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(54) Bearing section bar for a window frame, and glass fastening element and seal associated with said section bar

(57) A bearing section bar (30) for a frame of a window having at least one glass pane (4) comprises a first tubular part (31) and a longitudinal rib (34) supporting respectively a first seal (40) which engages with an inner side (104) of the glass (4) and a second seal (45) which engages with an outer side (204) of the glass (4); at least a fastening spring clip (41) is formed by an "L" shaped plate (50) having a first and a second portion (51,52) which are engaged with the outer side (204) of the glass (4) and, respectively, with the bearing section bar (30); the second portion (52) of the "L" shaped plate (50) of the fastening spring clip (41) is provided with inclined lateral fins (54) which press elastically against the bearing section bar (30) and form an elastic support between the glass pane (4) and the section bar (30)

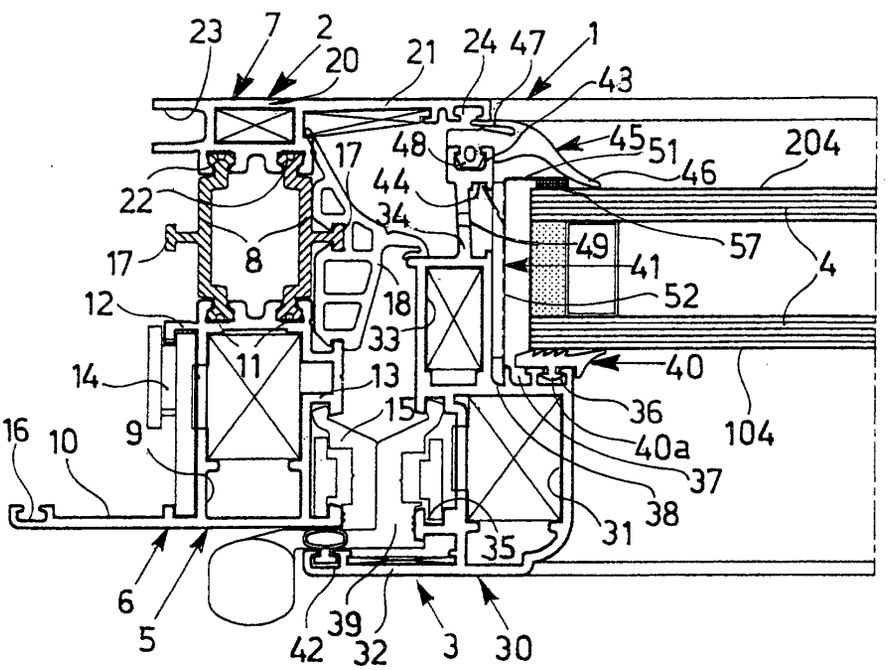

Fig.1

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Description

[0001] The present invention relates to a bearing section bar for a window frame and to a glass fastening element and a seal associated with said section bar.

[0002] in the field of frames for buildings, such as windows, doors and the like, the use of metal section bars is becoming increasingly widespread.

[0003] In the case of a window, said metal section bars are used to form a fixed frame and a movable frame which supports a glass pane.

[0004] Conventional internal frames for windows are formed by means of a bearing section bar and a glass-retaining section bar which are fastened to each other. Seals are positioned between the section bars and the glass.

[0005] In some cases, the bearing section bar comprises an internal tubular part and an external tubular part provided with a respective abutment fin substantially parallel to sides of the glass. The internal tubular part has a C-shaped channel-like seat inside which the glass-retaining section bar is mounted. The glass-retaining section bar has a cross-section substantially in the shape of a "U" and is provided with a C-shaped channel-like seat which receives the seal engaged with the inner side of the glass. The abutment fin of the external tubular part is provided with another C-shaped channel-like seat which receives the seal engaged with the outer side of the glass. The abutment fin of the internal tubular part engages with the fixed frame.

[0006] In the frames made with these section bars, the glass-retaining section bar is located on the inside of the glass and the abutment fin of the external tubular part also performs the function of covering it, so much so that the abutment fin and the glass-retaining section bar have practically the same width.

[0007] In other cases, the bearing section bar comprises a tubular part and a longitudinal wall substantially parallel to one side of the glass and connected to the tubular part. The tubular part is provided with a C-shaped channel-like seat which receives the seal engaged with the inner side of the glass. The tubular part is also provided with an abutment fin substantially parallel to the sides of the glass and engaged with the fixed frame. The longitudinal wall is provided with a longitudinal cavity inside which a glass-retaining section bar having a cross-section substantially in the shape of an "I" or "L" is mounted. The glass-retaining section bar projects laterally from the longitudinal wall towards the glass and supports another seal engaged with the outer side of the glass.

[0008] In the frames made with these latter section bars, the glass-retaining section bar is located on the outside the glass and, having a width practically equal to that of the tubular part of the bearing section bar, covers it.

[0009] In both cases, the presence of the glass-retaining section bar increases the dimensions of the internal frames of the doors or window frames in the plane of the glass and leaves free an opening for the glass, which has small dimensions. This opening assumes even smaller dimensions when a window with a metal frame is applied to a wooden framework of a pre-existing window. Therefore, the glazed area of the windows made with these frames is limited and penalizes the degree of illumination of the rooms.

[0010] The main object of the present invention is to provide a bearing section bar for a window frame, which avoids the drawbacks of known section bars.

[0011] Other objects of the invention relate to a spring clip for fastening a glass pane and a seal which are able to co-operate with said bearing section bar.

[0012] According to a first aspect, the invention relates to a bearing section bar for a frame of a window having at least one glass pane, said bearing section bar comprising a first tubular part and a longitudinal rib, said first tubular part supporting a first seal which engages with an inner side of said glass, said longitudinal rib supporting a second seal which engages with an outer side of said glass, at least a fastening spring clip being formed by an "L" shaped plate having a first and a second portion which are engaged with said outer side of said glass and, respectively, with said bearing section bar, said fastening spring clip being covered by said second seal, characterized in that said second portion of said "L" shaped plate of said fastening spring clip is provided with inclined lateral fins which press elastically against said bearing section bar and form an elastic support between said glass pane and said section bar.

[0013] Preferably, said first tubular part is provided with a first longitudinal cavity and said rib is provided with a recess, said second portion of said "L" shaped plate of said fastening spring clip being inserted in said first longitudinal cavity of said first tubular part, said second portion of said "L" shaped plate being also provided with at least one tongue which is inserted into said recess of said longitudinal rib, a plurality of fastening spring clips being arranged along the perimeter of said glass.

[0014] Advantageously, said first portion of said "L" shaped plate of said fastening spring clip is provided with a strip of resilient polymeric material which makes contact with the said outer side of said glass.

[0015] Preferably, said second seal has a cross-section substantially in the shape of a "Γ" and is provided with a shank and with a sealing lip, said shank being housed in a channel-like seat of said longitudinal rib, said sealing lip being engaged with said outer side of said glass and being located on the same side as said shank.

[0016] Advantageously, said rib is connected to said first tubular part by means of a second tubular part.

[0017] In one embodiment, said second tubular part is integral with said rib and said first tubular part.

[0018] In another embodiment, said second tubular part is integral with said first tubular part, while said rib

is connected to said second tubular part, said rib having a foot provided with projections which are inserted into channel-like seats of said second tubular part.

[0019] Advantageously, said rib is made of insulating material.

[0020] In a further embodiment, said rib is connected to said first tubular part by means of a pair of longitudinal bars made of insulating material, said first tubular part being provided with a pair of C-shaped channel-like seats which house first ends of said insulating bars, said rib having a foot provided with a further pair of C-shaped channel-like seats which house second ends of said insulating bars.

[0021] Advantageously, said first tubular part is provided with a second longitudinal cavity which houses glass support elements positioned between said glass and said bearing section bar.

[0022] Preferably, said channel-like seat of said longitudinal rib is "C" shaped.

[0023] According to a second aspect, the invention relates to a spring clip for fastening a glass pane to a section bar formed by a plate folded in the shape of an "L" and having a first and a second portion which are substantially perpendicular, said first portion of said plate being able to press against said outer side of said glass and said second portion of said "L" shaped plate being able to be inserted in a longitudinal cavity of said section bar, characterized in that said second portion of said "L" shaped plate is provided with inclined lateral fins which form an elastic support between said glass pane and said section bar.

[0024] Preferably, said second portion of said "L" shaped plate is provided with at least one tongue which can be inserted into a recess of said section bar.

[0025] Advantageously, said first portion of said "L" shaped plate is provided with a strip of resilient polymeric material able to make contact with said outer side of said glass.

[0026] Preferably, said first portion of said "L" shaped plate is provided with a hole designed to receive a tool for positioning said spring clip on said glass pane and inserting said second portion in said longitudinal cavity and said tongue in said recess.

[0027] According to a third aspect, the invention relates to a window comprising a frame for supporting a glass pane, said frame comprising a bearing section bar comprising a first tubular part and a longitudinal rib connected to said first tubular part, said first tubular part being provided with a first channel-like seat housing a first seal which engages with an inner side of said glass, characterized in that said longitudinal rib supports a second seal which engages with an outer side of said glass, said longitudinal rib being provided with a second channel-like seat housing a shank of said second seal, at least one fastening element being engaged with said outer side of said glass and with said bearing section bar so as to secure them together and being covered by said second seal.

[0028] Advantageously, said frame has a surface area smaller by about from 20% to 38% than that of a conventional frame.

[0029] According to a fourth aspect, the invention relates to a bearing section bar for a frame of a window having at least one glass pane, said bearing section bar comprising a first tubular part and a longitudinal rib, said first tubular part supporting a first seal which engages with an inner side of said glass, said longitudinal rib supporting a second seal which engages with an outer side of said glass, at least one fastening element consisting of a rigid structure incorporated in said second seal, being engaged with said outer side of said glass and with said bearing section bar, said second seal having a cross-section substantially in the shape of a "Γ" and being provided with a shank and a sealing lip, said shank being inserted in a channel-like seat of said rib, said sealing lip being engaged with said outer side of said glass and being located on the same side as said shank, characterized in that said rigid structure is provided with further sealing lips made of elastomeric material and making contact with said glass and has an additional shank inserted in said channel-like seat of said rib.

[0030] The bearing section bar according to the present invention offers various advantages.

[0031] The frame obtained therewith has a minimum volume such that it leaves free for the glass an opening of large dimensions. Basically, the outer side of the glass is covered only by the seal, while the fastening spring clips are located between the seal and the glass and between the seal and the section bar. Therefore, a large area able to let light through remains free in the glass.

[0032] The frame obtained with the bearing section bar according to the invention has a metal content less than that of a conventional frame because there is no glass-retaining section bar. This allows its weight to be reduced and the degree of thermal and acoustic insulation of the window to be improved.

[0033] Moreover, the fastening spring clip, thanks to its lateral elastic fins, is highly capable of being deformed and elastically supporting the glass pane in respect of the bearing section bar. Thus, the fastening spring clips have the advantage of allowing to take up and correct possible clearances and tolerances of the dimensions and positioning of the glass pane.

[0034] Furthermore, the time required for assembly of the frame made with the bearing section bar according to the invention is less than that required for a conventional frame because the operation of cutting and installing the glass-retaining section bar is eliminated.

[0035] The characteristic features and advantages of the invention will now be illustrated with reference to embodiments shown by way of a nonlimiting example in the accompanying drawings, in which:

Fig. 1 is a partial cross-sectional view of a window made with a bearing section bar according to the invention;

Fig. 2 is a partial cross-sectional view of a window made with a thermally insulated bearing section bar according to the invention;
Fig. 3 is a partial cross-sectional view of a central joint of a window, made with the bearing section bar according to Fig. 1;
Fig. 4 is a partial cross-sectional view of a central joint of a window, made with the bearing section bar according to Fig. 2;
Fig. 5 is a partial cross-sectional view of a window made with a variant of the bearing section bar according to Fig. 1;
Fig. 6 is a partial cross-sectional view of a window made with a first variant of the bearing section bar according to Fig. 2;
Fig. 7 is a partial cross-sectional view of a central joint of a window made with the bearing section bar according to Fig. 5;
Fig. 8 is a partial cross-sectional view of a central joint of a window made with the bearing section bar according to Fig. 6;
Fig. 9 is a partial, vertically sectioned, view of a window made with the bearing section bar according to Fig. 1;
Fig. 10 is a partial, vertically sectioned, view of a window made with a second variant of the bearing section bar according to Fig. 1;
Figs. 11, 12, 13, 14, 15 and 16 show, on a larger scale, variants of the fastening for a rib of the section bar according to Fig.10;
Figs. 11a show assembly of the rib according to Fig. 11;
Fig. 17 shows a perspective view of a spring clip for fastening a glass pane, associated with the bearing section bars according to Figs. 1-10;
Figs. 18, 19 and 20 show, respectively, a rear view, a top view and a side view of the fastening spring clip according to Fig. 17;
Figs. 21 and 21 a are a front view and a side view of an adhesive strip applied to the fastening spring clip according to Figs. 17-20;
Figs. 22, 23, 24 and 25 show a cross-sectional view, on a larger scale, of some embodiments of a seal which incorporates a rigid structure which can be associated with the bearing section bars according to Figs. 1-10.

[0036] Fig. 1 shows a window 1 with a movable wing, having a fixed frame 2, a movable frame 3, and a glass pane 4 of the double glazing type. The frame 2 comprises a thermally insulated section bar 5 having a configuration substantially in the shape of a "Z". The section bar 5 comprises, in turn, an internal metal section bar element 6, an external metal section bar element 7 and two insulating bars 8 which connect the internal and external metal section bar elements.

[0037] The metal section bar elements 6 and 7 are made, for example, of aluminium alloy and the insulating bars 8 are made of a suitable plastic material, for example, polyamide, if necessary reinforced with glass fibres.

[0038] The internal metal section bar element 6 comprises a tubular part 9 and an abutment fin 10. The tubular part 9 has a rectangular cross-section and has C-shaped channel-like seats 11, 12 and 13. The seats 11 house first ends of the insulating bars 8, the seat 12 houses a compensation (expansion) element 14 for the fastening to a wall and the seat 13 houses a component 15 of a hinge which connects the frames 2 and 3. The abutment fin 10 is provided with a C-shaped channel-like seat 16 for a seal.

[0039] Each insulating bar 8 is provided with a T-shaped tooth 17. A central seal 18, positioned between the two frames 2 and 3, is mounted on one tooth 17.

[0040] The external metal section bar element 7 comprises a tubular part 20 and an abutment fin 21. The tubular part 20 has a rectangular cross-section and has a pair of C-shaped channel-like seats 22 and a longitudinal channel 23. The seats 22 house second ends of the insulating bars 8.

[0041] The abutment fin 21 is provided with a C-shaped channel-like seat 24 for a seal.

[0042] The movable frame 3 comprises a bearing section bar 30 which, in turn, comprises two tubular parts 31 and 33, an abutment fin 32 and a longitudinal rib 34 which are formed as one piece.

[0043] The fin 32 is provided with a C-shaped channel-like seat 42 for a seal.

[0044] The tubular part 31 has a rectangular cross-section with a rounded edge and has a C-shaped channel-like seat 35, a C-shaped channel-like seat 36 and two longitudinal cavities 37 and 38. The seat 35 houses a component 39 of the hinge which connects together the frames 2 and 3. The seat 36 houses a shank 40a of a seal 40 which engages with an inner side 104 of the glass 4. The cavity 38 houses internally a spring clip 41 for fastening a glass pane, which secures the glass 4 to the bearing section bar 30 and will be described in detail further below.

[0045] The tubular part 33 has a rectangular cross-section, is positioned between the tubular part 31 and the longitudinal rib 34 and is integral with both of them.

[0046] The longitudinal rib 34 has a C-shaped channel-like seat 43, a recess 44 and a drainage hole 49. The channel-like seat 43 has an outwardly directed concavity and houses a shank 48 of a seal 45 which engages with an outer side 204 of the glass 4. The spring clip 41 engages with the recess 44, as will be described further below. The drainage hole 49 allows the discharging of water resulting from condensation and infiltration.

[0047] The seal 45 has a cross-section substantially in the shape of a "Γ" and has two sealing lips 46 and 47. The lips 46 makes contact with the side 204 of the glass 4 and is located on the same side as the shank 48. In turn, the lip 47 makes contact with the fin 21 of the section bar element 7 and is located on the opposite side to the shank 48.

[0048] The seals 40 and 45 are made of elastomeric material.

[0049] The fastening spring clip 41 is formed by a plate 50 (Figs. 17-20) which is folded in the shape of an "L" and has two substantially perpendicular portions 51 and 52. The portion 52 is provided with two fastening tongues 53 and two inclined lateral fins 54 which form an elastic support. The portion 51 is fitted with an adhesive strip 57 (Figs. 21 and 21 a) of resilient polymeric material, such as foam-type rubber, which interposes between the spring clip 41 and the glass 4. The portion 51 of the plate 50 is provided with a hole 55 having dimensions able to receive a tool which allows positioning of the spring clip 41 between the glass 4 and the section bar 30, the portion 52 of the plate 50 being inserted into the longitudinal cavity 38 of the tubular part 3 and the tongues 53 into the recess 44 of the rib 34, while the portion 51, by means of the resilient strip 57, presses against the outer side 204 of the glass 4.

[0050] When determining the dimensions of the bearing section bar 30, the width of the tubular part 33 and the rib 34 are chosen so as to house glass 4 having a thickness which ranges from about 15 mm to about 25 mm in order to optimise the degree of thermal and acoustic insulation of the window 1.

[0051] In order to construct the window 1, the movable frame 3 is assembled and the glass 4 is mounted on the outer side of the frame 3, resting on the seal 40 supported by the tubular part 31. Then, the glass 4 is secured to the frame 3 by means of a plurality of fastening spring clips 41 arranged along its perimeter. Each spring clip 41 is positioned on the glass 4 by means of tool, such as a screw driver, inserted into the hole 55 of the plate portion 51 and is then pushed towards the tubular part 31. In this way, the plate portion 52 penetrates into the longitudinal cavity 38 of the tubular part 31, the lateral fins 54 bear elastically against the tubular part 33, the tongues 53 are inserted into the recess 44 of the rib 34 and the plate portion 51 presses against the glass 4 by means of the resilient strip 57. Glass support elements, such as those indicated by 810 in Fig. 9, are positioned between the fastening spring clips 41. Then, the seal 45 is mounted in the channel-like seat 43 of the rib 34.

[0052] When the window 1 is complete, the outer edge of the glass 4 is covered only by the seal 45, while the spring clips 41 remain hidden below it. Thus a large glazed area is left free.

[0053] According to a variant, the seal 45 may be replaced by a seal 60 (Figs. 22) which incorporates a fastening element consisting of a rigid structure 61 coextruded with the elastomeric material of the seal. The seal 60 has a cross-section substantially in the shape of a "Γ" and comprises a body 62, two sealing lips 63 and 64 and a shank 65 made of elastomeric material. The lip 63 and the shank 65 are located on the same side of the body 62, while the lip 64 is located on the opposite side to the lip 63. The structure 61 is provided with an additional shank 67 which is inserted into the channel-like seat 43 of the rib 34. Further sealing lips 66 which are made of elastomeric material and make contact with the glass 4 are applied to the structure 61.

[0054] The seal 60 performs the function of sealing and securing the glass 4 to the bearing section bar 30.

[0055] Figs. 23-25 show other embodiments of the seal 60, having a respective rigid structure 161, 261 and 361 coextruded with the elastomeric material.

[0056] Fig. 2 shows a window 101 with a movable wing, in which parts identical to those of the window 1 in Fig. 1 are indicated by the same numbers. The window 101 has a movable frame 103 comprising a thermally insulated bearing section bar 130. The thermally insulated bearing section bar 130 comprises, in turn, a tubular part 131, an abutment fin 32, insulating bars 133 and a longitudinal rib 134.

[0057] The tubular part 131 has, in addition to the channel-like seat 36 and the longitudinal cavities 37 and 38, a pair of C-shaped channel-like seats 105 which house first ends of the insulating bars 133. The rib 34, in turn in addition to the channel-like seat 43 and the recess 44, has a foot 107 with a pair of C-shaped channel-like seats 108 inside which second ends of the insulating bars 133 are housed.

[0058] In the window 101 also, the glass 4 is secured to the bearing section bar 130 by means of fastening spring clips 41 and the glass support elements 810. The external edge of the glass 4 is covered only by the seal 45 which masks the spring clips and the glass support elements.

[0059] Fig. 3 shows a central joint 200 of a window 201 having an insert upright 202, a frame with a semi-fixed wing 203 and a movable frame 205. The upright 202 is fastened to the frame 203 by means of a screw 209. The frames 203 and 205 support a respective glass pane 4. The upright 202 comprises a thermally insulated section bar 210 which, in turn, comprises an internal metallic section bar element 206, an external metallic section bar element 207 and two insulating bars 208 which connect the internal and external metallic section bar elements. The central seal 18 is mounted on a T-shaped tooth 217 of an insulating bar 208.

[0060] Each of the frames 203 and 205 comprises a bearing section bar 30 the same as that shown in Fig. 1. Each bearing section bar 30 comprises the tubular parts 31 and 33 and the rib 34. A handle 211 is mounted in the frame 205.

[0061] Fig. 4 shows a central joint 300 of a window 301, in which parts the same as those of the central joint 200 in Fig. 3 are indicated by the same numbers. The central joint 300 has an insert upright 202, a frame with a semi-fixed wing 303 and a movable frame 305. Each of the frames 303 and 305 comprises a thermally insulated bearing section bar 130 which is the same as that shown in Fig. 2. Each bearing section bar 130 comprising the tubular part 130 identical to that shown in Fig. 2, each bearing section bar 130 comprising the tubular part 131, the insulating bars 133 and the rib 134.

[0062] Fig. 5 shows a window 401 with a movable wing, in which parts the same as those of the window 1 in Fig. 1 are indicated by the same numbers. The window 401 has the fixed frame 2 and a movable frame 403 comprising a bearing section bar 430. The bearing section bar 403 comprises, in turn, a tubular part 431, the tubular part 33 and the longitudinal rib 34, which are formed as one piece. The tubular part 431 has a cross-section formed by perpendicular rectangles with rounded edges and has a C-shaped channel-like seat 416 for a seal, the channel-like seat 36 and the longitudinal cavities 37 and 38. Components of a hinge 410 of the type suitable for wooden door and window framings are mounted in the frames 2 and 403.

[0063] Fig. 6 shows a window 501 with a movable wing, in which parts the same as those of the window 101 in Fig. 2 are indicated by the same numbers. The window 501 has the fixed frame 2 and a movable frame 503 comprising a thermally insulated bearing section bar 530. The bearing section bar 530 comprises, in turn, a tubular part 531, the insulating bars 133 and the longitudinal rib 134. The tubular part 531 has a cross-section formed by perpendicular rectangles with rounded edges and has the channel-shaped seat 36, the longitudinal cavities 37 and 38 and the pair of C-shaped channel-like seats 105 which house first ends of the insulating bars 133. The second ends of the insulating bars 133 are housed in the seats 108 of the foot 107 of the rib 134.

[0064] Fig. 7 shows a central joint 600 of a window 601, having an insert upright 202, a frame with a semi-fixed wing 603, and a movable frame 605. The upright 202 comprises a thermally insulated section bar 610 which, in turn, comprises an internal metallic section bar element 606, an external metallic section bar element 607 and two insulating bars 608 which connect the internal and external metal section bar elements. The central seal 18 is mounted on a T-shaped tooth 617 of an insulating bar 608. The frames 603 and 605 comprise a respective bearing section bar 430 the same as that shown in Fig. 5. Each bearing section bar 430 comprises the tubular part 431, tubular part 33 and longitudinal rib 34 which are formed as one piece.

[0065] Fig. 8 shows a central joint 700 of a window 701, in which parts the same as those of the central joint 600 in Fig. 7 are indicated by the same numbers. The central joint 700 has an insert upright 602, a frame with a semi-fixed wing 703, and a movable frame 705. The frames 703 and 705 comprise a respective thermally insulated bearing section bar 530 the same as that shown in that Fig. 6. Each bearing section bar 530 comprises the tubular part 531, the insulating bars 133 and the longitudinal rib 134.

[0066] Fig. 9 shows a vertical joint of a window made with the bearing section bar 30 in Fig. 1. The window 800 has a fixed frame 802 and a movable frame 803. The frame 802 comprises a thermally insulated section bar 805 which, in turn, comprises an internal metallic section bar element 806, an external metallic section bar element 807 and two insulating bars 808 which connect the internal and external metallic section bar elements. An insulating element 809 which is fastened to a wall 812 is mounted in the section bar element 806.

[0067] The frame 803 comprises the bearing section bar 30 which, in turn, comprises the two tubular parts 31 and 33, the abutment fin 32 and the longitudinal rib 34 formed as one piece. Glass support elements 810 are positioned between the bearing section bar 30 and the glass 4 in the spaces between the fastening spring clips 31, shown in Figs. 1-8. Each glass support element 810 has a wedge shape and is provided with a foot 811 which is inserted inside the cavity 37.

[0068] Fig. 10 shows a vertical joint of a window 900, in which parts the same as those of the window 800 are indicated by the same numbers. The window 900 has the fixed frame 802 and a movable frame 903 made with the bearing section bar 930. The bearing section bar 930 comprises a tubular part 931, an abutment fin 932, a tubular part 933 and a longitudinal rib 934 made of insulating material. The tubular part 933 is integral with the tubular part 931, while the rib 934 is connected to the tubular part 933. The tubular part 933 has a pair of C-shaped channel-like seats 905 and the longitudinal rib 934 has a foot 906 provided with projections 907 which are inserted into the seats 905. Glass support elements 800 are positioned between the bearing section bar 930 and the glass 4 in the spaces between the fastening spring clips 41.

[0069] The longitudinal rib may be made of a plastic material, such as polyamide, containing magnetic material with a given polarity, and the seal may contain magnetic material with a different polarity.

[0070] Fig. 11 shows a variant of the tubular part 933 and the rib 934 of the bearing section bar 930 shown in Fig. 10. In this variant, a tubular part 1033 has a pair of channel-like seats with a semi-spherical cross-section 1005, while a rib 1034 made of insulating material has a foot 106 provided with projections 1007 with a semi-spherical head, which are inserted into the seats 1005. Fig. 11a shows assembly of the longitudinal rib 1034 in the tubular part 1033.

[0071] Fig. 12 shows a variant of the tubular part 933 and the rib 934 in which a tubular part 1133 has a pair of channel-like seats with a trapezoidal cross-section 1105 and a rib 1134 has a foot 1106 provided with projections with a trapezoidal shape 1107 which are inserted into the seats 1105.

[0072] Fig. 13 shows a variant of the tubular part 933 and the rib 934 in which a tubular part 1233 has a pair of channel-like seats with a trapezoidal cross-section 1205 and a rib 1234 has a foot 1206 provided with projections with a trapezoidal shape 1207 which are inserted into the seats 1205.

[0073] Fig. 14 shows a variant of the tubular part 933 and the rib 934, in which a tubular part 1333 has a pair of channel-like seats with a C-shaped cross-section

1305 and a rib 1334 has a foot 1306 provided with projections 1307 which are inserted into the seats 1305.

[0074] Fig. 15 shows a variant of the tubular part 933 and the rib 934, in which a tubular part 1433 has a pair of channel-like seats 1405 and a rib 1434 has a foot 1406 provided with projections 1407 which are inserted into the seats 1405.

[0075] Fig. 16 shows a variant of the tubular part 933 and the rib 934, in which a tubular part 1533 has a channel-like seat with a C-shaped cross-section 1505 and a rib 1534 has a foot 1506 provided with a projection 1507 which is inserted into the seat 1505.

[0076] Preferably, in said bearing section bars, adhesive material, such as a glue, is interposed between the projections 907, 1007, 1107, 1207, 1307, 1407, 1507 of each rib and the respective seats 905, 1005, 1105, 1205, 1305, 1405, 1505 of each tubular part. Moreover, in the rib 1434 (Fig. 15), the projections 1407 of the foot 1406 are provided with hollows 1408 wherein the adhesive material is inserted.

[0077] The bearing section bars described above may be made entirely of insulating material instead of metal.

[0078] The advantages of the invention will emerge clearly from a comparison between windows made with conventional section bars of the first type described above and those made with the bearing section bar according to the invention.

[0079] A first comparison relates to a two-wing window with a width of 1200 mm, height of 1500 mm and total frame+glass surface area of 1.8 m^2, made with a first thermally insulated conventional section bar, and a two-wing window, with the same width, height and total surface area, made with the section bar according to the invention.

[0080] The free surface area of the glass of the window made with the conventional section bar is equal to 1.14 m^2 (63% of the total surface area), while that of the window made with the section bar according to the invention is equal to 1.34 m^2 (74% of the total surface area).

[0081] The surface area of the frame of the window made with the conventional section bar is equal to 0.66 m^2 (37%), while that of the frame of the window made with the section bar according to the invention is equal to 0.46 m^2 (26%).

[0082] With a glass having a transmission coefficient Ug equal to 2.7 W/m^2, frames with a transmission coefficient Uf equal to 3.3 W/m^2 and seal with a transmission coefficient ξ equal to 0.05 W/m^2, the heat transmission coefficient U_w of the abovementioned two-wing window made with the conventional section bar is equal to 3.11 W/m^2, while that of the window made with the section bar according to the invention is equal to 3 W/m^2. The heat transmission coefficient U_w of a window is defined by:

$$U_w = (Ag * Vg) + (Af*Uf) + (Lg*\Psi)/Ag + Af$$

where Ag is the surface area of the glass, Vg is the heat transmission coefficient of the glass, Af is the surface area of the frame, Uf is the heat transmission coefficient of the frame, Lg is the perimeter of the glass and Ψ is the heat transmission coefficient of the glass spacer.

[0083] Therefore, the window made with the bearing section bar according to the invention has, for the same type of glass used, the advantage of having a heat transmission coefficient which is about 3.6% less than that of a window with the same width and height, made with the conventional section bar. This is due to the particular shape of the bearing section bar according to the invention and the absence of the glass-retaining section bar.

[0084] A second comparison relates to a single-wing window with a width of 1200 mm, height of 1500 mm and total frame+glass surface area of 1.8 m^2, made with a second conventional section bar of the first type described above, and a two-wing window, with the same width, height and total surface area, made with the section bar according to the invention.

[0085] In the first window the free surface area of the glass is equal to 1.262 m^2 (70.1 %) and the surface area of the frame is equal to 0.538 m^2 (29.9%).

[0086] The second window has a free surface area of the glass equal to 1.257 m^2 (69.8%) and a surface area of the frame equal to 0.543 m^2 (30.2%).

[0087] Therefore a two-wing window, made with the section bar according to the invention, has a glazed surface area substantially greater than that of a two-wing window made with a conventional section bar and substantially the same as that of a single-wing window made with a conventional section bar.

Claims

1. Bearing section bar (30; 130; 430; 530; 930) for a frame (3; 103; 203; 205; 303; 305; 403; 503; 603; 605; 703; 705; 803; 903) of a window having at least one glass pane (4), said bearing section bar (30; 130; 430; 530; 930) comprising a first tubular part (31; 131; 431; 531; 931) and a longitudinal rib (34; 134; 934; 1034; 1134; 1234; 1334; 1434; 1534), said first tubular part (31; 131; 431; 531; 931) supporting a first seal (40) which engages with an inner side (104) of said glass (4), said longitudinal rib (34; 134; 934; 1034; 1134; 1234; 1334; 1434; 1534) supporting a second seal (45) which engages with an outer side (204) of said glass (4), at least a fastening spring clip (41) being formed by an "L" shaped plate (50) having a first and a second portion (51, 52) which are engaged with said outer side (204) of said glass (4) and, respectively, with said bearing section bar (30; 130; 430; 530; 930), said fastening spring clip (41) being covered by said second seal (45), **characterized in that** said second portion (52) of said "L" shaped plate (50) of said fastening

spring clip (41) is provided with inclined lateral fins (54) which press elastically against said bearing section bar (30; 130; 430; 530; 930) and form an elastic support between said glass pane (4) and said section bar (30; 130; 430; 530; 930).

2. Bearing section bar ((30; 130; 430; 530; 930) according to Claim 1, **characterized in that** said first tubular part (31; 131; 431; 531; 931) is provided with a first longitudinal cavity (38) and said rib (34; 134; 1034; 1134; 1234; 1334; 1434; 1534) is provided with a recess (44), said second portion (52) of said "L" shaped plate (50) of said fastening spring clip (41) being inserted in said first longitudinal cavity (38) of said first tubular part (31;131; 431; 531; 931), said second portion (52) of said "L" shaped plate being also provided with at least one tongue (53) which is inserted into said recess (44) of said longitudinal rib (34; 134; 934; 1034; 1134; 1234; 1334; 1434; 1534), a plurality of fastening spring clips (41) being arranged along the perimeter of said glass (4).

3. Bearing section bar (30; 130; 430; 530; 930) according to Claim 1, **characterized in that** said first portion of said "L" shaped plate (50) of said fastening spring clip (41) is provided with a strip (57) of resilient polymeric material which makes contact with the said outer side (204) of said glass (4).

4. Bearing section bar (30; 130; 430; 530; 930) according to Claim 1, **characterized in that** said second seal (45) has a cross-section substantially in the shape of a "Γ" and is provided with a shank (48) and with a sealing lip (46), said shank (48) being housed in a channel-like seat (43) of said longitudinal rib (34; 134; 934; 1034; 1134; 1234; 1334; 1434; 1534), said sealing lip (46; 63) being engaged with said outer side (204) of said glass (4) and being located on the same side as said shank (48).

5. Bearing section bar (30; 130; 430; 530; 930) according to Claim 1, **characterized in that** said rib (34; 934; 1034; 1134; 1234; 1334; 1434; 1534) is connected to said first tubular part (31; 431; 931) by means of a second tubular part (33; 933; 1033; 1133; 1233; 1333; 1433; 1533).

6. Bearing section bar (30; 430) according to Claim 5, **characterized in that** said second tubular part (33) is integral with said rib (34) and said first tubular part (31;431).

7. Bearing section bar (930) according to Claim 5, **characterized in that** said second tubular part (933; 1033; 1133; 1233; 1333; 1433; 1533) is integral with said first tubular part (931), while said rib (934; 1034; 1134; 1234; 1334; 1434; 1534) is connected to said second tubular part (933; 1033; 1133; 1233; 1333; 1433; 1533), said rib (934; 1034; 1134; 1234; 1334; 1434; 1534) having a foot (906; 1006; 1106; 1206; 1306; 1406; 1506) provided with projections (907; 1007; 1107; 1207; 1307; 1407; 1507) which are inserted into channel-like seats (905; 1005; 1105; 1205; 1305; 1405; 1505) of said second tubular part (933; 1033; 1133; 1233; 1333; 1433; 1533).

8. Bearing section bar (930) according to Claim 7, **characterized in that** said rib (934; 1034; 1134; 1234; 1334; 1434; 1534) is made of insulating material.

9. Bearing section bar (130; 530) according to Claim 1, **characterized in that** said rib (134) is connected to said first tubular part (131; 531) by means of a pair of longitudinal bars (133) made of insulating material, said first tubular part (131; 531) being provided with a pair of C-shaped channel-like seats (105) which house first ends of said insulating bars (133), said rib (134) having a foot (107) provided with a further pair of C-shaped channel-like seats (108) which house second ends of said insulating bars (133).

10. Bearing section bar (30; 130; 430; 530; 930) according to Claim 1, **characterized in that** said first tubular part (31; 131; 431; 531; 931) is provided with a second longitudinal cavity (37) which houses glass support elements (810) positioned between said glass (4) and said bearing section bar (30; 130; 430; 530; 930).

11. Bearing section bar (30; 130; 430; 530; 930) according to Claim 4, **characterized in that** said channel-like seat (43) of said longitudinal rib (34; 134; 934; 1034; 1134; 1234; 1334; 1434; 1534) is "C" shaped.

12. Spring clip (41) for fastening a glass pane (4) to a section bar (30, 130; 430; 530; 930) formed by a plate (50) folded in the shape of an "L" and having a first and a second portion (51, 52) which are substantially perpendicular, said first portion (51) of said plate being able to press against said outer side (204) of said glass (4) and said second portion (52) of said "L" shaped plate (50) being able to be inserted in a longitudinal cavity (38) of said section bar (30; 130; 430; 530; 930), **characterized in that** said second portion (52) of said "L" shaped plate (50) is provided with inclined lateral fins (54) which form an elastic support between said glass pane (4) and said section bar (30, 130; 430; 530; 930).

13. Spring clip (41) according to Claim 12, **characterized in that** said second portion (52) of said "L"

shaped plate (50) is provided with at least one tongue (53) which can be inserted into a recess (44) of said section bar (30; 130; 430; 530; 930).

14. Spring clip (41) according to Claim 12, **characterized in that** said first portion (51) of said "L" shaped plate (50) is provided with a strip (57) of resilient polymeric material able to make contact with said outer side (204) of said glass (4).

15. Spring clip (41) according to Claims 12 and 13, **characterized in that** said first portion (51) of said "L" shaped plate (50) is provided with a hole (55) designed to receive a tool for positioning said spring clip (41) on said glass pane (4) and inserting said second portion (52) in said longitudinal cavity (38) and said tongue (53) in said recess (44).

16. Window comprising a frame (3; 103; 203; 205; 303; 305; 403; 503; 603; 605; 703; 705; 803; 903) for supporting a glass pane (4), said frame (3; 103; 203; 205; 303; 305; 403; 503; 603; 605; 703; 705; 803; 903) comprising a bearing section bar (30; 130; 430; 530; 930) comprising a first tubular part (31; 131; 431; 531; 931) and a longitudinal rib (34; 134; 934; 1034; 1134; 1234; 1334; 1434; 1534) connected to said first tubular part (31; 131; 431; 531; 931), said first tubular part (31; 131; 431; 531; 931) being provided with a first channel-like seat (36) housing a first seal (40) which engages with an inner side (104) of said glass (4), **characterized in that** said longitudinal rib (34; 134; 934; 1034; 1134; 1234; 1334; 1434; 1534) supports a second seal (45; 60) which engages with an outer side (204) of said glass (4), said longitudinal rib (34; 134; 934; 1034; 1134; 1234; 1334; 1434; 1534) being provided with a second channel-like seat (43) housing a shank (48; 65) of said second seal (45; 60), at least one fastening element (41; 61; 161; 261; 361) being engaged with said outer side (204) of said glass (4) and with said bearing section bar (30; 130; 430; 530; 930) so as to secure them together and being covered by said second seal (45; 60).

17. Window according to Claim 23, **characterized in that** said frame (3; 103; 203; 205; 303; 305; 403; 503; 603; 605; 703; 705; 803; 903) has a surface area smaller by about from 20% to 38% than that of a conventional frame.

18. Bearing section bar (30; 130; 430; 530; 930) for a frame (3; 103; 203; 205; 303; 305; 403; 503; 603; 605; 703; 705; 803; 903) of a window having at least one glass pane (4), said bearing section bar (30; 130; 430; 530; 930) comprising a first tubular part (31; 131; 431; 531; 931) and a longitudinal rib (34; 134; 934; 1034; 1134; 1234; 1334; 1434; 1534), said first tubular part (31; 131; 431; 531; 931) supporting a first seal (40) which engages with an inner side (104) of said glass (4), said longitudinal rib (34; 134; 934; 1034; 1134; 1234; 1334; 1434; 1534) supporting a second seal (60) which engages with an outer side (204) of said glass (4), at least one fastening element (61; 161; 261; 361) consisting of a rigid structure incorporated in said second seal (60), being engaged with said outer side (204) of said glass (4) and with said bearing section bar (30; 130; 430; 530; 930), said second seal (60) having a cross-section substantially in the shape of a "Γ" and being provided with a shank (65) and a sealing lip (63), said shank (65) being inserted in a channel-like seat (43) of said rib (34; 134; 934; 1034; 1134; 1234; 1334; 1434; 1534), said sealing lip (63) being engaged with said outer side (204) of said glass (4) and being located on the same side as said shank (65), **characterized in that** said rigid structure (61; 161; 261; 361) is provided with further sealing lips (66) made of elastomeric material and making contact with said glass (4) and has an additional shank (67) inserted in said channel-like seat (43) of said rib (34; 134; 934; 1034; 1134; 1234; 1334; 1434; 1534).

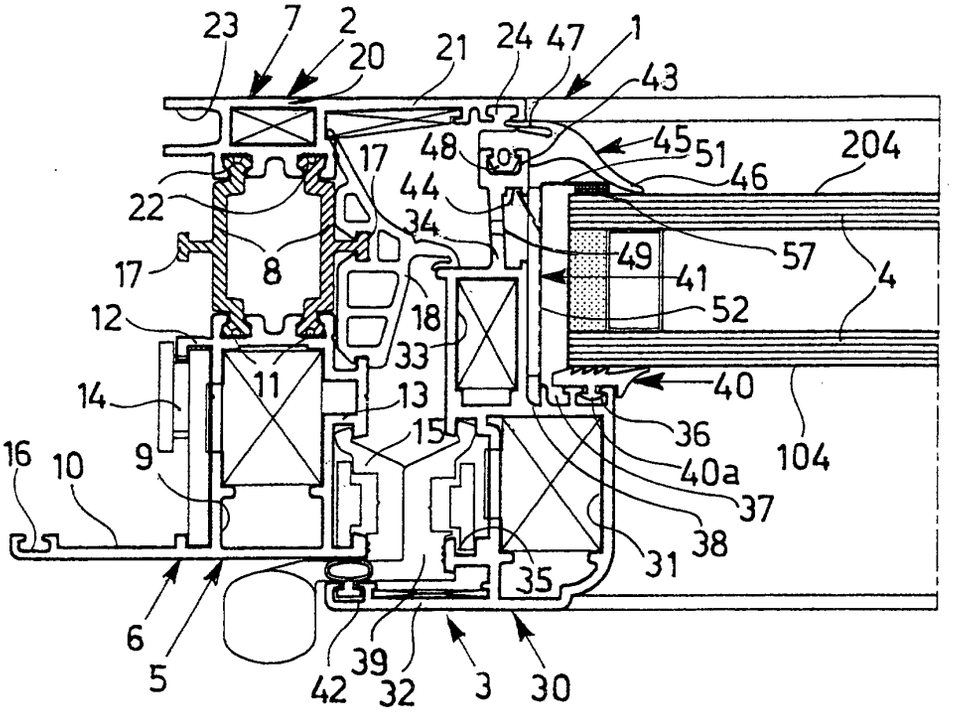
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Fig.1

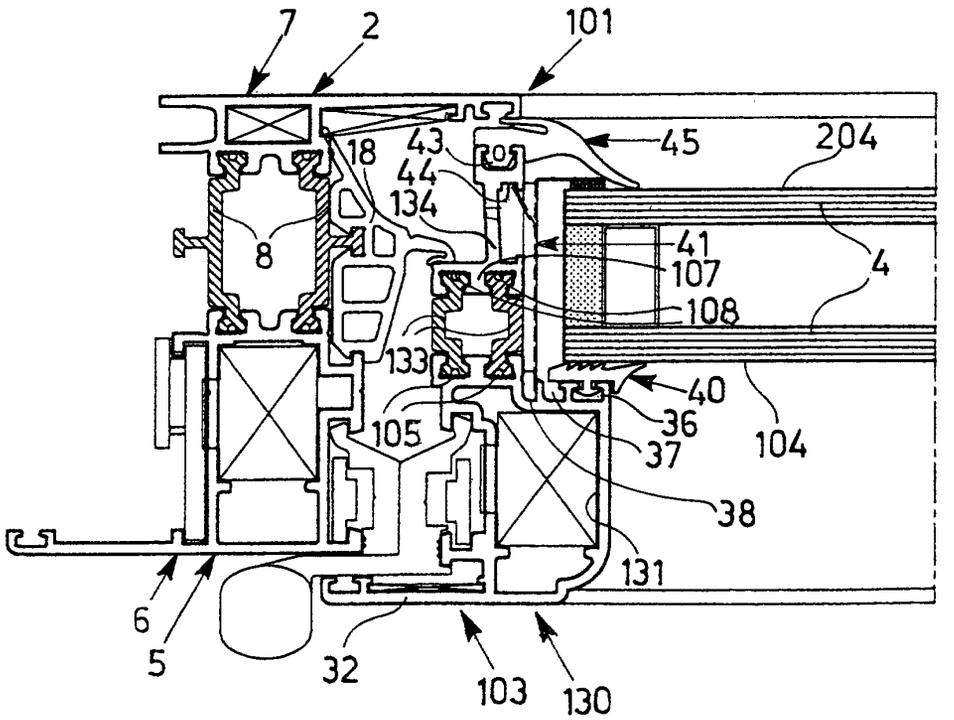
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Fig.2

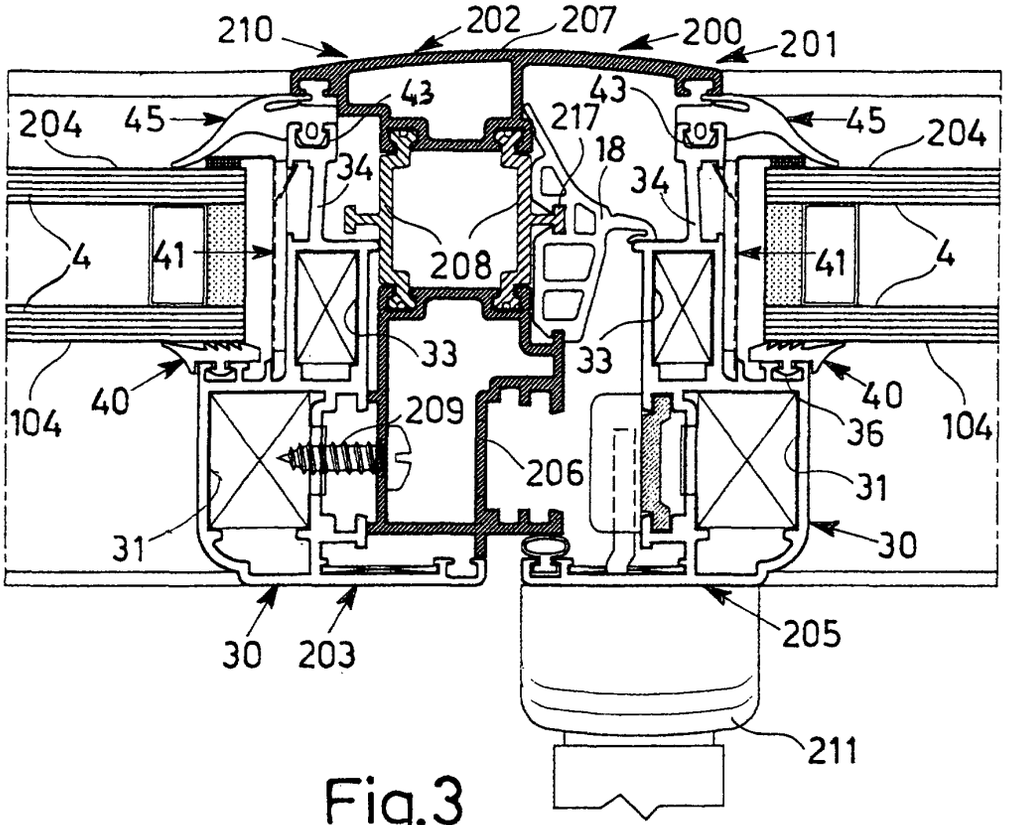
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Fig.3

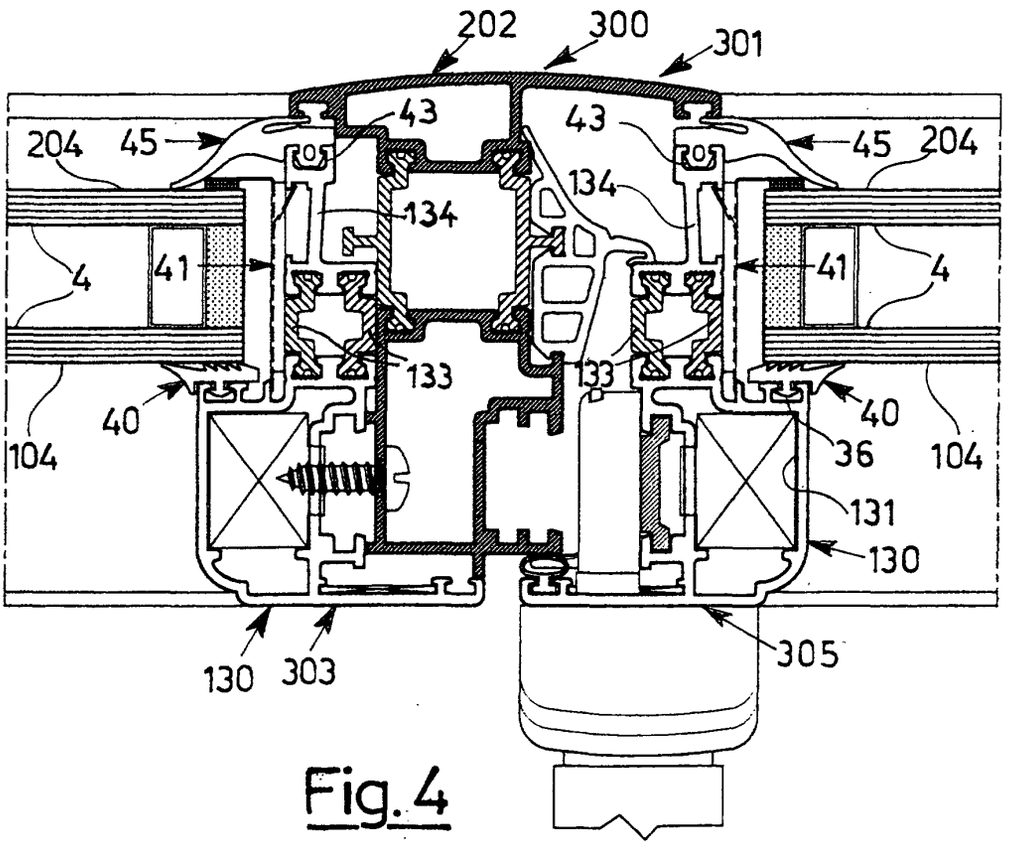
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Fig.4

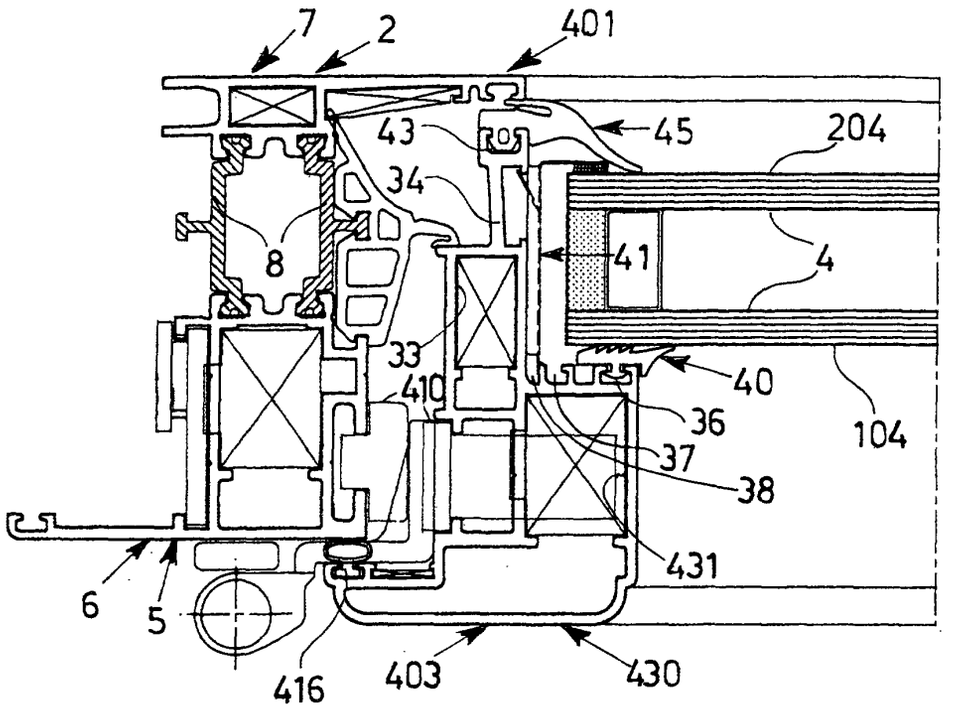
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Fig. 5

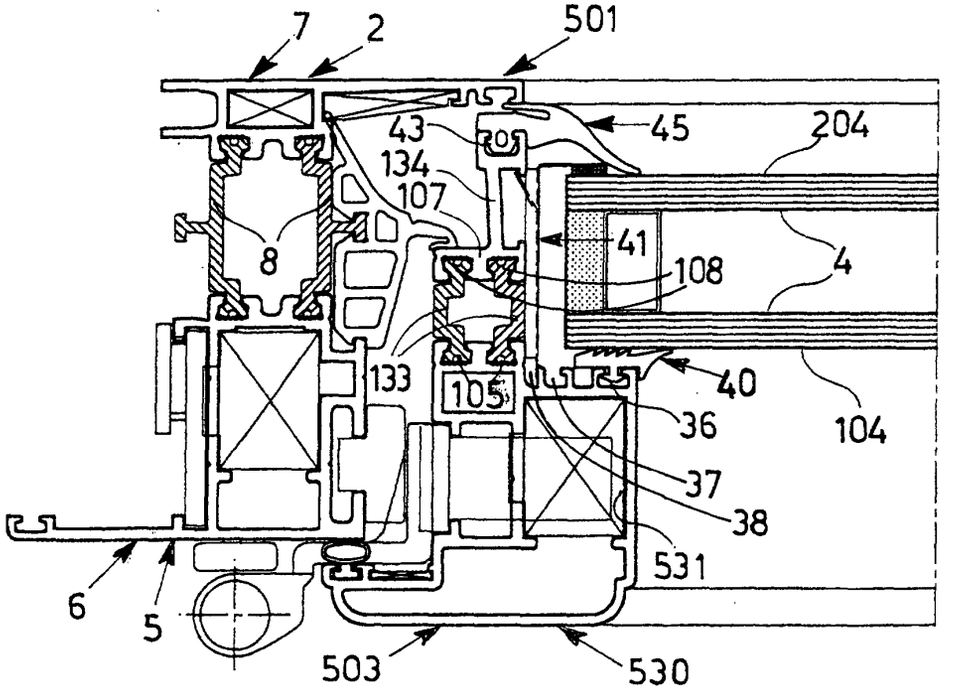
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Fig. 6

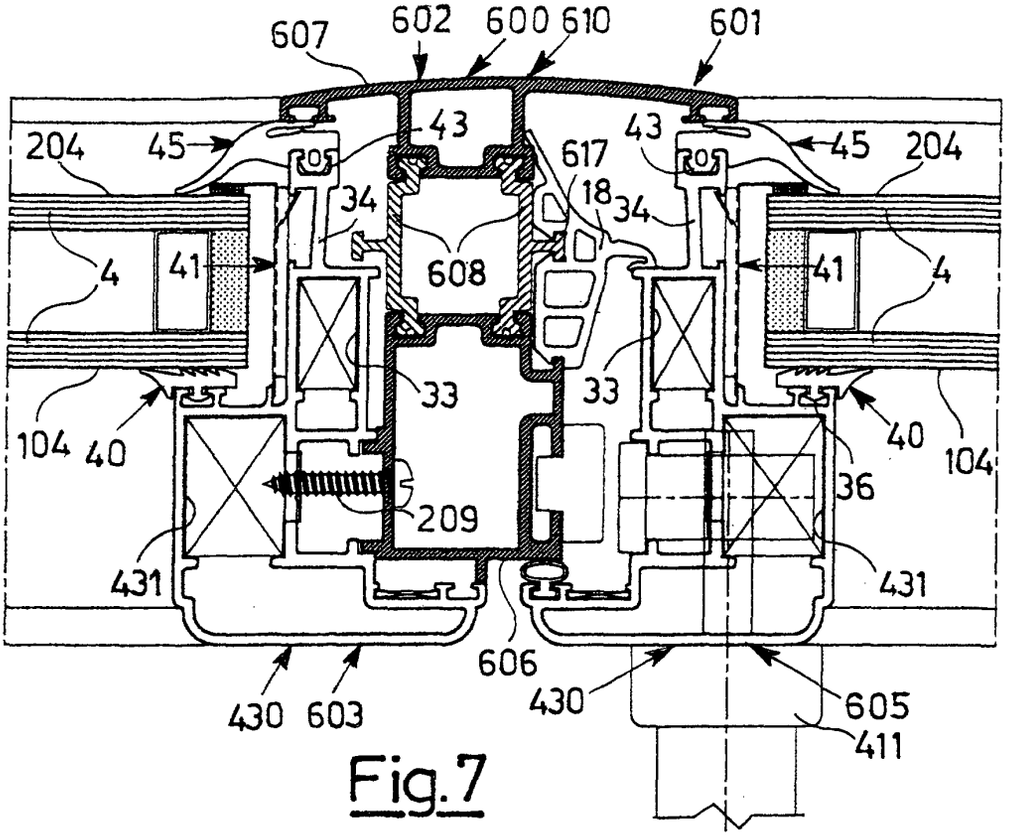
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Fig.7

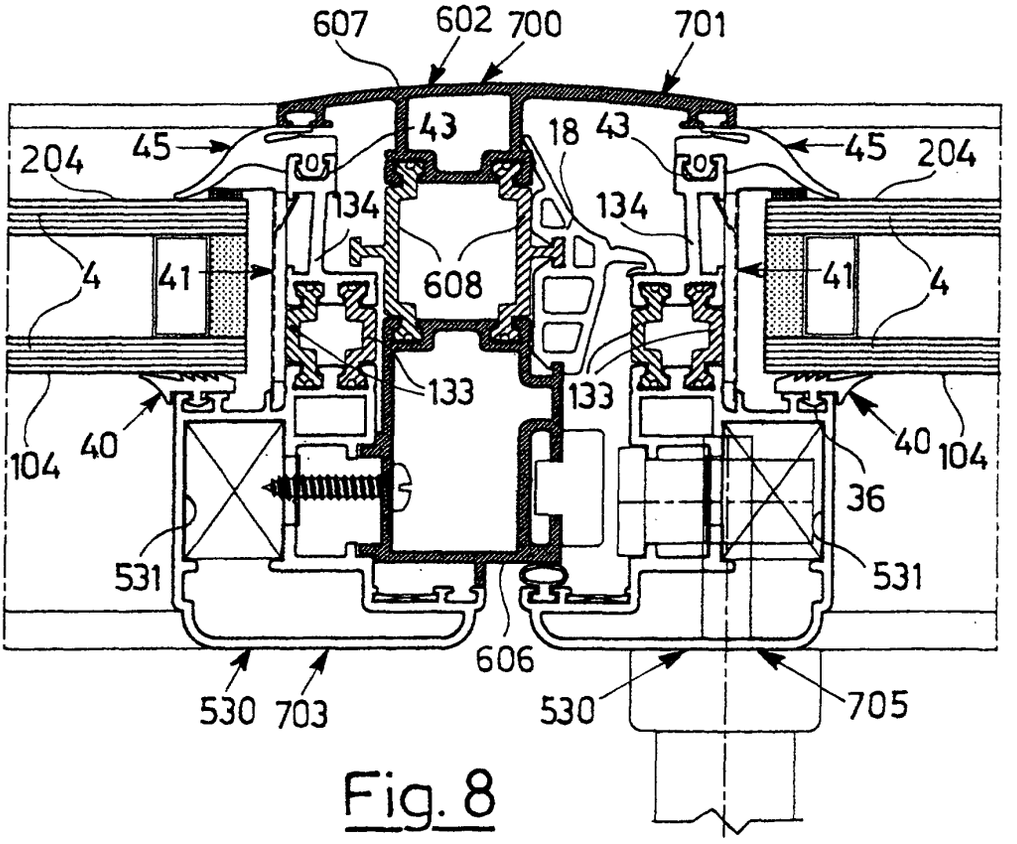
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Fig. 8

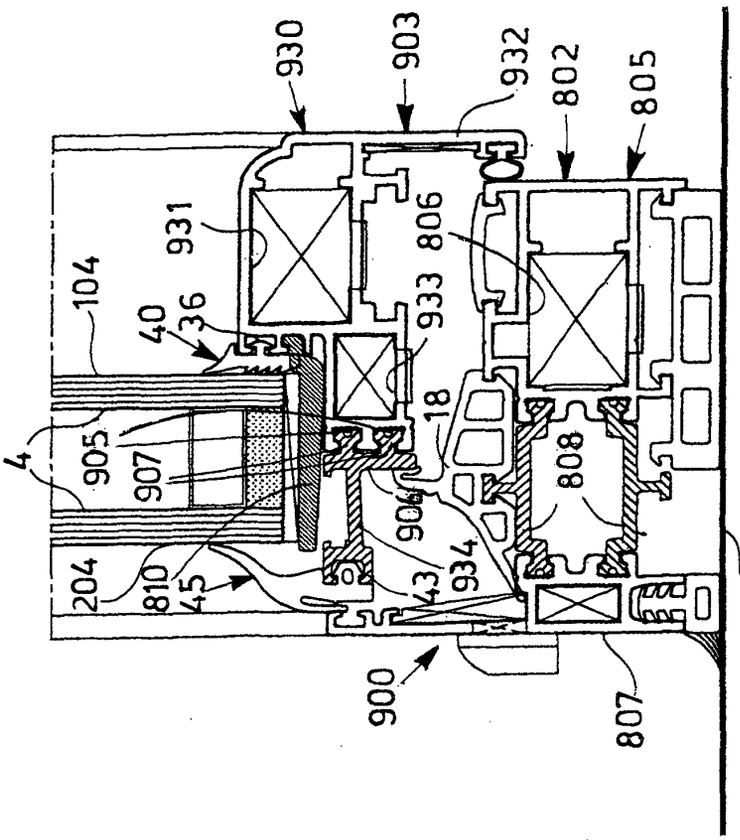
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Fig.10

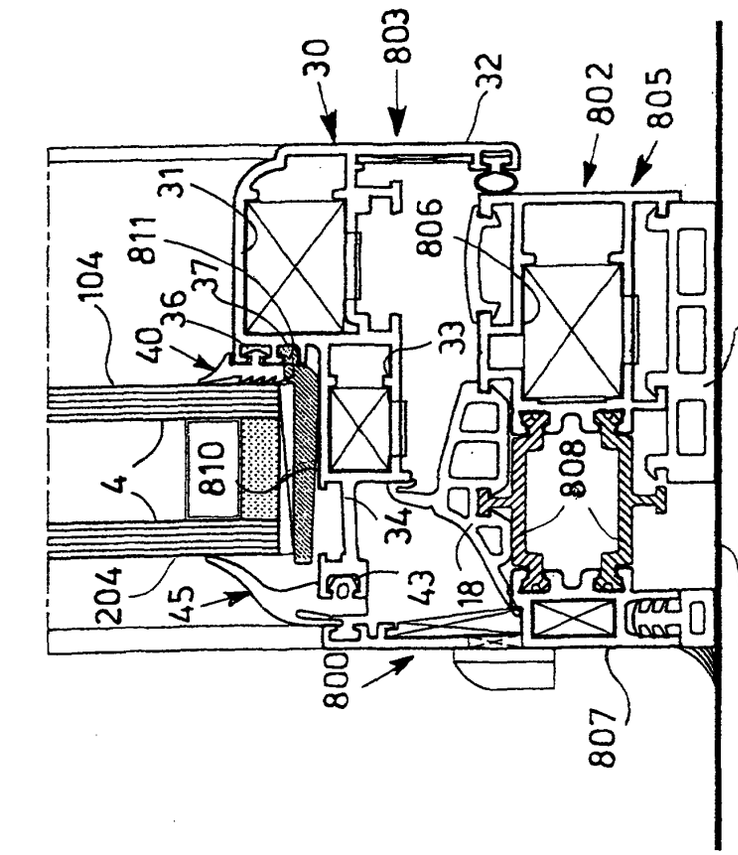
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Fig.9

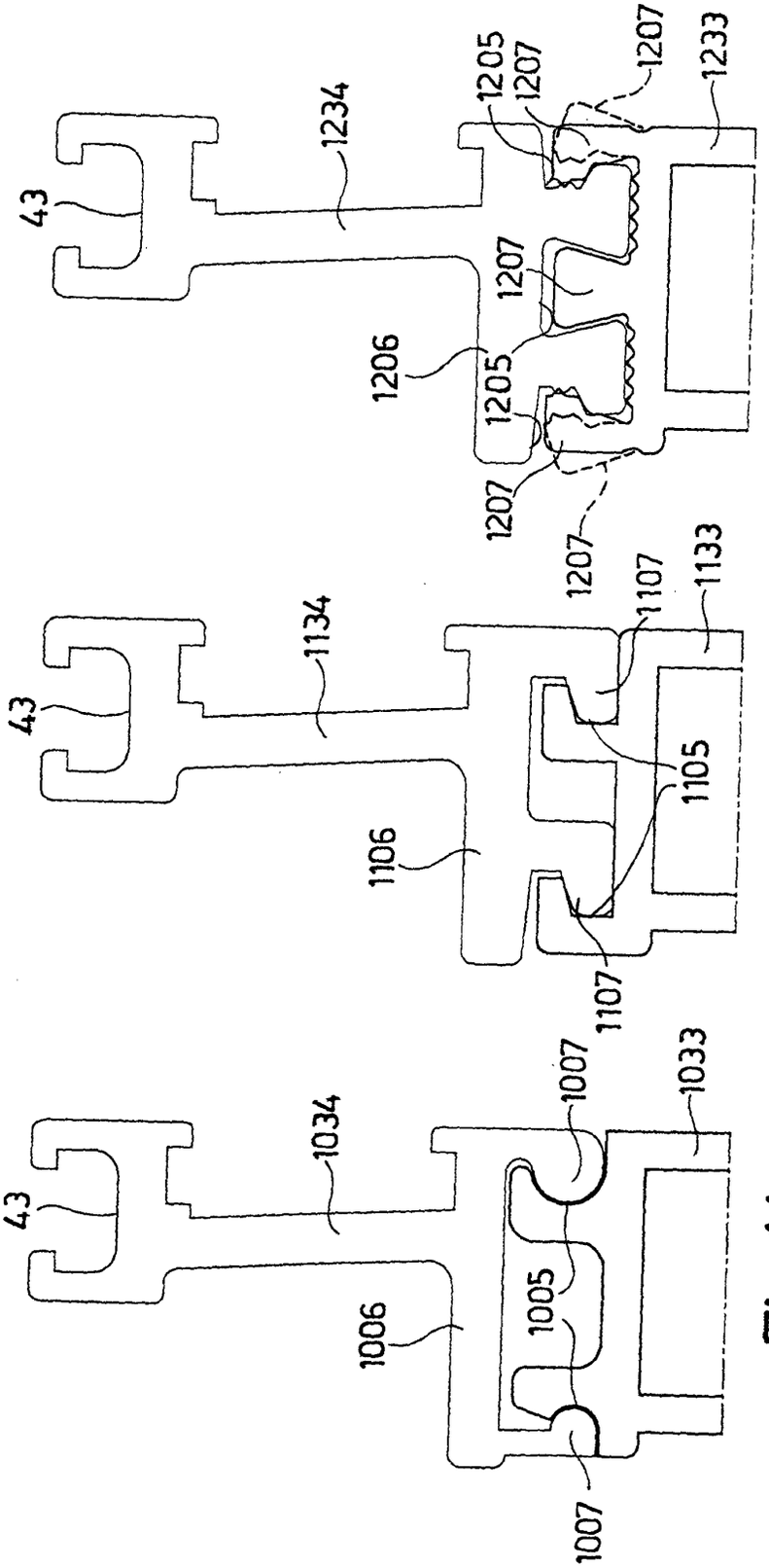

Fig.13

Fig.12

Fig.11

Fig.11a

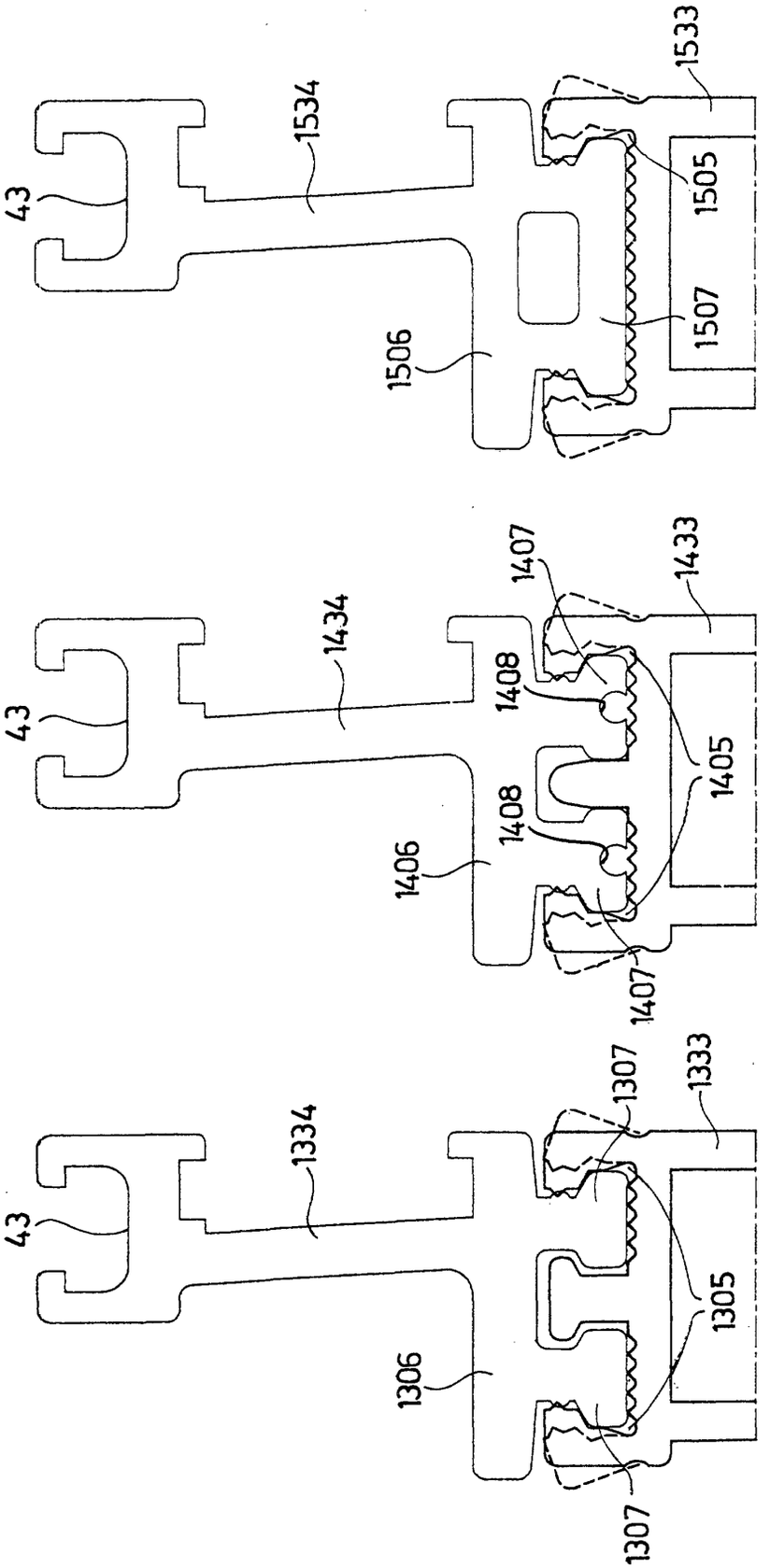

Fig.16

Fig.15

Fig.14

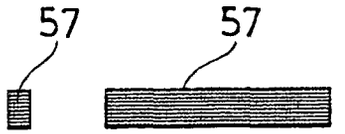

Fig.21a Fig.21

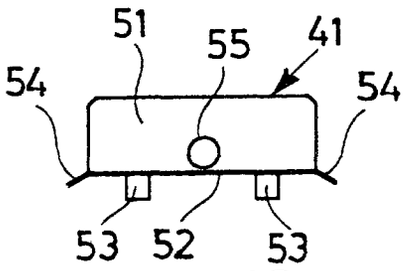

Fig.19

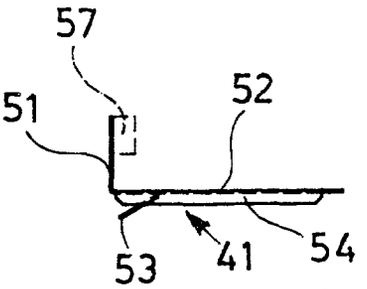

Fig.20

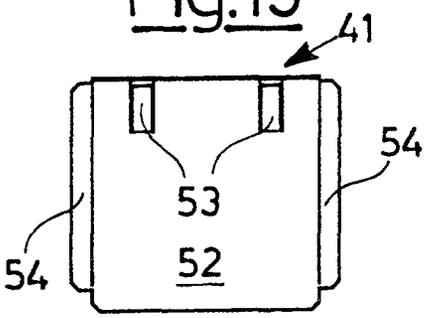

Fig.18

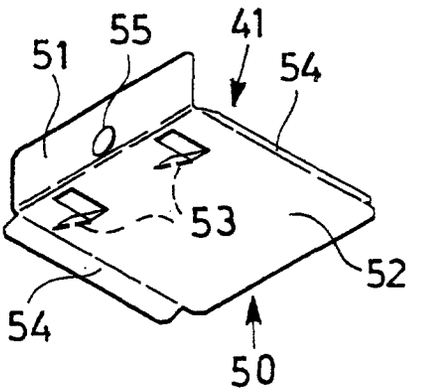

Fig.17

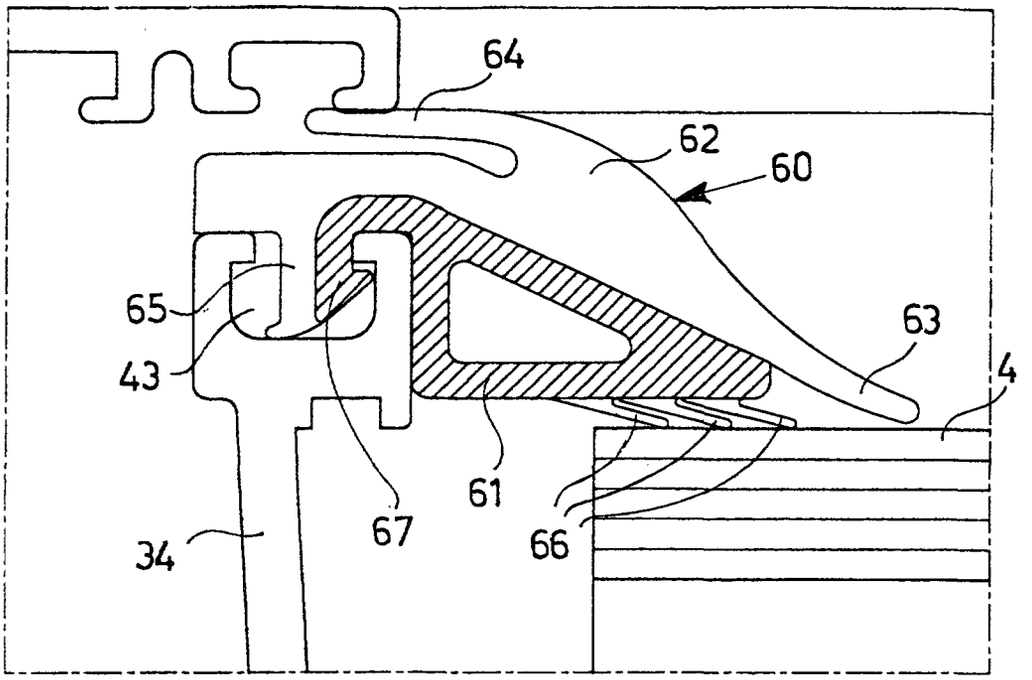

Fig.22

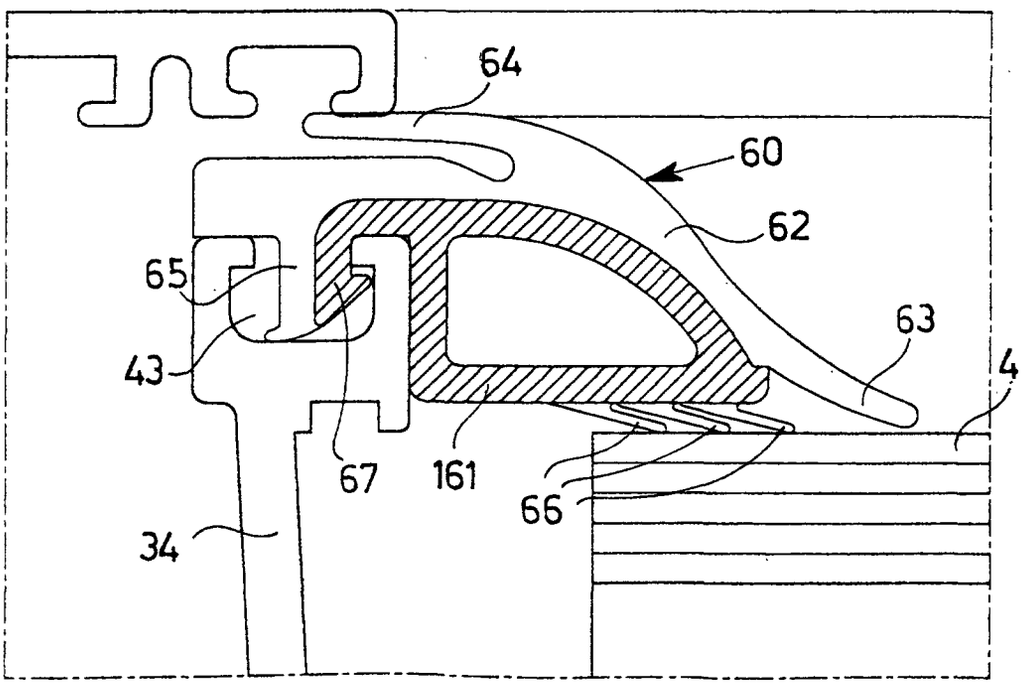

Fig.23

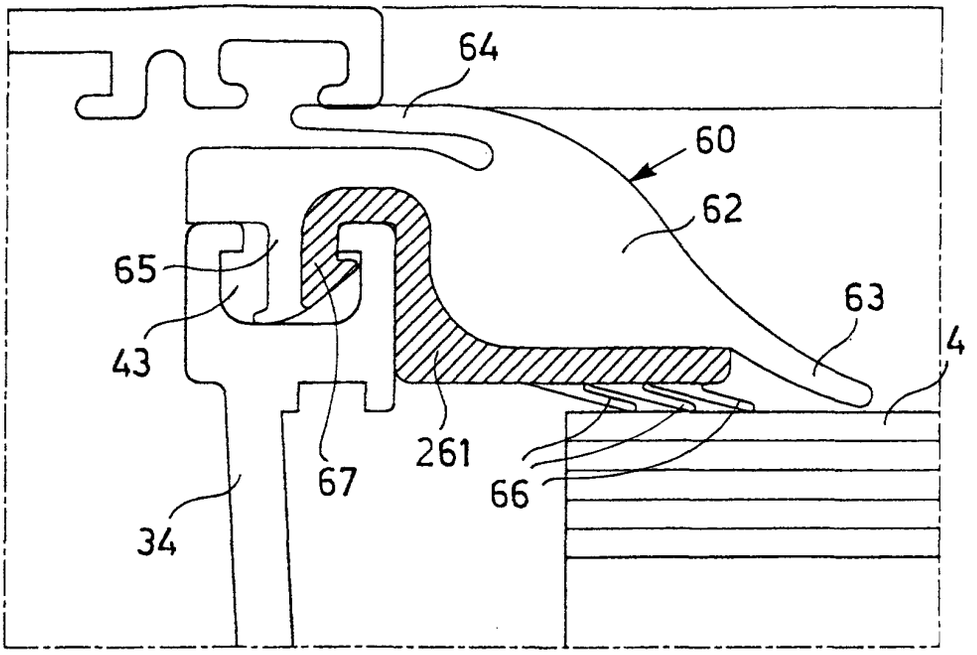

Fig.24

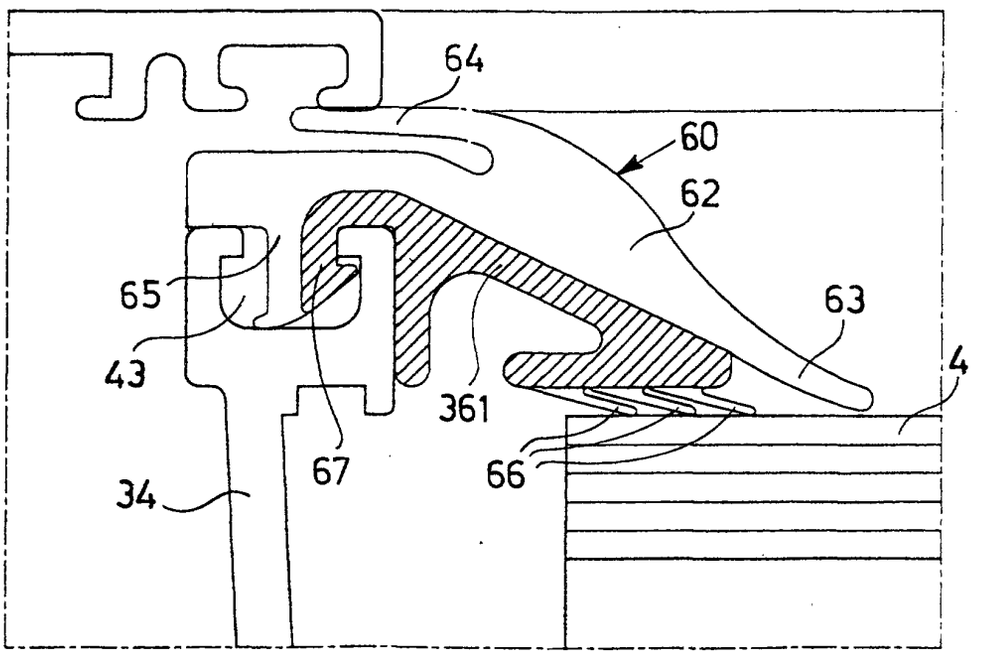

Fig.25

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 20 4025

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.7)
X Y	DE 43 01 395 A (SCHMIDLIN AG AESCH) 21 July 1994 (1994-07-21) * column 3, line 1 - line 38 * * column 3, line 55 - line 68 * * column 4, line 44 - column 5, line 6 * * figure 7 *	16,17 1-5,7,9, 11-15	E06B3/54 E06B3/62 E06B3/263
X A	DE 32 17 244 A (JACOB GERNOT DIPL ING) 10 November 1983 (1983-11-10) * page 11, line 19 - page 14, line 10; figures 3,4 *	16,17 1-6,12, 14,18	
Y	DE 34 35 241 A (RAYMOND A FA) 3 April 1986 (1986-04-03) * page 6, line 1 - page 8, line 15; figures *	1-5,7,9, 11-15	
Y A	DE 24 39 407 A (SCHOENINGER GMBH) 26 February 1976 (1976-02-26) * page 5, paragraph 5 - page 12, paragraph 2; figures *	18 1,4,16, 17	TECHNICAL FIELDS SEARCHED (Int.Cl.7) E06B
Y A	FR 2 455 670 A (FEAL SPA) 28 November 1980 (1980-11-28) * the whole document *	18 1,4-6, 16,17	
A	EP 0 225 473 A (ELTREVA AG) 16 June 1987 (1987-06-16) * page 6, paragraph 2 - page 7, paragraph 4; figures *	1,2,4,8, 10-13, 16-18	
A	FR 2 723 134 A (OUEST ALU SA) 2 February 1996 (1996-02-02) * the whole document *	1,4-6, 16-18	

-/--

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	29 January 2002	Depoorter, F

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 20 4025

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.7)
A	DE 298 17 044 U (SCHUECO INT KG) 17 December 1998 (1998-12-17) * the whole document *	1,4-6, 16-18	
A	DE 195 43 557 A (SOMMER METALLBAU STAHLBAU GMBH) 28 May 1997 (1997-05-28) * the whole document *	1,4,9, 11,16,18	
A	GB 2 323 116 A (TAYLOR GRAHAM CHARLES) 16 September 1998 (1998-09-16) * page 5, line 12 - page 9, line 13; figures *	1-3, 12-14	
A	DE 198 14 620 A (WICONA BAUSYSTEME GMBH) 28 October 1999 (1999-10-28) * column 2, line 58 - column 3, line 58; figures 1-4 *	10,11	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	29 January 2002	Depoorter, F

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