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⑤④ **Ventilation device for building roofs.**

⑤⑦ The device has a rectangular housing (2) defining a ventilation opening controlled by flaps (5) pivotally movable about hinge axes (6) by means of a drive device (not shown). The flaps (5) each consist of an elongated, flat, extruded hollow-section body (102) of plastics material having a rear edge reinforcing tube (105) with a flange extension (106) at the bottom and an inserted reinforcing section (108) at its underside with two added bearing blocks (111) for a pivot drive. The pivot blocks (111) are disposed close to the ends of the hollow-section body (102) and are connected at their front end, to the reinforcing section (108) and at their rear end to the flange extension (106) to form a reinforced skeleton for the flap.

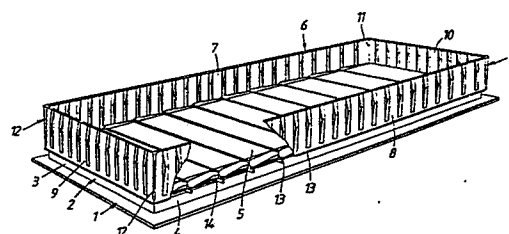


Fig. 1.

Description

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 lamellar flaps for weathering a ventilation opening, each consisting of an elongated, flat extruded hollow-section body of plastics material, particularly polycarbonate, which is provided, along its rear marginal edge with an inserted reinforcing tube having a flange extension at the bottom, along its front marginal edge with an inserted reinforcing section and at its underside with two added bearing blocks for a pivot drive.

It is one object of the invention to provide a ventilation device of the kind mentioned above in which the lamellar flaps offer a high degree of torsional rigidity even with great lengths and ensure that the reinforcing parts do not fall down into the building through the ventilation opening even if the plastics material melts in the event of fire.

The lamellar flaps provided in a ventilation device according to the invention solve this problem with the features of the characterising part of claim 1. With regard to further developments of the flaps, reference should be made to claims 2 to 5.

The uniting of the local reinforcements extending longitudinally in the hollow-section body, through the bearing blocks, to form a reinforcing skeleton in the form of a frame not only increases the torsional rigidity of the flaps but also establishes a bond between the reinforcing parts at the same time, which is retained even in the event of softening or melting of the plastics material.

A ventilation device according to the invention may have an outer housing having upright walls connected to one another in substantially right-angled corner joints.

Outer housings of this type are used as wind baffles and surround the ventilation opening defined by the main housing already mentioned. The vertical walls of the outer housing, generally situated opposite one another, parallel in pairs, usually consist of metal sheets which are provided with stiffening beads and which may be provided, at their upper and/or lower longitudinal edges, with folds as edge reinforcement and are connected to one another at their edges adjacent to one another in the corner joint. For such a connection, the outer housing walls may be provided, at their ends, with connecting flanges in the region of which the walls are riveted or screwed together.

The known corner-joint connections presuppose special formations of the walls in the region of their end edges and involve not inconsiderable expense in making the connections as well as corresponding expense if the housing has to be dismantled, for example in the event of inspection work.

It is a further object of the invention to provide an outer housing of the said type, the walls of which are formed from simple portions and can be rapidly and simply connected to one another in an undetachable manner.

In order to solve this problem, such an outer housing in a ventilation device according to the invention is characterised by the features of claims 6 to 11.

The separated connecting device, which can be assembled by locking engagement of its parts, fixes the end edges in the corner joint of adjacent walls securely in relation to one another and only requires a few movements of the hand, which can be executed without a tool, for its fitting. At the same time, the connecting device is economical, reliable and does not require any special precautions to be taken on the walls themselves.

Exemplary embodiments of the subject of the invention are 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 in 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 adjacent 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. The free marginal edge 361 of the deflector lip lies at least at the same height as the culmination line 251 of the surface of the covering wall 271 but may also project upwards beyond this and form the highest part of the flap 5 in the closed position.

Provided at the outside of the end walls 271 of each flap is a deflector rib 371 which, at the side adjacent 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 (6) by means of a drive device and which, in their closed position, overlap one another in a direction transverse to their hinge axes (6), 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 (27) extending downwards beyond the bottom wall (15) of the flap (5) wherein the lamellar flaps (5) each consist of an elongated, flat, extruded hollow-section body (102) of plastics material, particularly polycarbonate, which is provided, along its rear edge (104) with an inserted reinforcing tube (105) having a flange extension (106) at the bottom, along its front edge (107) with an inserted reinforcing section (108) and at its underside with two added bearing blocks (111) for a pivot drive, characterised in that the bearing blocks (111) are disposed close to the ends of the hollow-section body (102) and are connected, at their front end to the reinforcing section (108, 109) and at their rear end to the flange extension (106) of the reinforcing tube (105) to form a reinforcing skeleton in the form of a frame.

2. A device as claimed in claim 1, characterised in that the connecting members (112) for the reinforcing parts (105, 106, 108, 109, 111) 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).

3. A device as claimed in claim 2, characterised in that the reinforcing parts (105, 106, 108, 109) are supported in their compartments in the hollow-section body (102) by means of supporting ribs (114) which are formed at the inside of the compartments and the apices of which predetermine a substantially linear supporting engagement.

4. A device as claimed in any of claims 1 to 3, characterised in that blind rivets (112) are provided as connecting members.

5. A closing plate as claimed in any preceding claim, characterised in that the parts (105, 106, 108, 109, 111) of the reinforcing skeleton consist of aluminium.

6. A device as claimed in any preceding claim characterised by an outer housing having upright walls (7,8; 9,10) connected to one another in substantially right-angled corner joints (11), and a connecting device (12) consisting of an outer portion (15) and of an inner portion (16) which can be brought into locking engagement with this, for the wall connection.

7. A device as claimed in claim 6, characterised in that the portions (15, 16) of the connecting device (12) are injection moulded from plastics material.

8. A device as claimed in claim 6 or 7, characterised in that the outer portion (15) is constructed in the form of an angle member (17) which extends over the height of the wall and engages with a locking action under and behind the lower edges of the two adjacent walls (for example 8, 10) in the corner joint (11) in a hook-like manner with a foot portion (18) formed thereon and which is provided, in a head region, with a detent pin (20) aligned diagonally in relation to the corner joint (11) and projecting inwards.

9. A device as claimed in claims 6, 7 or 8 characterised in that the inner portion (16) comprises an extension (21) which engages behind the adjacent walls (for example 8, 10) in the corner joint (11) at the inside in the upper region and has a detent aperture (22) receiving the detent pin (20) with a locking action and that the inner portion comprises a plate (25) engaging over the upper edges (for example 23, 24) of the walls (for example 8, 10) and having locking attachments (26, 27) projecting downwards.

10. A device as claimed in claim 9, characterised in that two locking attachments (26) engage in locking apertures (28) in the upper edges (for example 23, 24) of the walls (for example 8, 10) at each side of the corner joint (11) in the connected position of the portions (15, 16).

11. A device as claimed in claim 9 or 10, characterised in that a further locking attachment (27) engages behind the walls (for example 8, 10) in the upper corner region at the outside.

12. A device as claimed in any of claims 8 to 11, characterised in that the plate (25) of the inner portion (16) and the head portion (19) of the outer portion (15) adjoin one another positively along edges (29, 30) adjacent to one another, in the connected position.

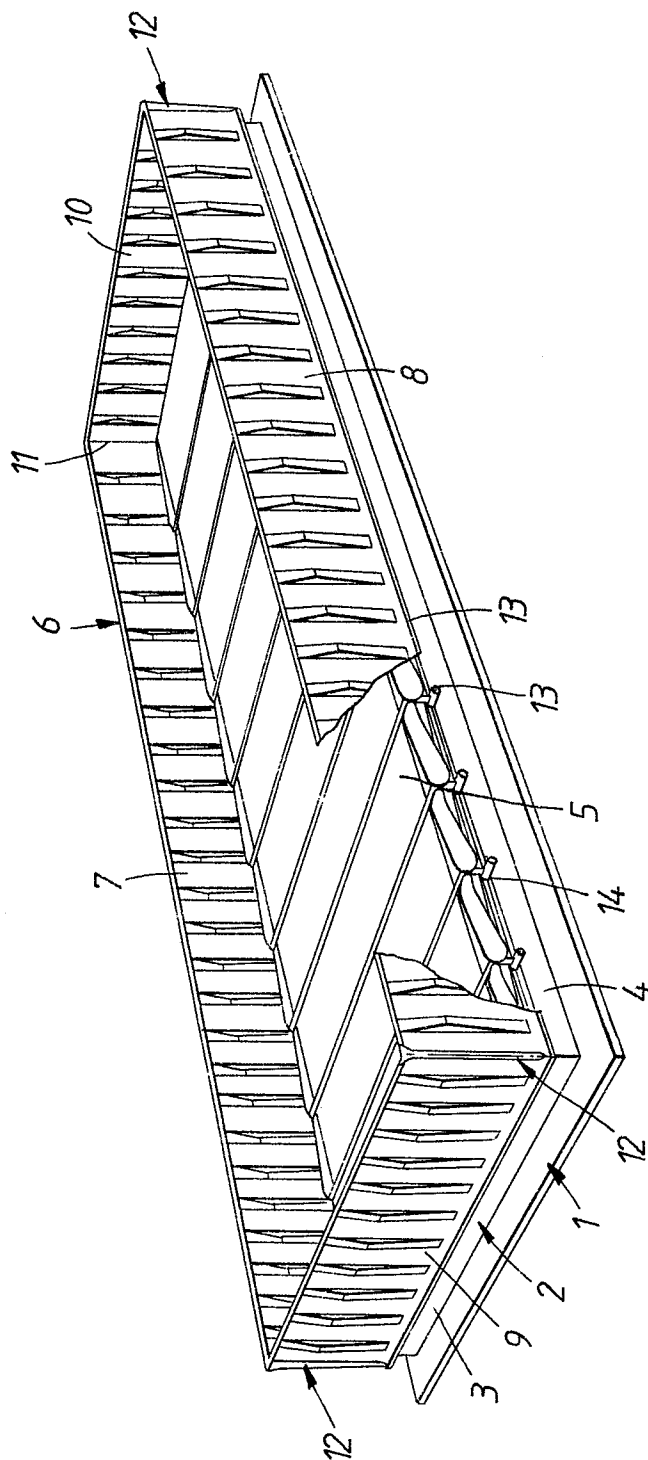
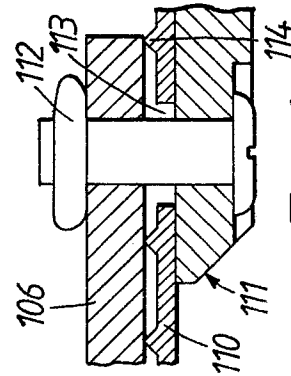
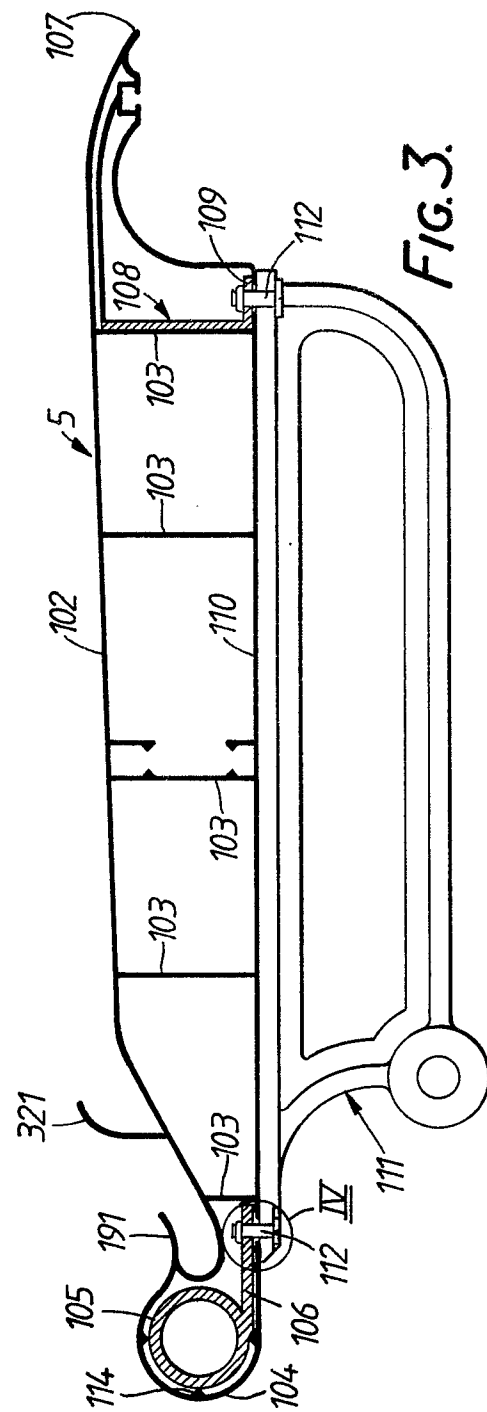
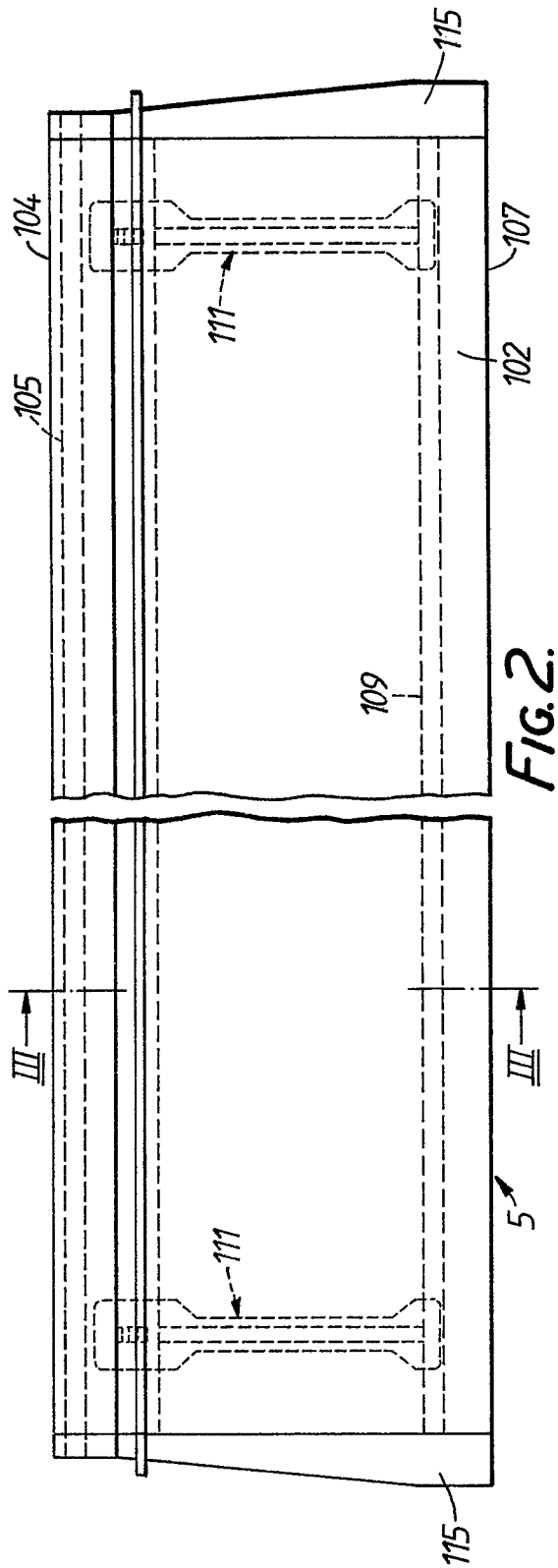
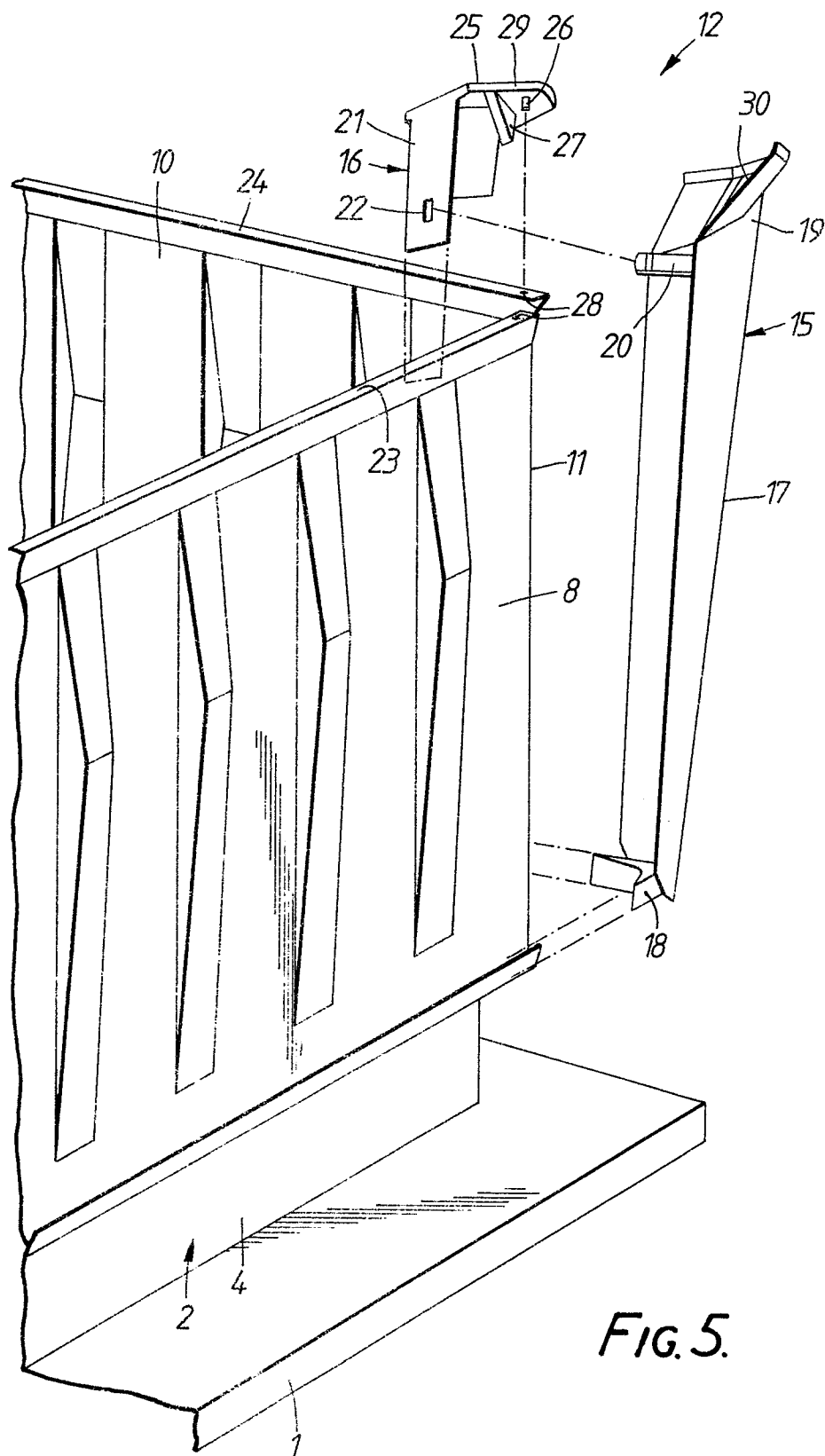


FIG. 1.





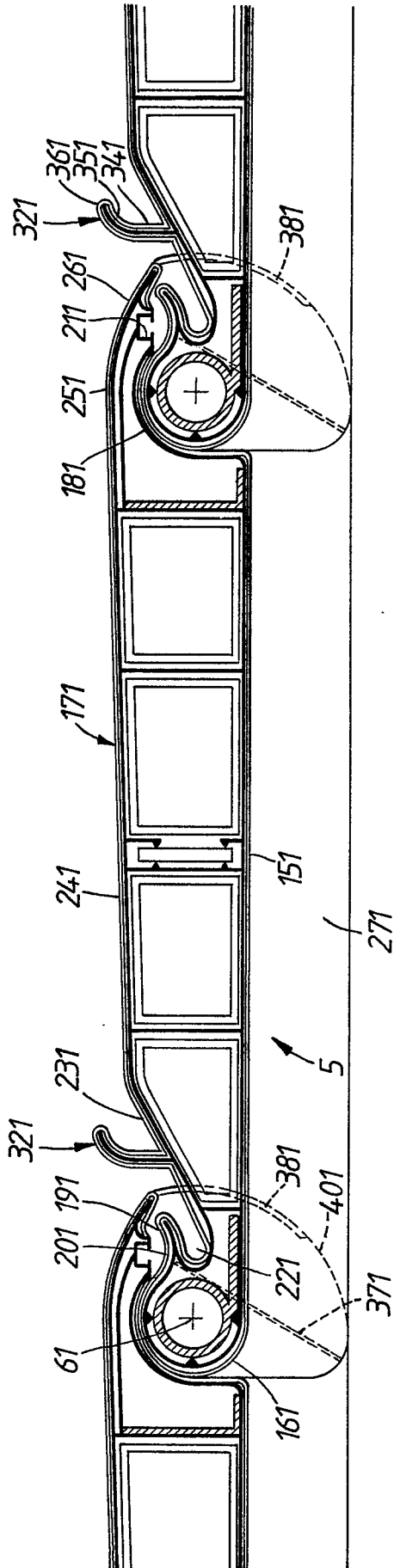


FIG. 6.

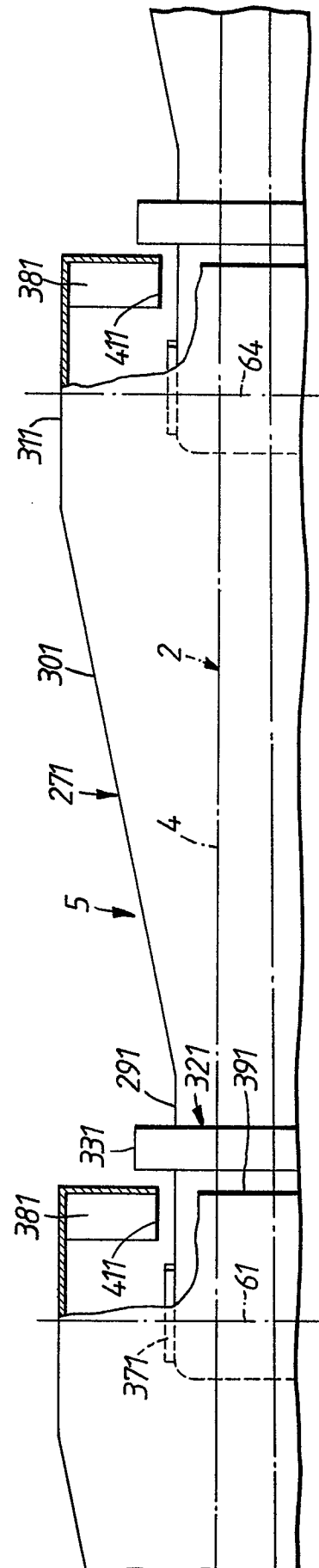


FIG. 7.