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(71) Applicant: **Profilati S.p.A.**
40059 Medicina (Bologna) (IT)

(72) Inventor: **CARPANO, Roberto**
40126 BOLOGNA (IT)

(74) Representative: **Rapisardi, Mariacristina**
Ufficio Brevetti Rapisardi S.r.l.
Via Serbelloni, 12
20122 Milano (IT)

(54) THERMAL BREAK ALUMINIUM WINDOW OR DOOR, A THERMALLY INSULATING PROFILE THEREFOR AND A MACHINE FOR COUPLING PROFILES

(57) A thermal break aluminium window or door comprising a frame and a casement having a first interior profile and a second exterior profile connected to each other by means of a third profile made of thermally insulating material; said third profile has, in cross section, a first side having two contiguous teeth engaged in respective contiguous seats present on said first profile and a second side having a single tooth engaged in a respective single seat of said second profile, said single tooth being positioned in such a way as to leave an ample free portion of said second side for the engagement thereof with a weather stripping for said casement, there being further provided a compensation means on said third profile to compensate for the different thermal expansion of said first and second profiles relative to the thermal expansion of said third profile.

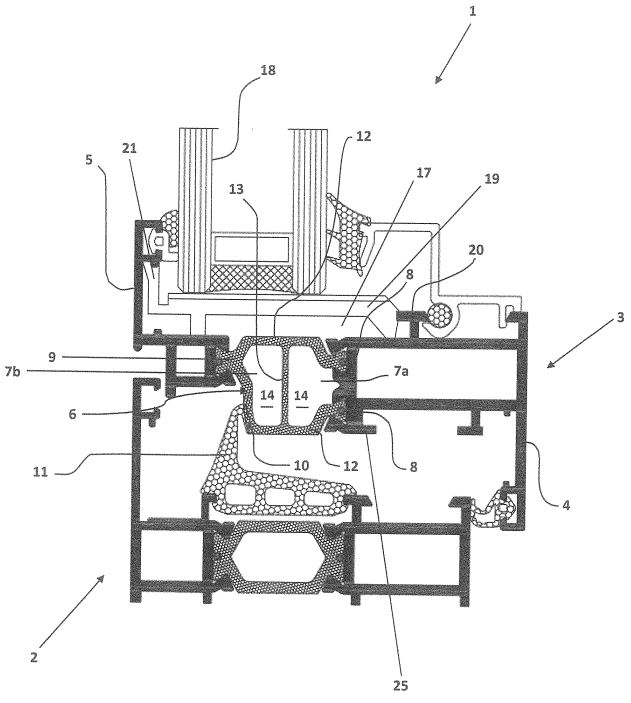

FIG. 2

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Description

[0001] As is well known, thermal break aluminium windows and doors are presently made by joining the profile communicating with the exterior with the one communicating with the interior of the room via a third coupling profile made of polyamide or another thermally insulating material.

[0002] The coupling between the three aforesaid profiles can be made either before or after the coating treatment (with a powder coating) they are subjected to.

[0003] The powder coating is normally polymerized at high temperatures, for example temperatures of 160°C, which also reach peaks of up to 200°C.

[0004] If the coating treatment is performed prior to the coupling of the three profiles, the interior and exterior profiles are individually coated and then coupled with the third thermally insulating profile.

[0005] In this case there is an increase in costs due to transport of the profiles from the place of manufacture to that of the coating treatment and, finally, to the one where the coupling takes place.

[0006] If the coating treatment is performed after the coupling of the three profiles, the interior and exterior profiles are coated when already coupled to the third thermally insulating profile.

[0007] In this case there is a decrease in costs, since the handling of the profiles is reduced, but on the other hand the high temperature reached during the coating treatment gives rise to deformation and twisting forces between the first and second profile with the third profile.

[0008] In particular, in the case of horizontal coating the profiles coupled to one another are often subjected to bending, whereas in the case of vertical coating they are subjected to twisting due to the fact that only one profile is engaged, whereas the others coupled to it are not.

[0009] Moreover, during polymerization, the glue used in coupling the profiles melts and when it subsequently cools, it maintains the profiles in the incorrect position assumed during the coating treatment.

[0010] In addition to the foregoing, it should be borne in mind that the high temperatures favour the elimination of moisture from the third profile, which can therefore undergo dimensional changes.

[0011] The task of the present invention is to provide a thermal break aluminium window or door that is free of the above-mentioned drawbacks attributable to the prior art.

[0012] Within the scope of this task, it is an object of the invention to provide a thermal break aluminium window or door that allows a decrease in costs to be obtained, since the handling of the profiles is reduced, and simultaneously avoids giving rise to deformation and twisting forces between the first and second profile with the third profile.

[0013] It is another object of the invention to provide a thermal break aluminium window or door which allows the weight of the glass pane of the window or door, irrespective of what type it is, to be distributed over both the interior and exterior profiles.

[0014] A further object of the invention is to provide a thermal break aluminium window or door that allows to optimize the fluid dynamic seal between the profiles of the window or door.

[0015] Yet a further object of the invention is to provide a thermal break aluminium window or door that allows the overall dimensions to be reduced, while ensuring an illuminated surface that is larger in size, and at the same time allows the hardware to be housed inside it.

[0016] This task, as well as these and other objects, are achieved by a thermal break aluminium window or door comprising a frame and a casement having a first exterior profile and a second interior profile connected to each other by means of a third profile made of thermally insulating material, characterized in that said third profile has, in cross section, a first side having two contiguous teeth engaged in respective contiguous seats present on said first profile and a second side having a single tooth engaged in a respective single seat of said second profile, said single tooth being positioned in such a way as to leave an ample free portion of said second side for the engagement thereof with a weather stripping for said casement, there being further provided a compensation means on said third profile to compensate for the different thermal expansion of said first and second profiles relative to the thermal expansion of said third profile.

[0017] Advantageously, thanks to this construction for the third profile the vertical dimension of the window or door can be reduced to a value comprised between 68mm and 72mm and preferably equal to 70mm.

[0018] The present invention also relates to a machine for coupling profiles to produce a thermal break aluminium window or door comprising a frame and a casement, said frame having a first exterior profile and a second interior profile connected to each other by means of a third profile made of thermally insulating material, characterized in that it has first motorized coupling rollers for connecting said first and said second profiles with said third profile, there being provided second idle coupling rollers having different peripheral rotation speeds from said first rollers due to the asymmetry of said third profile.

[0019] The present invention also discloses a thermally insulating profile for a thermal break aluminium window or door, characterized in that it has, in cross section, a first side having two contiguous teeth and a second side having a single tooth positioned in such a way as to leave an ample free portion of said second side, said first side having a gap in the material along the whole extent thereof, in a central area between said two teeth, there being further provided an internal stiffening element associated with two parallel sides connecting said first and second side, said stiffening element dividing said profile into two separate chambers. Additional features of the present invention are further defined by the claims dependent on claim 1.

[0020] Additional features and advantages of the invention will become more apparent from the description of a preferred but non-exclusive embodiment of a thermal break aluminium window or door according to the invention, illustrated by way of indicative and non-limiting example in the appended drawings, in which:

Fig.1 is a schematic perspective view of a first application of the thermal break aluminium window or door according to the invention;
Fig.2 is a sectional view of a second application of the thermal break aluminium window or door according to the invention.

[0021] Equivalent parts will be indicated in the description with the same numerical reference.

[0022] With particular reference to the above-described figures, the thermal break aluminium window or door according to the invention is indicated in its entirety with the no. 1.

[0023] The thermal break aluminium window or door, though it is not excluded that it can be of any other analogous metal material, comprises a frame 2 and a casement 3 defined by a first interior profile 4 and a second exterior profile 5 connected to each other by means of a third profile 6 made of thermally insulating material. More particularly, the third profile 6 has, in cross section, a first side 7a having two contiguous teeth 8 engaged in respective contiguous seats present on the first profile and a second side 7b having a single tooth 9 engaged in a respective single seat of the second profile 5.

[0024] Conveniently, the single tooth 9 is positioned in such a way as to leave an ample free portion 10 of the second side 7b to facilitate and optimize the engagement thereof with a weather stripping 11 of the casement with the frame.

[0025] Advantageously the third profile 6, as will be described in greater detail, comprises a compensation means to compensate for the different thermal expansion of said first and second profiles relative to the thermal expansion of said third profile. More precisely, the compensation means comprises a gap in the material fashioned on the first side 7a, in a central area between the two teeth 8, so as to impart a controlled elasticity to the third profile 6 capable of absorbing the acting forces and moments that can be generated thereupon, as previously explained, during the coating treatment.

[0026] The controlled elasticity is imparted to the third profile by the fact that the first and second sides are joined to each other by two sides 12 parallel to each other, with which a stiffening element 13 placed inside the third profile is associated in such a way as divide the inside thereof into two separate chambers 14.

[0027] In order ensure an increased clamping force for the single tooth 9 with the second profile 5, the seat housing the same is defined by a double hammer-like element 15, whereas the two contiguous seats of the two contiguous teeth 8 are each defined by a hammer-like element 15 and an anvil-like element 16.

[0028] Furthermore, again for the same reason, the single tooth 9 is of a larger size than each of the two contiguous teeth 8.

[0029] One of the two parallel sides 12, moreover, is coplanar with the surfaces of the first and second profiles 2, 3 defining the seat 17 for housing a glass pane 18.

[0030] The other side 12 of the profile 6, i.e. the one opposite the seat 17, is also coplanar and contiguous with a surface 25 of the profile 3.

[0031] This feature allows to improve the coating of the window or door, since there are no recesses or undercuts, at least in the exposed areas, which would be difficult to reach by the powder coating.

[0032] Furthermore, the coplanarity of the surfaces of the three profiles makes it possible to house, in the seat 17, an insert 19 for distributing the load of the glass pane 18 simultaneously on the first and second profiles.

[0033] The insert 19 comprises an undercut 20 for engaging with the first profile 4 and tabs 21 for engaging with the second profile 5.

[0034] The aforesaid embodiment also allows to house all of the hardware inside the window or door.

[0035] The particularity of the structure of the window or door highlighted above implies that the connection between the various profiles takes place on a specially equipped machine in which there are provided first motorized coupling rollers for connecting the first and second profiles with the third profile and second idle coupling rollers having different peripheral rotation speeds precisely because of the particular asymmetry which characterizes the third profile 6.

[0036] It has been noted in practice that the thermal break aluminium window or door according to the invention is particularly advantageous for allowing assembly and coating times to be considerably reduced while at the same time having absolute structural and dimensional precision.

[0037] The thermal break aluminium window or door thus conceived is susceptible of numerous modifications and variants falling within the scope of the inventive concept and all the details are replaceable by technically equivalent elements.

[0038] All the materials used, as well as the dimensions, may in practice be of any type, according to needs and the state of the art.

Claims

1. A thermal break aluminium window or door comprising a frame and a casement having a first interior profile and a second exterior profile connected to each other by means of a third profile made of thermally insulating material, **characterized in that** said third profile has, in cross section, a first side having two contiguous teeth engaged in respective contiguous seats present on said first profile and a second

side having a single tooth engaged in a respective single seat of said second profile, said single tooth being positioned in such a way as to leave an ample free portion of said second side for the engagement thereof with weather stripping for said casement, there being further provided a compensation means on said third profile to compensate for the different thermal expansion of said first and second profiles relative to the thermal expansion of said third profile.

2. The window or door according to claim 1, **characterized in that** said compensation means comprises a gap in the material along the entire extent of said third profile, serving to absorb the forces and moments acting upon said third profile.

3. The window or door according to claim 3, **characterized in that** said gap in the material is formed on said first side in a central area between said two teeth.

4. The window or door according to claim 1, **characterized in that** said first and second sides are joined to each other by two sides parallel to each other.

5. The window or door according to claim 1, **characterized in that** said third profile has within it a stiffening element associated with said two parallel sides.

6. The window or door according to claim 1, **characterized in that** said stiffening element is designed to divide said third profile into two separate chambers.

7. The window or door according to claim 1, **characterized in that** said single seat is defined by a double hammer-like element.

8. The window or door according to claim 1, **characterized in that** said two contiguous seats are each defined by a hammer-like element and an anvil-like element.

9. The window or door according to claim 1, **characterized in that** said single tooth is of a larger size than each of said two contiguous teeth.

10. The window or door according to claim 1, **characterized in that** at least one of said two parallel sides is coplanar with the surfaces of said first and second profiles defining the seat for housing a glass pane.

11. The window or door according to claim 1, **characterized in that** it comprises
an insert for distributing the load of said glass pane on said first and second profiles.

12. The window or door according to claim 11, **characterized in that** said distributing insert comprises an undercut for engaging with said first profile and tabs for engaging with said second profile.

13. The window or door according to claim 1, **characterized in that** it comprises all of the internal hardware of said first and second profiles.

14. A machine for coupling profiles to produce a thermal break aluminium
window or door comprising a frame and a casement, said casement having a first exterior profile and a second interior profile connected to each other by means of a third profile made of thermally insulating material, **characterized in that** it has first motorized coupling rollers for connecting said first and said second profiles with said third profile, there being provided second idle coupling rollers having different peripheral rotation speeds from said first rollers due to the asymmetry of said third profile.

15. A thermally insulating profile for a thermal break aluminium window or
door, **characterized in that** it has, in cross section, a first side having two contiguous teeth and a second side having a single tooth positioned in such a way as to leave an ample free portion of said second side, said first side having a gap in the material along the whole extent thereof, in a central area between said two teeth, there being further provided an internal stiffening element associated with two parallel sides connecting said first and second side, said stiffening element dividing said profile into two separate chambers.

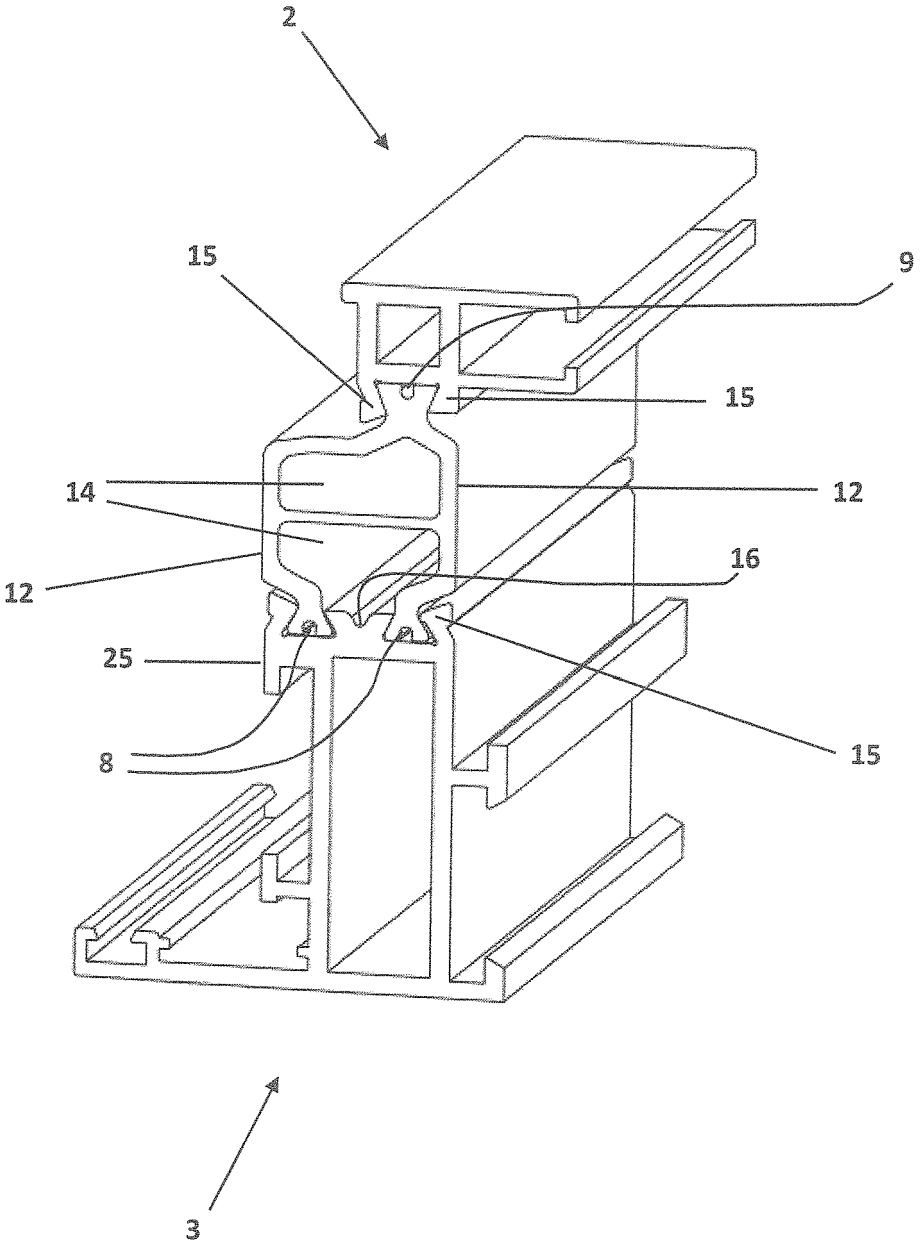

FIG. 1

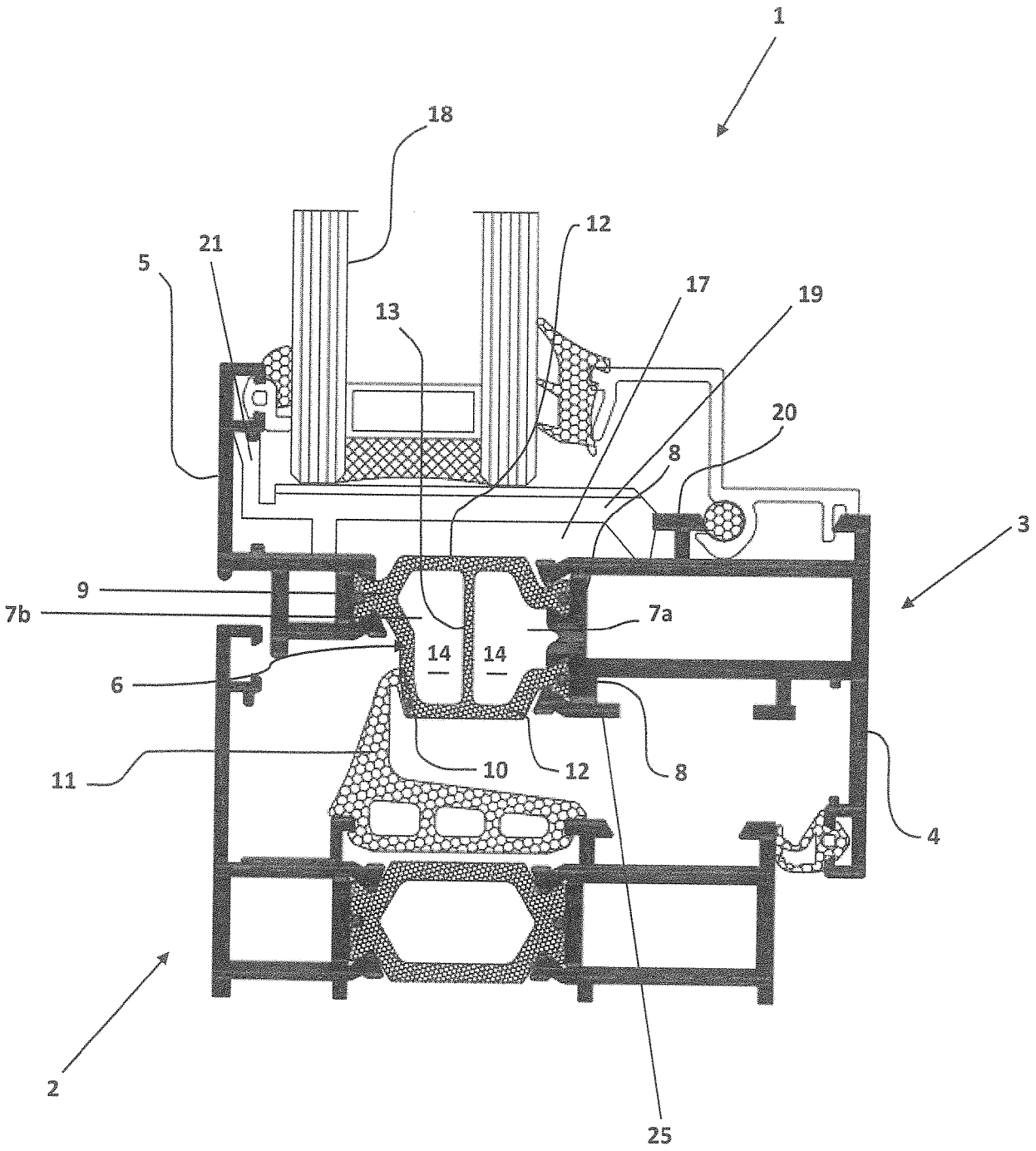

FIG. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 16 17 2131

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	DE 195 30 349 C1 (EKONAL BAUSYSTEME GMBH & CO KG [DE]) 24 October 1996 (1996-10-24) * the whole document * -----	1-10, 13-15 11,12	INV. E06B3/263 E06B3/273
Y	DE 10 2013 100249 A1 (SCHÜCO INTERNAT KG [DE]) 17 July 2014 (2014-07-17) * figure 4 * -----	11,12	

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	4 October 2016	Blancquaert, Katleen

CATEGORY OF CITED DOCUMENTS

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
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 16 17 2131

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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04-10-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19530349 C1	24-10-1996	NONE	
DE 102013100249 A1	17-07-2014	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82