March 27, 1951 J. H. HARWARD 2,546,187

STRUCTURAL FRAME FOR WINDOWS

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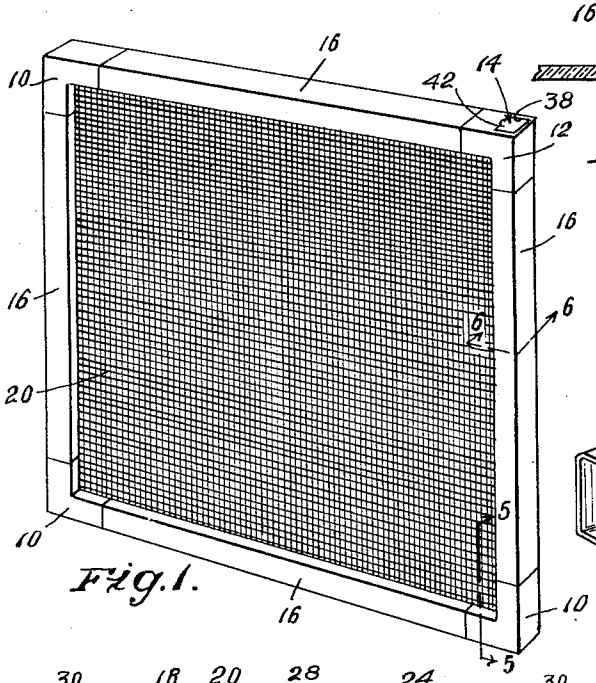


Fig. 1.

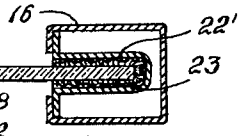


Fig. 8.

Fig. 4

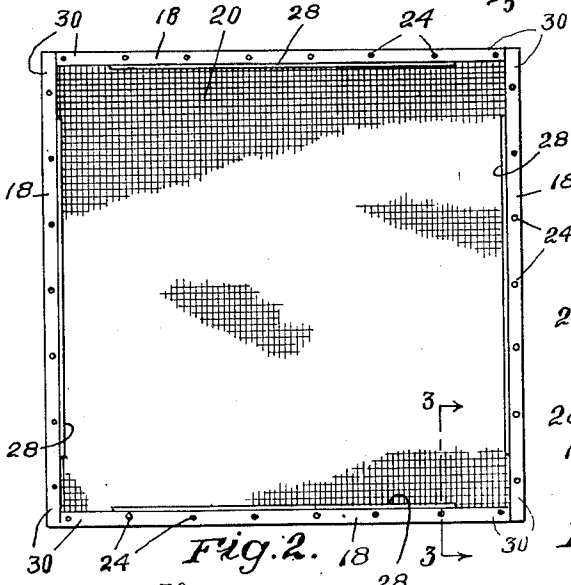


Fig. 2.

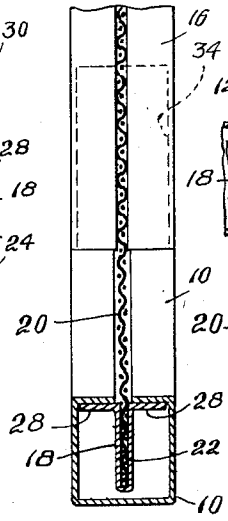


Fig. 5.

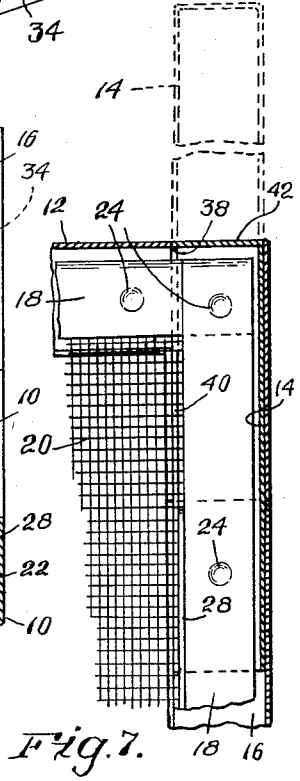


Fig. 7.

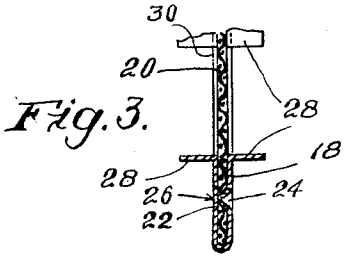


Fig. 3.

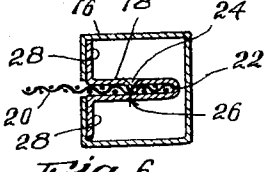


Fig. 6.

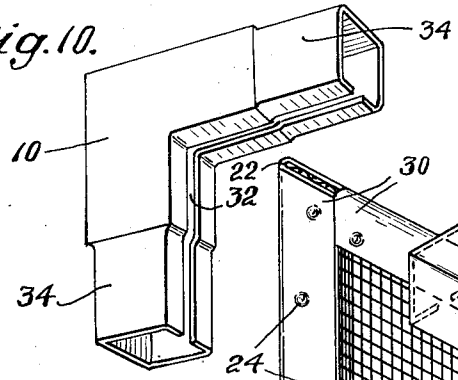
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STRUCTURAL FRAME FOR WINDOWS

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Fig. 10.



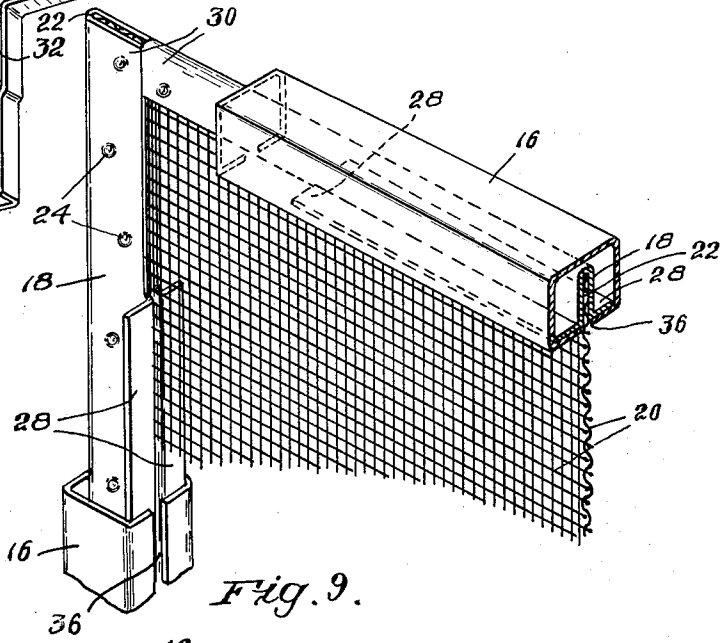


Fig. 9.

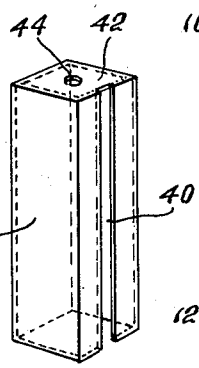


Fig. 12.

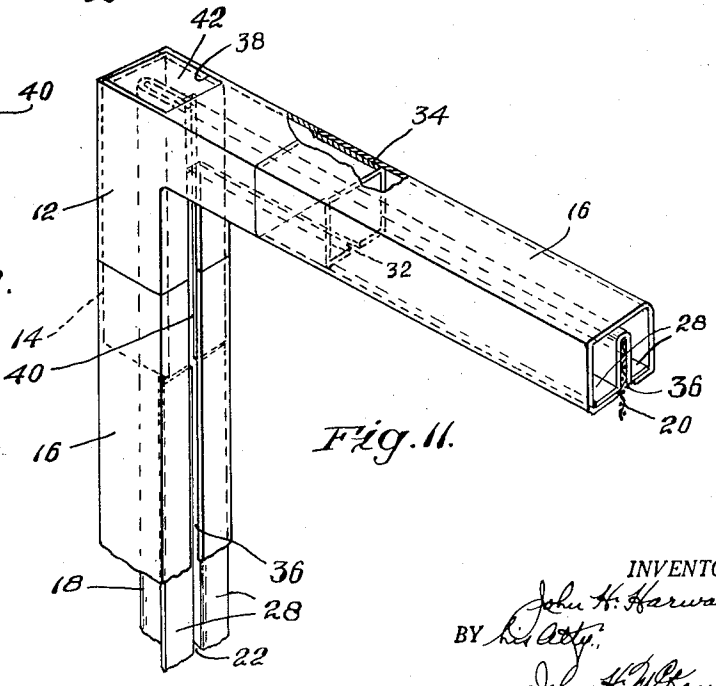


Fig. 11.

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STRUCTURAL FRAME FOR WINDOWS

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Application August 16, 1946, Serial No. 690,938

5 Claims. (Cl. 160—353)

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This invention relates to improvements in structural frames for window screens and window glass. More particularly it provides an improved frame structure which can be assembled from inter-fitting pre-formed parts into a rigid and strong mounting frame for a sheet section of screening or, if desired, a pane of glass.

It is among the objects of the invention to provide a durably strong and rigid rectangular frame structure having inner frame sections preliminarily secured to a rectangular section of screening, or a pane of glass, along each of the four sides thereof, and having inter-fitting and self-locking generally tubular outer frame sections enclosing the inner frame sections and combining to produce a superior screen or window unit which conveniently may be mounted at a window opening in any conventional or desired manner.

Another object is to provide a sectional frame structure having inter-fitting and inter-locking sections which conveniently and economically may be pre-formed on principles of mass production.

A further object is to provide a sectional frame structure having inter-fitting and interlocking sections and in which a section of screening and a pane of glass may be interchangeable.

It is, moreover, my purpose and object generally to improve rectangular frame structures, and more especially such frames for mounting window screening and window glass.

In the accompanying drawings:

Fig. 1 is a perspective view of a window screen having a frame embodying features of my invention;

Fig. 2 is a face view of the screen of Fig. 1 with the outer frame sections removed;

Fig. 3 is a cross-sectional view on line 3—3 of Fig. 2, on a larger scale;

Fig. 4 is a perspective view of one of the three similar corner sections of the outer frame;

Fig. 5 is a cross-sectional view on line 5—5 of Fig. 1, on a larger scale;

Fig. 6 is a cross-sectional view on line 6—6 of Fig. 1, on a larger scale;

Fig. 7 is a fragmentary cross-sectional view through the outer frame at the locking corner, showing the corner locking member in full lines in its locking position and showing it by broken lines prior to being pressed to locking position;

Fig. 8 is a fragmentary cross-sectional view through one side of a frame having glass mounted therein;

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Fig. 9 is a perspective view of one corner of the screen of Fig. 1 illustrating the manner of assembling the frame sections;

Fig. 10 is a perspective view of the corner section which fits at the corner of the structure of Fig. 9;

Fig. 11 is a perspective view of the locking corner which is the last to be assembled, illustrating the manner of its assembly; and

Fig. 12 is a perspective view of the locking member for the corner shown in Fig. 11.

Referring to the drawing, the window screen of Fig. 1 has three corner frame sections 10 which may be in all respects similar, and a fourth corner section 12 which is the last to be assembled and which is formed for reception of a locking member 14. Four generally tubular and similar outer frame sections 16 extend between the corner sections along each of the four sides of the frame.

Within the outer frame sections 10, 12, 14 and 16 are inner frame sections 18 within which the mesh screening 20 is mounted. Referring to Figs. 2 and 3, all of the inner frame sections 18 may be identical, or two sections at opposite sides may be slightly longer than the other two, as illustrated, so that the longer sections extend from side to side and the shorter sections extend between the ends of the longer sections.

Each inner frame section 18 may be made of any suitable stiff material but preferably is formed from a sheet metal strip folded longitudinally upon itself to provide a suitably deep groove 22, extending from end to end of the section, within which a marginal portion of the screening 20 is arranged. The screening may be held in the groove 22 in any desired manner, as by spot-welding or by drawing the opposite walls of the groove together upon the screening by screws or the like. I prefer, however, to removably hold the screening as by spaced punchings indicated at 24 which provide spaced detents on the inner side of one or both walls of groove 22, as at 26, which project against or through the screening and securely hold the screening when the groove walls are held together. Resilience of the material permits slight spreading of the groove walls as the screening is being inserted in the groove, and the walls spring back sufficiently to hold the screening until the walls are clamped together by the outer frame as presently will appear.

Each wall of groove 22 has a right-angular flange 28 thereon, with the flanges of the opposite walls of the groove projecting in opposite

directions. However, the flanges 28 terminate short of the ends of the section to provide unflanged end portions 30, for a purpose which later will appear.

In assembling the frame, all four inner frame sections 18 will be arranged each along one margin of the screening 20, with the screening engaged and held in the groove 22 of each section 18, as represented in Fig. 2.

Each of the three similar corner sections 10 of the outer frame is a generally tubular L-shaped member with rectangular cross-section, as shown in Figs. 4 and 10. Sections 10 may be formed of any suitable material, but preferably will be of sheet metal formed as illustrated to provide the slot 32 at the inner side of the angle. Also, the end portions of each corner section 10 has slightly less cross-sectional dimensions than the remainder of the section, as shown at 34. These end portions 34 are adapted to nicely fit within the end portions of the outer frame sections 16, each of which latter is generally tubular with rectangular cross-section and with a slot 33 extending from end to end along one wall of the section as best seen in Figs. 9 and 11. The sections 16 may be formed of any suitable material but preferably will be of stiff sheet metal.

Assuming the inner frame sections and screening to be assembled as in Fig. 2, any one of the corner sections 10 next may be mounted at any one of the four corners of the inner unit by sliding it into place with the unflanged portions 30 of the inner frame sections entering the slot 32. One outer frame section 16 next is slipped endwise over an inner section 18, with its slot 36 inward for receiving therein the screen-clamping portion of the section 18, with the flanges 28 of section 18 engaged within section 16 and securely held thereby against any lateral spreading which might release the screening in groove 22.

This first section 16 is slid inward to the corner section 10 and, while the corner section is held in place, the inner end of section 16 is forced over the reduced end 34 of the corner section.

Another section 16 is similarly slipped endwise toward corner section 10 at the adjacent side, engaging over the inner frame section 18 as before and pressed over the other reduced portion 34 of the corner section 10, thereby completing one corner.

Referring to Fig. 9, it may be assumed that the partially assembled screen has been rotated clockwise and that the corner, of Fig. 9, is the second corner to be assembled. The upper one of the sections 16 is already in place. Hence the second corner section 10 is slipped over the unflanged portions 30 of the inner frame sections, as before, but the upper reduced end of corner section 10 is forced into the end of the section 16 while the latter is held against longitudinal displacement. Then a third section 16 is slipped endwise toward the second corner section and is forced over the reduced end 34 of the corner section to complete the second corner.

The third corner is assembled in the same manner as the second and when three corners are complete, it will be obvious that all four of the sections 16 will be in place and only the unflanged portions 30 of the inner frame sections at the last corner will be exposed. Hence the last corner section 12 is formed the same as corner sections 10 but with only one of the reduced end portions 34, so that this one portion 34 can be pressed into the end portion of one

of the sections 16 with the portion of the corner section where a reduced portion 34 is absent passing the end of the other section 16. Then the lock member 14 is inserted in a hole 38 in corner section 12 and pressed inward until its inner portion enters the end of section 16, thereby serving the same function as the absent portion 34.

As seen in Fig. 12, the locking member 14 has a slot 40 and has its outer end closed as at 42 so that, when in place, it closes the hole 38.

If desired, a small hole 44 may be provided in the end of locking member 14 for insertion of a tool to facilitate withdrawal of the locking member when it may be desired to knock down the frame.

While my improved frame structure is primarily adapted for mounting screening, the inner frame sections may be formed with a suitably wider groove for receiving the marginal portion of a pane of glass, as indicated in Fig. 8, in which case a suitable packing or sealing medium 23 preferably would line the groove 22'. The assembling of a glass-mounting frame would be the same as described for the screen frame.

Also, if desired, the inner frame sections capable of holding glass may have screening substituted for the glass by having the packing medium 23 of a sort which can clamp the screening when the frame is assembled. By this means, a single frame may serve for holding screening in summer and glass may replace the screening for winter use.

While I have indicated that sheet metal is a preferred material from which to form the various elements of my frame, by bending the metal into the desired shapes, I desire that it be understood that my frame elements may be formed of any suitable plastic or composition material which may be molded or otherwise formed to provide inter-fitting frame elements in accordance with my present disclosure.

I claim as my invention:

1. A structural mounting frame comprising inner and outer frame sections of which each inner frame section extends along a different side of the frame and has opposed walls defining a space for reception of a marginal portion of a member which is to be mounted, and each having a flange projecting at right angles to said opposed walls at the entrance to said space, said outer frame sections comprising a series of generally tubular straight side sections, each having a longitudinal slot extending along one wall from end to end of the section, and a series of generally tubular corner sections each comprising two angularly related legs and each having a slot extending along a wall of each leg of the corner and continuous from one leg to the other, each said corner section being fitted over a corner formed by two adjacent inner frame sections, with end portions of said inner frame sections passed through the slot of the corner section, and each said outer frame side section being slipped endwise over an inner frame section with said flange of the inner section engaging within the outer frame side section and with opposite end portions of each outer frame side section inter-engaged with a portion of two different outer frame corner sections, one of said corner sections being butted endwise against the adjacent end of an outer frame section, and having an opening in a wall thereof, and a locking element inserted through said opening and extending across the

plane of said butted ends of the corner member and the outer frame side section.

2. In a structural mounting frame, four inner frame strips adapted to be engaged along the margins of a member which is to be mounted, with a strip extending along each side of said member and frame, each said strip having a flange projecting at right angles to the body of the strip and terminating short of the end portions of each strip, four generally tubular outer frame side sections, each shorter than the said strips and each slotted longitudinally from end to end and slid endwise over a said strip with its slot inward and with said flange of the strip enclosed within the tubular side section and maintaining the strip and side section against lateral separation, and four generally tubular L-shaped outer frame corner sections, each slotted all along its inner walls and each arranged over a corner juncture of two of said strips, with end portions of said strips passed through the slot of the corner section and with the corner sections and outer frame side sections telescoped one within the other at each corner of the frame, and abutment means at each corner region of said telescoping of corner sections and side sections predetermining the amount of permissible telescoping of sections, whereby said inner frame strip flanges prevent lateral spreading of the outer frame side sections and said corner members prevent any relative endwise movements of the outer frame side sections.

3. A window screen frame comprising, at each side of the frame an inner stiff strip member having oppositely disposed walls for engaging the margin of a piece of screening between them, each said wall having a flange thereon terminating short of the end regions of the respective strips, and an outer stiff generally tubular side section of frame slotted from end to end and slidably engaged over said strip member with its said slot inward for accommodating a said piece of screening and with the said flange of the strip member engaged within the tubular side section and the said end regions of the strip member extending beyond the tubular side section, a generally tubular L-shaped corner section slotted all along its inner side arranged over the end regions of two adjacent strip members with said end regions passed through the slot of the corner section, said L-shaped corner section having a portion at each end telescoped within an end of a said tubular side section and having an exterior shoulder predetermining the amount of permissible telescoping, the said telescoped end portion of one of said corner sections being separate from the remainder of said one corner section and being movable relative to said one corner member to its said telescoping position after the frame otherwise is completely assembled, thereby to lock all of the frame parts rigidly together.

4. A structural mounting frame comprising a generally rectangular inner frame having means at each side of the rectangle projecting out of the general plane of the frame, means on the inner frame for securing thereto the marginal portions of an element which is to be mounted, four generally tubular outer frame side sections each having a wall which is slotted from end to end of the section and each being adapted to be slipped endwise over a different side of the inner frame with the slotted walls of all of the outer frame sections facing inward and with said projecting means on the inner frame engaging back of said slotted walls, a generally tubular corner member having two angularly related legs engaging end portions of adjacent outer frame side sections at each corner of the mounting frame, at least one of said corner members having each of its two legs engaging an outer frame side section with one fitting endwise within the other, and another of said corner members having one of its legs butted endwise against an end of an outer frame side section and having a locking element extending within the corner member and movable across the plane of said butted ends.

5. A structural mounting frame comprising a generally rectangular inner frame having means at each side of the rectangle projecting out of the general plane of the frame, means on the inner frame for securing thereto the marginal portions of an element which is to be mounted, four generally tubular outer frame side sections each having a wall which is slotted from end to end of the section and each being adapted to be slipped endwise over a different side of the inner frame with the slotted walls of all of the outer frame sections facing inward and with said projecting means on the inner frame engaging back of said slotted walls, a generally tubular corner member having two angularly related legs engaging end portions of adjacent outer frame side sections at each corner of the mounting frame, each of said corner members having a portion of reduced exterior dimensions at the end portion of each of its said angularly related legs with a limiting shoulder at the inner end of each said reduced end portion, and each said reduced portion extending with nice fit within an end portion of a said tubular outer frame side section, with the ends of the outer frame side sections butted against said shoulders of the corner members at each of the four corners of the structural mounting frame.

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