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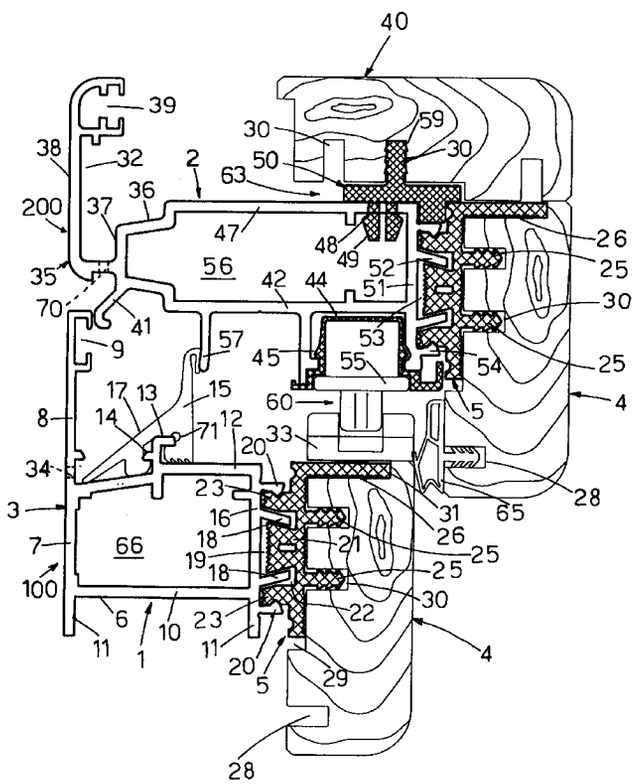
(54) Set of composite metal-wood sections for door- and window-frames

(57) A set of composite metal-wood sections (1; 2) for door- and window-frames with a high degree of thermal insulation is formed by outer sections in metal (3; 35) and inner panelling elements in wood (4; 40). The panelling elements (4; 40) are joined to the metal sections (3; 35) by means of strips (5) and nogs (50) of plastic material that also have a function of thermal insulation. In addition an omega-shaped section in plastic material (45) is interposed between a metal section (35) and a rod (55) of a device (60) for closing a door- and window-frame, again with a function of thermal insulation.

Fig.1



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Description

The present invention relates to a set of composite metal-wood sections for door- and window-frames, that have a high degree of thermal insulation with respect to wooden panelling elements and to metal components of a locking device for a door- and window-frame.

For aesthetic reasons and for reasons of thermal and sound insulation, the market requires door- and window-frames with the outer part in metal, usually aluminium, and the inner one in wood.

Mixed aluminium-wood sections already exist on the market.

The joining systems used so far are mainly three.

A first system consists in fastening the aluminium part to the wooden part by means of a suitable chemical compound, such as, for example, an epoxy or polyurethane resin that glues the two parts together.

The use of this first system, while it does ensure a continuous connection between the wooden part and aluminium part and thus guarantees air- and water-tightness, has the disadvantage of requiring a special production plant and that it cannot be produced directly by a maker of door- and window-frames. Moreover, it is not possible to separate the wooden part for maintenance and painting operations.

A second system provides for the wooden part to be fastened to the aluminium part by means of connecting clips or nogs.

As it is obvious, the use of this second system does not allow a continuous connection to be made between the wooden part and the aluminium part, and this has the drawback of jeopardising the thermal insulation, as well as the air- and water-tightness.

In order to overcome these drawbacks the patent application PCT/EP92/00837, in the name of the same Applicant, provides for the use of a connecting element capable of being fastened to an inner wooden section and near and connected to an outer metal section and of a U-shaped element capable of providing a fastening engagement between the outer section and the connecting element.

In order to assemble a composite section with this joining system consisting of several pieces, a door- and window-frame maker must execute fairly long and laborious operations, that negatively affect the final cost of the door- and window-frames.

The object of the present invention is a set of composite metal-wood sections wherein the metal part is connected in a continuous manner to the wooden part, executing the joining with normal door- and window-frame maker equipment, and wherein the metal part is completely insulated thermally from the wooden part and from components of a device for closing the door- and window-frame.

According to the invention such object is achieved by means of a set of composite metal-wood sections for door- and window-frames, said door- and window-frames comprising a fixed frame and at least one movable frame of a wing, said composite sections comprising at least one outer supporting section in metal, at least one inner panelling element in wood and at least one element of interconnection between said metal section and said panelling element, characterized in that

- a first element of interconnection is formed by a strip of plastic material, having properties of thermal insulation, provided, on one side, with a central dovetail-shaped ridge and with two lateral ridges, separated from said central ridge through two longitudinal grooves and provided, on an opposite side, with at least one toothed tang and with an end tang, both protruding laterally,
- said metal section comprises an inner wall provided with inclined fins and deformable teeth capable of being fixedly fastened to said central ridge and to said lateral ridges, respectively, of said strip, and
- a first inner wooden panelling element is provided with at least one longitudinal slot capable of receiving in a disengageable manner said toothed tang of said strip and is provided with at least one sunken end seat capable of housing said end tang of said strip, so that said strip carries out the function of sealing and of complete thermal insulation between said metal section and said wooden panelling element.

According to a preferred embodiment, second elements of interconnection are interposed between said metal section and a second wooden panelling element arranged at right angles with respect to said first wooden panelling element, said second elements of interconnection being formed by nogs of plastic material that, on one side, have a deformable catch and an end notch and, on another side, at least one second toothed tang, said deformable catch being fixedly fastened to a hole of a lateral wall of said metal section, said end notch containing one end of said strip and said second toothed tang being disengageably inserted in a second longitudinal slot of said second panelling element, so that said strip and said nogs execute a function of complete thermal insulation between said section and said panelling elements and said end tang of said first strip execute a function of sealing between said first and second panelling element.

According to another preferred embodiment, said metal section comprises another lateral wall provided with a U-shaped seat capable of housing a component of a device for closing said door- and window-frame with the interposition of an omega-shaped section of plastic material having thermal insulation properties.

In such a way, by using door- and window-frame maker equipment, it is possible to join the metal parts with the wooden parts and with other metal parts of the device for closing the door- and window-frame by means of elements of interconnection in plastic material that execute both a function of joining the parts and a function of thermal insulation and sealing. A complete thermal

insulation of the wooden parts is thus guaranteed, avoiding the formation of condensate that would jeopardize their integrity and the arising of galvanic currents that would oxidize the metal parts.

The features of the present invention will be made more evident by an embodiment thereof illustrated as a non-limiting example in the enclosed drawings, wherein:

Fig. 1 is a partially sectioned view of a door- and window-frame made with composite metal-wood sections according to the invention;
Figs. 2-7 illustrate, separately, outer metal sections, elements of interconnection, a section in plastic material and a wooden panelling element of the door- and window-frame of Fig. 1;
Figs. 8-10 illustrate, on an enlarged scale, details of the door- and window-frame of Fig. 1.

There is shown in Fig. 1 a movable wing door- and window-frame comprising a fixed frame 100 formed by composite metal-wood sections 1 and by a movable frame 200 formed by composite metal-wood sections 2, embodied according to the invention.

The composite section 1 comprises an outer aluminium supporting section 3, an inner panelling element, formed by a solid block of wood 4, and an element of interconnection, formed by a strip 5 in plastic material, that is used for fastening the wooden panel 4 to the aluminium section 3 and for thermally insulating said inner panel 4 from the outer section 3.

The aluminium section 3, also visible in Fig. 2, is obtained by extrusion and comprises a tubular casing 6 with a substantially polygonal cross-section. The tubular casing 6 comprises, in turn, an external wall 7 that extends into an abutment fin 8 provided with a C-shaped seat 9 for a weather strip and with a slit 34 for discharging any water that is infiltrated between the movable frame 200 and the fixed frame 100. The casing 6 comprises a first lateral wall 10 provided with two tangs 11 for fastening to a wall of an opening for housing the door- and window-frame. The tubular casing 6 also comprises a second lateral wall 12 provided with a folded-down tang 13, that has a ridge 14, capable of supporting a weather strip 15 substantially in the shape of a triangle, provided with an inclined wall 17. The weather strip 15 is fastened to the section 3 at just one central point, since it is provided with a chamber 71 by means of which it is fitted over the folded-down tang 13 and over the ridge 14. The weather strip 15 has the function of sealing and being provided with the wall 17 inclined toward the slit 34, it facilitates the outward drainage of any water that is infiltrated. An inner seat 66 of the tubular casing is used for the housing of a bracket (not shown) for joining sections 3 arranged at right angles. The tubular casing 6 also comprises an inner wall 16 provided with two fins 18 inclined with respect to the wall itself, forming a dovetail-shaped slot 19, and provided with two deformable teeth 20 side by side with the fins 18.

The strip 5, in PVC reinforced with glass fibres, also shown in Figs. 4 and 8, has, on one side, a central dovetail-shaped ridge 21 and two lateral ridges provided with notches 24, separated by the central ridge 21 by means of two grooves 22. The strip 5, on another side, has two toothed, or grooved, tangs 25 and an end tang 26, protruding laterally, whose functions will be illustrated later. Some walls of the strip 5 are knurled for a good grip on the wooden block 4.

The wooden block 4, also shown in Fig. 7, is provided with a groove 28 used for housing a weather strip, with a sunken rear seat 29 capable of supporting the strip 5, with two longitudinal slots 30 wherein the toothed tangs 25 of the strip 5 are inserted under pressure and with a lateral sunken end seat 31 used for housing the end tang 26 of the same strip 5.

The composite section 1 is assembled by inserting the fins 18 of the section 2 into the grooves 22 of the strip 5 and the dovetail-shaped ridge 21 into the slot 19, leaving a certain clearance between them; the teeth 20 are then bent by means of usual door- and window-frame maker equipment and penetrate into the notches 24 of the lateral ridges 23, fixedly fastening the strip 5 to the section 2 (see also Fig. 8). At this point the wooden block 4 is fitted under pressure over the toothed tangs 25 of the strip 5, so that the toothed tangs 25 are inserted under pressure into the longitudinal slots 30, while the end tang 26 is housed in the sunken seat 31 of the same wooden block 4.

In this way the metal section 3 and the wooden block 4 are firmly joined together in a direction perpendicular to the walls 7 and 16, while the presence of the clearances between ridge 21 and slot 19 and between fins 18 and grooves 22 allows relative movements between section 2 and block 4 in a direction parallel to the walls 7 and 16, to compensate for the different thermal expansions that take place between the outer aluminium section 2 and the inner wooden block 4.

The end tang 26 of the strip 5 acts as a thermal insulation element between the block 4 and a steel striker plate 33 of a closing device 60 (hinges and cremone bolt) of the movable wing.

Thus, the strip 5 acts as a means for joining section 3 to the block and as a means of thermal insulation that completely insulates the wooden block 4 from the section 3 and from the striker plate 33, avoiding the formation of condensate that would cause the wooden block to rot.

The composite section 2 comprises an outer supporting section in aluminium 35, two inner panelling elements formed by two blocks of wood 4 and 40 arranged at right angles, the second of which acts as a glass-pane holder, an element of interconnection formed by a strip 5 in plastic material, such as PVC reinforced with glass fibres, and elements of interconnection formed by nogs 50 in nylon. The strip 5 and the nogs 50 are used to fasten the wooden blocks 4 to the aluminium section 35 and to thermally insulate said blocks 4 from the section 35.

The aluminium section 35, also visible in Fig. 3, is obtained by extrusion and comprises a tubular casing 36

with a substantially polygonal cross-section. The tubular casing 36, in turn, comprises an external wall 37 having a substantially trapeze-like shape, from which there protrudes outwardly and laterally an abutment fin 38 provided with a double U-shaped seat 39 for a weather strip and provided with a seat 32 for a bracket (not shown) for reinforcing and aligning fins 38 of sections 35 arranged at right angles. At the base of the fin 38 there is a hole 70 for discharging condensate and for ventilation of a glass pane (not shown). The wall 37 is also provided with a tang 41 having a curved end, with which the fin 8 of the composite section 1 goes into abutment. The tang 41 has the function of a drop breaker: it prevents any infiltration waters from climbing up along section 35 and causes them to be conveyed toward the discharge slit 34. The tubular casing 36 also comprises a first lateral wall 42 provided with a U-shaped seat 44 wherein there is snap-inserted an omega-shaped section 45 in plastic material, such as shockproof PVC (also visible in Figs. 6 and 9), provided with a lip 46. The section 45 is used to thermally insulate the aluminium section 35 from a steel rod 55 of the device 60 for closing the movable wing. The wall 42 is also provided with a striker tang 57, with which the weather strip 15 goes into abutment. The tubular casing 36 comprises a second lateral wall 47 provided with holes 48, in each of which a deformable catch 49 of a nog 50 is snap-inserted. The tubular casing 36 also comprises an internal wall 51 provided with two inclined fins 52, forming a dovetail-shaped slot 53, and with two deformable teeth 54 side by side with the fins 52. An internal seat 56 of the tubular casing 36 is used to house a joining bracket (not shown) of sections 35 arranged at right angles.

Each nog 50, as also shown in Figs. 5 and 10, is formed by a nylon block provided with a sunken recess 58 and provided, on the side opposite to the one of the deformable catch 49, with a toothed, or grooved, tang 59 capable of being inserted under pressure into a longitudinal slot 62 of the glass-pane holder 40.

The function of the nogs 50 can be carried out by a strip in plastic material having the same shape as a nog 50, provided with a toothed tang 59 and with a series of deformable catches 49.

The wooden block 40 has shape and dimensions that are the same as those of the block 4.

The composite section 2 is assembled by joining the metal section 35 to the wooden block 4 by means of the strip 5, with the operative system described in the assembly of the composite section 1. The nogs 50 are fastened to the metal section 35 by snap-inserting the catches 49 into the holes 48 of the wall 47. The block 40 is fitted under pressure over the toothed tangs 59 of the nogs 50, so that the tangs 59 are inserted under pressure into the longitudional slot 30 of the same block 40, while the end tang 26 of the strip 5 remains interposed between the blocks 4 and 40. The rod 55 of the device 60 is housed in the seat 44 after the insertion of the omega-shaped section 45, that is in contact with the strip 5 through the lip 46. A weather strip 65 is inserted into the groove 28 to act as a seal between the blocks 4 of the composite sections 1 and 2.

Thus, the metal section 35 and the blocks 4 and 40 are also firmly fastened together in a direction perpendicular to the wall 51 and to the walls 42 and 47, respectively, while the presence of the clearances between ridge 21 and slot 53 and between fins 52 and grooves 22 allows relative movements between section 35 and block 4 in a direction parallel to the wall 51, to compensate for the different thermal expansions of the aluminium section 35 and of the wooden block 4.

The metal section 35 is thermally insulated from the wooden blocks 4 and 40 by means of the strip 5 and the blocks 50 and it is also thermally insulated from the rod 55 of the device 60 by means of the omega-shaped section 45 in plastic material, while the tang 26 of the strip 5 acts as a weather strip between the blocks 4 and 40.

The metal section 35 is completely thermally insulated from the blocks 4 and 40 and from the rod 55 by means of the strip 5, the nogs 50 and the omega-shaped section 45 due to the fact that the strip 5 and the nogs 50 are arranged at right angles and remain in contact at the end 27 and at the notch 58 and the section 45 remains in contact with the strip 5 by means of the lip 46.

Thus, the section 35 remains completely insulated from the blocks 4 and 40 and from the rod 55, so that the formation of condensate is avoided, that would cause the wooden blocks to rot, and the arising of galvanic currents between section 35 and rod 55, that would cause oxidation.

In addition, between section 35, nogs 50 and block 40 a ventilation chamber 63 is created that ensures an aeration sufficient to eliminate the condensate inside the wing.

Claims

1. A set of composite metal-wood sections (1; 2) for door- and window-frames, said door- and window-frames comprising a fixed frame (100) and at least one movable frame (200) of a wing, said composite sections (1; 2) comprising at least one outer supporting section in metal (3; 35), at least one inner panelling element in wood (4) and at least one element of interconnection (5) between said metal section (3; 35) and said panelling element (4), characterized in that

   - a first element of interconnection (5) is formed by a strip of plastic material, having properties of thermal insulation, provided, on one side, with a central dovetail-shaped ridge (21) and with two lateral ridges (23), separated from said central ridge (21) through two longitudinal grooves (22) and provided, on an opposite side, with at least one toothed tang (25) and with an end tang (26), both protruding laterally,
   - said metal section (3; 35) comprises an inner wall (16; 51) provided with inclined fins (18; 52)

and deformable teeth (20; 54) capable of being fixedly fastened to said central ridge (21) and to said lateral ridges (23), respectively, of said strip (5), and

- a first inner wooden panelling element (4) is provided with at least one longitudinal slot (30) capable of receiving in a disengageable manner said toothed tang (25) of said strip (5) and is provided with at least one sunken end seat (31) capable of housing said end tang (26) of said strip (5), so that said strip (5) carries out the function of sealing and of complete thermal insulation between said metal section (3; 35) and said wooden panelling element (4).

2. A set of sections according to claim 1, characterized in that second elements of interconnection (50) are interposed between said metal section (35) and a second wooden panelling element (40) arranged at right angles with respect to said first wooden panelling element (4), said second elements of interconnection (50) being formed by nogs of plastic material that, on one side, have a deformable catch (49) and an end notch (58) and, on another side, at least one second toothed tang (59), said deformable catch (49) being fixedly fastened to a hole (48) of a lateral wall (47) of said metal section (35), said end notch (58) containing one end (27) of said strip (5) and said second toothed tang (59) being disengageably inserted in a second longitudinal slot (62) of said second panelling element (40), so that said strip (5) and said nogs (50) execute a function of complete thermal insulation between said section (35) and said panelling elements (4; 40) and said end tang (26) of said first strip (5) execute a function of sealing between said first and second panelling element (4; 40).

3. Set of sections according to claim 1, characterized in that said metal section (35) comprises another lateral wall (42) provided with a U-shaped seat (44) capable of housing a component (55) of a device (60) for closing said door- and window-frame with the interposition of an omega-shaped section of plastic material (45) having thermal insulation properties.

4. Set of sections according to claim 3, characterized in that said omega-shaped section (45) is provided with a lip (46) that remains in contact with said first strip (5).

5. Set of sections according to claims 1 and 2, characterized in that said metal section (35) comprises a tubular casing (36) with a substantially polygonal cross-section, which, in turn, comprises an external trapeze-like wall (37), from which there protrudes outwardly and laterally an abutment fin (38), a first lateral wall (42) provided with said U-shaped seat (44), a second lateral wall (47) provided with said hole (48), in which said deformable catch (49) is snap-inserted, and said internal wall (51) provided with said inclined fins (52), forming said dovetail-shaped slot (53), and provided with said two deformable teeth (54) side by side with said fins (52).

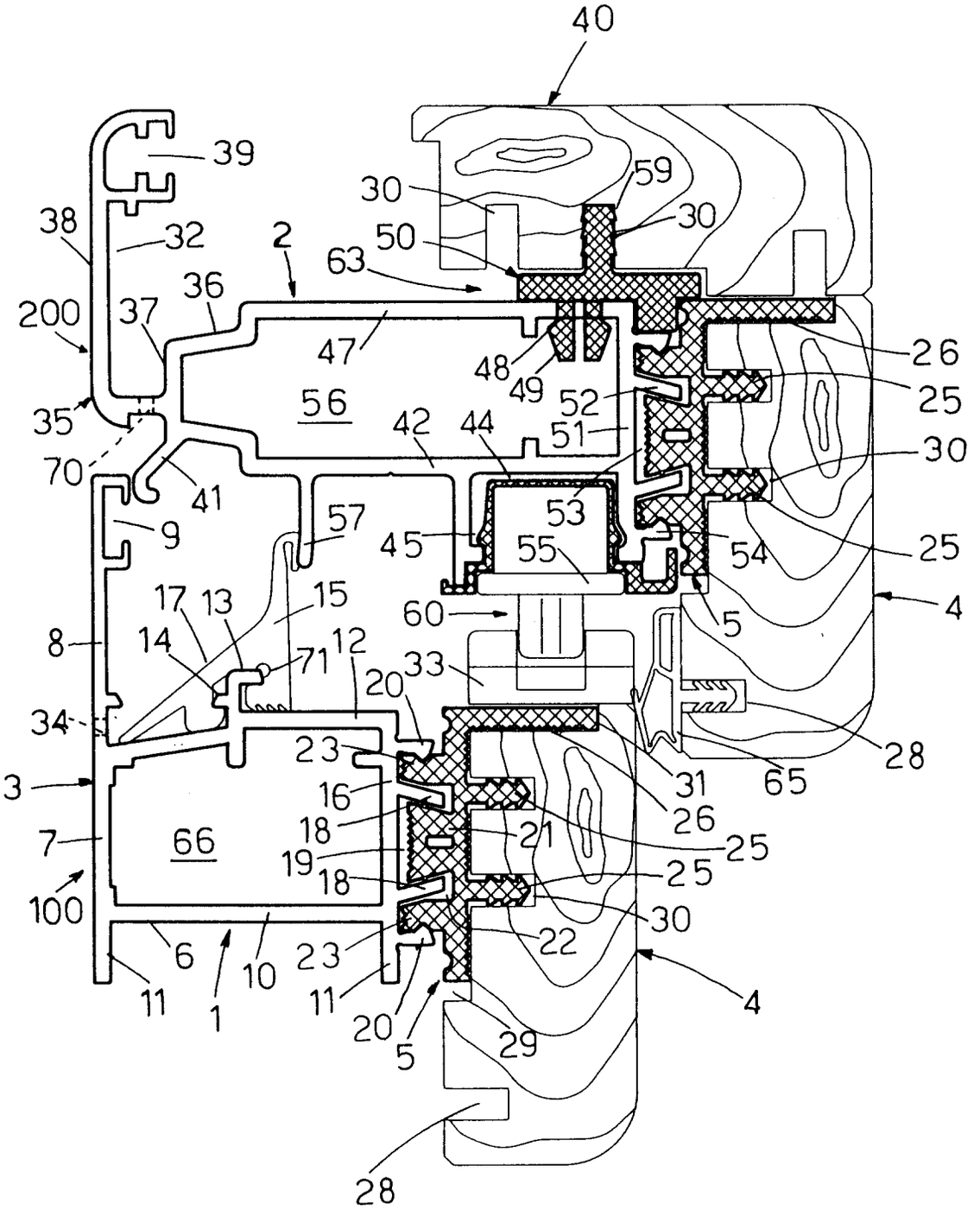
6. Set of sections according to claim 1, characterized in that between said metal section (35), said nogs (50) and said second panelling element (40) there is formed a ventilation chamber (63).

7. Set of sections according to claim 1, characterized in that said metal section (3) comprises a tubular casing (6) with a substantially polygonal cross-section, which, in turn, comprises an external wall (7) that extends into an abutment fin (8), a first lateral wall (10) provided with two tangs (11) for fastening to a wall of an opening for housing the door- and window-frame, a second lateral wall (12) provided with a folded-down tang (13), that has a ridge (14), capable of supporting a weather strip (15), and said inner wall (16) provided with said inclined fins (18) forming said dovetail-shaped slot (19), and provided with said deformable teeth (20) side by side with said fins (18).

8. Set of sections according to claim 7, characterized in that said weather strip (15) is substantially in the shape of a triangle and is provided with an inclined wall (17) capable of facilitating the drainage of any water that is infiltrated toward a drainage slit (34) of said metal section (3), said weather strip (15) being provided with a chamber (71) by means of which it is fitted over said folded-down tang (13) and over said ridge (14), so as to be connected to said section (3) at just one central point.

9. Set of sections according to claims 5 and 7, characterized in that said walls (37, 42) of said metal section (35) of said movable frame (200) are provided with tangs (41, 57) that remain in contact with said abutment fin and with said weather strip (15) of said metal section (3) of said fixed frame (100).

Fig.1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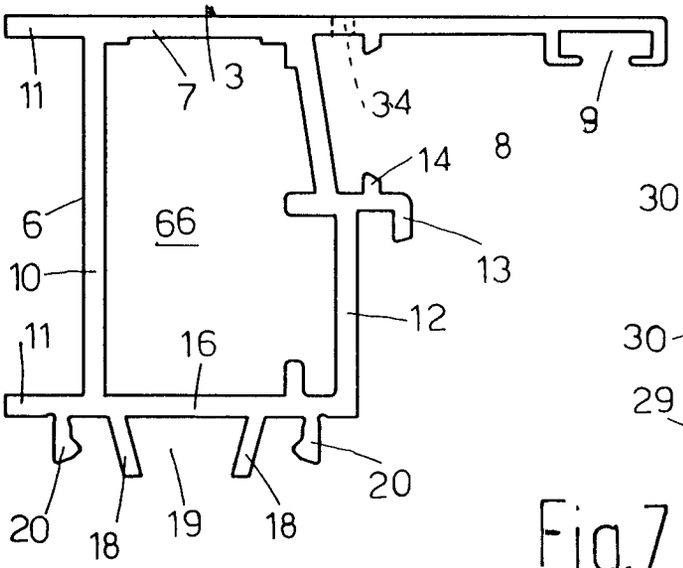


Fig. 2

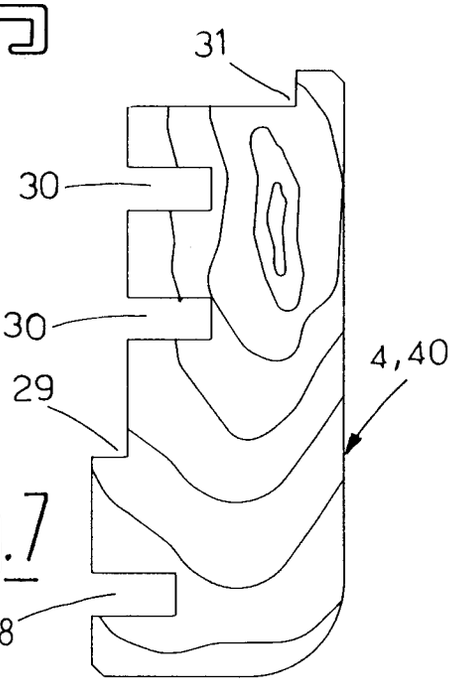


Fig. 7

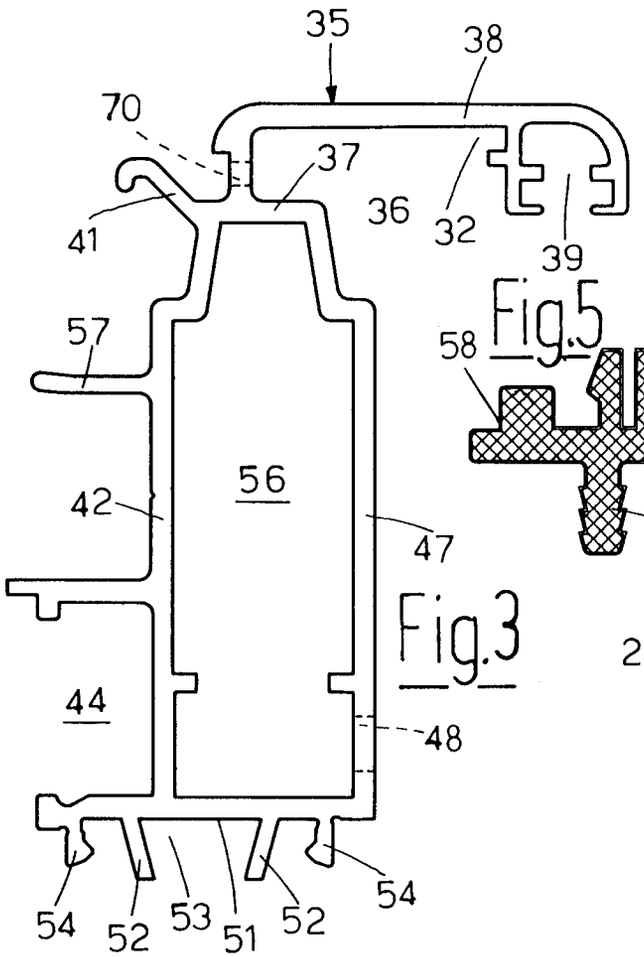


Fig. 3

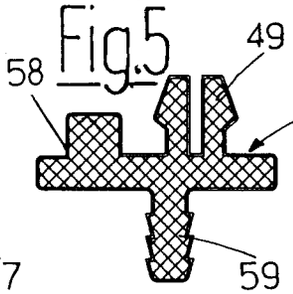


Fig. 5

Fig. 6

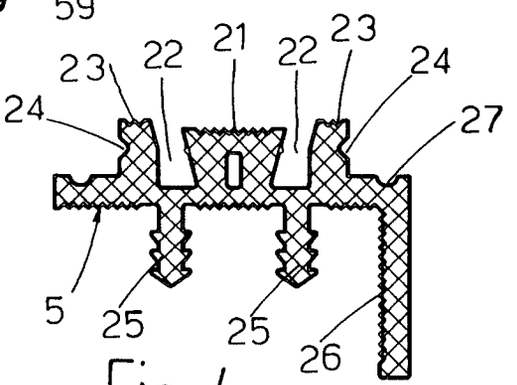


Fig. 4

Fig.10

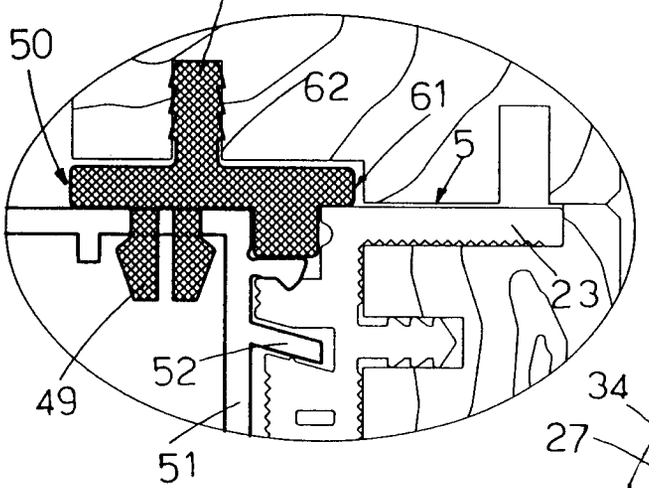


Fig.8

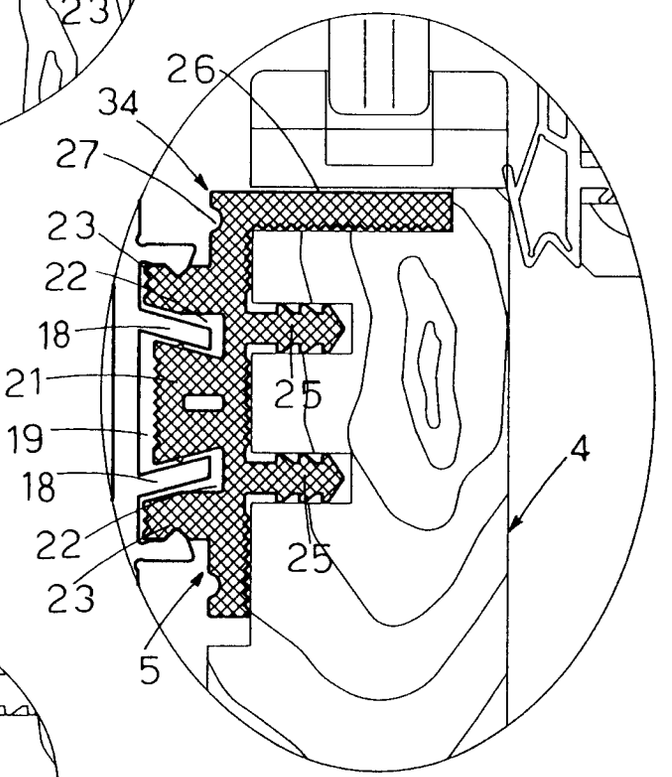
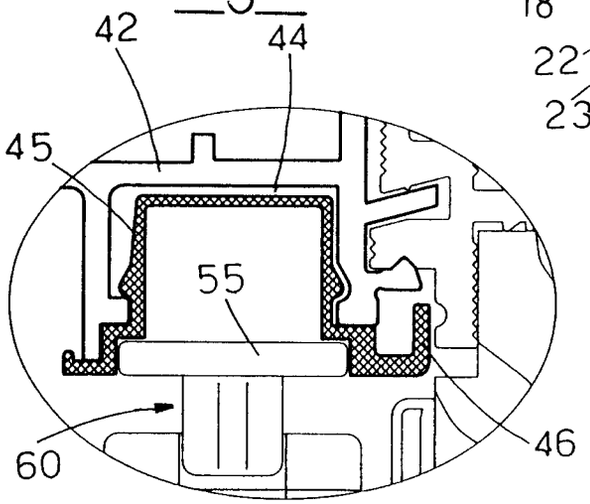


Fig.9



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EUROPEAN SEARCH REPORT

Application Number
EP 95 20 2073

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.6)
A	NUOVA FINESTRA, vol. 15, no. 5, May 1994 MILANO IT, pages 118-127, 'LE NOVITA' 'FRUTTO DEL TAGLIO TERMICO' * page 121, column 4, line 16 - page 122, column 1, last line; figure *	1,5,7-9	E06B3/30
A	DE-A-32 34 842 (RUHRKOHLE) * page 4, paragraph 2 - paragraph 4 * * page 7, paragraph 1 - paragraph 3 * * figures *	2	
A	FR-A-1 489 331 (CLAEYS) * page 2, left column, paragraph 4; figure *	1	
A	WO-A-93 06329 (JOINT S.R.L.)		
P,A	WO-A-94 25716 (GASSER) * page 6, line 25 - page 7, line 4 * * page 8, line 12 - page 9, line 39 * * figures *	1,3,5,6	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	6 October 1995	Depoorter, F

CATEGORY OF CITED DOCUMENTS

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