May 12, 1953 W. C. WATKINS 2,637,878

COMBINED DOOR AND WINDOW

Filed July 28, 1949 2 Sheets-Sheet 1

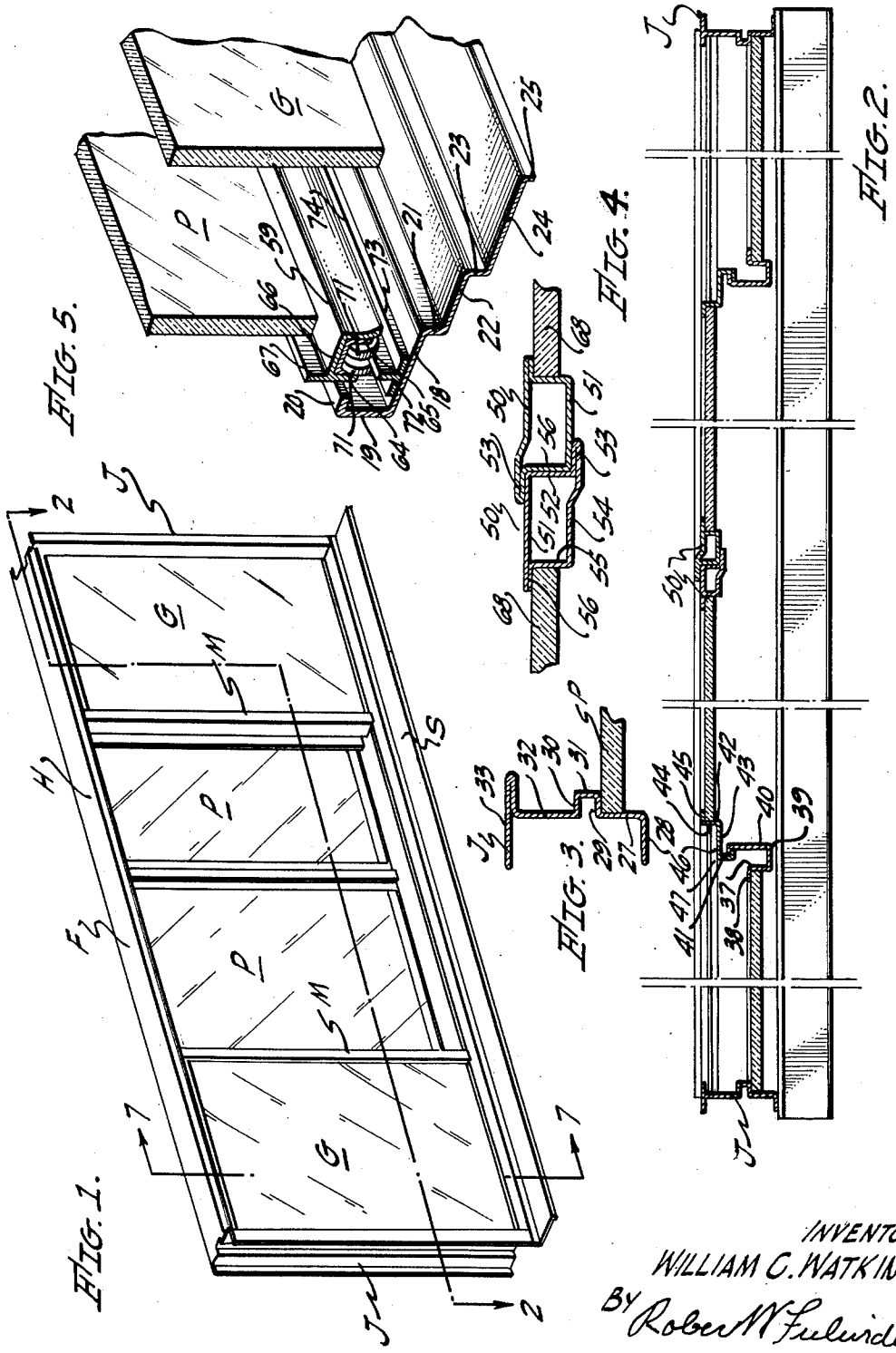


FIG. 1.

FIG. 5.

FIG. 4.

FIG. 3.

FIG. 2.

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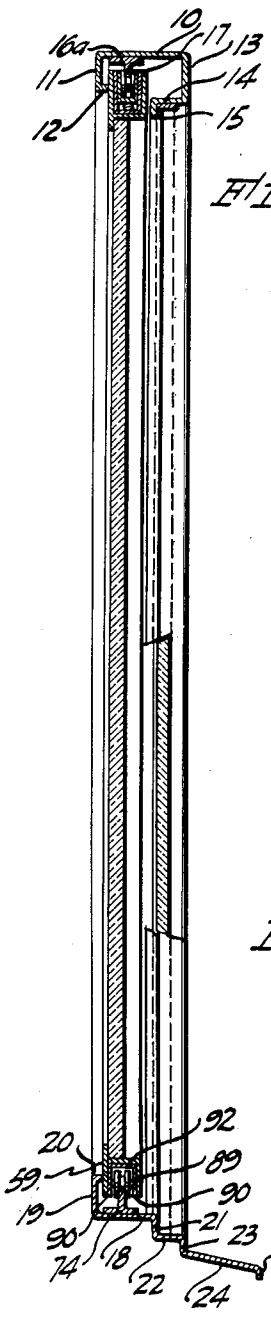


FIG. 7.

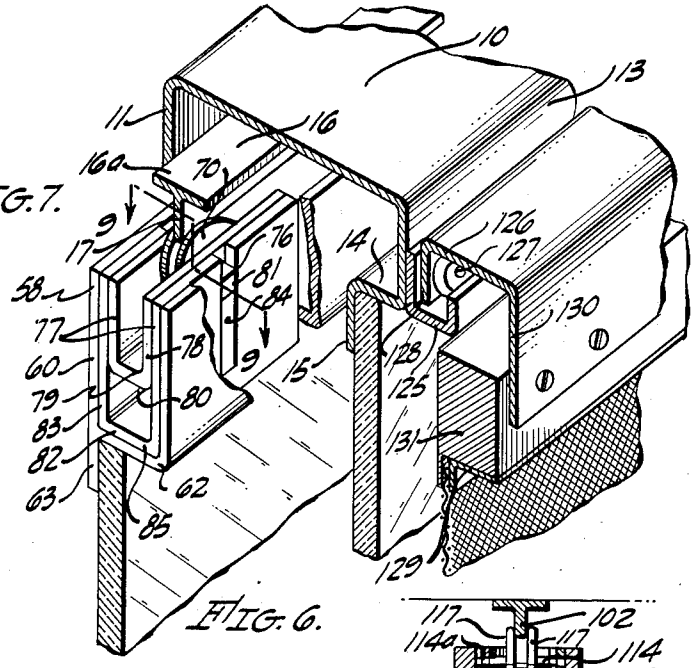


FIG. 6.

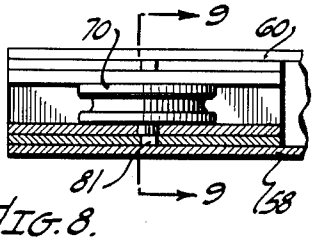
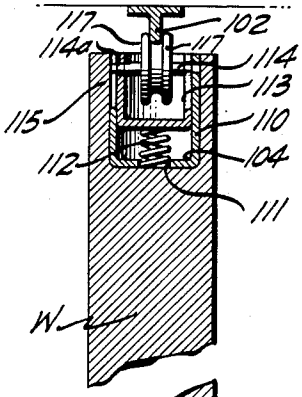


FIG. 8.



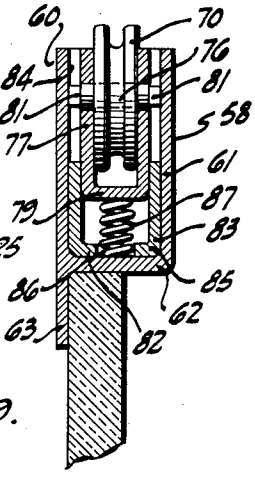


FIG. 9.

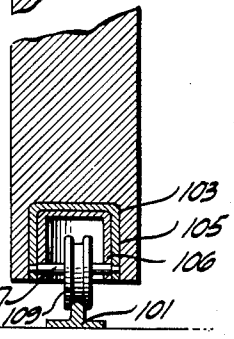


FIG. 10.

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COMBINED DOOR AND WINDOW

William C. Watkins, Los Angeles, Calif.

Application July 28, 1949, Serial No. 107,172

3 Claims. (Cl. 20—19)

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My invention relates to the field of building materials, and more particularly to a combination door and window.

Although there is available on the market a variety of steel sash, including the window disclosed and claimed in my co-pending application, Serial No. 732,946, which has now been abandoned, these devices are not adapted for installation in structures in which it is desired to provide a combination door and window. An example of such an installation is a combination door and window positioned in the wall of a structure, whereby the window is not only adapted for viewing purposes, but by longitudinally moving one or more panels of the window a person may walk from the structure to a patio or terrace which is situated adjacent thereto. This particular type of combined door and window construction is frequently desired in structures situated in desert areas, and in those areas which enjoy a semi-tropical climate.

The purpose of my present invention is to devise such a combination door and window, and one that will eliminate a number of the disadvantages of construction and operation which are inherent to the presently available metallic doors and windows.

These and other objects and advantages of my invention will become apparent from the following description of a preferred form and certain alternate forms thereof, and from the drawings illustrating those forms in which:

Fig. 1 is a perspective view of my combination door and window;

Fig. 2 is a horizontal cross-sectional view of the device taken on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged horizontal cross-sectional view of one of the side jambs of the device;

Fig. 4 is an enlarged horizontal cross-sectional view of the inner vertical end pieces of the slidable panels in the closed position;

Fig. 5 is a fragmentary perspective view of the lower portion of one of the slidable panels;

Fig. 6 is a fragmentary perspective view of the upper portion of one of the panels and showing the manner in which it is maintained in a vertical position;

Fig. 7 is a vertical cross-sectional view of my device taken on the line 7—7 of Fig. 1;

Fig. 8 is a plan view of the roller support shown in Fig. 6;

Fig. 9 is a vertical cross-sectional view of the roller supports shown in Fig. 8, and taken on the line 6—6 thereof; and,

Fig. 10 is a vertical cross-sectional view of an alternate form of roller support for a door or window.

Referring now to Fig. 1 for the general arrangement of my combination door and window, it will be seen that it includes a substantially rectangular framework F having a longitudinally extending head member H, a sill S situated thereunder, and the sill and head member being connected to each end thereof by a vertical side jamb J. Longitudinally spaced and situated between the side jambs J are two stationary vertical mullions M that extend from the sill S to the head member H. Two substantially rectangular stationary panes of glass G or other transparent material are supported in the frame F, with each pane being situated in one of the end portions of the frame between one of the jambs J and mullions M. Two longitudinally movable, transparent, panels P are mounted in the frame F, and serve the dual function of providing a door to close the space between the two mullions M, with the panels when so positioned also serving as windows.

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The head member H as may best be seen in Figs. 6 and 7 includes a substantially horizontal rectangular member 10, with the member on its rearward edge developing into a substantially vertical flange 11 that extends downwardly to terminate in a forwardly extending lip 12. The forward edge of the member 10 is bent or formed into a substantially vertical flange 13 which on its lower edge develops into a substantially horizontal rearwardly extending leg 14. A short vertical lip 15 extends downwardly from the inner edge of the leg 14.

A track 16 which serves to movably support and maintain the panels P in a vertical position is situated within the confines of the member H, and extends longitudinally along the inner surface thereof. The track is of T-shaped cross-section, and includes a base plate 16a which is affixed to the member 10, with the plate having a vertically positioned rail member 17 extending downwardly therefrom.

The sill S is situated in the same vertical plane as the head member H, with the sill as may best be seen in Figs. 5 and 7 including an elongated horizontally positioned member 18 of substantially the same length as the member 10, and the member 18 having a vertical flange 19 extending upwardly from the rearward edge thereof. The flange 19 on its upper end develops into a forwardly extending horizontal lip 20. A downwardly extending step is formed on the forward edge of the member 18, and includes a flange 21 having a horizontally positioned leg 22 extending forwardly from the lower edge thereof. A relatively short vertically positioned member 23 extends downwardly from the forward edge of the leg 22, and develops on its lower edge into an angularly disposed sill member 24 which has a vertically positioned lip 25 formed on the forward edge thereof. It will be apparent that both the head member H and the sill member S can be fabricated from com-

ponent strips of material to provide the above described shapes, or as I have found to be more convenient when in volume production of my invention, to have the shapes extruded and delivered to me by the supplier in the finished form. Although I prefer to use steel in fabricating the frame F of my combined door and window it will be apparent that other metals may be used for this purpose, so long as they have the required physical properties of rigidity, resistance to corrosion and weathering, and the capacity to withstand the hard usage to which my invention will be put.

The side jambs J as may best be seen in Figs. 2 and 3 are identical, but oppositely disposed with each jamb including a vertically positioned member 27 which on its forward edge develops into an outwardly extending flange 28. The member 27 on its rearward edge develops into a vertically positioned channel shaped member having two laterally spaced flanges 29 and 30, with a web 31 extending therebetween. Extending rearwardly from the edge of the flange 30 is a vertically positioned member 32 which has the rearward portion thereof doubled over to provide a flange 33 which is parallel to the flange 28.

The mullions M as may best be seen in Fig. 2 are identical in cross-section, but oppositely disposed. Each of the mullions M includes a vertically positioned member 37 having a lip 38 extending outwardly therefrom on the rearward edge, and a flange 39 formed on the forward edge, with the flange 39 being parallel to the lip 38. A leg 40 extends rearwardly from the flange 39, and develops on its rearward edge into an outwardly extending lip 41.

The slidable panels P as may best be seen in Fig. 2, each include an identical but oppositely disposed vertical member 42 that forms the outer edge thereof. The member 42 includes a substantially vertical strip 43 having a leg 44 disposed normal thereto on the inner edge thereof. A lip 45 extends inwardly from each of the legs 44. An outwardly extending hooked member 46 is formed on the outer edge of the member 43, and includes a short inwardly positioned leg 47 that is adapted to be situated adjacent to the lip 41, when the panels P are in the closed position.

The inner vertical edge of each of the panels P is formed from an upright member 50, the cross-section of which can best be seen in Fig. 4. Each of the members 50 is preferably fabricated from a strip of metallic material 51 which by a bending operation has a flange 52 formed normal thereto, with the flange on its free end being doubled over to provide a second flange 53, with the inner surfaces of the flanges 53 being adapted to engage the exterior surfaces of the members 51 when the panels P are in the closed position. Extending outwardly from each of the flanges 53 is a member 54 that is parallel to the member 51, with the member 54 on its outer edge developing into a rearwardly extending leg 55 which on its free edge is formed into an outwardly extending lip 56 that is situated adjacent to the outer portion of the member 51. Upon the two panels P being brought together to form a door for the space existing between the two mullions M, the two members 56 are brought in contact with one another, and the flanges 53 overlap the members 50 to provide a windproof joint. Each of the members 50 has a sufficiently large cross-section as to permit a conventional

lock to be situated within the confines thereof, with the result that when the panels are in the closed position and locked, unauthorized entry is impossible from the outside through the space existing between the two mullions M.

The two upright members 42 and 50 of each of the panels P are held together by an upwardly positioned horizontal member 58, and a similar but oppositely disposed lower horizontal member 59. The member 58 as may best be seen in Figs. 6 and 9 has a channel shaped cross-section which includes two laterally spaced vertical flanges 60 and 61 which are connected by a horizontal web 62.

A lip 63 which is in vertical alignment with the flange 60 extends downwardly therefrom below the web 62.

The member 59 includes two laterally spaced flanges 64 and 65 that are connected by a horizontal web 66, with a lip 67 extending upwardly from the web and being in vertical alignment with the lip 63. Thus, it will be seen that a rectangular pane of glass 68 can be positioned in each of the panels P, and when so situated will have the upper and lower edge thereof situated adjacent to the exterior surfaces of the web 62 and 66 respectively. The vertical edges of the panes P when so situated in the panels, are in contact with the exterior surfaces of the legs 44 and 45. The inner surface of each of the panes 68 when positioned in a panel P rest against the outer surface of the lips 45, 56, 63 and 67. Each of the glass panes 68 is held in position in one of the panels P by putty or by conventional means normally used for this purpose. The lower portion of the flange 65 is preferably flared outwardly, in order that water or moisture running down the pane 68 is directed outwardly from the flared portions towards the sill member 24.

Each of the panels P is longitudinally movable within the frame F, due to the upper portion of each panel being supplied on each end thereof with a roller 70 which is mounted within the confines of the channel shaped member 58 as will hereinafter be explained in detail. The rollers 70 are of the grooved type which permits them to engage the lower edge of the rail 18, and thus maintain each of the panels P in a vertical position. Two grooved rollers 71 are likewise mounted within the confines of the channel shaped member 59, with the rollers 71 having the grooved portion thereof resting on and engaging the upper edge of a rail 72 that extends the longitudinal length of the member 18. The rail 72 is preferably an integral portion of a track 73 of T-shaped cross-section, which has its base plate 74 welded or otherwise secured to the upper surface of the member 18.

Each of the rollers 70 in the upper portion of each panel P is rotatably mounted on a horizontally positioned shaft 76, with the shaft being supported between two laterally spaced vertical flanges 77 and 78 of a channel shaped member 79. A web 80 connects the lower edges of the flanges 77 and 78. The ends of each of the shafts 76 extend beyond the exterior surfaces of the flanges 77 and 78, with this portion of each of the shafts being flattened to have a substantially rectangular cross-section 81. The channel shaped members 79, each of which longitudinally is relatively short, are slidably mounted within the confines of a second channel shaped member 82 of substantially the same longitudinal length as the member 79, with this second member having two laterally spaced legs 83. Each of the

legs 83 has a vertically extending slot 84 formed therein.

The outer portions 81 of each of the shafts 76 are slidably mounted in one of the slots 84, and are adapted to move upwardly and downwardly therein. The upper portion of each of the slots 84 is peened inwardly to prevent the shaft 76 from being inadvertently displaced therefrom. Each of the channel shaped members 82 includes a web 85 that connects the lower portions of the legs 83. The lower surface of each of the webs 85 rests on the upper surface of the web 62. Each of the webs 85 has a vertically positioned bore 86 formed therein, with the bore having the lower end of a vertically positioned helical spring 87 extending downwardly therethrough, and the lower end of the spring resting on the upper surface of the web 62. The spring 87 is at all times in compression, with its upper end in contact with the lower surface of the web 80, and the spring tending at all times to move the channel shaped member 79 upwardly whereby the roller 70 is maintained in contact with the lower edge of the rail 17.

The rollers 71 carry the full load of each of the panels P, with each of the rollers being rotatably supported on a horizontally positioned shaft 89 that extends between two laterally spaced vertical flanges 90, as may best be seen in Figs. 5 and 7. The upper edges of the flanges 90 are connected by a horizontally positioned web 92. The channel shaped members 91 like the members 79 are relatively short in length, and are mounted within the confines of one of the channels 59, but unlike the upwardly positioned members 79 are not provided with a spring mounting for the rollers 71. Spring mountings are unnecessary for the rollers 71 as they carry the entire weight of each of the panels P, which is sufficient to keep the rollers in contact with the upper portion of the rail 72.

The operation and installation of my combination door and window is extremely simple. The frame F and the various component parts making up the finished combination door and window are fabricated by the manufacturer, and dispatched to the structure in which they will be installed. Each of the frames F is installed in the structure in accordance with building practice, and the glazing operation completed therein prior to the building being placed in use.

The stationary panes of glass P are situated between the jambs J and the mullions M, with each pane of glass having the bottom edge thereof resting on the upper surface of one of the legs 22, the upper horizontal edge of the glass in contact with the lower face of one of the legs 14, and the vertical edges of the glass pane in contact with the exterior surface of the legs 40 and legs 37. The inner surface of the glass rests against the exterior surface of the lips 15, 21, 29, and 38. Each of the panes of glass P is held in this position by putty or other conventional means normally employed for this purpose. The manner in which the panes of glass 58 are mounted in the slidable panels P has already been discussed in detail.

With the window thus assembled its operation is obvious. Either of the panels P may be moved longitudinally, with the weight of the panels being supported on the rollers 71 which travel along the upper edge of the rail 72. Each of the panels is maintained in an upright vertical position by the spring 87 urging the rollers 70 upwardly into contact with the lower edge of the rail 18. It will be noted that when the panels P are moved together into a closed position, the two upright members 50 engage one another to provide a windproof joint. It will be apparent that the window can be further windproofed by the use of weather stripping on certain portions thereof, such as the concave window stripping 99 affixed to the flange 65, and extending inwardly to contact the outer vertical face of the rail 72. The weather stripping is manufactured from a somewhat resilient material, which tends to keep the inner edge of the strip in contact with the rail 72 at all times.

Should it be desired to remove one of the panels P from the frame F, the panel is moved upwardly to further compress the springs 87, which upward movement permits the rollers 71 to be removed from the rail 72. The complete panel P can then be moved downwardly and removed from the frame F. To place a panel P in the frame F the above described operation is simply reversed.

In some instances it may be desired to slidably mount a door or window on two vertically spaced, horizontally mounted rails 101 and 102 as may best be seen in Fig. 10. In the event it is wooden door W, a number of recesses 103 of annular cross-section are formed along the lower edge thereof, with similar recesses 104 being formed along the upper portion. Each of the recesses 103 has an inverted metallic cup 105 of annular cross-section inserted therein, with this cup holding a second cup 106 in which a horizontally positioned shaft 107 is mounted between the sidewalls thereof. A grooved roller 109 is rotatably mounted on the shaft 107, with the grooved portion of the roller engaging the upper portion of the rail 101.

A metallic cup 110 is slidably inserted in each of the recesses 104, with the cup having a vertically positioned bore 111 formed in the lower portion thereof. A vertically positioned helical spring 112 has the lower portion thereof extending downwardly through the bore 111 to have the lower portion of the spring rest on the portion of the door W situated under the cup 110. A second cup 113 is slidably mounted in the cup 110, with the lower portion of the cup 113 resting on the upper end of the spring 112. A horizontally positioned shaft 114 extends between the side walls of the cup 113, with the outer ends of the cup extending beyond the side walls of the cup 113, and being flattened to a substantially rectangular portion 114*a*. The shaft portions 114*a* are slidably mounted in vertically positioned bores 115 formed in the vertical side walls of the cup 110. A grooved roller 117 is mounted on each of the shafts 114, with the grooved portion of the roller engaging the rail 102, and being at all times held in contact therewith due to the spring 112 being in compression and tending to move the cup 113 upwardly. The operation of a door or window movably supported in this manner, can be removed from the rails 101 and 102 in the same manner as described in connection with the panels P.

Should it be desired to provide a screen S for the device, the form shown in Fig. 6 may be employed. An inverted L-shaped track 125 is welded or otherwise affixed to the forward face of the head member H, and extends the longitudinal length thereof. Two longitudinally extending L-shaped members 126, each of the same length as the panels P, have a plurality of rollers 127 supported from the rearwardly positioned flange

128 thereof. The rollers are adapted to movably support the members 126 on the track 125.

A rectangular member 129, preferably formed of wood, extends the longitudinal length of the member 126 and is affixed by screws to the forwardly positioned flange thereof. The screen S is affixed by conventional clamping means 131 to the lower portion of the member 129, with the screen extending downwardly to a horizontal longitudinally extending inverted U-shaped member (not shown), which engages a similar but oppositely disposed member (not shown) affixed to the sill S. Thus, the screen can be longitudinally moved to close the opening between the mullions M when the panels P are in the open position.

While the above described combination door and window has been found to provide the advantages and attain the objects hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiment of my invention, and that I do not mean to limit myself to the details of construction, other than as defined in the appended claims.

I claim:

1. A window and door structure that includes: a substantially rectangular frame having a horizontally disposed head member and a sill member, said head member and sill member having oppositely disposed longitudinally extending rails formed as a part thereof that are in vertical alignment; a rectangular panel movable longitudinally in said frame, said panel having a horizontal head member having vertical sides and a horizontal bottom and a horizontal base member having vertical sides and a horizontal top; a plurality of pairs of nesting members removably mounted in longitudinally spaced relationship within the confines of said panel head member, the outermost of each of said pairs of nesting members having their vertical sides formed with aligned vertical slots and their horizontal bottoms formed with an aperture, the innermost of each of said pairs of nesting members having their vertical sides formed with a pair of horizontally aligned bores; a horizontal shaft disposed between each of said pairs of bores and having their ends extending outwardly therefrom so as to be vertically slidable within said slots; a grooved roller mounted on each of said shafts; a helical spring interposed between the bottom of each of said innermost members and the aperture formed in the bottom of each of said outermost members so as to bias said innermost members and said rollers upwardly against the head member-supported rail; and a plurality of grooved rollers supported between the sides of said base member for rolling engagement with said sill-supported rail.

2. A window and door structure that includes: a substantially rectangular frame having a horizontally disposed head member and a sill member, said head member and sill member having oppositely disposed longitudinally extending rails formed as a part thereof that are in vertical alignment: a rectangular panel movable longitudinally in said frame, said panel having a horizontal head member of U-shaped cross section and a horizontal base member of inverted U-shaped cross section; a plurality of first U-shaped members removably mounted in longitudinally spaced relationship within the confines of said panel head member, each of said U-shaped members having their vertical legs formed with aligned vertical slots and their lower leg formed with an aperture; a plurality of second U-shaped members, each being slidably nested within one of said first U-shaped members and having their vertical legs formed with a pair of horizontally-aligned bores; a horizontal shaft disposed between each of said pairs of bores and having their ends extending outwardly therefrom so as to be vertically slidable within each of said pairs of slots; a grooved roller mounted between the vertical legs of each of said second U-shaped members by said shafts; a helical spring interposed between the bottom of the horizontal leg of each of said second U-shaped members and the aperture formed in each of said first U-shaped members so as to bias said second U-shaped members and said rollers upwardly against the head member-supported rail; and, a plurality of grooved rollers supported between the sides of said base member for rolling engagement with said sill-supported rail.

3. A window and door structure that includes: a substantially rectangular frame having a horizontally disposed head member and a sill member, said head member and sill member having oppositely disposed longitudinally extending rails formed as a part thereof that are in vertical alignment; a rectangular panel movable longitudinally in said frame; a plurality of cup-shaped members rigidly mounted by the upper portion of said panel, the side walls of each of said members being formed with aligned vertical slots and the bottom wall of each of said members being formed with an aperture; a plurality of smaller cup-shaped members telescopically and vertically slidably disposed within said cup-shaped members, the side walls of each of said smaller cup-shaped members being formed with a pair of horizontally aligned bores; a horizontal shaft disposed between each of said pairs of bores and having their ends extending outwardly therefrom so as to be vertically slidable between each of said pairs of slots; a grooved roller mounted between the side walls of each of said smaller cup-shaped members by said shafts; a helical spring interposed between the under side of each of said smaller cup-shaped members and the aperture formed in said cup-shaped members so as to bias said smaller cup-shaped members and said rollers upwardly against the head member-supported rail; and a plurality of cup-shaped members rigidly mounted by the lower portion of said panel, each of said members supporting a grooved roller adapted for rolling engagement with the sill-supported rail.

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