

Dec. 7, 1965

H. E. LIETAERT

3,221,453

WALL SYSTEM

Filed June 21, 1962

2 Sheets-Sheet 1

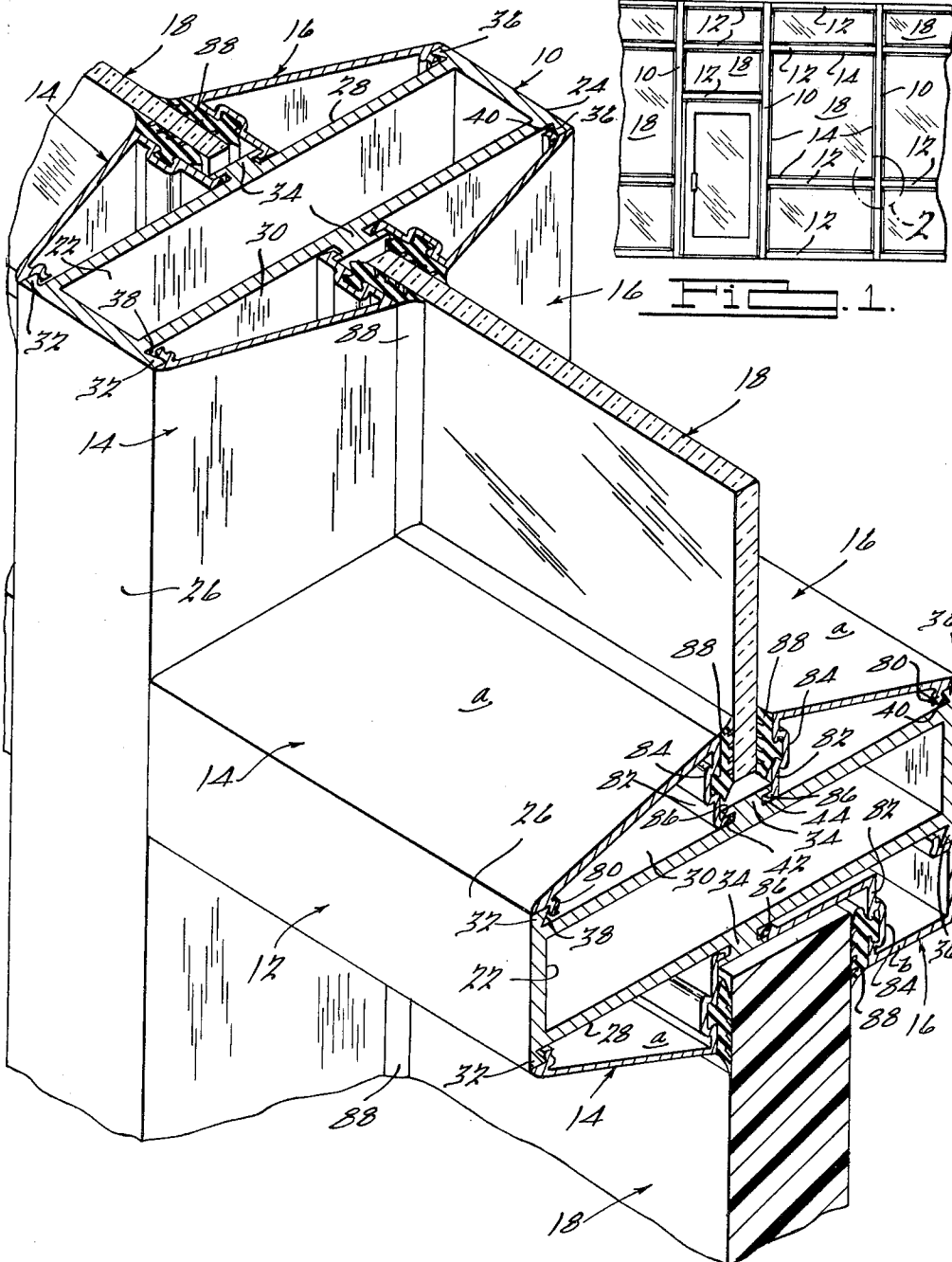


FIG. 2.

INVENTOR.

Harold E. Lietaert

BY

Karnes, Dickey & Price
ATTORNEYS

Dec. 7, 1965

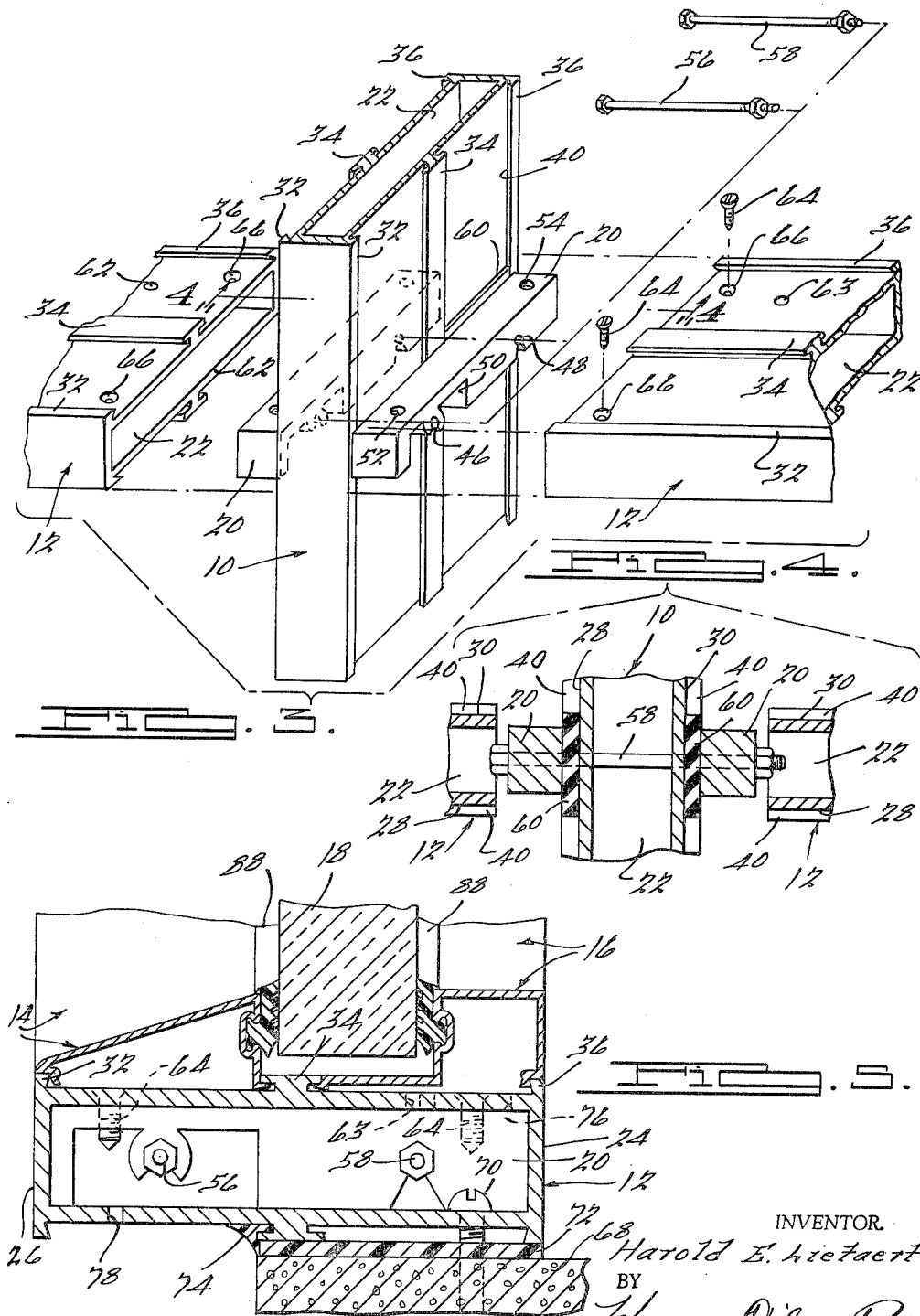
H. E. LIETAERT

3,221,453

WALL SYSTEM

Filed June 21, 1962

2 Sheets-Sheet 2



INVENTOR

Harold E. Lietaert

BY

Karnes, Decker & Peirce
ATTORNEYS

1

3,221,453

WALL SYSTEM

Harold E. Lietaert, 712 Washington St., Monroe, Mich.

Filed June 21, 1962, Ser. No. 204,100

2 Claims. (Cl. 52-209)

This invention relates generally to improved building constructions, and more particularly to a unique wall system suitable for construction of building fronts, curtain walls, interior partitions, sun screens, and so on.

It is a primary object of the present invention to provide a unique wall system which is extremely simple in construction, comprising but several basic components, which is economical to manufacture and erect, and which is extremely versatile in application.

A further object concerns the provision of a novel wall system wherein there is provided an integral internal drain system which when embodied in an exterior wall or a wall subject to extreme moisture conditions will carry off in a harmless fashion any moisture which may, due to faulty erection or the like, leak through or into the wall, or which may condense on the surfaces thereof. A related object lies in the provision of such a wall system, wherein the possibility of leakage is reduced in the first instance by eliminating the need for seals which must be inserted by a rolling and hence stretching operation, which seals have been found to have a tendency under actual conditions to contract or shrink and leave openings for leakage.

Another object of this invention resides in the provision of a novel wall system which results in a wall which is extremely sturdy as well as architecturally pleasing in appearance, the system being such that the walls formed may have very slim lines if desired, such that panels of various and different materials and thicknesses may be assembled with the outside faces of each of them lying in a common plane, or along the same sight line, and such that none of the fasteners used will show in the completed assembly.

Yet a further object resides in the provision of a unique wall system which, as compared to existing systems, is more economical to manufacture because it consists of a smaller number of different components, each of which is of simple design and substantially all of which may be economically extruded, and which is more economical to erect because a minimum number of bolts and screws and no springs or angle brackets are utilized, because the panels and other components thereof may be installed from either inside or outside the wall by one workman, and because only simple tools are required.

These and other objects of the present invention will become apparent from consideration of the specification taken in conjunction with the accompanying drawings in which there is illustrated a single embodiment of the present invention and wherein:

FIGURE 1 is a front elevational view of a portion of a completed wall embodying the principles of the present invention;

FIGURE 2 is a fragmentary perspective view illustrating the portion of the wall shown in FIGURE 1 in the broken circle;

FIGURE 3 is an exploded assembly view illustrating the details of construction of the various components and manner of assembly thereof;

FIGURE 4 is a sectional view taken substantially along line 4-4 of FIGURE 3; and

FIGURE 5 is a fragmentary vertical sectional view of the lowermost portion of a wall incorporating the principles of the present invention.

The wall system of the present invention is extremely versatile in application and may be utilized to form walls of practically any desired design. For example, one of

2

its most likely applications is for the construction of fronts for commercial buildings of various types, such as that shown in FIGURE 1. In such an application the system is utilized to create a generally rectilinear framework having a plurality of various size and shaped rectilinear openings therein, which openings are adapted to respectively receive windows, double or single glazed, doors, translucent panels, opaque panels, colored panels, aggregate panels, or any other desired type of panel, all according to the function to be achieved and the desire of the architect. Although it is contemplated that in most applications the wall system will be assembled in a rectilinear arrangement, such as that shown, the system is certainly not limited to such an arrangement. Accordingly, the system may be said to comprise, in a broad sense, a plurality of frame members, often called mullions, which are horizontally and vertically arranged and secured together to define the frame work of a wall, panels or the like adapted to fit within the openings in the framework, and means for securing the panels to the framework.

Referring to the drawings, there is illustrated in FIGURE 2 a typical and representative intersection of a horizontal member and a vertical member of a wall system incorporating the principles of the present invention. As can be seen in FIGURES 1, 2, and 3, the basic components of the wall system of the present invention are vertically extending frame members 10, horizontally extending frame members 12, only one of each of which is shown, outside stop members 14, inside stop members 16, panels 18, and connectors 20 (FIGURE 3).

Horizontal frame members 12 and vertical frame members 10 may be identical in basic construction and cross-sectional configuration, so identical reference numerals will be used to indicate the various details of construction of each. In the embodiment illustrated, each of the frame members is generally rectangular in cross-section, having a hollow core 22, inside and outside faces 24 and 26, respectively, and attaching surfaces 28 and 30. By "inside" is meant inside the building defined by the wall, and by "outside" is meant outside the building. Each of surfaces 28 and 30 are provided throughout their lengths with three parallel elongated flanges 32, 34, and 36, which in the disclosed embodiment have outer surfaces lying in a common plane. Flanges 32 and 36 are undercut slightly, as at 38 and 40, and flange 34 is undercut along the opposite edges thereof as at 42 and 44. A first pair of opposed surfaces is defined by undercut portions 38 and 42, and undercut portions 44 and 40 define a second pair of opposed surfaces. In the embodiment illustrated, flange 32 is centrally disposed on each of the frame members and flanges 32 and 36 are located at the outer edges thereof. As will be appreciated, the frame members are of a cross-sectional shape which has high strength and is ideally suited to being extruded, a highly economical manufacturing operation.

These frame members may be secured together in any desired arrangement in a manner best illustrated in FIGURE 3, utilizing connectors 20, which also bear a major portion of the weight of the panels and horizontal frame members. As can be seen, each connector 20 is a substantially solid member having a cross-sectional configuration equal in size and shape to hollow core 22 of the frame members. In addition, it is provided with a pair of horizontally disposed openings 46 and 48, and a pair of vertically disposed threaded openings 52 and 54. Connector 20 is of solid configuration for the one-half of its length which extends between flanges 36 and 34 of vertical frame member 10, for sealing purposes as will be more apparent hereinafter, but is hollowed out, as at 50, at its other end to conserve metal. For economical fabrication connector 20 is of a shape ideally suited for extrusion in a direction parallel to the axes of openings 46 and 48.

As can be seen in FIGURES 3 and 4, where it is desired to secure a pair of aligned horizontal frame members to opposite sides of a vertical frame member, a pair of connectors 20 are used together. In this case they are positioned on opposite sides of vertical frame member 10 and tightly secured thereto by means of a pair of bolts 46 and 58 passing through openings 46 and 48, respectively, in one connector, appropriately located holes in the vertical frame member, and openings 46 and 48, respectively, in the other connector. Between each of the connectors and vertical frame member in the region between flanges 34 and 36 on each side of the latter, there is provided a resilient sealing gasket 60. This gasket, which extends above and below each connector 20 to engage the end of horizontal frame member 12, prevents moisture or other liquid from traveling down the inside one-half of the attaching surfaces of the vertical frame member, i.e., the portions thereof disposed between flanges 34 and 36. To complete the seal thus formed, slightly more than the inside one-half of the end of each of the horizontal frame members is coated with a suitable sealant, as indicated at 62 in FIGURE 3, just prior to assembly. In addition, sealant is provided between the flat outer surface of flanges 34 and the portions of connectors 20 which abut thereagainst.

As will be appreciated, the resulting construction is such that it is impossible for any water or other liquid disposed either on the upper surface of the horizontal frame members or within the core thereof to leak to the inside of the building. In addition, to further insure against the leakage of water into the building, the inside halves of the upper attaching surfaces of each of the horizontal members, i.e., the portions between flanges 34 and 36, are provided along their lengths with a plurality of spaced weep holes 63. In the event that water or any other liquid collects on these surfaces, such as due to condensation or the like, such liquid will drain through weep holes 63 so that there is no likelihood of it rising high enough to leak over flange 36 into the building. The liquid which drains through the weep holes into core 22 of the horizontal frame members may thus pass down the attaching surface portions of the vertical frame members disposed between flanges 32 and 34 thereon, from which it eventually flows or drains into the lowermost horizontal frame members in a manner to be described hereinafter. In no case can such liquid pass to the inside of the building.

The framework for the entire wall is thus very simply constructed in the above-described manner, only two bolts being necessary at each junction of a pair of horizontal frame members and a vertical frame member, the location and number of such junctions being up to the designer. If only one horizontal frame member is to be joined to a vertical frame member at a given elevation, only one connector is used and it is bolted directly to the vertical member. If desired, the entire framework may be entirely prefabricated and shipped assembled, or preferably, to reduce transportation costs, it can be shipped to the construction site in a knocked-down condition with all the vertical and horizontal frame members cut to length, and if desired, all the connectors 20 sealed and secured to the vertical members at the appropriate places.

Each of the horizontal frame members is tightly secured in place by means of suitable flat head machine screws 64 which are adapted to pass through countersunk holes 66 in each of the horizontal frame members adjacent the ends thereof into threaded engagement with threaded openings 52 and 54 in each connector. To insure positive sealing, countersunk holes 66 may be located very slightly farther from the end edge of their horizontal frame member than are threaded openings 52 and 54 from the outer surfaces of flanges 32, 34, and 36 of the vertical frame member. With this arrangement, as screws 64 are tightened, the conical surface on the head

thereof will tend to cam the horizontal frame member into the tightest possible engagement with the vertical frame member.

Although many arrangements are possible, there is illustrated in FIGURE 5 one method by which the wall thus formed can be secured at its bottom to the building foundation, which method makes provision for the drainage of liquid which may have collected in and on the various frame members. As can be seen, the lowermost frame member may be secured to the front edge of the building foundation, indicated at 68, by means of a plurality of suitably spaced bolts or the like 70 which pass from the core of the frame member through the bottom wall thereof into the foundation. For sealing purposes there may be provided a suitable sheet of gasket material 72 between the frame member and the foundation, and the forward edge thereof may be provided with suitable caulking compound 74. This lowermost frame member may be identical in construction to all the other frame members, with the exception that it is provided with a plurality of holes through which bolts 70 may pass, a plurality of corresponding access holes 76 for reaching the bolts 70, and a plurality of weep holes 78 through the bottom wall thereof in the region which projects forwardly of the foundation. Thus, any water or other liquid which collects in the frame system will eventually flow down the outside surfaces of the vertical frame members, between flanges 32 and 34, to the lowermost horizontal frame member, from which it will drain through weep holes 78 to the ground therebeneath.

The next step in construction concerns the addition of panels to the framework thus completed. As noted above, these panels may be of any shape, design, configuration or type. For example, such panels might include glass windows, either double or single glazed, transparent or translucent, colored or noncolored plastic panels, panels of aggregate or cement or wood, or laminate panels, etc. The thickness of the panels is also immaterial so long as it is substantially uniform around the periphery of a given panel, and less than the width of an entire frame member. As mentioned above, each panel is secured within an opening defined by the framework by means of suitable stop members 14 and 16.

These stop members are mounted about the periphery of each opening defined in the framework, one set on the outside of the building between flanges 32 and 34, and another set on the inside of the building between flanges 34 and 36, the panels adapted to be positioned and secured therebetween. The inside and outside stop members may be of any cross-sectional configuration, so long as they are provided with substantially parallel spaced edges adapted to engage the opposed surfaces defined between ribs 32 and 34, and 34 and 36, and so long as these edges are resilient with respect to each other so that they can be snapped into place and resiliently maintained there. Flanges 32, 34, and 36 on the frame members thus have a dual function in that they provide the major load bearing surfaces between frame members, as well as mounting means for the stop members.

As can be seen, all of the stop members are provided along one edge thereof with elongated locking lips or flanges 80 adapted to engage undercut portions 38 or 40, with substantially vertical portions 82 having a channel 84 defined therein, and along the other edge thereof with a locking lip or flange 86 adapted to engage undercut portions 42 or 44. Lips 80 and 86 project outwardly in the opposite direction, as can be seen, to lockingly engage grooves 38 and 42, respectively, or grooves 44 and 40, respectively. The stop members may be assembled into place by simply engaging lip 86 with the appropriate undercut portion of the frame member and then pushing the entire stop member toward the center of the frame member until lip 80 snaps into engagement with the appropriate corresponding undercut portion. The holding members are thus self-locking and do not re-

quire the use of troublesome springs. Also they can be locked in place without first mounting the panels. Channels 84 are adapted to receive elongated seals 88, which are of generally conventional construction. Although channels are illustrated, other means may be utilized to secure seals 88 to the stop members. In the present system, however, the seals may be inserted into the channels in the stop members in a relaxed state prior to their final assembly. Therefore, since the seals are relaxed they cannot later contact and cause leakage, as might occur if they were rolled, i.e., stretched into place after both sets of stop members and the panels were assembled.

To complete the assembly of the panel to the framework, it is only necessary to snap into place all of the outside stop members or all of the inside stop members about the periphery of a given opening, then insert the panel, and then from the opposite side to the wall snap into place the opposite set of stop members, thus compressing the seals against the panels to secure and seal them. One of the important advantages of the present system is that the panels may be thus inserted and secured in place from either side of the wall by one workman.

The particular cross-sectional configuration of each stop member depends on the thickness of the panel being mounted as well as the appearance desired. Thus, if relatively thin panels are to be mounted, such as panes of glass or the like, the stop members may be shaped similar to the ones indicated at *a* in FIGURE 2. On the other hand, if a thicker panel is to be used, such as illustrated at the bottom of FIGURE 2, the outside stop member may be of the same configuration as those indicated at *a*, and the inside one may be of a configuration similar to the one indicated at *b*. With this arrangement the outside surfaces of all the panels will lie in a common plane, for the sake of appearance, regardless of their thickness. It will also be noted that stop member *b* is more rectangular in configuration than stop members *a* as might be desired simply for appearance sake.

As can thus be seen, the wall system of the present invention is extremely versatile in application. In addition to the variations disclosed, a number of other variations are possible. For example, if expansion joints are required certain of the vertical frame members may be formed in two parts each telescopically joined together, Corner frame members for a building may be extruded of a generally square cross-sectional configuration with the three necessary flanges formed on adjacent faces rather than opposite faces. Doors may be located in a given frame defined by the framework in lieu of a panel, such as shown in FIGURE 1, simply by forming one set of stop members as a door stop and modifying the stop members along one side of the opening to provide for mounting the door hinges to the adjacent vertical frame member. Windows which can be opened may be substituted in lieu of panels by simply having the stop members engage the frame of the window assembly rather than the window itself. For appearance the stop members themselves may be colored. Many other modifications and variations will of course present themselves to one skilled in the art.

Thus, there is disclosed in the above description and in the drawings an exemplary embodiment of the invention which fully and effectively accomplishes the objects thereof. However, it will be apparent that variations in the

details of the construction may be indulged in without departing from the sphere of the invention herein described, or the scope of the appended claims.

I claim:

1. A wall system comprising: a plurality of horizontally and vertically disposed hollow core frame members defining framework openings, each of said frame members having attaching surfaces; connecting means securing said frame members together, said wall system having an inside portion and an outside portion; panel means positioned within the openings in the frame work; means maintaining said panel members in position; weep holes extending from the upper surface of each of said horizontally disposed frame members to the hollow core thereof along the inside portion of said wall system; means limiting fluid communication between the hollow core of each horizontally disposed frame member and the attaching surface of each adjacent vertically disposed frame member to only the outside portion of said wall system, said last-mentioned means including sealing means extending between said hollow core of each of said horizontally disposed frame members and the attaching surface of each of said adjacent vertically disposed frame members and between the end of the upper surface of each of said horizontally disposed frame members and the attaching surface of each of said adjacent vertically disposed frame members on the inside portion of the wall system whereby any liquid which may collect on the horizontally arranged frame members on the inside portion of said wall system is communicated down the outside portion of the wall system by said adjacent vertically arranged frame members.

2. A wall system as defined in claim 1 wherein said attaching surfaces include means defining a first flange; means defining a second flange; means defining a third flange intermediate said first and second flanges, said third flange dividing said wall system into said inside and outside wall portions; means defining a first pair of opposed facing gripping surfaces on said first and third flanges, respectively; means defining a second pair of opposed facing gripping surfaces on said second and third flanges, respectively, all of said gripping surfaces on each frame member being substantially parallel to one another; said means maintaining said panel members in position including a plurality of elongated stop members, each of said stop members having panel engaging means and a pair of lips generally parallel and flexible with respect to one another, said pair of lips resiliently engaging a respective pair of said gripping surfaces to resiliently hold said stop member in place; said panel members positioned and secured in said framework between the stop members held by said first pair of gripping surfaces and the stop members held by said second pair of gripping surfaces.

References Cited by the Examiner

UNITED STATES PATENTS

2,914,145	11/1959	Benson	189—34
2,963,126	12/1960	Cudini	189—34
2,985,262	5/1961	Hildebran	189—34
3,016,993	1/1962	Owen	189—34

FRANK L. ABBOTT, *Primary Examiner*.

RICHARD W. COOKE, JR., JACOB L. NACKENOFF,
Examiners.