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(54) **THERMAL BREAK DOOR OR WINDOW**

(57) The thermal break door or window comprising at least one leaf (1) and a stop frame (2) for the leaf (1), wherein the leaf (1) comprises a leaf frame (3) and at least one glass pane (4), wherein the stop frame (2) comprises an inner metal stop profile (5), an outer metal stop profile (6), at least one interconnecting profile made of heat insulating material (7), and the leaf frame (3) comprises an inner metal leaf profile (8), an outer metal leaf profile (9), and a leaf profile made of heat insulating material (10) interconnecting between the inner leaf profile

(8) and the outer leaf profile (9), the door or window further comprising a first sealing gasket (12) between the outer stop profile (6) and the outer leaf profile (9), a second sealing gasket (13), and a third sealing gasket (11) between the inner stop profile (5) and the inner leaf profile (8), the second sealing gasket (13) being configured and disposed so as to delimit, between the stop frame (2) and the leaf frame (3), a first air chamber (15) in cooperation with the first sealing gasket (12) and a second air chamber (14) in cooperation with the third sealing gasket (11).

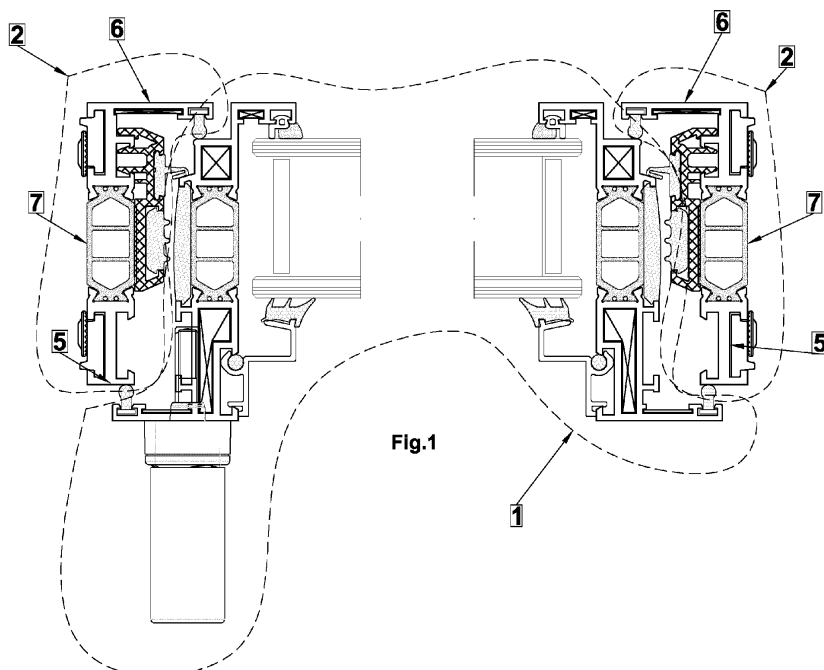


Fig.1

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Description

[0001] As is known, currently, the leaves and the relative stop frames of aluminium thermal break doors or windows are made by joining the aluminium profile communicating with the outside with that communicating with the inside of the room by means of an interconnecting profile made of polyamide or other heat insulating material.

[0002] The market requires increasingly high performance in terms of mechanical strength, burglar resistance, noise reduction and heat insulation.

[0003] Recently, moreover, there is an emerging trend of doors and windows with minimalist frames which leave as much space as possible to the glass panes to increase the brightness of the environment.

[0004] In addition to being more aesthetically pleasing, a door or window with a high ratio between the surface of the glass planes and the surface of the leaf can contribute to a reduction in the electrical consumption required for lighting the environment.

[0005] A multitude of solutions are known which, however, manage to meet only some of the performance specifications requested by the market.

[0006] The task of the present invention is to make a thermal break door or window which lacks the aforementioned technical drawbacks attributable to the prior art.

[0007] Within the scope of this task it is an object of the invention to make a thermal break door or window with improved performance in terms of mechanical strength, burglar resistance, noise reduction and heat insulation.

[0008] Still an object of the invention to make a thermal break door or window with leaf frame and stop frame of the minimalist leaves which do not affect the features of mechanical strength, burglar resistance, noise reduction and heat insulation.

[0009] This task as well as these and other objects are achieved by a thermal break door or window comprising at least one leaf and a stop frame for the leaf, in which said leaf comprises a leaf frame and at least one glass pane, in which said stop frame comprises an inner metal stop profile, an outer metal stop profile, at least one profile made of heat insulating material interconnecting between said inner stop profile and said outer stop profile, and said leaf frame comprises an inner metal leaf profile, an outer metal leaf profile, and a leaf profile made of heat insulating material interconnecting between said inner leaf profile and said outer leaf profile, characterised in that it comprises a first sealing gasket between said outer stop profile and said outer leaf profile, a second sealing gasket, and a third sealing gasket between said inner stop profile and said inner leaf profile, said second sealing gasket being configured and disposed so as to delimit, between said stop frame and said leaf frame, a first air chamber in cooperation with said first sealing gasket and a second air chamber in cooperation with said third sealing gasket.

[0010] In an embodiment of the invention, in said closing position second sealing gasket is configured and disposed so as to engage with a tooth of said outer leaf profile.

[0011] In an embodiment of the invention, said second sealing gasket is supported by a block which is made of a more rigid material compared thereto and heat insulating.

[0012] In an embodiment of the invention, said block has a coupling seat for said second sealing gasket and teeth for coupling to said outer stop profile.

[0013] In an embodiment of the invention, said block has a coupling seat for a pad cooperating with a counter-pad so as to delimit a labyrinth air channel in said second air chamber.

[0014] In an embodiment of the invention, said pad and said counter-pad are positioned in a facing zone between the interconnecting profiles.

[0015] In an embodiment of the invention, said inner leaf profile has a longitudinal cavity for housing an arm of a fastening bracket, said cavity being delimited by a wall of said inner leaf profile having an outer recess for coupling to a glazing bead profile.

[0016] In an embodiment of the invention, at said recess said cavity is in a rearward position relative to one side of said interconnecting leaf profile facing said glass pane.

[0017] In an embodiment of the invention, said inner and outer stop profiles have a respective longitudinal cavity for housing an arm of a fastening bracket, where said cavity of said inner and outer stop profiles is in a rearward position relative to one side of said interconnecting profile between said inner and outer stop profiles facing said block.

[0018] In an embodiment of the invention, said inner and outer stop profiles have a longitudinal opening for access to said longitudinal cavity thereof.

[0019] Further features and advantages of the invention will more fully emerge from the description of a preferred but not exclusive embodiment of a thermal break door or window according to the invention, illustrated by way of non-limiting example in the appended drawings, in which:

fig. 1 is a sectional view of a single-leaf thermal break door or window according to the invention where the door or window is in the closing position;

fig. 1a shows an enlarged detail of the side joint of the door or window of fig. 1;

fig. 2 is a sectional view of a double-leaf thermal break door or window according to the invention where the double leaf is in the closing position;

fig. 2a shows an enlarged detail of the central joint of the door or window of fig. 2;

fig. 3 is a sectional view of the thermal break door or window of figure 1 where the leaf is in partial opening position;

fig. 3a shows an enlarged detail of the side joint of

the door or window of fig. 3.

[0020] Equivalent parts in the description will be indicated with the same numerical reference. Hereinafter, the term "inner" means "facing the interior of the environment closed by the door or window", and the term "outer" means "facing the exterior of the environment closed by the door or window".

[0021] With particular reference to the figures described above, the thermal break door or window comprises at least one leaf 1 which can oscillate between an opening position and a closing position of the door or window, and a stop frame 2 for the leaf 1.

[0022] In figures 1, 1a, 3 and 3a, the door or window illustrated is with a single leaf 1, while in figures 2 and 2a the door or window illustrated is with a double leaf 1, 1A.

[0023] In both cases, the stop frame 2 comprises fixed elements 5, 6 and 7.

[0024] The leaf 1 comprises a leaf frame 3, at least one glass pane 4 and an inner handle 100.

[0025] The leaf 1A comprises a leaf frame 3' and at least one glass pane 4.

[0026] The structure of the side joint of the door or window with a single leaf 1 and the side joint of the door or window with a double leaf 1, 1A is substantially identical; the structure of the central joint of the double-leaf door or window is instead different in that the leaf frame 3' is adapted to act as a stop for the leaf frame 3.

[0027] The stop frame 2 comprises an inner metal stop profile 5, an outer metal stop profile 6, and at least one profile made of heat insulating material 7 interconnecting between the inner stop profile 5 and the outer stop profile 6.

[0028] In practice, both the single leaf 1 of the single-leaf door or window and each leaf 1, 1A of the double-leaf door or window can be rotated to bring itself into the opening and closing position of the door or window.

[0029] Each interconnecting profile 7 has at the opposite ends dovetailed feet 29 provided with seats for an adhesive and retained by harpoons 30 specially connected by means of mechanical deformation by rolling to the inner stop profile 5 or to the outer stop profile 6.

[0030] The leaf frame 3 comprises an inner metal leaf profile 8 disposed facing the inner stop profile 5 when the leaf 1 is in the closing position, an outer metal leaf profile 9 disposed facing the outer stop profile 6 when the leaf 1 is in the closing position, and a leaf profile in heat insulating material 10 interconnecting between the inner leaf profile 8 and the outer leaf profile 9.

[0031] Each interconnecting leaf profile 10 has at the opposite ends of dovetailed feet 32 provided with seats for an adhesive and retained by harpoons 33 specially connected by means of mechanical deformation by rolling to the inner leaf profile 8 or to the outer leaf profile 9.

[0032] The interconnecting leaf profile 10 is disposed facing the interconnecting leaf profile 7 when the leaf 1 is in the closing position.

[0033] The interconnecting leaf profile 10 and the in-

terconnecting profile 7 can be made of polymer, for example polyamide.

[0034] The door or window comprises a first sealing gasket 12 between the outer stop profile 6 and the outer leaf profile 9, a second sealing gasket 13, and a third sealing gasket 11 between the inner stop profile 5 and the inner leaf profile 8.

[0035] The second sealing gasket 13 separates a first air chamber 15 and a second air chamber 14 when the leaf 1 is in the closing position.

[0036] The second sealing gasket 13 is more precisely configured and disposed to delimit a first air chamber 15 in cooperation with the first sealing gasket 12 between the stop frame 2 and the leaf frame 3 and a second air chamber 14 in cooperation with the third sealing gasket 11.

[0037] The second sealing gasket 13 engages a tooth 16 of the outer leaf profile 9 when the leaf 1 is in the closing position.

[0038] This solution helps to reduce the total case of the side joint of the door or window.

[0039] In particular, the total case of the side joint of the door or window shown in figures 1 and 3 can be reduced to 58 mm.

[0040] Furthermore, since the second sealing gasket 13 does not cooperate with the interconnecting leaf profile 10, the latter must not have configuration constraints to ensure the sealing and consequently it can be identical to the interconnecting leaf profile 7 in the side joint of the door or window.

[0041] This leads to a simplification in logistics and warehouse management.

[0042] In their preferred illustrated form, the interconnecting profile 7 and the interconnecting leaf profile 10 employed in the side joint of the door or window have a closed polygonal-section cavity internally provided with one or more partitioning septa.

[0043] The second sealing gasket 13 is supported by a block 17 which is made of a more rigid material compared thereto and heat insulating, for example a polymer, in particular ABS.

[0044] The block 17 has a coupling seat 18 for the second sealing gasket 13 and coupling teeth 19 for the outer stop profile 6.

[0045] The seat 18 is configured for a shape and force snap connection of the second sealing gasket 13. The outer stop profile 6 also has a seat 35 configured for a shape and force snap connection of the teeth 19.

[0046] The block 17 has in particular a first portion 17a provided with the coupling teeth 19 in the seat 35 obtained on the outer stop profile 6 and a second portion 17b covering the interconnecting profile 7.

[0047] The second portion 17b of the block 17 has a flat surface 25 preferably fastened by means of a layer of adhesive 27 to a flat surface 26 of the interconnecting profile 7.

[0048] The first portion 17a of the block 17 has the coupling seat 18 for the second sealing gasket 13 on the

opposite side to the coupling teeth 19 for the outer stop profile 6.

[0049] The block 17 further has a coupling seat 20 for a pad 21 cooperating with a counter-pad 22 so as to delimit a labyrinth air channel 23 in the second air chamber 14.

[0050] The coupling seat 20 for the pad 21 is present on the second portion 17b of the block 17 on the side opposite the flat surface 25 for fastening to the interconnecting profile 7.

[0051] The seat 20 is configured for a shape and force snap connection of the pad 21.

[0052] The labyrinth air channel 23 is delimited by an irregular surface with reliefs and depressions of at least one between the pad 21 and the counter-pad 22, with only the pad 21 in the case illustrated.

[0053] The pad 21 and the counter-pad 22 are positioned in a facing zone between the interconnecting profile 7 and the interconnecting leaf profile 10 when the leaf 1 is in the closing position.

[0054] The counter-pad 22 covers the interconnecting leaf profile 10 and is clamped against it by means of a shape and force snap coupling in a seat delimited by the tooth 16 of the outer leaf profile 9 and by a tooth 28 of the inner leaf profile 8.

[0055] In particular, the counter-pad 22 has a first shaped end thereof coupled to the tooth 16 of the outer leaf profile 9, on the side of the latter opposite that against which the second sealing gasket 13 engages, and a second shaped end thereof coupled to the tooth 28 of the inner leaf profile 8. Preferably, the two gaskets 11 and 12, the pad 21 and the counter-pad 22 can be made of the same elastomeric material.

[0056] The gasket 13 can be made of different material, for example compact EPDM.

[0057] The second air chamber 14 provides, laterally to the labyrinth channel 23, a free space 24 available for a hardware (not shown) of the door or window.

[0058] The leaf profiles 8, 9 have respective longitudinal cavities 36, 37 for housing an arm of respective fastening brackets 38, 39.

[0059] The fastening brackets 38, 39 can be made of extruded aluminium or die-cast aluminium.

[0060] The fastening brackets 38, 39 advantageously have a surface finish treatment layer consisting of an anodic oxidation. The oxide layer, obtained by means of an irreversible electrochemical process, allows to improve the mechanical surface features of the material surface and avoid the corrosion thereof. The oxide layer has red-coloured organic pigments which confer a characteristic chromatic effect aimed at also visually indicating the special corrosion resistance features of the product.

[0061] The brackets 38, 39 are used to fasten the four sections to the four corners, two opposing horizontals and two opposing verticals, of which the inner leaf profile 8 and the outer leaf profile 9 are composed.

[0062] The stop profiles 5, 6 also have respective lon-

gitudinal cavities 40, 41 for housing an arm of respective fastening brackets 42, 43.

[0063] The fastening brackets 42, 43 can be made of extruded aluminium or die-cast aluminium.

[0064] The fastening brackets 42, 43 also advantageously have a surface finish treatment layer consisting of an anodic oxidation. The oxide layer, obtained by means of an irreversible electrochemical process, allows to improve the mechanical surface features of the material surface and avoid the corrosion thereof. The oxide layer has red-coloured organic pigments which confer a characteristic chromatic effect aimed at also visually indicating the special corrosion resistance features of the product.

[0065] In this case, the brackets 42, 43 are used to fasten the four sections to the four corners, two opposing horizontals and two opposing verticals, of which the inner stop profile 5 and the outer stop profile 6 are composed.

[0066] The cavity 36 of the inner leaf profile 8 is delimited by a wall of the inner leaf profile 8 having an outer recess 45 for coupling to a glazing bead profile 44.

[0067] At the recess 45, the cavity 36 of the inner leaf profile 8 is in a rearward position relative to the side of the interconnecting leaf profile 10 facing the glass pane 4.

[0068] This solution helps to reduce the total case of the side joint of the door or window.

[0069] As said, the total case of the side joint of the door or window shown in figures 1 and 3 can be reduced to 58 mm.

[0070] The metal profiles 5, 6, 8 and 9 can be made of an aluminium alloy, for example an aluminium magnesium silicon alloy, in particular alloy 6005, which confers suitable mechanical strength and burglary resistance properties.

[0071] The two separate air chambers 14, 15 which are created between the stop frame 2 and the leaf frame 3 when the leaf 1 is closed, thanks also to the labyrinth channel 23 which is formed in the zone of the second chamber 14 adjacent to the first chamber 15, contribute to improving the heat and acoustic insulation and the watertightness.

[0072] The special configuration of the stop frame 2 and the leaf frame 3 allows a considerable reduction in the case of the side joint of the door or window.

[0073] This means, in addition to a valuable minimalist effect now particularly sought after in the field of thermal break glass doors or windows, a greater brightness of the environment in which the door or window is installed.

[0074] The increase in the glass surface of the door or window offers a further contribution to energy savings due to the excellent heat insulating properties of the glass panes currently on the market. Finally, they are present both in the frame and on the leaf of the alignment brackets 50, 51, and 52.

[0075] The central joint of the door or window of figures 2, 2a defined by the frame of the two leaves 3, 3' is also structured so as to reduce the case.

[0076] In particular, at the central joint of the door or

window of figures 2, 2a the leaf frame 3 has a construction corresponding to that already described for the side joint.

[0077] Instead at the central joint of the door or window of figures 2, 2a, the leaf frame 3' comprises an inner metal leaf profile 8' disposed facing the inner metal leaf profile 8 of the leaf frame 3 when the door or window is closed, an outer metal leaf profile 9' disposed facing the outer metal leaf profile 9 of the leaf frame 3 when the door or window is closed, and at least one or, as shown, multiple leaf profiles in heat insulating material 10' interconnecting between the inner leaf profile 8' and the outer leaf profile 9'.

[0078] Each interconnecting leaf profile 10 has at the opposite ends dovetailed feet 32' provided with seats for an adhesive and retained by harpoons 33' specially connected by means of mechanical deformation by rolling to the inner leaf profile 8' or to the outer leaf profile 9'.

[0079] The interconnecting leaf profile 10' can be made of polymer, for example polyamide.

[0080] The door or window comprises a first sealing gasket 12' between the outer leaf profiles 9, 9', a second sealing gasket 13', and a third sealing gasket 11' between the inner leaf profiles 8, 8'. The second sealing gasket 13' separates a first air chamber 15' and a second air chamber 14' when the door or window is closed.

[0081] The second sealing gasket 13' is more precisely configured and disposed to delimit a first air chamber 15' in cooperation with the first sealing gasket 12' between the leaf frames 3, 3' and a second air chamber 14' in cooperation with the third sealing gasket 11'.

[0082] Also in this case, the second sealing gasket 13' is supported by a block 60 which is made of a more rigid material compared thereto and heat insulating, for example a polymer, in particular ABS.

[0083] The block 60 has a coupling seat 61 for the second sealing gasket 13' and coupling teeth 62 for the outer stop profile 9'.

[0084] The seat 61 is configured for a shape and force snap connection of the second sealing gasket 13'. The block 60 further has a coupling seat 63 for a pad 64 cooperating with a counter-pad 65 so as to delimit a labyrinth air channel in the second air chamber 14'.

[0085] The seat 63 is configured for a shape and force snap connection of the pad 64.

[0086] Overall, this solution helps to reduce the total case of the side joint of the door or window.

[0087] In particular, the total case of the central joint of the door or window shown in figures 2 and 2a can be reduced to 85 mm.

[0088] The thermal break door or window as conceived herein is susceptible to numerous modifications and variants all falling within the scope of the inventive concept and all the details are replaceable by technically equivalent elements.

[0089] In practice, the materials used, as well as the dimensions, can be any according to the needs and the state of the art.

Claims

1. A thermal break door or window comprising at least one leaf (1) and a stop frame (2) for the leaf (1), wherein said leaf (1) comprises a leaf frame (3) and at least one glass pane (4), wherein said stop frame (2) comprises an inner metal stop profile (5), an outer metal stop profile (6), at least one profile made of heat insulating material (7) interconnecting between said inner stop profile (5) and said outer stop profile (6), and said leaf frame (3) comprises an inner metal leaf profile (8), an outer metal leaf profile (9), and a leaf profile made of heat insulating material (10) interconnecting between said inner leaf profile (8) and said outer leaf profile (9), and wherein a first sealing gasket (12) between said outer stop profile (6) and said outer leaf profile (9), a second sealing gasket (13), and a third sealing gasket (11) between said inner stop profile (5) and said inner leaf profile (8) are provided, said second sealing gasket (13) being configured and disposed so as to delimit, between said stop frame (2) and said leaf frame (3), a first air chamber (15) in cooperation with said first sealing gasket (12) and a second air chamber (14) in cooperation with said third sealing gasket (11), said second sealing gasket (13) being supported by a block (17) which is made of a more rigid material compared thereto and heat insulating, said block (17) having a coupling seat (18) for said second sealing gasket (13), **characterised in that** said second sealing gasket (13) is configured and disposed so as to engage with a tooth (16) of said outer leaf profile (9) and said block (17) has teeth (19) for coupling to said outer stop profile.
2. The thermal break door or window according to the preceding claim, **characterised in that** said block (17) has a coupling seat (20) for a pad (21) cooperating with a counter-pad (22) so as to delimit a labyrinth air channel (23) in said second air chamber (14).
3. The thermal break door or window according to the preceding claim, **characterised in that** said pad (21) and said counter-pad (22) are positioned in a facing zone between said interconnecting profile (7) and said interconnecting leaf profile (10).
4. The thermal break door or window according to any preceding claim, **characterised in that** said inner leaf profile (8) has a longitudinal cavity (36) for housing an arm of a fastening bracket (38), said cavity (36) being delimited by a wall of said inner leaf profile (8) having an outer recess (45) for coupling to a glazing bead profile (44).
5. The thermal break door or window according to the preceding claim, **characterised in that**, at said re-

cess (45), said cavity (36) is in a rearward position relative to one side of said interconnecting leaf profile (10) facing said glass pane (4).

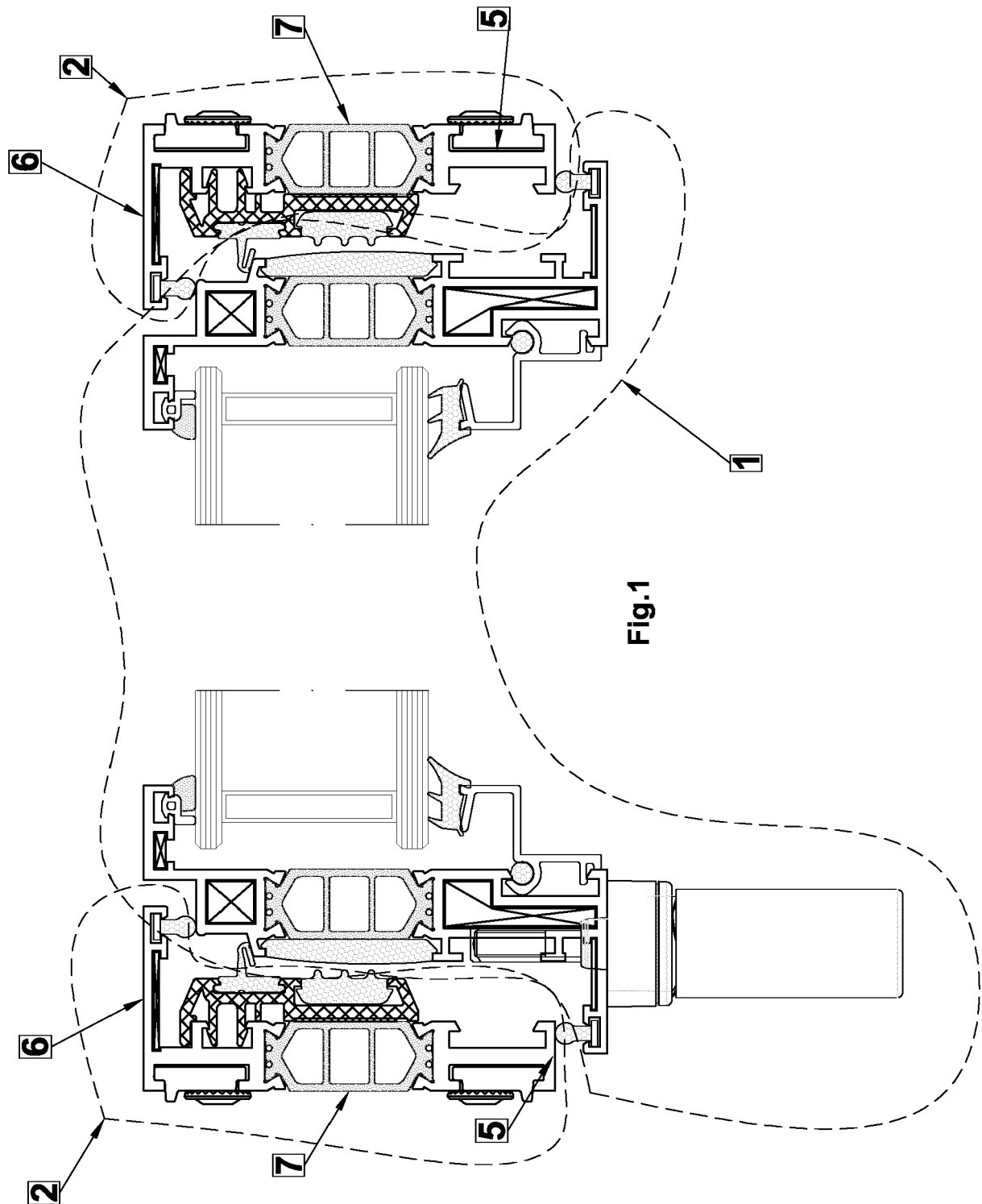
6. The thermal break door or window according to any preceding claim, **characterised in that** said inner and outer stop profiles (5, 6) have a respective longitudinal cavity (40, 41) for housing an arm of a fastening bracket (42, 43), wherein said cavity (40, 41) of said inner and outer stop profiles (5, 6) is in a rearward position relative to one side of said interconnecting profile (7) facing said block (17). 5
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7. The thermal break door or window according to the preceding claim, **characterised in that** said inner and outer stop profiles (5, 6) have a longitudinal opening (46, 47) for access to said longitudinal cavity (40, 41) thereof. 15

8. The thermal break door or window according to any preceding claim, **characterised in that** it comprises two leaves (1, 1A) defining a central joint of the door or window wherein the leaf frame (3') of the second leaf (1A) comprises an inner metal leaf profile (8'), an outer metal leaf profile (9'), and at least one leaf profile made of heat insulating material (10') interconnecting between said inner leaf profile (8') and said outer leaf profile (9'), said second leaf (1A) further having, at said central joint, a first sealing gasket (12') between said outer metal leaf profiles (9, 9'), a second sealing gasket (13'), and a third sealing gasket (11') between said inner leaf profiles (8, 8'), said second sealing gasket (13') being configured and disposed so as to delimit, between said leaf frames (3, 3'), a first air chamber (15') in cooperation with said first sealing gasket (12') and a second air chamber (14') in cooperation with said third sealing gasket (11'). 20
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9. The thermal break door or window according to any preceding claim from 4 to 8, **characterised in that** said fastening bracket (38, 39, 42, 43) has a surface finish treatment layer consisting of an anodic oxidation, said treatment layer including red-coloured organic pigments which confer a characteristic chromatic effect aimed at also visually indicating the special corrosion resistance features of the product. 40
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10. The thermal break door or window according to any preceding claim, **characterised in that** said inner metal stop profile (5), said outer metal stop profile (6), said inner metal leaf profile (8), and said outer metal leaf profile (9) are made of aluminium magnesium silicon-based alloy 6005 for reducing the total case of the door or window. 50
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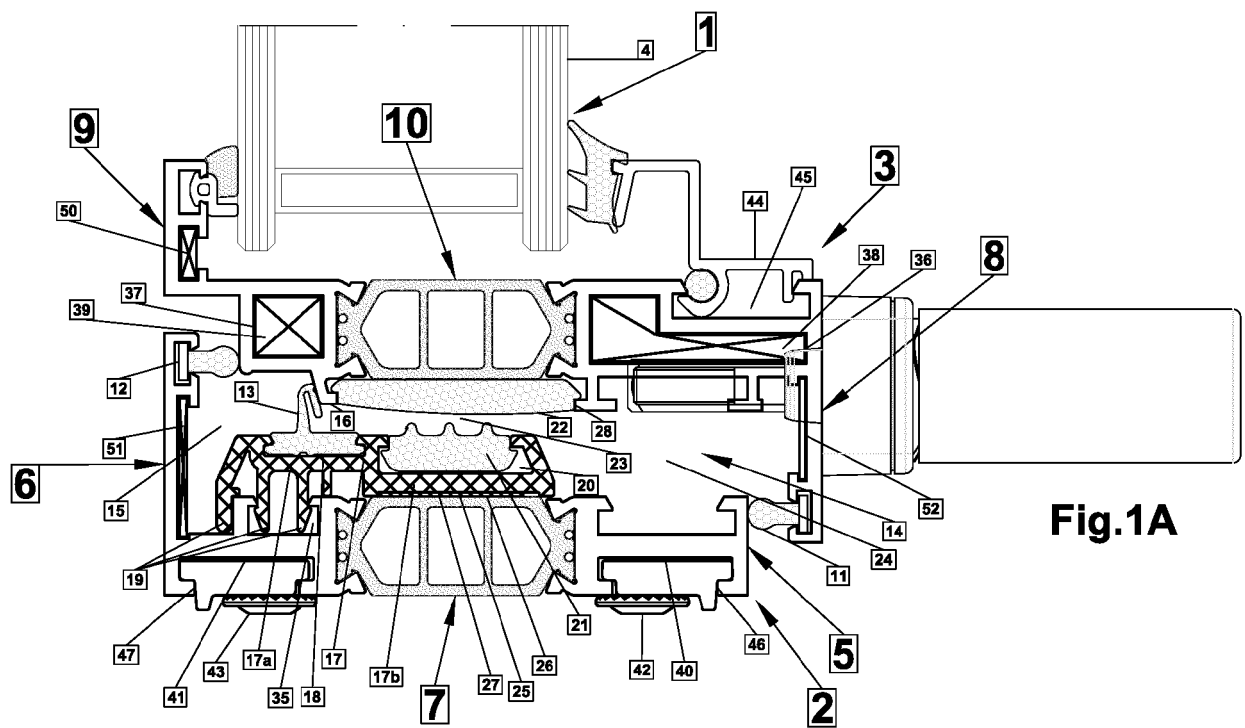


Fig.1A

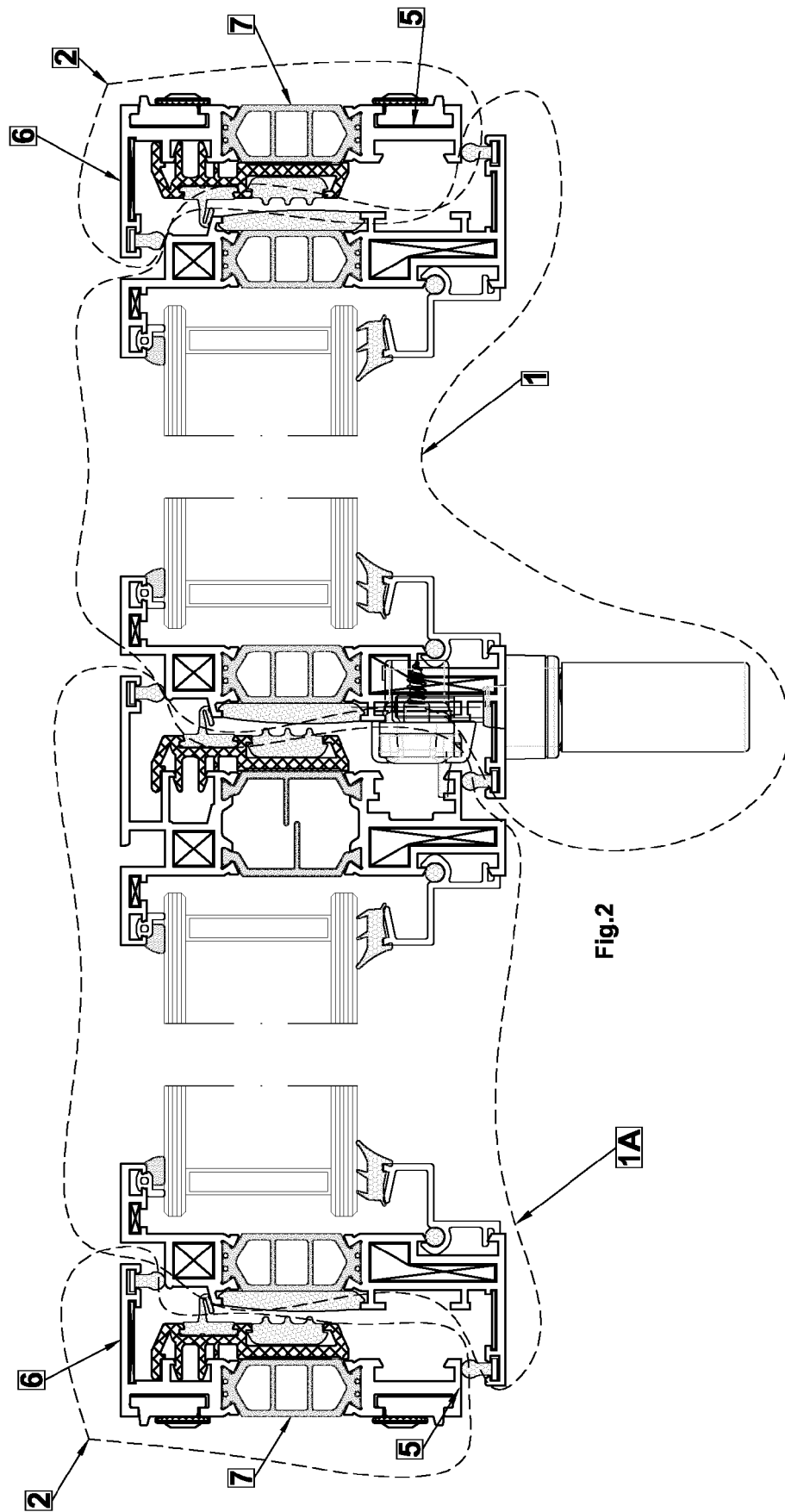
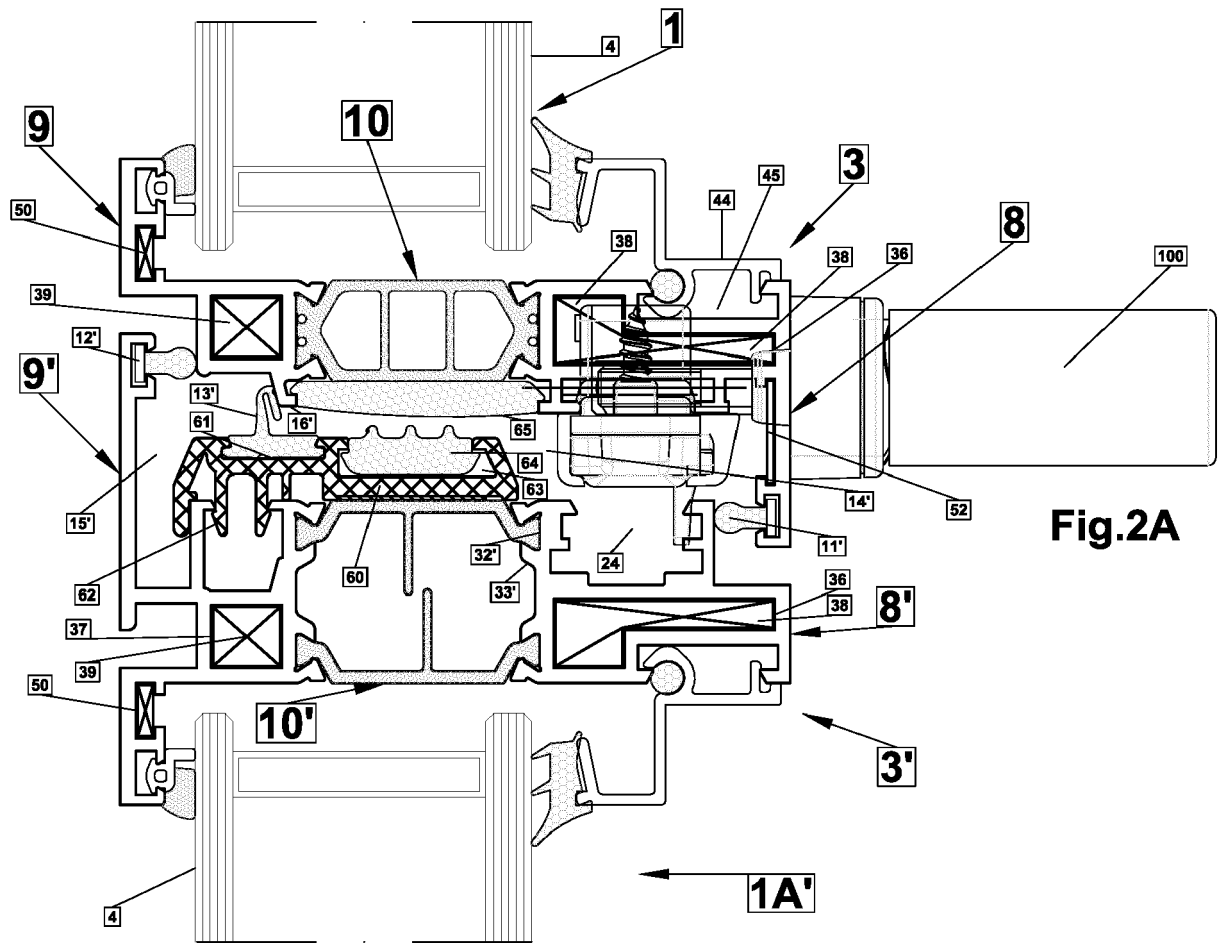
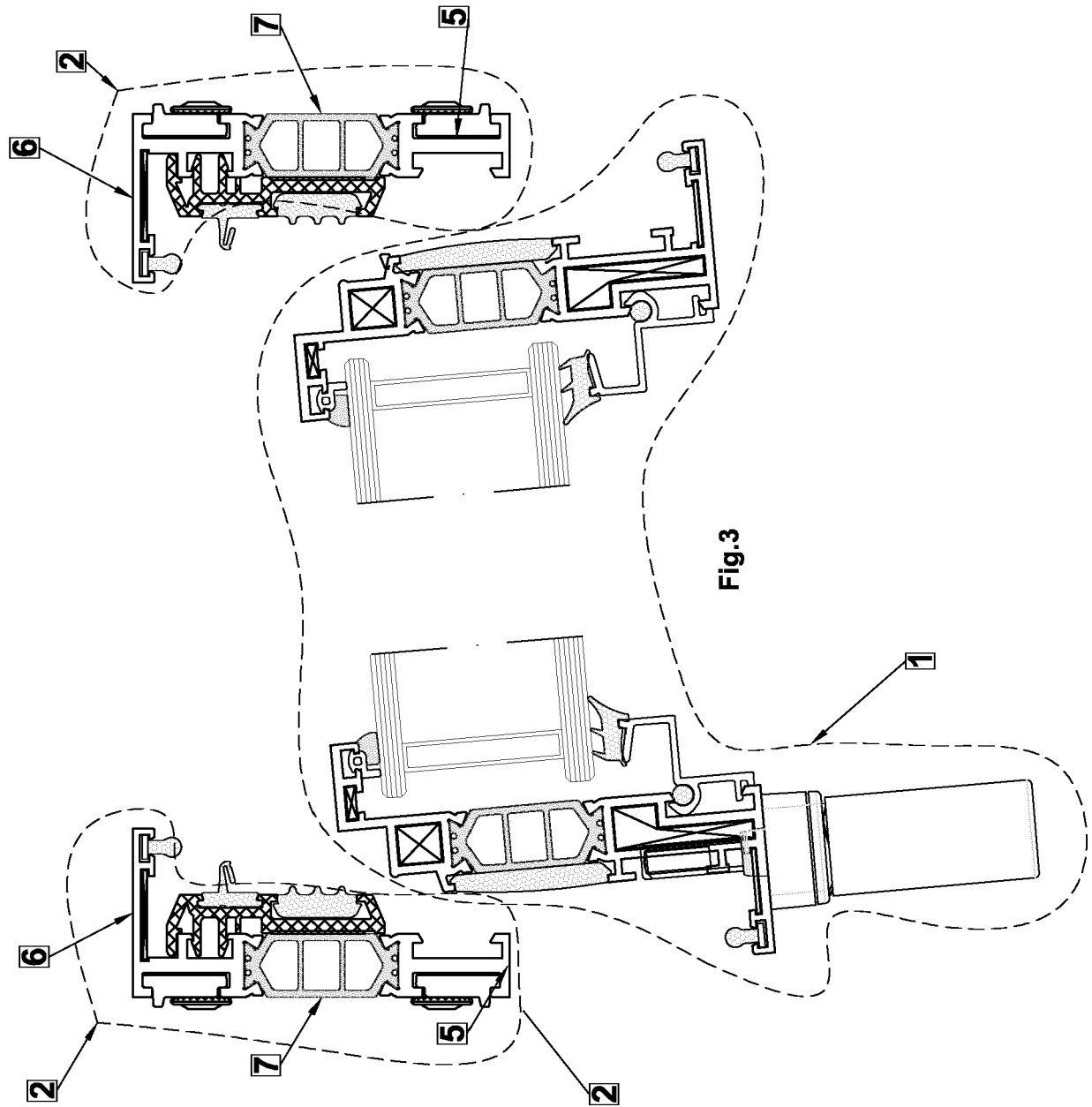
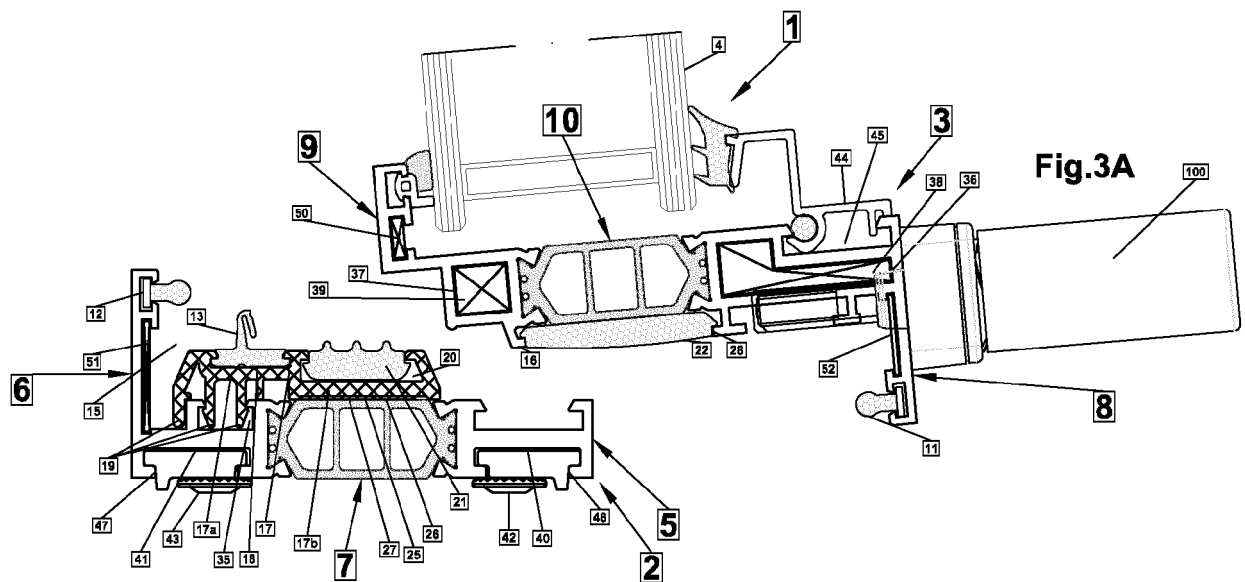


Fig.2









EUROPEAN SEARCH REPORT

Application Number

EP 23 15 2582

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	BE 1 021 226 B1 (GROUP A NV [BE]) 18 August 2015 (2015-08-18) * figures 1-5 *	1-10	INV. E06B7/23 E06B3/263
A	DE 297 01 026 U1 (HARTMANN & CO W [DE]) 7 May 1997 (1997-05-07) * figures 10-15 *	1-10	
			TECHNICAL FIELDS SEARCHED (IPC)
			E06B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		10 June 2023	Verdonck, Benoit
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X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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10-06-2023

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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