No. 726,229. PATENTED APR. 21, 1903.

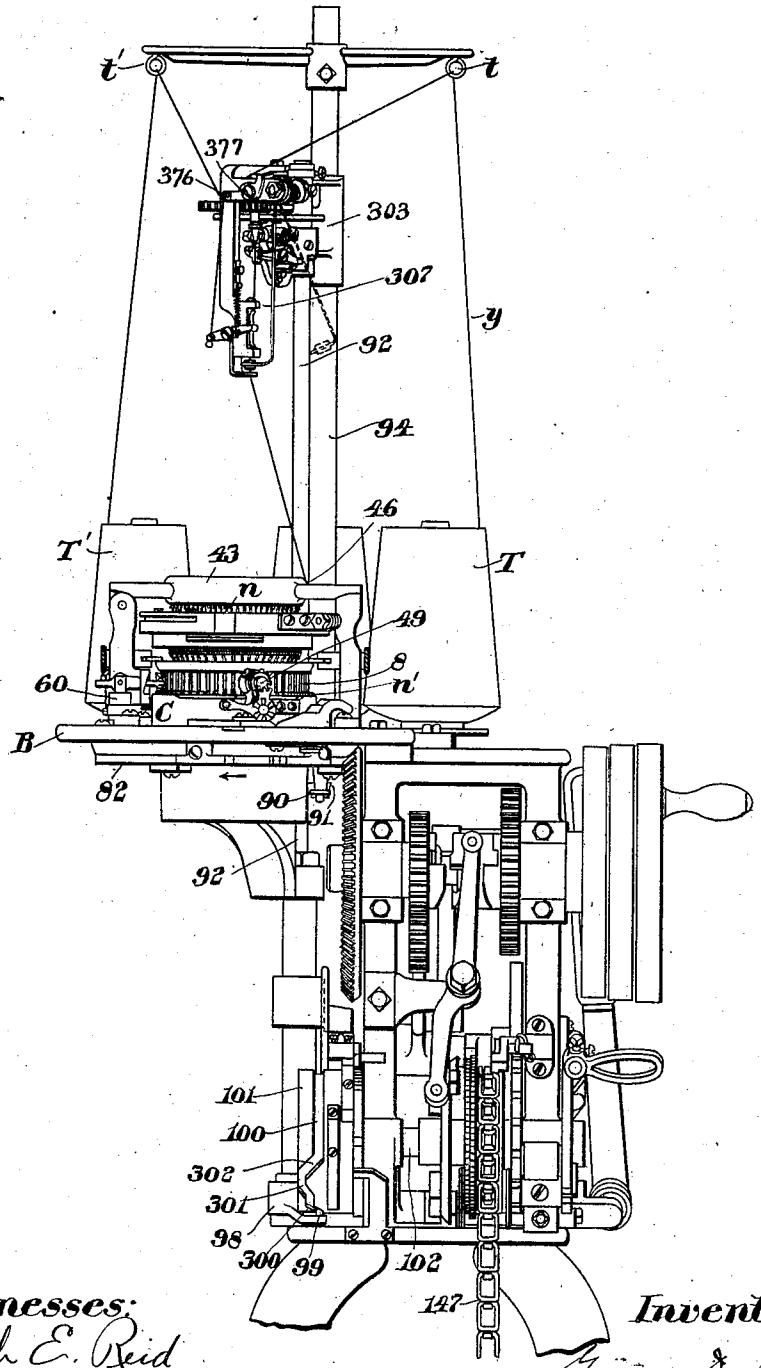
G. D. MAYO.

THREAD FEEDING MECHANISM FOR KNITTING MACHINES.

APPLICATION FILED MAR. 20, 1903.

NO MODEL. 6 SHEETS—SHEET 1.

Fig. 1



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No. 726,229. PATENTED APR. 21, 1903.

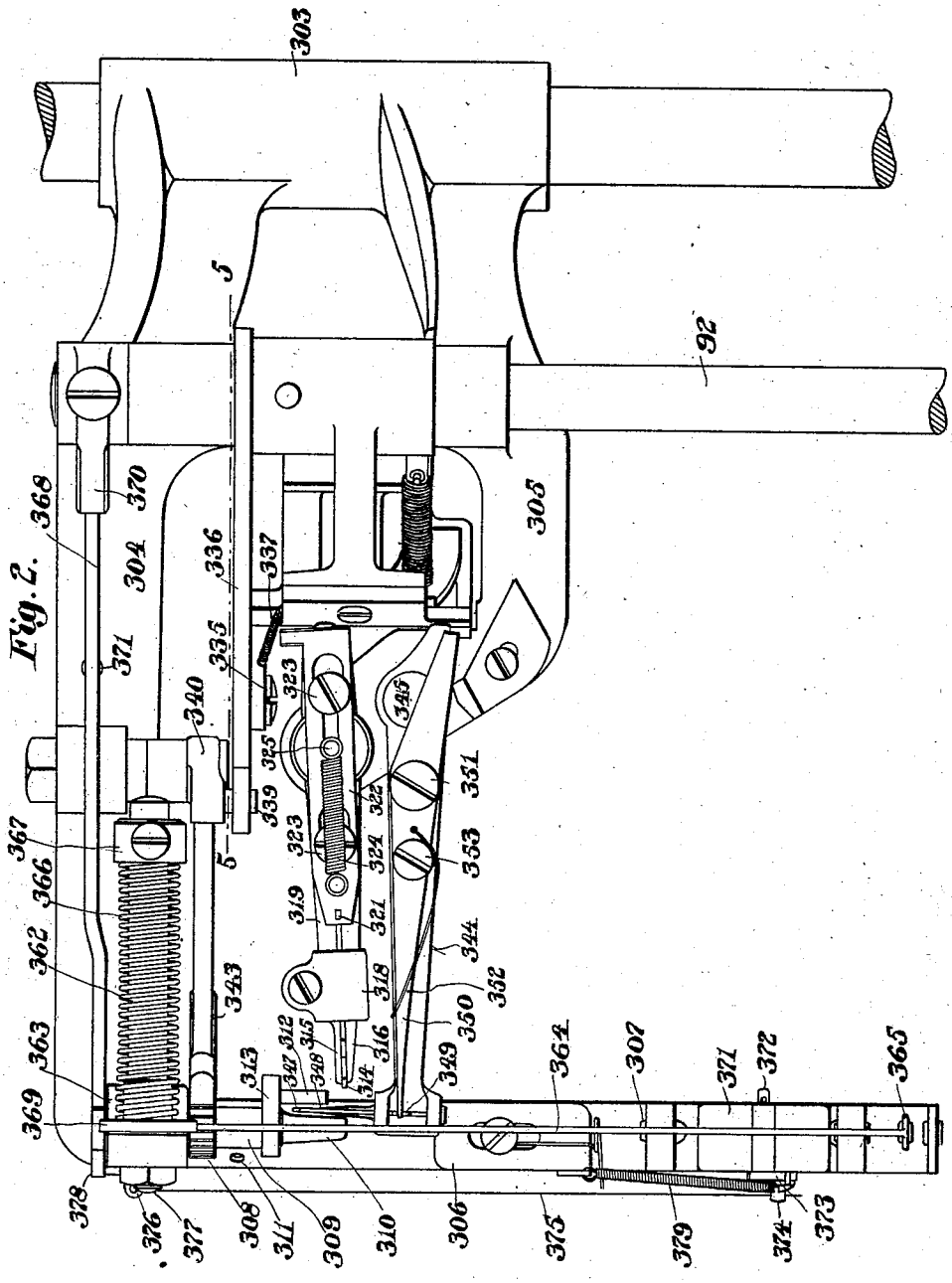
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THREAD FEEDING MECHANISM FOR KNITTING MACHINES.

APPLICATION FILED MAR. 20, 1903.

NO MODEL. 6 SHEETS—SHEET 2.

Fig. 2.



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No. 726,229. PATENTED APR. 21, 1903.

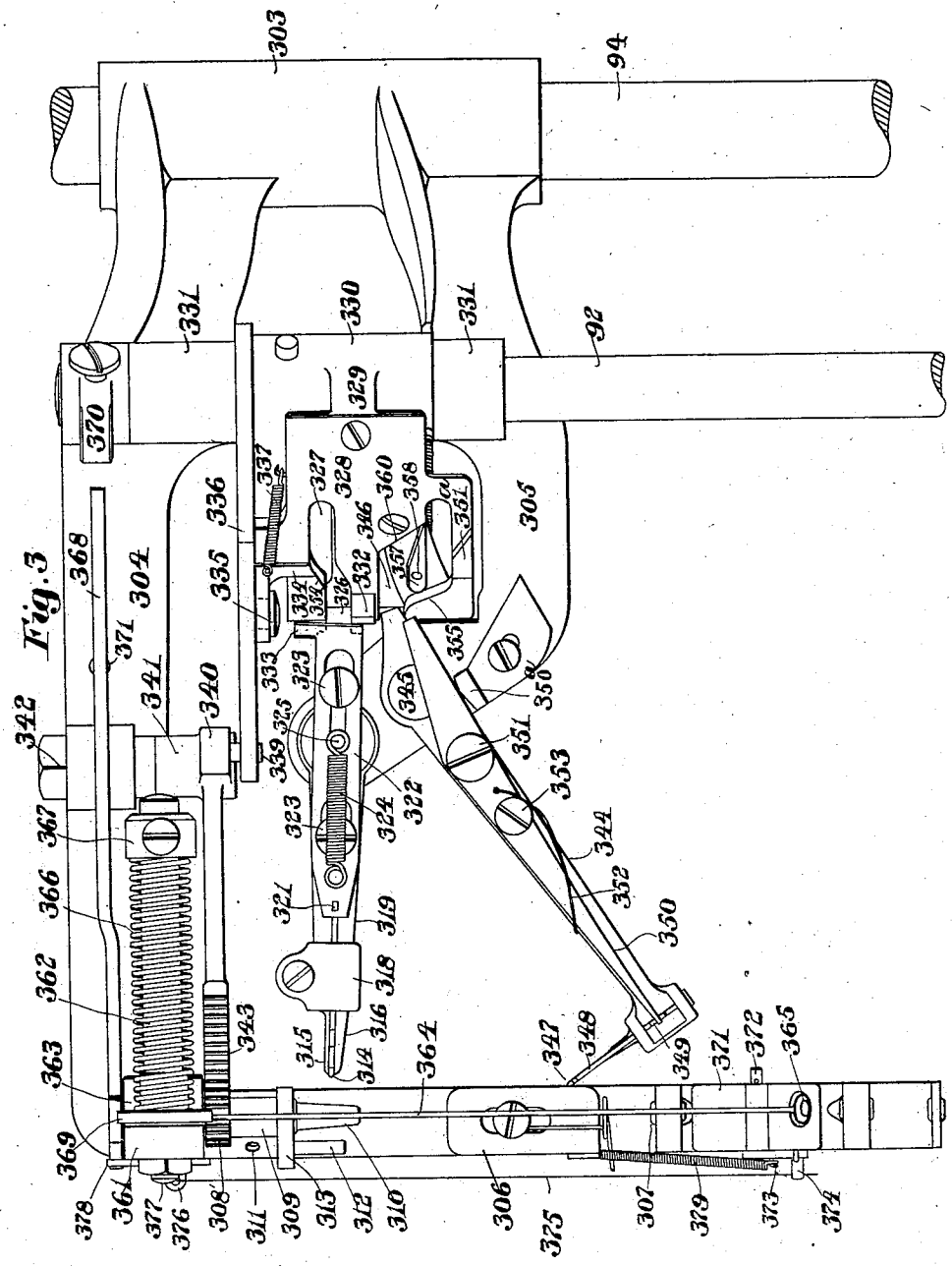
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THREAD FEEDING MECHANISM FOR KNITTING MACHINES.

APPLICATION FILED MAR. 20, 1903.

NO MODEL. 6 SHEETS—SHEET 3.

Fig. 3



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No. 726,229. PATENTED APR. 21, 1903.

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THREAD FEEDING MECHANISM FOR KNITTING MACHINES.

APPLICATION FILED MAR. 20, 1903.

NO MODEL. 6 SHEETS—SHEET 4.

Fig. 4.

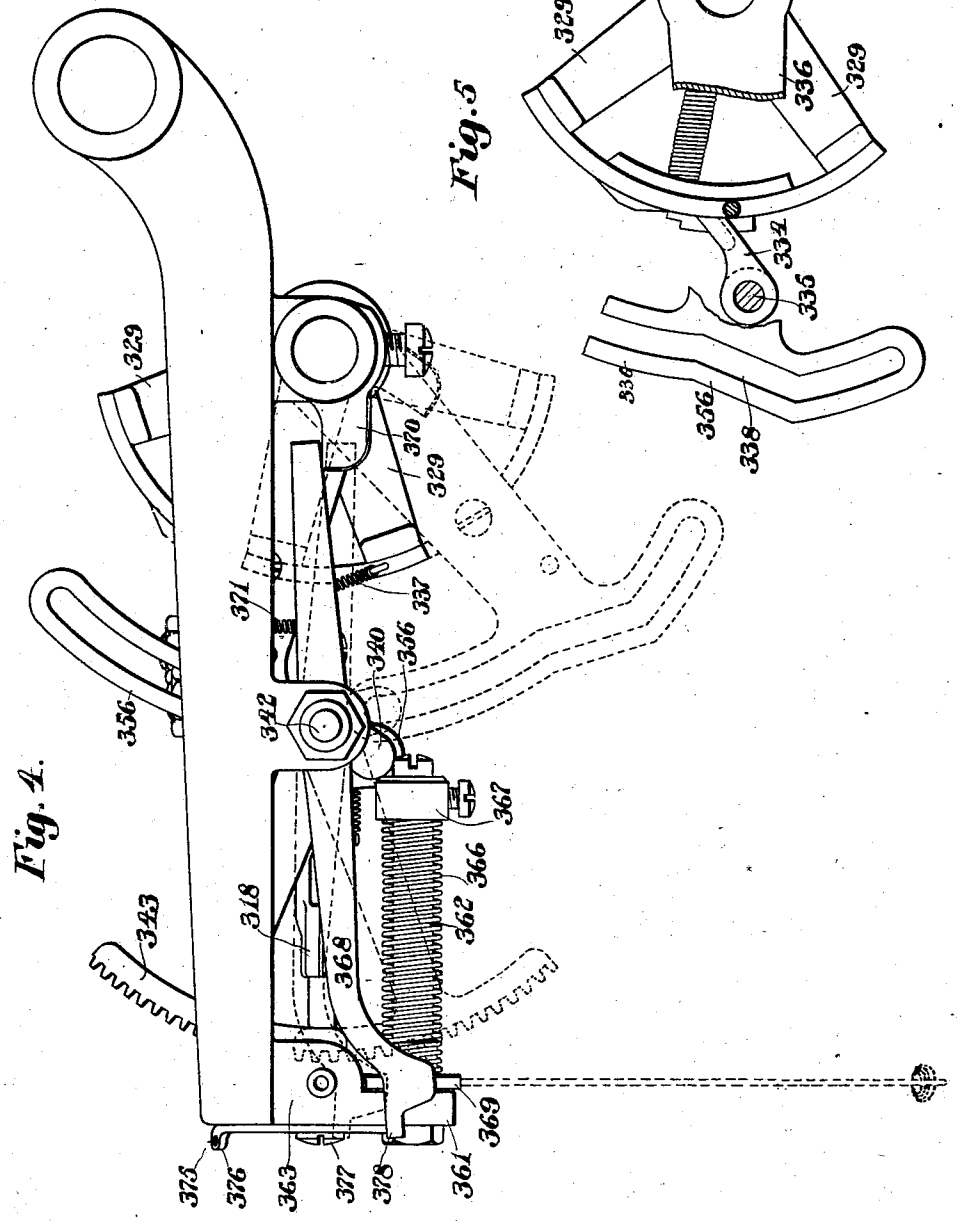


Fig. 5.

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NO MODEL. 6 SHEETS—SHEET 5.

Fig. 15.

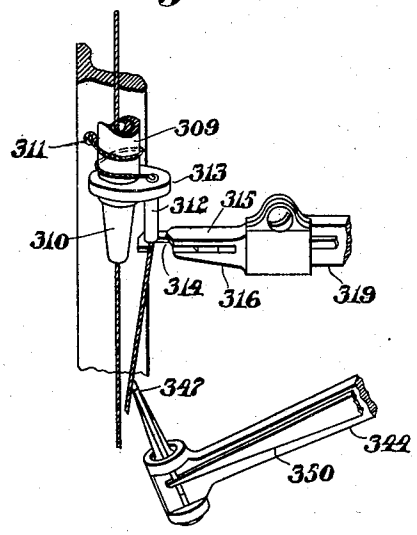


Fig. 14.

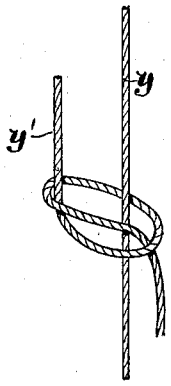


Fig. 6.

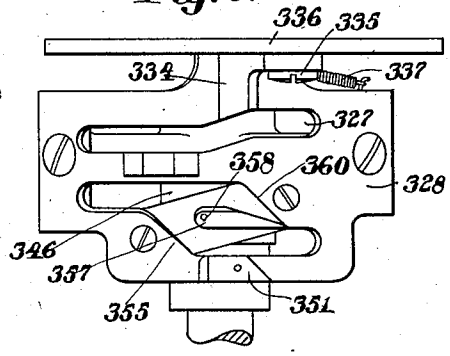


Fig. 7.

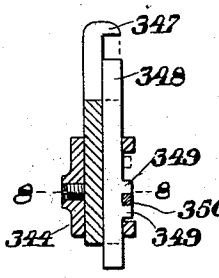
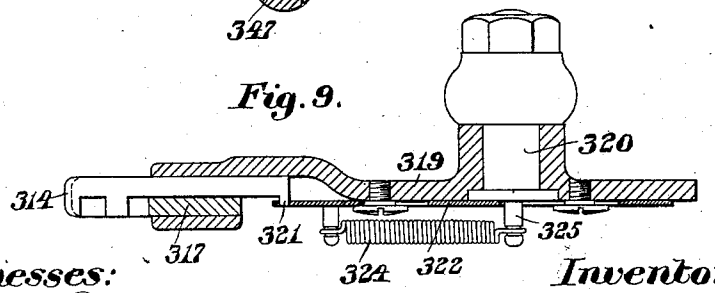


Fig. 8.



Fig. 9.



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No. 726,229. PATENTED APR. 21, 1903.

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THREAD FEEDING MECHANISM FOR KNITTING MACHINES.

APPLICATION FILED MAR. 20, 1903.

NO MODEL. 6 SHEETS—SHEET 6.

Fig. 10.

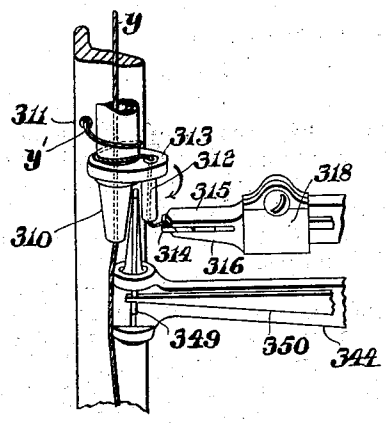


Fig. 11.

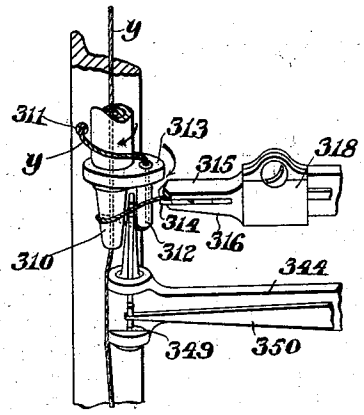


Fig. 12.

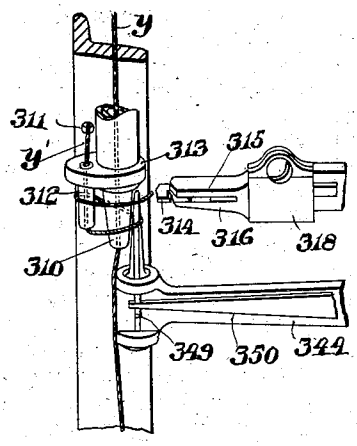
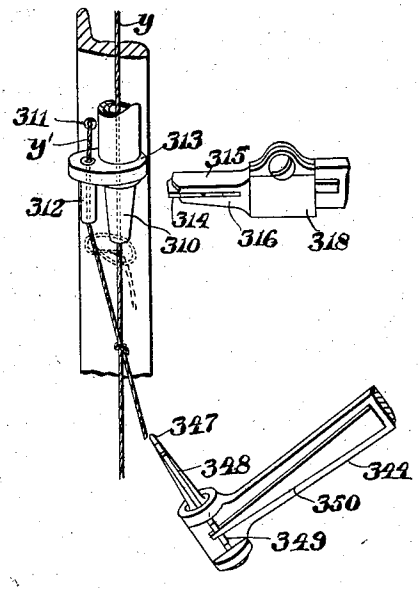


Fig. 13.



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UNITED STATES PATENT OFFICE.

GEORGE D. MAYO, OF FRANKLIN, NEW HAMPSHIRE.

THREAD-FEEDING MECHANISM FOR KNITTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 726,229, dated April 21, 1903.

Application filed March 20, 1903. Serial No. 148,704. (No model.)

To all whom it may concern:

Be it known that I, GEORGE D. MAYO, a citizen of the United States, residing at Franklin, in the county of Merrimack and State of New Hampshire, have invented an Improvement in Thread-Feeding Mechanism for Knitting-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

Knitting-machines, particularly when of the circular type, such as commonly used in the knitting of stockings, are usually provided with thread-feeding mechanisms for supplying the requisite or extra threads to the stockings being knit to produce the desired effect—as, for instance, to give extra weight or wearing qualities thereto, usually at the heel and toe portions thereof.

Prior to my invention thread-feeding mechanisms have usually provided for bringing the end of the extra or new thread alongside of the main or running thread and in frictional engagement therewith, so as to be drawn frictionally by the running-thread to the machine to be knit into the knitted fabric, or else said mechanisms have been provided with means for wrapping or winding the end of the extra or new thread or a portion thereof near its end one or more times about and upon the running-thread, thereby to increase the certainty of frictional engagement between the two threads and make sure the drawing of the extra or new thread to the work with and by the running-thread. Both these types of mechanism have, however, in practice proven more or less defective largely because of the inadequacy of frictional engagement of the one thread with the other, particularly when either of the threads is relatively hard and wiry, as is frequently the case, such a thread having so much inherent resiliency or springiness that it tends to spring away or unwind from the thread with which it is engaged as soon as released by the winding mechanism, thereby entirely destroying the frictional engagement necessary to enable the one to be drawn by the other to the work.

My present invention aims to improve mechanisms of this sort, whereby to render more certain the engagement of several threads, and thereby insure more certain carrying forward of the extra or new thread or threads to the work when desired.

To enable my invention to be understood, I will first describe the same in connection with the best embodiment thereof in an extra-thread-feeding mechanism now known to me, such embodiment being illustrated in the accompanying drawings, wherein—

Figure 1, in front elevation, represents a knitting-machine of the type referred to, the same being equipped with an extra-thread-feeding mechanism, illustrating my invention; Fig. 2, an enlarged side elevation of the parts comprising the thread-feeding mechanism proper; Fig. 3, a similar view showing the parts in different positions; Fig. 4, a top or plan view of the parts as shown in Fig. 2; Fig. 5, a horizontal sectional detail on the dotted line 5 5, Fig. 2, showing portions of the cam-segment and associated parts which are concealed in Fig. 4; Fig. 6, a detail looking at the face of the segmental cam-plate 328, Figs. 2 and 3, the view looking from the left in said figures; Fig. 7, a sectional detail looking at the end of the drawing-through device, showing the same on an enlarged scale; Fig. 8, a horizontal section thereof on the dotted line 8 8; Fig. 9, a horizontal sectional detail showing the combined clamping and severing device; Figs. 10, 11, 12, and 13, perspective details illustrating various steps in the formation of the knot which in the mechanism shown is relied upon to furnish the required engagement between the threads; Fig. 14, a view showing the knotted formation prior to tightening thereof, and Fig. 15 a perspective detail illustrating the manner of engaging the extra thread for severing the same when it is no longer required in the work.

In the particular embodiment of my invention selected for illustration thereof and shown in the drawings I have provided means for engaging the required threads—for example, the running-thread and the extra thread—and producing therein or therewith a knot formation that may be drawn taut, and thereby insure a tight or firm frictional engagement thereof, such as will prevent the extra

thread, however wiry it may be, from springing out of engagement with the running-thread before it is drawn into the work.

Referring first to Fig. 1 of the drawings, my invention obviously may be used in connection with any kind or type of knitting-machine. For convenience herein I have illustrated my invention in connection with a circular machine, such as shown and described in my application for Letters Patent of the United States, filed December 4, 1902, Serial No. 133,823, to which reference may be had for a full and complete description of the construction and operation thereof.

It is sufficient here to designate merely the bed-plate B, the needles *n*, mounted in a suitable needle-cylinder, (not shown,) the skeleton cylinder 8, through which the heels *n'* protrude to be acted upon by the stitch-cam mounted on the cam-ring C, and the latch-ring 43, provided at 46 with a thread guide or eye through which the knitting thread or threads is or are conducted to the machine. Suspended from the bed-plate B is a cam-ring 82, so constructed that when rotated in one direction—as, for instance, in the direction of the arrow, Fig. 1—it will in the first part of its movement cause the switch-cam 49 to be moved to elevate, say, one-half of the needles prior to narrowing for the heel and toe and to set in operation the picker device or devices 60 for narrowing and by further movement in the same direction cause operation of the picker device or devices for widening, and then substantially simultaneously by a single return movement in a direction opposite said arrow throw out the picker device or devices and operate the switch-cam 49 to depress the elevated needles preparatory to resumption of circular knitting. This cam-ring 82, as set forth in my said application, is given the necessary rotary reciprocatory movements by means of a link 90, connecting the said ring with an arm 91 on a vertical rock-shaft 92, which in turn is rotated by means of an arm 98, fast upon its lower end and carrying a stud 99, which enters a cam-groove 100 in a barrel or cylinder cam 101, fast on a pattern-shaft 102, forming part of a pattern mechanism, of which the chain 147 is shown as a part.

It will be noticed by reference to Fig. 1 that the offsets in the cam-groove 100, of which but one can be seen, which produce the described movements of the cam-ring 82, have at one side two steps 300 and 301 for producing the first two movements described—viz., one for throwing in the switch-cam to elevate the needles and the other to set in operation the picker mechanism for widening and a single return step 302 for throwing out the picker mechanism and for depressing the elevated needles.

It is usually desired that the extra thread shall be engaged with the main thread at the commencement of the narrowing, which marks the commencement of a heel or toe portion and which it is ordinarily desired to reinforce or thicken, and it is desired also that the said extra thread shall be severed or withdrawn at the close of the widening, which marks the completion of the heel or toe. It is therefore convenient in such instances to operate the extra-thread mechanism from and by the means employed for moving the cam-ring 82, which sets in operation the narrowing and widening devices, and this is done in the present instance by utilizing for the operation of the extra-thread mechanism the vertical rock-shaft 92, referred to.

Turning now to Figs. 1, 3, and 4, upon the stationary thread-guide post 94, erected upon the frame of the machine, there is secured a head 303, provided with two horizontally-extended supporting-arms 304 305. The topmost arm 304 has at its free end a downturned arm 306, carrying at its lower end a thread-guide 307, through which the thread or threads is or are conducted to the machine. The main or running thread is taken from any suitable source—as, for instance, a cop T, (see Fig. 1)—and is led upwardly to and through a suitably-located guiding-eye *t*, thence to and through the said arm 304, issuing from and at the under side thereof through a hollow pinion 308, loosely journaled at the under side of said arm upon a depending fixed tubular thread-guide, which terminates in a tapering nose 310, through which the thread issues and passes to the guiding-eye 307 below. The extra or reinforcing thread taken from any suitable source—as, for example, a second cop T', Fig. 1—is led upwardly to and through a suitable guiding-eye *t'*, thence to and through a lateral guiding-aperture 311 in the downturned arm 306, and thence to and through the tubular rotary carrier 312, which depends from a laterally-extended arm 313, fast on the barrel 309 of the guiding-pinion referred to.

As best shown in Fig. 10, in the normal condition of the mechanism, with the main thread running to the machine, the end of the extra thread when not in use is held slightly to one side of the rotary carrier 312 in a clamp consisting of a movable hooked member 314, arranged to slide between the top and bottom fingers 315 316 of a holder 317. (See Fig. 9.) This holder is clamped in the slotted head 318 of an operating-lever 319, fulcrumed upon a horizontal stud 320, Fig. 9, which projects laterally from the end of the lower horizontal supporting-arm 305 of the main head 303, referred to.

Referring now to Figs. 3 and 9, the sliding hooked member 314 has at its rear end a projecting lug 321, which enters a suitable aperture in a sliding plate 322, arranged to slide horizontally upon and at the side face of the said operating-lever 319, said sliding plate having horizontal slots for the reception of the guiding-screws 323, carried by said lever. A spring 324, attached to the said sliding plate and to a post 325 on the said operating-lever,

draws the sliding plate and its connected hooked member 314 normally to the right, Figs. 3 and 9, with the hooked end of said member 314 within and between the top and bottom fingers 315 316 of the head 317, referred to. The bottom finger 316 of the said head and the coöperating lower edge of the hook 314 constitute a severing device or shears such that when the said hook is drawn inwardly between the said top and bottom fingers 315 and 316 they will coöperate to shear off or sever the thread pulled to one side by the hook. The top finger 315, in connection with the dulled upper edge of the hook 314, constitutes a clamp which simultaneously with the cutting, shearing, or severing engages and clamps the severed-thread end. Thus the device described constitutes a combined severing device and clamp to sever the thread and clamp or hold the end immediately back of the point at which it has been severed. At its inner or rear end the operating-lever 319 has a portion 326, which enters a cam-slot 327, cut in the segmental plate 328, which is mounted at its ends (see Figs. 3 and 4) upon the radially-extending arms 329 of a hub 330, fast upon the vertical rotatable rod 92, previously referred to. This rod 92 at its upper end is supported and turns in suitable bearings 331, provided therefor in and at the sides of the supporting-arms 304 305. The sliding plate 322, referred to, at its inner or rear end is arranged at its lower edge to be acted upon by a cam 332 upon the face of the segmental plate 328, and at its upper edge the said sliding plate has a vertically-extended finger 333, (see Figs. 3 and 6,) which is adapted to be acted upon by the cam 334. This cam (see Fig. 5) is mounted to swing upon a depending stud or screw 335 on the under side of the pinion-actuating cam-plate 336, which is made fast upon and to swing with the hub 320 of the segmental plate 328, referred to. A spring 337 tends to hold the swinging cam 334 normally against the segmental plate 328, so that when the said plate 328 swings from left to right the said cam will effectively act upon the finger 333 and move the sliding plate 322 to the left, Fig. 3, to project its hook 314 outwardly from between the clamping and shearing fingers 315 316, whereas movement of the segmental plate 328 from right to left will cause the said finger 333 to pass behind the swinging cam 334, the latter swinging to clear and without moving the same.

The pinion-actuating plate 336 (see Figs. 3, 4, and 5) has a cam-slot 338 therein for the reception of a stud 339, depending from a laterally-extended arm 340 on a hub 341, journaled about a vertical stud or bearing 342 in the supporting-arm 304. This hub 341 carries also a segmental gear 343, which meshes with the tubular guiding-pinion 308, referred to. Thus any rotative movement of the vertical rock-shaft 92 to cause the extra thread in the rotary carrier 312 to be carried about the main or running thread will also cause endwise movement of the sliding plate 322 to cause the hook 314 to protrude from or be withdrawn between the clamping and shearing fingers 315 316, the movements being properly timed, as will be hereinafter described, by the shapes of the respective cams 338 and 327 in the plates 336 and 328.

Referring again to Figs. 2 and 3, below the operating-lever 319 there is a second operating-lever 344, mounted upon a horizontal stud 345, projecting laterally from the side of the lower supporting-arm 305, the inner or rear end of the said second operating-lever (see Fig. 3) entering a cam-shaped slot 346 in the segmental plate 328. This second operating-lever 344 at its free end carries a vertically-extended fixed drawing-through hook 347. (See Figs. 7 and 8.) Coöperating with this hook is a vertically-movable clamping member 348, arranged to slide in a slot milled in the side of the hook-shank and provided with a pair of laterally-extended lugs 349, between which enters the end of an auxiliary lever 350, carried by and at the side of the operating-lever 344. This auxiliary lever 350 is fulcrumed upon a screw 351, carried by the said lever 344, and at its rear end terminates immediately in front of the face of the segmental plate 328 and in position to be acted upon by a cam-lug 351^a thereon. The operating-lever 350 is held normally in position, with the clamping member 348 in contact with the under side of the hook 347, by a spring 352, coiled about a screw 353 on the said operating-lever and having its ends respectively engaging the said operating-lever and the said auxiliary lever.

In the normal position of the mechanism the hook 349 and its coöperating clamping member 348, which together constitute one form of what may properly be called a "drawing-through" device, together occupy a position, as indicated in Fig. 10, between the rotary carrier 312 and the tapering nose 310, through which the main or running thread is led.

Referring now to Figs. 2, 4, and 10, assuming the main thread (marked y) to be running to the machine and the end of the extra or reinforcing thread y' to be held in and by the clamp 314 315, the operation of the particular mechanism illustrated is as follows: When the rock-shaft 92 is given its initial rocking movement by the step 300 of the barrel-cam 101 for shifting the cam-ring 82 to elevate one-half the needles preparatory to narrowing, the same movement of said rock-shaft swings the segmental cam-plate 328 from its full-line position, Fig. 4, toward its dotted position, Fig. 4, sufficiently to cause the portion 326 of the inner end of the shear-operating lever 319 and the inner end of the drawing-through operating-lever 344 to travel past the offset portions 354 and 355 of their respective cam-slots 327 and 346 of said plate. By the same movement the depending stud 339 of the gear-segment is caused to travel past the offset

portion 356 of its cam-slot 338, Fig. 5, in the cam-plate 336 and swings the toothed segment 343 so as to rotate the pinion 308 and its rotary thread-carrier 312 one and one-half times around the nose 310, through which the main thread is running to the machine. Bearing in mind that the end of the extra thread is held clamped between the hook 314 and finger 315, Fig. 10, this rotative movement of the rotary thread-carrier 312 acts to wind a portion of the extra thread which is back of the end of said thread one and one-half times around the said nose 310 and around the drawing-through device 347 standing beside it.

In Fig. 11 the carrier 312 is shown as completing its first turn around the nose 310 and drawing-through device 347. During the last half of the first complete rotation of the rotary thread-carrier the clamp 314 315, holding the end of the extra thread, is raised from the level Fig. 10 to the level Fig. 11 by the action of the offset portion 354 of its cam upon the end 326 of its operating-lever 319, thereby raising the portion of extra thread first carried about the nose 310 to the level of the drawing-through hook 347, the clamping member of which has been opened to receive it by the action upon its operating-lever of the face-lug 351^a of the segmental plate 328 described. As the rotary thread-carrier 312 continues its movement through the last half-rotation thereof the said cam-lug 351^a clears the rear end of the auxiliary lever 350 and permits the latter, acted upon by its spring 352, to spring upwardly and bring the clamping member 348 of the drawing-through device tightly against the drawing-through hook 347, so as to nip or clamp between it and the said hook the portion of the extra thread which was first carried about the nose 310 and which, as described, had been raised to a higher level than the portion carried about on the second half-rotation of the carrier. Immediately after the drawing-through device has thus seized the extra thread the face-cam 332 (see Fig. 3) of the segmental plate 328 engages the lower rear corner of the sliding plate 322 and moves the latter to the left, Fig. 3, to eject its clamping and shearing hook 314 from between the fingers 315 316, thereby freeing the end of the extra thread and leaving the latter tightly nipped just back of its end in and by the drawing-through device. The parts are now in the position Fig. 12, where it will be seen that the drawing-through device lies within the second half-turn of the thread about the nose 310 and holds nipped in its end and above the said second half-turn of thread the now-free end of the said thread. At this point in the swinging movement of the segmental plate 328 the rear end of the drawing-through operating-lever 344 clears the portion 357 of the said segmental plate, permitting the longer front end to drop by gravity into its full-line position, Figs. 13 and 3. This dropping of the said lever performs two functions—namely, it causes the drawing-through device to draw the free end of the extra thread down through or within the loop in the extra thread which is below it, thus forming a bight in the form of a knot, as indicated in dotted lines, Fig. 13, and in full lines, Fig. 14, and at the same time by its further movement it draws the said knot tightly about and upon the running thread, as indicated in Fig. 13, so as to be carried to the machine therewith. In the downward tightening movement of the drawing-through device, immediately upon the tightening of the knot about and upon the running thread, the further fall of its operating-lever causes the rear end of the auxiliary lever 350 to strike the stop 350^a, which moves said lever sufficiently to open or ease off on the drawing-through-device clamp and release the end of the extra thread, permitting the same to be drawn to the machine with the main thread. All this takes place, as stated, during the first part of the initial movement imparted to the cam-ring 82, which causes the throwing up of one half the needles preparatory to narrowing, so that by the time the second half of said initial movement of said ring takes place, due to the second step 301 of the cam 101, Fig. 1, the extra thread thus knotted to the main thread will have reached or practically reached the needles, and upon the second step movement of the said cam-ring for throwing in the needle-picking devices, at which time the actual narrowing commences, the extra thread will be in readiness to be knit into the work. This second and further movement of the said rock-shaft 92 produces no further movement of the parts of the thread-delivering mechanism, because the cam-slots 338, Fig. 5, and 327 and 346, Fig. 3, are provided with idle portions for the balance of the movement of said rock-shaft. The widening having been completed upon the completion of a heel or toe, the return movement of the rock-shaft 92 swings the segmental plate 328 in an opposite direction, or from right to left, Figs. 2 and 3. The first part of this return movement performs no work in connection with the extra-thread mechanism, owing to the idle portions of the cam-grooves referred to. During the last half movement of said cam-surfaces, however, the toothed sector 343 is moved to rotate the extra-thread carrier 312 back again through the one and one-half turns about the nose 310 to its original position, Fig. 10. During this return movement and just as the said carrier has completed the first half thereof the portion 326 upon the inner end of the operating-lever 319 reaches the offset 354 in its cam-groove 327 and depresses the combined clamp and shear to a level below the bottom of the rotary thread-carrier. Simultaneously with this depression of said clamp and shear the finger 333 upon the sliding plate 322 on said lever meets and rides over the swinging cam 334, which slides it forward and projects the clamping-hook

314 outward from between the fingers 315 316, so that in the latter part of the return rotation of the rotary thread-carrier about the nose 310 the said extra thread is laid under the said hook 314, as in Fig. 15, in order that as the said finger 333 clears the swinging cam 334 and springs to the right, Fig. 2, it may draw the hook 314 between the fingers 315 316 and by the action of its lower edge, in connection with the lower finger, sever the said extra thread, and by the action of its upper edge with the upper finger clamp the free end back of the point at which it was severed. At the same time the drawing-through operating-lever 344 is returned to its elevated position, Figs. 2 and 10, in readiness for the formation of a second knot when the extra thread is again desired to be introduced into the work. The upward or return movement of the drawing-through device should be delayed with respect to the return movement of the other parts beyond the time at which it would occur if produced by the offset portion 355 of the cam 346. To effect this delayed return, I have made the portion 357 of said cam as a swinging tongue, the same swinging about a radial pivot 358, acted upon from behind by a spring 359, which holds the said tongue normally in its horizontal position, Figs. 3 and 6. In the first movement of the said segment from right to left the rear operating end of the operating-lever 344 passes under this cam-tongue and upwardly along the offset 355. On the return movement, however, from left to right the rear end of the said operating-lever passes above this tongue until it meets the downwardly-inclined surface 360, which depresses it, the cam-tongue yielding before it.

By the particular mechanism described the extra thread is engaged with the main or running thread by a knot formation of the threads, which involves one illustration of the drawing of one portion of thread through or within another looped portion of thread. However this is done and whatever be the engaging formation, the fact that one portion of thread is carried into pinching contact with a plurality of other thread portions insures positive and certain engagement of the two threads which are to travel to the machine together and which must be entirely wanting in any arrangements involving the mere laying of the end of one thread next to and parallel with another or where the end of one thread is merely wrapped one or more times about and upon the other, leaving its end free to spring away and unwind if the threads or either of them are more or less wiry or springy. The mechanism described further provides a means for positively tightening the formation of one thread upon the other beyond what is possible by the mere carrying of one thread about the other. It will be noticed also that with the particular mechanism illustrated the entire engaging formation is obtained without carrying the free end of one thread about the other.

Referring now to Figs. 2, 3, and 4, the upper supporting-arm 304 carries a laterally-extended lug 361, in which is mounted a horizontal stud 362, upon which is loosely mounted the hub 363 of the depending take-up 364, having a usual thread-guide 365 at its lower end, through which the main thread normally runs. A coiled spring 366 encircles the stud 362 and is attached at one of its ends to the hub of the take-up arm and at its opposite end to a collar 367, fast on the end of said stud, said spring tending normally to swing the said take-up arm away from the line of traverse of the threads. During the reciprocating movements of the machine for narrowing and widening this take-up, in a manner well understood by those skilled in the art, operates to take up the slack in the main and thickening threads, whatever number be employed. During circular knitting this take-up is held positively out of action by a lever 368, Fig. 4, fulcrumed upon the vertical stud 342 and acting at its outer end behind an ear 369 on the take-up-arm hub, it being acted upon at its inner end by a short arm 370, fast on the upper end of the rocking rod 92. When the said rod is turned from right to left upon completion of a heel or toe, said arm 370 engages the lever 368 and throws its free end outwardly, thereby, through the lug 369 on the take-up arm, throwing the lower end of said arm inward, with its eye in alinement with the line of traverse of the threads. Upon opposite movement of the said rock-shaft at the beginning of a heel or toe when a take-up is desired the arm 370 is moved away from the inner end of said lever 368, permitting a spring 371 to throw that end of said lever outward and its free end inward away from the lug 369 of the take-up-arm hub, leaving the take-up under the influence of its spring 366 to take up slack in the thread as necessary. The depending arm 306 of the thread-delivering-mechanism support is provided immediately below the thread-guide eye 307 with a suitable clamp 371 in the form of a light clamping-plate loosely mounted upon the pin 372. This pin is carried upon one end of a short rocker-arm 373, pivoted at 374 to said depending arm and connected at its rear end by a wire 375 with one arm of a bell-crank lever 376, pivoted at 377 also to said depending arm, but near the top thereof. The other arm of said bell-crank lies in the path of a finger 378 on the end of the take-up-controlling lever 368, so that when the said lever is moved to release the take-up it simultaneously and by the same movement releases the bell-crank lever and its connected clamp-lever below and permits the clamp to be drawn by its spring 379 toward the face of the depending arm immediately back of it, thereby to clamp the thread or threads above the take-up arm

sufficiently to cause the latter to draw the slack from the machine rather than from the source of the thread-supply. When the take-up-operating lever 368 is moved outwardly to hold the take-up positively in its innermost position, as shown in full lines in the drawings, the finger 378 thereon overrides the end of the upright arm of the bell-crank lever 376 and moves the same and its connected clamp-lever below to throw the thread-clamp 371 away from the adjacent face of the said depending arm to permit the thread or threads to run freely past the same without frictional or clamping action.

I have here described one (the preferred) embodiment of my invention; but it is to be understood that my invention is not restricted or limited to the particular embodiment thereof nor to the particular use thereof here shown and described by way of illustration thereof, for it may be variously embodied within the spirit and scope of the invention. Neither is my invention restricted in its use to two threads only, for frequently several threads are handled as one, or otherwise.

I claim—

1. A thread-feeding mechanism for a knitting-machine, containing means for engaging a plurality of threads by a knot formation.

2. A thread-feeding mechanism for a knitting-machine containing means for drawing one portion of a thread into pinching contact with a plurality of other thread portions.

3. A thread-feeding mechanism for a knitting-machine containing means for tying a knot in one thread about and upon another.

4. A thread-feeding mechanism for a knitting-machine containing means for engaging an extra thread with a main thread by a knot formation.

5. A thread-feeding mechanism for a knitting-machine containing means for engaging an extra thread with a main thread by drawing one portion of a thread inside another looped portion of thread.

6. A thread-feeding mechanism for a knitting-machine containing means for engaging a plurality of threads by a knot formation without carrying the end of either thread about another.

7. A thread-feeding mechanism for a knitting-machine containing means for engaging a plurality of threads by a formation involving the passing of a portion of one thread within or through a looped portion of the same thread.

8. A thread-feeding mechanism for a knitting-machine containing means for engaging a plurality of threads by a knot formation and means for severing one of said threads back of said knot.

9. A thread-feeding mechanism for a knitting-machine containing means for engaging a plurality of threads by a knot formation, means for severing one of said threads back of said knot and means for holding the end of the severed thread.

10. A thread-feeding mechanism for a knitting-machine containing means for engaging a plurality of threads by a knot formation, and a combined severing and clamping device for one of the threads.

11. A thread-feeding mechanism for a knitting-machine containing a drawing-through device having means for engaging a thread and drawing it through a thread-loop.

12. A thread-feeding mechanism for a knitting-machine containing a drawing-through device in the form of a clamp and actuating means therefor.

13. A thread-feeding mechanism for a knitting-machine containing a combined clamping and severing device, means for carrying a portion of one thread about another, and a drawing-through device.

14. A thread-feeding mechanism for a knitting-machine containing guides for a plurality of threads, means for carrying one thread about the line of travel of another thread, laterally-movable thread-engaging means, thread-clamping means rendered operative thereby, and longitudinally-movable drawing-through means.

15. A thread-feeding mechanism for a knitting-machine containing guides for a plurality of threads, means for carrying one thread about the line of travel of another thread, laterally-movable thread-engaging means, thread-severing means rendered operative thereby for severing one thread, and longitudinally-movable drawing-through means.

16. A thread-feeding mechanism for a knitting-machine containing rotary means for carrying one thread about the line of travel of another thread, a laterally-movable thread-engaging hook, means coöperating therewith to sever and hold the end of one thread, and a longitudinally-movable hook-shaped drawing-through device.

17. A thread-feeding mechanism for a knitting-machine containing means for carrying one thread about the line of travel of another thread, a laterally-movable thread-engaging hook, severing and clamping means, of which said hook forms a part, a longitudinally-movable drawing-through hook, a clamp coöperating therewith and operating means for said parts.

18. A thread-feeding mechanism for a knitting-machine containing means for carrying one thread about another thread, a laterally-movable thread-engaging device, thread-severing and thread-clamping means rendered operative thereby, means to impart rising-and-falling movement also to said thread-engaging device, a longitudinally-movable drawing-through device, and operating means for said parts.

19. A thread-feeding mechanism for a knitting-machine containing means for carrying one thread about another thread, laterally-movable thread-engaging means, thread severing and holding means rendered operative thereby, a longitudinally-movable drawing-

through device, means to operate it to draw through a portion of a thread when engaging a plurality of threads one with another, and means to provide delayed return of said drawing-through device relative to return movement of the coöperating parts.

20. A thread-feeding mechanism for a knitting-machine containing means for engaging a plurality of threads by a knot formation, and means to tighten said threads so engaged, one upon another.

21. A thread-feeding mechanism for a knitting-machine containing means for engaging a plurality of threads by a knot formation, said means including a combined drawing-through and tightening device.

22. In a knitting-machine the combination with thread-feeding mechanism constructed to engage a plurality of threads by a knot formation, of a take-up operating in connection therewith and between alternate operations thereof.

23. The combination of thread-feeding mechanism containing means for engaging a plurality of threads by a knot formation, and a thread take-up, with common operating means therefor.

24. In a knitting-machine, the combination with knitting devices and narrowing and widening means therefor, of thread-feeding mechanism containing means for engaging a plurality of threads by a knot formation.

25. In a knitting-machine the combination with knitting devices, of thread-feeding mechanism containing means for engaging a plurality of threads by a knot formation, means for severing a thread when no longer needed, and means for operating said thread-feeding mechanism at predetermined times relative to the operation of said knitting devices.

26. In a knitting-machine the combination with knitting devices, of thread-feeding means for engaging a plurality of threads by a knot formation to vary the thread-feed for the machine, and means for operating said thread-feeding mechanism at predetermined intervals relative to the operation of the knitting devices.

27. In a knitting-machine the combination with knitting devices, of thread-feeding mechanism containing means for engaging a plurality of threads, said means including means for drawing a portion of thread through another looped portion of thread, whereby to vary the number of threads carried to the knitting devices, and means for operating said thread-feeding mechanism at predetermined intervals relative to the operation of said knitting devices.

28. In a knitting-machine the combination with knitting devices, of guiding means for a plurality of threads, means for engaging said threads by a formation involving the drawing of a portion of thread through another, looped portion of thread, whereby a bight is obtained, and means for severing one of said threads back of the engaging point.

29. In a knitting-machine, knot-tying means for tying one thread to another and means for severing one of said threads.

30. In a knitting-machine, means for engaging one thread with another, said means including means for drawing a portion of thread through a loop in another portion of thread, whereby a securing-bight is obtained.

31. In a knitting-machine, knot-tying means for tying one thread to another.

32. In a knitting-machine, knot-tying means for tying one thread to another, and pattern mechanism to determine the times of operation of said means.

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

GEORGE D. MAYO.

Witnesses:
FREDERICK L. EMERY,
SUSAN E. HAYNES.