

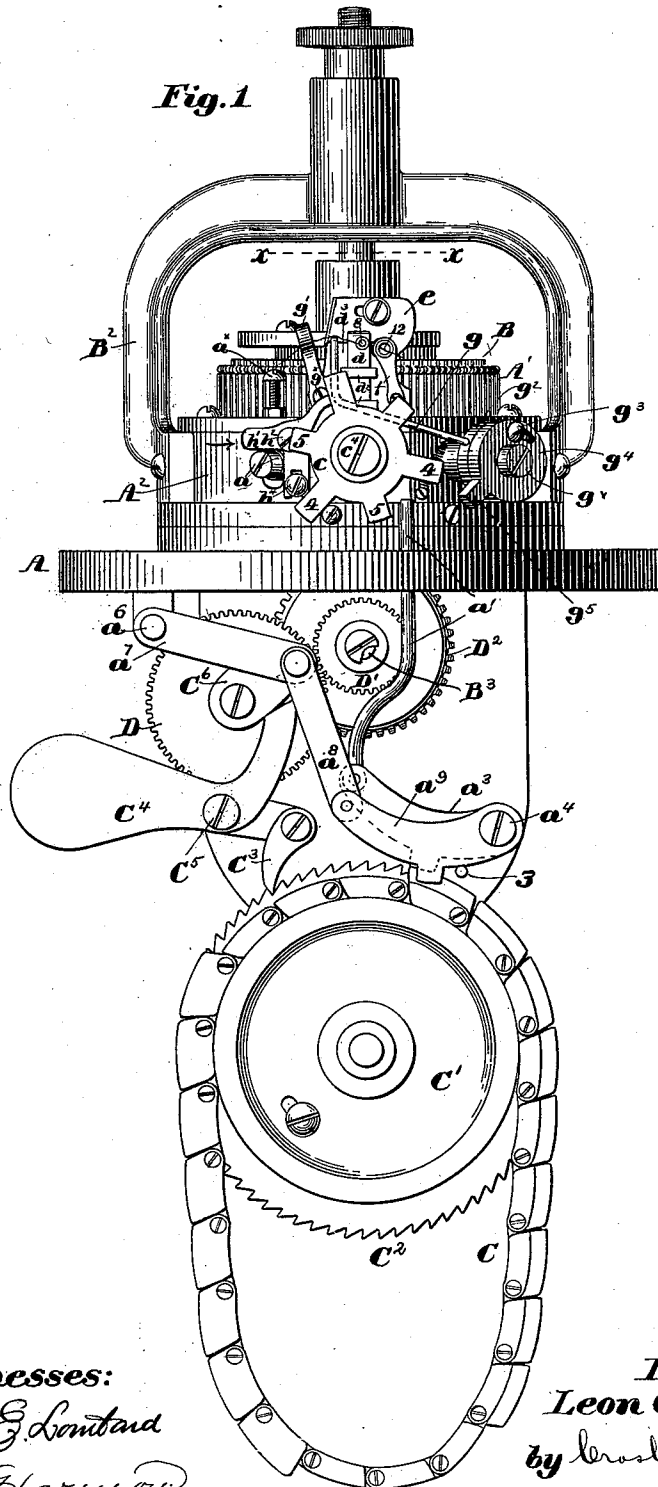
(No Model.)

2 Sheets—Sheet 1.

L. C. HUSE.
CIRCULAR KNITTING MACHINE.

No. 593,663.

Patented Nov. 16, 1897.



Witnesses:
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A. C. Harmon

Inventor:
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Atty.

(No Model.)

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Fig. 2.

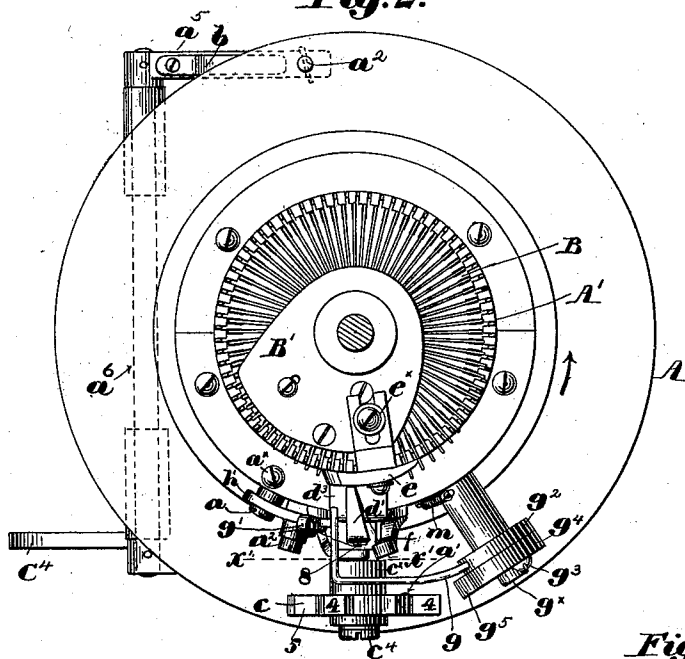


Fig. 4.

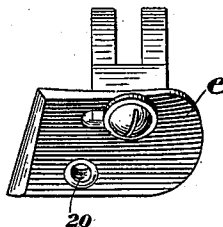
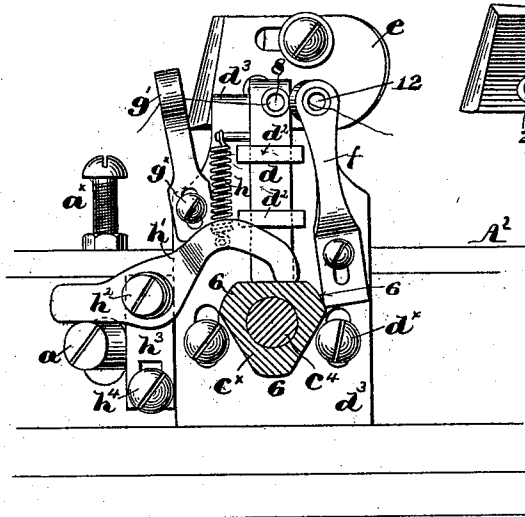


Fig. 3.



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UNITED STATES PATENT OFFICE.

LEON C. HUSE, OF LACONIA, NEW HAMPSHIRE.

CIRCULAR-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 593,663, dated November 16, 1897.

Application filed October 26, 1896. Serial No. 610,062. (No model.)

To all whom it may concern:

Be it known that I, LEON C. HUSE, of Laconia, in the county of Belknap and State of New Hampshire, have invented an Improvement in Circular-Knitting Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention in knitting-machines has for its object to provide an improved mechanism for automatically putting into the knitted tube at any desired point of each knitted course a reinforcing-thread. The reinforcing-thread may be put into only a part of a course and may be broken off before the course is finished.

The particular features in which my invention consists will be hereinafter described, and defined in the claims at the end of this specification.

Figure 1, in elevation, represents a sufficient portion of a circular-knitting machine with my improvement added to enable my invention to be understood. Fig. 2 is a section below the line *x*, Fig. 1. Fig. 3 is a sectional detail on the line *x'*, Fig. 2. Fig. 4 is a detail showing the main-thread guide and its delivery-hole.

The bed-plate A, the needle-bed A', attached thereto to receive and guide the upright or cylinder needle, the dial or plate needle bed B to receive the dial or plate needle, the dial-needle cam B', the cam-cylinder A², the yoke B², connecting the cam-cylinder and dial-needle cam to rotate them in unison, the pattern chain or surface C, having a double row of links, some of which are higher than others, the pattern-chain-carrying wheel or hub C', the ratchet-wheel C², and the pawl C³, mounted on the counterbalanced pawl-carrier C⁴, pivoted at C⁵ and actuated by a cam C⁶, fast on a gear D, in turn actuated from a pinion D' on the main shaft of the machine, said shaft also carrying the bevel-gear D², driven from the cam-cylinder, are and may be all as common in circular-knitting machines, so need not be herein further described.

In practice the interior of the cam-cylinder will be provided with the usual needle-cam groove containing a movable drawing-down cam to vary the length of the loop made

in the thread when making the stitch, said cam of usual construction not being shown, but the drawings do show a stud *a* projecting from said drawing-down cam through a slot in the cam-cylinder, a stop-screw *a*^x by its position normally limiting the upward movement of the said drawing-down cam and determining the shortest length of stitch.

The main knitting-thread taken from a suitable bobbin (not shown) will be let through an eye 12 at the top of an adjustable arm *f* and thence through an eye 20 in the usual thread-guide *e*, fast on the dial-cam by a screw *e*^x, the said thread-guide presenting the thread from its inner side to the needles.

The main thread is supposed to be running at all times through the said thread-guide, and it may at desired times act frictionally upon and take with it, when permitted to do so, the reinforcing-thread, thus presenting both threads to the needle at the desired part of the knitted fabric when the introduction of a second thread is required.

The reinforcing-thread contained on a suitable bobbin (not shown) will be led first through an eye on the upper end of an arm *g'*, held by a suitable screw *g*^x, and thence to an eye 8 in the shank *d* of a vertically-reciprocating thread-clamp *d'*, said clamp lapping over the top of a rest or plate *d*³, secured to the cam-cylinder by suitable screws *d*^x, the thickening-thread passing between the said clamp and the top of the rest, and thence and through the eye in the usual thread-guide with the main thread.

When the reinforcing-thread is unclamped, it is left free to be taken up by the main running thread and carried with it to the needles, and when the reinforcing-thread is clamped its delivery is stopped and it is parted between the main-thread guide and the needles.

The shank of the thread-clamp is loosely mounted in guides *d*², and a spring *h* acts to keep the foot of the shank against a cam-hub *c*^x, forming part of a wheel *c*, having a series of long and short arms 4 5, said wheel and its hub being mounted frictionally on a suitable stud *c*⁴, carried in the base of the stand *d*³. This wheel is carried about the needle-bed with the cam-cylinder, and during the movement of the cam-cylinder the arms of the wheel may meet one or the other of a series

of pins controlled as to their position by the pattern-surface, as I will now describe.

The bed-plate A has suitable holes for the reception of pins a' a^2 , the pin a' being connected to a lever a^3 , pivoted at a^4 , while the pin a^2 is connected with the arm a^5 of a rock-shaft a^6 , having at its opposite end an arm a^7 , joined by a link a^8 with a lever a^9 , also pivoted at a^4 , said levers being adapted to be acted upon by and lifted at the proper time by its own series of high links of the pattern-chain. A spring b , attached to the arm a^5 and interposed between it and the bed A, normally acts to keep the lever a^9 against a pin 3, the pin 3 being so located that it serves as a down-stop for both levers a^9 and a^3 , and when the said levers rest on the said pin only one of the long arms 4 of the wheel c will strike a pin, whichever is first to meet it, and it will turn the wheel c so that the cam-hub will permit the clamp to drop and hold the thickening-thread out of action. When only the main thread is being used, the levers a^9 and a^3 will rest on the pin 3.

When the clamp is to be raised to permit the thickening-thread to be taken in with the main thread, one of the pins a' or a^2 will be lifted according to which side of the knitted tube is to be reinforced, said raised pins being then struck by the short arm 5 of the wheel c , which effects the turning of the cam and causes one of its hubs or cam part 6 to act on the shank d of the clamp and lift it from the running thread.

In order that the thickening-thread may be immediately taken up and carried by the main thread without unduly straining the same until after the thickening-thread has been caught by the needle, I have added to the machine a pull-off g , it being located between the hole 8 of the thread-clamp and a hole in the upper end of the guide-arm g' , said pull-off consisting of an arm g , carried by a disk g^2 , adjustably attached by a set-screw g^3 to a disk g^4 , mounted on a stud g^x , fixed to the cam-cylinder, the said disk g^4 having a toe g^5 .

When the thickening-thread is to be introduced, the pin a' or a^2 , whichever is to act, will be raised, and it will be lifted into its operative position before toe g^5 referred to reaches in the rotation of the cylinder the pin, and consequently the pull-off will be moved to act on the reinforcing-thread between the clamp and the eye in the arm g' and pull off from the bobbin a quantity of thread, leaving it slack, so that when the clamp is released the running thread may readily pick up the slack thread and take it with it.

The introduction of the thickening-thread, together with the running thread, requires for the best work that the loop formed by two threads should be longer, and to do this I have interposed between the stud a , extended, as described, from the usual drawing-down cam of the cam-cylinder and the cam, as c^x , a lever h' , it being pivoted at h^2 upon a ver-

tically-adjustable plate h^3 , held in its adjusted position by a suitable screw h^4 . The adjustment of the plate h^3 vertically controls the effective throw of the lever h' . The drawings show the clamp as active in holding the thickening-thread.

To introduce the thickening-thread in one-half of a course, the high projections of the chain will act, let it be supposed, on lever a^3 and will lift the pin a' , putting it into position Fig. 1, so that as the cylinder commences its rotation in the direction of the arrow in Fig. 1 it will cause one of the short arms 5 of the cam-wheel to meet that pin, which will turn the wheel and cause one of the cam-lumps 6 to lift the clamp, letting the thickening-thread run in; but as soon as the cam-cylinder completes one-half rotation, let it be supposed, a long arm 4 of the wheel c will meet the opposite pin a^2 and the cam-wheel will be again turned to lower the clamp to part the thickening-thread. Just before a short arm 5 meets a pin, as stated, said pin will, as stated, be struck, as described, by the toe g^5 to pull off the requisite amount of thread. By lifting the pin a^2 the thickening-thread may be put into the other half of the knitted tube, and the pin a' will thereafter effect the rotation of the wheel c and cause the thread to be clamped and part it. This thickening-thread may be put into any part of the knitted tube by suitably locating the pins a' or a^2 at the desired part of the bed and putting them under the control of the pattern-surface. By adjusting the disk having the toe g^5 a greater or less quantity of thread may be pulled off and left slack. The toe g^5 is normally kept down in the path of the pin by means of a suitable spring m , connected to the hub of the disk g^2 and to the cam-cylinder.

The cam-cylinder in practice will derive its rotation from a bevel-gear on the main shaft B^3 of the machine, all as in United States Patent No. 292,490, dated January 29, 1894.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a circular-knitting machine, a cam-cylinder, a main-thread guide to supply the usual needles of the machine with a main running thread, a rest, a clamp cooperating therewith for a reinforcing-thread on its way to the main-thread guide, a wheel having arms of different lengths and provided with a cam to act on and open the clamp to free the reinforcing-thread, a pin, a pattern-surface to move said pin and put it into position to turn the said wheel and cause its cam to move the clamp to release the running thread, and a second pin to meet an arm of the said wheel during one and the same rotation of the cam-cylinder to turn said wheel and its cam, and permit the clamp to be closed, and part the reinforcing-thread, leaving it only in a part of the knitted course in which it was introduced, substantially as described.

2. In a knitting-machine, a thread-clamp, means to move it to alternately release and then clamp a reinforcing-thread as the said thread is to be presented to the needles or
5 stopped, combined with a pull-off, composed of an arm attached to a pivoted disk provided with a toe, a pin, and a pattern-surface to control the position of the pin to actuate said pull-off in advance of moving the said clamp
10 to release the reinforcing-thread, whereby slack thread may be put into the reinforcing-thread near the said clamp, substantially as described.

3. In a knitting-machine, a thread-clamp, means to move it to alternately release and then clamp a reinforcing-thread as the said thread is to be presented to the needles or
15 stopped, combined with a pull-off, means to adjust said pull-off to pull off more or less thread, and means to actuate it in advance of moving the said clamp to release the reinforcing-thread, whereby slack thread may be put
20 into the reinforcing-thread near the said clamp, substantially as described.

4. In a circular-knitting machine, the following instrumentalities, viz: a cam-cylinder, having the usual drawing-down cam provided with a pin as *a* projected through the
25 cylinder and exposed at the outer side thereof, a main-thread guide to supply the usual needles of the machine with a main or run-

ning thread, a rest, a clamp cooperating therewith to control a reinforcing-thread on its way to the main-thread guide, a wheel having
35 arms of different lengths, and provided with a series of cam-faces to act on and open the clamp to free the reinforcing-thread, a lever interposed between the said cam, and the pin on the drawing-down cam, a pin as *a'*, a pattern-surface to move said pin and put it into
40 position to turn the said wheel and cause its cam to move the clamp to release the clamping-thread and at the same time depress the drawing-down cam to lengthen the stitch, and a second pin to meet an arm of the said wheel
45 during one and the same rotation of the cam-cylinder to turn said wheel again and permit the clamp to be closed onto and to part the reinforcing-thread, and allow the drawing-down cam to rise, such operation leaving said
50 reinforcing-thread only in a part of the knitted course in which it was first introduced, the stitches in which the reinforcing-thread is introduced being thereby made longer, substantially as described.

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

LEON C. HUSE.

Witnesses:

E. F. REEVES,
A. B. SANBORN.