

(Model.)

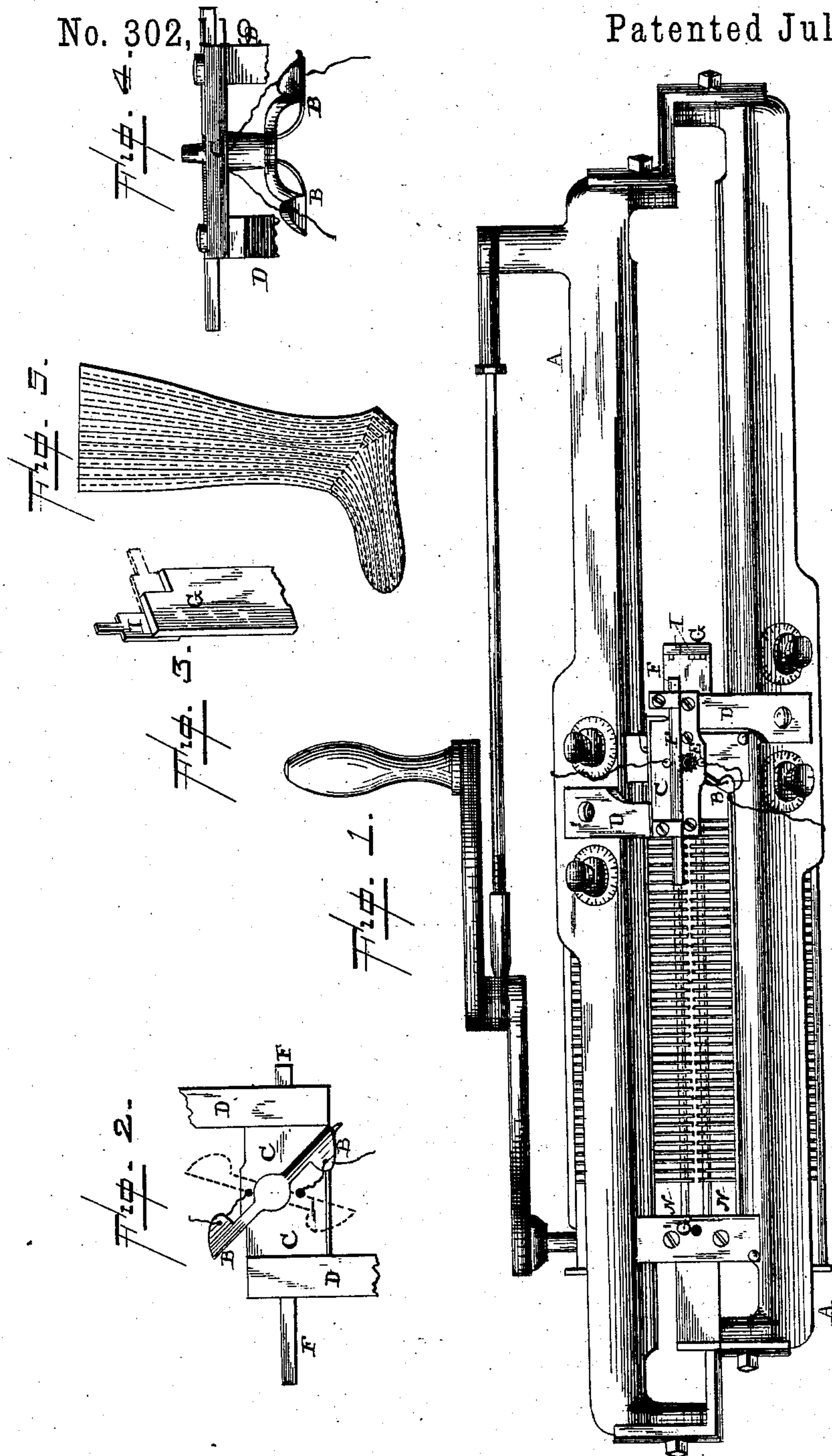
2 Sheets—Sheet 1

W. ESTY.

ART OF KNITTING WIDENED TUBULAR FABRICS.

No. 302,119

Patented July 15, 1884.



Witnesses.

Louis F. Gardner
J. W. Garner

Inventor.

Wm. Esty
per
J. A. Lehmann,
att'y.

(Model.)

2 Sheets—Sheet 2.

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Fig. 6

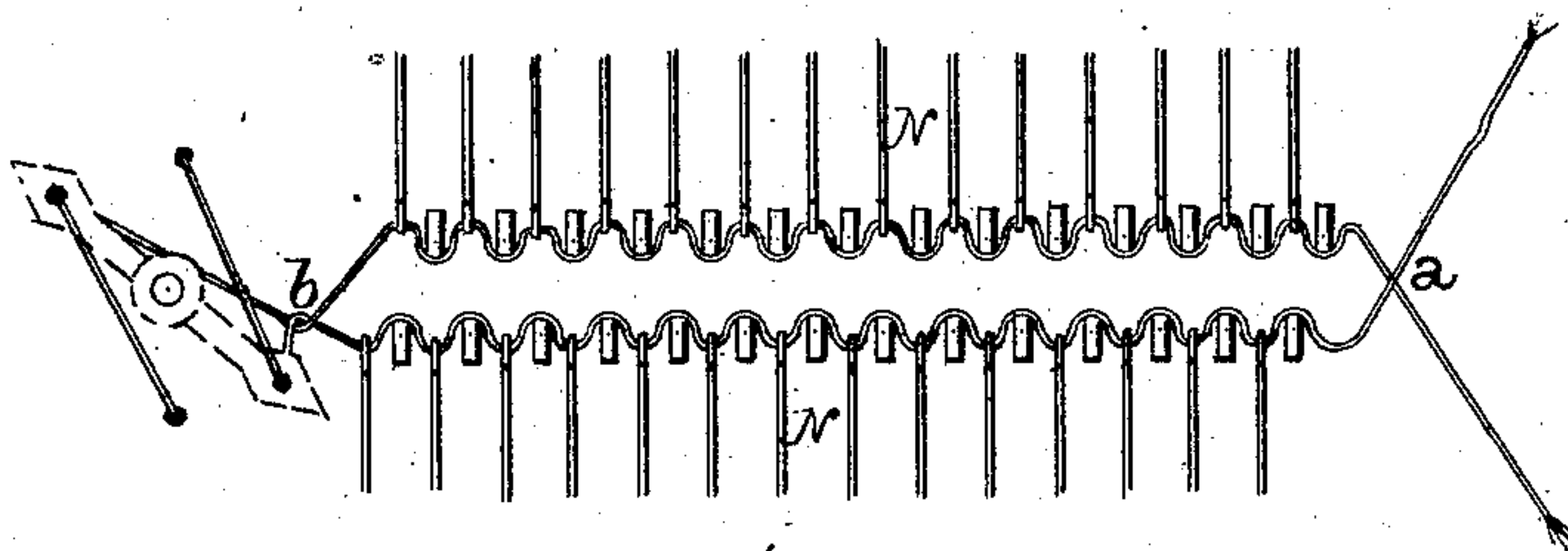
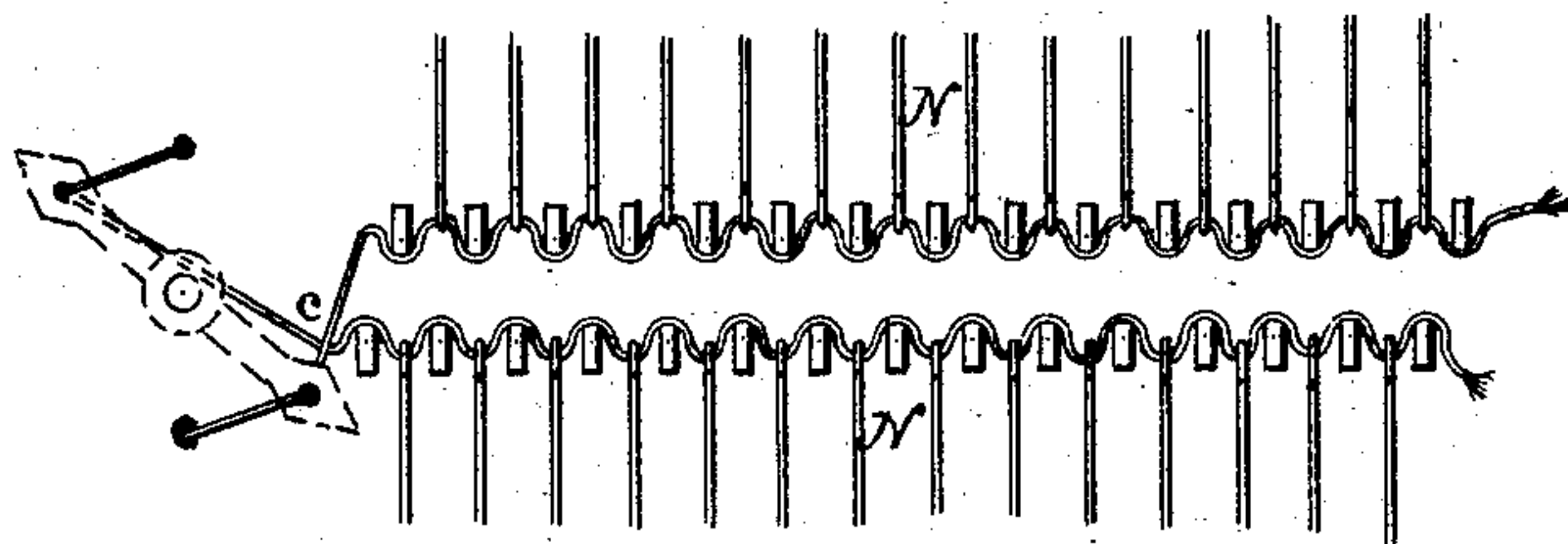


Fig. 7



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UNITED STATES PATENT OFFICE.

WILLIAM ESTY, OF LACONIA, NEW HAMPSHIRE.

ART OF KNITTING WIDENED TUBULAR FABRICS.

SPECIFICATION forming part of Letters Patent No. 302,119, dated July 15, 1884.

Application filed December 8, 1882. (Model.)

To all whom it may concern:

Be it known that I, WILLIAM ESTY, of Laconia, in the county of Belknap and State of New Hampshire, have invented certain new and useful Improvements in the Art of Knitting Widened Tubular Fabrics; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to a tubular knit fabric; and it consists in the improvement in the art of knitting a widened tubular fabric with two yarns on two distinct sets of needles, which consists in simultaneously knitting a course on each set upon all of the needles in operation with a different yarn on each set, then at the end of such course crossing the yarn from each set of needles to the other and knitting back another course on each set of all the needles in operation, then bringing an additional needle at the end of each set into operation, feeding yarn thereto, and then dropping such additional needles with yarn thereon out of action, then crossing and twisting the yarn from each set of needles to the other and knitting one or more courses on each set upon all of the needles in operation, as before, then bringing into action the additional needles previously dropped with yarn thereon, and completing the stitches previously begun but not completed, and, after knitting any desired number of courses upon all of the needles in operation, repeating the steps before described as often as desired, whereby widened tubular fabric is knitted, as will be more fully described hereinafter.

The object of my invention is to produce a tubular knit fabric which is widened during the process of knitting, and in which the two yarns are twisted together where they cross on one side of the fabric, for the purpose of tightening the seam which is formed down that side of the fabric on which the widening takes place.

Figure 1 is a plan view. Figs. 2, 3, 4 are detail views of a machine upon which my invention may be carried into effect; and Fig. 5 shows a stocking the leg of which is knit in

accordance with my invention. Figs. 6 and 7 show how the yarns cross over at one end and are twisted at the other end of the stroke of the carrier.

In carrying my invention into operation, a common flat Lamb knitting machine is used, as here shown, and in connection therewith a partially-revolving yarn-carrier is employed, which is, or may be, the same as that shown in the application filed by me August 27, 1883. This machine is here shown simply for the purpose of showing a machine upon which my mode of widening a tubular knit fabric may be practiced.

A represents an ordinary flat knitting machine, such as is in common use, and in which two sets of needles, N N, are used, each set being made to face the other, and is enabled to knit one side of the fabric. Supported above the two sets of needles N N is a double thread or yarn carrier, B, preferably made of the shape here shown, and which has its shank to extend up through a suitable supporting-plate, C. This supporting-plate C is supported rigidly upon the top of the machine by means of the braces D, one of which supports each end. Upon the upper end of the shank of the carrier there is formed a pinion, E, which meshes with the sliding rack-bar F. This rack-bar is intended to strike against a suitable stop or projection, G, each time that the carrier is moved endwise by the crank far enough for the end of the rack to strike against the stop, for the purpose of being moved endwise just far enough to reverse the thread or yarn carrier one-half way around, and thus reverse the yarn from one set of needles to the other. At the side of the fabric where the widening does not take place the yarns are simply made to cross from one set of needles to the other, as shown at *a* in Fig. 6. The carrier, after shifting the yarn from one set of needles to the other, leaves the yarn crossed, as shown at *c*, Fig. 7, and then, after moving back over the needles, when the carrier is again reversed, the yarns are twisted together for the purpose of tightening the seam, which is made down that side of the fabric where the widening takes place, as shown at *b* in Fig. 6.

In carrying out my improved method on

this machine I pass through each end of the
 carrier a separate and distinct yarn or yarns,
 one yarn or yarns for each set of needles, the
 cams which operate the needles being placed
 5 in such relation to each other that one set
 knits in advance of the other. This carrier
 unites the two flat webs by carrying yarn knit
 on one side at one stroke back on the other
 side at the other stroke, and this change of
 10 yarn from one set of needles to the other is
 made at every half-turn of the carrier. When
 the machine is knitting and the carrier re-
 versed at both ends of the stroke, the yarns
 are simultaneously knit upon the two sets of
 15 needles every time the carrier is moved over
 them, and each alternate course of the com-
 pleted fabric will run in opposite directions,
 one yarn or thread traveling around to the
 right and the other to the left, crossing the
 20 yarns at one end, as at *c*, Fig. 7, and twisting
 the yarns together at the other, as at *b*, Fig.
 6, for the purpose of tightening the seam which
 is formed down that side of the fabric on which
 the widening takes place, and a tubular fab-
 25 ric is produced. The work is set up on, for
 instance, one hundred and twenty needles,
 which form the smallest part of the fabric to
 be knit. The knitting is then carried on, for
 instance, seventy rounds, and then the widen-
 30 ing begins. The first empty needle is thrown
 into action, one in each set of needles, and
 these two empty needles, one at each end, of
 those in operation catch the yarn, the first
 course, and hold it, but do not knit. These
 35 two needles holding the yarn are dropped
 down by the action of the cams out of action,
 as described in my former patent, No. 247,325,
 September 20, 1881, and then one, two, or
 more courses are knit, according to how rap-
 40 idly the widening is to be done, the yarns be-
 ing made to cross from one set of needles to
 the other at each course knit. The two ad-
 ditional needles are then brought into action,

still holding the stitches they caught before
 they were dropped, and when another course 45
 is knit these two needles knit with all of
 the others that are in action upon each side,
 and complete the stitches previously begun
 but not completed. These steps are continued
 until any desired width of fabric is reached, 50
 when no more needles will be brought into
 action.

Having thus described my invention, I
 claim—

The improvement in the art of knitting a 55
 widened tubular fabric with two yarns on two
 distinct sets of needles, which consists in si-
 multaneously knitting a course on each set
 upon all of the needles in operation with a
 different yarn on each set, then at the end of 60
 such course crossing the yarn from one set of
 needles to the other and knitting back an-
 other course on each set of all of the needles
 in operation, then bringing an additional nee- 65
 dle at the end of each set of needles into op-
 eration, feeding yarns thereto, and then drop-
 ping such additional needles with the yarn
 thereon out of action, then crossing and twist-
 ing the yarn from each set of needles to the
 other and knitting one or more courses on 70
 each set of all of the needles in operation, as
 before, then bringing into action the addi-
 tional needles previously dropped with yarn
 thereon, and completing the stitches previ- 75
 ously begun but not completed, and, after knit-
 ting any desired number of courses on all of
 the needles in operation, repeating the steps
 before described as often as desired, substan-
 tially as set forth.

In testimony whereof I affix my signature in 80
 presence of two witnesses.

WILLIAM ESTY.

Witnesses:

D. S. DINSMOOR,
 W. W. WHICHER.