United States Patent [19]

Kessler

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[54] **UNITARY RIGID EDGE CHANNEL FOR WINDOWS**

[76] Inventor: **Gerald Kessler,** 388 Cranberry Rd., Boardman, Ohio 44512

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[52] **U.S. Cl.** **52/127,** 52/400, 52/475

[51] **Int. Cl.** **E04b 1/62,** E06b 3/62

[58] **Field of Search** ..... 52/399, 400, 403, 475, 476, 52/493; 29/235, 155 R, 453

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Primary Examiner—Frank L. Abbott
Assistant Examiner—Mark H. Wolk

[57] **ABSTRACT**

Windows for modern housing are usually supplied as one-piece glass panes having the edges set into a channel-shaped frame of relatively rigid material, usually of aluminum or rigid plastic. A simple channel construction for this purpose is described, together with a method of assembling it to the window pane, which greatly reduces the cost of both parts and assembly labor over the previous practice.

3 Claims, 7 Drawing Figures

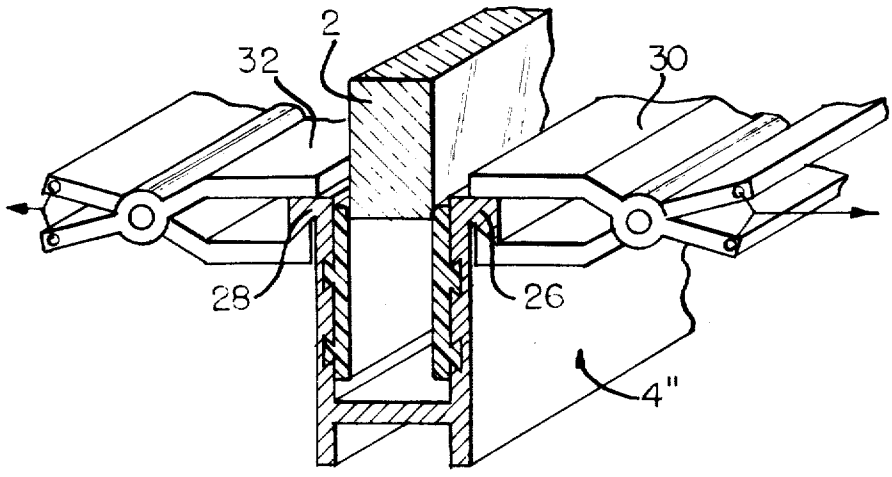


FIG. 1.

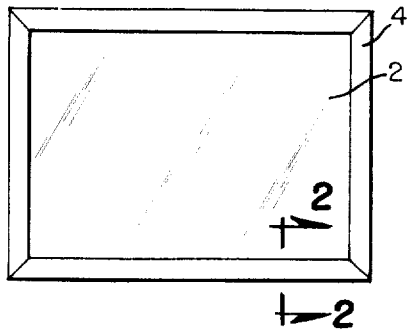


FIG. 2.

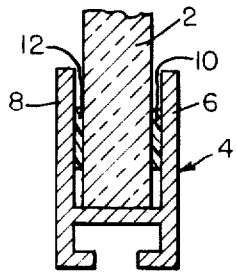


FIG. 3.

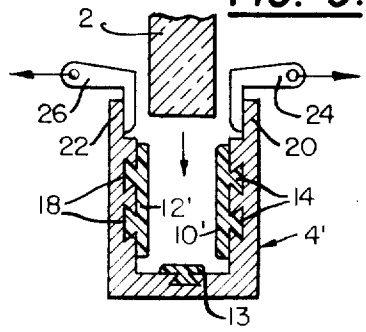


FIG. 4.

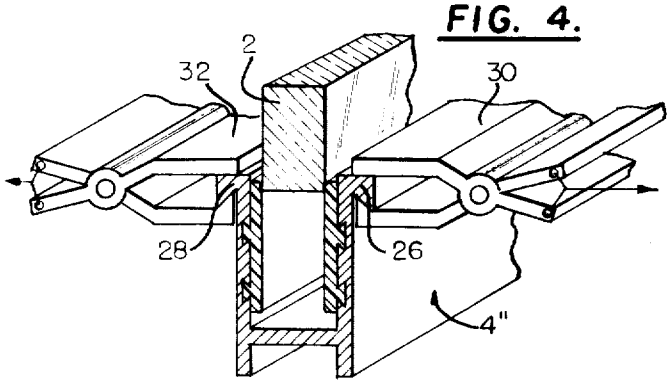


FIG. 3A.

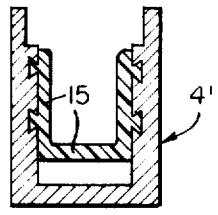


FIG. 5.

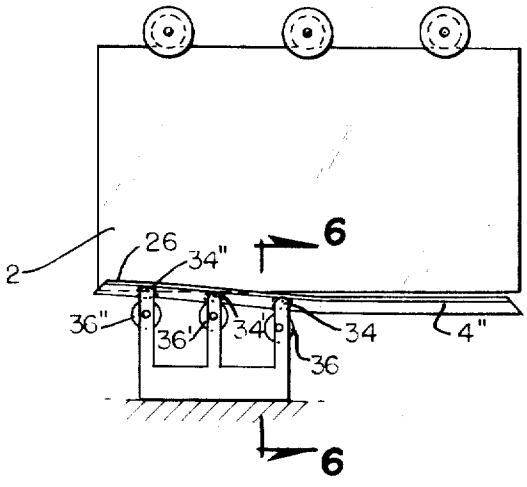
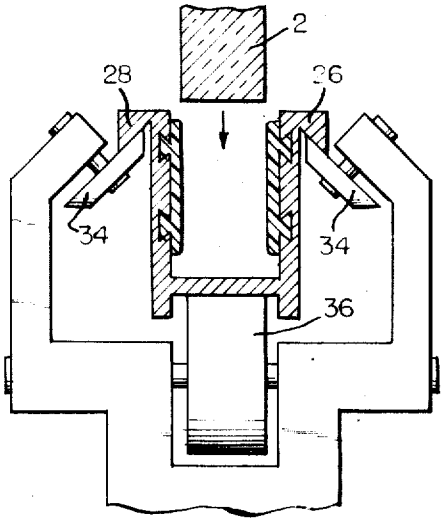


FIG. 6.



UNITARY RIGID EDGE CHANNEL FOR WINDOWS

Window sash is currently most commonly supplied in the form of one-piece glass windows having a frame or "surround" made of aluminum or rigid plastic formed by extrusion through a die, since this provides a very inexpensive and satisfactory construction. The surround is generally in the form of a channel member, the walls of the channel embracing the opposite sides of the glass at the edges thereof and holding it firmly to provide the necessary strength for the sash, and also usually serve as a runner by means of which the sash is slid in the window frame to open or close the window. In addition to being strong, the surround must also be waterproof, and therefore it has been necessary to glaze the window to perform the function which was formerly performed by the use of putty with the old-fashioned wooden windows. The sealing function in modern windows is performed usually by means of soft plastic strips which engage the glass and lie between it and the rigid walls of the channel to perform the sealing function. These soft strips, which serve both to exclude water and air, and also to cushion the glass in its rigid channel, are applied in a number of ways, one of which is to slide a strip between the glass and the channel after the channel has been assembled to the glass, and another is to use dual-extrusion channels having such soft strips integrally extending from the inner walls of the channel member, still another is to use channel members made up of several pieces which are assembled, e.g., by means of screws, on the glass pane. All of these methods are expensive either in labor or in the cost of elaborate channel constructions, so that they often constitute a major part of the expense of the completed window frame. Attempts to make a simple U-shaped channel frame member of rigid material have heretofore required that a sealing strip of softer material, in the form of a tape of sufficient width to be placed on the top edge of the glass pane and to drape down on both sides for at least a portion of the length of the channel wall, be assembled on the edge of the glass pane, after which the channel member is placed on top of this and tapped down with a hammer or similar tool to force the channel over the soft strip, so that the final assembly will have a sealing member between the glass and the rigid channel. This is cumbersome and very expensive in labor, and often results in a high breakage cost, since the channel must be made a fairly tight fit if the resulting structure is to be reasonably rigid and tight, so that considerable force is required to set it in place on the edge of the pane.

The present invention obviates the above disadvantages by providing the simplest structure possible for the intended purpose. Considering the case of an aluminum (or rigid plastic) U-shaped channel, it is made of the proper channel width to firmly grip a glass pane set into it, then the inner walls of the channel are coated with a layer of soft plastic material which may be applied in any one of a number of ways as will be shown below, but essentially constitutes a coating on the side walls of the rigid channel which serves at the same time to cushion the edge of the glass pane in the channel, to seal the glass, and to provide a firm frictional engagement between the glass and the channel, so that the glass cannot be readily withdrawn, whereby a strong unitary frame structure is provided which in some instances may even have sufficient strength so that joining the frame strips at the corner in accordance with present practice may not be necessary. Since such a frame would be difficult or impossible to assemble by conventional methods, special means are provided whereby the walls of the channel can be spread apart at their open end against their natural inherent resiliency, for a sufficient distance to enable the edge of the glass pane to be readily inserted, after which the spreading device releases the channel legs to firmly grip the glass pane. This procedure can be accomplished in the field by repair men, using special tools provided for the purpose, or preferably is accomplished initially during the factory assembly of the window sash, and may even be accomplished so inexpensively compared to the high cost of labor for replacement in the field, that it would be cheaper to stock extra windows and replace them when broken rather than replace the glass in the frame under such circumstances.

The specific nature of the invention, as well as other objects and advantages thereof, will clearly appear from a description of a preferred embodiment as shown in the accompanying drawing in which:

FIG. **1** is a front view of the type of window to which the invention applies;

FIG. **2** is a sectional view taken on line **2—2** of FIG. **1**, showing one form of the invention;

FIG. **3** is a transverse sectional view of a different from of window channel, together with means for spreading the channel legs;

FIG. **3A** is a similar view of a modification of FIG. **3**;

FIG. **4** is a view similar to FIG. **3** of still another form of the invention;

FIG. **5** is a side view of a device for the factory assembly of a channel of the type shown in FIG. **4**; and

FIG. **6** is a sectional view taken on line **6—6** of FIG. **5**.

FIG. **1** shows a typical modern window having a glass pane **2** and a frame or surround **4** made of rigid extruded material such as aluminum or rigid plastic.

FIG. **2** shows the simplest form of the invention in which the frame **4** is in the form of a U-shaped channel of sufficiently rigid material, having upstanding legs **6** and **8**, which grasp the glass pane **2** on opposite sides. Between the inner wall of the channel and the glass pane there is a coating or layer **10, 12** of soft plastic material which is firmly adhered to the extruded channel member **4**. This layer may be applied by spraying or brushing or in any other known manner, and serves both as a gripping and a sealing surface, and is also sufficiently thick to serve to some extent as a cushioning material between the channel and the glass. The layer may be of any suitable material such as flexible PVC (Vinyl), flexible EVA (Ethylene vinyl acetate) which are extrudable thermoplastics and can also be extruded onto the surface of the metal or plastic channel after the latter is fully formed, as a separate factory operation. It is also possible to use other viscous compounds, e.g., plastisols, organasols, liquid rubbers of the poyl-sulphide type, polyurethane, or silicone or neoprene type, some of which cure in air and others by means of heat, which could be applied during a normal operation of the window, e.g., heat-treat or paint ovens. The application of the gripping surface can be applied to the interior of the rigid channel so that it self-adheres thereto, or can be applied through an intermediate adhesive as a separate thin strip by suitable machinery. It can also be applied to the rigid channel by extruding or pumping through a die onto the surface of the channel

in such condition that the material is forced into locking areas as shown in FIG. 3 at 14 and 18, these locking channels or grooves having been previously formed during the extrusion of the channel member itself. It will be understood that there may be considerable frictional force developed during the assembly of the frame onto the glass edge, and it is therefore essential to have a very good adhesion between the plastic layer 10 or 12 and the channel. An interlock such as shown at 14 and 18 is therefore very useful and in some cases may be essential for proper operation during the assembly.

The channel shown in FIG. 3 is also made with upstanding ears or lugs as shown at 22 and 20 permitting the insertion of suitably-dimensioned hooks 24 and 26 so that the legs of the channel can be spread apart sufficiently to permit easy insertion of the glass pane 2. The hooks 24 and 26 could be at the end of a device like a pair of plyers operated manually by a service man in the field, or could be part of suitable production machinery for production assembly in the factory. If desired, a bottom pad or strip 13 of soft plastic material can be placed at the bottom of the channel to cushion the edge of the glass 2, and also to limit the distance the glass can penetrate the channel. Another way of doing this is shown in FIG. 3A, by making the plastic extrusion 15 in the form of a smaller U-channel with its bottom at the desired distance above the bottom of the rigid channel.

FIG. 4 shows still another type of lug 26, 28 for spreading the legs of the channel. This may be done either by means of wide clamps as shown at 30 and 32 which grip the entire length of the channel, or a considerable portion of it, so that the entire glass pane can be inserted at once, or else as shown in FIGS. 5 and 6, by starting at one end of the strip and spreading a short area st a time as will be explained below. The first method (FIG. 4) is particularly suitable in the case of fairly small window panes, such as are used in automobiles and similar locations. The second method is more suitable in the case of long channel sections such as are used in larger window panes. It will be apparent that the distortion of the section as shown in FIG. 5 is what is normally done when assembling rigid U-shaped channels with a previously-applied strip of friction or sealing material wrapped around the edge before the channel is inserted; in this case, it has been the practice to begin tapping the channel at one end to get it on and to continue the tapping along the length of the channel until it is entirely assembled.

As shown in FIGS. 5 and 6, the spreading operation can be accomplished by means of suitably spaced and dimensioned spreading wheels 34 which engage the undercut portion of the lugs 26 and 28 to pull them apart for insertion of the glass pane 2. As will be seen in FIG. 5, there are several sets of such wheels 34, 34', etc., each set being spaced slightly further apart than the preceding one, and also being set more close to the edge of the glass pane, so that as the channel walls are spread apart, the bottom of the channel is also forced, by means of roller 36, onto the edge of the glass pane 2. The glass pane and the channel strip 4'' are fed into the machine as shown in FIG. 5, in the proper positional relationship to each other, and by the time the pane and strip have been pushed through the roller wheel assembly, the channel strip has been properly assembled to the glass pane. The same operation is then repeated for the other sides to form the complete window. If desired, conventional corner connectors may be used to pull the frame together, or alternatively, the frictional engagement between the channel and the glass may be sufficient in some cases so that no further reinforcement is necessary.

It should be noted that the invention is not limited to use with extrusions, but the frame could also be rolled as formed metal as used in automobile glazing. The entire operation shown in FIG. 5 may be part of a completely automated operation using conventional techniques, whereby the glass sheets are fed in succession one behind another and the various stages of assembly are performed until the fully completed window pane is turned out at the end of the assembly line.

While the gripping surface of the smooth plastic material has been shown as smooth, it will be apparent that it could be ribbed or otherwise slightly corrugated to produce a better holding surface.

I claim:

1. A unitary, rigid, extruded U-channel frame member for window panels and the like,
   a. said frame member having two opposed upstanding wall members spaced apart a distance to firmly grip a panel edge inserted between said wall members,
   b. at least one of the inner sides of each of said opposed wall members being permanently surfaced with a continuous layer of soft plastic material firmly attached to the side wall and providing a substantial friction and sealing surface in contact with the corresponding opposed surfaces of a panel edge inserted into the channel of said frame member,
   c. said channel wall members having spreading lugs extending, near their top edges, away from a panel inserted in said channel frame.

2. The invention according to claim 1, said lugs extending as a continuation of the channel legs but spaced away from a panel inserted into the frame to permit application and release of a mechanical spreading member.

3. The invention according to claim 2, said lugs extending axially along the length of said channel frame member and having a re-entrant portion engagable by a pair of oppositely-disposed spreading wheels to spread said channel legs as said wheels move relative to the length of said channel member from end to end.

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