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(54) **Wall panel, method for manufacturing same and use of the panel in a curtain wall**

Wandpaneel, sein Herstellungsverfahren und seine Anwendung in einer Vorhangfassade

Panneau de façade, son procédé de fabrication et son usage dans un mur rideau

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Description

[0001] The invention relates to a panel, comprising at least two substantially parallel sheets which are held at a mutual distance from each other by spacers extending between the sheets, adjacent the edges thereof.

[0002] Such panels are generally known for use in curtain walls. The panels are then glued or clamped against a framework of posts. For the purpose of clamping the panels, these can be provided at their circumference with a channel-shaped profile extending between the edges of the sheets and open towards the side facing the surroundings. In this profile, one or several clamping elements can be inserted which are secured against the framework, the arrangement being such that a part of the profile and the adjacent sheet edge is confined against the framework by the clamping elements. The profile then provides an even distribution of the clamping force over the edge of the sheet and prevents direct contact between the or each clamping element and the sheet, which contact could lead to unacceptably high tensions and, hence, damage to the sheet. Moreover, between the profile and the sheet, an insulating layer can be provided to prevent thermal bridges.

[0003] The profile should be accurately positioned relative to the panel, as a deviation in the position of the profile will affect the attachment of the panel to the framework. As a result, the panels can be suspended askew or come to be under an undesired tension. Skewness is unacceptable from an esthetic point of view, leads to an unfavorable transmission of forces working, in use, on the panels, and moreover, can lead to possible sealings between the panels no longer linking up properly. Therefore, in the manufacture of the known panels, in particular larger panels, where a small deviation in position can rapidly lead to great, adverse effects, the profiles are first interconnected to form a frame, whereupon the frame is fastened against one of the sheets. By thus interconnecting the profiles, their mutual position and their eventual position relative to the sheet can be controlled better. However, it will be clear that such a method is cumbersome, requires extra time and will increase the costs of manufacture.

[0004] European patent application EP 0 957 227 describes a construction, wherein profiles are used that have two stop surfaces that abut against a longitudinal edge and a side of one of the sheets, as well as a chamber for receiving resilient means. The profiles have projecting parts that extend along the chamber and project outside of the contour of the panel.

[0005] German patent application DE 199 42 170 describes a similar arrangement wherein profiles are used that have two stop surfaces and a chamber. The profile is arranged to be attached to a large frame that extends between two sheets of separate panels. The sheets are significantly shorter than the opposing side sheets that have the profiles attached to provide space for the frame.

[0006] The invention contemplates a panel of the type

described hereinabove, in which the drawback mentioned is obviated while maintaining its advantages. To that end, a panel according to the invention is characterized by the features of claim 1.

5 **[0007]** By providing the panel with a profile with stop surfaces, the panel can be manufactured in a simpler manner than the known panels. The profiles can be placed in a simple manner, by a first and second stop surface, respectively, against a longitudinal edge and a side adjacent thereto of one of the sheets. The eventual position of the profile is then substantially determined by the cooperation between the stop surfaces and the edge of the sheet. In this manner, the profiles can be provided at the desired position in an accurate and reproducible manner, without the profiles first having to be interconnected. As a result, a time-consuming and hence expensive manufacturing step can be omitted.

10 **[0008]** The stop surfaces offer the additional advantage that they protect the longitudinal edge of the sheet, so that the risk of damage during storage, transport and use diminishes. Optionally, opposite the second stop surface, approximately parallel thereto, a third stop surface can be provided, so that the three stop surfaces together form a substantially V-shaped or U-shaped channel which can be slid around the edge of the sheet. Consequently, the respective edge of the sheet will be protected even better.

15 **[0009]** Due to the simple and accurate placing of the profiles, the panel can be attached without problems against the framework of a curtain wall with the aid of clamping elements inserted into these profiles.

20 **[0010]** A panel according to the invention can further be advantageously used in a curtain wall in which the panels are glued instead of clamped against the framework or an auxiliary framework to be attached thereto. In that case, the profile can serve as a holder for sealing rubbers, with which the slit between two adjacent panels can be sealed off. The panels usually utilized in a glued curtain wall are not provided with a profile. The sealing rubbers are attached in the framework or auxiliary framework. As a result, the sealing rubbers lie relatively far backwards. It has appeared that for the insulating effect of the sealing rubbers, it is more advantageous to place them as much forward as possible, hence away from the framework. With a panel according to the invention, this is possible, owing to the profile extending around the panel.

25 **[0011]** In an especially advantageous embodiment, a panel according to the invention is characterized by the features of claim 5.

30 **[0012]** This embodiment, in which the profile, at least a U-shaped chamber thereof, extends substantially in line with one of the sheets with the open side facing outwards, is particularly suitable for use in a glued curtain wall as described hereinabove, in which the profile is used as holder for a sealing rubber. The profile secures the sealing rubber in the proper position, also when, during use, considerable forces work thereon, so that a seal-

ing lip of the rubber, extending beyond the contour, can sealingly abut against the sealing lip of an adjacent panel and always a proper sealing is guaranteed.

[0013] Optionally, several sheets of the panel can be provided with such a profile, so that several sealings can be provided one after the other. Between two successive sealings, air chambers will then be formed, which contribute to the insulating effect of the entire sealing. Due to the profiles extending around the outer circumference of the sheet, these are readily accessible and the rubbers can be provided therein in a simple manner after the panels are glued to the framework.

[0014] In another advantageous embodiment, a panel according to the invention is characterized by the features of claim 6.

[0015] This embodiment, in which the profile, at least the chamber thereof, extends virtually completely between the edges of the sheets, is particularly suitable for use in a clamped wall. Due to the stop surfaces, the profile will extend accurately at the proper position, so that the panel can be mounted on the framework in a position-retaining manner with the aid of clamping elements inserted into the profiles. The clamping force applied by the clamping element is then evenly distributed by the profile over the edge of sheet adjacent this profile. As the profile is largely located between the sheets, it will be virtually completely hidden from view when the panel is incorporated in a curtain wall. If desired, between the profile and the sheet against which it has been attached, an insulating layer can be provided for the prevention of thermal bridges.

[0016] In accordance with the first embodiment, the panel can further be glued onto a framework. In that case, sealing rubbers can be inserted in the profile. As in this second embodiment the profile is located further forward relative to the framework than in the first embodiment, the insulating effect of the sealing rubbers provided therein will have improved even more.

[0017] The sheet against which the profile is provided is dimensioned such that the profile, in mounted condition, does not project beyond a contour of the panel defined by the further sheets. As a result, the panel has no projecting parts which can easily become damaged or can inflict damage. Moreover, as a consequence, the panel can be disposed on one of its sides, for instance during transport or storage. Further, as a result, when the panel is in mounted position, the profiles are hidden from view.

[0018] In a first embodiment, where the profile is located substantially in line with one of the sheets, the respective sheet can be shortened over a length equal to the depth of the profile, measured from the open side to the first stop surface. Further, the width of the profile, measured in a direction at right angles to the depth, is preferably substantially equal to the thickness of the sheet. As a result, the profile will hardly project in the fastened position.

[0019] In a second embodiment, the largest part of the

profile lies between the sheets and therefore within the contours of the panel. Optionally, the sheet against which the first stop surface abuts can be shortened over a distance corresponding to the thickness of this first stop surface.

[0020] In a further elaboration, a panel according to the invention is characterized by the features of claim 7.

[0021] The channel between the edges of the sheets and the spaces can be filled with a sealing mass. This results in a good sealing of the panel and also helps the attachment in the channel of the part of the profile extending therein. The sealing material is preferably selected such that this can also have an insulating function.

[0022] The invention further relates to the use of a panel in a curtain wall characterized by the features of claims 15 and 16.

[0023] A panel according to the invention offers advantages when used in both a glued curtain wall and a clamped curtain wall. In the first case, for instance, a sealing rubber can be included in the profile, in the second case a clamping element. In both cases, the profile provides an accurate, dimension-retaining position of the elements anchored therein, in that due to the stop surfaces, the profiles themselves are accurately positioned relative to the panel.

[0024] The invention further relates to a method for manufacturing a panel according to the invention, characterized by the features of claim 17.

[0025] Due to the stop surfaces of the profiles, these can be provided as loose parts against the edges of one or several sheets, while the cooperation between these edges and the stop surfaces provides an accurate positioning of the profiles. As a result, the known method of manufacture, with which the profile parts are first interconnected to form a frame, is considerably simplified. Moreover, a much more flexible method of manufacture is obtained, wherein the panels can be provided with different profiles along the different edges, or wherein only a part of the edges is provided with a profile.

[0026] In the further subclaims, further advantageous embodiments of a panel according to the invention are described, as well as a method for manufacturing such and the use of such a panel in a curtain wall.

[0027] In clarification of the invention, exemplary embodiments of a panel according to the invention will be described with reference to the drawing. In the drawing:

Fig. 1 shows a panel according to the invention provided with a profile extending substantially in line with one of the sheets of the panel;

Fig. 2 shows a horizontal cross section of a curtain wall provided with panels according to Fig. 1;

Fig. 3 shows a panel according to the invention provided with a panel extending substantially between the sheets of the panel;

Fig. 4A,B show a cross section of a clamped curtain wall provided with panels according to Fig. 3, in assembled and disassembled condition; and

Fig. 4C shows a cross section according to Figs. 4A, B with alternative clamping elements.

[0028] In this description, identical or corresponding parts have identical or corresponding reference numerals.

[0029] Fig. 1 shows, in cross section, a panel 1 according to the invention, at least an edge thereof. The panel 1 comprises a first sheet 2 and a second sheet 3, extending substantially parallel to each other and being held at a mutual distance by spacers 4. These spacers 4, of which only one is visible in Fig. 1, extend along the longitudinal edges of the sheets 2, 3 at a relative short distance therefrom, and, between the sheets 2, 3, include an inside space 5. At the side of the spacer 4 remote from the inside space 5, a channel-shaped space 8 extends between the edges of the sheets 2, 3. This channel-shaped space 8 is filled with a sealing and preferably insulating mass 9, which contributes to both the sealing and the gluing together of the sheets 2, 3.

[0030] The spacer 4 can for instance be a profile extruded from plastic or aluminum, and, in the exemplary embodiment shown, has a substantially rectangular, single-chambered cross section. It will be clear that different embodiments are possible. The chamber 6 is in communication 7 with the inside space 5 and is preferably filled with moisture-absorbing grains known per se, for absorbing any moisture present in the inside space 5.

[0031] A panel 1 as described hereinabove is known per se and is for instance used in curtain walls. The sheets 2, 3 can for instance be manufactured from glass, plastic or aluminum. However, also different materials are possible. Although not shown, the sheets 2, 3 can be of mutually different thickness. Further, the sheets 2, 3 can, in principle, have any shape, but in the exemplary embodiments shown, each time, the starting point will be a rectangular shape, so that the panel 1 will have a substantially block-shaped contour C.

[0032] Along at least a part of its circumference, the first sheet 2 is provided with a profile 10. This profile 10 (see Fig. 1A) comprises a substantially rectangular chamber 12, which abuts against the edge of the sheet 2 with a first side 14 and is open at an opposite, second side 13. This first side therefore forms a first stop surface 15 for the profile 10. The profile 10 is further provided with a second and third stop surface 16, 18, extending substantially at right angles to the first stop surface 15, on both ends of the sheet 2. In cooperation with the edge of the sheet 2, these stop surfaces 15, 16, 18 provide that the profile 10 abuts against the sheet 2 in a position-retaining manner. To that end, optionally, the first and second stop surface 15, 16 or the first and third stop surface 15, 18 will be sufficient. However, use of three stop surfaces 15, 16, 18 offers the advantage that with these, the edge is completely protected, which can help prevent damage to that edge. Moreover, use of a third stop surface keeps the profile 10 from pivoting about the longitudinal edge in the plane of the drawing. The profile

10 is for instance attached against the first sheet 2 with glue or with a double-sided adhesive strip. In addition, the sealing mass 9 provided in the channel-shaped space 8 too contributes to the fixation of the profile 10 against the first sheet 2. If desired, the second and third stop surface 16, 18 can be placed at a slight inclination relative to each other, so that the free edges of the stop surfaces have a converging configuration and/or adjacent the free edges of both stop surfaces 16, 18, projections or like profiles can be provided. With this, with the profile 10 in the mounted position, a bias can be realized, with which tolerances in the sheet 2 can be compensated. As the profile 10 comprises only one connecting wall 14, the profile 10, the stop surfaces 16, 18 have, in addition to a resilient effect, also a hinging effect.

[0033] The inside width B of the first stop surface 15 is approximately equal to the thickness D of the first sheet 2. Further, as can be clearly seen in Fig. 1, the first sheet 2 is shorter than the second sheet 3 over a distance L, which distance L is approximately equal to the outside depth U of the chamber 12 of the profile 10, measured between the open side 13 and the first stop surface 15. As a result, the profile 10, in mounted condition, lies substantially within the block-shaped contour C of the panel 1 defined by the two sheets 2, 3. This offers the advantage that the panels can be composed automatically according to a customary manner of manufacture to be further described. This further offers the advantage that the panel 1 has no vulnerable projecting parts and, during storage or transport, can be disposed on one side. Moreover, when the panel 1 is incorporated in a curtain wall, the profile 10 will not be visible from the side of the second sheet 3.

[0034] In the chamber 12 of the profile 10, a sealing rubber 20 can be provided as shown in Fig. 1. The purpose thereof will be further explained with reference to Fig. 2. In Fig. 2, in horizontal cross section, a part of a curtain wall is shown, wherein two panels 1 according to Fig. 1, with their sides facing each other, are attached, particularly glued, against a post 26 of a framework. Use is then made of an auxiliary profile 27, for instance extruded from plastic or aluminum. To that end, this auxiliary profile 27 has been disposed on a flat base, whereupon the panel 1, with the first sheet 2 was glued onto the auxiliary profile 27, with the aid of self-adhesive sealing strip 24. Hereupon, the space between the panel 1, the sealing strip 24 and the auxiliary profile 27 was glued closed with a sealing mass 25, which can be of the same type as the mass 9 applied between the sheets 2, 3. After the sealing strip 24 and the sealing mass have set, the panels 1 with the auxiliary profiles 27 glued thereon are attached against the post 26 with the aid of a generally known attachment means 28, such as a screw or a bolt. Optionally, the auxiliary profile 27 can comprise loose part profiles 27A, B, as represented in Fig. 2, while the panel 1 is glued to one of those part profiles 27B, which part profile 27 can then be connected to a remaining part profile 27A of the auxiliary profile 27, for instance be slid

or snapped tight therein.

[0035] Assembling a curtain wall in the manner described hereinabove is known per se. With these known curtain walls the auxiliary profiles 27 are provided with a recess 29, in which, for attaching the auxiliary profile 27 to the post 26, a sealing rubber 20 can be inserted, for sealing a slit 30 present between two adjacent panels 1. The sealing rubber 20 is provided with a sealing lip 22, which, in the mounted condition, extends substantially parallel to the panel 1. The sealing lip is at least greater than half the width of the slit 30, so that the sealing lips 22 of two adjacent panels 1 facing each other, overlap, at least partly, so that a moisture-proof and wind-proof sealing is obtained.

[0036] It has appeared that the insulating effect of such sealing increases according as it is located further outwards, in the direction of the second sheet 3 of the panel 1, and is preferably located in one line with the insulating sealing 9 of the panel 1. A panel 1 according to the invention offers the possibility for such a favorable positioning of the sealing rubbers 20 due to the profile 10.

[0037] Further, for a proper sealing, it is of importance that the sealing lips 22 abut each other in a straight line. This is achieved with a panel 1 according to the invention, in that the location of the profiles 10 is accurately defined due to the stop surfaces 15, 16, 18, and, hence, the location and position of the rubbers 20 provided therein too.

[0038] In Fig. 2, both in the profile 10 of the panel 1 and in the auxiliary profile 27, a sealing rubber 20, 21 is included, so that a double sealing is obtained. Optionally, both sealing rubbers can be replaced by a single, double-lipped sealing rubber 20', which, as shown in Fig. 2A, can be attached in the profile 10 of the panel 1 and the recess 29 in the auxiliary profile 27. It is somewhat more cumbersome to provide such a sealing rubber 20', but, once provided, it has a very stable position because of the double anchoring in the profile 10 and the auxiliary profile 27 and, furthermore, it supports the attachment of the profile 10, so that the sealing mass 25 could even be omitted. In both figures 2, 2A, between the sealings, a virtually air-tight chamber 23 is formed, which helps improve the insulating effect of the entire sealing.

[0039] Fig. 3 shows an alternative embodiment of a panel 101 according to the invention. The panel 101 has substantially the same structure as the panel 1 shown in Fig. 1. Therefore, identical or corresponding parts are indicated with identical or corresponding reference numerals, increased by 100. The profile 110 comprises a first stop surface 115 which abuts against a longitudinal edge of the first sheet 102, a second stop surface 116 which abuts against a side of the first sheet 102 proximal to the inside space 105 and a U-shaped chamber 112, located between the first and second sheet 102, 103, with an open side turned outwards. The first sheet 102 has been shortened relative to the second sheet 103 over a distance L' , which is substantially equal to the thickness of the first stop surface 115, the arrangement being such that this stop surface 115, in mounted condition, does

not, at least not appreciably, project beyond the contour C of the panel 101. Optionally, a third stop surface 118 can be provided (not shown), parallel to the second stop surface 116 and abutting against the outside of the first sheet 102.

[0040] As in the embodiment described hereinabove, the stop surfaces 115, 116, 118 ensure that the profile 110 is positioned unequivocally relative to the sheet 102 in a simple manner. As a result, the position of a sealing rubber 20 inserted into the profile 110 will also be defined, so that, when using the panel 110 in a curtain wall, an accurately contiguous sealing can be realized. The shape of the chamber 112 shown in Fig. 3 for that matter, slightly diverges from that of Fig. 1. It will be clear that, depending on the sealing rubber to be provided therein, many different shapes are possible.

[0041] A panel 101 according to Fig. 3 can be secured in a curtain wall in the same manner as shown in Fig. 2 for panel 1. The sealing rubbers 20 can then be inserted into the U-shaped chamber 112. As this U-shaped chamber 112 lies further outwards, i.e. closer to the second sheet 103 than chamber 12 in panel 1, a even better insulating effect can be obtained. In that case, moreover, the sealing rubber 20 is in line with the sealing mass 109 of the panel 101, which, as already indicated, is also particularly advantageous for the insulating effect of the sealing.

[0042] A panel 1, 101 can further be clamped in a curtain wall, as shown in Fig. 4, for a panel 101 according to Fig. 3. In the U-shaped chambers 11 of both adjacent panels 101, clamping elements 31 have been inserted with a longitudinal edge 31A, B. A middle part 31C of the clamping element 31, connecting the longitudinal edges 31A, B, is attached against a post 126 of the wall framework with a screw, bolt or such known attachment means 34. To this end, this post 126 is provided with a slotted profile 35, extending from the post 126 as far as into the slit 30 between the adjacent panels 101. This slotted profile 35 may be provided with a toothing extending over the entire length or regularly interspaced screw holes, into which the attachment means 34 can be fastened.

[0043] In the attached position (Fig. 4A), the longitudinal edges 31A, B, inserted into the profile chambers 112, press the first sheets 102 against the post 126, so that these sheets 102 are confined against the post 126. So as to prevent direct contact and, possibly, high contact tensions associated therewith, against the post 126, on both sides of the slotted profile 35, two slightly elastic shock profiles 132 are provided, which abut against the first sheets 102 with flexible lips 133. These shock profiles 132 can absorb dynamic loads working on the panels 101 during use and, moreover, effect a proper sealing between the panel 101 and the post 26.

[0044] In a first embodiment, the clamping element 31 extends over the entire length of the panel 101. This offers the advantage that the clamping force is evenly distributed over the edge of the sheet 102 and, moreover, in that case, the longitudinal edges 31A,B can contribute

to the moisture-proof and wind-proof sealing of the slit 30 between the panels 101. Preferably, the clamping element 31 is manufactured from a relatively rigid material, for instance plastic or aluminum. Further, the clamping element 31 with the longitudinal edges 31A,B projecting on both sides can be built up from a single part or from two separate parts 31A, 31B, as shown in Fig. 4B. A two-part design offers the advantage that the separate halves 31A, 31B can be slid into the chambers 112 of the profiles 100 more easily than a single part, which is particularly advantageous when the width of the slit 30 between the two adjacent panels 101 is relatively small relative to the sizes of the longitudinal edges 31A, B. With the two-part design, when the parts are attached to the post 26, the middle part 31C can be of a design such that upon attachment to the post, they engage one another or overlap one another.

[0045] In an alternative embodiment, the clamping element 31 has a limited length and per panel 101, several clamping elements 31 are used. These clamping elements 31 are preferably pre-fitted in the slotted profile 35, in a position wherein the clamping edges 31A,B extend substantially in the longitudinal direction of the slotted profile 35. During assembly of the panels 101, the clamping elements 31 are then rotated, such that a centering boss 37 engages in the slotted profile 35 and the clamping edges 31A, B engage in the profile chambers 112 of the two adjacent panels 101. Then, in the above-described manner, the clamping element 31 is secured in the slotted profile 35 with an attachment means 34, so that the panels 101 are clamped against the post 126. In this case also, the clamping elements 31 can be of two-part design, so that the clamping edges 31A,B can be rotated independently of each other.

[0046] In a further advantageous embodiment, the clamping elements 31' can be designed as shown in Fig. 4C, while one of the clamping edges 31A' with respect to the embodiments shown in Figs. 4A, B is extended with a supporting edge 36, a supporting surface of which, in mounted condition, can abut against an end face of the first, innermost sheet 102, at least a first stop surface 115 of a profile 110 placed against the end face mentioned. The opposite clamping edge 31B' is designed as a wedge-shaped ridge 31B', which can cooperate with a resilient element 142, which, prior to assembly, has been inserted into a profile chamber 112 of an adjacent panel 101. To that end, the profile chamber 112 can be provided at regular mutual distances with locking projections or a continuous locking edge 143.

[0047] The clamping element 31' shown in Fig. 4C is particularly suitable for horizontal use. To that end, clamping elements 31' are fitted in the slotted profiles 35 extending substantially horizontally, such that the clamping edge 31A' has the supporting edge 36 turned upwards and the ridge 31B' turned downwards. Thereupon, a panel 101 is placed in a slightly forwardly tilted position with a lower edge of the sheet 102 on the supporting edge 36. In the profile chamber 112 of an upper edge of this

panel 101, resilient elements 142 have been inserted. The panel 101 is then tilted to a vertical position, while a free end 142B of the resilient element 142, upon passing the ridge 131B', slightly compresses and when it has passed, rebounds so that the panel 101 is prevented from tilting back. Thus, in a very simple manner, the panels 101 can be anchored adjacent their top and bottom side, whereupon a mechanic has his hands free for attaching the vertical clamping elements 31'. The shock profiles 132 are then designed such that, on the one side, due to the flexible lips 133, they are sufficiently flexible to allow tilting of the panels 101 in the direction of the horizontal and/or vertical post during assembly work described hereinabove and, on the other side, due to the more rigid middle part 132, they are sufficiently rigid to be able to offer counter-pressure to forces working, in use, on the panels 101, for instance wind pressure.

[0048] Naturally, instead of horizontally, the clamping elements 31' can also be used vertically, and the profile chambers 112 can be provided with resilient elements 142 at both sides of, or around the panels 101 to be mounted. Thus, the panels 101 can be snapped onto the uprights 126 and/or horizontals in a perpendicular position. When the clamping elements 31' are used vertically, if desired, the clamping edge 31A' can be replaced with a similar wedge-shaped ridge as 31B'.

[0049] Further, like the clamping elements described hereinabove, the clamping element 31' can be designed as a continuous profile or as an element of limited length, while several clamping elements 31' per panel 101 are used. The same holds for the resilient element 142. Prior to the panels 101 being mounted, the clamping elements 31' can be attached to the slotted profile 35 or be manufactured integrally therewith.

[0050] In the embodiment shown in Fig. 4C, at a side proximal to the slotted profile 35, the shock profiles 132 are provided with a flexible flashing 136, which offers thermal insulation between the panel 101 and the slotted profile 35. The flashing 136 is flexible such that it can follow the outer contour of the resilient element 142, as shown on the right hand side in Fig. 4C.

[0051] After attachment of the clamping element 31, 31', for sealing the slit 30 between the sheets 103 of the panels 101, a cover profile 38 can be provided. To that end, the clamping elements 31, 31' or the separate clamping parts 31A,B, 31A',B' can be provided with a slot 40, on which a contour 39 provided on the cover profile 38 can engage. The cover profile 38 can be manufactured from a slightly flexible material and is preferably of such shape and size, that in mounted position, the edges of the contour 39 sealingly abut against the edges of the sheets 103 of the panels 101.

[0052] When the profiles, like in the above-described example, are used for attachment of the panel 101 to the outer wall, relatively high requirements will be imposed on the accuracy with which the profiles 110 are positioned relative to the panel 101. Due to the profile 110 according to the invention, in particular the first and second stop

surface 115, 116 thereof, these accuracy requirements can be met.

[0053] Moreover, again due to the profiles with the stop surfaces, the panels 1, 101 can be realized in a relatively simple manner. The first sheet 2, 102 is then laid on a horizontal base, whereupon along one or several sides of this sheet 2, 102, a profile part 10, 110 is provided. If desired, per side, a different profile part 10, 110 can be used. Owing to the stop surfaces 15, 16, 18; 115, 116, these loose profile parts 10, 110 can be provided in a simple manner at the proper location and in the proper position relative to each other and the sheet 2, 102, without, to that end, these parts 10,110 first having to be interconnected to form a frame, as is the case with the known panels 1, 101. It is noted that no high requirements are imposed on the corner connection of these profile parts 10, 110, as they are of little influence to the location and position of the sealing rubbers 20 or the clamping elements 31 which, in use, are inserted into the profiles 10, 110.

[0054] After the profiles 10, 110 have been provided, the spacers 4, 104 are glued to the sheet 2, 102, whereupon the whole is covered with the second sheet 3, 103. Then, the channel-shaped space 8, 108 between the edges of the sheets 2, 3; 102, 103 and the spacers 4, 104 is filled with a sealing mass 9, 109. This mass 9, 109 provides for the sheets 2, 3; 102, 103 to be glued to each other and sealed, and further contributes to the attachment of the profile 10, 110 against the sheet 2, 102. After the glue and the sealing mass have set, the panels 1, 101 can be used in a curtain wall as described herein-above.

[0055] The invention is not limited in any manner to the embodiments represented in the description and the drawings. Many variations thereon are possible within the framework of the invention as outlined by the claims.

[0056] For instance, the panels can comprise more than two sheets, and within one panel, several sheets with a profile according to the invention can be provided. For instance, sheets, located at the outside of the panel can each be provided with a profile as a result of which around the panel a double sealing can be provided. Also, a first sheet of the panel can be provided with a first profile, suitable for receiving a clamping element, and a second sheet of the same panel can be provided with a second profile, suitable for receiving a sealing rubber, so that a panel is obtained which can be attached to the framework through clamping, and which, moreover can be provided with sealing rubbers. Further, the profiles and the spacers can be integrated into a single, for instance extruded, profile.

[0057] Further, as the profiles can be placed against the different sides of a sheet, a sheet can be provided with a profile over only a part of its circumference, which cannot be realized with the known profiles, where the profile parts are first interconnected for forming a frame.

[0058] These and comparable variations are understood to fall within the framework of the invention as out-

lined by the claims.

Claims

1. A wall panel, comprising at least two substantially parallel sheets (2, 3; 102, 103) which are held at a mutual distance by spacers (4, 104) extending between the sheets (2, 3; 102, 103) adjacent the edges thereof, wherein along at least one side of the panel (1, 101) a profile (10, 110) extends, which profile (10, 110) comprises at least a first stop surface (15, 115) and at least a second stop surface (16, 18; 116), as well as a chamber (12, 112) open towards the surroundings, the first stop surface (15, 115) abutting against a longitudinal edge of one of the sheets (2, 3; 102, 103) and the second stop surface (16, 18; 116) abutting against one of the sides of the sheets (2, 3; 102, 103) extending substantially parallel to each other, **characterized in that** the profile (10, 110) is located substantially within a contour (C) of the panel (1, 101) defined by the sheets (2, 3; 102, 103).
2. A panel according to claim 1, wherein the contour is substantially block-shaped.
3. A panel according to claim 1 or 2, wherein the sheet (2, 102) against which the stop surfaces (15, 16; 115, 116) abut is shortened, so that the circumference of this sheet (2, 102) together with the profile (10, 110) is substantially equal to that of the adjacent sheet (3, 103).
4. A panel according to any of the preceding claims, wherein the first and second stop surface (15, 16; 115, 116) adjoin and are substantially at right angles to each other.
5. A panel according to any of the preceding claims, wherein the chamber (12) adjoins the first stop surface (15) and extends substantially in line with the sheet (2) against which this first stop surface (15) abuts, the chamber (12) being open at a side remote from this first stop surface (15).
6. A panel according to any of the claims 1 - 4, wherein the chamber (112) adjoins the second stop surface (116) and extends substantially between the two sheets (2, 3; 102, 103).
7. A panel according to any one of the preceding claims, wherein between the edges of the sheets (2, 3; 102, 103) and the spacers (4, 104) a channel-shaped space (8, 108) open towards the outside is defined, which space (8, 108) is filled with a sealing, preferably insulating mass (9, 109).

8. A panel according to any one of the preceding claims, wherein the sheets (2, 3; 102, 103) and the panel (1, 101) have a substantially rectangular shape.
9. A panel according to any one of the preceding claims, wherein the sheets (2, 3; 102, 103) are of glass.
10. A panel according to any one of the preceding claims, wherein the profile (10, 110) is glued onto the sheet (2, 102).
11. A panel according to any one of the preceding claims, wherein the profile (10, 110) is manufactured from plastic.
12. A panel according to any one of claims 1- 10, wherein the profile (10, 110) is manufactured from aluminum.
13. A panel according to any one of the preceding claims, wherein the profile (10, 110) is extruded.
14. A panel according to any one of the preceding claims, wherein in the chamber (12, 112) of the profile (10, 11) a sealing rubber (20) is fitted, provided with a sealing lip (22) extending beyond the contour (C) of the panel (1, 101), substantially parallel to the panel (1, 101).
15. The use of a panel according to any one of claims 1 - 13 for forming a curtain wall, wherein the panel (1, 101) is attached to a framework of vertical and horizontal posts (26) and wherein in the chamber (12, 112) of the profile (10, 110) a sealing rubber (20) is provided such that a sealing lip (22) of this sealing rubber (20) extends beyond the contour (C) of the panel (1, 101), substantially parallel to the panel (1, 101), the sealing lip (22) having a length such that it can abut in an overlapping manner against a sealing lip (22) of an adjacent panel (1, 101).
16. The use of a panel according to any one of claims 1-13 for forming a curtain wall, wherein the panel (1, 101) adjacent its edges is clamped onto a framework of vertical and horizontal posts (26) with the aid of clamping elements (31), which clamping elements (31), to that end, comprise a clamping edge (31A,B) which is inserted into the chamber (12, 112) of the profile (10, 110) and which clamping elements (31) are attached to the framework (26) with an attachment part (31C) adjoining the clamping edge (31A, B), the arrangement being such that a part of the panel (1, 101) located between the clamping edge (31A,B) and the framework (26) is clamped against the framework (26) by the clamping edge (31A,B).
17. A method for manufacturing a wall panel (1, 101) according to any one of claims 1 - 13, comprising the following steps:

- providing and attaching at least one profile (10, 110) against at least one longitudinal edge of a first sheet (2, 102) by abutting this or each profile (10, 110) by a first and second stop surface (15, 16; 115, 116) against abutting surfaces of the respective longitudinal edge of the sheet (2, 102) cooperating with these stop surfaces;
- attaching spacers (4, 104) on the first sheet-shaped element (2, 102) at some distance from the longitudinal edge;
- attaching a second sheet (3, 103) on the spacers (4, 104);
- filling with a sealing mass (9, 109) a channel-shaped space (8, 108) open towards the surroundings and bound between the edges of the sheets (2, 3; 102, 103) and the spacers (4, 104).

Patentansprüche

1. Wandpaneel mit wenigstens zwei im Wesentlichen parallelen Platten (2, 3; 102; 103), die von zwischen den Platten (2, 3; 102, 103), benachbart zu den Kanten der Platten verlaufenden Abstandshaltern (4, 104) auf Abstand zueinander gehalten werden, wobei entlang wenigstens einer Seite des Wandpaneels (1, 101) ein Profil (10, 110) verläuft, wobei das Profil (10, 110) wenigstens eine erste Anschlagfläche (15, 115) und wenigstens eine zweite Anschlagfläche (16, 18; 116) sowie eine zur Umgebung offene Kammer (12, 112) aufweist, wobei die erste Anschlagfläche (15, 115) an wenigstens einer Längskante einer der Platten (2, 3; 102, 103) anliegt und die zweite Anschlagfläche (16, 18; 116) an einer der Seiten der im Wesentlichen parallel zueinander verlaufenden Platten (2, 3; 102, 103) anliegt, **dadurch gekennzeichnet, dass** das Profil (10, 110) im Wesentlichen innerhalb einer Kontour (C) des durch die beiden Platten (2, 3; 102, 103) definierten Wandpaneels liegt.
2. Wandpaneel nach Anspruch 1, wobei die Kontour im Wesentlichen quaderförmig ist.
3. Wandpaneel nach Anspruch 1 oder 2, wobei diejenige Platte (2, 102), an der die Anschlagflächen (15, 16; 115, 116) anliegen, verkürzt ist, so dass der Umfang dieser Platte (2, 102) zusammen mit dem Profil (10, 110) im Wesentlichen gleich dem der benachbarten Platte (3, 103) ist.
4. Wandpaneel nach einem der vorhergehenden Ansprüche, wobei die erste und die zweite Anschlagfläche (15, 16; 115, 116) aneinander angrenzen und im Wesentlichen im rechten Winkel zueinander stehen.
5. Wandpaneel nach einem der vorhergehenden An-

- sprüche, wobei die Kammer (12) zu der ersten Anschlagfläche (15) benachbart ist und sich im Wesentlichen in Richtung der Platte (2) erstreckt, gegen die die erste Anschlagfläche (15) anliegt, wobei die Kammer (12) an der von der ersten Anschlagfläche (15) abgewandten Seite offen ist.
6. Wandpaneel nach einem der Ansprüche 1 bis 4, wobei die Kammer (112) an die zweite Anschlagfläche (116) angrenzt und im Wesentlichen zwischen den beiden Platten (2, 3; 102, 103) verläuft.
7. Wandpaneel nach einem der vorhergehenden Ansprüche, wobei zwischen den Kanten der Platten (2, 3; 102, 103) und den Abstandshaltern (4, 104) ein kanalförmiger, nach außen offener Raum (8, 108) definiert ist, wobei der Raum (8, 108) mit einem Dichtungsmittel, vorzugsweise mit einer Isoliermasse (9, 109) gefüllt ist.
8. Wandpaneel nach einem der vorhergehenden Ansprüche, wobei die Platten (2, 3; 102, 103) und das Wandpaneel (1, 101) eine im Wesentlichen rechteckige Form haben.
9. Wandpaneel nach einem der vorhergehenden Ansprüche, wobei die Platten (2, 3; 102, 103) aus Glas sind.
10. Wandpaneel nach einem der vorhergehenden Ansprüche, wobei das Profil (10, 110) an die Platte (2, 102) geklebt ist.
11. Wandpaneel nach einem der vorhergehenden Ansprüche, wobei das Profil (10, 110) aus Kunststoff hergestellt ist.
12. Wandpaneel nach einem der Ansprüche 1 bis 10, wobei das Profil (10, 110) aus Aluminium hergestellt ist.
13. Wandpaneel nach einem der vorhergehenden Ansprüche, wobei das Profil (10, 110) extrudiert ist,
14. Wandpaneel nach einem der vorhergehenden Ansprüche, wobei in die Kammer (12, 112) des Profils (10, 110) eine Gummidichtung (20) eingepasst ist, die mit einer Dichtungslippe (22) versehen ist, welche sich im Wesentlichen parallel zu dem Wandpaneel (1, 101) über die Kontour (C) des Wandpaneels (1, 101) hinaus erstreckt.
15. Verwendung eines Wandpaneels nach einem der Ansprüche 1 bis 13 zum Bilden einer Vorhangwand, wobei das Wandpaneel (1, 101) an einem Rahmen aus vertikalen und horizontalen Stangen (26) befestigt wird und wobei in der Kammer (12, 112) des Profils (10, 110) eine Gummidichtung (20) vorgese-
- hen wird, so dass eine Dichtungslippe (22) dieser Gummidichtung (20) im Wesentlichen parallel zu dem Wandpaneel (1, 101) über die Kontour (C) des Wandpaneels (1, 101) hinaus vorsteht, wobei die Dichtungslippe (22) eine solche Länge hat, dass sie in einer überlappenden Weise gegen eine Dichtungslippe (22) eines benachbarten Wandpaneels (1, 101) anliegen kann.
16. Verwendung eines Wandpaneels nach einem der Ansprüche 1 bis 13 zum Bilden einer Vorhangwand, wobei das Wandpaneel (1, 101) angrenzend an seine Kanten an einen Rahmen aus vertikalen und horizontalen Stangen (26) mit Hilfe von Klemmelementen (31) festgeklemmt wird, wobei die Klemmelemente (31) zu diesem Zweck eine Klemmkante (31A, B) aufweisen, die in die Kammer (12, 112) des Profils (10, 110) eingesetzt wird, und wobei die Klemmelemente (31) mit einem Befestigungsteil (31C), das an die Klemmkante (31A, B) angrenzt, an dem Rahmen (26) befestigt werden, wobei die Anordnung so ist, dass ein zwischen der Klemmkante (31A, B) und dem Rahmen (26) liegender Teil des Wandpaneels (1, 101) durch die Klemmkante (31A, B) gegen den Rahmen (26) geklemmt wird.
17. Verfahren zum Herstellen eines Wandpaneels (1, 101) gemäß einem der Ansprüche 1 bis 13 mit den folgenden Schritten: Bereitstellen und Befestigen wenigstens eines Profils (10, 110) an wenigstens eine Längskante einer ersten Platte (2, 102), indem dieses oder jedes Profil (10, 110) mit einer ersten und einer zweiten Anschlagfläche (15, 16; 115, 116) gegen Anlageoberflächen der jeweiligen Längskante der Platte (2, 102), die mit diesen Anschlagflächen zusammenwirkt, in Anlage gebracht wird, Befestigen von Abstandshaltern (4, 104) an dem ersten plattenförmigen Element (2, 102) in einem Abstand von der Längskante, Befestigen einer zweiten Platte (3, 103) an den Abstandshaltern (4, 104), Füllen eines kanalförmigen, zu der Umgebung offenen und zwischen den Kanten der Platten (2, 3; 102, 103) und den Abstandshaltern (4, 104) begrenzten Raums (8, 108) mit einer Dichtungsmasse.

Revendications

1. Panneau de mur, comprenant au moins deux feuilles (2, 3 ; 102, 103) sensiblement parallèles qui sont maintenues à distance mutuelle par des pièces d'écartement (4, 104) s'étendant entre les feuilles (2, 3 ; 102, 103) de manière adjacente aux bords de celles-ci, dans lequel le long d'au moins un côté du panneau (1, 101) s'étend un profilé (10, 110), lequel profilé (10, 110) comprend au moins une première surface de butée (15, 115) et au moins une seconde

- surface de butée (16, 18 ; 116), ainsi qu'une chambre (12, 112) ouverte en direction des zones environnantes, la première surface de butée (15, 115) étant en butée contre un bord longitudinal d'une des feuilles (2, 3 ; 102, 103) et la seconde surface de butée (16, 18 ; 116) étant en butée contre un des côtés des feuilles (2, 3 ; 102, 103) s'étendant sensiblement parallèlement les uns aux autres, **caractérisé en ce que** le profilé (10, 110) est situé sensiblement à l'intérieur d'un contour (C) du panneau (1, 101) défini par les feuilles (2, 3 ; 102, 103).
2. Panneau selon la revendication 1, dans lequel le contour est sensiblement en forme de bloc.
 3. Panneau selon la revendication 1 ou 2, dans lequel la feuille (2, 102) contre laquelle les surfaces de butée (15, 16 ; 115, 116) sont en butée est raccourcie, de sorte que la circonférence de cette feuille (2, 102) conjointement avec le profilé (10, 110) est sensiblement égale à la feuille adjacente (3, 103).
 4. Panneau selon l'une quelconque des revendications précédentes, dans lequel les première et seconde surfaces de butée (15, 16 ; 115, 116) sont attenantes et sont sensiblement à angle droit l'une par rapport à l'autre.
 5. Panneau selon l'une quelconque des revendications précédentes, dans lequel la chambre (12) est attenante à la première surface de butée (15) et s'étend sensiblement en alignement sur la feuille (2) contre laquelle cette première surface de butée (15) est en butée, la chambre (12) étant ouverte au niveau d'un côté distant de cette première surface de butée (15).
 6. Panneau selon l'une quelconque des revendications 1 à 4, dans lequel la chambre (112) est attenante à la seconde surface de butée (116) et s'étend sensiblement entre les deux feuilles (2, 3 ; 102, 103).
 7. Panneau selon l'une quelconque des revendications précédentes, dans lequel entre les bords des feuilles (2, 3 ; 102, 103) et les pièces d'écartement (4, 104) est défini un espace en forme de canal (8, 108) ouvert en direction de l'extérieur, lequel espace (8, 108) est rempli d'une masse d'étanchéité, de préférence isolante (9, 109).
 8. Panneau selon l'une quelconque des revendications précédentes, dans lequel les feuilles (2, 3 ; 102, 103) et le panneau (1, 101) présentent une forme sensiblement rectangulaire.
 9. Panneau selon l'une quelconque des revendications précédentes, dans lequel les feuilles (2, 3 ; 102, 103) sont en verre.
 10. Panneau selon l'une quelconque des revendications précédentes, dans lequel le profilé (10, 110) est collé sur la feuille (2, 102).
 11. Panneau selon l'une quelconque des revendications précédentes, dans lequel le profilé (10, 110) est fabriqué en plastique.
 12. Panneau selon l'une quelconque des revendications 1 à 10, dans lequel le profilé (10, 110) est fabriqué en aluminium.
 13. Panneau selon l'une quelconque des revendications précédentes, dans lequel le profilé (10, 110) est extrudé.
 14. Panneau selon l'une quelconque des revendications précédentes, dans lequel dans la chambre (12, 112) du profilé (10, 11) est inséré un caoutchouc d'étanchéité (20), pourvu d'une lèvre d'étanchéité (22) s'étendant au-delà du contour (C) du panneau (1, 101), sensiblement parallèlement au panneau (1, 101).
 15. Utilisation d'un panneau selon l'une quelconque des revendications 1 à 13 pour former un mur rideau, dans lequel le panneau (1, 101) est fixé à une ossature de colonnes verticales et horizontales (26) et dans lequel il est prévu dans la chambre (12, 112) du profilé (10, 110) un caoutchouc d'étanchéité (20) de telle sorte qu'une lèvre d'étanchéité (22) de ce caoutchouc d'étanchéité (20) s'étend au-delà du contour (C) du panneau (1, 101), sensiblement parallèle au panneau (1, 101), la lèvre d'étanchéité (22) présentant une longueur telle qu'elle peut être en butée par chevauchement contre une lèvre d'étanchéité (22) d'un panneau adjacent (1, 101).
 16. Utilisation d'un panneau selon l'une quelconque des revendications 1 à 13 pour former un mur rideau, dans lequel le panneau (1, 101) adjacent à ses bords est serré sur une ossature de colonnes verticales et horizontales (26) à l'aide d'éléments de serrage (31), lesquels éléments de serrage (31), à cette fin, comprennent un bord de serrage (31A, B) qui est inséré à l'intérieur de la chambre (12, 112) du profilé (10, 110) et lesquels éléments de serrage (31) sont fixés à l'ossature (26) par une partie de fixation (31C) attenante au bord de serrage (31A, B), l'agencement étant tel qu'une partie du panneau (1, 101) située entre le bord de serrage (31A, B) et l'ossature (26) est serrée contre l'ossature (26) par le bord de serrage (31A, B).
 17. Procédé de fabrication d'un panneau de mur (1, 101) selon l'une quelconque des revendications 1 à 13, comprenant les étapes suivantes :

- la fourniture et la fixation d'au moins un profilé (10, 110) contre au moins un bord longitudinal d'une première feuille (2, 102) en mettant en butée ce ou chaque profilé (10, 110) par une première et seconde surface de butée (15, 16 ; 115, 116) contre les surfaces de butée du bord longitudinal respectif de la feuille (2, 102) coopérant avec ces surfaces de butée ; 5
- la fixation de pièces d'écartement (4, 104) sur le premier élément en forme de plaque (2, 102) à une certaine distance du bord longitudinal ; 10
- la fixation d'une seconde feuille (3, 103) sur les pièces d'écartement (4, 104) ;
- le remplissage avec une masse d'étanchéité (9, 109) d'un espace en forme de canal (8, 108) ouvert en direction des zones environnantes et délimité entre les bords des feuilles (2, 3 ; 102, 103) et les pièces d'écartement (4, 104) 15

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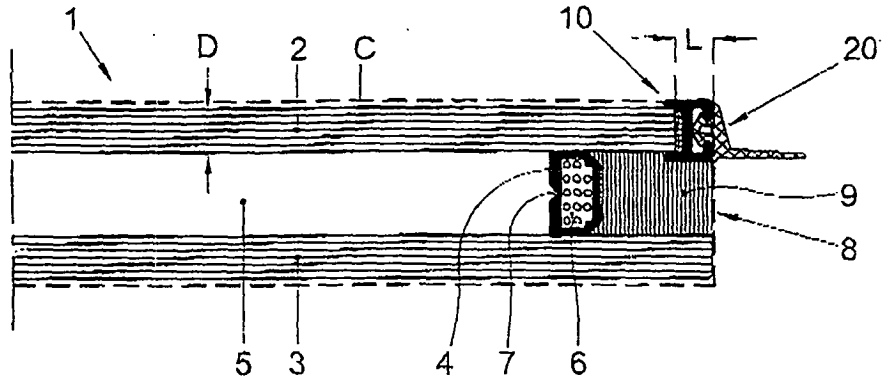


Fig. 1

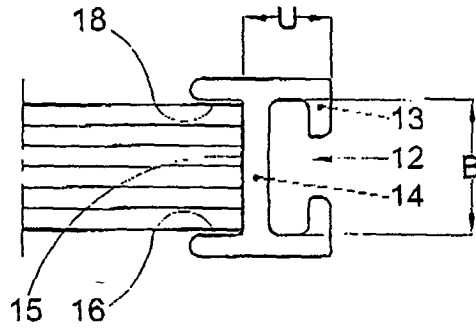


Fig. 1A

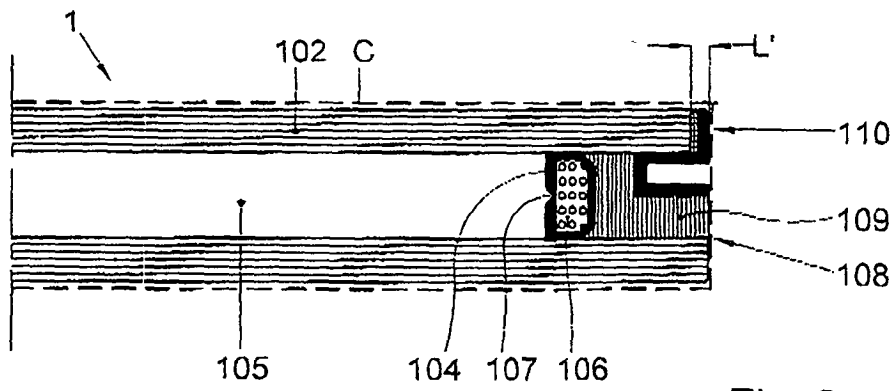


Fig. 3

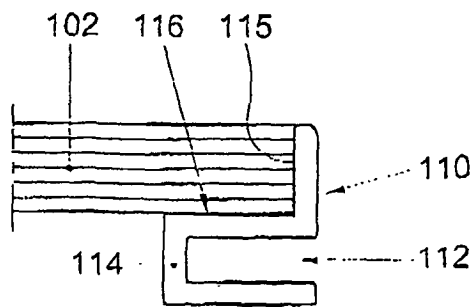


Fig. 3A

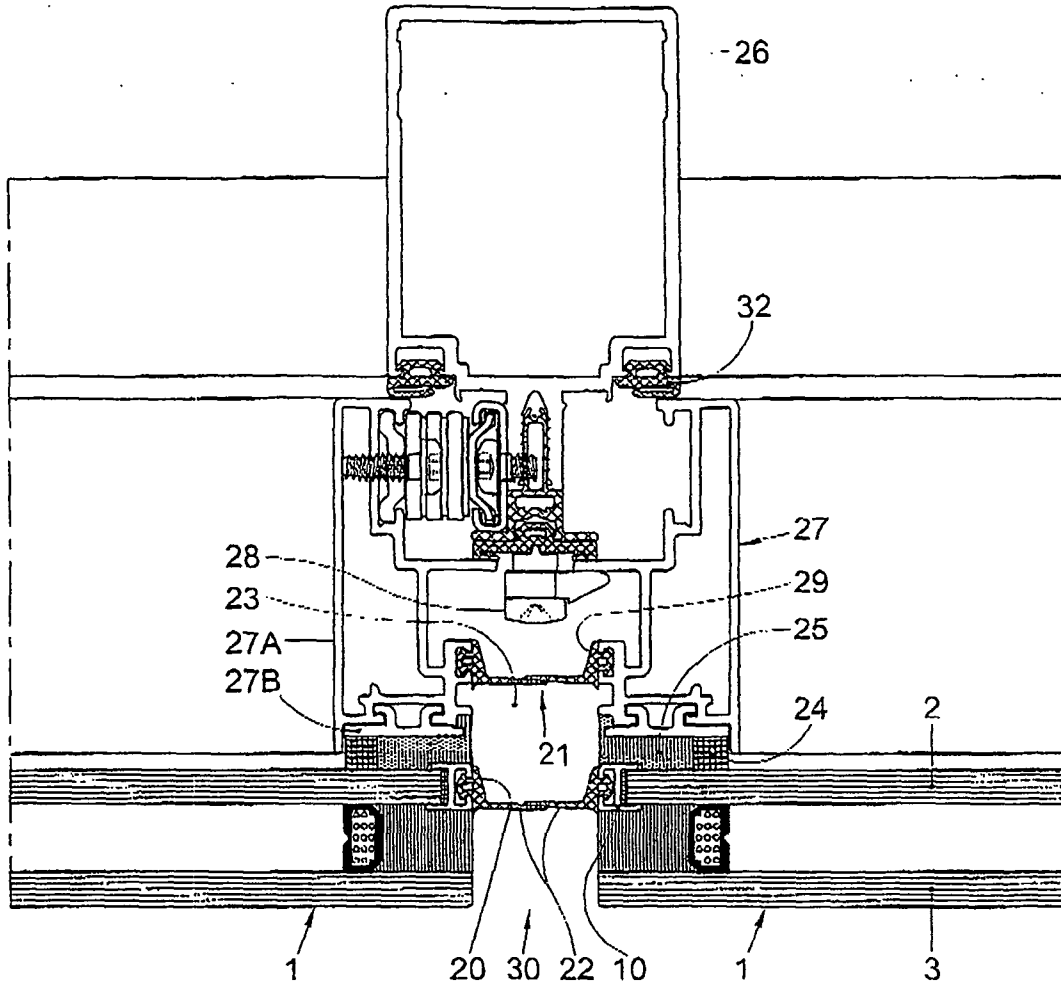


Fig. 2

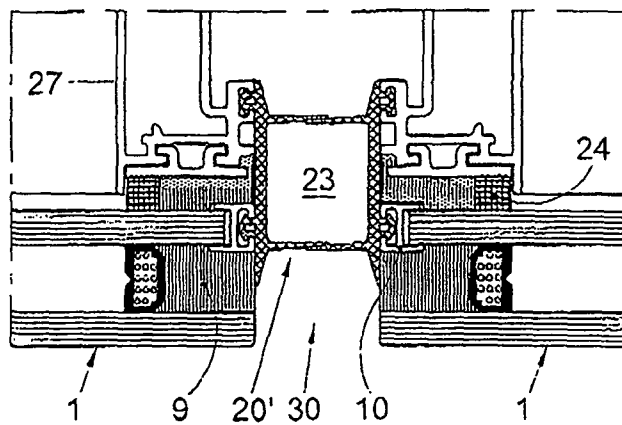


Fig. 2A

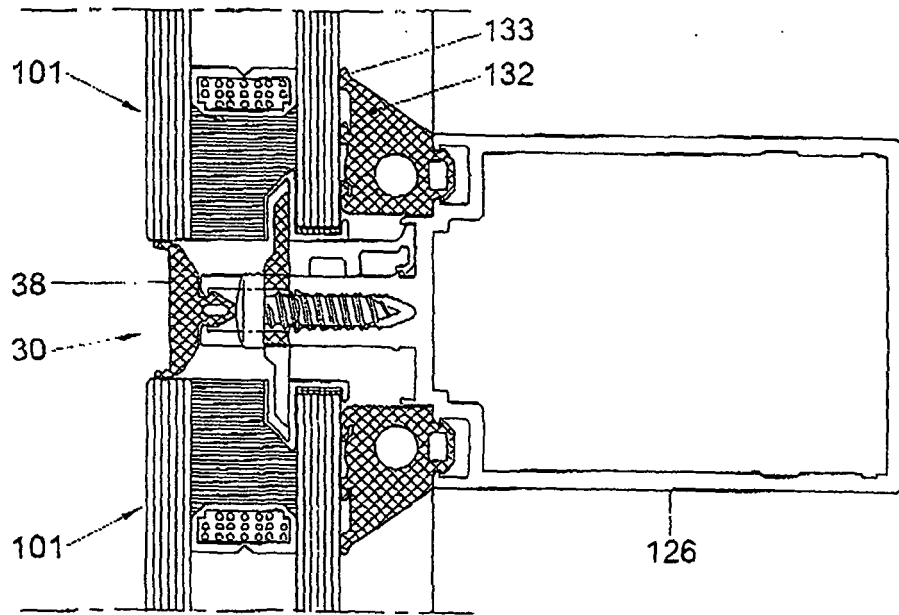


Fig. 4A

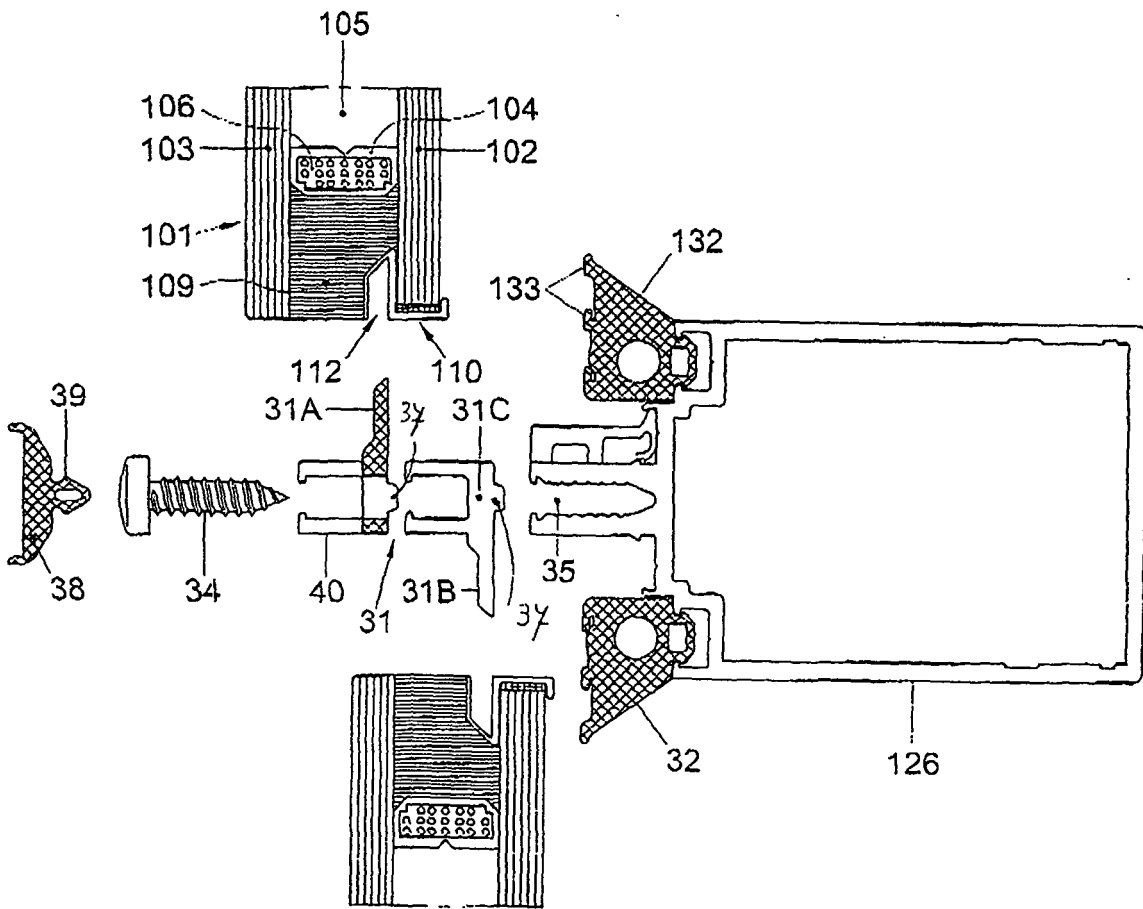


Fig. 4B

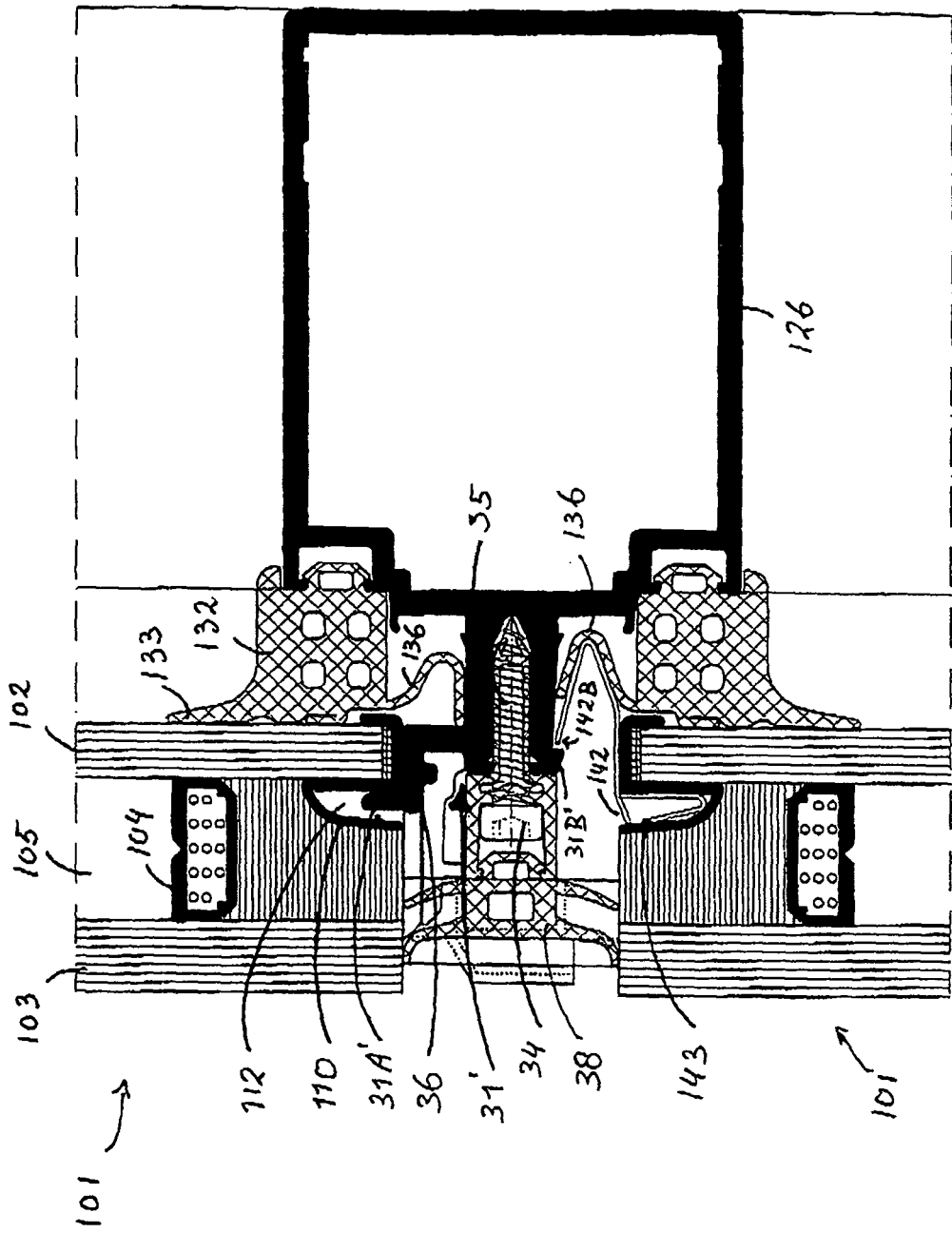


FIG. 4C

REFERENCES CITED IN THE DESCRIPTION

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