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Process for the construction of glass wall panels and panel obtained with said process.

The glass wall panels comprise a support metal section (2) onto which is fixed by glueing a single-sheet pane (L), or a double-sheet pane with an intermediate insulating chamber. According to the invention, onto at least the front surface of the metal support section (2) - on which said pane (L) is subsequently fixed by means of a silicone adhesive (5) - there is applied, by melting, a superficial covering layer (P) consisting of a material apt to form a

perfectly smooth adhesion surface (P'), as molten metal applied by plasma spray or vitreous enamel, said material (P) having a chemical affinity with the silicone adhesive (5). The invention also concerns a glass wall panel obtained with said process and glued either directly onto the frame of the glass wall support structure, or onto a rim frame apt to be mechanically anchored, in an interchangeable manner, onto said support structure frame.

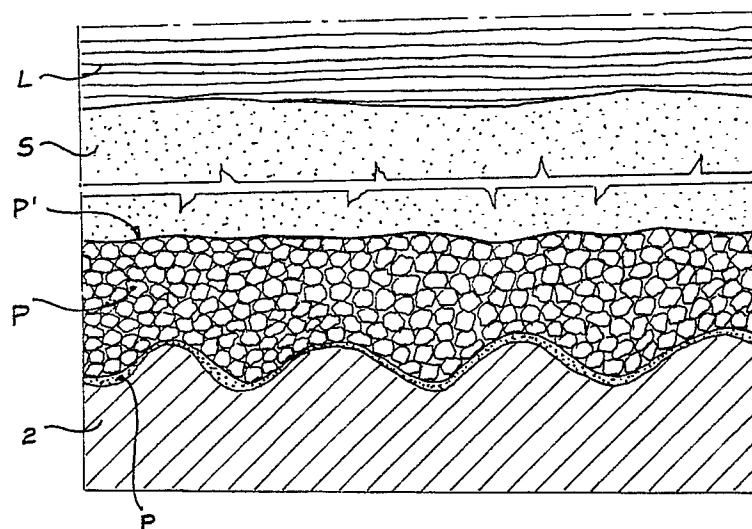


Fig. 2

It is known that in building construction, particularly to construct the outer walls of buildings for civil use, it is becoming customary to use glass panels so as to form the outer walls entirely of glass.

According to the most known technology, such panels consist of a metal support frame, into which is mounted a glass sheet or pane and, more precisely, a double-sheet pane with an intermediate insulating chamber. Nevertheless, when using such panels, at least part of the frame profile shows up along the contour of the pane, thereby forming an integrating element of the overall aesthetic appearance of the building wall.

More recently, the requirement has arisen to construct substantially continuous glass walls, wherein the profiles of the frames supporting the panes are no longer visible. Glass panels answering this requirement are described for example in the Italian Patent N. 1.180.493, filed in 1984 by C.C. DI COSTA & C. s.r.l.. According to this Patent, use is made of a double-sheet pane with intermediate chamber, having a special structure, wherein the inside sheet has smaller dimensions than the outside one. The metal frame supporting this double-sheet pane has a two-stepped profile, the contour of the inside sheet being glued onto the innermost step and the contour of the outside sheet being glued onto the outermost step; the outside sheet is moreover dimensioned so that the support frame appears fully masked from the external side. The glueing is carried out by means of a silicone adhesive.

On the basis of tests carried out in recent years, it has been found, however, that such a glueing system is not sufficiently reliable to last throughout time. In fact, while the silicone adhesive perfectly keeps its adhesion onto the pane for a long time - possibly due to the fact that the glass surface is perfectly smooth, so that adhesion is fully and uniformly guaranteed, and possibly also due to an evident chemical affinity between glass and the silicone adhesive - its adhesion onto the surface of the metal frame is instead far less effective.

The different techniques adopted so far to improve the adhesive conditions - by providing, for example, to thoroughly clean and/or degrease the frame metal surface, and/or to carry out very accurate oxidation, anodizing or other anticorrosion treatments - have merely led to very modest improvements, without however providing a total guarantee of length throughout time.

To overcome this drawback, other solutions have thus been proposed, substantially tending to combine the adhesive anchorage with a mechanical type anchorage. A panel of this type is described for example in the Italian Patent application No.

12556 A/85, always in the name of C.C. DI COSTA & C. s.r.l., wherein - to improve the structure described in the previously cited Italian Patent No. 1.180.493 the support frame is formed starting from a metal section having, in correspondence of its innermost part, a groove housing and retaining the edge of the inside sheet of the pane (while the outside sheet is still retained by mere glueing onto the inside one).

As can be easily understood, the construction of such a panel, and particularly the mounting of the inside sheet of the pane into the groove of the frame, is extremely complicated and practically impossible in mass production. Furthermore, such a solution can be adopted exclusively with double-sheet panes having an insulating chamber built for the purpose, and cannot hence be applied to a single-sheet pane or even to a double-sheet pane of standard production (wherein the two sheets have the same dimensions).

Another panel of the type with mechanical anchorage, combined with an adhesive anchorage, is that described in the Italian Patent application No. 22615 A/87, in the name of AZZIMONTI. In this panel, the metal support frame is formed starting from a section having an outwardly facing channel groove. Into this groove there is housed, and retained by mechanical means, a glass strip, onto which is glued the edge of the single- or double-sheet pane by means of a silicone adhesive. This allows to partly overcome the above mentioned drawbacks - concerning the construction difficulties or the requirement to use a double-sheet pane of special configuration - but is apt to determine other inconveniences, and particularly:

- on one hand, for what concerns the length of the adhesive action: in fact, the glass strip housed into the frame groove is subject to considerable stresses (especially due to the different thermal expansions to which are subjected the metal section, the glass strip housed therein and the actual pane), so that microcracks are easily produced thereby facilitating disjunction of the adhesive;

- on the other hand, for what concerns the firm retention of the pane: in fact, the glass strip is generally housed into said groove with some slack, so that the pane is subject to oscillations and vibrations. The fact that the glass strip is in some cases replaced by an extruded high-density silicone bar improves, but does not fully overcome the above inconveniences.

The object of the present invention is a process for the construction of glass wall panels, fundamentally based on the glueing technique, which is apt to simplify and speed up said construction, which can be used with automatic systems on a vast scale and, above all, which provides for the highest guarantees of length and reliability through-

out lifetime.

These results are achieved - in a process for the construction of glass wall panels comprising a support metal section onto which is fixed by glueing a single-sheet pane or a double-sheet pane with an intermediate insulating chamber - essentially due to the fact that a superficial covering layer, consisting of a material apt to form a perfectly smooth adhesion surface, is applied by melting onto at least the front surface of said metal section, and that said pane is subsequently fixed onto said adhesion surface by means of a silicone adhesive.

According to a first embodiment of the invention, said superficial covering layer is formed by melting of metal obtained by plasma spray.

According to another preferred embodiment of the invention, said superficial covering layer is formed of a material having a chemical affinity with the silicone adhesive, and particularly by melting of a vitreous enamel layer.

Further characteristics and advantages of the process according to the invention, and of the glass wall panel obtained therewith, will anyhow be more evident from the following detailed description of some preferred embodiments thereof, given by way of example and illustrated on the accompanying drawings, in which:

Fig. 1 shows, on a very enlarged scale, a short length of the surface of a known metal section, onto which a pane is fixed by silicone adhesive according to known technique;

Fig. 2 is a view similar to that of fig. 1, but referring to a section treated according to the invention;

Figs. 3 to 6 show four successive steps of the process to construct a glass wall panel according to the invention;

Figs. 7 to 10 show four successive steps of the construction of a glass wall panel according to a different embodiment of the invention;

Fig. 11 is a horizontal section view showing part of a glass wall comprising the sections forming a rim frame and those forming the support structure; and

Fig. 12 is a view similar to that of fig. 11, but referring to a different embodiment of the invention.

As shown on a very enlarged scale in figure 1 - with reference to known technique - onto a metal section 2, generally an extruded section, there is fixed a pane L by means of a silicone adhesive S. The surface of the section 2 (seen, as said, on a very enlarged scale) has a series of microcavities A - determined both by the physiochemical characteristics of the material and by the working techniques - which produce two types of inconveniences:

- on one hand, the silicone adhesive S, which has a

very high surface tension, is not apt to penetrate into said microcavities, thereby reducing the actual contact surface between metal and silicone;

- on the other hand, the bottom of said microcavities ends up by filling with dirt R - for instance residues from the metal cleaning or surface washing operations - which in turn makes the silicone adhesive conditions worse.

It has on the other hand been found that, with the known surface treatments on metal sections - particularly, in the case of aluminium sections, with the known oxidation or anodizing techniques, which create an oxidation and/or protective film F - it has not been possible to appreciably improve the silicone adhesiveness. The adhesion is instead perfect on the side of the pane L, thanks to its uniform and smooth surface.

Figure 2 shows (always on a very enlarged scale) a glass panel length obtained according to the fundamental characteristic of the present invention: the metal section 2 is actually provided - over at least its front adhesion surface - with a covering layer consisting of a vitreous enamel or of a melted metal obtained by plasma spray.

The technology of applying a surface covering layer of vitreous enamel has been known for a long time and it consists in remelting a frit over the metal surface. If the metal is iron, the remelting is done at a relatively high temperature, for instance up to 1000°C; whereas, if an aluminium section is involved, care will be taken to use a low-melting frit, whereby the remelting can be carried out at about 500°C. Since, as said, these technologies are known, it is not deemed necessary to describe them in detail. It is instead important to note that, in the past and up to date, said enamel covering layer has always been applied merely as a surface finishing and/or protection element for the underlying metallic material (especially in sanitary apparatuses), but it has never been used - according to the fundamental teaching of the present invention - to produce a surface apt to guarantee a reliable adhesion for a silicone layer.

Figure 2 clearly shows how the enamel layer P is apt to fill the cited microcavities and ends up by leveling the surface of the metal section and making it homogeneous. The resulting surface P' contacting the silicone is therefore smooth and uniform, and is apt to guarantee a perfect and continuous adhesion of the silicone layer, comparable to the adhesion on the opposite glass surface of the pane L.

The same effect of the enamel layer can be obtained - according to the invention - by applying a covering formed of a metallic layer by means of the plasma-spray technique; this consists in the continuous melting of metallic powders through a voltaic arc immersed into an environment con-

trolled by inert gas. According to this technique, the melted microparticles are cast onto the surface of the support metal section, onto which they thus settle by melting. This melted metal layer can reach a thickness of a few millimeter tens. Since also this technology is known - though from more recent times - it is not deemed necessary to describe it in further detail. Also in this case it should however be noted how, up to date, this technology has essentially been used to protect the metallic material and not - according to the fundamental concept of the invention - to form a special adhesion surface for a silicone layer. It should of course be pointed out that the choice of any type of remelting metal - though providing the same advantage as the enamel covering layer from the point of view of a smooth adhesion surface - does not however provide the additional advantage of a surface having a chemical affinity with the silicone adhesive.

According to a first embodiment - illustrated in figures 3 to 6 - the technique of the present invention is used for mounting a glass panel directly onto its support structure. As shown, the structure consists of a base metal frame 1 - for instance an iron or aluminium frame - which is shaped and sized according to the construction requirements of the glass wall. On the front surface of said frame - namely the outwardly facing surface of the wall - there is mechanically fixed a section 2 supporting the double-sheet pane 3, 4. The fixing is done by known means, for instance by tripping engagement or by screws or the like.

To the side of the section 2 there is fitted a gasket 5 - preferably an extruded reinforced silicone gasket - onto which is rested the pane 3. Since said gasket projects above the level of the section 2, between this latter and the inner surface of the pane 3 there is a free space into which is injected the silicone adhesive S by means of a spray nozzle U.

As clearly shown in figure 4, an additional advantage of the process according to the present invention lies in the fact that the spray nozzle has a free access into the space between the pane 3 and the section 2, whereby this space can be filled with silicone under visual control and in ideal conditions to guarantee a perfect filling.

The operation of fixing the pane onto its frame could now be considered ended. This is certainly the case when having to fix onto the support section 2 a single-sheet pane 3, as it happens in some constructions. The same occurs when having to fix a double-sheet pane 3, 4, with an intermediate chamber, in the event of using commercial type double panes having the two sheets of perfectly identical dimensions. In such cases - similarly to what is shown in figure 4 - the outer edge of the

pane 3 is in line with, or eventually slightly projecting from the line of the section 2, so that when mounting this panel into a glass wall, the section is positively hidden by the pane which is on view on the external side.

According to a further interesting characteristic of the present invention, use can instead be made of a double-sheet pane 3, 4, of the special type, already mentioned and described in the cited Italian Patent No. 1.180.493, wherein the outside pane 4 is larger than the inside pane 3. With such a double-sheet pane it is possible - after having fixed the pane 3 onto the section 2, as shown in figure 4 - to fix to the side of the frame 1 a section 6 shaped as illustrated in figures 5 and 6. Said section comprises an essentially L-shaped portion 6a-6b, to which there is associated an essentially T-shaped portion 6c-6d: the portion 6a is used for a mechanical anchorage onto the frame 1, for instance by means of a screw 7; the portion 6b is used to support, in lateral projection, the T-shaped portion of the section 6; the portion 6c is used to support, in projection towards the front of the glass wall, the top transversal portion 6d of the T; and this portion 6d is used for supporting directly the pane 4, which is fixed thereon by glueing (see figure 6).

Of course, also the shaped section 6 is provided - at least onto the surface of its portion 6d supporting the pane 4 - with an enamel or melted metal covering layer, according to the fundamental characteristic of the present invention.

The configuration is such that, between the facing surfaces of the portion 6d and of the pane 4 there is a free space - similar to the previously described space between the section 2 and the pane 3 - into which it is possible to inject the silicone adhesive layer S, under perfect visual control, by means of a spray nozzle U. As clearly shown in figure 6, the silicone adhesive is applied to an extent sufficient to fill the whole space between the portion 6d of the section 6 and the pane 4, up to pressing against the silicone gasket 8 which joins the two panes 3 and 4 and which defines the intermediate insulating chamber. This evidently guarantees a supplementary anchorage.

Finally, according to a further characteristic of the invention, there is an additional guarantee of retention - essentially in case of emergency - due to the fact that the portion 6d of the section 6 is dimensioned so that its inward end projects, even to a slight extent, into the space between the two panes 3 and 4: in this way, said inward end acts as a mechanical stop for the pane 3, which stop is normally not operative but becomes operative in case of emergency.

The embodiment of figures 7 to 10 shows a different method to carry out the process of the

invention, according to which the glass panel is not applied directly onto its support structure, but onto a rim frame which is then mechanically fixed onto said support structure. This arrangement has the double advantage of facilitating transport of the glass panels, separately from their respective support structures, and of allowing fast replacement of an eventually damaged glass panel.

As shown in figure 7, the rim frame 9 has an overall L-shaped section, wherein the base of the L defines a first adhesion surface 9' and the top of the L has a widened portion which defines a second adhesion surface 9". Both surfaces 9' and 9" are treated with the process of the invention and are thus provided with a vitreous enamel or a melted metal adhesive covering layer.

The rim frame 9 is also provided with a seat into which is fitted a gasket 10, preferably an extruded reinforced silicone gasket, onto which is rested a double-sheet pane 3, 4, fully similar to that shown in figures 3 to 6. Once the panes 3, 4, have been positioned thereon, the silicone adhesive layer S is injected with a nozzle U at a pressure sufficient for the adhesive to fill the whole space between the frame 9 and the facing surfaces of the panes 3, 4, and of the gasket 8 interposed therebetween (see figure 8).

Once the rim frame 9 has been applied onto the double-sheet pane 3, 4, the glass panel can be mounted onto a support structure 11 by suitable mechanical means, for instance by a tightening screw or bolt 12, as shown in figures 9 and 10.

Figure 11 shows part of a glass wall comprising, on one hand, a main support structure for the glass panels, consisting of sections 11, 11', and on the other hand, a plurality of rim frames, consisting of sections 12, onto each of which is fixed by glueing a pane 13.

In figure 11, the metal sections 12 forming the rim frame are essentially L-shaped, with a side 12a parallel to the glass wall and used for fixing the pane 13, and with a side 12b perpendicular to the glass wall and forming the rigid part of said rim frame.

The pane 13 is a single-sheet pane, glued onto the side 12a of the rim frame by means of a silicone adhesive layer 14 and with the interposition of a spacing gasket 15.

In order to mount the rim frame onto the support structure, its side 12b is provided with a set of threaded holes, into which screw dowels 16. These preferably comprise a socket screwing head 16a, while the opposite end 16b thereof forms an anchor pin emerging into a space delimited by two ribs 12c formed in the rim frame.

The rim frame 12 is mounted on the support structure (as indicated in continuous lines on the right of fig. 11, and in dashed lines on the left of

the same figure) by positioning its side 12b next to the side 11b of the section 11 of said support structure, which is in turn perpendicular to the pane. Each dowel 16 is screwed, by means of a suitable spanner 17, until its end or pin 16b engages into a cavity of anchorage formed between two ribs 11c of the side 11b of the section 11.

As shown on the left of figure 11, the spanner 17 is operated by acting from the inside of the glass wall into the free space between two posts of the section 11 defining the window span. Once the rim frame has been fixed onto the support structure, by means of a set of dowels 16 (suitably spaced along the periphery of said frame), a protective sealing gasket 18 is applied onto the side 12b of the section 12. Another gasket 19 is applied onto the post 11 of the support structure.

The heretofore described arrangement can also be inverted when having to mount the glass panel in correspondence of an area of the glass wall provided with a bulkhead P, having an even partial closing function, for instance the function of a breast. In this case, it would in fact be impossible to operate the spanner 17 from the inside.

In this inverted arrangement, the threaded hole into which screws the dowel 16 is formed on the side 11b of the section 11' of the structure supporting the glass wall - as shown on the right of fig. 11 in correspondence of the cavity formed between the two ribs 11c. The dowel 16 can thus be screwed from the outside of the glass wall, as indicated by the position of the spanner 17'. The screwing action allows the tip 16c of the dowel 16 to engage into the cavity formed between the ribs 12c of the section 12, thereby firmly fixing the rim frame onto the support structure of the glass wall.

Of course, the mounting arrangement according to this embodiment - wherein a single-sheet pane is adopted - provides for the use of a rim frame formed of substantially L-shaped sections 12, since one side of the L (12a) is used to fix the pane, while the other side (12b) is used for fixing the frame onto the support structure by means of the dowels 16.

In the embodiment of figure 12, a double-sheet pane 20, 21, is adopted - of the special type already described with reference to the embodiment of figures 3 to 6 - wherein the contour of the outside pane 20 has larger dimensions than that of the inside pane 21. Such a double pane requires the use of a rim frame 22 formed of substantially Z-shaped sections: each section has in fact two sides 22a, 22b, parallel to the glass wall, onto which are glued the panes 20 and 21 respectively, and one side 22c perpendicular to the glass wall, which joins the sides 22a, 22b, and which is used to anchor the rim frame onto the support structure by means of the dowels 16, as previously seen.

Figure 12 shows, on the left, the anchorage of the rim frame 22 onto a section 23 of the support structure, being in this case the section of a window or door frame in a closed position. This section has in turn one side 23a perpendicular to the glass wall and thus parallel to the side 22c. The dowels 16 are screwed into suitable threaded holes provided on said side 23a of the section 23, and their head 16b engages into the groove-shaped cavity 22d provided on the side 22c.

During construction of the glass wall, the screwing is done - as clearly shown on the left of the drawing - from the outside of the door or window frame, by means of the spanner 17.

Always with reference to the embodiment of figure 12, it should be noted that, after having fixed the rim frames 22 by means of the dowels 16, one mounts the section 24, 25, to cover the junction line.

In case it should be necessary to replace a damaged glass wall panel, it is of course possible to do the operation from the inside, by opening the door or window frame 23, causing it to rotate about its vertical hinges (not shown), as clearly illustrated on the right of figure 12 (arrow F). When the frame 23 is open, the dowel 16 is loosened and the panel 20, 21, can be removed.

Thus, according to the present invention, at least the following advantages can be obtained in respect of known technology:

- increase of the contact surface between the silicone adhesive layer and the metal support of the frame, with elimination of the porosity of the sub-layer, thanks to the particles of the melted material which fill the microcavities of said support;
- optimal adhesion between silicone and metal support, thanks to the fact that the silicone layer is injected under direct visual control;
- chemical compatibility between silicone and the covering layer of the metal support;
- further guarantee of reliability thanks to the mechanical emergency stop, which however does not operate in normal conditions.

On the other hand, the constructive variants according to figures 7 to 10, and particularly figures 11 and 12, allow to obtain the following additional advantages in respect of known technology:

- at the initial stage, the mounting of the glass wall merely involves the construction of the support structure comprising the sections (11, 11') which, being at this stage free from other structures, are light and can easily and rapidly be fixed onto the building skeleton;
- the mounting of the single- or double-sheet pane is done in the factory, onto a light rim frame which is easy to handle, and thus in the best working conditions;
- this easy handling allows to transport and mount

the glass panels onto their support structure without any particular difficulties;

- this easy mounting allows furthermore a fast replacement of any damaged panels.

It is anyhow understood that the particular embodiments described heretofore are a mere example and that a technician skilled in the art can easily imagine various other constructive variants based on the teachings of the present invention, without thereby departing from the protection scope thereof, the only essential characteristic being that of providing a molten covering layer on the metal surfaces onto which the panes have to be glued.

Claims

1) Process for the construction of glass wall panels comprising a support metal section onto which is fixed by glueing a single-sheet pane, or a double-sheet pane with an intermediate insulating chamber, characterized in that a superficial covering layer, consisting of a material apt to form a perfectly smooth adhesion surface, is applied by melting onto at least the front surface of said metal section, and in that said pane is subsequently fixed onto said adhesion surface by means of a silicone adhesive.

2) Process as in claim 1), wherein said superficial covering layer is formed by melting of metal obtained by plasma spray.

3) Process as in claim 1), wherein said superficial covering layer is formed of a material having a chemical affinity with the silicone adhesive.

4) Process as in claim 3), wherein said superficial covering layer is formed by melting of a vitreous enamel layer.

5) Process as in any one of the preceding claims, wherein a spacing gasket is fitted onto the side of said metal support section and the pane is rested on said gasket so as to form a laterally open free space into which the silicone adhesive is injected under direct visual control by means of a spray nozzle.

6) Process as in claim 1), wherein said glass panel is fixed by glueing at least its inside pane onto a metal section forming part of the frame of a support structure.

7) Process as in claim 6), making use of a double-sheet pane having the inside sheet of smaller dimensions than the outside sheet, wherein, after the inside sheet has been glued onto a first adhesion surface, an additional section is fixed to the side of the frame of the support structure, consisting of an L-shaped portion apt to be mechanically anchored to said frame and of a T-shaped portion having a second adhesion surface,

and wherein said outside sheet is then fixed onto said second adhesion surface by means of a silicone adhesive.

8) Process as in claim 7), wherein a laterally open free space is formed between said second adhesion surface of the additional section and said outside sheet, into which the silicone adhesive is injected under visual control by means of a spray nozzle.

9) Process as in claim 8), wherein said silicone adhesive is applied to an extent sufficient to fill the whole space between said second adhesion surface and the sealing gasket interposed between the two double-sheet panes, up to pressing against said gasket.

10) Process as in claim 1), wherein said glass panel is fixed by glueing onto a metal section forming a rim frame, and said rim frame is subsequently anchored by mechanical means onto the frame of the support structure of the glass wall.

11) Process as in claim 10), making use of a double-sheet pane having an inside sheet of smaller dimensions than the outside sheet, wherein the rim frame is formed by metal sections having a general L-shape, the base of the L forming a first adhesion surface onto which can be glued the inside sheet, and a second adhesion surface being formed on the top of the L so that the outside sheet may be glued thereon.

12) Glass panel for glass walls, of the type wherein the single-or double-sheet pane is applied onto the front surface of a support metal section by means of a silicone adhesive, characterized in that, said front surface of the support section is provided with a molten covering layer, consisting of a material apt to form a perfectly smooth adhesion surface, onto which the pane is applied.

13) Glass panel as in claim 12), wherein said covering layer is formed of molten metal applied by plasma spray.

14) Glass panel as in claim 12), wherein said covering layer is formed of a material having a chemical affinity with the silicone adhesive.

15) Glass panel as in claim 14), wherein said covering layer consists of a vitreous enamel.

16) Glass panel as in claim 12), wherein said support metal section forms an integrating part of the frame of a support structure.

17) Glass panel as in claim 12), comprising two support metal sections fixedly connected to the frame of a support structure, each of the two sections having an adhesion surface provided with the molten covering layer onto which the outside and, respectively, inside pane of the glass panel are fixed by glueing.

18) Glass panel as in claim 17), consisting of a double-sheet pane wherein the outside sheet is of larger dimensions than the inside sheet, and com-

prising a first support metal section fixed to the top of the frame of the support structure, for the inside sheet to be glued thereon, and a second support metal section fixed to the side of the frame of the support structure and having a laterally projecting L-shaped portion for anchorage to said frame and a T-shaped portion projecting towards the front, the top of the T forming said adhesion surface provided with a molten covering layer for the outside sheet to be glued thereon.

19) Glass panel as in claim 18), wherein said top part of the T has an end slightly projecting into the space between the two sheets of the double pane and forming a mechanical emergency stop.

20) Glass panel as in claim 12), wherein said support metal section forms a rim frame apt to be anchored by mechanical means, in an interchangeable manner, onto the frame of the support structure.

21) Glass panel as in claim 20), consisting of a single-sheet pane, wherein the rim frame is formed of substantially L-shaped sections, the side of the L parallel to the glass wall forming an adhesion surface for the pane to be glued thereon, while the side of the L perpendicular to the glass wall carries said means of anchorage to the frame of the support structure.

22) Glass panel as in claim 20), consisting of a double-sheet pane having the outside sheet of larger dimensions than the inside sheet, wherein the rim frame is formed of substantially Z-shaped sections, the two sides of the Z parallel to the glass wall forming adhesion surfaces for the inside and respectively outside sheet to be glued thereon, while the intermediate portion of the Z, perpendicular to the glass wall carries said means of anchorage to the frame of the support structure.

23) Glass panel as in claim 20), wherein said mechanical anchorage means consist of a plurality of dowels, which screw into threaded holes provided along the periphery of each rim frame and the pin end of which engages into anchorage seats formed into the opposite sections of the structure supporting the glass wall, said dowels being screwed from the inside of the glass wall.

24) Glass panel as in claim 23), wherein said anchorage seats consist of a longitudinal portion in each section of the support structure, shaped as a groove or delimited by parallel ribs.

25) Glass panel as in claim 20), wherein said mechanical anchorage means consist of a plurality of dowels, which screw into threaded holes provided along the periphery of the sections of the structure supporting the glass wall and the pin end of which engages into anchorage seats formed into the opposite sections of the rim frame, said dowels being screwed from the outside of the glass wall.

26) Glass panel as in claim 25), wherein said

threaded holes are formed on one side of each section of the support structure projecting perpendicularly to the glass wall.

27) Glass panel as in claim 26), wherein said anchorage seats consist of a longitudinal portion in each section of the rim frame, shaped as a groove or delimited by parallel ribs.

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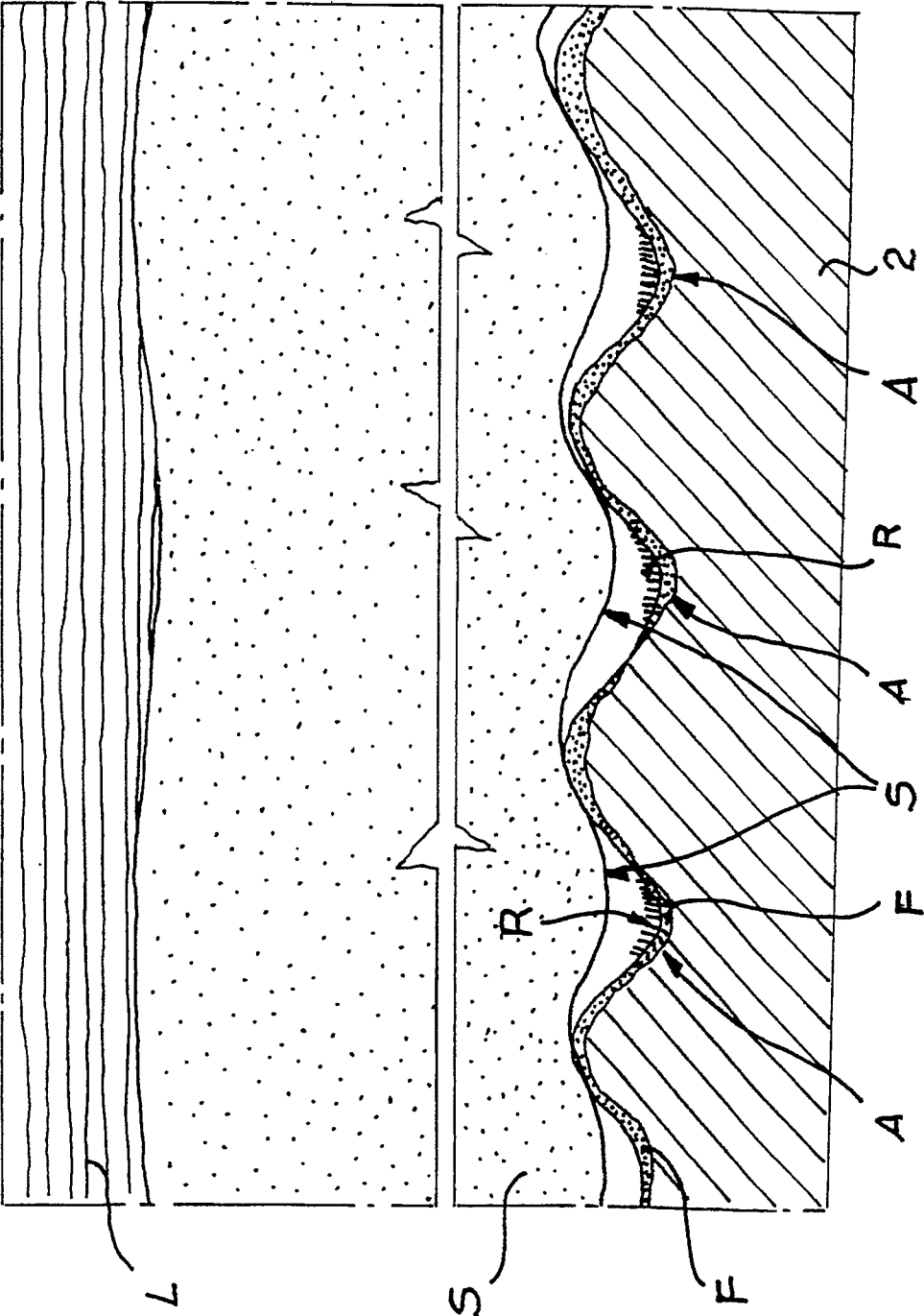


Fig. 1

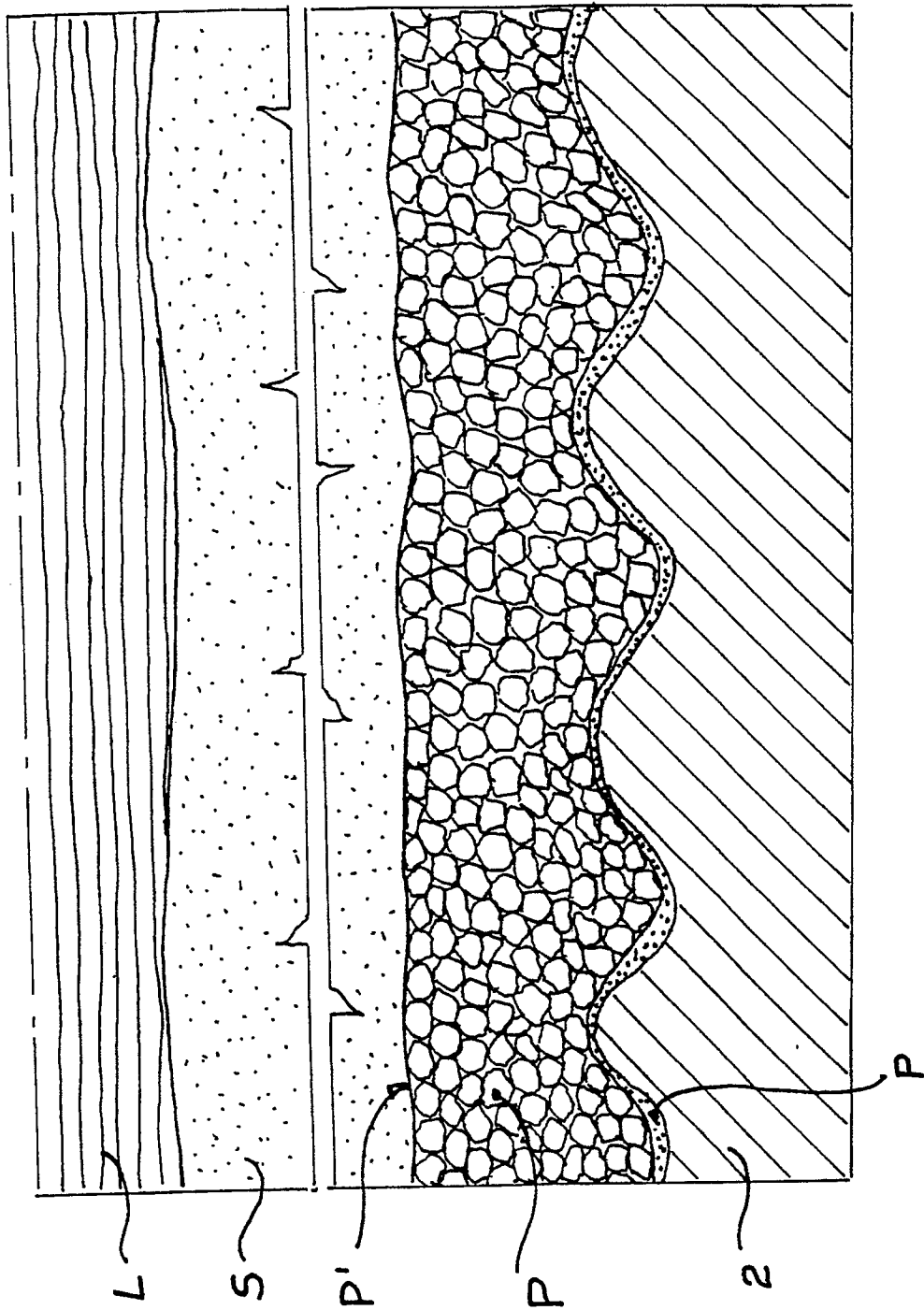


Fig. 2

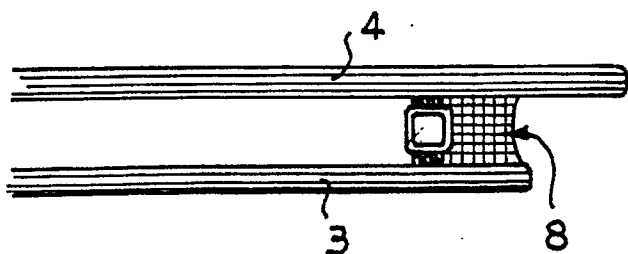


Fig. 3

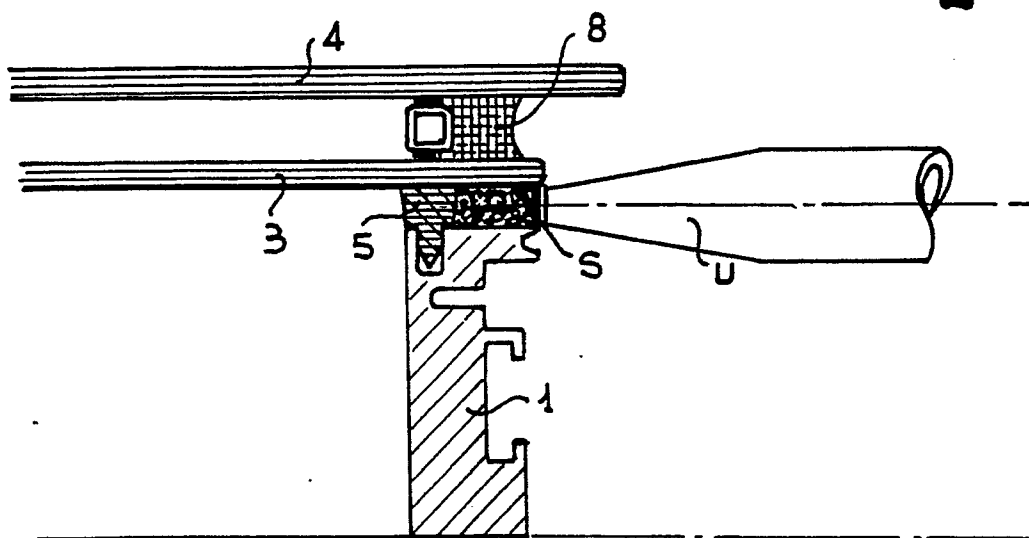
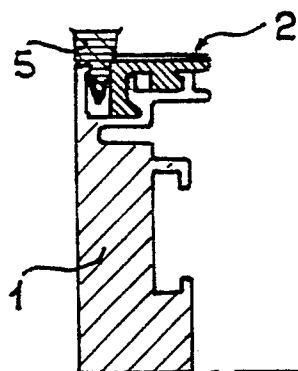


Fig. 4

Fig. 5

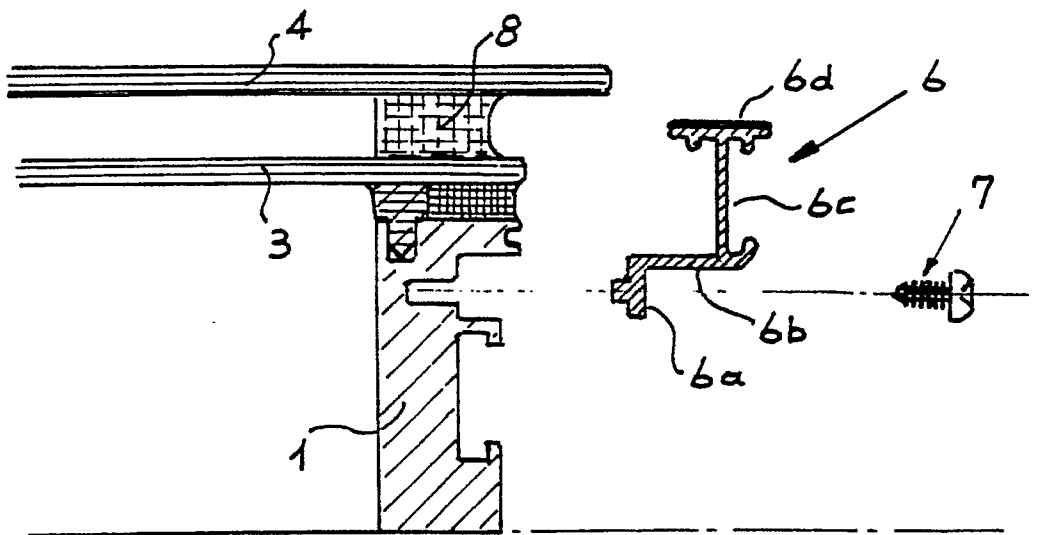
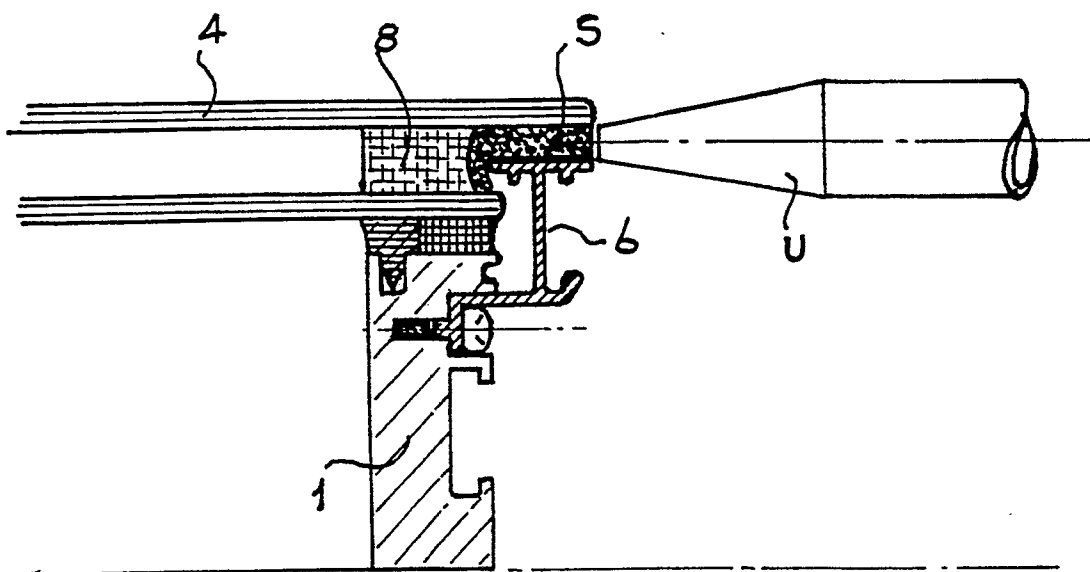


Fig. 6



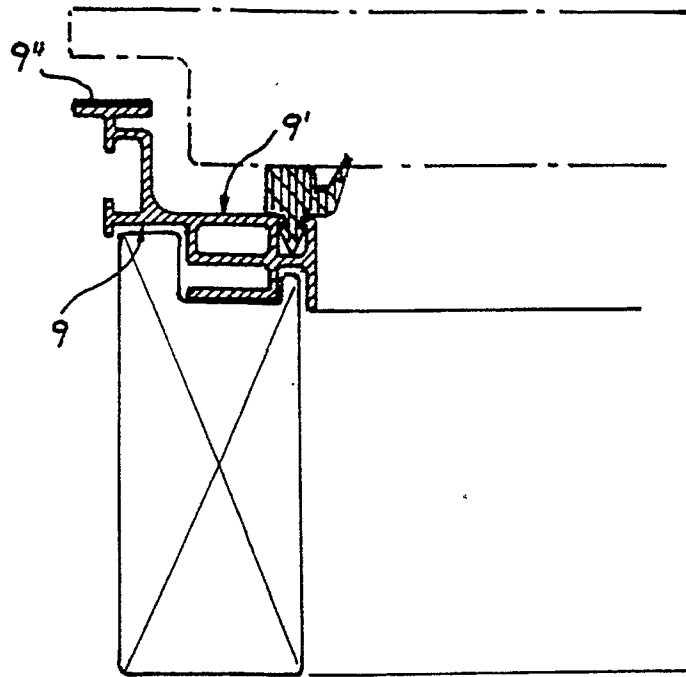
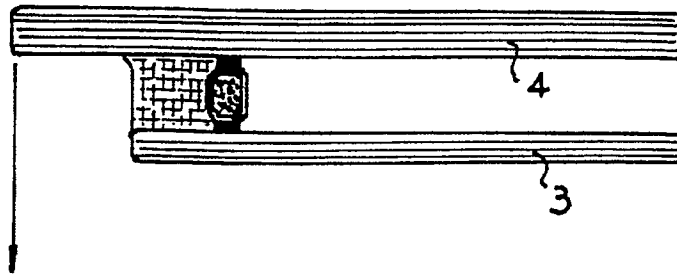


Fig. 7

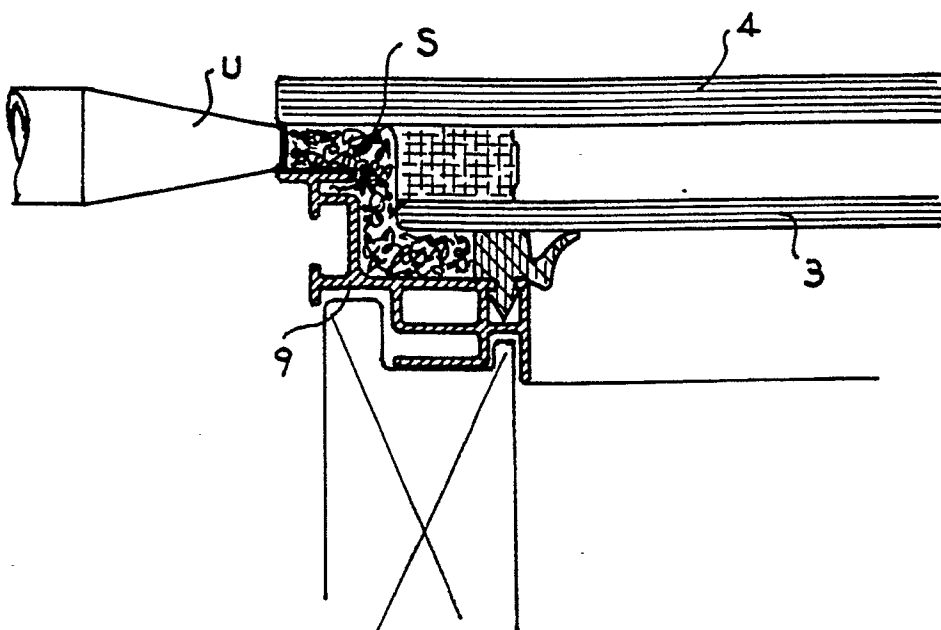


Fig. 8

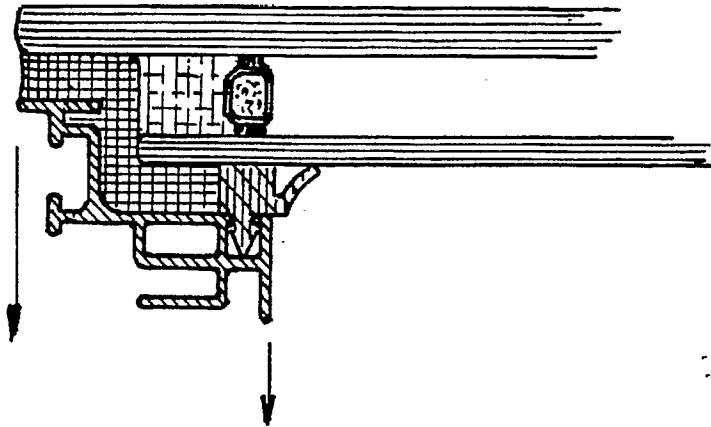


Fig. 9

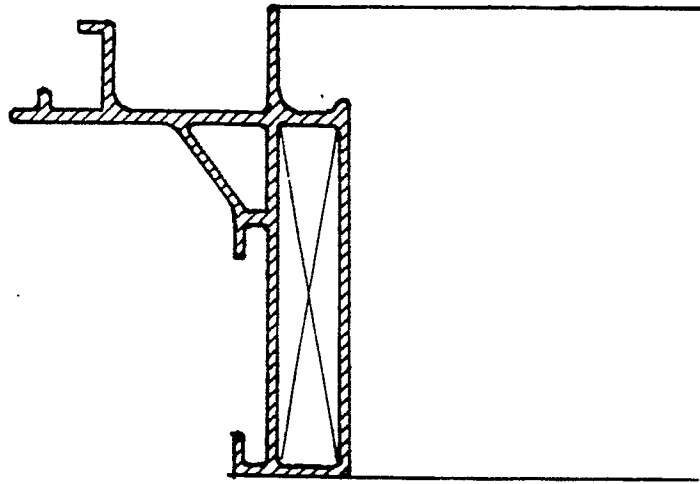
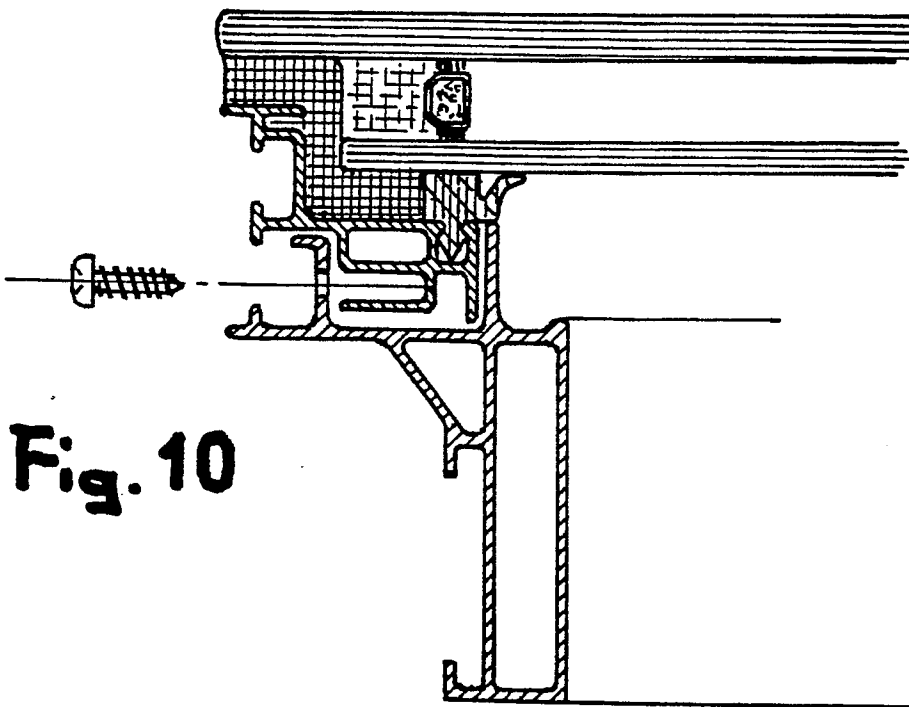


Fig. 10



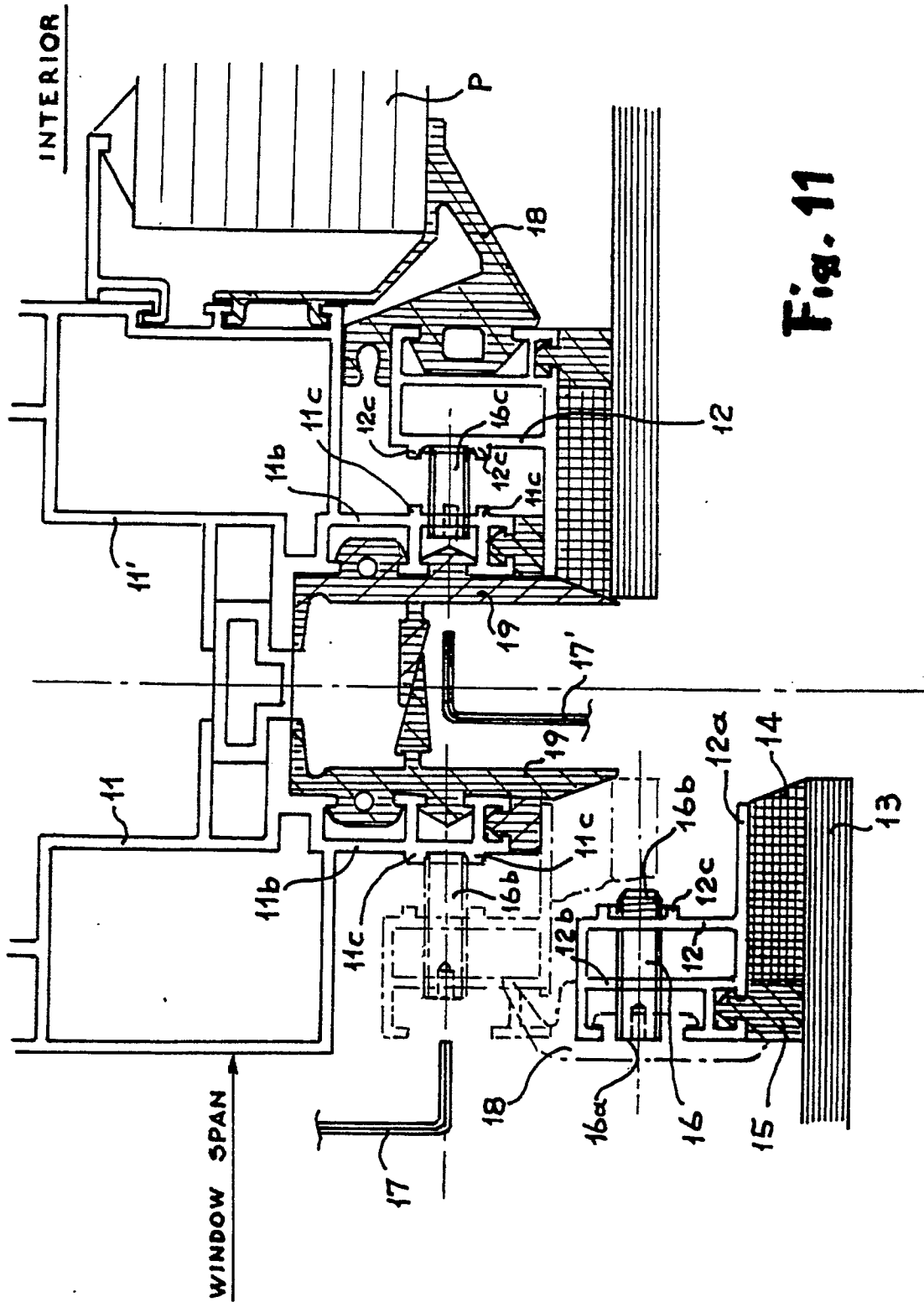
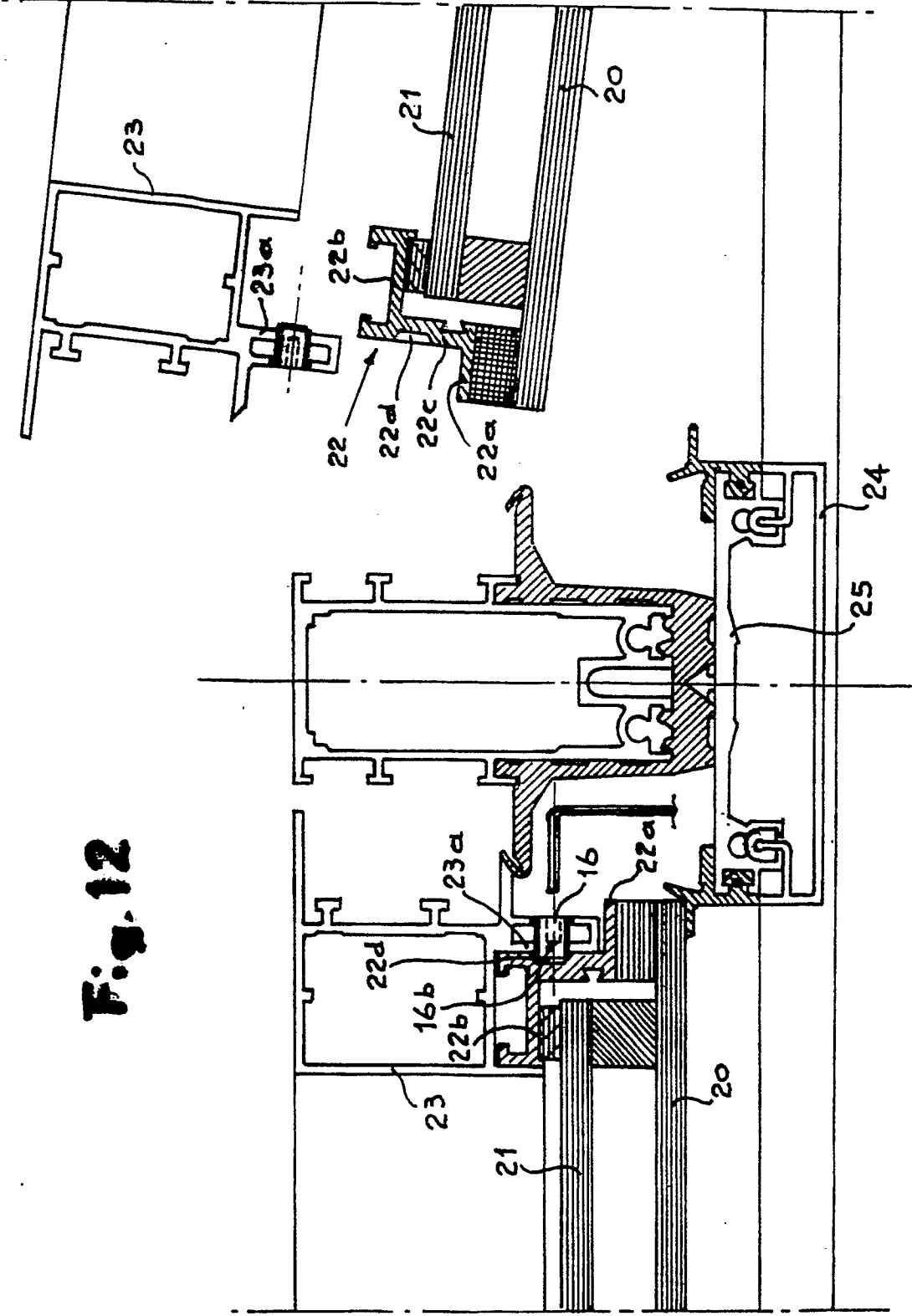


Fig. 12





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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	EP-A-301462 (POLYU'ITALIANA) * column 9, lines 9 - 55 * * column 12, lines 25 - 46 * * column 15, line 55 - column 17, line 17 * * figures 1, 8, 11 * ---	1-4, 6, 10, 12-15, 16, 20	E06B3/54
Y	WO-A-8703327 (BACHLI) * page 31, paragraph 4 - page 33, paragraph 2 * ---	1-4, 6, 10, 12-15, 16, 20	
A	DE-A-3633618 (GARTNER) * column 2, line 11 - column 3, line 7 * * column 4, line 22 - column 5, line 29; figures 3-5 * ---	1, 3, 5, 6, 12, 14, 16	
A	DE-A-3626194 (SCHUCO) * column 3, line 2 - column 4, line 27; figures 1, 2 * ---	5-11, 16, 23	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	EP-A-223132 (ELTREVA) * page 6, line 17 - page 7, line 19 * * page 8, paragraph 4 - page 9, paragraph 2 * * page 10, paragraph 4 - page 11, paragraph 1; figures 1-7 * ---	5, 6, 7, 10, 16, 20-27	E06B
A	GB-A-2142357 (WALSH) * page 3, lines 9 - 109; figures 3, 4, 6 * --- -/--	5, 6, 10, 16, 20, 21, 23, 24	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 27 SEPTEMBER 1990	Examiner DEPOORTER F.
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A	EP-A-280832 (METALLBAU KOLLER) * column 2, lines 29 - 53 * * column 3, line 51 - column 4, line 50 * * column 5, paragraph 2; figures 2, 3, 6 * -----	6-11, 16-18, 20-23, 25, 26	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 27 SEPTEMBER 1990	Examiner DEPOORTER F.
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