Feb. 11, 1941. A. J. DANIELS 2,231,528

GLAZING CONSTRUCTION

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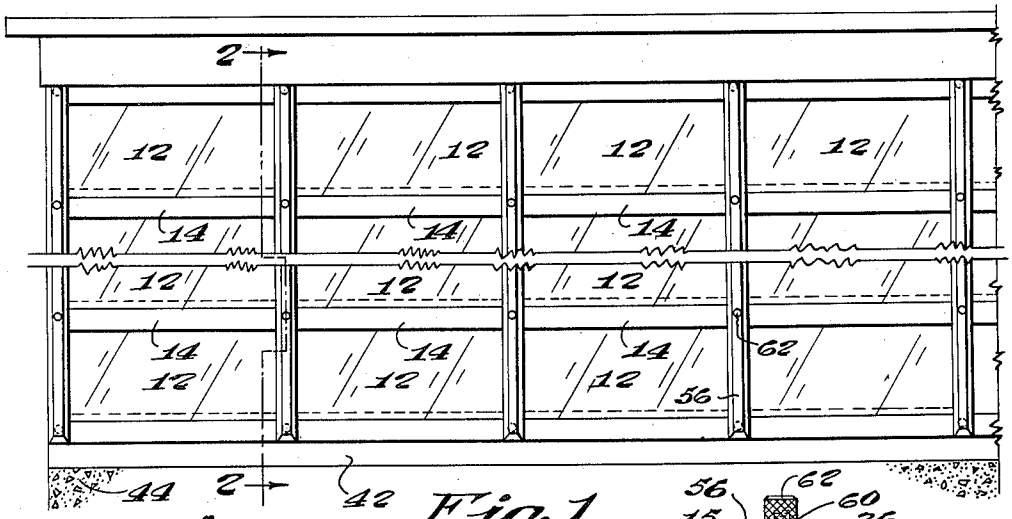


Fig. 1

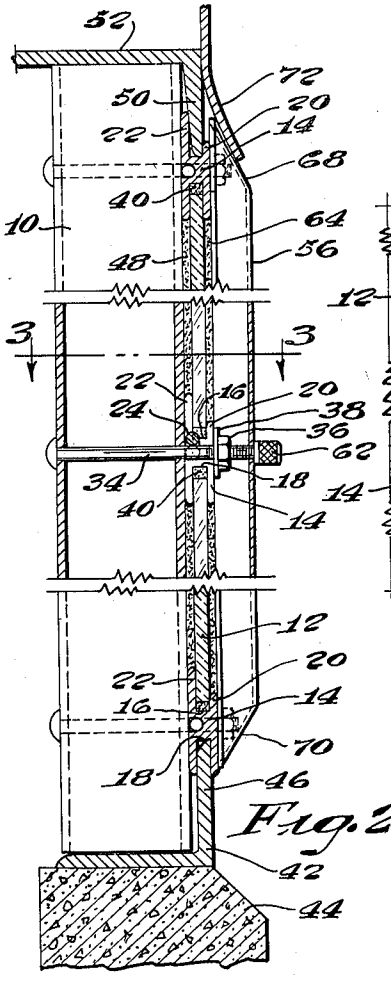


Fig. 2

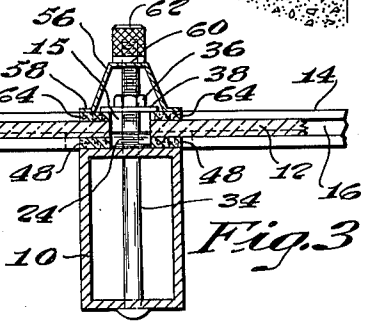


Fig. 3

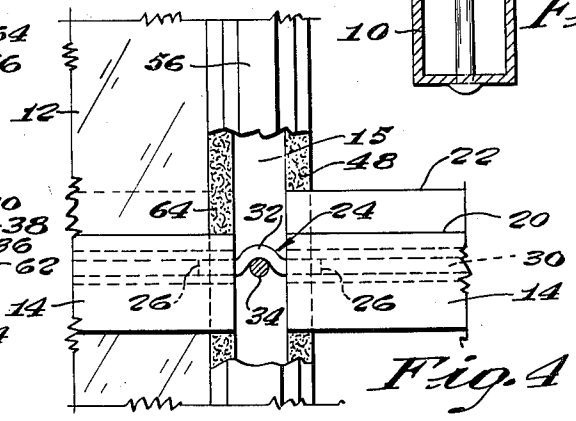


Fig. 4

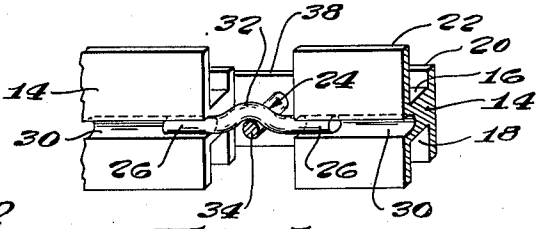


Fig. 5

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Fig. 6

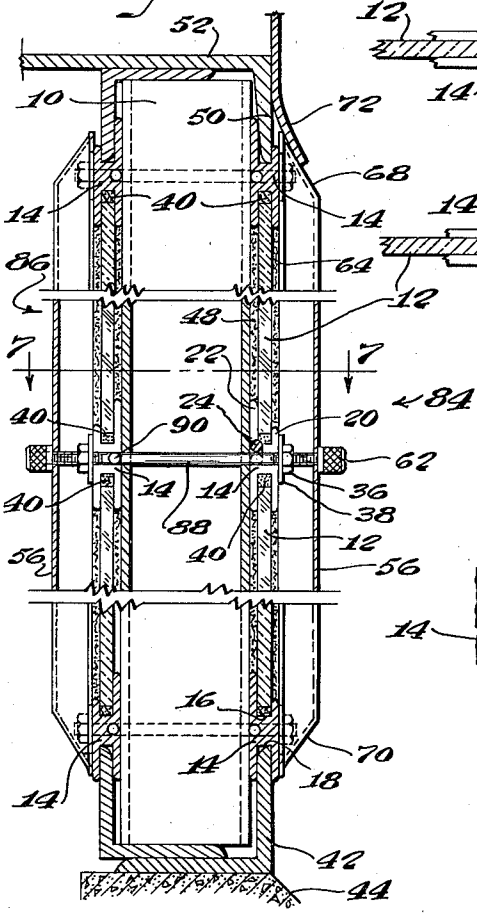


Fig. 7

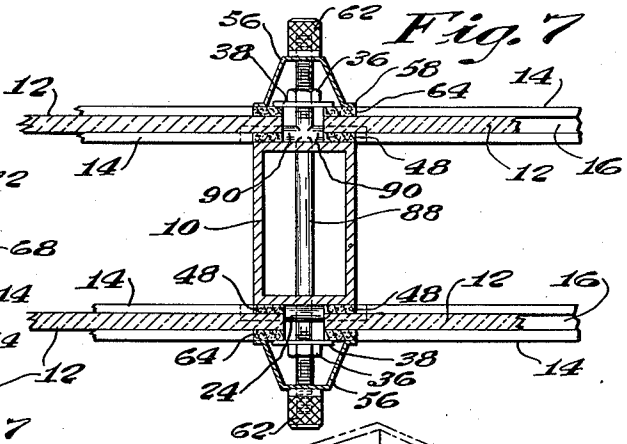
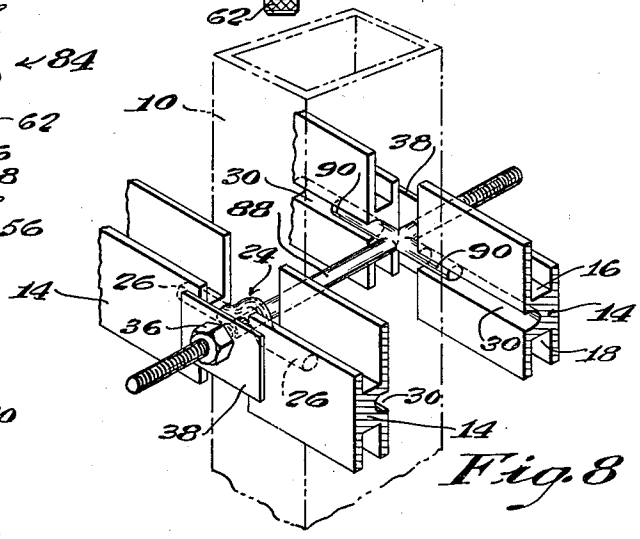


Fig. 8



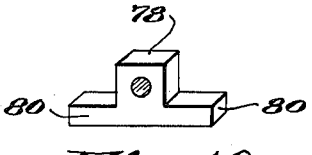


Fig. 10

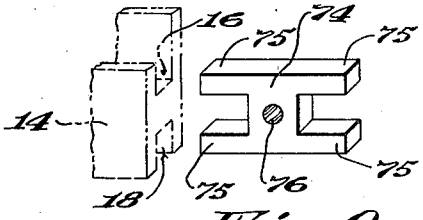


Fig. 9

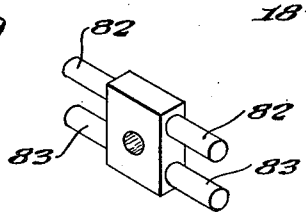


Fig. 11

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GLAZING CONSTRUCTION

Albert J. Daniels, Shrewsbury, Mass.

Application March 28, 1939, Serial No. 264,563

12 Claims. (Cl. 189—34)

This invention relates to a building construction and more particularly to a glazing construction.

The invention has for an object to provide a novel and improved glazing construction which may be economically manufactured and erected and in which the individual panels are supported in a novel manner such as to minimize liability of breakage of the panel or distortion of the structure when the latter expands or contracts under varying atmospheric conditions.

A further object of the invention is to provide a novel and improved double glazing construction which may be economically manufactured and erected and in which the individual panels are supported in a novel manner such as to minimize liability of breakage of the panel or distortion of the structure when the latter expands or contracts under varying atmospheric conditions.

With these general objects in view and such others as may hereinafter appear, the invention consists in the glazing constructions and in the various structures, arrangements and combinations of parts hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention, Fig. 1 is a front elevation of a sufficient portion of the side wall of a building embodying the present invention to enable it to be understood; Fig. 2 is a cross-section on the line 2—2 of Fig. 1; showing the invention as embodied in single glazing construction; Fig. 3 is a plan view in cross-section on the line 3—3 of Fig. 2; Fig. 4 is an enlarged detail view in front elevation showing the manner of connecting adjacent glass holding members to permit relative expansion and contraction; Fig. 5 is a perspective view of a detail of construction to be referred to; Fig. 6 is a cross-section similar to Fig. 2, showing the invention as embodied in double glazing construction; Fig. 7 is a plan view in cross-section on the line 7—7 of Fig. 6; Fig. 8 is a perspective view showing the manner of supporting and connecting adjacent glass holding members in the double glazing construction; and Figs. 9, 10 and 11 are perspective views of modified forms of connecting members adapted to permit relative expansion and contraction of the glass holding members.

In general, the invention contemplates a novel glazing construction embodying uprights and horizontally arranged panel supporting members for supporting the glass or other panels. The panel supporting members are constructed in sections and of a length such that they may be erected to overlap upon the face of the upright and to provide a space between ends of adjacent sections thereof. Provision is made for mounting the sections of the panel supporting members upon the uprights in a manner such as to facilitate erection and alignment of the component parts of the glazing structure and also in a manner such as to permit movement of said sections with relation to the uprights upon expansion and contraction thereof, thereby minimizing panel breakage and distortion of the structure under varying atmospheric conditions. The invention further contemplates a novel and superior double glazing construction, as will be described.

Referring now to the drawings, the different features of the invention are illustrated in Figs. 1 and 2, as embodied in a single glazing construction and in Figs. 6 and 7 in a double glazing construction. In general, a series of upright fixed supporting members 10 preferably tubular in cross-section are arranged to support individual panel sections 12 preferably of glass between horizontal supporting members 14. The supporting members 14 are connected to the uprights 10 in a manner such as to suspend the panel sections thereon and to provide in effect a floating support for the panels 12 to permit relative movement thereof as will be described.

As illustrated in Figs. 1 and 2, each panel section comprises a rectangular panel 12, herein shown as being composed of glass, and which is supported along two edges by the members 14 extending horizontally between the upright members 10. Each panel supporting member 14 is provided with grooves 16 and 18 upon opposite sides thereof, the outside wall 20 of the upper groove 16 being shorter than the inside wall 22 for a purpose to be described. The members 14 are arranged in pairs for the reception of the top and bottom edges of a panel 12, with the parallel longitudinal edges of the panel received in the upper groove 16 of the lower member, and the lower groove 18 of the upper member. The panel 12 and its supporting members 14 may and preferably will be of the same width and less than the distance between center lines of adjacent upright members 10 to provide a space 15 between adjacent ends of the sections of the supporting members 14 and panels 12. The sections of the supporting members 14 are of such length as to overlap upon the face of the uprights 10 as illustrated.

Provision is made for mounting the adjacent sections of the supporting members 14 upon the upright 10 in a manner such as to permit movement of the sections under expansion and contraction thereof and, to this end, the panel supporting members 14 are secured to the upright members 10 by connectors 24 arranged to permit such relative movement. As illustrated in Fig. 5, each connector 24 is provided with aligned straight portions 26 adapted to be received in a groove 30 provided on the rear face of each panel supporting member 14. An intermediate portion 32 of the connector is bent to extend over a bolt 34 extending through and projecting from the upright member 10 as shown in Fig. 3 so that each connector 24 transmits to its bolt 34 one-half the weight of each of a pair of adjacent panels 12 and their lower supporting members 14. The bolt 34 extends beyond the panel supporting members 14 and a nut 36 cooperating with a rectangular washer 38 serves to clamp the ends of the members 14 firmly against the vertical face of the associated upright member 10.

From the description thus far it will be observed that in each assembled section, as shown in Fig. 1, the ends of both members 14, which carry the panel 12, are vertically supported on the upright members 10 by the bolts 34. This support is such, however, that endwise expansion and contraction of both the panel 12 and the members 14 can take place freely, due to the provision for relative movement which exists between the grooves 30 of the members 14 and the straight portions 26 of each connector 24. Any expansion or contraction which may take place in a vertical direction is compensated for by the fact that the upper edge of each panel 12 only partially fills the lower groove 18 of the upper member 14, providing ample space for movement of the panel 12 in the groove 18. In order to render the junctions between the panel 12 and the supporting members 14 weatherproof, yieldable plastic material 40 may be employed in the grooves 16 and 18.

Thus, each glazed section is, in effect, floating between four fixed points of support, represented by the bolts 34 at its four corners, with the connectors 24 permitting independent expansion or contraction of the parts of each section without subjecting the structure to bending strains. Furthermore, each individual panel 12 is floating between the grooves 16 and 18 of its horizontal supporting members 14 thereby permitting expansion and contraction of a panel and its supporting members to take place at different rates according to the expansion characteristics of the material of which the parts may be composed.

In erecting the single glaze construction in a building, the vertical frame members 10 may be erected in spaced relation upon a base member 42 supported on a suitable foundation 44 as shown in Fig. 2. The base member 42 is shown as being in the form of an angle-iron, with its vertical flange 46 of such thickness as to be received in the lower groove 18 of the first course of supporting members 14. The members 14 may then be attached to the vertical member 10 by means of the connecting members 24, bolts 34, washers 38 and nuts 36. The grooves 16 and 18 of the members 14 may then be provided with a suitable plastic material 40. Strips 48 of any suitable cushioning material, such as asphaltic felt, are then laid against the upright members 10, as shown in Figs. 3 and 4, to form a weatherproof joint and a yielding support for the vertical edges of the panel, such strips extending vertically along the front edges of the upright between the adjacent members 14. The individual panels may now be inserted into the grooves by first introducing the upper edge of the glass or panel member into the deeper groove 18 a sufficient distance upwardly so that the lower edge of the panel may clear the shorter front wall 20. The panel is then lowered into the groove 16 of the lower member 14 as illustrated in Fig 2. When the top course of members 14 has been reached, the upper grooves 16 of these members are engaged by the downwardly extending flange 50 of a top plate 52 in the form of a channel forming part of the supporting structure of the building. The upright members 10 may be secured at their upper ends to the top plate 52 in any suitable manner. Thus, the entire wall structure is sealed along the top and bottom by the flanges 46 and 50, forming an integral part of the base 42 and top plate 52, respectively.

In order to cover the open spaces 15 between the ends of adjacent panels 12 and between the adjacent sections of the supporting members 14, each upright frame member 10 is provided with a cap 56. As best shown in Fig. 3, each cap 56 is preferably of general U-shape in cross-section, with flanges 58 engaging the ends of the several pairs of panel supporting members 14 where they overlie the upright frame member 10. Each cap 56 is provided with a plurality of holes 60 for receiving the projecting ends of the bolts 34, and the cap 56 may be securely positioned by knurled nuts 62 cooperating with the ends of the bolts 34. When securing a cap 56 in position, suitable felt strips 64 are placed beneath the flanges 58, to fill the spaces between the flanges and the panels 12, as indicated at the broken away portion of a cap in Fig. 4. Each cap 56 is preferably beveled at its extremities, as indicated at 68, 70, so as to merge with the top and bottom panel supporting members 14, and a flashing strip 72 may be placed over the upper flange 50 to make a waterproof seal with the upper members 14 and the caps 56.

Referring now to Figs. 9, 10 and 11, as herein shown, various modifications of the connecting member 24 may be employed in the present glazing structure. One modification, as illustrated in Fig. 6 may comprise a connector 74 in the form of a block, provided with spaced wings 75 having the same width as the slots 16 and 18 of the horizontal members 14. The connector 74 may be mounted on the bolt 34 passing through an opening 76 and the wings 75 are arranged to slide in the grooves 16 and 18 of opposed panel supporting members, thus supporting the latter in a manner as to permit endwise expansion or contraction thereof.

Another modification shown in Fig. 10, may comprise a similar block member 78 provided with wing members 80 adapted to slidingly fit into the lower grooves 16 of opposed supporting members 14. Fig. 11 illustrates still another modfication, wherein the wing members 82, 83 may be cylindrical in form, and adapted to extend into the grooves 16 and 18 respectively of adjacent panel supporting members 14. Each of the herein illustrated and described connecting members are adapted to support adjacent panel supporting members in alignment with each other and to permit of relative endwise expansion and contraction, as will be apparent from consideration of Figs. 6, 10 and 11.

The herein described manner of mounting individual panel sections to form a single glazed wall may also be used with advantage in a double glaz-

ing construction, and as herein shown, see Figs. 6, 7 and 8, the exterior wall 84 and the interior wall 86 may comprise duplicate units similar to the single glazed construction shown in Fig. 2. However, in the double glazed construction, a special cross bolt 88 is preferably used, having extended and aligned portions 90, adapted to fit into the grooves 36 of the adjacent supporting members 14 of the interior wall 86. Thus, the exterior and interior walls are supported upon the same bolts, which extend through the tubular uprights 10. In assembling the double glazed structure, the first step is to insert the cross bolts 88 through the uprights 10 so that the aligned portions 90 come up against the upright 10. Thereafter, the exterior wall 84 is assembled in the same manner as heretofore described in connection with the single glazed structure. During the assembly of the exterior wall, the cross bolts 88 are drawn up tight by the nuts 36 against the upright members 10, and in a position so that the aligned portions 90 are horizontally disposed at right angles to the upright members. The interior wall 86 is then assembled upon the opposite side of the uprights, using the cross bolts 88 thus secured to suspend the panel supporting members 14 in a manner similar to the connecting members 24. In some instances, it may be desirable to use the cross bolts 88 for single glazed construction, such as where a customer may want to erect a second or interior glazed wall at a later date.

The panel supporting members 14, which have been herein described as preferably being of the same width as the individual panels 12, may, in some instances, be made of a length corresponding to two or more panels. In such instances, the members 14 may be provided with a hole through which a bolt may extend to secure the members 14 directly to the intermediate upright 10 and, in operation, expansion or contraction may take place in a lateral drection toward or from either side of the center of the intermediate upright to which the members are secured.

From the description thus far, it will be observed that the improved glazing construction of the present invention may be prefabricated, and the parts are adapted to be economically and readily assembled with minimum labor. Although the invention has been described as embodied in a side wall of a building, it will be understood that the different features thereof may, if found advantageous, be used in the construction of other portions of a building, such as to form interior partitions, or for skylights, roofs, ceiling, etc.

Although the invention has been illustrated and described in connection with a glazing structure, it will be apparent the panels may comprise materials other than glass, such as of cementitious, resinous and other panel forming materials, and as used throughout the claims the term "panel" is intended to include such equivalent panel materials. The panels may be provided with sound absorbing and heat insulating material attached to the inside surface thereof. The glazing construction is of such design that suitable ventilating ducts may be inserted in place of some of the panels. In practice, various combinations may be developed according to particular requirements, such as opaque panels along the lower portion of the wall and transparent panels in the upper portion with ventilating ducts placed at suitable intervals in the lower and upper sections, as required.

While the preferred embodiments of the invention have been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. In a glazing construction, in combination, a plurality of upright supporting members, a plurality of vertically spaced and horizontally extended glass supporting members, each member comprising a plurality of sections, said sections being provided with upper and lower grooves for the reception of the top and bottom edges of glass panels, and being of a length such as to overlap upon one of said upright supporting members and to provide a space between it and the ends of the adjacent sections, a plurality of glass panels supported by said horizontally extended supports and means for mounting said horizontally extended supports upon said vertical supports, a plurality of fastening devices secured to said vertical supporting members and projecting through spaces between the ends of adjacent sections of said horizontally disposed supporting members, and means slidably engaging said sections and supported by said fastening devices for mounting the sections upon said vertical supporting members in a manner such as to permit relative movement thereof upon expansion and contraction.

2. In a glazing construction, in combination, a plurality of upright supporting members, a plurality of vertically spaced and horizontally extended panel supporting members, each member comprising a plurality of sections, said sections being provided with upper and lower grooves for the reception of the top and bottom edges of the panels, and being of a length such as to overlap upon one of said upright supporting members and to provide a space between it and the ends of the adjacent sections, a plurality of panels supported by said horizontally extended supports and means for mounting said horizontally extended supports upon said vertical supports, said means comprising a plurality of fastening devices mounted upon said vertical supporting members and projecting between the ends of adjacent sections of said horizontally disposed supporting members and slidably engaging said sections to permit movement upon expansion and contraction thereof.

3. In a glazing construction, in combination, a plurality of upright supporting members, a plurality of vertically spaced and horizontally extended glass supporting members, each member comprising a plurality of sections, said sections being provided with upper and lower grooves for the reception of the top and bottom edges of glass panels, and being of a length such as to overlap upon one of said upright supporting members and to provide a space between it and the ends of the adjacent sections, a plurality of glass panels supported by said horizontally extended supports and means for mounting said horizontally extended supports upon said vertical supports, said means comprising a plurality of bolts secured to said vertical supporting members, one bolt being arranged to extend through the space provided between the ends of each pair of sections of said horizontally disposed supporting members, a member engaging said bolt to be supported thereby and having its opposite ends slidably engaging said adjacent sections to permit relative movement thereof upon expansion and contraction, and a nut upon said bolt for holding the horizontally disposed supporting members

from movement in a direction outwardly from said vertical supporting members.

4. In a glazing construction, in combination, a plurality of upright supporting members, a plurality of vertically spaced and horizontally extended panel supporting members, each horizontally extended panel supporting member comprising a plurality of sections of a length to provide a substantial space between adjacent sections but of a width less than the width of said vertical supporting member, a plurality of panels supported by said horizontally extended panel supporting members, and means carried by said vertical supporting members projecting through said space for securing said horizontally disposed panel supporting sections to said vertical supporting members, said means having provision for causing alignment of said sections and for permitting relative movement lengthwise thereof upon expansion and contraction.

5. In a glazing construction, in combination, a plurality of upright supporting members, a plurality of vertically spaced and horizontally extended panel supporting members, each horizontally extended panel supporting member comprising a plurality of sections of a length to provide a substantial space between adjacent sections but of a width less than the width of said vertical supporting member, a plurality of panels supported by said horizontally extended panel supporting members, and means carried by said vertical supporting members projecting through said space for securing said horizontally disposed panel supporting sections to said vertical supporting members, said means having provision for causing alignment of said sections and for permitting relative movement lengthwise thereof upon expansion and contraction, comprising longitudinally extended openings in the ends of said sections and supporting means slidably received within said openings.

6. In a double glazing construction, in combination, a plurality of vertical supporting members, a plurality of panels comprising an outer glazing unit and a plurality of panels comprising an inner glazing unit, means for supporting the panels of said units upon the outer and inner surfaces of said vertical supporting members including outer and inner sets of horizontally disposed panel supporting members, each composed of sections and with the sections of such length as to overlap upon the outer and inner faces respectively of said vertical supporting members, and to provide spaces between the ends of adjacent sections and a plurality of fastening devices mounted upon said vertical supporting members arranged so that each of the opposite ends of a fastening device projects through the spaces between corresponding sections of the outer and inner sets of said panel supporting members, and means for mounting said sections upon said ends of said fastening devices to permit relative movement lengthwise of the sections upon expansion and contraction of said sections.

7. In a double glazing construction, in combination, a plurality of vertical supporting members, a plurality of panels comprising an outer glazing unit and a plurality of panels comprising an inner glazing unit, means for supporting the panels of said units upon the outer and inner surfaces of said vertical supporting members including outer and inner sets of horizontally disposed panel supporting members, each composed of sections and with the sections of such length as to overlap upon the outer and inner faces respectively of said vertical supporting members, and to provide spaces between the ends of adjacent sections, and means mounted upon the vertical supporting members and projecting through said spaces for operatively supporting said sections in a manner as to permit relative movement lengthwise of the sections upon expansion and contraction thereof.

8. In a double glazing construction, in combination, a plurality of vertical supporting members, a plurality of panels comprising an outer glazing unit and a plurality of panels comprising an inner glazing unit, means for supporting the panels of said units upon the outer and inner surfaces of said vertical supporting members including outer and inner sets of horizontally disposed panel supporting members, each composed of sections and with the sections of such length as to overlap upon the outer and inner faces respectively of said vertical supporting members, and to provide spaces between the ends of adjacent sections, a plurality of fastening devices mounted upon said vertical supporting members arranged so that each of the opposite ends of a fastening device projects through the spaces between corresponding sections of the outer and inner sets of said panel supporting members, means integral with a fastening device for slidably engaging adjacent sections of one of said sets of panel supporting members, means removably mounted upon the second projecting end portion of said fastening device for slidably engaging the ends of adjacent sections and the second of sets of panel supporting members, and clamping means cooperating with said projecting end portions of said fastening device for holding the structure from outward and inward movement.

9. In a double glazing construction, in combination, a plurality of vertical supporting members, a plurality of panels comprising an outer glazing unit and a plurality of panels comprising an inner glazing unit, means for supporting the panels of said units upon the outer and inner surfaces of said vertical supporting members including outer and inner sets of horizontally disposed panel supporting members, each composed of sections and with the sections of such length as to overlap upon the outer and inner faces respectively of said vertically supporting members, and to provide spaces between the ends of adjacent sections, and a plurality of bolts extending through the vertical supporting members and arranged so that each of the opposite ends of a bolt projects through the spaces provided between adjacent sections of corresponding sets of horizontal panel supporting members, means carried by said bolt and slidably engaging the ends of said sections for supporting said sections from vertical movement while permitting horizontal movement thereof under the influence of expansion and contraction, and clamping means cooperating with the ends of said bolt for holding the structure against the opposite faces of said vertical supporting members.

10. In a double glazing construction, in combination, a plurality of vertical supporting members, a plurality of panels comprising an outer glazing unit and a plurality of panels comprising an inner glazing unit, means for supporting the panels of said units upon the outer and inner surfaces of said vertical supporting members including outer and inner sets of horizontally disposed panel supporting members, each composed

of sections and with the sections of such length as to overlap upon the outer and inner faces respectively of said vertically supporting members, and to provide spaces between the ends of adjacent sections, a plurality of bolts extending through said vertical supporting members and arranged so that each of the opposite ends of a bolt projects through a space between corresponding sections of the outer and inner sets of said panel supporting members, said bolt being provided with members forming a part thereof and slidably engaging the ends of adjacent sections of the inner set of panel supporting members, a horizontally disposed but detachable rod slidably engaging the ends of adjacent sections of the outer set of panel supporting members for suspending the same upon the outer projecting end of said rod, and means for clamping both sets of panel supporting members from movement in a direction away from said vertical supporting members.

11. In a double glazing construction, in combination, a plurality of vertical tubular supporting members, a plurality of panels comprising an outer glazing unit and a plurality of panels comprising an inner glazing unit, means for supporting the panels of said units upon the outer and inner surfaces of said vertical supporting members including outer and inner sets of horizontally disposed panel supporting members, each composed of sections and with the sections of such length as to overlap upon the outer and inner faces respectively of said vertical supporting members, and to provide spaces between the ends of adjacent sections and a plurality of fastening devices mounted upon said vertical supporting members arranged so that the opposite ends of a fastening device project through the spaces between corresponding sections of the outer and inner sets of said panel supporting members, and means for mounting said sections upon said ends of said fastening devices to permit relative movement lengthwise of the sections upon expansion and contraction of said sections.

12. In a double glazing construction, in combination, a plurality of vertical supporting members, a plurality of panels comprising an outer glazing unit and a plurality of panels comprising an inner glazing unit, means for supporting the panels of said units upon the outer and inner surfaces of said vertical supporting members including outer and inner sets of horizontally disposed panel supporting members, each composed of sections and with the sections of such length as to overlap upon the outer and inner faces respectively of said vertical supporting members, and to provide spaces between the ends of adjacent sections, and a plurality of fastening devices mounted upon the vertical supporting members and projecting through the spaces provided between adjacent sections of the outer and inner sets of panel supporting members, said fastening devices having provision for permitting relative movement of the sections lengthwise thereof upon expansion and contraction of the sections.

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