Feb. 26, 1957 F. ZIMMERMANN 2,782,887

WINDOW CONSTRUCTION

Filed Feb. 9, 1952

Fig. 4

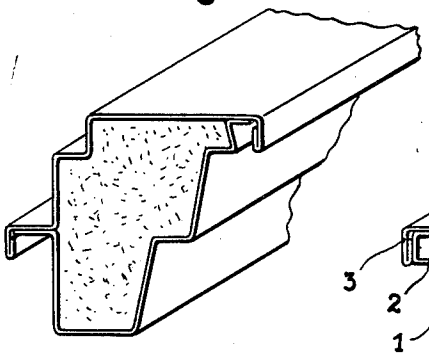


Fig. 1

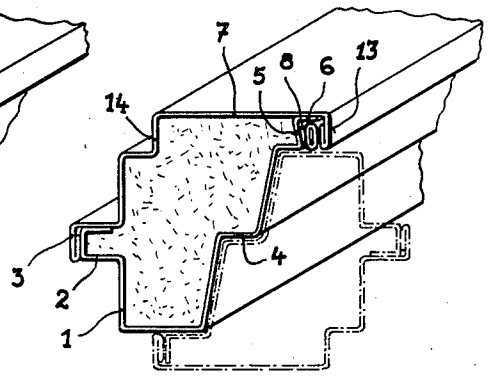


Fig. 2

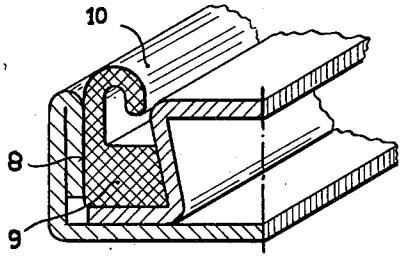
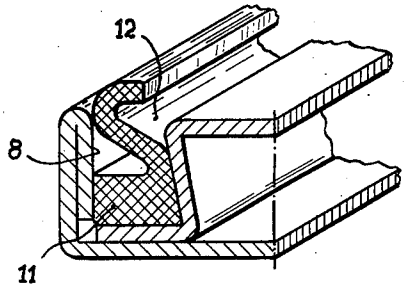


Fig. 3



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WINDOW CONSTRUCTION

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5 Claims. (Cl. 189—75)

This invention relates to improvements in window construction. It more particularly relates to a new metal construction for the frame and sash of a window.

As is known, the frames and sashes of windows are generally constructed of either metal or wood. The use of either of these construction materials has certain advantages and disadvantages.

Window frames and sashes constructed of wood have comparatively good insulating qualities and are generally free from condensation formation due to the relative temperatures between the inside and outside. These window frames and sashes constructed of wood, however, are generally not as structurally strong as frames and sashes constructed of metal. In addition, these wooden frames and sashes are not fireproof, are subject to deterioration by the weather, and often swell and warp, which causes very undesirable sticking which makes opening and closing very difficult.

Window frames and sashes which are constructed of metal are generally much stronger than those which are constructed of wood, are fire-proof and will not swell and warp, and thus generally remain easy to operate. These metal frames and sashes, however, have very poor insulating characteristics as compared with wood. They are noted for the strong tendency of condensation to form thereon, due to the temperature difference between the inside and the outside. The metal frames and sashes are generally of solid construction, which renders them rather heavy and cumbersome. If they have hollow portions, condensation tends to form in these portions, which leads to rust and deterioration. The use of the lighter, corrosion-free metals is generally very expensive and does not overcome the poor insulating qualities of the window and the tendency toward condensation formation.

One object of this invention is a new construction for window frames and casements, which will avoid the disadvantages of both former metal and wood construction and combine the advantageous features of both these constructions.

A further object of this invention is a novel method for the construction of these new window frames and sashes.

A still further object of this invention is a construction for window frames and sashes which combines the advantages and eliminates the disadvantages of the former wood and metal frames and sashes and which will provide a weather and draft-tight closure. These and still further objects will become apparent from the following description, read in conjunction with the drawing, in which:

Fig. 1 shows a perspective view of a section of a window sash in accordance with the invention for use in a casement-type window, positioned in closing contact with a window frame in accordance with the invention shown in dotted lines;

Fig. 2 shows a perspective view of a section of an embodiment of a sealing gasket in accordance with the invention;

Fig. 3 shows a perspective view of a section of another embodiment of a sealing gasket used in accordance with the invention; and

Fig. 4 shows a perspective view of a section of a different embodiment of a frame or sash for use on a casement-type window in accordance with the invention.

In accordance with the invention the window sash and/or the window frame consists of a hollow metal shell portion which contains an insulating material which has been caused to foam and entirely fill the interior of the hollow metal shell before solidifying in that condition, and binding to the metal.

The metal shell itself may have any desired constructional shape, though the thickness of the walls in relation to the hollow space to be filled with the foaming insulating material should be relatively small. The metal of the metal shell itself need only be thick enough to be structurally strong enough to withstand the use for which it is intended. The rigidity and strength of this shell portion which forms the sash or frame itself, may be increased in any known manner without increasing the thickness of the walls, as, for example, with the use of ribs or angle shapes.

The metal may, of course, be any known metal material, though it has proven advantageous from a constructional and economic point of view to use a cold rolled steel. Such steel of a thickness, for example, of about 1/32 to 3/16 of an inch has proven suitable for ordinary purposes.

The insulating material which completely fills the hollow metal frame or sash shell may be any of the known materials which can be caused to foam and which will substantially form a solidified mass in the foamed form. Examples of these materials include curable resins such as the phenol amide or amine bases; synthetic thermoplastics such as polyvinylchloride, polystyrol, cellulose acetate, polyvinylacetate and polyvinylacetale. Various rubber compounds which may be foamed can also, of course, be used. Since these compounds, capable of being foamed, are well known in the art, a more detailed description thereof is not deemed necessary. It is only necessary that this foam insulating material be capable of self-bonding to the interior metal wall of the metal shell portion. The use of polyurethane compounds formed by the polyaddition of alkyd resin with diisocyanide, and which can be produced in soft or hard condition with a specific gravity of .05 to .3 have proven particularly advantageous in accordance with the invention.

The foaming of these materials may be effected in any known or conventional manner, as, for example, by the addition of chemical foam-forming substances, mechanical agitation, heating, gas generation or introduction or any combination of the above expedients.

The foaming must be effected so that the foam-insulating material will completely fill the hollow interior of the metal frame or sash shell. This will generally result in the solid adhering of the foam material to the metal walls. If foam insulating materials are used which will not be self-bonding to the interior of the metal shell even when formed under pressure, it is, of course, possible to add a binding agent to make this material self-bonding. The use of such an adhesive binding agent is, however, generally not required. Since the foam material will be self-adhering to the metal walls, the internal condensation, sweating and internal corrosion is positively prevented.

It is generally preferable to effect the foaming under pressure to insure that all the space within the metal shell will be completely filled and that the material will adhere to the walls. This foaming under pressure may, of course, be effected on sections of the frame or sash prior to complete assembly. According to the preferred mode of oper-

ation, however, the entire frame or sash is completed with the foam insulating material completely enclosed in the hollow spaces. Then the foaming is effected, and since the space in which it can occur is confined by the metal shell, it occurs under pressure, completely filling the shell with the insulating material and leaving no hollow spaces.

Thus, for example, the hollow metal shell which forms the structural portion of the frame or sash is made in two parts which are joined together to form the hollow shell. Prior to the joining together of these parts, the foam substance is inserted. After the joining the material is caused to foam, as, for example, by shaking, heating or the use of chemicals with delayed action. The foaming will not occur, therefore, until the entire hollow shell is formed and there is a completely closed hollow space. It is, of course, also possible to make the complete straight sections, as, for example, which form the tops, sides and bottoms of the frame or sash, and insert the foam material into these sections before joining them into the entire frame or sash, and then causing the foam formation. The foam formation may also be effected in the straight sections prior to assembly and may be effected under pressure in these sections with a suitable closure for the ends or the like.

It is preferable that the frames or sashes, in accordance with the invention, and especially casement frames or sashes, be provided with a weather strip or gasket made of gum rubber or similar material. This strip should be positioned for sealing contact with a corresponding portion of another sash or of a frame to provide a weather and draft-tight and water-tight seal from the outside. The strip or gasket is advantageously positioned with a base portion which may be dove-tailed in a recess in the frame or sash. A thinner sealing portion extending as a rib with a hook or goose neck cross-section, for example, provides the sealing element.

The invention will be explained in further detail with reference to the embodiments shown in the drawing. The window sash from which the section shown in Fig. 1 is taken, has the over-all shape of any conventional casement window sash. The over-all shape is thus rectangular. The metal shell portion is made up of an approximately U-shaped lower portion 1 and a cover portion 7. The two portions are joined at 6 and 3. The hollow interior formed by the metal shell composed of these two sections is completely enclosed and runs completely around the over-all rectangular shape of the sash itself. The lower, substantially U-shaped portion 1 is provided with the hook-shaped ledge 2. The upper cover portion 7 is provided with the flanged and beaded rim 3. Part 1 and part 7 are joined at portions 2 and 3, respectively. The projection, defined by portions 2 and 3, provides the ledge to which the window pane is attached in the usual manner, as, for example, by putty or the like. The upper portion 7 has the beaded end 13 turned over at a right angle. The lower U-shaped portion 1, has the substantially Z-shaped edge 5, which is joined by its flat portion 6 to the upper member 7 near 13 and defines with the member 13 the dove-tailed recess 8.

The two portions 1 and 7 are joined at their points of contact in any known manner, as, for example, by welding, soldering, or the like.

The window-supporting ledge 2 is preferably positioned at or near the center of the assembled sash so that the entire sash may be used for right or left-hand installation. The side of the sash opposite the side with the window-pane supporting ledge, preferably has a terrace profile, as is defined by the step 4. This adds to the rigidity and structural strength of the sash and acts as a weather seal. The dotted portions shown in the lower portion of Fig. 1 is a corresponding mating sash in a casement window, or the frame of the casement window. It will be noted that this corresponding frame or sash also has a step 4 and together the two parts form the weather and draft seal.

The step 4, similar to the ledge 2, is centrally positioned to allow for either right or left-hand installation. In the dove-tailed recess portion 8, defined by the portion 13 of the part 7 and the side 5 of the part 1, a weather strip or gasket is positioned. This weather strip will come in weather-sealing contact with the corresponding sash or frame as shown in the dotted portion of Fig. 1. The structure of this seal or gasket is shown in Figs. 2 and 3. In Fig. 2 it has a dove-tailed shaped base portion 9 which is anchored in the dove-tailed recess 8 and a thinner flexible sealing portion with a hooked cross-section 10. As shown in Fig. 3, the sealing gasket or weather strip has the base 11 which is anchored in the dove-tailed recess 8 and the flexible sealing portion 12, which has a goose-neck cross-section. The sealing rims 10 or 12 with the hooked or goose-neck cross-section will flexibly and resiliently come into sealing contact with the flat section of the corresponding sash or frame. The particular shapes of the weather strip or gasket as shown, will prevent buckling and jamming and insure an excellent seal.

The angle portion 14 in the metal shell adds structural strength and rigidity. Instead of the window-supporting ledge having the form shown in Fig. 1, it may be constructed as shown in Fig. 4.

The entire hollow space within the metal shell, defined by the parts 1 and 7, is completely filled with the foam insulating material which adheres to the inner walls of the metal shell.

The foam material is preferably inserted by placing it in, for example, the portion 1 prior to putting on the cover portion 7. Thereafter, the cover portion 7 is secured in place and the hollow space is completely enclosed. At this time the material is caused to foam, as, for example, by heating, shaking, or the like. The material will foam under pressure and completely fill the space and all the crevices that adhere to the walls.

The new sash frame construction in accordance with the invention, has the rigidity, strength, freedom from warping and swelling and all the other desirable constructional advantages of a metal frame or sash. At the same time, its heat and sound-insulating characteristics are superior to those of wood. The new frames and sashes will not sweat and have no tendency toward condensation formation. Internal corrosion will not take place, due to the internal adhering of the foam insulating material. In addition to giving the hollow metal frame or sash all the desirable characteristics of a metal and wood frame, while eliminating the undesirable characteristics of both, the foam insulating material also increases the rigidity and strength of the section.

Though the new frames and sashes have been described with reference to casement-type windows, they are, of course, not limited thereto. It is, of course, obvious that certain changes and embodiments may be made without departing from the spirit of the invention. The description and the drawings is therefore intended to be illustrative and not limitative.

I claim:

1. A new construction for window frames and sashes comprising a structural hollow metal shell having a terraced profile on at least one side thereof and a window supporting ledge extending from the opposite side thereof, said shell containing a foam insulating material foamed to substantially completely fill the interior thereof and self-bond to the metal shell.

2. Construction according to claim 1 in which said metal shell defines a recess extending along the edge of said terraced side, said recess containing a resilient weather strip.

3. Construction according to claim 2 in which said weather strip has a base portion positioned in said recess and a resilient bent sealing rib extending from said base portion.

4. Construction according to claim 3 in which said recess is a dovetailed recess and said weather strip base

portion is dimensioned to fit said dovetailed recessed portion.

5. Construction according to claim 4 in which said metal shell consists of a substantially U-shaped terraced portion and a cover portion with an angled rib, said U-shaped portion and said cover portion being joined at said window pane supporting ledge and portion defining said recessed groove.

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