

(Specimens.)

W. B. FITTZ.
WOVEN FABRIC FOR TUBULAR ARTICLES.

No. 597,672.

Patented Jan. 18, 1898.

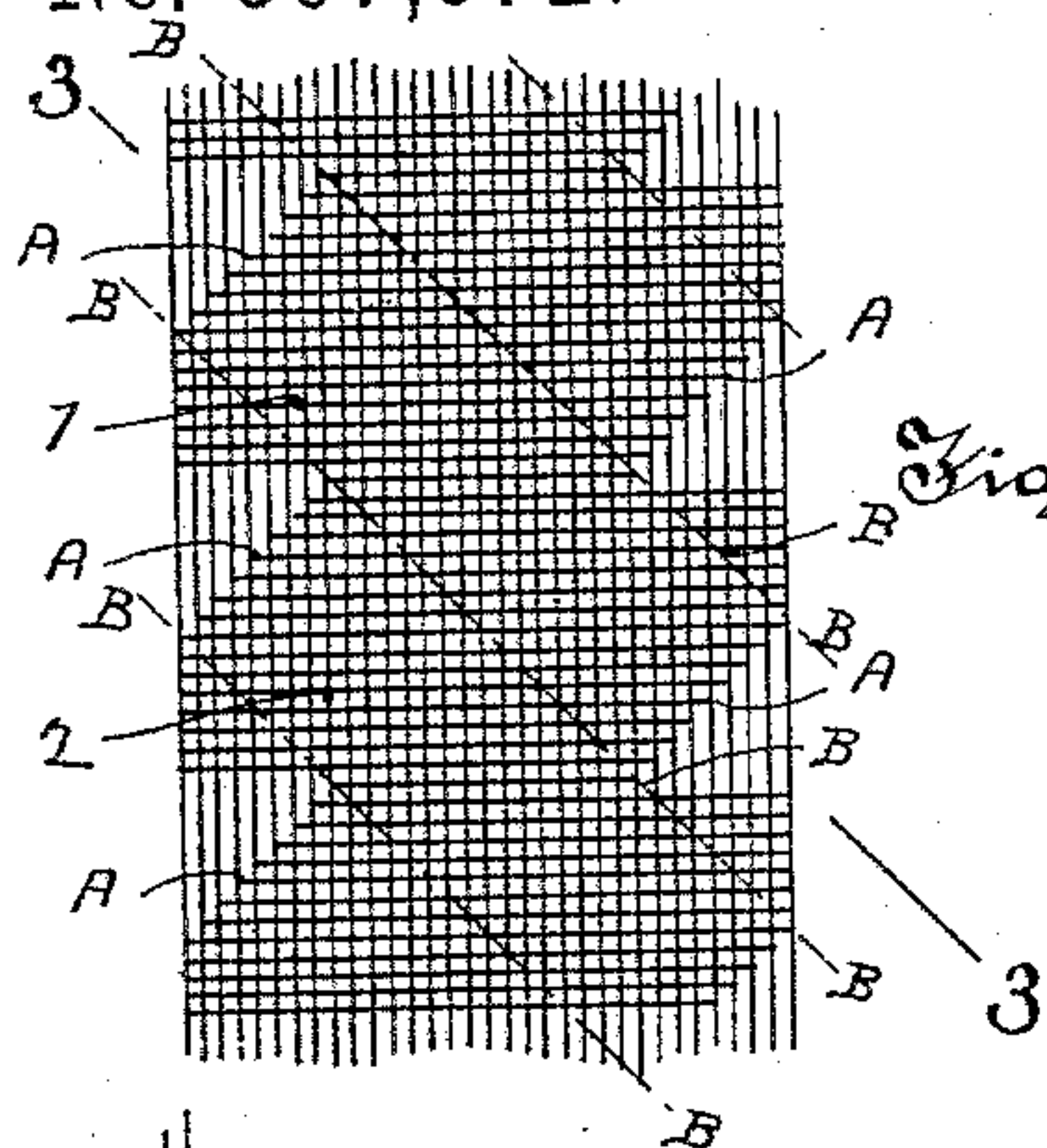


Fig. 1.

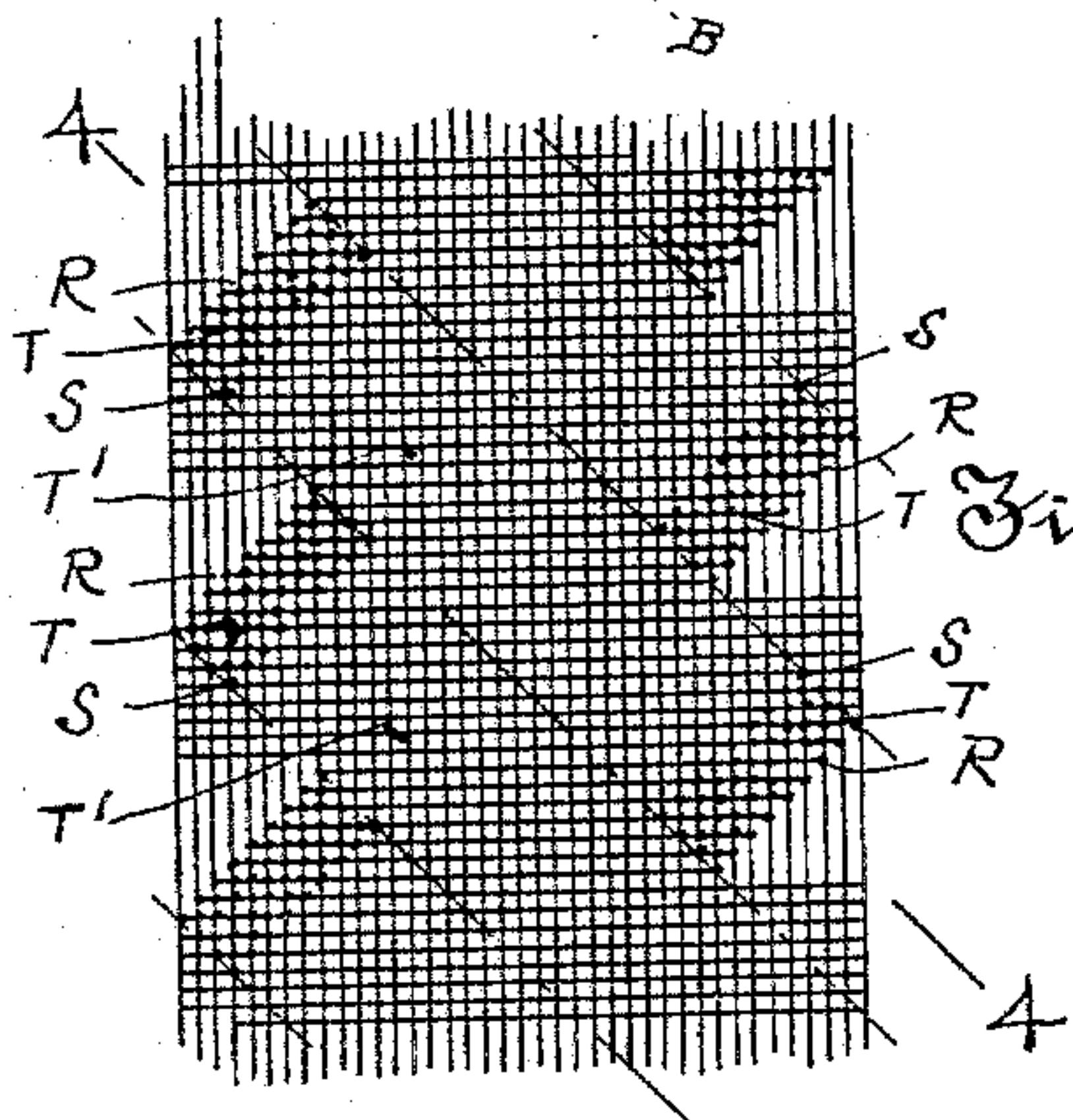


Fig. 2.

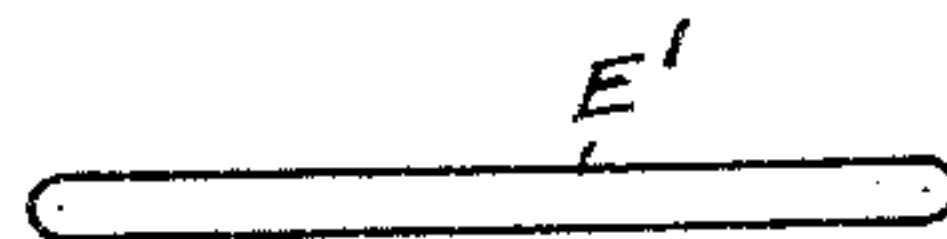


Fig. 3.

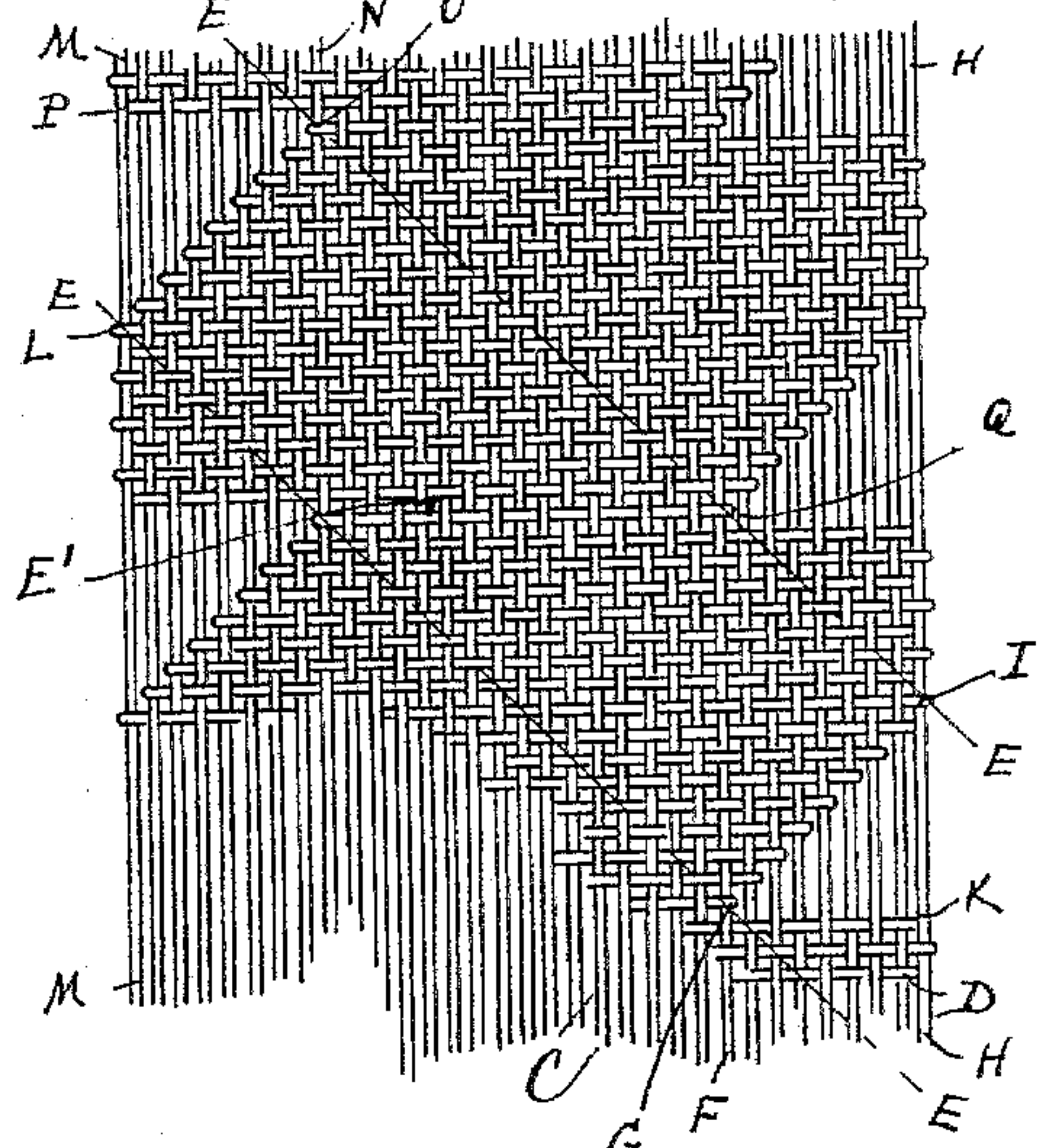


Fig. 6.

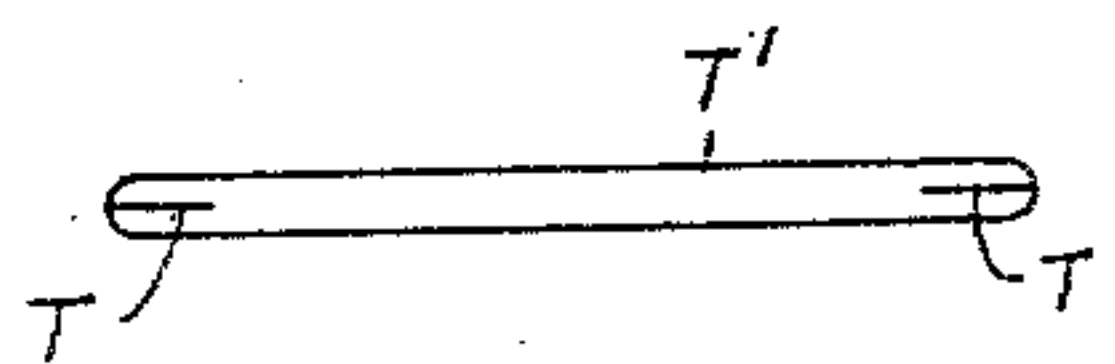


Fig. 5.

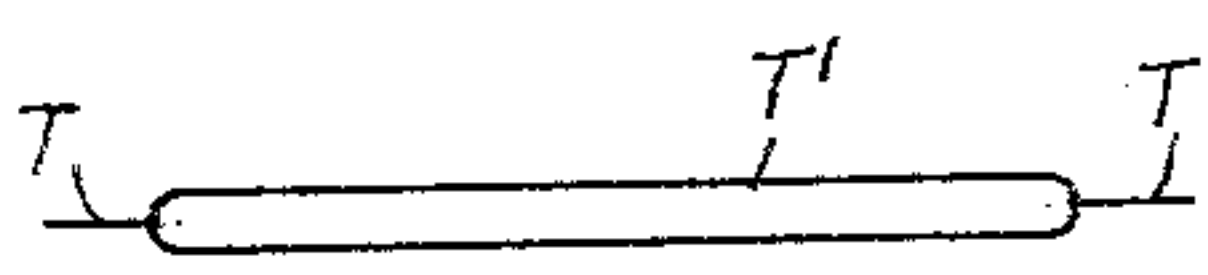


Fig. 4.

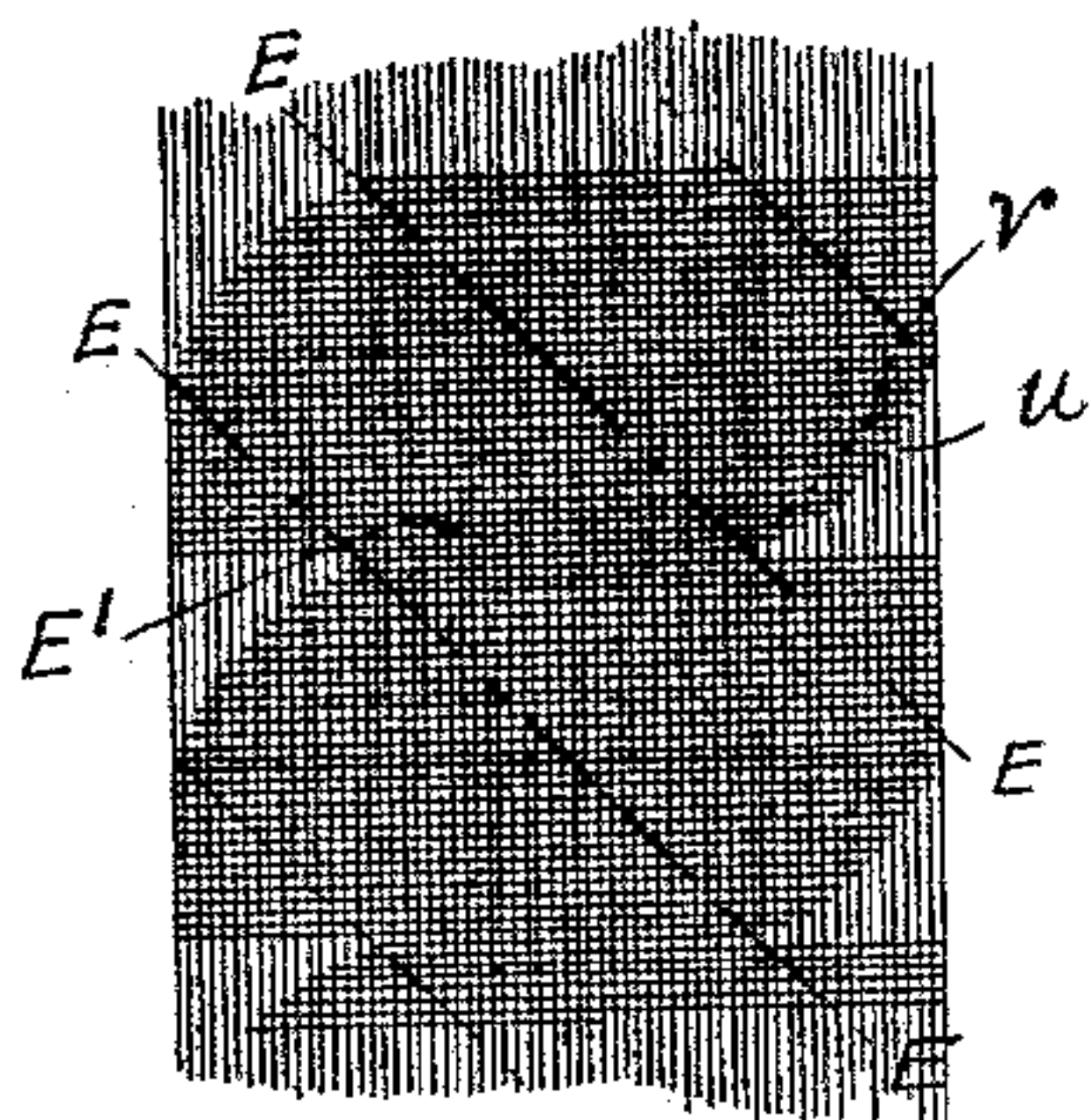


Fig. 7.

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WOVEN FABRIC FOR TUBULAR ARTICLES.

SPECIFICATION forming part of Letters Patent No. 597,672, dated January 18, 1898.

Application filed September 24, 1896. Serial No. 606,888. (Specimens.)

To all whom it may concern:

Be it known that I, WILLIAM B. FITTZ, a citizen of the United States, residing at West Boylston, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Woven Fabrics for Tubular Articles, of which the following is a specification, accompanied by drawings, forming a part of the same, in which—

Figure 1 represents a piece of woven fabric embodying my invention. Fig. 2 represents a piece of woven fabric embodying my invention and showing a modification in the method of weaving. Fig. 3 is a sectional view on line 3 3, Fig. 1. Fig. 4 is a sectional view on line 4 4, Fig. 2. Fig. 5 represents a piece of a tubular fabric woven in the manner shown in Figs. 2 and 4 and turned so as to bring the selvage edges on the inner side of the fabric. Fig. 6 represents a piece of fabric woven in the manner shown in Fig. 1, but with the threads enlarged to more clearly illustrate the method of weaving; and Fig. 7 represents a piece of woven fabric having the selvage edges of the tubular section curved instead of straight, as represented in Figs. 1 and 2.

Similar letters and numerals refer to similar parts in the different figures.

The object of my present invention is to form a selvage edge upon a piece of cloth, cut on a bias from a woven fabric with the selvage edge at right angles with the bias line upon which the cloth is cut, so that when the cloth is cut on the bias a rectangular piece will be produced having two parallel ends with a woven selvage at an oblique angle to both the warp and weft threads, and I accomplish this object during the operation of weaving by raising or lowering a certain number of warp-threads at the edge of the fabric, so they will not become interwoven with the weft-threads during the passage of the shuttle.

In ordinary weaving the selvage edge is formed upon the fabric by carrying the weft-thread around the outer thread of warp, making the selvage edge parallel with the warp-threads, and in order to form a selvage edge obliquely to the warp-threads I successively raise the outer threads of the warp, uniformly increasing or decreasing, as the case may be, the number of threads raised at each subsequent pick or throw of the shuttle.

The fabric forming the subject of my present invention, as hereinafter described, is especially adapted for the foundation fabric of tubular articles, such as pneumatic tires, and when it is to be used as the foundation fabric of pneumatic tires I prefer to weave it in the form of tubular cloth having a series of short diagonal selvages at an angle of forty-five degrees to the warp and weft threads of the fabric and with the length of each diagonal selvage equal to the width of the bias piece required to form the tire.

In Fig. 1 I have represented a piece of woven fabric in the form of a tubular cloth woven in the ordinary and well-known method of weaving tubular fabrics, such as bags and the like, but having the selvage edges on each side of the fabric formed at an angle of forty-five degrees with the warp and weft threads at regular intervals, as denoted by the lines A, so that when the woven fabric is cut apart on the broken lines B each of the strips 1 2 will form a rectangular tubular piece having a woven selvage at the lines A A and at right angles with the sides of the strip, so that each of the strips 1 2 will form a tubular fabric woven continuously throughout its entire extent, as represented in Fig. 3, and constituting an endless strip of the proper width to form the pneumatic tire and having the warp and weft threads extending across the strip at an angle of forty-five degrees.

The method of forming the short diagonal selvages on the line A is illustrated in Fig. 6, where a piece of fabric is represented with the warp and weft threads enlarged from those shown in Fig. 1 in order to show more clearly the method of weaving.

In Fig. 6, C denotes the warp-threads, and D the filling-thread interwoven therewith. The rectangular-woven portion of the fabric included between the broken lines E E constitutes the piece which is to be cut from the fabric on the lines E E to form the pneumatic tire, said piece having diagonal selvages at right angles with the lines E E to form the ends of the rectangular piece E'.

By means of suitable shedding mechanism all the warp-threads at one edge of the fabric and outside of the warp-thread F, which passes through the corner G of the rectangular bias piece E, are raised or lowered, so they

will not be interwoven with the weft-thread D, causing the weft-thread, when it is returned through the fabric, to be carried around the warp-thread F, and at each successive throw of the shuttle I cause an additional warp-thread to be woven into the fabric until the outer warp-thread H is reached at the corner I of the rectangular piece E, thereby forming a diagonal selvage edge between the points G and I, and leaving a triangular portion of the warp unwoven between the points G, I, and K. When the weft-thread in the process of weaving reaches the corner L of the rectangular piece E', the outer warp-thread M is raised or lowered, so it will not be interwoven with the weft-thread, thereby causing the weft-thread to be carried around the second warp-thread from the edge, and the number of warp-threads which are prevented from being interwoven with the weft-thread is increased by one at each successive throw of the shuttle until the warp-thread N is reached at the corner O of the rectangular piece E', leaving the triangular section unwoven between the points L O P, when the weaving is again extended to the extreme edge of the fabric and the formation of a diagonal selvage is again begun on the opposite side of the fabric at the point Q in the manner already described.

When the piece E' is cut from the fabric, it will constitute an endless band continuously woven throughout its whole extent and having both its warp and weft threads on a bias or at an angle of forty-five degrees with the direction of its length.

In Fig. 2 I have shown a slight modification in a tubular woven fabric by weaving each end of the rectangular bias piece single instead of tubular, and forming a diagonal selvage edge on the lines R R, but weaving the fabric in the form of single cloth from the edge R to the lines S, so that when the bias pieces are cut from the fabric they will be tubular between the lines S S, but of single cloth between the lines S and R and form a narrow strip of single cloth T on both sides of the tubular fabric T', as shown in Fig. 4, and in the construction of the pneumatic tire the fabric is turned so as to bring the single cloth T inside the tube.

The essential point in weaving a tubular fabric is to cause the two single fabrics—that is, the upper and lower fabrics—to be joined together on diagonal lines on opposite edges of the fabric, so that when the bias pieces are cut the diagonal line on which the fabrics are joined in the weaving will form the opposite ends of the bias piece, so the bias strips will constitute an endless strip having its warp and weft threads obliquely thereto.

I have thus far described the method of weaving a fabric having a series of diagonal selvages formed on a straight line.

Instead of forming the selvages on a straight line they may be formed on a curved line, if

desired, describing the arc of a circle, in order to facilitate the formation of the endless band into the tubular foundation of the tire.

In Fig. 7 I have represented a piece of fabric having the diagonal selvages formed on a curved line, as represented at *u*, instead of a straight line, as at *v*, the curved line *u* forming an arc of which the line *v* is the chord. The formation of the selvage upon a curved line, as at *u*, is accomplished by having the warp-threads fine enough so as to require several warp-threads to be held out of weaving at each throw of the shuttle, instead of one thread, as represented in Fig. 6, and the curvature of the selvage is secured by gradually decreasing the number of warp-threads held out of weaving at each throw of the shuttle until the center of the selvage is reached and then gradually increasing the number of warp-threads held out of weaving at each throw of the shuttle in weaving the last half of the arc.

In Fig. 6 I have represented a single thread of warp as taken from or added, as the case may be, to the woven fabric at each throw of the shuttle. The number carried into or out of weaving at each throw of the shuttle, however, will vary for the purpose of determining the angle of the selvage to the warp and weft threads.

The body of the fabric, whether single or double, can be woven in any desired pattern—such, for example, as a plain twill, herringbone, basket-weave, &c.

The weaving of the body of the fabric can be accomplished by means of the ordinary warp-shedding mechanism now employed in weaving tubular fabrics, and in order to control the requisite number of warp-threads at each edge of the fabric to form at the desired intervals a diagonal selvage having an angle of forty-five degrees with the line of warp-threads, or such other angle as may be desired, I prefer to employ the ordinary and well-known jacquard mechanism.

The warp-shedding mechanism requisite to accomplish the results I have described will be well understood by those conversant with the art of weaving, and as they form no part of the present invention I have not deemed it necessary to describe them in detail.

The fabric woven as above described is cut into diagonal strips which are united at their ends by the diagonal selvages, forming an endless band of the proper width to form a foundation fabric for a bicycle-tire. The endless band so formed has its opposite edges brought together to form an endless tube of the proper length for the tire.

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

1. A fabric for the foundation of endless tubular articles consisting of a woven tubular strip having a series of diagonal selvages on its opposite edges arranged to form the ends of rectangular pieces when cut from said fabric at an angle of forty-five degrees to the

line of warp and weft whereby said pieces form continuously-woven endless bands, substantially as described.

2. A fabric for the foundation of endless
5 tubular articles consisting of a woven tubular fabric having a series of diagonal selvages on its opposite edges arranged to form the ends of rectangular pieces when cut from the fabric at an angle of forty-five degrees to the

warp and weft threads with a narrow band at each of said selvages woven single, substantially as described.

Dated this 22d day of September, 1896.

WILLIAM B. FITTZ.

Witnesses:

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HARRY S. BANNING.