

(Specimens.)

J. COOPER.
ELASTIC KNIT FABRIC.

No. 471,349.

Patented Mar. 22, 1892.

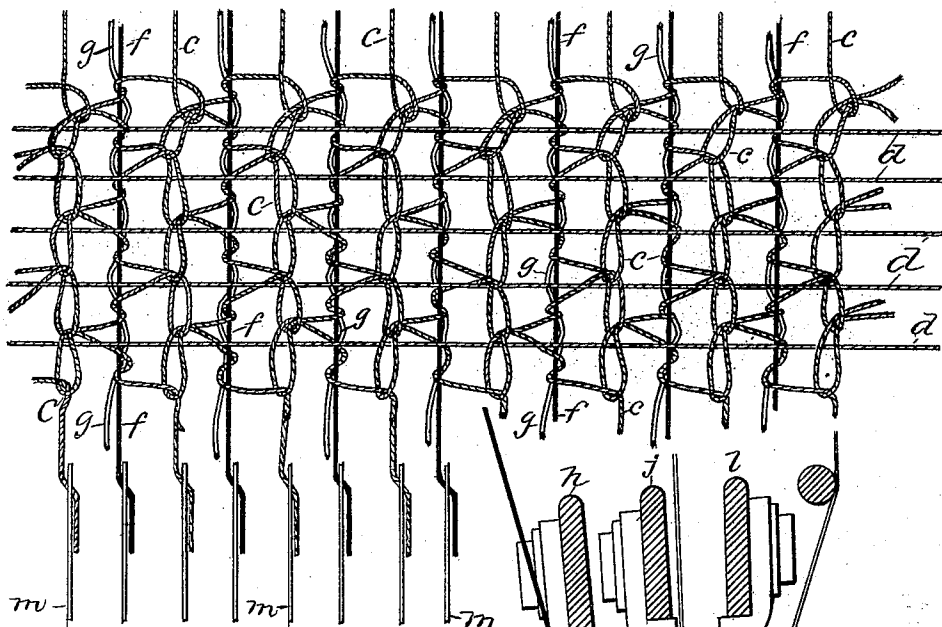


FIG. 1.

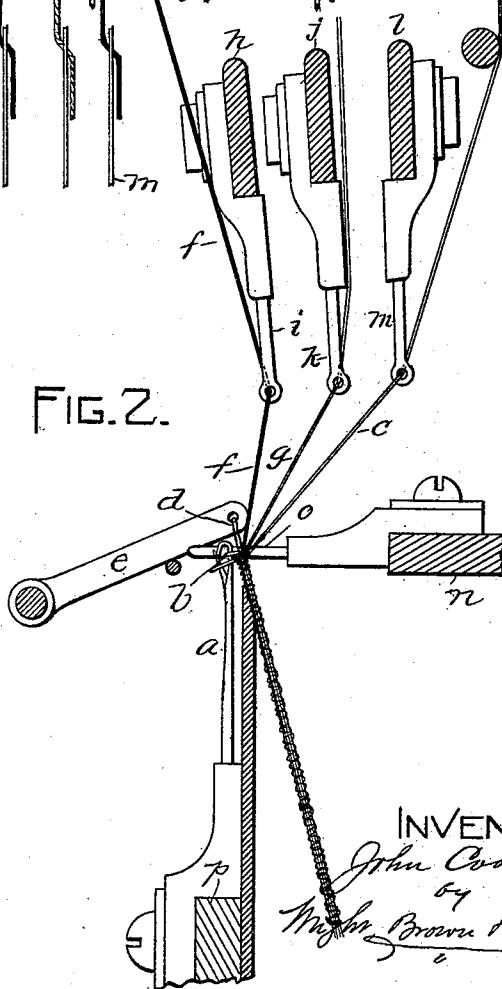


FIG. 2.

WITNESSES.
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UNITED STATES PATENT OFFICE.

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ELASTIC KNIT FABRIC.

SPECIFICATION forming part of Letters Patent No. 471,349, dated March 22, 1892.

Application filed June 12, 1891. Serial No. 395,977. (No specimens.)

To all whom it may concern:

Be it known that I, JOHN COOPER, of Canton, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Elastic Knit Fabrics, of which the following is a specification.

The invention relates to that class or kind of elastic fabrics in which strands of rubber or caoutchouc are introduced, in order to render them extensible to a high degree and suit them for use as gores in the ankle portion of certain kinds of boots and shoes and also as suspenders and other garment-supporters, &c.

It is the object of the invention to provide an improved elastic fabric having structural characteristics, which render it serviceable in a very high degree.

The invention also consists of a warp-knit fabric having strands of rubber bound thereto and covered by a separate warp-thread, and transverse or weft threads also tied or bound to the warp or body fabric, all as hereinafter more fully described, and subsequently pointed out in the claim.

The drawings and letters of reference marked thereon hereto annexed form a part of this specification, the same letters designating the same parts or features, as the case may be, wherever they occur.

In the drawings, Figure 1 is a face view of my improved fabric greatly distended, the loops being represented as unduly long and the meshes as open to an exaggerated extent, in order the better to show the structural characteristics of the fabric. Fig. 2 is a diagram, partly in section, showing a part of the means employed in the production of the fabric and serving also to explain the mode of procedure practiced to form the fabric.

In carrying out my invention I may employ a series of needles *a*, having loops *b* formed thereon from a thread *c* in the well-known manner of knitting what is known as a "warp" fabric—that is, by providing as many threads as there are needles in the series and laying each thread first upon one needle, forming a loop, then laying the said thread upon the next adjacent needle, again forming a loop, then laying the said thread upon the first-mentioned needle, and so on, so that each thread will be laid upon its adjacent pair of needles, as it were, in the form of a figure

eight (8.) With a series of needles holding loops, as aforesaid, I proceed, first, to lay in a weft-thread *d* upon the backs of the needles, which may be done by means of a guide *e*, moved along the row or series. I next lay strands of rubber *f* upon the backs of the needles by moving each guide *e*, carrying a strand *f* to the extent of two needles—that is, so as to lay each of the rubber strands across or upon the backs of two or a pair of needles by moving the guide-bar *h* longitudinally, after which the said guide-bar is rocked so as to move each guide *e* forward between the pair of needles over which it operates and the adjacent needles, in order that the said guides and rubber strands may be out of the way of the guides and threads to be subsequently operated. I then cover threads *f* upon the backs of the needles by moving the guide-bar *j* and guides *k* in a way precisely the same as that described with respect to the guide-bar *h* and guide *e*, so as to lay the threads *g* upon the needles in a manner similar to that in which the strands *f* were laid thereon. I next lay the warp-threads *c* into the hooks of the needles after the manner of knitting "warp fabrics," so called, and form a new loop. During the operation of drawing the needles to form new loops the guide-bars are rocked so as to move the guides back on the same line as that upon which they were moved forward, so that the guides may be shogged in the opposite direction for the next series of loops. In the way described I am enabled rapidly and economically to produce a fabric having a high degree of elasticity in the direction in which the rubber strands extend and non-elastic in a transverse direction or on the line of the weft-threads, and having also a firm and durable body formed from the warp-threads, the strands of rubber being bound or tied to the body fabric by the weft and binding warps, the latter serving at the same time to cover the rubber strands on the back of the goods and not appearing upon the face thereof, as will be clearly understood by an inspection of Fig. 1 of the drawings.

In the production of a fabric, such as is represented in Fig. 1 of the drawings, the knitting will have been begun at the top and ended at the bottom—that is, the loops at the bottom represent those last formed. It will

be observed, of course, that a less number of strands of rubber than one for each of the needles in the series may be employed, and that similar formal changes may be made without departing from the nature or spirit of the invention.

h designates a guide-bar provided with guides for the rubber strands.

j is a bar provided with guides *k* for the binding-warps.

l is a bar having a series of guides *m* for the body-warps *c*, and *n* is a bar equipped with points or fingers *o*, adapted to be passed between the needles to hold the fabric down as the needles rise to receive thread for new loops.

p is the needle-bar.

It will be understood that the several bars are movable by hand or any suitable instrumentality for the purpose of laying the threads upon the needles and accomplishing the results described. It will also be understood, of course, that the fabric shown in the drawings is represented as greatly distended in the direction of the rubber strands, so that the several threads are out of their normal positions, and so that the rubber strands have the appearance of extending upon a straight line in the goods, and as though the guides carrying the same had not been shogged at all, and so that the covering-threads *g* appear to run on a waved line on the backs of the rubber strands *f*. When the fabric is distended, as shown, the rubber strands *f* and covering-strands *g* will be drawn to position between the lines of loops formed by the warp-knitting strands *c*, and portions of the latter extending between

the lines of loops will have the appearance of being wrapped around the strands *f g*, though in fact in the process of knitting the strands *f* and *g* are lapped around or upon the threads *c*, all as will be understood by knitting artisans without further description.

The means herein shown and described form no part of the present invention, since the said means are made the subject of a separate application for a patent filed of even date herewith, Serial No. 395,978, to the specification of which application reference is made for a fuller understanding of a machine which may be employed in the production of the article forming the subject-matter of the present case.

Having thus explained the nature of my invention and described a way of practicing the same, I declare that what I claim is—

An elastic fabric embracing in its structure a ground fabric knit in warp-stitch, strands of rubber running through the fabric in one direction, weft-threads extending in the fabric at right angles to the strands of rubber, and covering-threads extending in the fabric in the direction of the rubber strands and covering the latter, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 6th day of June, A. D. 1891.

JOHN COOPER.

Witnesses:

ARTHUR W. CROSSLEY,
A. D. HARRISON.