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3,277,952

TRAVERSE SCREEN CONSTRUCTION

Filed Jan. 8, 1964

3 Sheets-Sheet 1

Fig. 1.

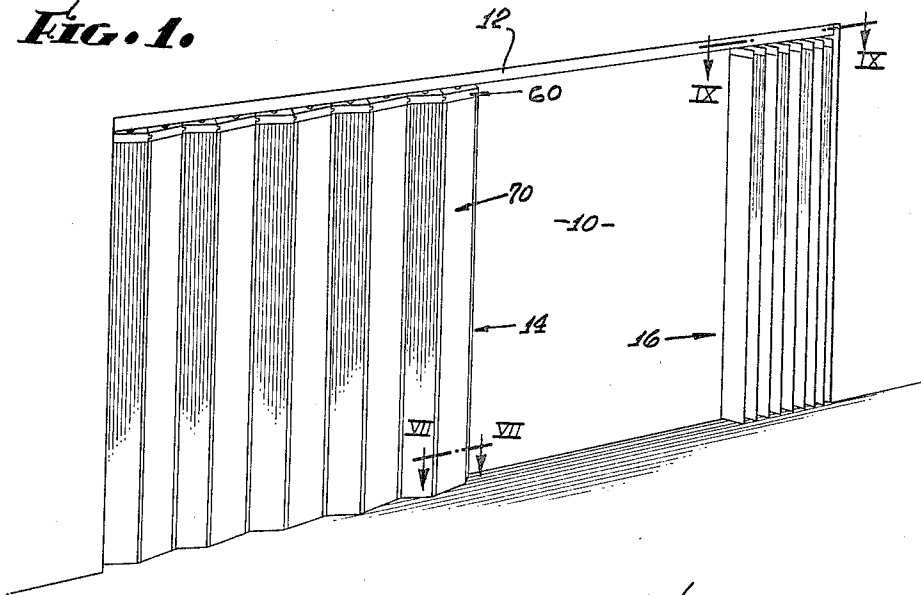


Fig. 2.

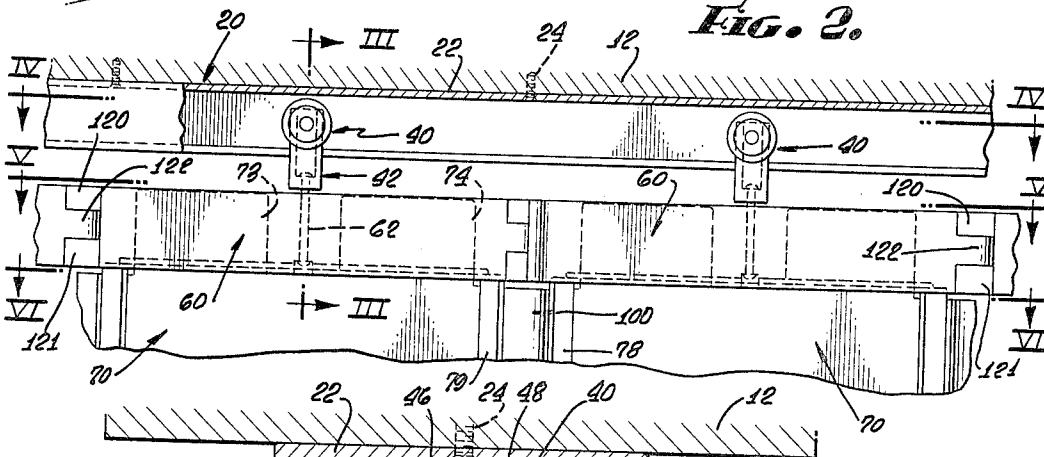
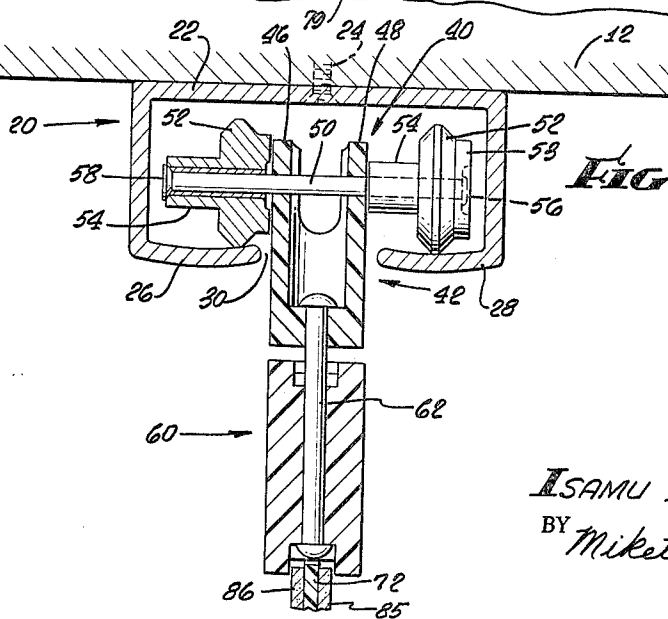


Fig. 3.



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FIG. 4.

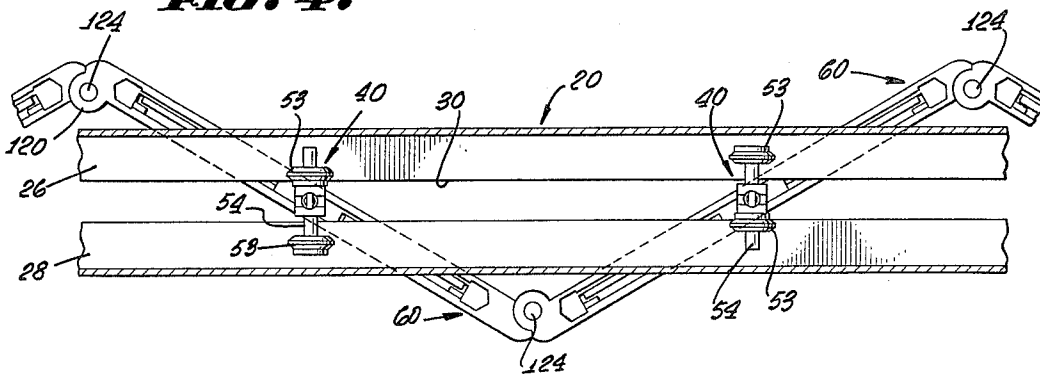


FIG. 5.

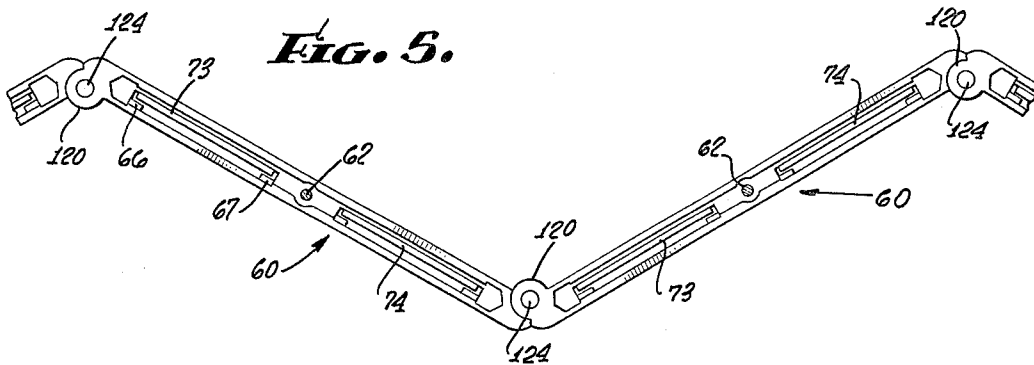


FIG. 6.

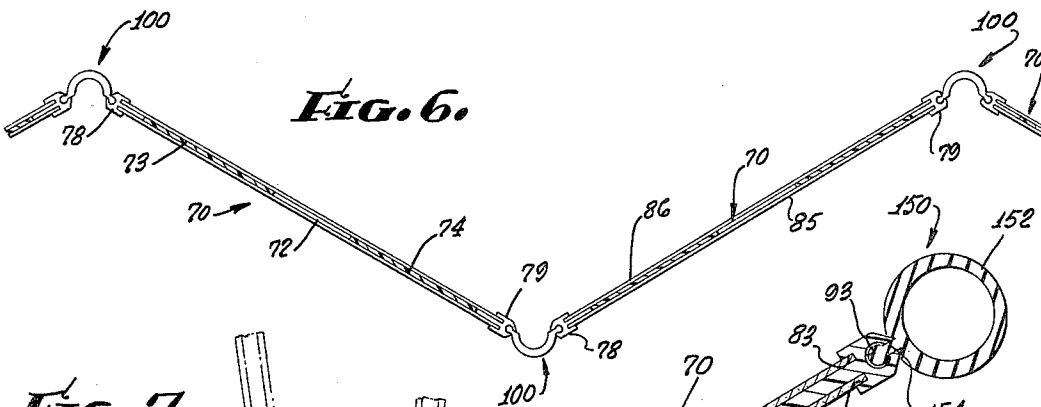
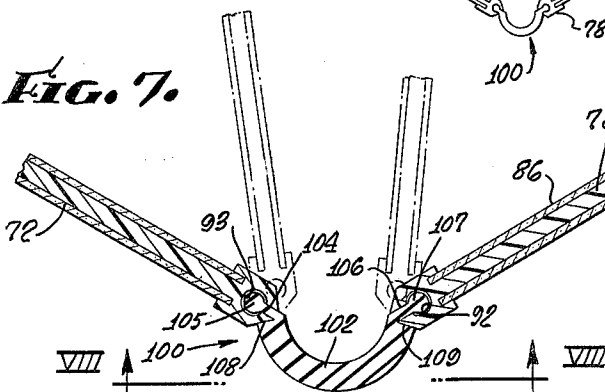


FIG. 7.



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TRAVERSE SCREEN CONSTRUCTION

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10 Claims. (Cl. 160—199)

The present invention relates generally to foldable screens for openings such as doors, windows and the like, including a number of hingedly connected panels each supported by a carrier arm movable along overhead traverse rail means, and more particularly describes such a construction by which to permit easy and rapid assembly and disassembly of the panels from each other and from their supporting carrier arms, the panels also permitting convenient change of decorative elements thereon as may be desired by the user from time to time.

In accordance with a preferred form of the invention hereinafter described and illustrated in detail, there is provided a plurality of elongated, vertically extending panels adapted to be unfolded in zig-zag relationship outwardly into operative screening position, or to be traversed into retracted, compact relation with adjacent panels lying in substantially parallel planes. Each panel is suspended from an overhead track or rail by means of a carrier arm having a roller assembly rotatably connected thereto, and vertically extending hinge means are provided for hingedly interconnecting adjacent panels. Each hinge is desirably in the form of a longitudinally extending body such as an extrusion having a length substantially equal to that of the vertical height of the panels and including flexible web portions terminating outwardly in enlarged anchors slidably received in vertically extending bores formed in marginal portions of each panel. During movement from one position to the other of the completed articulated panel, the flexible portions of the hinge, made of rubber or similar material, serve to permit the relative pivotal movement between adjacent panels. Adjacent carrier arms are pivotally connected to each other for swinging movement about axes in vertical alignment with the panel hinges.

Each of the panels is desirably formed with inwardly facing grooves along its vertical side edges whereby to receive marginal portions of decorative inserts as desired by the user. Each of the panels, moreover, is formed to provide, preferably integrally, upwardly extending apertured support ears for detachable connection to its overhead carrier arm for support by the latter, whereby the panel may be withdrawn from the support carrier arm in order, for example, to facilitate the change of a decorative insert carried by the panel to replace a damaged panel or for other reasons. The longitudinally extending hinge elements between adjacent panels provide a smoothly curved external surface, enhancing the appearance of the completed installation.

Accordingly, it is a principal object of the present invention to disclose and provide novel improvements in traverse screens. Other objects and purposes are to provide, in such a construction, a plurality of vertically extending panels, each hingedly interconnected to an adjacent panel by inexpensive hinge members; to provide in said panels integrally formed outwardly directed longitudinal slots communicating with enlarged longitudinal bores for slidably receiving correspondingly shaped portions of said hinge members; to provide in such a construction panels having grooves extending along their vertical edges whereby to permit the user to insert ornamental sheet elements within the grooves so that the decorative motif may be changed at will; to provide in such a construction panels having integrally formed upwardly projecting support ears for detachable attachment

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to a carrier arm; to provide in such a construction roller means for the carrier arms permitting very compact stacking when the screen is in retracted position; and for other and additional purposes as will be understood from the following description of a preferred embodiment of the invention, taken in connection with the accompanying drawings in which:

FIG. 1 is a perspective view of a window opening or the like in front of which are mounted screens in accordance with the present invention; the screen at the left is shown in extended or screening position; the screen at the right is shown in almost completely retracted position.

FIG. 2 is a fragmentary vertical sectional view through the center of the overhead track and showing, in elevation, fragmentary upper portions of two adjacent hingedly connected panels of the screen and their pivotally connected supporting carrier arms and roller assemblies.

FIG. 3 is a vertical sectional view on an enlarged scale taken on arrows III—III of FIG. 2, one of the rollers being shown in elevation.

FIGS. 4, 5 and 6 are views looking downwardly on the arrows IV—IV, V—V and VI—VI respectively of FIG. 2.

FIG. 7 is a fragmentary sectional view taken on arrows VII—VII of FIG. 1, showing in solid lines the position of adjacent panels as seen in FIG. 1, and in dotted outline, the position of such panels and their interconnecting hinge when the screen is retracted so that the panels are in adjacent substantially parallel relation.

FIG. 8 is a fragmentary view at the bottom of the screen, taken on the arrows VIII—VIII of FIG. 7, with a lower corner portion of the left panel broken away to show one form of wedging clamp between a hinge and panel to prevent unintended disassembly thereof.

FIG. 9 is a fragmentary view looking downwardly on the arrows IX—IX of FIG. 1.

FIG. 10 is an exploded perspective view, with a portion of the carrier arm broken away, of the roller assembly, the carrier arm supported thereby and the upper portion of one of the panels including its support ears adapted to be detachably attached to the carrier arm; a portion of one of the decorative inserts is also broken away to more clearly show one of the panel ears.

FIGS. 11 and 12 are fragmentary sectional views taken on the arrows XI—XI of FIG. 10, FIG. 11 showing the panel in an intermediate position during attachment thereof to the carrier arm, and FIG. 12 showing the panel in final supported attachment to the carrier arm.

FIG. 13 is a sectional view looking upwardly on the arrows XIII—XIII of FIG. 11.

FIG. 14 is a sectional view looking upwardly on the arrows XIV—XIV of FIG. 12.

Referring in detail to the drawings showing a preferred form of the invention, a window opening indicated generally at 10 in FIG. 1 is framed by conventional structural members including an upper horizontal header beam or the like 12 from which the present screen is suspended, the left hand screen section 14 being extended into screening position and the right hand section 16 being almost completely withdrawn into retracted or compact position. Each of the two screens 14 and 16 is made up of a plurality of vertically elongated panels, each detachably attached to an upper carrier arm which is in turn pivotally suspended from a roller assembly traversable along an overhead track. Typically the track extends in a straight line, but it may be curved if desired for decorative or structural reasons. Each panel section and its supporting carrier arm are in articulated hinged connection with an adjacent panel section and carrier arm.

FIGS. 2 and 3 show the support structure including an overhead track indicated generally at 20 having an upper wall 22 fastened to header 12 by suitable means 24 and

lower wall sections 26 and 28 spaced apart to define therebetween an open slot 30.

A roller assembly indicated generally at 40 (see also FIG. 10) includes a block indicated generally at 42 having a lower base, the block being upwardly bifurcated to form laterally spaced parallel legs 46 and 48. A pin 50 extends horizontally through bores formed in legs 46 and 48, and through bores formed in rollers 52, thus serving as an axle for the latter, the pin 50 having an enlarged head 56 at one end received in a recess formed in the roller face, and being upset at 58 at its other end in a similar recess to retain the rollers in rotatable assembled relation as shown. Each roller includes a spacer disk 53 on one side and a tubular extension sleeve 54 on the other, the disk and sleeve being preferably formed integrally with the roller proper. Successive pairs of rollers are staggered by reversing the orientation of the roller sleeve and disk, as seen in FIG. 9. This permits use of rollers having larger diameters than would otherwise be possible, in order to facilitate travel along track 20, while at the same time permitting compact stacking when the screen is retracted. It may be noted that the screen as shown in FIG. 9 is not in wholly retracted position, for clarity of presentation.

A carrier arm indicated generally at 60 is rotatably suspended from the roller assembly by a pin 62, and is adapted to support one of the vertically extending panels making up the screen in accordance with the invention. Thus, with particular reference to FIG. 10, a panel indicated generally at 70 may be formed of extruded plastic such as high impact styrene, polyvinyl chloride or the like, having substantial stiffness. The panel includes a thin central web portion 72 having a pair of laterally spaced upwardly projecting attachment ears 73 and 74, apertured at 75 and preferably formed integrally with the web 72.

The carrier arm 60 includes a pair of slots 63 and 64 extending vertically through the depth of the arm, each slot being adapted to receive one of the ears 73, 74. Centrally within each slot there is formed a cylindrical support button or stud projecting horizontally from one wall of the slot, the stud being engageable with the ear aperture 75 when the ear is completely received in the slot. The opposite wall of the slot is provided with a pair of ramps 66, 67 projecting from the wall in horizontal alignment with the stud 65 and spaced laterally therefrom.

Assembly of the panel ear 73 into supported engagement within the carrier arm slot 63 will be understood by reference to FIGS. 11-14. Thus in FIGS. 11 and 13, ear 73 is seen when moved partially into slot 63, with its upper corner portions 76, 77 engaged by ramps 66, 67, and the ear being consequently slightly bent by reason of the sliding abutment of the upper central portion of the ear across the outer face of stud 65. In FIGS. 12 and 14 the parts are shown in completely assembled relation with the stud 65 received in aperture 75 and the ear being held in the position shown by ramps 66, 67. It will be understood that the other carrier arm slot 64 identically receives the other panel support ear 74. As shown in connection with ramp 67 in FIG. 12, the upper and lower camming surfaces 68 and 69 extend symmetrically upwardly and downwardly from the ramp apex.

Disassembly of the panel ears from the carrier arm is easily accomplished by momentarily bending the central portion of each ear out of alignment with the stud so that the ear apertures clear the studs. This may be done either digitally or with a thin bladed tool slid into each slot between the ear and the wall from which stud 65 projects.

Panel 70 includes vertically extending integral side flanges 78, 79 flanking the web 72. The flanges are so formed that each provides a pair of grooves paralleling the web 72, to receive marginal portions of decorative insert strips, and the flanges are formed also to slidably

receive an enlarged anchor portion of an elongated hinge made of a flexible material.

Thus, with reference to FIGS. 7 and 10, flange 78 includes inwardly directed grooves 80 and 81, while flange 79 includes grooves 82 and 83. The grooves 80 and 82 receive opposite marginal strips of decorative insert 85 overlying one face of the central web 72, while grooves 81 and 83 receive marginal strips of insert 86 overlying the opposite face of the web.

The flanges are outwardly slotted at 90 and 91, the slots communicating with enlarged bores 92 and 93 respectively, the slots and bores extending throughout the length of the panel. An elongated hinge, indicated generally at 100, similarly extends the length of the panel and includes a central approximately semicircular portion 102 and a pair of arms 104 and 106 terminating in enlarged anchor portions 105 and 107 respectively. The hinge arms are received in the slots of the panel flanges, while the anchors are received in the bores of the panel flanges. The hinge is made of a flexible material such as soft rubber or material having comparable characteristics, and the parts are slidably assembled into the relationship shown. The flexibility of the hinge, primarily of its arms, permits the panels to be opened to the extended position seen in solid lines in FIG. 7, and to be closed into parallel or substantially parallel relation as shown in dotted outline. When in fully extended position, adjacent panels form an angle therebetween of the order of 120° or slightly more, and when so extended, hinge shoulders 108 and 109 may abut the panel flanges to limit the angular movement of the flanges. The carrier arms are desirably provided with shoulders 110 and 111 (see FIG. 9) which abut as seen in FIG. 5 to similarly limit outward pivotal movement of the arms.

The carrier arms are provided at their ends with knuckle hinge means, desirably in the form of a pair of spaced knuckles 120 and 121 at one end offset in one direction from the general plane of the carrier arm, and a single knuckle 122 at the other end, the single knuckle fitting between the spaced knuckles of the adjacent arm and being oppositely offset from said plane. A pivot pin 124 extends through bores in the knuckles providing a pivotal axis in substantial alignment with a face of the carrier arm to permit close stacking when the screen is retracted. The lower horizontal face of the carrier arm as seen for example in FIG. 11 is desirably recessed as indicated at 130 so that the upper edges of the panel and of the decorative inserts may be concealed therein to enhance the appearance of the screen. The upper horizontal face is similarly recessed at 132, since it becomes the lower face in an adjacent panel and carrier arm assembly, it being desirable for reasons of economy that a single form of carrier arm be used. The symmetry of ramp camming surfaces 68 and 69 previously mentioned is desirable for the same reasons.

Typically the hinges and decorative inserts will be held in assembled relation with the panels by frictional engagement therewith. However, to further insure that the hinges and inserts will not slip downwardly during use, the lowermost ends of the respective panel grooves and bores may be crimped or otherwise closed or blocked. In the case of the hinge, because of the resilient nature of its material, an alternative construction as shown in FIG. 8 may be employed, wherein a sleeve 140 of thin metal partially surrounds the anchor portion of the hinge. Sleeve 140 serves as a wedge or clamping member between the anchor and the bore of the panel flange and thus insures that the hinge does not move vertically relative to the panel during installation or operation of the screen. When it is desired to disassemble the hinge from the panel, the sleeve 140 may be withdrawn downwardly against its frictional engagement between the hinge anchor and panel bore by prying its enlarged head 142 downwardly, and a similar sleeve may also be provided at the upper end of the hinge anchors. The head 142 is desirably

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eccentric relative to the sleeve axis, having an extension large enough to underlie an outer marginal portion of the decorative inserts as indicated, whereby to prevent slipping of the inserts downwardly relative to the panel.

The end panel of a screen section may carry a terminal strip along its free vertical edge. Thus a strip indicated generally at 150 in FIG. 7 may include an outer portion 152 of any desired configuration, here shown as cylindrical, and an arm and anchor configuration as seen at 154 slidably received in the slot and bore of the panel. Desirably the outer portion 152 is somewhat larger in thickness than the panel itself, to provide a convenient grip for the user in opening and closing the screen, and it may be made hollow, as shown, or solid as desired.

With particular reference to the hinge construction, as best appears in FIG. 7, the thickened central portion 102 provides sufficient strength to allow the hinge to be pushed into engagement with adjacent panels, while the thin arms 104 and 106 provide virtually the entire flexure needed in moving the screen between open and closed positions. However, it is to be noted that when the screen is moved to fully extended position, a slight flexure of the central portion of the hinge, after abutment of the panels against hinge shoulders 108 and 109, provides a snubbing limit to the movement, so that the parts are not twisted or otherwise distorted.

The panels, hinges and terminal strips may be economically extruded in accordance with known processes and the screen is accordingly very inexpensive to produce. Panels may be conveniently and quickly added to or removed from an installation by reason of the constructions described, and the appearance of the screen may be easily changed from time to time by reason of the removability and replaceability of the decorative inserts overlying the panel faces.

It will be understood that the stud and ramp or ramps projecting from the walls defining each slot in the carrier arm must be spaced from the respective opposite walls by a distance at least slightly more than the thickness of the panel ear to provide clearance for the movement of the ear within the slot. For proper support of the panel, it is not necessary that the stud project farther from its wall than the ear thickness. Hence, in order to minimize overall thickness of the carrier arm and thereby permit compact stacking, the walls defining the slot in a typical installation will be spaced apart by a distance approximately double the ear thickness. Each ramp, of course, must project far enough from its wall to prevent the ear aperture from unintended disengagement from the stud, and desirably should project sufficiently to retain the ear closely adjacent the stud wall when the parts are assembled. The actual dimensions of the parts can be varied to suit a specific application. In a typical installation the panel width may be about three inches, its web and ear thickness about $\frac{1}{16}$ inch, the ear height (and carrier arm height) about one half inch, the ear width about one inch or a little more, and the ear aperture diameter about one quarter inch, with the stud diameter slightly less. Desirably the carrier arm wall bearing the stud is thicker than the opposite wall, both to insure sufficient strength to support the panel and to position the supported panel midway of the carrier arm thickness and in vertical alignment with the support pin 62.

Minor modifications and changes not substantially departing from the illustrative form of the invention hereinabove described and shown are intended to be embraced with the scope of the appended claims.

I claim:

1. In a traverse screen having a plurality of vertically extending hinged connected panels supported by suspension means movable along an overhead track, the provision of:

a panel provided with an upwardly projecting attachment ear of resilient material having an aperture

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formed therethrough, the ear having a thickness small relative to its length and width;

and a carrier arm constituting part of the suspension means and having an open slot extending vertically therethrough defined by walls spaced apart a distance approximately double the thickness of the ear, the arm having a stud projecting from one of said walls into the slot and received in said aperture, and a pair of ramps projecting into said slot from the other wall and spaced from said stud on each side thereof and in substantial horizontal alignment therewith, the outermost extent of said stud and ramps being spaced from their respective opposite walls by distances greater than the thickness of the ear, each ramp terminating inwardly in an apex and including camming surfaces extending symmetrically upwardly and downwardly from the apex.

2. The invention as stated in claim 1 wherein said panel includes a thin central web section bounded laterally by a pair of longitudinally extending flange sections, each flange section having formed therein a slot and an enlarged bore, said slots and bores extending longitudinally, said slots being outwardly directed and communicating inwardly with said bores throughout the length of the slots and bores.

3. The invention as stated in claim 1 wherein said panel includes a thin central web section bounded laterally by a pair of longitudinally extending flange sections of greater thickness than the web section and each said flange section has formed therein a groove parallel to the web section and adjacent thereto, said grooves facing each other, and including a decorative insert of sheet material overlying the web section with marginal portions received in said grooves.

4. The invention as stated in claim 1 wherein said panel is provided with a second apertured ear spaced laterally from the first ear and identical thereto, and the carrier arm includes a second slot for receiving said second ear, said second slot being formed to have a stud and ramps projecting thereinto from walls defining the slot, identically to the first named carrier arm slot.

5. In a multipanel traverse screen construction, in combination:

a panel provided with an upwardly projecting ear of resilient material having an aperture formed therethrough, the ear having a thickness small relative to its length and width;

and a carrier arm having an open slot extending vertically therethrough defined by walls spaced apart a distance approximately double the thickness of the ear, the arm having a stud projecting into the slot from one of said walls intermediate the ends of the slot and a ramp projecting into the slot from the other wall, the ramp and stud being spaced from one another longitudinally of the slot and in horizontal alignment, and the outermost extent of each being spaced from the respective opposite wall by distances greater than the thickness of the ear, said ramp terminating inwardly in an apex and including camming surfaces extending symmetrically upwardly and downwardly from the apex.

6. The invention as stated in claim 5 wherein said one wall carrying the stud is substantially thicker than said other wall.

7. The invention as stated in claim 5 wherein said ramp is disposed adjacent one end of the slot.

8. The invention as stated in claim 7 including a second ramp identical to the first named ramp and projecting into the slot from said other wall adjacent the other end of the slot and in horizontal alignment with said stud.

9. In a traverse screen having a plurality of vertically extending hinged connected panels supported by suspension means movable along an overhead track, the provision of:

a panel provided with an upwardly projecting attach-

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ment ear of resilient material having an aperture formed therethrough, the ear having a thickness small relative to its length and width, said panel including a thin central web section bounded laterally by a pair of longitudinally extending flange sections formed integrally with the web section and of greater thickness than the web section, each said flange section having formed therein a groove parallel to the web section and adjacent thereto, said grooves facing each other and disposed in a common vertical plane, and including a decorative insert of sheet material overlying the web section with marginal portions received in said grooves;

and a carrier arm constituting part of the suspension means and having a downwardly open slot formed therein defined by walls spaced apart a distance approximately double the thickness of the ear, the arm having a stud projecting from one of said walls into the slot and received in said aperture, and a pair of ramps projecting into said slot from the other wall and spaced from said stud on each side thereof and in substantial horizontal alignment therewith, the outermost extent of said stud and ramps being spaced from their respective opposite walls by distances greater than the thickness of the ear.

10. In a traverse screen having a plurality of vertically extending hinged connected panels supported by suspension means movable along an overhead track, the provision of:

a panel provided with an upwardly projecting attachment ear of resilient material having an aperture formed therethrough, the ear having a thickness small relative to its length and width, said panel including a thin central web section bounded laterally by a pair

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of longitudinally extending flange sections formed integrally with the web section and of greater thickness than the web section, each said flange section having formed therein a groove parallel to the web section and adjacent thereto, said grooves facing each other and disposed in a common vertical plane, and including a decorative insert of sheet material overlying the web section with marginal portions received in said grooves;

and a carrier arm constituting part of the suspension means and having a downwardly open slot formed therein and means within the slot including a horizontally projecting stud received in said aperture for supporting said panel.

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