

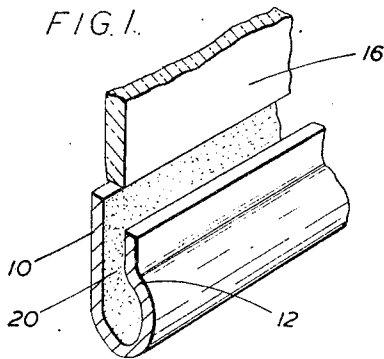
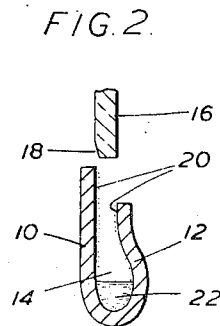
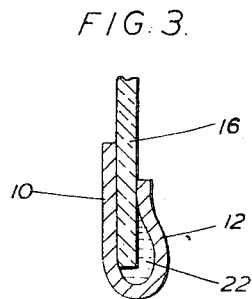
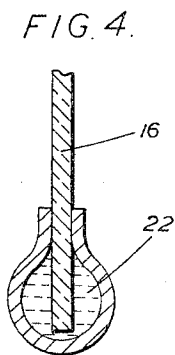
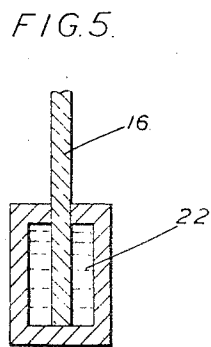
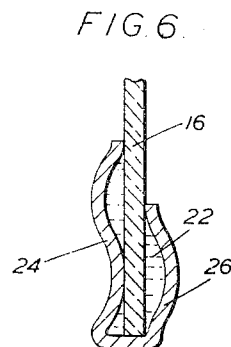
Dec. 5, 1944.

C. BOWER

2,364,512

FASTENING OF SHEET MATERIAL INTO FRAMES AND LIKE MEMBERS

Filed Sept. 27, 1943



Inventor

Charles Bower

By

Stevens and Davis

Attorneys

UNITED STATES PATENT OFFICE

2,364,512

FASTENING OF SHEET MATERIAL INTO
FRAMES AND LIKE MEMBERS

Charles Bower, Kirby Muxloe, England, assignor
to Reid and Sigrist Limited, Kirby Muxloe,
England

Application September 27, 1943, Serial No. 504,073
In Great Britain October 22, 1942

4 Claims. (Cl. 18—59)

This invention relates to the securing of panels into frames and the like and its object is to provide a method which will allow the panel to move lengthwise in the frame members while preventing it from being withdrawn edgewise. The method according to this invention is particularly useful in cases where the panel is of a material different from that of the frame and in which, therefore, differential thermal expansion might cause the panel or the frame to be buckled or otherwise damaged.

The invention may advantageously be employed for securing the margins of windows, hoods and the like of aircraft in metal frame members. Such windows or hoods are ordinarily made of transparent synthetic resin or like materials, such for example as those known under the registered trade-marks "Perspex" and "Plexiglass," and the marginal parts have hitherto been secured to frames or reinforcing members of channel or grooved cross-section by means of rivets, screws or the like. It has been found in practice, however, that the differential expansion and contraction between the synthetic resin material and the metal of the frame, and the vibration to which they are subjected, sometimes cause the material to break away from the rivets or the like.

According to the present invention this disadvantage is avoided by securing the margin of the panel in the groove in the frame or like member by means of a cement which adheres to the panel but not to the frame member, and which fills the space between the panel and the sides of the groove, the groove being undercut or otherwise shaped in cross-section so that when the cement filling solidifies the edge of the panel is positively held against movement towards the mouth of the groove.

The cement may be prevented from adhering to the frame member by coating the internal surface of the groove with material such as grease or oil, or with French chalk or like powdery material, either alone or in conjunction with grease or oil, prior to the insertion of the cement. Alternatively, the groove may be lined with thin sheet material which is not adversely affected by the cement. For example, thin sheet rubber, or the sheet material known under the registered trade-mark "Cellophane" may be used for this purpose.

The cement may consist of a paste containing a solvent, in which case it solidifies by evaporation of the solvent, or it may be a thermoplastic material requiring heat to bring it into the re-

quired pasty or semi-pasty condition, and becoming solid when cool.

Referring to the accompanying drawing:

Figure 1 is a perspective view of a metal channel member and a portion of the panel to be secured therein;

Figure 2 is a cross-section showing the cement inserted and the margin of the panel about to be inserted;

Figure 3 is a view similar to Figure 2 showing the joint completed; and

Figures 4, 5 and 6 are views similar to Figure 3 showing modified forms of channel member.

Referring to Figures 1 to 3, which show the preferred form of channel member, this member is made of sheet metal bent to a channel section, one side 10 being flat and the other side 12 reversely curved so that the groove 14 is of unsymmetrical bulb shape. The edge of the flat side 10 extends beyond the edge of the curved side 12, thereby making the panel 16 stronger along the line where it leaves the frame firstly by avoiding steep temperature gradients when the parts are being warmed or cooled, and secondly by reinforcing the panel where the bending moment is liable to be greatest. The width of the groove 14 at the neck of the bulb is just sufficient to admit the panel 16 and the maximum width of the lower bulbous portion of the groove is about twice the thickness of the panel. The edge of the panel is bevelled as indicated at 18 on the side which is to lie against the flat side 10 of the frame.

The inner surface of the groove is smeared or spread with oil and then coated with powdery material, such as French chalk, this coating being indicated at 20. The appropriate quantity of cement 22 is then inserted and is uniformly distributed along the length of the groove. The amount of cement used is such that when the edge of the panel 16 is inserted into the groove and pressed home, the cement occupies substantially the whole of the remaining space within the bulb portion of the groove as shown in Figure 3.

In the case of a window, hood or the like made of "Perspex" or similar material, the cement may conveniently consist of the same material made into a paste with a suitable solvent, which may be benzene, toluene, xylene, acetone, chloroform, trichlorethylene, or ethyl-, butyl-, or amyl-acetate in the case of "Perspex." Such a cement attaches itself very firmly to the window or the like owing to the action of the solvent and when the solvent has evaporated the bulb portion of the groove is occupied by a hard beading formed

partly by the margin of the window or the like and partly by the cement integrally united therewith. This beading prevents the window or the like from being drawn out of the groove edgewise but owing to the action of the French chalk and the oil or grease coating, the beading is free to move lengthwise in the groove. Thus, the window or the like and the frame can expand and contract independently when temperature changes occur and the straining of either of the parts is avoided. Furthermore, owing to the avoidance of rivets or the like fastening devices, vibration cannot set up heavy local stresses which might cause fracture.

Figure 4 shows a modified frame, the cross-section of which is a symmetrical bulb. Figure 5 shows another form in which the frame is of rectangular section; and Figure 6 shows yet another form having its two sides 24, 26 of unequal height, as in the form shown in Figures 1 to 3, and of waved or sinuous shape in cross-section, so that although the width of the groove is the same at all points the cement 22 forms longitudinal beadings or bulges on the panel 16 which prevent the withdrawal of the panel. It will be evident that many other forms of frame may be employed, the only requirements being that the cross-section of the groove should be substantially uniform throughout its length and should be such that the cement forms one or more beadings which prevent the withdrawal of the panel.

It will be understood that the invention is applicable also to panels or the like of material other than plastics, for example plywood, fibre-board and the like and in such cases a cement is employed which becomes bonded to the rough or fibrous surfaces of these materials. A suitable cement for such materials may consist of a viscous solution of Celluloid in acetone or amyl acetate with a filling of saw-dust.

What I claim is:

1. The method of securing the margin of a panel in a frame member formed with a groove at least one side of which is spaced away from the surface of the panel to form a substantially closed pocket, consisting in applying a coating of adhesion-preventing material to the surfaces of said groove, inserting into said groove a quantity of viscous cement which adheres to the panel but not to the coated surfaces of the frame member, said quantity being less than that required to fill the groove, inserting the margin of the panel edgewise into the groove to displace said cement into said pocket and maintaining

said panel in place until the cement has solidified, thereby to produce a solid projection on the panel which prevents the panel from being withdrawn from the groove edgewise while allowing endwise movement of the panel in the groove.

2. The method of securing the margin of a panel in a frame member formed with a groove at least one side of which is spaced away from the surface of the panel to form a substantially closed pocket, consisting in applying a coating of grease and French chalk to the surfaces of said groove, inserting into said groove a quantity of viscous cement which adheres to the panel but not to the coated surfaces of the frame member, said quantity being less than that required to fill the groove, inserting the margin of the panel edgewise into the groove to displace said cement into said pocket and maintaining said panel in place until the cement has solidified, thereby to produce a solid projection on the panel which prevents the panel from being withdrawn from the groove edgewise while allowing endwise movement of the panel in the groove.

3. The method of securing the margin of a panel in a frame member formed with a groove at least one side of which is spaced away from the surface of the panel to form a substantially closed pocket, consisting in inserting a lining of thin sheet material into said groove, inserting into said groove a quantity of viscous cement which adheres to the panel, said quantity being less than that required to fill the groove, inserting the margin of the panel edgewise into the groove to displace said cement into said pocket and maintaining said panel in place until the cement has solidified, thereby to produce a solid projection on the panel which prevents the panel from being withdrawn from the groove edgewise while allowing endwise movement of the panel in the groove.

4. The method of securing the margin of a panel of synthetic resin in a frame member formed with a groove at least one side of which is spaced away from the surface of the panel to form a substantially closed pocket, consisting in coating the surfaces of said groove with adhesion-preventing material, and filling said pocket with a cement consisting of said synthetic resin and a solvent thereof said cement when it has become solidified forming a solid integral projection on the panel which prevents the panel from being withdrawn from the groove edgewise while allowing endwise movement of the panel in the groove.

CHARLES BOWER.