

March 13, 1962

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3,024,837

STORM DOOR

Filed Jan. 28, 1959

3 Sheets-Sheet 1

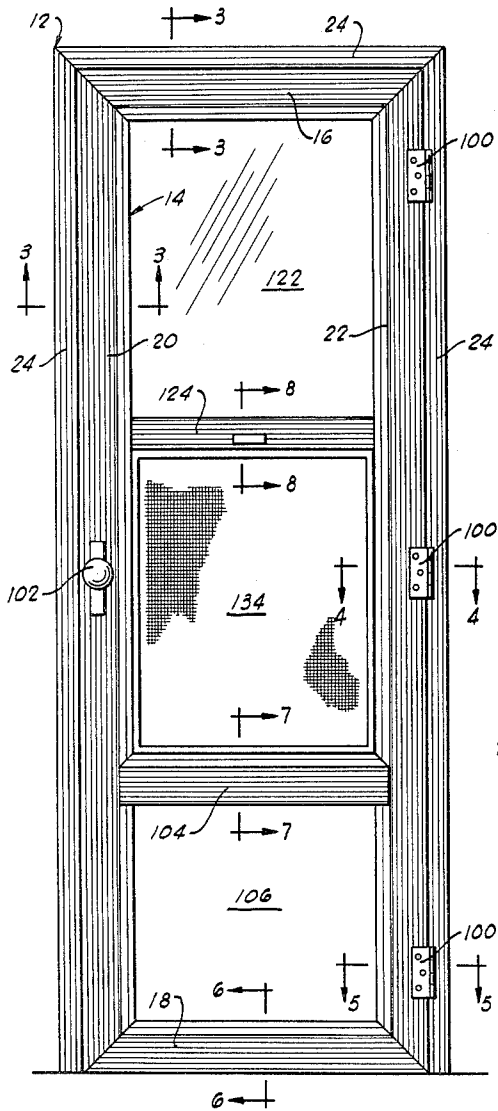


FIG. 1

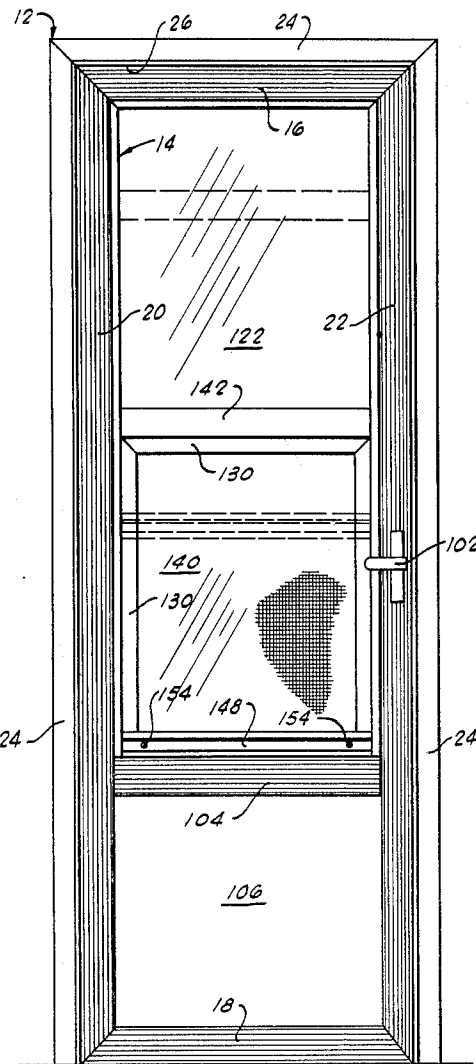


FIG. 2

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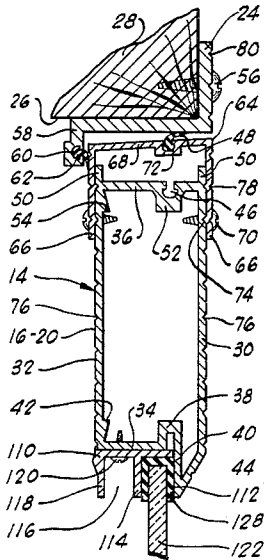


FIG. 3

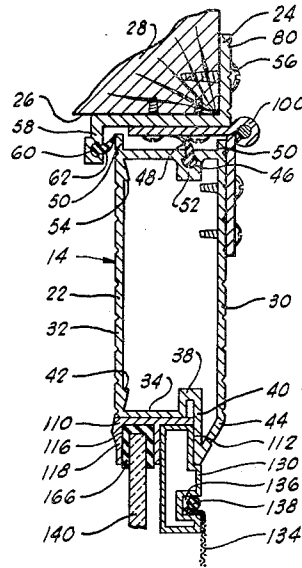


FIG. 4

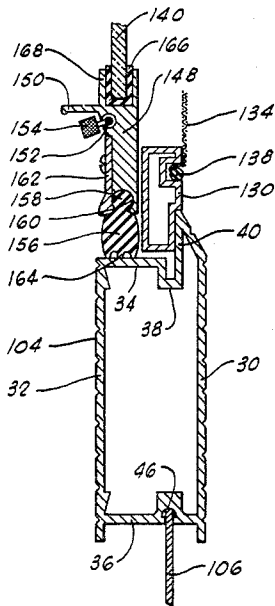


FIG. 5

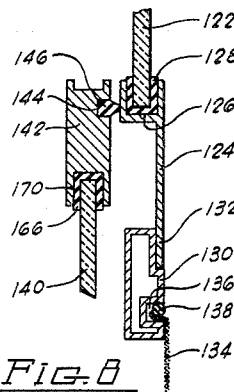


FIG. 6

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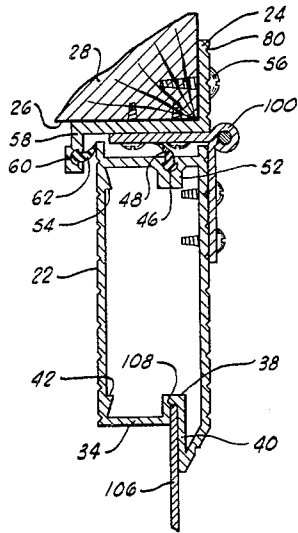


FIG-5

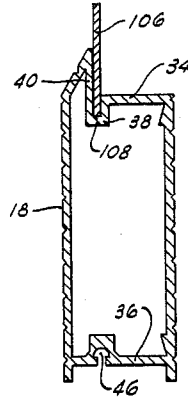


FIG. 6

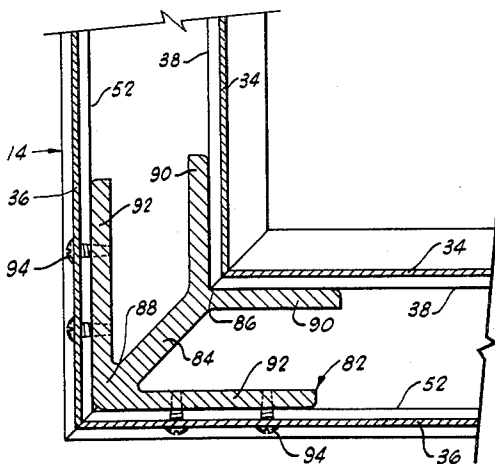


Fig-9

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3,024,837

STORM DOOR

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5 Claims. (Cl. 160—91)

This invention relates, as indicated, to improvements in storm doors, and more particularly, but not by way of limitation, to improvements in what are commonly known as self-storing storm doors.

The present invention contemplates a novel storm door construction utilizing identical light-weight frame members interconnected to form an attractive frame for a storm door. Each member of the storm door frame is of unitary construction and is preferably formed out of extruded aluminum to provide a light-weight, yet strong and attractive frame member. The frame members are thin-walled, and hollow in cross section, but are reinforced in a novel manner to provide a rigid and strong construction. Also, the various members of the frame are interconnected by novel anchoring means which are completely enclosed by the frame members to provide no obstructions or unsightly connectors on the door frame. The present invention also contemplates the use of channel members which may be easily and conveniently secured around one side and the top or bottom of a storm door frame to adapt the storm door to substantially any size of door opening. The frame of the storm door is sealed in the door opening (when the storm door is closed) by a novel construction which does not detract from the appearance of the door. The present invention further contemplates a novel panel construction for the storm door, such that the door may be used the year around and separate screen and storm doors are not required for a residence or the like.

An important object of this invention is to provide a light-weight, yet strongly constructed storm door.

Another object of this invention is to provide a storm door which may be easily adapted to fit substantially any size of door opening.

A further object of this invention is to provide a storm door having an attractive appearance and which displays the minimum number of fastenings or connecting devices to a casual observer, to provide the appearance of a completely unitized structure.

Another object of this invention is to provide a construction which may be conveniently used in various climatic conditions and serve either as a storm door or as a screen door.

Other objects and advantages of the invention will be evident from the following detailed description, when read in conjunction with the accompanying drawings which illustrate my invention.

In the drawings:

FIGURE 1 is an elevational view of the front or outer side of a door constructed in accordance with this invention.

FIGURE 2 is an elevational view of the rear or inner side of the door shown in FIG. 1.

FIGURE 3 is a sectional view as taken along lines 3—3 of FIG. 1.

FIGURE 4 is a sectional view as taken along lines 4—4 of FIG. 1.

FIGURE 5 is a sectional view as taken along lines 5—5 of FIG. 1.

FIGURE 6 is a sectional view as taken along lines 6—6 of FIG. 1.

FIGURE 7 is a sectional view as taken along lines 7—7 of FIG. 1.

FIGURE 8 is another sectional view as taken along lines 8—8 of FIG. 1.

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FIGURE 9 is an enlarged sectional view taken through one corner of the door frame illustrating a typical connection of the frame members.

Referring to the drawings in detail, and particularly FIGS. 1 and 2, reference character 12 generally designates a storm door construction which includes a rectangularly-shaped frame 14 comprising a top frame member 16, a bottom frame member 18 and side frame members 20 and 22. Backing bars 24 preferably extend along the top and the sides of the door frame 14 to receive the frame, as will be hereinafter set forth, and the bars 24 are in turn secured in a door opening 26 which is normally faced with wooden members 28, as is well known in the art.

As shown in FIGS. 3 through 6, each member 16 through 22 of the door frame 14 comprises a hollow housing which is generally rectangular in cross section, with front and rear walls 30 and 32, and inner and outer end walls 34 and 36, respectively. As previously indicated, each of the members of the frame 14 is a unitary construction, and is preferably formed out of extruded aluminum to provide a light weight and attractive construction. The inner end wall 34 of each frame member is extended inwardly at 38 between the front and rear walls 30 and 32, and is then extended outwardly with respect to the walls 30 and 32 in a direction parallel with the front and rear walls 30 and 32 to form a shoulder 40 facing rearwardly with respect to the frame 14. The inwardly extended portion 38 of each end wall 34 forms a reinforcing projection extending along the length of the respective frame member. Also, a flange 42 is formed on the inner face of the rear wall 32 of each frame member in alignment with the adjacent reinforcing projection 38 for purposes which will be hereinafter set forth. The inner edge portion 44 of the front wall of each frame member is extended rearwardly to mate with the inner edge of the shoulder 40 formed by the extended portion of the inner end wall 34.

The outer end wall 36 of each frame member is provided with a groove 46 extending along the length of the respective frame member and opening outwardly with respect to the frame member. An elastic sealing strip 48 (FIG. 4) may be provided in each groove 46 of each frame member, or in portions of the frame members, as will be hereinafter described, to seal the door frame 14 in the door opening 26. The outer edge portions 50 of the walls 30 and 32 of each frame member preferably extend outwardly beyond the outer end wall 36 and provide a measure of protection for the sealing strips 48 to prevent the sealing strips from being inadvertently pulled or knocked out of the grooves 46. The outer end wall 36 of each frame member is also extended inwardly around the respective groove 46 to provide another reinforcing projection 52 extending along the length of the frame member. The reinforcing projection 52 is preferably positioned opposite the reinforcing projection 38 on the inner end wall 34, for purposes which will be hereinafter set forth. Furthermore, a flange 54 is formed along the inner face of the rear wall 32 in alignment with the projection 52.

As shown in FIGS. 4 and 5, the sealing strips 48 around the door frame 14 normally contact the adjacent Z-shaped backing bar 24 (hereinafter called a Z-bar) to provide a seal of the door frame in the door opening 26. Each of the Z-bars 24 is secured to the door opening frame 28 by suitable screws 56 and is provided with an inwardly extending flange portion 58 within the door opening 26 to limit the inward movement of the door frame 14. Each Z-bar flange 58 is also provided with a longitudinal groove 60 which receives an elastic sealing strip 62 therein. The sealing strips 62 contact the rear walls 32 of the frame members and provide a double seal

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with the sealing strips 48, such that a minimum leakage of air will occur around the door frame.

In many storm door installations the door opening 26 will be larger than the available size of storm door frame 14. In this event, a channel member 64 is secured along the top frame member 16 and one of the side members 20 as illustrated in FIG. 3 to increase the length and width of the storm door frame 14. Each channel member 64 has parallel leg portions 66 spaced to extend over the walls 30 and 32 of the respective frame member, and base portion 68 extending substantially at right angles to the leg portions 66 to duplicate the outer end wall 36 of the respective frame member. The channel member 64 is secured to the respective frame member by suitable screws 70 to provide a rigid construction. It will also be observed in FIG. 3 that the legs 66 of each channel member 64 are of sufficient length to extend the overall width of the respective frame member a substantial distance. A groove 72 is formed in the base portion 68 of each channel member 64 to receive one of the sealing strips 48 and effectively seal the door frame in the door opening 26.

It will also be noted in FIG. 3 that each of the legs 66 of each channel member 64 is provided with longitudinally extending beads 74 along the inner face thereof which mate with longitudinally extending grooves 76 formed in the outer faces of the walls 30 and 32 of the respective frame member. The beads 74 are spaced the same distance apart as the grooves 76 in the frame member to facilitate the alignment of the respective channel member 64 along the length of the respective frame member. Also, similar grooves 78 are preferably provided in the outer faces of the leg portions 66 of the channel member 64 and are spaced the same distance apart as the grooves 76, such that the channel member 64 will appear to be an integral part of the respective frame member and the differences in the sizes of the various frame members will ordinarily be unnoticed by a casual observer. Furthermore, similar grooves 80 are preferably provided in the outer face of each Z-bar 24 to enhance the overall appearance of the door construction 12.

As illustrated by the typical corner of the frame 14 shown in FIG. 9, each end of each of the frame members 16 through 22 of the frame 14 is mitered at 45 degrees to facilitate the connection of the frame members in abutting relation. A novel anchoring device, generally designated by reference character 82, is provided at each corner of the frame 14 to rigidly interconnect the respective frame members. Each anchoring device 82 comprises a center bar 84 having an inner end 86 and an outer end 88. Side bars 90 are extended from opposite sides of the inner end 86 of the bar 84 at 90 degrees with respect to one another. Also, outer side bars 92 are extended from opposite sides of the outer end 88 of the bar 84 at 90 degrees with respect to one another. Each of the bars 84, 90 and 92 is of a thickness substantially equal to the distance between the front wall 30 and the rear wall 32 of each frame member 16 through 22, such that each anchoring device 82 may be completely telescoped into the ends of the adjacent frame members. Also, the distance between the pair of inner and outer bars 90 and 92 is such that each pair of inner and outer bars will frictionally fit between the reinforcing projections 38 and 52 of the respective frame member into which the side bars are wedged. It will further be noted that the outer side bar 92 of each anchoring device will be wedged against the reinforcing projection 52 and flange 54 while the respective inner side bar 90 is wedged against the reinforcing projection 38 and flange 42 of the respective frame member into which the anchoring device is forced. Each anchoring device 82 is further secured in the adjacent frame members by screws 94 threaded through the outer end walls 36 of the respective frame members into the outer side bars 92.

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From the foregoing it will be apparent that the door frame 14 is rigidly constructed and will be of light-weight construction. Also, the door frame 14 may be selectively increased in width or height by use of the channel members 64, such that the door frame may be adapted to substantially any size of door opening 26. The door frame 14 is supported in the opening 26 by suitable hinges 100 connected to the side frame member 22 and the respective Z-bar 24, as shown in FIG. 1. Also, a suitable latch 102 is preferably provided in the other side member 20 to hold the door frame 14 in a closed position. The details of construction of the latch 102 form no part of the present invention and will not be described in detail herein.

As shown in FIGS. 1 and 7, a cross mullion 104 is secured across the door frame 14 between the side frame members 20 and 22, preferably about half way between the center and lower end of the door frame 14. The cross mullion 104 is preferably constructed in the same manner as the frame members 16 through 22, and is arranged with the outer end wall 36 thereof extended downwardly as shown in FIG. 7. The opposite ends of the cross mullion 104 may be secured to the side frame members 20 and 22 in any suitable manner (not shown). A kick plate 106 is secured in the lower portion of the door frame 14 below the cross mullion 104. The kick plate 106 is preferably formed out of a metal, such as aluminum, to withstand inadvertent kicking by people moving adjacent the door 12, and is also preferably opaque. I prefer to secure the kick plate 106 in the door frame 14 by extending the upper edge of the plate 106 into the groove 46 in the lower end of the cross mullion 104. Each side edge of the kick plate 106 is extended into a groove 108 formed in the inner end wall 34 of the respective side frame member 20 or 22, as shown in FIG. 5. It will be observed that each groove 108 is formed by the reinforcing projection 38 in the respective frame member, and that the groove 108 is in alignment with the groove 46 in the outer end wall 36 of the respective frame member. The lower edge of the kick plate 106 is anchored in the groove 108 formed in the bottom frame member 18 as illustrated in FIG. 6.

As shown in FIGS. 3 and 4, a window rail 110 is secured along the inner end wall 34 of each of the side frame members 20 and 22 between the cross mullion 104 and the top frame member 16. Also, a window rail 110 is secured along the inner end wall 34 of the top frame member 16. Each of the window rails 110 is substantially F-shaped in cross section and is secured with the base of the F in contact with the shoulder 40 of the respective frame member. Thus, a forward channel 112 is provided between the central flange 114 of each rail 110 and the respective shoulder 40, and a rearward channel 116 is provided between the central flange 114 and the end flange 118 of the respective window rail 110. Each window rail 110 is secured to the respective frame member by suitable screws 120, such that the channels 112 and 116 extend around the inner periphery of the frame 14 above the cross mullion 104.

A stationary transparent panel 122 is secured in the forward channels 112 of the window rails 110 and extends from the top frame member 16 downwardly approximately half way between the member 16 and the cross mullion 104. A meeting rail 124 is secured along the lower edge of the stationary transparent panel 122, as illustrated in FIG. 8, and extends horizontally across the frame 14 into the forward channels 112 at the opposite sides of the frame 14. The meeting rail 124 is provided with a channel 126 to receive the lower edge portion of the stationary transparent panel 122. It will also be noted in FIGS. 3 and 8 that an elastic sealing strip 128 is secured around each edge of the stationary transparent panel 122. Each elastic strip 128 is wedged into the respective channel 126 or 112 to effectively seal the stationary transparent panel 122 in the frame 14.

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A screen holder 130 is secured in the forward channels 112 of the window rails 110 at each side of the frame 14 below the stationary transparent panel 122, as illustrated in FIG. 4. Also, a screen holder 130 is secured against the shoulder 40 of the cross mullion 104, and another screen holder 130 is secured against a depending flange portion 132 of the meeting rail 124 at the lower end of the stationary transparent panel 122. Each of the screen holders 130 comprises an elongated hollow housing shaped to be wedged in the channels 112, and the adjacent ends of the screen holders are rigidly interconnected to form a rectangularly-shaped frame for a suitable screen 134. Each of the screen holders 130 is provided with a longitudinal groove 136 into which the respective edge portion of the screen 134 is extended. An elastic tube or rod 138 is then wedged into each of the grooves 136 on top of the respective edge portion of the screen 134, such that the screen 134 will be held taut in the screen holders 130 and the screen will prevent access through the door frame 14 between the stationary transparent panel 122 and the kick plate 106.

As shown in FIGS. 2 and 4, a movable transparent panel 140 is extended into the rear channels 116 of the window rails 110 at the opposite sides of the door frame 14, and the panel 140 is of a size to completely cover the screen 134. A meeting rail 142 is secured on the upper end of the movable transparent panel 140 (as shown in FIG. 8) and the meeting rail 142 is provided with a groove 144 in the inner face thereof to receive an elastic sealing strip 146. The sealing strip 146 is of a size to contact the meeting rail 124 on the lower end of the stationary transparent panel 122 when the movable panel 140 is in its lowermost position, such that the upper edge of the movable panel 140 is sealed to the lower end of the stationary transparent panel 122.

A bottom rail 148 (FIG. 7) is secured along the lower edge of the movable panel 140 and is extended into the rear channels 116 at the opposite sides of the frame 14. The bottom rail 148 is provided with a lifting flange 150 extending rearwardly from the panel 140 for facilitating the raising and lowering of the panel 140 from the inner side of the door 12. Also, suitable locking bolts 152 are slidably secured in the opposite end portions of the bottom rail 148 for engaging complementary apertures (not shown) in the window rails 110 at the opposite sides of the door frame 14 to hold the movable panel 140 in selected vertical positions in a manner similar to double hung wooden windows, as is well known in the art. The locking bolts 152 are operated by suitable handles 154 in the usual manner. A sealing strip 156 is secured along the lower edge of the bottom rail to contact the inner end wall 34 of the cross mullion 104 and seal the movable panel 140 to the cross mullion. The sealing strip 156 is provided with a tubular bead 158 along the upper edge thereof which is received in a socket 160 formed along the lower edge of the bottom rail 148. The bead 158 is held in the socket 160 by a suitable flange 162 rigidly secured to the bottom rail 148, such that the sealing strip 156 will move upwardly and downwardly with movement of the panel 140. A series of ridges 164 are preferably provided along the lower face of the sealing strip 156 to facilitate the seal provided against the cross mullion 104.

As will be observed in FIG. 4, each side edge of the movable panel 140 is extended into a U-shaped sealing strip 166, and each sealing strip 166 is in turn tightly fitted in the respective channel 116 to provide a seal of the movable panel 140 to the window rails 110 at the opposite sides of the frame 14. Similar sealing strips 166 are provided along the upper and lower edges of the movable panel 140 as illustrated in FIGS. 7 and 8. The lower sealing strip 166 is wedged into a channel 168 formed along the upper end of the bottom rail 148, and the sealing strip 166 at the upper edge of the panel 140 is wedged into a channel 170 formed along the lower

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end of the meeting rail 142. Thus, the movable panel 140 will be effectively sealed to the frame 14 when the movable panel 140 is in the lowermost position. However, the panel 140 may be easily raised (as shown by the dashed lines in FIG. 2) by disengaging the locking bolts 152 and lifting upwardly on the flange 150. The side edges of the movable panel 140 are then moved upwardly through the rear channels 116 in the window rails 110 at the opposite sides of the frame 14. It will be apparent that when the movable panel 140 is raised, the screen 134 will provide ventilation through the door 12.

From the foregoing it will be apparent that the present invention provides a novel storm door which may be used in all climatic conditions and will not require changing from storm to screen doors at various times during the year. The present storm door is light in weight but constructed for a maximum service life. The members of the frame of the door are interconnected in a novel manner to conceal all fastening or securing devices to give the appearance of a unitary door frame construction. Also, the present door frame may be adapted to fit substantially any size of door opening in an easy and convenient manner without changing the appearance of the door frame. It will further be apparent that the present storm door is effectively sealed and may be used to prevent the leakage of cold air through a door opening.

Changes may be made in the combination and arrangement of parts or elements as heretofore set forth in the specification and shown in the drawings, it being understood that changes may be made in the embodiment disclosed without departing from the spirit and scope of the invention as defined in the following claims.

I claim:

1. In a storm door for use in a door opening, a rectangularly-shaped storm door frame of a size to fit in the door opening and having interconnected top and bottom and side frame members; each of said frame members being a hollow unitary member having front and back walls and inner and outer end walls to form a generally rectangular configuration in cross section, the outer end wall of each frame member having a groove therein extending along the length of the respective frame member and opening outwardly with respect to the frame member, the outer edge portion of the inner end wall of each frame member being extended inwardly with respect to the frame to form a shoulder extending along the length of the frame member facing rearwardly with respect to the frame; elastic material sealing strips anchored in said grooves in the side and top frame members to cooperate with the sides and top of the door opening; means for supporting the frame for swinging movement in and out of the door opening; and panel means anchored against said shoulders preventing access through the frame, said panel means including a cross mullion secured between the side frame members; a window rail secured to the inner end wall of the top frame member along the entire length of the top frame member; a window rail secured along the inner end wall of each side frame member between the top frame member and the cross mullion; each of said window rails being F-shaped in cross section and secured to the respective frame member inner end wall with the base thereof abutting the shoulder of the respective inner end wall to form rearward and forward channels along on the top frame member and along the side frame members between the top frame member and the cross mullion; an upper transparent panel secured in a fixed position in said forward channels; a lower transparent panel slidably extending into said rearward channels in the side frame members for vertical movement; said transparent panels being of lengths to overlap when the movable panel is in its lowermost position; a screen anchored in the forward channels of the side frame members between the stationary transparent panel and the cross mullion; and an opaque panel anchored to the cross mullion, the bottom

frame member and the side frame members below the cross mullion.

2. A storm door as defined in claim 1 characterized further to include meeting rails secured along the lower end of the stationary transparent panel and the upper end of the movable transparent panel, a bottom rail secured along the lower end of the movable transparent panel, elastic sealing strips around the edges of each transparent panel for sealing the respective panel in each rail thereof, an elastic sealing strip carried by the meeting rail of the movable transparent panel arranged to seal against the meeting rail on the lower end of the stationary transparent panel when the movable panel is in its lowermost position, and a sealing strip carried by said bottom rail arranged to seal against the cross mullion when the movable rail is in its lowermost position.

3. A storm door as defined in claim 1 wherein the cross mullion is constructed in the same manner as the frame members of the storm door frame and is arranged with the inner end wall thereof facing upwardly, and wherein the upper edge of the opaque panel is extended into the groove in the outer end wall of the cross mullion.

4. A storm door as defined in claim 3 characterized further to include screen holders anchored in the forward channels of the frame side members below the stationary transparent panel, a screen holder anchored against the meeting rail of the stationary transparent panel, a screen holder anchored against the shoulder on the inner end wall of the cross mullion, each of said screen holders comprising an elongated hollow member having a groove therein to receive the respective edge portion of the screen, and an elastic cylindrically-shaped member of a size to be wedged in each screen holder groove on top of the respective edge portion of the screen and secure the screen to the hollow members, said hollow members being interconnected to form a rectangularly-shaped frame around the screen.

5. In a storm door for use in a door opening, a rectangularly shaped storm door frame of a size to fit in the door opening and having interconnected top, bottom and side frame members, each of said frame members being

a hollow unitary member having front and back walls and inner and outer end walls to form a generally rectangular configuration in cross section, said outer end walls each extending inwardly between said front and rear walls and forming a reinforcing projection extending along the length of said frame members, said reinforcing projection defining an outwardly opening groove extending along the length of the respective frame member, said inner end walls each extending inwardly between said front and rear walls to form a second reinforcing projection extending along the length of said frame members, said second reinforcing projection defining an inwardly opening groove extending along the length of the respective frame member; panel means having its edges received in said inwardly opening grooves and preventing access through the frame; elastic material sealing strips anchored in said outwardly opening grooves to cooperate with the sides and top of the door opening; hinge means connected to the front wall of one of said side frame members and the respective side of the door opening for supporting the frame for swinging movement in and out of the door opening; a pair of flanges on the inner face of one of said front and rear walls of each frame member for reinforcing said walls, each of said flanges being horizontally aligned with, and extending parallel to, one of said reinforcing projections; and right angle shaped anchoring means pressed into adjacent hollow frame members at each corner of said frame and frictionally bearing against said pair of flanges and said reinforcing projections, said anchoring means, flanges and reinforcing projections cooperating to form a strong, neat, mitred joint at the corners of said frame.

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