

(No Model.)

2 Sheets—Sheet 1.

R. W. SCOTT & L. N. D. WILLIAMS.
CIRCULAR KNITTING MACHINE.

No. 467,956.

Patented Feb. 2, 1892.

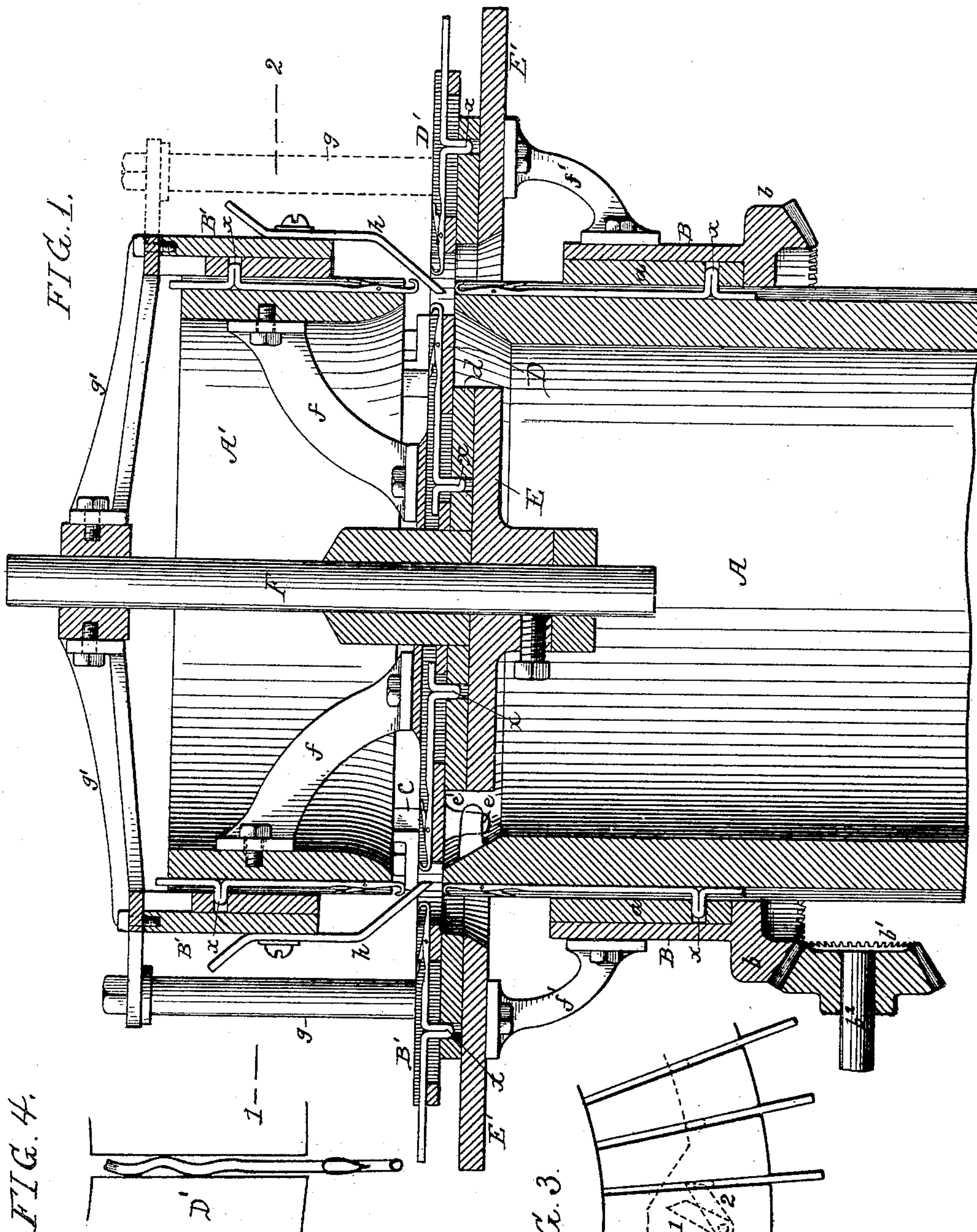
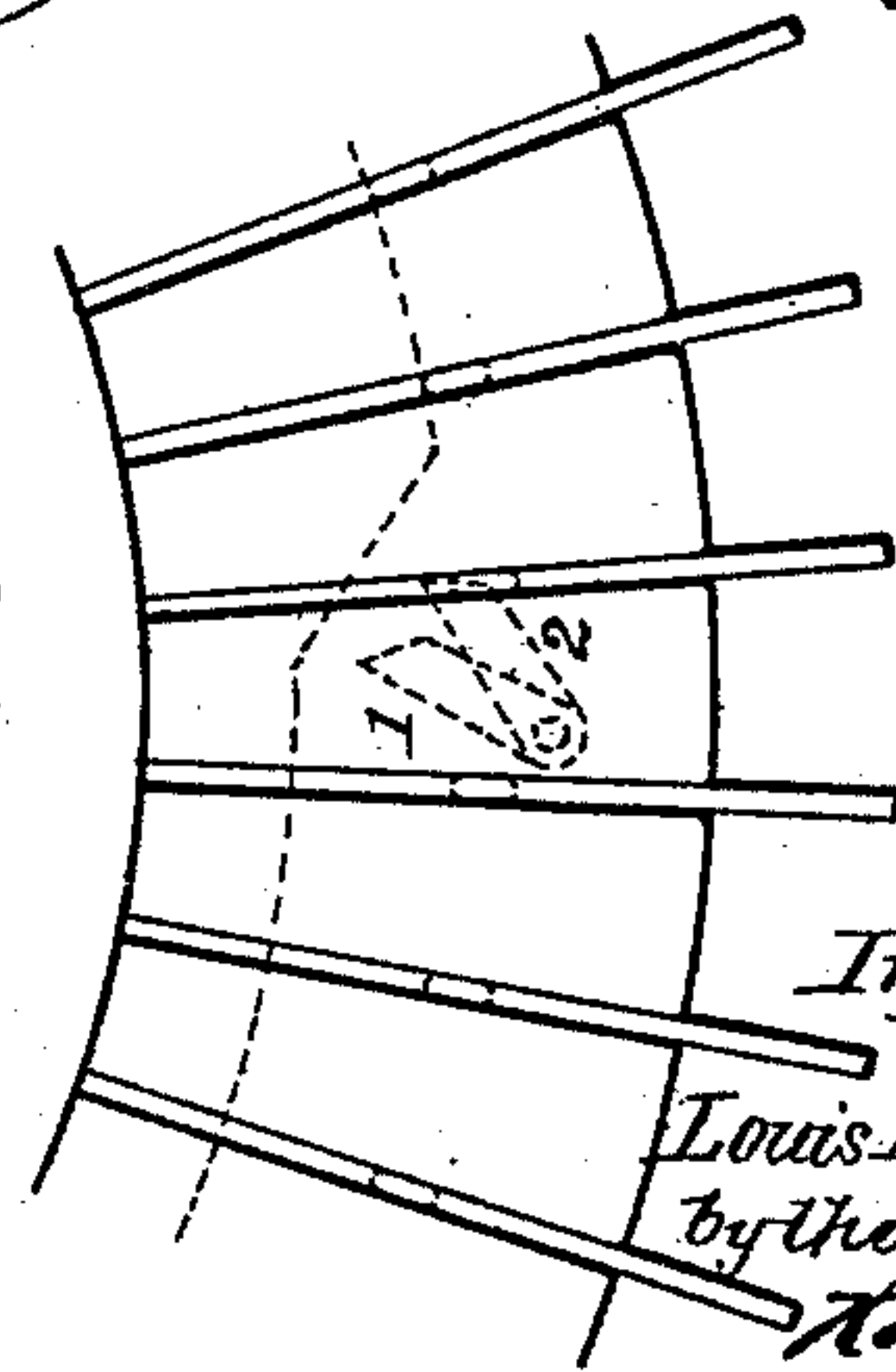


FIG. 3.



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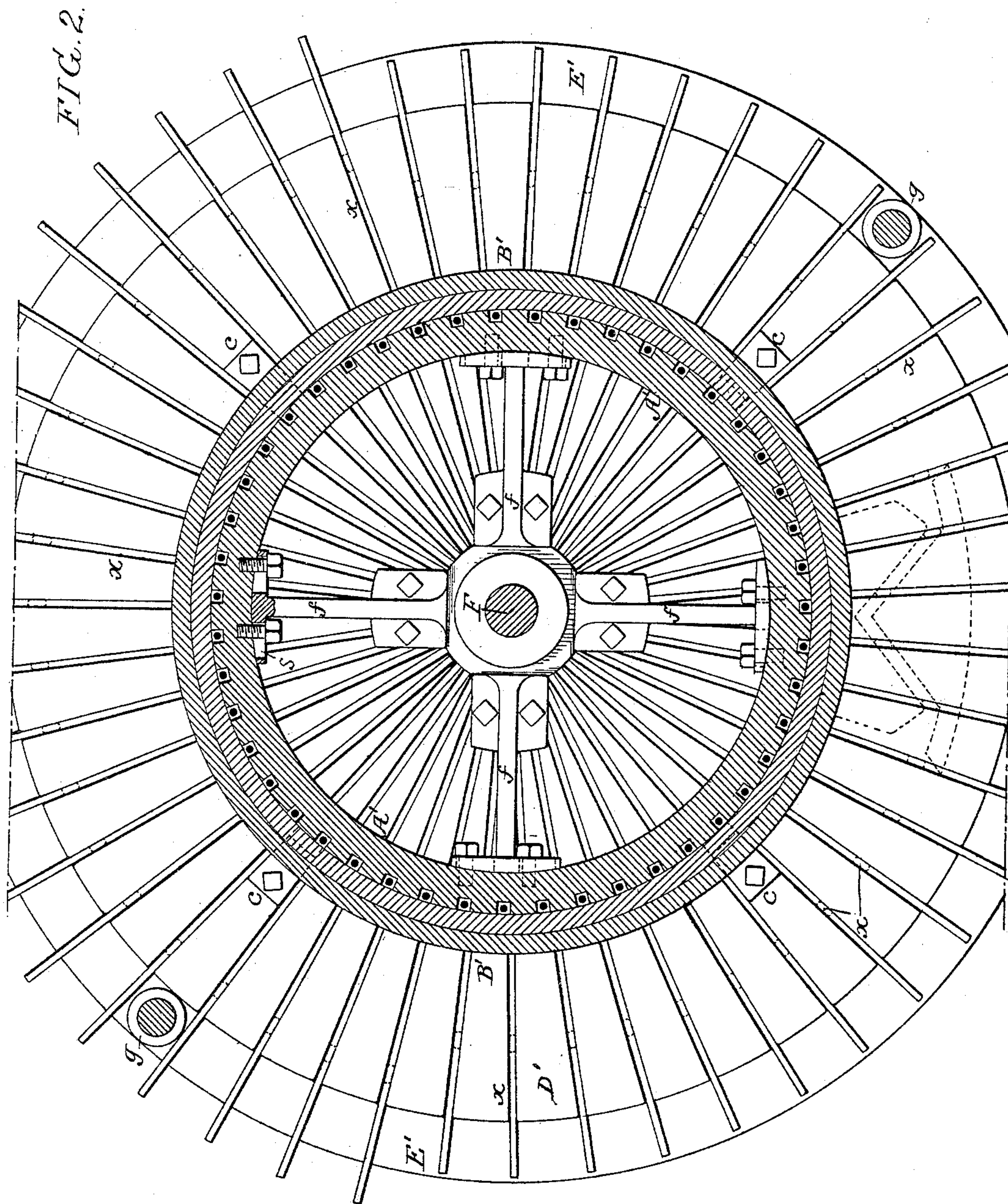
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2 Sheets—Sheet 2.

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CIRCULAR KNITTING MACHINE.

No. 467,956.

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Witnesses:
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John J. Meany

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UNITED STATES PATENT OFFICE.

ROBERT W. SCOTT AND LOUIS N. D. WILLIAMS, OF PHILADELPHIA,
PENNSYLVANIA.

CIRCULAR-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 467,956, dated February 2, 1892.

Application filed May 18, 1889. Serial No. 311,309. (No model.)

To all whom it may concern:

Be it known that we, ROBERT W. SCOTT and LOUIS N. D. WILLIAMS, both citizens of the United States, and residents of Philadelphia, Pennsylvania, have invented certain Improvements in Circular-Knitting Machines, of which the following is a specification.

The object of our invention is to construct a knitting-machine whereby knitted webs, either plain or ribbed, may be narrowed and widened in the manner set forth in the separate application filed by us March 26, 1889, Serial No. 304,865. This object we attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 represents a sectional view of a rib-knitting machine provided with attachments in accordance with our invention, Fig. 2 being a sectional plan view on the line 1 2, Fig. 1; Fig. 3, a view illustrating a modification of a part of the invention, and Fig. 4 an enlarged view of part of the machine.

A represents the needle-cylinder of the machine, which occupies a fixed position, and B is the cam-cylinder, having cams *a* for acting upon the bits *x* of the needles in the usual manner, this cam-cylinder in the present instance having at its lower end a bevel-wheel *b*, which meshes with a bevel-pinion *b'* on a driving-shaft *b''*.

D is the horizontal needle-dial, and E the dial cam-plate, having cams *d* for acting upon the bits *x* of the dial-needles, this dial cam-plate being secured to a central shaft or spindle F, which is caused to rotate with the cam-cylinder B in the manner hereinafter set forth. The needle-dial is also mounted upon the shaft or spindle F, but is not connected thereto, said needle-dial being prevented from turning by engagement of a lug *e* on said dial with a lug *e'*, projecting inward from the needle-cylinder A, near the upper end of the same. These parts are all substantially similar to those of an ordinary rib-knitting machine, with the exception that the dial cam-plate is below the needle-dial instead of above the same, as usual, and the bits are on the backs of the dial-needles instead of in front of the same, this construction being adopted for convenience in applying and op-

erating the attachments, which form the subject of our invention, and which we will now proceed to describe. These attachments comprise a supplementary needle-dial D' and a supplementary needle-cylinder A', with supplementary dial cam-plate E' and supplementary cam-cylinder B'. The supplementary needle-dial is in the present instance in the form of a ring concentric with the dial D and mounted outside of the needle-cylinder A, said dial being attached at suitable points by means of brackets *c* to the supplementary needle-cylinder A', which is located above the main needle-cylinder A and is mounted upon the dial D by means of suitable arms or brackets *f*, so that both needle-cylinders and both dials occupy a fixed position.

The needles of the cylinders and those of the dials occupy reverse positions in respect to each other—that is to say, the hooks of all the needles are adjacent to one another, the hooks of the needles of the main cylinder being at the top, those of the supplementary cylinder at the bottom, those of the dial at the outer ends, and those of the supplementary dial at the inner ends, and the four needles comprising the set are side by side—that is to say, the needle of the main cylinder A may form the first needle of the set, a needle of the main dial the second needle of the set, a needle of the supplementary dial the third of the set, and a needle of the supplementary cylinder the last of the set, so that when the needles of all the cylinders and dials are in action four stitches will be drawn in each set.

The supplementary dial cam-plate E' is in the present instance mounted upon and driven by the main cam-cylinder B by means of brackets *f'*, and the supplementary cam-cylinder B' is mounted upon and driven from this supplementary cam-plate E' by means of columns *g* and connecting-bars *g'*, as shown in Fig. 1, these connecting-bars extending to the central shaft or spindle F and serving to effect the rotation of the same and of the main dial cam-plate E in unison with the other cam cylinders and plate.

The needles of the supplementary needle-cylinder A' and supplementary dial D' can be moved longitudinally in the guideways of

the supplementary needle dial and cylinder, so that their bits α can be moved out of the path of the cams, both sets of cams being constructed as shown by dotted lines in Fig. 2 in order to permit this, and the needles of the supplementary needle-cylinder having spring-shanks or being otherwise so constructed as to have such frictional hold upon their bearings as to retain themselves in any position to which they may be adjusted. (See Fig. 4, for instance.) Hence the needles of said supplementary cylinder and dial can be thrown into and out of action, as required.

The needles of the supplementary dial draw stitches similar to those of the main cylinder—that is to say, they draw stitches on the face of the web—while the needles of the supplementary cylinder draw stitches similar to those of the main dial—that is to say, on the back of the web.

In the ordinary knitting operation the needles of the main cylinder and dial only are in action, so as to produce ordinary ribbed work; but in case it is desired to introduce a number of widening-wales into either face of the fabric the desired number of needles of the supplementary dial may be moved into operative position, either simultaneously or in succession, to form extra wales in the outer face of the fabric, or the needles of the supplementary needle-cylinder may be thrown into action in the same way to form extra wales in the inner face of the fabric, or needles of both the supplementary cylinder and dial may be rendered operative, the extra wales in each case being introduced between different pairs of the standing wales of the fabric instead of being bunched in one spot, as in the ordinary method of widening.

By introducing needles of the supplementary dial and supplementary cylinder simultaneously the widening of the fabric is changed without changing the character of the stitch, as set forth in a separate application filed by us and bearing even date herewith, Serial No. 311,310. The narrowing of the fabric may be effected either by transferring a loop from a needle of the supplementary dial onto the adjacent needle of the main cylinder or by transferring a loop from a needle of the supplementary cylinder to the adjacent needle of the main dial, or the reverse operation may be effected—that is to say, a loop may be transferred from the needle of the main cylinder to the adjacent needle of the supplementary dial, or from a needle of the dial to the adjacent needle of the supplementary cylinder, as set forth in our application Serial No. 304,865, before referred to. For this purpose the supplementary cylinder and dial should be movable slightly in one direction or the other. Hence the brackets f , which support the said supplementary needle cylinder and dial, are slotted, as at s , to permit a slight movement of the said cylinder and dial in one direction or the other, as shown in Fig. 2.

We have shown in the present instance opposite thread-guides h , carried by the supplementary cam-cylinder B' , so that the machine is a double-feed machine, and the introduction of widening-wales or the dropping of wales for narrowing can be effected in each course; but it will be evident that the invention can be applied to single-feed machines or to machines having more than two feeds. It will of course be understood that the thread-guides h are in advance of the point at which the needles are projected by the cams, so that said guides will not be in the way of the needles when the latter are projected. We have also shown the supplementary cylinder and dial needles extending completely around the machine. Hence extra or widening wales can be introduced at any point in the diameter of the tube; but it will be evident that segments of greater or less extent may replace the supplementary cylinder and supplementary dial where the extra widening-wales are to be introduced throughout but a limited area. It will also be evident that although we have shown our invention as applied to a rib-knitting machine it can be applied to plain-knitting machines with equal facility, the dial and supplementary needle-cylinder in this case being omitted and the needles of the supplementary dial employed to form extra or widening wales between the needles of the main cylinder and to transfer stitches to or receive them from the needles of the said main cylinder in narrowing, or the needles of the dial may serve as supplementary needles for this purpose when the cams of the dial-plate are so constructed that the needles of the dial may be moved into or out of the control of said cams, so as to be thrown into or out of action, as required, such construction being shown by dotted lines in Fig. 2 in connection with the cams of the supplementary dial. It will be apparent, also, that our invention can be carried out in connection with that class of machines in which the needle-beds are straight instead of cylindrical, although our invention is of especial advantage in connection with circular machines. In some of our claims, therefore, we have used the term "needle-carrier" to indicate either a straight or a circular machine.

Instead of moving the needles into and out of control of the cams of the supplementary cylinder and dial, the cams themselves may, if desired, be actuated so as to fail to operate the needles in such manner as to cause said needles to take the thread. For instance, the cam which projects the needles may be so moved after acting upon a certain number of needles that the remaining needles will not be projected sufficiently to catch the thread.

In Fig. 3 we have shown an instance of the use of a movable cam, which can be adjusted either to the operative position 1 or to the inoperative position 2, the spaces between the needles being sufficient to permit a change in the position of the cam between successive

needles, so that the cam may be allowed to remain in active position while passing as many needles as desired and may then be thrown into inoperative position before reaching the next needle; or, instead of cams for projecting the needles, movable plates adjustable as to length and acting upon a series of needles simultaneously may be used.

Having thus described our invention, we claim and desire to secure by Letters Patent—

1. The combination of the main needle-carrier and its needles, means for actuating said needles, a supplementary needle-carrier having needles located between those of the main carrier, a device for operating said needles, the latter or the operating device being movable into or out of operative position, and provision for moving the supplementary carrier in respect to the main carrier, whereby the shifting of stitches from the needles of one to those of the other may be effected, substantially as specified.

2. The combination of the main needle-carrier and its needles, means for operating said needles, a dial having needles and operating devices therefor, a supplementary needle-carrier and its needles, and an operating device for said needles, the latter or the operating device being movable into or out of operative position in order to operate only selected needles, substantially as specified.

3. The combination of the main needle-cylinder and its needles, means for operating said needles, a circular dial with needles and operating device therefor, a supplementary needle-carrier and its needles, and an operating device for said needles, the latter or the operating device therefor being movable into or out of operative position, substantially as specified.

4. The combination of a needle-carrier and its needles, means for operating said needles, a dial having needles and operating devices therefor, two supplementary needle-carriers

and their needles, one operating in conjunction with the main needle-carrier and the other in conjunction with the dial, and operating devices for the needles of said supplementary carriers, said needles or their operating devices being movable into or out of operative position in order to select the operating needles, substantially as specified.

5. The combination of a needle-carrier and its needles, means for operating said needles, a dial having needles and operating devices therefor, two supplementary needle-carriers, each having needles, operating devices for said needles, the latter or their operating devices being movable into or out of operative position to select the operative needles, and provision for moving both of said supplementary carriers in respect to the main carrier and dial for transferring stitches from the needles of one to those of the other, substantially as specified.

6. The combination of the main needle-cylinder and its needles, means for operating said needles, a circular dial having needles and operating devices therefor, a supplementary dial having needles operating in conjunction with those of the main cylinder, a supplementary needle-cylinder having needles operating in conjunction with those of the main dial, and operating devices for the needles of said supplementary cylinder and dial, said needles or their operating devices being movable into or out of operative position to select the operative needles, substantially as specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ROBERT W. SCOTT.
LOUIS N. D. WILLIAMS.

Witnesses:

GEO. D. STREET,
HARRY SMITH.