June 2, 1953 L. J. MILONE 2,640,535

TRIPLE SLIDING STORM WINDOW UNIT

Filed June 29, 1950 5 Sheets-Sheet 1

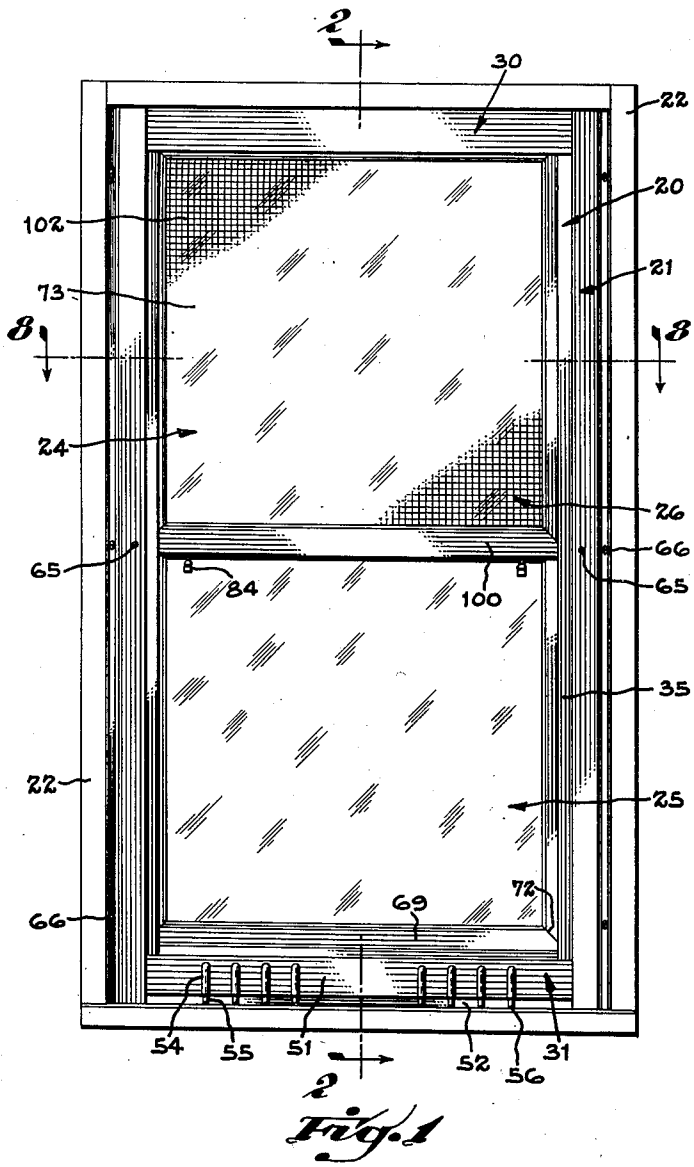

Fig. 1

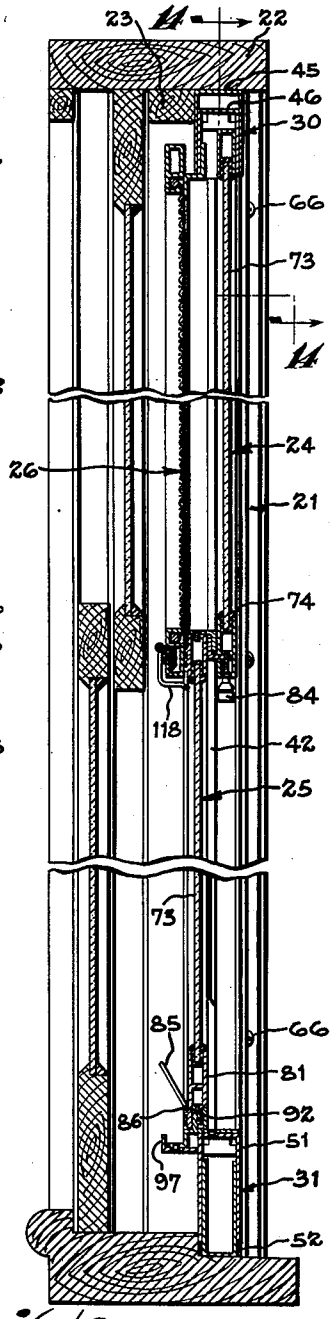

Fig. 2

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June 2, 1953 L. J. MILONE 2,640,535

TRIPLE SLIDING STORM WINDOW UNIT

Filed June 29, 1950 5 Sheets-Sheet 2

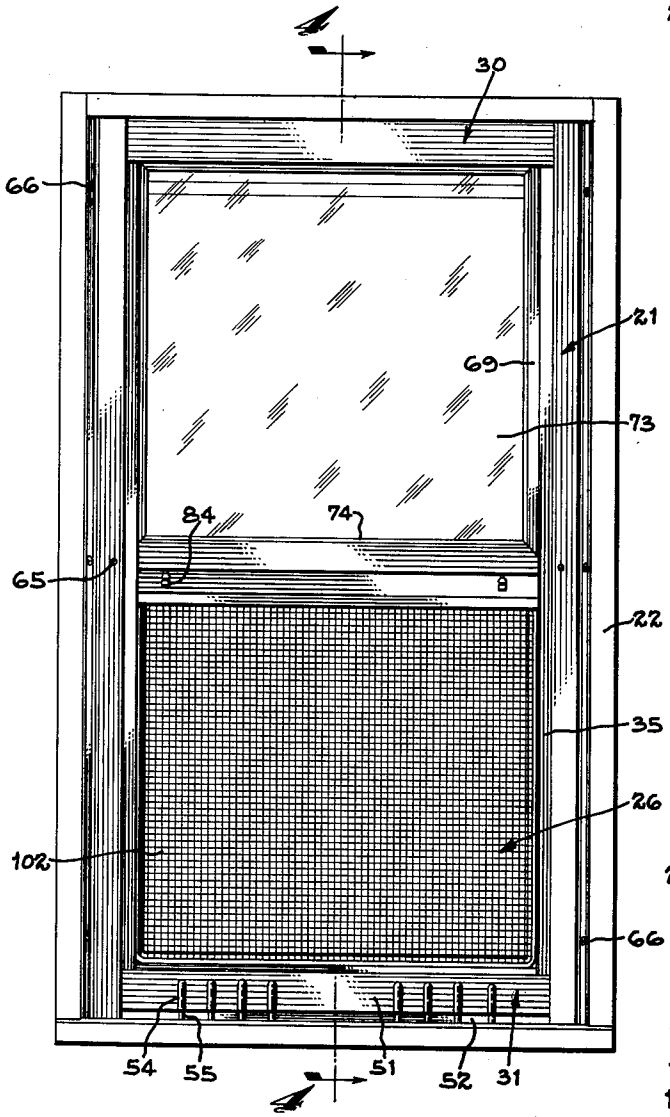

Fig. 3

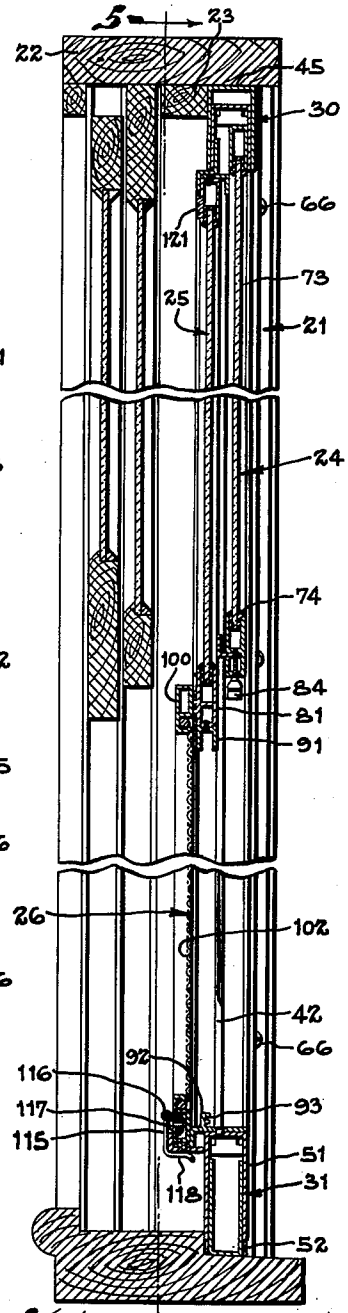

Fig. 4

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June 2, 1953 L. J. MILONE 2,640,535

TRIPLE SLIDING STORM WINDOW UNIT

Filed June 29, 1950 5 Sheets-Sheet 3

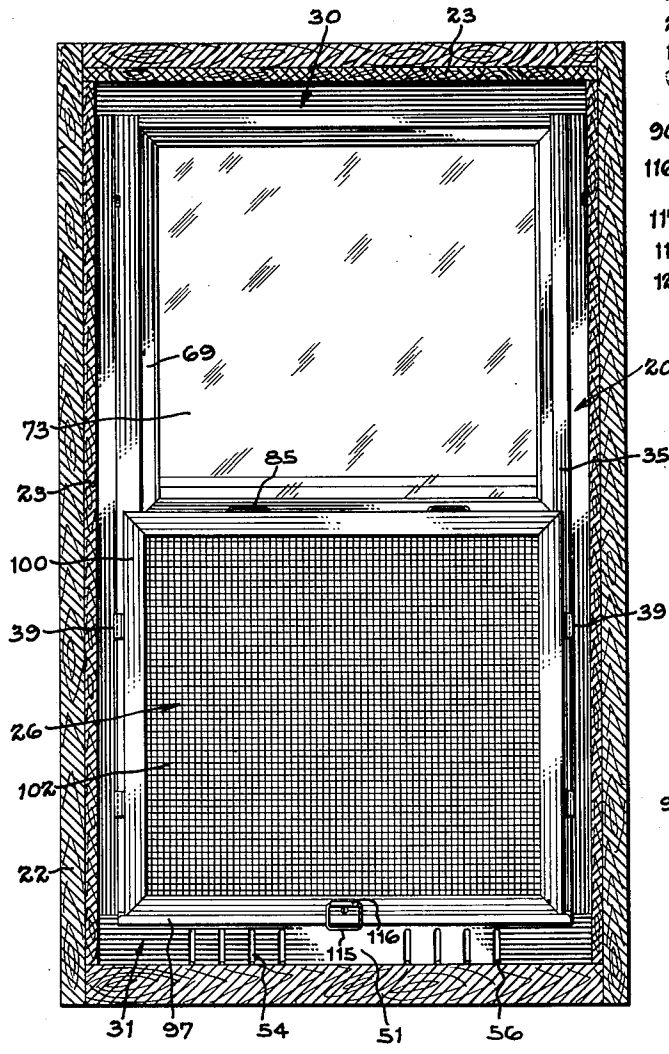

Fig. 5

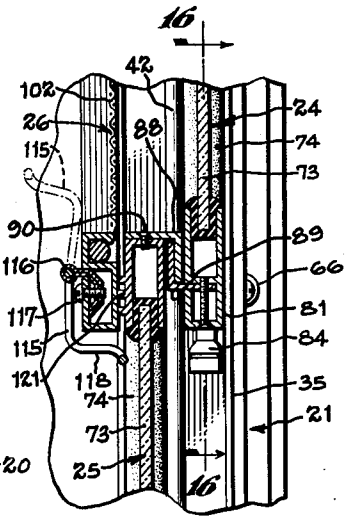

Fig. 6

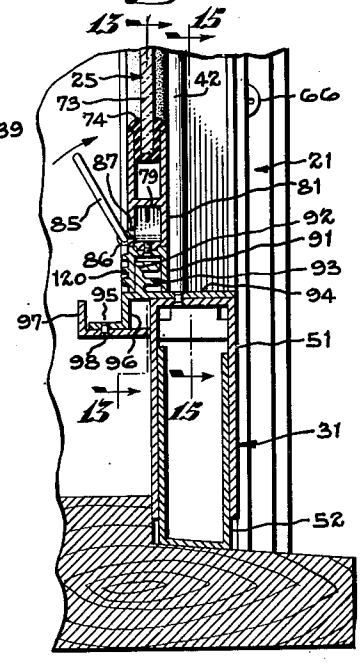

Fig. 7

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June 2, 1953 L. J. MILONE 2,640,535

TRIPLE SLIDING STORM WINDOW UNIT

Filed June 29, 1950 5 Sheets-Sheet 4

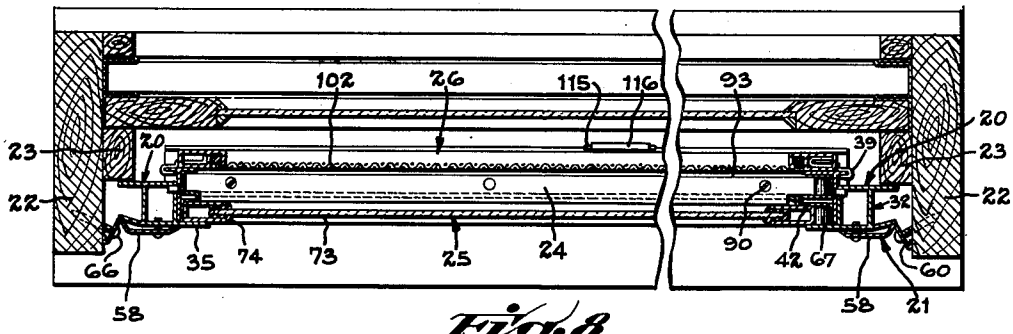

Fig. 8

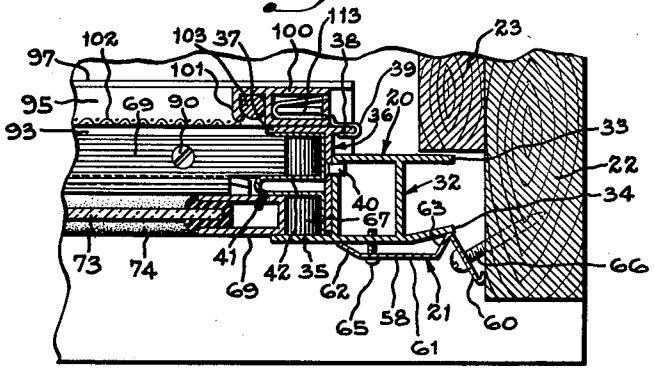

Fig. 9

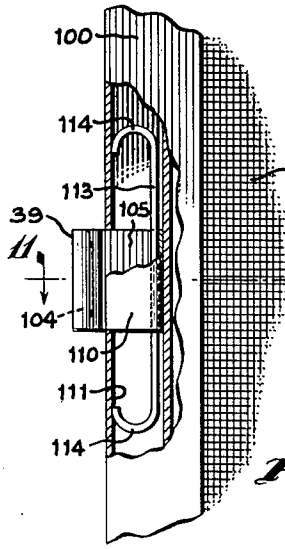

Fig. 10

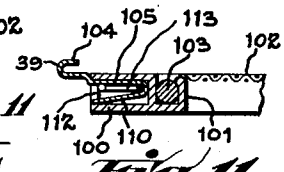

Fig. 11

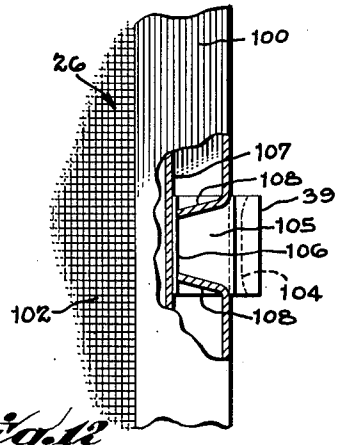

Fig. 12

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June 2, 1953 L. J. MILONE 2,640,535

TRIPLE SLIDING STORM WINDOW UNIT

Filed June 29, 1950 5 Sheets-Sheet 5

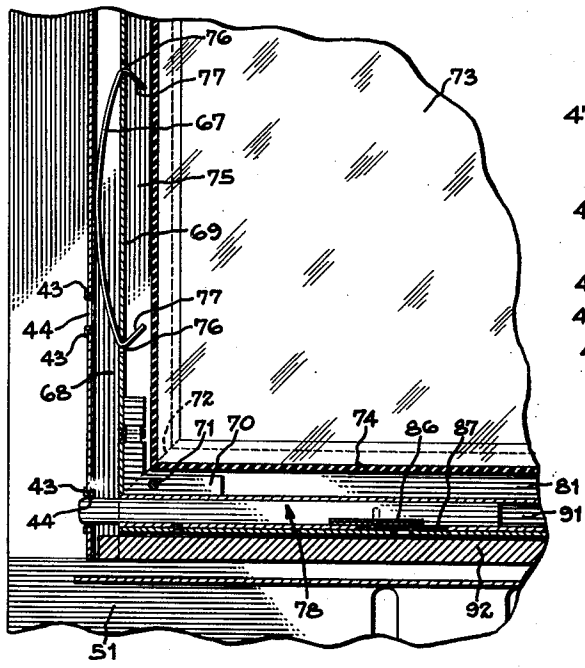

Fig. 13

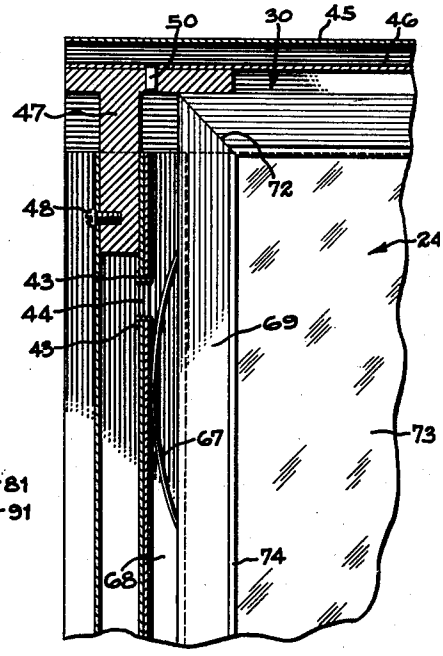

Fig. 14

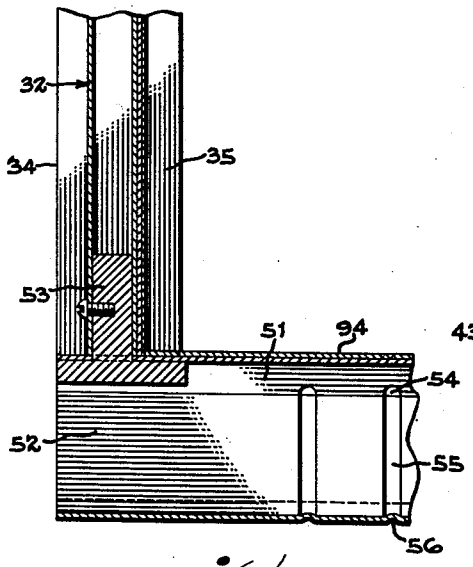

Fig. 15

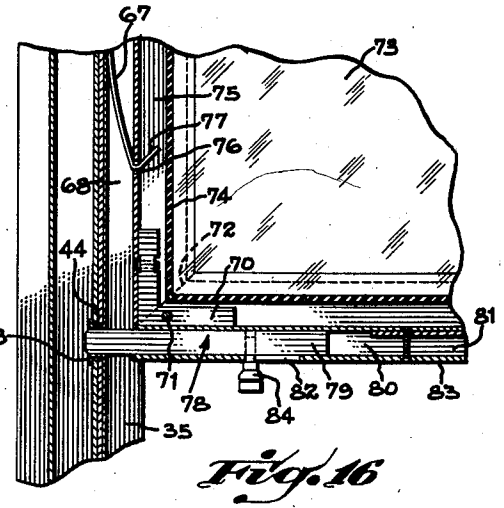

Fig. 16

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2,640,535

UNITED STATES PATENT OFFICE

2,640,535

TRIPLE SLIDING STORM WINDOW UNIT

Louis J. Milone, Livingston, N. J., assignor to The Eagle-Picher Company, Cincinnati, Ohio, a corporation of Ohio

Application June 29, 1950, Serial No. 171,054

15 Claims. (Cl. 160—182)

1

This invention relates to improvements in storm window units of the class used extensively in residential buildings having sliding sash windows and adapted to provide weather protection in cooperation with the regular sashes. These units are fitted into the window openings to the outside of the regular sashes and they are equipped with storm sashes arranged to provide a dead air space for protection against heat loss during the winter season; in addition, they include a screen sash for ventilation during the summer season.

A structure of this type is disclosed in the co-pending application of Louis J. Milone, Serial No. 74,358, filed February 3, 1949, to which attention is invited. In general, this co-pending application embodies a metal frame having a pair of sliding storm sashes and a screen sash, all slidably confined within runner channels formed in the frame. The screen sash of this unit is interposed between the storm sashes, being slidably mounted within a runner channel intermediate the storm sash channels and arranged to cooperate with the meeting rails of the storm sashes to form a weather seal when the storm sashes are closed. These three members are adjustable in various positions to provide a complete closure for weather protection during the winter season with practically no ventilation, partial ventilation during milder weather, and full ventilation through the insect screen during the summer season with both storm sashes raised and the screen sash lowered. The arrangement is such that the storm and screen sashes need not be removed for storage at the change of seasons; instead, they are simply shifted to inoperative positions, although if desired, they may conveniently be removed for cleaning.

The present structure constitutes an assembled unit having the same general characteristics, including a pair of slidable storm sashes for weather protection and ventilation and a screen sash for summer use, and the invention resides in several novel features and improvements in structure. The principal objects have been to reduce the cost of fabricating the units; to facilitate the fitting and installation of the units in spite of variations from normal in the size and shape of the standard window openings to which they are applied; also, to provide a more

2

efficient weather seal between the storm window unit and window opening and between the storm sashes and their frame. Further objects are directed to improvements in the mounting of the screen sash, a novel mounting arrangement for the flexible runner channels of the storm sashes and improvements in the sash latches, all of which are more clearly disclosed hereinafter.

In order to economize in fabrication costs, a simplified frame and cooperating screen sash have been developed which eliminates a screen sash runner channel, the screen sash being arranged to embrace the face of the storm sash channel instead, by the use of yieldable clips. Fitting of the frame unit in the window opening has been facilitated by the provision of flexible adaptor strips secured to the frame and adapted to be attached to the opening to support rigidly the storm window frame, at the same time yieldably compensating for variations in the opening to provide an improved weather seal.

In order to simplify the frame structure, the storm sashes are mounted side-by-side and slightly spaced from one another within a pair of channel runners having flexible sheet metal liners which expand against the storm sashes for sealing. The meeting rails of the sashes are provided with oppositely related angular flanges which interlock with one another to provide tortuous interfaces for weather sealing when closed.

The screen sash is hung to the inside of the storm sashes by means of clips which engage at opposite sides, the edges of flanges formed along the sash channels and the mounting clips for the screen sash are yieldably extensible along one side to permit the sash to be disengaged from the pair of flanges which support it. These clips are spring urged against the opposed flanges to provide a frictional engagement capable of supporting the screen sash in various adjusted positions without the use of latches. The extensible spring urged clips are sufficiently resilient to permit the screen sash to be demounted by shifting it laterally and thereby to disengage the clips along one side from the runner flange. This arrangement simplifies the frame construction by utilizing two channel runners instead of three, as above noted, facilitates removal of the screen sash for cleaning, and additionally serves the

function of holding the sash at its adjusted elevation.

The screen sash is locked in closed position by a latch mounted upon its lower cross rail which functions also as a lift or handle for raising and lowering the sash. This combined latch and pull is in the form of a loop shaped handle pivotally mounted on the lower cross rail of the screen sash, having an angular portion which extends outwardly as a hand hold in one position. In its second position, the angular portion swings downwardly into engagement with a cross rail of the storm sash frame to lock the sash securely to the cross rail in closed position.

The standard window frames, as above noted, vary from building to building due to warpage and variations from normal size. For this purpose, the adaptor frame extends from the storm sash frame to the window opening to close off the space intervening between the frame and opening. In the present structure, the adaptor frame includes along its opposite sides flexible sheet metal strips extending laterally toward the window opening. These strips preferably are secured permanently to the storm window frame and their extended edges are attached to the surface of the window opening by means of screws which spring the edges of the flexible strips into intimate engagement against the surface of the window frame.

By this arrangement, the adaptor strips are secured in a positive manner both to the storm sash frame and window opening to support the storm sash frame rigidly within the opening; and by virtue of the yieldability of the adaptor strips, they are free to compensate for irregularities in the angularity and contour of the window opening to provide a weather seal. To compensate for variations at the top and bottom of the window opening, the storm window unit is equipped with top and bottom rails which may be adjusted vertically and angularly to seal off the space between the storm unit and window opening at these points; therefore, the four sides of the frame are weather sealed with respect to the window opening.

The frame units are fabricated preferably from sections of extruded aluminum which are configurated to the necessary shape in cross section to provide runner channels for the sashes; also the extruded channel sections include marginal flanges engageable by the yieldable screen mounting clips as previously noted. The extruded sections are smooth-surfaced when new but they are not well suited for sliding engagement since the aluminum is rather soft and becomes roughened during service, thus causing the sashes to bind frictionally within their channels. The above noted sheet metal liners are formed from stainless steel strips disposed within the extruded channels arranged to embrace the edges of the storm sashes under pressure to provide a weather seal and, at the same time, permit the sashes to slide smoothly even after prolonged service.

The extruded storm sash channels are of sufficient width to retain both sashes and the steel liner strip is configurated to provide a pair of runners side-by-side, one for each sash, with an intermediate separator between them. The separator is formed by doubling the steel sheet upon itself to form spaced flexible walls which tend to expand outwardly. These expansible sheet metal walls force the sashes outwardly in opposite directions against the side flanges of the extruded channel under controlled pressure which is sufficient to permit sliding movement and at the same time provide a weather seal. The liner strips are secured in the extruded channels by providing mounting holes in the bottoms of the channels and severing out portions of the liner sheet and clinching the severed portions around the edges of the holes.

The openings thus defined are utilized in a dual function, first to mount the liner strips, and secondly to provide keepers engageable by latches which are mounted upon the storm sashes serving to lock the sashes either in closed position or at selected elevations for ventilation. These latches include bars which slide outwardly from the sashes and project through the holes to provide a positive engagement; and the holes are located in sets at opposite sides of the frame at several elevations to provide several height adjustments for the sashes.

Further advantages and details of the structure are more fully disclosed in the specification with reference to the attached drawings disclosing a preferred embodiment of the invention:

In the drawings:

Figure 1 is a general view illustrating the improved storm sash unit as viewed from the outside of a building, showing the storm sashes in closed position for winter use with the screen sash in its elevated storage position.

Figure 2 is an enlarged fragmentary sectional view taken on line 2—2, Figure 1, showing in cross section the relationship of the sashes corresponding to the position of Figure 1.

Figure 3 is a view similar to Figure 1 except that the storm sashes are shown in elevated position with the screen sash lowered to convert the unit for summer usage.

Figure 4 is an enlarged fragmentary sectional view taken on line 4—4, Figure 3, showing the relationship of the sashes corresponding to Figure 3.

Figure 5 is a general view of the unit, as viewed from the inside of the building on the plane indicated by line 5—5 in Figure 4, with the storm sashes elevated and the screen sash in lowered position, as in Figure 3.

Figure 6 is an enlarged fragmentary view taken from Figure 2, detailing the interlocked weather sealing relationship of the adjoining meeting rails of the storm sashes when the sashes are in closed position.

Figure 7 is an enlarged fragmentary sectional view, also taken from Figure 2, detailing the telescopic lower rail of the storm sash frame and the weather sealing arrangement of the lower storm sash with respect to the frame cross rail.

Figure 8 is a cross sectional view taken on line 8—8, Figure 1, illustrating generally the relationship of the storm window unit with respect to a standard window frame and the relationship of the storm and screen sashes in the storm sash frame.

Figure 9 is an enlarged fragmentary view taken from Figure 8, detailing the yieldable adaptor strips for mounting the storm sash frame with respect to the window opening, the construction and arrangement of the sheet metal runners for slidably retaining the storm sashes in weather sealing engagement in their frame and the structure for slidably mounting the screen sash.

Figure 10 is a fragmentary side view partially broken away, illustrating one of the yieldable clips for mounting the screen sash with respect to the storm sash frame.

Figure 11 is a sectional view taken on line 11—11, Figure 10, further detailing the yieldable mounting clip disclosed in Figure 10.

Figure 12 is a view similar to Figure 10 illustrating one of the fixed mounting clips which is secured upon the side of the screen sash frame opposite to the yieldable clips for cooperation with the yieldable clip in detachably maintaining the screen sash in position upon its frame flange.

Figure 13 is a sectional view taken on line 13—13, Figure 7, detailing the corner construction of the lower storm sash and its relationship with the lower portion of the frame within which it is mounted.

Figure 14 is a sectional view taken on line 14—14, Figure 2, detailing the corner construction of the upper storm sash and its relationship with the upper portion of the frame.

Figure 15 is a sectional view taken on line 15—15, Figure 7, further detailing the corner construction of the lower portion of the storm sash frame.

Figure 16 is a sectional view similar to Figure 13 showing a portion of the upper storm sash latched in an elevated position with respect to the storm sash frame.

Referring to Figures 1, 3 and 5, the storm window unit consists generally of a storm window frame 20 and an adaptor frame 21, enclosing the space between the storm window frame and the opening defined by the standard window frame 22 with the storm window frame engaged against the runner strips 23 of the standard window frame. The adaptor frame 21 compensates for variations in the size and shape of the standard window frame and establishes a weather seal between the storm unit and window opening as hereinafter disclosed in detail. This arrangement is necessary because standard window frames vary from normal size and shape incident to individual fitting, warpage and is especially noticeable in older buildings; however, by virtue of the compensation afforded by the adaptor frame, the manufacturer is able to produce storm sash units for the various standard window sizes which may be installed without alteration in spite of such variations from standard in the window openings.

Slidably mounted within the storm sash frame 20 is an upper storm sash 24, a lower sash 25 and, an insect screen sash 26. These respective sashes may be removed from the frame for cleaning or at installation conveniently by springing them laterally to one side, the sashes being provided with yieldable members which normally maintain them slidably in confined position within the storm sash frame. The structural details of this arrangement are disclosed in the drawings and are described in detail hereinafter. The storm units are installed preferably with the sashes removed for convenience in handling and, after installation, their sashes are sprung into normal position quickly and easily.

The storm window frame is constructed from aluminum extrusions forming side rails or stiles generally of channel shape in cross section for slidably confining the storm sashes and having flanges for mounting the screen sash. In addition, the storm window frame is provided with a top or head rail 30 and a bottom rail 31. The side rails are of two-piece construction as illustrated most clearly in Figure 9. As disclosed, there is provided a base extrusion 32 to which is secured the side members of the adaptor frame 21, the side members having their opposite or

outer edges fastened to the surface of the window opening to support the storm sash frame. The base member constitutes a thin walled hollow extrusion having a pair of outwardly extending flanges 33 and 34 and an inwardly projecting flange 35 which forms one half of each sash retaining channel. The channel is completed by a second extrusion 36 which is substantially T-shaped in cross section complementary to the base extrusion to provide the opposite side flange 37 of the channel and having secondary flange 38 extending parallel to the side flange in a direction opposite to the open channel to provide a slide rail engageable by the mounting clips 39 of the screen frame, as hereinafter described in detail. The T-shaped extrusion 36 is secured upon the face of the hollow extrusion 35 by means of screws or rivets, as indicated at 40 in Figure 9.

Since the aluminum extrusions are relatively soft and subject to scoring, a slideway or liner 41, which is formed preferably from resilient stainless sheet steel strips, is installed within the channel to provide a pair of runners for the respective storm sashes arranged to separate the sashes from one another. The slideway 41 is configured in cross section to provide a central spacer 42 formed by doubling the sheet metal upon itself, the doubled portion of the sheet metal being of loop formation to provide resilient spaced walls which spring the storm sashes outwardly into intimate sliding engagement with the side flanges of the channels. The runners are installed in the channels at opposite sides facing one another, as shown in Figure 8, the lower storm sash being confined in the outer channel and upper sash being confined in the inner channel such that the meeting rails of the sashes in closed position interlock with one another, as illustrated in Figure 6. The stainless steel separator 42, by its resiliency, intimately engages the sides of the respective storm sashes to provide weather seals to prevent looseness of the sashes with respect to the frame and to provide a smooth bearing surface. The runners are restrained against displacement in the channel by clinching the partially severed portions 43 of the base of the sheet metal liners at one or more places to the bottom of the channels, as indicated in Figures 13 and 14, the extrusions for this purpose having openings 44 to receive the clinched portions of the runner strips. These openings also cooperate with the sash latches to lock the sashes positively in adjusted position, as disclosed hereinafter.

The head rail 30 of the storm sash frame consists of a pair of inverted U-shaped extrusions which are telescopically engaged one upon the other, the outer extrusion 45 being arranged to seat upon the top rail of the standard window frame with its side engaged against a stop 23, as shown in Figure 2. The inner extrusion 46 is fixed to the storm sash frame, its ends being connected to the stiles by means of T-shaped brackets 47 which are inserted respectively into the hollow portion of the stile and into the endwise portion of the channel, as viewed in Figure 14. The angle bracket is secured in position by means of the screw and rivet 48 and 50 to provide a rigid assembly. The outer U-shaped extrusion 45 is slidably engaged upon the inner extrusion to provide both vertical and angular adjustments and thereby to permit the storm window frame assembly to adapt itself to the top of the window frame; thus, the storm unit

frame is mounted in fixed position in the standard window opening by the adaptor frame along its sides, while its head rail and bottom rail may be adjusted to the top and bottom of the window opening. The head rail, by virtue of its inverted channel configuration, permits the upper storm sash to extend within the interior of the head rail, as disclosed in Figures 2, 4 and 14.

The lower cross rail of the storm sash frame which is indicated generally at 31 in Figures 3 and 7, also provides vertical and angular adjustment to adapt the storm sash frame to the window opening. For this purpose the rail assembly constitutes an outer channel shaped extrusion 51 and an inner extrusion 52 also of channel configuration; however, in this instance, the open sides of the two channels face toward one another to constitute a hollow enclosure. A T-shaped bracket 53 (Figure 15), similar to the above noted bracket 47, is employed in joining the outer extrusion to the side members at the lower corners. The mating webs at the outside of the extrusions 52 and 53 are provided with complementary corrugations 54 and 55 which lock the channels against endwise displacement with respect to one another while permitting relative adjustment in a vertical plane. In addition, these corrugations form air passageways communicating with the outside of the frame to provide controlled circulation of fresh air in the space between the window sashes and storm sashes and thereby to prevent the sashes from frosting. For this purpose, the corrugations extend across the lower portion of the cross rail which seats against the window sill, as indicated at 56 in Figures 1 and 15; these openings also provide for the drainage of condensates.

The storm sash frame as a unit is supported rigidly within the window opening by means of retainer strips 58—58, forming a part of the adaptor frame 21, as above noted. These strips are installed along opposite sides to the outside of the frame, as disclosed in Figures 8 and 9, and are formed preferably from resilient stainless steel configurated in cross section to provide an angular side flange 60 joined to a channel shaped section 61 which lies in pressure engagement against the outer surface of the frame. The respective opposite side flanges 62 and 63 of the channel section 61 space the section from the frame surface with the flanges 62 and 63 in line contact with the surface of the frame to form a seal. The angular flange 60 is joined to the edge of flange 63 as a continuation of it and this flange establishes a line contact with the surface of the window opening to provide a weather seal. The channel sections 61 are fastened to the storm window frame by one or more screws 65 and the angular flange 60 is drawn into intimate engagement against the surface of the window opening by screws 66, as shown in Figures 1 and 9, with the storm sash frame seated against the stop rails 23.

It will be observed that the flexibility of the adaptor strips permits them to conform accurately to the configuration of the window opening and the screws 65 and 66 provide intimate engagement against the surfaces which they embrace for sealing purposes; moreover, by their construction and attachment, the strips support the storm unit rigidly in the opening. In assembling the storm unit in the opening, the storm sashes and fly screen preferably are removed to facilitate handling and the storm sash frames as a unit may be placed conveniently within the opening with the adaptor strips secured in position by the screws 65. After adjusting the head rail and bottom rail to the window opening, the attaching screws 66 are applied directly through the strips to mount the storm sash frame permanently in the opening. After installation of the frame unit, the fly screens and storm sashes may be applied conveniently by springing them laterally into engagement with their respective channels in the manner hereinafter disclosed. Although the present structure is illustrated and described in conjunction with a conventional wood window frame, it is contemplated to adapt the units to metal windows of various types in substantially the same manner, utilizing if necessary machine screws instead of the wood screws 66 disclosed.

The position of the frame unit with respect to the window opening can be regulated with precision by adjustment of the screws 66 which pass through the yieldable extensions. For example, the frame unit can be drawn toward one side or another by tightening the screws at the desired side and loosening them on the opposite side. By virtue of their yieldability, the angular flanges 60 will mutually compensate for such adjustment and preserve the weather seal. By mounting the adaptor strips 61 directly upon the storm sash frame, the storm sash frame is supported in fixed position but in spaced relationship with the window opening independently of the head rail and bottom rail, these members serving only to complete the weather sealing of the frame unit within the opening.

The construction of the upper and lower storm sashes is illustrated most clearly in Figures 13 and 14, the respective sashes being substantially identical, each sash being confined along opposite edges within the channels defined by the yieldable slideway liners 41. As shown in Figures 8 and 9, the left hand edge of each respective sash is seated against the bottom of the liner and the right hand edges are provided with leaf springs 67 which urge the sashes toward the left. The springs provide a clearance indicated at 68 between the sash and runner such that the sashes may be sprung laterally to the right compressing the springs 67 and disengaging the left hand edges of the sashes from their runners.

The side members of each sash frame are constructed from aluminum extrusions 69 which are U-shaped in cross section. The corners of the side and end sections 69 are joined as shown in Figures 13 and 16 by means of angle brackets 70 secured by rivets 71. The adjoining corners of the extruded sections are mitered as at 72 and the glass panels 73 are mounted in the assembled frames between a yieldable strip 74 preferably of rubber, which is channel shaped in cross section, the marginal edge of the panel being frictionally embraced by the strip. As shown in Figure 13, the panels terminate inwardly from the outer wall of the sash frame channels providing a clearance which is indicated at 75. The yieldable springs 67 are secured in position by passing their opposite ends through openings 76 formed in the channel extrusions, the ends of the springs being bent inwardly as at 77 to lock them permanently to the channels with the ends of the springs projecting into the clearance 75.

The lower rail of each storm sash is provided along opposite sides with a pair of latches indicated generally at 78, each being arranged to cooperate with the openings 44, previously noted, to lock the sashes in closed or in adjusted open

positions. Described in detail with reference to Figures 6 and 16, the latches for the upper storm sash each consist of a latch bar 79 slidably sustained in a hollow section 80, forming a part of the channel extrusion 81 which constitutes the lower cross rail. A slot 82 is formed in the lower wall 83 of this section and a bolt 84 passes through slot 82 into the latch bar 79. The several liner mounting holes 44 are in alignment with one another along opposite sides of the frame to permit the sash to be locked at various elevations by sliding the respective latch into engagement with the openings, as shown in Figure 16.

The lower sash is substantially of the same construction as the upper, being provided with a pair of sash pulls 85—85 (Figure 7) constituting wire loops having their ends pivotally engaged in clips 86 secured to the slide bolt 79. The clips 86 pass through respective slots 87 formed in the wall of the hollow section 80 with the pulls facing the inside of the room. The storm sash frame for the lower sash is of course provided with openings 44 for engagement by the latch bars of the lower sash so that both sashes can be locked in adjusted positions with respect to one another. The lifts or pulls 85 thus serve to actuate the latch bars and to raise and lower the sash; also, it is shiftable to a flat position (Figure 7) to prevent interference with the screen sash.

In closed position, as shown in Figures 2 and 6, a weather-proof seal is established between the meeting rails of the upper and lower sashes by means of a pair of angle members 88 and 89 which are secured respectively to the meeting rails of the upper and lower sashes by screws 90. These angle members face in opposite directions with respect to one another and they are offset laterally to provide an interlocking interface with the vertical flange of one angle overhanging the vertical flange of the other. This provides a tortuous passageway which is effective to prevent the flow of air between the meeting rails when the sashes are closed.

As shown in Figure 7, the cross member 81 of the lower sash 25 includes in addition to the hollow section 80, an inverted channel indicated at 91 cooperating with a fluted rail 92 which is adapted to seat within the channel when sash 25 is closed. The flutes 93 in rail 92 are toward the outside of the window and when embraced within the channel provide an efficient seal against seepage of driving rain. Rail 92 may be formed as part of a sill plate 94 which is riveted to the upper channel member of cross rail 31. In addition, there is provided a channel 95 located to the inside of the frame to embrace the lower edge of the screen sash in closed position (Figure 4). The channel also cooperates with a latch to lock the screen sash in closed position, as hereinafter noted. The channel 95 is constituted by an angular portion 96 of sill plate 94, combined with an angle section 97 which is riveted as at 98 to the sill plate.

The fly screen 26 is slidably mounted upon the flanges 37—37 which form a part of the storm sash frame, the screen sash being engaged upon the flanges 38 by the clips 39, previously noted. This arrangement provides a simplified and more compact frame construction since the fly screen does not require a retaining channel such as utilized for the storm sashes. Since the problem of establishing a weather seal is not present in connection with the fly screen, the elimination of a third channel has no effect upon the efficiency of the unit.

Described in detail with respect to Figures 9 to 12 inclusive, the fly screen constitutes a frame which is constructed from extruded sections 100 having a hollow configuration providing a lateral channel 101 around the inner margin of the frame for mounting the screen cloth 102. As shown in Figure 9, the screen cloth is marginally secured to the frame by retainer rods 103 which are pressed into the channel 101, with the screen cloth looped around the rods and squeezed between the rod and the sides of the channel.

The mounting clips 39 for the right hand side of the screen are formed from sheet metal, bent to provide a hook 104 extending from the edge of the frame in a position to embrace slidably the flange 38, as shown in Figure 12. The clips include a shank 105 which passes through an opening formed in the hollow extrusion 100 and being provided with an angular foot portion 106 resting against the inner wall 107 of the hollow portion of the extrusion. The clip is permanently secured in position by clinching inwardly the severed portions 108—108 of the outer wall, the ends of the sections 108 engaging the foot 106 and wedging it securely against the wall 107. Along the opposite edge of the screen sash there is provided a series of similar clips 39 which are yieldably mounted within the frame extrusion in the manner disclosed in Figures 10 and 11. The yieldable clips 39 permit the screen sash to be shifted laterally in a direction to disengage the hook 104 of the fixed clips from the flange 38 and thereby to permit removal of the screen sash from the storm window unit.

Described in detail, the spring mounted clip 39 includes a hook 104 and a shank 105 similar to the fixed clip. In addition, shank 105 at its inner end is bent over upon itself to provide a spring anchor 110, the side wall 111 of the frame extrusion being provided with an opening 112 to permit insertion of the clip. A spring loop 113 having its ends rounded as at 114 (Figure 10) is interposed in the V-shaped configuration of the spring anchor with the curved ends of the spring resting against the wall 111. Upon applying force laterally to the left, as viewed in Figures 8 and 9, spring 113 will deform and thereby permit the clip to be withdrawn from the screen frame a sufficient distance to permit the hook 104 on the opposite side to be disengaged from the screen retaining flange 38. In addition, the spring of the clip provides a frictional engagement with the opposite flanges 38—38 which is sufficient to maintain the screen in adjusted position vertically with respect to its retaining rails. The screen therefore is self-sustaining in its elevated storage position disclosed in Figure 2 and need not be provided with latches to hold it in this position.

In its lowered position (Figure 4) for warm weather, the storm sashes are locked positively in elevated position by the previously described latches and the screen sash may be locked in its lowered position by means of a combined pull and latch 115 for security. As shown in Figures 4, 5 and 6, the latch 115 consists of a wire loop having its opposite ends pivotally mounted in a sheet metal clip 116 secured by a screw 117 to the lower cross rail. The lower portion of lift 115 is bent at right angles to form a hook portion 118 engageable as shown with the channel 95. In its lowered position, the lower edge of the screen frame resides within the channel with its upper cross rail adjacent to the cross rail of the lower storm sash 25. To prevent the entry of insects,

a fluted rib 120 is formed along the inner face of the cross rail of sash 25 which is contiguous with the upper frame section 100 of the screen when the screen is in lowered position; the flutes in rib 120 resting against the outer face of the screen frame as shown in Figure 6. In addition, a fluted rib 121 may be provided along the upper frame member of sash 25, to cooperate with the lower rail of the screen to prevent the entry of insects in the event it is desired to use the screen for ventilation purposes in its upper position, the outer sash 24 being lowered at the time. In its utility as a sash pull, as shown in Figure 6, the member is disengaged from channel 95 and swings upwardly in which position it bears against the screen frame with the angular hook portion 118 projecting outwardly to provide a convenient hand hold. It will be noted that the screen sash is disposed to the inside of the storm sashes for convenient manipulation and to protect it from exposure to the weather.

Having described my invention, I claim:

1. A weather sealed storm window unit having a pair of vertically slidable storm sashes and a screen sash adapted to be installed in weather sealed engagement in a standard window opening comprising, a storm sash frame having side and end members formed of extruded metal sections, the side members being configurated to provide respective channels, the said channels having their open sides facing one another and having spaced sides flanges adapted to confine slidably the said pair of storm sashes, runner strips formed of resilient sheet metal seated within the said channels, each runner strip being configurated in cross section to provide an intermediate wall of looped configuration in cross section, the walls of said loop being adapted to expand outwardly in opposite directions toward the side flanges to provide a controlled pressure engagement against the edge of the sashes to force the sashes outwardly against the side flanges of the channels and thereby produce a weather seal, a screen sash retaining flange extending outwardly from the side flanges in opposite directions, a screen sash having retaining clips engaged over the edge of the screen sash flanges, adaptor strips formed of resilient sheet metal secured to the storm sash frame side members and having extended marginal edges engaged in weather sealing contact with the surface of the standard window opening, and fastening means securing the said marginal edges to the window opening to support the storm window frame rigidly within the opening.

2. A storm window unit adapted to be installed in weather sealing engagement within a standard window opening comprising, a storm window frame having storm sashes slidably confined therein in weather sealed engagement with the storm window frame, an adaptor frame arranged to establish a weather seal between the storm window and the surface of the window opening constituting flexible sheet metal strips, each of said strips having an inner marginal edge of channel shape in cross section having side flanges engaged against the outer surface of the storm window frame, the outer side flange of the channel having a second flange joined along its frame engaging edge, the second flange extending outwardly at an angle diverging from the flange to which it is joined with its free edge engaged against the surface of the standard window opening and being adapted to yield and thereby to conform to the contour and angulation of the window opening, fastening means extending through the channel section of the strips to clamp the side flanges thereof in intimate weather sealing engagement with the storm sash frame, and fastening means extending through the second flange to clamp the free edge of the flange in intimate weather sealing engagement with the surface of the window opening with the storm window frame rigidly supported in spaced relationship within the window opening by the flexible metal strips.

3. A convertible storm sash and screen unit comprising, a storm window frame arranged to be mounted within a standard window opening, a pair of storm sashes mounted slidably within the storm window frame, the said frame having respective channels along its opposite sides, the channels having their open sides facing one another and having spaced side flanges, an intermediate separator member disposed within the channel and adapted to engage and confine the respective storm sashes for vertical movement relative to one another, one of the side flanges of each channel having a screen sash flange extending outwardly in a direction opposite to the open sides of the channels, a screen sash adapted to be mounted in facial engagement against the said screen sash flanges, and yieldable retainer clips mounted upon the screen sash and extending laterally in opposite directions into engagement with the edges of the screen sash flanges and adapted to slidably mount the screen sash upon the outer surface of the screen sash flanges.

4. A convertible storm sash and screen unit comprising, a storm window frame arranged to be mounted within a standard window opening, a pair of storm sashes mounted slidably within the storm window frame, the said frame constituting extruded metal side member sections, the metal sections of the side members having respective channels with their open sides facing one another and having spaced side flanges, a separator interposed in the said channels intermediate the side flanges and coextensive therewith, the separator being adapted to provide respective spaced runners for the storm sashes adapting the sashes to be shifted vertically with respect to one another, the side flanges of the channels having respective screen sash flanges extending outwardly in opposite directions from the open side of the channels, a screen sash engaged against the outer surface of said screen sash flanges, a plurality of mounting clips extending outwardly from the opposite sides of the screen sash and having outer ends adapted to embrace the screen sash flanges, and spring elements associated with the said mounting clips adapted to yieldably urge the clips into frictional engagement with the screen sash flanges under predetermined pressure to permit the screen sash to be adjusted vertically with respect to the screen sash flanges with sufficient frictional engagement to sustain the screen sash in its adjusted position.

5. A convertible storm sash and screen unit comprising, a storm window frame arranged to be mounted within a standard window opening, a pair of storm sashes mounted slidably within the storm window frame, the said frame having respective channels along its opposite sides, the channels having their open sides facing one another and adapted to engage and confine the storm sashes for vertical movement relative to one another, one of the side flanges of each channel having a screen sash flange extending outwardly in a direction opposite to the open sides of the channels, a screen sash adapted to be mounted in facial engagement against the said

screen sash flanges, a plurality of retainer clips mounted upon the screen sash along opposite sides, the outer ends of the clips being doubled over to form hooks adapted to embrace the opposite edges of the flanges, the retainer clips being rigidly mounted along one side of the screen sash, and spring elements along the opposite sides of the screen sash connecting the retainer clips extensibly to the sash to provide disengagement of the sash by shifting the same laterally a sufficient distance to disengage the rigid clips from their flange.

6. A convertible storm sash and screen window unit comprising, a storm window frame arranged to be secured within a standard window opening, a pair of storm sashes mounted within the storm window frame, said frame constituting extruded sections having respective channels along its opposite vertical sides, the channels having their open sides facing one another and having spaced side flanges and an intermediate separator adapted to provide within the channels a pair of runners for slidably mounting the storm sashes for vertical movement relative to one another, the side flanges of the channel extrusions each having a screen sash flange extending outwardly in opposite directions from the open side of the channel, a screen sash constituting a frame formed from extruded sections having a hollow cross section, a screen cloth panel having its marginal edges engaged within the screen sash frame, a series of mounting clips extending from the opposite side edges of the screen sash frame, the said mounting clips each constituting a sheet metal clip having an outer end doubled upon itself to form a hook engageable over the outer edge of the screen sash flange, the said clips having shank portions passing into the hollow extrusions of the screen sash frame, and springs confined within the hollow screen sash extrusions along one side of the sash frame and connected to the shanks, the springs being constructed and arranged to draw the said clips into clamping engagement against the screen sash flanges.

7. In a weather sealed storm window unit having a pair of vertically slidable storm sashes, a storm sash frame having side members formed of rigid extruded metal sections of channel shape in cross section, the said channels having their open sides facing one another and having spaced side flanges adapted to confine slidably the said pair of storm sashes, a flexible runner strip formed of resilient sheet metal seated within the channel shaped extrusions and adapted to provide a weather sealed bearing surface with respect to the sashes, the runner strip being configurated in cross section to provide a base section joined by an intermediate resilient separator in the form of an open loop having spaced flexible walls, said base section providing a pair of spaced runners separated by the spaced flexible walls of said loop, the said spaced walls being adapted to expand outwardly in opposite directions toward the side flanges to provide a controlled pressure engagement against the respective storm sashes to force the sashes outwardly against the side flanges of the channels and thereby produce a weather seal, the base section of the runner being seated against the bottom of the channel to provide a bearing surface for the side edges of the respective storm sashes.

8. In a weather sealed storm window unit having slidable storm sashes, a storm sash frame having side members formed of metal extrusions including channels adapted to confine slidably a pair of storm sashes, a runner strip formed of flexible sheet metal including an intermediate separator adapted to be seated within the said channels to provide spaced runners for the respective storm sashes, the bottom of each of the channels including mounting holes adapted to anchor the said flexible runner strips, the runner strips having partially severed portions passing through the mounting holes and clinched upon the edges of the mounting holes for anchoring the strips within the channels, the storm sashes having latch plungers slidably mounted along their side edges adapted to lock the same at selected elevations within the frame, the said latch plungers being adapted in engaged position to project through the said mounting holes to provide a positive engagement therein to support the sashes at selected elevations.

9. In a weather sealed storm window unit having a pair of vertically slidable storm sashes, a storm sash frame having side members formed of rigid extruded metal sections of channel shape in cross section, the said channels having their open sides facing one another and having spaced side flanges adapted to confine slidably the said pair of storm sashes, a flexible runner strip formed of resilient sheet metal seated within the channel shaped extrusions and adapted to provide a weather sealed bearing surface with respect to the sashes, the runner strip being configurated in cross section to provide a base section joined by an intermediate resilient separator of looped configuration providing a pair of spaced runners separated by the spaced walls of said loop, the said spaced walls being adapted to expand outwardly in opposite directions against the sashes to force the sashes outwardly against the side flanges of the channels, the base section of the runner being seated against the bottom of the channel to provide a bearing surface for the side edges of the respective storm sashes, the bottom of the extruded channels having a plurality of mounting holes for anchoring the flexible runner strips therein, the base section of the runner strips having partially severed portions bent into clinching engagement with the said mounting holes securing the runner strips in position within the channels, and respective slidable latch plungers mounted on the storm sashes and adapted to project their ends through said mounting holes to lock the sashes rigidly in adjusted position.

10. In a storm window unit having a frame including channels adapted to confine slidably a pair of storm sashes, a pair of screen sash retaining flanges disposed along opposite sides of the said channels, a screen sash formed of hollow extruded sections, a plurality of yieldable mounting clips mounted on the extruded section along one side of the screen sash frame and slidably embracing the outer edge of one of the screen sash flanges, a plurality of fixed retaining clips mounted on the extruded section along the opposite side of the screen sash frame and slidably embracing the outer edge of the other screen sash flange, the said fixed and yieldable clips being arranged to cooperate with one another to retain the screen sash in adjusted position by frictional engagement with the edges of the flanges, the said fixed clips each including a shank passing through the hollow extrusion, the shank including an angular foot disposed within the extrusion and seated against the inner surface of the hollow extrusion, the extrusion having partially severed portions adjacent the angular foot, the severed sections being bent inwardly with

their inner edges in engagement against the foot, the partially severed portions being arranged to anchor the foot within the extrusion by wedging the foot between the surface of the extrusion and the ends of the severed portions.

11. In a storm window unit having slidable storm sashes and a screen sash, a frame having a pair of channel shaped side members adapted to slidably confine the storm sashes and screen sash, the frame having a lower cross rail including a cantilever flange of channel shape in cross section facing upwardly and being extended from the frame to a plane displaced from the plane of the channel shaped side members and adapted to embrace the lower portion of the screen sash, a combined sash pull and latch member pivotally mounted upon the lower edge of the screen sash, the said member having a right angular portion formed upon its free end, the said right angular portion being adapted to depend below the lower edge of the screen sash upon being swung to its lowered position, the said right angular portion of the sash pull and latch member being bent in a direction facing the free end of the cantilever flange and to embrace the flange and thereby to lock the screen sash in closed position and being adapted to project at right angles from the sash when the member is placed in elevated position to provide a projecting pull for raising or lowering the sash.

12. A convertible storm sash and screen unit comprising, a storm window frame adapted to be mounted within a standard window opening, a pair of storm sashes mounted slidably within the storm window frame, the said frame having respective channels along its opposite sides, the channels having their open sides facing one another and having spaced side flanges, an intermediate separator member disposed within the channel and adapted to engage and confine the respective storm sashes for vertical movement relative to one another, one of the side flanges of each channel having a screen sash flange extending outwardly in a direction opposite to the open sides of the channels, a screen sash adapted to be mounted in facial engagement against the said screen sash flanges, means mounted on the opposite side edges of the screen sash and extending outwardly therefrom, said means embracing the opposite outer edges of the said screen sash flanges and adapted to slidably mount the screen sash upon the outer surface of the screen sash flanges, the lower storm sash which is adjacent the screen sash having the lower edge thereof configurated to provide an inverted channel, a fluted rib on the sill portion of the window frame, said fluted rib engageable within said inverted channel when the storm sash adjacent the screen sash is in lowered position to provide a water seal between said sash and sill.

13. In a storm window unit having a pair of slidable storm sashes and a screen sash, a frame having side members adapted to slidably confine the storm sashes and the screen sash, said screen sash disposed to the inside of the unit, the storm sashes and screen sash each having upper and lower cross rails, the lower cross rail of the storm sash which is mounted adjacent to the screen sash having an inverted channel portion, a fluted rib along the lower portion of the frame and engageable within said inverted channel portion when the storm sash adjacent the screen sash is in lowered position to provide a water seal between the lower cross rail of the storm sash and frame, and a fluted rib along the inner face of the lower cross rail of the storm sash, said fluted rib being adjacent the screen sash and engageable with the upper cross rail of said screen sash when said screen sash is lowered and the storm sash adjacent it is raised to provide a seal between the cross rails of the storm sash and screen sash to prevent the entry of insects.

14. In a storm window unit having slidable storm sashes and an insect screen sash, a window frame having upper and lower cross rails and having a pair of channel shaped side members adapted to slidably confine the storm sashes, the channel shaped side members on opposite sides each having a screen sash flange extending outwardly in a direction facing away from the open sides of the channels, means mounted on the opposite side edges of the screen sash slidably embracing the screen sash flanges whereby the screen sash is adjustable vertically in a plane parallel with and displaced from the plane of the storm sashes, the lower cross rail of the window frame including a cantilever flange of channel shape in cross section facing upwardly and being extended in a plane displaced from the plane of the channel shaped side members, the screen sash having a lower cross rail and the cantilever flange being adapted to receive and embrace said lower cross rail when the screen sash is lowered, a selective sash pull and latch member pivotally mounted upon the lower cross rail of the screen sash, the said member having a right angular portion formed upon its free end, the said right angular portion being adapted to underlie and embrace the cantilever flange when pivoted downwardly to latching position to lock the screen sash in closed position with its lower cross rail nested in the cantilever flange, said member being adapted to project at right angles from the cross member of the screen sash when pivoted upwardly to provide a horizontally projected pull for raising or lowering the screen sash.

15. In a convertible storm sash and screen unit, a storm window frame adapted to be mounted within a standard window opening, an upper and lower storm sash mounted slidably within the storm window frame, the said frame having respective channels along its opposite sides, the channels having their open sides facing one another and having spaced side flanges, an intermediate separator member disposed within each channel and coextensive therewith, each separator member being formed of flexible sheet metal looped to provide yieldable spaced walls, the storm sashes being confined in pressure engagement against said spaced walls by the spaced side flanges of the channels to provide a weather seal between the sashes and storm window frame, the storm sashes having adjoining meeting rails disposed adjacent one another when the storm sashes are in closed position, the meeting rail of the upper storm sash having an angle member providing a vertical flange extending upwardly, said vertical flange being spaced from the meeting rail toward the meeting rail of the lower storm sash, the lower storm sash having an angle member providing a vertical flange extending downwardly and spaced from the meeting rail toward the meeting rail of the upper storm sash, said flanges being adapted to provide an interlocking interface with respect to one another when the sashes are closed to provide a weather seal, said interlocking flanges being disposed in the plane of said separator mem-

bers, the yieldable walls of the separator member being adapted to maintain the storm sashes and the cooperating vertical flanges in alignment with respect to one another to provide accurate registry of the vertical flanges in interlocking position.

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