(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 108 848 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
20.06.2001 Bulletin 2001/25

(51) Int Cl.[7]: **E06B 3/26**, B21D 53/74

(21) Application number: **00204349.5**

(22) Date of filing: **06.12.2000**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **17.12.1999 NL 1013879**

(71) Applicant: **van Gemert Repair B.V.**
5433 NE Katwijk (Gem. Cuijk) (NL)

(72) Inventor: **van Gemert, Hendrikus Theodorus Martinus**
6641 WK Beuningen (NL)

(74) Representative:
Van Weele, Paul Johannes Frits et al
Octrooibureau Los en Stigter B.V.,
Weteringschans 96
1017 XS Amsterdam (NL)

(54) Method of manufacturing a frame for a window with rounded corners, and frame manufactured according to the method

(57) A method of manufacturing a frame for a window with rounded corners assembled of frame sections and in-between these provided with heat-insulating means, which method comprises in a first step the application of the heat-insulating means between the two frame sections, and in a second step the bending of the combined sections to produce a semi-product having substantially the form of the final frame of the window, wherein the frame sections and the insulating material are heated up to a certain temperature limit.

According to the invention the insulating material can be bent cold, comprises the second step of bending the combined section in cold condition, subsequent to which, in a third step, heating takes place in a heating furnace at a furnace temperature up to maximally said temperature limit, at which furnace temperature the frame material becomes harder.

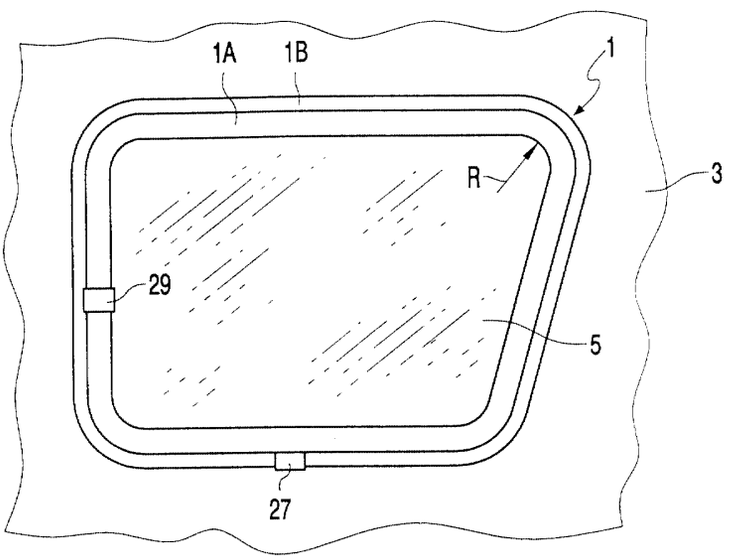

FIG. 1

EP 1 108 848 A1

Description

[0001] The invention relates to a method of manufacturing a frame for a window with rounded corners, which frame comprises frame sections provided at both sides, in-between which heat-insulating means are provided, such as one or more heat-insulating sections made of a heat-insulating material, which method comprises in a first step the application of the heat-insulating means between the two frame sections, and in a second step, with the aid of a suitable bending tool, the bending of the combined section comprised of the two frame sections with in-between the insulating means producing a semi-product having substantially the form of the final frame of the window, which method also comprises the heating of the frame sections, wherein the insulating material is heat resistant up to a certain temperature limit.

[0002] Such a method is known from the German *Offenlegungsschrift* DE 43 43 862 A1. This document describes a method in which the frame sections are made of metal, in particular of aluminium. The insulating means consist of a body of insulating foam material, for example polyurethane foam. The drawback of an insulating body of this type is that the frame, for reasons that include the rigidity of the insulating material, tends to break when being bent. In order to avoid this, the assembly consisting of the frame sections and the heat-insulating body are placed in a heating furnace at a furnace temperature of 60°C to 150°C, which temperature is adjusted to the properties of the insulating material. The fact that the insulating material softens at the temperature prevailing in the heating furnace, losing its brittleness, allows the frame to be bent in warm condition.

[0003] The drawback of the above - mentioned method and other methods known from the prior art is that while the combined sections can indeed be bent for the manufacture of a frame for a window, the rounding-off radius that can be realized is always relatively large due to the rigidity of the frame sections; characteristically it cannot be made smaller than 300 mm. For many applications, such as ship's windows for yachts and inland river craft or for caravans, and the like, much smaller rounding-off radii are required.

[0004] The objective of the invention is a method of the kind mentioned in the preamble, by which it is possible to manufacture frames with rounded corners having a relatively small rounding off radius, and which are characterized by the measures enumerated in the characterizing part of claim 1.

[0005] The feature of the invention is that the basic material for both the frame sections and the insulating material, is readily bendable in cold condition, that is to say normally the temperature prevailing on the shop floor. The hardness, especially of the frame sections that is required in practice, is realized only after the bending in a third step of the method, by a heat treatment in a heating furnace.

[0006] Claim 2 relates to a preferred embodiment of the invention. Cladding units such as window sections are frequently manufactured from aluminiums. The aluminium alloy AlMgSi 0.5 (DIN specification, international specification: 6060/6063) is a widely used material. According to the respective standard, this alloy is used in the manufacture of sections for cladding units such as windows, is applied at a hardness specification F22 (in accordance with the Netherlands NEN specification). The preferred embodiment of the invention is based on frame sections that are manufactured, for example, by the usual extrusion, from a frame material of the same aluminium alloy AlMgSi 0.5 but of a lesser hardness, namely specification F19 (in accordance with the Netherlands NEN standard). Because of this lesser hardness, the frame sections are cold bendable after extrusion. The smallest rounding off radii that can be realized without damaging the combined section, are considerably smaller than those realizable up to now with the methods of the prior art. The hardness of the aluminium alloy can be improved, when in the third step the semi-product obtained by bending, is heated in the heating furnace. When using the said aluminium alloy, this is assumed to be the result of the growing dimensions of the crystals present in the alloy.

[0007] The invention preferably also uses the features presented in claim 3. The final product will then, at least approximately, process the same hardness normally used with window sections made of the above-mentioned aluminium alloy for windows, so that they comply with the respective standards.

[0008] In practice, the embodiment of claim 4 has been shown to be interesting. The insulating material according to this claim is sufficiently bendable in cold condition while also being sufficiently heat resistant.

[0009] According to claim 5, the method can be performed at a furnace temperature which is at least approximately 180°C. The insulating material, for example, of the type mentioned above, has been shown to be unaffected at these temperatures, making it possible to improve the hardness within a reasonable time to approximately F22 (in accordance with the Netherlands NEN specification), at least in the case of the above-mentioned aluminium alloys.

[0010] The invention also relates to a frame manufactured with a method according to the invention, which is characterized in that the frame possesses one or more roundings having a radius of less than 300 mm. This makes it possible for the first time to manufacture windows from frame sections which (i) as ready product are in practice sufficiently hard, (ii) comply with the respective standards, and (iii) possess rounded corners having a radius which for this kind of a window is not unacceptably large.

[0011] Finally, the invention also relates to a window provided with a frame according to the invention.

[0012] The invention will now be further elucidated with reference to some non-limitative examples shown

in the drawing, in which:

Figure 1 illustrates a window according to the invention provided in the wall of a ship or a caravan, or the like,

Figure 2, is a cross section of a portion of the window and the adjacent wall according to Figure 1, and

Figure 3, is a partial cross section similar to the one of Figure 2 of another embodiment of a window according to the invention.

[0013] Similar parts in the Figures will be referred to by identical reference numbers.

[0014] Figure 1 shows a window 1 provided in a wall 3 of, for example, a pleasure boat, or an inland river craft, or a caravan, or the like. In the case concerned it is a top hung window, see Figure 2, having a movable window portion 1A and a stationary window portion 1B, permanently fixed in the wall 3. The movable window portion 1A is provided with a glass panel 5, in this case a double-walled glass panel with a heat-insulating interspace 7. Such double-walled glass or plastic panels are generally known in the art so that a description of these will be omitted.

[0015] The stationary window portion 1B consists of two frame sections 9 and 11, respectively, between which two heat-insulating sections 13 are mounted. The frame sections of the type shown are often manufactured from plastic or light metal by means of a suitable extrusion process. Extruded frame sections for numerous applications are available on the market in an enormous variety with or without intermediate heat-insulating sections and made, for example, from a suitable plastic. A detailed description of the frame sections and heat-insulating sections shown in the drawing will therefore be omitted. It should merely be mentioned that the ends of the heat-insulating sections 13 are inserted into swallow tail recesses of the frame sections 9 and 11, in order to securely connect them thereto. The movable window 1A comprises the frame sections 15, and 17, coupled with each other and with the heat-insulating sections 19 to form a combined section.

[0016] The glass panel 5 is mounted between the frame sections 15 and 17 with the aid of an elastic mounting section 21 provided therebetween. This mounting section not only serves in the known manner as a soft protective intermediate layer between the glass panel and the frame sections, but at the same time as element to accommodate dimensional tolerance, and as water-tight seal between the glass panel and the window frame, but also as thermal insulation element between the frame sections 15 and the frame section 17. The mounting section 21, however, is not part of the window frame to be manufactured according to the method of the invention, and is fitted only when the glass panel 5 is mounted into the window frame.

[0017] At a free end in the frame section 11 an elastically deformable sealing section 23 is provided made of, for example, a suitable type of rubber. In the frame sections 15, a similar elastically deformable sealing section 25 is provided. Such sealing sections are generally known in the art and will therefore not be described further. Their purpose is to provide a substantially water-tight fit between the movable window portion 1A and the stationary window portion 1B, when the window is in the closed position (see Figure 2).

[0018] In accordance with the invention, the combined section comprised of the frame section 9, the frame section 11 as well as the two intermediate heat-insulating sections 13, are bent cold into substantially the shape shown in Figure 1. The two ends of this combined section are fastened together with the aid of a stainless steel bracket 27, which is known as such, in order to provide a sturdy frame. However, prior to fitting the bracket 27, the semi-product comprised of the combined section bent in cold condition to match the window shape, is placed in a furnace at a furnace temperature effectuating the hardening of the frame material. After a predetermined time which will depend on the materials used, the semi-product is removed from the furnace, after cooling the sealing section 23 is applied and the bracket 27 is fitted.

[0019] The frame of the movable window portion 1A is manufactured in a similar manner, using a stainless steel bracket 29 to connect up the ends of the combined section.

[0020] In the top right-hand corner the combined section of the movable window 1A can be seen, comprised of the frame sections 15 and 17 and the two intermediate heat-insulating sections 19, that have been bent in cold condition to a rounding-off radius of approximately 100 mm. This is considerably less than was possible up to now for windows of the kind discussed here. Up to now the smallest possible rounding-off radius was approximately 300 mm. Obviously such a large rounding-off radius will be inappropriate for the manufacture of windows of the type shown in Figure 1 and which are suitable, for example, for boats, caravans, etc.

[0021] After the above description of the embodiments according to the Figures 1 and 2, the embodiment in Figure 3 will be readily understood and will therefore only be discussed very briefly. By omitting the elastically deformable sealing section 25, the movable window portion 1A shown in Figures 1 and 2 is suitable for being fitted directly into the wall 3, into an opening which is of course smaller than the one used for the window shown in the Figures 1 and 2.

[0022] The embodiments according to the Figures 1 to 3 are based on frame sections manufactured from the frame material AlMgSi 0.5. However, other materials consisting of metals or plastics or combinations thereof may conceivably also be applied using the method according to the invention, or may in the future become available for the manufacture of frames for windows with rounded corners in accordance with the method of the

invention.

[0023] The invention is not limited to the above-discussed embodiments of the invention but comprises, on the contrary, every method within the scope of the independent claim 1, and any frame within the scope of the independent claim 6. The term "frame" should be taken in the widest sense. Within the framework of this specification, this term comprises, for example, also frames for doors or for panels of any kind that are provided with a frame having rounded corners of the kind described in claim 1. Likewise, the term "window" must be interpreted in the widest sense, and comprises panels of any kind, including doors and the like.

Claims

1. A method of manufacturing a frame for a window with rounded corners, which frame at both sides comprises frame sections in-between which are provided heat-insulating means such as one or more heat-insulating sections made of a heat-insulating material, which method comprises in a first step the application of the heat-insulating means between the two frame sections, and in a second step, with the aid of a suitable bending tool, the bending of the combined section consisting of the two frame sections with in-between these the insulating means to form a semi-product having substantially the form of the final frame of the window, which method also comprises the heating of the frame sections, wherein the insulating material is heat resistant up to a certain temperature limit,
   characterized
   - in that the frame sections are manufactured from a frame material which becomes harder under the influence of heat,
   - in that the insulating material is cold bendable,
   - in that said second step comprises bending of the combined section in cold condition and
   - in that the third step comprises said heating by placing the said semi-product in a heating furnace at a furnace temperature up to maximally said temperature limit, at which furnace temperature hardening of the frame material takes place.

2. A method according to claim 1, **characterized** in that the frame material consists of an aluminium alloy AlMgSi 0.5 (DIN specification) which prior to the third step has a hardness of F19 (in accordance with the Netherlands NEN specification).

3. A method according to claim 2, **characterized** in that the aluminium material in the third step is heated to a hardness of at least approximately F22 (in accordance with the Netherlands NEN specification).

4. A method according to one or more of the preceding claims, **characterized** in that the insulating material consists of polyamide 6.6 reinforced with 25% of glass fibre.

5. A method according to one or more of the preceding claims, **characterized** in that the furnace temperature is at least approximately 180°C.

6. A frame manufactured by a method according to one or more of the preceding claims, **characterized** in that the frame possesses one or more roundings having a radius of less than 300 mm.

7. A window provided with a frame according to claim 6.

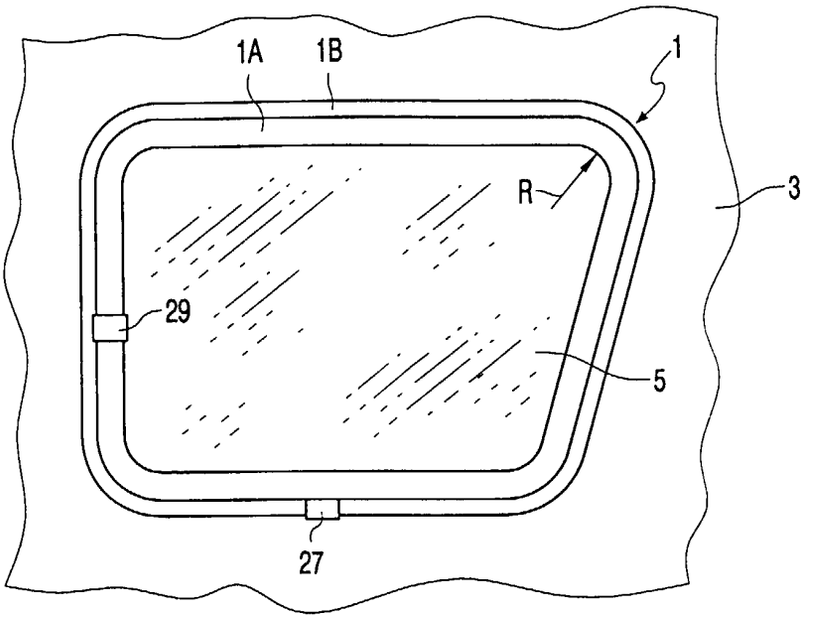

FIG. 1

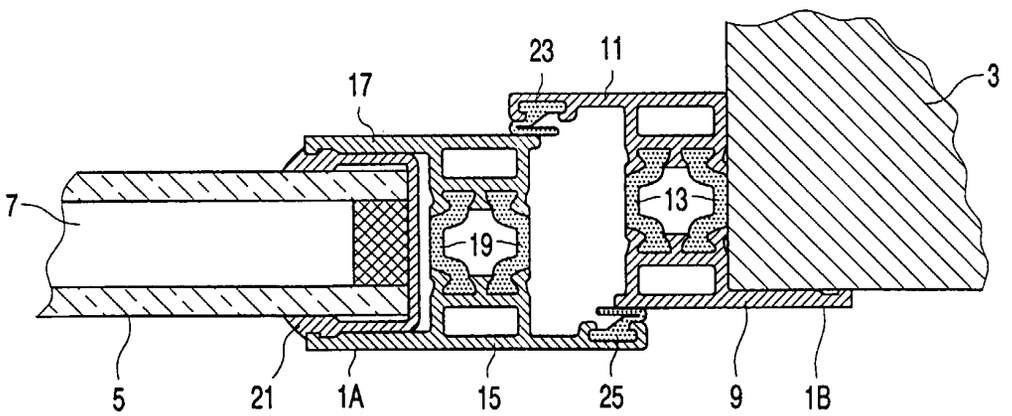

FIG. 2

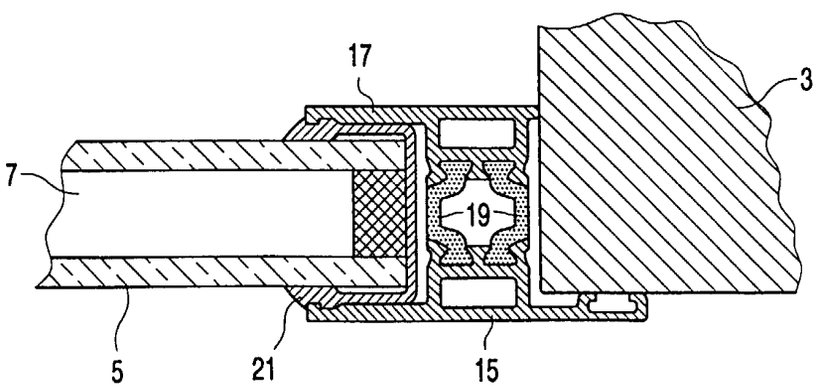

FIG. 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 20 4349

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	EP 0 715 052 A (VIANELLO) 5 June 1996 (1996-06-05) * column 3, line 51 - column 5, line 9; figures 1-8 *	6,7	E06B3/26 B21D53/74
D,A	DE 43 43 862 A (KREYE) 29 June 1995 (1995-06-29) * column 2, line 25-54; figure *	1	
A	EP 0 687 743 A (THE FURUKAWA ELECTRIC CO.) 20 December 1995 (1995-12-20) * page 3, line 13-52 *	2,3,5	
A	WO 98 18975 A (FREDERIKSEN) 7 May 1998 (1998-05-07) * page 3, line 14 - page 4, line 24 *	2,3	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)
E06B
B21D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	2 February 2001	Kergueno, J

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
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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 00 20 4349

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

02-02-2001

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0715052 A	05-06-1996	IT TV940127 A	30-04-1996
		JP 8206742 A	13-08-1996
		US 5687596 A	18-11-1997
DE 4343862 A	29-06-1995	NONE	
EP 687743 A	20-12-1995	JP 8060285 A	05-03-1996
WO 9818975 A	07-05-1998	AU 4699497 A	22-05-1998

EPO FORM P0459

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