J. B. LOMAX,

KNITTING MACHINE.

APPLICATION FILED SEPT. 14, 1916.

1,236,189.

Patented Aug. 7, 1917.

2 SHEETS—SHEET 1.

Fig. 1.

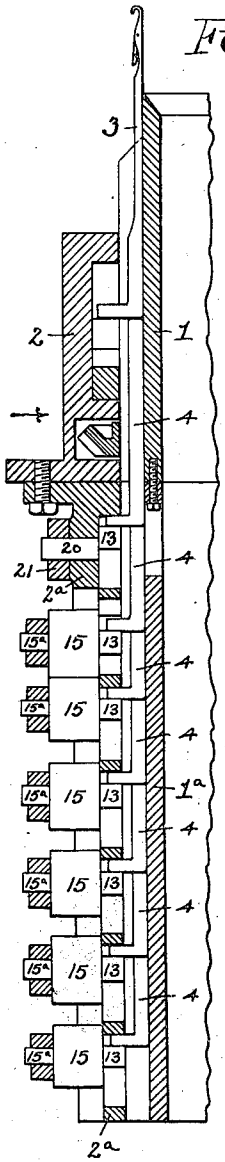


Fig. 2.

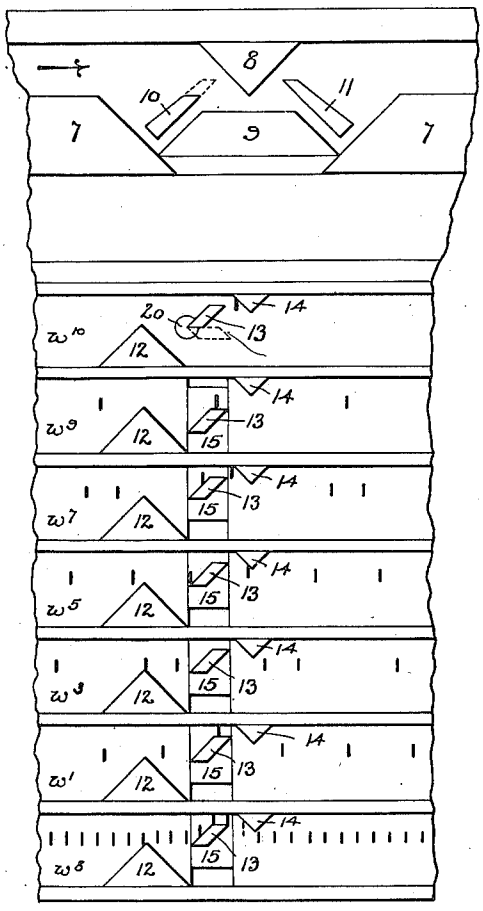


Fig. 5.

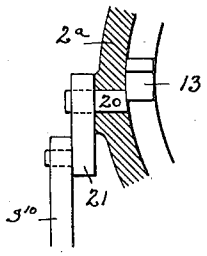


Fig. 6.

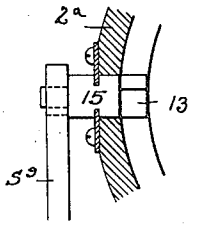
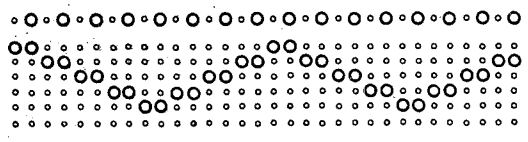


Fig. 8.



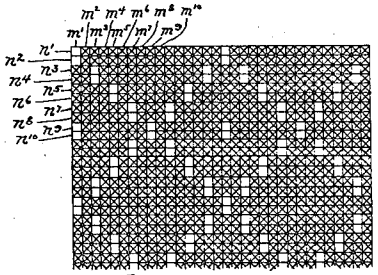


Fig. 7.

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2 SHEETS—SHEET 2.

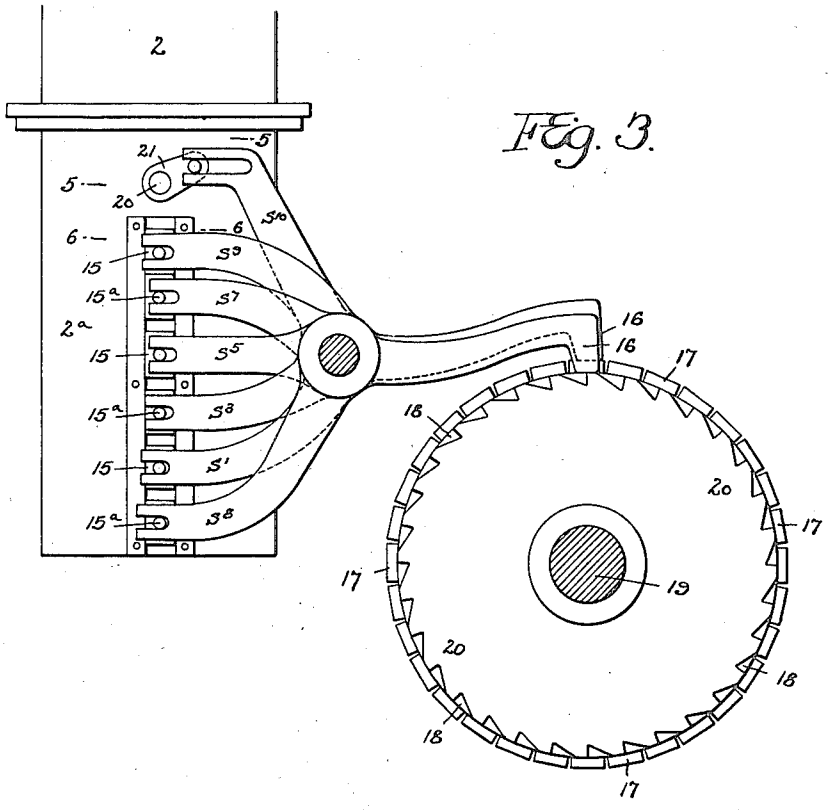


Fig. 3.

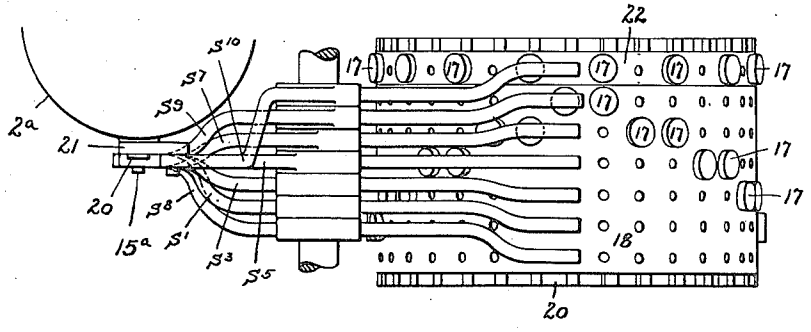


Fig. 4.

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JOHN B. LOMAX, OF PHILADELPHIA, PENNSYLVANIA.

KNITTING-MACHINE.

1,236,189. Specification of Letters Patent. Patented Aug. 7, 1917.

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To all whom it may concern:

Be it known that I, JOHN B. LOMAX, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Knitting-Machines, of which the following is a specification.

My invention consists of mechanism for use in connection with a knitting machine for the production, in the knitted web, of the effect which is commonly termed "lacework" and which consists of tuck stitches distributed throughout the web in accordance with a predetermined pattern. In carrying out my invention I use, in connection with the knitting machine needles, needle-operating jacks and cams under control of pattern mechanism for effecting operation of said jacks.

In the accompanying drawing—

Figure 1 is a vertical sectional view, of sufficient of a circular knitting machine of the rotating cylinder type to illustrate the application thereto of needle-controlling jacks and jack-operating cams in accordance with my invention;

Fig. 2 is a face view of the needle and jack-operating cams;

Fig. 3 is a side elevation, on a smaller scale, looking in the direction of the arrow Fig. 1, and illustrating also in side elevation a pattern drum and lever mechanism coöperating therewith to effect movement of the jack-operating cams;

Fig. 4 is a top view of the mechanism shown in Fig. 3;

Fig. 5 is a view, partly in section, on the line 5—5, Fig. 3;

Fig. 6 is a top view, partly in section, on the line 6—6, Fig. 3;

Fig. 7 is a diagram representing the courses and wales of stitches in a knitted web having a "lacework" pattern produced therein in accordance with my invention, and

Fig. 8 is a view representing the disposition of the blocks and blanks upon certain pattern drums employed in the production of said design.

In Fig. 1 of the drawing, 1 represents part of the needle cylinder of an ordinary circular knitting machine, which is rotated in the usual manner within a stationary cam cylinder 2, and is provided with needles 3 which are guided vertically in the needle grooves of the cylinder and are reciprocated by means of cams mounted in the cam cylinder 2 and acting on the projecting butts of the needles in the ordinary way. Secured to and disposed below the needle cylinder 1 is a cylinder 1^a grooved in a manner similar to the needle cylinder 1 for the reception and guidance of needle operating jacks 4 which also have projecting butts acted upon by cams mounted in a cylinder 2^a disposed below the cam cylinder 2.

The cam cylinder 2 is provided with cams, 7, 8, 9, 10 and 11 which are of the usual construction except as to the cam 10. Ordinarily this cam is of the character shown by dotted lines in Fig. 2 so as to raise all of the needles to the clearing point when they are, during round-and-round knitting, traveling in the direction of the arrow shown in said figure. In my machine, however, this cam 10 is shorter than usual, as shown by full lines in Fig. 2 so that it only raises the needles to the tuck point, hence in the absence of the needle actuating jacks all of the needles would tuck continuously.

By the use of the pattern-controlled jacks, however, certain of the needles may be permitted to remain at the tuck point and others may be raised to the clearing point and the disposition of the tuck stitches throughout the web may thus be governed in accordance with any desired pattern.

Referring now to the diagram Fig. 7, in which the unshaded blocks represent tuck stitches and the shaded blocks full stitches, m represent the wales of the web and n the courses of stitches, and in the pattern shown in said figure tuck stitches are shown in courses n', n^2, n^9 and n^{10} in wales m', in courses n^3 and n^4 in wales m^3, in courses n^5 and n^6 in wales m^5, in courses n^7 and n^8 in wales m^7, and in courses n^9 and n^{10} in wales m^9.

This necessitates an arrangement of the jacks 4 in six sets whose butts travel, respectively, in the raceways w', w^3, w^5, w^7, w^9 and w^8 in Fig. 2, the jacks in the sets corresponding with w', w^3, w^5, w^7 and w^9 acting, respectively, upon the needles which produce the wales m', m^3, m^5, m^7 and m^9, and the jacks in set corresponding with w^8 acting upon the needles which produce the wales m^2, m^4, m^6 and m^8. When, therefore, a jack fails to act upon its corresponding needle to lift the same said needle will produce tuck stitches as long as the jack remains down and when the jack lifts the needle the latter will clear as long as the jack remains lifted.

The butts of the jacks are acted upon by cams 12 which raise them to the tuck point, by supplementary cams 13 which raise them to the clearing point, and by depressing cams 14 which again restore them to the tuck point. The cams 12 and 14 are fixed but the cams 13 are adjustable so as to either clear their jacks or permit them to remain at the tuck point, each of these cams being carried by a slide 15 which is suitably guided in the cylinder 2^a so as to permit of a limited amount of vertical movement therein, each slide having a projecting pin 15^a, and these pins being engaged by slotted arms of rock levers, s', s^3, s^5, s^7, s^9 and s^8, corresponding, respectively, to the sets of jacks w', w^3, w^5, w^7, w^9 and w^8, the other arm of each of these levers having a toe 16 which is acted upon by blocks 17 on a pattern drum 18 mounted so as to be free to turn on a shaft 19 and having intermittent movements of partial rotation imparted to it by any suitably operated pawl mechanism acting upon a ratchet wheel 20 secured to the drum.

Whenever the toe 16 of one of the rock levers is raised by a block 17 of the pattern drum the corresponding cam 13 will be depressed, the jacks acted upon thereby will not be lifted, and the needles acted upon by said jacks will be permitted to remain at the tuck point to which they have been adjusted by the cam 10 of the cam cylinder 2, but whenever the toe 16 of a rock lever rests upon the surface of the drum 18 the corresponding cam 13 will be raised and the jacks controlled by said cam will raise to the clearing point the needle acted on thereby.

Such operation of the needles is effected during round-and-round knitting but when the machine is also intended for to-and-fro knitting, as for instance when heel and toe pockets are to be produced upon knitted tubes, one or more of the jack butts in set w^8 will have been only partially depressed by the cam 14, and on the reverse movement of the cylinder 1^a one of said butts, occupying the position shown by dotted lines in Fig. 2, will strike the upper rear corner of the cam 13 and will consequently be bent or broken by reason of such contact.

This particular jack therefore (and if desired also one or more contiguous jacks) instead of having its butt disposed in the raceway w^8 has its butt in a special raceway w^{10} so that the cam 13 in the latter raceway can be moved out of the path of the butt without affecting any of the other jacks and by preference said cam 13 in the raceway w^{10} is mounted so as to swing instead of to slide, being carried by a rock shaft 20 which has on the outside of the cam cylinder 2 an arm 21 (Fig. 5) with projecting pin embraced by the slotted end of an arm on a lever s^{10}, whose toe 16 is acted upon by blocks 17 on a special drum 22 located at one side of the drum 18, as shown in Fig. 4, and operated independently thereof, in order to provide for the rocking of the lever s^{10} only when round-and-round movement of the cylinder 1^a is discontinued and before reciprocating movement of said cylinder begins.

I claim:

1. The combination, in a knitting machine, of the rotating cylinder and its needles, cam mechanism acting upon said needles to raise them to the tuck point, a supplementary cylinder movable with the needle cylinder and having therein jacks disposed in sets, each adapted to act only upon certain needles, a cam cylinder having movable cams one for each set of said jacks, and each adapted when in one position to raise the jacks controlled thereby to the clearing point or when in the other position to permit said jacks to remain at the tuck point, and means for moving said cams from one position to the other.

2. The combination, in a knitting machine, of the rotating cylinder and its needles, a cam cylinder having a lifting cam constructed to raise the needles only to the tuck point during round-and-round knitting, a supplementary cylinder movable with the needle cylinder and having therein jacks disposed in sets each adapted to act only upon certain needles, a cam cylinder having movable cams one for each set of said jacks and each adapted when in one position to raise the jacks controlled thereby to the clearing point and when in the other position to permit said jacks to remain at the tuck point, and means for moving said cams from one position to the other.

3. The combination, in a knitting machine, of the rotating cylinder and its needles, cam mechanism acting upon said needles to raise them to the tuck point, a supplementary cylinder moving with the needle cylinder and having therein jacks disposed in sets each adapted to act only upon certain needles, a cam cylinder having movable cams one for each set of said jacks, and each adapted when in one position to raise the jacks controlled thereby to the clearing point and when in the other position to permit said jacks to remain at the tuck point, and pattern mechanism providing for the independent operation of each of said cams.

4. The combination, in a knitting machine, of the rotating cylinder having needles therein disposed in groups, cam mechanism acting upon said needles to raise them to the tuck point, a supplementary cylinder movable with the needle cylinder and having therein jacks disposed in sets, the jacks in all but one of said sets acting upon a

single needle only of each group and the jacks in the remaining set acting upon all of the remaining needles of each group, a cam cylinder having movable cams one for each set of jacks, and each adapted when in one position to raise the jacks controlled thereby to the clearing point and when in the other position to permit said jacks to remain at the tuck point, and means for moving said cams from one position to the other.

5. The combination, in a knitting machine, of the rotating cylinder and its needles, cam mechanism acting upon said needles to raise them to the tuck point, a supplementary cylinder movable with the needle cylinder and having therein jacks disposed in sets each adapted to act only upon certain needles, a cam cylinder having movable cams one for each set of said jacks and each adapted when in one position to raise the jacks controlled thereby to the clearing point and when in the other position to permit said jacks to remain at the tuck point, mechanism providing for the independent operation of each of said sets of jacks, and mechanism independent thereof for acting upon a selected jack or jacks of one set.

In testimony whereof, I have signed my name to this specification.

JOHN B. LOMAX.