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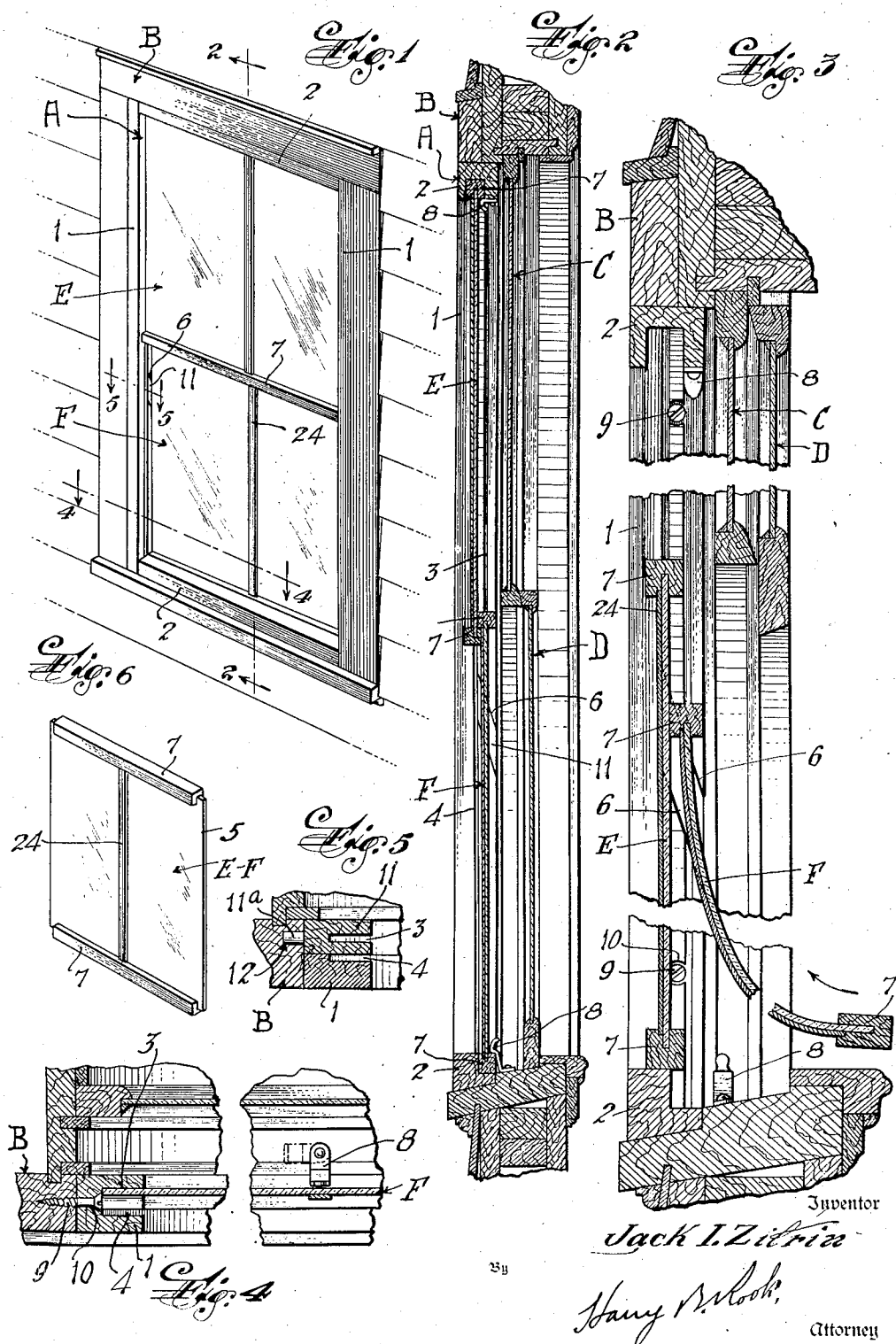
J. I. ZITRIN

2,392,715

SLIDING WINDOW OR SCREEN

Filed Sept. 8, 1943

3 Sheets-Sheet 1



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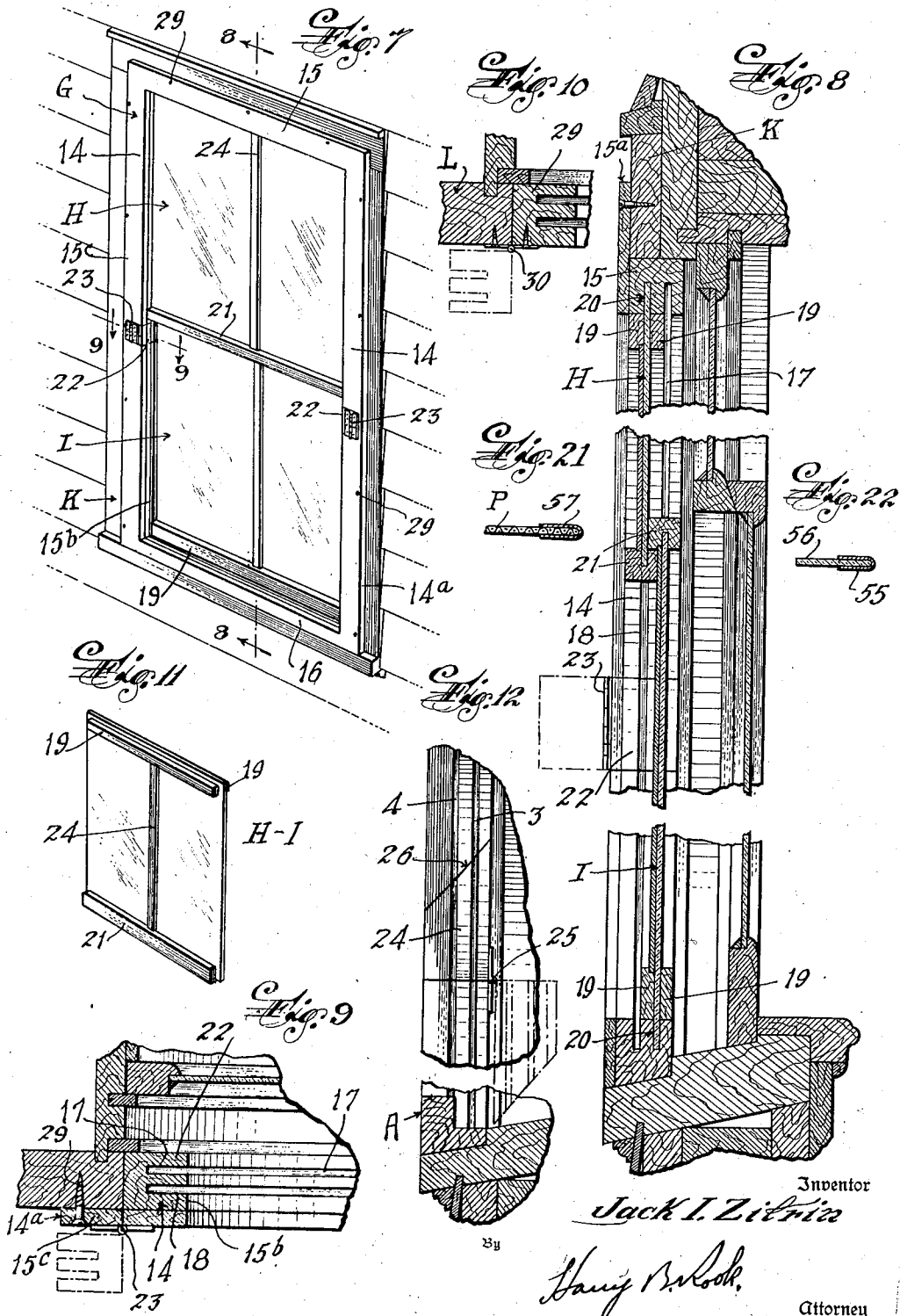
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3 Sheets-Sheet 2



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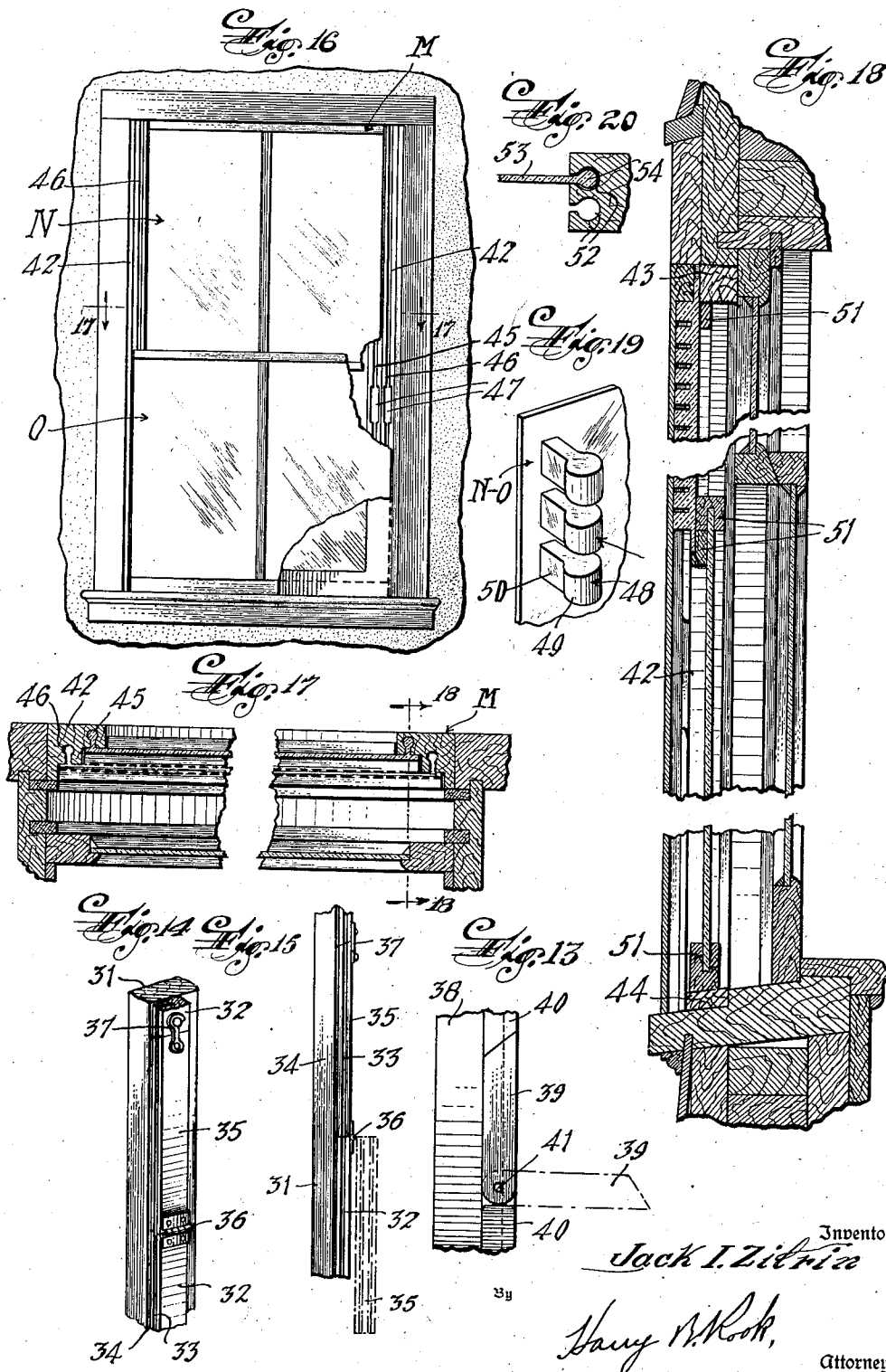
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UNITED STATES PATENT OFFICE

2,392,715

SLIDING WINDOW OR SCREEN

Jack I. Zitrin, Newark, N. J.

Application September 8, 1943, Serial No. 501,519

6 Claims. (Cl. 160—184)

This invention relates in general to ordinary windows and doors for buildings, aeroplanes, show cases and the like, storm windows and screens of the type that include one or more sections which slide in a frame as contrasted with the type that have sections mounted to swing on hooks and eyes or hinges.

The original installation of windows, especially storm windows, and screens as well as the occasional or seasonal installations and removals, are tedious, consume too much time, require tools, fitting of sash or screen sections and connecting together of hooks and eyes; generally a skilled person is necessary to do the job. Moreover, the cost of the structure is high. Also, known structures of this character easily become broken and require a large amount of space, especially when in storage.

A prime object of my invention is to provide a novel and improved construction for a window, or a door or a screen which shall be relatively inexpensive, which can be originally installed and occasionally or seasonally changed in a minimum of time and by a relatively unskilled person, which cannot be easily broken and which will require only a small amount of space.

Another object of the invention is to provide a structure of the character described and of the type that includes two sections, panels or sash that are slidable in guide grooves in a frame, and which embodies a novel and improved construction such that said sections, panels or sash can be inserted into and removed from said guide grooves in said frame in succession, easily and quickly and by a relatively unskilled person, or even a child or an elderly person, without tools and with a minimum of manipulation of parts.

A further object is to provide such a construction, particularly for a storm window, which shall comprise a sash, panel or section formed of transparent flexible material, for example a plastic substance or wire mesh, slidable in guide grooves in a frame which is constructed with notches leading laterally into said grooves so that said section can be inserted into and removed from said grooves by bending or flexing and simultaneously longitudinally sliding said section through said notches.

Other objects, advantages and results of the invention will be brought out by the following description in conjunction with the accompanying drawings in which

Figure 1 is a perspective view of a storm window embodying my invention installed within an ordinary window frame.

Figure 2 is an enlarged vertical longitudinal sectional view on the line 2—2 of Figure 1.

Figure 3 is a further enlarged fragmentary vertical sectional view showing the manner of inserting and removing the window or screen sections, sash or panels.

Figure 4 is an enlarged horizontal sectional view on the line 4—4 of Figure 1.

Figure 5 is a similar view on the line 5—5 of Figure 1.

Figure 6 is a detached perspective view of one of the sash or panels illustrated in Figure 1.

Figure 7 is a view similar to Figure 1 showing a modification of the invention.

Figure 8 is an enlarged vertical sectional view on the line 8—8 of Figure 7.

Figure 9 is an enlarged horizontal sectional view on the line 9—9 of Figure 7.

Figure 10 is a similar view showing a modification of the invention.

Figure 11 is a detached perspective view of one of the sash or panels illustrated in Figure 7.

Figure 12 is a fragmentary vertical sectional view showing another modification of the invention.

Figure 13 is an enlarged fragmentary elevational view of the inside of one of the side pieces of the mounting frame, illustrating a modification of the invention.

Figure 14 is a fragmentary perspective view of the inside of one of the side pieces of the mounting frame, showing another modification of the invention.

Figure 15 is a side elevational view of the construction shown in Figure 14.

Figure 16 is an elevational view of the inside of a building window having a storm window embodying a modification of the invention installed therein, portions of the regular window sash being broken away for clearness in illustration.

Figure 17 is an enlarged broken horizontal sectional view on the line 17—17 of Figure 16.

Figure 18 is a further enlarged vertical sectional view on the line 18—18 of Figure 17, with portions of the structure broken away.

Figure 19 is a fragmentary perspective view of one of the window panels illustrated in Figures 16 to 18 inclusive.

Figure 20 is a fragmentary horizontal sectional view through one of the panels and one of the side pieces of a mounting frame, showing a further modification of the invention.

Figure 21 is a fragmentary horizontal sectional

view through one of the panels when the invention is embodied in a window screen, and

Figure 22 is a similar view showing a modification of one of the plastic panels.

Specifically describing the embodiment of the invention illustrated in Figures 1 to 6 inclusive, the reference character A designates a mounting frame, comprising side pieces 1 and end pieces 2, to fit within a window frame B at the outside of the usual sash which in the present instance is shown as comprising an upper sash C and a lower sash D vertically slidable in the window frame. Within the mounting frame are slidably arranged two panels, sections or sash E and F of flexible material; for example, for a storm window the material may be of any suitable flexible transparent plastic material, and for a window screen the sections may comprise wire screen or gauze.

Each of the side pieces 1 of the mounting frame has two parallel longitudinal grooves 3 and 4 in the inner surface thereof and opening inwardly of said mounting frame, each groove in one side piece being complementary to one of said grooves in the other side piece for mounting one of the panels E and F. Each panel has each of its longitudinal edges 5 formed to slide in the corresponding said complementary grooves and the panels are of such size and shape that they may be arranged at opposite ends of the mounting frame with one end portion of each overlapping an end portion of the other to wholly close the frame, as clearly shown in Figure 2.

In accordance with this form of the invention, the panels E and F may be inserted into and removed from the respective grooves 3 and 4 from either the outside or the inside of the window, but as shown in the drawings the panels are inserted and removed into and from the mounting frame from the inside of the window. For this purpose, each side piece is provided with an opening or notch 6 which extends inwardly from the inner face of the mounting frame and from the inner surface of the side piece, and said notch or opening intersects both of the guide grooves 3 and 4. The openings or notches 6 are located at one side, preferably the lower side of the middle of the length of the frame as clearly shown in Figure 2, and preferably said notches or openings are directed upwardly, viewing them from the inner face of the frame.

In order to mount the panels E and F in the mounting frame, the panel is first inserted for the upper or outer portion of the frame. The panels are alike so that no particular care is required in selecting the panels for the upper and lower positions. The upper end of the panel is slipped through the notches 6 to bring the longitudinal edges of the panel into alignment with the portions of the outer guide grooves 4 above the openings, the panel being flexed along transverse lines and simultaneously slid upwardly. After the longitudinal edges of the panel have been entirely inserted into the respective grooves 4 the panel is slid downwardly past the opening 6 as shown in Figure 3. Thereupon the upper end of the other panel is slipped through the openings 6 and flexed and longitudinally slid upwardly to bring the longitudinal edges of the panel into the corresponding guide grooves 3. The panel is slid upwardly until the lower edge passes the openings 6 whereupon the panel is pulled downwardly into its normal position as shown in Figure 2. Then the upper panel E may be pushed upwardly to its normal position.

Preferably, each panel has rigid transverse

rails 7 adjacent each transverse edge to prevent flexing of the panels along longitudinal lines. It is desirable that the rails at the overlapping end portions of the panels abut each other when the panels are in frame-closing position as shown in Figure 2. This is especially desirable where the panels constitute sash of a storm window so as to prevent passage of air between the panels. Any suitable weather-tight interlocking contact between said rails may be utilized.

With such a construction it will be observed that the top rail of the lower panel will engage the under side of the top rail of the upper panel as the lower panel is inserted, so that the upper panel will be raised by and upon insertion of the lower panel. Preferably, suitable fasteners 8 will be provided for locking the panels in frame-closing position.

The mounting frame may be fastened in the window frame in any suitable manner but conveniently wood screws 9 may be inserted through openings 10 in the side pieces of the mounting frame and screwed into the mounting frame.

It may be desirable, especially for the sake of appearance, to normally close the openings 6 on the sides of the frame with closure blocks 11 which may be secured in position in any suitable manner. As shown in Figure 5, the closure block has a stud 11a to frictionally fit a socket 12 in the window frame.

A modification of the invention is shown in Figures 7 to 11 inclusive where the mounting frame G is in general the same as the mounting frame A and comprises side pieces 14 and end pieces 15 and 16, each side piece having two parallel longitudinal grooves 17 and 18 in the inner surface thereof and opening inwardly of the frame for guiding the panels H and I. However, each side piece has a flange 14a which overlies the outer face of the window frame K, and the mounting frame is secured in the window frame by fastening members such as wood screws 29 passing through said flanges and into the window frame. Preferably, the top end piece 15 has a flange 15a corresponding to the flange 14a. The bottom end piece 16 may have a flange or may be devoid of a flange, depending upon the construction and arrangement of the window sill.

If desired, each side and end piece of the mounting frame may be formed of two sections, one section 15b carrying the grooves for the panels and being arranged within the window frame, and the other section 15c forming the flange 14a (see Figure 9).

The panels H and I may be formed of the same material as are the panels E and F, but preferably the rigid rails 19 which correspond to the rails 7 are applied to opposite sides of the panel in spaced relation to the transverse edge thereof opposite that which overlaps the other panel; and each top and bottom end piece of the mounting frame G has a groove 20 to receive the transverse edge of the corresponding panel when the panels are in frame-closing position. The rails 21 at the other ends of the panels may straddle the corresponding transverse edges or be grooved to receive the panels, so that said rails 21 will abut each other like the rails 7 when the panels are in frame-closing position.

Each of the side pieces has a removable section 22 to form an opening or notch corresponding to the opening 6, through which the panels H and I can be inserted into and removed from the mounting frame G. As shown, each section 22 is hingedly connected at 23 to the flange 14a (see

Figures 7 and 9) so that the section can be swung outwardly from the mounting frame into a position alongside the outer face of the flange. When the removable sections are swung outwardly as described they leave openings in the corresponding side pieces, and the sections are sufficiently long to permit the panels H and I to be flexed and slid longitudinally into and out of the respective guide grooves 17 and 18 in the manner described in connection with the panels E and F.

In all forms of the invention, the rails 7, 19, 21, etc., preferably slidably abut the sides of the mounting frame to restrain flexing of the longitudinal edge portions of the panels, and reinforcing strips 24 may be secured to the panels to prevent undue flexing of the panels along transverse lines. Also, suitable weather-strip may be utilized if desired to form weather-tight joints between the panels and the mounting frames.

In the form of the invention shown in Figures 7 to 9 inclusive, the removable sections swing horizontally about vertical axes, but if desired the removable sections may swing about horizontal axes as shown in Figure 12. Here the frame is like the frame A of Figures 1 and 2, and the removable section 24 of each side piece of the mounting frame is hingedly connected at 25 to the inner side of the mounting frame so that the section can be swung inwardly alongside the inner face of the mounting frame as shown by dot-and-dash lines in Figures 12 when it is desired to insert and remove the panels into and from the mounting frame, respectively. In such a construction, the swinging end of the removable section preferably will be beveled as at 26 to facilitate the pivotal movement and ensure a snug joint between the removable section and the main portions of the side piece.

If desired, a mounting frame of the type of frame A may be provided with a removable section 29 similar to the section 22 and hingedly connected at 30 directly to the window frame L as shown in Figure 10. This form of the invention is the same in structure and operation as the form shown in Figures 7 to 9 inclusive, with the exception that the mounting frame does not have the flange 14a.

In Figures 14 and 15 I have shown a modification of the structure illustrated in Figures 7 to 9 inclusive, wherein instead of the removable section 22 hingedly mounted on a vertical axis to swing toward the outside of the mounting frame, each side piece of the mounting frame comprises a section 31 which has applied to the inner side thereof a guide section 32 in which is formed one of the guide grooves 33 and one side and the base of the other guide groove 34, the other side of which is formed by the section 31. Each of the guide sections 32 has a portion 35 hingedly connected at 36 on a horizontal axis to swing toward the inner side of the mounting frame to provide an opening for the insertion of the panels into the grooves 33 and 34. A suitable fastener such as a hook 37 may be utilized for holding the portion 35 in its normal position as shown in solid lines in Figures 14 and 15. When it is desired to insert or remove the panels, the portion 35 is swung downwardly and inwardly as shown by dot-and-dash lines in Figure 15.

It will be observed that the form of the invention shown in Figures 14 and 15 is similar to that illustrated in Figure 12, the main difference being in the structure of the side piece of the frame.

Instead of arranging the removable or hinged

sections of the side pieces to swing toward the inside or the outside of the mounting frame, a section of each side piece may be arranged to swing in the general plane of the mounting frame and inwardly thereof as shown in Figure 13. Here the side piece 38 is in general the same as the side pieces shown in Figures 14 and 15, but the hinged portion 39 of the guide section 40 is pivotally mounted on a pin 41 so that it may be swung inwardly of the frame to provide an opening for the insertion of the panels into the guide grooves as shown by dot-and-dash lines in Figure 13, or may be swung normally into alignment with the main portion of the guide section 40 as shown by solid lines.

In all forms of the invention so far described it will be understood that the panels can be removed from the respective mounting frames by first pushing the lower panel upwardly to a point above the openings 6, 22, etc., of the mounting frames, then flexing the lower end portions of the lower panel and pulling them outwardly through said openings, and thereafter flexing and pulling the upper panel through the said openings.

So far the invention has been described primarily as a storm window, but of course the panels E, F, H and I may constitute screen panels rather than window panels. As shown in Figure 21, each panel may consist of a sheet of wire screen F whose longitudinal edges are formed as by binding strips 57 to slide in the guide grooves 3, 4, 16, 17, etc. The mounting and removing of the screen sections in and from the mounting frames is effected in exactly the same way as is the mounting and removal of the plastic window panels.

In Figures 16 to 19 inclusive, I have shown another modification of the invention wherein the mounting frame M comprises side pieces 42, a top piece 43 and a bottom piece 44. Each side piece 42 has undercut grooves 45 and 46 which are spaced apart in the general plane of the frame and also depthwise of the frame. The grooves 45 of the two side pieces are complementary to each other for mounting one of the panels N and O, in the present instance the upper panel N, while the other grooves 46 are complementary to each other for mounting the other panel. The mouths of the grooves open through one face of the mounting frame M, preferably the inner face, and each side piece has an opening 47 for each of the grooves, through which guide means on the longitudinal, marginal portions of the respective panels may be inserted into the grooves.

As shown, these guide means comprise in effect sectional guide ribs which are composed of a plurality of longitudinally aligned spaced sections 48, each of which includes an approximately cylindrical portion 49 and a relatively narrow neck portion 50, the cylindrical portions 49 corresponding in shape to the undercut portions of the grooves 45 and 46, and the neck portions 50 corresponding in width to the mouths of the grooves.

The openings 47 are greater in width than the respective grooves, corresponding in width substantially to the cylindrical portions 49 of the guide rib sections; and said openings are of sufficient length to permit the guide ribs to be inserted therethrough and into the corresponding grooves upon simultaneous flexing and longitudinal sliding of the corresponding panel.

The panels may be of any suitable structure such as hereinbefore described, but of course must be flexible, and the panels are mounted in the frame M in substantially the same manner as

described in connection with the form of the invention shown in Figures 1 to 5 inclusive. In other words, to insert either panel into the mounting frame, the ends of the guide ribs are inserted into the corresponding openings 47, and simultaneously, the panel is flexed and longitudinally slid so as to push the guide ribs into the guide grooves.

The panels N and O are provided with reinforcing rails 51 at their top and bottom or transverse edges of substantially the same structure and for the same purpose as the rails 7 of the form of the invention illustrated in Figures 1 to 5 inclusive.

With this form of the invention, it will be seen that the guide ribs in the undercut guide grooves will positively hold the panels N and O against movement out of their own planes, and at the same time will effectually guide the panels for vertical sliding movement in the mounting frame.

In order to positively insure against displacement of the edges of the panels from the guide grooves in the form of the invention shown in Figures 1 to 9 inclusive, the guide grooves may be undercut as indicated at 52 in Figure 20, and the longitudinal edges of the panels 53 may have longitudinal beads or ribs 54 corresponding in shape to the grooves. With this construction, it will be seen that the ribs 54 will positively prevent the panels from flexing or from being pushed out of their own planes.

In some instances, it may be desirable to provide reinforcement for the longitudinal edge portions of the panels in the forms of the invention shown in Figures 1 to 11 inclusive, and for this purpose a U-shaped metal edge reinforcing strip 55 may be applied in embracing relation to the edge portion of the panel 56 as shown in Figure 22.

With my invention it will be seen that adequate ventilation may be obtained where the invention is embodied in a storm window, due to the ease with which the panels may be raised and lowered. Furthermore, the plastic panels have high heat-insulating properties which are especially advantageous in storm windows.

In all forms of the invention, the mounting frames may be constructed to fit certain standard sizes of window or door frames, and any mounting frame having once been constructed, may be easily and quickly mounted in any window frame of the corresponding size so that numbering or other identification of the mounting frames is unnecessary. Also, the panels may be interchangeable so that no special care will be necessary in selecting the panels as they are inserted into the mounting frames. The panels are light in weight and the structure of the panels and frames is such that they may be easily installed and removed by relatively unskilled or elderly persons and without the use of tools or special fastening devices.

While I have shown and described my invention as embodying certain details of construction, it will be understood that the construction of the invention may be widely modified and changed by those skilled in the art within the spirit and the scope of the invention.

What I claim is:

1. The combination of a frame having side pieces and end pieces and two parallel longitudinal grooves in the inner surface of each side piece and opening inwardly of said frame, each groove in one side piece being complementary to one said groove in the other side piece for mount-

ing a panel, flexible panels each having its longitudinal edges slidable in a pair of said complementary grooves, said panels complementing each other so that with one end portion of each overlying an end portion of the other said panels will close said frame, each said side piece having a removable section at one side of the middle of the length of said frame to form a notch in said side piece that intersects both said grooves, said panels being insertible into the respective complementary grooves by simultaneously flexing and longitudinally sliding said panels through said notches.

2. The combination of a frame having side pieces and end pieces, each side piece having a longitudinal undercut groove opening through a surface thereof on one face of the frame, and a panel formed of flexible material and having a guide rib extending along each longitudinal marginal portion at one side of said panel to slidably fit in one of said undercut grooves, each said side piece having an opening intersecting said groove and greater in width than the mouth of the groove to facilitate insertion of the corresponding said guide rib through said opening and into the corresponding groove upon simultaneous flexing and longitudinal sliding of the panel.

3. The combination of a frame having side pieces and end pieces and two parallel longitudinal grooves in the inner surface of each side piece and opening inwardly of said frame, each groove in one side piece being complementary to one said groove in the other side piece for mounting a panel, panels, each formed of flexible material having its longitudinal edges slidable in a pair of said complementary grooves, said panels complementing each other so that with one transverse edge portion of each overlying one transverse edge portion of the other and the other edge portions located at opposite ends of the frame, said panels will close said frame, each said side piece having a notch extending inwardly from said inner surface and from one face of the frame and intersecting both said grooves at a point at one side of the middle of the length of said frame, said panels being insertible into the respective complementary grooves by simultaneously flexing and longitudinally sliding said panels through said notches, each panel having a rigid end rail at each of its transverse edges to prevent flexing of said panels along longitudinal lines, and the ends of said rails slidably abutting said inner surfaces of said side pieces of said frame beyond said grooves.

4. The combination of a frame having side pieces and end pieces, and two parallel longitudinal grooves in each side piece, each groove in one side piece being complementary to a groove in the other side piece for mounting a panel, panels, each having its longitudinal edges slidable in a pair of said complementary grooves, said panels complementing each other so that with one transverse edge portion of each overlying one transverse edge portion of the other and the other transverse edge portions located at opposite ends of said frame said panels will close said frame, each panel having a rigid end rail adjacent each transverse edge thereof and said rail at the first-mentioned edge portion of one panel being located between and adapted to abut both rails of the other panel upon relative movement of said panels in opposite directions.

5. The combination of a frame having side pieces and end pieces and two parallel longitudinal

nal grooves in the inner surface of each side piece and opening inwardly of said frame, each groove in one side piece being complementary to one said groove in the other side piece for mounting a panel, panels, each formed of flexible material having its longitudinal edges slidable in a pair of said complementary grooves, said panels complementing each other so that with one transverse edge portion of each overlying one transverse edge portion of the other and the other edge portions located at opposite ends of the frame, said panels will close said frame, each said side piece having a notch extending inwardly from said inner surface and from one face of the frame and intersecting both said grooves at a point at one side of the middle of the length of said frame, said panels being insertible into the respective complementary grooves by simultaneously flexing and longitudinally sliding said panels through said notches, each end piece of said frame having a groove to receive one transverse edge of one of said panels when said panels are in frame-closing position.

6. The combination of a frame having side pieces and end pieces, and two parallel longitudinal grooves in each side piece, each groove in one side piece being complementary to a groove in the other side piece for mounting a panel, panels, each having its longitudinal edges slidable in a pair of said complementary grooves, said panels complementing each other so that with one transverse edge portion of each overlying one transverse edge portion of the other and the other transverse edge portions located at opposite ends of said frame, said panels will close said frame, each said panel comprising a sheet of resiliently flexible plastic material and there being a rigid rail secured to each said sheet in spaced relation to the second-mentioned transverse edge thereof to prevent flexing of the sheet along longitudinal lines, each end piece of said frame having a groove to receive said second-mentioned transverse edge of one of said panels when said panels are in frame-closing position.

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