

No. 697,392.

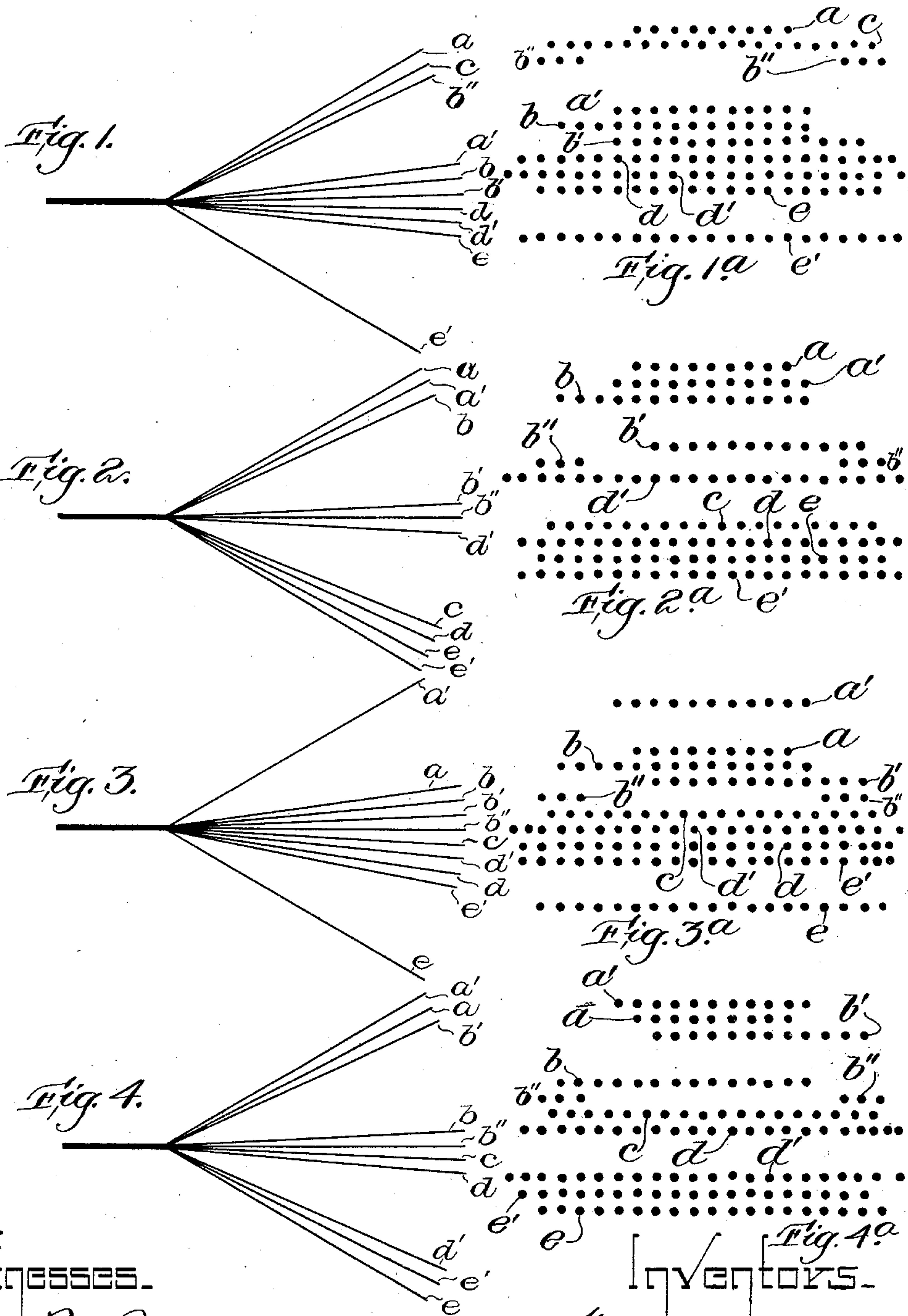
Patented Apr. 8, 1902.

W. BECK & J. F. PRESTON.
ART OF WEAVING TUBULAR FABRICS.

(Application filed Jan. 6, 1900. Renewed Jan. 22, 1902.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses.
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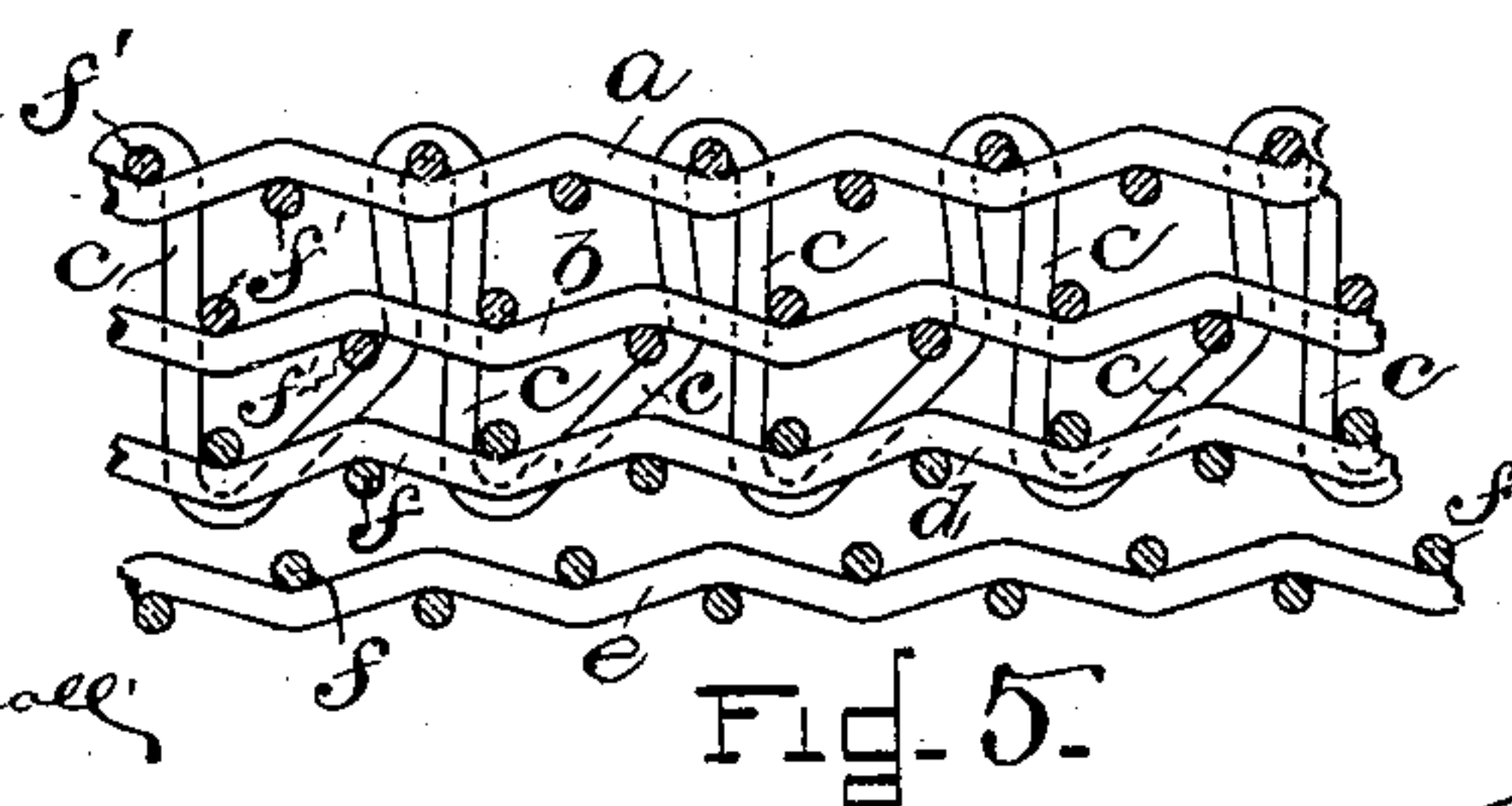
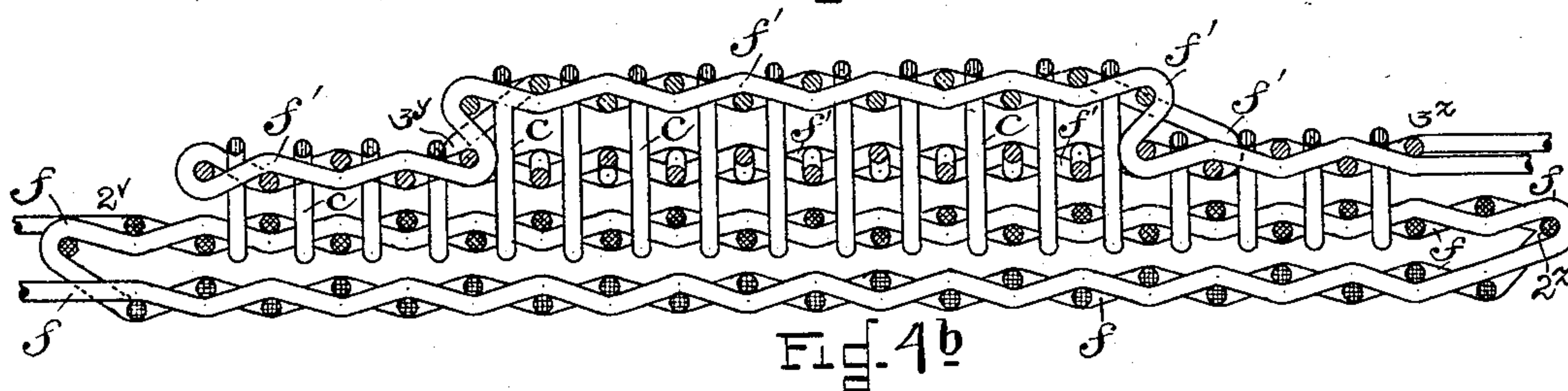
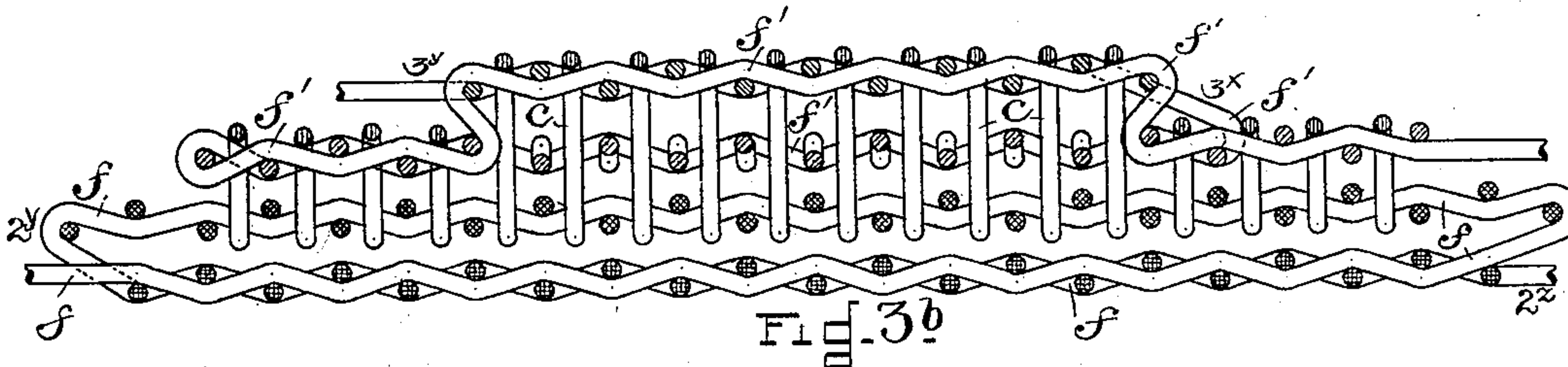
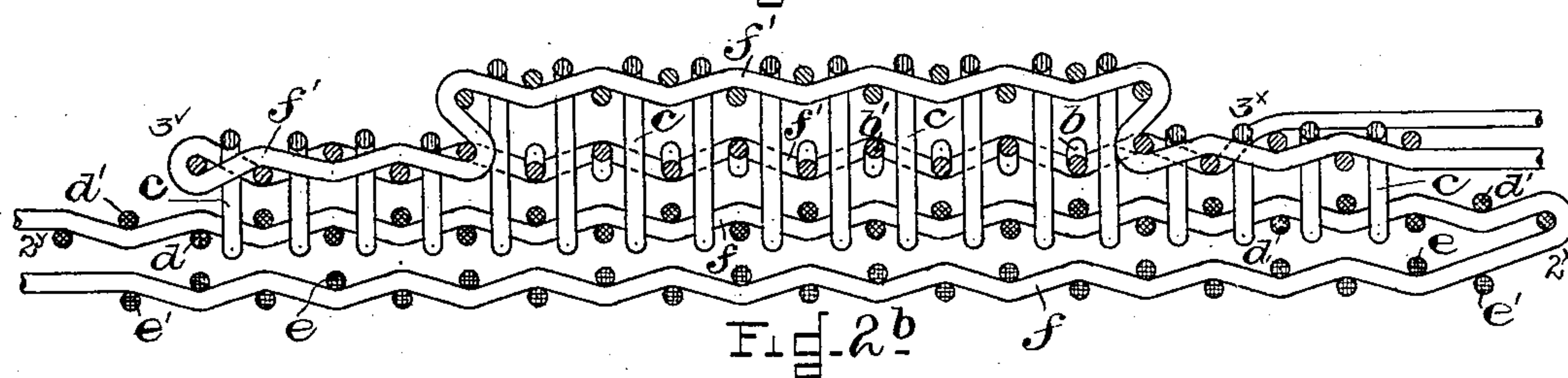
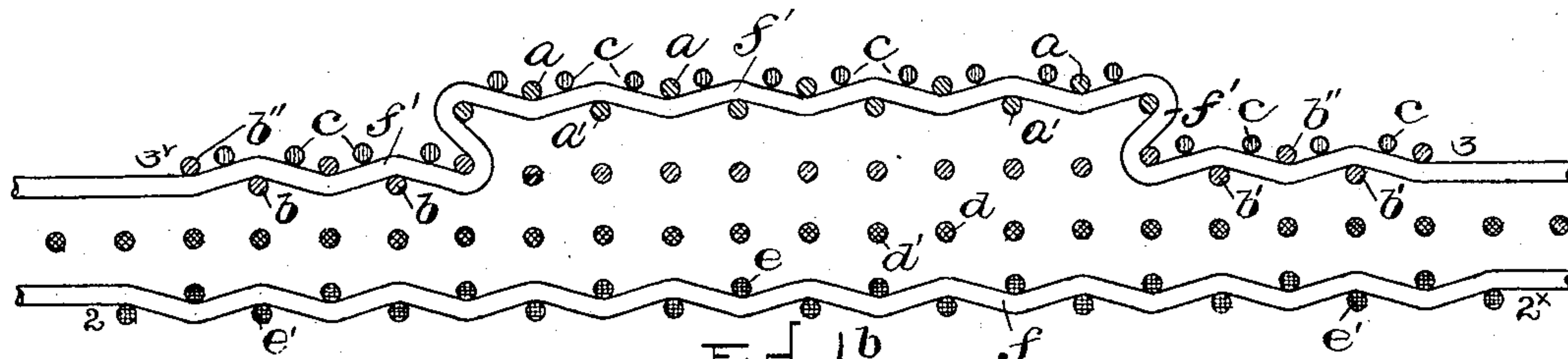
W. BECK & J. F. PRESTON.

ART OF WEAVING TUBULAR FABRICS.

(Application filed Jan. 6, 1900. Renewed Jan. 22, 1902.)

(No Model.)

2 Sheets—Sheet 2.



Witnesses.

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UNITED STATES PATENT OFFICE.

WILLIAM BECK, OF LAWRENCE, AND JAMES F. PRESTON, OF BOSTON, MASSACHUSETTS, ASSIGNORS TO THE PRESTON HOSE AND TIRE COMPANY, OF EVERETT, MASSACHUSETTS, A CORPORATION OF MAINE.

ART OF WEAVING TUBULAR FABRICS.

SPECIFICATION forming part of Letters Patent No. 697,392, dated April 8, 1902.

Application filed January 6, 1900. Renewed January 22, 1902. Serial No. 90,847. (No specimens.)

To all whom it may concern:

Be it known that we, WILLIAM BECK, of Lawrence, in the county of Essex, and JAMES F. PRESTON, of Boston, in the county of Suffolk, State of Massachusetts, have invented certain new and useful Improvements in the Art of Weaving Tubular Fabrics for Vehicle-Tires, of which the following is a specification.

10 This invention relates to the art of weaving tubular fabric for incorporation in vehicle-tires and aims to provide an improved method whereby simultaneously with the weaving of a continuous main or foundation tube a number of superposed reinforcing layers or plies
15 may be woven so as to overlie the tread portion of such main tube and be united throughout to each other and to the latter.

The essential steps of the improved method are set forth in the appended claims, and a preferred way of carrying out the same is specifically set forth hereinafter with reference to the accompanying drawings.

25 Of said drawings, Figures 1 to 4 are diagrammatic representations of the several sets of warps, showing how the sheds are made for different picks. Figs. 1^a to 4^a are corresponding cross-sectional illustrations. Figs. 1^b to 4^b are cross-sectional views illustrating
30 the fabric at different stages of construction, showing the course of the filling or weft threads in different picks. Fig. 5 is a fragmentary longitudinal sectional illustration of the fabric.

35 In making the fabric shown in the drawings we employ ten sets of warp-threads, of which *a* and *a'* designate two sets of warps for the outermost reinforcing layer or ply; *b* and *b'*, two sets of warps for the wider reinforcing-ply which comes next to the main tube; *b''*, an extra set of warps for the portions of said wider reinforcing-ply which extend beyond the outer ply, this extra set comprising two small groups at opposite sides, as
40 shown in Figs. 1^a to 4^a; *c*, a set of stitching-warps or tie-threads which unite the two reinforcing-plies together and to the main tube; *d* and *d'*, two sets of warps for the upper side of the main tube, and *e* and *e'* two sets of
45 warps for the lower side of the main tube.

Two wefts or filling-threads *f* and *f'* are used, one for the main tube and the other for the reinforcing-plies, this other being common to both plies and extending continuously through them in the manner presently to appear. 55

Figs. 1 and 1^a show the relative positions of the sets of warps when the sheds have been made for picks of the shuttles, during which one lays the filling-thread *f* in the lower side 60 of the main tube, (from 2 to 2^x, Fig. 1^b,) while the other lays the filling-thread *f'* in the outer reinforcing-ply and in both portions of the inner reinforcing-ply, which extend beyond the same, as clearly shown in Fig. 1^b from 3 65 to 3^v. The upper side of the top shed comprises one set *a* of the outer-ply warps, the set of stitching-warps *c*, and the extra set of inner-ply warps *b*. The lower side of this shed and upper side of the lower shed comprise 70 the other set of outer-ply warps *a'*, the two sets of inner-ply warps *b* and *b'*, the two sets of warps *d* and *d'* of the upper side of the main tube, and one set of warps *e* of the lower side of said tube. The under side of the 75 lower shed comprises the warps *e'* of the other set belonging to the lower side of the main tube. It will be seen that the filling-thread *f'* is laid under the set of stitching-warps. For the next pick the sheds are made up as 80 follows, (see Figs. 2 and 2^a.) The upper side of the upper shed comprises both sets of warps *a* and *a'* belonging to the outer ply and one set of warps *b* of the inner ply. The lower side of the upper shed and upper side of the 85 lower shed comprise the other set of warps *b'* of the inner ply, the extra warps *b''*, and one set of warps *d'* of the upper side of the main tube. The lower side of the lower shed comprises the tie-threads or stitching-warps *c*, 90 the other set of warps *d* of the upper side of the main tube, and the two sets of warps *e* and *e'* belonging to the lower side of the main tube. The filling-thread *f* will then be laid in the upper side of the main tube above the 95 tie-threads or stitching-warps *c*, (from 2^x to 2^v in Fig. 2^b,) while the filling-thread *f'* is being laid in the inner reinforcing-ply, from one edge of the same beyond the corresponding edge of the outer ply as far as the other edge 100

of the latter, but not to the corresponding edge of the inner ply (from 3^v to 3^x , Fig. 2^b.) It will be noted in this connection that the two sets of warps b and b' , while of the same width, are offset from each other laterally, so that they overlap only throughout the width of the outer ply, and the warps lying beyond work in conjunction with the two groups of extra warps b'' , respectively.

(See Figs. 1^a to 4^a.) For the next pick the upper side of the upper shed comprises only the set of warps a' of the outer ply, and the lower side of the lower shed comprises only the warps e of the lower side of the main tube, so that all the other warps are between the two sheds. Hence the filling-thread f is laid in the lower side of the main tube, (from 2^v to 2^z , Fig. 3^b,) and the filling-thread f' is laid simply in the outer reinforcing-ply, (from 3^x to 3^v , Fig. 3^b.) It will be noted that the tie-threads have moved up into the top of the lower shed, and it may be added that they remain in this intermediate position during the next pick also. For this next pick the top side of the upper shed comprises both sets of warps a and a' of the outer ply and the set of warps b' of the inner reinforcing-ply; the intermediate warps comprise the other set b , belonging to the said inner ply, the extra warps b'' , the stitching-warps c , and the set of warps d of the upper side of the main tube. The lower side of the lower shed comprises the other set of warps d' belonging to said upper side of the main tube and the two sets of warps of the lower side of the latter. It follows that the filling-thread f will be laid in the upper side of the main tube, (from 2^z to 2^v , Fig. 4^b,) while the filling-thread f' is being laid in the inner reinforcing-ply from one edge of the outer ply to the far edge of the inner ply, (3^v to 3^z , Fig. 4^b.) For the next pick the sheds are formed as first described, the stitching-warps and the extra warps b'' being carried into the upper side of the upper shed. This, it will be seen, occurs at every fourth pick, the said extra warps remaining in the lower side of the top shed and upper side of the bottom shed during the three intervening picks, whereas the stitching-warps go down into the lower side of the bottom shed for the first succeeding pick and then remain in the upper side of said shed during the other two picks of the three referred to as intervening.

It will be seen that by pursuing the method above described a continuously-woven main tube will be produced by the filling-thread f and the warps d d' and e e' , and simultaneously two reinforcing-plies, tubularly continuous and comprising the warps a and a' , those of the warps b and b' , which are superposed, and the filling-thread f' . At the same time extensions of the inner ply are woven, composed of the rest of the warps b b' and

the extra warps b'' and the filling-thread f' . Furthermore, both reinforcing-plies are tied together throughout the width of the outer ply by the stitching-warps, which also unite the plies to the upper side of the main tube, including the lateral extensions of the inner ply.

It will be seen that the method herein specifically described is well calculated to carry out the object primarily indicated. However, it is to be understood that this method is susceptible of modifications within the scope of the invention.

The fabric here shown is claimed as an article of manufacture in a separate application, Serial No. 554, filed by us January 6, 1900.

Having thus described a preferred mode of carrying out our invention, though without attempting to set forth all of the modes of its use, what we claim is—

1. The improvement in the art of weaving tubular reinforced fabric for vehicle-tires, the same consisting in weaving a continuous tube and simultaneously weaving a multi-ply reinforce over the tread portion thereof and uniting the same to the tube proper.

2. The improvement in the art of weaving tubular reinforced fabric for vehicle-tires, the same consisting in weaving a continuous tube and simultaneously weaving a multi-ply reinforce over the tread portion thereof with a filling-thread common to all the reinforcing-plies, and uniting the same together and to the tube proper.

3. The improvement in the art of weaving tubular fabric for vehicle-tires, the same consisting in weaving a continuous tube, simultaneously therewith weaving a plurality of tubularly continuous reinforcing-plies over the tread portion of the tube, and at the same time uniting the reinforcing-plies together and to the tube proper.

4. The improvement in the art of weaving tubular fabric for vehicle-tires, the same consisting in weaving a continuous tube, simultaneously therewith weaving a plurality of tubularly continuous reinforcing-plies over the tread portion of the tube, and single-ply lateral extensions from the junction thereof; and at the same time uniting the reinforcing-plies together and to the tube proper.

5. The improvement in the art of weaving tubular fabric for vehicle-tires, the same consisting in weaving a continuous tube, simultaneously therewith weaving a plurality of tubularly continuous reinforcing-plies over the tread portion of the tube, and single-ply lateral extensions from the junction thereof, all with one and the same filling-thread.

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Witnesses:

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