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(54) **SUPPORT AND CONSTRUCTION FOR FACADE PANELS IN A CURTAIN WALL AND CURTAIN WALL**

TRÄGER UND KONSTRUKTION FÜR FASSADENPLATTEN IN EINER VORHANGWAND UND VORHANGWAND

SUPPORT ET CONSTRUCTION POUR PANNEAUX DE FAÇADE DANS UNE FAÇADE-RIDEAUX ET FAÇADE-RIDEAUX

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(56) References cited:

**EP-A2- 1 460 191 DE-A1- 19 606 906
DE-A1- 19 854 203 US-A- 4 428 171**

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Description

[0001] The present invention relates to a curtain wall.

[0002] More specifically the invention relates to curtain walls that primarily consist of glass facade panels that are placed in a construction consisting of vertical elements, called posts, and horizontal elements, called rails.

[0003] In the case of relatively high weights of the facade panels and/or with fire-resistant curtain walls, the posts and rails are connected together by cruciform supports that are fastened to a post, and of which two wings are fastened to rails, and if need be rest on a nose of the rails, for example in a supporting structure made of aluminium profiles. It goes without saying that such supports can also be constructed with one wing for use with posts that only have rails on one side.

[0004] The facade panels, for example glass panels that can be relatively heavy, then rest on the supports, which transmit the weight of the facade panels to the posts via the rails.

[0005] Such supports are known from DE 19854203, DE29912697 and EP 1460191 for example.

[0006] However, such supports and constructions for curtain walls that make use of them have a number of disadvantages.

[0007] For example the supports, together with the rails to which they are connected, can bend under the weight of the supported facade panels. This can lead to a rail touching the underlying facade panel, which can be damaged as a result.

[0008] A solution for this is to use deeper rails, i.e. rails that extend over a greater horizontal distance, which is aesthetically unattractive and of course is more expensive on account of an increased use of materials.

[0009] Deeper rails also only have a limited effect on the rigidity of the rail, because while the dimensions of the rails are indeed larger in the horizontal direction, but they are generally hollow profiles such that the rigidity in the vertical direction only increases to a limited extent, while bending takes place in the vertical direction.

[0010] Another solution is disclosed in US4428171, in which the wings have upward and downward reinforcement ribs to make them stronger, but are still connected to the rails.

[0011] Wings of the traditional supports cannot be made more rigid by giving them a greater height, because the height is limited by the vertical distance between two facade panels, which must be kept small.

[0012] The purpose of the present invention is to provide a solution to the aforementioned and other disadvantages, by providing a curtain wall as defined in claim 1.

[0013] This means in practice that the rail has no supportive function for the vertical forces exerted by a facade panel but that these forces are transferred directly to the posts by means of the supports.

[0014] As a result the wings of the supports may possibly bend slightly under the weight of the facade panels, without this bending being passed on to the rails.

[0015] Preferably the wing is essentially T shaped here, viewed in the vertical cross-section, whereby the reinforcing rib is formed by the head of the T.

[0016] For clarity it is noted here that this is a T turned by 90°.

[0017] This thus implies that the reinforcing rib extends both upwards and downwards. In practice this reinforcing rib, after construction of the curtain wall, must be alongside the facade panels, so that a part of the wing can be at a lower height between the facade panels, because the vertical distance between the facade panels must be kept small.

[0018] In a preferred embodiment the components of the construction are designed such that the wing can move with respect to the rail, whereby a movement is possible in the vertical direction over a minimum distance.

[0019] This thus means that the wing and the rails are not designed to be connected together, for example due to a complementary shape or by facilities for coupling means.

[0020] In a further preferred embodiment of the construction, the rail is provided with a detail for a seal on the top and/or bottom edge, whereby the detail or details are at least partially above or below and around the reinforcing rib.

[0021] As a result standard seals can be used to seal the space between a facade panel and a rail, while there is nevertheless room for the reinforcing rib.

[0022] In a further preferred embodiment the construction also comprises a screw profile, whereby the rail and screw profile have a partially complementary shape so that the screw profile can be inserted in the rail.

[0023] As a result it is possible to use a rail without a protruding ridge or nose, but which nonetheless has a good grip point for screws of a clamping profile. As a result rails can be made to the desired size more easily, because it is not necessary to remove a part of a nose.

[0024] When such a screw profile is made of plastic, it can also act as a screw profile and insulator at the same time.

[0025] The reinforcing rib of the wing, viewed in the horizontal direction, is at least partly between the rail and each of the two facade panels located above one another.

[0026] With the intention of better showing the characteristics of the invention, a preferred embodiment of a construction, including a support, for building a curtain wall according to the invention and the use thereof is described hereinafter by way of an example, without any limiting nature, with reference to the accompanying drawings, wherein:

Figure 1 shows an exploded view of a traditional construction of a post with two rails for a curtain wall; figure 2 shows a cross-section of the construction of figure 1 according to line II-II in a further finished state; figure 3 shows a perspective view of a part of a con-

struction according to the invention in a situation in which the construction is partially constructed; figure 4 shows the construction of figure 3 in a further advanced state of construction; figure 5 shows a cross-section of the construction of figure 4 according to line V-V; figure 6 shows a support according to the invention; figure 7 shows an alternative construction according to the invention; and figure 8 shows the detail indicated by F8 in figure 7 on a larger scale.

[0027] The part of a curtain wall 1 shown in figures 1 and 2 primarily consists of a post 2, made from a hollow aluminium post profile, and two rails 3, made of hollow aluminium rail profiles, that are fastened together. It goes without saying that an entire curtain wall 1 comprises a large number of such posts 2 and rails 3.

[0028] The post 2 and rails 3 are provided with details 5 at two edges in which seals 6 are affixed that can seal off openings between the post 2 and the rails 3 on the one hand, and a facade panel 7, for example a glass panel, on the other hand.

[0029] The rails 3 are provided with a nose 8, which is a double ridge 9 with a narrow groove 10 between them. The nose 8 protrudes out of the rails 3 in the direction of the facade panel 7.

[0030] A cruciform support 11 is fastened to the post 2 and rails 3, that primarily consists of a body 12 that is fastened to the post 2 by means of bolts 13 and two wings 14 that are each fastened to a rail 3 by means of bolts 14. In this case, but not necessarily, the support 11 is made of steel, but could also be made of aluminium or another metal.

[0031] A facade panel rests on a wing 14 of a support 11 via a small supporting block 15, and this wing 14 in turn partly rests on the nose 8 of the rails 3, and partly rests on the post 2 via the body 12.

[0032] An insulator 16 is affixed in the nose 8 between two facade panels 7 located above one another, which counteracts air circulation in the space between two facade panels 7 and thereby increases the insulating properties of the curtain wall 1.

[0033] The transition between two facade panels 7 is covered by a clamping profile 17 of two parts screwed into the insulator 16 and the nose 8. This clamping profile 17 clamps facade panels 7 against the rails 3, so that the facade panels are well secured in the construction of rails 3 and posts.

[0034] Because the rails 3 bend under the weight of the facade panels 7, there is a risk of the rails 3 touching the underlying facade panel 7, in the middle between two posts 2, which can lead to damage. Thus when designing the curtain wall 1 particular attention must be paid to the rails 3 being designed with sufficient rigidity.

[0035] The maximum vertical distance between two facade panels 7 is defined by the height H of the rails 3 in combination with the overlap, set by standards, between

the clamping profile 17 and a facade panel 7 and a small clearance to prevent contact. It is undesirable here to increase the height H of the rails 3 with regard to the undesired visual impact thereof.

[0036] It is clear that in this traditional curtain wall the maximum height A of the wing, and thus its rigidity, is limited by the maximum vertical distance between two facade panels 7.

[0037] A curtain wall 1 that is composed of a construction according to the invention, as shown in figures 3 to 6, differs as follows from the traditional curtain wall 1 described above.

[0038] The support 11 is constructed such that only the body 12 contains holes 18 to fasten the support 11 to the post 2. The wings 14 are not designed to be connected to the rails 3. The result is that the support 11 is then only fastened to the post 2.

[0039] In order to make room for this support 11 a part of the nose 8 is milled away.

[0040] The wings 14 of the support 11 are provided with a reinforcing rib 19, which extends over the length L of the wing 14 and protrudes both below and above the part 20 of the wing 14 on which the facade panel 7 rests. Due to its height A the reinforcing rib 19 provides effective resistance against vertical bending of the wing 14.

[0041] The wings 14 have a cross-section that has the form of a tilted T, whereby the reinforcing rib 19 forms the head of the T.

[0042] The rails 3 are constructed with a deepened section 21 that is located between the details 5 for seals 6. This deepened section 21 provides room for the reinforcing rib 19, so that the reinforcing rib 19 has a height A that is greater than the maximum vertical distance between two facade panels 7, whereby the reinforcing rib 19 is between the rail 3 and the facade panel 7.

[0043] As can be seen in figure 5 in particular, the details 5 for seals 6 fit widely around the reinforcing rib 19, so that this reinforcing rib 19 can move freely between the details 5 for seals 6, at least over a certain distance.

[0044] As shown in figures 4 and 5, in this case the construction is provided with an extension piece 22 that is mounted on the support 11. To this end this extension piece 22 and the support 11 are provided with holes 23 in which bolts can be affixed. By means of this extension piece 22 an increased supporting surface for a facade panel 7 is obtained.

[0045] As a result, with one size of support 11 and various sizes of extension pieces, very many different thicknesses of facade panels can be supported. It is thus not necessary to make and keep a stock of a number of sizes of the relatively complex and thus expensive supports 11.

[0046] The extension piece can, depending on the material from which it is made, also partially act as an insulator.

[0047] In this construction the weight of the facade panels 7 is transmitted directly to the posts 2 via the supports 11, without this weight being transmitted to the posts 2 via the rails 3.

[0048] The construction shown in figures 7 and 8 differs from the construction of figures 3 to 6 because the rail profiles from which the rails 3 are made are not constructed with a nose 8.

[0049] Instead of this the deepened section 21 is constructed as an undercut groove that enables a complementarily shaped aluminium screw profile 24 to be inserted there, in which the screws with which the clamping profile 17 is fastened can grip. As a result a traditional plastic insulator can be used.

[0050] Alternatively, for better insulating properties this could also be a combined screw/insulator profile that is entirely or partially made of plastic.

[0051] As a result no part of a nose 8 needs to be removed, but the space between the facade panels 7 is filled with a separate screw profile 24 over the distance that is necessary, which facilitates making the rails 3 to size from rail profiles.

[0052] The present invention is by no means limited to the embodiments described as an example and shown in the drawings, but a support, construction and curtain wall according to the invention can be realised in all kinds of forms and dimensions without departing from the scope of the invention, which is defined by the appended claims.

Claims

1. Curtain wall of facade panels (7) placed in a construction of posts (2) and rails (3), whereby this construction comprises at least one support (11) for such facade panels (7), whereby the support (11) comprises a body (12) to fasten the support (11) to a post (2) and comprises at least one wing (14) extending sideways in order to support a facade panel (7), directly or otherwise, whereby the wing (14) is provided with a reinforcing rib (19) against vertical bending, and whereby this reinforcing rib (19) extends in the longitudinal direction (L) of the wing (14) and whereby this reinforcing rib (19) extends upwards and/or downwards, whereby the construction defines a maximum vertical distance between two facade panels to be placed above one another (7), and whereby the height (A) of the wing (14) at the location of the reinforcing rib (19) is greater than the said maximum vertical distance, whereby the reinforcing rib (19) of the wing (14), viewed in the horizontal direction, is at least partly between the rail (3) and at least one of the two facade panels (7) placed above one another, wherein the support (11) is fastened to a post (2) and wherein a facade panel (7) is supported in the vertical direction by a post (2) or posts (2) by means of one or more of the said supports (11), **characterised in that** the facade panel (7) is, in the vertical direction, not supported by means of the rail (3).

2. Curtain wall according to claim 1, **characterised in that**, viewed in the vertical cross-section, the wing (14) is essentially T shaped, whereby the reinforcing rib (19) is formed by the head of the T.

3. Curtain wall according to any one of the previous claims, **characterised in that** the support is primarily or entirely made of steel or aluminium.

4. Curtain wall according to any one of the previous claims, **characterised in that** an extension piece (22) is provided by or mounted on the support to increase the size of a supporting surface formed by the support (11).

5. Curtain wall according any one of the previous claims, **characterised in that** the wing (14) can move with respect to the rail (3), whereby a movement is possible at least in the vertical direction over a minimum distance.

6. Curtain wall according to claim 5, **characterised in that** the rail (3) is provided with a detail (5) for a seal (6) near the top and/or bottom edge, whereby the detail (5) or the details (5) are at least partially above or below the reinforcing rib (19).

7. Curtain wall according to any one of the previous claims, **characterised in that** the rail (3) is made of aluminium.

8. Curtain wall according to any one of the previous claims, **characterised in that** it also comprises a screw profile (24), whereby the rail (3) and the screw profile (24) partly have a complementary shape so that the screw profile (24) can be inserted in the rail (3).

9. Curtain wall according to claim 8, **characterised in that** the screw profile (24) is made of plastic and/or aluminium.

10. Curtain wall according to any one of the previous claims, **characterised in that** the reinforcing rib (19) of the wing (14), viewed in the horizontal direction, is at least partly between the rail (3) and each of the two facade panels placed above one another (7).

11. Curtain wall according to any one of the previous claims, **characterised in that** the facade panels (7) are primarily glass panels.

Patentansprüche

1. Vorhangwand aus Fassadenpaneelen (7), die in einer Konstruktion aus Pfosten (2) und Riegeln (3) angeordnet sind, wobei diese Konstruktion mindestens

eine Stütze (11) für solche Fassadenpaneele (7) umfasst, wobei die Stütze (11) einen Körper (12) zur Befestigung der Stütze (11) an einem Pfosten (2) umfasst und mindestens einen sich seitwärts erstreckenden Flügel (14) zur direkten oder anderweitigen Unterstützung eines Fassadenpaneels (7) umfasst, wobei der Flügel (14) mit einer Verstärkungsrippe (19) gegen vertikales Durchbiegen versehen ist und wobei diese Verstärkungsrippe (19) sich in der Längsrichtung (L) des Flügels (14) erstreckt und wobei diese Verstärkungsrippe (19) sich aufwärts und/oder abwärts erstreckt, wobei die Konstruktion einen maximalen vertikalen Abstand zwischen zwei übereinander anzuordnenden Fassadenpaneelen (7) definiert, und wobei die Höhe (A) des Flügels (14) an der Stelle der Verstärkungsrippe (19) größer als der besagte maximale vertikale Abstand ist, wobei die Verstärkungsrippe (19) des Flügels (14), in horizontaler Richtung gesehen, sich mindestens teilweise zwischen dem Riegel (3) und mindestens einem der zwei übereinander angeordneten Fassadenpaneele (7) befindet, wobei die Stütze (11) an einem Pfosten (2) befestigt ist und wobei ein Fassadenpaneel (7) in vertikaler Richtung durch einen Pfosten (2) oder mehrere Pfosten (2) mittels einer oder mehrerer der vorgenannten Stützen (11) gestützt wird, **dadurch gekennzeichnet, dass** das Fassadenpaneel (7) in der vertikalen Richtung nicht mittels des Riegels (3) gestützt wird.

2. Vorhangwand nach Anspruch 1, **dadurch gekennzeichnet, dass**, im vertikalen Querschnitt gesehen, der Flügel (14) im Wesentlichen T-förmig ist, wobei die Verstärkungsrippe (19) durch den Kopf des T gebildet wird.
3. Vorhangwand nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Stütze teilweise oder vollständig aus Stahl oder Aluminium hergestellt ist.
4. Vorhangwand nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** ein Verlängerungsstück (22) bei der Stütze vorgesehen oder daran montiert ist, um die Größe einer von der Stütze (11) geformten Stützfläche zu vergrößern.
5. Vorhangwand nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Flügel (14) in Bezug zu dem Riegel (3) bewegbar ist, wobei eine Bewegung mindestens in vertikaler Richtung über einen Mindestabstand möglich ist.
6. Vorhangwand nach Anspruch 5, **dadurch gekennzeichnet, dass** der Riegel (3) mit einem Detail (5) für eine Dichtung (6) in Nähe der Ober- und/oder Unterkante versehen ist, wobei das Detail (5) oder die Details (5) sich mindestens teilweise über oder

unter der Verstärkungsrippe (19) befinden.

7. Vorhangwand nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Riegel (3) aus Aluminium hergestellt ist.
8. Vorhangwand nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** sie auch ein Schraubprofil (24) umfasst, wobei der Riegel (3) und das Schraubprofil (24) teilweise eine komplementäre Form aufweisen, sodass das Schraubprofil (24) in den Riegel (3) eingebracht werden kann.
9. Vorhangwand nach Anspruch 8, **dadurch gekennzeichnet, dass** das Schraubprofil (24) aus Kunststoff und/oder Aluminium hergestellt ist.
10. Vorhangwand nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Verstärkungsrippe (19) des Flügels (14), in horizontaler Richtung gesehen, sich mindestens teilweise zwischen dem Riegel (3) und jedem der zwei übereinander angeordneten Fassadenpaneele (7) befindet.
11. Vorhangwand nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Fassadenpaneele (7) hauptsächlich Glaspaneele sind.

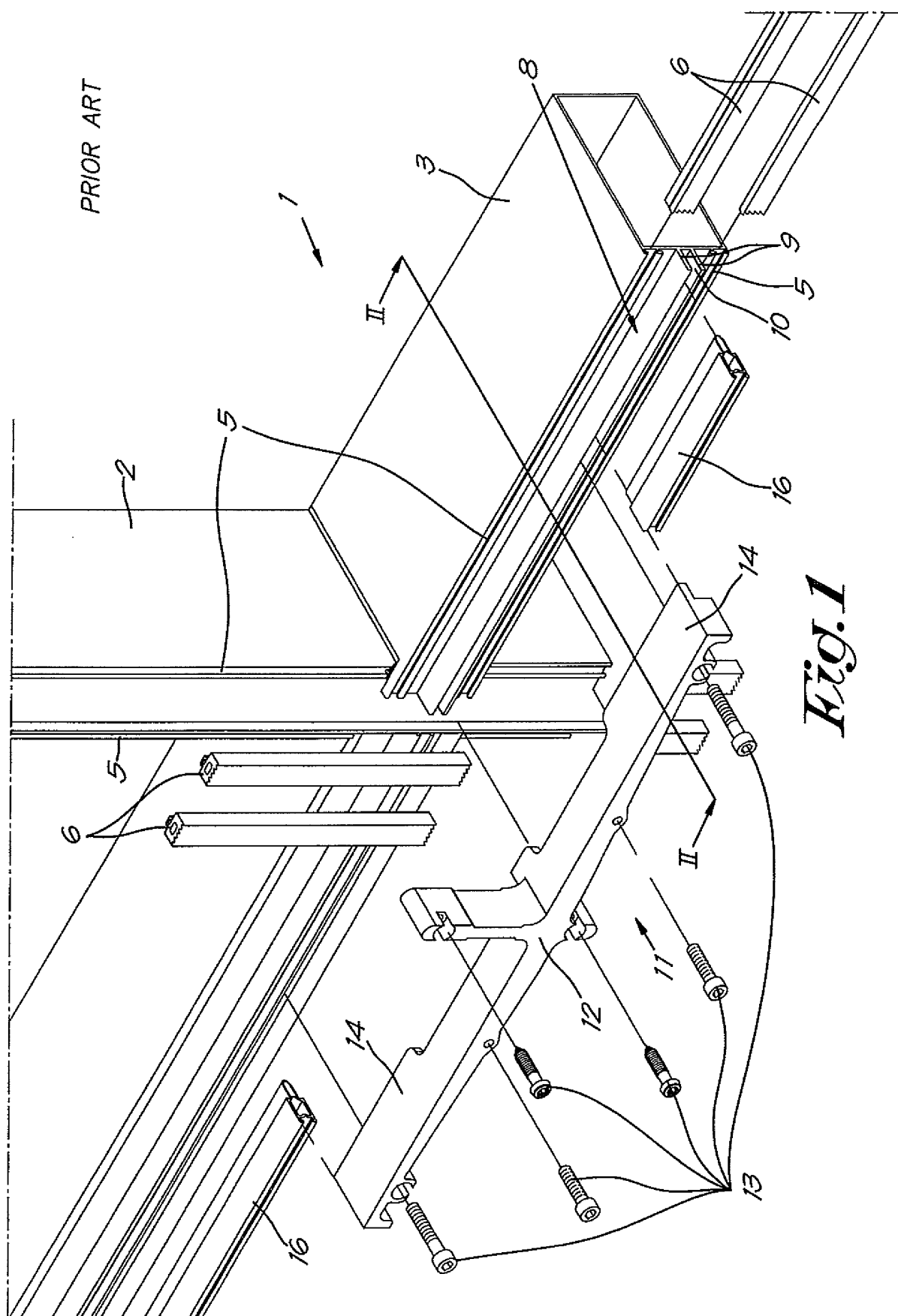
30 Revendications

1. Mur rideau de panneaux de façade (7) placés dans une structure de montants (2) et de rails (3), ladite structure comprenant au moins un support (11) pour lesdits panneaux de façade (7), le support (11) comprenant un corps (12) pour fixer le support (11) à un montant (2) et comprenant au moins une aile (14) s'étendant en direction latérale dans le but de supporter un panneau de façade (7), de manière directe ou d'une autre manière, l'aile (14) étant munie d'une nervure de renforcement (19) pour s'opposer à la flexion verticale, et cette nervure de renforcement (19) s'étendant dans la direction longitudinale (L) de l'aile (14) et cette nervure de renforcement (19) s'étendant vers le haut et/ou vers le bas, la structure définissant une distance verticale maximale entre deux panneaux de façade (7) destinés à venir se placer l'un par-dessus l'autre, et la hauteur (A) de l'aile (14), à l'endroit occupé par la nervure de renforcement (19), étant supérieure à ladite distance verticale maximale, la nervure de renforcement (19) de l'aile (14), lorsqu'on regarde dans la direction horizontale, étant disposée au moins en partie entre le rail (3) et au moins un des panneaux de façade (7) placés l'un par-dessus l'autre, le support (11) étant fixé à un montant (2) et un panneau de façade (7) étant supporté dans la direction verticale par un montant (2) ou par des montants (2) au moyen d'un ou

plusieurs desdits supports (11), **caractérisé en ce que** le panneau de façade (7), dans la direction verticale, n'est pas supporté au moyen du rail (3).

2. Mur rideau selon la revendication 1, **caractérisé en ce que**, lorsqu'on regarde dans une vue verticale en coupe transversale, l'aile (14) prend essentiellement une configuration en forme de T, la nervure de renforcement (19) étant formée par la tête du T. 5
10
3. Mur rideau selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le support est réalisé, à titre principal ou entièrement, en acier ou en aluminium. 15
4. Mur rideau selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'on** prévoit une pièce de prolongement (22) via le support ou montée sur le support afin d'augmenter la dimension d'une surface de support formée par le support (11). 20
5. Mur rideau selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'aile (14) peut se déplacer par rapport au rail (3), un mouvement étant possible au moins dans la direction verticale sur une distance minimale. 25
6. Mur rideau selon la revendication 5, **caractérisé en ce que** le rail (3) est muni d'un détail (5) pour un joint d'étanchéité (6) à proximité du bord supérieur et/ou du bord inférieur, le détail (5) ou les détails (5) étant disposé(s) au moins en partie au-dessus ou en dessous de la nervure de renforcement (19). 30
7. Mur rideau selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le rail (3) est réalisé en aluminium. 35
8. Mur rideau selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'il** comprend également un profilé à visser (24), le rail (3) et le profilé à visser (24) possédant en partie une configuration complémentaire d'une manière telle que le profilé à visser (24) peut être inséré dans le rail (3). 40
45
9. Mur rideau selon la revendication 8, **caractérisé en ce que** le profilé à visser (24) est réalisé en une matière plastique et/ou en aluminium. 50
10. Mur rideau selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la nervure de renforcement (19) de l'aile (14), lorsqu'on regarde dans la direction horizontale, vient se disposer au moins en partie entre le rail (3) et chacun des deux panneaux de façade (7) placés l'un par-dessus l'autre. 55

11. Mur rideau selon l'une quelconque des revendications précédentes, **caractérisé en ce que** les panneaux de façade (7) représentent principalement des panneaux de verre.



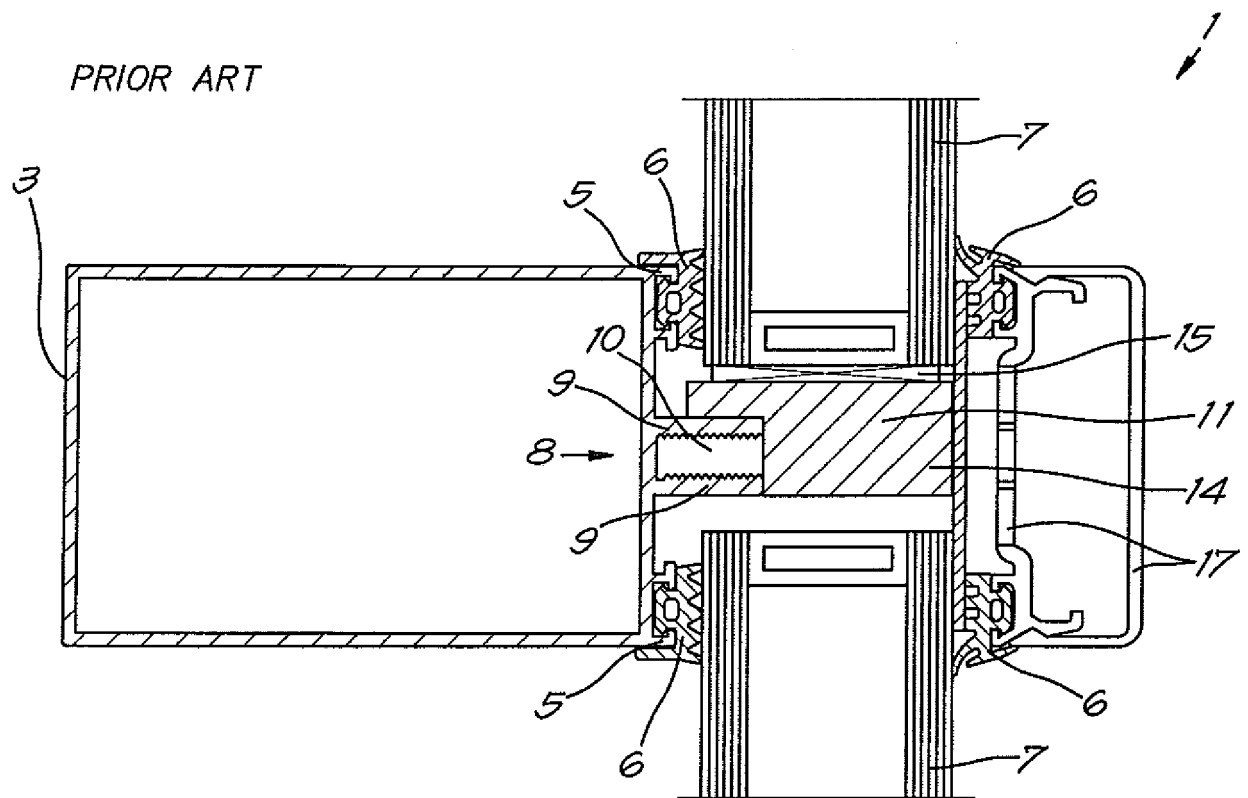


Fig. 2

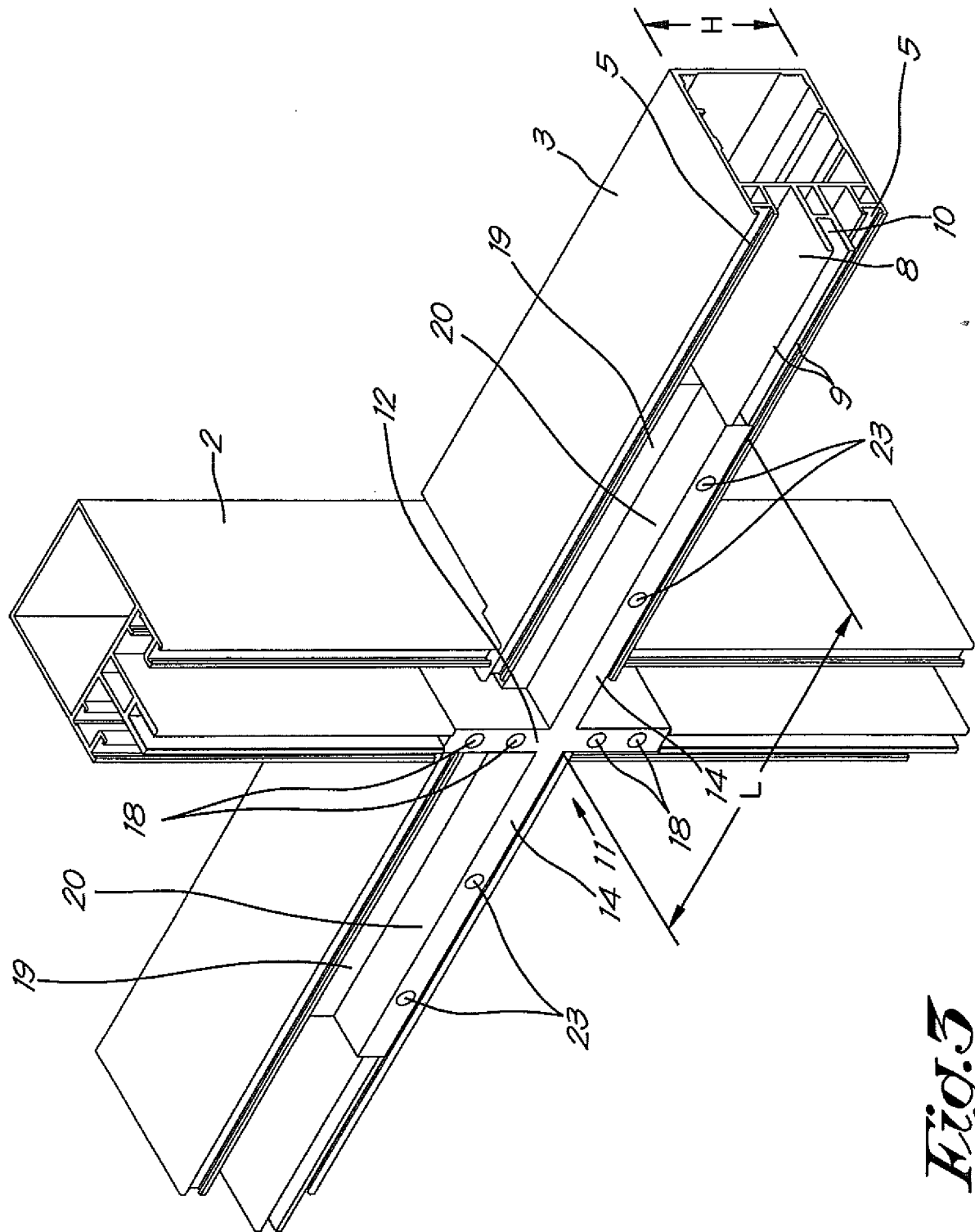
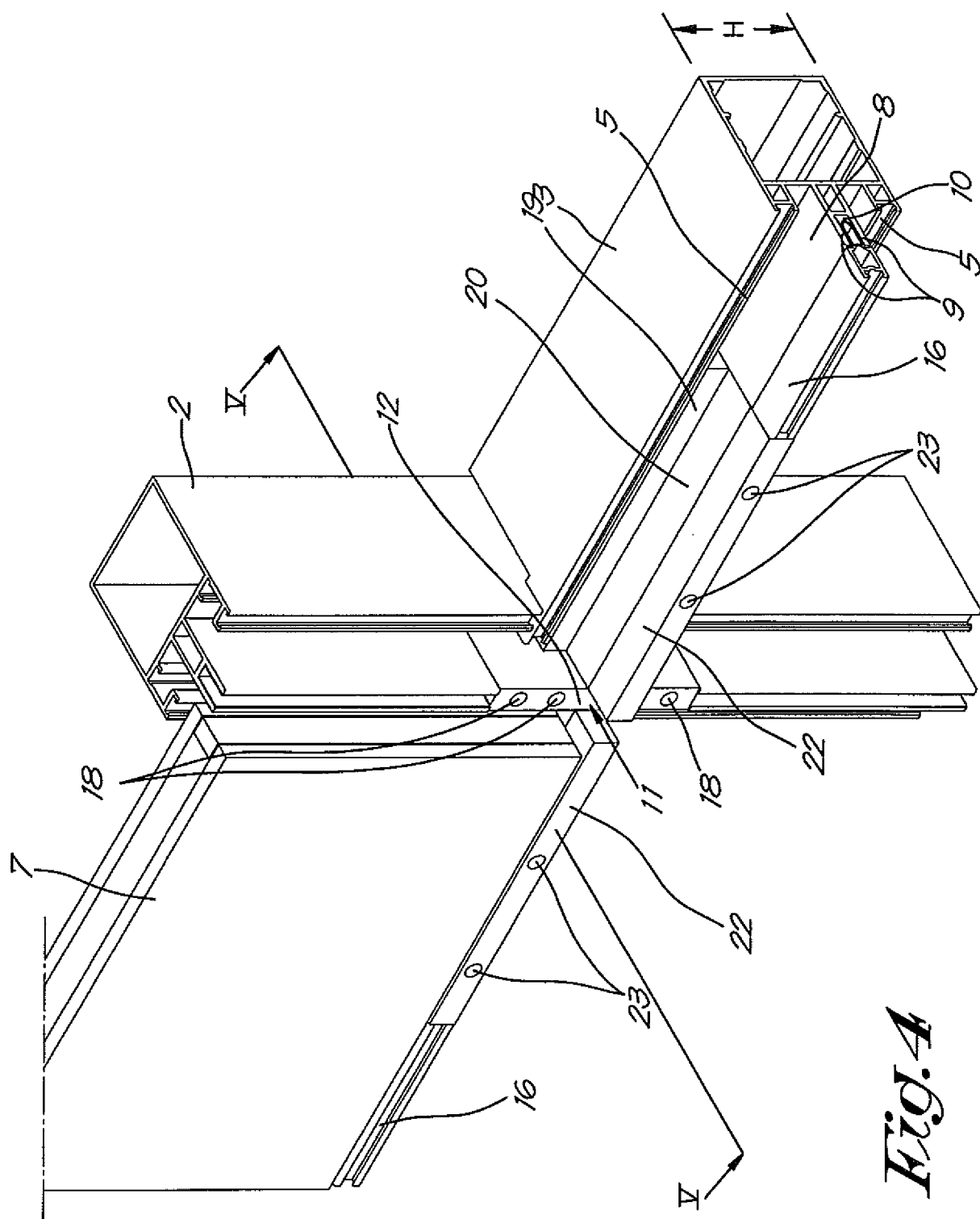


Fig. 3



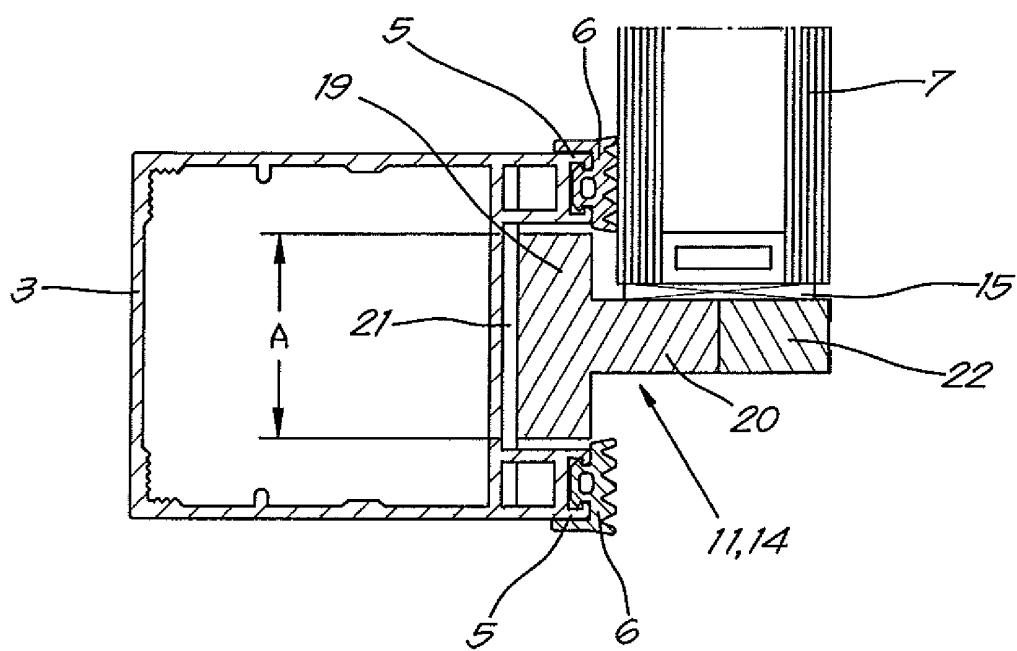


Fig.5

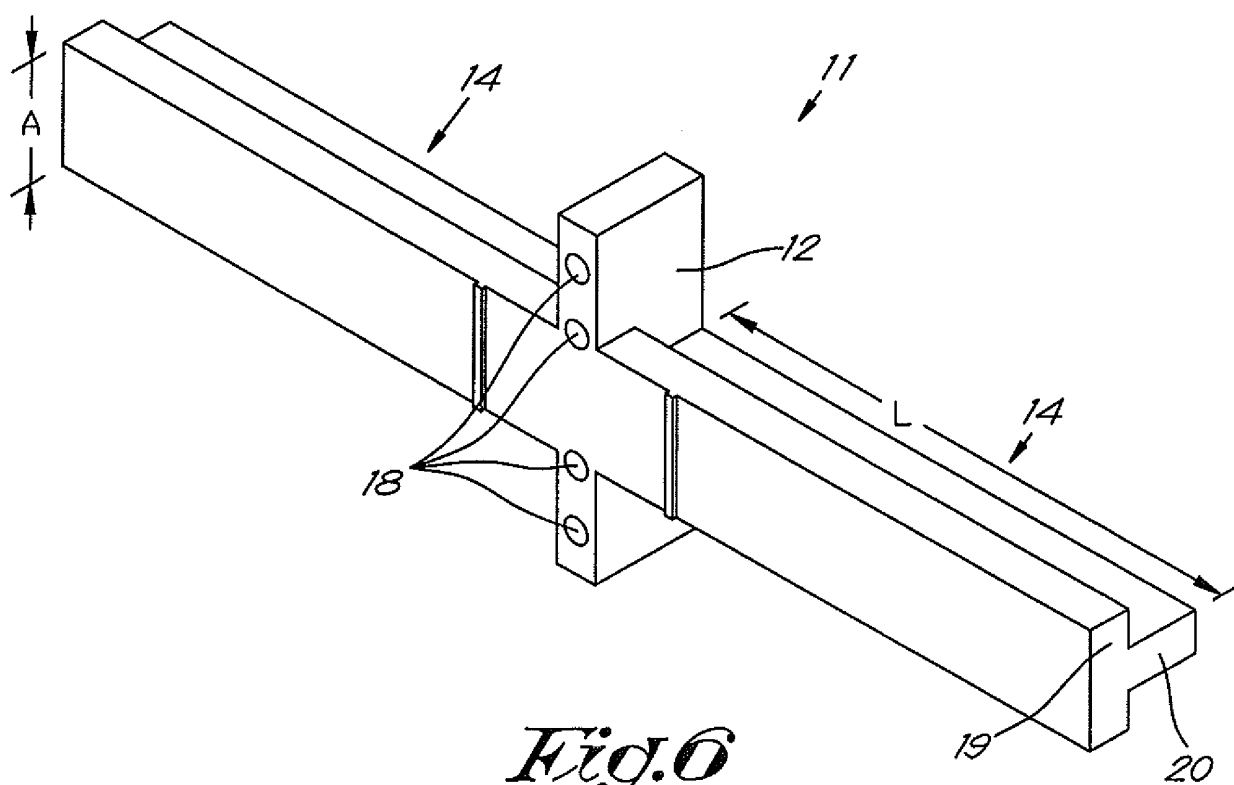


Fig. 6

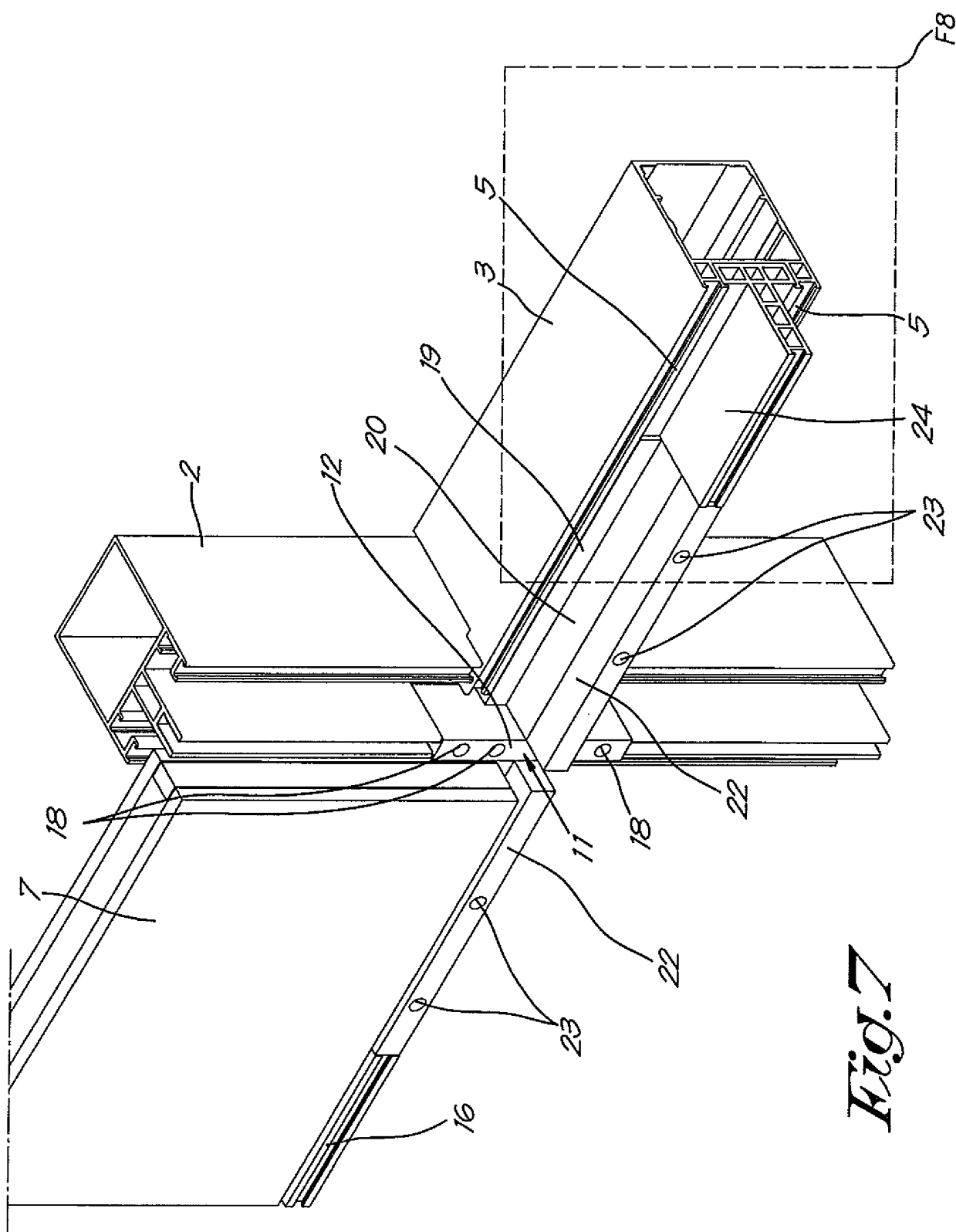


Fig. 7

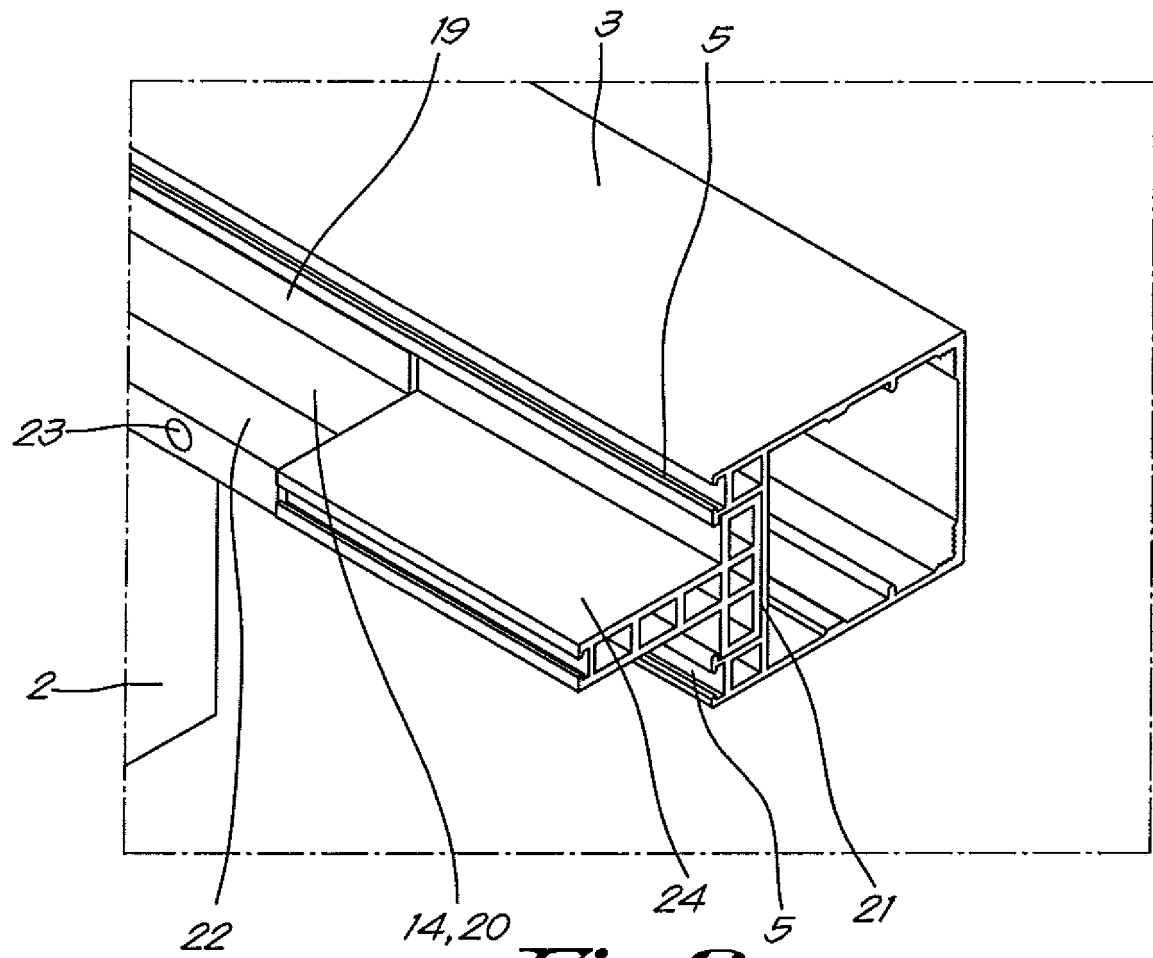


Fig. 8

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- DE 19854203 [0005]
- DE 29912697 [0005]
- EP 1460191 A [0005]
- US 4428171 A [0010]