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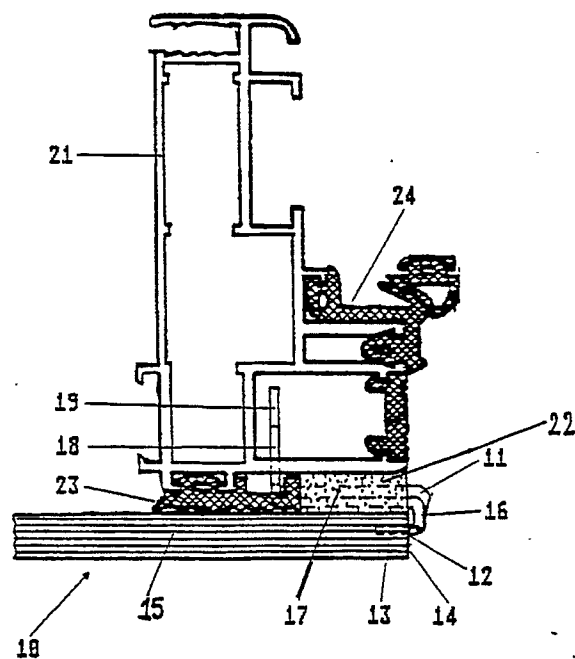
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**Supporting and mechanical anchoring device for panels belonging to a structural array of window frames and/or structural walling systems.**

At least one edge (14) of each of said panels (15) is provided with at least one recess or cavity (13) suitable for housing, in operation, a first arm (12) belonging to a mechanical retaining element (11) of the external surface of said panels (15), said mechanical retaining element (11) cooperating with a fixed supporting structure internal to the building, wherein said mechanical retaining element (11) is provided with another arm (18) having an extension (19) insertable with a predetermined clearance into a slot (20) provided in a section (21) integral with said fixed supporting structure, said extension (19) being movable inside of said slot (20) about a predetermined distance and according to three, mutually perpendicular, directions, two of said directions being contained in a plane which is parallel to the major surface of said panel (15), the third direction being contained in a plane which is perpendicular to said major surface of said panel (15).



**Fig. 1**

## SUPPORTING AND MECHANICAL ANCHORING DEVICE FOR PANELS BELONGING TO A STRUCTURAL ARRAY OF WINDOW FRAMES AND/OR STRUCTURAL WALLING SYSTEMS.

The present invention relates to a supporting and mechanical anchoring device for panels, advantageously for glass panels, belonging to a structural array of window frames and/or structural walling systems.

More particularly, the present invention relates to a device allowing the support and the mechanical anchoring of panels, advantageously of glass panels, belonging to window frames and/or structural walling systems of buildings in which the single panels are individually retained by a supporting structure and, at the meantime, are movable in a restricted extent according to three mutually perpendicular directions in order to compensate eventual working and laying tolerances of the panels, as well as the unavoidable movements due to the weather conditions as squally wind or expansions due to temperature and/or humidity changes.

The present invention may be mainly applied in the field of the construction of buildings.

### BACKGROUND ART

Many devices are known for solving the problem of supporting and anchoring of glass panels for window frames or glass facade walling systems.

In the case of double-layer insulating glass panels, the background art provides for a mechanical anchoring of the internal glass layer to the supporting structure situated inside of the building by means of metallic sections, while the external panels are merely fastened by glueing them to the spacer elements provided between two adjacent panels.

This embodiment practically involves several disadvantages and drawbacks since the glass wallings, which are relatively heavy, undergo high mechanical stresses which are for instance due to vibrations, or expansions, or to the action of UV-rays, and it may very well happen that the glueing between the various panels may yield, also because the properties of the silicone-like materials used for such a glueing show a degradation in time.

This constitutes a potential source of accidents.

Other embodiments have been proposed in order to solve that problem; these embodiments provide for the support and the anchoring of the external glass layer, both in the case of single-layer and multiple-layer panels.

One kind of possible mechanical anchoring provides for the drilling of the panel and for the

fastening of the same panel to the rear supporting structure by means of screws.

A form of embodiment of this kind is disclosed, for instance, in documents US-A-3.685.240, US-A-4.689.928, EP-A-0.136.064, EP-A-0.233.821 and EP-A-0.024.857.

Document EP-A-0.250.989 discloses a structural glass walling in which the individual facade glass plates comprise joints formed by structural sealants and from metallic elements which engage the facade glass plates in recesses formed in their four side edges, to form a safety connection which mechanically supplements the chemical-physical connection formed by the structural sealants.

Said mechanical elements are formed by metallic sections fixed to an internal supporting structure.

The joints are sealed by means of a synthetic polymeric material in order to form a connection which is fixed but enables a restricted movement of the panel relative to the fixed structure under thermal expansion conditions.

Document DE-A-3.624.491 discloses a similar supporting and anchoring device, in which the external layer of the glass panel is worked along its edges in order to form a step in which is placed a mechanical retaining element formed by a metallic strip which is fixed, on its turn, to the facade internal supporting structure.

However, both of the forms of embodiment mentioned above involve some disadvantages and drawbacks, since the movements allowed to the panels by the metallic retaining elements are extremely restricted and often they do not suffice for compensating either of the working and laying tolerances, or the environmental stresses which the panels undergo when they are assembled; consequently, the risk of an accidental breakage of said panels is rather high.

The prior art underlying the present invention is constituted by the document EP-A-0.250.989 cited above; it is a purpose of the present invention to obviate to the drawbacks and disadvantages typical of the prior art, and to provide, thus, a supporting and mechanical anchoring device for panels, advantageously glass panels for window frames and/or glass walling systems, which enables to compensate both of the working and laying tolerances, and the movements due to environmental mechanical stresses acting from any direction on the panels, said device furthermore being economical and easy to be installed.

This is achieved by a supporting and mechanical anchoring device having the features disclosed

in claim 1.

The dependent claims describe advantageous forms of embodiment of the invention.

The device according to the present invention comprises a mechanical retaining element formed by a metallic section, generally a steel section, having a first arm insertable in a recess or cavity provided in all of the edges of a panel, advantageously a glass panel, and another arm cooperating with a slot provided on a metallic section integral with the internal supporting structure of the structural array.

The structure of said other arm enables a restricted movement, which is nevertheless widely sufficient for compensating any working and laying tolerances and external mechanical stresses acting on the same arm, and consequently on the panel connected to it, inside of the slot provided on said metallic section, according to three, mutually perpendicular, directions.

This possibility of movement according to three mutually perpendicular directions allows safety conditions to be achieved and to compensate any working and laying tolerance, as well as any environmental stress.

#### ILLUSTRATION OF THE DRAWINGS

Other features and advantages of the invention will become apparent by reading the following description of a form of embodiment of the invention, given as a non-limiting example, with reference to the figures shown in the attached drawings, in which:

- fig. 1 shows a plan view of a device according to the invention, applied for supporting a single-layer glass panel;
- fig. 2 shows a plan view of a device according to the present invention, applied for supporting a double-layer glass panel;
- figs. 3a to 3c show a mechanical retaining element according to the present invention;
- figs. 4a and 4b show, respectively as plan and elevation view, a section connectable to a retaining element and to the array supporting structure;
- fig. 5 shows, in a perspective schematical view, the cooperating action between a retaining element and a section according to the present invention.

#### DESCRIPTION OF A PREFERRED FORM OF EMBODIMENT

In the figures, reference sign 10 generally indicates a supporting and mechanical anchoring device for glass panels of window frames and/or structural walling systems according to the present invention.

Said device 10 comprises a mechanical retaining element 11 formed by a metallic pressed element having a first arm 12 intended to be inserted, together with a suitable gasket (not illustrated in the figures), into a recess or cavity 13 which is provided in the edge 14 of a panel 15, advantageously a glass panel, belonging to a structural array of panels forming a facade glass walling of a building.

Referring to figures 1 and 3a to 3c, said first arm 12 is connected to a second arm 16 which is generally perpendicular to the former, and said second arm 16 is connected to a third arm 17, which is generally parallel to said first arm 12 and, consequently, to the major internal surface of panel 15.

Lastly, said third arm 17 is connected to a fourth arm 18, which is perpendicular to the internal surface of panel 15 and which comprises an extension 19 cooperating with a slot 20 (see figures 4a and 5) formed in a section 21 in a way which will be later on described in detail.

In the described form of embodiment said third (17) and fourth (18) arms are provided with reinforcing ribs 27.

However, said ribs 27 are not essential for realising element 11, the component materials of which may vary in accordance with different design requirements.

Fig. 2 shows a form of embodiment similar to that of fig. 1, applied to a double-layer glass panel; elements similar to those already described with reference to fig. 1 carry the same reference signs, provided with an apex.

According to the invention, said third arm 17 is buried in a moulding of a resilient structural sealant 22, which also connects panel 15 with section 21 and which enables a precise positioning of element 10 relative to panel 15, while preserving all the possibilities of movement of panel 15 in respect of section 21.

Furthermore, gaskets 23, 24 realised in a resilient material are respectively placed between section 21 and panel 15 and between two adjacent sections 21.

Finally, each section 21 is provided with means (not shown in the figures) for connecting it to a rear supporting structure provided, in some instances, with mechanisms allowing the individual panels 15 or groups thereof to be opened about a vertical or a horizontal axis.

Referring to fig. 5, it may be noted that, once that said extension 19 has been inserted into the slot 20 of the fixed section 21, said fourth arm 18

may carry out three kinds of movement according to three directions which are substantially perpendicular to each other, namely:

- a first movement in the direction indicated by arrow A, corresponding to a movement of the retaining element 11 on a plane parallel to the main surface of panel 15 (see figs. 1 and 2). This movement is limited by the distance interposed between the longitudinal edges of slot 20;
- a second movement in the direction indicated by arrow B, also corresponding to a movement of the retaining element 11 on a plane parallel to the main surface of panel 15, but in a direction which is perpendicular to that of said first movement. This movement is limited by the distance interposed between the extension 19 of arm 18 and the body of the same arm 18;
- a third movement in the direction indicated by arrow C, corresponding to a movement of the retaining element 11 on a plane which is perpendicular to the main surface of panel 15. This movement essentially depends on the distance interposed between the edges 25 and 26 of the supporting arm of extension 19, in respect of the slot length.

Thus, a precise dimensioning of slot 20 and of arm 20 with the extension 19 allows the designer to predetermine the maximum allowable movement extent in each direction for each panel 15, achieving in this way the purposes of the invention, since a panel, advantageously a glass panel, is obtained which belongs to a window frame or to a structural walling system, which is mechanically retained (and which therefore fulfills the highest safety requirements) and which in the meantime allows both the working and laying tolerances and the size variations due to environmental external stresses to be widely compensated.

The invention has been described with reference to a particular form of embodiment.

However, it comprises several other forms of embodiment which fall within its scope.

Thus, forms of embodiment falling within the scope of the invention include applications for glass panels having more than two glass layers, or panels provided with step-formed notches cooperating with the retaining element, as described in document DE-A-3.624.491, and thus visible from outside, as well as forms of embodiment according to which the supporting and anchoring device is used for retaining panels constituted by non-vitreous material, such as marble, stone, or granite panels, or any other panel-shaped building material as, for instance, synthetic plastic material as plexiglass.

Furthermore, the shape of the sections to be connected to the supporting structure may be widely modified and may not correspond to that shown in figs. 4a and 4b, provided that said section

would comprise a slot suitable for cooperating with the panel retaining element.

The shape of said retaining element may also be modified within wide limits, provided that the element would comprise an arm for mechanically retaining the panel and an arm cooperating with the slot provided in the section.

These and other forms of embodiment fall within the scope of the invention.

## Claims

1. Supporting and mechanical anchoring device (10) for panels (15) belonging to structural arrays of window frames and/or to structural walling systems, in which at least one edge (14) of each of said panels (15) is provided with at least one recess or notch (13) suitable for cooperating, when installed, with a first arm (12) belonging to a mechanical retaining element (11) of the external surface of said panels (15), said mechanical retaining element (11) cooperating with a fixed supporting structure internal to the building, characterised in that said mechanical retaining element (11) is provided with another arm (18) having an extension (19) insertable with a predetermined clearance into a slot (20) provided in a section (21) integral with said fixed supporting structure, said extension (19) being movable inside of said slot (20) about a predetermined distance and according to three, mutually perpendicular, directions, two of said directions being contained in a plane which is parallel to the major surface of said panel (15), the third direction being contained in a plane which is perpendicular to said major surface of said panel (15).

2. Device (10) according to claim 1, characterised in that said mechanical retaining element (11) is constituted by a metallic pressed element comprising said first arm (12), one end of which is integral with a second arm (16) which is substantially perpendicular to said first arm (12), said second arm (16) being integral by one end thereof with a third arm (17) which is substantially perpendicular to said second arm (16), said third arm (17) being integral by one end thereof with said another arm (18) carrying said extension (19), said third arm (17) being substantially perpendicular to said another arm (18).

3. Device (10) according to claim 2, characterised in that said third arm is buried, when assembled, in a structural sealant moulding (22) connecting said panel (15) to said section (21).

4. Device (10) according to anyone of the preceding claims, characterised in that said mechanical retaining element (11) is provided with reinforcing ribs (27).

5. Device (10) according to anyone of the pre-

ceding claims, characterised in that said first arm (12) of said mechanical retaining element (11) is connected to said recess or notch (13) by means of gaskets.

6. Device (10) according to anyone of the preceding claims, characterised in that it is used for retaining external glass panels (15) of single-layer, or double-layer, or triple-layer glazing systems.

7. Device (10) according to one of the claims 1 to 5, characterised in that it is used for retaining stone, or marble, or granite or wooden panels (15) or panels (15) constituted by a synthetic plastic material or by any other building material.

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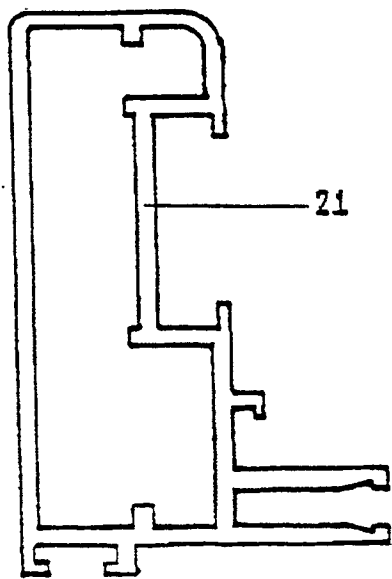


Fig. 4b

Fig. 4a

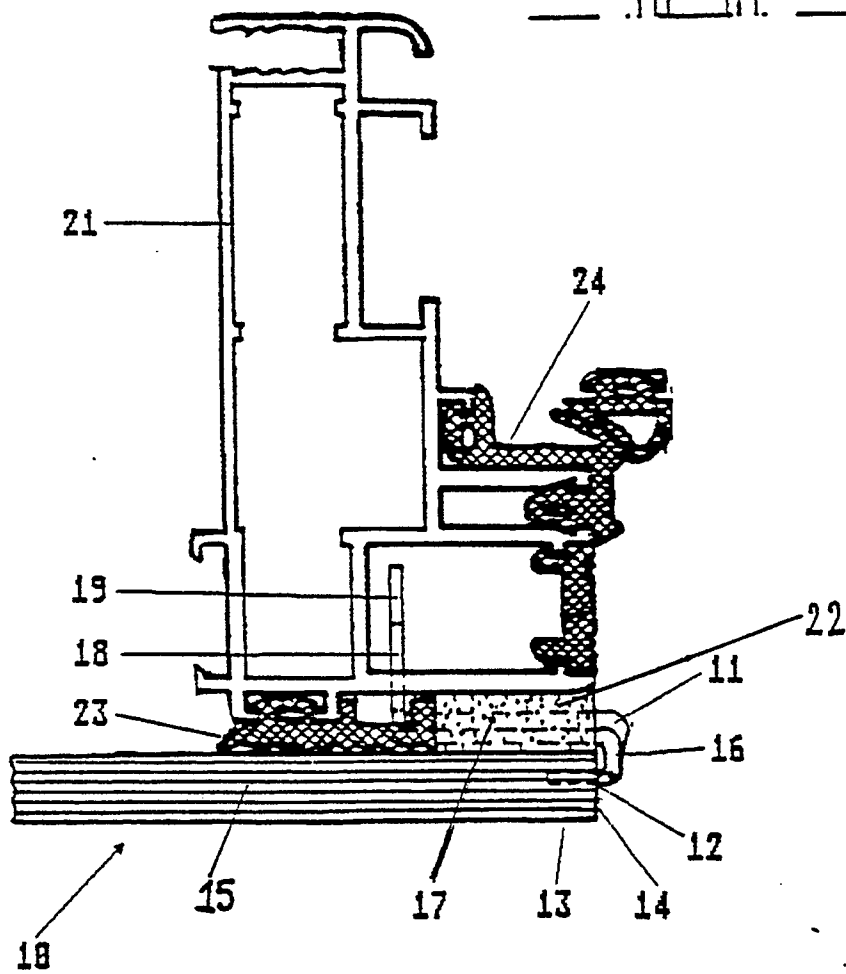
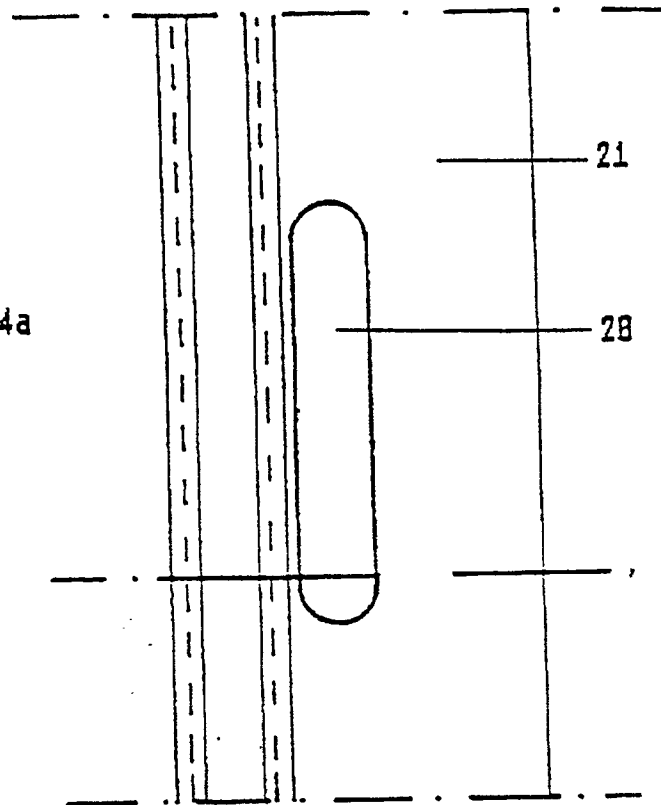
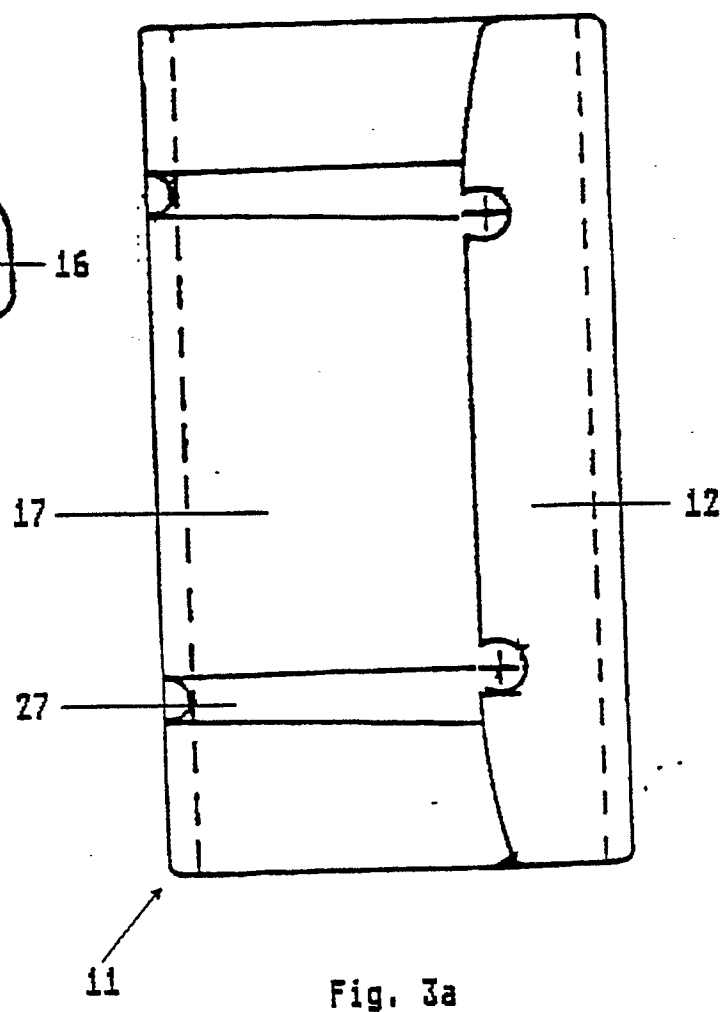
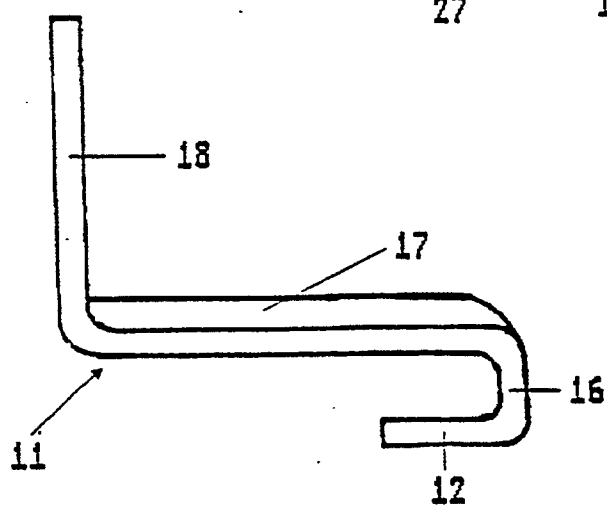
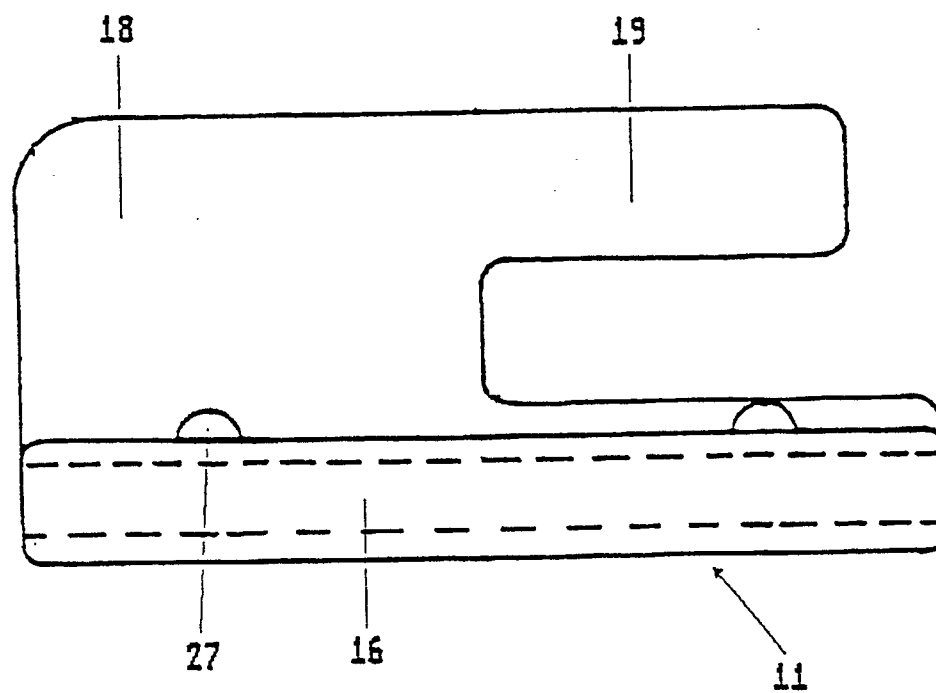
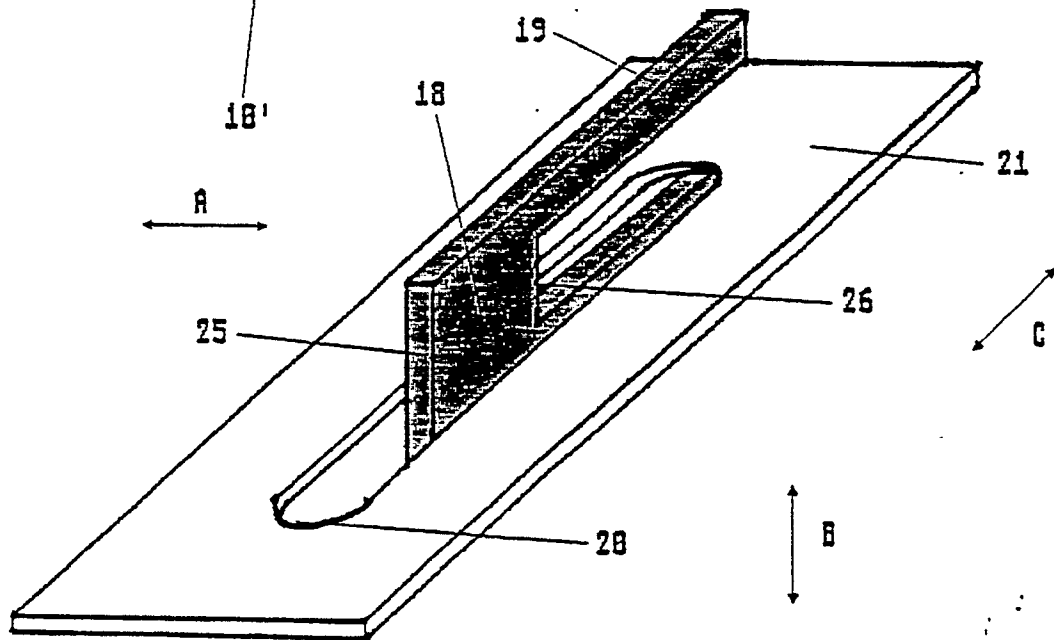
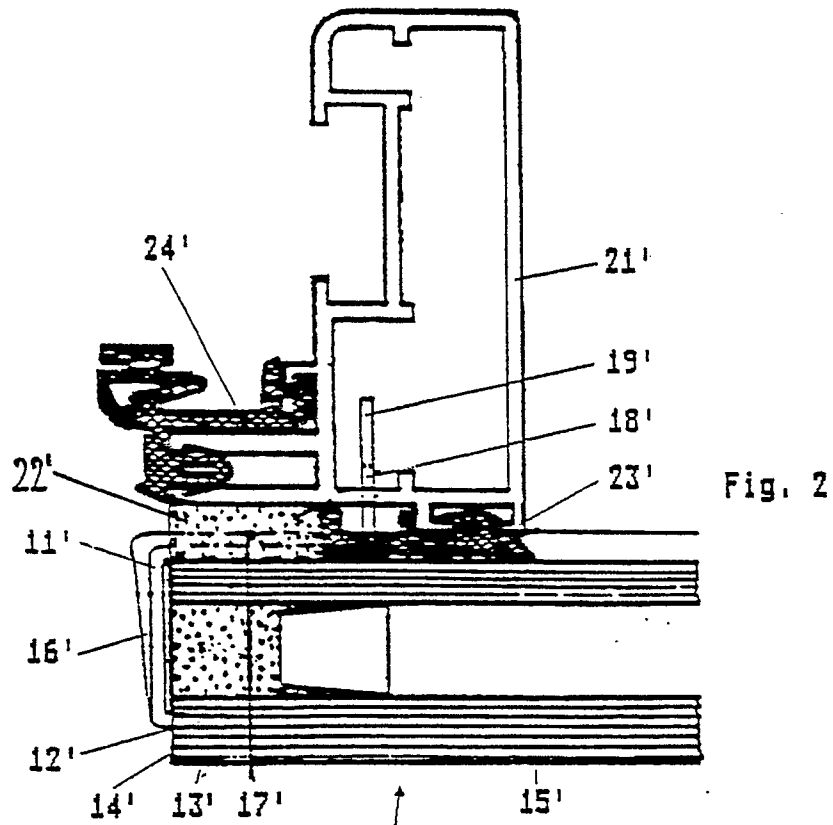


Fig. 1









European Patent  
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# EUROPEAN SEARCH REPORT

Application Number

EP 90 11 1760

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	DE-A-1659937 (GÜTZ) * page 5, paragraph 2,3; figures 1, 2, 6 *	1, 7	E06B3/54
Y	DE-U-8621152 (POHL) * page 19, paragraph 2; figures 8-11 *	1, 7	
A	EP-A-0311737 (WARD BUILDING SYSTEMS) * figure 5 *	1, 4, 7	
A	US-A-3672107 (SANTRY)		
A	FR-A-1340757 (METALL-WERK MERKUR)		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			E06B E04F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 26 SEPTEMBER 1990	Examiner VERVEER D.
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			