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A. LANG

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METAL SCREEN AND METHOD OF MANUFACTURE

Filed April 18, 1936

Fig. 1.

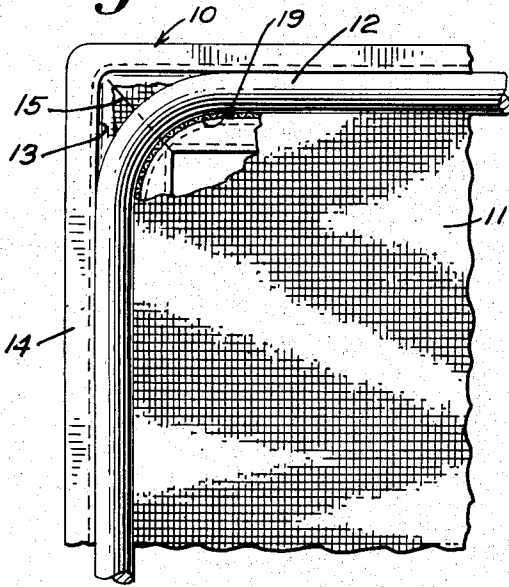


Fig. 2.

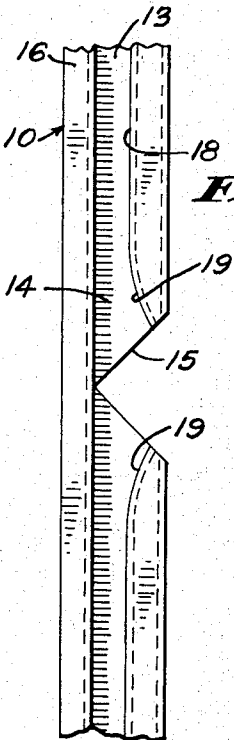
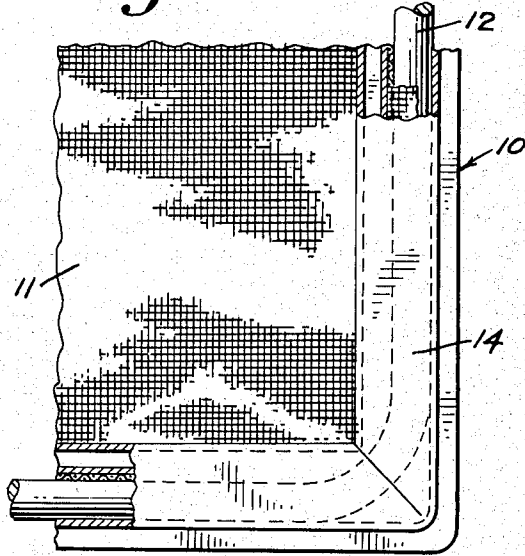


Fig. 3.

Fig. 4.

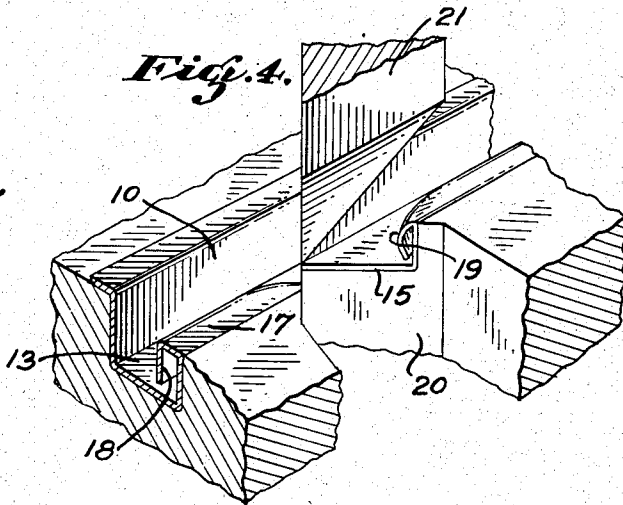


Fig. 7.

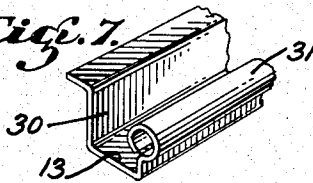


Fig. 8.

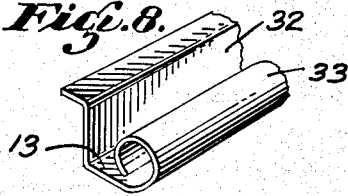


Fig. 5.

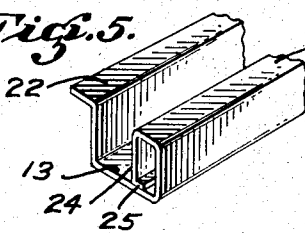
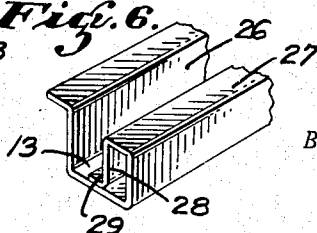


Fig. 6.



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METAL SCREEN AND METHOD OF MANUFACTURE

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Application April 18, 1936, Serial No. 75,134

11 Claims. (Cl. 156—14)

The present invention relates to an improvement in metallic window screens and more particularly to an improved metallic frame for window screens and a method of manufacturing same.

An object of the invention is to provide a metallic screen of novel construction in which the metal thereof is disposed in its most effective position with respect to the strains and stresses set up therein by the screen fabric secured thereupon.

Another object of the invention is to provide a strong and inexpensive metal frame for screens of the type having a channel into which the edges of a screen fabric are secured by a metal rod or other member forced into the channel in wedging engagement with the screen fabric.

Another object of the invention is to provide a metal frame for a window screen having a continuous channel extending around one side thereof in which the inside corners of the channel are rounded to receive the screen fabric and prevent damage thereto at this point.

Another object of the invention is to provide a metal frame for a screen fabric having a continuous channel extending therearound in which the channel is rounded at its corners to permit the use of a screen securing rod having arcuate corner bends.

Another object of the invention is to provide a metallic frame for window screens having a securing rod channel with a reinforcing reentrant flanged portion disposed along the inside edge thereof.

A further object of the invention is to provide a method of forming a metallic frame having a channel and a reentrant flanged reinforcing rib along its inside edge which will produce a rounded inner surface in the channel at the corners of the frame.

For a better understanding of the invention reference should be had to the accompanying drawing where there is shown by way of illustration and not of limitation, fragmentary parts of a complete window screen constructed in accordance with a preferred embodiment of the invention.

In the drawing:

Figure 1 is a fragmentary back view of a window screen having parts broken away to disclose the manner of securing the screen fabric upon the frame,

Figure 2 is a view similar to Figure 1, showing the front surface of a window screen at another corner thereof,

Figure 3 is a back view of a portion of a screen frame member of preferred construction showing the channel and the reinforcing reentrant flange with one of the mitre cuts made therein to form a corner in the frame,

Figure 4 is a fragmentary perspective view showing one form of die and shear which may be used to provide the corner forming mitre cut of the frame member illustrated in Figure 3, and

Figures 5, 6, 7 and 8 are fragmentary views showing other forms of frame forming strips which are adapted to and contemplated by this invention.

In the construction of metallic window screens of the character contemplated by this invention, it is desirable that the completed screen be of light construction and at the same time of sufficient strength to maintain the screen fabric in a taut condition. These conditions are satisfied in the present invention by forming the screen of three major parts, one part being a channel forming frame member and the other two parts being the screen fabric and a screen fabric retaining rod which is adapted to be disposed into wedging relation with the screen fabric in the channel of the frame member.

The present invention distinguishes over the invention disclosed and claimed in my copending application, Serial Number 75,133, filed on even date herewith, in that the screen frame has improved and novel features which impart greater stiffness to the frame and also provide a rounded screen fabric supporting surface at the corners of the frame which will prevent damage to the screen fabric and permit the use of a spring steel rod in the screen receiving channel of the frame.

At the present time, to provide sufficient stiffness in a metallic screen frame of the channel type, it is the custom to fold the frame forming strip to provide a rectangular box-like cross section along the outer edge of the frame and locate the screen receiving channel along the inside edge thereof. The best example of such a construction, at present known to the applicant, is illustrated in United States Patent No. 1,187,402, dated June 13, 1916, to Clifford Traut. In this patent the screen fabric receiving channel is formed at the inside of a frame portion of rectangular cross section by a spaced upstanding flange extending along the inside edge thereof. With such an arrangement it will be readily seen that the unsupported flange thus formed will be required to take all of the strain exerted by the screen fabric and consequently a frame of this

construction is limited to comparatively small screens. For example, a screen not materially greater than thirty-six inches in length.

As distinguished from the arrangement shown in the above patent, the present invention contemplates the formation of a rectangular box-like reinforcing cross section or rib along the inside edge of the frame and a location of the screen fabric receiving channel at the outside of this reinforcing section or rib. This will dispose the metal of the frame member in a position where the strains exerted by the screen fabric will be applied directly thereupon and produce a screen frame that will effectively maintain the screen fabric taut under all conditions. As a result it is possible, with the construction herein disclosed, to construct larger screens than have been heretofore made. For example, the applicant has made screens of his improved construction having a length of sixty inches.

In Figures 1 and 2 of the drawing, the screen frame, designated generally by the numeral 10, is shown as having a screen fabric 11 secured thereupon by means of a wedging rod 12 which is adapted to be wedged with the edge of the screen fabric in a channel 13 formed in the frame 10. In these figures of the drawing, the frame 10 is shown as formed of a continuous longitudinally folded strip of metal 14 having mitre cuts 15 extending from the inside partially through the folded strip 14 at points corresponding to the corners of the completed frame.

In Figure 3 of the drawing, there is shown a short length of the frame forming strip 14 having a corner forming mitre cut 15 made therein. As shown, the mitre cut 15 extends through the inner edge of the folded strip 14 to a point in line with the surface of the outside wall of the channel 13. This permits the uncut portion of the strip 14 to be bent around the mitre cut 15 and thus form a right angle corner for the screen frame 10 which will not require any welding or other securing means at this point. When the frame forming strip 14 is provided with four mitre cuts 15 it will be seen that a complete frame 10 may be formed from a single strip of metal with but a single joint therein at the meeting ends of the strip 14. At the same time the frame thus formed will have an uninterrupted or continuous channel 13 extending entirely therearound. As here illustrated, the frame 10 has a flange 16 extending outwardly from the channel 13 and at the inner edge of the channel 13 there is a box-like structure or rib 17 of rectangular cross section which is formed by a reentrant flange 18 that is disposed in spaced relation with the outside wall of the channel 13 so as to provide opposed surfaces between which the screen securing rod 12 may be wedged to secure the screen fabric 11 upon the completed frame. This disposition of a box-like structure or rib 17 along the inside of the frame 10 locates the metal of the frame in its most effective position to impart rigidity to the frame and also provides a relatively wide surface over which the screen fabric 11 can be drawn and thus greatly reduces the possibility of a fracture of the screen fabric 11 when it is being secured upon the frame. In addition to disposing the metal of the strip 14 in its most effective strain supporting position upon the frame 10, this construction also lends itself to the formation of a rounded screen fabric engaging surface 19 at the corners of the screen frame. This rounded screen fabric engaging surface 19 is produced by collapsing the box-like structure or rib 17 adjacent the mitre cuts 15 so

as to curve the reentrant flange 18 inwardly upon the frame 10 at these points.

In Figure 4 of the drawing, there is shown an arrangement wherein the mitre cut 15 and the curved surfaces 19 upon the box-like structure 17 may be formed in a single operation. As here shown, the frame forming strip 14 is disposed in a channel-like shearing die 20 which has a cooperating shearing or punching tool 21. The cutting end of the shearing tool 21 is preferably formed as an inverted triangular pyramid having two vertically disposed sides which form the sides of the mitre cut 15. With a shearing tool of this character it will be readily seen that as the point of the shearing tool 21 is forced down upon the frame forming strip 14, as illustrated, it will form a 90 degree mitre cut from the outside wall of the channel 13 inwardly and eventually collapse the box-like structure 17. This will bend the reentrant flange 18 outwardly with respect to the channel 13 and thus form the curved screen fabric supporting surface 19 previously referred to. In this figure of the drawing, the shearing tool 21 is shown in its initial cutting position, but as having been withdrawn to this point after making a mitre cut 15.

In my above identified copending application there is disclosed and claimed the use of a screen retaining rod 12 having outwardly bowed portions which reinforce the frame 10 by producing an inherent outward biasing force in the side of the frame. As therein illustrated and described, the retaining rod 12 has a substantially square bend at each corner of the frame 10. A bend of that character can be formed cold in ordinary cold drawn steel or iron rod, but where spring steel is desired, it is necessary to heat the rod in order to make a right angle bend without fracturing the rod at this point. In the present invention this difficulty is overcome by the rounded surface within the channel 13 at each corner of the frame 10, as it is possible with such a rounded channel to use a retaining rod having a round corner bend such as can be formed in a spring steel rod without heating the rod. A further advantage obtained by the rounded surface upon the inside of the channel 13 and a rounded bend in the rod 12 at each corner of the frame, is that it provides a substantially diagonal disposition of a portion of the retaining rod 12 at this point. This imparts additional rigidity at the corners of the screen frame 10 which will serve to retain the frame 10 in its original squared condition.

While the screen frame 10 is shown and described above as having a box-like structure 17 formed by bending the metal of the frame forming strip 14 upon itself to provide a reentrant flange 18, it is to be understood that this box-like reinforcing structure 17 upon the screen frame may take a number of different forms.

In Figure 5 there is shown a portion of a frame forming strip, designated by the numeral 22, having a box-like structure 23 of rectangular outline in which a reentrant flange 24 terminates at the bottom of the channel 13 in an additional flange 25.

In Figure 6 of the drawing, there is shown a frame forming strip 26 having a box-like structure 27 of rectangular cross section in which a reentrant flanged portion 28 terminates in an outwardly extending flange 29 which engages the bottom surface of the channel 13.

In Figure 7 of the drawing, the box-like reinforcing structure along the inside edge of the frame forming strip, designated by the numeral 76

30, is a cylindrical beading 31 extending along the inside edge thereof. This beading 31 is formed by rolling the metal at this point inwardly into the channel 13 so that the free edge thereof may be collapsed to provide the curved surface at the corners of the frame when the mitre cuts 14 are formed therein, as described above.

In Figure 8 of the drawing, there is shown a portion of a frame forming strip 31 having the channel 13 completed by rolling up the inner edge of the strip 31. This construction provides a rounded bearing surface 33 over which the screen fabric may be drawn and the free edge thereof may be collapsed to provide the rounded corner, as above described, when the mitre cuts are formed therein, as contemplated by this invention.

In all of the arrangements disclosed above, it will be noted that the frame forming strips have the stiffening flanges or ribs disposed along the inside of the channel 13, and as a result the stresses exerted by the screen fabric 11 will be applied directly upon the major part of the frame rather than upon an inwardly disposed and unsupported flange, as is disclosed by the prior art.

While I have, for the sake of clearness and in order to disclose the invention so that the same can be readily understood, described and illustrated specific devices and arrangements, I desire to have it understood that this invention is not limited to the specific means disclosed, but may be embodied in other ways that will suggest themselves to persons skilled in the art. It is believed that this invention is new and it is desired to claim it so that all such changes as come within the scope of the appended claims are to be considered as part of this invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. A metallic frame for a window screen having its sides formed of a continuous strip of sheet metal turned inwardly along its inside edge to provide a support in the plane of the screen substantially wider than the thickness of said metal strip over which the screen fabric may be drawn, and having an upwardly turned portion with an outwardly extending flange forming in conjunction with said support a channel outside of said support into which a screen securing rod may be disposed, the outwardly extending flange upon said upwardly turned portion serving to reinforce said latter portion and as a means for securing the frame upon a supporting surface.

2. A metallic frame for a window screen having its sides formed of a continuous strip of sheet metal folded inwardly upon itself along its inner edge to form a hollow rectangular rib over which the screen fabric may be drawn, and having an upwardly turned portion with an outwardly extending flange along its outer edge which in conjunction with said rectangular rib forms a support engaging surface and a channel outside of said rib into which the edge of the screen fabric and a securing rod may be disposed in a concealed manner.

3. A metallic frame for a window screen having its sides formed of a continuous strip of sheet metal turned inwardly upon itself along its inner edge to provide a hollow reinforcing rib over which the screen fabric may be drawn, and having an upwardly turned portion with an outwardly extending reinforcing and support en-

gaging flange disposed in spaced relation to said reinforcing rib and forming in conjunction therewith a channel into which the edge of a screen fabric and a securing rod may be disposed.

4. In a window screen frame, the combination of a strip of sheet metal folded lengthwise to form a channel having a reentrant flange disposed intermediate the sides thereof and forming a box-like structure along the inside of the strip over which a screen fabric is drawn, said strip being bent at mitre cuts extending through said box-like structure and the bottom of the channel at points corresponding to the corners of the frame, a screen fabric having its edges disposed over said box-like structure, and a reinforcing rod disposed in said channel in wedging relation between the outside wall thereof and the reentrant flange of the box-like structure.

5. In a window screen frame, the combination of a strip of sheet metal folded lengthwise to form a channel having a reentrant flange disposed intermediate the sides thereof and forming a box-like structure along the inside of the strip over which a screen fabric is drawn, said strip having mitre cuts extending through said box-like structure and the bottom only of the channel the remaining portion of the channel being bent around said mitre cuts to form the corners of the frame, a screen fabric having its edges disposed over said box-like structure, a reinforcing rod disposed in said channel in wedging relation between the outside wall thereof and the reentrant flange of the box-like structure, and an outwardly extending flange along the outside of said channel for attaching the screen to a surface, whereby said reinforcing rod will be concealed.

6. In a window screen frame, the combination of a strip of sheet metal folded lengthwise to form a main channel having a second oppositely disposed channel intermediate the sides of said main channel forming a bearing surface over which a screen fabric is drawn, said strip having mitre cuts extending through said oppositely disposed channel and a portion of the main channel and being bent around said mitre cuts to form the corners of the frame, a screen fabric having its edges disposed over said oppositely disposed channel, a reinforcing rod disposed in said main channel in wedging relation between the outside wall thereof and the outer flange of said oppositely disposed channel, and a flange extending outwardly from said main channel opposite the bearing surface formed by said intermediate channel providing a support engaging surface upon said frame.

7. The method of forming a metallic frame for window screens of the type having a continuous screen fabric securing channel extending therearound, which comprises folding a strip of sheet metal to form a channel with a reentrant collapsible overhanging portion, shearing a mitre cut into the bottom of said channel and said reentrant collapsible overhanging portion, collapsing said reentrant overhanging portion at each side of said mitre cut, and finally bending the uncut portion of said strip at a right angle about said mitre cut, whereby a rounded surface will be provided at the corners of said channel when said frame is formed.

8. The method of forming a metallic frame for window screens of the type having a continuous screen fabric securing channel extending therearound, which comprises folding a strip of sheet metal to form a wide channel with a reentrant collapsible portion along the inside edge of said wide channel, shearing a mitre cut into the bot-

tom web of said channel and through said reentrant collapsible portion, collapsing said portion at each side of said mitre cut, and finally bending the uncut portion of said strip at a right angle about said mitre cut, whereby a rounded surface will be provided at the corners of said channel when said frame is formed.

9. The method of forming a metallic frame for window screens of the type having a continuous channel extending therearound for the reception of a screen fabric and securing means, which comprises folding a strip of sheet metal longitudinally to form a wide channel, and by a further bending forming a reentrant collapsible inwardly disposed portion within said channel over which the screen fabric is to be drawn, shearing a mitre cut into a portion of said channel and entirely through said reentrant collapsible portion in a manner that will collapse said reentrant collapsible portion at each side of the mitre cut, and finally bending the uncut portion of said strip at a right angle about said mitre cut substantially as described.

10. A metallic frame for a window screen comprising a continuous strip of sheet metal bent lengthwise to form a channel having an outwardly extending flange along its outside edge and inwardly and downwardly extending flanges along the inside edge of said channel forming a rec-

tangular box-like rib, said strip being provided with mitre cuts extending through said rectangular box-like rib and including the bottom of said channel and being bent at the uncut portion thereof to close the mitre cuts and form the corners of the frame, whereby said frame will have a continuous rectangular reinforcing box-like rib along its inside edge over which a screen forming fabric may be drawn and a continuous outwardly extending support engaging flange along its outside edge.

11. In a metallic window screen the combination of a strip of sheet metal folded to form a channel-like recess for a screen fabric securing rod having a hollow rectangular rib along the inner edge thereof over which the edges of a screen fabric are drawn, said strip being provided with mitre cuts at the corners of the frame and said rectangular rib being collapsed at each side of these mitre cuts, whereby a rounded screen engaging surface will be provided in the channel-like recess at the corners of the frame, a screen fabric for said frame having its edges extending over said rectangular rib, and a securing rod having a rounded right angle bend disposed in said channel-like recess and extending around the corners of the frame in clamping engagement with said screen fabric.

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