R. HAMMERSLEY.

TAKE-UP MECHANISM.

APPLICATION FILED APR. 24, 1909.

988,091. Patented Mar. 28, 1911.

3 SHEETS—SHEET 1.

Fig. 1.

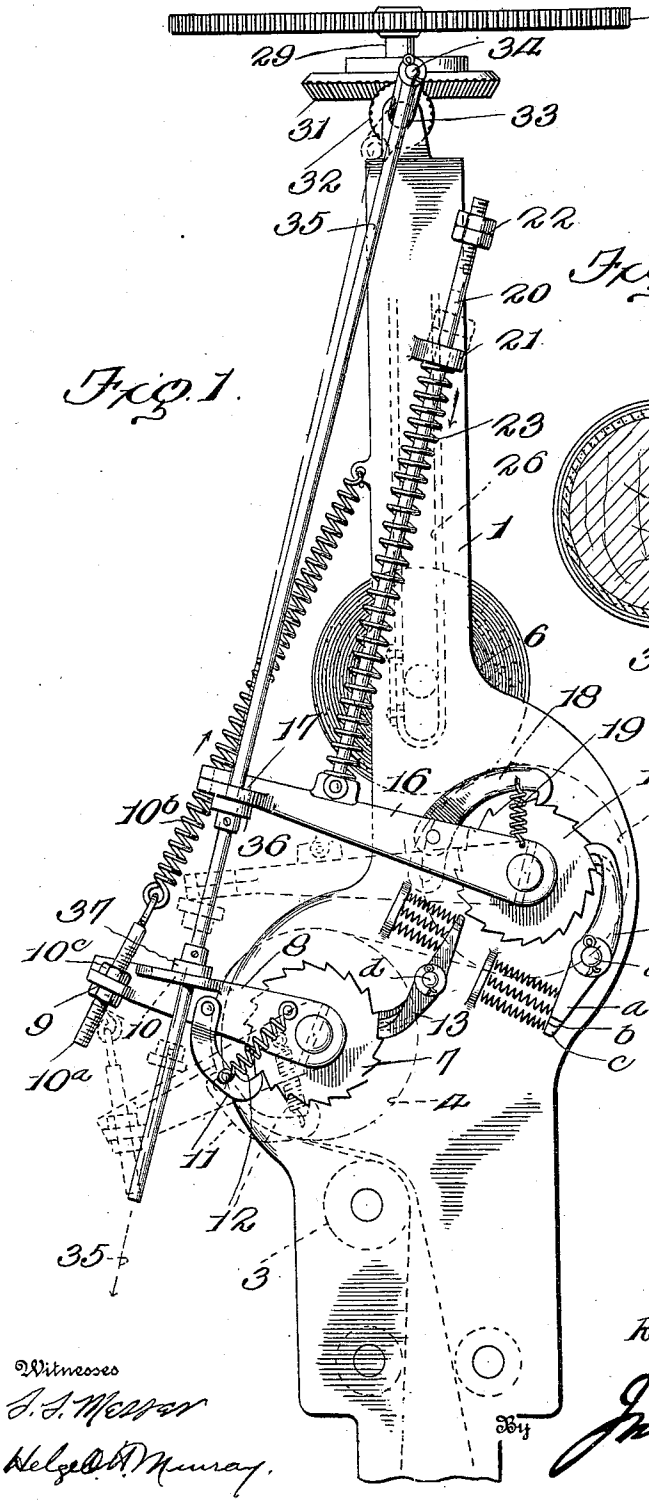
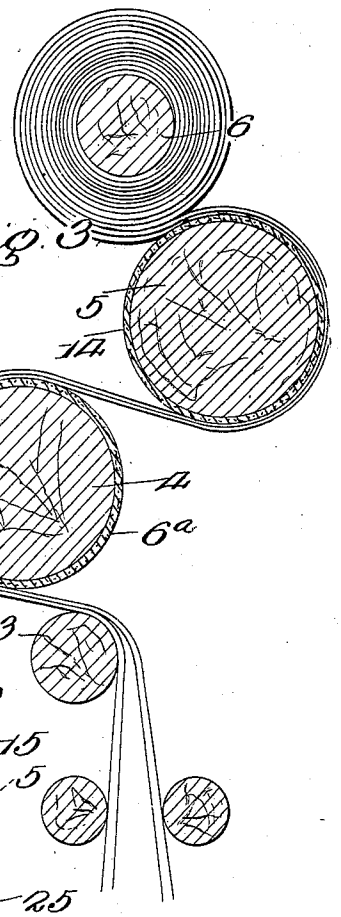


Fig. 3.



Witnesses

J. S. Wallace

Helge A. Murray.

Inventor

Ralph Hammersley

By

Attorney

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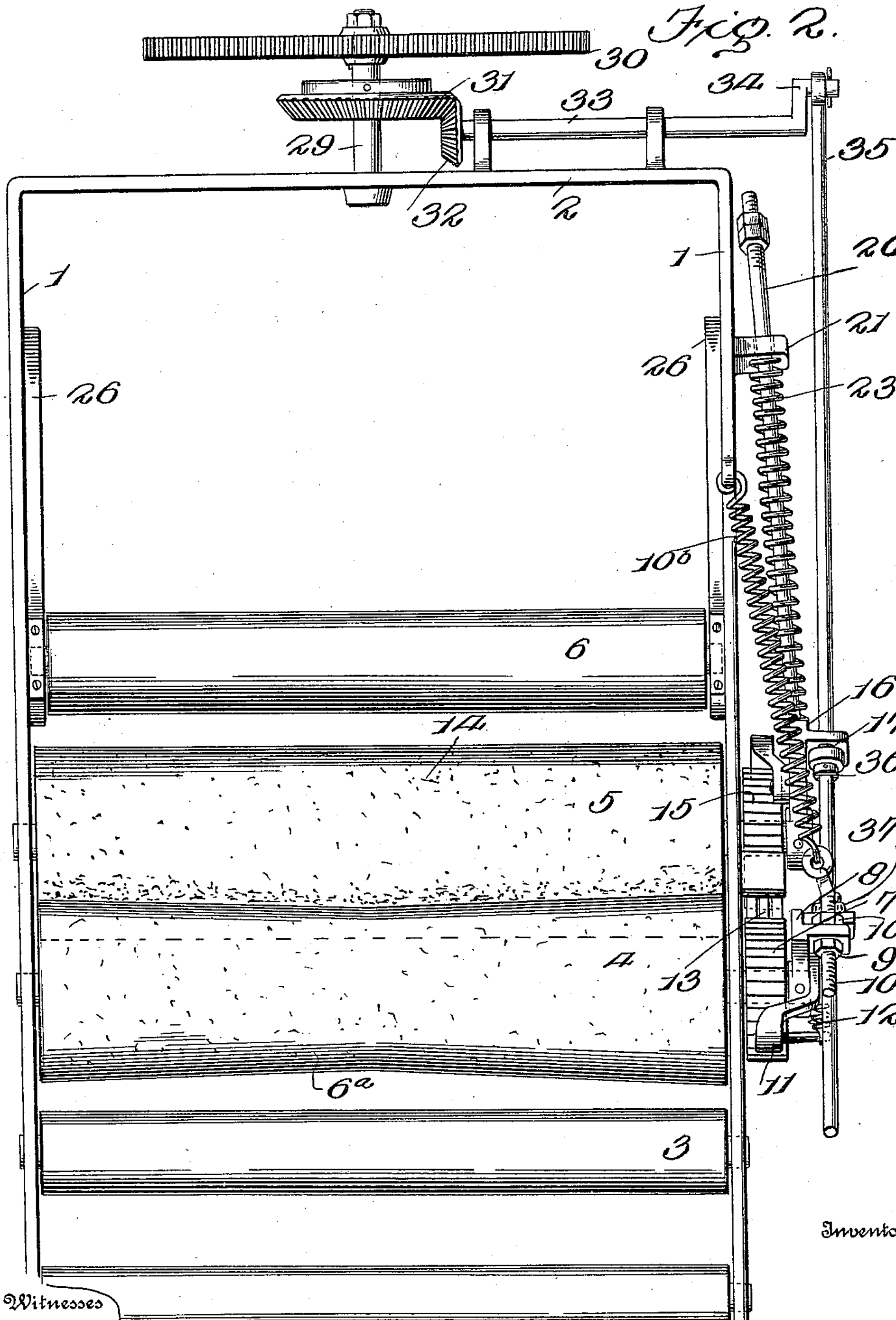
3 SHEETS—SHEET 2.

Fig. 2.



Inventor

Witnesses

S. J. Warren

Helge Ott Murray.

Ralph Hammersley

By

Attorney

R. HAMMERSLEY.

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3 SHEETS—SHEET 3.

Fig. 4.

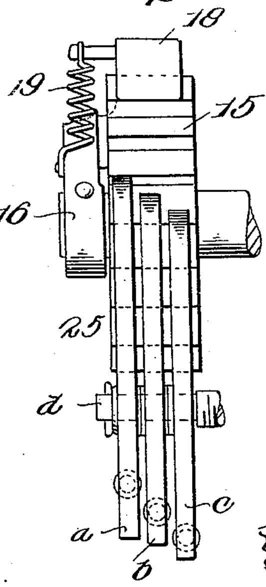


Fig. 7.

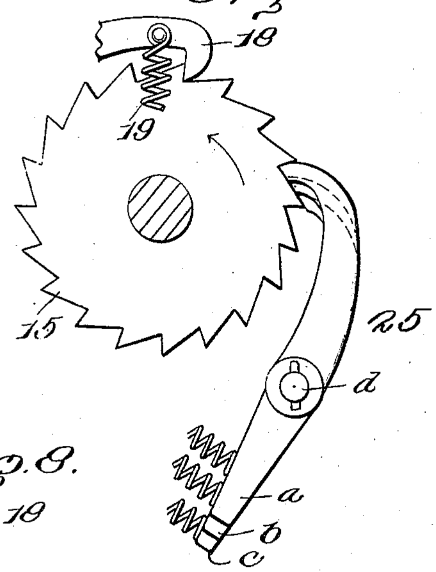


Fig. 8.

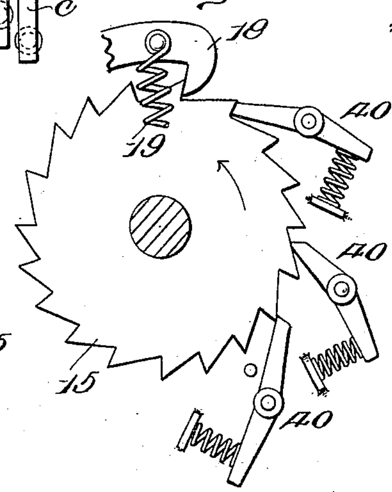


Fig. 5.

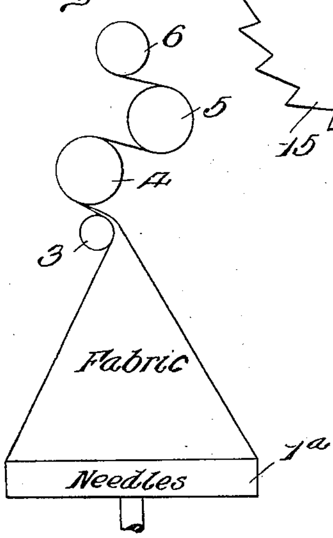
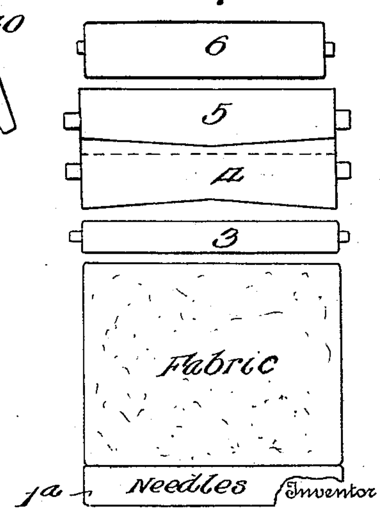


Fig. 6.



Witnesses

Inventor

Ralph Hammersley

By

Attorney

UNITED STATES PATENT OFFICE.

RALPH HAMMERSLEY, OF WATERFORD, NEW YORK.

TAKE-UP MECHANISM.

988,091. Specification of Letters Patent. Patented Mar. 28, 1911.

Application filed April 24, 1909. Serial No. 492,060.

To all whom it may concern:

Be it known that I, RALPH HAMMERSLEY, a citizen of the United States, residing at Waterford, in the county of Saratoga and State of New York, have invented certain new and useful Improvements in Take-Up Mechanism, of which the following is a specification.

This invention relates to improvements in take up mechanism, designed primarily for knitting machines.

Considerable difficulty has heretofore been experienced in maintaining proper tension of the fabric between the needles of the knitting machine, and the take up rolls. Obviously, without going into the disadvantages of this difficulty, it will be evident, that if a uniform tension can be maintained, a far better result will be accomplished.

According to my invention, I provide mechanism for automatically maintaining a uniform tension on the fabric, between the needles and the take up rolls.

A further object of the invention is to provide means for independently operating on the winding rolls, so that the tension on the fabric determines the movement of said rolls, the operating mechanism however being at all times in motion.

A further object of the invention consists in the provision of mechanism, including springs, for operating the winding rolls, the winding of the fabric being effected by the tension of the springs.

The invention also comprehends improvements in the details of construction, and arrangement of parts which will be hereinafter described and particularly pointed out in the claims.

In the drawings: Figure 1, is a side view of my improvement. Fig. 2, is a front view of the same. Fig. 3, is a vertical section: Fig. 4 is a detail edge view of one of the pawls and ratchets. Figs. 5 and 6 are diagrammatic illustrations of a portion of a knitting machine, showing the invention applied. Fig. 7 is a side view of Fig. 4. Fig. 8 is a side view of a different form of ratchet.

The numeral 1, indicates the usual revolving frame, which extends up from the circular series of needles 1^a, and comprises connecting bars at the lower portion, and a top bar 2.

Mounted in the side bars of the frame 1, are four rolls, 3, 4, 5 and 6. Roll 3, is an idler, and is positioned under and a little to one side of the center of roll 4, for the purpose of causing the fabric to engage a greater area of the periphery of said roll 4. Roll 4, tapers from the ends toward the center, for a purpose to be described, and is covered with a layer of emery material 6^a. On one end of the shaft supporting the roll 4, is secured a ratchet wheel 7, and secured to said shaft outside the ratchet wheel is a forwardly extending arm 8, provided near its outer end with two openings 9, and 10. Pivotally secured to the arm 8, is a pawl 11, the end of which engages with the ratchet wheel 7. The pawl is retained in engagement with the ratchet wheel by a light spring 12. A spring pressed hold back pawl 13, also engages with the ratchet wheel 7, to prevent the tension of the fabric pulling the roll 4, in the reverse direction. A rod 10^a, fits in the opening 9, and to its upper end is secured a spring 10^b, the upper end of which is fastened to the side of the frame 1; the tension of the spring serving to draw the arm 8, upwardly, the tension of the spring 10^b being regulated by a nut 10^c.

The periphery of the roll 5, is provided with a layer of emery material 14, and the end of the supporting shaft of said roll is provided with a ratchet wheel 15. Extending from the shaft is an arm 16, formed near its outer end with an opening 17. Pivotally secured to the arm 16, is a pawl 18, the end of which engages the ratchet 15, a spring 19, serving to retain said pawl in position on the ratchet. A rod 20, is pivoted to the arm 16, and extends up through an opening in a lug 21, extending from the frame 1; nuts 22, on the end of the rod serving to retain the arm when in its lowest position. A spring 23, is interposed between the lug 21, and the arm 16, the tension of said spring serving to force the arm in a downward direction. A spring pressed hold back pawl 25, engages the ratchet wheel 15, to prevent the roll 5, reversing its movement. The ends of the shaft of roll 6, slides in ways 26, on the inside of the frame 1, and is revolved by contact with the roll 5. The roll 5, is set back of and slightly below the top of roll 4, which position with the position of roll 3, insures of the fabric engaging a large surface of the rolls. This is also true of the roll 6. The latter is located slightly forward of the center of roll 5, which also

causes the fabric to fit snugly a large part of the periphery of said roll.

Extending up from the bar 2, of the frame is a shaft 29, provided with a gear wheel 30, and a beveled gear wheel 31 is loosely mounted on said shaft, and is fixed to a stationary support above the machine. Meshing with the beveled gear 31, is a smaller beveled gear wheel 32, mounted on a shaft 33, in bearings on the bar 2. The outer end of the shaft 33, is provided with a crank 34; a pitman rod 35, is pivoted to the crank 34, and passes through the openings 17, and 10, in the arms 10, and 16. Adjustably secured on the pitman rod 35, are two stops 36, and 37, arranged to strike the arms 8, and 16, as the crank reciprocates the rod.

The spring pressed hold back pawls 25, and 18 each comprises a series of pawls of different length, to insure holding the ratchet should the pawls 11, and 19, be moved by their respective operating springs 10^b and 23. The pawls are shown in Figs. 4 and 7 as will be observed comprise three distinct pawls, *a*, *b*, and *c*, mounted on a single stud *d*. If the roll 4, should be moved a trifle, the dog *a*, will engage the ratchet while a slight additional movement will cause the pawl *b*, to drop and upon a further movement pawl *c*, will drop. The distance between the operative ends of the pawls about equals one tooth of the ratchet wheel. As shown in Fig. 8, I may accomplish substantially the same result, by arranging a series of pawls 40, around the ratchet wheels. In this instance the pawls will be of different lengths, and arranged so as to successively engage behind the teeth.

In operation, the frame 1, is revolved around the series of needles in the usual manner. Motion is imparted to the shaft 29, and as the bevel gear 31, is stationary, the bevel gear 32, revolving around the same revolves shaft 33, hence the crank 34. The fabric is passed over the roll 3, around roll 4, under roll 5, and then around roll 6. As the pitman rod 35 is reciprocated, the stop 36, on its downward stroke contacts with the arm 8, and pawl 11, slips behind a tooth of the ratchet, the spring by this action being placed under tension. The pitman on its next stroke causes the stop 36, to strike against the arm 16, which moves the pawl 19, behind one tooth of its ratchet, the spring 23 in the meantime being compressed. When the pitman rod 35, moves up, and if the fabric is slack, the tension of the spring 10^b, would draw the arm 8, to its normal position and through the pawl and ratchet 8, and 7, and the roll 4, would be revolved, the hold back pawl 13 in the mean time slipping into position and holding said roll against reverse rotation. Now, when the pitman descends, the arm 16, is forced down to its normal position by its spring, 23, and through the pawl and ratchet 19, and 15, the roll 5, is revolved. As the roll 5, is revolved, the roll 6, which contacts therewith is also revolved, and as the roll of fabric increases in size, said roll is forced up the ways in the usual manner. But it is at this point the important operation and the real function of my invention is performed. As the size of the roll of fabric increases and as the roll 6, from which the roll of fabric receives its motion has heretofore moved the same distance at each stroke of the pitman connection, obviously the tension on the fabric could not possibly be uniform. For if the parts were set when starting the roll to establish a tension, when the roll increased in size, said tension would be so increased when the roll was completed, as to do damage to the fabric. But by providing each roll 4, and 5, with separate mechanism for revolving them, I am enabled to maintain a uniform tension on the fabric, irrespective of the diameter of the roll. If when the stop 37, forces the arm 8, down, and the tension of the fabric has reached a point which overcomes the power of spring 10^b, the arm 8, will remain in this abnormal position until further stitches are knit in the fabric which of course causes slackness. As the new stitches are formed, the spring gradually pulls on the arm 8, and thereby takes up the slack. Precisely the same action takes place with reference to the upper roll 5. If when the stop 36, strikes the arm 16, and moves the pawl 19, back a tooth, and there is no slack to be taken up, obviously the arm will not be quickly returned to normal position. But just as soon as the tension of the fabric is released, just so soon the spring commences to return the arm, and the pawls catch and hold the ratchet. Of course if by the time the stops 36, and 37, are again reciprocated, and the arms 8, and 16, have been moved the slightest under the influence of their respective springs, said stops will again strike said arms and reset the pawls for a new hold on the ratchets, when immediately the stops, move away from the arm the accumulated slackness will be automatically taken up.

The important and essential features of the present invention reside in the independently and alternately driven tension rolls, the control of their movements solely by the tension of the fabric immediately adjacent thereto, and the peculiar formation of one of such rolls to compensate for the form of the knitted structure. The independence of movement of the two rolls and their alternate operation is absolutely essential for the reason that one of said rolls is designed to control the tension of the fabric leaving the needles while the other is to control the tension of the fabric delivered to

the winding roll. As the surface area of the latter increases as the fabric is wound thereon, and hence the tension necessarily continuously varying it would be impossible to secure a proper tension at the needles (which must be fairly constant) by a device required to deliver a varying tension. The effects sought are distinctly different at the respective points, and therefore the winding roll tension device must be operated independently of the needle tensioning device, or the former must control the tension of the fabric beyond the needle tensioning device only with respect to the needles in order to prevent the varying tension required of the winding roll device from inducing a varying tension at the needles with obvious injurious results. In order to secure the independence of the tensioning effect and prevent the winding roll device from the possibility of affecting the needles, the respective tensioning devices are operated alternately. The peculiar form of the needle tensioning device is designed to compensate for the tubular formation of the fabric as before pointed out, and as this compensation must exist for the fabric drawn from the needles and must not exist at the winding rolls, as at such point it would result in an uneven distribution of the fabric layers, the respective tensioning devices are, therefore, of radically different forms.

The function of making the diameter of the center of the roll 4 smaller at its center than at its ends, is to compensate for the different distances between the front and rear, and the opposite sides of the fabric between the roll and the circular series of needles, which I have found quite essential.

As will be seen in the diagrams illustrated in Figs. 5 and 6 the distance from the center of the front and rear of the roll 4, and the series of needles 1^a, is greater than the distance between the ends of said roll, and said needles. As the roll 4, is revolved, and as the ends thereof are larger than the center, obviously the same amount of fabric will be wound and a uniform tension will be the result.

From the foregoing description, it will be seen I have provided a take up mechanism which will automatically maintain a uniform tension on the fabric, irrespective of the diameter of the roll. Furthermore it will be seen that by employing separate mechanism to revolve the respective rolls, and coating the peripheries of the latter with emery material, a positive means for taking up the tension is produced which insures the removal of the well known difficulties in this particular.

What I claim is:—

1. In a take up mechanism for a knitting machine, the combination with a frame, a pair of spaced apart rolls mounted in the frame, the fabric from the knitting machine passing over said rolls, mechanism for alternately and independently operating the rolls including reciprocating elements and a spring-operated lever, for each roll, connections between each lever and its roll to cause the tension of the fabric on the roll to determine the position of the lever with respect to its reciprocating element, whereby when the fabric is of the proper tension said lever or levers will be removed from the path of movement by its reciprocating element, and the roll or rolls will remain stationary until the fabric slackens.

2. In a take up mechanism for a knitting machine, the combination with a frame, a pair of spaced apart rolls mounted in the frame, the fabric from the knitting machine passing over said rolls, a ratchet wheel on each roll, levers, pawls, on the levers, for engaging the ratchet wheels, a continuously reciprocating element, and abutments carried by said element and operating to respectively engage and actuate the particular levers to set the pawls in the alternate movements of said element, and means to operate the levers in opposition to their actuation by the abutment, said means inducing movements of the rolls when the tension of the fabric is slackened.

3. In a take up mechanism for a knitting machine, the combination with a revolving frame, a pair of spaced apart rolls mounted therein one of said rolls tapering from the ends toward its center, the fabric passing around the rolls, mechanism independently acting on each roll of said pair to revolve the same when the tension of the fabric is reduced, continually moving means for operating said mechanism on each roll, said means having two distinct operating movements to actuate one roll mechanism in one movement and the other roll mechanism in the other movement, and a winding roll to receive the fabric, said winding roll being revolved by frictional contact with one of the pair of rolls.

4. A winding mechanism for knitting machines including two rolls, independent operating mechanism for each of said rolls, spring means for each mechanism to actuate said mechanism in one direction, and continuously-operating means to separately and alternately actuate the respective operating mechanisms against the tension of the spring means, and a third roll in frictional contact with one of the aforesaid rolls.

5. In a take-up mechanism for a knitting machine, the combination with a frame, a roll mounted in the frame at a point above the circularly arranged needles of the knitting machine, said roll having a depression at its central portion and over which the fabric passes, a second roll spaced from the aforesaid roll, a pawl and ratchet for re-

volving the second mentioned roll, a third roll to receive the fabric and which receives its motion from the second mentioned roll, springs for independently operating the pawls and ratchets of the respective rolls, and a constantly operating element having abutments which coöperate with and set the pawls and ratchets against the tension of the roll operating springs.

6. In combination, a knitting machine having a plurality of circularly arranged needles, a revolving frame, a series of rolls mounted in the frame, one of said rolls being reduced in diameter at or near its center, means controlled by the tension of the fabric for alternately and independently revolving the rolls and reciprocating means for alternately and independently setting the aforesaid means when the tension of the fabric becomes reduced.

7. In a take up mechanism for knitting machines the combination with a plurality of rolls, one of which tapers from its ends toward its center, of an independent operating mechanism for each roll, spring actuated means for each operating mechanism, and continuously operated means for alternately and independently setting under operative tension of said spring means each of said roll operating mechanisms, the movement of a particular roll under its spring means being opposed by the tension of the fabric being wound, whereby the fabric winding movement of any one roll is controlled by the tension of the fabric engaging said roll without regard to the movement of the remainder of the rolls.

8. In a take up mechanism for knitting machines, the combination of a pair of rolls, ratchets and pawls coöperating with said rolls, springs for normally drawing the pawls toward each other to operate the rolls, and a continually operating element for moving the pawls alternately in the opposite direction against the tension of the springs, the roll operating tension of the springs being directly measured by the tension of the fabric, whereby said springs act to operate the roll only as the fabric tension is less than the power of the springs.

9. A tension device for knitting machines arranged between the needles and winding roll, including spaced rolls over which the fabric is successively passed, spring actuated operating means on each roll, and continuously operated mechanism for independently and alternately tensioning said spring actuated operating means.

10. A take up mechanism for knitting machines including rolls arranged to successively receive and feed the fabric, independent operating means for each of said rolls including spring elements for operating the roll in one direction, and mechanism to engage and actuate each of said operating means to tension the same for roll operation, said mechanism alternately and independently actuating the respective operating means.

11. A take up mechanism for knitting machines including rolls arranged to successively receive and feed the fabric, independent operating means for each of said rolls including spring elements for operating the roll in one direction, mechanism to engage and actuate each of said operating means to tension the same for roll operation, said mechanism alternately and independently actuating the respective operating means, the tension of the fabric engaging each respective roll acting upon the roll in opposition to the roll operating means, whereby the movement of a particular roll is in direct correspondence with and inversely of the tension of the fabric.

In testimony whereof I affix my signature in presence of two witnesses.

RALPH HAMMERSLEY.

Witnesses:
HARRY R. DAVIDSON,
CHARLES L. MEAD.