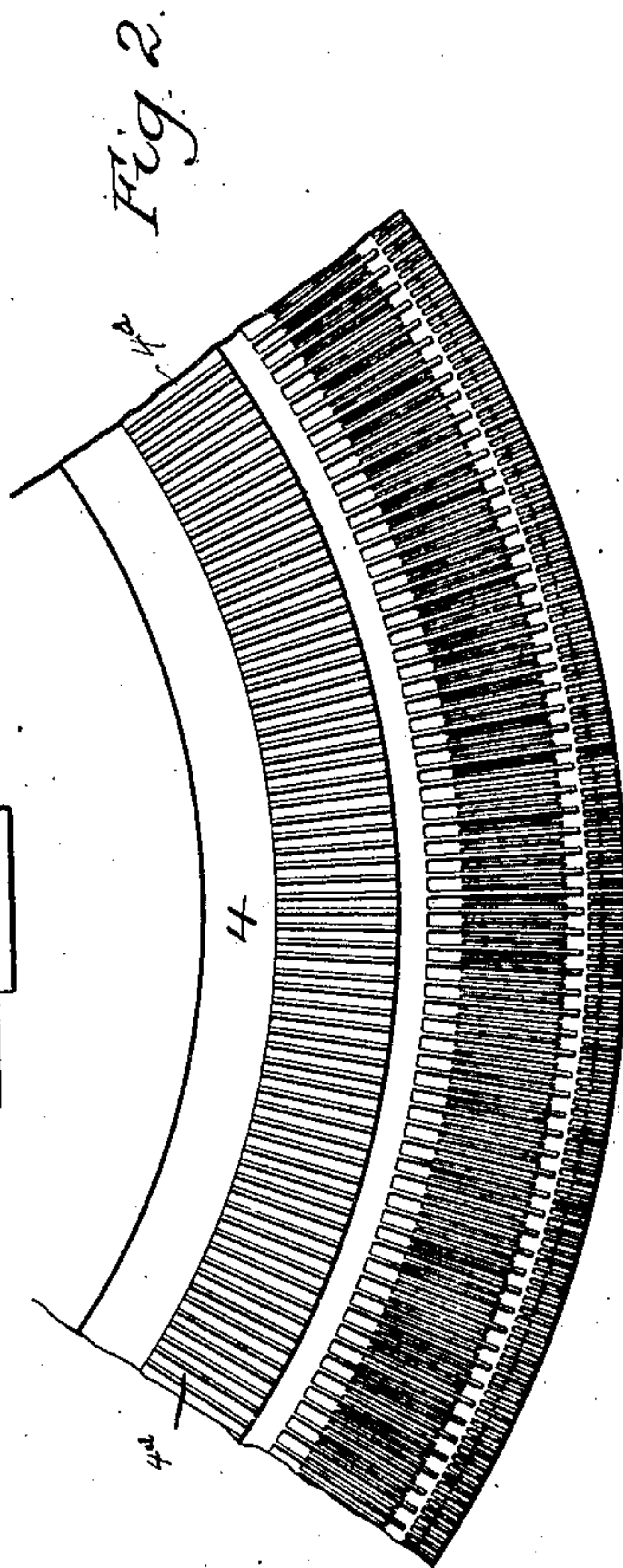
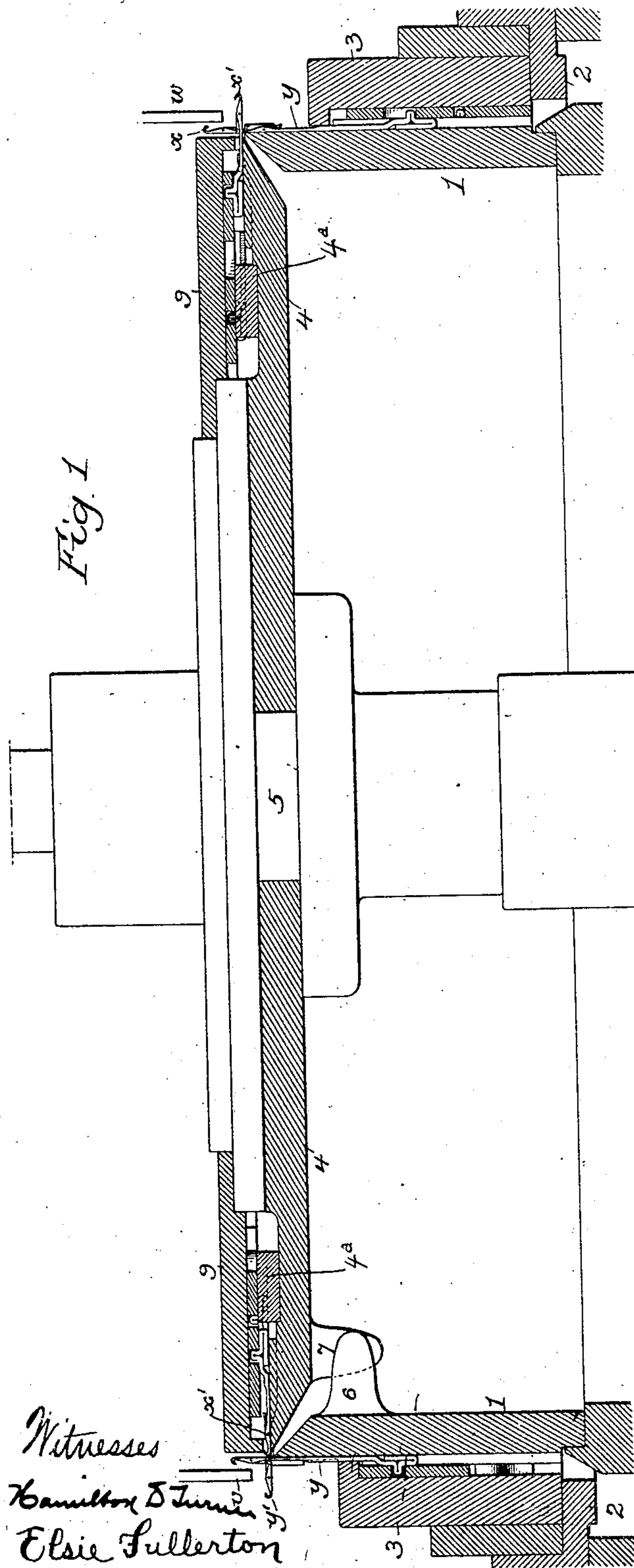


R. W. SCOTT.
RIB KNITTING MACHINE.
APPLICATION FILED SEPT. 21, 1908.

925,393.

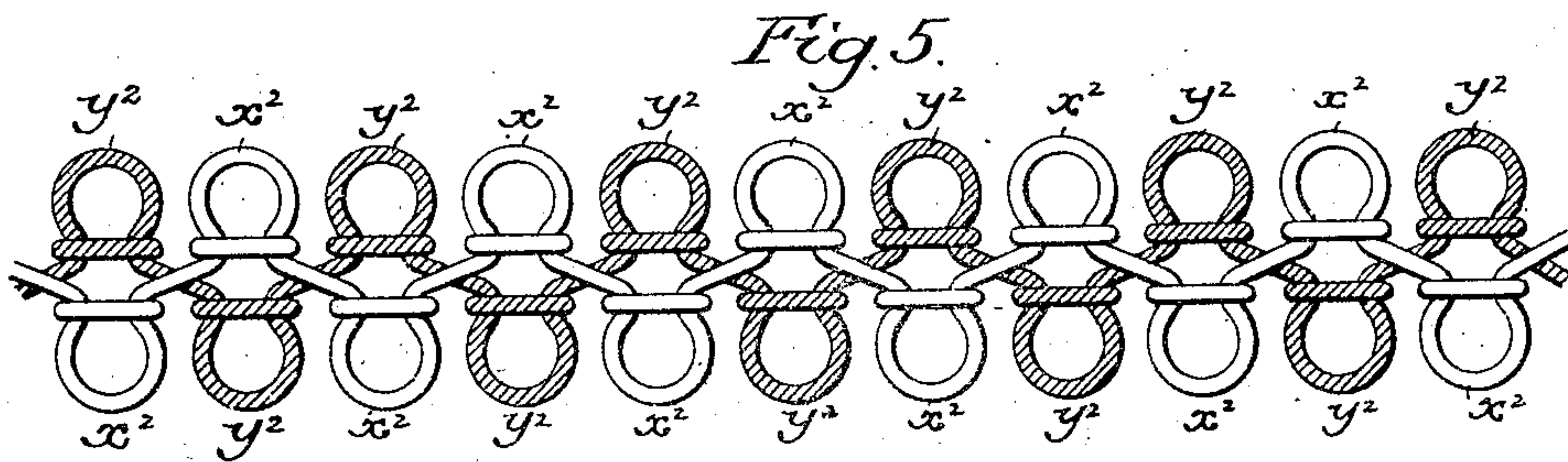
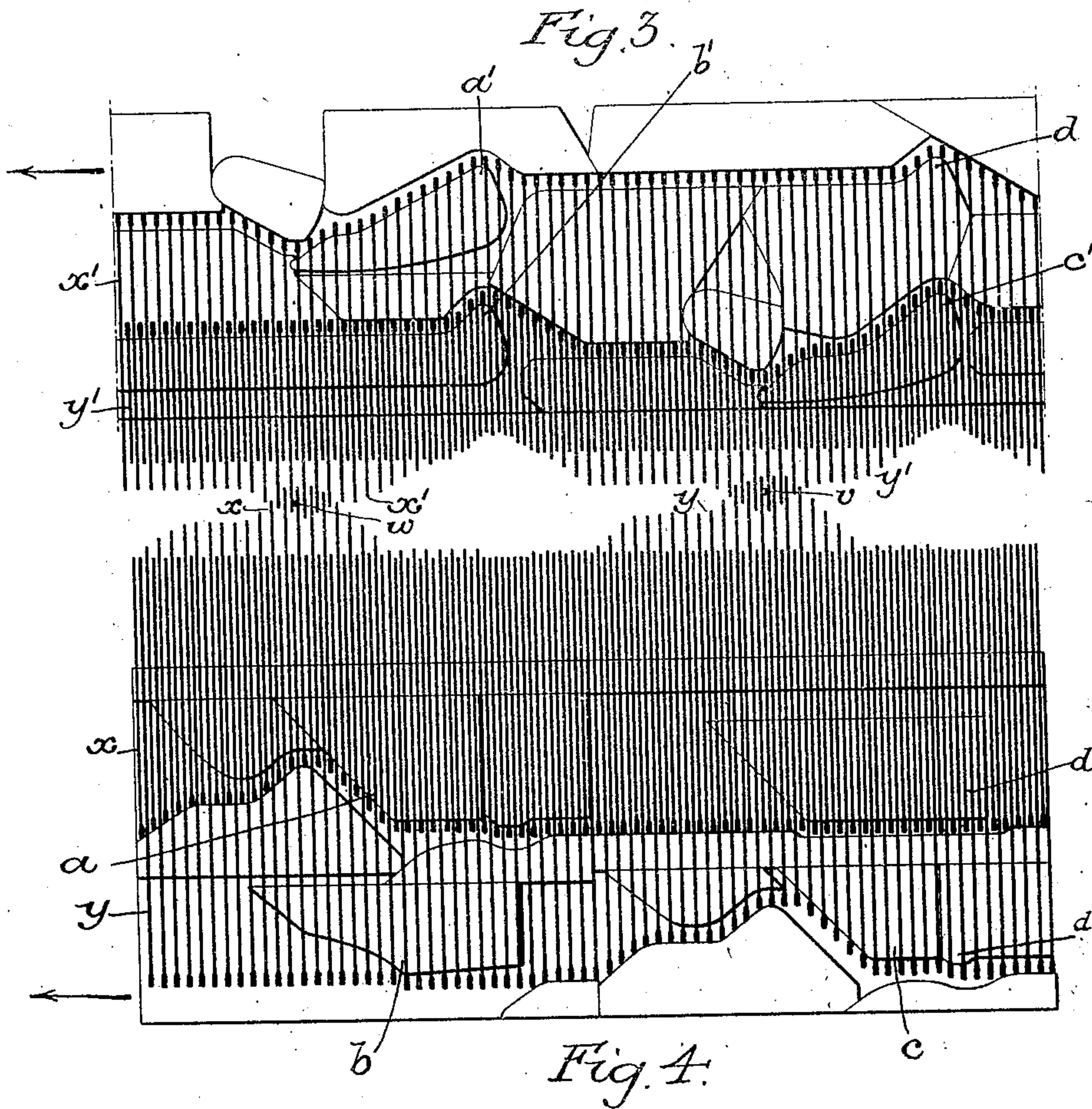
Patented June 15, 1909.
2 SHEETS—SHEET 1.



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UNITED STATES PATENT OFFICE.

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RIB-KNITTING MACHINE.

No. 925,393.

Specification of Letters Patent.

Patented June 15, 1909.

Application filed September 21, 1908. Serial No. 453,963.

To all whom it may concern:

Be it known that I, ROBERT W. SCOTT, a citizen of the United States, residing in Leeds Point, Atlantic county, New Jersey, have invented certain Improvements in Rib-Knitting Machines, of which the following is a specification.

The object of my invention is to provide a knitting machine which is susceptible of producing ribbed fabric having a closer disposition of the wales and a heavier or a firmer texture than a ribbed knitted fabric produced in the usual way.

In the accompanying drawings—Figure 1 is a vertical sectional view of sufficient of a rib knitting machine to illustrate my invention; Fig. 2 is a top or plan view of part of the needle-carrying dial of said machine; Fig. 3 is a view illustrating two groups of cams employed for operating the dial needles of the machine; Fig. 4 is a view illustrating two groups of cams for operating the cylinder needles of the machine, and Fig. 5 is an enlarged section of a piece of ribbed fabric which can be produced upon the machine.

The invention is susceptible of embodiment either in a machine of small diameter, having but two groups of cams in the cylinder cam ring and dial cam ring, or in a machine of larger diameter having a greater number of groups of cams in both cam rings, a machine of the latter type having been selected for purposes of illustration.

For the purpose of better illustrating the cooperation of the needles of the dial and cylinder, the cams of the dial cam ring shown in Fig. 3, are displayed on a straight line instead of being contained within a sector of a circle as in the actual machine and the cams for actuating the cylinder needles are displayed in Fig. 4 as in a flat plane, whereas in the actual machine they are distributed around the inner face of a circular cam ring. In the actual machine, therefore, the longitudinal dimensions of the cams of the dial cam ring will differ somewhat from those shown in Fig. 3 on account of the radial disposition of the needles in the dial but the said cams will, so far as regards the projection and retraction of the needles, act in the manner illustrated in said Fig. 3.

In Fig. 1 of the drawing, 1 represents the needle cylinder which is vertically grooved for the reception and guidance of its needles, and is suitably secured to the fixed base or

bed plate of the machine. Surrounding the needle cylinder is the cylindrical cam ring 3 upon whose inner face are mounted the cams for imparting reciprocating movement to the cylinder needles, said cam ring being secured to a rotatable ring 2 to which power may be applied in any of the usual ways.

The needle dial 4 is mounted on a central stem or spindle 5 and is held in stationary relation with the needle cylinder 1 either by means of engaging lugs on said cylinder and dial, such for instance, as shown at 6 and 7 in Fig. 1, or in any other convenient way, and above the dial is located the dial cam ring 9, upon whose under face are mounted the cams whereby reciprocating movement is imparted to the needles which are guided in the radially grooved upper face of the dial, said dial cam ring being caused to rotate with the cylinder cam ring in any ordinary way.

While I have selected for the purpose of illustrating my invention, a machine of that type in which the needle cylinder and dial are stationary, and cooperate with a rotating cylinder cam ring and a rotating dial cam ring, it should be understood that my invention is equally applicable to that type of machine in which these conditions are reversed and in which the cylinder cam ring and dial cam ring are the stationary elements, and the needle and dial rotate, or the invention is applicable to machines having straight needle beds and reciprocating cam carriers.

Both the needle cylinder and dial are equipped with two sets of needles, the needles of one set being disposed in respect to those of the other set in accordance with the character of the ribbed fabric which is to be produced.

The machine shown in the drawing is adapted for the production of a fabric having what is known as a one-and-one rib, the stitches being drawn alternately on a cylinder needle and a dial needle, and a needle x of one set in the cylinder alternates with a needle x' of the same set in the dial through the extent of the said cylinder and dial, the needles $x-x'$ of one set alternating with needles $y-y'$ of the other set.

If a two-and-two rib is desired, the needles will alternate in pairs instead of singly, and other types of rib will require corresponding change in the disposition of the needles in the two sets throughout the cylinder and dial.

The needles x' of the dial are in line with

the needles y of the cylinder, and the needles y' of the dial are in line with the needles x of the cylinder. The needles $x-x'$ cooperate in connection with one or more yarn feeds w , Fig. 1, to produce a ribbed fabric of the usual character and the needles $y-y'$ cooperate in connection with one or more yarn feeds v , Fig. 1, to produce another ribbed fabric of ordinary character whose needle wales are disposed between those of the fabric first produced, thus, as shown in Fig. 5, the needle wales x^2 are produced from one yarn upon the needles $x-x'$ and the needle wales y^2 are produced from another yarn upon the needles $y-y'$.

In order to provide for the independent operation of the needles $x-x'$ and $y-y'$, said needles are of different lengths, the needles x having their butts in a different plane from those of the needles y , and the needles x' having their butts in a different plane from those of the needles y' , as shown in Figs. 3 and 4, and the needle-actuating cams for the two sets of needles are likewise disposed in different planes as also shown in Figs. 3 and 4, the arrows in said figures representing the direction of movement of the cams in respect to the needles.

Any desired system of cams may be used for projecting and retracting the needles of each set, but I find it advisable to use, in cooperation with the retracting cams $a-a'$ which impart draft to the needles $x-x'$, other cams $b-b'$ for so acting upon the needles $y-y'$ at the same point that the stitches upon said needles $y-y'$ will be held under tension while the stitches are being drawn upon the needles $x-x'$, and, in like manner, cams $d-d'$ serve to retract the needles $x-x'$ and impart tension to the stitches thereon when the needles $y-y'$ are being subjected to the draft of the cams $c-c'$, in order to draw the stitches upon said needles $y-y'$.

The value of my improved machine for the production of ribbed fabrics having a close or heavy texture will be understood when it is borne in mind that it is impracticable in an ordinary rib knitting machine to produce a web having more than about fourteen needles to the inch on each face, for in such ordinary rib knitting machine the dial needles alternate with the cylinder needles and consequently the whole twenty-eight needles must be crowded into one inch of space. In a machine constructed in accordance with my invention however, the dial needles are in line with the cylinder needles, hence the only limit to the number of wales in the web is the limit of fineness to which each needle-carrying member of the machine can be cut. I can, therefore, produce ribbed webs having twenty-four or more wales to the inch on each face, while at the same time the knitting operation can be carried on with the same facility as in an ordinary rib knitting machine

having a gage of but twelve to the inch in each needle carrier, owing to the fact that in my improved machine but one-half of the total number of needles is knitting at each feed. The fabric therefore has a much finer appearance than usual arising from the closer disposition of the wales and ribbed fabric of heavy weight can be produced with the use of light yarns, because of the number of needle wales and courses of stitches per inch which my invention renders possible, whereas weight in an ordinary ribbed fabric means heavy yarn, and this, in turn, necessitates a coarse gage.

By the use of relatively heavy yarn in the production of each member of my composite web, I can so closely crowd the wales that the fabric will not possess the elasticity of an ordinary ribbed fabric but will, in this respect, partake more of the characteristics of a woven fabric.

Although I prefer in carrying out my invention to locate the dial needles in line with the cylinder needles in all cases, some of the advantages of my invention may be attained even although the dial needles are not thus disposed.

In grooving the dial for the reception and guidance of its needles only the outer portion of the dial need be grooved for the reception of all of said needles, the extent of this portion of the dial providing ample room for the formation of the full number of grooves. The inner portion of the dial, however, need only be grooved for the reception of the longer dial needles, consequently there is no tendency of the grooves to meet or run into one another in this more contracted portion of the dial (see Fig. 2). To facilitate the grooving of the dial the inner grooves are preferably formed in a separable ring 4^a.

As, in the composite fabric made upon my improved machine, both of the component webs are produced under the same conditions and are therefore of uniform character, the composite web itself is uniform throughout.

I claim:—

1. The combination in a knitting machine for producing a ribbed fabric, of two needle carriers each having two sets of needles, needle operating mechanism and a yarn supply cooperating with the needles of one set in each carrier to produce one ribbed fabric, and needle operating mechanism and a yarn supply cooperating with the needles of the other set in each carrier to produce another ribbed fabric interlocked with the first.

2. The combination in a knitting machine for producing a ribbed fabric, of two needle carriers each having two sets of needles, the needles of one set in each carrier being in line with the needles of the other set in the other carrier, needle operating mechanism and a yarn supply cooperating with the needles of

one set in each carrier to produce one ribbed fabric, and needle operating mechanism and a yarn supply cooperating with the needles of the other set in each carrier to produce another ribbed fabric interlocked with the first.

3. The combination in a knitting machine for producing a ribbed fabric, of two needle carriers each having two sets of needles, needle operating mechanism and a yarn supply cooperating with the needles of one set in each carrier to produce one ribbed fabric, needle operating mechanism and a yarn supply cooperating with the other set of needles in each carrier to produce another ribbed fabric interlocked with the first, and means for imparting tension to the stitches of each of said ribbed fabrics at the points where the stitches of the other ribbed fabric are being drawn.

4. The combination in a knitting machine for producing a ribbed fabric, of a cylinder and dial, each having two sets of needles, needle operating mechanism and a yarn supply cooperating with one set of needles of the cylinder and dial to produce one ribbed fabric and needle operating mechanism and a yarn supply cooperating with the other set of needles of the cylinder and dial to produce another ribbed fabric interlocked with the first.

5. The combination in a knitting machine for producing a ribbed fabric, of a cylinder

and dial, each having two sets of needles, the needles of the dial being in line with those of the cylinder, needle operating mechanism and a yarn supply cooperating with the needles of one set in the cylinder and dial to produce one ribbed fabric, and needle operating mechanism and a yarn supply cooperating with the needles of the other set in the cylinder and dial to produce another ribbed fabric interlocked with the first.

6. The combination in a knitting machine for producing a ribbed fabric of two needle carriers, each having two sets of needles, the needles of one set being of a different length from those of the other set, two sets of needle operating mechanism located in different planes, and two yarn supplies the needle operating mechanism in one plane and one yarn supply cooperating with one set of needles in each carrier to produce one ribbed fabric, and the needle operating mechanism in the other plane and the other yarn supply cooperating with the other set of needles in each carrier to produce another ribbed fabric interlocked with the first.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

ROBERT W. SCOTT

Witnesses:

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JOHN T. EVANS.