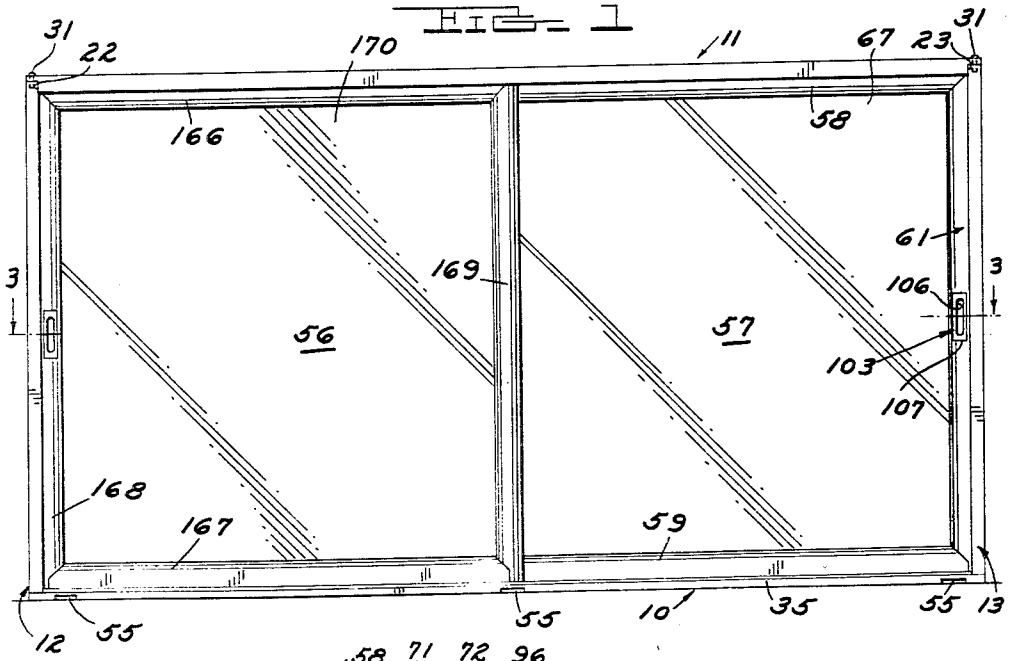
April 5, 1960 J. F. STEEL 2,931,434

SLIDING GLASS DOOR CONSTRUCTION

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FIG. 1



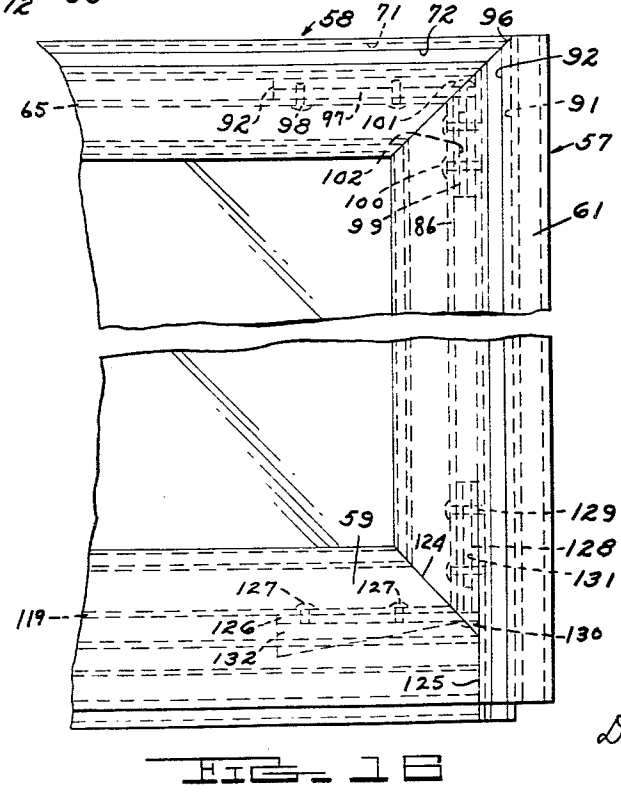
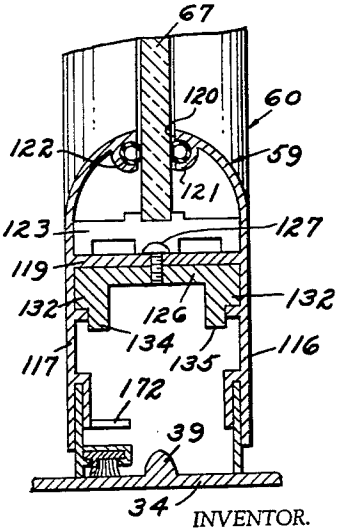


FIG. 18

FIG. 7



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SLIDING GLASS DOOR CONSTRUCTION

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FIG. 2

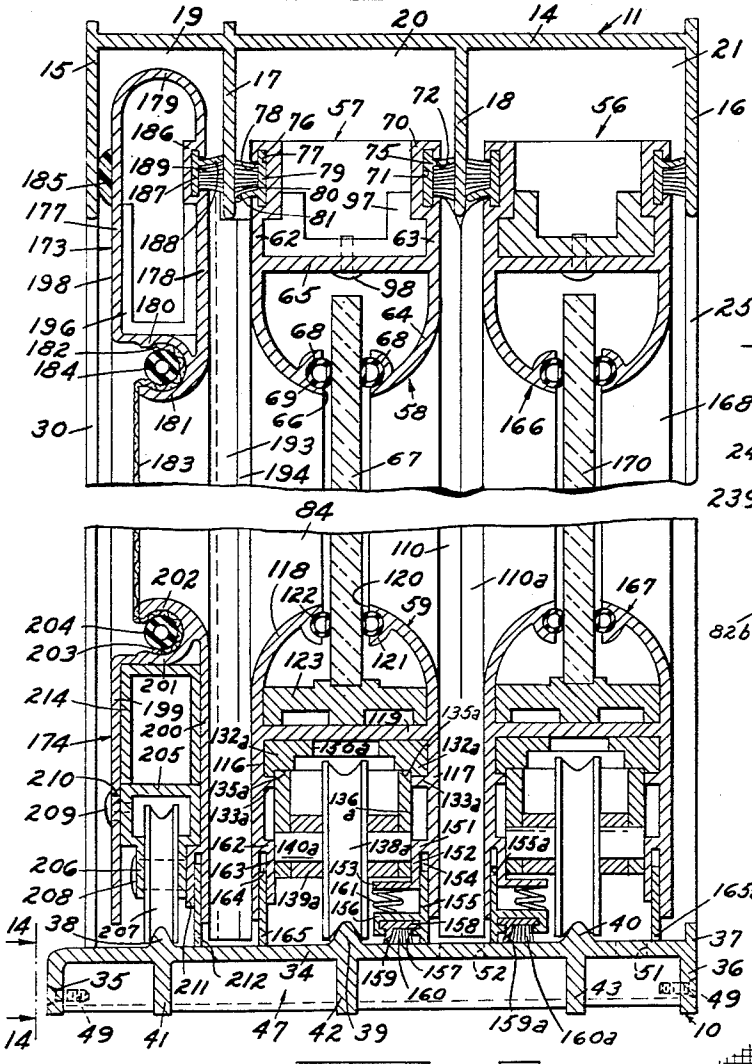


FIG. 9

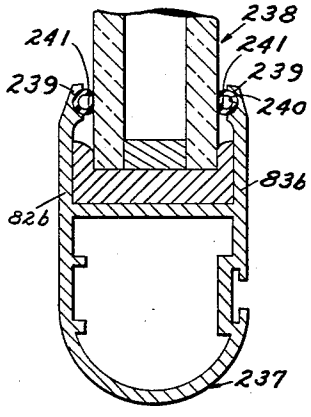


FIG. 8

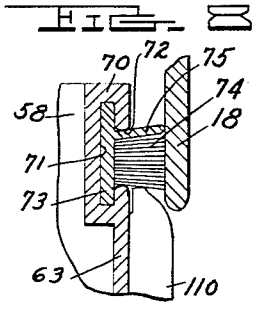
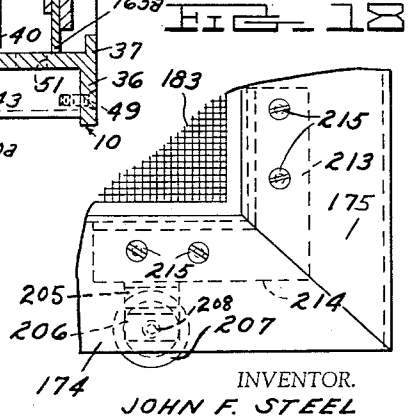


FIG. 10



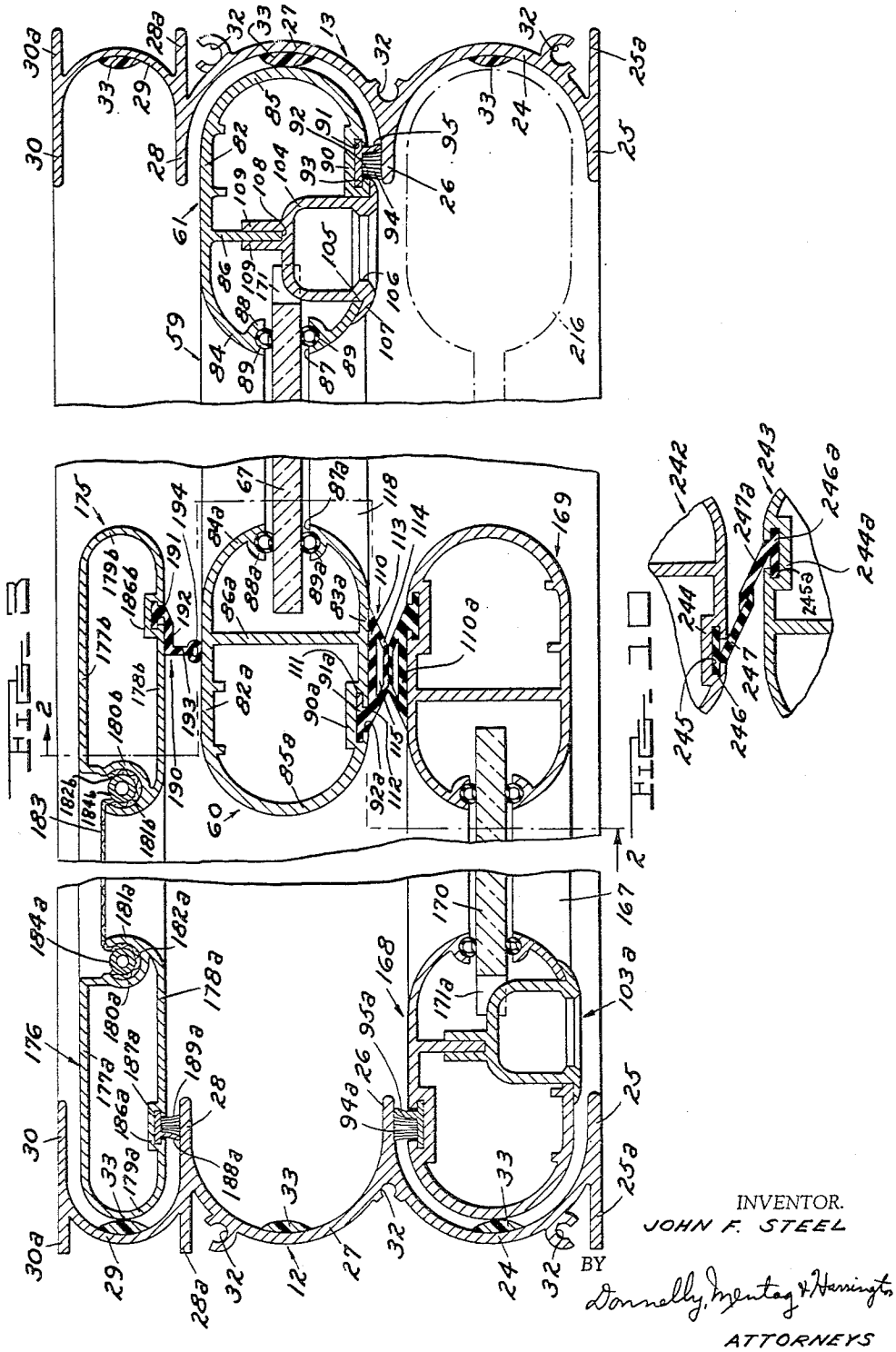
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SLIDING GLASS DOOR CONSTRUCTION

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SLIDING GLASS DOOR CONSTRUCTION

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FIG. 4

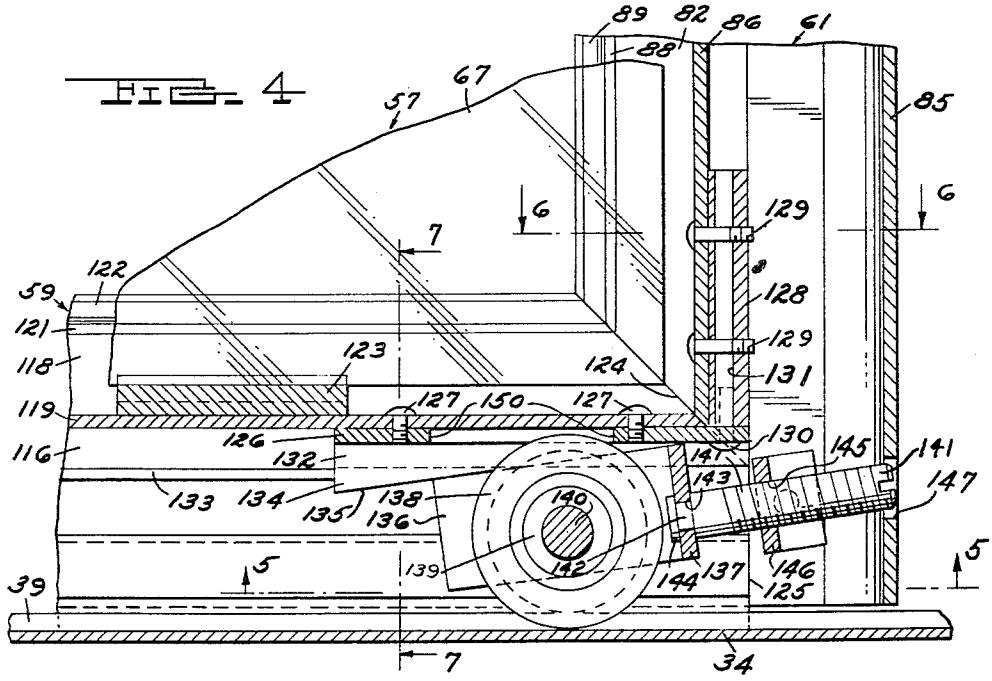


FIG. 5

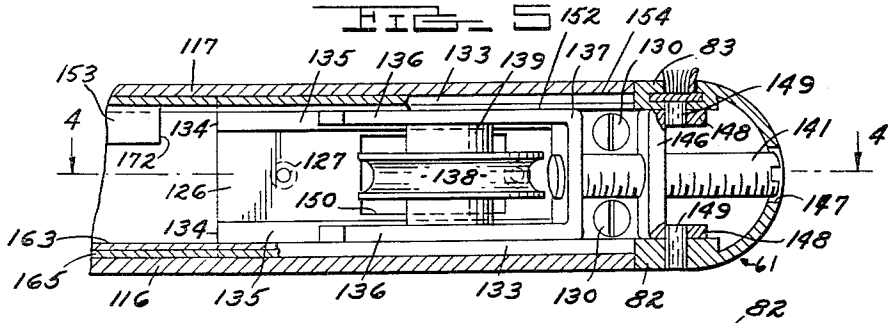
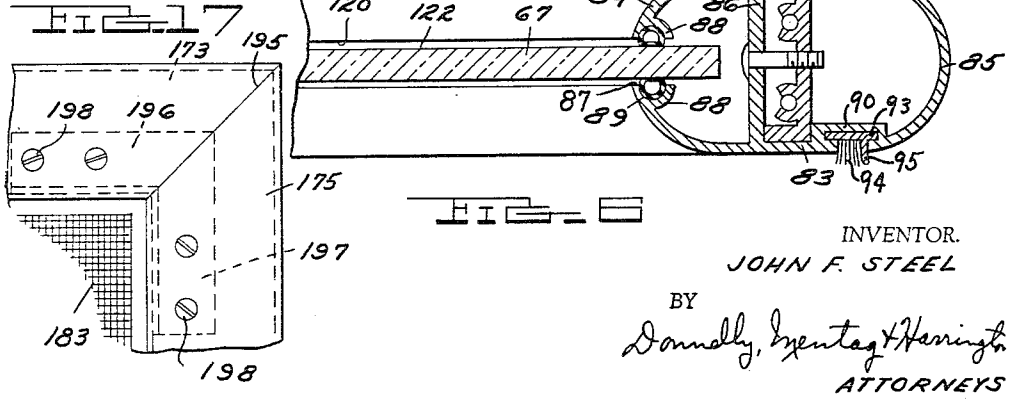


FIG. 7



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SLIDING GLASS DOOR CONSTRUCTION

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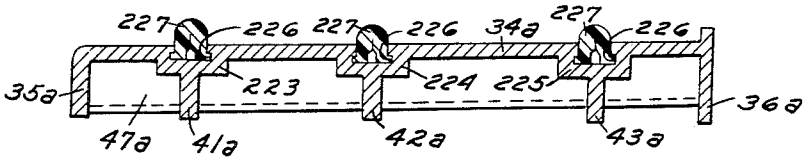


FIG. 12

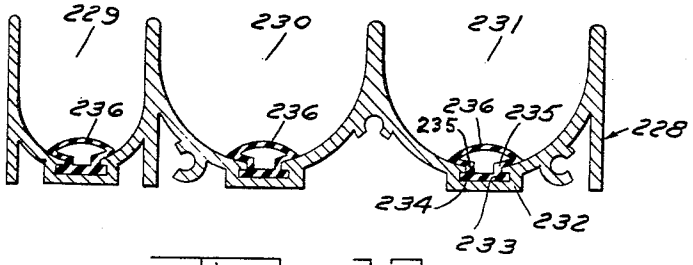


FIG. 13

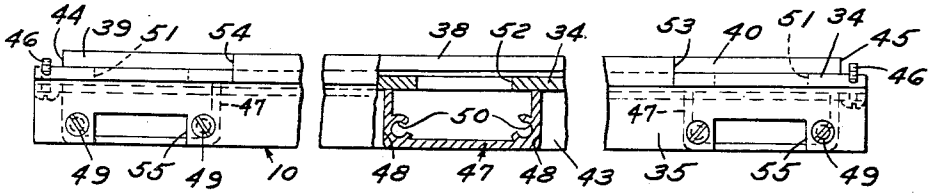


FIG. 14

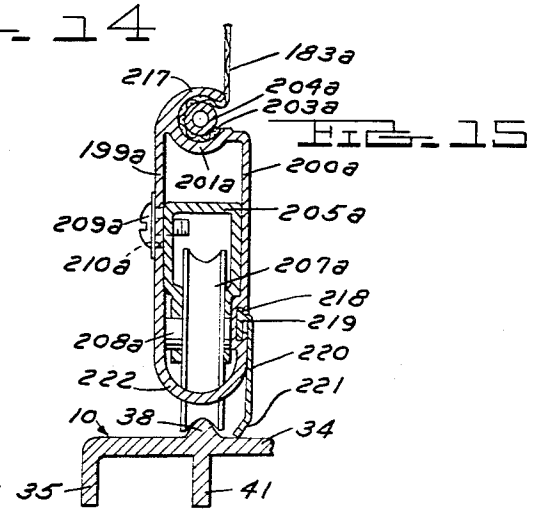


FIG. 15

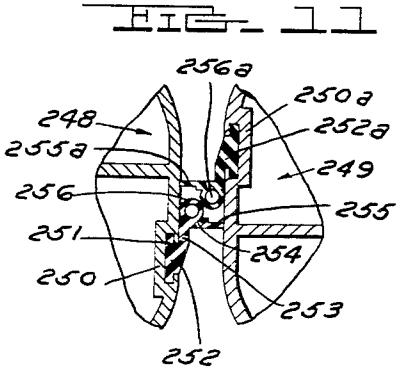


FIG. 11

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United States Patent Office 2,931,434 Patented Apr. 5, 1960

2,931,434

SLIDING GLASS DOOR CONSTRUCTION

John F. Steel, Detroit, Mich.

Application August 27, 1957, Serial No. 680,536

12 Claims. (Cl. 160—91)

This invention relates to improvements in sliding combination glass and screen door constructions, and, more particularly, to a novel and improved metal-framed sliding combination glass and screen door construction.

It is an important object of this invention to provide a novel sliding combination screen and glass door construction which includes an improved metal-framed door structure in which is sldiably mounted a pair of novelly constructed metal-framed sliding glass panels and a screen panel, and, which construction further includes improved weatherstripping means.

It is another object of this invention to provide in a construction of this class an improved metal-framed door structure which includes novel jamb, threshold and header members.

It is still another object of this invention to provide in a construction of this class improved metal-framed sliding glass and screen panels which include frame members that are shaped and constructed so as to be attractive in appearance and efficient in operation.

It is a further object of this invention to provide in a construction of this class an improved and highly efficient weatherstripping means between the sliding door panels and the door frame which will prevent air and water infiltration under severe weather conditions and which will prevent leakage of inside air, whereby, the construction may be used in air-conditioned homes and other buildings.

It is a still further object of this invention to provide a construction of this class an improved door frame threshold member which is provided with novel drainage and roller rail structures.

It is a still further object of this invention to provide a novel sliding combination screen and glass door construction which is compact and rugged in construction, economical of manufacture, attractive in appearance, and efficient in operation.

Other objects, features and advantages of this invention will be apparent from the following detailed description and appended claims, reference being had to the accompanying drawings forming a part of the specification wherein like reference numerals designate corresponding parts of the several views.

In the drawings:

Fig. 1 is an inside elevational view of a sliding combination screen and glass door construction embodying the invention;

Fig. 2 is an enlarged broken, elevational sectional view, of the structure illustrated in Fig. 3, taken substantially along the line 2—2 thereof, and looking in the direction of the arrows;

Fig. 3 is an enlarged broken, horizontal sectional view, of the structure illustrated in Fig. 1, taken along the line 3—3 thereof, and looking in the direction of the arrows;

Fig. 4 is a fragmentary elevational view, partly in section, of the structure illustrated in Fig. 5, taken along the

line 4—4 thereof, and looking in the direction of the arrows;

Fig. 5 is a fragmentary horizontal view, partly in section, of the structure illustrated in Fig. 4, taken along the line 5—5 thereof, and looking in the direction of the arrows;

Fig. 6 is a fragmentary horizontal sectional view of the structure illustrated in Fig. 4, taken along the line 6—6 thereof, and looking in the direction of the arrows;

Fig. 7 is a fragmentary elevational sectional view of the structure illustrated in Fig. 4, taken along the line 7—7 thereof, and looking in the direction of the arrows;

Fig. 8 is an enlarged, fragmentary, sectional view of the novel woven pile weather-seal construction employed in the invention;

Fig. 9 is a fragmentary elevational sectional view of a modified glass door frame adapted for use with a double pane glass door construction;

Fig. 10 is a fragmentary horizontal sectional view of a first interlocking type of stile weather-seal made in accordance with the invention;

Fig. 11 is a fragmentary horizontal sectional view of a second interlocking type of stile weather-seal made in accordance with the invention;

Fig. 12 is an elevational sectional view of a modified threshold member made in accordance with the invention;

Fig. 13 is a horizontal sectional view of a modified jamb member made in accordance with the invention;

Fig. 14 is a broken, enlarged, front elevational view of the threshold member illustrated in Fig. 2, taken along the line 14—14 thereof, and looking in the direction of the arrows;

Fig. 15 is a fragmentary elevational sectional view of a modified screen frame bottom rail made in accordance with the invention;

Fig. 16 is a fragmentary, broken, inside elevational view, with parts removed, of a glass panel made in accordance with the invention;

Fig. 17 is a fragmentary outside elevational view of the screen panel of the invention showing the joint structure between the top rail and a stile thereof; and

Fig. 18 is a fragmentary outside elevational view of the screen panel of the invention showing the joint structure between the bottom rail and a stile thereof.

Referring now to the drawings, and in particular to Figs. 1, 2, 3 and 14, an illustrative embodiment of the invention is shown which comprises a stationary door frame including the threshold member 10, the header member 11, and the left and right side jamb members 12 and 13, as viewed in Fig. 1. The header member 11 is preferably made from extruded aluminum, although it may be made from stainless steel or any other suitable corrosion resistant metal. The header member 11 comprises the horizontal longitudinally extended wall portion 14 which is provided with the outer integral downwardly extended channel flange 15, the inner downwardly extended channel flange 16 and the intermediate spaced apart channel flanges 17 and 18. As best seen in Fig. 2, the channel flanges 15 and 17 form a screen panel channel indicated by the numeral 19, the channel flanges 17 and 18 form an outer glass panel channel, generally indicated by the numeral 20, and the channel flanges 16 and 18 form an inner glass panel channel, indicated by the numeral 21. As shown in Fig. 1, the ends of the channel flanges 15, 16, 17 and 18 are cut away up to the header wall 14, as indicated by the numerals 22 and 23, whereby the outer ends of the header wall 14 overlie the upper ends of the two side jambs 12 and 13.

As shown in Figs. 1 and 3, the two side jambs 12 and 13 are similarly constructed, and only one will be de-

scribed and corresponding reference numerals will be applied to the corresponding parts of these jamb members. The side jamb members 12 and 13 are preferably made from an extruded aluminum, however, they may be made from any other suitable corrosion resistant material, such as stainless steel. Each of the side jamb members 12 and 13 include an inner inwardly facing U-shaped glass channel comprising the bight portion 24 and the integral inner and outer flanges 25 and 26, respectively. These side jambs further include an outer U-shaped inwardly facing glass channel which comprises the bight portion 27, and the inner and outer integral flanges 26 and 28, respectively. It will be seen that the flange 26 provides a common flange for both of the glass channels. The side jambs 12 and 13 each further include an inwardly facing U-shaped screen channel comprising the bight portion 29 and the inner and outer integral flanges 28 and 30. The flange 28 provides a common member for the outer glass channel and the screen channel. It will be seen that the flanges 25, 28 and 30 extend outwardly beyond the bight portions 24, 27 and 29 of the glass and screen channels, as indicated by the numerals 25*a*, 28*a* and 30*a*. As best seen in Figs. 1 and 3, the header member 11 is fixedly joined to the jamb members 12 and 13 by means of suitable screws, as 31, which are adapted to threadably engage in the longitudinally extended apertures 32 which are formed in integral longitudinally extended projections on the outer sides of the jamb members. The screen and glass channels of each of the jamb members 12 and 13 are provided with a plurality of spaced apart longitudinally disposed hemispherically shaped bumpers 33 which are formed from any suitable resilient material.

As shown in Figs. 1, 2 and 14, the threshold member 10 comprises a shelf or sill plate 34 which slopes downwardly and outwardly and which is provided with the outer integral leg 35 and the rear inner integral leg 36 which is extended above the inner edge of the sill plate 34 so as to provide the upwardly extended lip 37. The threshold member 10 further includes the upwardly and longitudinally extended integral roller or sheave rails 38, 39 and 40 which are laterally spaced apart and disposed substantially along the center line of the screen and outer and inner glass channels formed in the header and jamb members, respectively. The thresho'd member 10 is further provided with the three longitudinally extended integral supporting legs 41, 42 and 43 which are disposed beneath the sheave rails 38, 39 and 40, respectively. As shown in Fig. 14, the sheave rails 38, 39 and 40 terminate short of the ends of the threshold member 10, as indicated by the numerals 44 and 45, so as to permit the lower ends of the side jamb members 12 and 13 to be mounted on the threshold member 10 on the ends thereof and to be secured thereto by any suitable means, as by means of the screws 46 which are adapted to be threadably engaged in the lower ends of the apertures 32.

As shown in Figs. 1, 2 and 14, the threshold member 10 is provided with three condensation drainage channels, generally indicated by the numeral 47. The drainage channels 47 open at the top ends thereof and are adapted to be mounted in the transverse position under the sill plate 34, and the threshold legs 41, 42 and 43 have portions removed therefrom, as indicated by the numeral 48, for the reception of these drainage channels. The drainage channels 47 may be fixed in place by any suitable means, as by means of the screws 49, which are adapted to pass through the inner and outer threshold legs 35 and 36 and to be threadably engaged in the longitudinally extended holes 50 formed in these channels. If desired, suitable metal pins may be employed instead of the screws 49. Three drainage holes, as 51, are formed in the sill plate 34 between the lip 37 and the rail 40, and they are each disposed over one of the drain channels 47, whereby condensation draining on the sill plate 34 between the lip 37 and the rail 40 will be drained away. The sill plate 34 is further provided with three drain holes disposed between the rails 39 and 40 and over the channels 47 for draining condensation from the space between the rails 39 and 40. As shown in Fig. 14, the sheave rails 38 and 39 are cut off for approximately one inch at the right ends thereof, as indicated by the numeral 53, and the rail 38 is cut off for approximately one inch at the left end thereof, as indicated by the numeral 54, for drainage purposes, as more fully explained hereinafter. The outer threshold leg 35 is provided with a plurality of holes, as 55, adjacent the front ends of the drainage channels 47 to permit condensation collected in these channels to drain out to the atmosphere.

As shown in Figs. 1 and 3, the window construction of the present invention includes a left glass panel 56 and a right glass panel 57, as viewed from the inside of the construction. The right glass panel 57 includes the top rail 58, the bottom rail 59, and the left and right stiles 60 and 61, respectively. The glass panel rails and stiles are all preferably extruded from aluminum, however, they may be made from any other suitable corrosion resistant metal as stainless steel. As shown in Fig. 3, the right stile 61 abuts the bumpers 33 when the glass panel 57 is in the closed position. As shown in Figs. 2 and 16, the top rail 58 is U-shaped in cross section and comprises the pair of vertically spaced apart outer and inner walls 62 and 63, respectively, which are connected by the integral lower bight portion or rounded wall portion 64. The rail walls 62 and 63 are further joined by the integral longitudinally extended cross plate or web 65. The bight portion 64 is formed with a centrally disposed longitudinaally extended slot 66 in which is received the upper edge of the single glass pane 67 of the glass panel 57. The bight portion 64 is provided with a pair of longitudinally extended arc-shaped projections 68, which are disposed along the inner edge of the slot 66, which function to provide arc-shaped slots in each of which is mounted a strip of vinyl glazing material 69. As seen in Fig. 2, the vinyl glazing strips 69 function to operatively center the glass pane 67 in the slot 66 and provide a weather-seal therebetween.

As shown is Figs. 2 and 8, the rail wall 63 is provided with a longitudinally extended inwardly projecting integral enlarged portion 70 in which is formed a longitudinally extended T-shaped slot which comprises the inner slot 71 and the communicating slot 72 which opens to the atmosphere through the outer side of the wall 63. A continuous strip of weatherstripping is operatively mounted in said T-shaped slot and comprises a vinyl backing portion 73 which is mounted in the slot portion 71, and the woven pile 74, and the integral flexible vinyl lip 75. As seen in Fig. 2, the vinyl lip 75 is disposed along the top of the woven pile on the weather side thereof, and this lip functions to provide added protection against infiltration by water and other elements of the weather. The woven pile may be made from any suitable material, such as wool, mohair or the like, and as seen in Fig. 2, it is adapted to slidably engage the outer face of the header flange 18 to provide a second weather-seal at that point against the elements. The rail wall 62 is provided with a portion 76 similar to the portion 70 on the wall 63 in which is formed the slots 77 and 78. A continuous strip of weatherstripping material similar to that mounted in the slots 71 and 72 is mounted in the slots 77 and 78 and comprises the vinyl backing 79, the pile 80 and the integral lower flexible vinyl lip 81. It will be seen that the lip 81 is diposed on the bottom of the pile 80 which is toward the weather side, and that it engages the inner side of the header flange 17 to give added protection against infiltration of water and other elements. The pile 80 also engages the inner face of the header flange 17. If will be seen that the piles 74 and 80 function with the lips 75 and 81 to provide a quadruple sealing means along the upper rail of the glass panel 57 between the outside of the window construction and the inside of the window construction.

As shown in Figs. 1, 3 and 4, the right stile 61, of the outer glass panel 57, comprises a pair of spaced apart vertical flat walls, as the outer and inner walls 82 and 83, respectively. The inner and outer ends of the walls 82 and 83 are enclosed by the integral U-shaped or rounded end walls 84 and 85, respectively. The stile 61 further includes the vertical transversely disposed integral web or plate 86. The inner rounded end wall 84 is provided with the centrally disposed longitudinally extended glass pane slot 87 through which is received the right edge of the glass pane 67, as viewed in Fig. 1. An arc-shaped projection as 88 is integrally formed on the inside of the end wall 84 adjacent each edge of the slot 87, and these projections function to provide arc-shaped slots in each of which is mounted a strip of vinyl glazing material as 89. The vinyl glazing strips 89 function to operatively center the glass pane 67 in the slot 87 and to provide a weather-seal therebetween.

As shown in Fig. 3, the stile 61 is provided with a longitudinally extended inwardly projecting integral enlarged portion 90 in which is formed a longitudinally extended T-shaped slot which comprises the inner slot portion 91 and the outer communicating slot portion 92 which opens to the atmosphere through the outer side of the wall 83. A continuous strip of weatherstripping is operatively mounted in said T-shaped slot and comprises a vinyl backing portion 93 which is mounted in the inner slot portion 91, the woven pile 94, and the flexible vinyl lip 95 which is integral with the backing 93. As seen in Fig. 3, the vinyl lip 95 is disposed along the outer side of the pile 94, on the weather side thereof, and this lip 95 functions to provide added protection against infiltration by water or other elements of the weather. The pile 94 and the lip 95 sealingly engage the outer face of the jamb flange 26.

As shown in Fig. 16, the glass panel top rail 58 is fixedly joined to the stile 61 along the mitered line indicated by the numeral 96. The continuous weatherstrippings in the slots 72 and 92 also abut each other along the line 96. The means for securing the rail 58 and the stile 61 together includes the U-shaped plate 97 which is disposed on the upper side of the rail web 65 and is secured thereto by any suitable means as by the screws 98. A second plate 99 is secured to the inside face of the outer side of the stile web plate 86 by any suitable means, as by the screws 100. As shown in Fig. 16, the plate 97 overlaps the upper end of the plate 99 and these two plates are secured together by means of screws, as 101, which pass through the plate 97 and are threadably engaged in longitudinal apertures 102 formed in the plate 99.

As shown in Figs. 1 and 3, the glass panel 57 is provided with a flush type door grip, generally indicated by the numeral 103, which is provided with a substantially box-shaped body 104 that is recessed in a hole, as 105, which is cut out of the inner stile wall 83. The door grip 103 is further provided with a front opening 106 into which the operator's fingers may be inserted for gripping and sliding the panel 57. The door grip 103 is further provided with an integral circumferential flange 107 around the opening 106, and this flange is curved so as to fit flush against the outer face of the stile wall 83. The stile web wall 86 is cut-out, as at 108, to allow for the insertion of the door grip 103 into the stile 61. The door grip 103 is held in place by a friction fit between the box-like body 104 and the opening 105 in the stile wall 83, and further by means of the pair of integral spaced apart vertical flanges 109 on the rear side of the box-like body 104 which are adapted to engage the web wall 86 with a friction fit.

The left stile 60 of the right glass panel 57 is constructed similarly to the right stile 61 and the corresponding parts have been marked with the same reference numerals followed by the small letter "*a*." The left stile 60 is also joined to the panel top rail 58 in the same manner as the right stile 61, as was explained hereinbefore. There are some differences and one of them is that the left stile 60 is not provided with a door grip 103. Another difference is that instead of a weather-seal like the type used in slots 91 and 92 of the stile 61, a vertical interlocking flexible vinyl weatherstrip, generally indicated by the numeral 110, is employed in the slots 91*a* and 92*a*. It will be seen that the slots 91, 92, and 91*a* and 92*a* are disposed along the outer end of the stile walls 82 and 82*a*, respectively. While the pile 94 and the lip 95 operatively engage the outer face of the jamb flange 26, the interlocking weatherstripping 110 is adapted to coact with a similar strip of material on the glass panel 56, as more fully explained hereinafter. The upper end of the weatherstripping 110 would abut the left end of the continuous weather-seal in the slots 71 and 72 in the top rail 58 along a mitered juncture line, similar to line 96, between the rail 58 and the stile 60. The weatherstripping 110 includes a T-shaped longitudinally extended head portion comprising the part 111 which is seated in the slot 91*a* and the neck 112 which is seated in the slot 92*a*. Integral with the neck portion 112 is an offset longitudinally extended arm portion having a thick-walled inner part 113 which is adapted to lie against the outer face of the stile wall 83*a*. The arm portion 113 further includes an integral thin-walled outer part, indicated by the numeral 114, which is spaced from the inner part 113, as indicated by the numeral 115. The weatherstripping 113 thus presents to the outer side thereof two outwardly sloping faces which are joined by a face parallel to the stile wall 83*a*.

As shown in Figs. 2, 4 and 5, the bottom rail 59 of the right glass panel 57 comprises the outer and inner vertical walls 116 and 117, respectively, the upper ends of which are joined by the integral U-shaped or rounded upper end wall 118, and, the horizontal longitudinally extending web wall 119. The rounded upper end wall 118 is provided with a central longitudinally disposed slot 120 for the reception of the lower edge of the door glass pane 67. An arc-shaped projection, as 121, is integrally formed on the inside of the upper end wall 118 adjacent each edge of the slot 120, and these projections function to provide arc-shaped slots in each of which is mounted a strip of vinyl glazing material, as 122. The vinyl glazing strips 122 function to operatively center the glass pane 67 in the slot 120 and to provide a weather-seal therebetween. As shown in Figs. 2 and 4, the door glass pane 67 is adapted to rest on blocks or pads, as 123, which are preferably made from rubber or any other suitable resilient material and which are about six inches long. At least two of the blocks 123 are required, with one such block being disposed adjacent each end of the glass pane 67.

As shown in Figs. 4, 5 and 16, the right stile 61 is connected to the bottom rail 59 along the mitered line 124, and the vertical line 125, by suitable connection means including the horizontal plate 126 which is secured to the lower face of the rail wall 119 by means of the screws 127. The means for connecting the stile 61 to the rail 59 further includes the vertical plate 128 which is secured to the stile wall 86 by means of the screws 129. As shown in Fig. 4, the horizontal plate 126 overlaps the lower end of the plate 128 and these plates are securely held together by means of the screws 130 which are adapted to pass through the plate 126 and to be threadably engaged in the longitudinally extended apertures 131 in the plate 128. The left stile 60 would also be secured to the bottom rail 59 in the same manner.

The glass panel 57 is supported by a pair of adjustable sheave constructions which are operatively mounted on the lower end of the panel with a sheave at each end thereof. As shown in Figs. 4 and 5, these adjustable sheave constructions are constructed as follows. The plate 126 is provided with a pair of downwardly extended integral arms 132 which rest on the inwardly projected longitudinally extended lips 133 and each of the arms 132 has an inwardly and downwardly extended

portion 134 which is formed with an inwardly sloping lower face, as 135. The sheave supporting means comprises a U-shaped yoke which includes a pair of vertical spaced apart plates 136 which are adapted to slidably engage the sloping surface 135 on the arm portions 134. The outer ends of the plates 136 are integrally connected by the bight portion 137. A sheave 138 which is made from stainless steel, nylon, or other suitable material, is rotatably supported by means of the sealed roller bearing means 139 on the shaft 140, the ends of which are fixedly secured in the vertical plates 136.

The sheave 138 is adjustable inwardly and outwardly by means of the adjustment screw 141 which is provided on the inner end thereof with a reduced neck portion 142 which passes through the aperture 143 in the member 137. An enlarged head 144 on the inner end of the neck 142 secures the screw 141 to the member 137 but permits the neck 142 to be rotated in the aperture 143 during an adjustment operation. The screw 141 is threadably mounted through the aperture 145 in the bight portion 146 of a U-shaped support or carrier bracket. The outer end of the screw 141 projects into the aperture 147 in the stile wall 85 whereby this screw is accessible from the outside of the panel so that it may be rotated by a suitable tool to adjust the sheave carrier member inwardly and outwardly along the sloping surface 135. The screw carrier bracket includes the legs 148 which are integral with the ends of the bight portion 146 and these legs are rotatably mounted on the pins 149 which are fixedly mounted in the stile walls 82 and 83, as by means of a press fit.

It will be seen that the adjustable sheave means provides a mechanism whereby the panel 57 may be adjusted upwardly and downwardly to properly align the panel relative to the stationary door frame. As shown in Figs. 4 and 5, the plate 126 is provided with a hole 150 therethrough to provide for clearance for the sheave 138. The left end of the glass panel 57 is rollably and adjustably supported by a similar sheave means, as shown in Fig. 2, and the corresponding parts are indicated by corresponding reference numerals followed by the small letter "*a*."

The bottom rail 59 is provided with quadruple weather-seal means, as is now described. The inner rail plate 117 is provided on the inner side thereof with an inwardly projected longitudinally extended shoulder 151 (Fig. 2) from the outer end of which extends downwardly the longitudinal vertical arm 152 which is spaced from the wall 117. Integrally mounted on the lower end of the arm 152 is an inwardly extended longitudinal horizontal arm 153. Slidably mounted in the longitudinally extended slot 154, which is formed between the wall 117 and the arm 152, is a vertical longitudinally extended plate 155 which carries adjacent the lower end thereof an integral inwardly extended horizontal longitudinal tube 156 which is hollow in cross section and which is provided with a longitudinal slot 157 in the lower wall thereof. A continuous strip of weatherstripping is carried by the tube 156 and includes a vinyl backing 158 from one end of which extends downwardly and outwardly the integral flexible vinyl finger 159. The vinyl backing 158 also carries the woven pile 160 which is slidably engageable with the upper face of the threshold sill plate 34. A plurality of spaced apart stainless steel coil springs 161 are operatively mounted between the longitudinal arm 153 and the hollow tube 156 and these springs function to urge the sliding pile 160 and the finger 159 into sealing engagement with the threshold. The plate 155 is preferably made from rigid vinyl but may be made from aluminum. The plate 155 functions not only as an additional weather-seal but functions also as a means for governing the compression of the pile 160 so that it may operate most efficiently. As shown in Fig. 2, the outer rail wall 116 is provided on the inner side thereof with an integral inwardly extended longitudinal shoulder 162 from the outer end of which extends downwardly the integral longitudinal arm 163 so as to form the slot 164 in which is slidably mounted the longitudinal vertical plate 165 which is adapted to slidably engage the upper face of the threshold sill plate 34 and function as an additional weather-seal. The plate 165 is preferably made from rigid vinyl but it may also be made from aluminum, stainless steel, or any other suitable material. It will be seen that the plates 165 and 155, the lip 159, and the pile 160 all function to provide a quadruple weather-seal along the bottom edge of the panel 57.

As shown in Fig. 1, the left glass panel 56 comprises the top rail 166, the bottom rail 167, the left stile 168, the right stile 169 and the single glass pane 170. It will be seen that the left glass panel 56 is constructed the same as the right glass panel 57 but is merely reversed in position. That is, as viewed in Fig. 3, if the panel 57 were swung counter clockwise about its left end, it would serve as the left panel 56. Accordingly, a detailed description of the panel 56 is not necessary.

The panel top rails 58 and 166, and the stiles 60 and 169, are constructed exactly alike. The panel bottom rails 59 and 167, and the stiles 61 and 168, are constructed alike except for the following described differences.

The first difference between the panels 56 and 57 is that the flexible vinyl finger 95*a* is disposed inwardly of the woven pile 94*a* on the stile 168 and this is just the opposite of the disposition of the finger 95 on the stile 61. The flexible finger 95*a* is disposed on the inner side of the pile 94*a* so that it will be immediately in engagement with the weather elements. It will be seen that the interlocking weather-seal 110*a* on the stile 169 is sealingly engaged with the interlocking seal 110 when the panels 56 and 57 are in the closed position, as shown in Fig. 3. Another difference between the panels 56 and 57 is that the door grip 103*a* is reversed in its position in the stile 168 relative to the position of the door grip 103 in the stile 61 so that both door grips will be on the inside of the sliding door construction, and this is shown in Fig. 3. It will be seen that in order to mount the door grips 103 and 103*a* in the stiles 61 and 168, that the glass panes 67 and 170 must be notched out as indicated by the numerals 171 and 171*a*. A further difference between the glass panels 56 and 57 is illustrated in Fig. 2, wherein it will be seen that the slidable sealing member 165*a* is disposed along the inner side of the panel 56 while its corresponding sealing member 165 is disposed along the outer side of the panel 57. A still further difference between the panels 56 and 57 is shown in Fig. 2, wherein it will be seen that the sealing plate 155*a* is disposed along the outer side of the panel 56 and carries the sealing finger 159*a* along the outer side of the pile 160*a*. As best seen in Fig. 5, the longitudinal horizontal arm 153 is cut-off at the point 172 to permit adjustment of the sheave 138 inwardly. However, the finger 159 and the pile 160 extend to the right beyond the point 172 and up to the junction line 125.

As shown in Figs. 2 and 3, the screen panel comprises the top rail 173, the bottom rail 174, the right rail 175 and the left rail 176. The top rail includes the outer and inner vertical walls 177 and 178, respectively, which are joined the the upper ends thereof by the integral rounded end wall 179. The walls 177 and 178 are enclosed at the lower ends thereof by the integral wall 180. A downwardly and outwardly curved longitudinal lip 181 is integrally connected to the lower end of the wall 178 and the inner end of the wall 180 and is constructed to form a longitudinal groove for the reception of an edge 182 of the screen 183. The screen edge 182 is releasably secured in the groove formed by the lip 181 by a suitable glazing strip 184. A plurality of hemispherically shaped rubber pads 185 is suitable fixed on the outer surface of the outer wall 177 and slidably abut the inner

face of the header flange 15. The inner wall 178 is provided with an inwardly extended longitudinal projection 186 in which is formed a longitudinal T-slot for the reception of a continuous weather-seal. This weather-seal includes the vinyl backing 187 in which is carried the woven pile 189 which slidably abuts the outer face of the header flange 17. An integral flexible vinyl lip 188 is carried by the vinyl backing 187 and is disposed above the pile 189 and slidably engages the inner face of the header flange 17.

As shown in Fig. 3, the side rails 176 and 175 are constructed similarly to the top rail 173 and the corresponding parts are marked with similar reference numerals followed by the small letters "*a*" and "*b*," respectively. The right screen rail construction differs slightly from the left screen rail and the top screen rail in that the T-shaped slot in the projection 186*b* carries an interlocking weather-seal 190 made entirely from a flexible vinyl and which includes the longitudinal T-shaped head 191 to which is integrally connected the inwardly extended longitudinal arm 192 which lies against the rail 175. The interlocking seal 190 further includes the rearwardly extended integral longitudinal arm 193 on the inner end of which is formed a longitudinal flexible thin walled bead 194 which slidably and sealingly engages the outer face of the glass panel 57.

As shown in Fig. 17, the screen top rail 173 is connected to the screen side rail 175 along the mitered line 195 and these two rails are secured in place by means of an angle bracket having one leg 196 disposed in the top rail 173 and the other leg 197 disposed in the side rail 175. The aforementioned angle plate is fixedly secured to the rails 173 and 175 by any suitable means, as by the screws 198.

As shown in Fig. 2, the screen lower rail comprises the inner and outer vertical longitudinal walls 199 and 200 which are joined at the top ends thereof by the integral longitudinal upper wall 201. An upwardly and outwardly curved longitudinal lip 202 is integral with and extends outwardly from the upper end of the inner wall 200 and forms a longitudinal groove in which is releasably secured the lower edge 203 of the screen 183, by means of the vinyl glazing strip 204. A hollow bracket 205 which is rectangular in cross section, is mounted in the lower rail 174 and is provided with an opening in the lower wall thereof which is bounded by a pair of vertical downwardly extended legs 206 between which is operatively mounted a sheave 207 which is adapted to roll on the rail 38. The sheave 207 is suitable rotatably supported on the pin 208 which is fixed between the arms 206. As shown in Fig. 2, the sheave is mounted to rollably support the right end of the screen panel, but it will be understood that a similar sheave is also mounted under the left end of the screen panel. The bracket 205 is adjustably secured in place by means of the screw 209 which may be moved upwardly and downwardly in the slot 210 in the outer wall 199. As shown in Fig. 2, an integral vertical longitudinal arm 211 is formed on the inside of the lower rail wall 200 and is spaced therefrom to form a longitudinal slot in which is slidably mounted a flexible longitudinal vinyl weatherseal 212 which slidably engages the upper face of the threshold sill plate 34.

As shown in Fig. 18, the screen bottom rail 174 is connected to the screen side rail 175 by means of a suitable angle bracket having a vertical leg 213 extended into the rail 175 and the horizontal leg 214 extended into the rail 174, and this angle bracket is secured to these rails by means of suitable screws, as 215. Figs. 17 and 18 are illustrative of the manner in which the top, bottom and side rails of the screen panel are connected together.

It will be seen that when the left glass panel 56 is moved to the dotted position 216 as shown in Fig. 3, the screen panel will be in a position to let air pass therethrough and the weatherstripping means on the various rails thereof will provide efficient sealing action against insects. It will be seen that the combination screen and glass door construction of the present invention provides an improved construction which includes efficient weatherstripping means around the various panels thereof. For example, the glass panels are provided with quadruple weatherseals along the upper and lower edges thereof and with double weather-seals along the outer sides thereof. Furthermore, the novel interlock members 110 with their thin walls 114, provide an efficient interlock seal between the adjacent stiles 60 and 169 when the glass panels are in the closed position. The threshold member 35 with its novel drainage means provides an improved structure of this type which operates as follows. The drain holes 51 drain off all condensation from between the rail 40 and the lip 37 while the drain holes 52 drain off condensation between the rail 40 and the rail 39. Furthermore, since the rails 38 and 39 are cut-off at the right end thereof, any condensation trapped between the weather-seal lip 159 and the rail 39 may drain down the upper face of the threshold sill plate 34. Likewise, any condensation trapped between the rails 38 and 39 may drain around the edges of the cut-off portions of the rail 38. The rounded off inner edge walls of the various glass panel rails and stiles provide a pleasing and attractive appearance to the construction.

Fig. 15 illustrates a modification of the screen panel bottom rail. The rail illustrated in this figure is constructed substantially the same as the screen bottom rail illustrated in Fig. 2, and the corresponding parts are marked with similar reference numerals followed by the small letter "*a*." The screen edge retaining groove is disposed so as to face inwardly instead of outwardly as in the embodiment of Fig. 2. Accordingly, the lip 217 which is formed integral with the outer wall 199*a*, extends upwardly and inwardly. A further difference between the embodiment of Fig. 15 and that of Fig. 2 is that a different flexible vinyl weather-seal is employed. As shown in Fig. 15, a longitudinally extended T-shaped slot 218 is formed in the inner wall 200*a* and, mounted in this slot, is the T-shaped head 219 which is integral with the upper end of a vertical longitudinal flexible vinyl weatherstripping 220. The lower edge of the weatherstripping 220 is bent outwardly, as indicated by the numeral 221, and this lower edge slidably engages the upper face of the threshold sill plate 34. The lower end of the walls 199*a* and 200*a* are enclosed by a longitudinal integral rounded end wall 222 which is provided with a suitable slot through which the sheave 207*a* projects.

Fig. 12 discloses a modified threshold member which is provided with inserted sheave rails instead of integral rails. The parts of the embodiment of Fig. 12 which correspond to the threshold embodiment of Fig. 2 will be marked with similar reference numerals followed by the small letter "*a*." In the embodiment of Fig. 12, the sill plate 34*a* is provided with the spaced apart longitudinal downwardly extended projections 223, 224 and 225 in each of which is formed a longitudinal inverted T-shaped slot 226 which is adapted to receive a rigid vinyl longitudinal sheave rail 227.

Fig. 13 discloses a modified stationary frame side jamb 228 which is provided with the screen channel 229 and the glass panel channels 230 and 231. Each of the aforementioned channel sections is provided with an outwardly extended longitudinal projection 232 on their outer end wall in which is formed an inwardly disposed inverted T-shaped slot 233 in which is mounted a head 234 of a longitudinally extended weatherstripping made from flexible vinyl. This weatherstripping has a pair of spaced apart arms 235 integrally connected to the head 234, and integrally formed on the outer ends of the arms 235 is a continuous thin-walled bumper 236 which extends from the head member of the panel to the threshold member. It will be seen that the bumper 236 functions as an additional weather-seal between the stile member of a glass or screen panel with which it is engaged.

Fig. 9 discloses a modified glass panel stile 237 which is adapted to be used in a glass panel provided with

dual glazing as 238. The stile 237 would be constructed the same as the stiles of the embodiment of Fig. 3, but the inner ends of the walls 82*b* and 83*b* would not terminate in a rounded structure but would terminate in the longitudinal ends 239 which would be turned inwardly slightly and have formed along the inside thereof the grooves 240 for the reception of the glazing strips 241.

Fig. 10 discloses a modified interlocking weather-seal for use between adjacent stiles of an inner and outer glass panel when they are in the closed position. As shown in Fig. 10, the stiles 242 and 243 correspond to the stiles 60 and 169, as illustrated in Fig. 3. The longitudinal projection 244 corresponds to the longitudinal projection 90*a* of stile 60 and the longitudinal T-shaped groove 245 corresponds to the longitudinal T-shaped groove as 92*a*, 91*a*. The modified interlocking weather-seal includes a backing portion 246 which is mounted in the slot 245 and an integral and outwardly extended longitudinal portion 247 which is disposed at an acute angle relative to the adjacent side wall of the stile 242 on which it is carried. The interlock portions 246 and 247 are preferably made of rigid vinyl. The side faces of the interlock portion 247 are parallel and the outer edge is formed so as to be parallel with the outer face of the stile 242. The adjacently disposed stile 243 is provided with a similarly constructed interlock and the corresponding parts are marked with similar reference numerals followed by the small letter "*a*." As shown in Fig. 10, when the stiles 242 and 243 are moved to a position whereby their corresponding glass panels are in the closed position, the interlock portions 247 and 247*a* will overlap and abut each other and provide an efficient weatherseal.

Fig. 11 discloses a third interlock embodiment in which the numerals 248 and 249 indicate two glass panel stiles disposed adjacent each other in a position the same as the stiles 60 and 169 are disposed in Fig. 3. The projection 250 and the slot 251 correspond to the projection 90*a* and the slots 91*a* and 92*a* of the stile 60. The interlock of Fig. 11 includes the T-shaped longitudinal head 252 which is disposed in the slot 251 and to which is integrally connected the longitudinal arm 253 which is adapted to lie against the adajcent wall of the stile 248. A second arm 254 is integrally connected to the outer end of the arm 253 and extends therefrom at rightangles thereto toward the adjacent stile 249. The interlock portions 252, 253 and 254 are preferably formed from rigid vinyl. An integral longitudinal outwardly extended arm 255 extends outwardly from the outer end of the arm 254 and is preferably reduced in thickness as compared to the arm 254 and is adapted to slidably engage the adjacently disposed stile 249. The arm 255 is also made from rigid vinyl but because it is not as thick as the arm 254, it will have some degree of flexibility to provide for a sliding sealing action between the adjacent stile 249 and it. A thin-walled longitudinally extended integral bead 256 is formed on the outer face of the arm 254. A similar interlock is mounted on the stile 249 and the corresponding parts are marked with similar reference numerals followed by the small letter "*a*." It will be seen that the embodiment of Fig. 11 discloses an interlock which provides for a triple sealing action since the thin-walled beads 256 will engage each other to provide one line of sealing and the arms 255 will engage the adjacent stile to provide two more lines of sealing.

Although the screen panel interlocking weather-seal 190 is preferably made from a soft flexible vinyl, it will be understood, that this seal could be made from rigid vinyl, if desired. The rounded end wall portions of the glass panels and screen panel stiles provide a construction which is attractive in appearance and which is possessed of clean sight lines. The bumper weather-seal 236 provides an additional weather-seal when used, whereby, the glass and screen panels are provided with triple weather-sealing action along the outer sides thereof when this embodiment is employed. The novel construction of the improved combination glass and screen door permits easy and quick assembly of the door on the job, and this assembly is facilitated by the snap-in vinyle tubes used around the edges of the glass and screen panels.

While it will be apparent that the preferred embodiments of the invention herein disclosed are well calculated to fulfill the objects above stated, it will be appreciated that the invention is susceptible to modification, variation and change without departing from the proper scope or fair meaning of the subjoined claims.

What I claim is:

1. In a sliding glass and screen door construction of the class described, the combination, comprising: a stationary door frame including a header, a pair of side jambs, and a threshold; said header and jambs being each provided with an inwardly facing inner glass channel along the inner side thereof, an inwardly facing screen panel channel along the outer side thereof, and, an inwardly facing outer glass panel channel between the screen panel channel and the inner glass panel channel; said threshold being provided with an upper outwardly sloping sill plate on which is mounted a screen panel sheave rail, and an outer and an inner glass panel sheave rail; said rails being extended longitudinally of said sill plate and being substantially centrally located relative to the screen and glass channels in said header and jambs; means for draining the upper surface of said sill plate; a screen panel having the lower end thereof rollably supported on said screen panel rail and the upper end thereof slidably mounted in the screen channel in said header; an outer and an inner glass panel; adjustable sheave means for rollably supporting the lower ends of said glass panels on the glass panel rails; and, the upper ends of said glass panels being slidably mounted in the glass channels in said header.

2. In a sliding glass and screen door construction of the class described, the combination, comprising: a stationary door frame including a header, a pair of side jambs, and a threshold; said header and jambs being each provided with an inwardly facing inner glass channel along the inner side thereof, an inwardly facing screen panel channel along the outer side thereof, and, an inwardly facing outer glass panel channel between the screen panel channel and the inner glass panel channel; said threshold being provided with an upper outwardly sloping sill plate on which is mounted a screen panel sheave rail, and an outer and an inner glass panel sheave rail; said rails being extended longitudinally of said sill plate and being substantially centrally located relative to the screen and glass channels in said header and jambs; means for draining the upper surface of said sill plate; a screen panel; adjustable roller means for rollably supporting the lower end of said screen panel on said screen panel rail; the upper end of said screen panel being slidably mounted in the screen channel in said header; an outer and an inner glass panel; adjustable sheave means for rollably supporting the lower ends of said glass panels on the glass panel rails; the upper ends of said glass panels being slidably mounted in the glass channels in said header; resilient bumper means mounted in each of the screen and glass panel channels in said side jambs; and, weather-sealing means on the upper, lower and outer sides of said panels for engagement with said stationary frame, and, on the inner sides of said panels for engagement with the adjacently disposed panel.

3. The structure as defined in claim 2, wherein: said bumper means comprises a plurality of longitudinally disposed, spaced apart hemispherically shaped members formed from a resilient material.

4. The structure as defined in claim 2, wherein: said bumper means comprises a continuous strip of resilient material which is provided with a hollow head extended

outwardly into each channel, and which head is hemispherical in cross-section.

5. A screen panel structure for use with sliding glass doors in a stationary frame having a header, side jambs and a threshold, such header and jambs having channel portions, comprising: upper, lower, and a pair of side rails which are each formed with a rounded outer end wall and an inner and outer vertical wall integral therewith; each of said rails being provided with an integral inner end wall provided with a peripheral groove for the reception of an edge of the screen in said screen panel; a glazing strip mounted in each of the peripheral grooves for holding the screen in these grooves; a resilient bumper means on the outer face of the outer vertical wall of the upper rail for slidable engagement with the outer wall of said screen panel channel in the header; a continuous strip of woven pile weatherseal with a continuous lip of resilient material on the upper side thereof mounted on the inner wall of the upper rail for slidable engagement with the inner wall of said screen panel channel in the header; a vertical longitudinal flexible strip of vinyl fixedly mounted on the inner wall of said lower rail along the bottom edge thereof and being provided with an outwardly bent lower edge slidably engageable with the sill plate of said threshold; a continuous strip of woven pile weather seal with a continuous lip of resilient material on the outer side thereof mounted on the inner wall of one of said side rails; and, a flexible continuous strip of weatherstripping mounted on the inner wall of the other of said side rails.

6. A screen panel structure for use with sliding glass doors in a stationary frame having a header, side jambs and a threshold, such header and jambs having channel portions, comprising: an upper, lower and a pair of side rails which are each provided with an inner and outer vertical wall integral with an inner end wall provided with a peripheral groove for the reception of an edge of the screen in said screen panel; the upper and side rails being provided with an integral rounded outer end wall; a glazing strip mounted in each of the peripheral grooves for holding the screen in these grooves; a resilient bumper means on the outer face of the outer vertical wall of the upper rail for slidable engagement with the outer wall of said screen panel channel in the header; a continuous strip of woven pile weather-seal with a continuous lip of resilient material on the upper side thereof mounted on the inner wall of the upper rail for slidable engagement with the inner wall of said screen panel channel in the header; a vertical longitudinal flexible strip of vinyl slidably mounted on the inner wall of said lower rail along the bottom edge thereof and being slidably engageable with the sill plate of said threshold; a continuous strip of woven pile weather-seal with a continuous lip of resilient material on the outer side thereof mounted on the inner wall of one of said side rails; and, a flexible continuous strip of weatherstripping mounted on the inner wall of the other of said side rails.

7. A door panel structure for sliding glass doors comprising: inner and outer glass panels, each having a top and bottom rail, and an inner and outer stile; each of said rails and stiles being provided with a vertical inner and outer wall; a continuous strip of woven pile weather-seal with a continuous lip of resilient material on the weather side thereof on inner and outer walls of said top rails, and on the outer wall of the outer stile of the inner glass panel, and on the inner wall of the outer stile of the outer glass panel, for engaging the walls of channels in a header and side jambs; an interlocking weather-seal longitudinally disposed on the inner wall of the inner stile of the outer glass panel adapted to coact with a similar interlocking weather-seal longitudinally disposed on the outer wall of the inner stile of the inner glass panel; a vertical longitudinal flexible strip of weather-sealing material slidably mounted on the inner wall of the inner glass panel bottom rail, and on the outer wall of the outer glass panel bottom rail, along the bottom edges thereof, and being slidably engageable with the sill plate of a threshold; and, a continuous strip of woven pile weather-seal with a continuous lip of resilient material on the weather side thereof mounted on a spring-biased carrier along the front and rear edges of the outer and inner glass panel bottom rails, respectively, with a longitudinal vertical governing lip carried by said carrier and which is slidably engageable with the sill plate.

8. The structure as defined in claim 7, wherein: said top, and bottom rails, and said stiles of the glass panels are each provided with a rounded inner end wall integral with the vertical inner and outer walls thereof; said round inner end walls being provided with a central longitudinal slot; a pane of glass mounted in each glass panel with the edges thereof being slidably received into the slots in the rails and stiles of the respective glass panel; and, a continuous glazing strip press-fitted between each edge of said slots and the glass pane mounted therein.

9. The structure as defined in claim 7, wherein: said top, and bottom rails, and said stiles of the glass panels are each provided with a pair of inwardly extended spaced apart arms integral with the vertical inner and outer walls thereof; a dual pane of glass mounted in each glass panel with the edge thereof being slidably received between said arms in the rails and stiles of the respective glass panel; and, a continuous glazing strip press-fitted between one of said arms and the adjacent face of the dual pane of glass.

10. The structure as defined in claim 7, wherein: said interlocking weather-seal comprising a head and neck portion fixedly mounted on its respective stile; an arm portion integral with the neck portion and adapted to lie against the stile outer face; and, a spaced apart thin-walled portion integral with said arm portion.

11. The structure as defined in claim 7, wherein: said interlocking weather-seal comprises a T-shaped head to which is integrally connected an outwardly angularly extended arm portion.

12. The structure as defined in claim 7, wherein: said interlocking weather-seal comprises a T-shaped head; a first arm portion integral with the head and adapted to lie against the stile outer face; a second arm portion integral with the outer end of the first arm portion and extending outwardly therefrom at right angles thereof; the outer end of the second arm portion being reduced in thickness; and, a thin-walled tube integrally formed on the outer face of said second arm adjacent the inner end thereof.

References Cited in the file of this patent

UNITED STATES PATENTS

1,022,547	Hansen	Apr. 9, 1912
1,060,456	Hockett	Apr. 29, 1913
1,082,375	Vachon	Dec. 23, 1913
1,846,366	Shattuck	Feb. 23, 1932
1,956,651	Moran	May 1, 1934
2,282,885	Raymond	May 12, 1942
2,494,161	Blackman	Jan. 10, 1950
2,613,407	Foresman	Oct. 14, 1952
2,652,907	Miller	Sept. 22, 1953
2,662,053	Brown	Dec. 8, 1953
2,667,244	West	Jan. 26, 1954
2,668,318	Le Bon	Feb. 9, 1954
2,733,487	Hauck	Feb. 7, 1956
2,747,240	Peterson	May 29, 1956
2,765,885	Steffan	Oct. 9, 1956
2,787,034	Hauck	Apr. 2, 1957
2,788,097	Frick	Apr. 9, 1957
2,793,405	Focht	May 28, 1957
2,835,934	Franblau et al.	May 27, 1958