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[54] **WINDOW ASSEMBLY**

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[63] Continuation of Ser. No. 342,546, March 19, 1973, abandoned.

[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** **49/501;** 49/DIG. 1; 52/403

[51] **Int. Cl.**[2] **E06B 1/32**

[58] **Field of Search** 49/DIG. 1, 501; 52/731, 52/732, 656, 393, 403

[56] **References Cited**

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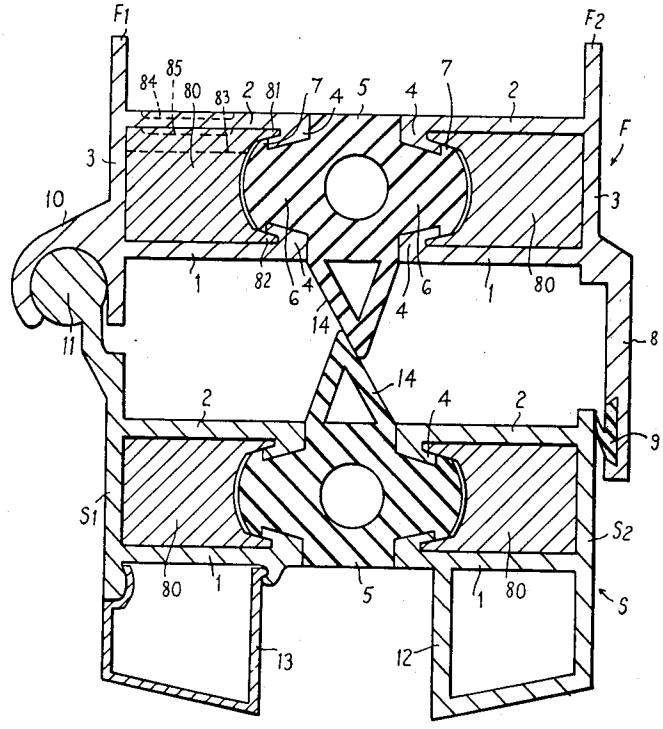
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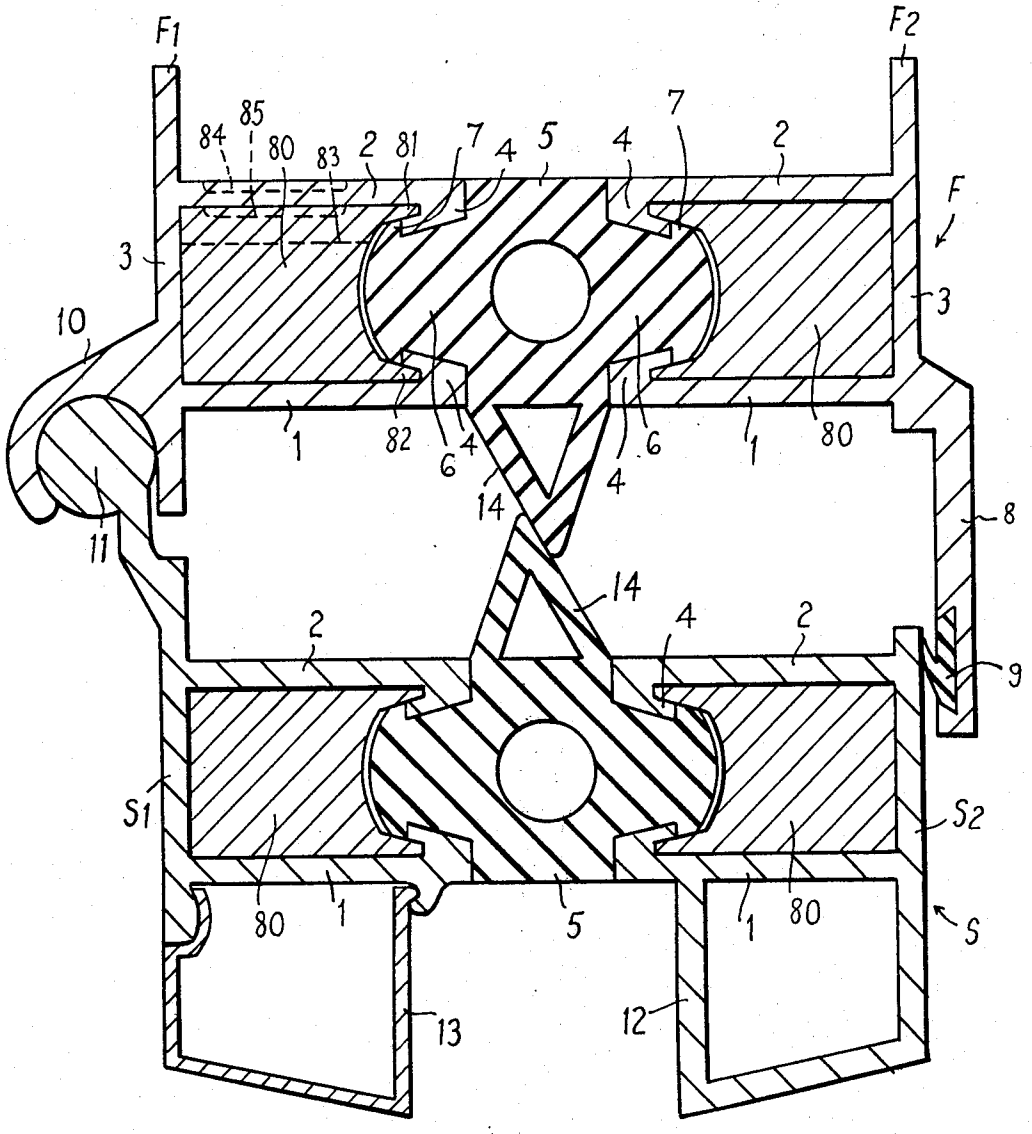
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[57] **ABSTRACT**

The invention relates to a thermal break window assembly comprising inner and outer frame parts made of metal extrusions each of which includes an open channel section having inwardly facing abutments adjacent the free edges of the opposing channel walls. The inner and outer frame parts are connected in spaced relation by a spacer made of a thermal insulating material and having opposite ends profiled to fit between and interlock with opposing pairs of abutments. The channel sections are forced on to the profiled end portions of the spacer by flexing the channel walls apart against the springiness of the metal until the abutments snap into and interlock with the profiled shape of the spacer and thereby secure the inner and outer frame parts and the spacer together.

8 Claims, 1 Drawing Figure




F1
F2
85
84
80
83
2
81
7
4
5
4
7
2
F
3
3
10
1
82
6
4
14
4
6
1
80
8
11
14
2
4
2
9
S1
S2
80
1
5
1
80
S
13
12

WINDOW ASSEMBLY

This is a continuation of application Ser. No. 342,546, filed Mar. 19, 1973, now abandoned.

This invention relates to a thermal break window assembly comprising inner and outer frame parts made of metal extrusions and spaced apart by a member of thermal insulating material.

An object of the invention is to provide a thermal break window assembly, and a method of making a thermal break window assembly, in which the inner and outer frame parts of a window frame or sash frame can be easily assembled to the thermal insulating spacer therebetween without the need for screws, bolts or rivets, or of operations requiring deformation of the metal to secure the parts together. The inner and outer frame parts can be separately treated, for example for finish including colouring, before they are assembled with the insulating spacer.

An embodiment of the invention will now be described with reference to the accompanying drawing which shows a horizontal section through a part of a window sash and frame.

Referring to the drawing there is shown a cross section through the head F of a window frame and the upper rail 5 of the sash frame of a top hung window assembly. The head of the frame consists of an outer frame part F1 and an inner frame part F2, both comprising extruded aluminium sections, which are connected together by a spacer 5 of thermal insulating material. The extruded frame parts F1 and F2 each comprise open channel sections defined by channel walls 1 and 2 connected at one end by an end wall 3 which also forms part of the exterior of the frame part. Along the inner surfaces of the channel walls 1 and 2, at or adjacent their free edges, are inwardly directed abutments 4, shown in the embodiment illustrated as having a hook shape in cross-section. The outer frame part F1 is also extruded with a hinge socket portion 10 and the inner frame part F2 has an extended wall part 8 provided with a recess for accommodating sealing strip 9.

The spacer 5 comprises a strip-like member having a cross-section with a generally rectangular central portion, which determines the spacing between the frame parts F1 and F2, and oppositely facing profiled end portions 6 recessed corresponding to the shape of the abutments 4 of the channel walls and having shoulders 7 adapted to engage behind the hooked ends of the abutments 4 for securing the frame parts together.

The spacer is made of a substantially rigid thermal insulating material, such as a rigid or semi-rigid grade of polyvinyl chloride or other plastics material, neopreme or rubber, and is snap-fitted and gripped between the opposing channel walls 1 and 2. The parts are assembled together by positioning the inner and outer frame parts F1 and F2 with the open ends of their channel sections facing each other and with the spacer therebetween, and pressing the two frame parts together. This causes the metal walls 1, 2 of the channel sections to flex apart against the springiness of the metal until the abutments 4 snap back into the recesses in the profiled end portions 6 of the spacer and engage behind the shoulders 7, thus firmly gripping the spacer and locking the parts together in assembled relation. To achieve good springing action of the extruded aluminum sections without distortion, the channel walls 1 and 2 and the end walls 3 are preferably made of the same cross-sectional thickness so that they act like a hairpin spring. To compensate for the walls 1, 2 possibly not returning fully to their original positions after being sprung apart, the frame parts may be extruded with the channel walls inclined slightly towards one another. The springiness of the metal may be improved by known heat treatment.

The upper rail of the sash frame similarly consists of an outer frame part S1 and an inner frame part S2 each comprising an extruded aluminum section having an open channel section defined by channel walls 1 and 2 and an end wall, the channel walls having inwardly projecting abutments 4, similar to the construction of the channel sections of the frame parts F1 and F2. The inner and outer frame parts S1, S2 are connected together by a spacer 5 similar to that previously described, the channel walls being secured to the profiled ends of the spacer by being snapped thereover as above described.

The outer frame part S1 is formed with a hinge pin 11 which slides into the hinge socket 10 of the part F1, whereby the sash can be hinged relative to the frame. The glazing, preferably consisting of a double glazing panel, is fitted in the space between the flange portion 12 of the extrusion S2 and a bead strip 13 which snaps into place on the part S1.

If desired the spacers 5 may be provided with projecting portions 14 which engage together when the sash is closed to provide a weather seal in addition to that provided by the sealing strip 9.

The extrusions forming the side and bottom members of the window frame and the sash frame may have similar cross-sections to those of the parts F1, F2, S1 and S2 except that the hinge portions 10 and 11 are omitted. The upper, side and bottom members are mitred at their ends and joined together to form the complete frame. They are preferably joined together by means of corner cleats 80, conveniently made of aluminium and having two arms disposed at a right angle to each other, which respectively extend into the channel sections of the frame parts to be joined together. Only the horizontal arms of the cleats adjacent one corner of the complete window assembly are indicated in the drawing, but both arms have the same cross-section as shown which substantially completely fills the space within the channel walls not occupied by the spacer 5 and includes lip portions 81 and 82 which fit into the recesses behind the hook-shaped abutments 4. Each arm of a cleat is provided with a transversely extending groove, the bottom of which is indicated by a dotted line 83, and is secured in position by indenting the channel wall 2 as indicated at 84 to produce a corresponding rib 85 along the inner surface of the channel wall 2 which bears against the side wall of the groove 83 remote from the corner. Thus the horizontal and upright members of the frame and sash can be firmly assembled without the use of screws or other separate fixing means.

The spacers 5 may extend for the full length of a frame or sash member or may comprise short sections located at spaced positions along the members.

In view of the large force required to force the channel walls of the frame parts over the profiled end portions of the spacers, this operation may conviently be effected progressively, for example, by feeding the extruded sections, with the spacer therebetween, between pressing rolls.

I claim:

1. In a thermal break window assembly comprising inner and outer frame parts made of metal extrusions and spaced apart by a member of thermal insulating material, said inner and outer frame parts each including an open channel section having inwardly facing abutments adjacent the free edges of the opposing channel side walls, the inner and outer metal frame parts being disposed with their open channel sections facing each other and connected in spaced relation by a spacer member made of a substantially rigid thermal insulating material and having opposite ends profiled in cross-section to fit between and having shoulders on each side to interlock behind opposing pairs of abutments to secure the frame parts and spacer member together, the improvement which is characterized by each of said channel sections being made of springy metal and the channel side walls being of a depth such that the side walls can spring apart sufficiently to permit the shoulders of a profiled end of solid cross-section of the substantially rigid spacer member to be forced into the channel section between the pair of inwardly facing abutments thereof, and in that the profiled end of solid cross-section of the spacer member is gripped between said abutments by the spring action of the channel side walls with the shoulders interlocked behind the abutments.

2. A window assembly according to claim 1, characterised in that said abutments are hook shaped and the profiled end portions of the spacer are formed with abutment receiving recesses terminated at each side by shoulders which engage respectively the free edge of a channel wall and the end of the hook portion of an abutment.

3. A window assembly according to claim 1 wherein the extremity of each profiled end of the spacer member terminates away from the channel end wall of the channel section in which it is fitted to leave spaces therebetween; and wherein upright and horizontal members of a frame are mitered at their corners and joined together by cleats each comprising two arms disposed at a right angle to each other which respectively extend into the said spaces between said extremities and the end walls of the channel sections of two members to be joined and are secured therein by projections on the inner surfaces of the channel walls engaging in recesses in the arms of the cleat.

4. A window assembly according to claim 3, wherein the abutments are hook-shaped and the arms of a cleat have a cross-section which substantially fills the space within the channel walls not occupied by the spacer member, and includes portions which extend into the spaces behind the hook-shaped abutments.

5. The method of making a thermal break window assembly comprising inner and outer frame parts made of metal extrusions and spaced apart by a member of thermal insulating material, characterised by

a. providing extruded inner and outer metal frame parts each including an open channel section comprising channel side walls and having inwardly facing abutments adjacent the free edges of the opposing channel side walls; said channel section being made of a springy metal and being dimensioned so that its channel side walls can be sprung apart and then spring back to substantially their initial position,

b. providing an extruded spacer member of substantially rigid thermal insulating material having opposite ends profiled in cross-section complementary to the internal cross-sectional shape of a channel section adjacent its open end, said profiled ends being solid in cross-section and including longitudinal recesses to receive said abutments,

c. positioning the open ends of the channel sections of the inner and outer frame parts to face each other, with the spacer member therebetween, and

d. pressing the frame parts together to spring the respective pairs of channel walls apart and over the adjacent profiled end of the spacer member and then to spring back to cause the abutments to snap into the longitudinal recesses and interlock with and grip the profiled end of the spacer member and thereby secure the inner and outer frame parts and the spacer member rigidly together.

6. The method according to claim 5, characterised in that the frame parts are pressed together by feeding them, with the spacer member therebetween, between pressing rolls.

7. The method according to claim 5, which consists in joining together horizontal and upright members of a frame by mitering their adjacent ends and inserting the respective arms of a right-angled cleat into the spaces in the channel sections thereof which are not occupied by the ends of the spacer members, each said arm having a recess in one of its surfaces, and forming an indentation in the outer surface of the opposing part of a channel wall to produce a corresponding projection on its inner surface extending into said recess in the arm.

8. A combination of parts for erection into a composite structure comprising inner and outer metal members spaced apart by a spacer member constituting a thermal barrier, the combination including inner and outer metal channel sections each made of a springy metal and having inwardly facing abutments adjacent the free edges of the opposing channel side walls, and a spacer member extruded of a substantially rigid thermal insulating material having opposite ends profiled in cross-section complementary to the internal cross-sectional shape of a channel section adjacent its open end said profiled ends being solid in cross-section and including longitudinal recesses to receive said abutments, the springiness of the metal and the dimensions of the channel section relative to the dimensions of the spacer member being such as to permit the channel side walls and opposing abutments to spring apart sufficiently to enable a profiled end of the spacer member to be forced between the opposing pair of abutments and to spring back, when the abutments engage in the longitudinal recesses, sufficiently to grip the spacer member therebetween.

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