(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 312 076 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
20.04.2011 Bulletin 2011/16

(51) Int Cl.:
E04B 2/90 *(2006.01)*

(21) Application number: **10187051.7**

(22) Date of filing: **08.10.2010**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **08.10.2009 NL 2003611**

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(54) **Outer wall element with wooden frame**

(57) The invention relates to a prefabricated outer wall element, comprising a frame extending at least on its outer edges, substantially flat filling parts connected to the frame and extending parallel to the main plane of the outer wall element, wherein the frame is adapted to be engaged by mounting means for mounting the outer wall element on a structure supporting the outer wall, wherein the frame is manufactured from wood and wherein the frame is adapted to be engaged by mounting means.

The wooden frame is preferably adapted to extend on the inner side in the direction transversely of its main plane, and parts facing its outer side are covered by profiles of metal or plastic. The parts of the construction visible from inside are thus manufactured from wood. The parts of the wooden construction facing outside are also protected from weather influences.

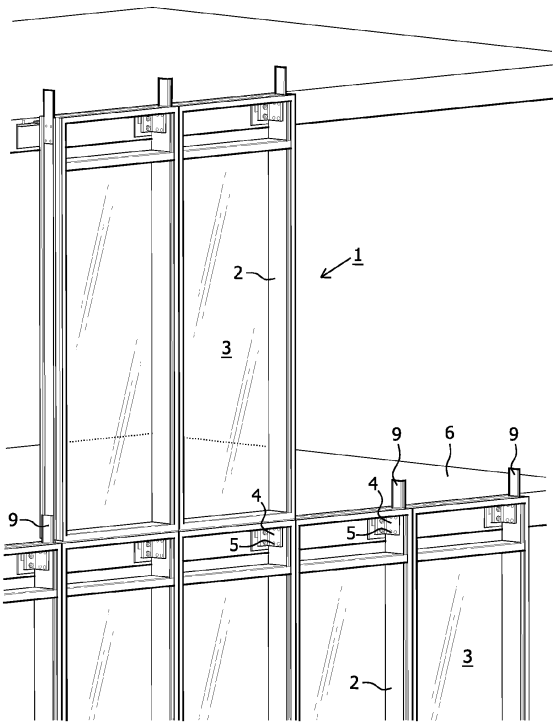

FIG. 1

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Description

[0001] The present invention relates to a prefabricated, usually substantially flat outer wall element, comprising a frame extending at least on the outer edges of the outer wall element and filling parts connected to the frame and extending parallel to the main plane of the outer wall element, wherein the frame is adapted to be engaged by mounting means for mounting the outer wall element on a construction, such as the rear construction, supporting the outer wall.

[0002] Such outer wall elements are generally known. They are used to construct outer walls of usually large buildings, such as offices, using prefabricated parts. The filling parts of such outer wall elements, which often form the greater part of the surface area of an outer wall, are usually formed largely by glass, usually double glass, which gives such outer wall elements a great weight. As a result metal, such as aluminium, is usually applied as a frame for these elements.

[0003] There has recently been increasing interest in the use of wood in buildings; wood has an appearance which is perceived by many as pleasing, while wood is also a renewable material, the sources of which cannot be depleted. This does however assume controlled and monitored forestation, this condition generally only being met in the western world.

[0004] This application of wood requires high standards for the wood used; the wood must thus be dimensionally stable, sufficiently strong and preserved, or capable of being preserved. This is because the wood is used as frame, i.e. bearing part for usually heavy filling parts such as glass windows. This can be achieved with wood which has undergone a preserving treatment and is possibly laminated. This latter measure particularly provides dimensional stability. This provides the option of not using wood of tropical origin and making use of wood grown in the western world, this entailing fewer ecological drawbacks. These facts indicate that there is also a desire to manufacture outer wall elements of the above stated type at least partially from wood.

[0005] In order to meet this wish to use wood in outer wall elements, NL-C-1 034 263 provides a prefabricated outer wall element comprising a frame manufactured from wood and extending at least on its outer edges, substantially flat filling parts connected to the frame and extending parallel to the main plane of the outer wall element, wherein the frame is adapted to be engaged by mounting means for mounting the outer wall element on a structure supporting the outer wall, wherein the parts of the wooden frame located on the periphery of the outer wall element are each provided on their peripheral surface with a first groove adapted for placing of a sealing profile.

[0006] Although such an outer wall panel meets the above stated requirements, it usually results in practice in torsion, breakage and leakage because the rigidity of the profiles prevents relative movements of the frames.

[0007] The object of the invention is to provide measures to prevent this.

[0008] This object is achieved in that flexible sealing profiles are arranged in at least a part of the first groove. The flexible profiles make it possible for the frames of the outer wall elements to move relative to each other without damage occurring.

[0009] These measures make it possible to arrange profiles between adjacent frames in effective manner so that thermal insulation chambers are formed between the adjacent frames.

[0010] According to a first preferred embodiment, the sealing profiles extend into one groove and into contact with an opposite peripheral surface of the frame of an adjacent outer wall element. Although a good seal between the elements is obtained with these measures, a groove only has to be placed in one of the two peripheral surfaces placed adjacently of a space between two elements.

[0011] According to an alternative, second embodiment, the sealing profiles extend into both grooves in mutually facing peripheral surfaces of the frames of adjacent outer wall elements. This embodiment does require two grooves, but the sealing can be formed more effectively, this such that a greater tolerance is obtained in the case of relative movements of the outer wall elements.

[0012] The presence of the flexible profiles usually coincides with the presence of an air gap between frames. In order to prevent this air gap from forming a thermal short-circuit, a further embodiment provides the measure that the first groove is located on the outer side of the frame as seen in the transverse direction of the frame, while at least one second groove is arranged in parts located on the inner side of the frame in the peripheral surface of the outer wall element. As a result of these measures an air chamber can be formed between the frames of the outer wall elements and the two sealing profiles, so creating an optimal insulation.

[0013] In order to obtain a better sealing of the air chamber, and thereby a better thermal insulation, it is recommended that the first grooves in peripheral surfaces of the frame coming into mutual contact in a corner of the frame are adapted for placing of mutually connecting sealing profiles. A complete sealing is hereby obtained and a leakage path for air and moisture is prevented from being formed between offset profiles. Leakage can no longer occur in the corners by avoiding such offsetting.

[0014] The thermal insulation is improved still further when the second grooves in peripheral surfaces of the frame coming into mutual contact in a corner of the frame are adapted for placing of mutually connecting sealing profiles. The air chamber is thus likewise sealed on the inner side of the outer wall.

[0015] According to a subsequent preferred embodiment, the wooden frame is adapted to extend substantially on the inner side of the filling parts in the direction transversely of the main plane of the outer wall element,

and profiles of metal or plastic are arranged against the parts of the frame facing the, in this direction, outer side of the filling parts. This preferably applied measure has the result that the parts of the construction visible from the inside are manufactured from wood, so that the pleasing effect of wood is obtained on the inside. The parts of the wooden construction directed toward the outer side of the outer wall are also protected from weather influences, this increasing the lifespan of the construction formed with such outer wall elements.

[0016] As already elucidated above, the outer wall elements are adapted to be connected by the mounting means to a structure supporting the outer wall. The forces acting on the connection between outer wall element and mounting means are considerable. Because these forces act on the wooden frame, the wooden frame must be adapted for this purpose. In order to better distribute the action of the forces, a preferred embodiment provides the measure that a metal strip is arranged between the grooves on the peripheral surface of the outer frame, which strip is adapted for engagement by the mounting means. This strip serves to distribute the forces.

[0017] A metal, plastic or wooden strip is preferably arranged on two opposite sides of the peripheral surfaces of the outer wall element, and on at least one side of the outer wall element the two strips extend beyond the peripheral surface of the outer frame. These parts extending outside the frame provide the option of mounting the outer wall element, for instance on an adjacent outer wall element, so that the outer wall elements each only need to be fixed at two points.

[0018] These advantages become particularly manifest when the metal strips are arranged on the vertical sides of the outer wall element and when the two strips extend outside the upper or lower side of the outer wall element.

[0019] Because the mounting means engage on the inner side of the frame parts adjacent to the periphery, the outer wall element is preferably provided with frame parts placed within the frame parts adjacent to the periphery. No disruptive structures then result for the seals extending on the outer side of the frame parts.

[0020] The outer wall element is preferably provided with frame parts which are placed within the frame parts adjacent to the periphery and which are located a short distance from the frame parts adjacent to the periphery. Only small surfaces hereby need to be covered with non-transparent filling parts, so that a great deal of space remains within the frame for filling parts which are transparent, such as glass.

[0021] The invention also relates to an outer wall provided with a number of outer wall elements as according to any of the foregoing claims, wherein the outer wall elements are each connected by means of mounting means to a structure supporting the outer wall when the outer wall elements are placed at a mutual distance in the outer wall. These measures make it possible to arrange flexible profiles between adjacent frames in effective manner so that dimensional variations and movements of the building can be absorbed.

[0022] The invention likewise relates to a method for constructing an outer wall, comprising the steps of placing a structure supporting the outer wall and connecting to this structure at least one prefabricated, substantially flat outer wall element comprising a wooden frame extending at least on its outer edges and filling parts connected to the wooden frame and extending parallel to the main plane of the outer wall element, wherein the wooden frame is adapted to be engaged by mounting means for mounting the outer wall element on a structure supporting the outer wall. It will be apparent that the advantages of this method become particularly manifest when more than one outer wall element is used.

[0023] At least a first and a second outer wall element are preferably connected to the support structure, a sealing profile is placed in the groove in the peripheral side of the first outer wall element adjacent to the second outer wall element, and the second element is placed such that the sealing profile extends into a groove in the peripheral side of the second element adjacent to the first element. It is not precluded however that no groove is present in the second outer wall element and that the sealing profile placed in the first outer wall element makes contact with the outer peripheral wall of the second outer wall element.

[0024] The present invention will be elucidated hereinbelow with reference to the accompanying drawings, in which:

Figure 1 is a schematic perspective view of an embodiment of the invention;
Figure 2 is a horizontal cross-sectional view of the embodiment shown in figure 1; and
Figure 3 is a vertical cross-sectional view of the embodiment shown in figure 1.

[0025] Figure 1 shows a number of outer wall elements 1, each comprising a rectangular frame 2 manufactured from wood and a glass pane 3 placed therein. It will be apparent that other frame shapes can also be applied instead of a rectangular frame. Outer wall elements 1 of an outer wall are usually all placed with their main plane parallel to each other, while their main planes usually coincide. It is noted that it may be the case that the outer wall elements do not have a flat main plane, but are provided with a curved main plane or with a stepped main plane. It is however still possible in such an outer wall element to designate a main plane which forms the seal between the building and the outside environment and which coincides as far as possible with the main plane of the outer wall.

[0026] Each of the outer wall elements 1 is provided with mounting means in the form of a bracket 4 which is connected to frame 2 of the relevant wall element 1 by means of bolts 5. Brackets 4 are each connected to a structural part of the outer wall in the form of a horizontally extending floor 6. In the present exemplary embodiment

floor 6 extends on the top side of each of the outer wall elements 1.

[0027] It will be apparent that it is likewise possible for floor 6 to extend on the bottom side of outer wall elements 1 or for a beam to extend both on the top and bottom side of outer wall elements 1, or for higher and lower-lying outer wall elements to be mounted on a horizontally extending floor 6. It is otherwise also possible for beam 1 to extend vertically in corresponding configurations.

[0028] Regardless of the configuration, it will be apparent that outer wall elements 1 are mutually connected by a seal which extends between the outer wall elements 1, and which will be elucidated with reference to figures 2 and 3.

[0029] Figure 1 also shows U-shaped metal profiles 9 which are arranged on the outer edge of the vertical parts of the frame and which protrude outside the periphery of frame 2.

These U-shaped profiles serve on the one hand to transmit the forces exerted by mounting brackets 4 and bolts 5 to the wooden frame, but also to form a connection between the adjacent outer wall parts. The protruding parts of the U-shaped metal profiles 9 are mounted for this purpose on adjacent frames.

[0030] Figure 2 is a partially horizontal cross-sectional view of the embodiment shown in figure 1, wherein the vertically extending frame parts 2V are shown, as well as the, in the present case, double-glazed pane 3. Metal, for instance aluminium, brackets 4 are mounted, by means of bolts 5 extending through wooden frame parts 2V, on the inner side of frame parts 2V extending on the edges of outer wall elements 1. Arranged on the outer side of these frame parts 2V are U-shaped metal profiles 9 which distribute the forces exerted by bolts 5 over a greater part of the surface of wooden frame 2. A good mounting is hereby obtained which takes into account the properties of the wood from which frame 2 is manufactured. The metal profiles are U-shaped and have two protruding parts 10 which extend into grooves 11 arranged in the frames. Brackets 4 are each connected to bracket parts 14 by means of bolts 15. The bracket parts are adapted for connection to horizontally extending beams 6, which are otherwise not shown in this figure. These preferably extend here in the vicinity of the upper side of frames 2.

[0031] In order to provide a seal, grooves extending all around are arranged in the peripheral surfaces of frames 2, wherein grooves 17 extend further toward the outer side of outer wall elements 1 and grooves 18 further toward the inner side thereof Arranged in grooves 17 are flexible sealing profiles 21 which provide for mutual sealing between outer wall elements 1 and between outer wall elements 1 and a structure surrounding them. Sealing profiles 21 extend for this purpose in both grooves 17. It is noted that it is likewise possible to have the sealing profiles extend into only a single groove and have them only make contact with the opposite frame. It is also pointed out that the grooves, and thereby sealing profiles 21, connect to each other in the horizontal frame parts and in the vertical frame parts so that sealing profiles 21 run through and thereby form an uninterrupted seal. It can be attractive to assemble sealing profiles 21 from a double-folded profile 21. It is hereby possible to use only a single profile half at the position of the connection between horizontal and vertical profile parts 21 so that the profile halves of parts making mutual contact in the connection overlap each other.

[0032] Particularly the above discussed profile placed on the outside in the first instance serves to provide a seal between the inside and the outside of the outer wall. The second profile 20 shown in the drawing, which extends in grooves 18 located further inward, forms a second seal. It will be apparent that the sealing profile here also extends into only a single groove and makes contact with the opposite frame. A space is closed off between the two seal 20, 21 which thereby serves as thermal insulation. It is however also possible to place a stronger profile in one of the grooves, whereby the profile forms a more structural connection between the frames.

[0033] Also arranged on the outer side of the frames is a profile 25 which serves to protect the wooden frame from weather influences and to fix the window panes or filling parts. Profile 25 likewise serves to cover the space between window pane 3 and frame 2 so that this space, and particularly the wooden surfaces thereof, are also safeguarded against weather influences.

[0034] Finally, the presence is noted of frame parts 2C extending parallel to vertical outer frame parts 2V and at a short distance from the outer frame parts. It hereby becomes possible to make the mounting brackets invisible from the outside in the case of relatively small surfaces by applying opaque glass or other opaque material. 2C can also represent a mullion serving as structural support in the case of very large glass surfaces or as transition to another panel or a window or door.

[0035] The same construction is shown in vertical cross-section in figure 3. The corresponding components are designated here with the same numerals, with the proviso that the horizontally extending frame parts, which can serve to make the mounting invisible, are designated with 2H.

[0036] The sealing profiles arranged in the grooves do however differ; in grooves 17, which are located close to the outside, a sealing profile 26 is used which not only forms a separation in the space between the two frame parts 2H, but which is moreover provided with a part which separates profiles 25 of adjacent outer wall elements 1 from each other. The profile is also adapted to bring about a good seal even in the case of dimensional variations between the two outer wall elements 1. This latter function is also fulfilled by profile 27, which is placed in the groove 18 located further inward.

[0037] The glass of panes 3 rests on a glass support profile 28 which is adapted to hold panes 3 in position. This also provides the option of enclosing panes 3 only on their top side so that dimensional variations of the

wooden frame, for instance as a result of the moisture content of the wood, do not result in stresses in the construction. Profiles 25 also play a part here; they serve to cover the join between glass and other filling parts over a determined oversize so that dimensional variations of the frame will not result in situations in which the joins are not properly covered. These profiles otherwise also serve to lock panes 3 or other filling parts; they thus fulfil the function of glazing bars.

[0038] It will be apparent that it is possible to depart from the above elucidated construction in many ways within the scope of the invention as defined by the appended claims.

Claims

1. Prefabricated outer wall element, comprising a frame manufactured from wood and extending at least on its outer edges, substantially flat filling parts connected to the frame and extending parallel to the main plane of the outer wall element, wherein the frame is adapted to be engaged by mounting means for mounting the outer wall element on a structure supporting the outer wall, wherein at least some of the parts of the wooden frame located on the periphery of the outer wall element are provided on their peripheral surface with a first groove adapted for placing of sealing profiles, **characterized in that** flexible sealing profiles are arranged in at least a part of the first groove.

2. Outer wall element as claimed in claim 1, **characterized in that** the sealing profiles extend into one groove and into contact with an opposite peripheral surface of the frame of an adjacent outer wall element.

3. Outer wall element as claimed in claim 1, **characterized in that** the sealing profiles extend into both grooves in mutually facing peripheral surfaces of the frames of adjacent outer wall elements.

4. Outer wall element as claimed in claim 1, 2 or 3, **characterized in that** the first groove is located on the outer side of the frame as seen in the transverse direction of the frame, while at least one second groove adapted for placing of sealing profiles is arranged in parts located on the inner side of the frame in the peripheral surface of the outer wall element.

5. Outer wall element as claimed in any of the foregoing claims, **characterized in that** the first grooves in peripheral surfaces of the frame coming into mutual contact in a corner of the frame are adapted for placing of mutually connecting sealing profiles.

6. Outer wall element as claimed in any of the foregoing claims, **characterized in that** the second grooves in peripheral surfaces of the frame coming into mutual contact in a corner of the frame are adapted for placing of mutually connecting sealing profiles.

7. Outer wall element as claimed in any of the foregoing claims, **characterized in that** the wooden frame is adapted to extend substantially on the inner side of the filling parts in the direction transversely of its main plane, and that metal or plastic profiles are arranged against the parts of the frame facing the, in this direction, outer side of the filling parts.

8. Outer wall element as claimed in claim 7, **characterized in that** a metal strip is arranged between the first and the second groove in at least one of the peripheral surfaces of the frame, which strip is adapted to be engaged by the mounting means.

9. Outer wall element as claimed in claim 8, **characterized in that** a metal strip is arranged on two opposite sides of the peripheral surfaces of the outer wall element, and that on at least one side of the outer wall element both strips extend beyond the peripheral surface of the outer frame.

10. Outer wall element as claimed in claim 9, **characterized in that** the metal strips are arranged on the vertical sides of the outer wall element and that both strips extend beyond the lower side of the outer wall element.

11. Outer wall element as claimed in claim 8, 9 or 10, **characterized in that** the outer wall element is adapted to be engaged by mounting means on the inner side of the frame parts placed on the periphery.

12. Outer wall element as claimed in claim 8, 9 or 10, **characterized in that** the outer wall element is provided with frame parts which are placed within the frame parts adjacent to the periphery and which are located at a distance from the frame parts adjacent to the periphery.

13. Outer wall provided with a number of outer wall elements as claimed in any of the foregoing claims, **characterized in that** the outer wall elements are each connected by means of mounting means to a structure supporting the outer wall, and that the outer wall elements are placed at a mutual distance in the outer wall.

14. Method for constructing an outer wall, comprising the steps of placing a structure supporting an outer wall and connecting to the support structure at least one prefabricated, substantially flat outer wall element provided with a filling element, comprising a wooden frame extending at least on its outer edges

and substantially flat filling parts connected to the wooden frame and extending parallel to the main plane of the outer wall element, wherein the wooden frame is adapted to be engaged by mounting means for mounting the outer wall element on a structure supporting the outer wall.

15. Method as claimed in claim 14, **characterized in that** at least a first and a second outer wall element are connected to the support structure, that a sealing profile is placed in the groove in the side of the first outer wall element adjacent to the second outer wall element, and that the second outer wall element is placed such that the sealing profile extends into a groove in the side of the second outer wall element adjacent to the first element.

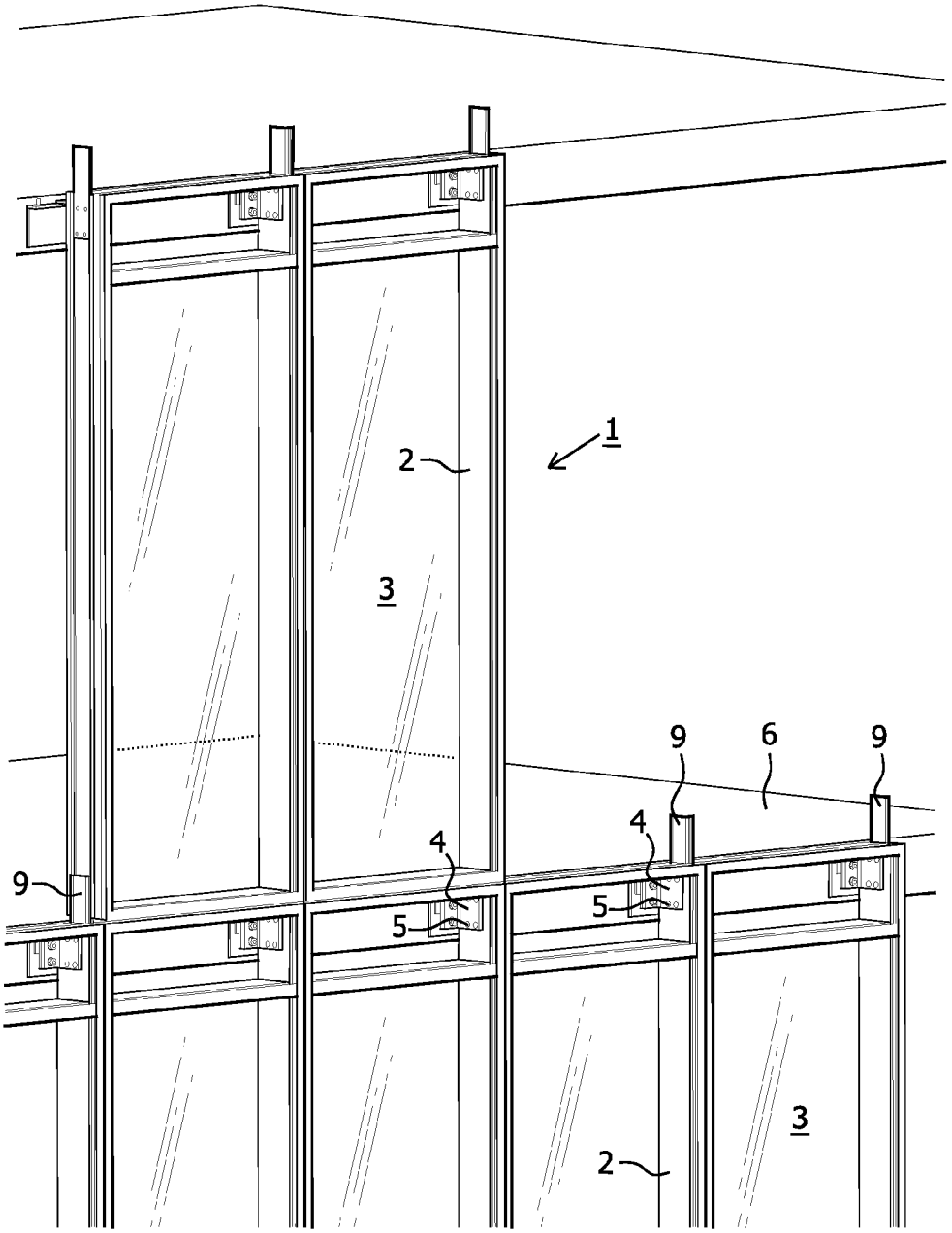

FIG. 1

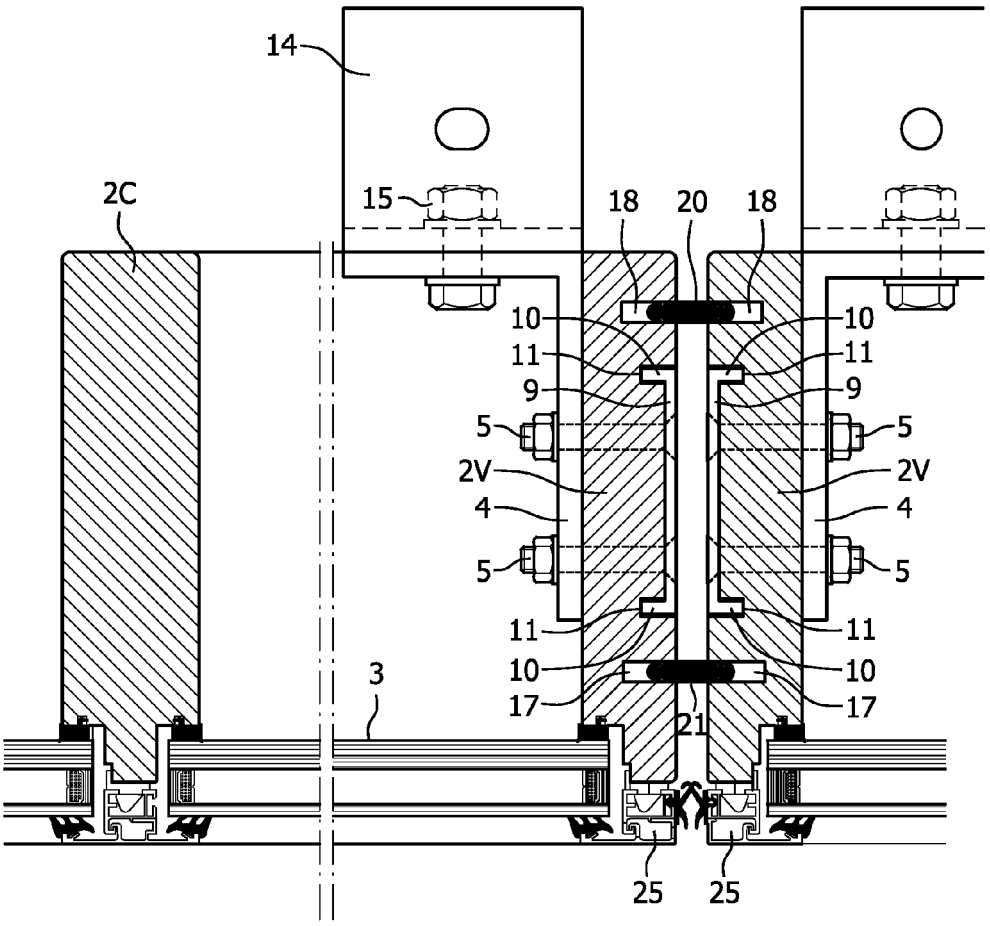

FIG. 2

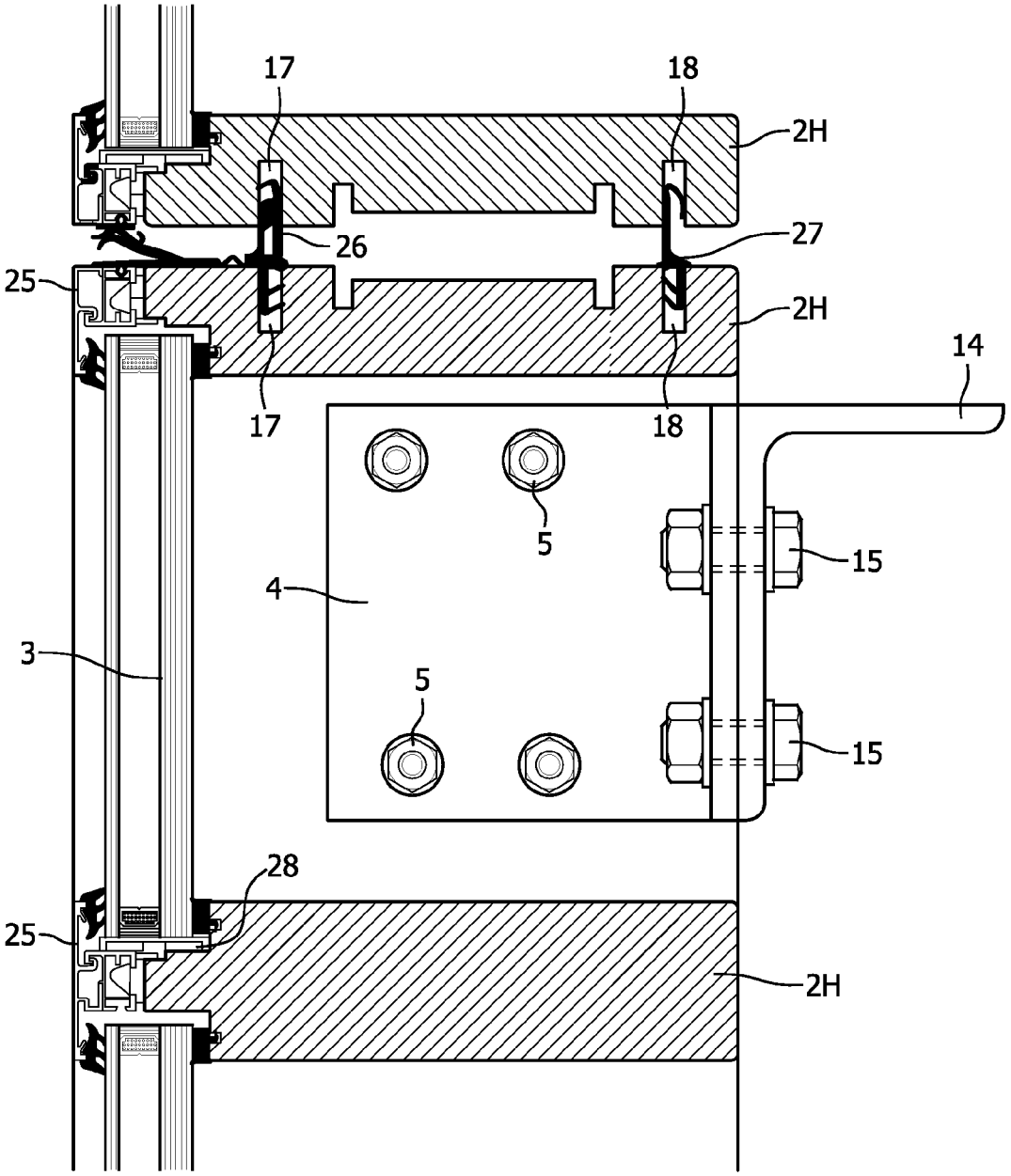

FIG. 3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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