Jan. 24, 1933. A. BOOMERSHINE 1,895,309

STRETCHING AND SECURING MEANS FOR FLEXIBLE MATERIAL

Filed Oct. 12, 1931 2 Sheets-Sheet 1

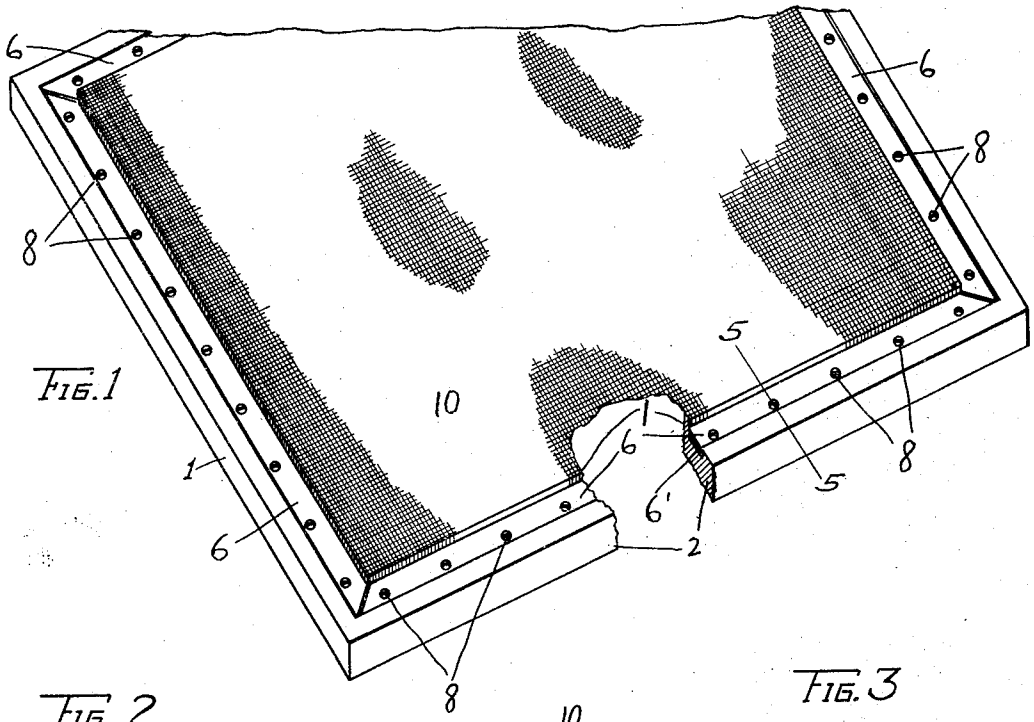


FIG. 1

FIG. 2

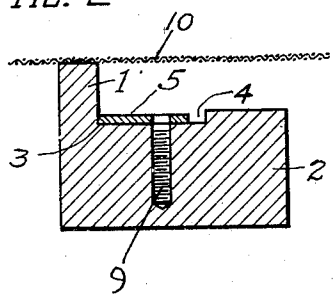


FIG. 3

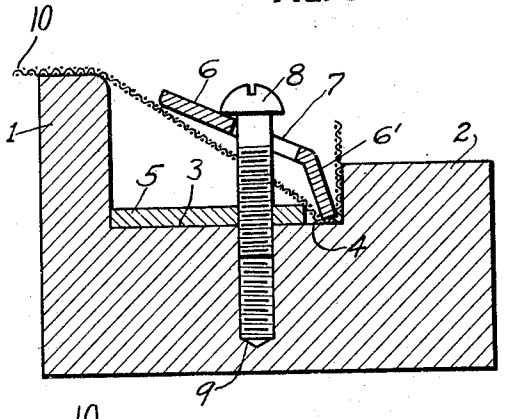


FIG. 4

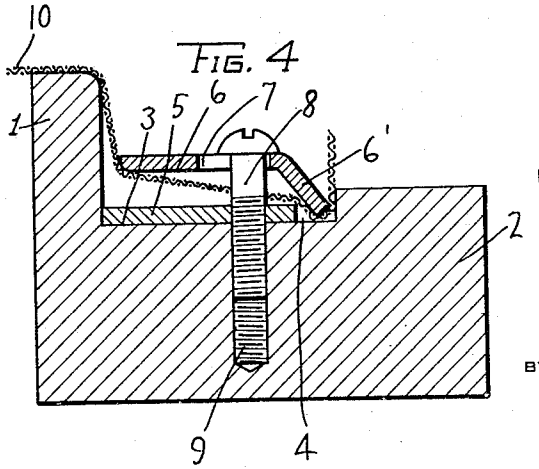
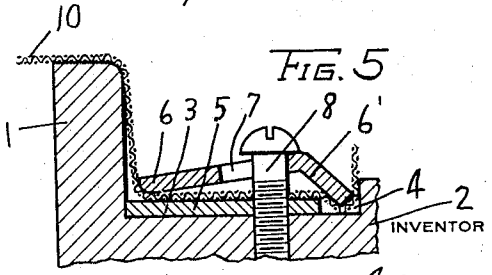


FIG. 5



INVENTOR

BY Adam Boomershine

Mateer & Orlich

ATTORNEYS

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FIG. 6

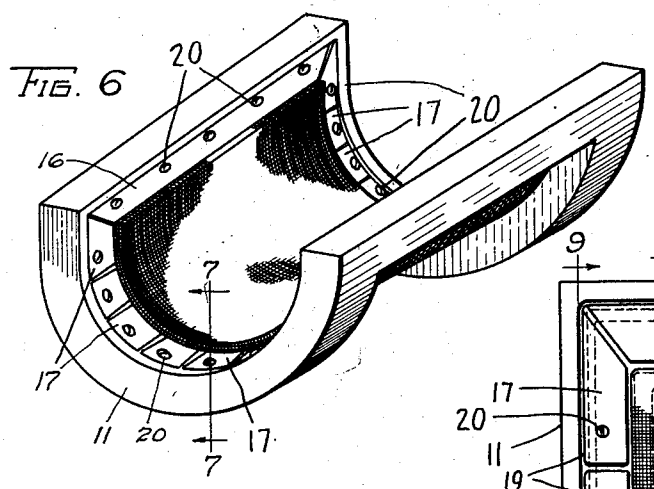


FIG. 7

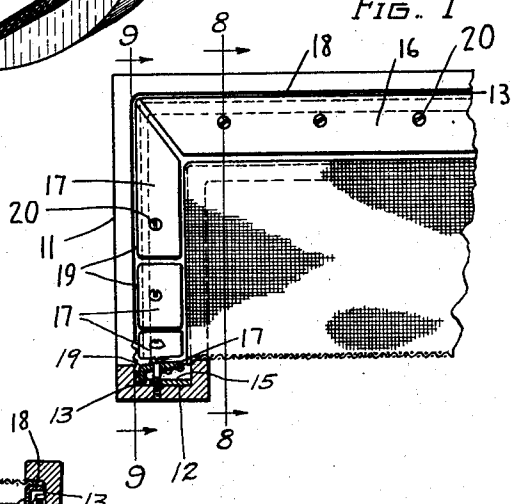


FIG. 8

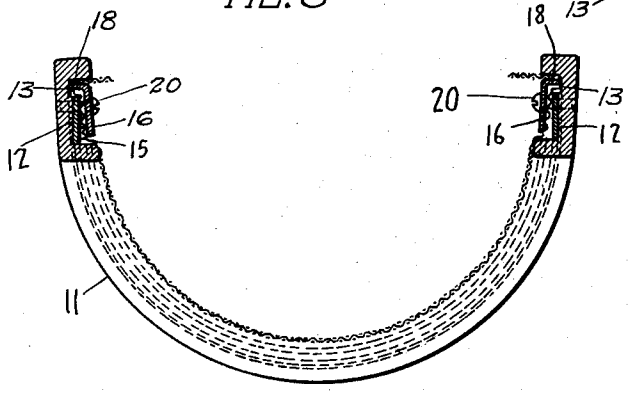


FIG. 9

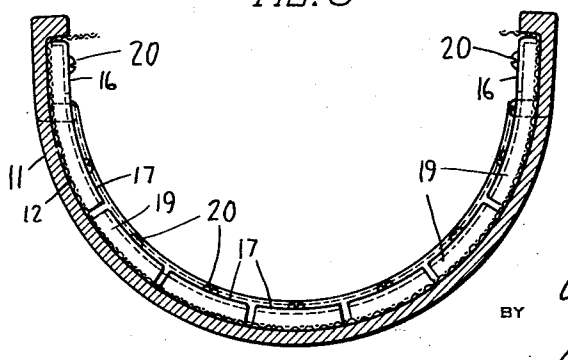


FIG. 10

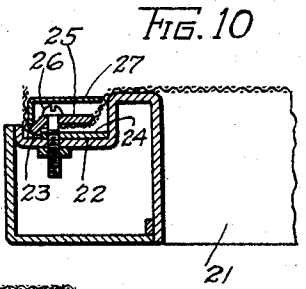
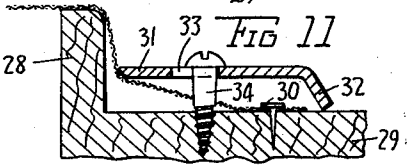


FIG 11



INVENTOR

Adam Boomershine

BY

Staley & Welch

ATTORNEYS

Patented Jan. 24, 1933 1,895,309

UNITED STATES PATENT OFFICE

ADAM BOOMERSHINE, OF DAYTON, OHIO

STRETCHING AND SECURING MEANS FOR FLEXIBLE MATERIAL

Application filed October 12, 1931. Serial No. 568,493.

This invention relates to means for stretching flexible material, such as fibrous cloth, wire cloth or the like, over a frame and securing the same in position on the frame in a taut condition.

The object of this invention is to provide means of the character referred to which will be simple in construction and effective in operation.

A further and more specific object of this invention is to provide stretching and securing means of the character referred to, in such a nature that such means will act initially to engage the marginal portion of the flexible material and thereafter hold such marginal portion of the material during the stretching operation.

A further object of my invention is to provide stretching devices for stretching flexible material over a frame of such a character that a more uniform tension may be applied to the material than with stretching devices heretofore employed and any spots of unstretched material may be readily removed without the necessity of releasing or increasing the tension upon the material as a whole.

In the accompanying drawings:

Fig. 1 is a perspective view partly broken away and shown in section of a frame and the stretching and securing device associated therewith, showing a piece of flexible material stretched over the frame and secured thereto.

Fig. 2 is an enlarged section through one of the side members of the frame showing a portion of a piece of fabric which has been laid over the frame ready to be stretched and secured.

Fig. 3 is an enlarged section through one of the members of the frame and one of the stretching and securing devices showing the manner in which the stretching and securing device is initially applied.

Fig. 4 is a view similar to Fig. 3 but showing the stretching and securing device in partially operated position.

Fig. 5 is a view similar to Figs. 3 and 4 but showing the stretching and securing device in fully operated position, this being a section on the line 5—5 of Fig. 1.

Fig. 6 is a perspective view of a modified form of frame and stretching and securing devices.

Fig. 7 is a section on the line 7—7 of Fig. 6.

Fig. 8 is a section on the line 8—8 of Fig. 7.

Fig. 9 is a section on the line 9—9 of Fig. 7.

Fig. 10 is a section through one of the frame members of another modified form of frame and also through one of the stretching and securing devices, showing a piece of fabric stretched thereover and secured thereto.

Fig. 11 is a detailed sectional view of a modified form of the invention.

Referring first to Figs. 1 to 5 inclusive, there is shown a square flat frame, the side members of which are each represented by 1. This frame may be constructed from any suitable material but in the present case is shown as a metal one. Each side frame member has a depressed laterally projecting portion 2 the depression being preferably in the form of a shallow channel 3. Each channel 3 is provided with a groove 4 which extends the full length thereof, this groove being formed in the present case by placing in the channel a metallic plate 5 which is less than the width of the channel and so positioned as to have the groove 4 occur at the outer side of the channel. With a frame of this form and dimensions four stretching and securing devices are employed, each of these stretching and securing devices consists of a flexible metallic strip 6 having the outer edge thereof bent at an angle as indicated at 6′. Each strip is also provided with a series of transversely elongated openings 7 to loosely receive screws 8 which are adapted to be loosely extended through the plate 5 and threaded in screw-threaded openings 9 in the frame part 2.

In operation when it is desired to stretch a piece of flexible material over this frame and secure the same in taut condition thereto, a piece of material of suitable dimensions, indicated at 10, is first laid over the frame as indicated in Fig. 2. The metallic strips 6 and their screws are then placed in position as indicated in Fig. 3, in which position it

will be noted that the free edge of the bent portion 6′ of each strip is pressing the marginal edge of the material into the groove 4, thus bringing the material in fairly taut condition over the frame. The screws of all the strips are then gradually tightened one by one which causes the metallic strips to be tilted toward the bottoms of the channels 3, the outer edges 6′ of the bent portions of the strips firmly holding the marginal edges of the material by pressing the material into the grooves 4 while the inner edges of the strips engage the inclined portion of the material and gradually tightly stretch the material over the top of the frame 1.

In Fig. 4 the material is shown in partially stretched condition, which may be sufficient in connection with some materials, while in Fig. 5 the material is shown in fully stretched condition. By reason of the elongation of the openings 7 the necessary relative movement between the strips 6 and the screws 8 is permitted, the width of these openings being less than the diameter of the heads of the screws so as to insure a contact between the heads of the screws and the strips during the stretching and clamping operation.

In Figs. 6 to 9 inclusive there is shown a modification in which the frame, indicated at 11, is of semi-circular formation, the frame in this case being a metal one. This frame 11 has channels 12 about its marginal edges and grooves 13 formed by the plates 15. Two opposite sides of this frame have flexible securing strips 16 which extend for the full length of the frame but the stretching and securing devices at the other sides of the frame are formed of a plurality of short plates 17 in order to allow such devices to conform to the curvature of the channels at those sides of the frame. The long strips 16 have the same bent portions 18 as the portions 6′ of the strips 6 with the exception that they are bent more nearly at a right-angle to the strips, and each of the short strips 17 have similar bent portions 19, for the purpose of engaging and pressing the fabric into the grooves. Each of the strips 16 and 17 are provided with elongated openings to receive the screws 20 and the manner of stretching and securing the material in this frame is the same as that previously described in connection with the square frame.

In Fig. 10 there is shown a modification in which the frame 21 is formed of pressed steel, the parts of which are welded together. Each side frame member in this case has a channel 22, plates 24 to form the grooves 23, flexible stretching and securing strips 25, and screws 26. In this case after the material has been stretched and secured, cover-plates 27 are preferably inserted and suitably secured in position in order to conceal the stretching and securing devices.

In Fig. 11 there is shown another modification of the invention in which 28 represents the raised portions of the frame and 29 is the depressed portion. In this case the marginal edge of the material to be stretched is secured to the depressed portion by tacks 30, or other suitable securing devices of that character. One of the flexible strips for applying the desired tension to the material is indicated at 31, this strip having a bent outer edge 32 which rests upon the depressed portion of the frame outside of the marginal edge of the material. The strip has a series of slotted openings, one of which is indicated at 33, to receive screws one of which is shown at 34. After the material has been stretched to a fairly taut condition and secured by the tacks 30, the strip 31 is depressed by turning the screws into the frame to cause it to engage the inclined portion of the material and properly tension the same.

One of the purposes of this invention is to stretch cloth such as bolting over a frame which is used for process painting, the cloth in this case being silk or metal cloth of fine mesh. It is obvious, however, that this invention is equally applicable to other purposes such as the stretching and securing of metal cloth in the frames of screen doors or windows, the purpose of the invention being to stretch and secure in a taut condition any kind of flexible material including fibrous cloth of all sorts, wire cloth and the like.

By this invention it will be seen that in the operation of stretching the material over the frame, the stretching and securing devices will first engage the marginal edges of the material and firmly hold the edges of the material while the operation of stretching the material over the frame is being performed. These devices are extremely simple in construction and very effective for the purpose of uniformly stretching material in all four directions over the frame so that distortion of the material is obviated.

One of the advantages of the invention resides in the employment of flexible stretching strips with a plurality of means for drawing the strip toward the depressed portions of the frame, this arrangement enabling the operator to remove any spots of unstretched material which may exist without disturbing the stretching device as a whole, by simply tightening those screws which are in line with the unstretched spot both laterally and longitudinally of the frame, the flexible character of the stretching strip permitting of such manipulation. In other words, after the stretching strips have been drawn to position by the screws, any portion thereof may be further tightened by reason of their flexibility, to produce additional tautness in certain portions of the material without the necessity of either loosening or tightening other portions of the strips.

Having thus described my invention I claim:

1. In a device for stretching and securing flexible material in taut condition, a frame having a marginal depressed portion, and a plurality of stretching and clamping strips, the outer edges of each strip being formed to initially engage the marginal portion of the material and clamp the same to the depressed portion of the frame, the inner edge of each strip being formed to engage the material at a point intermediate the outer edge of the strip and the surface of the frame over which the material is placed, and means to draw the strips gradually towards the depressed portion of the frame and hold the same in that position.

2. In a device for stretching and securing flexible material in taut condition, a frame having a marginal depressed portion, and a plurality of stretching and clamping strips, the outer edge of each of which is angularly bent to engage the marginal portion of the material and clamp the same to the depressed portion of the frame, the inner edge of said strip adapted to engage the material at a point intermediate the outer edge of the strip and the surface of the frame over which the material is placed and means to draw the strip gradually towards the depressed portion of the frame and hold the same in that position.

3. In a device for stretching and securing flexible material, a frame having depressed marginal channels, and strips in said channels together with means for gradually drawing the strips towards the bottom of the channels, the outer edge of each strip being formed to initially engage the marginal edge of the material in the channel and the inner edge of the strip adapted to engage the material at a point intermediate the outer edge of the channel and the surface of the frame over which the material is placed.

4. In a device for stretching and securing flexible material, a frame having a marginal depressed channel, said channel having a groove extending along the outer side thereof, and a stretching and clamping strip, together with means for drawing the same towards the bottom of the channel, the outer edge of said strip being bent and adapted to initially engage the material and press the same in said groove, the inner edge of said strip being adapted to engage the material between the groove and the surface of the frame over which the material is placed.

5. In a device for stretching and securing flexible material, a frame having a marginal depressed channel, said channel having a groove extending along the outer side thereof, and a stretching and clamping strip, together with means for drawing the same towards the bottom of the channel, the outer edge of said strip being bent and adapted to initially engage the material and press the same in said groove, the inner edge of said strip being adapted to engage the material between the groove and the surface of the frame over which the material is placed, said means for drawing the strip toward the bottom of the channel consisting of a plurality of screws extended through slotted openings in said strip and engaged with threaded openings in the bottom of said channel.

6. In a device for stretching and securing flexible material, a semi-circular frame having flat depressed portions at two opposite sides and circular depressed portions at the other two opposite sides, and stretching and clamping members together with means for securing same to said depressed portions, each of said clamping members having a part arranged to engage the marginal edge of the material to clamp the same to the depressed portion and another part to engage the material between said clamping part and the surface of the frame over which the material is placed, together with means to draw the members toward the depressed portion of the frame, the clamping members for the circular depressed portions consisting of a plurality of separate parts of short length.

7. In a device for stretching and securing flexible material, a semi-circular frame having flat depressed portions at two opposite sides and circular depressed portions at the other two opposite sides, and stretching and clamping strips together with means for drawing said strips toward the depressed portions, each strip having an outer edge to initially engage the marginal edge of the material to clamp the same, the other edge of each strip arranged to engage the material between the outer edge thereof and the surface of the frame over which the material is placed, the strips in the circular depressed channels being of comparatively short length.

8. In a device for stretching and securing flexible material in taut condition, an open frame having marginal depressed portions over which the fabric is placed with the marginal portions of the fabric overlying the depressed portions of the frame, a series of flexible stretching strips disposed over the fabric on the depressed portions of the frame, and a series of securing devices placed at intervals on each depressed portion of the frame to independently engage different portions of the flexible stretching strips to cause the same to stretch the fabric over the raised portion of the frame, each securing device being independently operable whereby different portions of each flexible strip may be independently tightened or relieved.

9. In a device for stretching and securing flexible material in taut condition, an open frame having marginal depressed portions over which the fabric is placed with the marginal portions of the fabric overlying the de-

pressed portions of the frame, and a series of screws threaded into the depressed portions of the frame and disposed at intervals on such depressed portions, said screws extending through apertures in the stretching strips whereby their heads independently engage different portions of a flexible strip to cause the same to tighten the fabric over the raised portion of the frame, said screws being independently operable whereby different portions of each flexible strip may be independently tightened or relieved.

In testimony whereof, I have hereunto set my hand this 6th day of October, 1931.

ADAM BOOMERSHINE.