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(54) Ventilation device for building roofs.

(57) The device has a rectangular housing (2) defining between opposite pairs of upstanding walls (3,4) (see Fig. 1) a ventilation opening controlled by overlapping flaps (5) pivotally movable about hinge axes (61) by means of a drive device (not shown). The flaps (5) have end walls (271) which extend downwardly outside the housing walls (4) and in the regions of their overlap the flaps are formed with water collecting channels (221). The flap outer walls (171) first rise steeply in an initial portion (231) adjacent the bottom of the channels (221) and then incline more gently upwards to end beyond a culmination line (251) in an end portion (261) inclined slightly downwards. To assist in preventing spillage of surface water through the ventilation opening when opening the flaps (5) an upright water deflector lip (321) is provided midway of the initial portion (231) of each flap outer surface which lip projects with its ends (331) beyond the end walls (271) of the flap. The outside of the end walls (271) of the flaps also have further water deflector ribs (371) which extend obliquely downwards past the discharge mouths of the water collecting channels (221).

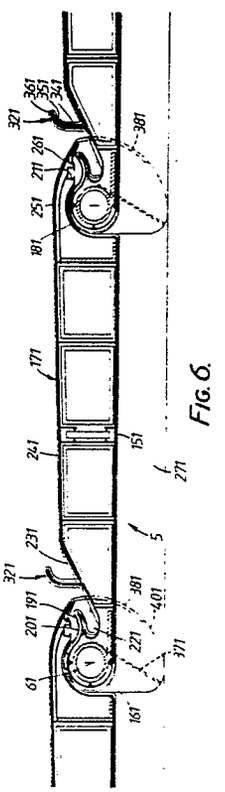

Fig. 6.

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VENTILATION DEVICE FOR BUILDING ROOFS

The invention relates to a ventilation device for building roofs in a construction according to the preamble of claim 1, that is to say a ventilation device having a housing which defines a ventilation opening and the walls of which are situated opposite one another, parallel in pairs, and having a plurality of like, lamellar flaps which are pivotally movable about a parallel stationary hinge axis by means of a drive device and which, in their closed position, overlap one another in a direction transverse to their hinge axes, engage over the walls of the housing carrying them, at their upper edge, and completely cover the ventilation opening in the housing and protect it against the entry of the weather, each flap being provided, at its ends, with an end wall extending downwards beyond the bottom wall of the flap and comprising, in the region of its rear edge, which is adjacent to the hinge axis and engaged over by the front marginal region of an adjacent flap, a collecting channel and gutter for water, which is situated in a cross-sectional constriction, as well as a covering wall adjoining this, the surface of which at first rises steeply in an initial portion adjacent to the bottom of the collecting channel and gutter, changes over into a main portion rising more gently and ends, beyond a culmination line, in an end portion bent slightly downwards, characterised in that provided in the region of the initial portion of the surface of the covering wall is an upright deflector lip which extends parallel to the collecting channel and gutter and projects, with its ends beyond the end walls of the flap in each case.

In a known ventilation device of this type there is a danger that during the upward pivoting of the flaps out of their closed position into their open position, water, which has gathered in the form of accumulations on the surface of the outside of the flaps, may enter the interior of the building through the ventilation opening. Such phenomena occur, in particular, in the case of ventilation devices with flaps, the covering wall of which consists of plastics material at its surface or is coated with plastics material, for example PVC or PC. Particularly in an initial period after the installation of the ventilation device, the adhesion of water leads to residues on the covering wall of the flaps in the form of drops of large area which may be thrown off into the building on a movement of the flaps into the open position. If such residues of water collect in the collecting channel and gutter, then even in the closed state of the flaps there is a certain risk of water entering the interior of the building because, despite a seal provided in the overlapping region between adjacent flaps, water can overflow inwards through capillary action or through the influence of wind pressure and then drip down into the building. The bearing region, in front of which the collecting channel and gutter discharges at the end, at the end wall of the flaps, is also in danger from the entry of water.

It is the object of the invention to form a ventilation device of the type in the preamble to claim 1 so that it is better secured against the overflow of water from the outside of the device into the ventilation opening. The invention solves this problem with the features of the characterising part of claim 1. With regard to further important developments, reference should be made to the claims 2 to 9.

In the ventilation device according to the invention, the deflector lips intercept accumulations of water running down or shooting down or drops of water thrown off when the flaps are opened and drain them off to the outside of the device so that water does not enter the interior of the building either as a result of the collecting channel and gutter, which usually has only a small cross-sectional area of flow, overflowing or as a result of dripping action. The deflector lip not only forms a deflector element for water and to some extent a preliminary collecting channel and gutter but also a deflector element for wind which prevents the build-up of wind pressure in the overlapping region between two flaps, which might drive water out of the collecting channel and gutter towards the seal in the overlapping region. Therefore, the ventilation device according to the invention offers increased imperviousness in the overlapping range even in the closed position of its flaps.

An exemplary embodiment of the subject of the invention is illustrated in more detail in the drawings. In the drawings:

FIG. 1 is a general perspective view partially broken away, of a ventilation device according to the present invention;

FIG. 2 shows a simplified, broken away plan view of a lamellar flap of the device shown in Figure 1;

FIG. 3 shows a section on the line III-III in Figure 2;

FIG. 4 shows a broken away detail IV from Figure 3 to a larger size;

FIG. 5 shows a broken away enlarged illustration of the corner joint region between two walls of the outer housing of the ventilation device shown in Figure 1;

FIG. 6 shows a broken away partial section through a group of the lamellar flaps in the closed position; and

FIG. 7 shows a broken away plan view of Figure 6 partially broken open.

The ventilation device illustrated as a whole in Figure 1 is adapted for fitting to roofs, particularly flat roofs, of industrial, commercial or municipal buildings. In the embodiment illustrated, it comprises a base 1 in the form of a frame, an inner housing 2 disposed on this, defining a ventilation opening and having walls situated opposite one another, parallel to one another n pairs, of which only the walls 3 and 4 are illustrated, and a plurality of like lamellar flaps 5 which are pivotally movable about a parallel, stationary hinge axis by means of a drive device not illustrated. In the closed position illustrated, the flaps 5 jointly form a closing device which completely covers the ventilation opening in the inner housing 2 and protects it from atmospheric influences.

The ventilation device further comprises an outer housing 6 which forms a wind deflecting turret. The outer housing 6 is in turn composed of plane-parallel walls 7, 8 and 9, 10 situated opposite one another, which consist of metal, particularly aluminium, and are connected to one another in the region of their corner joints 11 by means of a connecting device 12 in each case. The walls 7, 8, 9, 10 which extend with spacing from the outer edges of the flaps 5 and form a narrow passage with the walls 3, 4 of the inner housing 2, are supported on the inner housing 2 in a suitable manner, for example inserted, with detent locking, in clips 13 at the outside of bearing blocks 14 for the support of the flaps 5.

The flaps 5 each comprise an extruded hollow-section body 102 which has an elongated, flat basic shape and consists of plastics material, particularly polycarbonate. The plastics material may be made transparent or translucent if this is desired for reasons of general lighting.

The hollow-section body 102, which is divided into a plurality of compartments by internal webs 103, is provided along its rear marginal edge with an inserted reinforcing tube 105 having a flange extension 106 at the bottom. Extending along its front edge 107 in the hollow body 102 is an inserted reinforcing section 108 having a lower flange 109 which, like the flange extension 106, is aligned parallel to the bottom wall 110 of the hollow-section member 102.

At the underside, the flap 5 is provided with two added bearing blocks 111 on which drive means for a pivotal movement of the flap act. Like the reinforcing parts 105, 106, 108, 109, the bearing blocks 111 preferably consist of aluminium. The bearing blocks 111 are disposed close to the ends of the hollow-section body 2, connected at their front end to the flange 109 of the reinforcing section 108 and at their rear end to the flange extension 106 of the reinforcing tube 105 and, with these, form a stiffening skeleton in the form of a frame. In order to ensure that the different coefficients of heat expansion of plastics material and aluminium do not lead to compression or warping, the connecting members, which are preferably constructed in the form of blind rivets, engage through passages 113 in the bottom wall 110 of the hollow-section body 102, the diameter of which passages considerably exceeds that of the connecting members 112. As a result, a compensating gap is provided which permits a relative movement of the parts 106, 109 or 111 in relation to the bottom wall 110.

The reinforcing parts 105, 106, 108, 109 may advantageously be supported in their compartments in the hollow-section body 102 by means of supporting ribs 114 which are formed on the inside of the compartments and the apex of which predetermines a substantially linear supporting engagement for the reinforcing parts. This facilitates relative movements of the parts 106 and 111 or 109 and 111 in relation to the bottom wall 110 in the region of the blind rivets 112.

For the sake of completeness, it may also be mentioned that the hollow-section body 102 is closed at its ends by separate end members 115 which are fitted to the ends of the hollow-section body 102.

The walls of the flaps 5 may consist of aluminium instead of plastics material. Each flap 5 comprises a bottom wall 151, a region 161 in the form of a portion of a cylinder, receiving the pivot-axis construction along its rear edge, a covering wall 171 and a reduced region 181 in the form of a portion of a cylinder along its front edge, which region 181 receives a region 161 of an adjacednt flap 5 in the closed position of the flaps 5 illustrated in Figures 6 and 7. Following on the top of the region 161 in the form of a portion of a cylinder is a web-shaped extension 191 which, at the top, forms a trough 201 for the reception of a seal, not illustrated, which can be fixed in an anchoring groove 211 in the region 181,

Adjacent to the region 161 and below the extension 191, the flap 5 comprises, at its top, a collecting channel and gutter 221 for water, disposed in a cross-sectional constriction.

Adjacent to this collecting channel and gutter 221 is the covering wall 171, the surface of which first rises comparatively steeply, for example at an angle of 30°, in an initial portion 231 adjacent to the bottom of the collecting channel and gutter 221, changes over into a main portion 241 rising

comparatively gently, for example under 2°, and ends, beyond a culmination line 251, in an end portion 261 bent slightly downwards.

At its ends, the flap 5 comprises an end wall 271 which extends downwards beyond the bottom wall 151 and which may be formed on a separate end wall portion 281 added in each case. The end walls 271 extend parallel to one another in an initial portion 291 in the region of the rear marginal edge, diverge in a main portion 301 following towards the front marginal edge of the flap 5 and again extend parallel to one another in an end portion 311.

Provided in the region of the initial portion 231 of the surface of the covering wall 171 is an upright deflector lip 321 which extends parallel to the collecting channel and gutter 221 and projects with each of its ends 331 beyond the end walls 271 of the flap 5. The deflector lip 321 is disposed substantially in the middle of the initial portion 231 of the surface of the covering wall 171 and comprises a lower base region 341 aligned vertically in the closed position of its flap 5 and an upper marginal region 351 which is curved in the form of an arc towards the main portion 241 of the surface of the covering wall 171.

Provided at the outside of the end walls 271 of each flap is a deflector rib 371 which, at the side to the hinge axis, extends obliquely downwards past the outlet of the collecting channel and gutter 221. This deflector rib 371 ensures that water running off along the end wall 271 is deflected downwards towards the lower marginal edge of the end walls 271 before reaching the bearing region. Thus, even under the influence of air flows, assurance is provided that water which emerges from the collecting channel and gutter 221 or from the channel also formed by the deflector lip 321 is not driven upwards into the bearing region and further over the walls 4 of the housing 2 towards the ventilation opening.

In order to shield this region, which is critical from the sealing point of view, from air currents as much as possible, each flap 5 is provided, in the front corner regions, with a deflector web 381 which adjoins the front marginal edge 391 of the covering wall 7 and the front marginal edge 401 of the end wall 271 and extends downwards in the form of an arc along the front marginal edge 401 of the end wall 271.

This deflector web 381 shields the bearing region of the flaps 5, particularly as it ends with its inner edge 411 only a short distance away from the initial portion 291 of the end wall of an adjacent flap 5, which portion is associated with it in the closed position of the flaps 5. The spacing between the inner edge 411 and the opposite initial portion 291 of the end wall 271 of an adjacent flap 5 corresponds substantially to the height of the deflector rib 371, and the ends 331 of the deflector lip 321 project in a region in front of the front face of the deflector web 381 so that the deflector webs 381 also contribute towards deflecting water running out of the channel formed by the deflector lip 321 towards the lower edge of the end wall 271 of the flap 5 and deflecting it away from the bearing region.

As can be seen from Figure 5, the connecting device 12 consists of an outer portion 15 and an inner portion 16 which can be engaged with this to form a locked unit.

Both portions 15, 16 of the connecting device 12 are preferably injection moulded from plastics material. The outer portion 15 is constructed in the form of an angle member 17 extending over the height of the wall and engages under and behind the lower edges of the two adjacent walls in the corner joint 11, for example the walls 8, 10 in Figure 2, with a foot portion formed thereon. In an upper head region 19, the angle member 17 is provided with a detent pin 20 aligned diagonally in relation to the angle of the corner joint 11 and projecting inwards.

The inner portion 16 comprises an extension 21 which engages, at the inside in the upper region, behind the adjacent walls (8, 10 in Figure 2) in the corner joint 11 and has a detent aperture 22 receiving the detent pin 20 with a locking action. The inner portion also comprises a plate 25 which is made integral with the extension and engages over the upper edges 23, 24 of the walls 8, 10 and which is equipped with downwardly projecting locking attachments 26, 27 at its underside.

The two locking attachments 26, of which only the front locking attachment 26 adjacent to the observer is illustrated in Figure 5, engage in locking apertures 28 in the upper edges 23, 24 of the walls 8, 10 at each side of the corner joint in the connected position of the portions 15, 16, and the locking attachment 27 engages behind the walls 8, 10 in the upper corner region, at their outside.

In order to make the connection, with walls 8, 10 adjoining one another in the corner joint 11, the inner portion 16 is first superimposed or inserted in a vertical downward movement, after which the foot portion 18 is first brought into its locking position at the inside behind the lower edges of the walls 8, 10 in the region of the corner joint 11 by an upward movement of the outer portion 15. After that, the outer and inner portions 15, 16 are joined together by a diagonally directed pivotal movement of the outer portion 15 during which the detent pin 20 enters the detent aperture 22 and mutually locates the portions 15, 16. The plate 25 of the inner portion 16 and the head portion 19 of the outer portion 15 adjoin one another positively along their upper marginal edges 29 and 30 in their connected

position.

In the ventilation device described with reference to the drawings there is less danger that during the upward pivoting of the flaps 5 out of their closed position into their open position, water, which has gathered in the form of accumulations on the surface of the outside of the flaps, may enter the interior of the building through the ventilation opening. Such phenomena can occur, in particular, in the case of ventilation devices with flaps, the covering wall of which consists of plastics material at its surface or is coated with plastics material, for example PVC or PC. Particularly in an initial period after the installation of the ventilation device, the adhesion of water leads to residues on the covering wall of the flaps in the form of drops of large area which may be thrown off into the building on a movement of the flaps into the open position. If such residues of water collect in the collecting channel and gutter, then even in the closed state of the flaps there is a certain risk of water entering the interior of the building because, despite a seal provided in the overlapping region between adjacent flaps, water can overflow inwards through capillary action or through the influence of wind pressure and then drip down into the building. The bearing region, in front of which the collecting channel and gutter discharges at the end, at the end wall of the flaps, is also in danger from the entry of water.

The ventilation device described with reference to the drawings is better secured against the overflow of water from the outside of the device into the ventilation opening. Thus, the deflector lips intercept accumulations of water running down or shooting down or drops of water thrown off when the flaps 5 are opened and drain them off to the outside of the ventilation device so that water does not enter the interior of the building either as a result of the collecting channel and gutter, which usually has only a small cross-sectional area of flow, overflowing or as a result of dripping action. The deflector lip 321 not only forms a deflector element for water and to some extent a preliminary collecting channel and gutter but also a deflector element for wind which prevents the build-up of wind pressure in the overlapping region between two flaps 5, which might drive water out of the collecting channel 221 and gutter towards the seal 201 in the overlapping region. Therefore, the ventilation device described with reference to the drawings offers increased imperviousness in the overlapping range even in the closed position of its flaps 5.

Claims

1. A ventilation device for building roofs, having a housing (2) which defines a ventilation opening and the walls (3, 4) of which are situated opposite one another, parallel in pairs, and having a plurality of like, lamellar flaps (5) which are pivotally movable about a parallel stationary hinge axis (61) by means of a drive device and which, in their closed position, overlap one another in a direction transverse to their hinge axes (61), engage over the walls (3, 4) of the housing (2) carrying them, at their upper edge, and completely cover the ventilation opening in the housing (2) and protect it against the entry of the weather, each flap (5) being provided, at its ends, with an end wall (271) extending downwards beyond the bottom wall of the flap (5) and comprising, in the region of its rear edge, which is adjacent to the hinge axis (61) and engaged over by the front marginal region of an adjacent flap (5), a collecting channel and gutter (221) for water, which is situated in a cross-sectional constriction, as well as a covering wall (171) adjoining this, the surface of which at first rises steeply in an initial portion (231) adjacent to the bottom of the collecting channel and gutter (221), changes over into a main portion (241) rising more gently and ends, beyond a culmination line (251), in an end portion (261) bent slightly downwards, characterised in that provided in the region of the initial portion (231) of the surface of the covering wall (171) is an upright deflector lip (321) which extends parallel to the collecting channel and gutter (221) and projects, with its ends (331) beyond the end walls (271) of the flap (5) in each case.

2. A device as claimed in claim 1, characterised in that the deflector lip (321) is disposed substantially in the middle of the initial portion (231) of the surface of the covering wall (171).

3. A device as claimed in claim 1 or 2, characterised in that the deflector lip (321) comprises a lower base region (341) aligned vertically in the closed position of its flap (5) and an upper marginal region (351) which extends towards the main portion (241) of the surface of the covering wall (171).

4. A device as claimed in any of claims 1 to 3, characterised in that provided at the outside of the end walls (271) of each flap (5) is a deflector rib (371) which, at the side adjacent to the hinge axis (61), extends obliquely downwards past the discharge mouth of the collecting channel and gutter (221).

5. A device as claimed in any preceding claim, having end walls (271) on the flaps (5) which extend parallel to one another in an initial portion (291) in the region of the rear edge of the flap (5), diverge in a main portion (301) following towards the front marginal edge (391) of the flap (5) and

change over into an end portion (311) with alignment parallel to one another, characterised in that the flap (5) is provided, in each of the front corner regions, with a deflector web (381) which is adjacent to the front marginal edge (391) of the covering wall (171) and the front marginal edge of the end wall (271) and extends downwards in the form of an arc along the front marginal edge (400) of the end wall (271).

6. A device as claimed in claim 5, characterised in that the deflector web (381) ends with its inner edge (401) a short distance in front of the initial portion of the end wall of an adjacent flap (5), which portion is associated with it in the closed position of the flaps (5).

7. A device as claimed in claim 6, characterised in that the spacing between the inner edge (401) and the opposite initial portion (291) of the end wall (271) of an adjacent flap (5) corresponds substantially to the height of the deflector rib (371).

8. A device as claimed in any preceding claim characterised in that the ends (331) of the deflector lip (321) project in a region in front of the front face of the deflector webs (381).

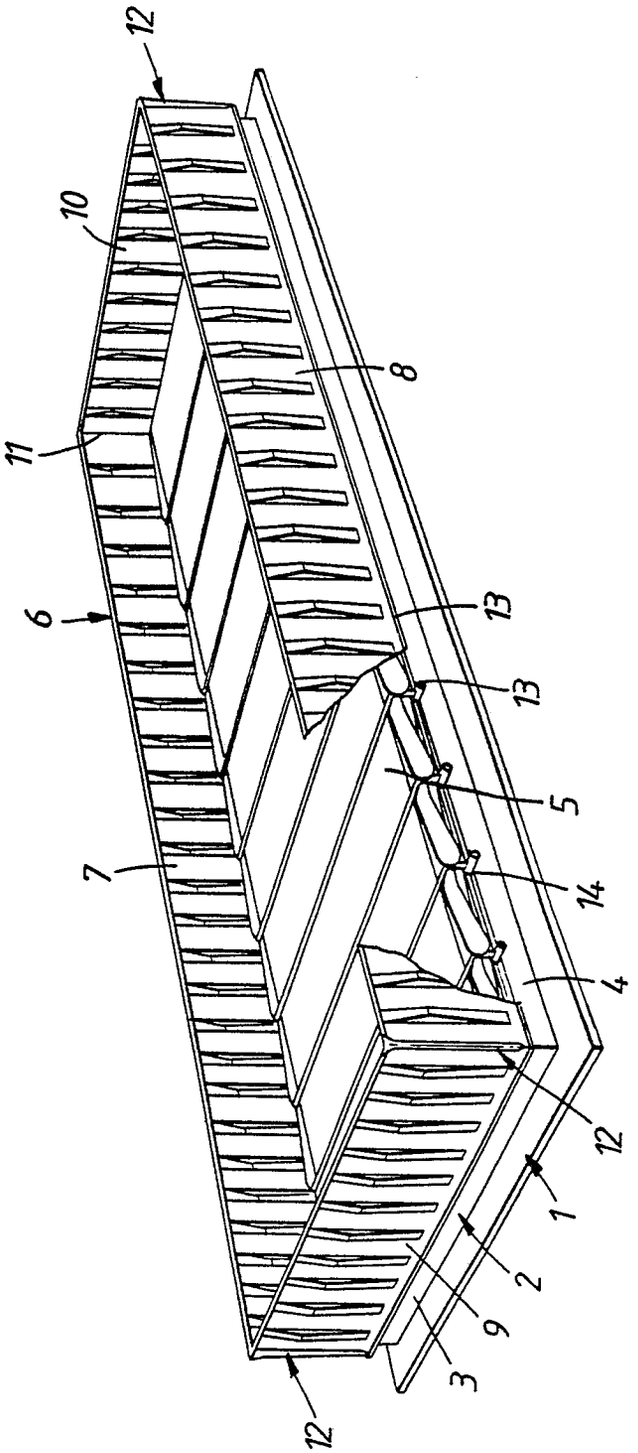

FIG. 1.

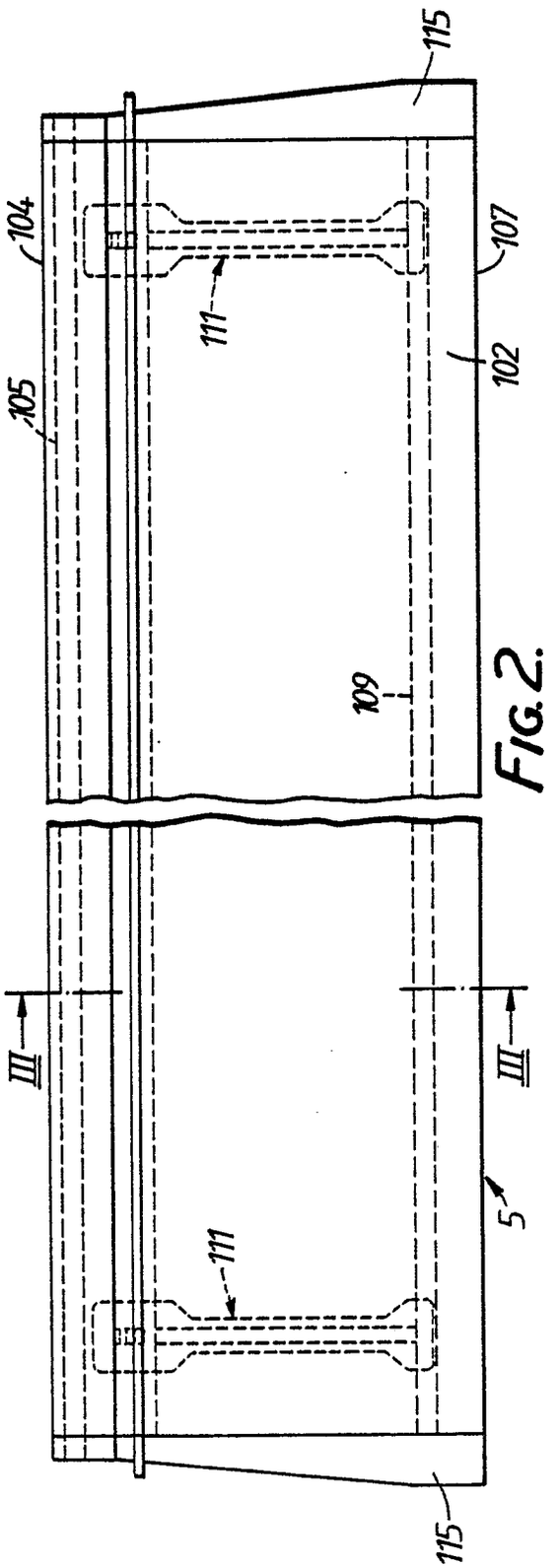

FIG.2.

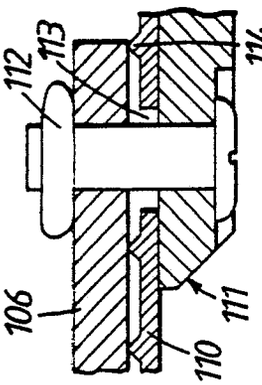

FIG.4.

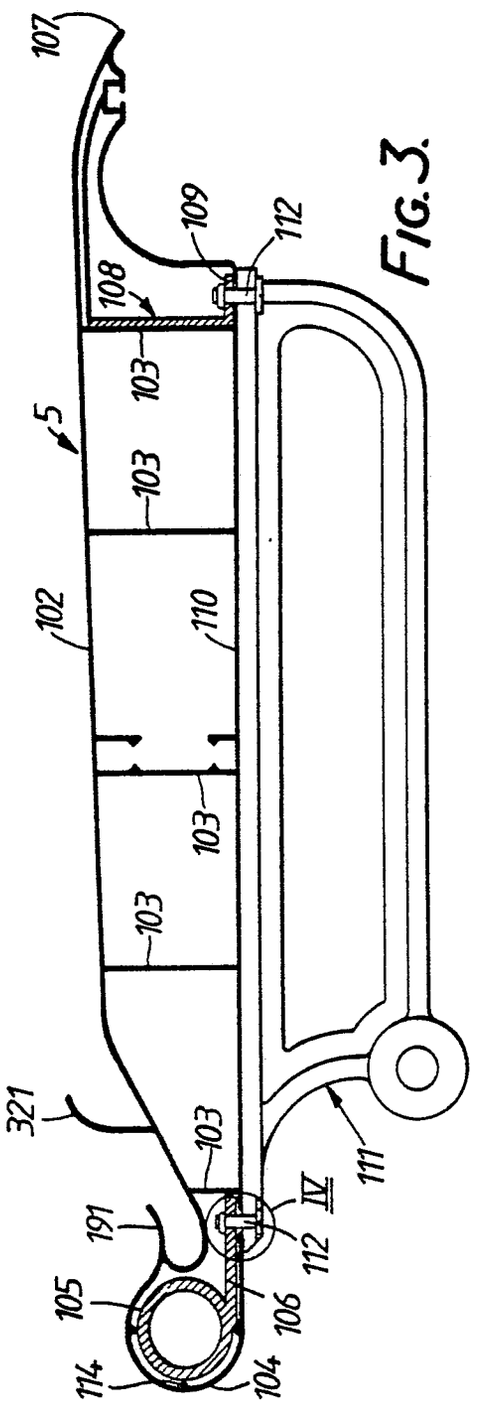

FIG.3.

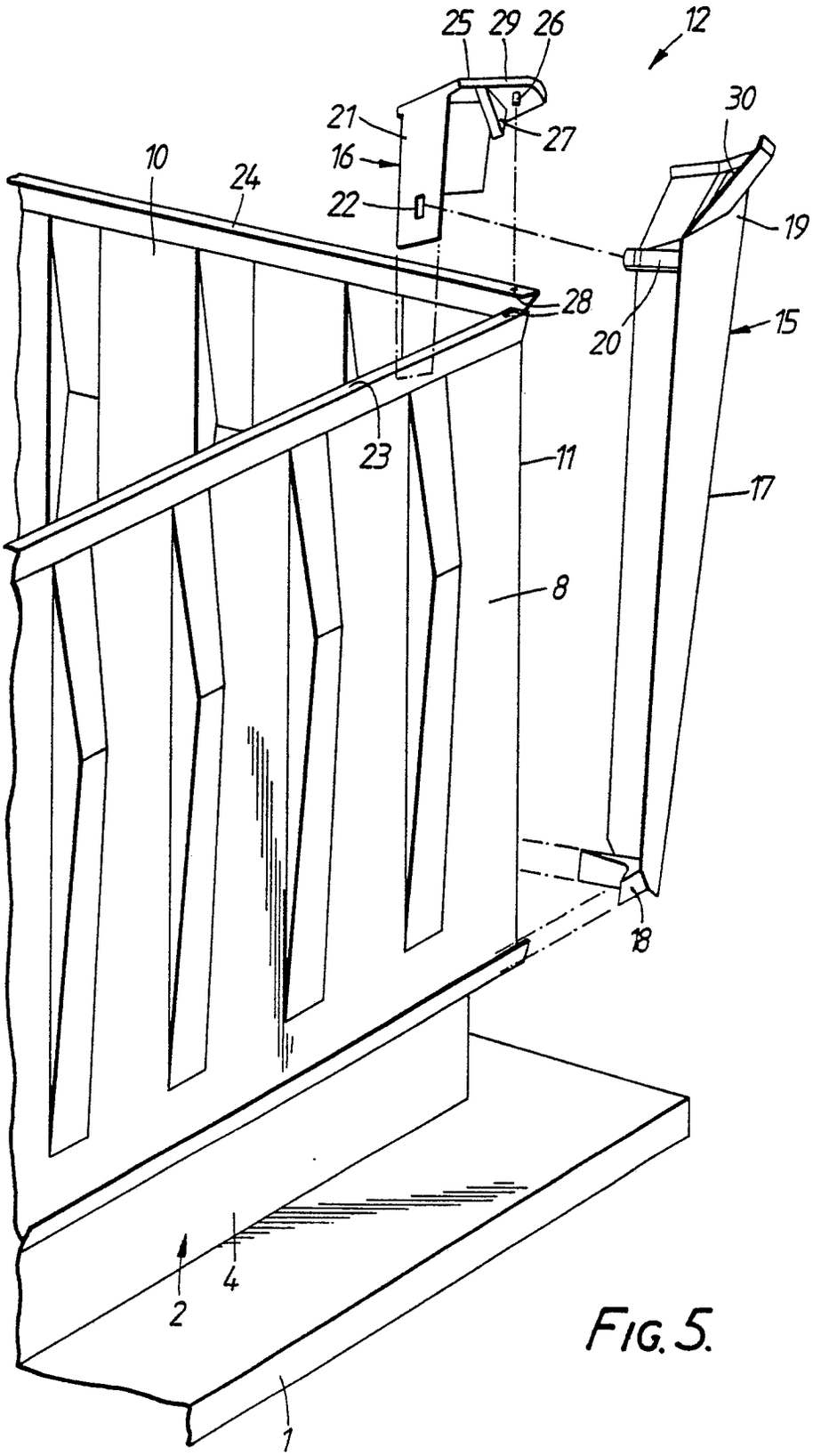

FIG. 5.

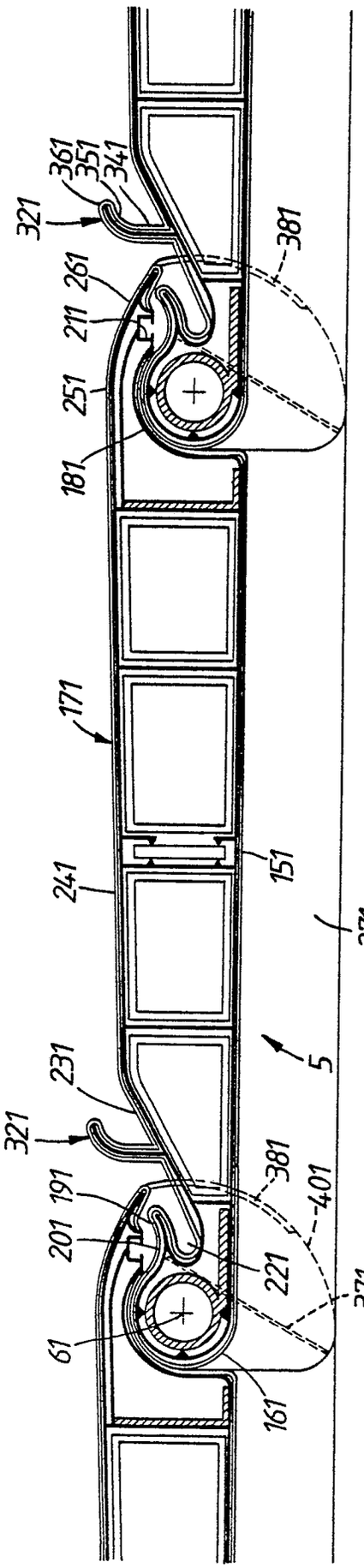
321
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FIG. 6.

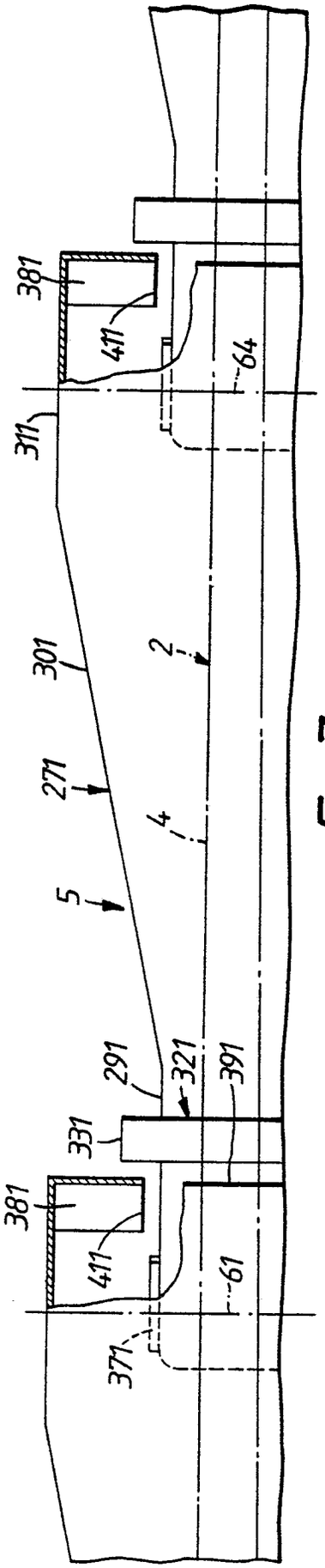
381
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FIG. 7.