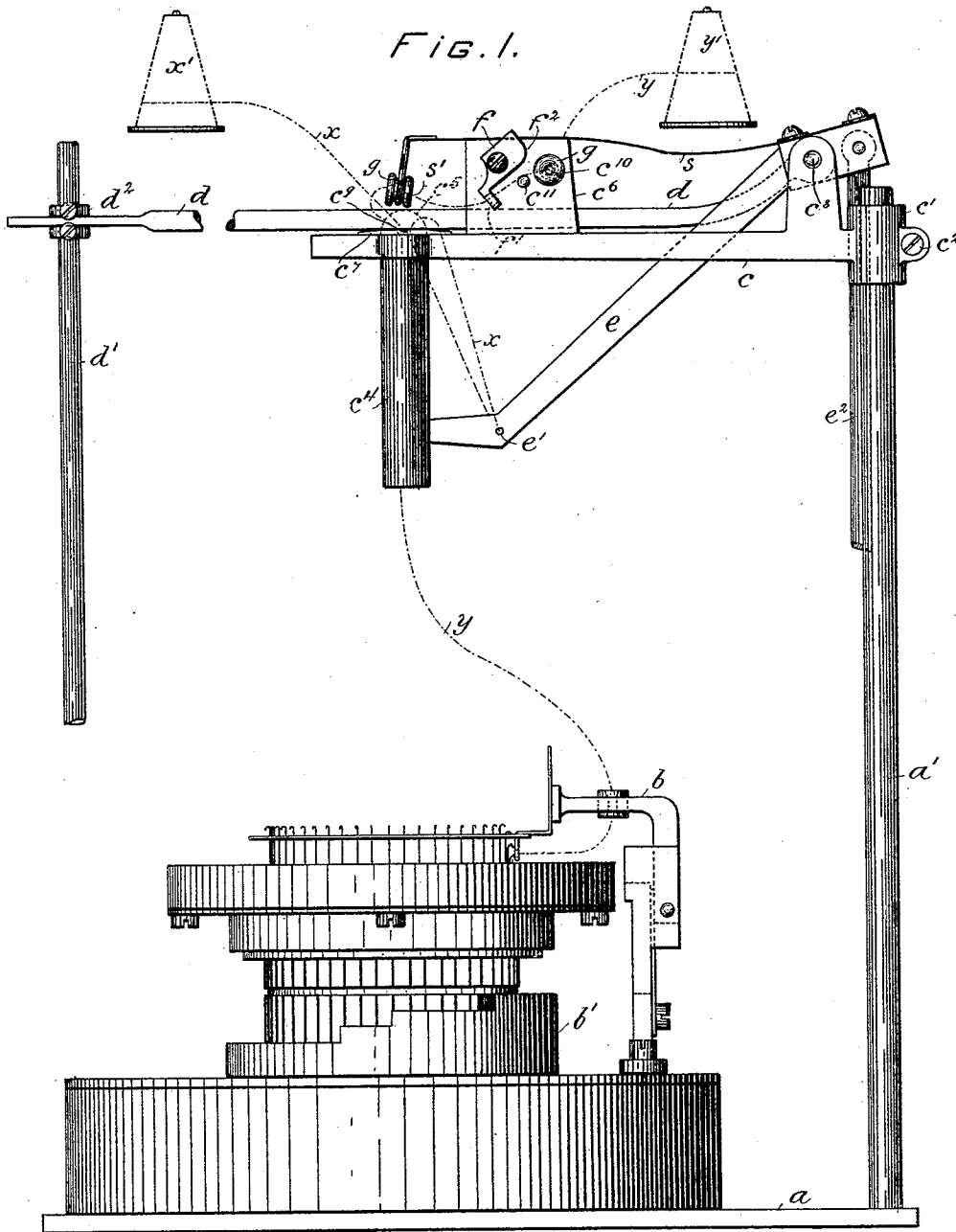


2 Sheets—Sheet 1.

THREAD CONTROLLING MECHANISM FOR KNITTING MACHINES.

Patented June 27, 1893.



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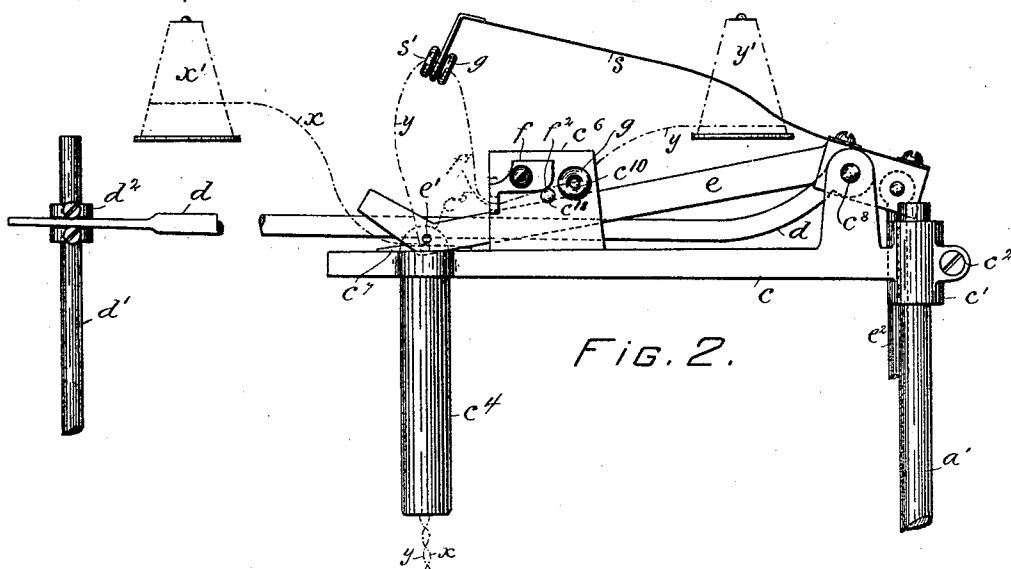


FIG. 2.

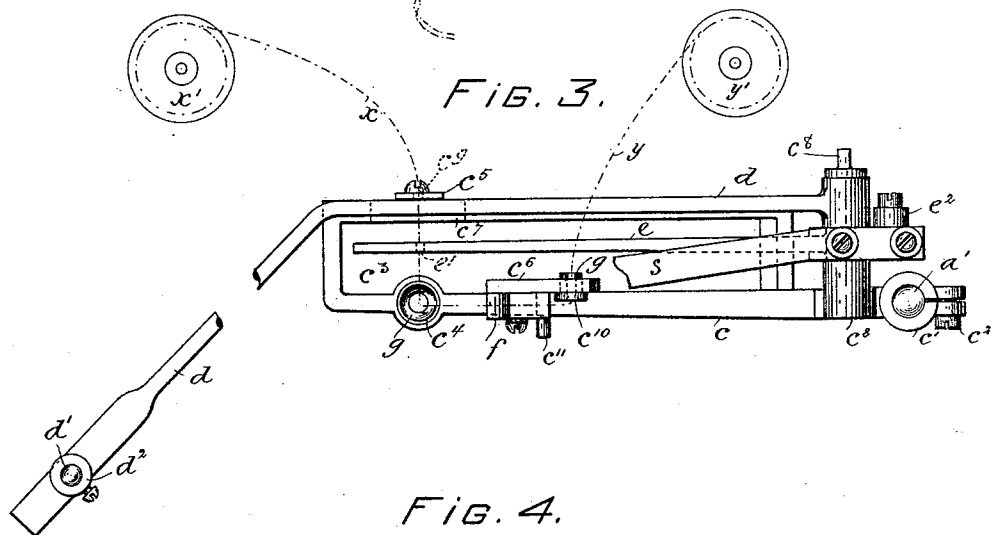
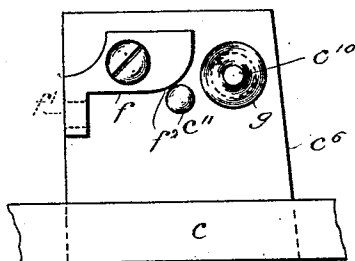
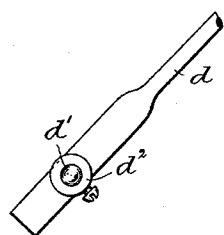


FIG. 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

EMIL J. FRANCK, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE NATIONAL AUTOMATIC KNITTER COMPANY, OF SAME PLACE, AND NORRISTOWN, PENNSYLVANIA.

THREAD-CONTROLLING MECHANISM FOR KNITTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 500,123, dated June 27, 1893.

Application filed August 22, 1892, Serial No. 443,719. (No model.)

To all whom it may concern:

Be it known that I, EMIL J. FRANCK, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Thread-Controlling Mechanism for Knitting-Machines, of which the following is a specification.

My present invention is applicable to a circular knitting machine provided with a thread carrier to which is imparted either a rotary movement or a movement of rotary reciprocation.

The principal objects of my present invention are, first, to provide a simple, durable, efficient and comparatively inexpensive device for automatically supplying an extra thread to the thread carrier and for withdrawing the extra thread therefrom; second, to provide such a device with efficient means for taking up the slack in the extra thread when it is broken and for releasing the portion so taken up as soon as the extra thread is again fed to the needles; and third, to provide efficient mechanism for automatically taking up the portions of the main thread or threads which are slackened by reason of the excessive range of rotary reciprocating motion or over throw that is imparted to the thread carrier.

My invention, stated in general terms, consists of a thread controlling device comprising a fixed frame or housing provided with a thread guide, clamping mechanism for the extra thread or threads, a detent for nipping the main thread or threads, a pivotal take-up and slackener carrying the extra thread or threads, a spring take-up having one extremity in engagement with the main thread or threads and the other extremity attached to the take-up and slackener, and rods for operating the take-up and slackener and the clamping mechanism; and my invention further consists in the improvements hereinafter described and claimed.

The nature, scope and characteristic features of my invention will be more fully understood from the following description taken

in connection with the accompanying drawings forming part hereof; and in which—

Figure 1, is an elevational view showing a thread controlling device embodying features of my invention in application to a knitting machine and also showing the parts of the device in position for excluding an extra thread or threads and for permitting of the continuous feed of the main thread or threads. Fig. 2, is a similar view of the thread controlling device showing the parts thereof in position for admitting an extra thread or threads and for effecting a proper take up of the main thread or threads to compensate for the excessive travel of the thread carrier when it is moved with a rotary reciprocating motion. Fig. 3, is a top or plan view of the same, but showing the spring take up arm broken away. Fig. 4, is a detached view drawn to an enlarged scale and illustrating the main thread controlling detent and its accessories.

In the drawings I have illustrated my invention in application to a knitting machine of the type set forth in my application for Letters Patent of the United States filed on the 4th day of November, 1892, and serially numbered 451,017, but it must be borne in mind that my present invention is applicable to other types of knitting machines.

Referring to the drawings *a*, is a portion of the main frame of a knitting machine.

b, is a thread-carrier adapted to move in unison with the cam-ring *b'*, and either a rotary motion around the needles may be imparted to the thread-carrier and cam-ring as occurs in the production of knitted tubes, or a reciprocating rotary motion across certain of the needles may be imparted to the thread-carrier and cam-ring as occurs in the fabrication of the heel and toe portions of stockings and socks.

In practice the distance traversed by the thread-carrier *b*, back and forth across the heel needles always exceeds the space occupied by the heel needles, so that the thread is laid onto the heel needles when the thread-carrier is traveling in one direction and is carried beyond the needles and back before it is again laid onto the needles by the reverse

motion of the thread-carrier, and the portion of the thread thus slackened is exceedingly apt to become tangled.

Having thus described such parts and indicated such peculiarities in the mode of operation of one type of knitting machine, as are necessary for a proper explanation of my invention, I will now proceed to describe a thread controlling, take-up and tension device embodying features of the latter.

In the drawings *a'*, is a post projecting upward from the main-frame *a*.

c, is a bracket adjustably connected with the post *a'*, by means of a split ring *c'*, and its complemental set-screw *c''*. This bracket *c*, is slotted as at *c''*, and is provided with a thread-guide *c''*, upwardly projecting lugs *c''* and *c''*, a lip *c''*, and a pin *c''*, for purposes to be presently described.

d, is a clamping-arm pivotally mounted on the pin *c''*, and adapted to co-operate with the lip *c''*.

d', is a rod adjustably connected with the arm *d*, by means of twin collars *d''*.

e, is a take up and slackener arm pivotally connected with the pin *c''*, and afforded a range of play through the slot *c''*, of the bracket *c*. One extremity of this arm *e* is provided with an eye *e'*, for the reception of the extra thread or threads *x*, and the other extremity thereof is pivotally connected with a rod *e''*.

The lug *c''*, is provided with an eye *c''*, for the reception of the extra thread or threads *x*, and the lug *c''*, is provided with an eye *c''*, for the reception of the main thread or threads *y*, and with a pin *c''*.

f, is a detent pivotally connected with the lug *c''*, and provided with an eye *f'*, for the reception of the main thread or threads *y*, and with a cheek *f''*, adapted to co-operate with the pin *c''*, in order to nip and retard the feed of the main thread or threads *y*. This detent *f*, may be counterbalanced or the end *f'*, may, as in the present instance, be slightly heavier than the end *f''*; in either case the position of the detent depends upon and is controlled by the direction in which the main thread or threads is or are led away from the detent.

s, is a spring take up arm having one extremity thereof connected with the arm *e*, and having the other extremity thereof provided with a thread eye *s'*, for the reception of the main thread or threads *y*.

g, are porcelain thimbles or linings inserted into the thread eyes *c''* and *s'*, and thread guide *c''*, in order to afford a smooth and durable surface for the passage of the threads.

The rods *d'* and *e''*, constitute means for actuating the arms *d* and *e*, and these rods *d'* and *e''*, are operated through the intervention of suitable connections by the reversing gear that causes a rotary or a reciprocating rotary motion to be imparted to the cam-ring *b'*, and thread guide *b*. Many different types of such connections and reversing gear may

be employed for this purpose, but the same constitute no part of my invention. However, in my said application (Serial No. 451,017) I have shown and described a type of such mechanism that has been found practically efficient.

The mode of operation of the hereinbefore described thread-controlling, take-up and tension mechanism, is as follows:—The main thread or threads *y*, pass from the bobbin *y'*, through the eye *c''*, between the pin *c''*, and cheek *f''*, and thence through the eyes *f'* and *s'*, and the thread guide *c''*. The extra thread or threads *x*, pass from the bobbin *x'*, through the eye *c''*, over the lip *c''*, through the eye *e'*, and thence into the thread-guide *c''*. From the thread-guide *c''*, the main thread or threads *y*, with or without the extra threads *x*, pass to the thread-carrier *b*, and are by it laid onto the needles. The same mechanism that imparts a rotary motion to the cam-ring *b'*, and thread-carrier *b*, in order to cause the the fabrication of a tubular web, may be caused to draw the rod *d'*, downward and to shift the rod *e''*, upward into the positions shown in Fig. 1. Under these circumstances the extra thread *x*, is firmly held between the lip *c''* and arm *d*, and hence is not laid onto the needles, and the main thread *y*, is permitted to be drawn or fed continuously from the bobbin *y'*, and laid onto the needles by the thread-carrier *b*. The same mechanism that imparts a reciprocating rotary motion to the cam-ring *b'*, and thread-carrier *b*, in order to effect the production of a flat web may be availed of for shifting the rod *d'*, upward and for drawing the rod *e''*, downward into the positions shown in Fig. 2. Under these circumstances the arms *d* and *e*, are both shifted upward. The upward motion of the arm *d*, releases the extra thread *x*, and the upward motion of the arm *e*, slackens the same, so that the extra thread *x*, twines about or otherwise engages the main thread *y*, and travels with it to the thread-carrier *b*, and is laid onto the needles. The upward motion of the arm *e*, also brings the spring *s*, into action. This spring *s*, tends to take-up the slack in the main thread *y*, and the tension thus induced in the main thread *y*, tends to cause the detent *f*, to be turned into the position shown in Fig. 2. in order to cause the main thread *y*, to be nipped or held between the pin *c''*, and the cheek *f''*. When the thread-carrier *b*, is traveling across the needles in one direction the spring *s*, is overcome and pulled down, the detent *f*, is turned downward as shown in Fig. 1, and the main thread *y*, is continuously drawn from the bobbin *y'*, and laid onto the needles. However, the thread-carrier *b*, travels beyond the needles, as has been hereinabove explained, so that more thread is drawn from the bobbin *y'*, than is laid onto the needles. During the commencement of the return stroke of the thread-carrier *b*, and while it is approaching the needles, the main thread is slackened and the excessive quan-

tity of thread that was drawn from the bobbin and not laid onto the needles is taken up by the spring *s*, it being understood that the detent *f*, prevents the thread from being drawn from the bobbin *y'*, while the spring *s*, is moving upward. As soon as the thread-carrier comes opposite the needles upon its return stroke the spring *s*, is drawn down into position for permitting of the free or continuous feed of the main thread from the bobbin *y'*, as shown in Fig. 1.

The above described operation is repeated at the completion of one and at the commencement of another oscillation of the thread-carrier, and thus the excessive feed of the main thread due to the over-throw or excessive travel of the thread-carrier is compensated for or taken up by the spring *s*, and controlled by the detent *f*. When a rotary motion is again imparted to the thread-carrier *b*, the rod *d'*, is shifted downward into the position shown in Fig. 1, and thus clamps and stops the feed of the extra thread *x*, with the result that the extra thread is subjected to tension and is thus caused to be broken by the moving thread carrier at a point near the needles. At the same time the rod *e'*, is shifted upward and the arm *e*, is turned downward, and this motion of the arm *e*, causes the broken end of the extra thread to be drawn up clear of the needles and into position for re-engagement with the main threads at the proper time and in the manner hereinabove set forth.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A thread controlling device for a knitting machine comprising a fixed frame or housing, a thread-guide, a pivotal arm for clamping the extra thread, a pivotal slackener and take-up arm for the extra thread, a spring take-up arm having one end attached to the slackener and take-up arm, and the other end in engagement with the main-thread, a detent for the main-thread, and rods for shifting said arms, substantially as and for the purposes set forth.

2. A thread controlling device for a knitting machine comprising a thread guide, a fixed frame or housing, a clamping arm pivoted at one extremity to said frame or housing and adapted to clamp the extra thread or threads, a detent adapted to nip the main thread or threads, a thread slackener and take-up arm pivoted between its extremities to the frame or housing and having one end carrying the extra thread, a spring take-up arm mounted at or near the fulcrum of the slackener and engaging the main thread or threads, and rods for operating the other end of the slackener and take-up arm and the free end of the clamping-arm, substantially as and for the purposes set forth.

3. In a thread controlling device for knitting machines, a detent adapted to nip the main thread, in combination with a slackener

and take-up arm for the extra thread and a spring take-up arm attached to the slackener and engaging the main thread, the construction being such that the detent is turned out of action when the slackener and take-up arm is down and is in action when the slackener and take-up arm is up, substantially as set forth.

4. In a thread controlling device for knitting machines, a fixed housing or frame, a pivotal arm carrying the extra thread and provided at or near its fulcrum with a spring carrying at its free extremity the main thread, in combination with a pivotal detent adapted to nip the main thread when the arm is up and to disengage the same when the arm is down, substantially as and for the purposes set forth.

5. In a thread controlling device for knitting machines, a housing or frame provided with a lug, a thread eye in said lug, a detent pivotally connected with said lug and provided with a thread-eye for the main thread, in combination with a slackener and take-up arm carrying the extra thread and provided with a take-up spring arm having at its free end an eye through which the main thread passes, substantially as and for the purposes set forth.

6. In a thread controlling device for knitting machines, a fixed housing or frame provided with a lug and a pivotal arm, a rod for actuating said arm, a thread eye in said lug, a detent pivotally connected with the lug and provided with a thread eye, a stop for the detent, and a take-up spring having one extremity applied to said arm at or near the fulcrum thereof and the other extremity provided with an eye through which the main thread passes, substantially as and for the purposes set forth.

7. A thread controlling device for knitting machines, comprising a frame or housing carried by a standard on the bed-plate and provided with a thread guide, a detent and its complemental back-stop, a pivotal clamping arm for the extra thread, a pivotal take-up arm and slackener for the extra thread, a take-up spring applied to the take-up arm and slackener near the fulcrum thereof and having its free extremity in engagement with the main-thread, and rods for shifting the clamping and take-up arms and slackener, substantially as and for the purposes set forth.

8. A thread controlling device for knitting machines, comprising a frame or housing provided with a thread guide and lugs and a lip, thread eyes in said lugs, a detent and its complemental stop pin for nipping the main thread, a pivotal clamping arm co-operating with said lip to retard the extra thread, a pivotal slackener and take-up arm for the extra thread, a take-up spring applied to the slackener and take-up arm near the fulcrum thereof and having an eye at its free end through which the main thread passes, and rods for

shifting the clamping arm and take-up arm and slackener, substantially as and for the purposes set forth.

9. A thread slackener and take-up device
5 for knitting machines comprising a pivotal arm having at its free extremity an eye for the extra thread, a take-up spring applied to said arm and having at its free extremity an eye through which the main thread passes, and
10 a rod adapted to turn said arm upward or downward, substantially as and for the purposes set forth.

10. The combination, in a thread controlling device, of a thread carrier a bracket supported from the fixed frame-work of the machine, a clamping arm for retarding the extra thread at the bracket and thus causing
15 the moving thread carrier to break it at or near the needles, a pivotal arm for taking up a loop or bight in the extra thread to draw the broken end thereof clear of the needles and thread carrier and for slackening the extra thread to permit it to be carried by the
20 main thread to the thread carrier and needles,

and a rod for operating the pivotal arm, substantially as and for the purposes set forth. 25

11. The combination, in a thread controlling device, of a thread carrier a clamping arm for retarding the extra thread and thus causing the moving thread carrier to break it
30 at or near the needles, a detent for the main thread, a pivotal arm for taking up the extra thread to draw the broken end thereof clear of the needles and thread carrier and for slackening the extra thread to permit it to be
35 carried to the needles and thread carrier, and a spring connected at one extremity thereof to said arm and having the other extremity thereof in engagement with the main thread, and a rod for operating the pivotal arm, substantially as and for the purposes set forth. 40

In witness whereof I have hereunto set my signature in the presence of two subscribing witnesses.

EMIL J. FRANCK.

Witnesses:

THOMAS M. SMITH,
RICHARD C. MAXWELL.