

J. SWANN.

ELASTIC FABRIC AND ART OF WEAVING THE SAME.

No. 306,785.

Patented Oct. 21, 1884.

Fig. 1.

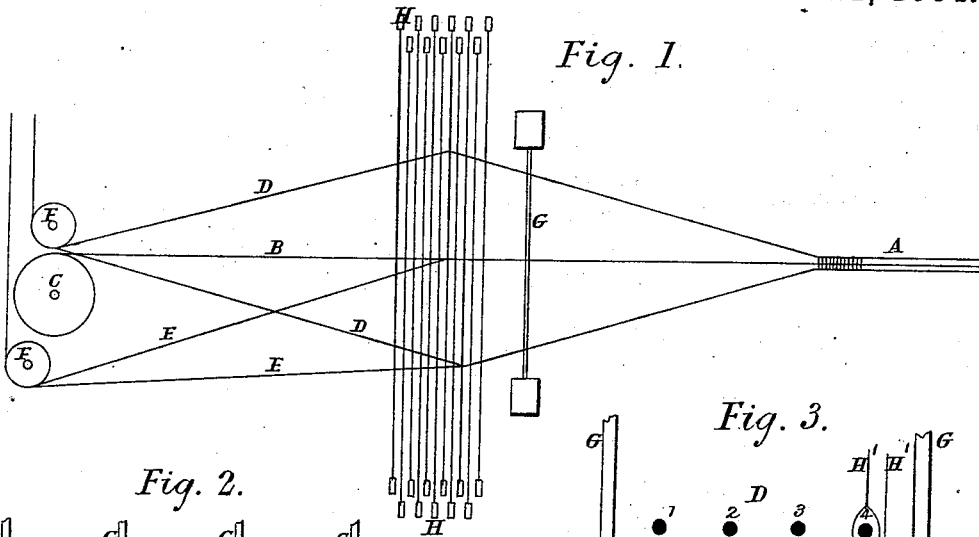


Fig. 2.

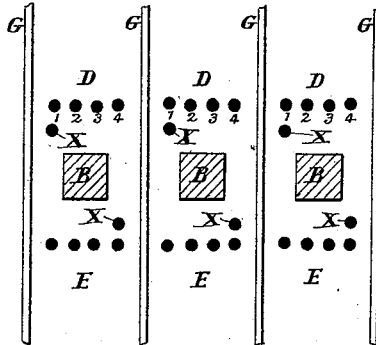
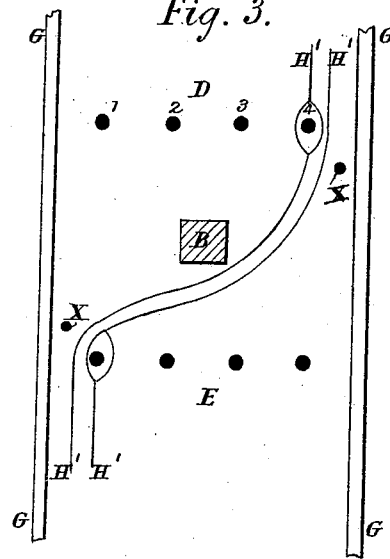


Fig. 3.



Witnesses  
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Inventor  
John Swann,  
By atty  
Maldwin, Hopkins & Peyton.

(No Model.)

5 Sheets—Sheet 2.

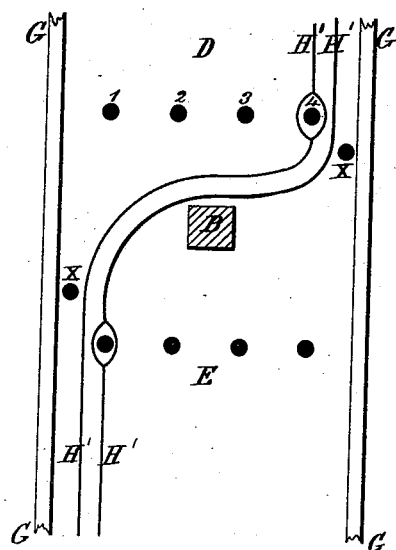
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*Fig. 4.*



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Fig. 5.

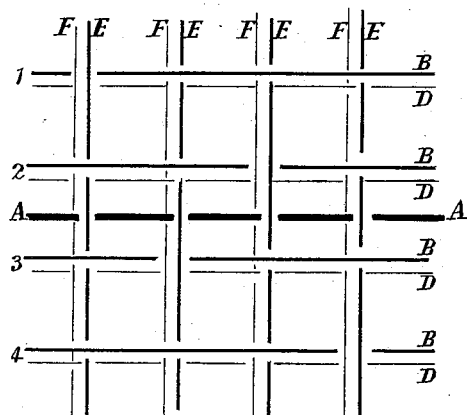


Fig. 6.

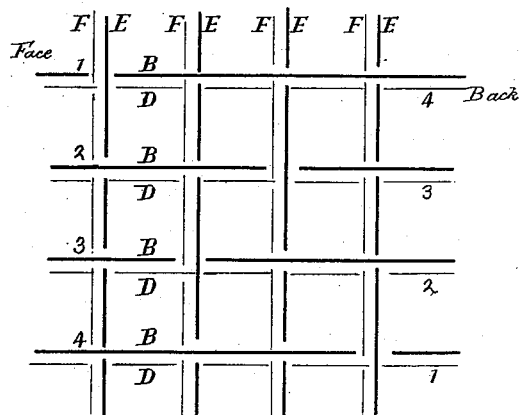


Fig. 7.

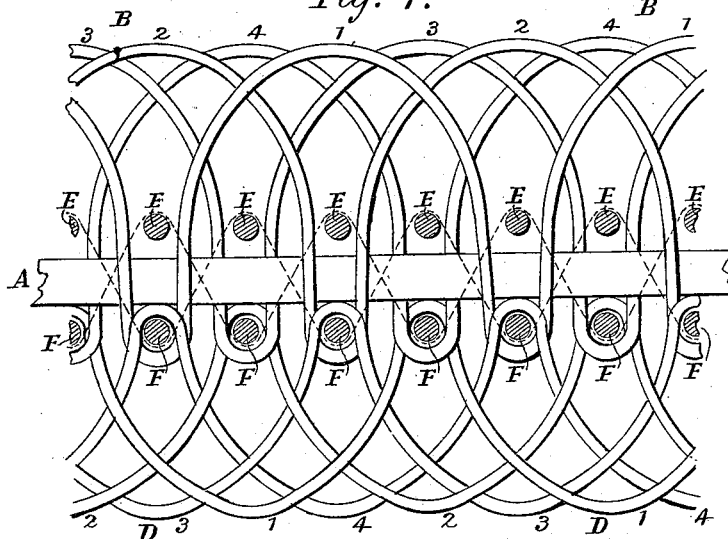


Fig. 8.

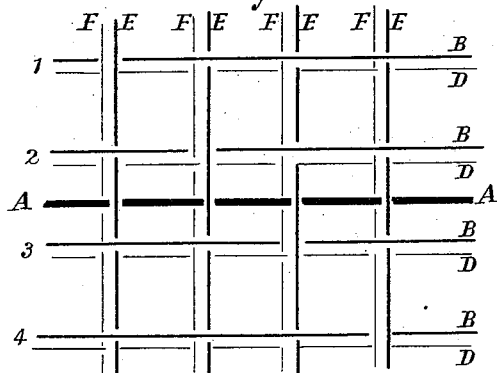
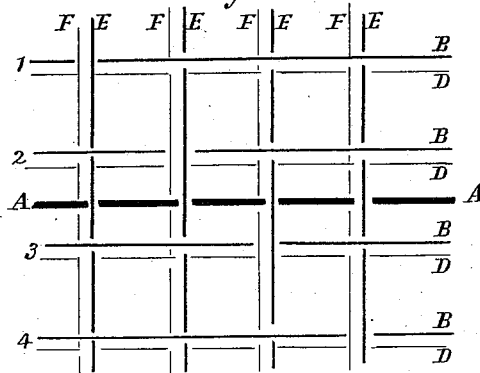


Fig. 9.



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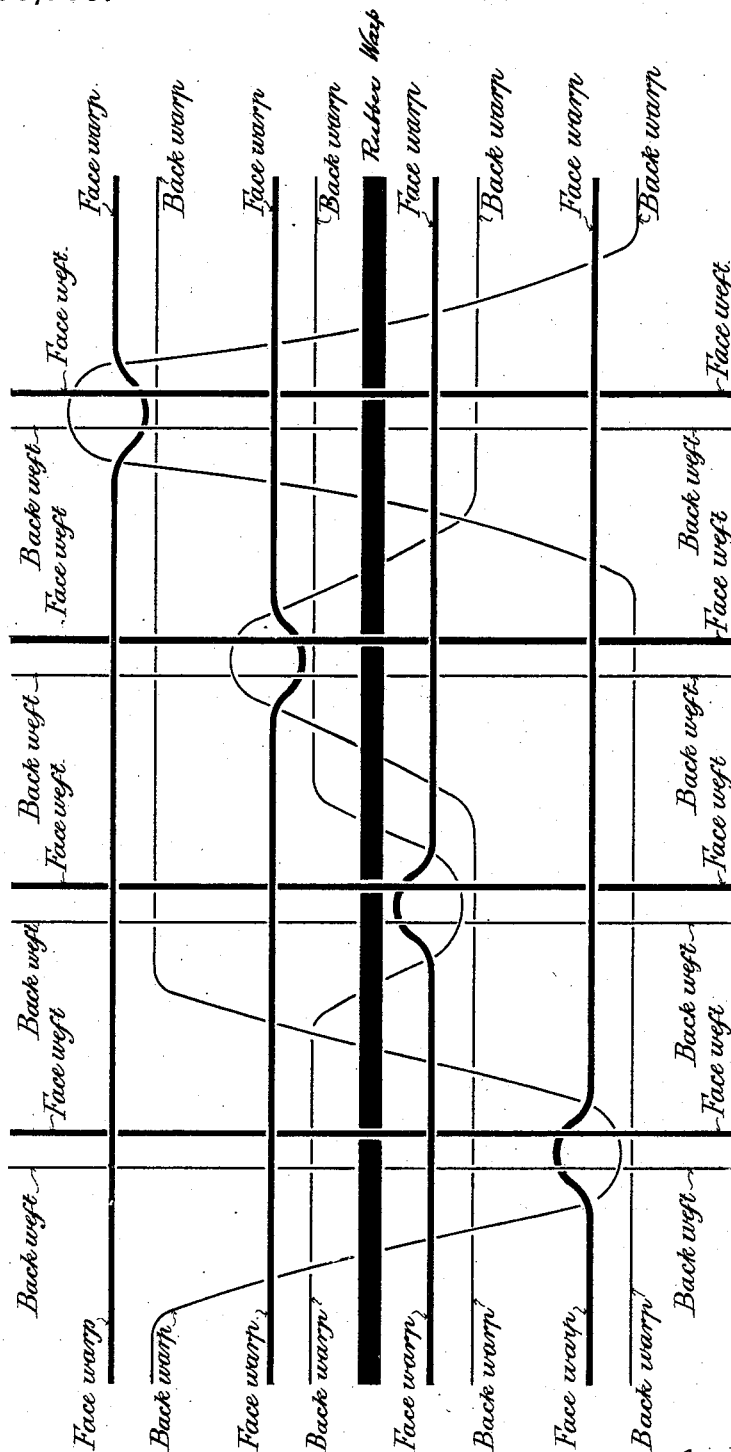
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Fig. 10.



Witnesses.

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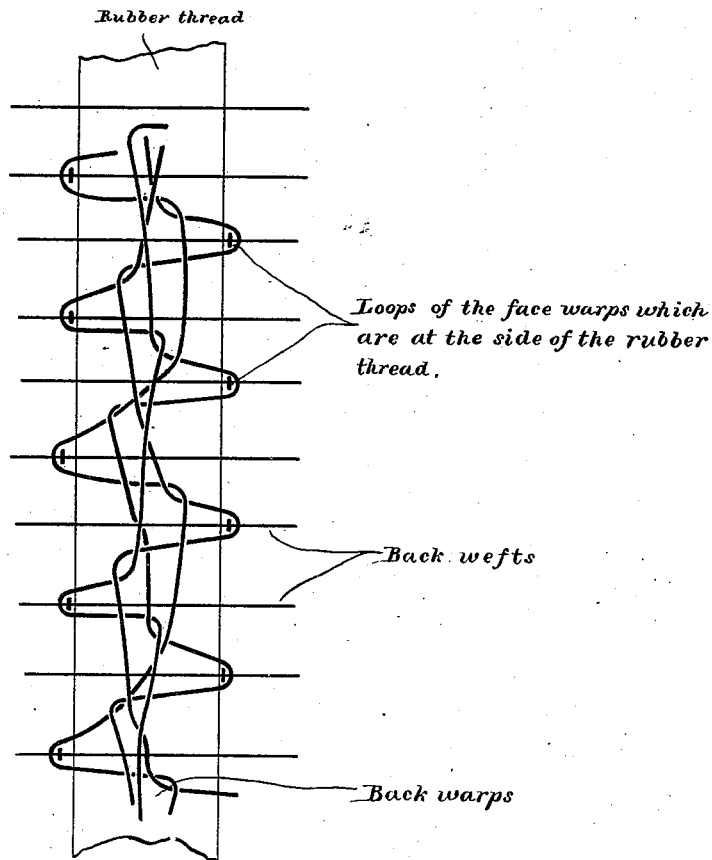
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No. 306,785.

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*Fig. 11.*



WITNESSES

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# UNITED STATES PATENT OFFICE.

JOHN SWANN, OF NOTTINGHAM, ENGLAND.

## ELASTIC FABRIC AND ART OF WEAVING THE SAME.

SPECIFICATION forming part of Letters Patent No. 306,785, dated October 21, 1884.

Application filed May 8, 1883. (No model.) Patented in England October 9, 1882, No. 4,805.

*To all whom it may concern:*

Be it known that I, JOHN SWANN, a subject of the Queen of Great Britain, residing at Toll Street, Derby Road, Nottingham, England, have invented certain new and useful Improvements in Elastic Fabrics and the Art of Weaving the Same, (for which I have received Letters Patent in Great Britain, No. 4,805, dated October 9, 1882,) of which the following is a specification.

This invention has for its object improvements in the manufacture of elastic terry web.

In the specification of a former patent granted to W. E. Jefferson on the 10th day of June, in the year 1879, No. 216,328, was described the making, in a double shuttle loom, of an elastic fabric in which the back of the fabric was formed by terry loops of back warps, which were tied into the fabric by the back weft only, and the face was formed of face warps tied into the fabric both by the face weft and by the back weft, and in which the back warps had given to them the same movement as the face warps, but reversed. According to my invention, in place of giving to the back warps the same movements as the face warps, but reversed, as is described in Jefferson's patent, I cause the back warps to be drawn across the under side of the rubber threads, or the face warps to be drawn across their upper side, so as to assist in tying and holding these rubber threads into the fabric.

To cause the back warps to be drawn across the under side of the rubber warps, I proceed in the following manner: Whenever a face warp is lowered, it is lowered on its own side of the rubber thread, and at the same time a back warp from the opposite side of the rubber thread is raised, and is, in addition, brought to the opposite side of the face warp to that at which it is normally situated. In this way, when a shoot of back weft has been passed between the two warps and has been beaten up by the reed, and the warps have been allowed to resume their former positions, a bend or loop of the back warp will remain caught by the weft and held on the opposite side of the face warp. By these means the back warps are made to lap across the under side of the rubber thread and assist in tying and holding it into the fabric. The appearance of the

back of the fabric is likewise improved, as some of the terry loops of back warp are thereby made to incline over in one direction and others in the opposite direction. In a similar way the face warps, instead of being drawn downward on their own side of the rubber warps, may be drawn down on the opposite side, so as to make them lap across the top of the rubber thread instead of always lying parallel with it, as heretofore.

In order that my invention may be fully understood, I will proceed to describe more fully the manner in which the manufacture of my new elastic terry web is performed.

Figure 1 of the drawings hereto annexed shows a diagram side view of the positions of the several warps in the loom and of the reed of the batten and also of the heddle leaves. The binder-warps are not shown in this diagram. Fig. 2 is a diagram view, on an enlarged scale, of some of the dents of the reed with the several warps passing through them. Figs. 3 and 4 are diagram views, each showing two of the dents or blades of the reed, and the face, back, rubber, and binder warps that pass between them, with the cords or threads of the heddle-leaves, by which one face warp and one back warp are to be lowered and raised, respectively, and by which the back warp, when raised, is drawn to the opposite side of the face warp to that on which it is normally situated. Fig. 5 is a diagram showing the order in which I prefer to tie in the back and face warps, respectively. Fig. 6 illustrates in a somewhat different manner the same order of tying in the warps. Fig. 7 shows an exaggerated diagram view of the fabric so woven when cut through in a line parallel with the warps. Figs. 8 and 9 show modified ways in which the fabric may be made. Fig. 10 is a diagram showing a face view of the fabric, looked at somewhat at an angle and with the threads very far apart. Fig. 11 is a diagram showing, on an enlarged scale, an under side view of one of the rubber threads with the back warps lapped to and fro across it, the back wefts, and the loops of the face warps. In this figure the face warps are tied in in the order 4 3 2 1, and the back warps in the order 1 2 3 4. The face warps and wefts are shown by thicker lines than the back warps

and wefts, so that they may be readily distinguished one from the other.

In the diagram, Fig. 1, A is a portion of the woven fabric. B represents the stretched rubber threads wound on a roller or beam, C, D represents the series of face warps. E represents the series of back warps. F F are rollers over which the two sets of warps are conducted. G is the reed or comb of the sley or batten. H H are the heddle-leaves.

In Figs. 2, 3, and 4, B are the rubber threads, D the face warps, E the back warps, H' the cords of heddle-leaves, and X X are the binder-warps.

The several warp-threads are led through the reed of the batten in the ordinary manner, which is as follows: A stretched rubber thread, B, is passed through each dent of the reed. Four or other number of face warps D are passed through the same above the top of the rubber thread, and four or other number of back warps E also through the same dent of the reed and below the rubber thread. Two or more binder-warps X are also passed through the same dent of the reed—one or more above the rubber thread and one or more below it. The number of the dents in the reed depends upon the width of the fabric to be made. In rear of the batten the several warp-threads are led through eyes in the cords or threads H' of the heddle-leaves H. There are separate heddle-leaves for each of the four or other number of face warps, also separate heddle-leaves for each of the back warps and for each of the binder-warps, and the cords or threads of the heddle-leaves pass down between the warps, as is usual. The binder-warps are, as heretofore, made to cross after each pick of weft, and are caught by both wefts. One of the face warps is lowered for each pick to such an extent that both wefts pass above it, and one of the back wefts is raised to such an extent that the back weft only passes below it, and according to my invention, as above stated, whenever a face warp is lowered on its own side of the rubber thread, the back warp, which is simultaneously raised, is taken from the opposite side of the rubber thread, and is drawn to the opposite side of the face warp to that at which it is normally situated.

In Fig. 1 one face warp is shown lowered, and one back warp raised, and the batten back in position for two shuttles to be passed through the two sheds in the warps—one through the upper shed and the other through the lower one. I have not thought it necessary to show a complete loom, as its construction is well understood. The diagram is only shown in order that the way in which I carry out my invention may be clearly understood.

The diagram view, Fig. 3, shows the cords or threads of the heddle-leaves by which one face warp and one back warp are to be lowered and raised, respectively, and by which the back warp is at the same time to be drawn to the opposite side of the face warp to that on which it is normally situated. The heddle-

cords for raising and lowering the other warps are not shown in this diagram; but wherever a back warp has to be similarly drawn to the opposite side of a face warp the drawing sideways of the back warp is effected in the same manner and by the same means. It will be seen from this diagram that the cords or threads of the heddle-leaves used for raising the back warps are carried under and then past the rubber threads and past the face warp on the opposite side to that at which the back warp is normally situated, while the cords for lowering the face warps are carried past the rubber threads on the same side as the face warps are situated, then below the rubber thread and past the back warp on the opposite side to that at which the face warp is situated. In this way the back warps will (in the woven elastic fabric) be made to lap across the under side of the rubber threads, for the reason that each back warp, as it is in succession raised, is also drawn sideways across the under side of the rubber thread and to the opposite side of a face warp, which is simultaneously lowered; and, further, for the reason that the back warp is afterward made to go back toward its own side of the rubber thread, because other of the back warps are in succession raised between it and the side edge of the rubber thread to which it had been drawn, and are similarly drawn sideways and caught by a face warp on the opposite side of the rubber thread, as will be seen by diagram 11, which shows an enlarged under side view of one of the rubber threads, with the back warps lapped to and fro across it. The back warps and wefts are shown by comparatively thin lines, in order that the way in which they are interlaced may be better seen. They would, if magnified to the same extent as the rubber thread, be in reality very much thicker than represented. If the face warps were to be crossed over the top of the rubber thread, the cords or threads of the heddle-leaves used for lowering them would similarly be carried down on the opposite side of the rubber thread to that at which each face warp is situated, and the cords or threads of the heddle-leaves used for raising the back warps would be led upward past the rubber threads, then across the top of the rubber thread, and then upward on the opposite side of the face warp, as shown in the diagram, Fig. 4. Heretofore the cords or threads of the heddle-leaves used for raising and lowering the warps have always been carried vertically past the rubber threads on the same side of these threads as the warps connected to them were situated.

When the fabric is woven in the way illustrated by the diagrams, Figs. 5 and 6, all the face warps are crossed, in the manner above described, with back warps that are on the opposite side of the rubber thread, and the back warps are thereby made to lap across the under side of the rubber threads.

In the diagram, Figs. 5, 7, 8, and 9, A is a warp of elastic india-rubber thread. B are the

face warps; D, the back warps. E are the picks of face weft, and F the picks of back weft. The back warps and weft are indicated by somewhat thinner lines than the face warps and weft. The warps are numbered with consecutive numbers.

In Fig. 6 the warps which are raised and lowered simultaneously are placed together.

It will be seen that in this fabric illustrated by the diagram, Figs. 5 and 6, the face warps are tied in in the order 1 3 2 4, and the back warps in the order 4 2 3 1. Consequently No. 1 face warp will be linked in the manner above explained with No. 4 back warp, and No. 2 face warp with No. 3 back warp, No. 3 face warp with No. 2 back warp, and No. 4 face warp with No. 1 back warp.

Fig. 7 shows, as before stated, an exaggerated diagram view of the fabric so made, cut through in a line parallel with the warps. It is marked with the same letters of reference as in diagram, Fig. 5.

Another way in which the fabric may be made is shown at Fig. 8. In this fabric the face warps are tied in in the order 1 2 3 4, and the back warps in the order 4 2 3 1, so that No. 1 face warp is linked with No. 4 back warp, No. 2 face warp with No. 2 back warp, No. 3 face warp with No. 3 back warp, and No. 4 face warp with No. 1 back warp. A fabric made in this way has a trail pattern on the face.

Another way in which the fabric may be made is shown at Fig. 9. In this fabric also the face warps are tied in in the order Nos. 1 2 3 4; but the back warps are tied in in the order Nos. 4 3 1 2, so that No. 1 face warp is linked with No. 4 back warp, No. 2 face warp with No. 3 back warp, No. 3 face warp with No. 1 back warp, and No. 4 face warp with No. 2 back warp.

I have not shown any diagram of a fabric

made with the face warps crossing over the top of the rubber threads; but from the description above given and from the diagram, Fig. 4, it will clearly be seen how they can be made to do so, if required.

I claim as my own invention—

1. As an improvement in the art of weaving elastic fabrics, the hereinbefore - described method of producing such fabrics with the face warps made to lie across the face of the rubber threads, or the back warps to lie across the back of the rubber threads, consisting in placing the rubber threads between a series of face warps above and a series of back warps beneath, in succession lowering the face warps from one side of each rubber thread, and simultaneously with the lowering of each face warp raising a back warp from the opposite side of its rubber thread, and causing the back warp to be then drawn to the opposite side of the face warp to that at which it is normally situated, and also causing the warps of the one series to be caught by the weft at each side of the fabric, (both the back weft and the front weft,) while those of the other series are caught by the weft at one side only of the fabric, substantially as set forth.

2. The described elastic fabric, in which the face warps are caught by the weft at each side of the fabric, (both the back weft and the front weft,) and the back warps caught by the back weft only, and in which the face warps, or some of them, are tied or linked with back warps from below those sides of the respective rubber threads opposite the sides by which the face warps pass, substantially as hereinbefore set forth.

JOHN SWANN.

Witnesses:

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