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(12) # EUROPEAN PATENT APPLICATION

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(54) **Method of fabricating thermally clad metal section for glazing frames and clad section.**

(57) Thermally clad metal section comprises metal section (10) (for example, of an aluminium alloy) and cladding section (12) (for example, of a PVC plastics material) of relatively low thermal conductivity. The metal section comprises two oppositely and outwardly projecting lips (20, 24) which can be received in two oppositely and inwardly facing channels (38, 40) of the cladding section. To secure the clad section together, a resilient neoprene cord (46) is inserted into one of the channels (38) and one lip (20) is inserted to engage the cord. The other lip is forced against an outer surface (62) of the cladding section to slide over the surface, with compression of the cord (46), and snap home into its channel (40). The cord (46) serves both to retain the lip (24) in its channel (40) and as a seal between the metal and cladding sections.

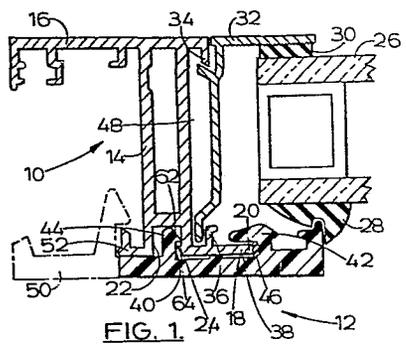

FIG. 1.

EP 0 046 084 A1

METHOD OF FABRICATING THERMALLY CLAD METAL SECTION FOR GLAZING FRAMES AND CLAD SECTION

This invention is concerned with a method of fabricating thermally clad metal section adapted for use in constructing frames for use in glazing, and clad section adapted for such use.

A difficulty arises with the use of metal sections, for example in replacement windows, in that heat loss through the metal from inside a building can be substantial. Associated with this problem is one of condensation, moisture condensing out of the relatively warm interior air on to the relatively cold metal; condensation can not only lead to unsightly "runs" of water down the glass panes, but can also lead to damage to surrounding structure (for example plasterwork, timber and wallcoverings). In an effort to overcome both these difficulties, and also in some cases to provide a decorative effect, it is known to provide so-called "thermal cladding" to help to insulate the metal from the inside of a building.

Thermal cladding can take the form of plastics extruded sections which fit over surfaces of the metal sections which are otherwise exposed to the inside of the building, the plastics material being of a relatively low thermal conductivity as compared with the metal. Various ways have been suggested for securing the plastics cladding section to the metal section, usually involving some combination of retaining formations on the metal and plastics sections. In one known system, oppositely and inwardly projecting retaining lips of a central portion of the metal section are engaged in oppositely and outwardly facing channels of the cladding

section, the cladding section projecting well beyond the central portion of the metal section to provide a glazing flange of the clad section for the support of a glass pane. A disadvantage of this known system is that the distance between the two sets of retaining formations is rather short, which can give rise to problems as regards both the alignment and the stability of the projecting glazing flange. For the system to be at all satisfactory, the manufacturing tolerances on the formations on the metal and plastics sections must necessarily be very close, or the cladding may be insecurely attached and/or misaligned. Furthermore, fabrication of the clad strip is laborious, one section having to be slid along its length into the other in order to engage the retaining formations.

In another known system, the cladding section is secured by means of a barbed element, which projects from the central portion of the metal section, and a retaining lip provided by a free-end portion of a projecting flange of the metal section, one end portion of the cladding being impaled on the barbed element and an opposite end portion, provided by a glazing flange of the cladding, providing a channel in which the retaining lip is located. Whilst this arrangement provides the advantage that the retaining formations are spaced further apart than is the case with the first known system referred to, fixing by means of a barbed element is not entirely satisfactory. Firstly, the depth of that part of the cladding section which will receive the barbed element has to be greater than usual in that region, in order to provide a sufficient depth of material to achieve a secure fixing; this can have the undesirable side effect of demanding the use of non-standard window fittings. Secondly, there can be a tendency for the cladding section to crack as a result

of stresses induced by insertion of the barbed element, which is generally undesirable and could result in the cladding being insecurely held by the metal section.

Both of the two known systems referred to suffer from a further drawback, which is that a satisfactory seal may not be achieved between the metal and plastics sections. Such a seal is highly desirable to prevent the passage of both warm air, from inside the building, and condensation. In each case the interengagement of the metal and plastics retaining formations is to some extend relied upon to provide a seal, but in practice this is not necessarily satisfactory owing to misalignments and distortions which can occur in the components.

It is one of the objects of the present invention to provide an improved method of fabricating thermally clad metal section which can enable improved clad section to be formed reliably and at high speed.

In its method aspects the invention is characterised in that it comprises:

(i) procuring metal section which comprises two oppositely and outwardly projecting retaining lips,

(ii) procuring cladding section which is of a relatively low thermal conductivity as compared with the metal section and which provides two oppositely and inwardly facing channels adapted to receive the lips of the metal section,

(iii) inserting one of the lips of the metal section into one of the channels of the cladding section to compress resiliently compressible means within the channel, and

(iv) inserting the other of the lips of the metal section into the other of the channels of the cladding section to secure the cladding section to the metal section, said compressible means remaining sandwiched in said one of the channels between the lip and the cladding section.

The method is preferably further characterised in that it comprises engaging said one of the lips of the metal section with said resiliently compressible means within said one of the channels, engaging said other of the lips with an outer surface of a channel-providing portion of the cladding section providing said other of the channels, and urging together said other of the lips and said channel-providing portion to cause the lip to slide over said outer surface and enter said other of the channels, the arrangement being such that as the lip slides over said outer surface said one of the lips moves into said one of the channels with compression of said compressible means, and thereafter said compressible means urges said other of the lips into said other of the channels.

The metal and cladding sections may readily be urged together, to force the lip to slide over the outer surface of the cladding section and snap home into the channel, by means of a machine comprising opposed pressure rollers, juxtaposed lengths of the metal and cladding sections being fed through the roll nip with said one of the lips already engaged with the compressible means. High speed assembly by machine can be achieved in this manner.

It is another of the objects of the present invention to provide improved thermally clad metal section in which a good seal between the metal and the cladding sections can be reliably achieved.

In its product aspects the invention is characterised in that the metal section comprises two oppositely and outwardly projecting retaining lips which are received in two oppositely and inwardly facing channels of cladding section, a resiliently compressible sealing strip being sandwiched in one of said channels between the lip in that channel and the cladding section.

Preferably, in clad section as set out in the last preceding paragraph, or as made by a method according to the last preceding paragraph but four, a resiliently compressible sealing strip in the form of a resilient neoprene cord is sandwiched in said one of the channels between the lip in that channel and the cladding section. However, said resiliently compressible means may take any suitable form and might be moulded integrally with the cladding section.

The cladding section is preferably of a plastics material, and most preferably a PVC material, but may be of any material of a relatively low thermal conductivity.

The distance between the two sets of retaining formations of the clad section can be substantial, which can be of advantage in ensuring correct alignment and stability of a glazing flange provided by the cladding section, and can also allow the use of a relatively thin cladding section since the section may not have to be inherently so stiff. Manufacturing tolerances do not have to be especially close, since the compressible means can accommodate small variations in dimensions. Furthermore a reliable seal between the metal and cladding sections is readily achieved.

There now follows a detailed description, to be read with reference to the accompanying drawings, of

various features of a replacement window system which illustrate the invention by way of example.

In the accompanying drawings, which are all views in transverse cross-section of elongate extruded sections:-

Figure 1 shows an unequal leg frame member, comprising thermally clad metal section, supporting double glazing, the outline of an equal leg frame member being indicated in broken line; and

Figure 2 shows a mullion/transom member comprising thermally clad metal section.

The clad unequal leg outer frame member shown in Figure 1 comprises metal extruded section 10 and plastics extruded section 12 clipped on to the metal section. The plastics section is of a relatively low thermal conductivity as compared with the metal section.

As seen in Figure 1, the metal section 10 comprises a generally oblong-rectangular hollow body portion 14. Projecting in opposite directions from opposite sides of the body portion 14, from adjacent opposite ends of the body portion, are a wide flange 16, providing the outer, long, leg of the unequal leg member, and a shorter flange 18 providing a mounting flange. A free-end portion of the mounting flange 18 provides a first retaining lip 20 of the metal section. There is a recess 22 in that end of the body portion 14 from adjacent which the mounting flange projects, and a second retaining lip 24 of the metal section projects into the recess, to project oppositely and outwardly from (i.e. away from) the first lip 20.

The plastics cladding section 12 is mounted on the mounting flange 18 of the metal section 10 and provides a glazing flange of the frame member. A double glazing unit 26 is shown, in Figure 1, mounted in a conventional manner, by means of a glazing wedge 28 and a weather-strip 30, between the glazing flange and a glazing bead 32. The glazing bead is mounted by means of opposed glazing ribs 34 and 36 of the metal section. The cladding section 12 provides first and second, oppositely and inwardly facing, channels 38 and 40 adapted to receive the first and second lips 20 and 24 of the metal section. A first channel-providing portion 42 of the plastics section, defining the first channel 38, provides a relatively deep channel whereas a second channel-providing portion 44, defining the second channel 40, provides a relatively shallow channel.

A resiliently compressible sealing strip 46 in the form of a resilient neoprene cord is sandwiched in the first channel 38 of the cladding section between an end face of the first lip 20 and a bottom wall of the channel. The seal prevents passage of vapour or condensate between the metal and plastics sections (i.e. in a direction transversely of the lengths of the elongate sections). It will be appreciated that when the frame member is employed, for example, as a horizontal bottom member of a window, the sealing strip 46 will be positioned well above the bottom of a recess 48 (see Figure 1) in which condensed water might collect.

Indicated in chain-dot outline in Figure 1 is the full extent of an alternative cladding section 50 which can be substituted for the cladding section 12 to provide an inner leg of an equal leg frame member. The longer cladding section 50 is secured to the metal section 10 in a similar manner to that in which the

shorter section 12 is secured. However, in securing the longer section 50 use is made of a glazing-rib projection 52 of the metal section 10 to constitute a second lip of the metal section projecting oppositely and outwardly from the first lip 20.

The clad mullion/transom member shown in Figure 2 comprises metal extruded section 54 and two plastics extruded sections 12 which are each the same as that of the unequal leg component of Figure 1. The plastics sections 12 are each mounted on the metal section 54 in the same way as the plastics section 12 is mounted in the unequal leg component, with sealing strips 46 interposed between the metal and the plastics sections. To seal a gap 56 between the two plastics sections 12, the metal section 54 comprises a recess 58 defined by serrated side walls, and a plastics (for example PVC) sealing strip 60 is introduced into the recess 58 to bridge the gap 56; a good seal can be achieved by pouring a fine stream of solvent down the exposed face of the located sealing strip 60 to form a meniscus, so as to weld together the strip and adjacent portions of the plastics sections 12.

Fabrication of the thermally clad metal section shown in Figure 1 will now be described. [Essentially the same method applies to fabrication of the clad mullion/transom shown in Figure 2, and also to attachment of the longer, alternative, cladding section 50 to the metal section 10 of Figure 1.] The neoprene cord 46 is introduced into the bottom of the first channel 38 of the plastics section 12. The first retaining lip 20 of the metal section is then inserted into the first channel to engage the cord 46. The second retaining lip 24 of the metal section is engaged with an outer surface 62 of the second channel-providing portion 44 and the metal

and cladding sections are introduced into a roll nip of a machine comprising opposed pressure rollers.

It is to be observed from Figure 1 that the outer surface 62 of the cladding section and an end face 64 of the second lip 24 are so shaped as to encourage one to slide over the other when the lip is urged against the surface in a direction generally towards the second channel 40. Such sliding movement between the metal and cladding sections can be accommodated by resilient compression of the cord 46 by the first lip 20, allowing movement of the lip 20 into the first channel 38.

Accordingly, upon feeding the juxtaposed metal and cladding sections into and through the roll nip, which urges together the lip 24 and the channel-providing portion 44, the lip 24 is caused to slide over the outer surface 62 and snap into the second channel 40, the lip being urged by the compressed cord 46 to enter the channel 40. The cladding section and the metal section thus become secured together, with the sandwiched cord 46 retaining the lip 24 in the channel 40.

The metal extruded sections hereinbefore described are all of an aluminium alloy, and the plastics extruded sections are all of an exterior grade PVC synthetic resin material. However, other suitable materials could be employed for other embodiments of the invention, though in all cases the cladding section needs to be of a relatively low thermal conductivity, as compared with the metal section, in order to provide effective thermal insulation.

CLAIMS

1. A method of fabricating thermally clad metal section adapted for use in constructing frames for use in glazing, characterised in that it comprises:

(i) procuring metal section (10) which comprises two oppositely and outwardly projecting retaining lips (20,24),

(ii) procuring cladding section (12) which is of a relatively low thermal conductivity as compared with the metal section and which provides two oppositely and inwardly facing channels (38,40) adapted to receive the lips of the metal section,

(iii) inserting one of the lips (20) of the metal section into one of the channels (38) of the cladding section to compress resiliently compressible means (46) within the channel, and

(iv) inserting the other of the lips (24) of the metal section into the other of the channels (40) of the cladding section to secure the cladding section to the metal section, said compressible means (46) remaining sandwiched in said one of the channels (38) between the lip (20) and the cladding section.

2. A method according to Claim 1 characterised in that it comprises engaging said one of the lips (20) of the metal section with said resiliently compressible means (46) within said one of the channels (38), engaging said other of the lips (24) with an outer surface (62) of a channel-providing portion (44) of the cladding section providing said other of the channels (40), and urging together said other of the

lips (24) and said channel-providing portion to cause the lip to slide over said outer surface and enter said other of the channels, the arrangement being such that as the lip (24) slides over said outer surface (62) said one of the lips (20) moves into said one of the channels (38) with compression of said compressible means (46), and thereafter said compressible means urges said other of the lips (24) into said other of the channels (40).

3. A method according to either of Claims 1 and 2 charaterised in that said one of the lips (20) is inserted into said one of the channels (38) to compress compressible means (46) in the form of a resiliently compressible sealing strip.

4. Thermally clad metal section adapted for use in constructing frames for use in glazing and comprising metal section (10) and cladding section (12) which is secured to the metal section and is of a relatively low thermal conductivity as compared with the metal section, characterised in that the metal section comprises two oppositely and outwardly projecting retaining lips (20,24) which are received in two oppositely and inwardly facing channels (38,40) of the cladding section, a resiliently compressible sealing strip (46) being sandwiched in one (38) of said channels between the lip (20) in that channel and the cladding section.

5. Thermally clad metal section according to Claim 4 characterised in that the sealing strip (46) is in the form of a resilient neoprene cord.

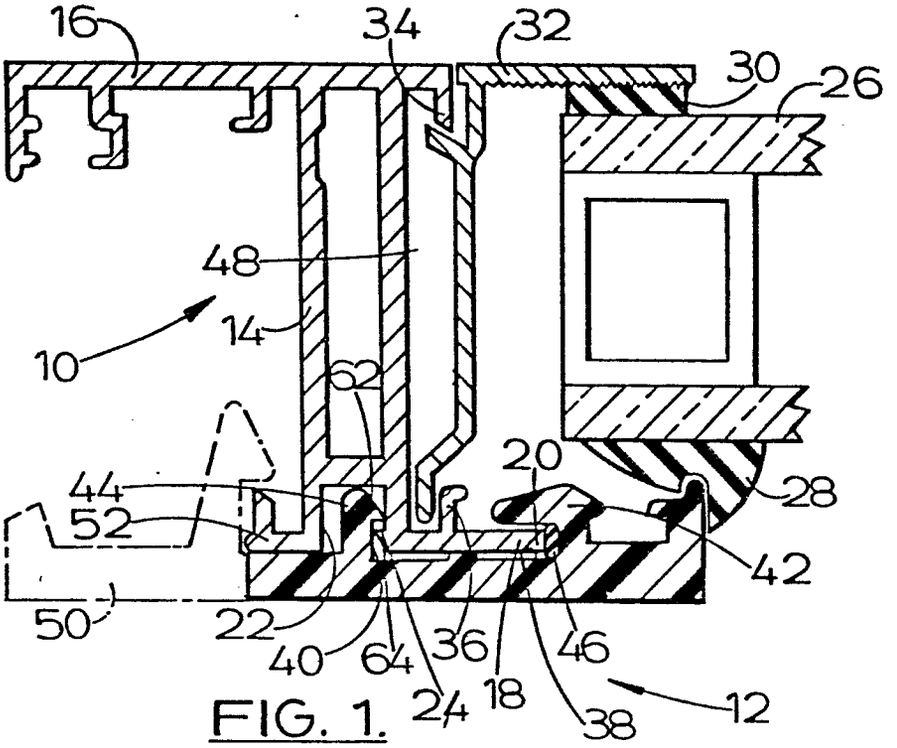
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FIG. 1.

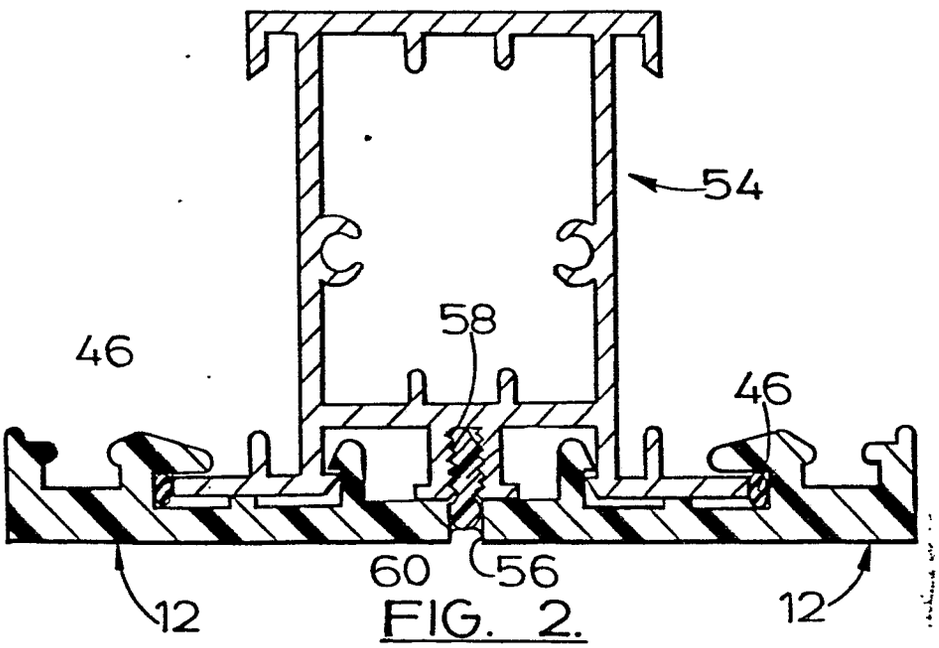
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FIG. 2.

European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 81 30 3649.8

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
	DE - A1 - 2 416 273 (H. PASCHE et al.) * claims 1 to 4, 12; page 2, paragraph 1; fig. 1, 3 *	1,2,4
	DE - U - 1 957 040 (E. NOTTER OHG) * claims 1, 3, 5; fig. *	1,2,4
	DE - U - 7 008 627 (J.& A. ERBSLÖH) * claims; fig. *	1,2,4
	AT -B - 341 742 (E. NIPP) * claim; fig. *	1,2,4
A	DE - U - 1 866 912 (G. SCHLEGEL) * claim 1; fig. *	1-4

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

E 06 B 3/26
F 16 S 3/02

TECHNICAL FIELDS SEARCHED (Int. Cl.³)

E 06 B 3/00
E 06 B 7/00
F 16 B 2/00
F 16 B 17/00

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Berlin	28-10-1981	WUNDERLICH