

[54] **GLAZING SYSTEM**
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Va.; a part interest
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[51] Int. Cl.**E04b 2/88**
[58] Field of Search.....52/235, 489, 239, 134, 385,
52/513, 241, 73, 487

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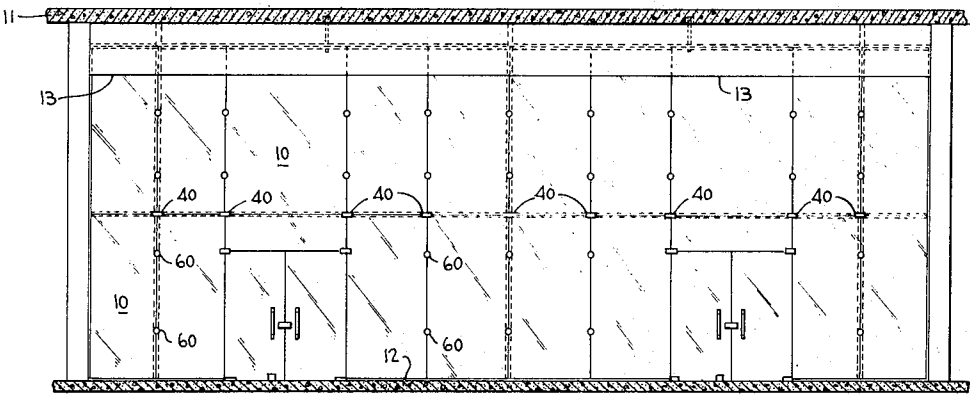
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Attorney—Brufsky, Staas, Breiner and Halsey

[57] **ABSTRACT**

A glazing system and components for utilizing said system is described. The resultant glazing has the attractive appearance of an all-glass system, but can be rapidly installed by personnel having limited experience.

8 Claims, 12 Drawing Figures



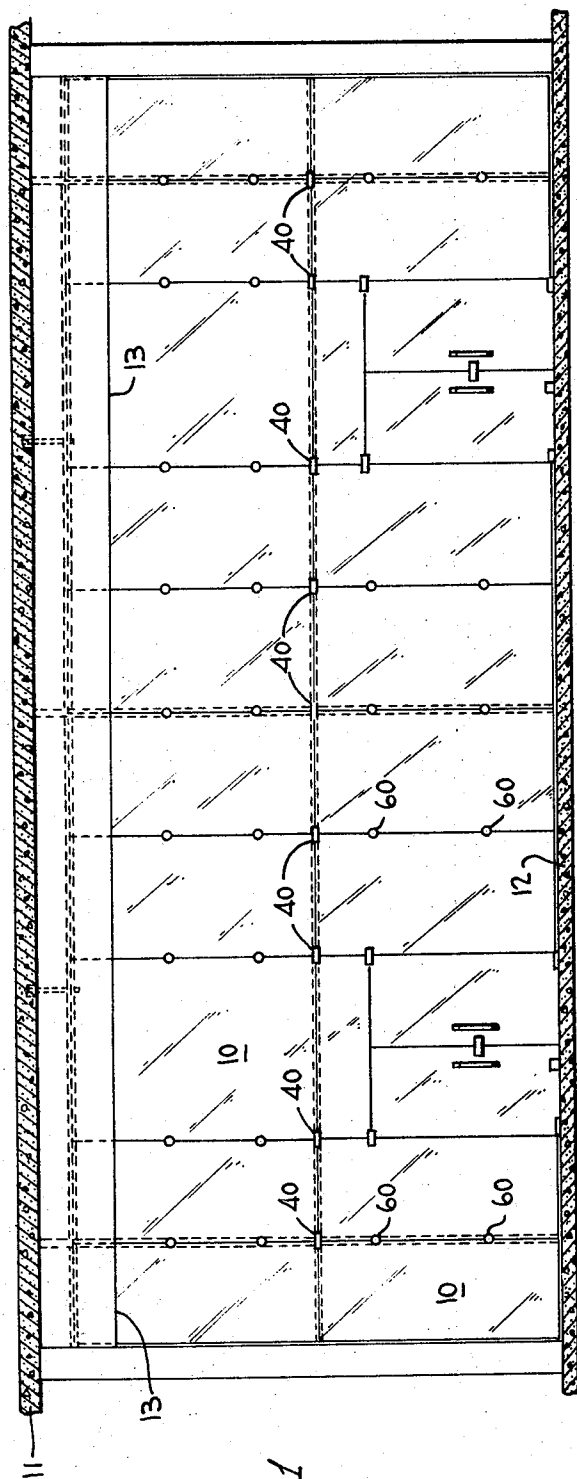


FIG. 1

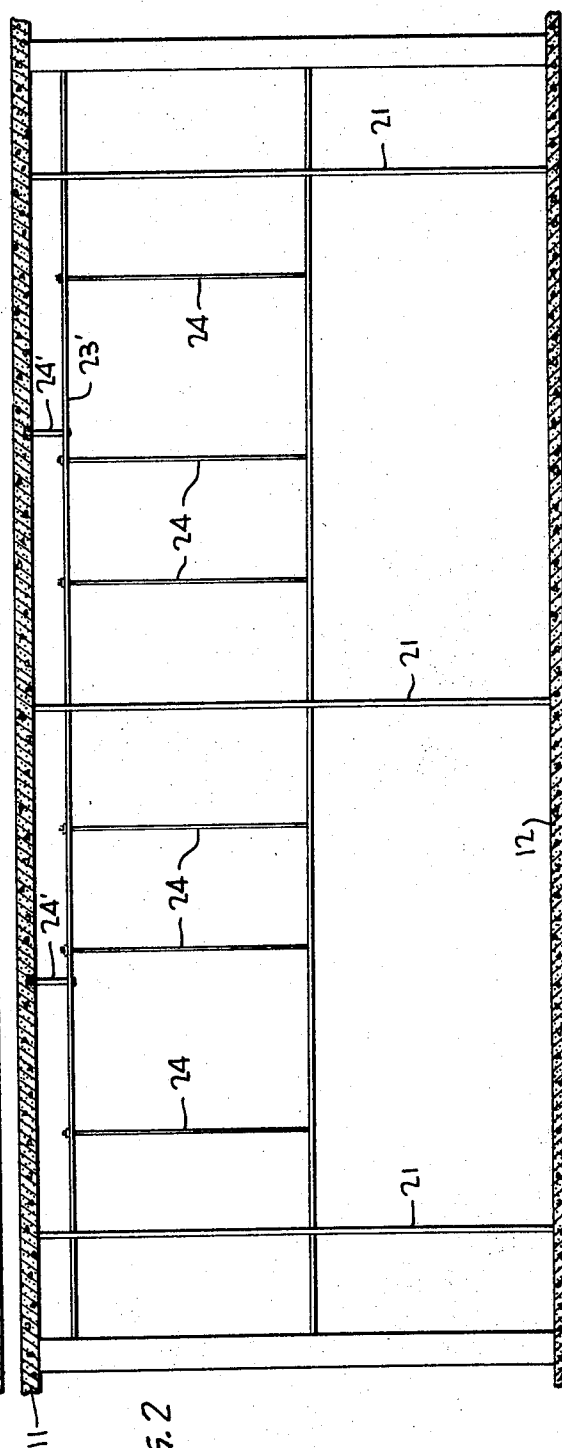


FIG. 2

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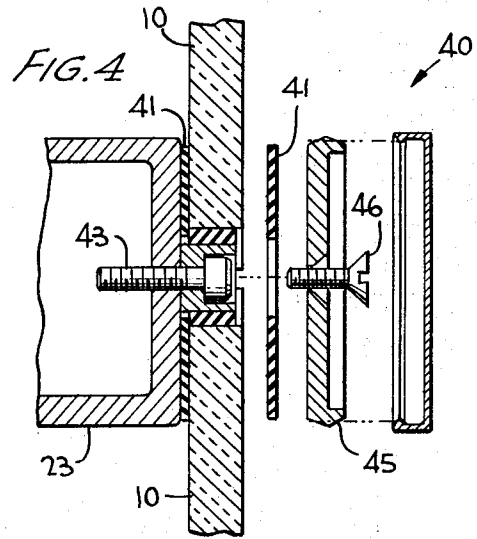
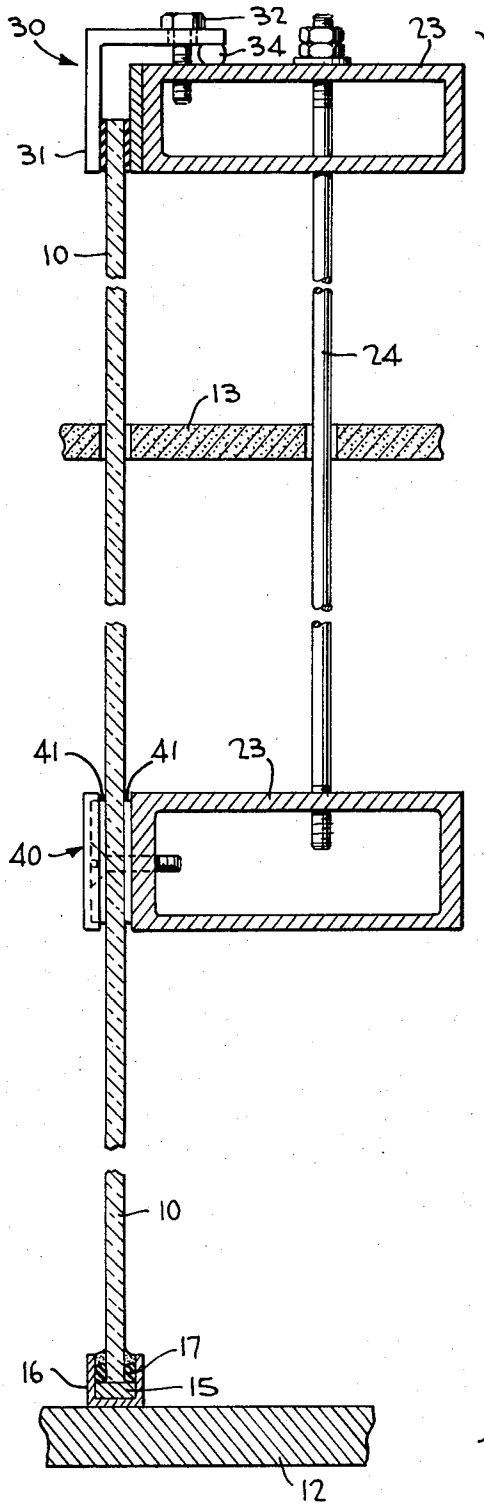


FIG. 3

FIG. 5

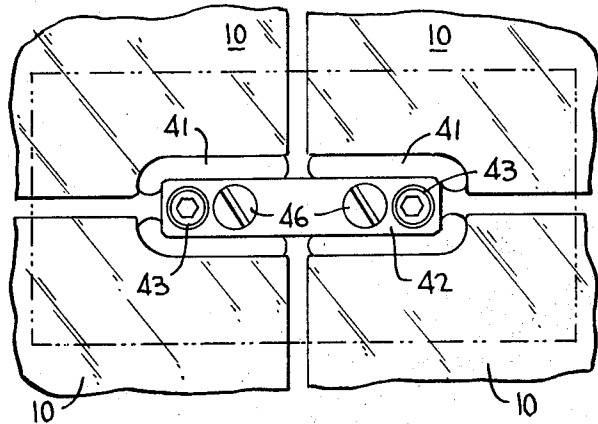


FIG. 6

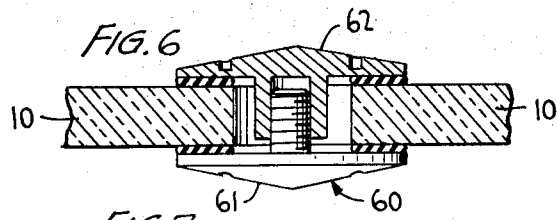
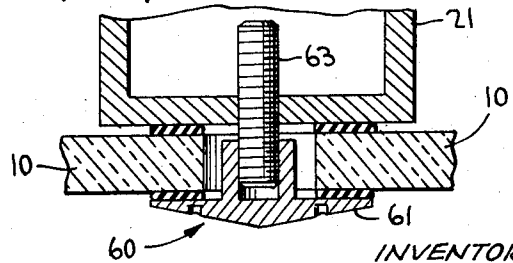


FIG. 7



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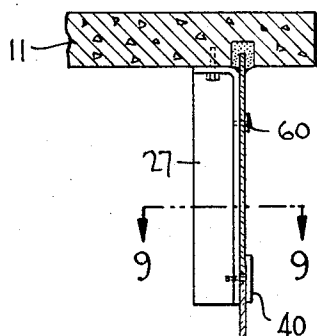
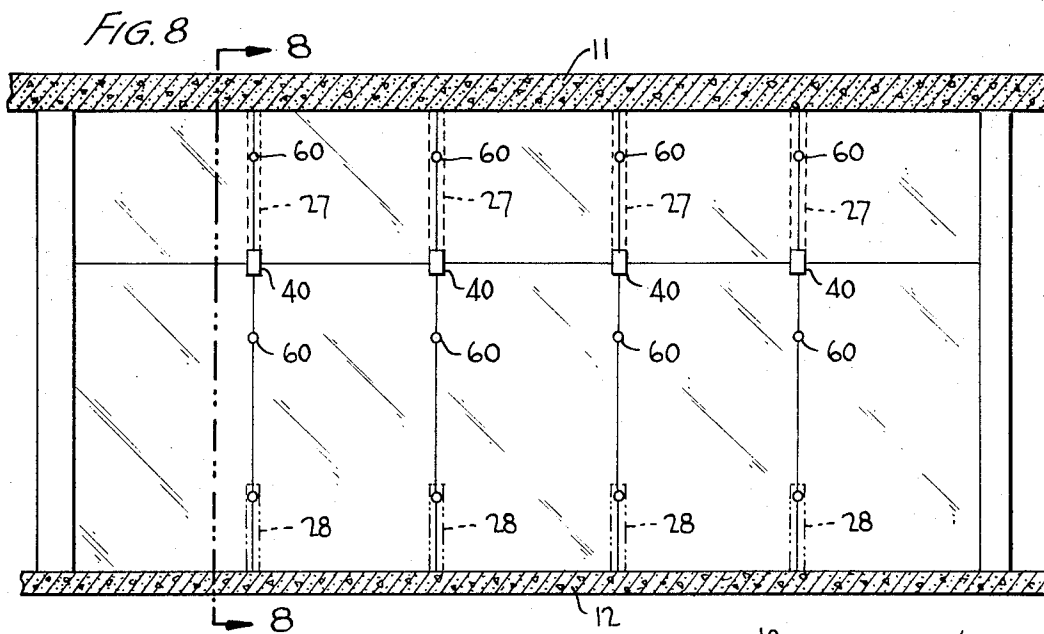


FIG. 10

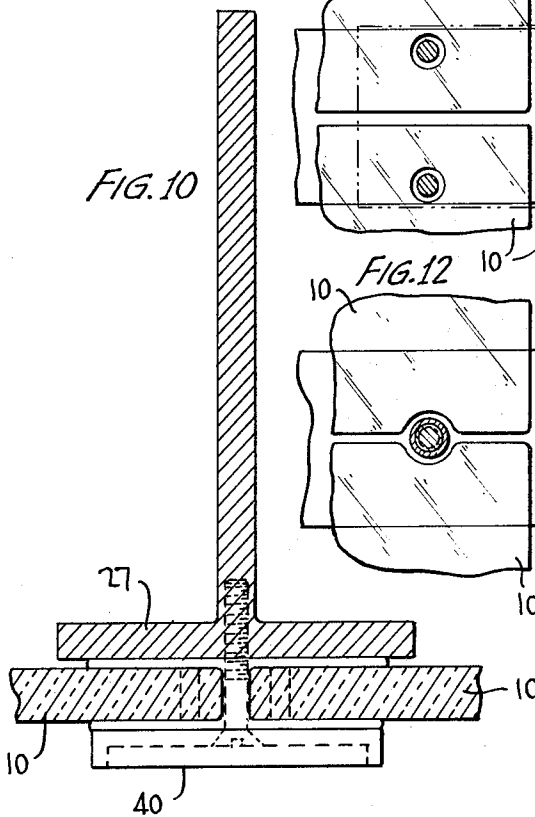


FIG. 11

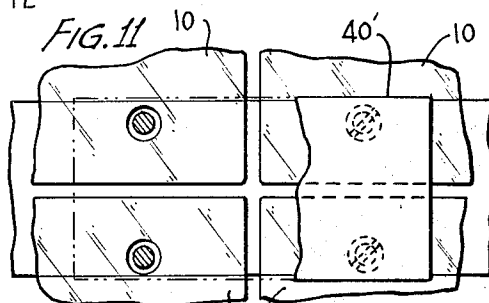
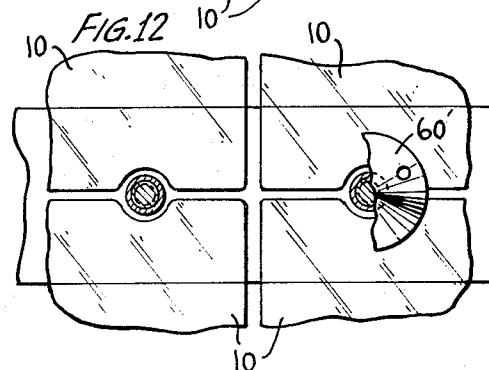


FIG. 12



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GLAZING SYSTEM

FIELD OF INVENTION AND PRIOR ART

This invention is directed to an improved system for installing glass and to components employed in this system. More particularly, this invention is directed to the installation of tempered glass in large openings which can be rapidly and conveniently accomplished by personnel having only limited experience. The completed system has the attractive appearance of being an all-glass system.

In the prior art, two techniques have been developed for glazing large openings. One of these techniques is generally known as the all-glass suspended system, and the other is the metal-glazing system. In the all-glass suspended system, tempered glass is assembled generally in two tiers with the lights of the upper tier suspended from a beam provided for that purpose during the construction of the building being glazed. Rigidity or mechanical integrity is achieved by placing glass fins perpendicular to the glass wall at each vertical joint between the lights of the upper tier. Although this system presents the pleasing appearance of an all-glass system, installation of the system requires precision workmanship and is extremely time-consuming and, therefore, costly. In the metal-glazing system, a metal framework is provided to receive panes of pre-cut glass. These panes are secured in the metal framework by means of metal stops or embedded in neoprene, or the like, extruded gaskets and have wide application in curtain wall construction. Although the metal-glazing system can tolerate less precise workmanship than the all-glass suspended system, fabrication of the framework is a time and material consuming operation and, therefore, again expensive.

OBJECTS AND GENERAL DESCRIPTION OF THE INVENTION

Accordingly, it is an object of the present invention to provide a glazing system which is attractive, having the appearance of being an all-glass system, and yet capable of convenient and inexpensive installation.

It is another object of the present invention to provide a rapid and convenient method of enclosing large openings with glass which requires no initial modifications to the construction.

It is another object of this invention to provide components for utilization in a glazing system.

These and other objects of the invention will be more readily apparent from the following detailed description.

In accordance with a preferred embodiment of the present glazing system, a loose framework is erected for receiving tempered glass sheets of any size within the capabilities of tempering ovens. This framework comprises vertical members, preferably spaced on approximately 20-foot centers, and a single visible horizontal beam anchored to the vertical members and held in horizontal position by suspension means located behind each vertical glass joint of the upper tier. Sheets of tempered glass are then successively attached to the outer face of the framework at the corners where four lights (sheets) meet to provide a continuous expanse of glass. It is essential that the horizontal beam and vertical members are constructed and arranged to provide a

common place at the point of attachment of the glass sheets. The suspension means, which can be small rods, being spaced behind the glass joint are not noticeable. Moreover, since the entire front of the system is glass, the vertical beams and visible horizontal beam are scarcely noticeable, providing a system having the appearance from the outside of being all glass. The rigidity and mechanical integrity is provided to the construction by the loose framework, but eliminates the lengthy framework installation of metal glazing as well as the glazing operation itself since the panes of glass are simply attached to the outer face of the loose framework. In addition to having the attractive appearance of an all-glass system, major economy and convenience are achieved compared to prior art systems since it is possible to use less skilled personnel in the construction without need of the expensive framework or modification of the structure being glazed to include an extra suspension beam as in all-glass systems.

Modifications can be made to the presently described glazing system in instances where the building opening being glazed is of moderate size. In these modifications the framework of vertical and horizontal beams can be replaced with partial vertical beams extending from the ceiling slab and, optionally, partial vertical beams extending from the floor of the building opening. Normally, openings capable of being glazed with this modified system can be no more than about 11 to 13 feet in height. Furthermore, in instances where the opening being glazed is relatively narrow, a single horizontal beam can be employed as the framework.

The installation of the present glazing system is facilitated by a four-corner bracket comprising a holding block which is constructed to be of substantially the same thickness as the tempered glass sheets of the installation, sized to fit into the opening provided by the notched corners of four sheets of tempered glass. Accordingly, the holding block positions and supports the glass sheets. A holding cover which overlaps the notched area of each of the sheets is fitted to the holding block. A finished cover is snapped over the holding cover to provide a finished appearance. This bracket permits a rapid, safe, and stable construction.

THE DRAWING AND DETAILED DESCRIPTION

The improved glazing system of the present invention will be more readily apparent from the following detailed discussion with particular emphasis being placed on the accompanying drawings wherein like numerals are employed to designate like parts throughout and wherein

FIG. 1 is an elevational view of the glass system of the present invention;

FIG. 2 is an elevational view similar to that shown in FIG. 1 with the tempered glass sheets removed;

FIG. 3 is a sectional view taken along lines 1—1 of FIG. 1 showing the hardware and framework employed in securing the glass sheets;

FIG. 4 is an exploded sectional view of the "four-corner" bracket employed to secure the glass sheets to the horizontal beam;

FIG. 5 is a front view illustrating the corner notches in the glass sheets in relation to the holding block of the bracket of FIG. 4;

FIGS. 6 and 7 illustrate the manner in which sheets of glass are interconnected at their joints by button means;

FIG. 8 is an elevational view of the glazing system for an opening of moderate height employing the brackets of FIG. 4 in the vertical position attached to a partial vertical beam;

FIG. 9 is a sectional view taken along lines 8—8 of FIG. 8;

FIG. 10 is a sectional view taken along lines 9—9 of FIG. 9; and

FIGS. 11 and 12 illustrate alternative embodiments of attaching the glass sheets to the horizontal beams.

More specifically, referring primarily to FIGS. 1 and 2, a loose framework is erected comprising vertical members 21 which are approximately 20 feet apart and tie into ceiling slab 11 and the floor slab 12 of the building opening being glazed. Horizontal members 23 and 23' are anchored to vertical members 21 and held in horizontal position by suspension means 24 and 24'. Suspension means 24', anchored to the ceiling slab 11, are above the ceiling line 13 (see FIG. 1) and are not visible. However, suspension means 24 are positioned to coincide with the vertical joints of the glass sheets of the upper tier. These suspension means, as seen more clearly in FIG. 3, are positioned behind the glass of the final installation. Optionally, beam 23' can be omitted in the construction and members 24 suspended directly from ceiling slab 11. The sheets 10 of tempered glass which are notched at their corners and at their vertical sides before the tempering operation are then successively attached to the outer face of the loose framework. Sheets 10, referring primarily to FIG. 3, are first set on soft setting blocks 15, which may be of neoprene, wood, or lead, in a floor groove provided in the concrete floor slab 12 upon casting or achieved by fastening a U-member 16 to the floor locating it properly in relation to the outer face of the framework. The sheets of glass are buffered within the groove by gasketing 17. Next, the tempered glass sheets are securely fastened to the framework at horizontal beam 23 where four sheets meet at their notched corners by means of a bracket 40 and at the top by means of an L-shaped extrusion 30 as best seen in FIG. 3.

As seen most clearly in FIGS. 3, 4, and 5, a neoprene gasket 41 is positioned between horizontal framework member 23 and the glass. Holding block 42 of bracket 40 is positioned in the opening formed by the meeting of the notched four corners of the tempered glass sheets and fastened to member 23 by dual means 43. The notches in the corners of the tempered glass are approximately five-sixteenths of an inch by 1½ inches and, accordingly, the holding block is approximately one-half inch by 2 inches. A second neoprene gasket 41 is placed over the front or outer face of the tempered glass sheets and secured in position by holding cover 45 by dual means 46. The dual securing means are essential to avoid rotation of the bracket and consequent movement of the glass. A finishing cover 49 is snapped over the entire bracket to provide an attractive finished look. The upper tier of glass which is rigidly secured in its lower end by bracket 40 is secured to beam 23' by tightening nut 32 which passes through L-clamped 30 and into beam 23'. This tightening causes pressure to be applied to pivot point 34 which may be hard rubber,

lead, or the like, to cause leg 31 of clamp 30 to move toward the glass sheet and firmly position glass sheet 10 in proper alignment. The sheets of tempered glass are next secured through the notches on the vertical sides by means of buttons 60 as shown in detail in FIGS. 6 and 7. Preferably, the buttons comprise male member 61 and female member 62 which are fastened by snap or screw action from opposite sides of the glass as seen in FIG. 6; or where the glass sheets coincide with a vertical member 21, female button member 62 is secured directly to a threaded bolt in the vertical member.

As seen in the elevational view of FIG. 1, entrances can be incorporated in the glass wall using metallic fittings presently available in the industry. Preferably, after the entire wall is completed, the wall is sealed at the joining edges of the glass sheets with a silicone sealant.

A modified installation is shown in FIGS. 8, 9, and 10 where the opening being glazed is of relatively moderate size, i.e., 11 to 13 feet in height. According to this embodiment, the only framework consists of partial vertical beams 27 suspended directly from ceiling slab 11. The glass sheets 10 are first set upon setting block 15 which can be neoprene, wood, or lead in groove 18 in concrete floor 12. The glass is then secured by bracket 40 as previously described. However, in this instance the bracket is vertical on partial vertical beams 27 rather than being horizontal as shown in FIGS. 1, 4, and 5. The top part of the upper tier of glass is set into groove 18' in ceiling slab 11. The glass sheets are again secured to notches on the vertical sides by means of buttons 60. Optionally, partial vertical beams 28, shown in phantom lines, can extend upwardly from floor slab 12. By employing beams, thinner sheets of the tempered glass can be utilized. For example, to close an 11-foot opening with glass sheets of 9 feet and 2 feet, without the lower beams, it would be necessary to employ ½-inch glass sheets to obtain sufficient strength. However, with the beams, glass sheets of ¾-inch thickness can be employed.

FIGS. 11 and 12 illustrate modified means for securing the tempered glass sheets to the support beams. In FIG. 11 holes are drilled at predetermined locations at the corners of sheets 10 and anchored to beams 23 by pegs or bolts 43'. A cover facing 40' can be positioned over the pegs or bolts 43' to provide a finished appearance to the installation. In FIG. 12 the edges of a pair of glass sheets 10 are notched in mated relation and anchored to beam 23 by pegs or bolts 43'. Buttons 60' are used to secure the glass to beam 23. These modified securing means are not as convenient as those shown in FIGS. 3, 4, and 5.

As apparent, the present invention provides a glazing system permitting convenient installation of tempered glass utilizing relatively unskilled labor. The system is convenient and economical. Various modifications to the system will be apparent to one skilled in the art. These modifications, being within the ability of one skilled in the art, fall within the scope of the present invention.

It is claimed:

1. A glazing system for closing a relatively large opening in a building comprising upper and lower tiers of tempered glass which close said opening, said tiers comprising a plurality of tempered glass sheets having

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joining vertical edges, and a loose support framework positioned interiorly of said tiers of glass comprising a horizontal beam suspended from ceiling means by vertical hanger means, said vertical hanger means being spaced behind and free of direct contact with said glass sheets and positioned to be substantially directly in line with the joining vertical edges of said glass sheets in said upper tier, said glass sheets of said lower tier being anchored at the base thereof to floor means, said glass sheets of the upper tier being anchored at the top thereof to ceiling means, and said glass sheets of said lower and upper tiers meeting at and being anchored to said horizontal beam by anchoring means at points where a corner of four glass sheets join, said glazing system being free of supporting structure joining said ceiling means and said floor means thereby giving the appearance from the front view of being an all-glass system.

2. The glazing system of claim 1 wherein the glass sheets of said lower tier are anchored at the base by being inserted in channel means in said floor means.

3. The glazing system of claim 2 wherein said glass sheets of the upper tier are anchored to the ceiling means by means of an L-clamp associated with a second horizontal beam.

4. The glazing system of claim 1 wherein said plurality of glass sheets are notched at least at one corner thereof and said sheets anchored to said horizontal beam by a holding block positioned in the opening formed by the meeting of four notched corners of four notched glass sheets, said holding block being anchored to said horizontal beam, and cover means dimensioned to be slightly larger than the opening formed by said four notched corners fitted over said holding block and anchored to said holding block.

5. The glazing system of claim 1 including a plurality of button means comprising first and second elements, said first element having protruding means and said second element having receiving means, said first and

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second elements being constructed and arranged in order that said protruding means mates with said receiving means, said first element extending through mating notches in two of said plurality of glass sheets into said second element.

6. A glazing system for closing a relatively large opening in a building comprising vertical hangers suspended from ceiling means and a plurality of tempered glass sheets having vertical joining edges forming an upper tier and a lower tier closing said opening, said glass sheets of said upper tier being shorter than the glass sheets of said lower tier, said glass sheets of the upper tier being anchored at the top thereof to ceiling means and said glass sheets of said lower tier being anchored at the base thereof to floor means, the corners of the top of said plurality of glass sheets forming said lower tier and the corners of the bottom of said plurality of glass sheets forming the upper tier meeting at the base of said vertical hanger and being anchored at said corners to said vertical hanger by a holding bracket, said vertical hangers being spaced interiorly of said glass sheets and positioned to be substantially directly in line with the vertical joining edges of a plurality of said glass sheets, said glazing system being free of supporting structure joining said ceiling means and said floor means thereby giving the appearance from the front view of being all-glass system.

7. The glazing system of claim 6 including a plurality of vertical supports extending from floor means to a height of approximately sixteen inches.

8. The glazing system of claim 7 wherein the glass sheets are notched at a corner thereof and anchored at the base of said vertical hanger by means of a holding bracket comprising a holding block anchored to said vertical hanger and fitting within the opening formed by the notched corners of four glass sheets, and a cover bracket positioned over said holding block and anchored to said holding block.

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