

March 6, 1973

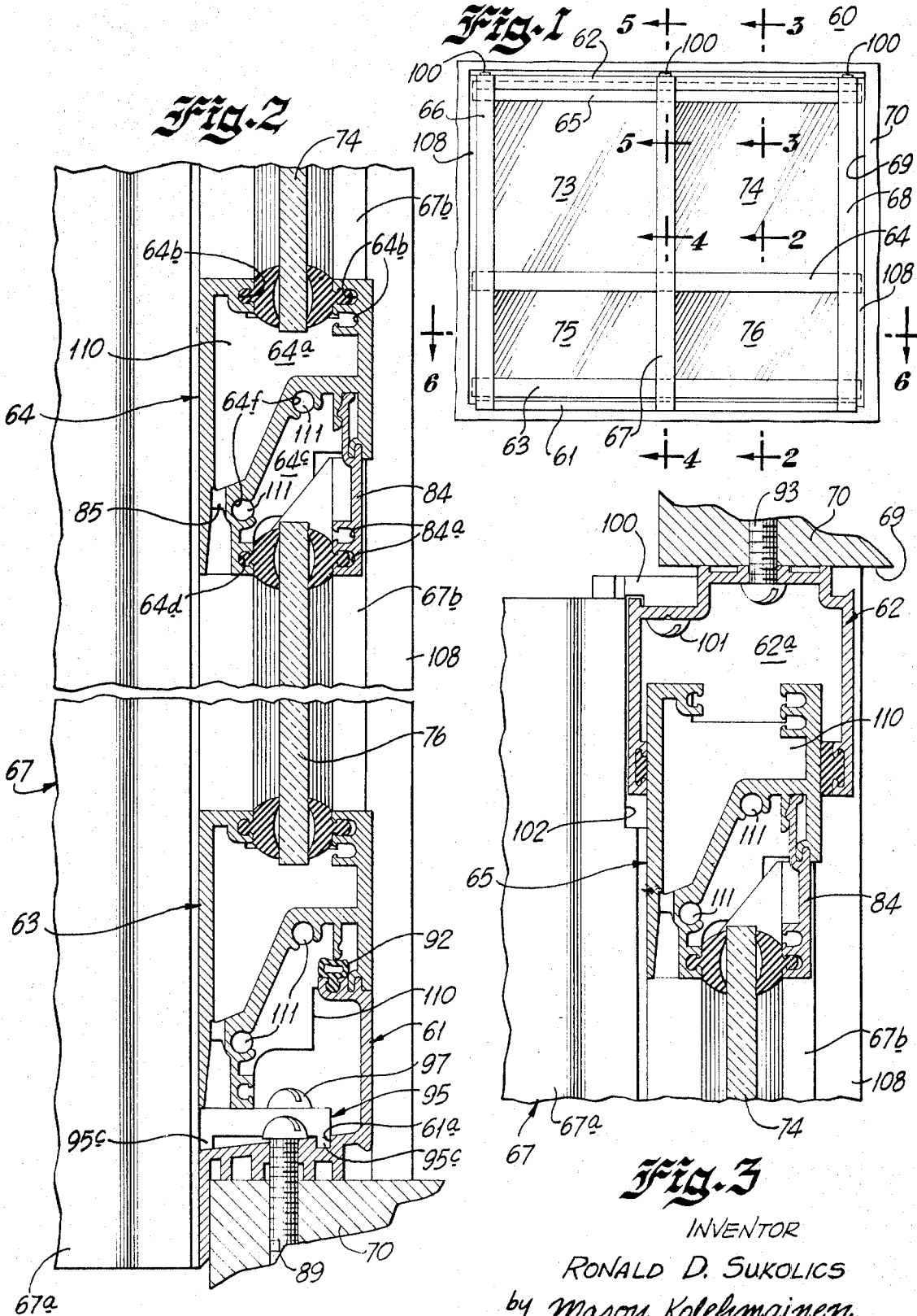
R. D. SUKOLICS

3,719,014

WALL SYSTEM

Filed Aug. 3, 1971

18 Sheets-Sheet 1



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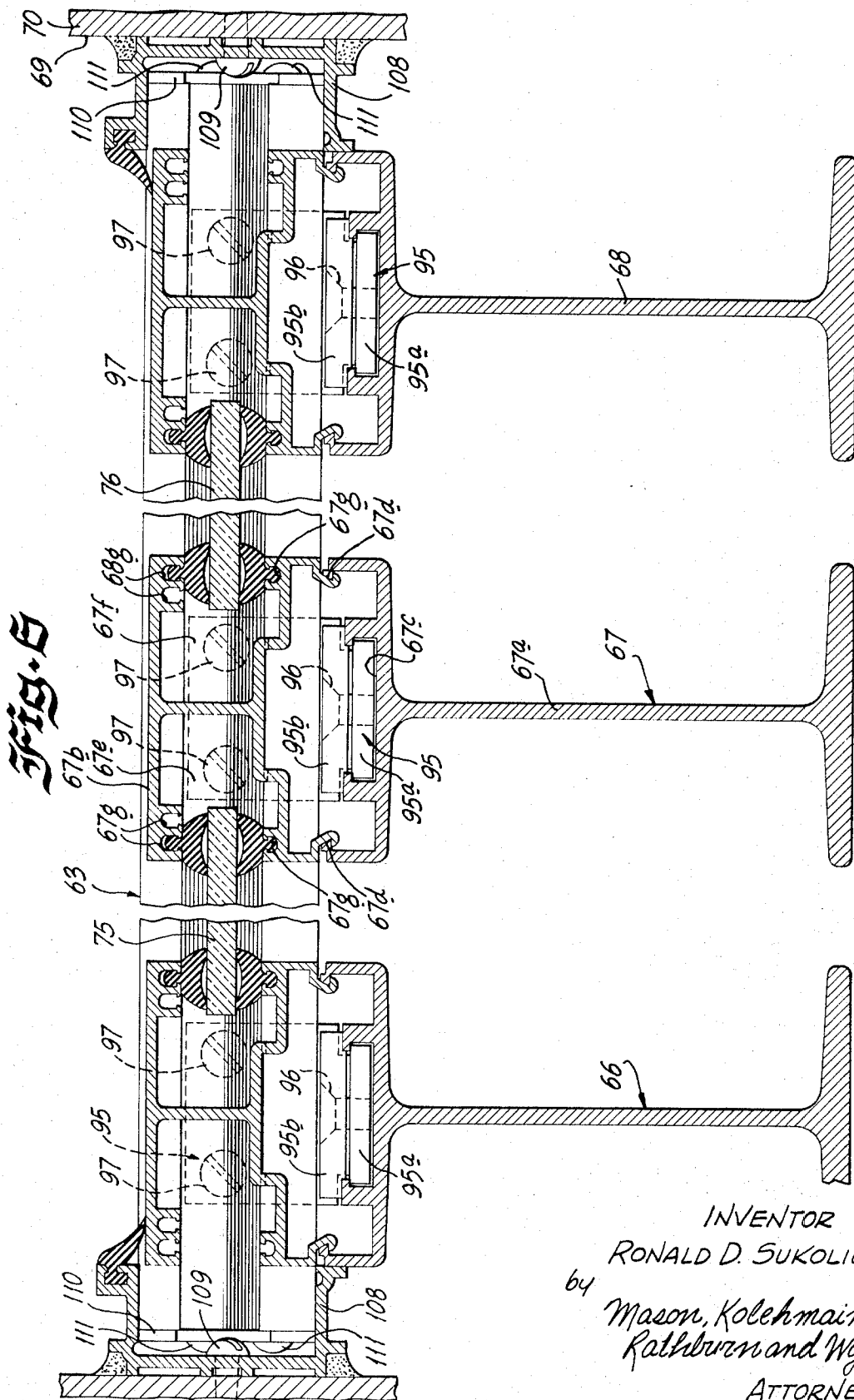
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18 Sheets-Sheet 3



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R. D. SUKOLICS

3,719,014

WALL SYSTEM

Filed Aug. 3, 1971

18 Sheets-Sheet 4

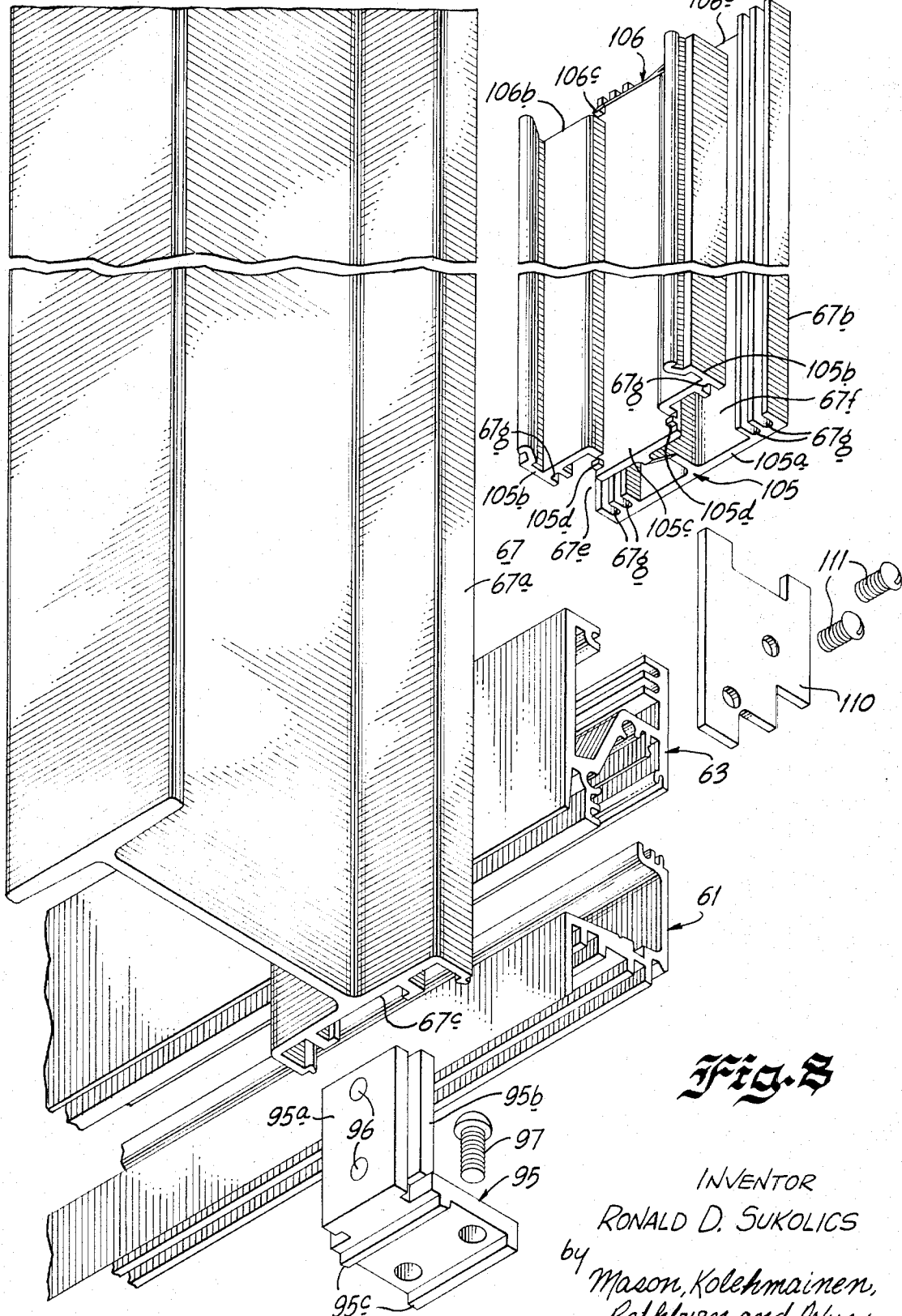


Fig. 3

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3,719,014

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Filed Aug. 3, 1971

18 Sheets-Sheet 5

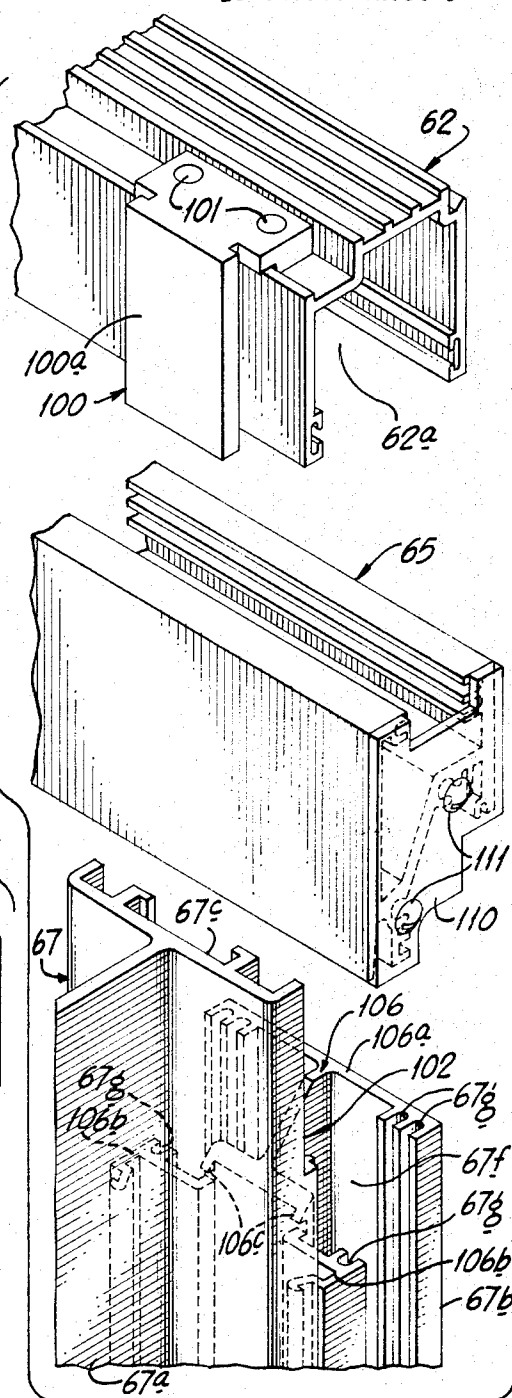
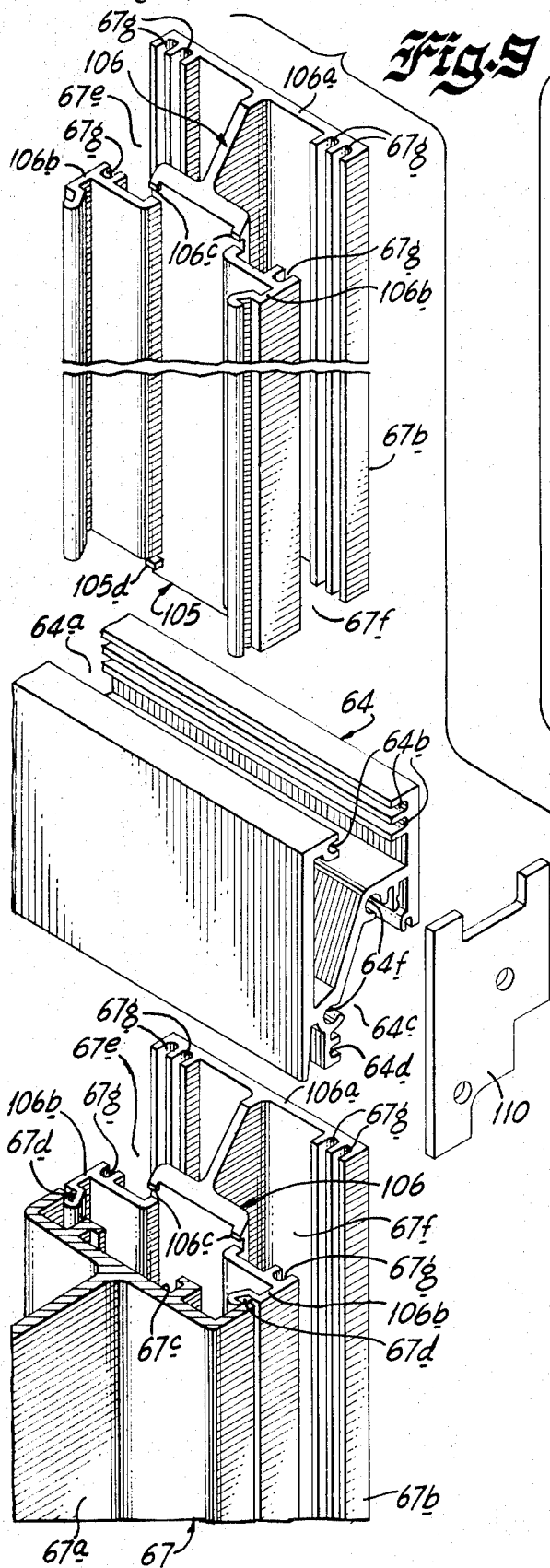


Fig. 10

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R. D. SUKOLICS

3,719,014

WALL SYSTEM

Filed Aug. 3, 1971

18 Sheets-Sheet 6

Fig. 11

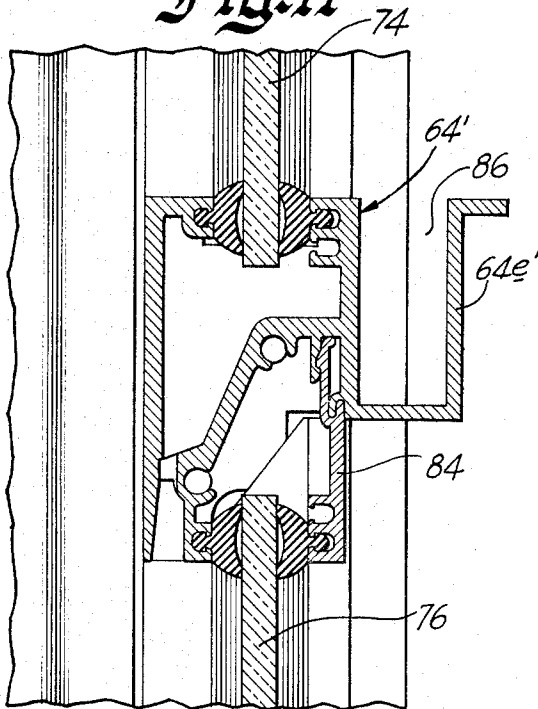


Fig. 12

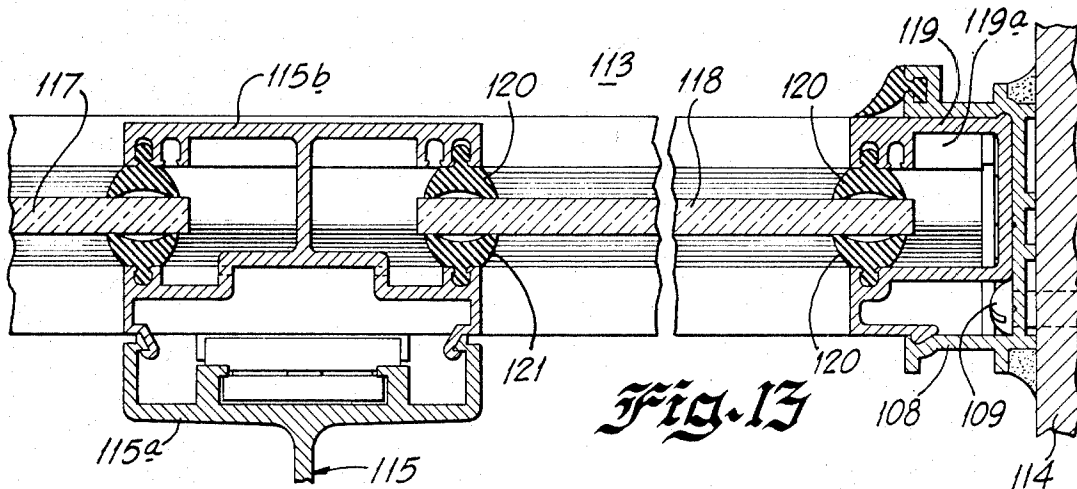
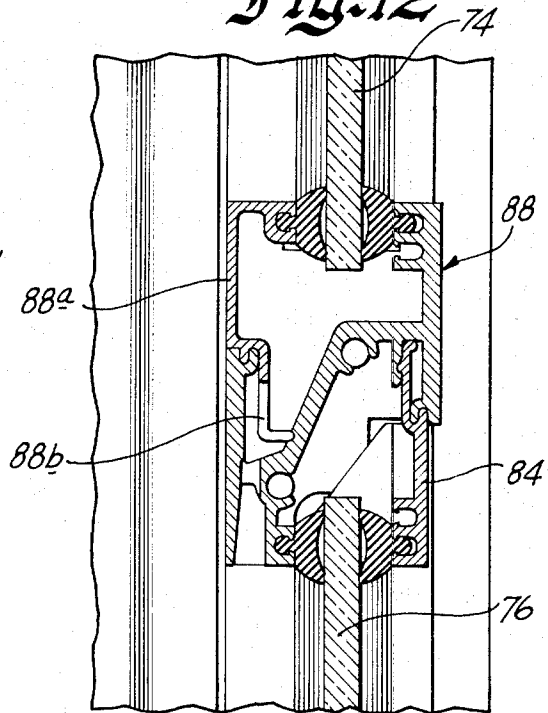


Fig. 13

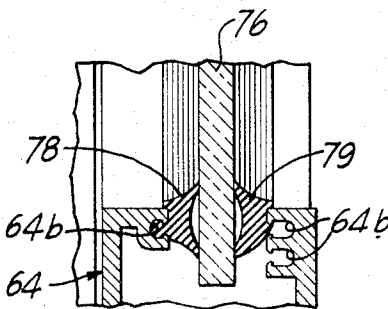


Fig. 14

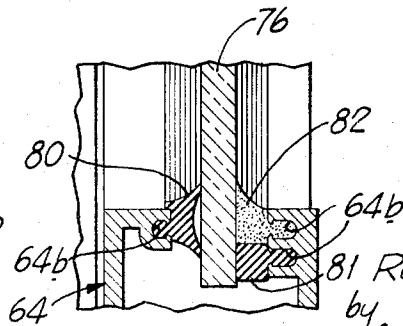


Fig. 15

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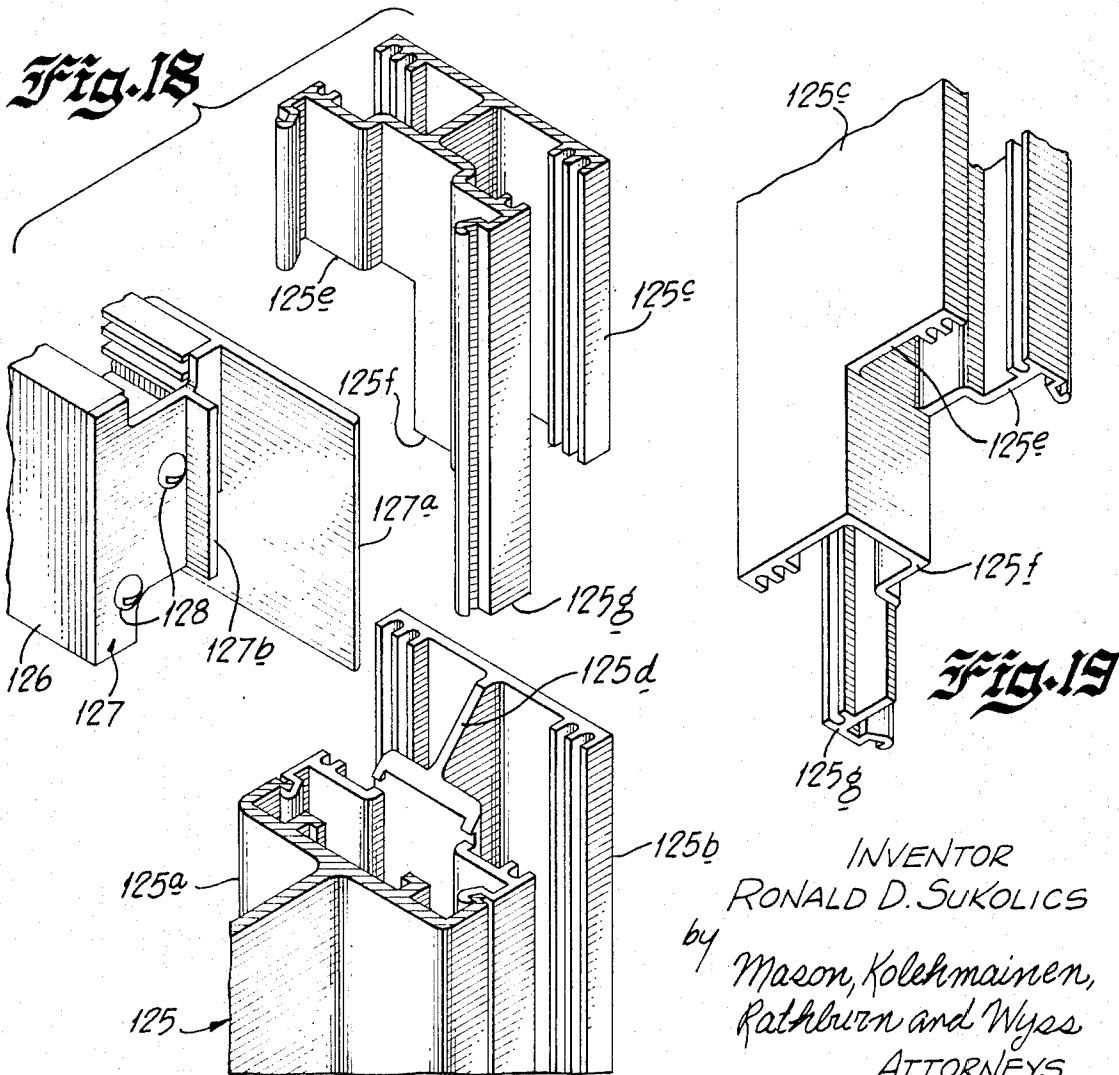
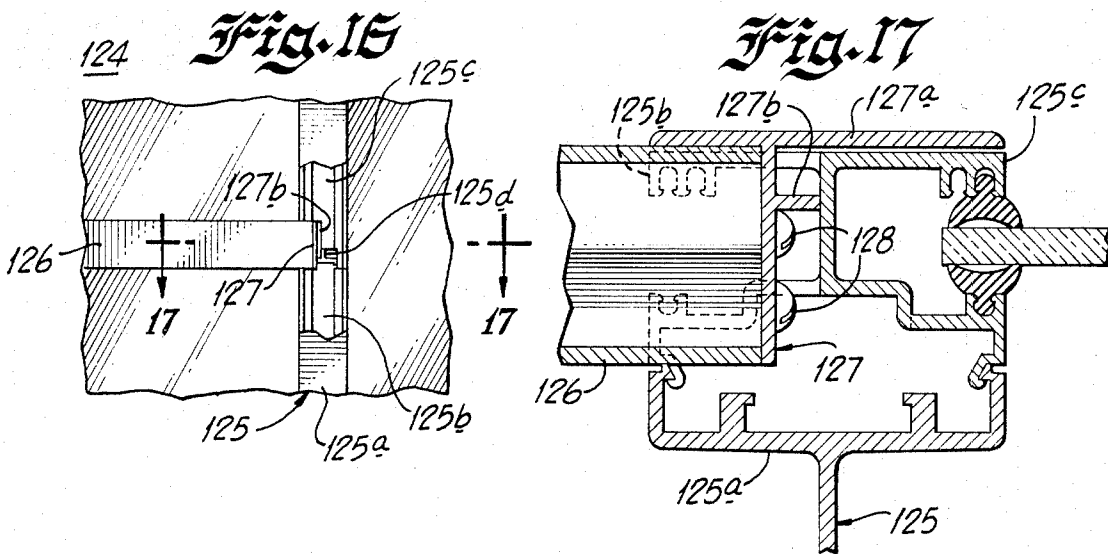
R. D. SUKOLICS

3,719,014

WALL SYSTEM

Filed Aug. 3, 1971

18 Sheets-Sheet 7



March 6, 1973

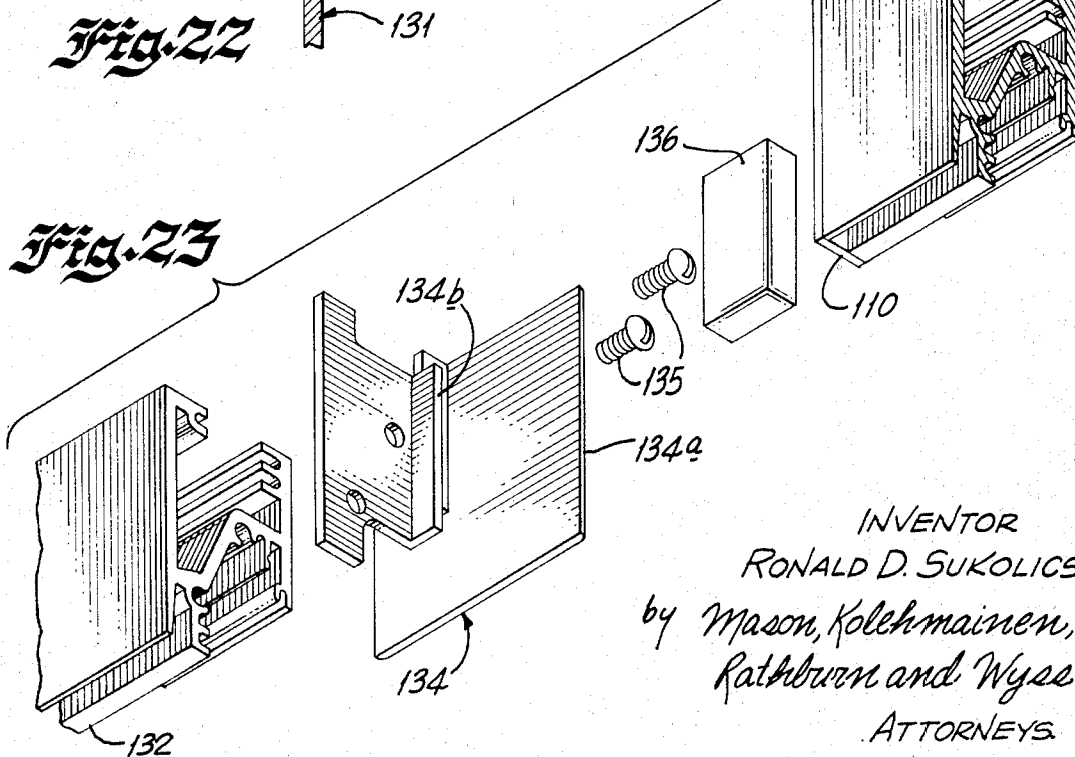
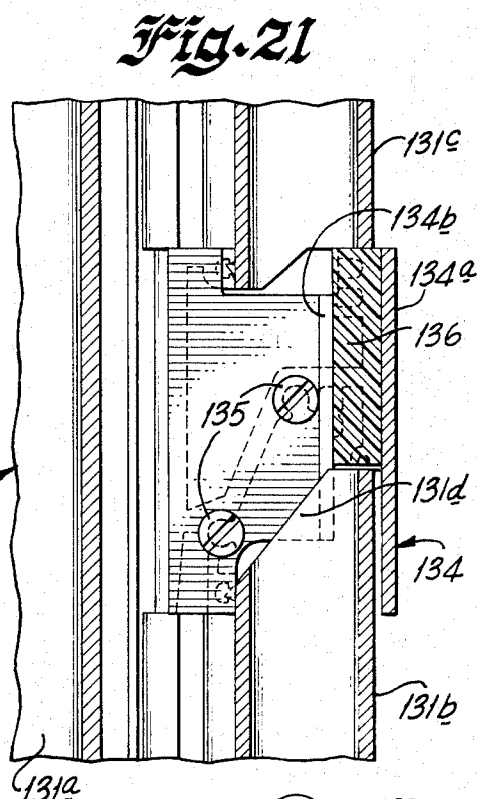
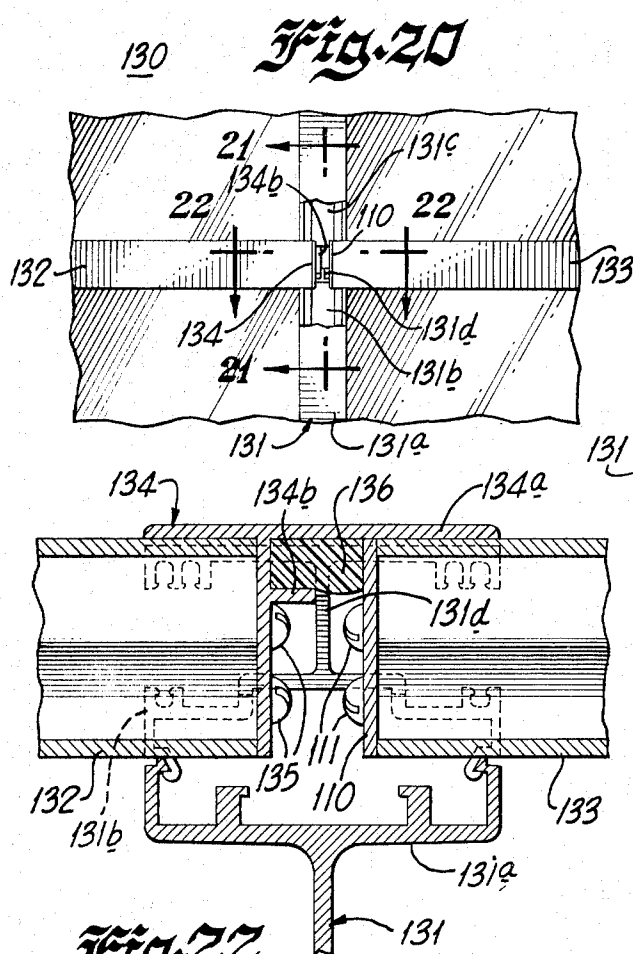
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Filed Aug. 3, 1971

18 Sheets-Sheet 8



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WALL SYSTEM

Filed Aug. 3 1971

13 Sheets-Sheet 9



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3,719,014

WALL SYSTEM

Filed Aug. 3, 1971

18 Sheets-Sheet 10

Fig. 27

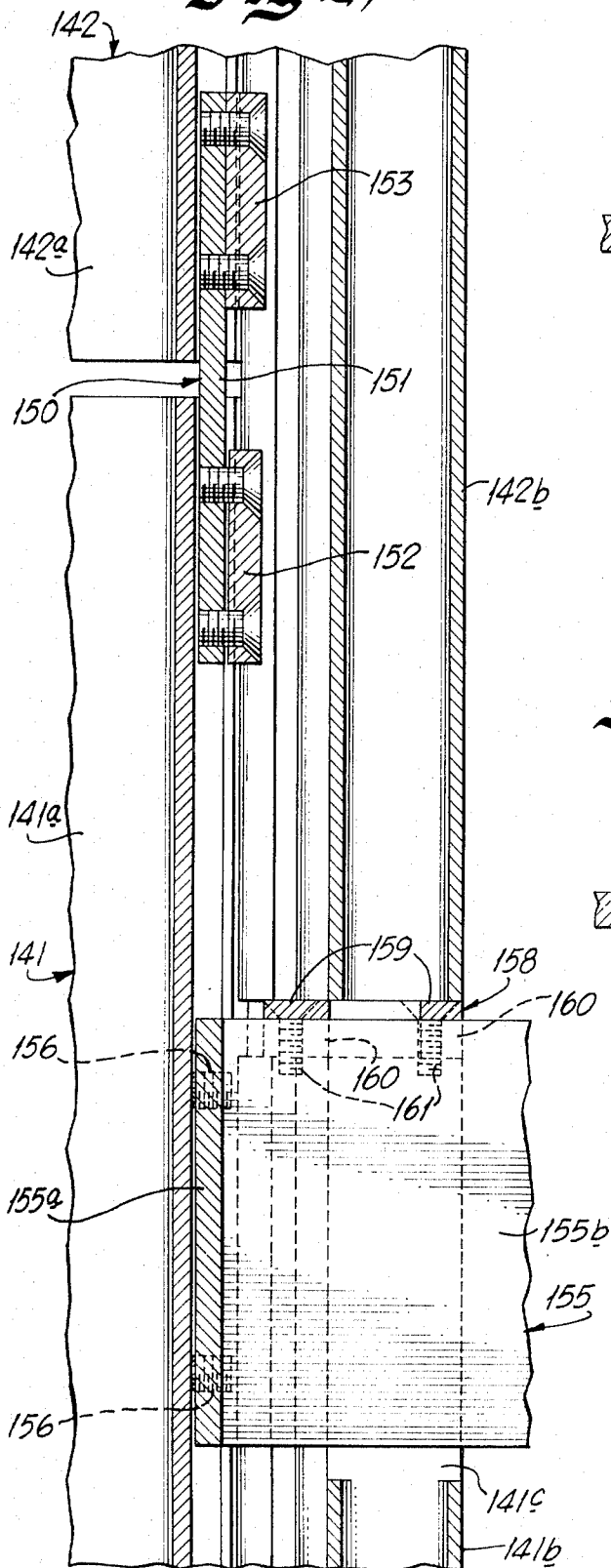


Fig. 25

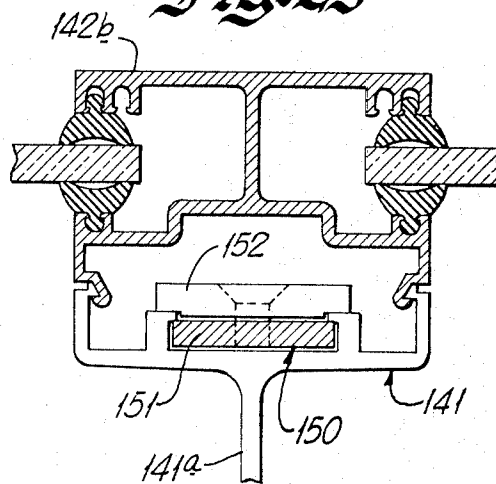
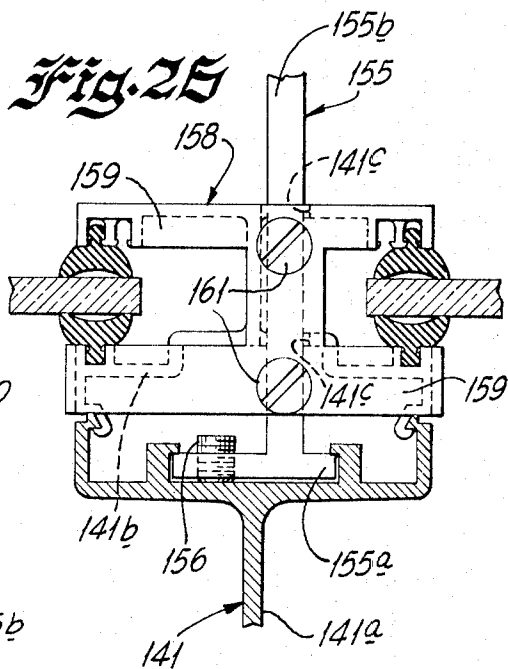


Fig. 25



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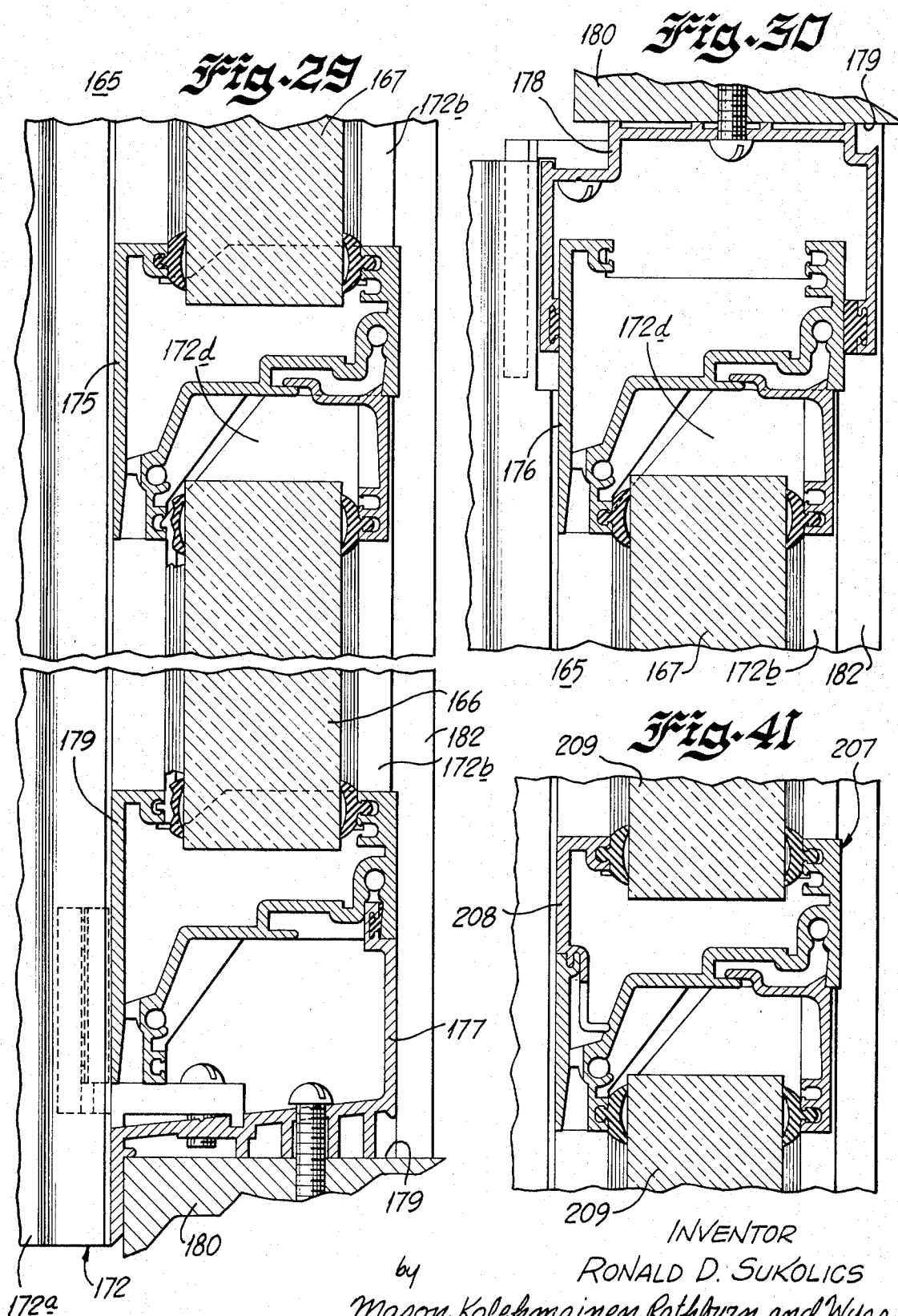
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WALL SYSTEM

Filed Aug. 3, 1971

18 Sheets-Sheet 11



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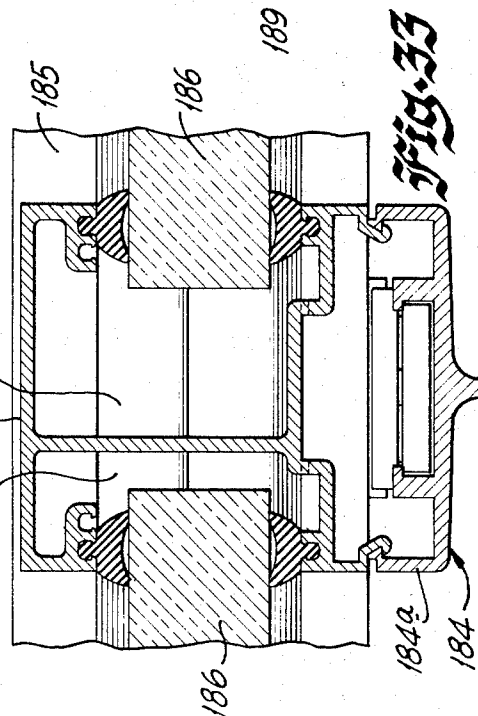
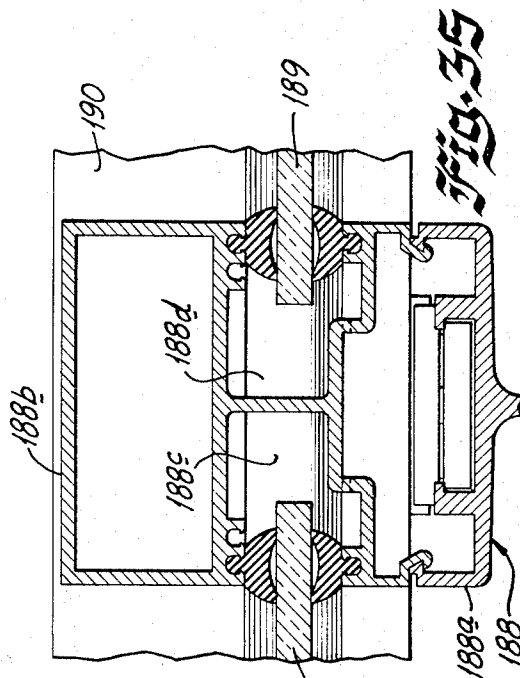
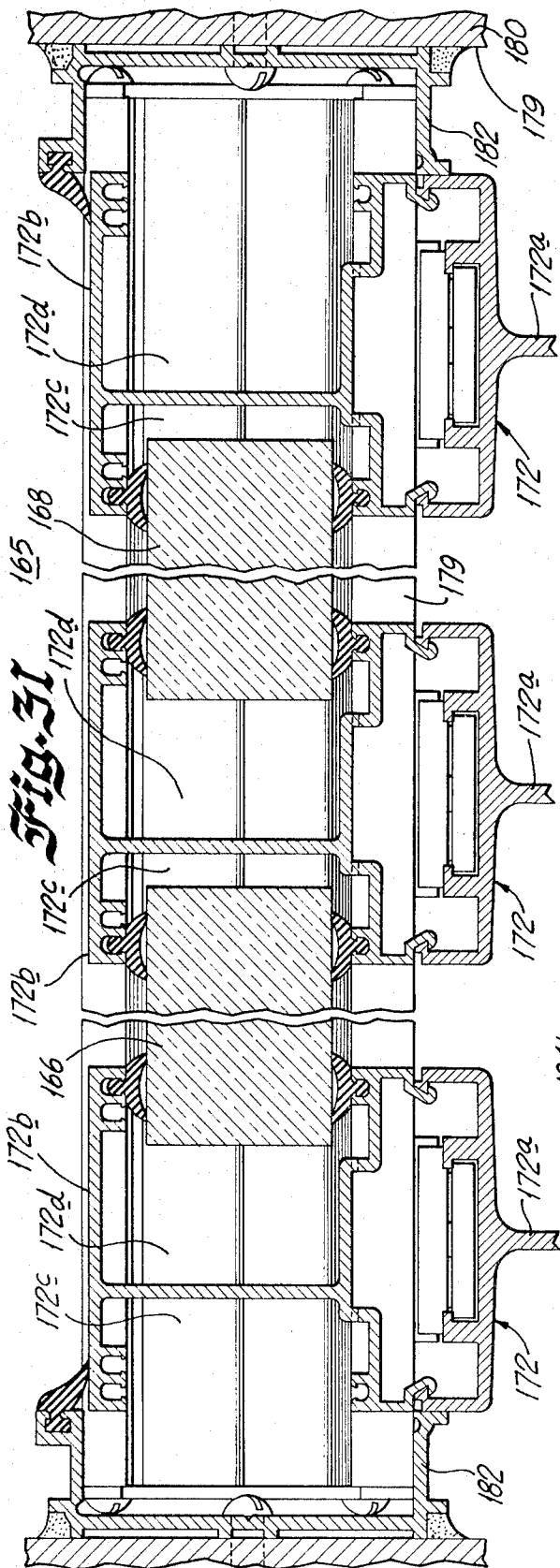
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3,719,014

WALL SYSTEM

Filed Aug. 3 1971

18 Sheets-Sheet 12



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March 6, 1973

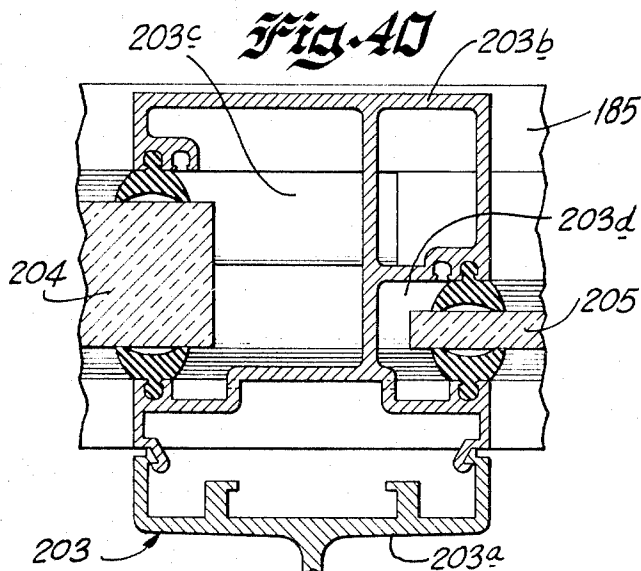
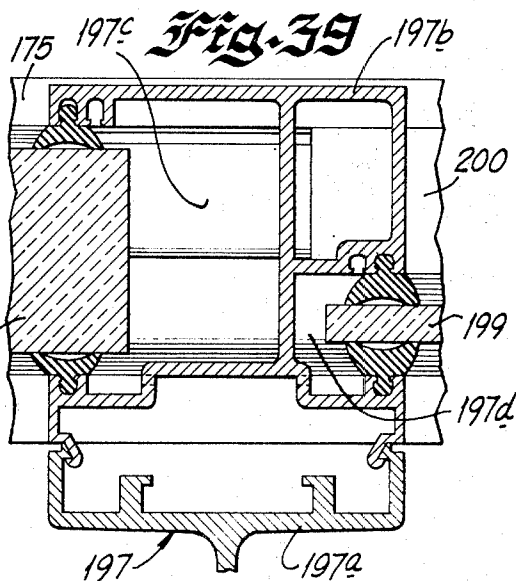
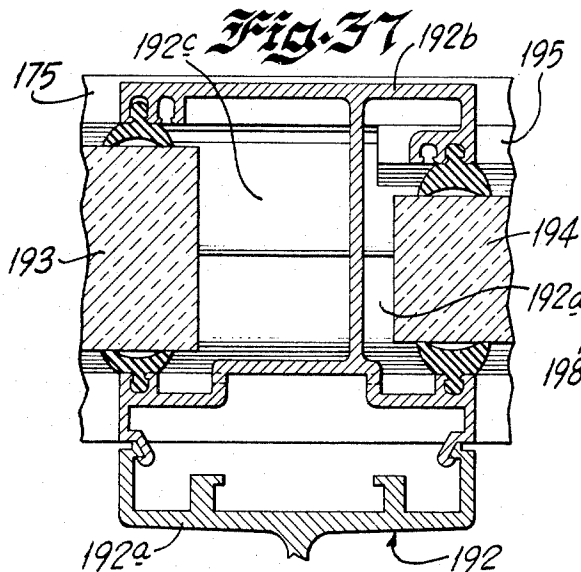
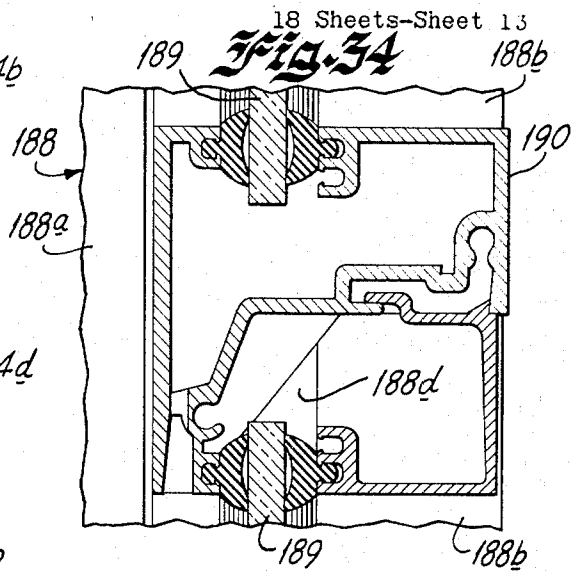
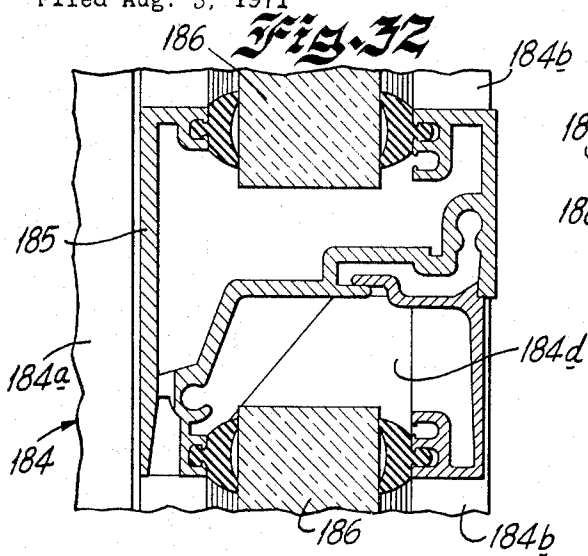
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3,719,014

WALL SYSTEM

Filed Aug. 3, 1971

18 Sheets-Sheet 13



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R. D. SUKOLICS

3,719,014

WALL SYSTEM

Filed Aug. 3 1971

18 Sheets-Sheet 14

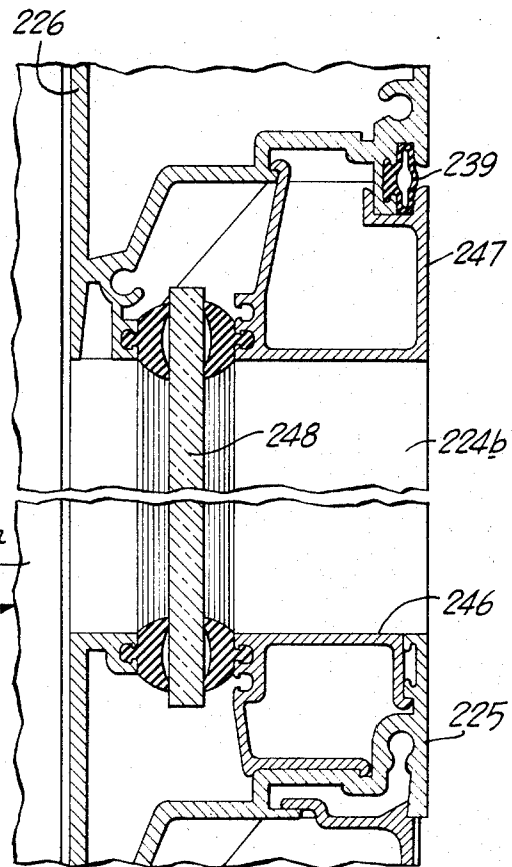
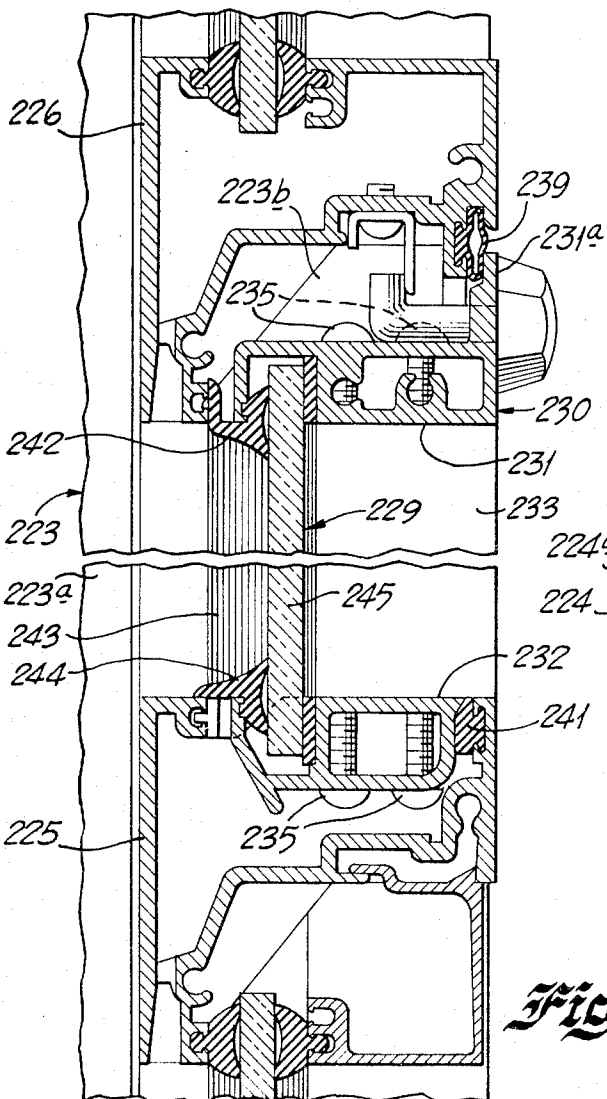
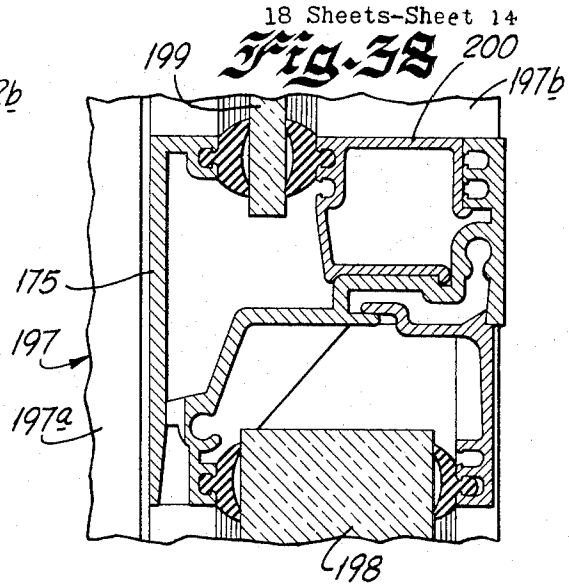
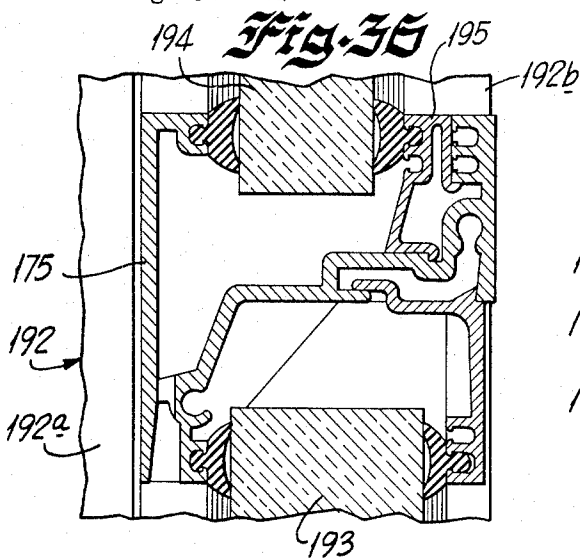


Fig. 44

Fig. 43
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R. D. SUKOLICS

3,719,014

WALL SYSTEM

Filed Aug. 3, 1971

18 Sheets-Sheet 16

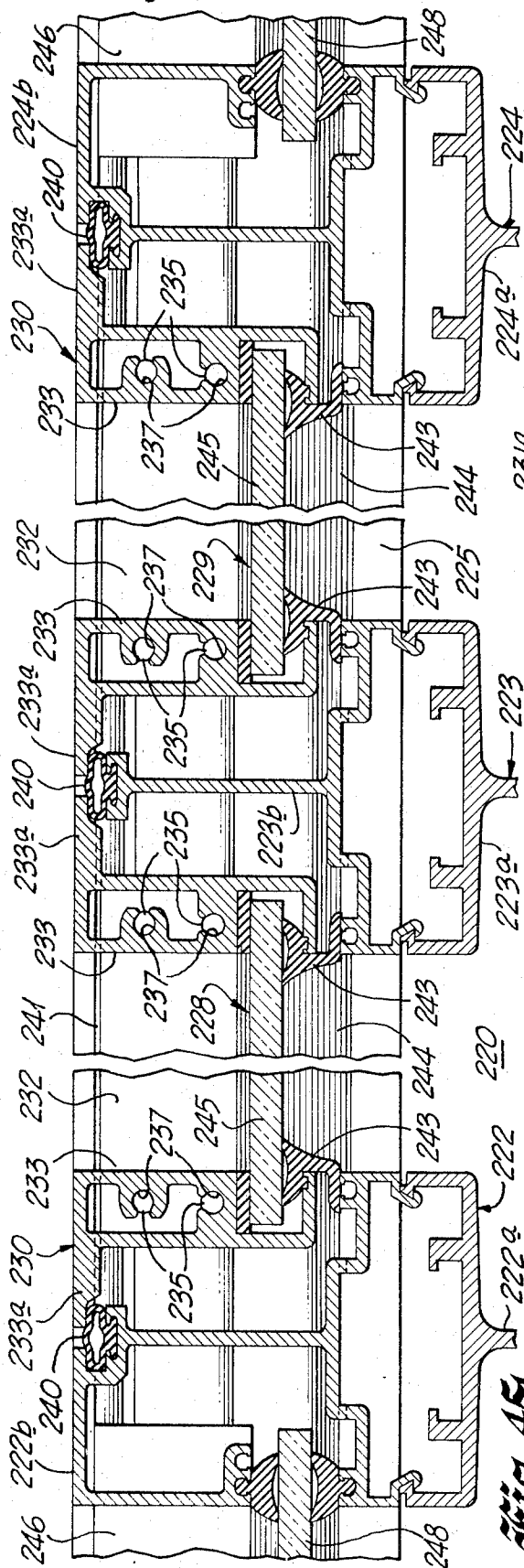


Fig. 45

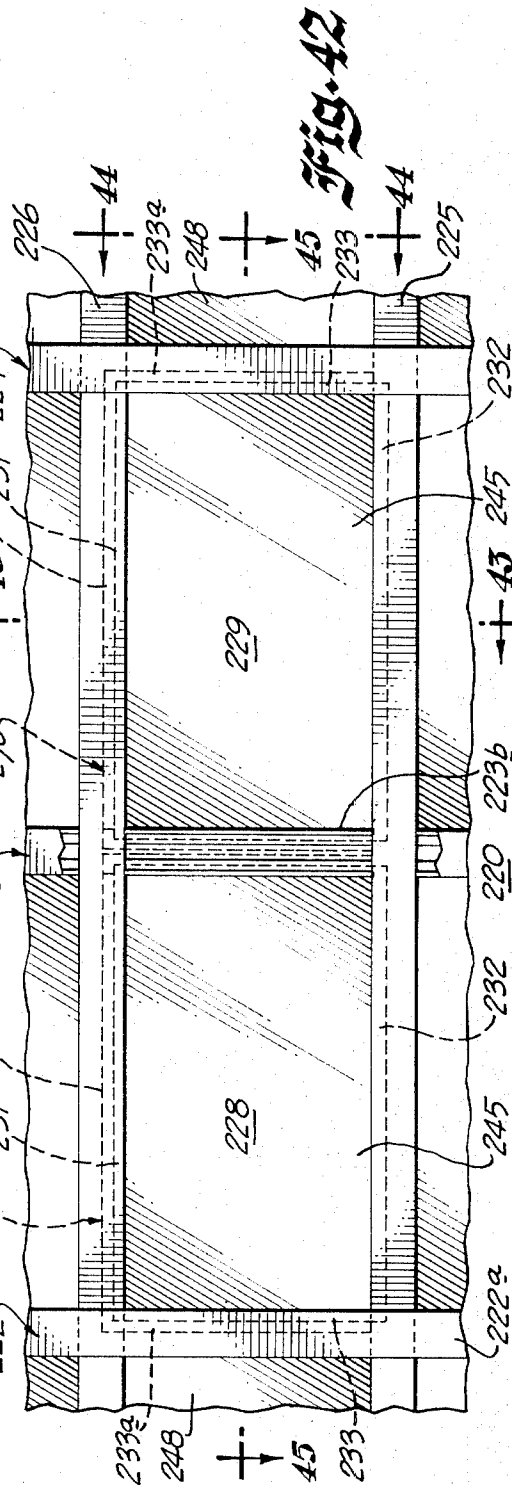


Fig. 42

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R. D. SUKOLICS

3,719,014

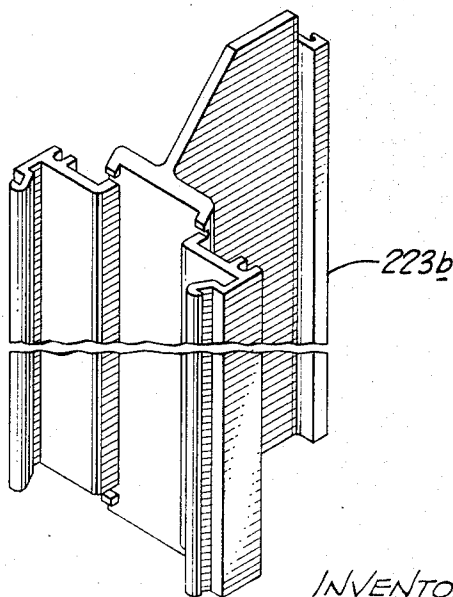
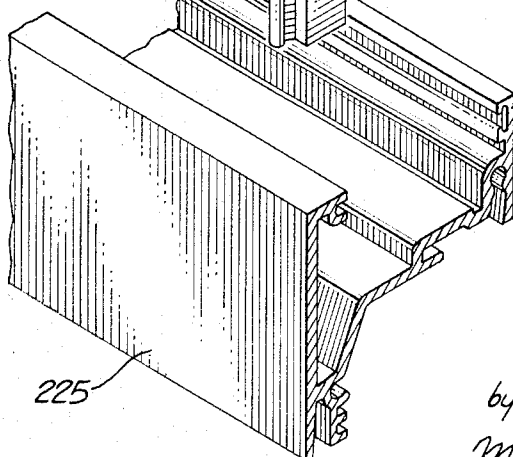
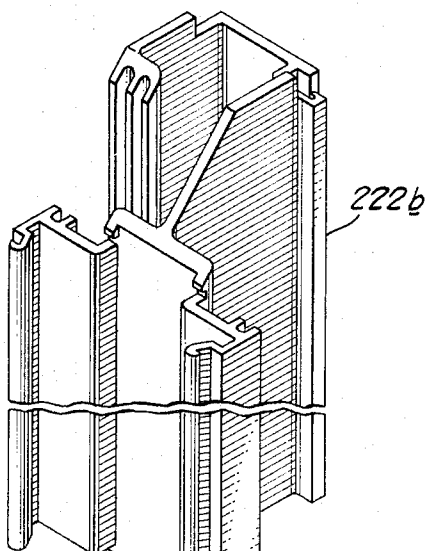
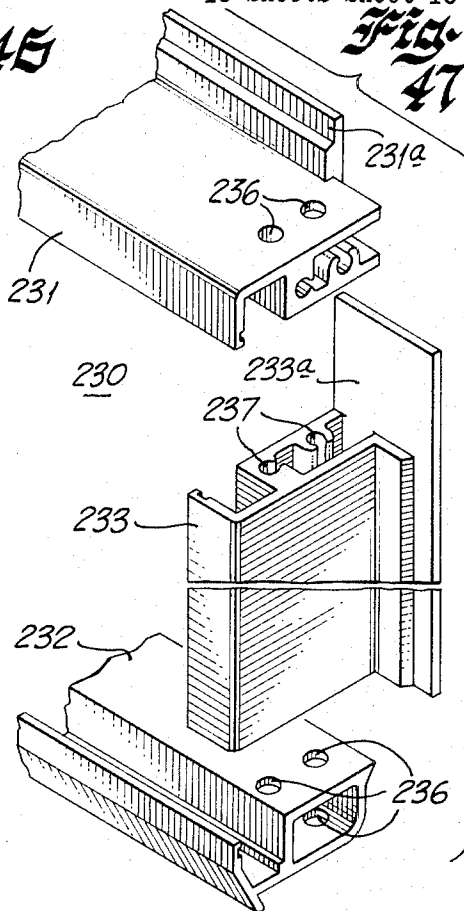
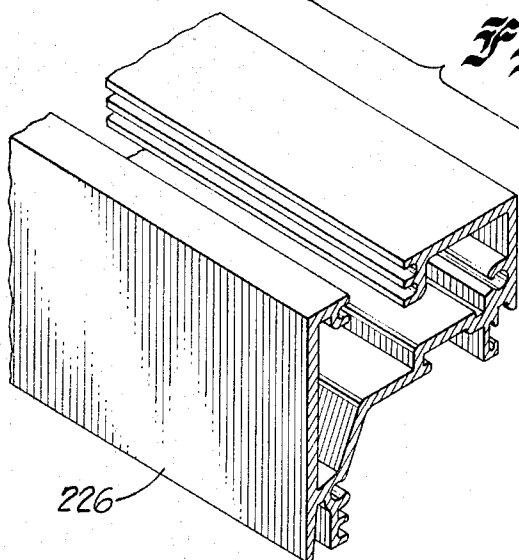
WALL SYSTEM

Filed Aug. 3, 1971

18 Sheets-Sheet 16

Fig. 45

Fig. 47



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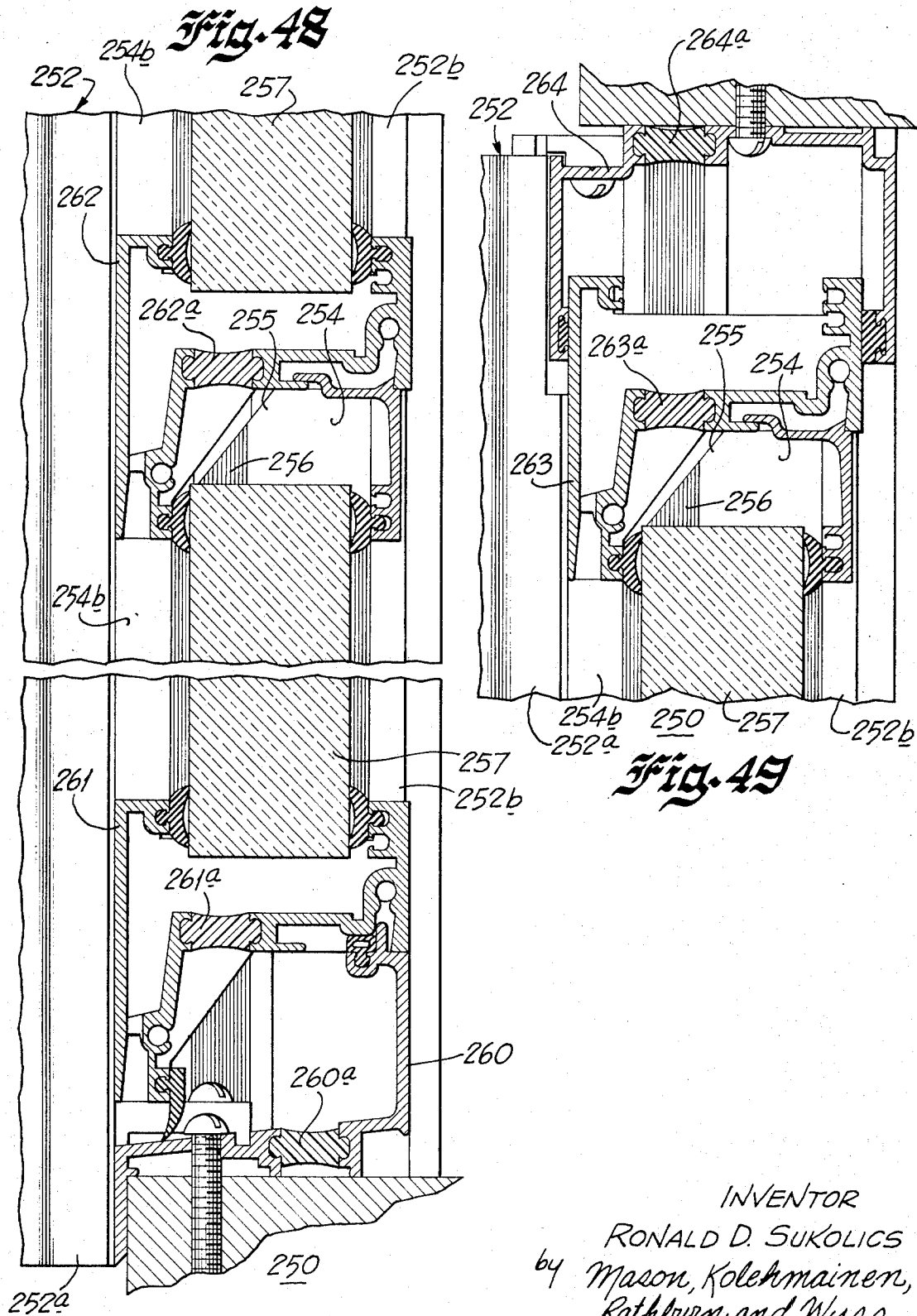
R. D. SUKOLICS

3,719,014

WALL SYSTEM

Filed Aug. 3, 1971

18 Sheets-Sheet 17



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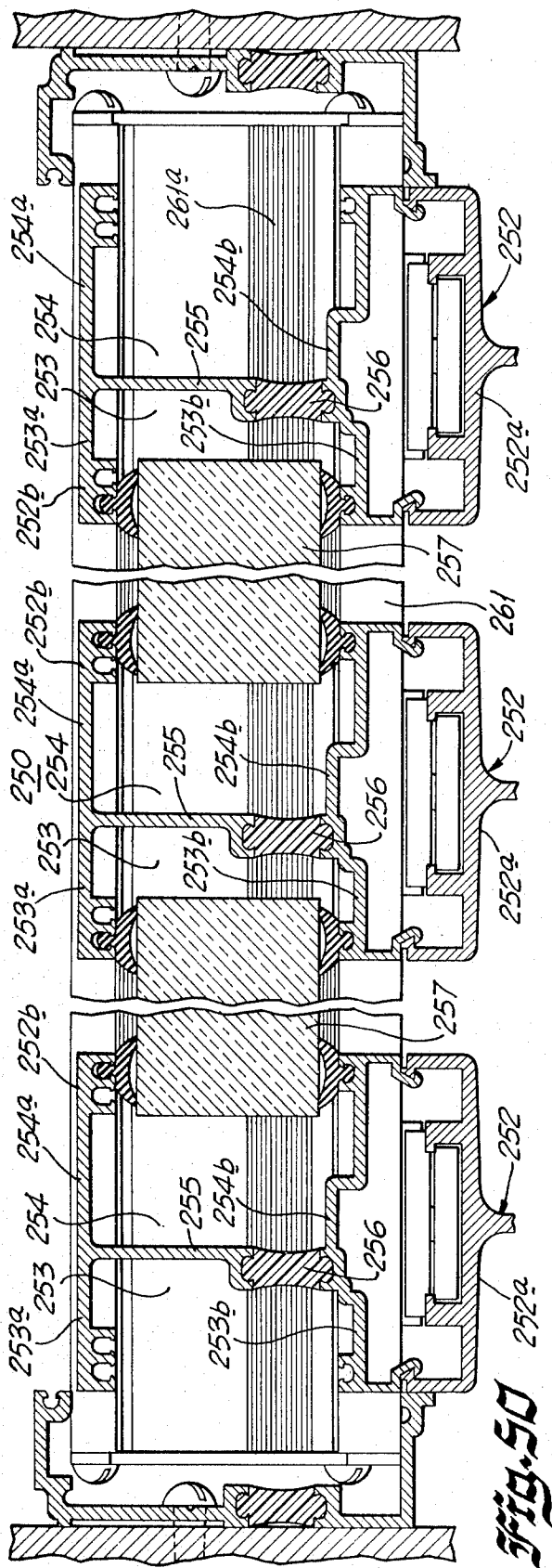
R. D. SUKOLICS

3,719,014

WALL SYSTEM

Filed Aug. 3, 1971

18 Sheets-Sheet 18



1

3,719,014

WALL SYSTEM

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Filed Aug. 3, 1971, Ser. No. 168,610

Int. Cl. E04b 2/88

U.S. Cl. 52—235

14 Claims

ABSTRACT OF THE DISCLOSURE

There is provided an improved wall system wherein the structural portions of the vertical mullions are separate from the remaining portion of the wall. Thus, there is provided a structural mullion portion with horizontal through members wherein the interior mullion portion snaps to the structural mullion portion to lock the through horizontal members in position. The shape of the structural portion may be varied without changing the other members of the system.

The present invention relates to a new and improved wall construction, and particularly, to a new and improved framing system for exterior wall construction for a building and the like.

More specifically, the present invention is directed to a stick wall system for use on single and multi-story buildings. The term "stick wall" as applied to a wall system is defined as one wherein all the components thereof are factory fabricated with a horizontal member running past the vertical members and installed in long lengths. The lengths of the horizontal are limited by the stock lengths available. The factory fabricated components are shipped to the job site in lengths, or sticks. The sticks are assembled piece by piece, into a grid directly on the building. The grid is then glazed from either the inside or outside depending upon job conditions. The spandrel panels may be installed along with the metal if desirable.

In accordance with the present invention, there is provided an improved stick wall system, wherein fabrication savings are obtainable by the elimination of parts, the elimination of fasteners and the holes required for their installation, the elimination of notches in the mullions at the horizontals, and by the fabrication largely on the short pieces of the system, thereby reducing handling problems. Moreover, elimination of notches, commonly present in the mullions at the horizontals retains the full structural potential of the mullion.

Moreover, material savings have been obtained by the elimination of members and by the consolidation of several members, thereby generally resulting in a more efficient structural member with less metal.

Although low cost is desirable in a wall system, other things must be considered. Performance is important. The framing system according to the present invention exceptionally inhibits air infiltration. It's drainage and pressure relief system functions substantially better than the required standards. The wall system provides good appearance and is versatile so as to meet the customers' needs at the lowest cost.

In accordance with the present invention, the wall system also solves two other annoying problems which occur in many wall systems. One is in the entrance area. It is desirable that a framing system or wall construction incorporates readily available entrances. Additionally, the same feature has been carried into the window area in certain embodiments of the present system. A special in-swing window has been designed which does not require the buildup of material common in other systems, and accordingly the sight line does not change in the window area. An object of the present invention is the provision

2

of a new and improved framing system for a wall construction.

Another object of the present invention is the provision of a new and improved stick wall system.

Still another object of the present invention is the provision of a framing system for a wall construction which is economical and which combines good performance, good appearance, and versatility to meet the customer's need.

Briefly, the foregoing and other objects and advantages of the present invention are accomplished by the provision of a wall system wherein the structural portions of the mullion are separate from the remaining portion of the wall. The horizontals are provided in stock lengths and run past the mullions. The interior mullion sections snap to the structural mullion portions and lock the through horizontals into position, thereby eliminating fastenings wherever practical.

For a better understanding of the present invention, reference may be had to the following detailed description taken in connection with the drawings, in which:

FIG. 1 is an elevational view, somewhat diagrammatic of a wall system according to the present invention;

FIG. 2 is a fragmentary sectional view of the wall system of FIG. 1, taken along line 2—2 of FIG. 1;

FIG. 3 is a fragmentary sectional view of the wall system of FIG. 1, taken along line 3—3 of FIG. 1;

FIG. 4 is a fragmentary sectional view of the wall system of FIG. 1, taken along line 4—4 of FIG. 1;

FIG. 5 is a fragmentary sectional view of the wall system of FIG. 1, taken along line 5—5 of FIG. 1;

FIG. 6 is a cross sectional view of the wall section of FIG. 1, taken along line 6—6 of FIG. 1;

FIG. 7 is a fragmentary sectional view of the wall system of FIG. 1, taken along line 7—7 of FIG. 5;

FIG. 8 is an exploded perspective view of the wall system of FIG. 1, illustrating mullion to the sill connection;

FIG. 9 is a fragmentary perspective view of the wall system of FIG. 1, illustrating the connection of an intermediate horizontal;

FIG. 10 is a fragmentary perspective exploded view of the wall system of FIG. 1, illustrating the mullion to header connection;

FIG. 11 is a fragmentary sectional view of a wall system illustrating an exterior glazed horizontal with a condensation trough or gutter;

FIG. 12 is a fragmentary sectional view of a wall system having an externally removable face;

FIG. 13 is a fragmentary plan sectional view of a wall system illustrating termination of the wall system against a building wall;

FIGS. 14 and 15 illustrate glazing alternatives of the present wall system;

FIG. 16 is a fragmentary elevational view, somewhat diagrammatic illustrating termination of a horizontal at a mullion;

FIG. 17 is a cross sectional plan view of the wall system of FIG. 16 taken along line 17—17 of FIG. 16;

FIG. 18 is an exploded perspective view illustrating termination of an intermediate horizontal of the wall system of FIG. 16;

FIG. 19 is a perspective view illustrating the cope of the interior mullion section at the termination of an intermediate horizontal;

FIG. 20 is a fragmentary elevational view of the wall system according to the present invention illustrating a horizontal expansion joint;

FIG. 21 is a fragmentary sectional view of the wall section of FIG. 20 taken along line 21—21 of FIG. 20;

FIG. 22 is a fragmentary cross sectional view of the wall system of FIG. 20 taken along line 22—22 of FIG. 20;

FIG. 23 is an exploded perspective view of an expandable horizontal in accordance with the embodiment of FIG. 20;

FIG. 24 is a fragmentary elevational view of a wall system according to the present invention illustrating a vertical expansion joint and anchor;

FIG. 25 is a fragmentary cross sectional view of the wall system of FIG. 24 taken along line 25—25 of FIG. 24;

FIG. 26 is a fragmentary cross sectional view of the wall system of FIG. 24 taken along line 26—26 of FIG. 24;

FIG. 27 is a fragmentary cross sectional view of the wall system of FIG. 24 taken along line 27—27 of FIG. 24;

FIG. 28 is an exploded perspective view of the wall system of FIG. 24 illustrating the expansion and anchor;

FIG. 29 is a fragmentary elevational sectional view of a wall system according to another embodiment of the present invention;

FIG. 30 is a fragmentary cross sectional elevational view of the wall system of FIG. 29;

FIG. 31 is a cross sectional plan view of the wall system of FIG. 29;

FIG. 32 is a fragmentary cross sectional elevational view illustrating a modified form of horizontal member for use with the embodiment of FIG. 29;

FIG. 33 is a fragmentary cross sectional plan view illustrating a modified form of vertical mullion for use with the wall system of FIG. 29;

FIG. 34 is a fragmentary elevational view illustrating a modified form of horizontal member for use with the wall system of FIG. 29;

FIG. 35 is a fragmentary plan sectional view illustrating a modified form of vertical mullion according to the present invention;

FIGS. 36 and 37 are fragmentary sectional views illustrating the transition from one sized panel to another sized panel in accordance with the present invention;

FIGS. 38 and 39 are cross sectional views illustrating a further transition between panel sizes in accordance with the present embodiment;

FIG. 40 is a cross sectional plan view illustrating a modified form of mullion arrangement adapted for the transition between panel sizes according to the present embodiment;

FIG. 41 is a cross sectional plan view of an externally glazed horizontal member;

FIG. 42 is a fragmentary elevational view of wall system including a concealed window;

FIG. 43 is a cross sectional elevational view of the window of FIG. 42 taken along line 43—43 of FIG. 42;

FIG. 44 is a cross sectional elevational view of the wall system of FIG. 42, taken along line 44—44 of FIG. 42;

FIG. 45 is a cross sectional plan view of the wall system of FIG. 42 taken along line 45—45 of FIG. 42;

FIG. 46 is an exploded perspective view of a mullion in a horizontal joint at a window;

FIG. 47 is an exploded perspective view of a window frame construction;

FIG. 48 is a fragmentary elevational sectional view of a wall construction according to the present invention and illustrating an insulated through horizontal arrangement according to another embodiment;

FIG. 49 is a fragmentary cross sectional elevational view of a wall construction according to FIG. 48 illustrating a header construction;

FIG. 50 is a cross sectional plan view of the insulated wall construction of FIG. 48; and

FIGS. 51 and 52 are fragmentary cross sectional plan views of the insulated wall system illustrating adaptation to intermediate and thin panels.

Referring now to the drawings, and particularly to the embodiment of FIGS. 1—32, there is illustrated a frame

system for a building wall and the like adapted to receive thin panels. In one commercial embodiment of the system, the thickness of the horizontal is $1\frac{1}{2}$ " and the system has been designated as a $1\frac{1}{2}$ " stick wall system, and will receive panels $\frac{1}{4}$ " to $\frac{1}{2}$ " thick.

More specifically, there is illustrated a wall construction 60, FIG. 1, including a sill member 61, a head member 62, horizontal members 63, 64 and 65, and a plurality of vertical mullions 66, 67 and 68 contained within an opening 69 of a building wall 70. The horizontal members 63, 64, 65 with the vertical mullions 66, 67, 68 form a plurality of openings which may be glazed with glass or other suitable panels 73, 74, 75 and 76. As best illustrated in FIGS. 6 and 8 to 10, the structural portion of the mullion is separate from the remaining portion of the wall. Considering for example, mullion 67 as typical, the mullion 67 includes a structural portion 67a here shown as a structural "T" mullion, but which may have any desired form such as a box, or tapered structure, and an interior mullion portion 67b.

The inner edge of the structural portion is provided with a "T" slot or pocket 67c for receiving an appropriate mullion anchor. The structural portion 67a and the interior portion 67b interlock through a one way snap lock as indicated at 67d. In the common configuration of the interior mullion section 67b, there is provided a pair of opposed glazing pockets 67e, 67f of general "U" shape to provide for glazing in a known manner, and each containing one or more glazing or gasket grooves 67g on its inner surface adjacent its open end. As best illustrated in FIGS. 14 and 15 the panels, shown here as panels 76, may be glazed by conventional glazing gaskets 78, 79 or may be wet glazed if desired by suitable glazing gaskets 80, 81 and wet glazing 82.

The basic horizontal member is best illustrated in FIGS. 2 and 3 as members 63, 64, and 65. Considering members 64 as typical, the member 64 is of somewhat H-shape, having an upwardly opening glazing pocket 64a, provided with glazing recesses 64b along the upper inner surface of its side walls. The horizontal member 64 is also provided with a somewhat downwardly opening pocket 64c which when completed by a glass stop 84 forms a glazing pocket also having glazing recesses 64d along the inner surface of the pocket legs. The glazing pockets 64a and 64d will receive the panels 74 and 76 respectively in a known manner. Where it is desired to provide a condensation gutter, the horizontal 64 may be modified, as shown at 64' FIG. 11, by the addition of an external horizontally extending condensation gutter 64e' defining a generally trough shape spillway 86.

The horizontal member 64 has extruded longitudinally extending splines 64f for receiving screw fasteners and the like. A drainage or pressure relief slot 85 may be provided in the horizontal member 64 opening into the upper glazing pocket 64a.

FIG. 12 illustrates a horizontal member 88, provided with a face, 88a, or glass stop removable from the outside and which, when assembled, provides a member appearance and function quite similar to members 63, 64, and 65. Advantageously, the removable face 88 provides for removal of the spandrel panel in case of damage. Suitable drainage and pressure relief slots 88b are provided on the lower edge of the removable face 88.

A typical sill assembly is illustrated in FIGS. 2 and 8. The sill or flashing member 61 is fastened to the building wall 70 in any suitable manner as with the fasteners 89. A standard horizontal is used with the sill member 61, here identified as the horizontal member 63, and which is identical to the horizontal members 64 and 65. If desired, a dry seal 92 may be used between the horizontal 63 and the sill member 61.

A typical head assembly is illustrated in FIGS. 3 and 10. The head member 62 is fastened to the building wall 70 in any suitable manner, as by the fasteners 93. The head member 62 is of generally U-shape having a down-

5

wardly opening pocket 62a receiving the horizontal member 65. As previously indicated the horizontal member 65 is identical to members 63 and 64.

A typical mullion anchor at the sill is illustrated in FIGS. 2, 6 and 8. Considering the attachment of mullion 67 as typical, the structural portion 67a is square cut at its bottom, and a mullion clip assembly 95 is provided for securing the mullion 67 to the sill member 61. More specifically the mullion clip 95 includes a chair shaped portion 95a and a head portion 95b. The head portion is somewhat T-shape such that when secured to the chair portion 95a there is provided a grooved head slidably receivable within the T-shaped grooves 67c of the structural portion 67a. Tightening of the fasteners 96 locks the clip assembly to the lower end of the mullion 67. The mullion clip 95 is provided with ribs 95c along its lower surface, one of which fits into a longitudinal groove 61a in the sill member 61, and the second of which rests on the sill member. The clip can be fastened to the sill member in any suitable manner as by fasteners 97.

A typical head assembly is illustrated in FIGS. 3, 6, 7 and 10. As illustrated there is provided a mullion head clip 100 which has been pre-assembled to the head member 62 at the desired mullion location by suitable fasteners 101. As therein illustrated the head clip 100 includes a somewhat T-shaped head portion 100a slidably receivable within the groove 67c of the structural mullion portion 67a. In assembly of the mullion, the mullion is notched at its top 102, FIGS. 3 and 10, to clear the head member 62, and the mullion may be slipped on to the clip. The mullion is free to slide up and down on the clip to accommodate vertical expansion.

It will be understood that in the erection of the structural mullion halves, the mullion is prepared with the notch 102 at its upper end and is provided with a lower clip 95, at its lower end. Moreover, the head clips 100 are pre-assembled with the head member 62 at the desired mullion locations. Thereafter the mullion may be slid on to the head portion 100a of a head clip 100, and the lower clip 95 may be seated on the sill members 61, and fastened into place with the fasteners 97.

As heretofore described horizontal members are used in long lengths, and are merely set in place, and interlocked by the snap in interior portions of the vertical mullions. Referring, for example, to the typical mullion 67, after assembly of the mullion in place, the appropriate horizontal member, here shown as member 63, will be installed on the sill in long lengths by dropping the horizontal member 63 in between the mullion and the sill member 61. No fastenings are necessary, the horizontal member 63 merely interlocks with the sill member 61. Each of the interior portions 67b of the mullion 67 are factory coped both at the bottom and top, as best illustrated in FIGS. 4, 8, 9 and 10.

The lower cope of section 67b is identified at 105, FIGS. 4 and 8, and includes shoulders 105a, 105b resting on the upper surface of the horizontal member. Moreover, the cope includes a downwardly extending portion 105c, having projections 105d engageable within one of the gasket grooves defined within the glazing pocket of the respective horizontal members. The interior mullion portion 67b snaps into the structural mullion portion 67a and rests on top of the horizontal member 63 in place. The projections 105d locking the horizontal member 63 in place. The upper end of the interior portion 67b is also provided with a factory fabricated upper cope as shown at 106, FIGS. 4, 5, 9 and 10.

The upper cope 106 includes a pair of vertically spaced shoulders 106a, 106b, and includes an inwardly extending projection 106c. The horizontal member fitting above the interior portion 67b is merely set in place, sitting on the shoulders 106a, 106b, and positioned with the projection 106c interlocking into one of the gasket grooves of the horizontal member.

The upper horizontal member 65 received within the

6

head member 62 is installed in a similar manner as the lower or intermediate members 63, 64. More specifically the upper horizontal member 65 may be positioned against the top of the head member 62 before assembly of the interior portions of the mullions. Thereafter the upper horizontal member 65 may be tapped down to rest on the interior portion of the mullion and snapped into position therewith, to the positions as best illustrated in FIGS. 3 and 5.

To provide for terminating the wall against the side surfaces of the openings 70, there is provided suitable stile members 108 fastened to the building 70 in any suitable manner, as by fasteners 109, FIG. 6.

Preferably moisture is prevented from entering the glazing pockets 67e and 67f of the structural mullion 67 from the open ends of the horizontal members by closing the terminal ends thereof with a suitable cap 110, FIGS. 6, 8, 9, and 10, fastened in any suitable manner by fasteners 111.

FIG. 13 represents termination of a wall construction 113 against the inner surface of building wall 114 without the use of a terminal mullion. In accordance with the embodiment of FIG. 13 the wall construction 113 includes one or more spaced vertical mullions 115 identical to the mullions 66, 67, and 68 hereto described and including a structural portion 115a and interior portion 115b, supporting the adjacent edges of spaced panels 117, 118. The stile member 108 is secured to the building wall 114 by suitable fasteners 109. A framing member 119 is provided having a snap fit into the stile member 108, and defining a glazing pocket 119a for receiving the edge of the panel 118. The panel 118 may be glazed in any suitable manner, as by the illustrated glazing gaskets 120, 121.

Provision is made for terminating an intermediate horizontal at a mullion. Referring, for example to FIGS. 16 to 18 there is illustrated a wall section 124 including a vertical mullion 125 and an intermediate horizontal 126 terminating at the mullion 125. The mullion 125 includes a structural portion 125a and lower and upper interior portions 125b and 125c.

To terminate the horizontal member 126, the horizontal member 126 is fitted with an end cap 127 secured to the end thereof by suitable fasteners 128, and including an inner cover flange 127a and an intermediate spacer flange 127b. The upper end of the lower interior portion 125b is coped in a conventional manner, as best illustrated in FIG. 18 at 125c. The lower end of the upper interior portion 125c however, is provided with a special cope providing one set of shoulders 125e, FIG. 19, which can rest on the upper surface of the intermediate horizontal member 126 and including a second shoulder 125f resting on the upper surface of the lower interior portion of 125b, and further including an additional downwardly projected portion 125g engageable with the lower shoulder 125h of the cope 125d in the lower interior portion 125b.

As it is well known provision must be made in long sections of wall for suitable expansion due to thermal changes. FIGS. 20-23 illustrate a wall section 130 provided with a suitable horizontal expansion joint. More specifically, as therein illustrated, there is provided a vertical mullion 131 including a structural portion 131a, a lower interior portion 131b, and an upper interior portion 131c. There is provided a pair of aligned horizontal members 132, 133, having spaced apart edges. One of the horizontal members 132 is provided with a suitable end cap 134, same as the cap 127 hereto described, and secured to the end thereof by suitable fasteners 135.

The cap 110 closes the adjacent end of the other horizontal member 133, being secured thereto by the fasteners 111. The end cap 134 includes an outer cover plate 134a and an inner spacing plate 134b, a somewhat U-shaped pocket is defined between the flanges 134a and 134b carrying a block of expandable material such as a sponge seal 136. The inner flange 134b butts against an intermediate web 131d of the lower intermediate portion

131b, as best illustrated in FIGS. 21 and 22, limiting horizontal movement of the horizontal member 132 and restricting relative expansion and contraction to the horizontal member 133.

For multi-story installation the vertical mullions may span two or more floors. Moreover, due to thermal changes it is necessary to provide for expansion and contraction of the vertical mullion in long runs thereof. Accordingly there is illustrated in FIGS. 24 to 28 suitable expansion and anchorage of the vertical mullions for multi-story installation. Referring now to FIGS. 24 to 28, there is illustrated a wall section 140, including a pair of spaced horizontal members, 143, 141, 142, and a plurality of spaced horizontal members 143, 144, 145, 146. The lower end of the vertical mullion 141 is secured to a sill member 147 by a suitable clip 148 in a manner hereto described.

Vertical expansion between the adjacent vertically spaced vertical mullions 141 and 142 is accommodated by permitting the lower end of the upper vertical mullion 142 to move freely in a vertical direction as best illustrated by the expansion joint 150. As therein shown there is provided a mullion splice bar 151, fixedly secured within the T-slot of the lower mullion 141 in any desired manner, as by welding or use of a clamp bar 152.

The upper mullion 142 is free to slide on the upper end of the splice bar 151, being guided thereby. If desired a clamping block 153, FIG. 27, may be used to guide the lower end of the upper vertical mullion 142, but since the upper mullion 142 must be free to slide on the splice bar 151, the upper clamp block 153 is dimensioned to allow such slideable movement of the upper mullion for expansion and contraction thereof.

A suitable structural anchor 155 is used to support the upper ends of the structural mullion portions. The structural anchor is a somewhat T-shaped member having a cross leg 155a fitted within the T-slot of the structural mullion portion, and fixedly secured thereto in any suitable manner as by welding or set screws 156, and a center leg 155b for attachment of the superstructure of the building.

Preferably the interior portions of the vertical mullions are not terminated at the same location as the structural portions thereof, thus providing improved weathering of the mullion. An expansion cap 158 including a body portion 159 and a sponge pad sealant portion 160 is secured to the structural anchor 155 in any suitable manner as by fasteners 161. The lower end of the upper interior portion 142b is square cut and rests on the expansion cap 158. The upper end of the lower interior portion 141b is also square cut, but is provided with the longitudinal end slot 141c to provide clearance around the structural anchor 155. The sponge portion 160 provides for the expansion area for the interior mullion portion 141b.

The wall system hereto described is provided with glazing pockets of $\frac{1}{4}$ " and will accept infill panel with a thickness from $\frac{1}{4}$ "- $\frac{1}{2}$ ". However, it is often desirable to use thicker edged panels for the building wall. Accordingly there are provided wall components having three standard size pockets; $\frac{1}{16}$ " glazing pocket for accepting $\frac{1}{4}$ " to $\frac{1}{2}$ " infill; $\frac{1}{16}$ " glazing pocket which will accept 1" to $\frac{3}{8}$ " infill; and $\frac{1}{4}$ " glazing pocket for $\frac{1}{8}$ " to $\frac{1}{2}$ " infill. Moreover, the system will accommodate combinations of panel thicknesses in a single wall. Such a system is illustrated in FIGS. 29-41.

Referring now to FIGS. 29 to 31 there is illustrated a wall system 165 generally similar to the wall systems heretofore described and dimensioned to receive wide edged panels 166, 167, 168 and 169. The wall system includes spaced vertical mullion 172, FIG. 31 including a structural portion 172a and interior portion 172b. The interior portion 172b each include opposed glazing pockets, 172c, 172d dimensioned to receive a thick panel and in the illustrated embodiment are of the deep and shallow type so that in any panel opening there are confronting

deep and shallow channels to provide for glazing or installation of the panels 166, 167, and 168.

Additionally, there are provided through horizontal members 174, 175, 176. A sill member 177 and a head member 178 are respectively provided at the bottom and top of the opening 179 in the building 180. Moreover stile members 181 and 182 are provided along the side edges of the wall system 165 for securement to the sides of the building 180 at the opening 179.

It will be seen that the assembly and construction of the wall system 165 as represented in FIGS. 29, 30 and 31 is similar to that hereto described except for dimensionally receiving the thicker panels, and for the provision of deep and shallow glazing pockets.

The wall system of FIGS. 29 to 31 can be adapted to receive intermediate thickness panels as illustrated in FIGS. 32 and 33. As therein illustrated there is provided a vertical mullion 184 having a structural portion 184a and interior portion 184b, and used in combination with a horizontal member 185, all proportioned to receive panels 186 of intermediate thickness. The wall system according to the embodiment of FIGS. 29 to 31 will also receive narrow edged wall panels, as illustrated in FIGS. 34 and 35. As therein illustrated there is provided a vertical mullion 188 having a structural portion 188a and an interior portion 188b. The interior portion 188b is provided with opposed glazing pockets 188c dimensioned to receive a thin panel such as commercial glass, 189. A horizontal member 190 is also provided dimensioned to receive the narrow panels 189.

FIGS. 36 and 37 illustrate the transition from a wide to a medium panel. More specifically, there is provided a vertical mullion 192 having a structural portion 192a at an interior portion 192b. The interior portion 192b is dimensioned with opposed pockets, 192c, 192d to receive a thick panel 193 and an intermediate panel 194. The horizontal member 175 may be used along with a glass stop 195 to provide for receiving the intermediate panel 194 in the horizontal members.

FIGS. 38 and 39 illustrate the transition from a wide to a thin panel. As therein illustrated there is provided a vertical mullion 197 having a structural portion 197a and an interior portion 197b. The interior portion is dimensioned to define opposed glazing channels 197c and 197d to receive a wide panel 198 and a narrow panel 199. The horizontal member 175 is used with a pocket filler 200, so as to dimension the glazing groove to receive the narrow panel 199.

FIG. 40 illustrates the transition from an intermediate thickness panel to a narrow panel. As therein illustrated there is provided a mullion 203 having a structural portion 203a at an interior portion 203b. The interior portion 203b is constructed to provide opposed glazing grooves 203c and 203d each dimensioned to receive respectively an intermediate thickness panel 204 and narrow panel 205.

It will be seen that the structural portions 172a and 184a, 188a, 192a, 197a and 203a are all identical, but the snap in interior portions are selected to accommodate the desired panel thickness.

FIG. 41 illustrates a horizontal member 207 having an externally removable glass top 208 to provide for external glazing thereof, and accordingly is similar to the horizontal member 88 heretofore described, but dimensioned to receive thick panels 209.

It will be understood that the wall system to FIGS. 29 through 41 will accept various commercially available windows, whether they be project in, project out, casement, top-hinged in-swing and the like. There has been a continuous objection from architects and owners to the change in sight lines of the wall encountered when windows are introduced into curtain walls. Increase in metal width has generally been inevitable when commercial windows are installed in existing walls. In accordance with the present invention, there is provided a concealed window which fits behind the wall members and does not increase the width of the sight lines. Such a concealed window is

illustrated in FIGS. 42 through 47. More specifically, as therein illustrated, there is shown a wall section 220, FIG. 42 including spaced vertical mullions 222, 223, 224, a window horizontal 225 used at the window sill and a window horizontal 226 used at the window head. Each of the mullions 222, 223, 224 include a structural portion 222a, 223a, 224a and each includes an interior portion 222b, 223b, 224b. As best seen in FIG. 45, the interior portions of the end mullions 222, and 224, are identical but reversed, so that there is no projecting confronting legs while the intermediate mullion 223 has an interior portion 223b of somewhat T-shaped with no projecting legs. A pair of project-in window sashes 228, 229 are provided each including a frame 230 formed of upper and lower horizontals 231, 232, and stile members 233. The horizontals 231, 232, run through with the stile members 233 butting thereagainst.

Suitable fasteners such as screws 235, FIG. 43 extend through suitable openings 236, FIG. 47, in the horizontals, and into suitable splines 237 in the stile members. Each of the stile members 233 and the upper horizontal 231 is provided with an outwardly extending flange along its inner edge 233a, 231a which seats against respective inner sealing gaskets 239, 240. The lower inner edge of the lower horizontal member 232 abuts against a gasket 241, FIG. 43, to form a lower inner seal. In addition, suitable outer gaskets 242, 243, 244 are provided which seal along the outer edge of the upper horizontal 231, the stile members 233, and the lower horizontal 232 to provide a double weathered window. Each of the window sashes 228, 229 contains suitable glazing 245 to complete the window structure.

FIG. 44 illustrates the transition between the window and fixed sections of the wall. More specifically as illustrated each of the horizontal members 225, 226, extending past the respectively mullions 222, 224, may be used with a suitable pocket filler 246 and glass stop 247 to secure a suitable panel such as glazing 248.

It will be seen that the outwardly extending inner flanges 231a, 233a, merge into the line of sight of the inner surface of the interior portions of the vertical mullions and the respective horizontals, thereby maintaining the sight line of the wall.

FIGS. 48 through 51 illustrate a wall system having thermally insulated through members. More specifically, as illustrated in FIGS. 48 through 52, there is provided a wall system 250 including a plurality of vertical mullions 252 each having a structural portion 252a and a snap-together interior portion 252b. Each of the interior portions 252b defines a pair of opposed glazing pockets 253, 254, each defined by a pair of generally parallel legs 253, 253b, 254a, 254b interconnected by a common bight or cross member 255. The cross member 255 includes an elongated longitudinally extending portion of suitable thermally insulated material 256 to provide a thermal break between the inner and outer portions of the metal in the building wall.

In the embodiment of FIG. 50, the interior portions 252b are dimensioned to secure a thick panel 256. It will be seen from FIGS. 48 and 49 that in addition to the thermal break in the mullion sections, horizontal members of the system including a sill member 260, a lower horizontal 261, an intermediate horizontal 262, an upper horizontal 263, and a head member 264, all include a suitable thermal break 268, 261a, 262a, 263a, 264a.

FIG. 51 illustrates a wall section 266 including a thermal break adapted for an intermediate thickness panel 267. More specifically, there is provided a vertical mullion 268 including a structural portion 268a, and an interior portion 268b, the interior portion 268b is a snap together member with the structural portion 268a and includes a thermal break 268c, in any through or transverse element. FIG. 52 illustrates a wall section 270 of the thermal insulating type adapted for normal or thin wall panels 271 and includes a vertical mullion 272, includ-

ing a structural portion 272a and interior portion 272b. The interior portion is a snap together fit with a structural portion 272a and includes a thermal break 272c through any transverse section or element.

It will be seen that the structural portions 252a, 268a and 272a of the mullions 252, 268, and 272 are all identical with the structural portions of the mullions hereto described, and that the thermally insulating wall may be fabricated to any of the structural systems hereto described.

The stick wall system according to the present invention is adapted for use on both single and multi-story buildings. Advantageously, all the components are factory fabricated. The horizontal members run past the vertical members and are installed in long lengths. The lengths of these horizontals are limited only by the stock lengths available.

The factory fabricated components are shipped to the job site in lengths or sticks and the sticks are assembled piece by piece into a grid directly on the building. The grid is then glazed from either the inside or the outside depending on the job conditions. The spandel panels may be installed along with the metal if desirable. It is understood that unlike integral systems, stick systems require installation clearance in the spandel area, especially if the spandel panels are installed and sealed from the inside of the building. The present system keeps the clearance in this area to a minimum.

The present system is advantageous over existing wall stick systems in many respects. One advantage is its low cost. Cost savings are effective in both the installation, fabrication, and material costs. The existing stick walls are based on the pressure plate design. They contain 3 and 4 piece members with fasteners and washers. They require power nut drivers and expensive torque wrenches, and infinite patience to install. In accordance with the present invention, a proposed wall has 2 and 3 piece members, practically no fasteners, and a rubber mallet is all that is required to assemble the majority of the components.

Briefly, the wall is installed first by the installation of the perimeter and structural mullions by conventional means. The lower horizontals simply drop into place. No fastenings are required. The interior mullion half snaps onto the structural mullion. A special factory fabricated cope or cut locks the base into position. Intermediate horizontal members, the same as that used at the lower portion, snap into position on top of the interior mullion half. The special factory cut locks the member into position. The process is started over again as the interior mullion half above the intermediate horizontal snaps into position. These four basic steps cover the essential installation procedure. Very little sealing and caulking is required in this system. When required it is placed in areas where it is not exposed and neatness is not required.

Although several embodiments of the present invention have been described, it is intended by the appended claims to cover all such modifications and embodiments as fall within the true spirit and scope of this invention.

I claim:

1. An improved wall framing system for a building and the like comprising:

spaced vertical mullions, each of said mullions including a structural mullion portion and an interior mullion portion, and

horizontal through members, said interior mullion portions snapping to said structural mullion portions and locking said horizontal through members into position without the use of auxiliary clips or fasteners.

2. An improved wall framing system as defined in claim 1 wherein said interior mullion defines opposed glazing pockets.

3. An improved wall framing system as set forth in claim 2 and including a plurality of panels having their

11

edges received within said opposed glazing pockets, and further including at least one operative window having a sash blending into the faces of the mullions and through horizontals and including a sash panel in the plane of the first mentioned panels whereby the sight lines of the operative window are aligned with the sight lines of the remainder of the framing system.

4. An improved wall framing system as set forth in claim 1 wherein each of said structural mullions includes a T-slot for receiving an anchor.

5. An improved wall framing system as set forth in claim 4 and including a through sill assembly, a through assembly, a plurality of head clips preassembled with said head assembly at the vertical mullion locations, each of said head clips including a T-shaped head portion slidably received within the T-slot of a structural mullion portion, a sill clip having a T-shaped head portion fixedly received in the lower end of each of said structural mullion portions and including a further portion fixedly secured to said sill assembly.

6. An improved wall framing system as set forth in claim 5 wherein said sill assembly includes a sill member secured to a building wall, and a through horizontal snapped to said sill member over the second mentioned portion of said sill clip.

7. An improved wall framing system as set forth in claim 5 wherein said head assembly includes a head member having a downwardly opening pocket and a through horizontal member slidably received in said pocket.

8. An improved wall framing system as set forth in claim 1 wherein said mullions extend past several stories, and wherein each of said mullions is provided with a vertical expansion joint, the vertical expansion joint on the structural mullion portions comprises a splice bar fastened to one mullion section and slidably received in the T-slot of the vertically aligned mullion section, the vertical expansion joint on the interior mullion portions is vertically spaced from the vertical expansion joint of the structural portion, the confronting ends of vertically adjacent interior portion sections being square cut, and an expansion cap including a compressible sealant portion secured to one of the structural mullion T-shaped anchor.

9. An improved wall framing system as set forth in claim 8 and including an anchor for one of said structural mullion portion sections, said anchor including a generally T-shaped member including a cross leg secured to said structural mullion portion section and a center leg extending inwardly for securement to a building structural element, said vertical expansion joint on said interior mullion portion being at said anchor, the confronting end of one of said interior mullion portion sections being provided with a longitudinal end slot to provide clearance for said center leg.

10. An improved wall framing system as set forth in claim 1 and including a pair of aligned horizontal through members meeting at a vertical mullion, the confronting ends of said members being square cut, an end cap plate

12

closing one of said ends, and an expansion cap closing the other of said ends, said expansion cap including a compressible sealant portion engaging said end cap plate.

11. An improvement wall framing system as set forth in claim 10 wherein said expansion cap includes an outer cover flange covering the confronting end of said one of said horizontal through members, and further including an intermediate inner spacing flange butting against a portion of said vertical mullion limiting horizontal movement of said other of said ends, said flanges defining a somewhat U-shaped pocket carrying said compressible sealant portion.

12. A method of erecting a wall framing system including:

- securing a sill assembly to a building structure;
- securing a head assembly to a building structure;
- securing a structural mullion portion of a vertical mullion between said assemblies;
- snapping a lower interior mullion portion section to said structural mullion;
- positioning a through horizontal member against the structural mullion portion and locked to the top of the lower interior mullion portion; and
- snapping an additional interior mullion portion section to said structural mullion above said through horizontal and locked thereto.

13. The method as set forth in claim 12 wherein said step of securing a head assembly to a building structure includes fastening a head member to a building structure and assembling an upper through horizontal therewith by the positioning of the upper through horizontal above its final position slidably interlocked with the head member, and wherein said method includes a final step of driving the upper through horizontal downwardly into its final position interlocked with the uppermost interior mullion portion section.

14. The method as set forth in claim 12 including the steps of assembling the head clip with the head assembly at the vertical mullion positions; assembling a sill clip to the lower end of a structural mullion portion; slidably interfitting the upper end of a structural mullion portion with a head clip, and securing the sill clip to the sill assembly.

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