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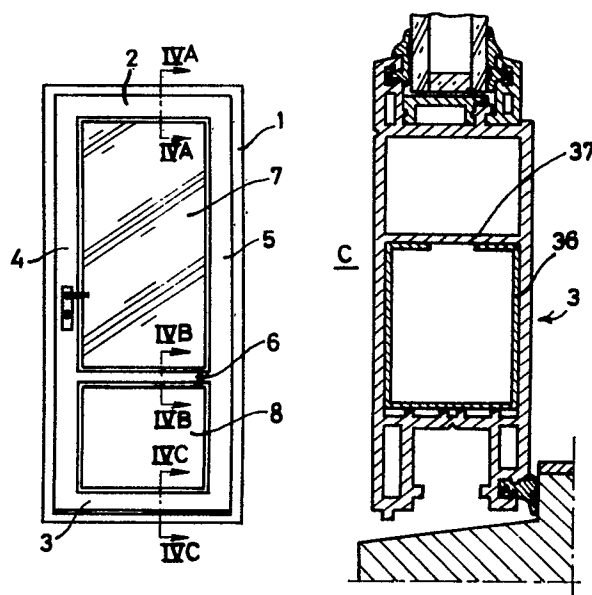
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54 Flush-fitting door.

57 Flush-fitting door whose surround is made up of welded-together hollow PVC sections (2-6), and in which the panel (7, 8) is held between strips (15) disposed on the PVC sections (12) and strips (18) which slot behind flanges (16, 17) provided on the PVC sections, the strips (15, 18) being designed in such a way that they lie fully within the section thickness.

The section (12) for the surround is preferably a tubular section (13) with at least one partition (14) which is provided on one side with the fixed strip (15) and the snap-in flanges (16, 17) for fastening of an insulating panel or insulating glass, and on the other side has two double-walled strips (20, 21) which are flush with the outsides of the tubular section, and between which an open chamber (22) is formed. The inside walls (20', 21') of the double-walled strips (20, 21) are provided with raised parts (23, 2) (sic), and along the top cross-member (2) and the jambs (4, 5) of the surround an auxiliary lath (35) which snaps into the said raised parts and closes the open chamber is provided.

It is advantageous if provision is made, on the double-walled strip at the contact side of the door, for a groove (25) with raised parts (26, 27) lying opposite each other in the opening, for the fitting of a sealing strip.



Flush-fitting door

The invention relates to a flush-fitting door, comprising a surround containing at least one closing panel.

5 Flush-fitting doors, as we know, are doors which over their entire thickness are recessed in the door frame, as opposed to rebated doors, which rest partially on the door frame with a rebate, which may be produced by fitting a panel of greater dimensions on the door. Flush-fitting doors have to some extent the disadvantage that the measurements have to be more accurate; otherwise the
10 doors will jam in the wall as soon as there is a slight deformation of the door frame. Since rebated doors come partially over the door frame, a reasonable seal is more likely to take place, even if there are considerable dimension differences between the door and the inside of
15 the frame rebate.

Flush-fitting doors are used widely in the Netherlands, both as inside doors and as outside doors; the latter particularly for back doors of houses, kitchen doors, balcony doors etc. Hitherto they have been available only in wood, and not in plastic. Rebated doors of
20 plastic, in particular rigid PVC, are known. Since a rebated door can be quite thick without any problem - there are plastic doors with thicknesses of 63 mm and more - it was relatively easy to design these doors for
25 the currently increasingly required thickness of insulating glass, so-called double glazing. When insulating

glass is being fitted there is generally the problem of the extra thickness in the form of special sections and clamping strips by means of which the glass has to be retained. There are all sorts of solutions to this problem when, as in the case of rebated doors, the thickness of the door imposes no essential limitation. Another, of course very important requirement is that of the strength and rigidity of a door with panel. Here again, a solution is found relatively easily in the case of rebated doors, again because the thickness of the door imposes no limitations. The end result is that rebated doors of plastic are relatively heavy and crude.

A rebated door of plastic is described, for example, in British Patent Specification 877,339, in which a (new) door frame of plastic is also used. This solves the thickness problem.

In the case of flush-fitting doors which have to be placed as replacements in an existing wooden door frame the maximum permitted thickness of 41 mm in the two above respects is a considerable restriction. The invention has, however, succeeded in developing a flush-fitting door of plastic which is suitable for taking a panel in the form of insulating glass of sufficient strength and stability, which is easily manufactured by plastic manufacturing techniques, and which is aesthetically very pleasing on account of its slimness, on the one hand, and on account of the chosen design solutions, on the other.

In the basic concept, the flush-fitting door according to the invention is characterized in that the surround is made up of welded-together hollow PVC sections, and in that the panel is held between strips disposed on the PVC sections and strips which slot behind flanges provided on the PVC sections, the strips being designed in such a way that they lie fully within the section thickness.

Within this concept, there is therefore a choice between a number of variants. The panel - in the form of an opaque panel - can be fitted over the entire area; but one can also - which is preferably the case - weld into the surround an centre cross-member, just like the hollow PVC section having the same thickness as the section of the surround, said sill dividing the area enclosed by the surround into two, and insulating glass being provided in one of the two part areas. One can fit in the other part area an opaque panel of the same thickness as the insulating glass. As regards the design features of the section for the surround, the invention proposes a tubular section with at least one partition which is provided on one side with the fixed strip and the snap-in flanges for fastening of the panel or insulating glass, and on the other side has two double-walled strips which are flush with the outsides of the tubular section, and between which an open chamber is formed.

It is further preferable that this should be achieved in such a way that the inside walls of the double-walled strips are provided with raised parts, and that along the top cross-member and the jambs of the surround an auxiliary lath which snaps into the said raised parts and closes the open chamber is provided.

As mentioned above, it is easier to obtain a good sealing of the door opening with rebated doors than with flush-fitting doors. The invention now, however, proposes that in the case of the flush-fitting door provision should be made, on the double-walled strip at the contact side of the door, for a groove with raised parts opposite each other in the opening for the purpose of fitting a sealing strip. This sealing strip then simply comes to rest against the rebate in the door frame when the door is closed and - given the great rigidity and stability of the door as a whole, so that warping cannot occur - ensures an excellent seal, even if the internal measurements of the door frame differ relatively greatly from the external measurements of the door.

The centre cross-member is preferably also a tubular section with at least one partition which is provided, on both sides in symmetrical fashion, with a fixed strip and snap-in flanges - for fastening of the panel or the insulating glass - having the same shape as those of the section provided for the surround.

It is pointed out that Dutch Patent Application

8611002 discloses a window or door construction in which the visible sides of the fixed and opening part lie in the same plane. This is, however, a design in which a door frame matching the opening part is provided. In the event of replacement, this therefore means that both the door and the door frame have to be replaced. The problem outlined above concerning the thickness for the use of double glazing is hereby solved, but the shape of the opening part is not suitable for use merely as a replacement of a door in an existing wooden door frame.

Finally, it is pointed out that the periodical "Plastica" 16 (1963) 12, p. 629, describes a PVC door which is designed as a rebated door, but where a matching plastic doorcasing is fastened to a wooden adjusting casing. In design, the door is made up of a large number of hollow PVC sections which with swallow-tailed connections slide into each other and which are finally connected together by solvent-welding.

The invention will now be explained with reference to the attached drawing of a preferred embodiment.

Fig. 1 shows a view of the finished door, closed, in a door frame;

Fig. 2 shows schematically the individual parts from which the door is made up, except for the glass laths;

Fig. 3 shows on a large scale the detail of the

connection between centre cross-member and stile after the glass laths have been fitted;

Figs. 4A, 4B and 4C give vertical sections according to the arrows IV-IV A, B and C in Fig. 1;

5 Fig. 5 shows on an even larger scale the shape of the section for the surround.

The flush-fitting door in Fig. 1 is seen from the inside of the room which is being closed off by it, so that the inside of the door frame 1 is visible. The door
10 comprises a surround which is formed by a top cross-member 2, a bottom cross-member 3, and two stiles 4 and 5. In the embodiment shown a centre cross-member 6 is also provided. All these parts are made of plastic, preferably rigid PVC, and they are welded together. In the top part
15 area produced by centre cross-member 6, insulating glass (double glazing) 7 is fitted, and the bottom part area is filled with an opaque, also heat-insulating, panel 8.

Fig. 2 shows the individual parts before welding. In the corners the parts of the surround are mitre-sawed
20 at an angle of 45 degrees, as indicated by 9, 9', in order to form weld faces. The centre cross-member 6 is provided with bevelled weld faces, such as 10 and 10'. The jamb is provided with a corresponding notch 11 into which the end 10, 10' is welded.

25 Fig. 3 shows the end position. It also shows that the strips, which are to be described further below, are

mitre-sawed.

The cross sections of Fig. 4A to 4C give an overall view of the shape of the sections with the different fixing strips for the panels 7 and 8. Before any discussion of this, you are referred to Fig. 5, which shows the shape in detail of the section for the surround 2-5 which will be indicated below as the main surround. This main surround, indicated as a whole by 12, comprises an essentially rectangular tube 13 with a partition 14. On the right side it is provided with a fixed strip 15, against which the insulating glass or the insulating panel can be pressed, and has two flanges 16, 17 which are designed to have a separate strip 18 (see Fig. 4A) snap into them.

The fixed strip 15 is double-walled along part of its length, as indicated at 18, while there is also a groove 19 for accommodation of a rubber seal.

On the other side, left in Fig. 5, the tube 13 is provided with two double-walled strips 20 and 21. An open chamber 22 is produced between them. The inside walls 20' and 21' of the strips are provided with raised parts 23 and 24. The fixed strip 21 is also provided with a groove 25 which has raised parts 26 and 27 lying opposite each other in the opening of said groove. A sealing strip 28 (see Fig. 4A) can thus be fitted in said groove. In its assembled state it is a short distance from the periphery of the surround, only on the

contact side of the door, i.e. the side which comes to rest against the rebate 30 in the door frame.

Figs. 4A to 4C will now be clear as regards the fixing of the panels 7 and 8 by means of strips or glass laths such as 18 and 18' in the surround of the door. The construction or fastening is exactly the same here as that for the top cross-member 2 and bottom cross-member 3 and the jambs 4 and 5 of the door. The centre cross-member 6 is shaped differently from the main section (see Fig. 4B). The section of the centre cross-member is provided on either side, in symmetrical fashion, with fixed strips 31 and 32 and with flanges for separate strips 33 and 34. All these strips and snap-in flanges are shaped identically to the fixed strip 15 and the snap-in flanges 16, 17, as described for the main section and shown in Fig. 5.

As can be seen from Figs. 4A to 4C, all strips and flanges lie fully within the thickness of the tubular form of the sections.

Fig. 4A shows two further features. The open chamber 21 described with reference to Fig. 5 on one side of the main section remains open to the bottom cross-member 3. At the top cross-member 2 - and in the same way for the jambs 4 and 5 - this open chamber is closed off by an auxiliary lath 35 which consists of a flat strip with two raised parts which are provided with snap-in flanges, by means of which this lath can be fixed behind the raised parts 23, 24 (see Fig. 5) in the open chamber. This produces a

streamlined appearance to the outer periphery of the door, while the solution chosen for it also further increases the rigidity of the sections.

5 It can also be seen in Figs. 4B and 4C that provision is made in the bottom cross-member 3 and the centre cross-member 6 - and the same can apply to the jambs 4 and 5 - for a reinforcement in the form of a metal tube 36. This tube has on its top side a groove 37 by means of which it can be fitted more easily in the section, while
10 the shape also produces greater rigidity of the tubular sections.

Claims:

1. Flush-fitting door, comprising a surround containing at least one closing panel, characterized in that the surround is made up of welded-together hollow PVC sections (2-6), and in that the panel (7, 8) is held between strips (15) disposed on the PVC sections (12) and strips (18) which slot behind flanges (16, 17) provided on the PVC sections, the strips (15, 18) being designed in such a way that they lie fully within the section thickness.
2. Door according to Claim 1, characterized in that welded into the surround is an centre cross-member (6), also as a hollow PVC section having the same thickness as the section of the surround, said sill dividing the face of the surround into two, and insulating glass (7) being provided in one of the part areas.
3. Door according to Claim 2, characterized in that fitted in the other part area is an opaque panel (8) of the same thickness as the insulating glass.
4. Door according to one of Claims 1 to 3, characterized in that the section (12) for the surround is a tubular section (13) with at least one partition (14) which is provided on one side with the fixed strip (15) and the snap-in flanges (16, 17) for fastening of the panel or insulating glass, and on the other side has two double-walled strips (20, 21) which are flush with the outsides of the tubular section, and between which an

open chamber (22) is formed.

5 5. Door according to Claim 4, characterized in that
the inside walls (20', 21') of the double-walled strips
(20, 21) are provided with raised parts (23, 2) (sic),
and provision is made along the top cross-member (2) and
the jambs (4, 5) of the surround for an auxiliary lath
(35) which snaps into the said raised part and closes the
open chamber.

10 6. Door according to Claim 4 or 5, characterized in
that on the double-walled strip at the contact side of
the door there is a groove (25) which has raised parts
(26, 27) lying opposite each other in the opening for
the fitting of a sealing strip.

15 7. Door according to Claims 2 and 3, characterized in
that the centre cross-member (6) is also a tubular section
with at least one partition which is provided on both
sides, in symmetrical fashion, with a fixed strip (31, 32)
and with snap-in flanges - for fastening of the panel or
the insulating glass - of the same shape as those provided
20 on the section for the surround.

8. Door according to one of Claims 1 to 7, character-
ized in that a reinforcement is provided in the tubular
section for the surround or for the centre cross-member.

25 9. Door according Claim 8, characterized in that the
door reinforcement comprises a metal tube (36) which has
a groove (37) on one side.

10. Door according to one of Claims 1-9, characterized
in that the weld faces between the centre cross-member
(6) and the jambs (4, 5) of the surround are formed by
the ends of the centre cross-member being bevelled (10,
5 10') essentially in symmetrical fashion and the jambs of
the surround being provided with corresponding notches
(11).

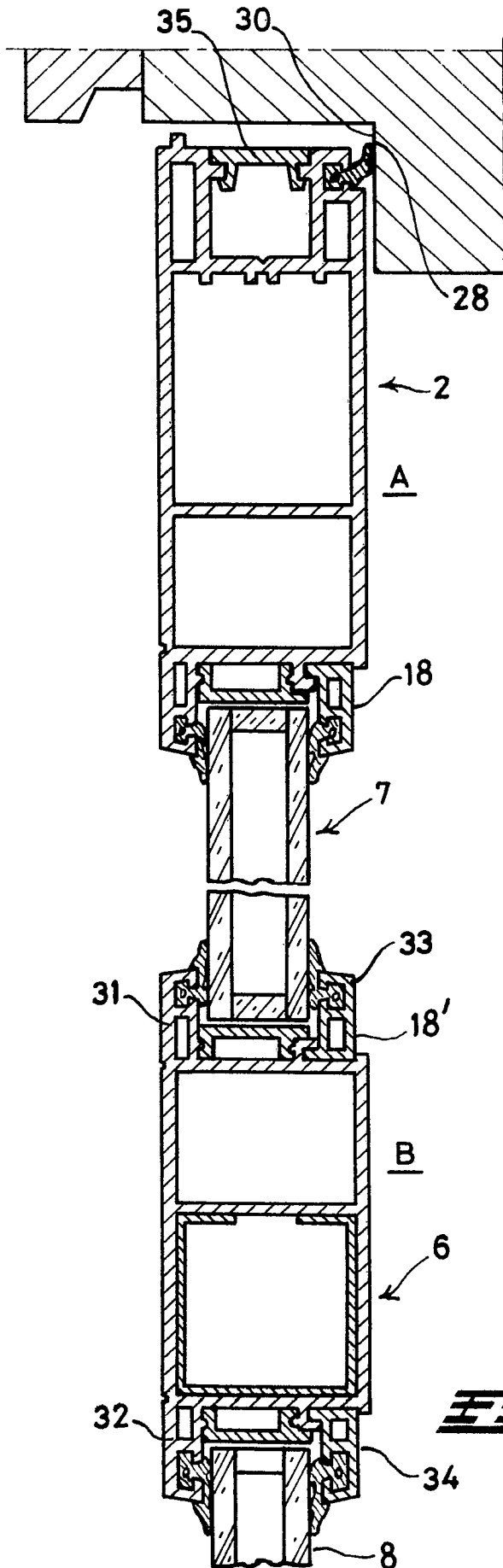


FIG. 4.

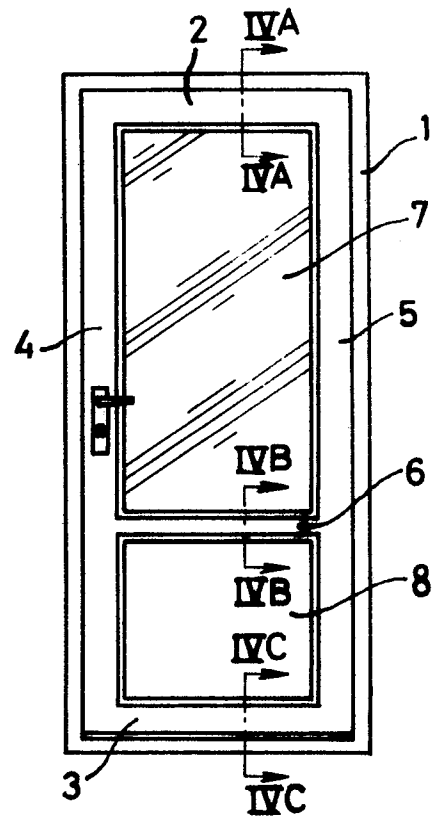
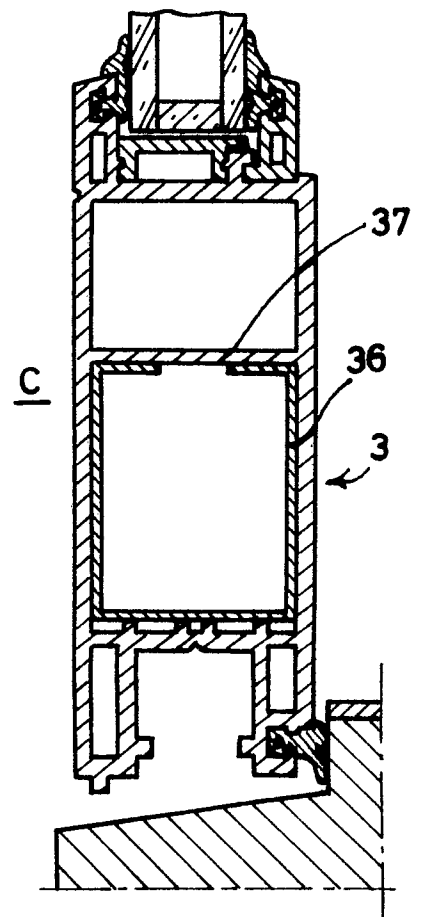
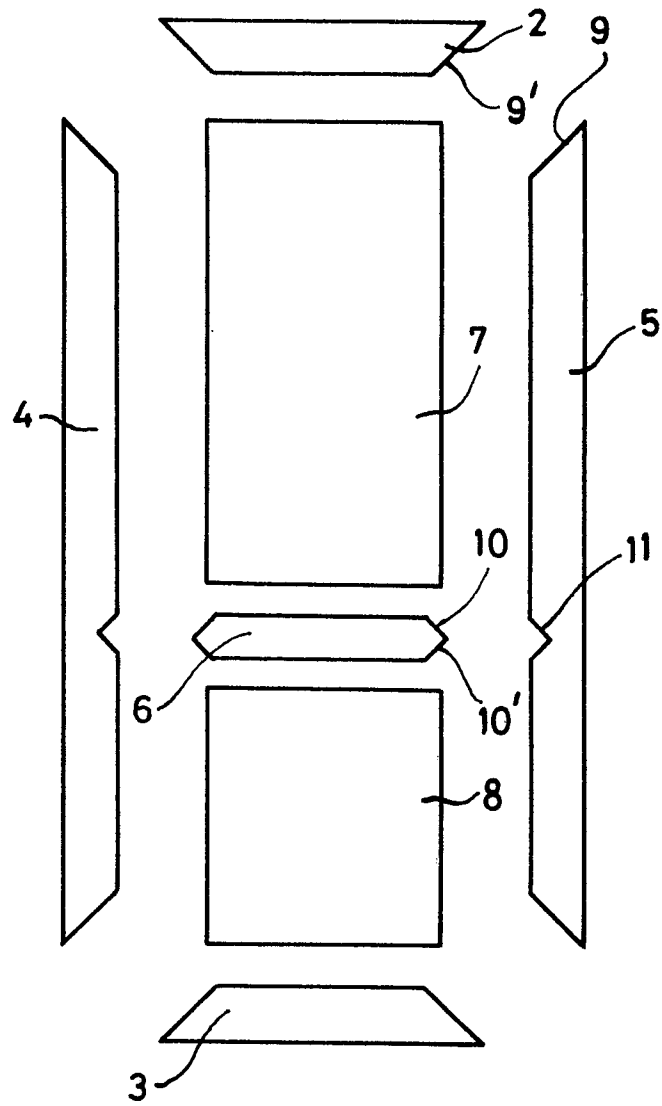
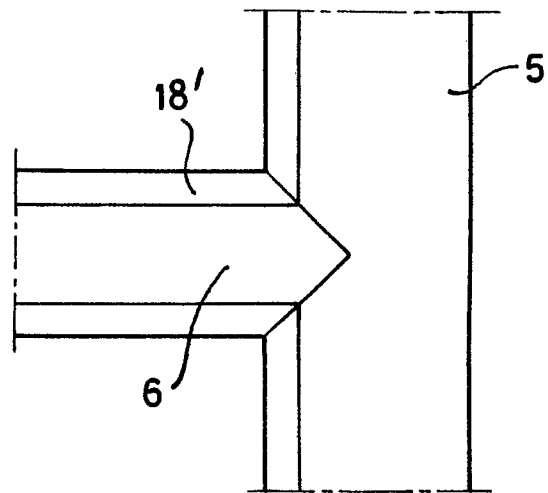


FIG. 2.



**FIG. 2.****FIG. 3.**

