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Description

5 **[0001]** This invention relates to an outflow nozzle and an air distribution device by using the outflow nozzle. The invention in particular also relates to an outflow nozzle for the individual adjustment of an air flow direction and the scattering of a main air flow in air flow distribution devices.

10 **[0002]** In outflow nozzles or air flow distribution devices, e.g. in connection with roof-mounted air conditioning systems for vehicles and the like, certain outer housing parts frequently are provided with slat structures for outputting the air flow, which by corresponding mechanisms likewise provided on the outside can be adjusted at a certain approach angle, in order to control a direction of the air flow or meter, in particular close the exit of air.

15 **[0003]** It is problematic that depending on the number and design of outlet openings correspondingly complex structures also must be provided, in order to be able to achieve a desired distribution of the air flow.

20 **[0004]** From EP 1 132 232 A1 an outflow nozzle with a movable guide blade is known, which is movable between two end positions such that depending on the position of the guide blade a supplied air flow can flow out via an air outlet with different air flow distributions.

[0005] It is the object underlying the invention to indicate an outflow nozzle and an air distribution device, in which in a particularly simple and yet flexible way the orientation and distribution of an air flow to be dispensed is adjustable.

25 **[0006]** In an outflow nozzle according to the invention, this object is solved with the features of independent claim 1 and in an air flow distribution device according to the invention with the features of independent claim 14. Advantageous developments of the outflow nozzle according to the invention are subject-matter of the dependent claims.

[0007] According to a first aspect of the invention an outflow nozzle is indicated, with a housing which includes at least one air inlet and at least one air outlet, and with an air flow distribution device which in the interior of the housing is arranged downstream of the air inlet and upstream of the air outlet and through
5 which an air flow supplied through the air inlet can be distributed in a controllable manner in terms of direction and proportion to the air flow outlet as a discharged air flow, wherein the air flow distribution device includes a guide blade which is adjustable at least between a first end position and a second end position such that in the first end position of the guide blade the supplied air flow can flow out
10 through the air outlet as discharged air flow with a first air flow distribution and in the second end position of the guide blade as discharged air flow with a second air flow distribution.

[0008] Thus, it is an aspect of the invention that instead of the usually provided plurality of control mechanisms on the outside of the housing the outflow
15 nozzle according to the invention includes an air flow distribution device in the interior of the housing and flow-mechanically between the air inlet and the air outlet, which includes a guide blade which in turn can take at least a first and a second end position, in order to achieve a first and a second air flow distribution.

[0009] By means of these measures, the air flow distribution can be
20 adjusted by a mechanism provided centrally in the housing interior of the air outflow nozzle, without external mechanisms being required for aligning the air flow distribution. This simplifies the construction of the air outflow nozzle and also provides for a design resting in itself, as the necessity is eliminated by the varying position of changing geometries. Independent of the chosen air flow distribution,
25 the air outflow nozzle thus always has the same outer shape, but due to the central regulation of the air flow distribution already in the interior of the nozzle and not near the exit from the housing provides for the adjustment of the air flow distribution in a particularly effective way.

[0010] At the air outlet an exit grid can be provided, wherein the discharged
30 air flow can flow out with the first air flow distribution via a first area of the exit grid and can flow out with the second air flow distribution via a second area of the exit grid. The first area and the second area are different areas of the exit grid.

[0011] This means that depending on the position of the guide blade and the air flow distribution dependent thereon, the air flow can flow out via different areas of the e.g. uniform exit grid. The exit grid remains unchanged. When the exit grid includes - as will yet be explained below - e.g. slats with a different orientation in the various areas, the air flow can be directed differently in dependence on the area through which it exits from the exit grid.

[0012] The guide blade can be arranged on a guide blade axis of rotation and can be rotatable or pivotable at least into the first and second end positions by rotating the guide blade axis of rotation. The use of a guide blade axis of rotation for rotating or pivoting the guide blade provides for a particularly simple mechanism for adjusting the air flow distribution, e.g. to also realize a plurality of intermediate positions between the first and the second end position.

[0013] There can also be provided an adjusting element coupled with the guide blade axis of rotation for rotating the guide blade axis of rotation. The adjusting element in particular can be guided from the housing to the outside, in order to allow the user to adjust the guide blade in the interior with a simple motion or by using a rotary knob. This can of course also be a motor-driven adjusting element, possibly with a kind of remote control which realizes an even more comfortable access to the adjustment possibilities of the air flow distribution.

[0014] The housing can include a mounting side or mounting plane and the guide blade axis of rotation can be arranged parallel to the mounting side such that (a) in the first end position the guide blade is oriented substantially parallel to the mounting side and in particular the supplied air flow can flow out parallel to the mounting side, and that (b) in the second end position the guide blade is not oriented parallel to the mounting side and in particular the supplied air flow cannot flow out parallel to the mounting side, but at an angle different from 0° , in particular vertically to the mounting side.

[0015] These measures are particularly effective, in order to in the first alternative along a mounting surface, on which the mounting side or plane of the housing is mounted, on the one hand realize a particularly large throw distance for the dispensed air flow, but on the other hand also realize a surface ventilation or cooling. In both objectives it is essential that the ejection of the air flow is

effected parallel to the mounting surface (e.g. the vehicle ceiling or the ceiling of a mobile home), on which the mounting side of the housing is mounted, and as close as possible to the same.

5 **[0016]** Alternatively, namely in connection with the second end position, a room cooling or room ventilation is achieved in the free space vertically to the mounting surface and hence also vertically to the mounting side, either a wall or a ceiling, e.g. of a vehicle or caravan.

10 **[0017]** The guide blade in addition can incrementally or continuously be adjustable in intermediate positions between the first and the second end position. In the second end position, the guide blade in particular can be oriented approximately vertically to the mounting side. These measures provide for an arbitrary and hence comfortable adjustment of the air flow distribution in the space to be cooled or ventilated.

15 **[0018]** The air flow distribution device can include at least one air flow deflection means with a plurality of vane blades which are arranged parallel to and spaced from each other on a common vane blade axis of rotation and are positioned at an acute angle to the vane blade axis of rotation, wherein the vane blades are rotatable or pivotable at least between a first end position and a second end position by a rotation of the vane blade axis of rotation. Providing the
20 arrangement of several vane blades thus realizes additional possibilities of the design of the air flow distribution.

25 **[0019]** In the first end position, the vane blades can be oriented parallel to a supply direction (coordinate axes x and $-x$) of the supplied air flow, and in the second end position not parallel to the supply direction x , $-x$ of the supplied air flow, so that in the first end position the supplied air flow can pass the vane blades largely unhindered and in the second end position the supplied air flow is laterally deflectable - in particular in the plane yx of the mounting side and/or vertically to the supply direction x , $-x$ -.

30 **[0020]** In one variant, the first and the second end position can be defined by means of respective stops against which the vane blades or the holder carrying the same can be pivoted. Likewise, however, it also is possible to understand the end positions as reference positions, wherein the vane blades

also can be moved beyond the end positions. Thus, the vane blades can e.g. be pivoted as desired over an angle of 360 degrees or beyond, so that arbitrary intermediate positions are possible.

5 **[0021]** In the first end position the vane blades thus have no effect with regard to the supplied air flow, whereas in the second end position they influence the direction and distribution of the supplied air flow when the same leaves the housing.

10 **[0022]** This effect is obtained by the oblique arrangement of the - expediently very flat - vane blades on the vane blade axis of rotation at an acute angle. While the vane blades in one rotary position (first end position) do not provide a resistance to the air flow, they effect a deflection of the air flow in another rotary position (e.g. the second end position).

15 **[0023]** There can also be provided an adjusting element coupled with the vane blade axis of rotation for rotating the vane blade axis of rotation. Here as well, the adjusting element can be a rotary knob or the like which at the housing is mechanically actuatable by the user from outside. Alternatively, the motorized operation again is recommendable, possible with a corresponding remote control function.

20 **[0024]** The vane blades can be formed planar and circular or elliptical and in their respective center be penetrated by the vane blade axis of rotation and be connected with the same. These are particularly simple designs of vane blades, which can be manufactured easily and at low cost in mass production. The vane blades preferably are formed alike. However, this is not absolutely necessary. Especially when certain housing geometries must be taken into account, e.g. with
25 regard to an overall height that changes transversely to the air flow, e.g. in the ceiling area, different vane blades, namely with different size, also can be provided. The fixation of the vane blade axis of rotation in the region of the respective center of the vane blades provides for a particularly compact construction with maximum directivity. However, this is not absolutely necessary
30 either; eccentrically arranged vane blades also are conceivable.

[0025] The air flow deflection means can be coupled with the guide blade or with its axis of rotation, in particular in the manner of a rigid connection. For

example, the guide blade axis of rotation and the vane blade axis of rotation (axis of rotation for the air deflection means) can be identical, e.g. by using a common shaft or the like, so that pivoting of the guide blade always is strictly coupled with the vane blades being rotated or pivoted. In this case, an adjusting element is
5 sufficient, in order to pivot the guide blade and the vane blade at the same time.

[0026] In the final analysis, this variant effects that in a defined position the guide blade and the vane blades let the air flow pass with as little hindrance as possible, whereas in another defined position the guide blade deflects the air flow with respect to the main flow direction and the vane blades at the same time
10 additionally effect a deflection of the air flow transversely to the main flow direction and hence a broadening of the air flow. The guide blade and the vane blades need not be adjusted individually, but due to their coupling necessarily each jointly take one of the defined positions. Of course, arbitrary intermediate positions also are possible.

[0027] However, a particular flexibility is obtained in the adjustment of the air flow distribution, when the position of the guide blade and the position of the vane blades can be realized independently. This is possible for example by using hollow shafts with corresponding recesses, which are insertable into each other, so that in general the parallelism of the axes of rotation for the guide blade on the
15 one hand and for the vane blades on the other hand is ensured.
20

[0028] To increase the flexibility in the air flow adjustment, two or more air flow deflection means - in particular those actuatable or movable independently - can be provided.

[0029] Upstream and directly before the flow distribution device an overflow
25 threshold can be provided for bundling the supplied air flow towards the air flow distribution device. Such overflow threshold again brings together the supplied air flow shortly before reaching the air flow distribution device, hence increases the flow velocity and aligns the entire air flow with the space region of the deflecting elements of the air flow distribution device, namely with regard to the guide blade
30 and possibly the vane blades, so that the same can produce their maximum effect.

[0030] By the overflow threshold it can be achieved in particular that the air flow does not impinge directly onto slats e.g. positioned transversely to the air flow, whereby strong turbulences would be caused. These slats can be overflowed due to the protective effect of the overflow threshold.

5 **[0031]** The overflow threshold also ensures that the air flow specifically is guided or aligned towards the air flow distribution device, whereby the air guiding elements provided there, in particular the guide blade and the vane blades, optimally can produce their effect. In the region of the overflow threshold a broadening of the air guiding duct also can be provided, so that a certain diffuser
10 effect can be achieved.

[0032] The air outlet can include at least one exit grid with a plurality of slats, wherein the exit grid or the slats are formed in particular in a region opposite the mounting side of the housing and/or in side regions of the housing. By using an exit grid with a plurality of slats a subsequent distribution of the air
15 flow pre-distributed in the housing interior is possible, e.g. via the position of the slats with respect to the housing surfaces and in particular with respect to the mounting side and hence with respect to the mounting surface, e.g. a ceiling or wall on which the underlying device for cooling or ventilating is mounted. In a preferred embodiment, the slats can rigidly be formed on the housing of the air
20 outflow nozzle. However, slats movable or pivotable in themselves also are possible.

[0033] In a region serving as the above-mentioned first region located closer to the air inlet and/or the air flow distribution device the slats can be oriented more steeply in relation to the mounting side and in a region serving as second
25 region located further away from the air inlet and/or the air distribution device the slats can be oriented more flatly in relation to the mounting side. The slats steeper in the first region permit the cooling or ventilation of the space in the region facing away from the mounting side. Cooling or ventilation e.g. is possible with ceiling mounting directly below the region of the ceiling or the appliance and
30 the air outlet. The slats of the housing oriented more flatly in the second region on the other hand ensure a surface ventilation or cooling along the mounting surface (room ceiling) on which the housing is mounted with its mounting side, or possibly a particularly high throw distance, in order to reach room areas of the

room to be cooled or ventilated, which are further away from the mounting side and the mounting surface.

[0034] To achieve a high throw distance in the plane xy of the mounting side, an overflow element can be formed in the region of the air flow outlet by action of the Coanda effect on the mounting side and away from the air inlet and from the air deflection means. To further increase the above-described effects of the surface ventilation or cooling and the room ventilation or cooling via an increased throw distance, the so-called Coanda effect thus can be utilized here, by which via the change of the pressure distribution in the air flow by means of an overflow element to be overflowed a directivity of the air flow, namely in the form of an attachment to the corresponding surface, namely here the mounting surface or room ceiling on which the mounting side of the housing is mounted, is achieved.

[0035] According to a further aspect an air flow distribution device is indicated, with an air guide housing which includes at least one air outlet, wherein an outflow nozzle according to the invention with an air inlet is mounted on the air outlet. The air flow distribution device according to the invention of course also can include several air outlets, on each of which an outflow nozzle according to the invention then is provided. This increases the possibilities of the individual cooling or ventilation of spaces provided with the air flow distribution device according to the invention.

[0036] These and further aspects will be explained with reference to examples on the basis of the attached schematic drawings.

Figs. 1A - B show an embodiment of the air flow distribution device in a perspective top view and a sectional side view, respectively.

Figs. 2 - 3 show two other embodiments of the air flow distribution device by using various outflow nozzles in a perspective exploded representation.

Figs. 4A - B show another embodiment of an air flow distribution device in a perspective view from above and from below, respectively.

Fig. 5 shows details of the air outflow nozzle used in the air flow distribution device of Figs. 4A - B in a perspective top view.

Figs. 6 - 7 show details of the air outflow nozzle used in connection with the embodiments of Figs. 4A - B and 5 in a sectional side view.

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[0037] In the following, embodiments of the invention will be described. All embodiments of the invention and also their technical features and properties can be combined with each other as desired and without limitation isolated individually or optionally combined.

10 **[0038]** In connection with the Figures, structurally and/or functionally identical, similar or equally acting features or elements will be designated with the same reference numerals. A detailed description of these features or elements will not be repeated in every case.

15 **[0039]** Figs. 1A and 1B schematically show an embodiment of an air flow distribution device 100 according to the invention in a perspective top view and sectional side view, respectively.

20 **[0040]** The device 100 includes an air guide housing 101 with a main air inlet 102 via which the air flow Z to be distributed is supplied. The same can originate e.g. from an air conditioner, in particular a roof-mounted air conditioner or the like.

25 **[0041]** The air flow distribution device 100 according to the invention furthermore includes first and second air outlets 103 on each of which an outflow nozzle 1 according to the invention with its respective air inlet 2 is mounted, in order to take up the air flow discharged from an air outlet 103 of the air flow distribution device 100 as supplied air flow Z and then after internal distribution dispense the same as output air flow A via a respective air outlet 3 into the space to be cooled or ventilated.

30 **[0042]** In the embodiment of Figs. 1A and 1B the air flow distribution device 100, but also the outflow nozzles 1 provided at the same, are mounted with their mounting sides 111 and 11 on a mounting surface 120 not shown in Figs. 1A and

1B. This can be e.g. the roof or ceiling area or also a wall area of a vehicle, e.g. of a caravan or a mobile home or the like.

[0043] In the sectional view of Fig. 1B there is also shown a distribution element 104 which is provided for the distribution of the air flow Z supplied via the main inlet 102 to the outlets 103.

[0044] In a schematic exploded representation, Figs. 2 and 3 show two other embodiments of the air flow distribution device 100 according to the invention. Again, there are shown the main air flow inlet or main air inlet 102 of the air flow distribution device 100 and each of the provided air outlets 103, on which various embodiments of the outflow nozzle 1 according to the invention with its air inlets 2 can be mounted, so that in operation the air flow Z supplied via the main air inlet 102 after internal distribution on the one hand in the device 100 via the air distribution element 104 itself, but then internally within the provided air outflow nozzles 1, is dispensed by an air output A via the air outlets 3 of the individual air outflow nozzles 1.

[0045] The embodiment of Fig. 2 for the air flow distribution device 100 according to the invention has an approximately T-shaped design, wherein at the ends of the T an outflow nozzle 1 each is provided. This air flow distribution device 100 according to the invention can be mounted e.g. at the ceiling of a vehicle and there at the wall area.

[0046] The embodiment for the air flow distribution device according to the invention as shown in Fig. 3 on the other hand has the shape of an L and therefore is particularly suitable for corner mounting on the ceiling e.g. of a vehicle.

[0047] The outflow nozzles 1 provided in Figs. 2 and 3 also have different designs of exit grids 15 provided there in the region of their air outlets 3.

[0048] Figs. 4A and 4B show a more concretized representation of an air flow distribution device 100 according to the invention for ceiling mounting in a vehicle, namely in a top view and in a view from below.

[0049] The representation of Fig. 4A thus shows the mounting sides 111 and 11 of the air flow distribution device 100 and of the provided outflow nozzles

1 as well as the main air inlet 102 of the air flow distribution device 100, which are formed at the housing 101.

[0050] In the view from below as shown in Fig. 4B, on the other hand, the air outlets 3 of the outflow nozzles 1 realized by the exit grids 15 as well as the
5 adjusting elements 26 and 36 for the non-illustrated mechanisms 21, 31 of an air flow distribution device 20, which are provided in the interior of the nozzles 1, can be seen.

[0051] In a perspective exploded representation, Fig. 5 shows a part of the inner life of an embodiment of the outflow nozzle 1 according to the invention.

10 [0052] In the lower region, the exit grid 15 of the air outlet 3 is shown, by which the air outlet 3 of the outflow nozzle 1 is formed or covered.

[0053] In the region above the same - here away from the exit grid 15, but in operation quasi resting on the same - the air flow distribution device 20 is shown with its main components. These main components are formed by a guide blade
15 21 which is pivotable about a guide blade axis of rotation 25 shown there by actuation of the adjusting element 26 in the form of an adjusting wheel.

[0054] In the representation of Fig. 5, the guide blade 21 is in a first end position 22 which also can be referred to as starting position, namely parallel to the supplied air flow Z and parallel to the non-illustrated mounting side 11 of the
20 outflow nozzle 1. In this first end position 22, the guide blade 21 at best slightly influences the supplied air flow Z, but in the ideal case not at all, so that in this first end position 22 no deflection of the supplied air flow Z is effected by the guide blade 21 and, unless subsequently or downstream thereof another interaction occurs, the air flow hence e.g. passes the air distribution device 20
25 almost unhindered.

[0055] The air flow distribution device 20 according to the embodiment of Fig. 5 furthermore includes two deflection means 30 each with a set of vane blades 31, which on independent shafts or rods defining respective vane blade axes of rotation 35 are mounted at an acute angle thereto and are arranged
30 equidistant to each other and in parallel with the same shape. The shafts or rods defining the vane blade axes of rotation 35 can be rotated via the provided adjusting elements 36 e.g. in the form of adjusting wheels, in order to vary the

orientation of the deflection means and hence of the vane blades 31 with respect to the supplied air flow Z.

[0056] In the arrangement shown in Fig. 5, both deflection means 30 and hence the respective vane blades 31 are in a second end position 33 which also
5 can be understood as final position, so that the approaching supplied air flow Z would be deflected laterally, namely - when the original flow direction is the illustrated x-direction - in the illustrated directions y and -y.

[0057] However, when the vane blades 31 are rotated by about 90 degrees into a first end position by means of the vane blade axes of rotation 35, the vane
10 blades 31 arranged obliquely on the vane blade axes of rotation 35 are positioned in the air flow such that they provide no or at best an only small air resistance to the same (not shown in Fig. 5). Correspondingly, the vane blades 31 then virtually do not deflect the air flow.

[0058] Figs. 6 and 7 show the arrangement according to Fig. 5 in the
15 mounted condition in a sectional representation, wherein for the guide blade 21 the first end position 22 (Fig. 6) and the second end position 23 (Fig. 7) each is shown.

[0059] In the representations of Figs. 6 and 7 there is also shown an
20 overflow threshold 14 as part of the housing 10 between the respective air inlet 2 and the air distribution device 20 in the interior of the housing 10 on a side 12 facing away from the mounting side 11. The overflow threshold 14 serves for focusing the supplied air flow Z on the space region in which the air flow distribution device 20 with the guide blade 21 on the one hand and the deflection means 30 on the other hand are located, in order to increase the flow-mechanical
25 interaction.

[0060] The overflow threshold 14 furthermore effects that the air flow cannot impinge directly onto the front slats 16 arranged closer to the overflow threshold 14. Rather, the air flow must first be deflected by the guide blade 21 or the vane
30 blades 31. The front slats 16 initially simply are overflowed, as can also be seen in particular in Fig. 6.

[0061] On the side of the housing 10 facing away from the air inlet 2 an overflow element 17 can be seen, through which here in the case of an

unhindered flow through the housing 10 during exit in cooperation with the slats 16 positioned less steeply or rather flatly in this region the so-called Coanda effect is produced, by which the exiting air flow A flows along the mounting surface 120, here the ceiling, with a high throw distance and thus on the one
5 hand can effect surface cooling and alternatively or in addition reaches room areas of the room to be ventilated or cooled further away from the outflow nozzle 1.

[0062] A further aspect is the alignment of slats 16 provided in the exit grid 15. In the region directly below the air flow distribution device 20, i.e. in particular
10 directly behind the overflow threshold 14, the slats 16 are positioned almost vertically with respect to the mounting side 11, but at least inclined less strongly as compared to the region of the exit grid 15 which is further away from the air inlet 2. There, the slats 16 form an acute angle with the mounting side 11 and extend almost parallel or flatly relative to the mounting side 11 or a mounting
15 plane present there. The central steeper angle of the slats 16 effects an outflow of the air into the space region directly below the outflow nozzle 1, whereas the slats 16 inclined with an acute angle and provided relatively flatly relative to the mounting side 11 and further away from the air inlet 2 - as has already been mentioned above - effect an air flow along the mounting surface 120, here the
20 ceiling. Depending on the position of the guide blade 21, the air flow thus is deflected into the region with the slats 16 positioned more steeply (second end position 23, Fig. 7) or is allowed to pass through almost unhindered to the slats 16 positioned flatly. Now, reference is made to the drawings in general. Further features of the invention will be explained and variants of the embodiments will
25 be indicated.

[0063] The invention indicates an outflow nozzle 1 for the individual adjustment of the air flow direction and the scattering of a main air flow, e.g. in an appliance for interior ventilation or cooling, namely with an undisturbed design on the part of the interior space.

30 [0064] In an advantageous way, the following partial objectives also can be achieved:

- Provision of an outflow nozzle 1 for an air distributor 100 of a roof-mounted air conditioning system in flat construction, i.e. with a low

overall height of the air duct as compared to its width (low ceiling heights in mobile homes and caravans, avoid collision with doors or cabinet doors)

- 5 • The outflow nozzle 1 is adapted in its shape to the design specifications of an air flow distributor 100 for the interior space. Its design should be able to continue the design vocabulary of an air flow distributor 100 for the interior space in the region of the air exit 103.
- 10 • The outflow nozzle 1 allows a targeted control of the air flow by the user. The exiting air flow A specifically reaches all reachable regions of the interior space and can be adjusted in its scattering quality. With maximum throw distance, an attachment of the air flow to the ceiling 120 is achieved.
- 15 • In the outflow nozzle 1 the pressure loss in the air path is as low as possible and rather independent of the deflection of the main air flow.
- The outflow nozzle 1 consists of few components.
- The outflow nozzle 1 can include leading and/or guiding elements 20, 21, 31 controllable in a motorized way.

[0065] According to the invention, an outflow nozzle 1 hence is indicated in particular,

- 20 • which connects to the air guiding duct 103 of an air flow distributor 100 mounted at the ceiling, e.g. of a heating, ventilation or air conditioning system, where the air flow Z flows into the outflow nozzle 1 on the inlet side 2,
- 25 • in which the air flow Z leaves the outflow nozzle 1 through at least one outlet opening 3,
- in which within the volume taken by the outflow nozzle 1 between inlet side 2 and outlet opening 3 the main air flow is divided and/or aligned by leading and/or guiding elements 20, 21, 31,

- in which the flow volume from the inlet side 2 up to at least one outlet opening 3 is enveloped by a wall or e.g. a housing 10, so that an air duct is obtained between the openings 2, 3,
- 5 • which includes at least one guide blade 21 which is mounted on a guide blade axis of rotation 25 which is equipped or connected with at least one adjusting element 26 for rotating the guide blade 21,
- which includes at least one exit grid 15,
- which includes at least one overflow threshold 14 that is arranged on the inlet side 2 in front of the exit grid 15,
- 10 • which includes an air duct enveloping the outflow nozzle 1 e.g. as housing 10, which can be formed by the air guiding duct of the underlying device 100.

[0066] Further aspects which relate to embodiments of the invention:

- 15 • The features, elements and/or components determining the function can spatially be arranged and designed relative to each other such that the main air flow Z specifically only is guided through partial regions of the exit grid 15 in dependence on the angle of rotation of the guide blade 21.
- 20 • The features, elements and/or components determining the function can spatially be arranged and designed relative to each other such that in the starting position 22, namely in particular in the first end position 22, the main air flow Z flows through the exit grid 15 only in a partial region close to the ceiling.
- 25 • The exit grid 15 can be designed such that in the starting position 22, namely in particular in the first end position 22, the main air flow Z attaches to the ceiling after leaving the outflow nozzle 1: Coanda effect.
- 30 • The features, elements and/or components determining the function can spatially be arranged and designed relative to each other such that in the end position 23, namely in particular in the second end

position 23 of the guide blade 21, i.e. in particular in the case of a maximum rotation with respect to the starting position 22, only a partial region of the exit grid 15 directly behind the overflow threshold 14 is traversed by the main air flow Z.

- 5
 - There can be formed several vane blades 31 arranged below a guide blade 21 and firmly connected with this guide blade 21, which are formed such that in the case of an adjustment about the guide blade axis of rotation 25 a targeted lateral deflection and/or scattering of the air flow Z flowing in at the inlet side 2 is effected, and/or which are
- 10
 - formed such that they are aligned in an orientation of the vane blades 31 associated to the starting position 22 of the guide blade 21, namely approximately parallel to the inflow direction x, -x, and thereby cause a pressure loss as low as possible during the traversal.
- 15
 - There can be provided at least one vane rod arranged below a guide blade 21 for the vane blade axis of rotation 35 of the vane blades 31, wherein a plurality of vane blades 31 each is present, which via the respective rod are firmly connected with each other.
- 20
 - The vane rod each can be a separate component.
 - The vane rod each can independently be rotatably mounted about the same axis of rotation 25 as the guide blade 21.
 - The vane rod each can be freely rotatable independent of the guide blade 21.
 - The vane rod each can laterally and/or centrally include at least one adjusting element 36 for rotating this vane rod.
- 25
 - On adjustment about its axis of rotation 35, the vane rod each can effect a targeted lateral deflection and/or a scattering of the air flow Z flowing in on the inlet side 2.
 - The vane rod each can be formed such that in a starting position of the vane blades 31 associated to the starting position 22 of the guide

blade 21, namely oriented approximately parallel to the inflow direction x , $-x$, it causes a pressure loss as low as possible during the traversal.

- There can be provided at least one exit grid 15 which is designed as a package of non-adjustably aligned guiding slats 16.
- 5 • The guiding slats 16 support the orientation of the main air flow or of a partial air flow corresponding to the set angle of rotation of the guide blade 21 in the traversed partial region of the exit grid 15.
- The angles of inclination with respect to the horizontal of the guiding slats close to the ceiling are formed such that in the starting position 22 of the guide blade 21, after leaving the outflow nozzle 1, the air flow attaches to the ceiling or mounting surface 120.
- 10 • The overflow threshold 14 e.g. is designed such that the air flow Z is guided over the guiding slats 16 behind the overflow threshold 14, in particular such that in the starting position 22 of the guide blade 21 only a partial region of the exit grid 15 is traversed close to the ceiling.
- 15 • By means of an inflow ramp, the overflow threshold 14 can be formed such that on the inlet side 2 before the exit grid 15 the air flow Z flows over guiding slats 16 in the aforementioned way, in particular such that in the starting position 22 of the guide blade 21 only a partial region of
- 20 the exit grid 15 is traversed close to the ceiling.

[0067] The movable guide blade 21 can include stepless and/or snap-in positions, in order to prevent a rotation of the guide blade 21, as a result of the dynamic pressure acting on the guide blade 21 on traversal of the outflow nozzle 1 or as a result of vibrations due to a frictional resistance of its movable elements

25 or due to the resistance of a catch.

[0068] Each vane blade axis of rotation 35 or each vane rod can include stepless and/or snap-in positions, in order to prevent a rotation of the vane rod as a result of the dynamic pressure acting on its vane blades 31 on traversal of the outflow nozzle 1 or as a result of vibrations due to a frictional resistance of its

30 movable elements or due to the resistance of a catch. By maximum rotation, the air duct can be closed in an end position of a guide blade 21.

[0069] By rotation of a guide blade 21, the air can be deflected such that it leaves the exit grid 15 in a direction in space opposite to the air flowing in on the inlet side 2 of the outflow nozzle 1.

[0070] The overflow threshold 14 can be designed as inflow ramp and form
5 a common component with the outflow grid 15, e.g. as part of the housing 10 of the outflow nozzle 1.

[0071] The adjusting elements 26 of the guide blade 21 and/or the adjusting elements 36 of each vane blade axis of rotation 35 or vane rod can include a mechanism for adjustment. This can be a gearwheel e.g. connected to an axis of
10 rotation 25, 35, which is rotated by shifting a toothed rack.

[0072] Below a guide blade 21 on both sides of the centrally arranged adjusting element 26 there can each be mounted an axis of rotation 35 for vane blades or a vane rod. In this case, the main air flow Z is split up into two laterally steerable partial streams which leave the outflow nozzle 1 via an exit opening 3.

PATENTKRAV

1. Udstrømningsdyse (1), med
et hus (10), som omfatter i det mindste ét luftindløb (2) og i det mindste ét luftudløb (3),
5 og med
en luftstrømsfordelingsindretning (20), som i det indre af huset (10) er forbundet
nedstrøms for luftindløbet (2) og opstrøms for luftudløbet (3), og ved hjælp af hvilken
en igennem luftindløbet (2) tilført luftstrøm (Z) styrbart kan fordeles retnings- og
mængdemæssigt som afgivet luftstrøm (A) til luftstrømsudløbet (3),
10 idet luftstrømsfordelingsindretningen (20) omfatter en føringsvinge (21), som kan
indstilles imellem i det mindste en første endestilling (22) og en anden endestilling (23)
således,
at den tilførte luftstrøm (Z) igennem luftudløbet (3) i en første endestilling (22) for
føringsvinge (21) kan udstrømme som afgivet luftstrøm (A) med en første luftstrøms-
15 fordeling og i den anden endestilling (23) for føringsvingen (21) kan udstrømme som
afgivet luftstrøm (A) med en anden luftstrømsfordeling,
kendetegnet ved, at
opstrøms og umiddelbart før luftstrømsfordelingsindretningen (20) er der tilvejebragt et
overstrømstrin (14) til samling af den tilførte luftstrøm (Z) imod luftstrømsfordelings-
20 indretningen (20).
2. Udstrømningsdyse (1) ifølge krav 1, hvor
et udgangsgitter (15) er tilvejebragt ved luftudløbet (3);
den afgivne luftstrøm (A) med den første luftstrømsfordeling kan udstrømme via et første
25 område (12a) i udgangsgitteret (15) og med den anden luftstrømsfordeling kan
udstrømme via et andet område (12b) i udgangsgitteret (15); og hvor
det første område og det andet område er forskellige områder af udgangsgitteret (15).
3. Udstrømningsdyse (1) ifølge krav 1 eller 2, hvor
30 føringsvingen (21) er anbragt på en føringsvingedrejeaksel (25), og at føringsvingen
(21) ved drejning af føringsvingedrejeakslen (25) er drejelig eller svingbar i det mindste
til den første endestilling (22) og den anden endestilling (23).
4. Udstrømningsdyse (1) ifølge ethvert af de foregående krav, hvor
35 huset (10) omfatter en montageside (11) og føringsvingedrejeakslen (25) er anbragt
således parallelt med montagesiden (11), at

- (a) i den første endestilling (22) er føringsvingen (21) rettet i det væsentlige parallelt med montagesiden (11) og den tilførte luftstrøm (Z) kan udstrømme i det væsentlige parallelt med montagesiden (11), og at
- (b) i den anden endestilling (23) er føringsvingen (21) rettet ikke parallelt med montagesiden (11) og den tilførte luftstrøm (Z) kan udstrømme ikke parallelt, især i en fra 0 forskellig vinkel, især vinkelret på montagesiden (11).

5. Udstrømningsdyse (1) ifølge ethvert af de foregående krav, hvor luftstrømsfordelingsindretningen (20) omfatter i det mindste én luftstrømsafbøjningsindretning (30) med adskillige skovblade (31), som er anbragt indbyrdes parallelt og i indbyrdes afstand på en fælles skovbladsdrejeaksel (35); skovbladene (31) er anbragt i en spids vinkel i forhold til drejeakslen (35); og hvor ved en drejning kan skovbladsdrejeakslen (35) drejes eller svinges i det mindste imellem en første endestilling og en anden endestilling (33).

6. Udstrømningsdyse (1) ifølge krav 5, hvor skovbladene (31) i den første endestilling er rettede parallelt med en tilførselsretning (x, -x) for den tilførte luftstrøm (Z) og i den anden endestilling (33) er rettet ikke parallelt med tilførselsretningen (x, -x) for den tilførte luftstrøm (Z), således at i den første endestilling kan skovbladene så vidt muligt uhindret passeres af den tilførte luftstrøm (Z) og i den anden endestilling (23) kan den tilførte luftstrøm (Z) afbøjes sideværts af skovbladene (31) – især i planet (yx) for montagesiden (11) og/eller vinkelret på tilførselsretningen (x, -x).

7. Udstrømningsdyse (1) ifølge ethvert af kravene 5 eller 6, hvor et med skovbladsdrejeakslen (33) forbundet justeringselement (36) er tilvejebragt til drejning af drejeakslen (35) for skovbladene (31).

8. Udstrømningsdyse (1) ifølge ethvert af kravene 5 til 7, hvor skovbladene (31) er udformede plane og cirkel- eller ellipseformede og i deres respektive midtpunkt er gennemtrængt af skovbladsdrejeakslen (35) og forbundet med denne.

9. Udstrømningsdyse (1) ifølge ethvert af kravene 5 til 8, hvor luftstrømsafbøjningsindretningen (30) er forbundet med føringsvingen (21) og især er koblet til dennes føringsvingedrejeaksel (25), især i form af en stiv forbindelse.

10. Udstrømningsdyse (1) ifølge ethvert af de foregående krav, hvor to eller flere – især indbyrdes uafhængigt betjenbare og bevægelige – luftstrøms-afbøjningsindretninger (30) er tilvejebragt.

5

11. Udstrømningsdyse (1) ifølge ethvert af de foregående krav, hvor udgangsgitteret (15) omfatter adskillige lameller (16), som især er udformede i et overfor montagesiden (11) for huset (10) liggende område (12) og/eller i sideområder for huset (10);

10 lamellerne (16) er tilvejebragt i det første og det andet område af udgangsgitteret (15).

12. Udstrømningsdyse (1) ifølge krav 11, hvor

lamellerne (16) i et som første område fungerende, nærmere luftindløbet (2) og/eller luftstrømsfordelingsindretningen (20) liggende område (12a) er rettede stejle i forhold

15 til montagesiden (11), og i et som andet område fungerende, længere fra luftindløbet (2) og/eller luftfordelingsindretningen (20) liggende område (12b) er rettede mere plant i forhold til montagesiden (11).

13. Luftstrømsfordelingsindretning (100),

20 med et luftføringshus (101), som i det mindste omfatter et luftudløb (103),

hvor der ved luftudløbet (103) er anbragt en udstrømningsdyse (1) ifølge ethvert af kravene 1 til 12 med et luftindløb (2).

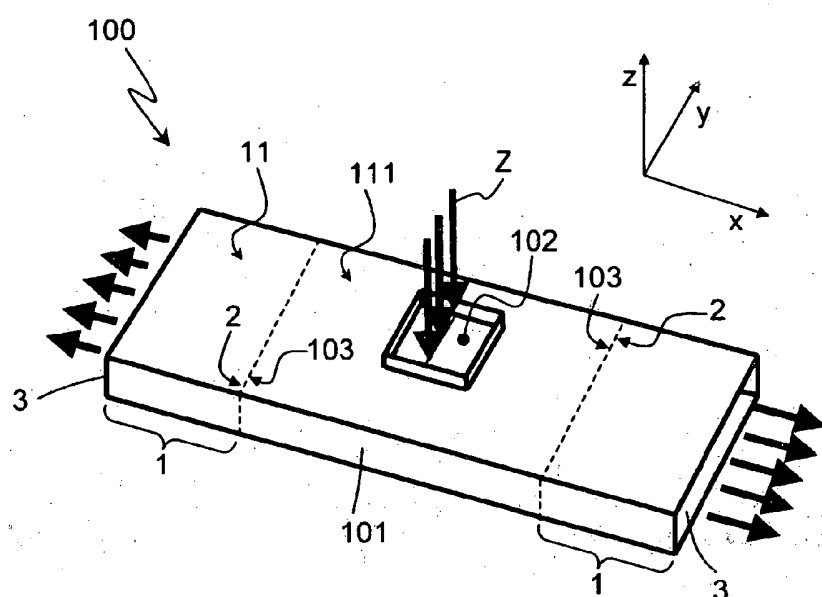


Fig. 1A

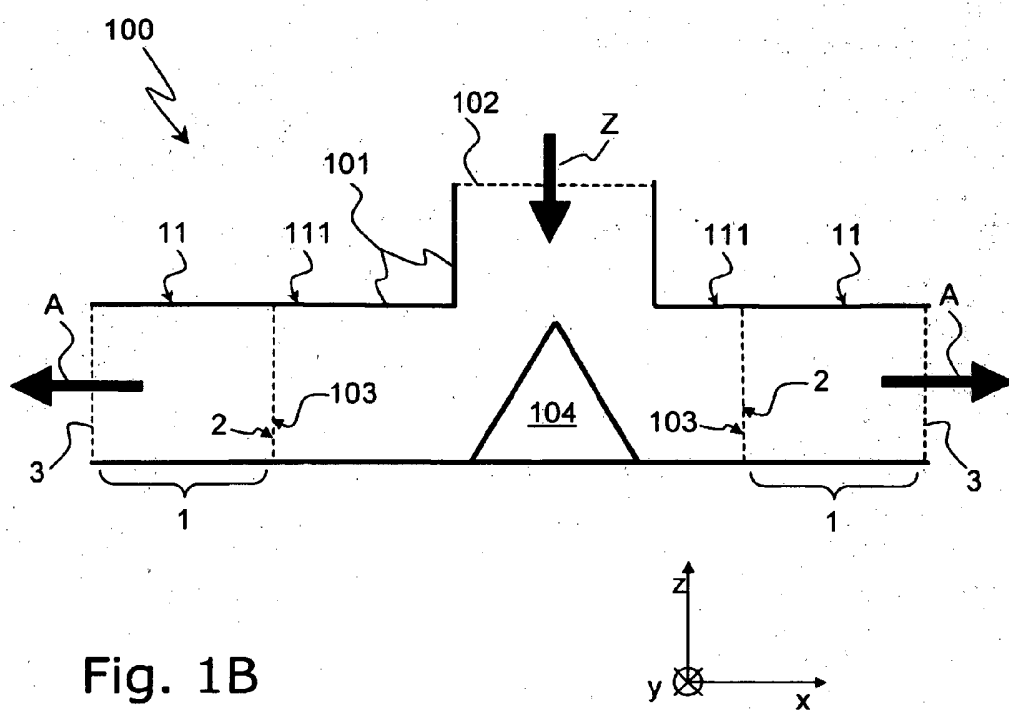


Fig. 1B

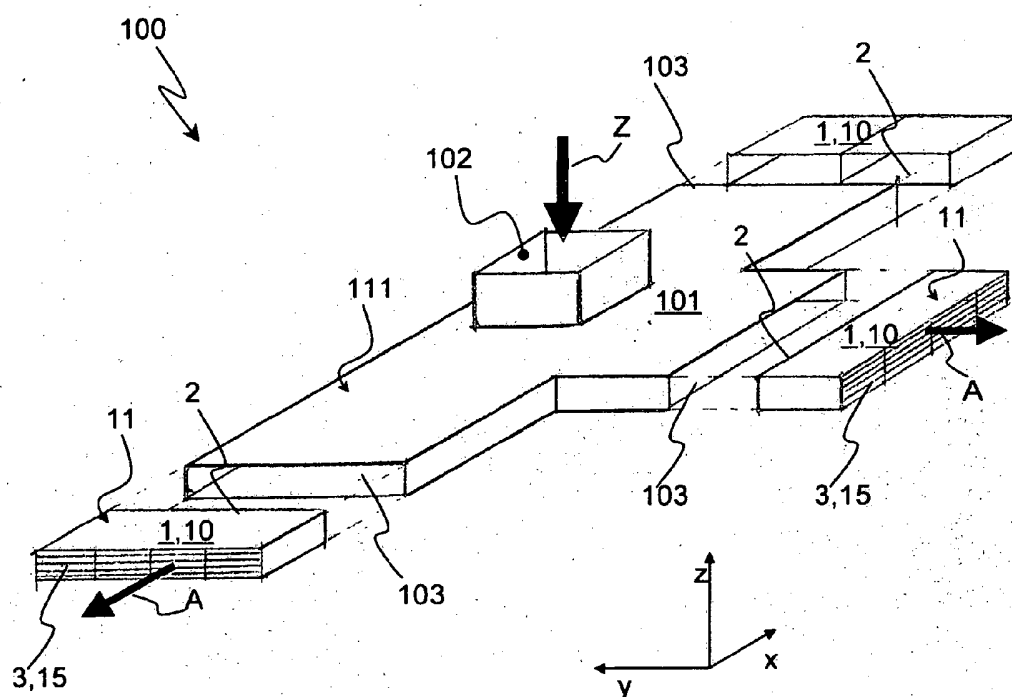
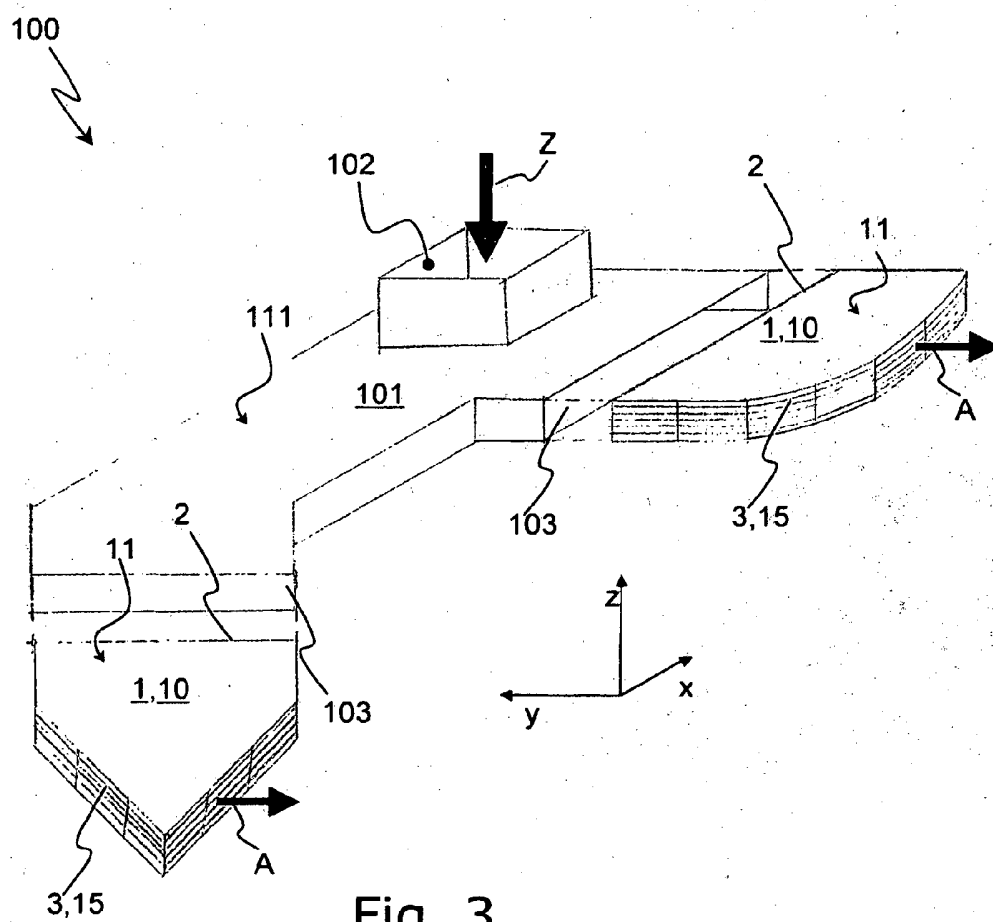


Fig. 2



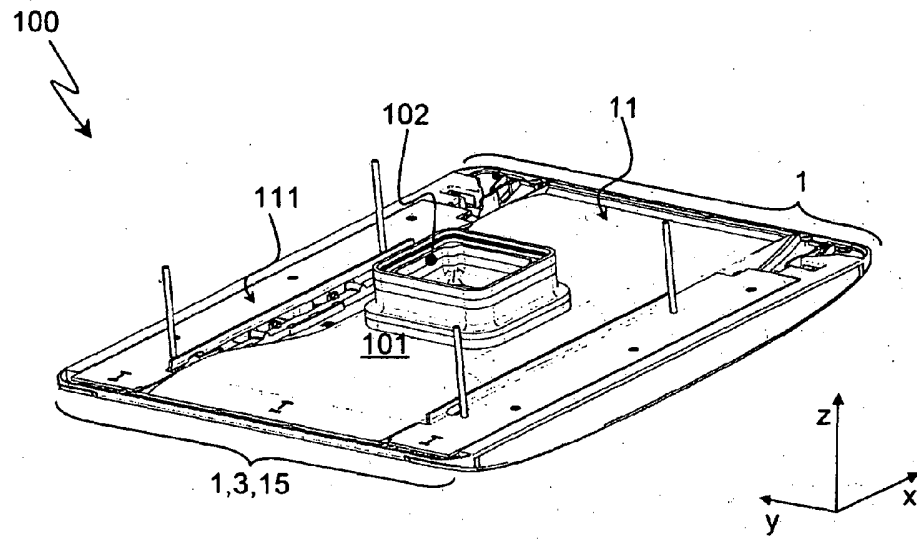


Fig. 4A

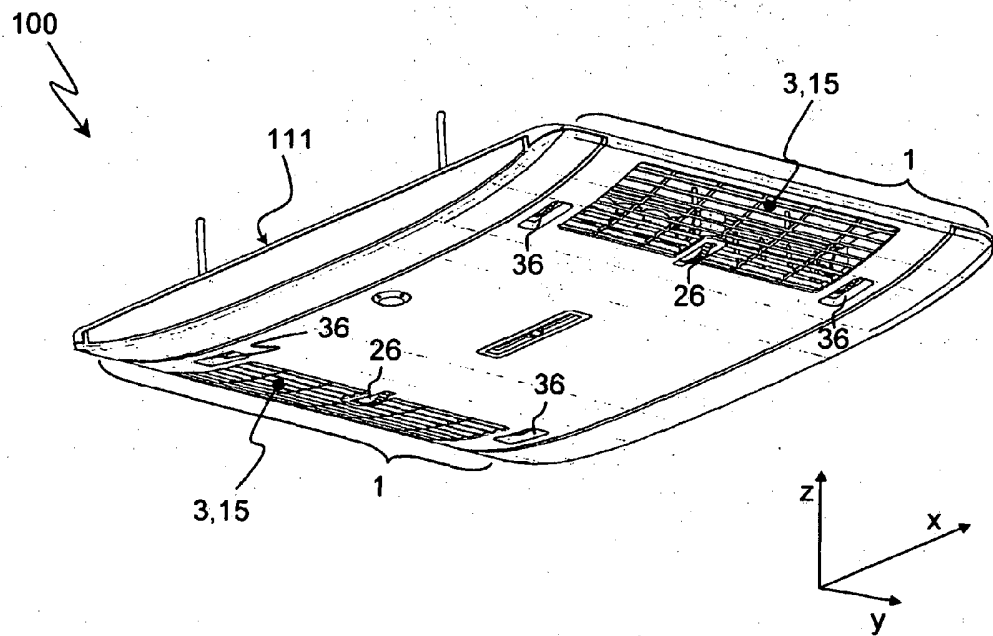


Fig. 4B

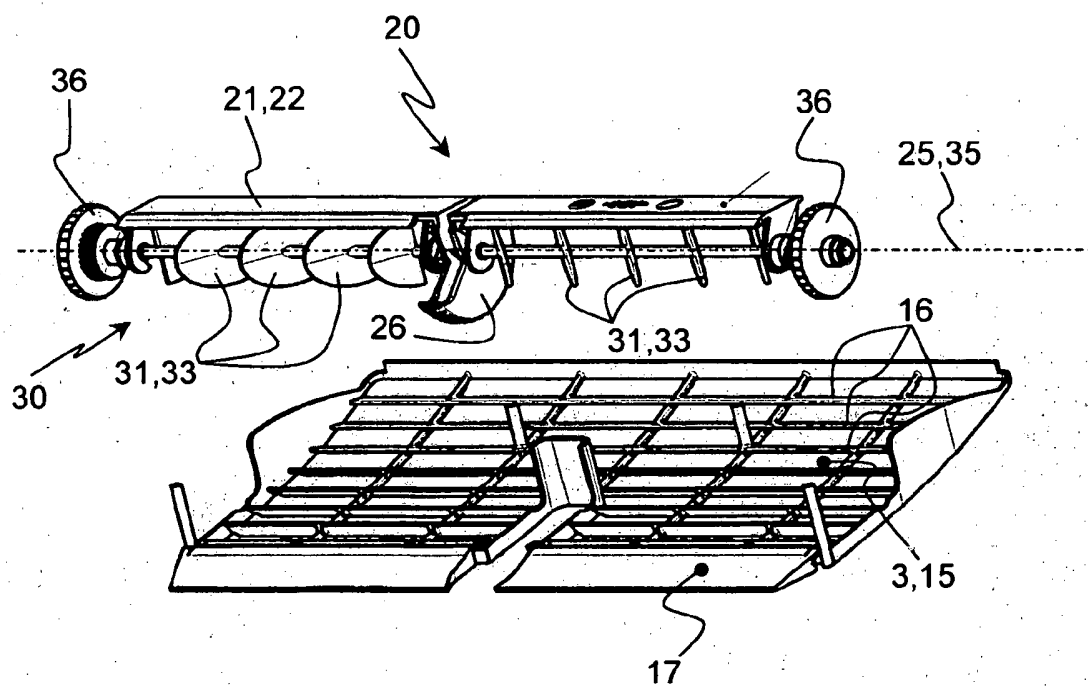
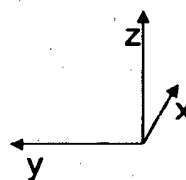


Fig. 5



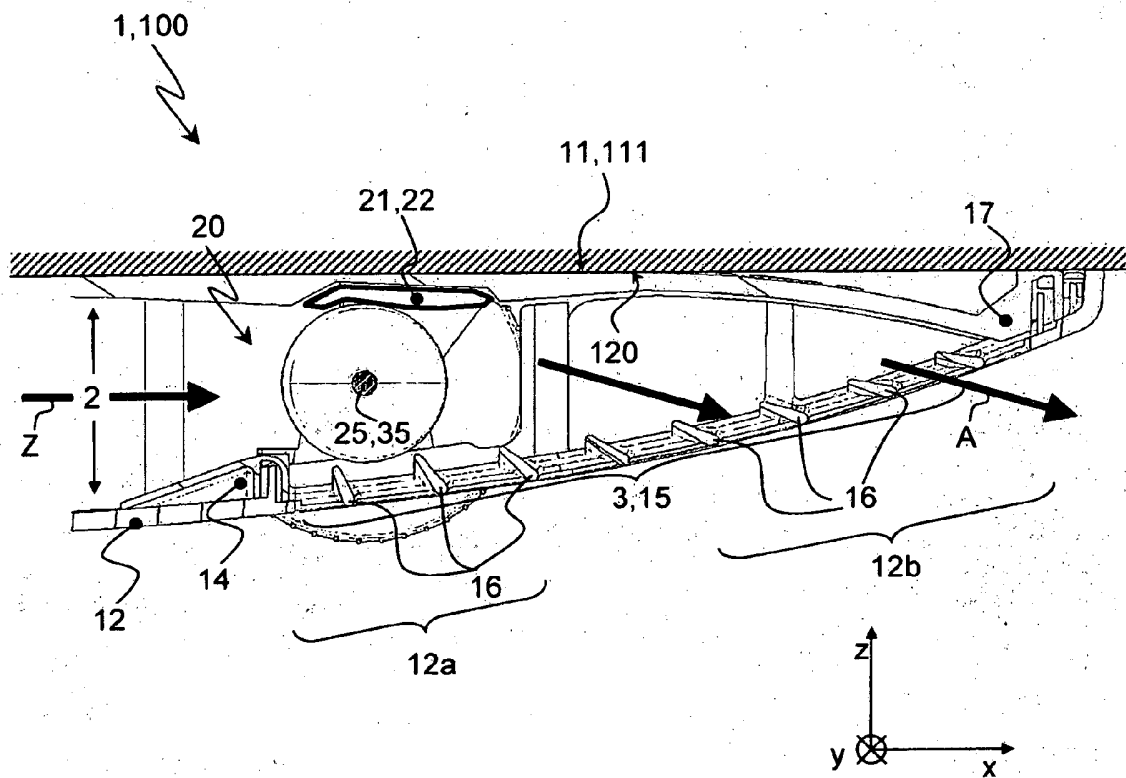


Fig. 6

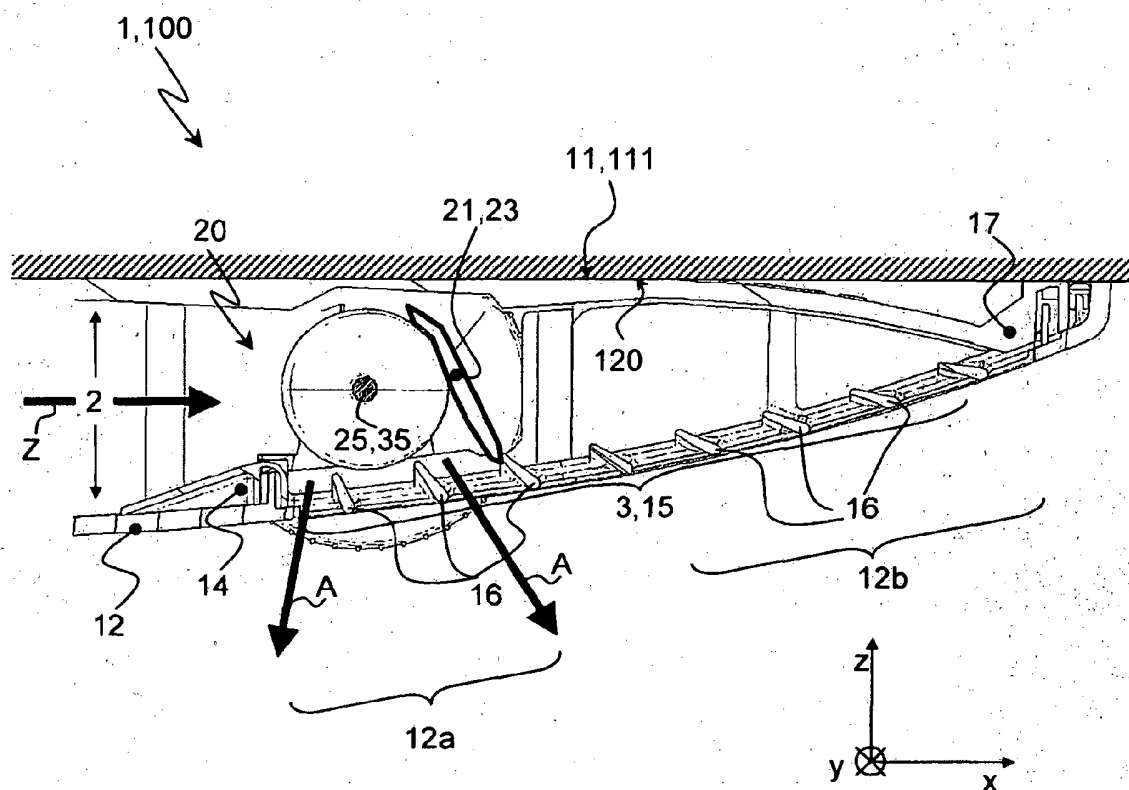


Fig. 7