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WINDOW SCREEN

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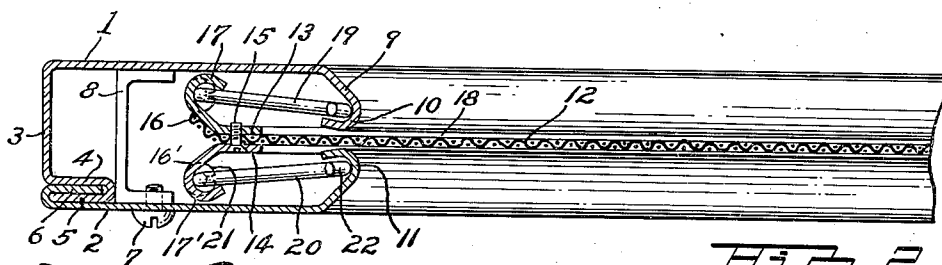


FIG. 2.

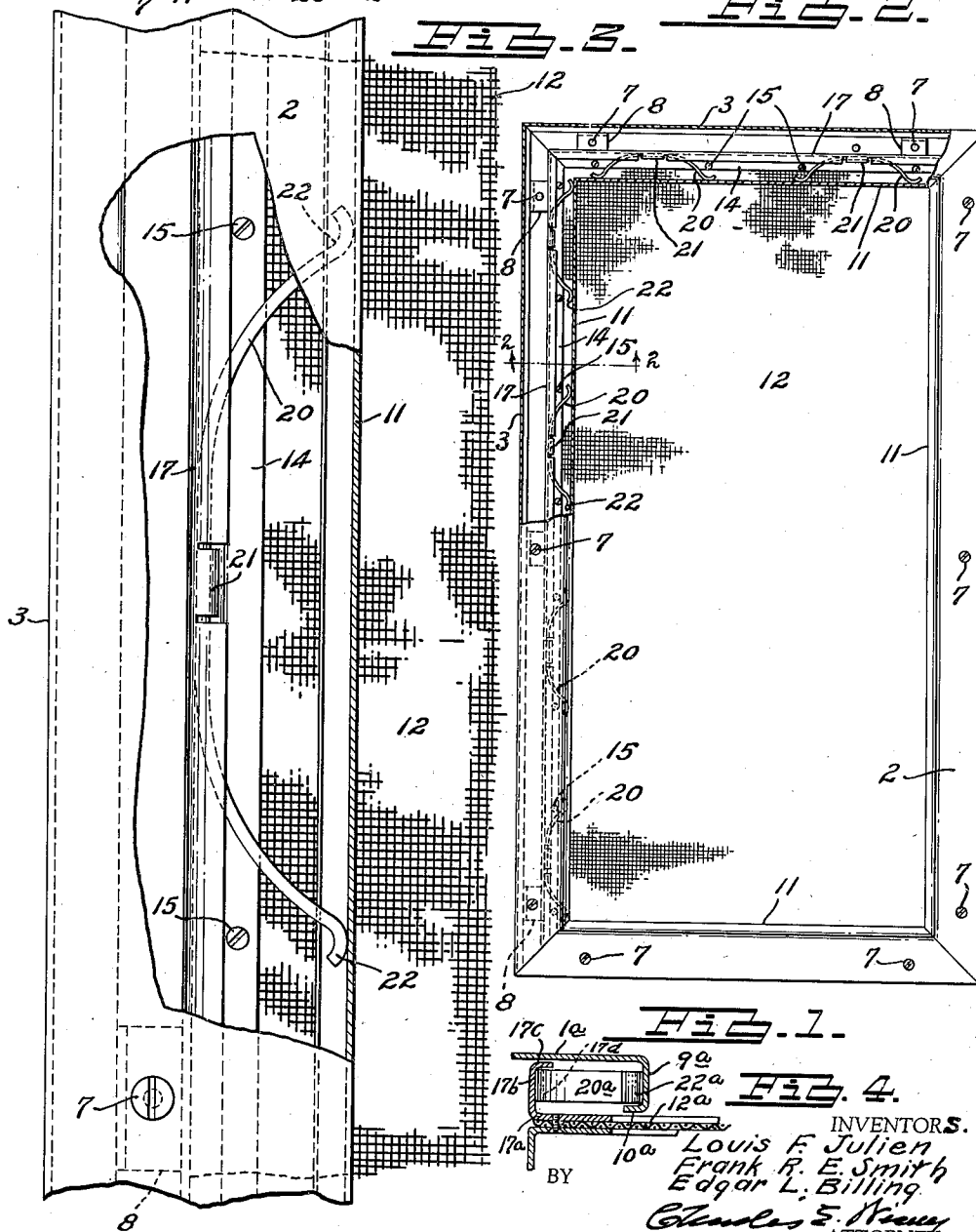


FIG. 1.

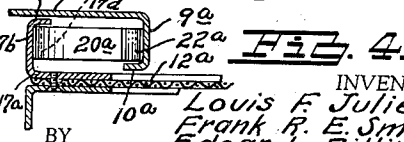


FIG. 4.

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WINDOW SCREEN

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8 Claims. (Cl. 156—14)

This invention relates to window screens for use in buildings and ordinarily utilized to prevent ingress of dirt and insects and an object of the invention is to provide a wire screen in which the fabric is maintained taut under the usual conditions of expansion and contraction through variations in temperature and to yield to pressure applied to the fabric.

A further feature and object of the invention is to provide a hollow sheet metal frame having end and side rails and an opening formed between the inner edges of the rails through which the fabric projects and a tensioning means in each of the rails which includes a light sheet metal frame element attached to the screen edge on all four sides and unattached one to the other. A portion of each of the frame elements on each of the opposite sides of the screen ride in sliding contact with the inner walls of the respective rail, and spring means is provided between the said frame elements and rails for maintaining the wire fabric under tension.

It is also an object and feature of the invention to provide said frame elements attached to the screen edge and lying within the channel of each of the sash rails with reversely bent edges to provide recesses which, in association with opposed recesses formed at the inner edge of the screen rail between which the fabric passes, provide seats for elliptical or bow springs so that in the assembled parts the said bow springs are all under compression tending to stretch the fabric.

It is also an object and feature of the invention to provide rails of separable sheet metal parts providing for replacement of a mutilated screen or repair of other parts of structure.

These and other objects and features of the invention are hereinafter more fully described and claimed and the preferred form of a structure embodying my invention is shown in the accompanying drawing in which—

Fig. 1 is an elevation showing my improved screen.

Fig. 2 is an enlarged section taken on line 2—2 of Fig. 1.

Fig. 3 is an enlarged elevation partially in section showing more particularly the mounting of the spring elements therein.

Fig. 4 is a section showing an alternative form of spring and mounting.

Screens having fabric under tension have been known heretofore but in many instances the frame is either adjustable to stretch the screen or tensioning devices provided consisting of a number of separable parts all of which tend to in-

crease the cost of the screen. In my improved screen structure the number of parts required are reduced to a minimum and are of the simplest form in that a simple half elliptical wire spring member is utilized at various points between the screen edges and the outer frame and the metal elements attached to the screen each form a guiding means therefor. My improved construction will be more fully understood from the following description.

The screen frame is of sheet metal formed of two separable parts 1 and 2 and these elements for each of the four sides of the screen are mitered at the ends to form a rectangular frame as shown in Fig. 1. As shown more clearly in Fig. 2, the part 1 of each rail forming the frame has an outer portion 3 at a right angle thereto which forms the outer periphery of the frame and this member 3 is formed with an inturned portion 4 and an out-turned portion 5 in spaced relation therewith to form a recess for the inturned edge 6 of the removable member 2.

Incidentally the member 2 especially in psychiatric hospitals and asylums is on the outer side of the screen to prevent inmates from tampering with the screws 7 which retains a sheet metal reinforcing block 8 in place, the opposite side flanges of which engage the inner faces of the elements 1 and 2 of each rail. The inner edges of both the elements 1 and 2 which form each rail of the frame have the edges inbent as at 9 and then return bent to form a U-channel as at 10 and the inner face of the channel 10 of the member 1 is spaced from the inner face of the similar channel 11 of the member 2 providing an opening through which the screen fabric 12 extends.

The members 1 of each rail of the frame are welded together at the mitered joints but the members 2 of each rail are not so welded but are independently movable outwardly in the plane of the screen member to permit the same to be withdrawn from assembled relation with the part 1, the spring elements 20, as hereinafter described, permitting such movement under the necessary pressure.

Removal of the elements 2, which are all on one side of the screen frame, permits introduction or removal of the screen and the frame elements attached to the edges thereof.

Each of the four edges of the screen fabric have sheet metal strips 13 and 14 secured thereto as by means of screws 15 and these strips 13 and 14 extend the full length of each of the four sides of the fabric thereby securely clamping the

same between the strips 13 and 14. These strips on each of the four edges of the screen in the rectangular form here shown remain open and are spaced at the corners. Therefore, the tension of the springs is applied directly to the fabric and the screen fabric may flex under pressure there-against without causing the strips to engage at the corners.

The two strips of each rail each have an out-turned portion 16 and 16' and inbent portions 17 and 17' respectively providing channels corresponding to the channels 10 and 11 of the frame elements 1 and 2. The portions 17 and 17' of the two marginal strips 13 and 14 practically ride in contact with the inner faces of the sash elements 1 and 2 and thus center the fabric in the throat or opening 18 between the out-turned portions 10 and 11 which are spaced sufficient distance apart to prevent the screen from normally riding in contact therewith. Under this condition any pressure that may be applied to the fabric 12 either from the exterior or the interior of the screen simply compresses the elliptical wire springs 19 and 20 which ride between the U-channels formed by the parts 10 and 11 and 17 and 17'. These spring elements are shown in elevation in Fig. 3 and are secured in place at the center by slitting the inturned flange 17 or 17' to provide a portion 21 that may be clamped inwardly about the spring as will be understood from Figs. 1 and 3. The terminal ends of the bow springs are out-bent as at 22 to contact the wall of the channels 10 or 11 as the case may be and by contraction or expansion of the screen fabric or by pressure applied thereto at an angle to its plane these terminal end portions 22 may ride in the seats provided therefor by the channels.

By providing the members 13 and 14 on the screen edge with portions 17 and 17' in opposed relation and sliding engagement with the respective inner faces of the opposite side walls of the members 1 and 2, there is a freedom of movement of the screen 12 in the sash rail and the parts do not bind and the tension on the screen fabric is always in a plane parallel with the plane of the fabric. This is true even though the sash rail elements may become somewhat distorted so that one or the other of the sash rails is out of true alignment with an opposite rail.

There are a number of springs 19 and 20 in each of the rails forming the frame and in an ordinary window frame they are usually placed on about eight inch centers with the spring elements of about six inches in length between the inner points 22 thereof riding the inner channels 10 and 11. There are a number of reinforcing members 8 as will be understood from Fig. 1 where the retaining screws 7 are shown on the respective side rails. The purpose of these is to support the sheet metal side walls 1 and 2 of the respective sash rails.

A screen constructed according to the invention as herein described is useable in many different characters of buildings where openings are required to be screened and are of long life particularly in view of the fact that the edge of the screen, which is often attached directly to the frame in common practice, is in my improved construction housed within the frame and thus protected from weather conditions.

The fabric will also remain taut and presents a much neater appearance than the old type of screens where the fabric is fixedly attached to the frame and after a period of use tends to sag due

to expansion of the wires. The screen is further very serviceable in hospitals and asylums, particularly psychiatric hospitals, where inmates destroy screens in various ways if there is any portion thereof that they can get hold of. In the improved screen herein described, the face of the screen toward the interior of the building is the upper side of Fig. 2 and it will be noted that there are no portions that an inmate could get hold of as the fastening for the screen fabric is housed and the screen is sufficiently flexible as to prevent their breaking it by pressure and for this particular purpose the wires are also of greater tensile strength than may be required for other character of installations for which it is adapted. Due to the form of the spring element here shown they may slide on the respective rails and thus the fabric will become centered in the frame under a substantially equal tension on all sides even though some of the spring elements be slightly more flexible than others.

In Fig. 4 is shown an alternative form of spring and mounting therefor. With this arrangement the outer side frame 1a is of sheet metal corresponding in that respect to the frame member 1 shown in Fig. 2. This member, however, has an inturned portion 9a at a right angle to the body of the element 1a and the end thereof is inturned as indicated at 10a. The frame portion 17a attached to the edge of the screen fabric 12a has an end portion 17b provided with an inturned edge 17c in opposed relation with the portion 9a of the member 1a. The portion 17c has a part indicated at 17d inturned to secure a flat bow spring 20a thereto.

This spring 20a is of bow shape corresponding to the spring element 20 shown in Fig. 3 and has an inturned end portion 22a seating against the inner face of the portion 9a of the member 1a. In this arrangement of parts there are two such springs 20a arranged in the same relation on opposite sides of the screen fabric and respectively corresponding to the springs 19 and 20 of Fig. 2. This alternative arrangement of parts results in the same functional relationship as the similar parts of Fig. 2.

The screen structure herein disclosed is particularly useful in screening openings in psychiatric hospitals and asylums and a major purpose is to provide a screen of such structural strength as to prevent the inmates from breaking the screen fabric or other elements of the structure to thereby effect an exit from the hospital. Thus the window bars commonly used may be dispensed with and with our improved screen in place the appearance is that of an ordinary screened window and the inmates do not get the impression that they are confined as in a jail.

From the foregoing description it will be evident that my improved screen and frame therefor is of simple and comparatively inexpensive construction, that the tensioning means which includes the springs and the seats therefor on the members 13 and 14 attached to the screen and the members 10 and 11 provided at the inner edge of the opposed side walls 1 and 2 of the rail, that the spring elements there-between are so associated that tension is always on lines parallel to the plane of the screen, and that the various objects and features of the invention are attained by the structure described.

Having thus fully described the invention, its utility and mode of operation, what is claimed and desired to be secured by Letters Patent of the United States is—

1. A window screen comprising a rectangular frame, each of the rails thereof being formed to provide a recess longitudinally of the rails and having a narrow opening peripherally of the interior of the frame, a wire mesh screen of rectangular form having the edge thereof on each side extending through the opening into the recess of the respective rail, a pair of strips attached to each of the edges of the screen fabric on opposite sides thereof and positioned in the recess of the respective rail, the said pair of strips being spaced at the corners of the fabric, said screen strips each having a portion projecting outwardly from the respective side of the screen fabric and each of the rails having a portion thereof adjacent the opening on each side of the screen fabric opposed to said projecting portion of the respective strips, and spring means in the said recesses of each of the rails between the said projecting portion of each strip and the respective opposed portion of the rails placed under compression by the positioning of the screen and strips thereon in position thereby maintaining the screen fabric under tension.

2. A window screen comprising a rectangular frame, each of the rails thereof being formed of sheet metal shaped to provide a recess longitudinally thereof and with the edges of the metal at the inner edge of the rail in opposed spaced relation, a wire screen of rectangular form having each of the side edges thereof extending through the opening and into the recess of the respective rail, the said spaced edges of each of the rails being inturned to provide a rounded surface adjacent the respective opposite sides of the screen, a strip attached to each edge of the screen and positioned in the recesses of the respective rails, said strips being unconnected one to the other and each strip having portions thereof projecting outwardly from the opposite side faces of the screen element, and a series of springs in the recesses of each of the rails on each side of the screen and extending between the projecting portion of the screen strip and the respective portion of the rail adjacent the opening therein, said springs being under compression in the assembled relationship of parts to thereby maintain the screen fabric under tension.

3. A window screen comprising a rectangular frame, each of the rails thereof being formed to provide a longitudinal recess and the inner edges of the rails having a longitudinal slot providing an opening to the recess of less width transversely of the rail than the recess, a wire screen of rectangular form having the edges thereof extending through the slot of the respective rail and into the recess thereof, a strip attached to each of the edges of the screen and positioned in the recess of the respective rail, the strips being unconnected one with the other and each strip on the screen edges having portions projecting substantially equidistantly from opposite faces of the wire screen to slidable engagement with the opposite inner faces of the side walls of the respective recess, spring elements on each side of the wire screen element each extending between the projecting portion of the strip on the respective side of the screen and the wall of the recess adjacent the opening and maintaining the screen under tension.

4. A window screen comprising a rectangular frame, each of the rails thereof being formed to provide a longitudinal recess and the inner edges of the rails having a slot providing an opening to the recess of less width transversely

of the rail than the recess and of the same length, a wire screen of rectangular form having the edges thereof extending through the slot of the respective rail and into the recess thereof, a strip attached to each of the edges of the screen and positioned in the recess of the respective rail, the said strips on the screen edges being unconnected one with the other and having portions projecting substantially equidistantly from opposite faces of the wire screen to slidable engagement with the opposite inner faces of the side walls of the recess, spring means on each side of the wire screen element extending between the projecting portion of the strip on the respective side and the inner wall of the recess adjacent the opening tending to place the screen under tension, one side face of each of the rails being removable to permit introduction of the screen strips and springs to place in the rails.

5. A window screen comprising a rectangular frame, each of the rails thereof being formed to provide a recess longitudinally thereof with a narrow opening about the periphery of the interior of the frame, a wire mesh screen of rectangular form having the edge thereof on each side extending through the opening into the recess of the respective rail, a strip attached to each edge of the screen and positioned in the recess of the respective rail, the said strips being unconnected one with the other and having portions thereof on each side of the screen extending transversely of the screen and provided with an inturned edge adjacent the respective side walls of the recess, the wall of the recess at the opening being inturned, and bow springs on each side of the screen portion within the recess each having its center attached to one of the inturned portions of the strip on its side of the screen and the ends thereof seating in the inturned portion of the recess wall on the same side of the screen, the said spring elements on each side of the screen lying at a like angle to the plane of the screen in opposed relation whereby the tension applied to the screen is maintained on lines parallel to the plane of the screen.

6. A window screen comprising a rectangular frame, the several rails of which are formed to provide a longitudinal recess with a slot opening thereto facing the opposite parallel rail, a wire mesh screen of rectangular form having its edges extending through the openings into the recess of the respective rails, a strip attached to each edge of the screen providing an abutment in the recess on each side of the screen, the wall of the recess on each side of the said opening of each rail providing an abutment, said strips being unconnected one with the other and spring means on each side of the screen between the respective abutments on the same side of the screen for maintaining the screen fabric taut.

7. A window screen comprising a rectangular frame, the several rails of which are formed to provide a longitudinal recess with a slot opening thereto facing the opposite parallel rail, a wire mesh screen of rectangular form having its edges extending through the openings into the recess of the respective rails, a strip attached to each edge of the screen providing an abutment in the recess on each side of the screen, the wall of the recess on each side of the said opening of each rail providing an abutment, said strips being unconnected one with the other, and a series of half elliptic springs on each side of the wire screen in each rail positioned between the abutments on

each side of the screen fabric and placed under pressure in the positioning of the screen frame in place to thereby maintain the screen fabric taut, one wall of each rail being removable to permit the positioning of the screen with the abutments thereon in the respective rails.

8. A window screen comprising a rectangular frame, each of the rails thereof being formed to provide a longitudinal recess having an opening through the inner edge of the rail, a wire mesh screen of rectangular form having the edges thereof extending through the opening of the respective rail into the recess, a strip on each of the edges of the screen within the recess of the respective rail, said strips being unconnected one with the other and each being of a form to provide an abutment on each side of the screen

fabric, the wall of each rail at each side of the opening to the recess therein being shaped to provide an abutment on each side of the screen opposed to the respective abutments provided by the strip, and a series of spring elements on each side of each edge of the screen between the abutments on the strip and the respective abutment on the frame, said spring elements on opposite sides of each edge of the screen lying at a like angle to the plane of the screen in opposed relation whereby the tension normally applied to the screen thereby is maintained on a line parallel with the plane of the screen.

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