Aug. 4, 1942. H. A. KAUFMANN 2,291,726

COMBINATION SASH CONSTRUCTION

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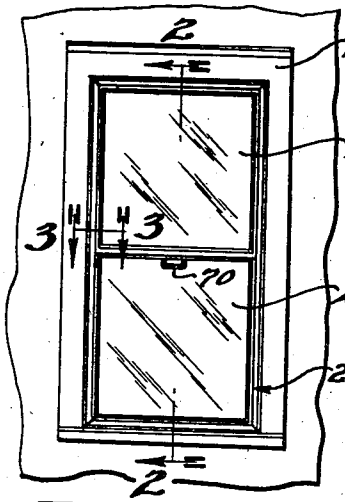


FIG. 1.

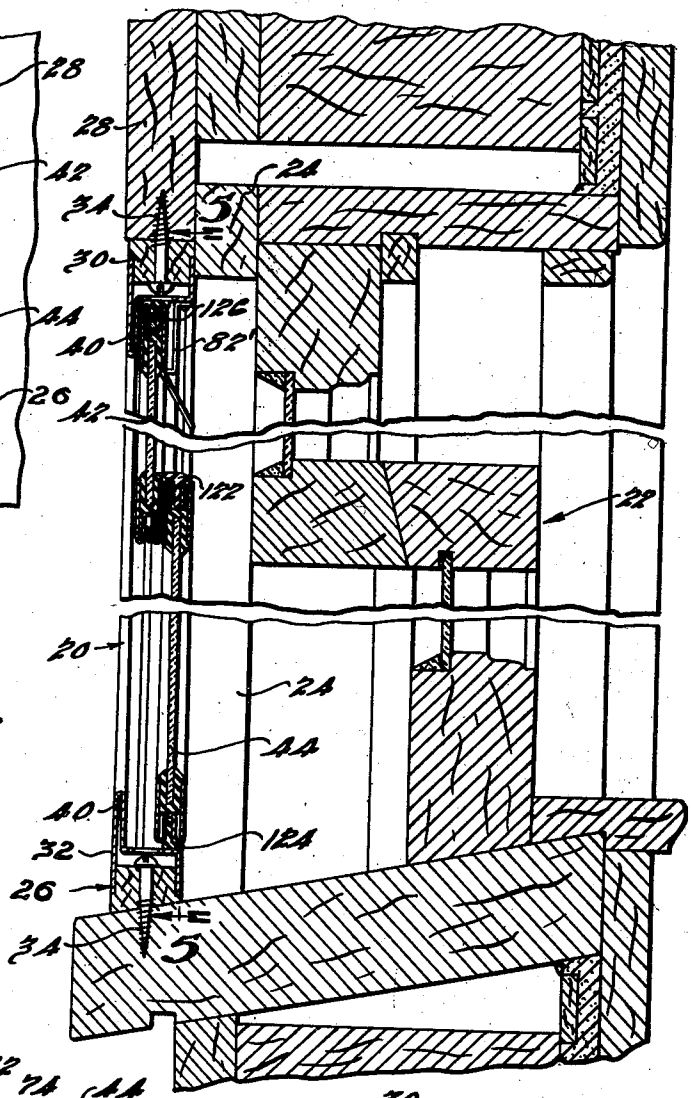


FIG. 2.

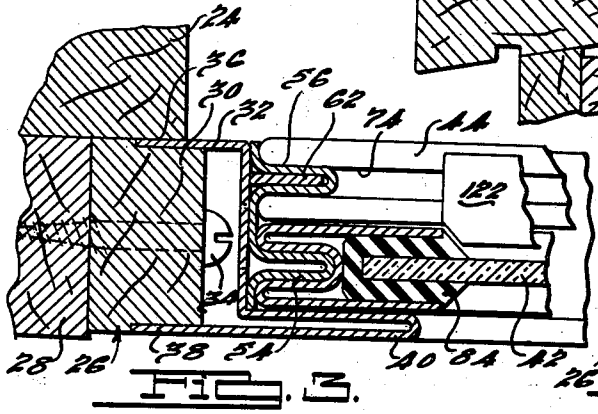


FIG. 3.

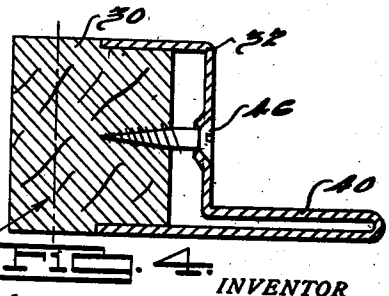


FIG. 4.

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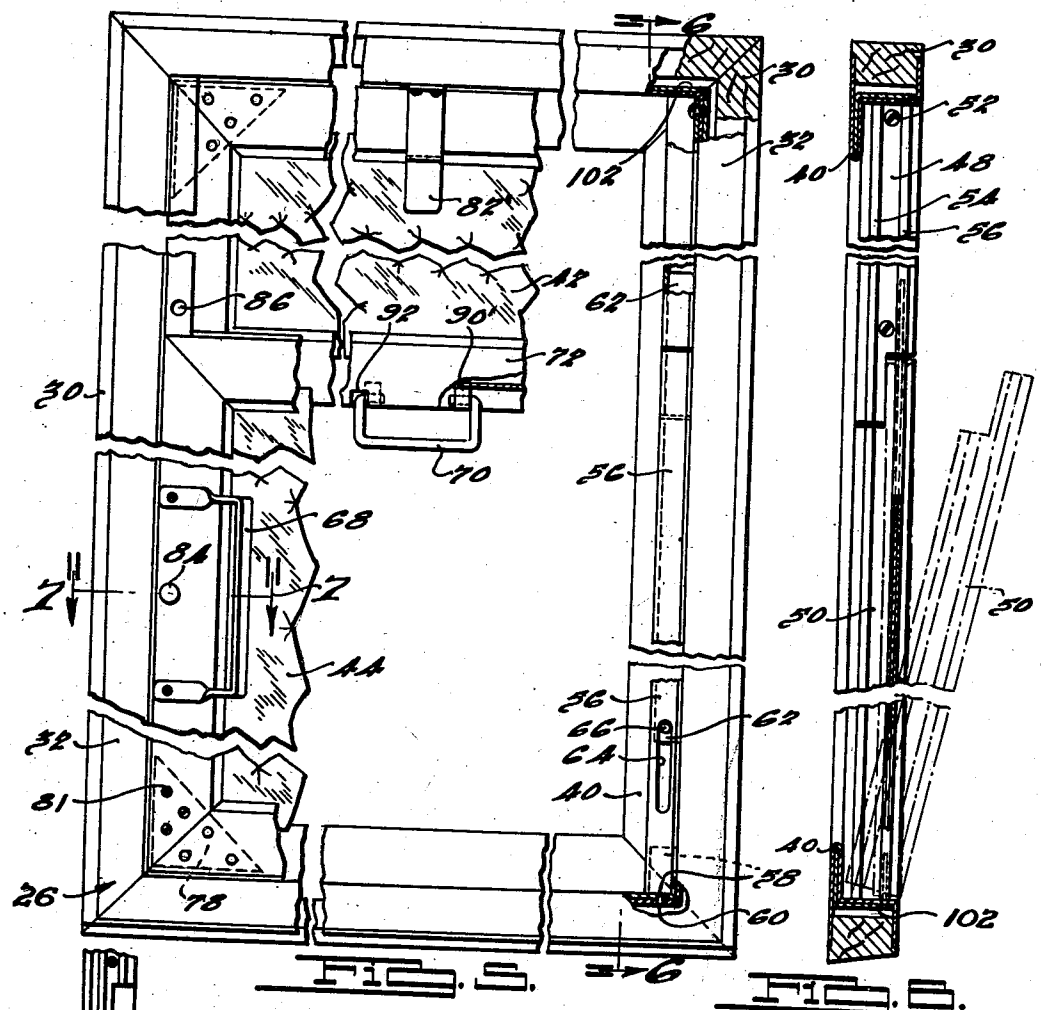


FIG. 5. FIG. 6.

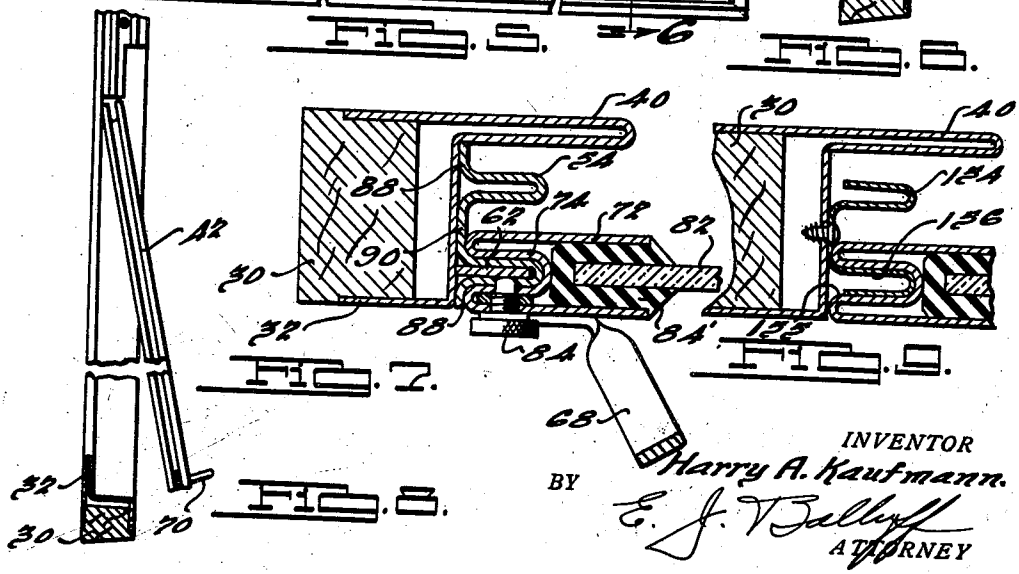


FIG. 7. FIG. 8.

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Fig. 10.

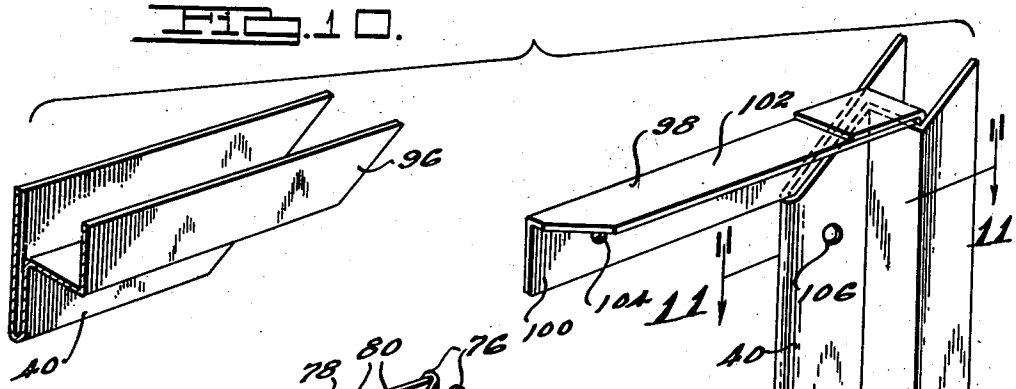
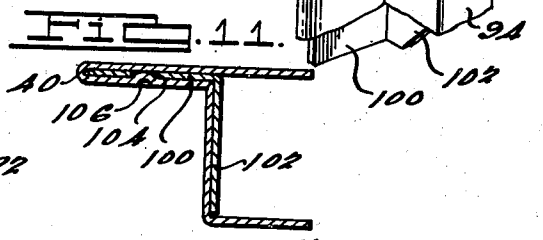


Fig. 11.



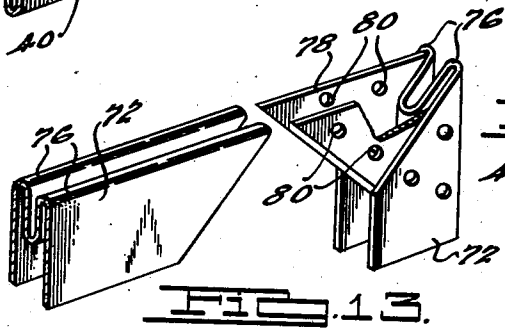


Fig. 13.

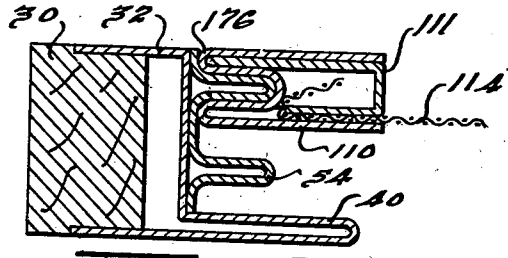


Fig. 15.

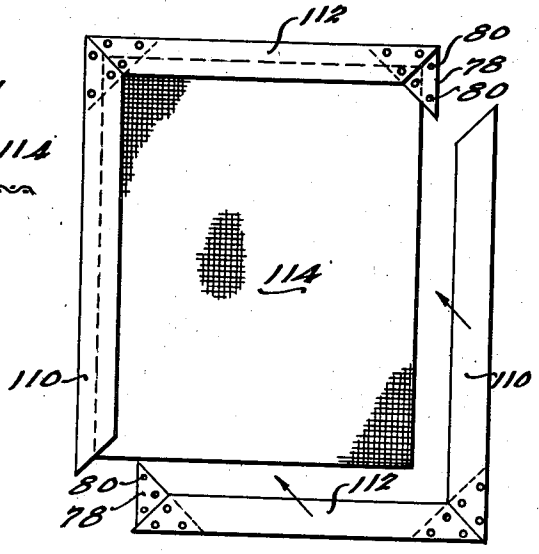


Fig. 14.

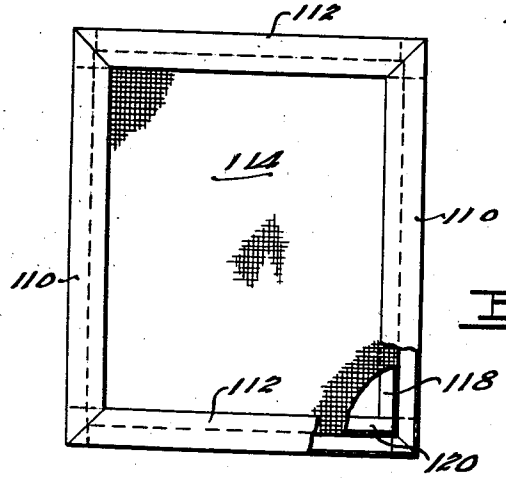


Fig. 12.

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COMBINATION SASH CONSTRUCTION

Harry A. Kaufmann, Grosse Pointe, Mich.

Application March 7, 1940, Serial No. 322,793

7 Claims. (Cl. 189—76)

This invention relates to window or sash construction and has particular reference to a new and improved form of metallic window construction which is specially suitable for use as combination storm and screen sash, although certain aspects of my invention are suitable for use in connection with standard window construction.

A principal object of my invention is to provide a combination storm and screen sash which has numerous advantages over any sash of this type now available on the market and which is constructed and arranged so as to be manufactured and installed in a very simple fashion and for a comparatively low cost.

Another object of the invention is to provide a new and improved form of sash construction in which the framing comprises metallic sections formed preferably by a rolling process.

Another object of the invention is to provide an improved form of metallic sash frame construction including provisions for holding the parts of the frame in assembled relationship.

Other objects and advantages of my invention will be apparent from a consideration of the following specification taken in conjunction with the accompanying drawings, of which there are three sheets and wherein:

Fig. 1 is an elevational view of the exterior of a window opening having a combination storm and screen sash embodying my invention associated therewith;

Fig. 2 is a vertical section on the line 2—2 of Fig. 1, with parts broken away;

Fig. 3 is a horizontal section taken along the line 3—3 of Fig. 1;

Fig. 4 is a section through the outer frame of the window and illustrating the manner in which the parts thereof are secured together;

Fig. 5 is a view taken along the line 5—5 of Fig. 2, with parts broken away and showing in elevation the interior of a sash embodying my invention;

Fig. 6 is a section taken along the line 6—6 of Fig. 5;

Fig. 7 is a section taken along the line 7—7 of Fig. 5;

Fig. 8 is a view somewhat similar to Fig. 6 and showing certain steps in the method of removing the upper sash;

Fig. 9 is a section similar to Fig. 3 and illustrating a modified form of guide construction;

Fig. 10 is an exploded view of a corner of the outer frame;

Fig. 11 is a section taken along the line 11—11 of Fig. 10 and illustrating the means for securing the parts of the frame in assembled relationship;

Fig. 12 is an elevational view of the screen sash suitable for use in the main frame of the window and which is adapted to be interchanged with one of the glass sections;

Fig. 13 is an exploded view of a corner of the screen frame or the glass frame;

Fig. 14 is a view which illustrates certain steps in the method of assembling the screen; and

Fig. 15 is a section similar to Fig. 3, but illustrating a screen sash associated with the main frame instead of a glass sash.

Referring now to Fig. 2, which is a vertical section through a window opening having a conventional sliding sash and a combination sash embodying my invention associated therewith, the combination sash indicated generally at 20 is illustrated as being arranged on the outside of the conventional sash indicated generally at 22. A stop 24 is arranged at the sides and the top of the window opening externally of the conventional sash, and the main or outer frame 26 of the combination sash is set into the opening formed by the exterior part of the window opening 28 and against the stop 24.

As illustrated, the main or outer frame 26 of of the combination sash comprises two rectangular frame parts 30 and 32, the outer part 30 being formed of wood or any other suitable material and being secured to the outside part 28 of the window opening by any suitable means such as screws 34. The inner part 32 of the main frame preferably is formed of metal and by a rolling process, and the section of which may be said to be chair-shaped. The inner part 32 of the main frame includes a pair of flanges 36 and 38 which are seated in a rabbeted-out portion of the outer part 30 of the frame and an inwardly directed flange 40, the inner periphery of which defines an opening which is spanned by the upper and lower sliding glass sash 42 and 44, respectively. The inner part 32 of the main frame is secured to the outer part 30 of the main frame by means of a plurality of screws 46 and in the manner illustrated in Fig. 4. The inner part 32 of the main frame 26 forms a seat for the guides or trackways upon which the upper and lower sash 42 and 44 are slidably supported.

There are two guides or trackways, one arranged on each side of the frame and secured to the inner part 32 of the main frame, as illustrated in Fig. 6. Each of the guides or trackways comprises an upper part or section 48 and a lower part or section 50. The upper part is more or less permanently secured to the main frame 26 by means of several sheet metal screws 52 which clamp the part 48 to the flat side of the inner part 32 of the main frame 26. The lower part 50 of each of the tracks or guideways is constructed and arranged so as to be separable from the main frame independently of the upper part 48. The upper and lower parts 48 and 50 of the guides or trackways are, as illustrated in Fig. 6,

formed and arranged so as to provide continuous tracks 54 and 56 upon which the upper and lower sash 42 and 44 are slidably mounted, respectively. The tracks or guides 54 and 56, as illustrated in Fig. 3, are formed integrally and may be formed by rolling a piece of sheet stock with suitable rolling dies.

While the upper part 48 and lower part 50 of each of the guideways are arranged to provide continuous tracks 54 and 56, it will be observed, by referring to Figs. 5 and 6, that the adjoining ends of the upper and lower parts of the guideways are constructed so that the track 56 for the lower sash, formed by the lower part 50 of the guide, is at least as long as the vertical dimension of the lower sash 44; that the track 54 for the upper sash, formed by the upper part 48 of the guideways, is at least as long as the vertical dimension of the upper sash 42; and that the track 54 for the upper sash, formed by the lower part 50 of the guideways, is not longer than the distance between the bottom of the upper sash in its upper position and the bottom of the opening formed by the horizontal part of the inner part 32 of the frame.

Each of the lower parts 50 of the guideways is held in place by a lug 58 projecting downwardly from the lower end of the lower part 50, which lug is adapted to engage or to be seated in a notch 60 provided in the bottom horizontal part of the main frame adjacent the lower corners and as illustrated in Fig. 5. The lug 58 may comprise a small strip of metal held in place in the space between the walls of the track 56 at the bottom thereof. Between the walls of the track 56 adjacent the upper end of the lower part 50, a bayonet 62 is slidably mounted. The bayonet 62 is adapted to be projected into the slot or space provided between the walls of the track 56 at the lower end of the upper part 48 and, as illustrated in Fig. 5, for the purpose of holding the lower part 50 in alignment with the upper part 48. A slot 64 may be formed in the inside wall of the track 56 so that a suitable pointed tool may engage a notch 66 formed in the end of the bayonet 62 for shifting the same from one of its positions to the other. In the position in which the bayonet 62 is illustrated in Fig. 5, the same is projecting from the upper end of the part 50 and into the slot formed by the walls of the track 56 at the lower end of the upper part 48 and thus is holding the lower part 50 in alignment with the uper part 48, it being understood that the lug 58 previously having been engaged in the notch 60.

When the lower sash 44 is in its upper position, the bayonet 62 may be disengaged from engagement with the upper part 48 by inserting a pointed tool in the notch 66 and moving the tool downwardly until the same engages the lower end of the slot 64. This, of course, must be done in connection with the lower part 50 on each side of the window. Thereafter, the lower sash 44 may be moved down to its lowermost position, leaving the upper sash 42 in its uppermost position. Then, by tilting the lower sash 44 and the lower parts 50, with which the lower sash is now in engagement, inwardly, as illustrated in Fig. 6, and about the notch 60 as a pivot, the upper end of the lower sash and the upper ends of the lower parts 50 of the guideways will be moved out of alignment with the upper part 48 of the guideways. The lower sash 44 may be provided with a handle 68 at each side thereof, for the purpose of manipulating the sash in its guideways.

While in Fig. 6 only the lower part 50 of the right hand guideway is shown tilted inwardly from its operative position, the lower sash 44 and the left hand guideway, looking at Fig. 5, will, of course, occupy the same relative position. After the lower sash 44 and the lower parts 50 of the guideways are in the position illustrated in Fig. 6, then by raising the lower sash 44 slightly, the lugs 58 may be disengaged from the notch 60 and the lower sash 44, and the guideways 50 may then be removed entirely from the main frame by tilting the same in such a way as to bring the bottom edge of the lower sash 44 through the opening of the conventional window 22 first, and of course it will be understood that in order to remove the sash 44 from its frame, the lower sash of the conventional window 22 must be in its uppermost position. The maximum width of the lower sash 44 and its guideways 50 must be less than the distance between the sides of the conventional sash 22 in order that the sash 44 may be moved inwardly through the conventional sash. The upper sash 42 may then be removed from the frame by sliding the upper sash 42 to its lowermost position and removing the same in the manner illustrated in Fig. 8. The upper sash 42 preferably is provided with a handle 70 for manipulating the upper sash 42. The handle 70, referring to Fig. 5, is pivoted to the lower end of the upper sash 42 at the center thereof and as will be explained mored fully hereinafter.

By reversing the process just described, the upper sash may be reinserted in the main frame, and then the lower sash and guideways 50 may be inserted. The upper and lower sash 42 and 44 may be either glazed or screened, the details of which will be explained hereinafter.

Of course, it will be apparent that a glazed sash may be substituted for a screen sash, due to change in seasons, when the lower guideways 50 are removed from the main frame. For example, after the lower sash 44 and the guideways 50 are removed from the main frame, as hereinbefore described, the guideways 50 may be separated from the sash 44, which may be glazed, and inserted in a similar manner in another sash of the same size as sash 44, but which is screened instead of glazed.

The frame of the upper and lower sections 42 and 44 are of the same construction, except that the lower frame is slightly longer than the upper frame, so that when the sash 42 and 44 are arranged so as to span the window opening, as illustrated in Fig. 5, the lower frame will overlap the lower part of the upper frame. The frame of the upper and lower sash may comprise four strips or sections 72 secured together to form a rectangular frame, as will be hereinafter described. Each strip 72 comprises a piece of sheet metal having a generally U-shaped section with a re-entrant U-shaped section 74 formed in the outside thereof. The walls of the U-shaped section or part 74 are shaped to conform with the shape of the tracks 54 and 56 and are of such size relative to the tracks 54 and 56 that there is a frictional engagement between the tracks and the U-shaped part 74 of the sash frame. The ends of the strips 72 preferably are mitered to a 45° angle so as to form a right angle corner (in the case of a rectangular window), and the end surfaces are arranged in abutting relationship, as illustrated, for example, in Fig. 5.

In Fig. 13 there is illustrated an exploded view of a corner of one of the sash frames. The section through the strips 72, as previously explained, is provided with a re-entrant portion 74 which forms two hollow legs 76. In each of the hollow legs 76 a gusset 78 is arranged, the width of the gusset being such as to be frictionally held in place in the legs 76 and as illustrated in Fig. 13. Each of the gussets is provided with a plurality of apertures 80 before being inserted in the legs 76 of the strips 72. After the gussets 78 have been arranged in the ends of the legs 76 and as illustrated in Fig. 13, then the outside walls of the strip 72 overlying the apertures 78 are deformed by embossing so as to force metal from the outside wall of the strip 72 into the apertures 80. This may be done by a punching operation. In this manner the gussets 78 are firmly clamped to the ends of one of the strips 72. Subsequently another strip 72 is arranged so that the legs 76 thereof receive the gussets 78 already secured to the first-mentioned strip 72, and the parts of the metal wall of the second strip 72 are then punched so as to force part of the metal thereof into the apertures 80 formed in the gussets 78 for the purpose of securely clamping or uniting the second strip 72 to the gussets 78, thereby to form part of the frame. The remaining corners of the frame are formed in the same manner except as hereinafter noted.

In the case of the glazed sash 42 and 44, the frame thereof is formed by joining the two sides and one end by the corner construction just defined. Thereafter the sheet of glass 82 may have the edge thereof covered with a U-shaped gasket 84', and the same may be slid into the inside channel of the frame through the open end thereof. Thereafter the remaining strip, which may be the bottom part of the sash frame, having the gussets 78 secured thereto, may be assembled in place, but in this case the portions of the gussets projecting from the end strip are secured to the adjacent ends of the side strips by sheet metal screws 81 rather than by embossing, so as to permit replacement of the glass in the event of breakage. Thus the glazed sash will have two corners on which screws will be used to fasten the gussets 78 to the ends of the side pieces instead of having the same embossed. The foregoing is merely by way of explanation in connection with the assembly of the frame and is illustrated in Fig. 5.

A hook or detent 82', secured to the inside of the main frame 26 at the top thereof may be provided to engage the lower edge of the top strip of the frame of the upper sash 42 for holding the same in its uppermost position. This hook 82' is accessible from the inside of the combination sash and may be disengaged by bending the same away from the upper sash 42.

The lower sash 44 may be provided with a knurled set screw 84 threaded in an opening formed in one side of the frame thereof, the end of said screw 84 being engageable in any one of a series of holes 86 provided in the side of track 56 for locking the sash 42 in any selected position. It is to be understood that the width of the tracks 54 and 56 may be of such size relative to that of the re-entrant part or groove 74 that the friction between the track and its groove may hold the sash in any position in which it is set. The friction between the tracks 54 and 56 and the groove 74 will also be determined by the coefficient of friction between the materials of which these parts are constructed. Preferably, there should be a good close fit between the tracks 54 and 56 and the groove 74, so that the same will function as weatherstripping to seal the sash to the main frame 26, but it may be desirable to rely upon the locking or holding means for the sash previously described, rather than friction, to hold the sash in its various positions.

In Fig. 9 there is illustrated a modified form of guideway which comprises a sheet of relatively thin stainless steel, formed to provide tracks 154 and 156 having, in general, the same cross section as the tracks 54 and 56. The tracks 54 and 56, in addition to being formed integrally in one sheet of metal, it will be observed, are provided with outwardly extending flanges 88 which lie in the same plane as that part 90 of the guideway which connects the two tracks 54 and 56, while the modified construction illustrated in Fig. 9 has no part equivalent to the flanges 88. The walls of tracks 154 and 156 may be made to flare slightly, so that the same will frictionally engage the grooves 155 which are identical to the grooves 74.

The handle 70 is pivotally secured to a pair of brackets 90', which are secured in the grooves 74 of the bottom strip of the upper sash 42. A pair of notches 92, in line with the sides of the handle 70, are formed in the inside leg 76 of the bottom strip 72 of the upper sash frame, so that the handle 70 may swing inwardly, as illustrated in Fig. 8.

The side and end strips 94 and 96 of the main frame may be held together by an angle 98, as illustrated in Fig. 10. The angle 98 comprises flanges 100 and 102, the flange 100 being fitted into the space in the flange 40 of the side and end strips 94 and 96. Flange 100 is provided with a series of holes 104 into which metal from the walls of the flange 40 is forced by embossing, as indicated at 106. The angle 98 forms a gusset which, by embossing, is secured to the strips of the main frame in substantially the same manner in which the gussets 78 are secured to the strips of the glass or screen frame for holding the same in assembled relationship.

Fig. 11, which is a section through a part of the main frame near the corner thereof, clearly illustrates the construction by which the angle 98 is secured to the strips of the main frame and shows one of the embossings in section. A section through one of the embossings of the frame shown in Fig. 13 would correspond to that illustrated in Fig. 11, but of course the section of the frame and the gusset would be different. In the case of the angle 98, the flange 102 thereof, when assembled, seats against the bottom part of the channel of the metal part of the main frame. Figs. 5 and 6 illustrate the actual assembly of the corners of the main frame.

The construction of a screen and the arrangement thereof in the combination sash are illustrated in Figs. 12, 14 and 15. The screen frame may be made up in two parts, as illustrated in Fig. 14, each part comprising an end 112 and a side 110 secured together by the corner construction illustrated in Fig. 13, the free ends of each of the ends 112 having the gussets 78 secured thereto, as illustrated in Fig. 14.

While the invention has been described with some detail, it is to be understood that the description is for the purpose of illustration only and is not definitive of the limits of the inventive idea. The right is reserved to make such changes in the details of construction and ar-

rangement of parts as will fall within the purview of the attached claims.

I claim:

1. Window construction comprising a metal frame having all sections thereof of similar cross-section, and each of said sections being formed to provide a U-shaped channel opening inwardly of said frame having oppositely arranged walls and a reentrant groove in the intermediate part of the U, and means for joining any two sections of said frame together comprising a pair of flat metal plates, each arranged independently in a portion of said channel at the adjacent ends of said sections and between the reentrant portion and a side of the U, said plates being each provided with a series of apertures therein and each of the outside walls of the channel of each of the said sections having integral and unbroken parts thereof projecting into said apertures.

2. Metallic window-corner construction comprising two adjacent abutting identical sash sections which are of a double U cross-section, and wherein the open side of said U's are directed inwardly of the frame, the side thereof constituting the walls of the said section being free of any bent-over edges by which to receive a panel and packing into the portion of said sections which is inward thereof with relation to said frame, a pair of small and substantially identical triangular connecting pieces each having a series of openings therein placed one piece in each U-part of one of said sections outwardly with respect to said frame from the position intended to be occupied by the said panel and packing therefor and extending into a corresponding U-part of the said abutting section, and said sections having portions of their outer sides deformed unbrokenly into said openings in each of said connecting pieces to hold them firmly in position.

3. Window construction comprising: four metal sections of identical cross-section and of substantially U-shaped cross-section wherein the U opens centerwise of said frame and wherein a reentrant groove is located in the intermediate part of the U, each corner of said frame containing a pair of relatively small metal plates each located between the reentrant groove and a side of said U-section to fill completely all of the space therebetween and extending from one section of said frame into an adjoining section, each plate having a plurality of openings therein and adjacent portions of said section being embossed without breaking of the metal of said section into said openings; a panel located within the U of said frame section, at least some of said openings being entirely outwardly of the innermost portion of said reentrant groove and said panel being inwardly of said innermost portion of said reentrant groove.

4. Window frame corner construction comprising: two meeting frame sections wherein each frame section presents a U-shaped cross-section having a reentrant groove located in the intermediate part of the U and each of said U-sections opens inwardly of said frame, a panel located within each U portion inwardly of the innermost portion of said groove and a relatively small metal plate located in one of said sections between said groove and a side of said section to fill completely the space therebetween and of size to extend from said one section into a corresponding portion of the adjoining section; a plurality of openings in said plate located to position at least one of them in each of said sections and to position at least one of them outwardly of the innermost portion of said groove and portions of the adjacent side of each of said sections embossed into said openings.

5. Window frame corner construction comprising: two meeting sections wherein each section presents a substantially U-shaped cross-section having a relatively deep reentrant groove located in the intermediate part of said U and said U-section opens inwardly of said frame and the inner portions of said U are entirely free of any bending; U-shaped packing located within said U-portion inwardly of the innermost portion of said groove, and opening inwardly of said window frame; a panel located within the U-opening of said packing and being of relative thickness with said packing and said frame section to cause said packing to lie tightly against the inner surface of the sides of the U-section; a relatively small metal plate located between said groove and a side of said section to fill completely the space therebetween and lying entirely below said packing and of size to extend from one section into a corresponding portion of the adjoining section; a plurality of openings in said plate located to position at least one of them in each of said sections, and portions of the adjacent sides of each of said sections embossed into said openings.

6. Window frame corner construction comprising: a pair of similar metallic frame sections having the adjoining ends thereof in mitered abutting relationship; the cross section of each of said sections including a pair of U-shaped channels opening inwardly of said frame and having their mutually remote walls extended further inward of the said window frame and without bent-over edges to define a space which is positioned inwardly of said frame from the said U-portions; a panel and associated packing retained in said space by said extended walls; and a relatively small and flat member located in each of said U-portions entirely outwardly with respect to said frame from said panel and associated packing and extending from one section into the adjacent section; means for holding each of said connecting pieces in fixed relationship with said frame section comprising a series of openings in each connecting piece which openings are positioned to face the flat side of each frame section and unbroken portions of said frame sections embossed into said openings.

7. Window frame corner construction comprising two similar metallic frame sections having the adjoining ends thereof in abutting relationship, the cross-section of each of said sections including a pair of U-shaped channels wherein the U of each opens inwardly of said frame and each of said U-sections has closely spaced walls, the ones of which walls comprising the outer walls of the section are entirely free of any bent-over portions in their edges innermost of the window frame; a pair of relatively small triangular connecting pieces positioned one within each of said U-shaped channels to fill completely the space between the walls of each of said channels and extending from one section into the other section and positive means for holding said connecting pieces in fixed relation with said section comprising a series of openings in each of said connecting pieces positioned to face the flat side of each associated frame section and unbroken portions of said frame section embossed into said openings.

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