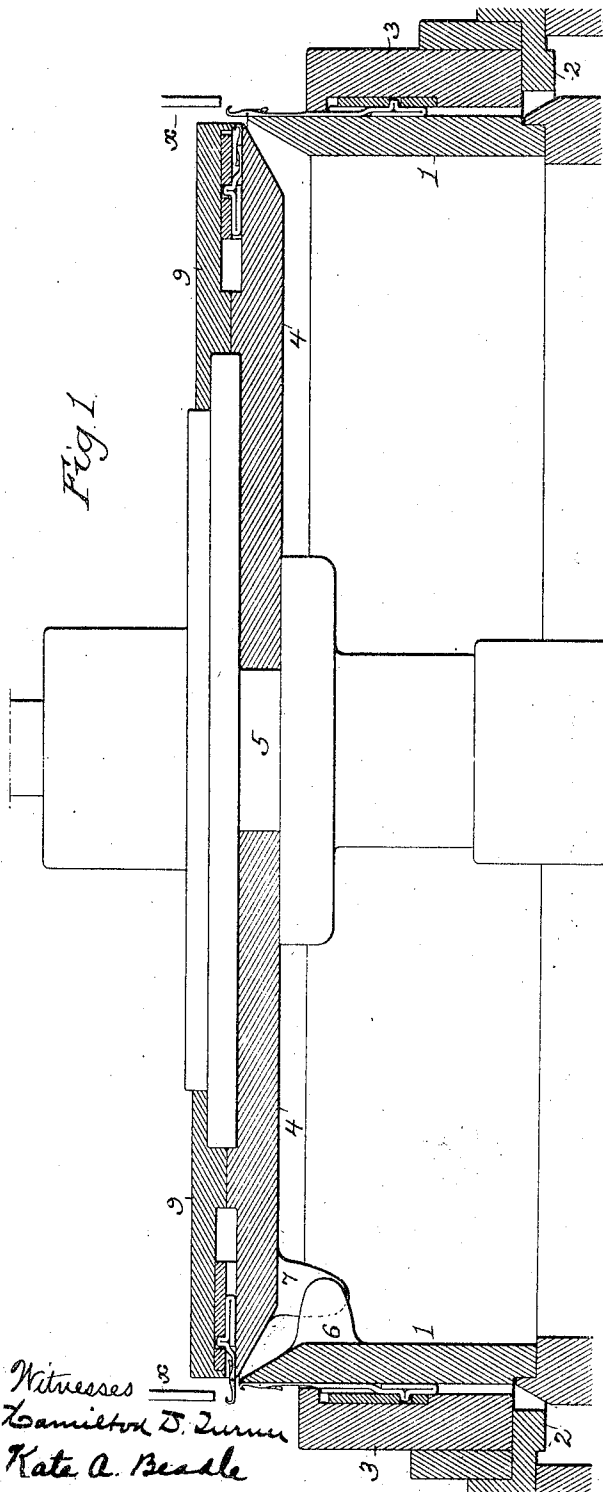


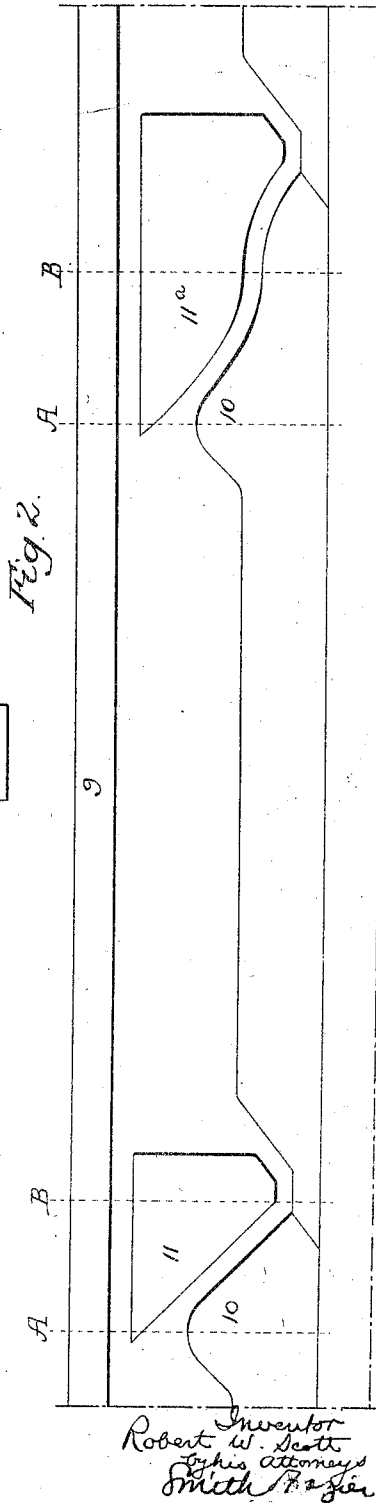
951,706.

R. W. SCOTT.  
RIB KNITTING MACHINE.  
APPLICATION FILED SEPT. 18, 1908.

Patented Mar. 8, 1910.  
2 SHEETS—SHEET 1.



Witnesses  
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2 SHEETS—SHEET 2.

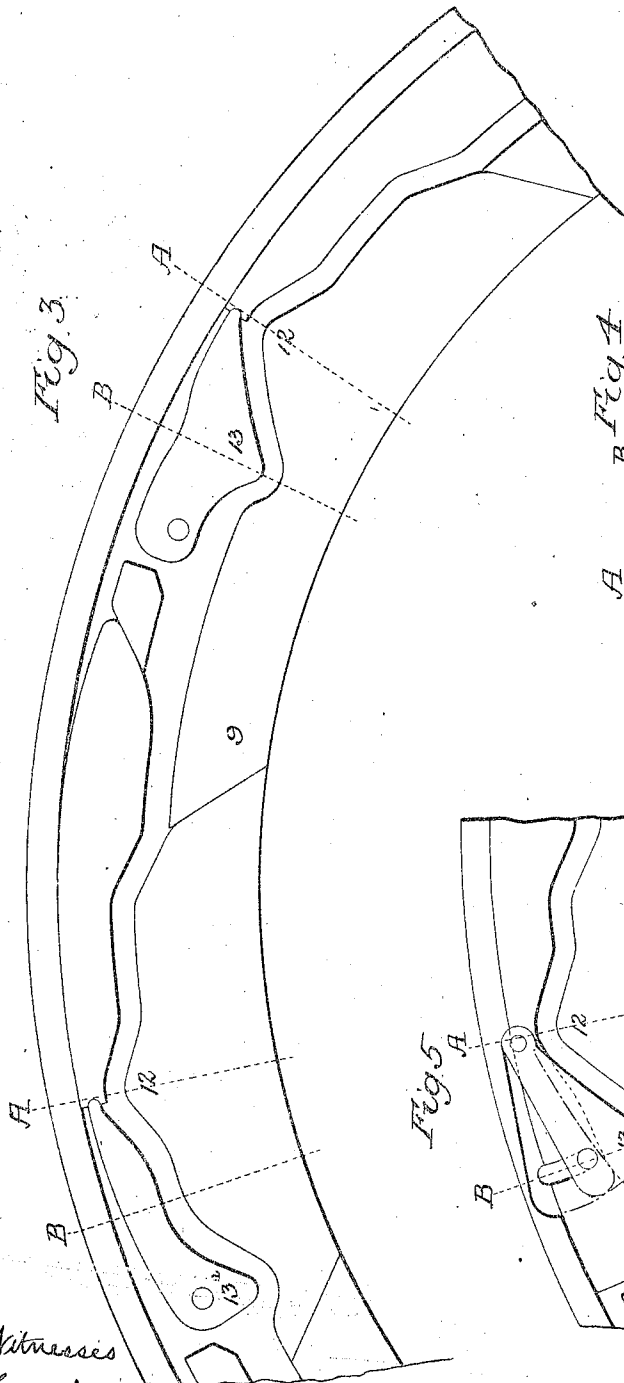


Fig. 3

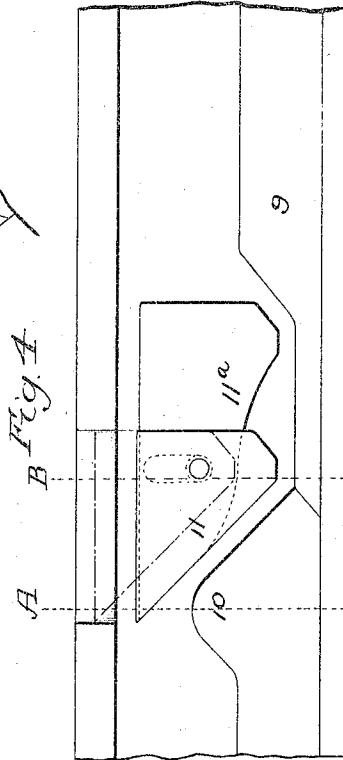


Fig. 4

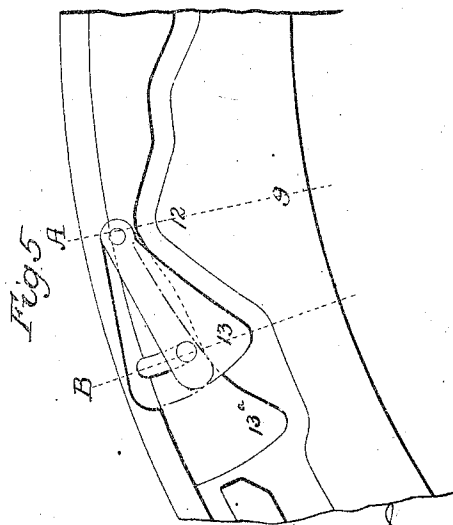


Fig. 5

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# UNITED STATES PATENT OFFICE.

ROBERT W. SCOTT, OF LEEDS POINT, NEW JERSEY, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO GENERAL KNIT FABRIC COMPANY, OF UTICA, NEW YORK, A CORPORATION OF NEW YORK.

## RIB-KNITTING MACHINE.

951,706.

Specification of Letters Patent.

Patented Mar. 8, 1910.

Application filed September 18, 1908. Serial No. 453,610.

*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 so construct a machine for knitting ribbed fabrics that a fine gage web can be produced which will present alternations of long and short stitches in the courses and wales of both faces of the web, as shown in my application Serial No. 461,983, filed November 10, 1908. This object I attain in the manner herein-after set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal sectional view of the essential parts of a circular multi-feed rib knitting machine constructed in accordance with my invention; Fig. 2 is a view of two sets of cams of the cylinder cam ring of said machine, displayed in a flat plane; Fig. 3 is a bottom view of part of the dial cam ring of the machine, illustrating two sets of cams with which such ring is equipped; Fig. 4 is a view of a composite cam intended for use in the cylinder cam ring of a single feed machine, and Fig. 5 is a view of a composite cam with which the dial cam ring of such single feed machine would be provided.

In Fig. 1 of the drawing, 1 represents the needle cylinder of the machine which is grooved for the reception and guidance of the needles and is suitably secured to the fixed base or bed plate of the machine. Surrounding the needle cylinder is a 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 stationary 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 radially

guided in the 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 cylinder and dial rotate, or the invention is applicable to machines having straight needle beds and reciprocating cam carriers.

Both the cylinder cam ring and the dial cam ring of the machine shown in Fig. 1 are provided with cams for projecting their respective needles to the clearing point, that is to say to the point at which the stitch already formed upon the needle is slipped back of the latch, and with retracting or draft cams whereby the needles are retracted to the knocking-over point, that is to say, to the point where the stitch previously formed upon the needle is slipped from the end of the latch and knocked over the hook of the needle, in order to engage the new stitch drawn by the latter.

In Fig. 2 of the drawing, the projecting cams of the cylinder cam ring are represented at 10 and the draft cams at 11 and 11<sup>a</sup> respectively, and in Fig. 3 the projecting cams of the dial cam plate are represented at 12 and the draft cams at 13 and 13<sup>a</sup> respectively.

In the manufacture of ordinary ribbed knitted fabric, the co-acting needles of the cylinder and dial do not reach the knocking over point, or the point of full retraction, at the same time, the needles of one set, termed the "primary" needles, reaching the knocking-over point before the needles of the other set, termed the "secondary" needles. Usually the cylinder needles are the primary needles and the dial needles are the secondary needles, the difference in the operation of the two sets of needles being due to the fact that the draft cams of the cylinder cam ring are comparatively short and present a relatively abrupt angle, as shown, for in-

stance, at 11, in Fig. 2, while the draft cams of the dial cam ring are longer, are curved and present a lesser angle, as shown for instance at 13<sup>a</sup>, in Fig. 3. The purpose of this construction is to delay the draft of each secondary needle until the primary needle in advance of it has completed its draft, thus preventing the closing of the latches of both needles at the same time, which would cause the knitting yarn to be trapped by the latch of that one of the needles to which it was last fed, and would result in the breaking of such trapped yarn by the draft upon it. In a machine having fourteen needles to the inch in each needle carrier, therefore, the primary needles will first draw at the rate of fourteen to the inch and the secondary needles will then draw at a corresponding rate, whereas if stitches were drawn by both sets of needles simultaneously the draft would be at the rate of twenty-eight to the inch, and the yarn would be trapped by the closing latches, and its forward or feeding movement would be restricted to such an extent as to cause it to break under the strain. The stitches drawn by the primary needles constitute the face of an ordinary ribbed knitted web and impart to said face an appearance different from that of the back of the web. While it might be possible in a coarse gage machine, say one having about eight needles to the inch in each set, to draw stitches upon both sets of needles simultaneously because of the relatively wide spacing of the needles, the coarseness of the latter and the size of the yarn, such operation is not practical in fine gage machines like those at present employed in the manufacture of ribbed knitted webs for underwear and like purposes, which frequently have as many as fourteen needles to the inch in each set. The use of primary and secondary needles also permits the needles of one set to draw longer stitches than those of the other set, the free passage of the yarn over a secondary needle permitting long draft by the preceding primary needles. In carrying out my invention, therefore, in order to produce alternations of long and short stitches, differently disposed in successive courses of the web, I cause each set of needles to act alternately as primary and secondary needles, the needles of each set which act as the primary needles at one feed acting as the secondary needles at the next feed. In a multi-feed machine, this can readily be accomplished by alternating a primary draft cam, such as shown at 11 on the cylinder cam ring, Fig. 2, and at 13 on the dial cam ring, Fig. 3, with a secondary draft cam, such as shown at 11<sup>a</sup> on the cylinder cam ring and at 13<sup>a</sup> on the dial cam ring, the secondary draft cam on the dial cam ring acting in conjunction with the primary draft cam on the cylinder cam

ring, and vice-versa, as shown in Figs. 2 and 3, in which the arrangement of the primary and secondary draft cams relatively to one another is indicated by the dotted lines A and B. In a fabric produced upon my improved machine, therefore, the stitches of one course upon one face of the web will be primary stitches and the stitches of the same course on the other face of the web will be secondary stitches, while in a succeeding course this relation of the stitches will be reversed, consequently both faces of the web will present the same appearance, and as one character of cam draws a longer stitch than the other character of cam, there will be both in the courses and wales of each face of the web an alternation of long and short stitches. In a single feed machine, the same result may be attained by the use of composite cams in the cylinder and dial cam rings, such for instance as represented, respectively, in Figs. 4 and 5, each cam comprising a primary member 11 or 13, and a secondary member 11<sup>a</sup> or 13<sup>a</sup>, each adapted to act upon the needle butts, the primary member of the cam being movably mounted on the cam ring so that it may be moved into operative position in knitting one course and then retracted as shown by dotted lines, in order to permit the secondary member to operate in knitting the next course. Such composite cams can also be used on the cam bars of a straight rib knitting machine, whether single or multiple feed, so that the primary member can act on one reciprocation of the cam bar, and the secondary member on the reverse reciprocation.

In a circular machine the trapping of the yarn which might take place because of the closing of the latches of adjoining needles at the same time when one of the primary cams was being shifted from operative to inoperative position, and the other from inoperative to operative position may be prevented by "tucking" upon the needles of one or both sets which are being acted upon by the draft cams at such time, such needles failing to slip their stitches back of the latches, which will consequently remain open when the needles are retracted. In a straight machine the position of the primary members of the cam may be changed after said cam has passed beyond the needles at the end of the needle bed.

In Fig. 1 of the drawing, two of the yarn guides are represented at *g*.

I claim:

1. A rib knitting machine having two sets of needles, cams, including primary and secondary draft cams, for actuating each set of needles, a primary draft cam for the first set of needles corresponding to the secondary draft cam for the second set of needles, and a primary draft cam for the second set of needles corresponding to the secondary draft

cam for the first set of needles, and yarn supplying means so disposed in respect to the cams that the needles which act as primary needles in knitting one course may act as secondary needles in knitting a succeeding course.

2. A rib knitting machine having two sets of needles, a plurality of yarn guides, and a plurality of cam mechanisms for actuating each set of needles, each set of cam mechanisms including alternating primary and secondary draft cams, the primary draft cams for one set of needles corresponding with the secondary draft cams for the other set of needles and vice-versa, and the yarn guides being so disposed in respect to the cams that the needles which act as primary needles in knitting one course may act as secondary needles in knitting a succeeding course.

3. A circular rib knitting machine having a needle cylinder and dial, each with needles, cylinder and dial cam rings, each having primary and secondary draft cams for actuating its respective set of needles, a primary draft cam of the cylinder corresponding to a secondary draft cam of the dial and a primary draft cam of the dial corresponding to

a secondary draft cam of the cylinder, and yarn supplying means so disposed in respect to the cams that the needles which act as primary needles in knitting one course may act as secondary needles in knitting a succeeding course.

4. A circular rib knitting machine having a needle cylinder and dial, each with needles, a plurality of yarn guides, and cylinder and dial cam rings each having a plurality of needle-actuating cam mechanisms with alternating primary and secondary draft cams, the primary draft cams of the cylinder set corresponding with the secondary draft cams of the dial set, and vice-versa, and the yarn guides being so disposed in respect to the cams that the needles which act as primary needles in knitting one course may act as secondary needles in knitting a succeeding course.

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

ROBERT W. SCOTT.

Witnesses:

MARGREATA SPACE,  
JOHN T. EVANS.