J. W. NEWELL.

MANUFACTURE OF ELASTIC CLOTH.

No. 33,361. Patented Sept. 24, 1861.

Fig: 1.

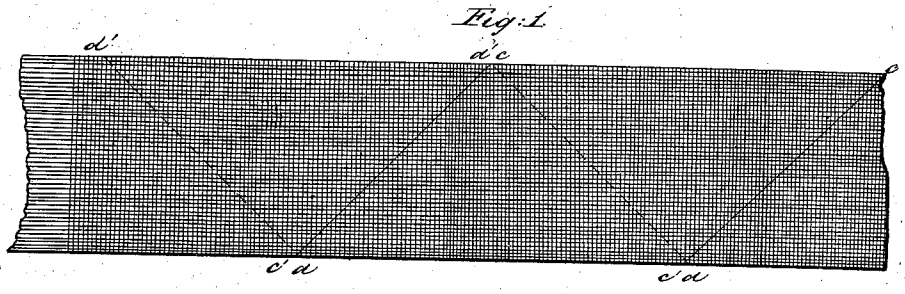


Fig: 3.

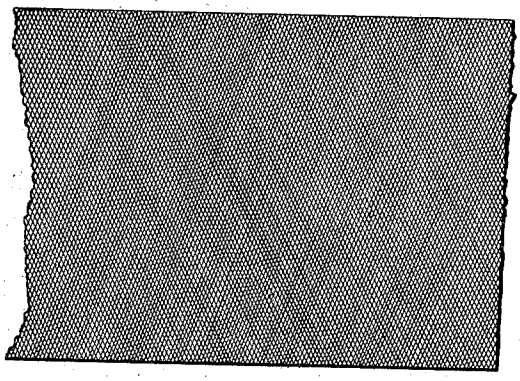


Fig: 2.

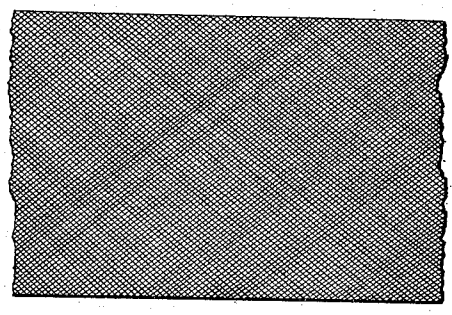
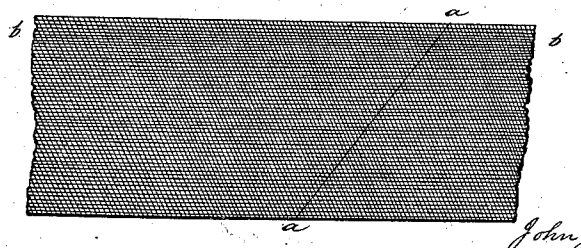


Fig: 4.



Witnesses.

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UNITED STATES PATENT OFFICE.

JOHN W. NEWELL, OF NEW BRUNSWICK, NEW JERSEY.

IMPROVEMENT IN THE MANUFACTURE OF ELASTIC CLOTH.

Specification forming part of Letters Patent No. **33,361**, dated September 24, 1861.

To all whom it may concern:

Be it known that I, JOHN W. NEWELL, of the city of New Brunswick, in the county of Middlesex and State of New Jersey, have invented a new and useful description of Elastic Cloth, which I denominate "Newell Elastic Cloth;" and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, in which—

Figure 2 represents the arrangement of the warp and weft threads of the textile material of which my new elastic cloth is in part composed.

Elastic cloths found in the market consist of combinations of india-rubber with textile materials, and may be divided into four classes, viz: first, that in which a stockinet fabric is combined with india-rubber either in sheets or in strands; second, that in which textile materials are combined with india-rubber in an extended condition either by cement or by weaving them upon the rubber, so that when the rubber is released from tension and permitted to contract the threads of the textile fabric are gathered up into waves or shirred, whence this description of elastic cloth is commonly called "shirred" or "corrugated" goods; third, that in which textile threads are braided upon strands of india-rubber; fourth, that in which a woven fabric with its warp-threads extended at an acute angle with the weft-threads is combined with india-rubber, which description of elastic cloth is known as "Solis cloth" or "Tyer and Helm cloth." Each of these classes, although useful, has defects peculiar to itself. The stockinet elastic cloth is defective on account of the peculiar stockinet surface which it presents. The shirred goods are defective because of their corrugated surface, of the cost of their manufacture, and because the rubber is divided into strands, which being separated from each other do not sustain each other. There is also a difficulty in properly securing the strands at their ends when applying the elastic cloth to other fabrics. Hence the ends of the strands frequently get loose and slip between the layers of the textile fabric, thus rendering the shirred elastic cloth valueless.

The braided goods are defective in the same respects as above stated in reference to the shirred goods, and in addition the textile surface produced by braiding opens when the elastic cloth is extended and is then loose upon the rubber strands. The Solis cloth, or that produced under the Tyer and Helm patent, presents a good surface and is free from the defects above stated in reference to the first three descriptions of elastic cloth; but as it is elastic only in a direction diagonal to its warp and weft threads, or in the direction *a a*, Fig. 4, and as one of these necessarily extends in the direction of the length of the fabric, or in the direction *b b*, Fig. 4, the fabric must be cut across in a direction diagonal to its length to procure strips which shall be elastic in the direction of their length. As the width of the fabric is practically limited by the width to which cloth can be easily woven and by the width of the calender-rollers which are employed to apply the elastic gum to it, the length of the strip of elastic cloth is necessarily limited, and it is practically impossible to make elastic strips of any great length upon the Solis and Tyer and Helm plans. Then again, as this description of cloth is used mainly for elastic gores of Congress boots, which gores are not of uniform size, but vary in dimensions according to the size of the boots, and as the length of the strips of elastic cloth is practically limited by the breadth of the cloth of which they are formed the cutting up of the strips into gores produces a large number of small remnants which are of no practical value. The Solis cloth is also objectionable from the use of a solvent of india-rubber in the cement used in its manufacture, because the solvent remaining in the fabric tends to cause it to rot or decompose.

My invention consists in an elastic cloth which is free from the defects above referred to; and it consists in a compound fabric produced by the combination of two sheets of woven cloth, obtained by cutting tubular cloth spirally, with a layer of the vulcanizable compound of elastic gum (such as india-rubber) and by vulcanizing the combined cloth and compound so as to render the combination permanent. This elastic cloth may be made of indefinite length and elastic in the direction either of its length or width, as desired, and with or without finished or turned

edges without requiring any increase in the breadth of the loom required to weave the woven cloth or in the width of the calender-rollers used in manufacturing it into elastic cloth and without the employment of a solvent for the elastic gum.

In order to produce such elastic cloth, I procure sheets of tubular cloth woven in a loom having heddles for forming two sheds and capable of throwing the same shuttle alternately through each shed. Such a loom is employed to weave bags, and the cloth produced by it has the form of a flattened tubular sheet consisting of two flat sheets united at their edges. The cloth tube may be woven of any desired length according to the length of the warp-threads used, and as these may be pieced, if necessary, a tube of indefinite length may be woven. Having procured the flat tube, I cut the upper half of it diagonally to the warp and weft threads, as shown by the lines *c c'*, Fig. 1, and extend the cut diagonally through the lower half of it in the direction of the dotted lines *d d'* of Fig. 1, so that the tube is cut spirally. The cut cloth when unfolded and extended produces a sheet, as shown at Fig. 2, in which both the warp and weft threads are oblique to the direction of its length, and which may be denominated "diagonal cloth." The length of this sheet is limited only by the length of the flat tube of which it was formed, and this, as stated before, may be indefinite. Having procured two sheets of the woven diagonal cloth in this form, I proceed to manufacture them into elastic cloth. I apply one of the sheets of diagonal cloth to a thin layer of the vulcanizable compound of india-rubber by means of the calender-rolls generally used in india-rubber and gutta-percha factories for spreading the vulcanizable putty-like compounds of these gums upon cloth. I then apply the second sheet to the opposite side of the layer of the vulcanizable compound, after which the whole is subjected to a sufficient heat to effect the vulcanization of the layer of the gum, whereby the combination of the gum and sheets of diagonal cloth is rendered permanent. The vulcanization is to be effected in stoves or heaters in the usual manner practiced in india-rubber factories. If the elastic cloth when finished is to be highly elastic in the direction of its length, I strain the two sheets of diagonal cloth sidewise before applying them to the vulcanizable compound, so as to cause the threads to assume the positions shown at Fig. 3; and if the fabric is to be highly elastic in the direction of its breadth I strain the two sheets of diagonal cloth lengthwise before applying them to the vulcanizable compound. If the fabric is to have turned edges, I cut one sheet of the diagonal cloth narrower than the other sheet, and before vulcanization I turn the margins of the wide sheet over upon those of the narrow sheet, securing the overlapping margins by means of the layer of the vulcanizable compound. The compound fabric thus obtained is distinguished from preceding fabrics, first, by the nature of the woven cloth used in its manufacture, which, as before stated, is that obtained by cutting tubular cloth spirally; second, by the mode of combining the two sheets of said cloth, which is by a layer of the vulcanizable compound of the elastic gum, third, by the mode of making the combination permanent, which is by vulcanizing it after the cloth and gum are united, and these three characteristics are essential.

Having thus described my invention sufficiently to enable manufactures of elastic cloth to practice it, I deem it proper to state that my invention is not limited to any peculiar mode of applying the cloth and gum, nor to any peculiar machinery for the purpose, as these may be varied. I have not deemed it proper to describe in detail the machinery required to weave the cloth, or to apply it to the gum, as machinery suitable for the former is well known to manufacturers of tubular cloth or bags, and machinery for the latter is well known to manufacturers of elastic cloth.

What I claim as my invention in this patent, and desire to secure by Letters Patent, is—

An elastic cloth which is a compound fabric produced by the combination of two sheets of woven cloth obtained by cutting tubular cloth spirally with a layer of elastic gum, such as india-rubber, the combination being rendered permanent by vulcanization, substantially as herein set forth.

In testimony whereof I have hereunto subscribed my name.

JN. W. NEWELL.

Witnesses:

A. D. NEWELL,

H. A. HULL.