FRAME CONSTRUCTION FOR A DOOR OR WINDOW

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This invention relates generally to a frame construction for a door or window, and more particularly to a sweat-free door construction especially adapted for use in a refrigerated beverage cooler.

It is an important object to achieve a door construction that can be utilized in refrigerated coolers, and which will remain dry at all times even under conditions where there is a considerable difference between the inside and outside cooler temperatures. In other words, the door of such cooler will not "sweat."

An important objective is to provide an external frame made of plastic material, a rigid frame made of metal which is disposed internally of the plastic external frame, and means fastening the plastic and metal frames together in a manner such that any load on the plastic frame is transmitted by engagement directly to and is borne by the internal metal frame.

Another important object is attained by the structural arrangement in which the external frame is made of a plurality of extruded plastic members arranged in end to end abutment, such plastic members having longitudinal internal slots that are in register at the abutting ends, and in which metal means are received in the registered slots at the abutting ends and are interconnected to metal strips received in the slots and extending between the ends of the plastic members to form a continuous rigid internal metal frame.

Still another important object is afforded in that the plastic members include portions that closely embrace the elongate metal strips and the interconnecting metal means at the abutting ends so that any load on the external frame formed by the plastic members is transmitted by engagement directly to the rigid internal metal frame rather than by the fastening means interconnecting the plastic members to the internal metal frame, and thereby preclude any damage either to the plastic members or to the connection of the fastening means with the plastic members. An important object is realized by the provision of mitered ends on the plastic members to form corners between adjacent abutting members, and by using a metal angle plate at each corner, the angle plate having arms located in the registered slots and operatively connected to the metal strips of adjacent plastic members. The metal strips extend between and connect the metal corner angles to form a unitary, rigid internal metal frame that is disposed completely within and contained by the extruded external plastic members.

An important object is achieved in that the arms of the metal corner angle overlap the associated metal strips of adjacent plastic members, and that the fastening means secures these overlapping metal parts to the plastic members.

Yet another important objective is to provide a frame construction that is simple and durable, economical to manufacture and assemble, and highly efficient in providing a sweat-free characteristic.

The foregoing and numerous other objects and advantages of the invention will more clearly appear from the following detailed description of a preferred embodiment, particularly when considered in connection with the accompanying drawings, in which:

FIG. 1 is a front elevational view of the frame construction utilized in a door or window;

FIG. 2 is an enlarged, fragmentary cross sectional view as seen along line 2—2 of FIG. 1;

FIG. 3 is a fragmentary, side elevational view of one end of one plastic member with the associated metal angle plates and metal strips attached, and

FIG. 4 is a side elevational view as seen from the left of FIG. 3.

Requiring now by characters of reference to the drawings, and first to FIG. 1, it will be understood that the frame construction can be advantageously utilized in either a door or a window. In the preferred embodiment illustrated, the frame construction is used in a sliding door having a window, such door being especially adapted in the front closure of a refrigerated beverage cooler. As will be explained, this frame construction provides a door that is sweat-free.

The frame construction includes a plurality of elongate, extruded plastic members 10 arranged in end to end abutment to provide an endless external frame generally indicated by 11. The opposite ends 12 and 13 of each plastic member 10 are mitered to provide corners between adjacent plastic members. In the preferred embodiment of FIG. 1, there are a total of four elongate plastic members 10 positioned to form a substantially rectangular door frame. Therefore, there is a plastic member 10 at the top, the bottom, and at each side.

Each plastic member 10 is substantially hollow and is substantially square in configuration having a front wall 14, a rear wall 15, a side wall 16 and an inner wall 17. The front wall 14 is provided with an integral flange 20 projecting inwardly beyond the inner wall 17.

The window carried by the external plastic frame 11 includes three panes of glass 21, 22 and 23 with their peripheral edges closely adjacent the inside wall 17. Glass pane 21 is located contiguous to the inside surface of flange 20. The glass panes 21—23 are maintained in spaced relationship by a pair of extruded spacers 24 and 25, such spacers being located within the confines defined by flange 20 and immediately adjacent the inside wall 17.

The spacer 24 is disposed between glass panes 21 and 22, while the spacer 25 is located between the glass panes 22 and 23. These spacers 24 and 25 provide intervening air spaces between the glass panes which afford insulative qualities to the window structure. The innermost glass pane 23 is secured in place by an overlapping aluminum strip 26 which is secured in place to the plastic members 10 constituting the external plastic frame 11 by a plurality of screws 27 extending through the strip 26 and into the rear wall 15 of such plastic members 10.

The endless spacers 24 and 25, each consists of a tubular casing constructed of elastomeric vinyl which is substantially rectangular in cross section. This casing is filled with a granular desiccant 30 adapted to absorb moisture that might form between the glass panes.

Each extruded plastic member 10 is formed internally with a pair of spaced partitions 31 and 32 extending lengthwise between the ends 12 and 13 substantially parallel to the front wall 14. The plastic member 10 includes inwardly projecting portions 33 that cooperate with the partition 31 to form an internal, longitudinal narrow slot 34. The other partition 32 cooperates with the rear wall 15 to provide another longitudinal narrow slot 35. The partitions 31 and 32 have an air chamber therebetween which enhances the insulative characteristics of the external extruded plastic frame 11. The longitudinal narrow slots 34 and 35 of adjacent plastic members 10 are in register respectively at the abutting corners.

At each corner of abutting adjacent plastic members 10, there are provided a pair of metal angle plates 36 and 37. The arms of the angle plate 36 are received in the registered slots 34 while the arms of the other metal angle plate 37 are received in the registered slots 35.
Disposed in and extending substantially the length of narrow slot 34 and 12, each plastic member 10 is a metal strip 40. A similar metal strip 41 is disposed in the other narrow slot 35 and extends longitudinally substantially between the ends 12 and 13. The metal strips 40 and 41 retained within each plastic member 10 overlap the arms of the associated metal angle plates 36 and 37 received respectively in the same slots 34 and 35 at opposite ends 12 and 13 of the plastic member 10.

Fastening means interconnect each end 12 and 13 of each plastic member 10 to the overlapping metal strips 40-41 and metal angle plates 36-37. More specifically, at each of these ends 12 or 13, a metal screw 42 is threadedly connected to and passed through the rear wall 15 of the plastic member 10, the screw 42 threadedly passing through and extending between the internal partitions 31 and 32. It will be noted that the end of screw 42 does not pass through the front wall 14 of the plastic member, but is disposed internally of such member in the space provided between the front wall 14 and the inwardly projecting partitions 33 at one side of the longitudinal narrow slot 34. Importantly, the screw 42 passes through the longitudinal narrow slots 34 and 35, and consequently secures together rigidly the overlapping metal strip 40 and the metal angle plate 36, and secures together the overlapping metal strip 41 and the metal angle plate 37.

The metal strips 40 extending between and effectively interconnecting the corner angle plates 36 at the opposite ends 12 and 13 of each plastic member 10 form a continuous metal part internally of the external extruded plastic frame 11. Similarly, the metal strips 41 extending between and effectively secures to the angle plates 37 at opposite corners of each plastic member 10 form another continuous rigid metal part. The screws 42 rigidly interconnect both of these continuous metal parts to form a rigid, endless metal frame completely within the external extruded plastic frame 11.

The elongate slots 34 and 35 of each plastic member 10 are formed by partitions 31 and 32 and other portions of the extruded member which closely embrace the associated metal strips 40 and 41 and the associated metal angle plates 36 and 37 respectively so that any load placed on the external plastic frame 11, as by the weight of the window structure contained within the external frame 11, is transmitted directly by bearing engagement to the metal strips 40 and 41 and to the metal angle plates 36 and 37. This load is not transmitted from the external plastic frame 11 to the internal metal frame 43 by the screws 42.

The metal strips 40 and 41 inside of each plastic member 10 interconnect the metal angle plates 36 and 37 at the corners to provide a rigid, and continuous metal frame. If these elongate metal strips 40 and 41 were omitted, the load carried by the external plastic frame 11 would be transmitted to the metal angle plates 36 and 37 solely by the screws 42. Because the plastic material forming the plastic members 10 is inherently softer and weaker than metal, the screw connection between the plastic members 10 and the metal angle plates 36 and 37 could be easily damaged and cause damage to the plastic material of such members. Because of the provision in the present embodiment of a continuous metal frame 43 within the extruded plastic external frame 11, the load is carried by the metal frame and not by the external plastic frame in a manner such that there is no likelihood of damaging the connection between the screws 42 and the extruded plastic members 10.

It is thought the functional advantages of the frame construction have become fully apparent from the foregoing detailed description of parts, but for completeness of disclosure, the assembly will be briefly described.

First, in each of the plastic members 10 the metal strips 40 and 41 are inserted into their appropriate longitudinal slots 34 and 35 respectively. The metal strips 40 and 41 extend substantially the length of the plastic member 10 between its ends 12 and 13.

Then, the pair of metal angle plates 36 and 37 are installed at the end 12, as is illustrated in FIGS. 3 and 4. One arm of each angle plate 36 and 37 is inserted into its appropriate slot 34 or 35 respectively so that such arm overlaps and lies contiguous to the metal strip 40 or 41 located in the same slot. The other arm of each metal angle plate 36 and 37 is inserted into its appropriate slot 34 or 35 of the next adjacent plastic member 10 in exactly the same manner. In this way, the plastic members 10 are located in end to end abutment to form the endless frame 11 shown in FIG. 2.

When the external plastic frame 11 and the internal metal frame 43 are completely arranged, they are effectively interconnected by the location and insertion of screws 42. Each screw 42 extends through the rear wall 15, through the overlapping metal strip 41 and metal angle plate 37 in the slot 35, extends through the partition 32, extends through the other partition 31, and extends through the overlapping metal strip 40 and metal angle plate 36 in the other slot 34. As explained previously, these screws 42 secure the overlapping metal strips and angle plates to the plastic members 10, and secure the overlapping metal strips and angle plates together to form a rigid internal metal frame 11.

The window assembly is then installed as is illustrated in FIG. 2. To hold the window assembly, the aluminum strips 26 are secured to the plastic members 10 and overlap the rear peripheral margin of the window assembly.

With this structure, the plastic members 10 are rigidly secured together to provide the external plastic frame 11, and the metal strips and metal angle plates are retained within the external plastic frame 11 and are secured together to form a rigid internal metal frame 43. Because of the close fit of the metal strips and metal angle plates within their associated slots in the plastic members, these plastic members transmit any load by bearing engagement directly to the rigid internal metal frame 11. Such load is not transmitted by the plastic members to the internal metal frame 11 through the screws 42. Consequently, there is no possibility that the connection provided by the screws 42 will cause any damage to the inherently softer material comprising the plastic members 10.

When this door is utilized in a refrigerated beverage cooler, the frame construction and the window assembly carried by the frame construction will provide the formation of any moisture condensation as a result of temperature differential between the inside and outside of such cooler. The door construction will be sweat-free.

Although the invention has been described by making detailed reference to a single preferred embodiment, such detail is to be understood in an instructive, rather than in any restrictive sense, many variants being possible within the scope of the claims hereunto appended.

I claim as my invention:
1. In a frame construction for a door or window:
   (a) an endless external frame made of members arranged in end to end abutment,
   (b) the said members being provided with longitudinal internal slots which are in register at their abutting ends,
   (c) a strip received in and extending through the slot of each said member,
   (d) reinforcing means at the abutting ends of each adjacent pair of members, the reinforcing means being received in the registered slots and interconnecting the strips therein, and
   (e) means fastening each said member and its associated reinforcing means and strip together at each end of the said member to form a rigid internal frame,
(f) the reinforcing means and strips constituting the internal frame being closely embraced by portions of the said members so that any load on the said members is transmitted directly to the rigid internal frame by bearing engagement between the said members and the rigid internal frame rather than by the means fastening the said members to the internal frame.

2. In a frame construction for a door or window:
   (a) a plurality of extruded plastic members positioned end to end to provide an endless external frame, the plastic members having their ends mitered to provide corners between adjacent plastic members,
   (b) each plastic member being provided with an elongate slot therein extending longitudinally, the slots of adjacent plastic members being in register at their corners,
   (c) a metal angle plate at each corner, the angle plate having arms located in the registered slots of adjacent plastic members,
   (d) a metal strip disposed in the slot of each plastic member and connected securely to the arms of the angle plates at the ends of the plastic member to form a rigid, continuous internal metal frame.

3. In a frame construction for a door or window:
   (a) a plurality of extruded plastic members positioned end to end to provide an endless external frame, the plastic members having their ends mitered to provide corners between adjacent plastic members,
   (b) each plastic member being provided with an elongate slot therein extending longitudinally, the slots of adjacent plastic members being in register at their corners,
   (c) a metal angle plate at each corner, the angle plate having arms located in the registered slots of adjacent plastic members,
   (d) a metal strip disposed in the slot of each plastic member and extending between and overlapping the angle plates at opposite ends of each plastic member, and
   (e) means fastening each plastic member, the associated angle plate and overlapping strip together at each end of the plastic member, the angle plates and overlapping strips together forming a continuous internal metal frame.

4. A frame construction as defined in claim 3, in which:
   (f) the plastic members closely embrace and engage the metal strips and angle metal plates so that any load on the plastic members is transmitted directly to the rigid internal metal frame by bearing engagement between the plastic members and the rigid internal metal frame rather than by the means fastening the plastic members and such metal frame.

5. In a frame construction for a door or window:
   (a) a plurality of extruded plastic members positioned end to end to provide an endless external frame, the plastic members having their ends mitered to provide corners between adjacent plastic members,
   (b) each plastic member including internal portions providing an elongate slot extending longitudinally, the slots of adjacent plastic members being in register at their corners,
   (c) a metal angle plate at each corner, the angle plate having arms located in the registered slots,
   (d) a metal strip received in each slot and overlapping the associated arms of the angle plates at the opposite ends of each plastic member, and
   (e) means fastening the ends of each plastic member to the associated overlapping metal strip and metal angle plate arms to form a continuous rigid internal metal frame,
   (f) the plastic members including the internal portions closely embracing and engaging the metal strips and metal angle plates so that any load is transmitted directly to the rigid internal metal frame by bearing engagement between the plastic members and the rigid internal metal frame rather than by the fastening means interconnecting the plastic members and metal frame.

6. In a frame construction for a door or window:
   (a) a plurality of extruded plastic members positioned end to end to provide an endless external frame,
   (b) each plastic member having an outer wall and being substantially hollow with at least one transverse partition extending lengthwise substantially parallel to and spaced from the outer wall, the partition and wall providing an elongate slot therebetween extending end to end of the plastic member, the slots of adjacent plastic members being in register at their corners,
   (c) a metal angle plate at each corner, the angle plate having arms received in the registered slots,
   (d) a metal strip received in each slot and overlapping the associated arms of the angle plates at the opposite ends of each plastic member, and
   (e) fastening means connecting the wall and partition at the ends of each plastic member to the overlapping metal strip and metal angle plate arms to form a rigid and continuous internal metal frame.
   (f) the plastic members including their partitions closely embracing and engaging the metal strips and metal angle plates so that any load is transmitted directly to the rigid internal metal frame by bearing engagement between the plastic members and the rigid internal metal frame rather than by the fastening means interconnecting the plastic members and such metal frame.

7. A frame construction as defined in claim 6, in which:
   (g) the fastening means comprises a screw threadedly interconnecting and extending between the outer wall and internal partition at each end of each plastic member, said screw extending through and operatively interconnecting the overlapping metal strip and arm of the metal angle plate, the load on the external plastic frame being transmitted and directed by bearing engagement to the rigid internal metal frame rather than being transmitted by the screw to said metal frame.

8. In a frame construction for a door or window:
   (a) a plurality of extruded plastic members positioned end to end to provide an endless external frame, the plastic members having their ends mitered to provide corners between adjacent plastic members,
   (b) the plastic members being substantially hollow with internal portions providing a pair of spaced elongate slots extending lengthwise, the slots being in register respectively at the abutting ends,
   (c) a pair of metal angle plates at each corner, each angle plate having arms received in registered slots of abutting plastic members,
   (d) a metal strip received in and extending through each slot of each plastic member, each metal strip overlapping the associated arms of the angle plates at the opposite ends of each plastic member,
   (e) fastening means securing the ends of each plastic member to the associated overlapping metal strips and metal angle plate arms to form a rigid and continuous internal metal frame, and
   (f) the plastic members including the internal portions closely embrace the metal strips and metal angle plates so that any load is transmitted by engagement directly to the rigid internal metal frame rather than by the fastening means to such metal frame.

9. In a frame construction for a door or window:
   (a) a plurality of extruded plastic members positioned end to end to provide an endless external frame, the plastic members having their ends mitered to provide corners between adjacent plastic members,
(b) the plastic members being substantially hollow, each plastic member having an outer wall,
(c) each plastic member including a pair of spaced partitions extending lengthwise substantially parallel to each other and to the outer wall of the plastic member and providing a pair of spaced elongate slots, the slots being in register at the abutting ends,
(d) a pair of metal angle plates at each corner, each angle plate having arms received in registered slots of abutting adjacent plastic members,
(e) a metal strip received in and extending through each slot of each plastic member, each metal strip received in each slot overlapping the associated arms of the angle plates at the opposite ends of each plastic member,
(f) a plurality of screws, at least one screw threadedly engaging and interconnecting the outer wall of each plastic member at each end with the pair of spaced internal partitions, the screw extending through and interconnecting the overlapping metal strips and the associated arms of the pair of metal angle plates at each corner to provide the rigid internal metal frame, and
(g) the plastic members including the pair of spaced partitions closely embrace the metal strips and metal angle plates so that any load is transmitted by engagement directly to the rigid internal metal frame rather than by the fastening means to such metal frame.

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