(No Model.) 3 Sheets—Sheet 1.

A. N. AMES.

THICKENING THREAD AND TAKE-UP MECHANISM FOR KNITTING MACHINES.

No. 600,761. Patented Mar. 15, 1898.

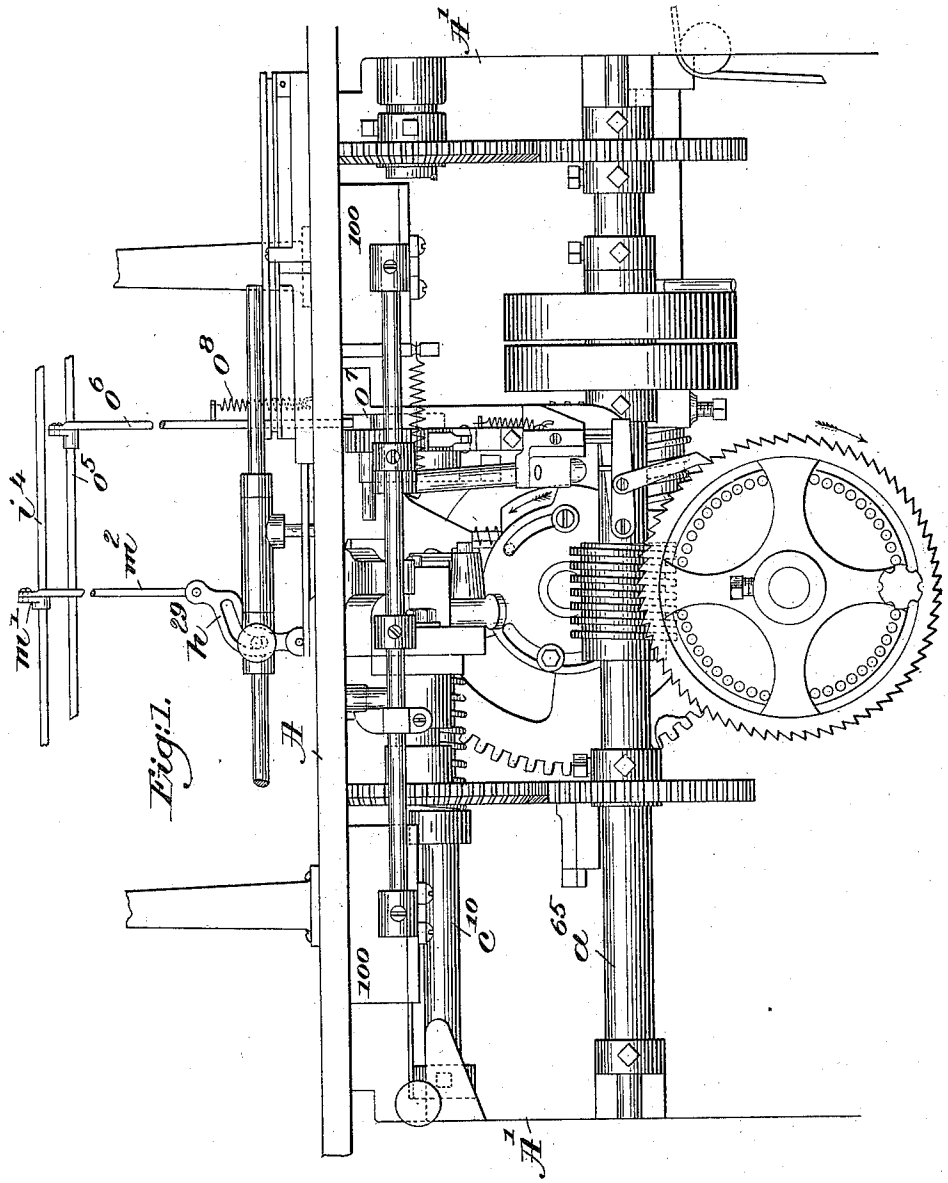


Fig: 1.

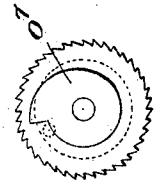


Fig: 7.

Witnesses.
Thomas J. Drummond
Edward F. Allen.

Inventor.
Arthur N. Ames
by Crosby & Gregory. attys.

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(No Model.) 3 Sheets—Sheet 2.

A. N. AMES.

THICKENING THREAD AND TAKE-UP MECHANISM FOR KNITTING MACHINES.

No. 600,761. Patented Mar. 15, 1898.

Fig. 2.

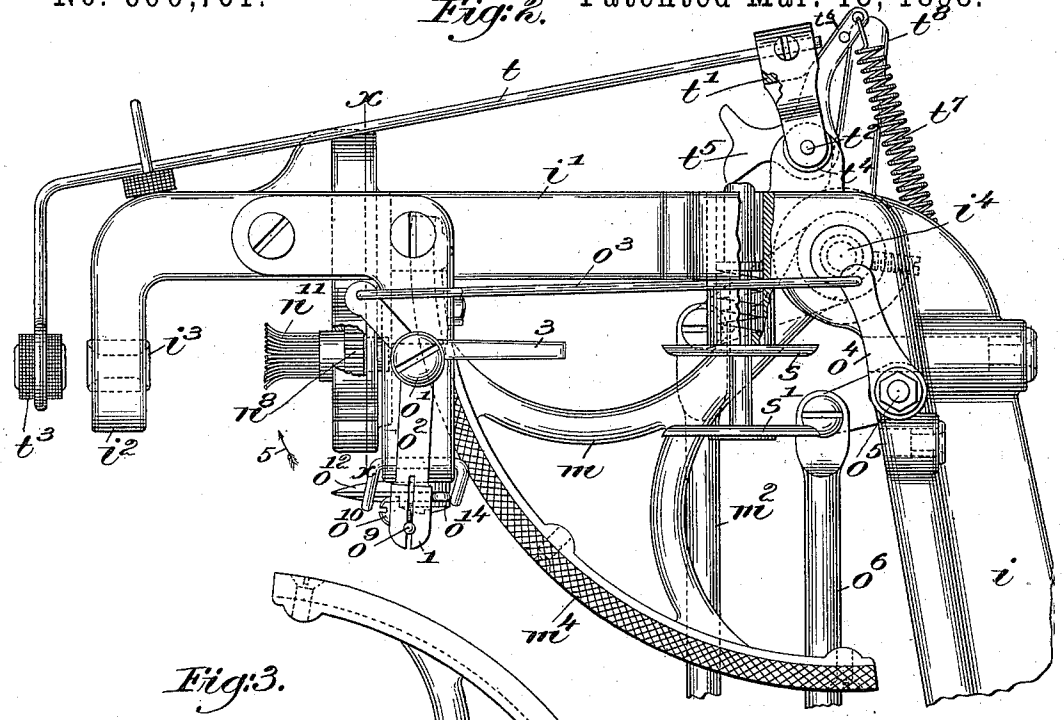
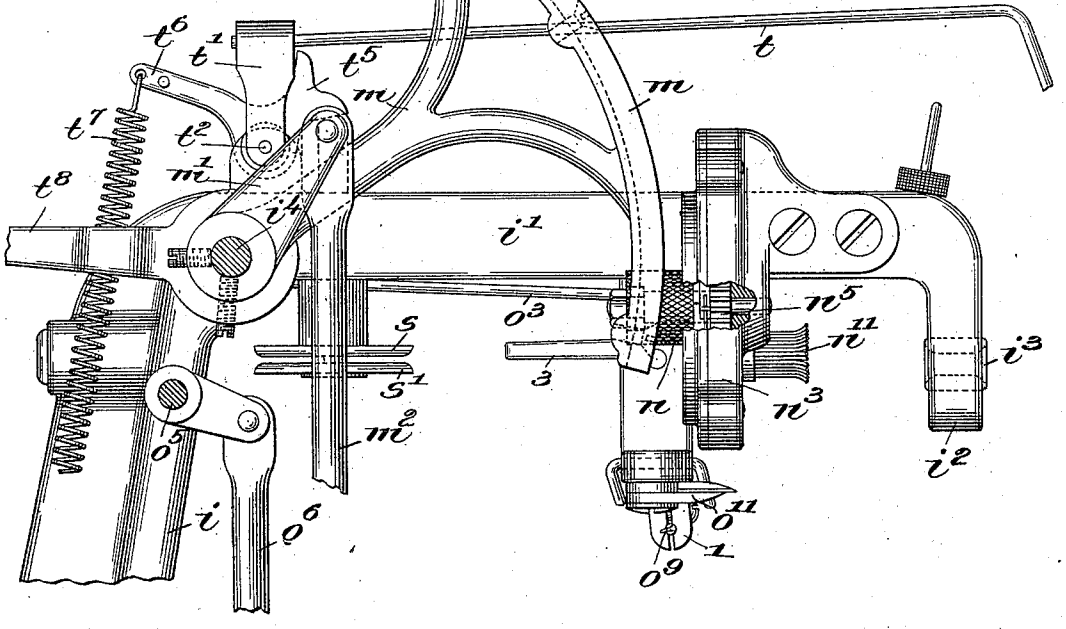


Fig. 3.



Witnesses.

A. A. Harrow

Thomas J. Drummond

Inventor:

Arthur N. Ames

by Crosby, Gregory & Perkins

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 3 Sheets—Sheet 3.

A. N. AMES.

THICKENING THREAD AND TAKE-UP MECHANISM FOR KNITTING MACHINES.

No. 600,761. Patented Mar. 15, 1898.

Fig. 4.

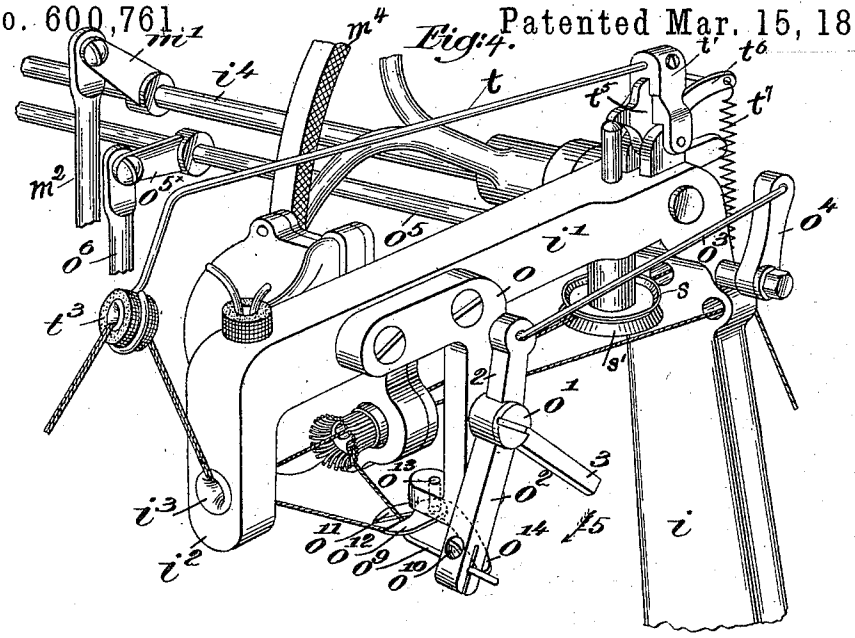


Fig. 5.

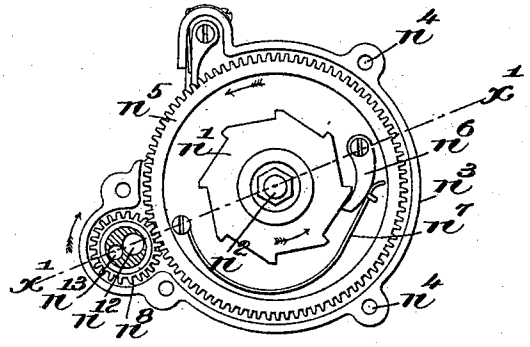
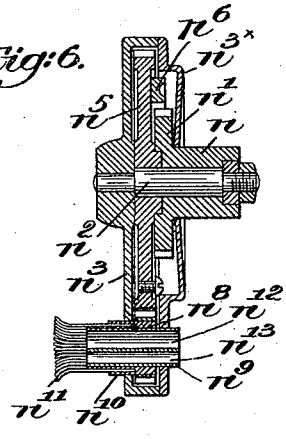


Fig. 6.



Witnesses.
A. C. Harmon
Thomas J. Drummond

Inventor.
Arthur N. Ames.
By Crosby & Gregory, Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ARTHUR N. AMES, OF FRANKLIN, NEW HAMPSHIRE, ASSIGNOR TO THE MAYO KNITTING MACHINE AND NEEDLE COMPANY, OF NEW HAMPSHIRE.

THICKENING-THREAD AND TAKE-UP MECHANISM FOR KNITTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 600,761, dated March 15, 1898.

Application filed November 12, 1894. Serial No. 528,459. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR N. AMES, of Franklin, county of Merrimac, State of New Hampshire, have invented an Improvement in Thickening-Thread and Take-Up Mechanisms for 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 especial reference to mechanisms for introducing into the work as needed additional or different threads.

My invention, generally speaking, comprehends a device for winding one thread about another without requiring the spools, cops, or sources of thread-supply to be movable and without putting into the threads back of the winding device an objectionable reverse or opposite twist.

My invention comprehends means for holding the free end of one thread previous to winding and means for throwing or moving said thread, or, as it is sometimes called, "yarn," into position for engagement by said holding means, and also a cutting device with means for moving the thread into position to be cut or severed thereby.

The above with other features of my invention will be hereinafter fully described and claimed.

My invention further comprehends the usual pivoted "take-up," with a retarding device to control its free movements and with an independently-movable spring-actuated lifter to raise the said take-up into its elevated or operative position, where it will serve to take up the slack in the thread. When the lifter referred to is removed from in front of the take-up, the latter, owing to its retarding device, descends into its normal or inoperative position only as it is drawn down by the thread.

In the drawings, Figure 1 shows in face view a sufficient portion of a well-known knitting-machine to which my improvement is applied to enable my said invention to be understood. Fig. 2, on an enlarged scale, shows the upper end of one of the standards and the thickening-thread and cutting mechanism mounted thereon; Fig. 3, a view of the parts shown in Fig. 2, looking from the opposite or back side thereof. Fig. 4 is a perspective detail showing the winder and cutting mechanism; Fig. 5, a vertical section on the dotted line $x\ x$, Fig. 2; Fig. 6, a cross-section on the line $x'\ x'$, Fig. 5; and Fig. 7, a detail showing the cam o^7.

Referring to the drawings, Fig. 1, the top plate A, supported upon suitable standards A' A', provided with the two curbs 100, each containing a cam-cylinder operated from the shaft a^{65}; the sliding rod d^3, connecting the cam-rings of the two cam-cylinders and moved to shift said rings at the beginning of the reciprocations of the cam-cylinders for narrowing and widening; the pattern-wheel c^{23}, actuated by its attached ratchet-wheel c^{21} and making one complete rotation at each operation of narrowing and widening, and other parts shown in Fig. 1 are and may be substantially like corresponding parts similarly lettered in the Mayo machine illustrated in United States Patent No. 474,671, dated May 10, 1892, said parts being constructed and operated substantially as set forth in the said patent, to which reference may be had, further description of the same herein being deemed unnecessary.

Upon the top plate of the machine, Fig. 1, I have herein arranged two standards $i\ i$, broken off in Fig. 1 to get the figure onto the sheet, but shown fully in Figs. 2, 3, and 4, said standards having their ends bent at substantially right angles, as shown, to form overhanging arms $i'\ i'$, said arms in turn having their ends turned downwardly at i^2 and provided with eyes i^3, vertically above and constituting guides through which the yarn or thread is fed to the needle-cylinders.

Extended between the standards $i\ i$ and journaled at its ends therein is a shaft i^4, upon which are fixed two like sectors $m\ m$, one for and at each standard, said shaft at its middle (see Figs. 1 and 4) having an actuating-arm m', connected by a rod m^2 with a slotted lever h^{29}, connected to and vibrated by the sliding rod d^3 referred to.

Inasmuch as the mechanisms upon the

standards i i are similar, I will herein describe but one of them in detail, it being understood that both are alike and both operated by the common shafts i^4 and o^5, to be referred to.

Each sector m along the side of its curved periphery is shown provided at one side with a friction-strip m^4 of rawhide or other suitable friction material to engage the milled or otherwise roughened periphery of a hub n (see Figs. 3 and 6) of a ratchet-wheel n', loosely journaled upon a stud n^2, projecting from the interior of an inclosing shell n^3, bolted at n^4 or otherwise suitably attached to the overhanging arm i' on the adjacent standard i. Close to the ratchet-wheel n' and loosely journaled upon the same stud n^2 is a toothed wheel n^5, provided with a pawl n^6, engaging the teeth of the ratchet-wheel n', (see Fig. 5,) a spring n^7 maintaining the said pawl in operative engagement with the said ratchet-teeth, rotation of the hub n and its ratchet-wheel in one direction giving a like rotation to the toothed wheel n^5, while rotation of the said hub and ratchet-wheel in the opposite direction takes place independently of and without moving the said toothed wheel n^5. The toothed wheel n^5 (see Fig. 5) meshes with and drives a pinion n^8, which (see Fig. 6) is loosely journaled about a stud n^9, firmly held in the cover $n^{3\times}$ of the inclosing shell n^3.

The pinion n^8 is provided with a rotary tubular winder, shown as an annular lip or sleeve n^{10}, extending laterally to one side and surrounding the projecting end of the stud n^9, (see Fig. 6,) and to the inner grooved face of this annular lip n^{10} are secured a plurality of projections n^{11}, preferably of wire or bristles in the form of a ring-like brush, the ends of the said projections or wires being curved or flared outwardly, as in the form shown, where holding-slots are provided between the adjacent wires or bristles forming the brush portion of the winder.

The stud n^9, as herein shown, is provided with two longitudinal holes n^{12} and n^{13}, which constitute, respectively, main and thickening yarn or thread guides, the main yarn or thread being passed through the guide n^{12}, thence through the eye i^3 in the overhanging arm, and, through a take-up to be described, to the needles, the thickening-thread being passed through the guide n^{13} and having its end drawn to one side (see Fig. 4) between and held or clamped by the projections or wire-like bristles on the pinion n^8 referred to.

It is usually desired to introduce a thickening-thread at the heel and toe of a stocking, to form which it is necessary to reciprocate the cam-cylinder. In the present instance when the slide-rod d^3 is moved to the right, Fig. 1, to shift the cam-rings preparatory to reciprocating the cam-cylinder such movement of the said rod, acting through the lever h^{29}, the rod m^2, and sector m, will rotate the ratchet-wheel n', its toothed wheel n^5, and the pinion n^8 in the direction indicated by the arrows thereon in Fig. 5 to cause the end of the thickening-thread held by the projections on the pinion to be rapidly wound about and upon the main thread passing through the thread-guide n^{12} to the needles, so that the said main thread will draw the thickening-thread with it to the work, the free end of the said thickening-thread readily disengaging itself from the projections which held it clamped in position. It now remains to sever the thickening-thread at the end of the reciprocations of the cam-cylinder when the said thread is no longer needed. The mechanism herein employed for this purpose is best shown in Figs. 2 and 4, wherein o is a bracket secured to one side of the overhanging arm i of the standard, and to the side of this bracket, upon a screw o', is pivoted the three-armed lever o^2, its three arms being herein distinguished by the figures 1, 2, and 3.

The arm 2 of the three-armed lever o^2 is herein shown as connected by a rearwardly-extended link o^3 with one arm o^4, (see Fig. 2,) fast on one end of a shaft o^5, journaled at its ends in the two standards i i and provided at its middle, between said standards, with an arm $o^{5\times}$, to which is jointed one end of a rod o^6, which (see Fig. 1) extends downwardly through the top plate of the machine and at its lower end rests upon the peripheral surface of a cam o^7, fast on the shaft of the pattern-wheel c^{23} and shown separately in Fig. 7, a spring o^8 (see Fig. 1) acting to retain the said rod o^6 always in operative contact with the said cam.

The arm 1 of the three-armed lever o^2 is shown as split to receive a finger o^9, hooked at its outer end, as shown, and clamped in the said arm by means of a clamping-screw o^{10}.

The cutting device herein shown consists of two cutting-blades o^{11} o^{12}, the latter of which is fixed to the bottom of the bracket o, while the former is pivoted thereto at o^{13} and is provided with an arm o^{14}, which stands in a position (see Fig. 4) between and adapted to be struck by the arms 1 and 3 of the three-armed lever o^2 when the latter is vibrated. Assuming the thickening-thread to have been wound upon the main thread, and thereby drawn into the work, and that it is now desired to sever the thread and hold it out of operation, the mechanism described operates as follows, viz: The pattern-wheel c^{23} rotates, as stated, once during the narrowing and widening of the work—that is, once from the beginning to the end of the reciprocations of the cam-cylinder. During the rotation of this pattern-wheel the cam o^7 is rotated thereby and gradually raises the rod o^6 and turns the three-armed lever o^2 in the direction of the arrow 5, Fig. 4, raising its hooked finger o^9 above the thickening-thread passing to the work, the said thread being pushed to one side by and to permit the raising of the said hooked finger. This movement of the three-armed lever o^2 causes its finger 3 to strike the arm o^{14} of the cutting-blade o^{11} and move the

latter away from its companion blade o^{12} to open the two cutter-blades, like a pair of scissors, as shown in Fig. 4. Immediately before the pattern-wheel completes its rotation and stops the reciprocations of the cam-cylinder the end of the rod o^6, acted upon by the spring o^8, drops from the highest point of the cam o^7 to the lowest point thereof, permitting the said spring to depress the rod o^6 and return the three-armed lever o^2 again to its normal full-line position, Fig. 2, in a direction opposite the arrow 5, said return movement of the three-armed lever causing its hooked finger o^9 to catch the thickening-thread and draw it down or to one side its line of movement, as shown in Fig. 4, between two of the clamping projections n^{11} on the pinion n^8, and between the two cutting-blades o^{11} o^{12}, further and final movement of the said three-armed lever causing its arm 1 to strike the arm o^{14} of the movable cutting-blade o^{11} and move the latter toward its companion blade to sever the thickening-thread and leave its end clamped or held firmly between the projections n^{11} on the pinion between which it was drawn. The portion of the thickening-thread beyond the cut is drawn to the machine and incorporated in the work before the reciprocations of the cam-cylinder are terminated by the pattern-wheel c^{23} reaching the end of its rotation. The slide-rod d^3 is now returned to the left into its normal position to return the cam-rings to their normal positions for circular work, and thereby the sector m again into its lowermost position, Fig. 2, such return movement of the sector, however, failing to rotate the pinion n^9 with its projections, because of the pawl-and-ratchet connection between the ratchet-wheel and the toothed wheel n^5.

Referring now to Figs. 2 and 3, t is a take-up arm held at its end in a suitable yoke-like lever t', pivoted at t^2 to a lug on the top of the overhanging arm i' of the standard, the free end of the said take-up arm being turned downwardly, as shown, and provided with an eye t^3, through which the thread or yarn is led to the needle. A friction-washer or retarding device t^4, interposed at the pivot t^2, between the yoke t' and the lug to which it is pivoted, serves to retard or give to the said take-up a substantially slow free movement in either direction for a purpose to be described. Pivoted to the same lug and moving about the same axis t^2 as the take-up arm is a lifter t^5, having an arm t^6, connected by a spring t^7 with the standard, said spring tending to raise the said lifter. The sector m is herein shown as provided with an arm t^8, which when the sector is in its lowermost normal position, Fig. 2, strikes the arm t^6 of the lifter t^5 and depresses the latter, holding it in its depressed full-line position, Fig. 2, the take-up t then lying in its lowermost inoperative position, as shown, with its eye i^3 axially in line with the eye t^3 and the main-yarn guide within the pinion n^8. When the sector m is raised to draw in the thickening-thread at the beginning of the reciprocations of the cam-cylinder, the arm t^8 of the sector is moved away from the arm t^6 on the lifter, (see Fig. 3,) permitting the spring t^7 to raise the lifter and the take-up into their full-line position, Fig. 3, to cause the take-up t to take up all slack in the thread or yarn passing to the machine, said take-up being free to fall and rise under the tension of the thread or yarn passed through its eye and the action of the spring t^7. At the end of the reciprocations of the cam-cylinder when the take-up is no longer needed the dropping of the sector m by movement of the slide-rod d^3 referred to causes its arm t^8 to strike the arm t^6 of the lifter and depress the latter into its position, Fig. 2, the retarding or friction device t^4, however, retaining the take-up still in its elevated position, permitting the latter to be drawn down gradually by the thread as the latter is worked into the stocking or other article being made.

s s' are two friction-plates which are separated and closed by the action of the lifter t^5 in usual manner to clamp the thread or yarn when the take-up is elevated and to release the same when the take-up is depressed.

In take-ups as heretofore constructed, so far as known to me, the take-up arm is positively depressed into its inoperative full-line position, Fig. 2, at or near the end of the reciprocations of the cam-cylinder, causing a sudden and considerable slackening of the thread before it can be worked up by the machine. In my improved take-up herein shown, however, the lifter which holds the take-up in its elevated or operative position is depressed, as usual, at or near the end of the reciprocations of the cam-cylinder; but the take-up arm itself being independent of the lifter and provided with a retarding or friction device remains in its elevated position and is drawn down gradually by the working up of the thread or yarn, preventing any undue slackening of the latter.

The pinion n^8, with its attached projections n^{11}, constitutes one form of what I term a "rotatable winder" to act upon the main and thickening threads passed through their fixed guides n^{12} and n^{13} and wind said threads one upon the other.

I have herein shown my improvement as applied to the well-known "Mayo" machine; but my invention is not restricted to its use in connection with this machine alone, for it may be applied in connection with any knitting-machine and connected to suitable parts to actuate the winder and cutting devices at the proper times; neither is my invention limited to the particular embodiment or construction herein shown, for it is evident that the same may be varied without departing from the spirit and scope of the invention.

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

1. In a knitting-machine, the combination

with main and thickening thread guides, of a combined winder and clamp provided with a plurality of projections in which the free end of the thickening-thread is clamped, and means to rotate said combined winder and clamp to wind the said main thread and the end of said thickening-thread one upon the other, substantially as described.

2. In a knitting-machine, the combination with main and thickening thread guides, of a rotatable winder to wind one thread upon the other, a cutting device, and means to draw the thickening-thread to one side its line of movement into position to be severed by said cutting device, substantially as described.

3. In a knitting-machine, the combination with main and thickening thread guides, of a combined winder and clamp provided with a series of clamping projections, a cutting device and a finger, and actuating mechanism for and to move the latter to draw the said thickening-thread to one side into position to be clamped by said projections and into position to be severed by said cutting device, substantially as described.

4. In a knitting-machine, a pivoted take-up arm, and a retarding device to control the free movement of the same; a lifter, an actuating-spring for and to raise the same into and maintain it in operative position; and means to move said lifter away from the said take-up to permit the latter to be freely moved by the thread into inoperative position, substantially as described.

5. In a knitting-machine, the combination with a guide device for a plurality of threads, of a rotary winder for carrying the end of one thread one or more times about another, holding means, and means for drawing one of said threads to one side its line of movement into position for engagement by said holding means.

6. In a knitting-machine the combination with a guide device for a plurality of threads, of a rotary winder for carrying the end of one thread one or more times about another, holding means, means for drawing one of said threads to one side its line of movement into position for engagement by said holding means, and means for severing said thread.

7. In a knitting-machine, the combination with a guide device for a plurality of threads, of a rotary winder for carrying the end of one thread one or more times about another, a cutter, and means to draw one of said threads to one side to be severed by said cutter.

8. In a knitting-machine, the combination with a guide device for a plurality of threads, of a rotary winder through which said threads are passed, one or more projections on said winder, and means to draw one of said threads to one side and leave its end in the path of movement of said projection or projections, to be rotated thereby.

9. In a knitting-machine, the combination with a guide device for a plurality of threads, of a rotary winder for winding the end of one thread about another, and means for rotating said winder in one direction and preventing rotation of the same in an opposite direction.

10. In a feed mechanism for a knitting-machine, the combination of a tubular twister slotted at one end, means for rotating said twister, and means for throwing a thread into engagement with the slotted end of said twister.

11. In a feed mechanism for a knitting-machine, the combination of a tubular twister slotted at one end, means for throwing a yarn into engagement with the slotted end of said twister, means for rotating said twister, and means for cutting off said yarn.

12. In a feed mechanism for a knitting-machine, the combination of a device provided with an open slot or slots, means for throwing a yarn into a slot thereof, and means for rotating said device to wind the thread engaging said slot around another thread, these slots serving frictionally to hold the thread and permit the latter to be readily disengaged therefrom.

13. In a feed mechanism for a knitting-machine, the combination of a rotary winder for winding one thread about another, and means for rotating said winder, means for throwing a thread into winding engagement with said winder, a cutter, and means actuating said cutter, connected with said thread-throwing mechanism.

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

ARTHUR N. AMES.

Witnesses:
FRED W. H. PORTER,
JAMES E. BARNARD.