June 23, 1931. R. L. HARTWELL 1,811,081

COMPOSITE METALLIC FABRIC

Filed Dec. 8, 1928 2 Sheets-Sheet 1

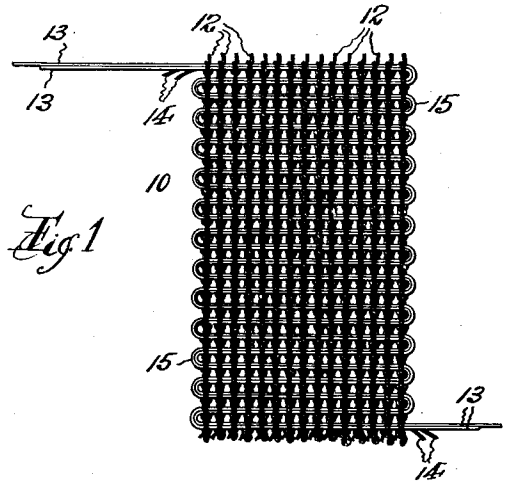


Fig. 1

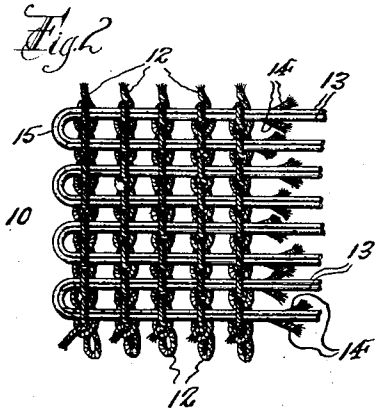


Fig. 2

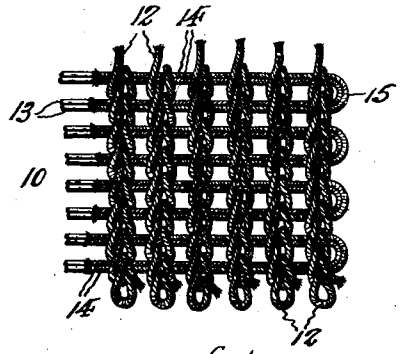


Fig. 3

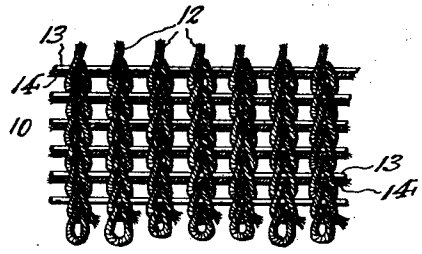


Fig. 4

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COMPOSITE METALLIC FABRIC

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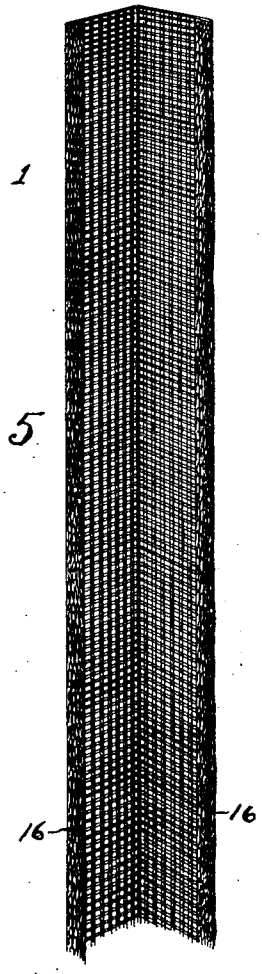


Fig. 5

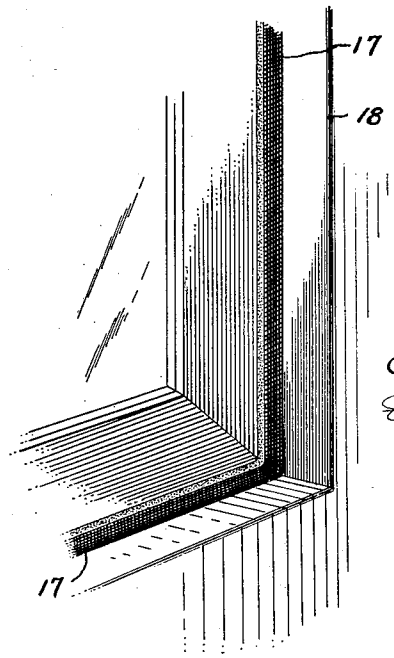


Fig. 6

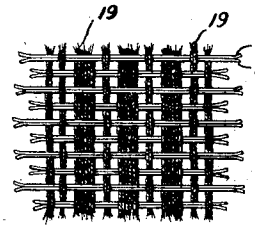


Fig. 7

Fig. 8



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UNITED STATES PATENT OFFICE

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COMPOSITE METALLIC FABRIC

Application filed December 8, 1928. Serial No. 324,638.

This invention relates, generally, to improvements in fabrics; and the invention has reference, more particularly, to a novel type of fabric which is so constructed that when the same is bent or deformed into desired shapes it will remain in such shapes when the deforming forces are removed.

One of the objects of the invention is to provide a fabric of the above character which possesses relatively great and uniform strength and which is highly resistant to wear and abrasion.

Another object of the invention lies in the provision of a fabric of the above character wherein the various strands are thoroughly bonded together so that there is no relative motion between the strands which would result in wear.

Still another object of the invention is to provide a fabric of the above character that is so constructed that it will not fray out at the side edges even when a selvage edge is not employed and which nevertheless is well adapted to have selvage edges when desired.

In carrying out the invention, continuous composite weft threads, which are preferably looped at the sides of the fabric, are adapted to be knitted or interwoven with suitable fibre warp threads. The composite weft threads are preferably composed of a plurality of strands of metallic material and fibre material arranged in superimposed relation, such that when the fabric is viewed from one side the metallic strands are not seen whereas when viewed from the other side these metallic strands or threads are seen. The loops of the composite weft threads formed at the sides of the fabric prevent the fraying of warp threads and add to the strength of the fabric. When the fabric is deformed so as to effect the bending of the metallic weft threads, the rigidity and strength of these threads act to retain the fabric in its deformed shape after the deforming forces are removed.

Other objects of this invention, not at this time more particularly enumerated, will be clearly understood from the following detailed description of the same.

The invention is clearly illustrated in the accompanying drawings, in which:—

Fig. 1 is a plan view of the novel fabric of this invention looking at one surface thereof;

Fig. 2 is an enlarged detail view of a portion of the structure shown in Fig. 1;

Fig. 3 is a view similar to Fig. 2, but looking at the opposite side of the fabric;

Fig. 4 is a view similar to Fig. 2, but illustrating a modified form of the invention;

Fig. 5 is a view of the fabric bent into form suitable for some uses and having a wide selvage edge;

Fig. 6 illustrates the use of the fabric as weather-stripping for windows;

Fig. 7 is a fragmentary plan view of a modified form of the fabric; and

Fig. 8 is an edge view of the fabric somewhat similar to that shown in Fig. 7.

Similar characters of reference are employed in all of the hereinabove described views, to indicate corresponding parts.

Referring now to Figs. 1 to 3 of said drawings, the reference character 1 designates the novel fabric of this invention as a whole. Fabric 1 is built up of fibre warp threads 12 such as vegetable or animal fibre threads and the combination of continuous metallic threads 13 and continuous fibre threads 14 forming composite weft threads. The weft threads 13 and 14 forming the composite weft thread are looped at the sides of the fabric 1 as at 15. The warp threads 12 are illustrated as attached to the weft threads 13 and 14 by use of the chain stitch but it is to be understood that any other form of knitting or weaving may be employed for interlocking the warp with the weft threads. The weft fibre threads 14 overlie the weft metallic threads 13 so that when the fabric is viewed from one side as illustrated in Fig. 3, only the fibre warp and weft threads are seen and the metallic threads or strands are hidden from view giving the fabric the ordinary homogeneous appearance of a knit, or woven vegetable or animal fibre thread fabric. However, the other side of the fabric shows the metallic weft threads crossed by

the fibre warp threads as illustrated in Figs. 1 and 2.

The metallic weft threads 13 are preferably made of a non-corrosive metal such as copper. Although these threads are illustrated as having a circular cross-section it is to be understood that they may have any other desired cross-section such as square or rectangular. Two continuous metallic weft threads and two continuous fibre weft threads are illustrated in the form of the invention shown in Figs. 1 to 3 but fewer or greater number of such weft threads may be employed if desired. For example, in Fig. 4 the fabric 1 is shown as having but a single metallic weft thread 13 positioned alongside a single fibre thread 14.

The metallic weft threads 13 gives the fabric 1 great transverse strength and wearing qualities while not appreciably lessening the flexibility of the fabric when the same is bent or folded transversely of its width. When the fabric is bent so as to cause the bending of the metallic weft threads, these threads act by their stiffness and rigidity to retain the fabric in the form into which it is bent, which renders the fabric of this invention highly desirable for a plurality of uses, such as weather-stripping, welts, gimps, bindings, etc. The knitting or weaving of the metallic strands into the body of the fabric secures a rigid bond between the fibre and metal strands and prevents relative movement of the different strands as well as any tendency for the fibre strands to fray off. Also, the use of continuous weft strands with the loops 15 at the sides of the fabric positively prevents fraying of the warp threads at the sides of the fabric. If desired, a selvage edge of any thickness may be attached to the sides of the fabric. This is illustrated especially in Fig. 5, wherein rather wide selvage edges 16 are formed at the sides of the fabric 10. The fabric 10 in this figure is illustrated as bent angularly across the metallic weft threads which act by their stiffness to retain the fabric in its angularly bent form. Since these metallic threads constitute a portion of each weft element of the fabric, they give the fabric a uniform strength throughout its area thereby enabling it to resist wear and abrasions uniformly without the possibility of failure at certain spots.

In Fig. 6 the novel fabric of this invention is shown as employed as a weather-strip 17 for a window 18. Here the great strength, uniform wearing qualities and ability to retain a desired shape possessed by the novel fabric of this invention is particularly noticeable. Inasmuch as the loops 15 prevent the fraying out of the warp threads, there is no need for a selvage edge in connection with the fabric of this invention. Also, inasmuch as the metallic threads cannot be seen with the fabric arranged as shown in Fig. 3, the weather-strip 17 presents a neat and attractive appearance.

In the form of the invention illustrated in Fig. 7, the warp and weft threads of the fabric are illustrated as interwoven in the ordinary manner. The warp threads 19, however, are shown as arranged in spaced groups varying in numbers of threads, thereby illustrating how various pattern effects may be obtained. If desired, the fibre weft threads may be omitted. In Fig. 8 the fibre weft threads 14 are shown in superimposed relation with the metallic weft threads 13 and the warp threads 19 are arranged in groups having similar numbers of threads.

It is to be understood that varying numbers of fibre weft threads may be combined with one or more metallic weft threads in forming the weft of the fabric. Thus, three or more fibre weft threads may be combined with one or more metallic weft strands.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:—

1. A fabric comprising a body composed of fibre warp threads and continuous metallic and fibre weft threads arranged in superimposed substantially parallel relation, said metallic constituent of said weft thread serving to stiffen said fabric transversely uniformly throughout the area thereof, whereby said fabric is caused to be readily flexible about transverse axes passing therethrough and is relatively rigid about longitudinal axes passing therethrough.

2. A fabric comprising a body composed of spaced fibre warp threads and spaced composite weft threads consisting of metallic threads and complementary fibre threads, said metallic threads extending in straight lines across said fabric with said complementary fibre threads in overlying relation therewith, whereby said metallic threads are substantially hidden from view when said fabric is viewed from its finished surface.

3. A fabric comprising a body composed of spaced fibre warp threads and spaced composite weft threads consisting of metallic threads and complementary fibre threads overlying said metallic threads, said composite weft threads being looped at the sides of said fabric, said complementary fibre threads serving to obscure said metallic threads when said fabric is viewed from one face thereof.

4. A fabric comprising a body composed of spaced fibre warp threads and spaced composite weft threads consisting of metallic threads and fibre threads extending sub-

tially parallel across said fabric and being looped at the sides of said fabric, said fabric, when deformed so as to bend said metallic threads, acting to retain its deformed shape, said fabric being easily flexible at right angles to the length of said metallic weft threads since said fibre warp threads are relatively flexible.

In testimony, that I claim the invention set forth above I have hereunto set my hand this 7th day of December, 1928.

RALF L. HARTWELL.