to 7, characterized in that air, which is directed to the chamber (26) is subjected to the forced flow and does experience a deflection by means of a chamber wall and/or that the chamber (26) of the

partial region, which is located in the emptying region (46), of the strip-shaped element forms a part of the air guiding channel (14).

9. Device according to one of claims 5 to 8, characterized in that a chamber (26) has a length (a) and a width (b), wherein, preferably, the length (a) is larger than the width (b) and/or the length (a) of a chamber (26) is oriented transversely to a length of the strip-shaped element (25).

10. Device according to one of claims 8 or 9, characterized in that the air flows through the chamber (26), when it forms a part of the air guiding channel (14), in the direction of its length (a).

11. Device according to one of the preceding claim, characterized in that the device (1) has a transport device for transporting a chamber (26) into an initial position, wherein an operable transport lever (9) for a user protrudes on a narrow side of the device housing (2), wherein, preferably, the transport lever (9) is arranged on the device housing (2) located opposite to the discharge nozzle (15).

12. Device according to one of the claims 7 to 11, characterized in that the device housing (2) has a basic contour, which is circular viewed in pressure direction of the pump wall (32), wherein the discharge nozzle (15) and/or the transport lever (9) protrudes beyond the basic contour and/or that the transport lever (9) is surrounded by a boundary wall (12), which also protrudes radially beyond the circular basic contour.

13. Device according to one of the preceding claims, characterized in that the pump wall (32) can be moved between an initial position and a pump position and can be automatically returned from the pump position into the initial position, wherein the pump wall (32) further has a fastening edge (33), a application region (34) and several convex regions (35, 36), which are embodied so as to surround the application region (34) in a circumferential direction and which are arranged outside of the application region (34) and between the fastening edge (33) and the application region (34), and the pump wall (32) as a whole is embodied so as to be closed, and wherein the convex regions (35) maintain their shape in response to a movement of the pump wall (32) by the impact of force on the

application region (34) from the initial position into the pump position, in the case of which the fastening edge (33) can be unmoved.

14. Device according to claim 13, characterized in that, viewed in a circumferential direction, rib-like transition regions (52) extend between the convex regions (35, 36) between the fastening edge (33) and the application region (34), wherein, preferably, a transition region (52) has a front face (53), which faces the application region (34) and/or that the application region (34) has an outer edge (54) located opposite the front face (53) and running in the same direction and/or that in the pump position, a buckling of the pump wall is at hand between the front face (53) and the outer edge (54).

15. Device according to one of the preceding claims, characterized in that the chamber (26), in an inhalation-ready position, is moved behind an air-permeable replacement cover and/or that the strip-shaped element (27) is guided so as to abut on corresponding stationary wall regions of the receiving chamber (48) so as to form a seal on the edge.