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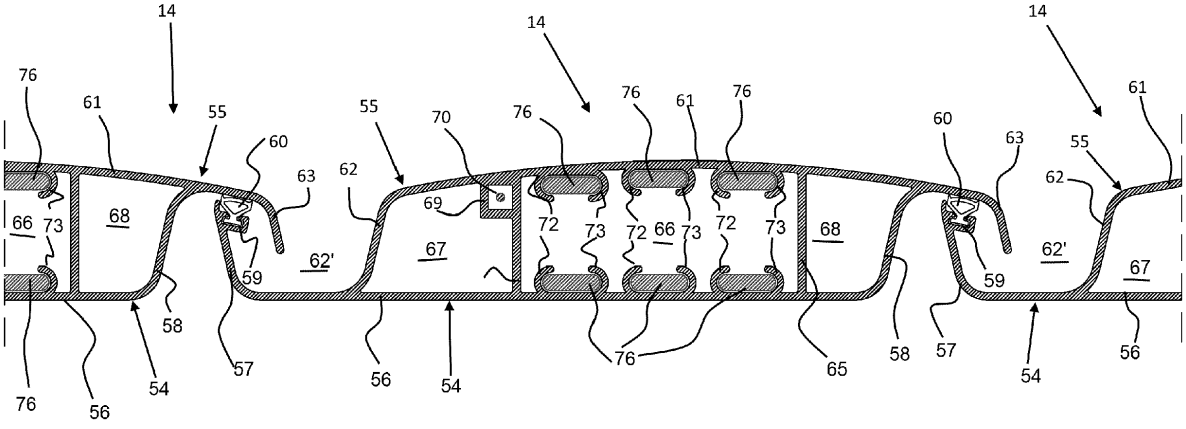
(54) **COVERING STRUCTURE FOR EXTERNAL ENVIRONMENTS PROVIDED WITH A DEVICE FOR REGULATING THE SUNLIGHT PENETRATION INTO THE SAME EXTERNAL ENVIRONMENTS**

(57) Covering structure (10) for external environments provided with a device for regulating the sunlight penetration into the same external environments, adapted to be placed onto terraces, gardens, green spaces or paved areas or the like, such as to create a shady area, or by regulating the sunlight penetration into the same area, and by protecting this latter from bad weather such rain, snow, hail, ice and the like, comprising a peripheral frame (11) with quadrangular shape or other suitable shape, arranged preferably horizontally, and supported at its vertices by at least four columns (12) and provided into its interior with a free area (13), in which a set of adjustable vanes (14) is inserted and fixed by hollow bodies (77), which vanes are arranged parallel and equally spaced away from each other, both longitudinally and transversally to the frame (11), depending on the needs of the user with the possibility to rotate around its own transversal axis, comprising heating means (76), connected to external power supplies, and applied to the frame (11) and to the vanes (14), and that are adapted to heat these latter for melting in a short time any possible deposit of snow, hail, ice or the like, and that said adjustable vanes (14) in the closed position thereof form a lower rectilinear surface and an upper undulated surface.

FIG. 12



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Description

[0001] The invention relates to a covering structure for external environments provided with a device for regulating the sunlight penetration into the same external environments, adapted to be placed onto terraces, gardens, green spaces or paved areas or the like, such as to create a shady area, or by regulating the sunlight penetration into the same area, and by protecting this latter from bad weather such rain, snow, hail, ice and the like.

[0002] At the present time, there are used pergolas for external environments provided on their upper part with adjustable vanes assembled in series parallel to each other, each centrally hinged on to the support frame of the same pergola, in such a way that if they are arranged horizontally they come into contact to each other, thereby creating a closed uniform flat surface, and in such a way that if they are rotated simultaneously they are spaced away to each other by reaching an inclined or vertical position, thereby creating some openings wherein the rays of sun may penetrate.

[0003] Such pergolas with adjustable vanes are sized in such a way that, when the vanes are arranged horizontally, they may support a certain load of weight due to the snow laid down above it or to hail, but then they must wait that such a snow or hail melts, in part by evaporating and in part by transforming it into water conveyed on to the ground, or by rotating the vanes in the vertical position thereof and by letting to drop some snow and the hailstone down into the underlying area, with subsequent need to drain this latter.

[0004] Therefore, such pergolas with adjustable vanes, in addition to the problem to drain the underlying area or to wait a long time in such a way that the snow or the hail or the like evaporates or melts so as to be able to rotate the vanes in the vertical position thereof and let the sunlight to penetrate therein, has the problems deriving from the formation of ice thereon, that can reduce or annul its rotating operation, and also it cool down the underlying environment by making it badly habitable.

[0005] The object of the present invention is to eliminate the above-described disadvantages by means of use of a covering structure for external environments provided with a device for regulating the sunlight penetration into the same external environments, that allows to eliminate quickly the snow, the hail, ice or the like from the upper surface when is closed and to maintain an habitable temperature in to the underlying repaired area even during the coldest periods.

[0006] The invention will be understood better from the following description, given by way of a not limitative example only and with reference to the accompanying drawings, in which :

- Fig. 1 shows a perspective view of the covering structure, according to the invention ;
- Fig. 2 shows a plan view of the structure of Fig. 1 in the closed position thereof;
- Fig. 3 shows a transversally cutaway view of the structure of Fig. 2 in a first embodiment thereof;
- Fig. 4 shows a longitudinally cutaway view of the structure of Fig. 2 ;
- Fig. 5 shows a view of the cross section of Fig. 4 in a first working position thereof;
- Fig. 6 shows a view of the cross section of Fig. 4 in a second working position thereof;
- Fig. 7 shows a view of some component parts of the structure of Fig. 3 ;
- Fig. 8a shows a front view of an additional component part of the covering structure ;
- Fig. 8b shows a transversally cutaway view of the component of Fig. 8a ;
- Fig. 8c shows a longitudinally cutaway view of the component of Fig. 8a ;
- Fig. 9 shows a view of some enlarged component parts of the structure of Fig. 3 ;
- Fig. 10 shows a transversally cutaway view of a second embodiment of the structure of Fig. 2 ;
- Fig. 11 shows a front cutaway view of some enlarged component parts of the structure of Fig. 10 ;
- Fig. 12 shows a side cutaway view of some component parts of the covering structure of Fig. 1 ;
- Fig. 13 shows a side cutaway view of additional component parts of the structure of Fig. 10.

[0007] In the above Figures, it is illustrated a covering structure for external environments provided with a device for regulating the sunlight penetration into the same external environments, adapted to be placed onto terraces, gardens, green spaces or paved areas or the like, such as to create a shady area, or by regulating the sunlight penetration into the same area, and by protecting this latter from bad weather such rain, snow, hail, ice and the like, and by maintaining into the same underlying area an habitable temperature even during the coldest periods.

[0008] As it is noted in the Figs. 1 and 2, the covering structure 10 for external environments is mainly constituted by a peripheral frame 11 with quadrangular shape or other suitable shape, arranged preferably horizontally, and supported by at least four columns 12, arranged on the ground and to the vertices of the same frame 11. Such peripheral frame 11 has into its interior a free area 13 in which it is inserted a set of adjustable vanes 14, shaped and movable in the ways that it will be described hereinafter.

[0009] Said frame 11 is mainly constituted by two crossbeams 15, 16 and two stanchions 17, 18 joined to each other at their end portions, of which each crossbeam and each stanchion are composed by two section bars 19, 20 each pair having the same shape and the same length and being joined to each other the one upon the other one, as it is shown in Fig. 3.

[0010] Whereas said second lower section bar 20 is adapted to act as gutter of the structure 10, for collecting and draining the rain water or the melting snow and it is

connected to a drain plant per se known (not shown), the first upper section bar 19 is adapted to support said adjustable vanes 14, which are arranged parallel and equally spaced away from each other, both longitudinally and transversally to the frame 11, depending on the user's needs.

[0011] As it is shown in Fig. 7, in a first embodiment of said frame 11, the upper section bar 19 is constituted by a first central horizontal parallelepiped hollow body 21, to which it is joined on the upper part of a vertical face 22, turned toward the free area 13 of the frame 11, a second horizontal parallelepiped hollow body 23 having a height smaller than the first body and provided for its entire length with a rectilinear opening 24, whereas onto the opposed vertical face 25 there are joined for its entire length two horizontal wings 26 and 27, of which the first wing has a depth greater than that of the second wing, and which are respectively arranged at the upper end portion 28 and at the lower end portion 29 of the section bar 19 and projected outward the frame 11.

[0012] The lower section bar 20 is mainly L-shaped, with a first vertical flat face 30 joined in its lower part and orthogonally to a second horizontal flat face 31 with the respective end portions thereof, whereas this second horizontal face 31 is orthogonally joined at the other end portion thereof to a third vertical flat face 32 having size smaller than the first face 30.

[0013] Said first flat vertical face 30 is provided almost at its middle height and for its entire length, with a small horizontal wing 33 turned toward the free area 13, whereas in the lower part for its entire length it is provided with two curved wings 34 and 35 spaced away ad arranged symmetrically to each other with their concave profile.

[0014] Said second horizontal flat face 31 and third vertical flat face 32 are respectively provided for the entire length thereof with a pair of curved wings 36, 37 and 38, 39 spaced away ad arranged symmetrically to each other with their concave profile.

[0015] The second section bar 20 is joined externally with the first section bar 19, in such a way that the two faces 25 and 30 are arranged parallel to each other, and that the wing 29 is arranged with its lower part into contact with the wing 27, and that the upper end portion 40 of the vertical face 30 is arranged with its lower part into contact with the wing 26.

[0016] In a second embodiment of said frame 11, as it is shown in Figs. 10, 11 and 13, the lower section bar 41 is identical to the lower section bar 20 previously described, whereas the upper section bar 42, that corresponds to the upper section bar 19, is constituted by a first central horizontal parallelepiped hollow body 43, to which it is joined on to a vertical face 44 turned toward the free area 13 of the frame 11, a second horizontal parallelepiped hollow body 45, having a height smaller than the first one, and provided with an opening 46 on to the vertical wall 46' opposed to the wall 44, and moreover, in the upper and lower part of said hollow body 45 the face 44 is provided with two additional horizontal parallelepiped bodies 47 and 48 provided with openings onto both the wall 44 and the opposed one, whereas onto the opposed vertical face 49 there are joined, for its entire length, two horizontal wings 50 and 52, of which the first wing has a depth greater than that of the second wing, and which are respectively arranged in correspondence of the upper perimeter of the cylinder 45 and the lower end portion 53 of the section bar 42 and which are turned outward the frame 11.

[0017] The second section bar 41 is joined externally with the first section bar 42, in such a way that the two faces 49 and 30 are arranged parallel to each other, and that the wing 29 is arranged with its lower part into contact with the wing 51, and that the upper end portion 40 of the vertical face 30 is arranged with its lower part into contact with the wing 50.

[0018] Into the hollow bodies 23 or 45, depending on the used embodiment, there are inserted into each one in sequence, into contact and in a locked manner some bodies 77 equal to each other (see Figs. 8a-8c), preferably made of polytetrafluoroethylene or similar material, each constituted by a parallelepiped body that is housed perfectly into the hollow bodies 23 or 45, and that it is provided with a central horizontal blind hole 78, that in position coincide axially with the opening 24 or the opening 46, respectively.

[0019] As it is shown in Fig. 12, the adjustable vanes 14 are each constituted by a section bar 14 made of metal or other suitable stiff material and composed by two shells 54 and 55 joined to each other, of which the first lower shell 54 is shaped with a horizontal flat face 56, the end portions 57 and 58 of which are curved upward, the first end portion 57 finishes with an overturned T-shaped groove 59 for the entire width thereof, and is adapted to house a gasket 60, the second end portion 58 is connected with the lower part of the other shell 55, which in turn is shaped with a curvilinear face 61, convex upward, with the two end portions 62 and 63 thereof turned downward, the first end portion 62 of which is joined to the upper part of the face 56 in the part in which there is provided the end portion 57, thereby creating a small channel 62' for the entire width of the vane 14, whereas the second end portion 63 of which is free at its end portion.

[0020] Two joining vertical walls 64 and 65 are provided spaced away to each other and interposed between the two shells 54 and 55, thereby creating a central hollow area 66, and two side hollow chambers 67 and 68, the first chamber 67 of which placed near the end portion 57 and the second chamber 68 of which placed near the end portion 58. Moreover, into the first chamber 67 there is provided a cavity 69, adjacent and parallel to the vertical wall 64, into which a lengthened metallic body 70 is integrally inserted, which is projected outward with a cylinder shaped portion 71, whereas into the central cavity 66, in the lower and upper part of its entire length, it is provided at least a pair of curved wings 72 and 73, which are spaced away and arranged symmetrical to each other

with their concave profile.

[0021] The so constituted adjustable vanes 14 are arranged into the frame 11, with their own cylindrical bodies 71 freely inserted into the holes 78, in such a way that such vanes 14 are arranged in the horizontal position (see Fig. 4), in which they are arranged the one into contact with the other one, in such a way that the gasket 60 of a first vane 14 abuts the lower part of the end portion 63 of a second vane 14 adjacent to such end portion, and that the end portion 63 of the first vane 14 abuts with its lower portion the gasket 60 of a third vane 14 adjacent to such end portion, in such a way that a uniform and sealed covering 74 is formed.

[0022] The vanes 14, being rotated simultaneously manually or mechanically with per se known means around the axis of their cylindrical bodies 71, move away to each other in such a way that their adjacent end portions move away to each other, thereby creating some openings 75, with a desired width, by passing through intermediate positions thereof as for example a vertical position (see Fig. 5), up to a maximum width in which the vanes 14 are in a position almost overturned (see Fig. 6), so that the sun rays may penetrate into the underlying area of the structure 10, with the desired quantity and direction.

[0023] In to said pairs of curved wings 34, 35 and 36, 37 and 38, 39 and 72, 73 there are inserted and secured some heating means 76, preferably constituted by electrical resistances 76, connected to at least an electric energy power as for example the domestic electrical supply line, a storage battery or some photovoltaic panels, and adapted to heat said vanes 14 and said gutters 20 or 41, in such a way that, in the case of snowfalls, hailstorm or the formation of ice while the vanes 14 are rotated in the horizontal position thereof, they melt thorough heating for conduction such snow, hail or ice in a short time, which by transforming itself into water, thanks to the curved convex shape of the shell 55, let such water to drain quickly into the small channels 62' that in turn convey it onto the underlying gutter 20 or 41, that being heated will provide in turn to transform the last eventually solid parts for then unloading them in the environment.

[0024] In the second embodiment of the frame 11, it is also possible to connect the hollow parallelepiped 43 to an external pressurized hot air source, in such a way that said hot air is conveyed onto the upper and lower surfaces of the vanes 14 in the direction A, in such a way to shorten further the times for melting the snow, hail or ice deposited onto the vanes 14 arranged horizontally.

[0025] With such solution it is possible therefore to obtain a covering sunscreen structure with adjustable vanes, that allows to let to penetrate into the underlying are the desired quantity of sun rays, and that in case of rain, snow, hail or the like provides an adequate covering of the same area, providing also to eliminate in a very short time the snow, hail or ice, being so able to let to penetrate newly the desired quantity of sun rays, once the perturbation is ended, so without the need to drain the underlying area.

Claims

1. Covering structure (10) for external environments provided with a device for regulating the sunlight penetration into the same external environments, adapted to be placed onto terraces, gardens, green spaces or paved areas or the like, such as to create a shady area, or by regulating the sunlight penetration into the same area, and by protecting this latter from bad weather such rain, snow, hail, ice and the like, comprising a peripheral frame (11) with quadrangular shape or other suitable shape, arranged preferably horizontally, and supported at its vertices by at least four columns (12) and provided into its interior with a free area (13), in which a set of adjustable vanes (14) is inserted and fixed by hollow bodies (77), which vanes are arranged parallel and equally spaced away from each other, both longitudinally and transversally to the frame (11), depending on the needs of the user with the possibility to rotate around its own transversal axis, **characterized in that** heating means (76), connected to external power supplies, are applied to the frame (11) and to the vanes (14), and are adapted to heat these latter for melting in a short time any possible deposit of snow, hail, ice or the like, and **that** said adjustable vanes (14) in the closed position thereof form a lower rectilinear surface and an upper undulated surface.

2. Covering structure according to claim 1, **characterized in that** the adjustable vanes (14) are each constituted by a section bar (14) made of metal or other suitable stiff material and composed by two shells (54 and 55) joined to each other, of which the first lower shell (54) is shaped with a horizontal flat face (56) the end portions (57 and 58) of which are curved upward, the first end portion (57) finishing with an overturned T-shaped groove (59) for the entire width thereof, and adapted to house a gasket (60), the second end portion (58) being connected with the lower part of the other shell (55), which in turn is shaped with a curvilinear face (61), convex upward, with the two end portions (62 and 63) thereof turned downward, the first end portion (62) of which is joined to the upper part of the face (56) in the part in which there is provided the end portion (57), thereby creating a small channel (62') for the entire width of the vane (14), whereas the second end portion (63) of which is free at its end portion, and two joining vertical walls (64 and 65) being provided spaced away to each other and interposed between the two shells (54 and 55), thereby creating a central hollow area (66), and two side hollow chambers (67 and 68), the first chamber (67) of which being placed near the end portion (57) and the second chamber (68) of

which being placed near the end portion (58), into the first chamber (67) there being provided a cavity (69), adjacent and parallel to the vertical wall (64), into which a lengthened metallic body (70) is integrally inserted, which is projected outward with a cylinder shaped portion (71), whereas into the central cavity (66), in the lower and upper part of its entire length, there are provided at least a pair of curved wings (72 and 73), which are spaced away and arranged symmetrical to each other with their concave profile, the so constituted adjustable vanes (14) being arranged into the frame (11), with their own cylindrical bodies (71) freely inserted into the bodies (77), in such a way that such vanes (14) are arranged in the horizontal position, in which they are arranged the one into contact with the other one, in such a way that the gasket (60) of a first vane (14) abuts the lower part of the end portion (63) of a second vane (14) adjacent to such end portion, and that the end portion (63) of the first vane (14) abuts with its lower portion the gasket (60) of a third vane (14) adjacent to such end portion, in such a way that a uniform, and sealed covering (74) is formed.

3. Covering structure according to claim 2, **characterized in that** said frame (11) is mainly constituted by two crossbeams (15, 16) and two stanchions (17, 18) joined to each other at their end portions, of which each crossbeam and each stanchion are composed by two section bars (19, 20 ; 42, 41) each pair having the same shape and the same length and they being joined to each other the one upon the other one, said second lower section bar (20, 41) being adapted to act as gutter of the structure (10), and said first upper section bar (19, 42) being adapted to support said adjustable vanes (14).

4. Covering structure according to claim 3, **characterized in that** the upper section bar (19) of said frame (11) is constituted by a first central horizontal parallelepiped hollow body (21), to which there is joined, on the upper part of a vertical face (22) turned toward the free area (13) of the frame (11), a second horizontal parallelepiped hollow body (23) having an height smaller than the first body and provided for its entire length with a rectilinear opening (24), whereas onto the opposed vertical face (25) there are joined for its entire length two horizontal wings (26 and 27), of which the first wing has a depth greater than the second wing, and which are respectively arranged at the upper end portion (28) and at the lower end portion (29) of the section bar (19) and projected outward the frame (11).

5. Covering structure according to claim 3, **characterized in that** the upper section bar (42) is constituted by a first central horizontal parallelepiped hollow body (43), to which there is joined on a vertical face (44) turned toward the free area (13) of the frame (11), a second horizontal parallelepiped hollow body (45), having an height smaller than the first one, and provided with an opening (46) on to the vertical wall (46') opposed to the wall (44) and moreover, in the upper and lower part of said hollow body (45) the face (44) is provided with two additional horizontal parallelepiped bodies (47 and 48) provided with openings onto both the wall (44) and the opposed one, whereas onto the opposed vertical face (49) there are joined for its entire length two horizontal wings (50 and 52), of which the first wing has a depth greater than the second wing, and which are respectively arranged in correspondence of the upper perimeter of the cylinder (45) and the lower end portion (53) of the section bar (42) and which are turned outward the frame (11).

6. Covering structure according to the previous claims, **characterized in that** the lower section bar (20, 41) is mainly L-shaped, with a first vertical flat face (30) joined in its lower part and orthogonally to a second horizontal flat face (31) with the respective end portions thereof, whereas this second horizontal flat face (31) is orthogonally joined at the other end portion thereof to a third vertical flat face (32) having size smaller than the first face (30), this latter being provided, almost at its middle height and for its entire length, with a small horizontal wing (33) turned toward the free area (13), whereas in the lower part for its entire length it is provided with two curved wings (34 and 35) spaced away ad arranged symmetrically to each other with their concave profile, said second horizontal flat face (31) and third vertical flat face (32) being respectively provided for the entire length thereof with a pair of curved wings (36, 37 and 38, 39) spaced away ad arranged symmetrically to each other with their concave profile, said second section bar (20, 41) being joined externally with the first section bar (19, 42), in such a way that the two faces (25, 49 and 30) are arranged parallel to each other, and that the wing (29) is arranged with its lower part into contact with the wing (27, 51) and that the upper end portion (40) of the vertical face (30) is arranged with its lower part into contact with the wing (26, 50).

7. Covering structure according to claim 6, **characterized in that** said bodies (77) are equal to each other, preferably made of polytetrafluoroethylene or similar material, each constituted by a parallelepiped body (77) provided with a central horizontal blind hole (78), each of such bodies (77) being inserted in sequence, into contact and in a locked manner with each other, in the interior of the hollow bodies (23, 45), in such a way that said central holes (78) coincide axially with the rectilinear openings (24, 46) of said bodies (23, 45), and that there are inserted into them the

bodies (71) of the vanes (14), in such a way that these latter may rotate freely therein.

8. Covering structure according to the previous claims, **characterized in that** into said pairs of curved wings (34, 35 and 36, 37 and 38, 39 and 72, 73) there inserted and secured said heating means (76), preferably constituted by electrical resistances (76), connected to at least an electric energy power as for example the domestic electrical supply line, a storage battery or few photovoltaic panels, and adapted to heat said vanes (14) and said gutters (20, 41).

9. Covering structure according to claim 8, **characterized in that** to said hollow parallelepiped (43) it is joined an external pressurized hot air source, in such a way that said hot air is conveyed onto the upper and lower surfaces of the vanes (14) in the direction A, in such a way to shorten further the times for melting the snow, hail or ice deposited onto the vanes (14) arranged horizontally.

FIG. 1

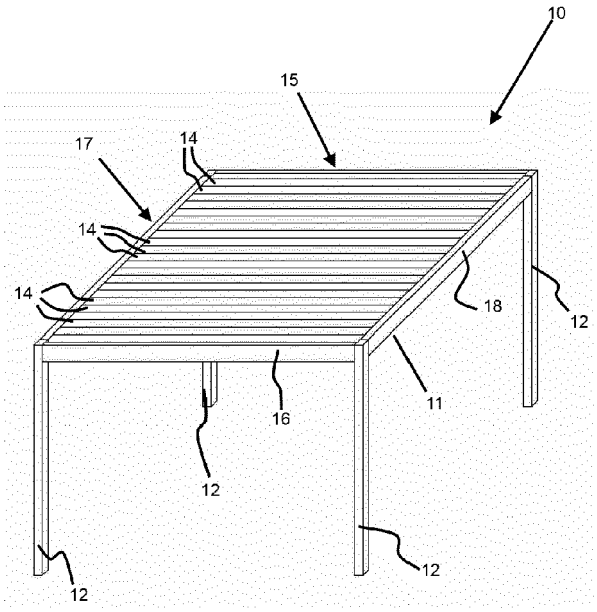


FIG. 3

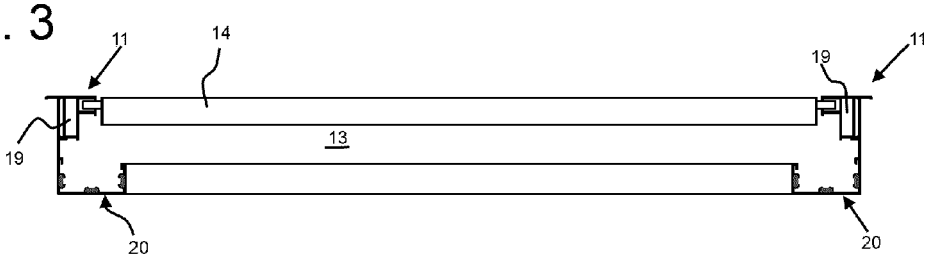
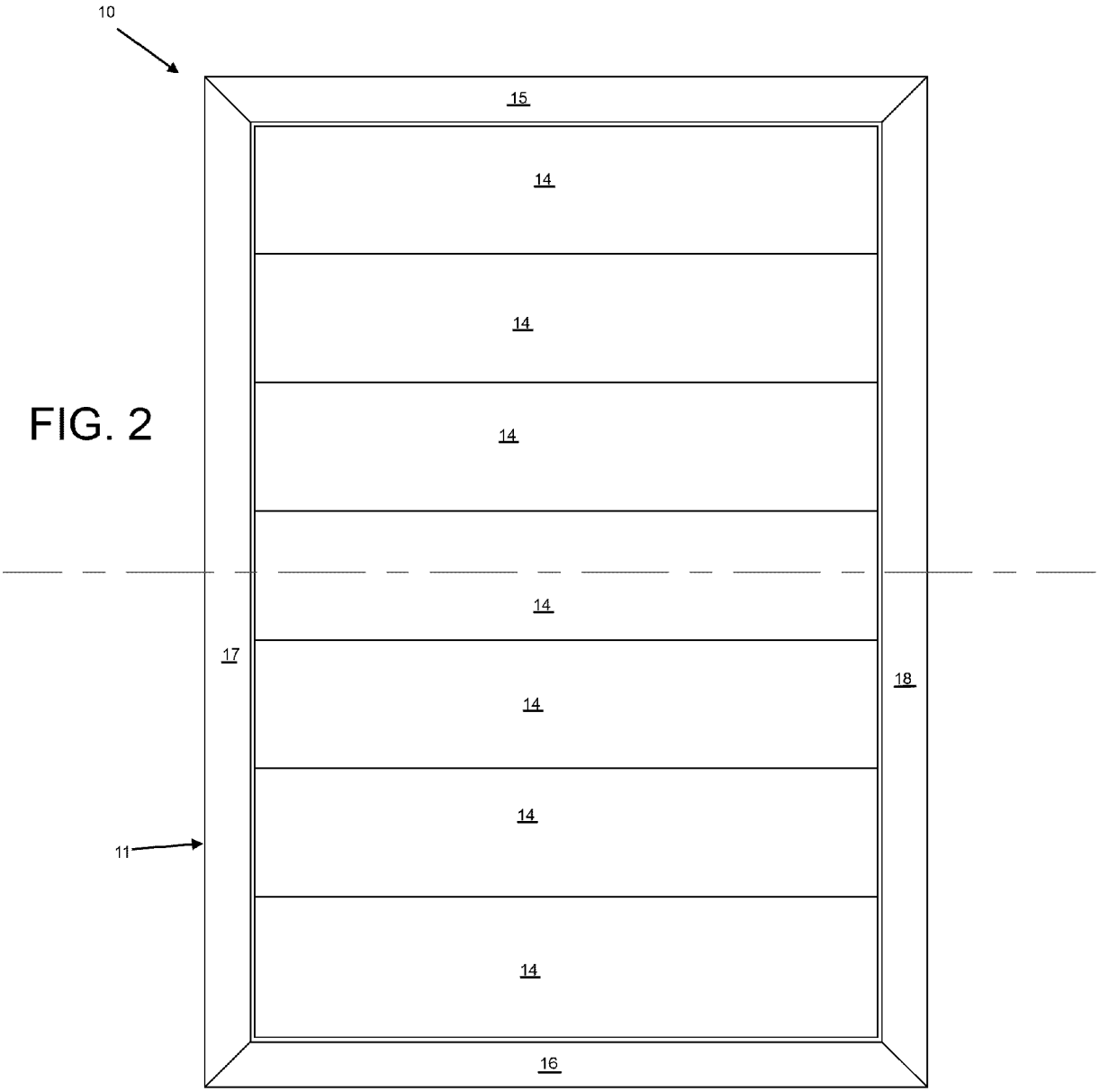


FIG. 2



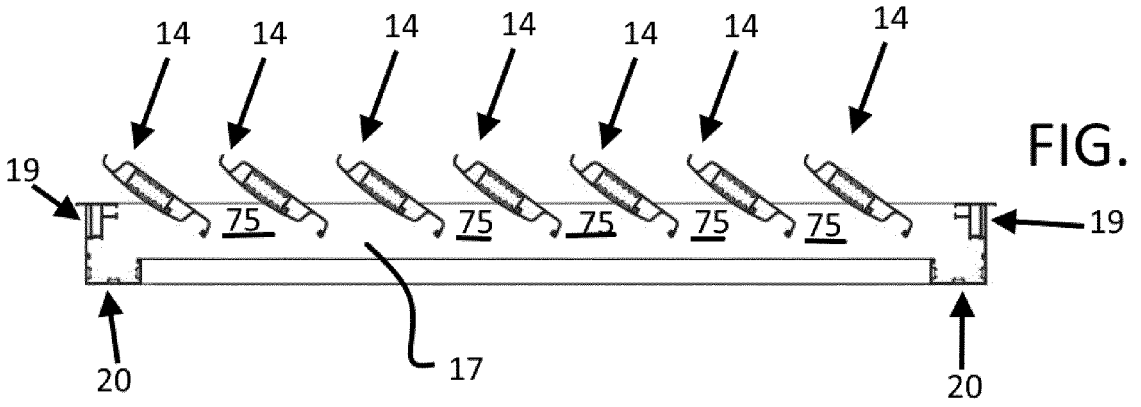


FIG. 6

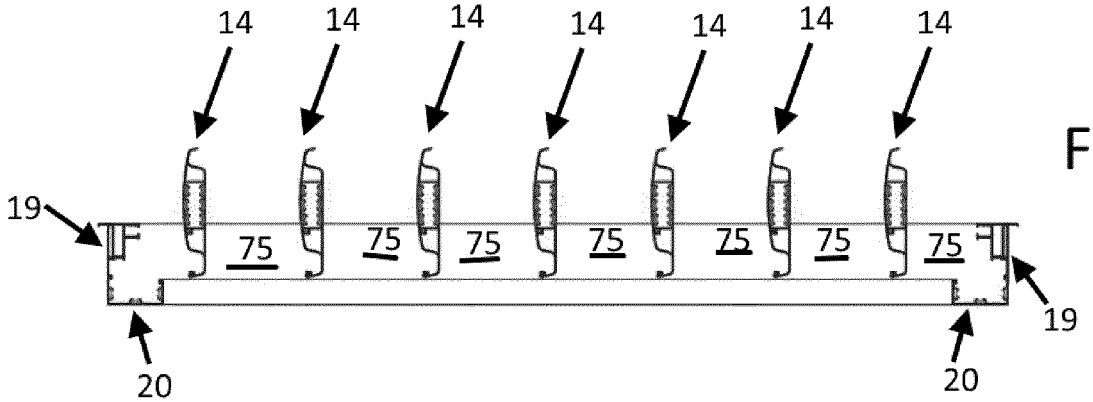


FIG. 5

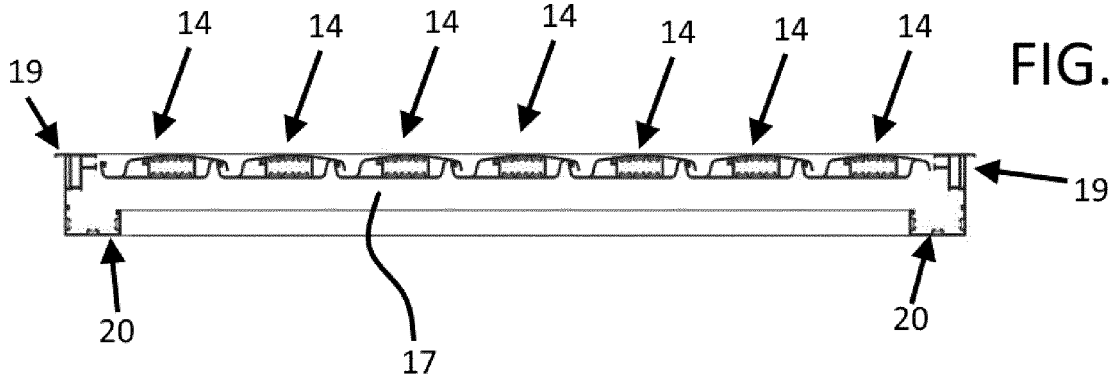


FIG. 4

FIG. 7

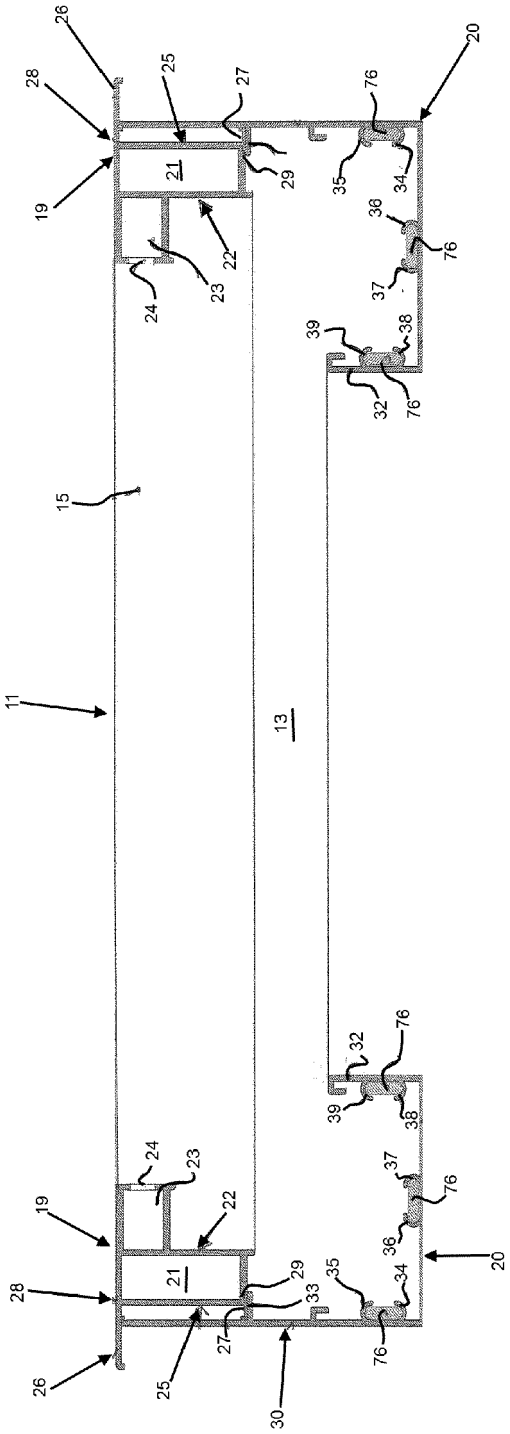
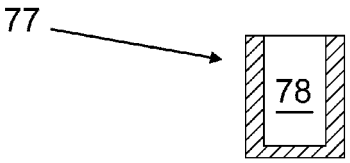


FIG. 8B



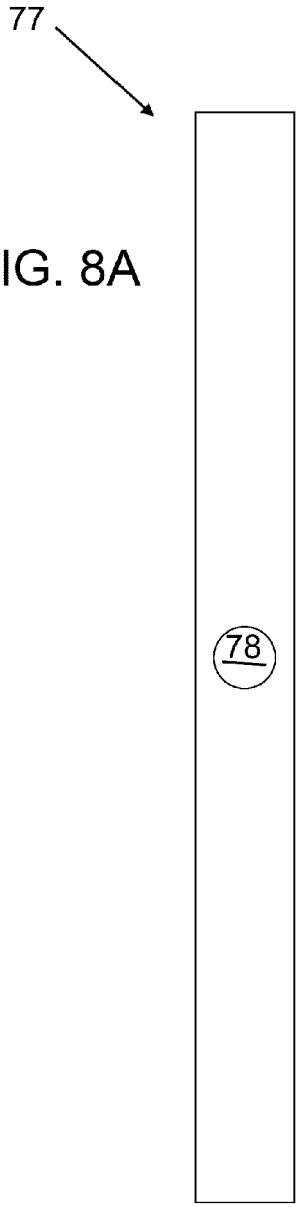


FIG. 8A

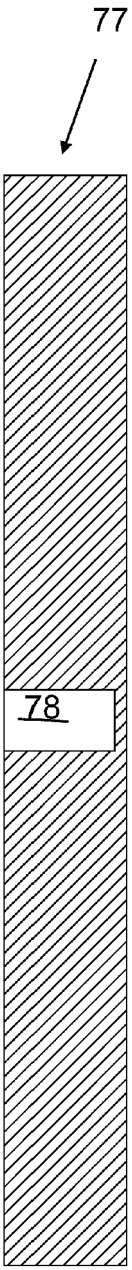


FIG. 8C

FIG. 9

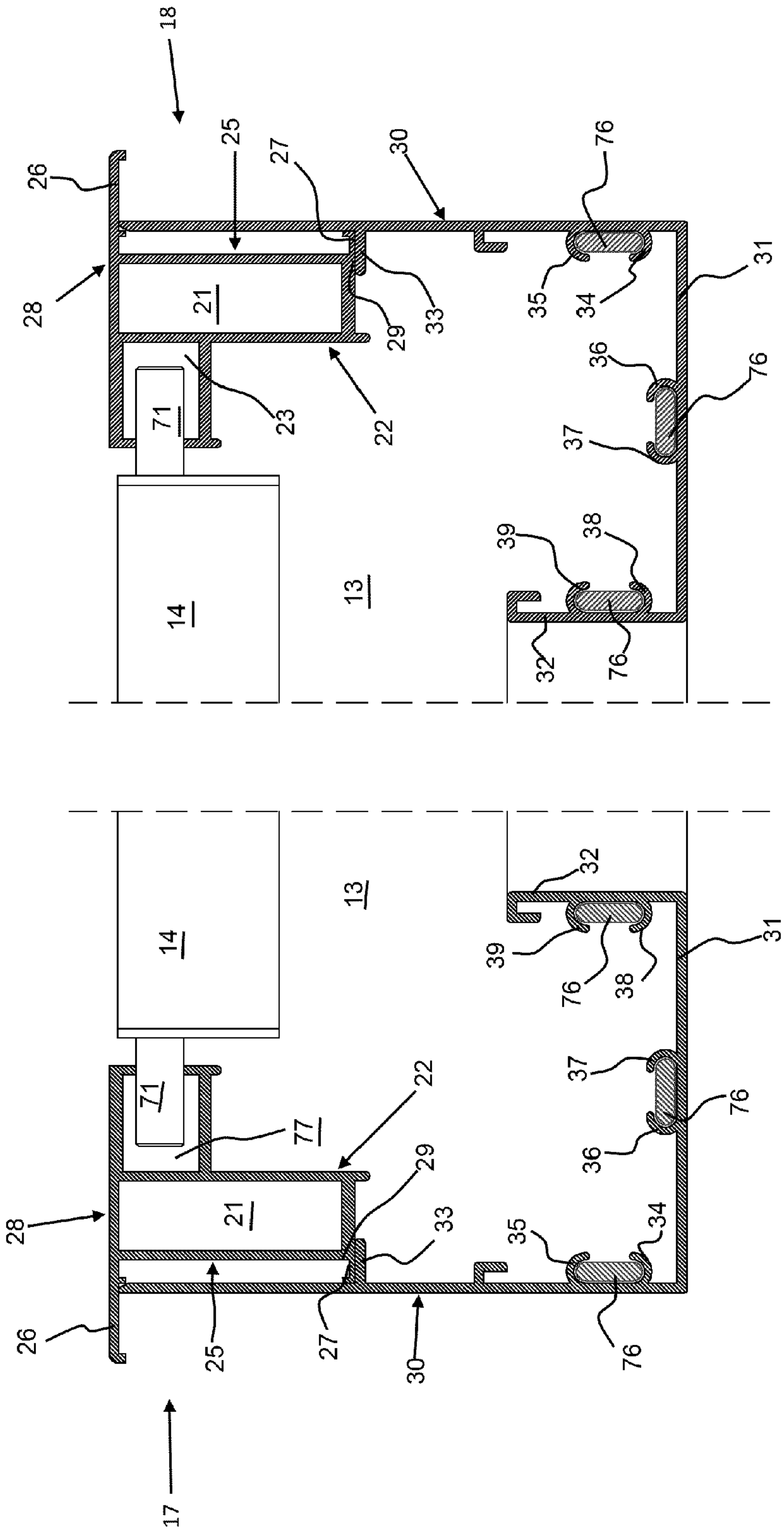

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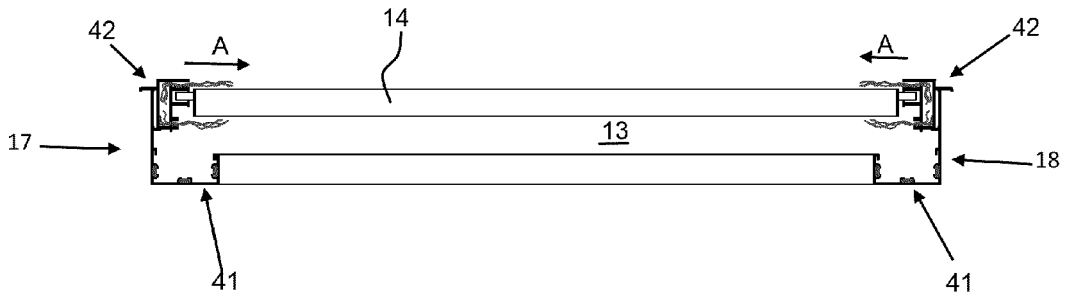
FIG. 10



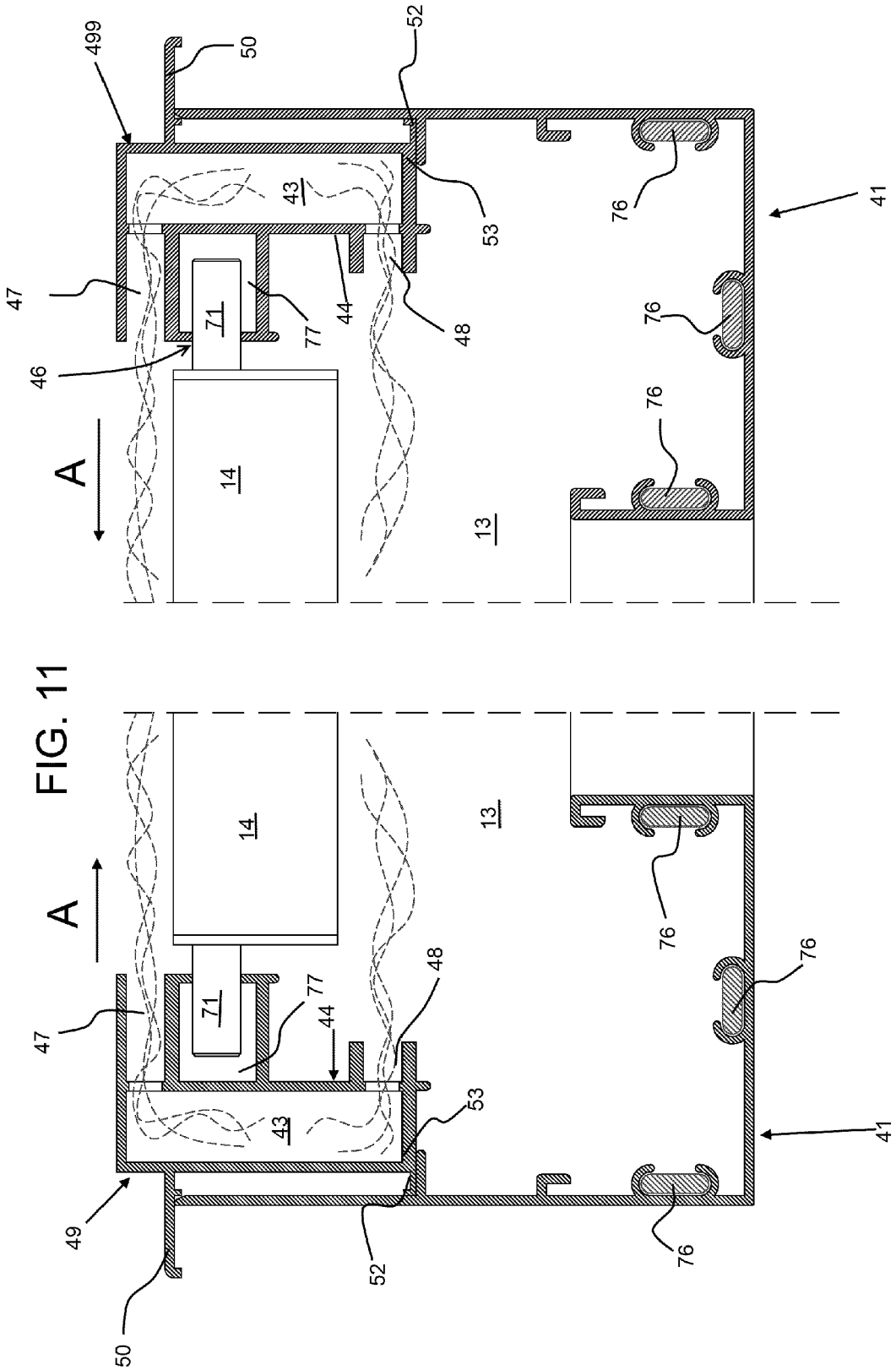
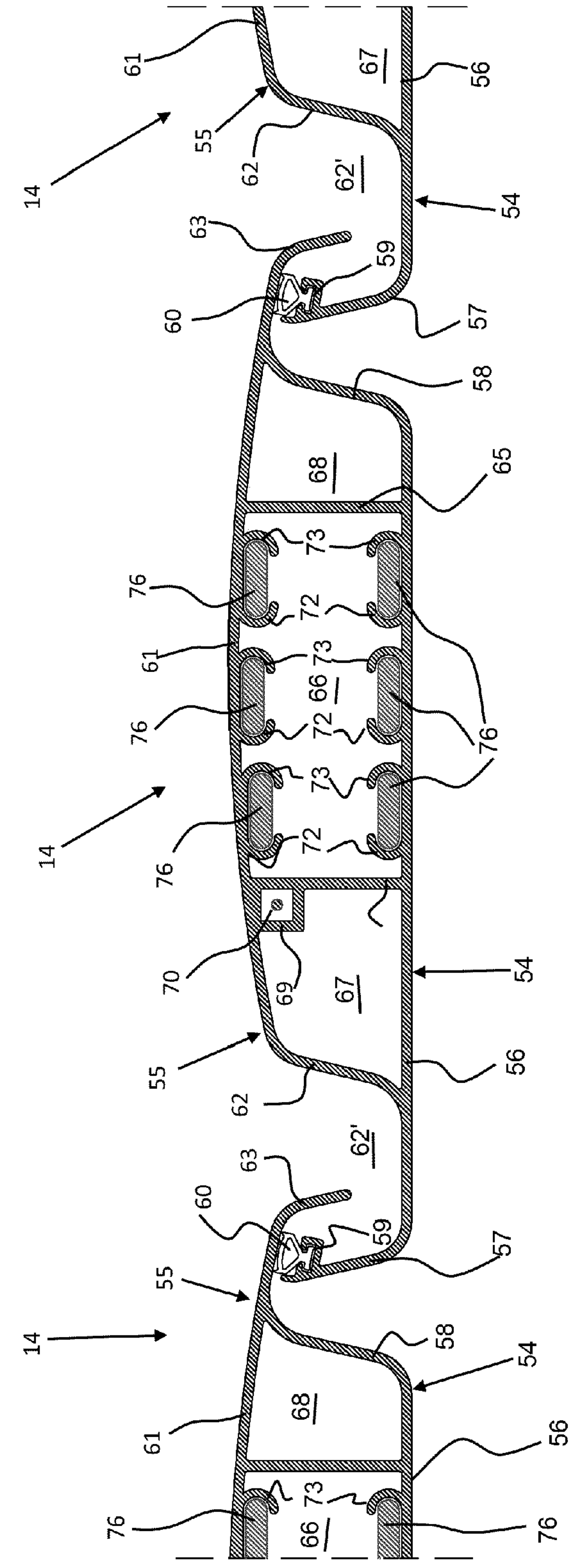


FIG. 11

FIG. 12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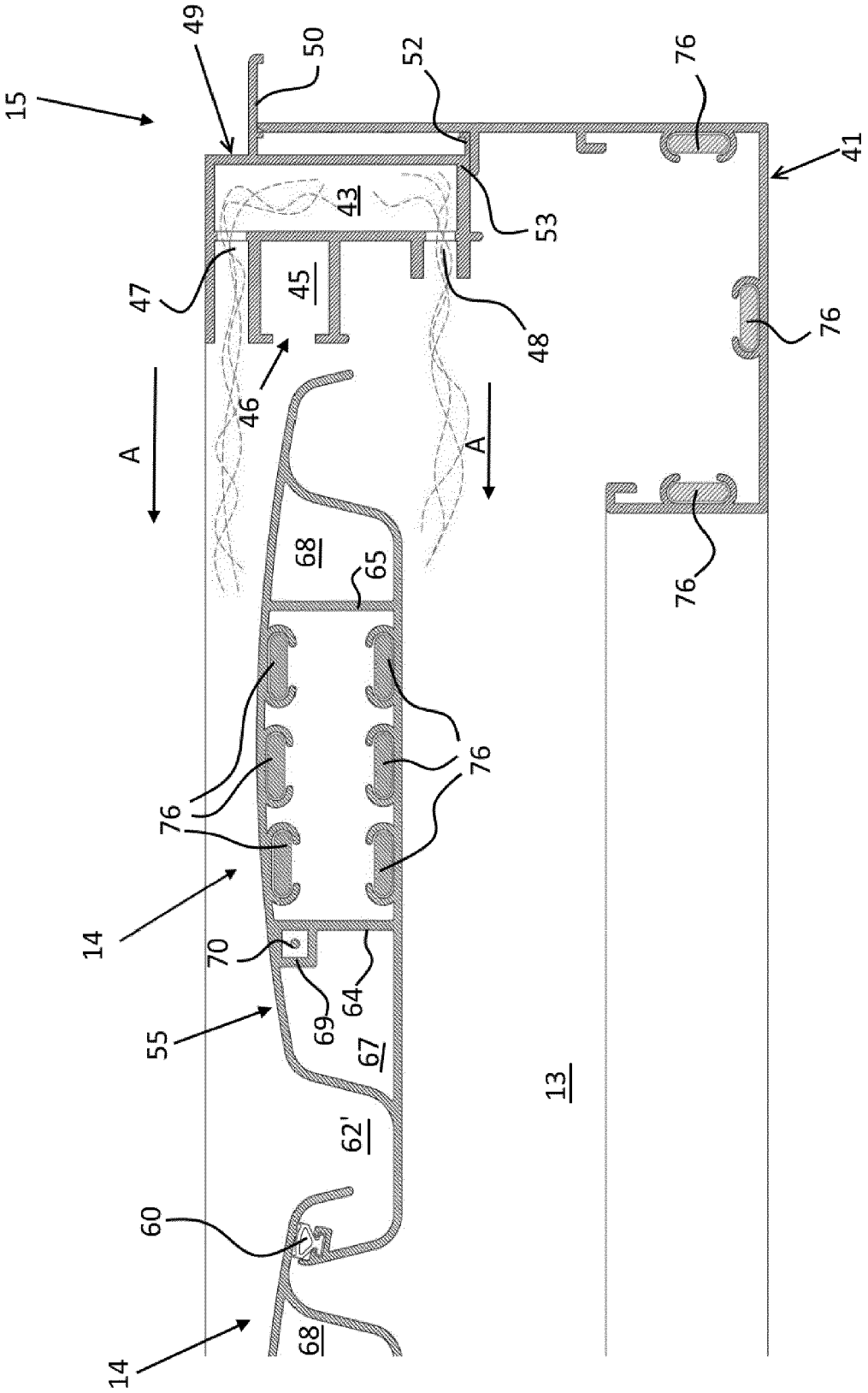
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FIG. 13

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EUROPEAN SEARCH REPORT

Application Number
EP 16 15 5966

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)

E04F
E04B
E04D
H05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	24 June 2016	Tänzler, Ansgar

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24-06-2016

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