March 26, 1940. H. C. MARTIN 2,194,860

NAPPED ELASTIC FABRIC

Original Filed Aug. 24, 1937

Fig. 1.

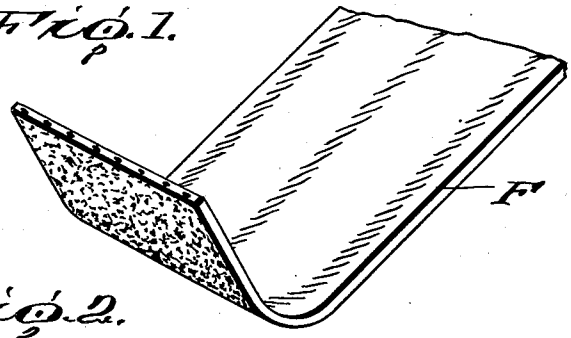


Fig. 2.

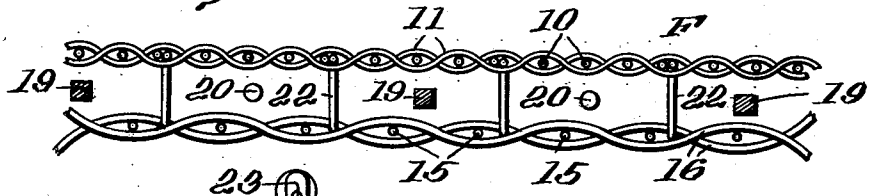


Fig. 3.

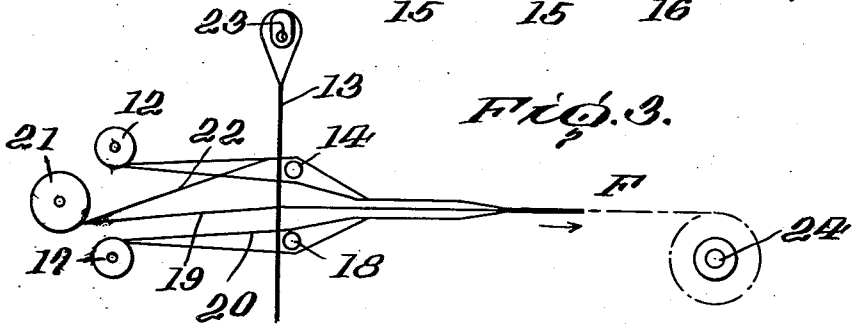


Fig. 4.

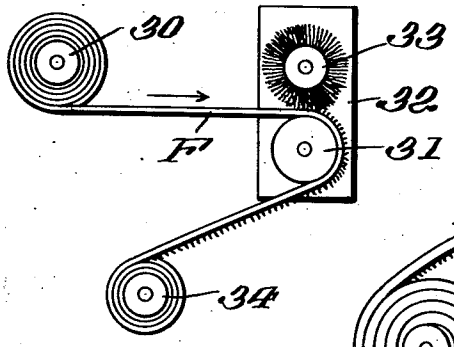
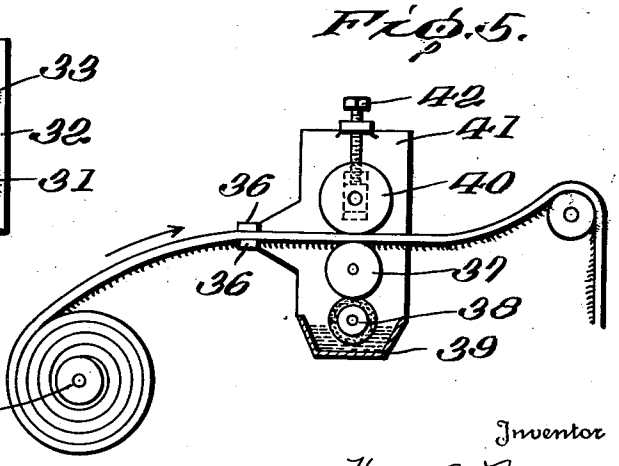


Fig. 5.



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UNITED STATES PATENT OFFICE

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NAPPED ELASTIC FABRIC

Horace Chesterton Martin, Middlesboro, Ky.

Application August 24, 1937, Serial No. 160,696
Renewed January 29, 1940

1 Claim. (Cl. 139—423)

This invention relates to a woven elastic article having a napped surface, and to the method of making the same.

As set out in my copending application Serial No. 160,697, filed on even date herewith, a napped woven article including elastic means can be employed in making gloves and like articles which have no lining, as the napped surface satisfies the normal function of a lining for the wrist portion of such an article and is devoid of certain defects which are inherent in the normally lined articles. The present application concerns a fabric which may be utilized in such articles, and to the method of making such a fabric, but it will be understood that the fabric may be employed for other purposes than that described specifically in my said application.

According to the present invention, a woven fabric is provided with a pattern side and with a napped side, and is prepared with elastic threads so that it may be stretched during employment. It is made by weaving complete plies of warp and weft threads for forming the outer and inner plies, with elastic warp threads and preferably with stuffer warp threads laid between the plies, and with binder warp threads which pass from ply to ply for securing the same together and for holding the stuffer and elastic warps in place. Such a fabric is then subjected to a brushing operation for raising a nap on the exposed surface of the inner ply, and then is preferably dyed by a printing operation to provide a desired color on the napped surface, while the exposed surface of the outer or face ply is provided with a desired pattern during the weaving operation itself. It will be understood that the expression "outer ply" is used to designate a ply for providing a facing surface, and the expression "inner ply" is used to designate a ply upon which a napped surface may be provided, regardless of the positioning or location of these plies in the final article produced.

An illustrative form of practicing the invention is shown on the accompanying drawing, in which:

Fig. 1 is a perspective view of a section of fabric as prepared.

Fig. 2 is an enlarged view showing a section taken at a right angle to the warp threads, and indicating diagrammatically the relative position of warp and weft threads.

Fig. 3 is a diagrammatic view indicating the weaving of the fabric.

Fig. 4 is a similar diagrammatic view indicating the nap of the fabric.

Fig. 5 is a similar diagrammatic view indicating the printing of the fabric.

As shown in Figs. 1 and 2, a piece of fabric F is woven of uniform width and with selvages at its edge. When the article is to be employed for making gloves or like articles, the loom is preferably so set up and arranged that the width of the fabric corresponds to the width of material to be employed in making the glove.

This fabric is comprised of the facing warp threads 10 which are woven with the facing weft threads 11 in the usual way, these warp threads being taken from the spools 12 (Fig. 3) and passed through the eyes of the heddle frames 13 for such warp threads while the weft threads are provided from a shuttle 14. Likewise, the inner ply of the fabric is provided by warp threads 15 joined by weft threads 16. The warp threads 15 may be taken from the spools 17 and passed through corresponding eyes in the heddle frames 13, while the weft threads are provided from a shuttle 18 (Fig. 3). Likewise, the elastic rubber threads 19 and stuffer threads 20 may be taken from spools 21 and thus carried into the fabric between the two plies as these are formed. The elastic threads 19 are maintained under tension during the weaving, and the fabric is formed under "full stretch", so that it is shortened by the action of the elastic threads upon release of the tension, in bringing the fabric to its normal condition. Thus, the fabric may thereafter be extended for say 80% of its normal length, by stretching. Since the weft threads are woven from a usual shuttle arrangement, the fabric has no "stretch" transversely and hence maintains its form in service.

In addition to the warp threads of the inner and outer plies, and in addition to the stuffer and elastic warp threads, the fabric is also provided with binder warp threads 22 which may be taken from spools in the rows 12, 17 or 21, and are passed through eyes of appropriate heddle frames 13 so that these binder threads are passed successively to receive weft threads as made by the shuttles 14 and 18 and thus operate to hold the plies together and tightly upon the elastic threads 19.

In the conventional diagram of Fig. 3, the heddle frames 13 are indicated as moved in proper order and relationship to one another by cams on the cam shaft 23, while the finished fabric is taken up on a receiving beam 24.

It will be noted that warp threads of various colors may be employed for forming the facing ply, and thus giving the desired pattern which

extends along the length of the fabric, in this illustrative form, such a pattern being indicated by the shading lines in Fig. 1 at the upper surface of the fabric F.

The fabric thus produced is then delivered from a roll 30 (Fig. 4) over a guiding roller 31 which is mounted on a frame 32 opposite a rapidly revolving steel brush 33, so that this brush 33 encounters the threads of the inner ply and effects a napping thereof, without cutting through these threads and injuring the desired strength of the fabric. The napped fabric is then rewound upon a receiving roller 34.

In Fig. 5, the fabric is delivered from a roller 35 (which may be the receiving roller 34 transferred for this operation) through guide members 36 and over a printing roll 37. In the illustrative form, the fabric is being printed in a solid color, that is, the same dyestuff is being employed from one edge of the fabric to the other, and throughout its length. This roller 37 may be of copper prepared for transferring a dyestuff to the napped surface of the fabric. A revolving brush 38 receives the dyestuff from a fountain 39 and delivers it in the desired quantity to the surface of the printing roller 37. Above the printing roller is provided a counter-pressure roller 40 which is adjustably mounted in the frame 41 so that its pressure may be regulated by a screw device 42. The printed fabric is permitted to dry and is then ready for service.

In manufacturing the fabric, the thread counts and number of ends employed will be determined by the width, thickness and strength demanded. It has been found advantageous, in manufacturing a fabric of this nature for employment in the wrists of gloves, to make it about 2½ inches wide, employing 140 thread ends for the facing warps 10 for the body of the fabric, and using 12 ends of 40/2 thread at each edge for providing the selvage and visible portion at these edges. The back was formed of 74 ends of 12/2 thread. Nineteen elastic threads were inserted, and 18 ends of 16/2 stuffer warp threads. The binder consists of 32 ends of 24/2 thread. This gives a strong fabric, in which the inner and outer plies are sufficiently strong to avoid the formation of wrinkles or puckers by the pull of the elastic threads, and to provide a sufficient body at the inner or back ply for the formation of a proper nap thereat.

Although the invention has been described with respect to a specific embodiment, it will be understood that neither the fabric nor the method of making the same is limited to such a specific embodiment, but may be modified in many ways within the scope of the appended claim.

I claim:

An elastic fabric comprising a face ply comprising warps and wefts and a back ply comprising warps and wefts said back ply being of fewer warp threads than said face ply, spaced binder warps connecting said plies together, stuffer warps and elastic warps enclosed between said plies, said stuffer warps and elastic warps alternating and each being separated from the other by one of the said binder warps, and said back ply being napped.

HORACE CHESTERTON MARTIN.