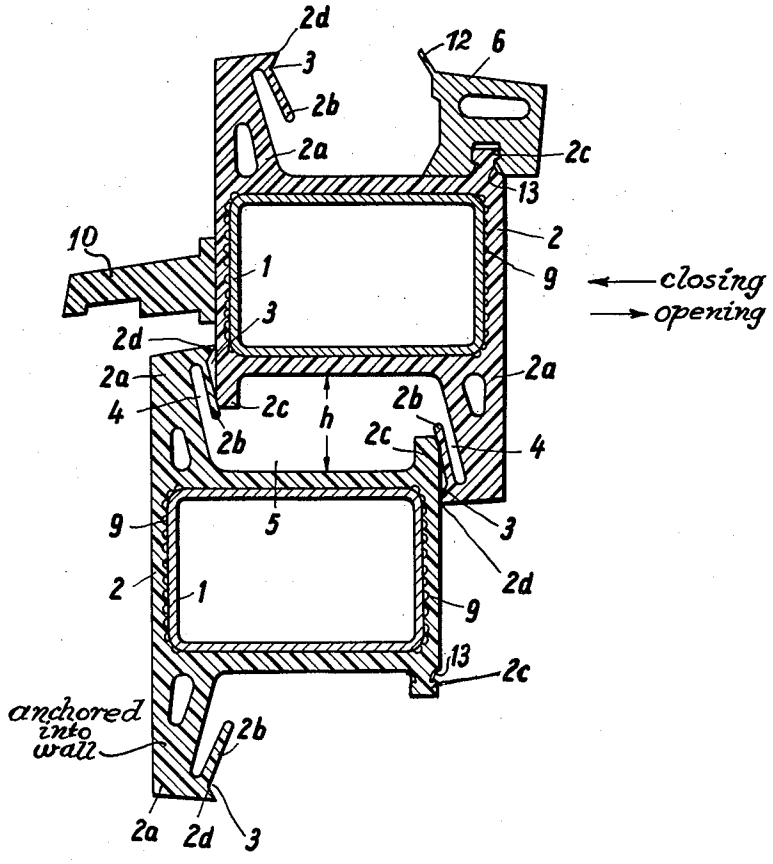
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WINDOW AND DOOR STRUCTURAL ELEMENT

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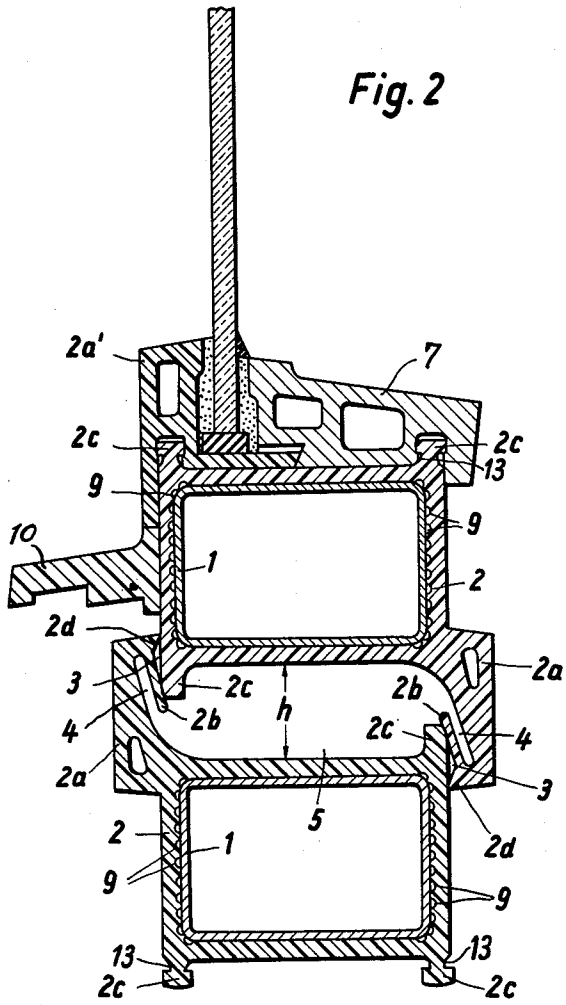
Fig. 1



WINDOW AND DOOR STRUCTURAL ELEMENT

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Fig. 2

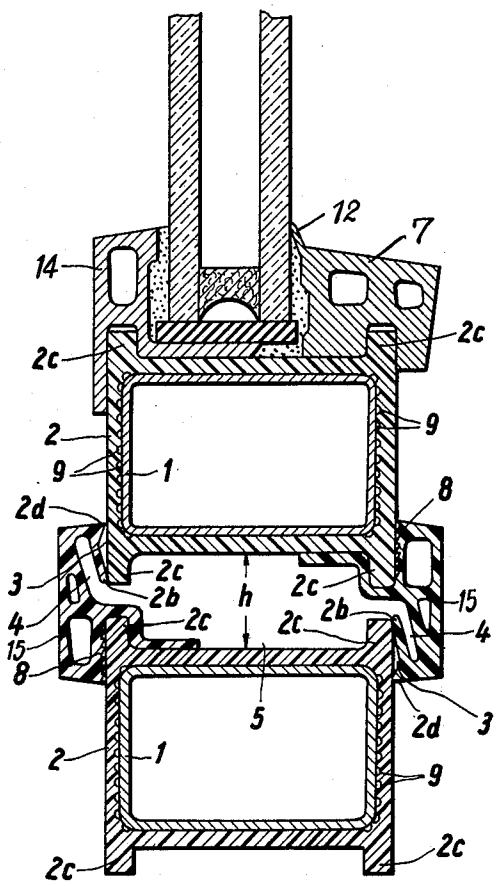


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Fig. 3



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WINDOW AND DOOR STRUCTURAL ELEMENT

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5 Claims. (Cl. 189—75)

The invention relates to an improved frame construction for windows, doors and the like, and particularly is directed to a structural member consisting of a tubular metallic member of rectangular section covered with a sheathing of extruded thermoplastic synthetic material. The structural member is particularly intended for windows and doors, and the sheathing is provided with projecting parts likewise formed of thermoplastic material which serve as stops for the structural member of another window or door or for stops on a fixed frame member.

A similar structural member is known, for example, from the German Patent No. 894,316. This known structure, however, is circular or oval in cross-section, but structural members having a rectangular section are known in which between the edge faces of two moving sashes or between a moving sash and a fixed window frame which face one another in the closed condition a gap must be left in order that the window or the door formed from such a member can be closed or opened. This intermediate space is desirable since it forms a frame-like insulating space which is filled with air.

It will be understood that with such windows or doors (hereinafter referred to merely as windows) the projecting parts of thermoplastic synthetic material provide the closure pressure and, owing to the inherent elasticity of the thermoplastic synthetic material, these parts provide also the sealing pressure. The projections must therefore be of suitable stiffness to insure the sealing effect of said insulating intermediate space.

In the said prior patent specification the projections are therefore formed in the form of ribs so that additional air columns are produced which act for insulating purposes and simultaneously seal off the gap between the moving members or between one of such members and a frame.

These known structural members are, however, incomplete in so far as they do not take into account the necessary tolerances in the extrusion of ribs of synthetic material required for obtaining satisfactory sealing.

In order to be able to fasten glazing strips to windows satisfactorily under difficult working conditions on buildings, and to be able to retain large and heavy insulating glazed elements satisfactorily with the required safety, additional metal strips are necessary which are attached by screws or must be fastened with springs and then attached by screws into position. The provision of threaded holes, however, requires the making of openings in the closed tubular sheathing of synthetic material so that moisture and water can penetrate into the tubular structural member and can cause corrosion at these points. The glazing work is therefore very costly.

It should also be observed that a great number of different structural members is necessary in order to be able to produce all types of windows. Finally, condensation on the inner faces of movable frames, especially with large temperature differences between the outside and the inside, cannot be reliably avoided.

In order to overcome these disadvantages, it is an object of the invention to make certain that the ribs on the tubular sheathing terminate in resilient and relatively sharp edges, and that the thinner ribs extend in the opposite direction of the heavier ribs so that a chamber will be formed when said ribs cooperate and engage or

a wall of an adjacent member is engaged to form suction-like air columns.

These air columns seal the insulating air space between two moving members or between a moving member and the frame and discourage the retention of water, mortar or dirt. Also, the closing operation of the window sash is facilitated since a suitably rounded corner member provided on the window frame will position the ribs in sliding engagement under tension.

A further advantage of the present invention lies in the fact that owing to the suction-like action of the ends of the ribs the latter themselves can be constructed much heavier than is possible with the ribs on the known structural members so that the ribs according to the invention can serve also as a reliable stop for the pane of glass to be mounted in the window sash.

The ribs may be made integral with the tubular sheathing or may be separately attached and fitted to the corner ribs of the tubular sheathing. For this purpose the separate ribs are provided with grooves which are conveniently provide internally with barb-like members. The upper edges of the corner ribs of the sheathing may also be thickened or provided with lateral ribs in order to produce push-on fastening means for the separate ribs at the corner ribs. If corner ribs are provided at all four corners of the tubular sheathing, all types of window sashes may be produced with such a basic structural member.

Moreover, corner ribs have the advantage that they serve for the desired enlargement of the intermediate air space between the structural members with the result that the ribs do not have to be made unnecessarily long.

Also, the corner ribs discourage the passage of water into the intermediate air space and into the inside of the room. Furthermore, it is of advantage that the corner ribs can serve for the attachment of glass panes and other members.

The sheathing does not have to engage the entire surface area of the metallic tube. It has been found that by producing grooves or other recesses in the inner wall of the sheathing, an air insulating layer can be formed which prevents condensation on the inner side of the window sash when greater temperature differences are encountered.

The drawing illustrates by way of example sectional views of a few embodiments of the structural member of the invention which form portions of closed windows.

In the drawings:

FIG. 1 is a vertical cross-sectional view of the lower portion of a closed window comprising a window sash, in which one corner of the upper rectangular structural member is provided with a separately attached glazing strip which is mounted on an outwardly extending rib of the thermoplastic synthetic sheathing on the inner metallic tube, while the lower rectangular structural member forms a portion of the window frame mounted in the wall of the building;

FIG. 2 is a vertical cross-sectional view of another embodiment of two abutting portions of a closed window in which both upper corners of the rectangular structural member of the sash are provided with upwardly projecting ribs for receiving separate push-on glazing strips, and

FIG. 3 is a vertical cross-sectional view of still another embodiment of two abutting portions of a closed window in which all four corners of the rectangular structural members of the sash and window frame are provided with outwardly extending ribs for receiving separate push-on glazing or sealing strips and for being mounted in the masonry of the building, respectively.

Referring to the drawings, the structural members forming a window sash and window frame, respectively, consist of a metallic supporting tube 1 of rectangular cross-

section provided with a tubular sheathing or covering 2 of thermoplastic synthetic material, for example polyvinyl chloride. The coverings as shown in FIGURES 1 and 2 are provided on at least one corner of each with outwardly directed ribs 2*a* which terminate in reverse portions forming thin ribs 2*b* which extend in a direction toward the coverings 2. In the closed position of the window a chamber 5 having the vertical dimension *h* is formed between the two adjacent structural members.

In the FIGS. 1 and 2 the ribs 2*a* are formed integral with the corners of the coverings 2. In FIG. 1 the coverings 2 are each provided with two corner ribs 2*c* and in FIG. 2 with three corner ribs 2*c*. FIG. 3 shows four corner ribs 2*c* on each covering 2.

According to the invention the free ends of the ribs 2*a* extend in a direction toward the vertical plane of the window, and thin ribs 2*b* extend from the vicinity of the free ends toward the coverings 2 and almost parallel to the ribs 2*a*. In the closed condition of the window sash the thin ribs 2*b* of one sash of the moving and the stationary window sashes cooperate and engage with the heavier ribs 2*c* of the other of the stationary and moving window sashes, for which purpose the sides of the corner ribs 2*c* facing the ribs 2*b* are rounded. Furthermore, the ribs 2*a* terminate at one edge of their free ends in relatively sharp edge portions 2*d* which, together with the thin ribs 2*b*, form peripherally extending sealing suction chambers 3 having a substantially triangular cross-section. The lower horizontal structural member of the sash has attached thereto or integrally formed therewith a window drip strip 10.

In a preferred embodiment of the invention the ribs 2*a* extend so far toward the plane of the window at their free ends that chambers 4 are formed between them and the inwardly extending thin ribs 2*b*. These chambers 4 enlarge the chambers 5 between the two abutting structural members and ensure that the ribs 2*a* need not be made excessively long for the purpose of obtaining a suitably large distance *h* so that a distortion of the ribs 2*a* as a result of the relatively large linear coefficient of expansion of the thermoplastic synthetic material is prevented.

Due to the suction action of the chambers 3, ribs such as 2*a* may also serve as elements of the glazing arrangement of the window sashes. In FIGURES 1 and 2 glazing strips 6 and 7 are additionally provided on the corners opposite the rib 2*a* and strip 2*a'*, respectively, and each glazing strip is attached separately to one of the corner ribs 2*c*, said ribs 2*c* being provided with longitudinally extending grooves as at 13 to form a bead.

The glazing strips 6 and 7 (and also 14 in FIG. 3) may consist of metal, such as aluminum or stainless steel and, as shown, strips 6 and 7 may be provided with a thin flexible lip 12 which engages the window pane and covers the glazing cement. These metal strips have the advantage that the metallic appearance of the outside and of the windows desired by some architects can be carried out in practice since between the attached glazing strips and the metallic supporting tubes 1 the thermoplastic synthetic sheathing 2 is arranged to serve as an insulating body. As a result any heat transmission which otherwise would be unavoidable with all metallic sashes is eliminated.

In the embodiment shown in FIG. 2 one of the ribs 2*c* on the tubular covering 2 is provided with a separately attached strip 2*a'* consisting, for example, of a harder thermoplastic synthetic material which may be desirable as a support for the glass pane.

FIG. 3 shows structural members 2 having vertically extending ribs 2*c* on each of the four corners and all these ribs 2*c* on the tubular covering 2 are of such a form as to receive push-on strips 14 and 15 similar to the push-on strips 2*a'* in FIGURE 2. The strips 14 and 15 provide strips related to the elements 2*a* and 2*a'* in FIGURES 1 and 2. Strips 15 serve as sealing strips which engage the ribs 2*c* while the strips 14 serve as glazing strips. In order to provide a firm seating for the strips 15 on the corner ribs 2*c*, one may provide barb-shaped ridges 8 (see FIG. 3) on the walls of the grooves in the attached strips 15. Also, as shown in FIGS. 1 and 2, the outermost ends of some of the ribs 2*c* may be formed so that a bead or the like is provided thereon in order that the strips 6 (FIG. 1) or 2*a'* (FIG. 2) may be joined to the corner ribs 2*c* by push-on pressure.

Grooves are shown at 9 which are provided for forming an air layer within the structural members. This air layer discourages the forming of condensation on the interior of the structural members between the tube 1 and the sheathing when the temperature differences between the inside and the outside are substantial.

What I claim is:

1. A structural member for making the frame structures of closure members such as windows and doors, comprising a tubular metallic member of rectangular section, a unitary extruded tubular sheathing of synthetic thermoplastic material covering said metallic member, said sheathing being provided with opposed side walls, oppositely extending ribs on said sheathing in substantially the same plane as said side walls, certain of said ribs being of increased width to project a greater distance beyond said side walls than other of said ribs, relatively thin sealing ribs formed on the outer ends of said ribs of increased width extending in a direction opposite to the direction of said rib of increased width and directed inwardly toward the sheathing, said relatively thin ribs being adapted to contactually engage one of the other of said oppositely extending ribs on an adjacent structural member, said other ribs and said ribs of increased width of adjacent structural members being adapted to cooperate when the structural members are used for window and window frame structures to form an air chamber enclosed by walls connecting said side walls and the interengaging ribs, each of said certain ribs of increased width being provided on a portion of its free end with a sharp edge which projects at an obtuse angle and cooperates with the adjacent surface of the relatively thin sealing rib to form a longitudinal recess, whereby when a rib of increased width is engaged by one of said other oppositely extending ribs of an adjacent structural member a sealing suction chamber will be formed in said recess and effectively seal the joint therebetween by an insulating air space.

2. A structural member as set forth in claim 1 in which at least one of said other ribs is provided with a rounded surface adapted to be engaged by a cooperating thin rib.

3. A structural member as set forth in claim 1 in which at least some of said other ribs on said sheathing are provided with beaded corner portions for being received in correspondingly shaped slots in separate glazing strips.

4. A structural member as set forth in claim 1 in which said thin ribs are arranged in substantially parallel spaced relationship to said ribs of increased width on said sheathing to form chambers therebetween when a thin rib is engaged by one of said other ribs of an adjacent structural member.

5. A structural member as set forth in claim 1 in which at least two walls of said rectangular sheathing facing said tubular metallic member are provided with recesses.

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