Nov. 17, 1931. R. A. NORQUIST ET AL 1,832,414

WINDOW SCREEN

Filed Dec. 11, 1929 2 Sheets-Sheet 1

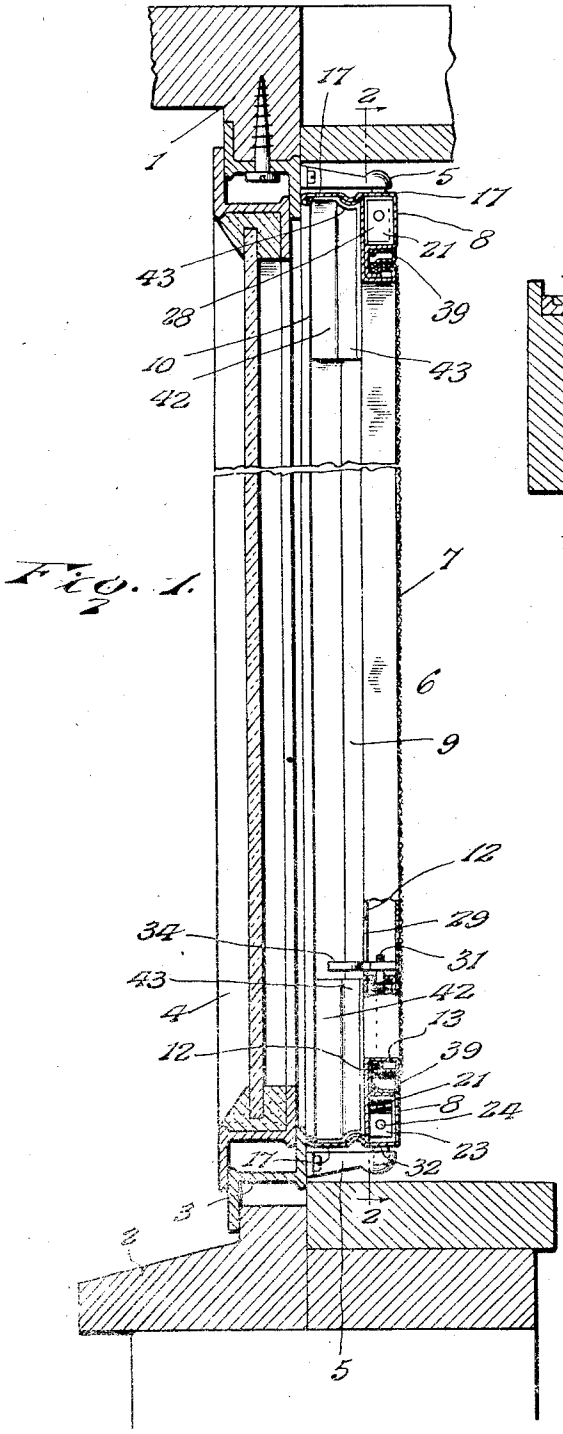


Fig. 1.

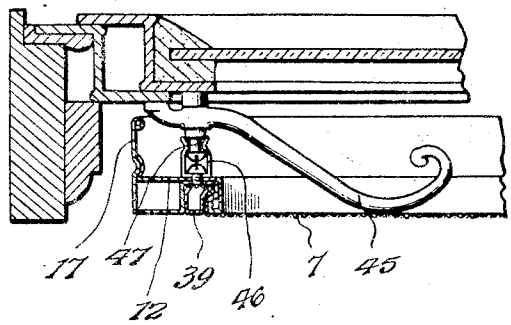


Fig. 6.

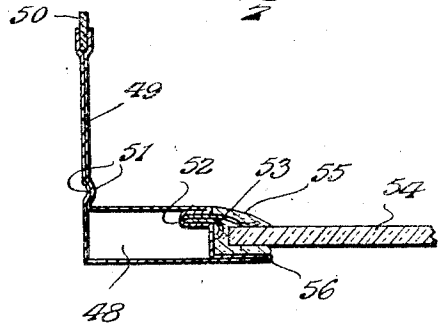


Fig. 7.

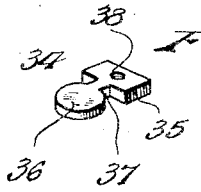


Fig. 8.

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Fig. 2.

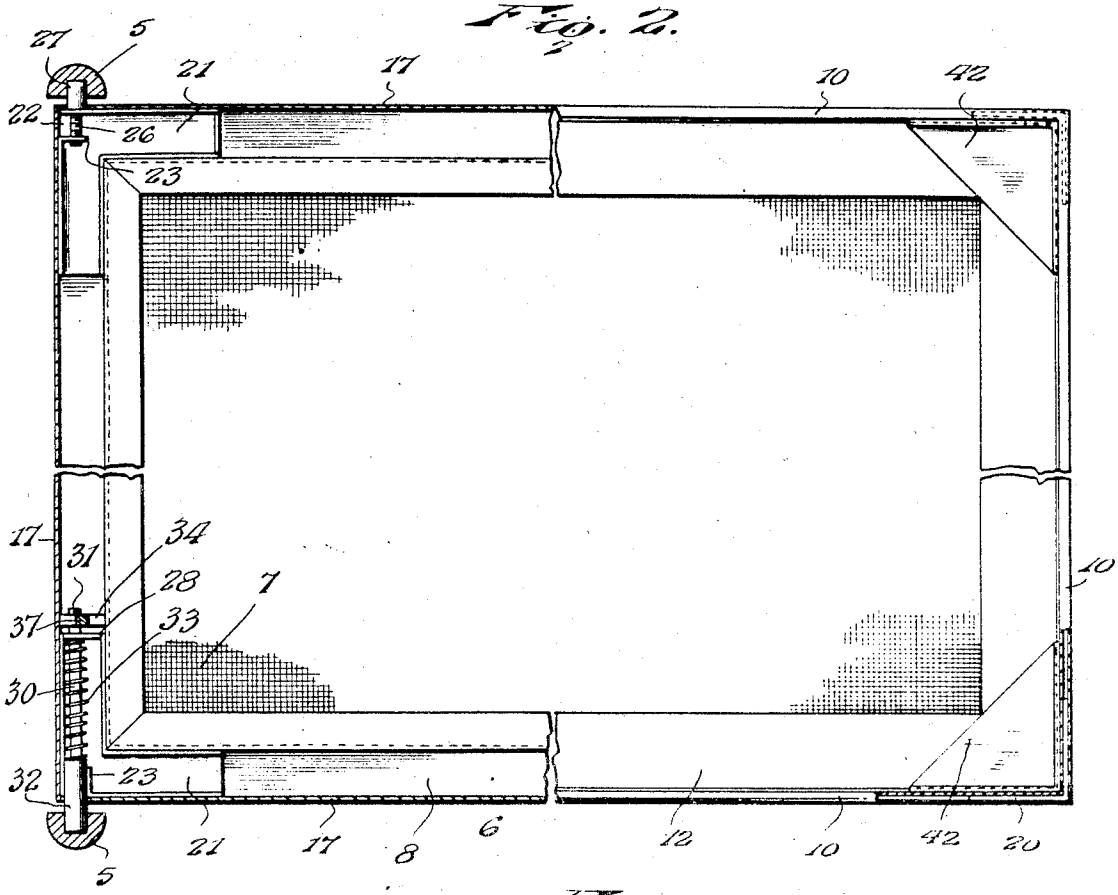


Fig. 5.

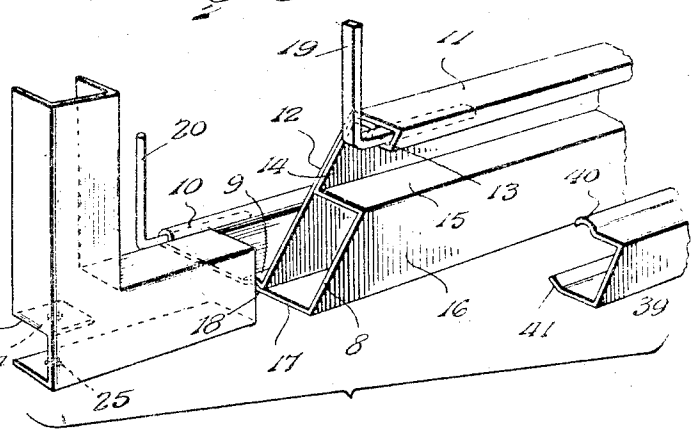


Fig. 3.

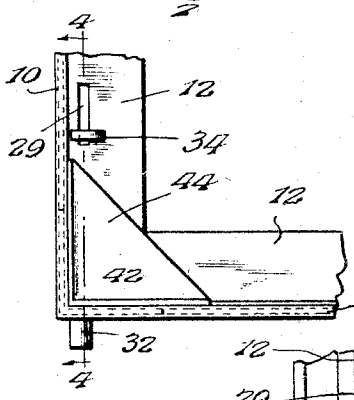
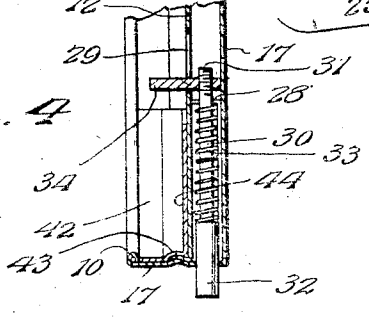


Fig. 4.



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UNITED STATES PATENT OFFICE

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WINDOW SCREEN

Application filed December 11, 1929. Serial No. 413,389.

This invention relates to window screens, more particularly of the swinging type designed for use in connection with casement windows, and the objects are to provide a strong and simply constructed frame which will withstand rough usage and will accommodate hardware employed upon the window, to provide simple and efficient means for reinforcing the frame at the corners of the same and especially around the pivotal points, and to provide novel and efficient pivot mechanism which may be expeditiously assembled with the frame. The invention also includes a novel structure for securing the screen material firmly in place in the frame and also includes means for securing glass in a frame whereby the invention may be applied to storm windows. The invention is illustrated in the accompanying drawings and consists in certain novel features which will be first fully described and then more particularly defined in the appended claims.

In the drawings:

Figure 1 is a vertical section through a window and a screen applied thereto,

Fig. 2 is a sectional elevation, the section being taken on the line 2—2 of Fig. 1,

Fig. 3 is an enlarged elevation of one corner of the screen frame,

Fig. 4 is a section on the line 4—4 of Fig. 3,

Fig. 5 is a detail perspective view showing members of the frame separated but in their proper relative positions,

Fig. 6 is a horizontal section showing means for accommodating the screen to a form of latch which is commonly used upon casement windows,

Fig. 7 is a sectional view illustrating the manner of securing a glass pane within the frame, and

Fig. 8 is a detail of a handle element which is employed in connection with the removable pivot.

In the drawings, the reference numeral 1 indicates the lintel and 2 the sill of a window frame, while 3 indicates the hinge frame and 4 the casement window mounted therein. In carrying out the present invention, there are provided, upon the inner side of the window hinge frame 3, upper and lower brackets 5 to and between which the screen 6 is pivotally mounted. The screen comprises a metallic frame and a sheet of wire netting, indicated at 7, stretched over and secured in the frame. In forming the frame, each frame bar is formed from a sheet metal blank and has its ends mitered, as indicated most clearly at 8 in Fig. 5, each blank being folded into the form illustrated in the drawings. Along one side edge of the material there is formed a bead 9 and the opposite side edge is rolled into a bead 10, the bead 9 being in the form of a grooved lip or flange, as clearly shown. At intermediate points between the bead 10 and lip 9 the material is folded longitudinally so as to provide a transverse web 11, disposed at a right angle to the intermediate side web 12, and to provide at the inner edge of said web 11, a longitudinal tubular portion 13 which is closed on one side by the web 11 and has one side wall so located as to abut said web between the side edges of the same, as clearly shown in Fig. 5. The ply of metal extending from the tube lies close against the web 11 between the tube 13 and the side web 12 and then lies close against the side web 12, as shown at 14, for a portion of the width of the same. From the lower edge of the web 14, the metal is carried outwardly, as at 15, at a right angle to the webs 12 and 14 and then downwardly to form a web 16 parallel with the web 12, this web 16 being integral at its lower edge with the base or side 17 which extends across the edge of the web 12 and terminates in the rolled bead 10 previously mentioned. Intermediate the side edges of the web 17, a ridge 18 is formed therein to extend longitudinally thereof and this ridge is so located that if the grooved lip or flange 9 be engaged by the ridge 18 the webs 12 and 16 will be parallel. We thus provide means for accurately obtaining the desired right angular formation in the lower tubular portion of the frame. After the metal has been stamped or folded into the described form, the lip 9 is permanently united with the ridge 18 by spot welding, brazing or in some similar efficient manner. It will be understood that four frame members or bars of the described

form are employed and that they are brought together at their mitered ends so as to form the stiles and the upper and lower rails of the screen frame. It is to be particularly noted upon reference to Fig. 6 that the web 17 has a width substantially greater than the width of the lower tubular portion of the bar and projects from said tubular portion to the hinge window frame and is adapted to bear against the latter frame so that a well defined space will be provided between the window and the screen to accommodate projecting hardware upon the window.

To reinforce the corners of the screen frame and to provide firm connections therefor, we engage in the tubular portion 13 angle brackets 19 which are right angular bars having their ends adapted to be engaged in said tubular portions 13 of the meeting frame members. These bars will fit closely in the ends of the tubular portions and, consequently, reinforce the same and they will also maintain the meeting bars in the desired right angular relation. Similar light rods or stout wires 20 are engaged in the ends of the beads 10 on meeting frame bars and serve the same functions as the connecting bracing bars 19, as will be understood. We also provide the brackets 21 which are of right angular formation and have their arms engaged in the larger tubular portions defined by the webs 12, 15, 16 and 17 of the meeting frame bars. These brackets 21 are of channel formation and at the outer side of the junction of the two arms of the bracket one wall is cut away, as shown at 22, and a tongue 23 thus defined is struck inwardly from the cut wall, a threaded opening 24 being formed through the tongue. Upon referring to Fig. 2, it will be clearly seen that the tongue 23 is disposed at a right angle to the wall from which it is struck and is, consequently, parallel with the walls of the relatively angular arm. In the outer side wall of the bracket an opening 25 is formed therein alined axially with the opening 24 and when the bracket is disposed at the top of the frame a fixed pivot is engaged in these openings and through an opening provided therefor in the web 17 of the upper rail of the screen frame. As shown in Fig. 2, the upper pivot consists of a screw 26 having an enlarged smooth head 27 adapted to fit rotatably within a socket provided therefor in the upper bracket 5. The screw has its shank inserted through an opening in the top web 17 of the rail and through the opening 25 to be engaged in the threaded opening 24 so that by turning the screw home until the base of its head 27 rests on the uppermost wall of the bracket the screw will be firmly held in place and will constitute the fixed pivot of the screen. When the bracket is inserted at an upper corner of the screen frame, the branch or arm housing the tongue 23 is disposed vertically, as shown, but when the bracket is disposed at a lower corner of the frame the arm housing said tongue is disposed horizontally so that the tongue will stand upright and the space between the tongue and the adjacent side wall of the bracket will be alined with an opening through the bottom web 17 of the lower rail. At that end of the bracket which is uppermost in the lower position of the bracket, there is a web or tongue 28 which is bent to extend across the end of the bracket and through said tongue is an opening alined with the space between the tongue 23 and the adjacent side wall of the bracket, while in the web 12 of the frame immediately above said cross web 28 a longitudinal slot 29 is formed, as shown in Figs. 3 and 4. The lower pivot consists of a somewhat elongated pin or rod 30 having a threaded inner end 31 and having an enlarged head 32 at its outer end, said head 32 being disposed between the tongue 23 and the adjacent side wall and passing through the opening in the bottom web 17. An expansion spring 33 is disposed around the pin or rod 30 between the head 32 thereof and the web 28 and yieldably holds the head 32 in its lowered position in which it will rotatably engage in a socket provided therefor in the lower bracket 5. In assembling these parts, the pin or rod with the spring disposed around it are inserted upwardly through the opening in the bottom web 17 and through the opening provided therefor in the web 28 so that the threaded end of the pin or rod will be visible through the slot 29. A handle member 34 is engaged with the threaded end 31 and extends through the slot 29 so that the pivot may be easily raised against the tension of the spring 33 when the screen is to be mounted for use or is to be removed for storage or repair. This handle member, as shown most clearly in Fig. 8, is a plate having a rectangular form at one end 35 and preferably having a disk-like form 36 at its opposite end, the two end portions being connected by a reduced neck 37. The rectangular end portion 35 has a central threaded opening 38 therethrough which is adapted to be engaged by the threaded end 31 of the pivot rod. The width of the handle member is such that it may be inserted through the slot 29 if the end 35 thereof be disposed longitudinally of the slot, as will be understood. After the end 35 has been pushed through the slot, it may be given a quarter turn so as to extend at right angles to the slot with the neck 37 engaged in the slot, whereupon the handle member cannot be drawn through the slot but may slide within the frame bar. In this position the end of the pivot rod may be easily engaged in the opening 38 and threaded therethrough so that the handle member will be firmly attached to the pivot. It will be readily noted that the brackets

21 may be disposed at any corner of the frame and may be arranged to accommodate the fixed pivot or the movable pivot, as the case may be, and, consequently, it is not necessary to provide different brackets for the separate corners.

The netting 7 is disposed over the frame bars with its edges disposed within the grooves or keyways defined by and provided between the tubular member 13 and the web 15, it being understood that the several frame bars are firmly united at their mitered ends by welding, brazing or otherwise. After the netting has been disposed over the frame, a key or spline 39 is inserted in the groove defined by the tubular portion 13 and the webs 14 and 15 and this spline or key, as shown clearly in Fig. 5, is a sheet metal channel bar having one side wall formed with a grooved lip 40 along its longitudinal free edge, and the other side wall has its free edge bent somewhat inwardly, as shown at 41. The key may thus be easily engaged within the frame bar so as to draw the netting taut and smooth and firmly secure it in the taut condition. The grooved lip 40 is intended to rest within the grooved portion provided between the tube 13 and the web 14, and, to be engaged therein, the key is slightly rocked so that the projecting lip may clear the inner or lower wall of the tubular member 13, as will be understood. The inward band 41 of the opposite side wall of the key will accommodate this canting or rocking of the key so that the desired binding engagement between the counterpart grooved elements may be easily effected and when the parts are assembled the netting will be firmly clamped between the inner portion of the key and the opposed webs or walls of the frame bar, as will be understood upon reference to Figs. 1 and 6. The outer surface of the key will lie flush with the corresponding surfaces of the tubular portion 13 and the web 16 of the frame bar so that a smooth frame will be produced and there will be no projections liable to catch in the clothing of persons manipulating or standing near the window and the frame is not apt to be distorted by chance blows.

To further reinforce the frame, we provide corner braces 42 which are right angular brackets having their side webs formed with grooved ridges 43 conforming to and adapted to engage over the lips 9 of the frame bars and be secured thereto by spot welding or other means. These corner brackets also have a connecting plate 44 which is intended to rest against the webs 12 of the frame bars and bridge the joint between them, as will be understood upon reference to Figs. 2 and 3. We thus reinforce the corners of the screen frame and guard against separation of the same in a highly efficient manner.

It sometimes happens that the latch employed upon the casement window projects therefrom to such an extent that it will not be accommodated within the recess or chamber defined by the webs 17 of the screen frame, as is the case with the latch handle 45 illustrated in Fig. 6. In this event, in order to prevent the latch handle bearing against the netting 7 so as to break the same, we provide a resilient clasp 46 which is secured upon the web 12 of the screen frame and presented toward the window, and we also provide a headed stud 47 which is to be secured upon the pivot or other convenient point of the latch or upon the casement or window frame so that it will be engaged by the resilient clasps, as clearly shown. The engagement of the clasp with the stud will prevent the screen swinging into its fully closed position and will support the screen slightly out of contact with the window frame. This is not objectionable, however, inasmuch as unless the window is closed the latch handle 45 will not offer an obstruction to the closing of the screen and, consequently, the entrance of insects into the room will be prevented and the full closing of the screen is not necessary. When the window is opened, the latch will be carried outwardly with the window and the screen may then be closed to its fullest extent. In this connection, it may be noted that the spring 33 around the movable pivot may be utilized not only as an expansion spring to yieldably hold the pivot in its operative position but may be also utilized as a torsion spring to tend constantly to hold the screen in its closed position.

The basic principle of our screen may be utilized in the construction of storm windows, as shown in Fig. 7, in which the frame for the storm window is shown as consisting of a sheet metal blank folded or stamped to provide the tubular portion 48 and the extension or side wing 49 which corresponds to the web 17 of the previously described construction. The edges of the two plies constituting the extension 49 are spread apart so as to clasp a strip 50 of felt or other material which will effect tight engagement with the window frame and exclude drafts. The two plies of the extension 49 are formed with grooved ridges 51 which mate in the same manner that the lip 9 and the ridge 18 mate and thereby maintain the desired parallelism between the walls of the tubular portion 48. The edge portion of the tubular member 48 has a fold 52 formed therein providing a groove or channel within which may be engaged spring retainers 53 adapted to bear against the pane 54 and maintain the same in the proper position relative to the frame, putty 55 being disposed around the edges of the pane 54 and the spring retainers so as to form the desired water-tight and air-tight joint around the edge of the pane. The pane will thus be securely fastened in place, and the inner side portion of the frame bar is provided with the

extended lip 56 which covers the inner portion of the putty 55 and thereby attains a neat finish for the inner portion of the frame. It will be understood that this storm window is mounted in the same manner that the screen frame is mounted and the extension 49 upon the four sides of the frame defines a chamber or space within which the hardware upon the casement window may be housed.

Having thus described the invention, we claim:

1. A screen frame provided with means at one end for pivotally mounting the same and provided upon its outer face with integral lateral extensions adapted to bear against the inner side of a casement window frame and thereby define a chamber for housing hardware upon a window.

2. A window screen frame bar formed from a single sheet metal blank and defining an inner tubular portion and an outer tubular portion with a longitudinal keyway between said tubular portions, one edge portion of the blank constituting one wall of the outer tubular portion and the opposite edge portion of the blank extending across the first-mentioned edge portion at a right angle thereto, said edge portions being provided with cooperating ridges which are permanently secured together, and a key engageable in the keyway to secure screen material therein.

3. A window screen frame bar formed from a single integral blank and having inner and outer tubular portions with an intermediate longitudinal keyway, the edge portions of the blank being disposed at a right angle to each other and one edge portion having a bead formed thereon and the other edge portion having a grooved lip extending therealong and adapted to rest on said bead formed in the intersecting edge portion.

4. In a window screen, the combination of a frame bar having a longitudinal keyway formed therein, said keyway having side walls and a connecting wall at right angles to said side walls and provided with a projecting portion along the free edge of one side wall, and a key engageable in the keyway to secure the edge of screen material therein, said key having a ridge along the free edge of one side adapted to engage behind the projecting portion on the keyway and having an inwardly bent edge on its opposite side whereby to accommodate canting of the key when the latter is being engaged in the keyway.

5. A window screen comprising frame bars each having inner and outer side members, a web integral with the inner side member and disposed at right angles to said members and projecting laterally beyond the outer side member, and intermediate folded portions defining a screen-receiving groove, the outer side member being parallel with the inner side member and having a grooved lip along its edge on its outer face and the laterally extending web having a rib seating in said lip whereby to insure proper location of the parts.

In testimony whereof we affix our signatures.

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