

No. 697,390.

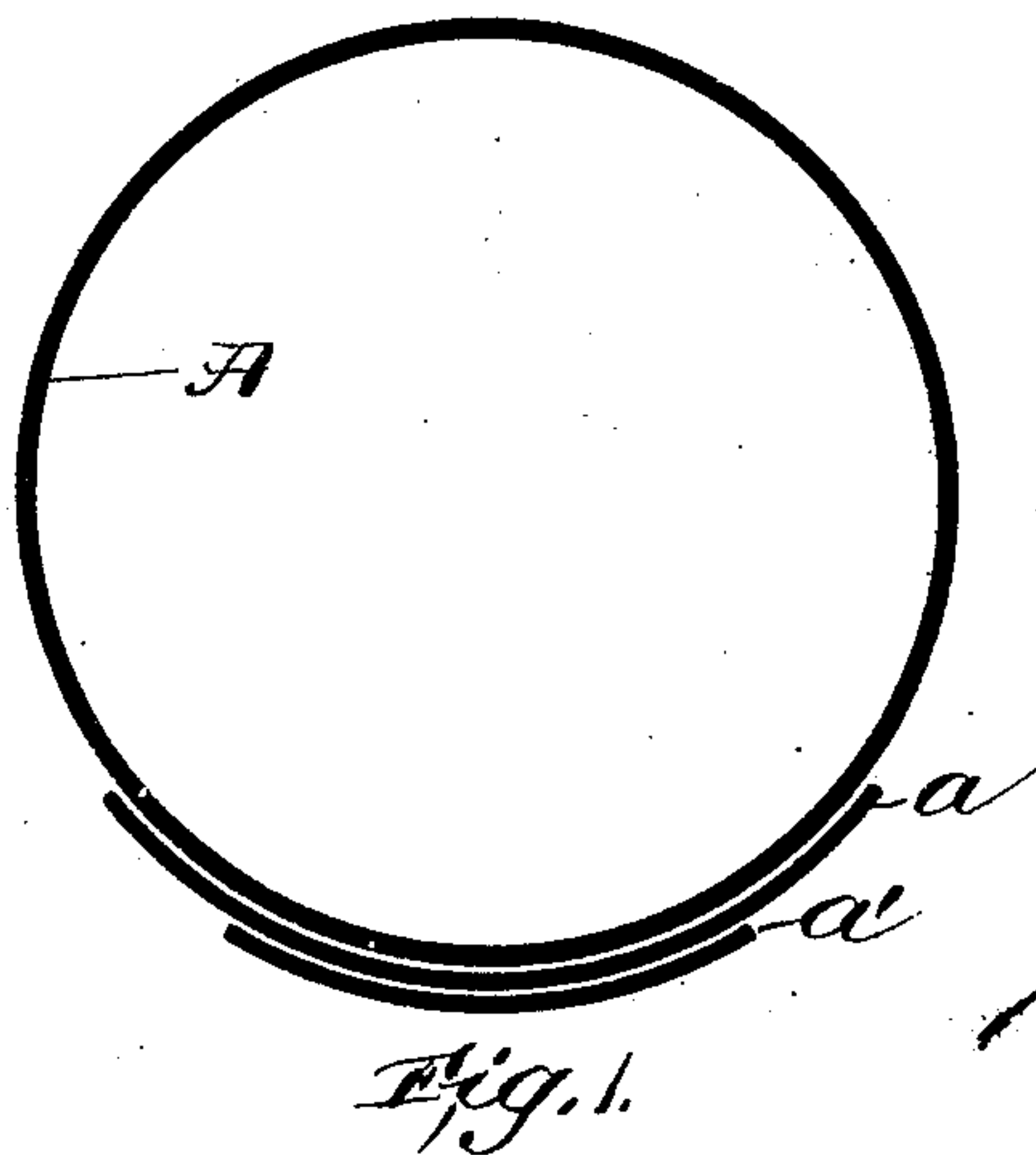
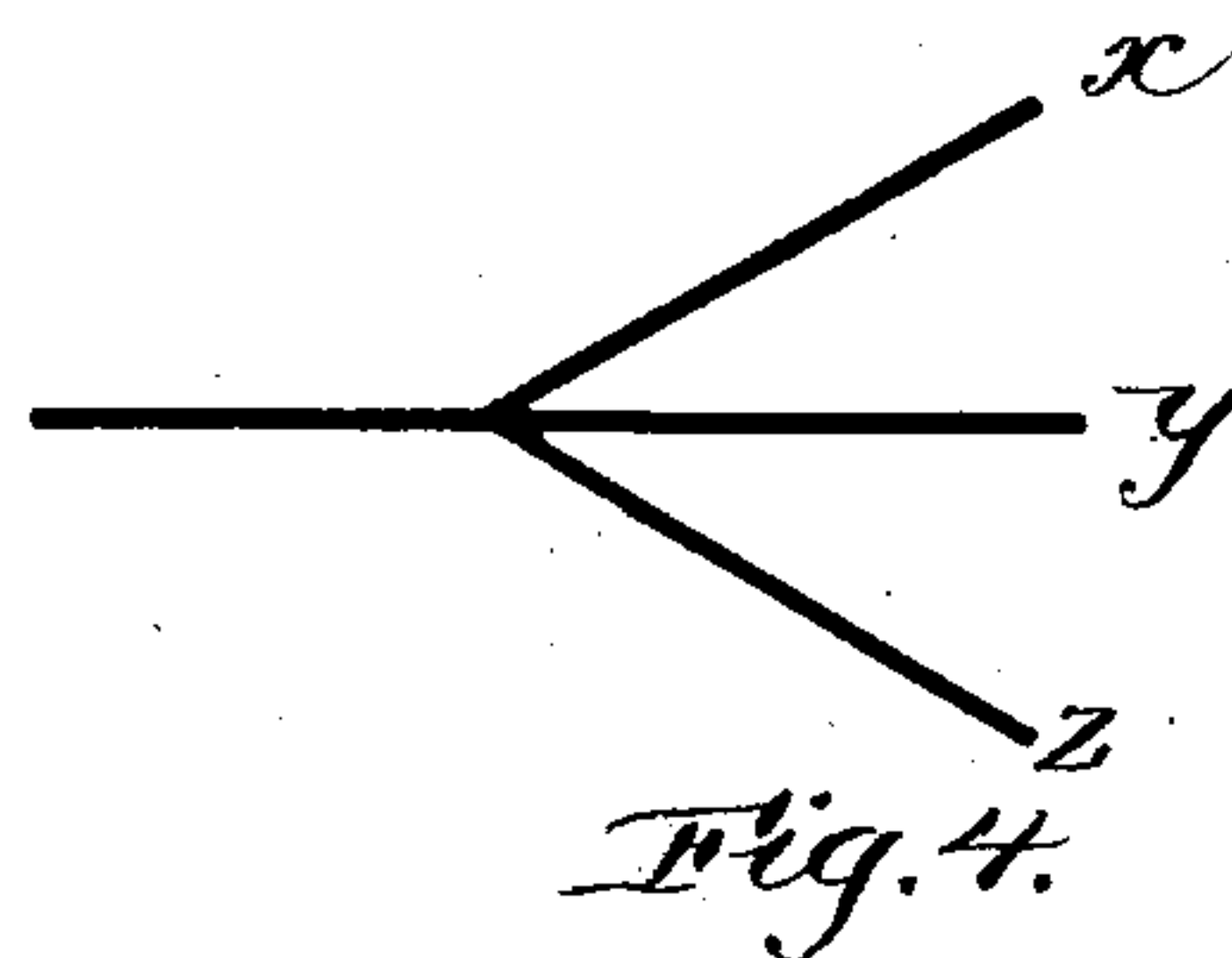
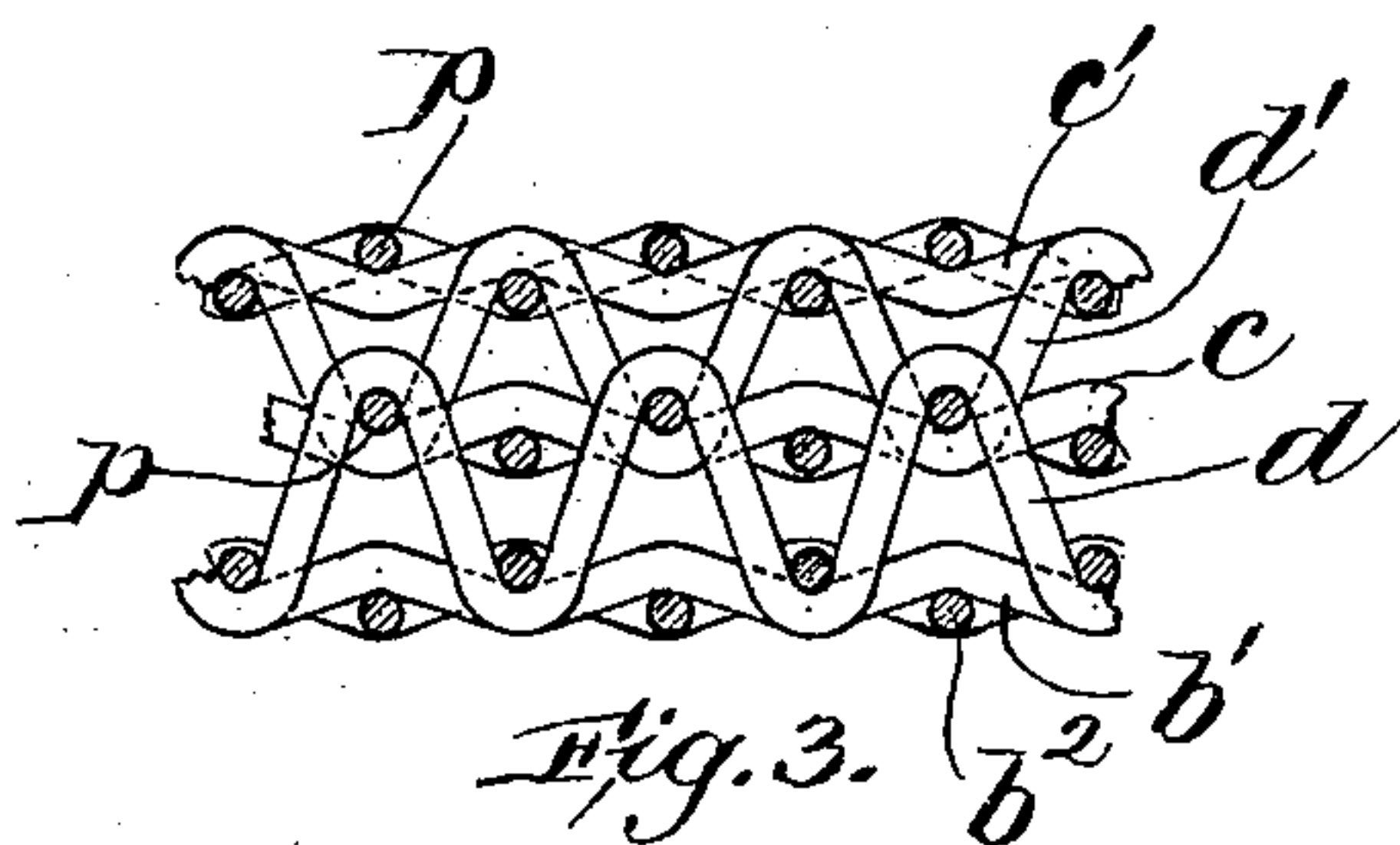
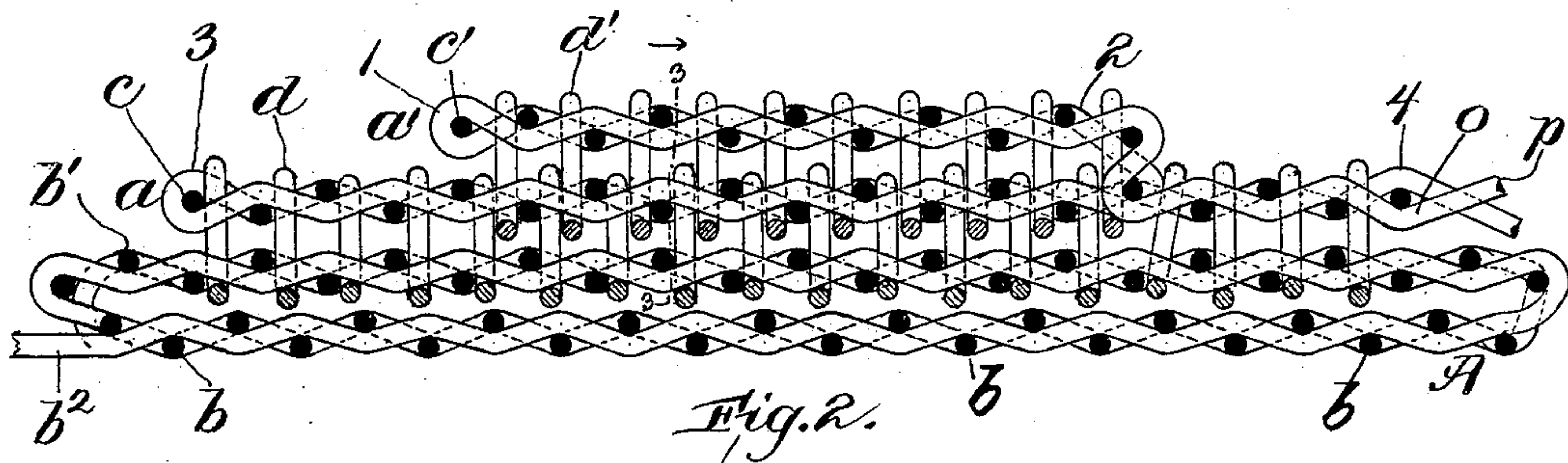
Patented Apr. 8, 1902.

W. BECK.

WOVEN TUBULAR FABRIC.

(Application filed Oct. 29, 1898. Renewed Jan. 22, 1902.)

(No Model.)



Witnesses:
Arthur G. Randall.
J. F. Preston.

Inventor:
 Liam Beck

UNITED STATES PATENT OFFICE.

WILLIAM BECK, OF LAWRENCE, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE PRESTON HOSE AND TIRE COMPANY, A CORPORATION OF MAINE.

WOVEN TUBULAR FABRIC.

SPECIFICATION forming part of Letters Patent No. 697,390, dated April 8, 1902.

Application filed October 29, 1898. Renewed January 22, 1902. Serial No. 90,845. (No specimens.)

To all whom it may concern:

Be it known that I, WILLIAM BECK, a citizen of the United States, residing at Lawrence, county of Essex, State of Massachusetts, have
5 invented certain new and useful Improvements in Woven Tubular Fabrics, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention has for its object to construct
10 a tubular fabric for pneumatic vehicle-tires, such fabric having a thickened or reinforced tread portion formed or provided in the structure of the fabric.

Of the drawings, Figure 1 is a diagrammatic
15 cross-sectional view through a tire embodying this invention. Fig. 2 is a cross-sectional view of a woven tubular fabric embodying this invention. Fig. 3 is a longitudinal section of a portion of the fabric shown in Fig. 2, taken
20 on line 3 3 of Fig. 2. Fig. 4 is a diagram hereinafter referred to.

In the drawings I have shown the construction of a woven fabric embodying this invention such as would be produced in a loom employing two shuttles operating in unison, one
25 adapted to lay the weft in the tubular body portion A (see Fig. 1) and the other adapted to lay the weft in the reinforcing-layers $a a'$, there being an independently-operated set of
30 warps for the body A and each of the layers $a a'$. The harnesses controlling the warps are so operated as to form two sheds at each pick, the lines x, y , and z (see Fig. 4) representing
35 the lines of the warp-threads, $x y$ being the shed for the reinforce-shuttle and $y z$ being the shed for the body-shuttle.

Referring to Figs. 2 and 3, b and b' represent the warp-threads for the body A, and b^2 the body-shuttle thread or weft.

$c c'$ are respectively the main and auxiliary
40 warp-threads of the reinforce, which consists of layers $a a'$, and p the reinforce-shuttle thread or weft. The one reinforce-shuttle thread p , as herein shown, engages both sets
45 of warps $c c'$.

The two shuttles, as hereinbefore stated, may be operated in unison, but in opposite directions, the tubular body fabric being woven in the manner in which tubular fabrics are

ordinarily produced—that is to say, the body-shuttle lays the weft first across the lower half
50 of the tube and then across the upper half thereof, the harnesses controlling the warps $b b'$ being so operated that the weft is laid in the shed of the warps b in the first pick and
55 in the shed of the warps b' in the second pick and then in the shed of the warps b again, and so on throughout the length of the fabric, $y z$ in Fig. 4 representing the shed for the body-shuttle.

The reinforcing layers $a a'$ are produced and made an integral part of the body A simultaneously with the weaving of the latter, and in order to secure the layer a' to the layer a and to secure the layer a to the body
60 A two sets of stitching-warps (represented at $d d'$) are embodied in the fabric, the stitching-warps d' serving to secure the layer a' to the layer a and the stitching-warps d serving to secure the layer a to the body A.
65 The first pick lays the weft p in the reinforce from the point marked 0 to the point marked 1, and the shed for this pick includes those main warp-threads c of the layer a which are located at one side (to the right in Fig.
70 2) of the auxiliary warps c' and also includes all of the auxiliary warps c' of the layer a' , thus laying the first pick partly in the layer a and partly in the layer a' . The
75 second pick lays the weft p in the reinforce from the point marked 1 to the point marked 2, and the shed for that pick includes all of the auxiliary warps c' of the layer a' , and at the time of this and the next succeeding pick
80 the harness controlling the stitching-warps d' is held raised and the weft p laid under said stitching-warps d' in this and the next succeeding pick. The third pick lays the
85 weft p from the point marked 2 to the point marked 3 and beneath the stitching-warps d' ,
90 as just stated, and the shed for this pick includes all of the main warp-threads c not included in the first pick—that is to say, it includes all of the main warps c of the layer a lying to the left (see Fig. 2) of those main
95 warps c included in the shed of the first pick. The fourth pick lays the weft p from the point marked 3 to the point marked 4, and

the shed for that pick includes all of the main warp-threads c , and the harness controlling the stitching-warps d' is lowered during this pick, so that the weft p is laid over the said stitching-warps d' . Thus it will be seen that during the second and third picks the stitching-warps d' are at x (see Fig. 4) and at y during the first and fourth picks, and the said stitching-warps are caused to overlies the shuttle-thread p in the second and third picks and to lie under said thread in the first and fourth.

The harness controlling the stitching-warps d occupies three positions during the four picks just described, which is essential in order to effect the weave herein shown. During the first pick the said stitching-warps d are held in the line y , (see Fig. 4,) and during the second pick the said stitching-warps are held in the line z , at which time the body-weft q is laid over said warps d , thus connecting the layer a with the body A , as shown in Fig. 3. During the third pick the said stitching-warps are held in the line y , and during the fourth pick said warps d are held in the line x , at which time the reinforce-weft p is laid under said stitching-warps d . The movements of said stitching-warps d and d' are repeated during each succeeding four picks of the loom.

In some instances it may be desirable to employ a single set of stitching-warps for securing the reinforce to the body; but I prefer to employ two sets, as described, one for securing the layer a' to the layer a and the other for securing the layer a to the body A , for the reason that should the stitching-warps d' become severed through wear the warps d will remain intact, and although the outermost layer a' may become detached as the result of such wearing away the layer a is still secured in position upon the body A by means of the stitching-warps d , whereas when only one set of stitching-warps is employed both layers become detached from the body A when said warps are severed.

The method of weaving herein disclosed is claimed, broadly, in an application filed by J. F. Preston and myself jointly under date of January 6, 1900, and bearing Serial No. 555.

The distinguishing structural characteristics of this fabric are that the tubular body-web has integrally superposed reinforced plies or layers formed from warps and weft-

threads extending but partially around the tubular body and throughout the entire length thereof.

What I claim is—

1. A tire-tube of continuous woven fabric having a woven reinforcing-ply overlying the tread portion of the tube and a second woven reinforcing-ply overlying the first, together with two sets of stitching-warps interwoven with the same weft-threads of the first reinforcing-ply, one set of said stitching-warps being interwoven with weft-threads of the tube proper and the other set being interwoven with weft-threads of the second reinforcing-ply.

2. A tire-tube of continuous woven fabric having a number of superposed woven reinforcing-plies overlying its tread portion, each ply having its own warp-threads while the same filling-thread is common to or continuous between the reinforcing-plies; together with stitching-warps uniting the plies to each other and to the tube proper.

3. A tire-tube of continuous woven fabric with a woven reinforcing-ply overlying its tread portion and a narrower woven reinforcing-ply overlying the first, each ply having its own warp-threads while the filling-thread extends continuously through both reinforcing-plies as follows: from one edge of the first ply part way through the latter and thence through the second ply and back through the same and thence through the first ply to the other edge thereof and back through the full width of said first ply; together with stitching-warps uniting the two plies to each other and to the tube proper.

4. A tire-tube of continuous woven fabric having a number of superposed woven reinforcing-plies overlying its tread portion and graduated in width, each ply having its own warp-threads, while the same filling-thread is common to or continuous between the reinforcing-plies; together with stitching-warps uniting the plies to each other and the tube proper.

In testimony whereof I affix my signature, in the presence of two witnesses, this 15th day of September, 1898.

WILLIAM BECK.

Witnesses:

J. F. PRESTON,

CHAS. H. DREW.