Sept. 25, 1951 E. M. ZESCH 2,569,394

FABRIC TAKE-UP MECHANISM FOR TEXTILE MACHINES

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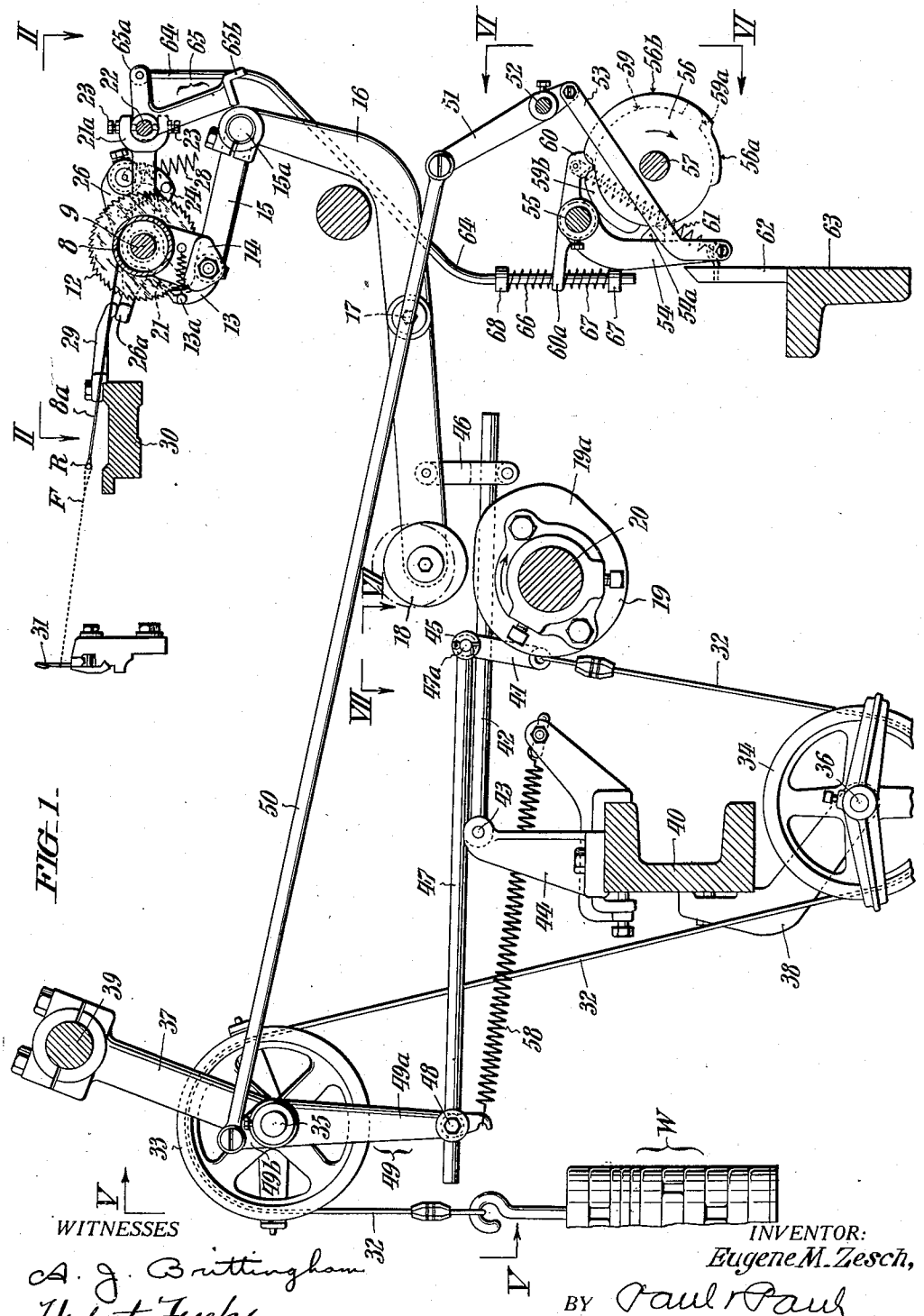


FIG. 1.

WITNESSES

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FIG. 2.

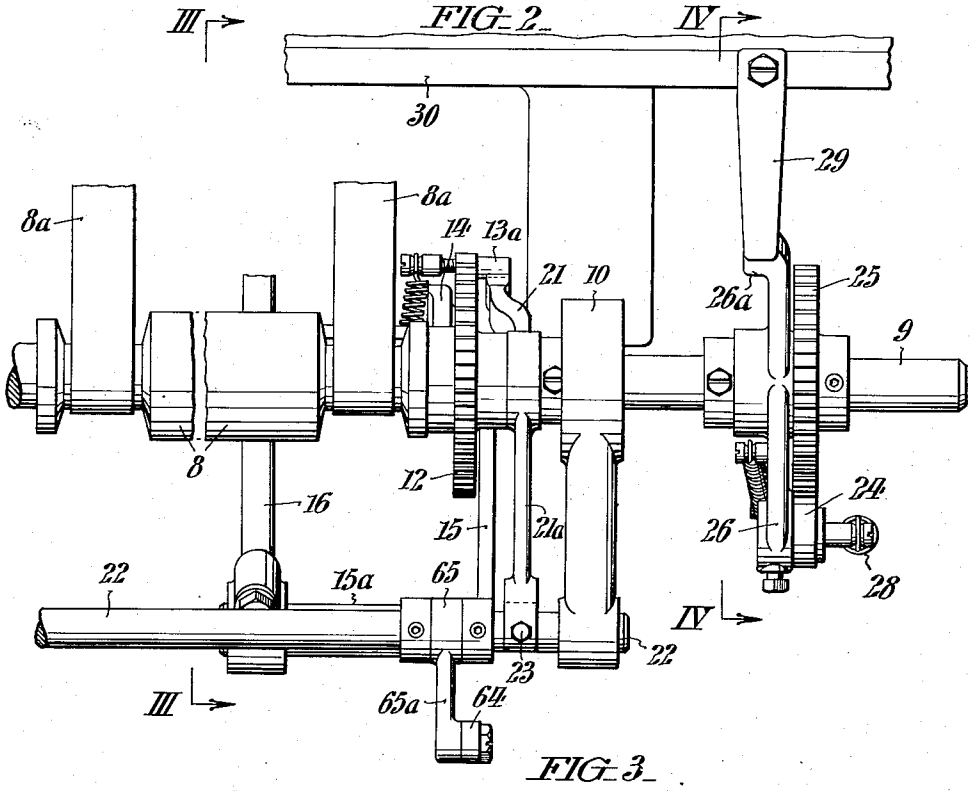
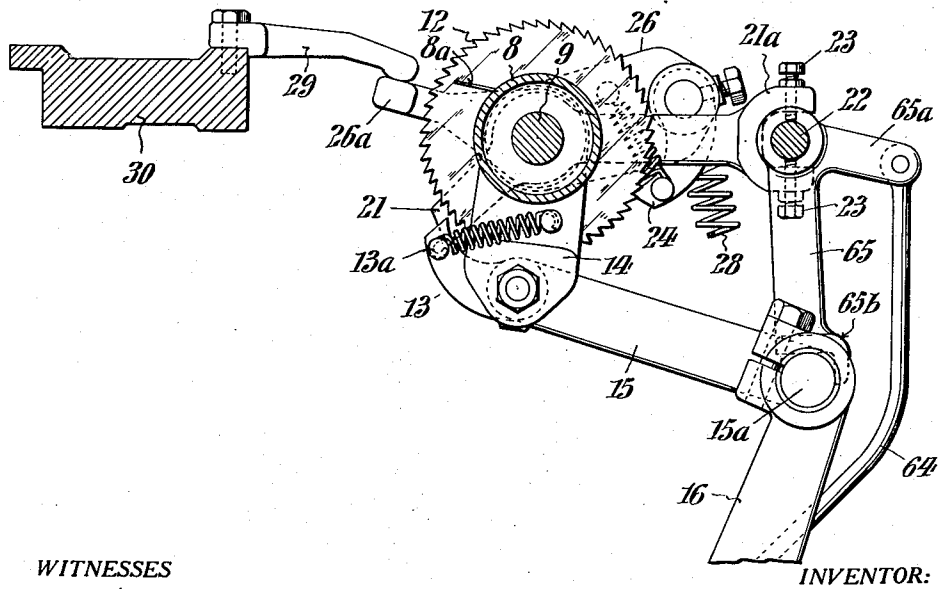



FIG. 3.




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FIG. 4

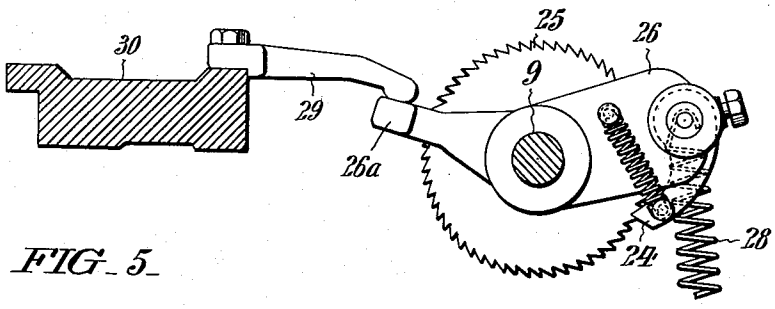



FIG. 5

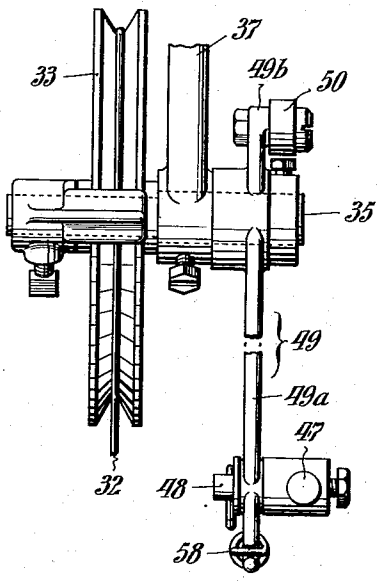



FIG. 6

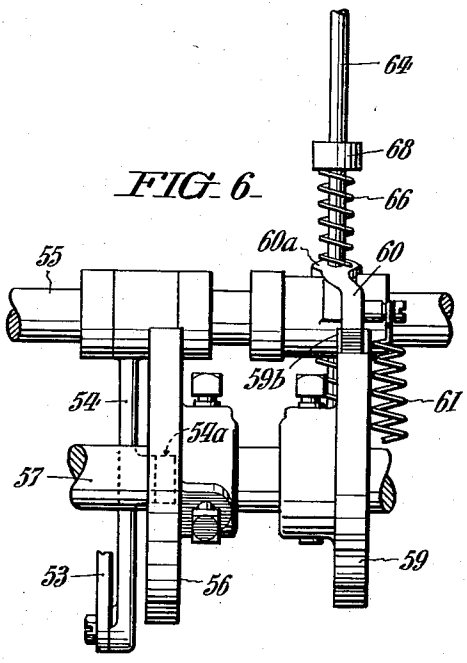
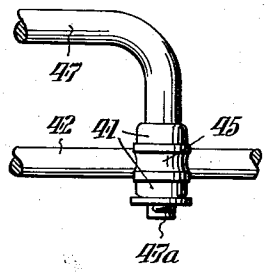



FIG. 7




WITNESSES

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Patented Sept. 25, 1951

2,569,394

# UNITED STATES PATENT OFFICE

2,569,394

## FABRIC TAKE-UP MECHANISM FOR TEXTILE MACHINES

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Application June 2, 1949, Serial No. 96,666

14 Claims. (Cl. 66—149)

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This invention relates to take-up mechanisms for textile machines. More particularly, it is concerned with take-up mechanisms for straight knitting machines of the type ordinarily used in the production of flat full fashioned stocking blanks, wherein, the fabric is drawn from the needles by slowly rotated draw-off reels, and wherein, in order to insure the formation of uniform loops throughout, the tension on the fabric must be progressively varied, i. e., decreased during the knitting. Ordinarily this is accomplished by multiple weights hung from chains or cables connected to the draw-off reels, from which chains some of the weights had to be removed by the machine attendant at prescribed intervals during the knitting of successive stocking blanks.

The chief aim of my invention is to provide a simple and inexpensive take-up mechanism which is entirely automatic in its operation to periodically vary the tension imposed upon the fabric by the draw-off reels as required during each knitting cycle of the machine, with a view to dispense with the necessity for dependence, as heretofore, upon the skill and judgment of the machine attendant to manually regulate the tension.

In connection with take-up mechanism having the foregoing attributes, it is a further aim of my invention to provide means whereby the mechanism is automatically rendered inactive during the fashioning phases of each stocking knitting phase without relaxation of the tension on the fabric, as well as means which will allow reverse rotation of the fabric without relaxation of the tension during the welt closing phase of each knitting cycle.

Other objects and attendant advantages will appear from the detailed description of the attached drawings, wherein

Fig. 1 is a skeletonized view in cross section, of a straight stocking knitting machine with automatic fabric draw-off mechanism conveniently embodying my invention.

Fig. 2 is a fragmentary view in top plan looking as indicated by the angled arrows II—II in Fig. 1, and drawn to a larger scale.

Figs. 3 and 4 are detail views in cross section taken as indicated by the arrows III—III and IV—IV respectively in Fig. 2.

Figs. 5 and 6 are fragmentary views in elevation looking as indicated by the angled arrows V—V and VI—VI in Fig. 1, and

Fig. 7 is a fragmentary detail view in top plan, looking as indicated by the angled arrows VII—VII in Fig. 1.

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With more specific reference to these illustrations, 8 designates the fabric take-up reel of my improved draw-off mechanism whereof the shaft 9 is rotatively supported in fixed bearings, such as shown at 10 in Fig. 2, on the framework of the machine. After customary practice, the roller 8 is provided at opposite ends with the usual pull straps 8a. To the reel shaft 9 is affixed a ratchet wheel 12 adapted to be picked by a spring-influenced pawl 13 on a carrier in the form of an arm 14 which is free for oscillation about said shaft. By means of a link 15, the pawl carrier 14 is coupled with a stud 15a on one extremity of a horizontally-arranged floating lever 16 fulcrumed intermediate its ends to rock about a fixed pivot 17 on the machine framework. A roller 18 at the other end of the lever 16 is disposed in the path of the high spot or rise 19a of a rotary cam 19 on the main cam shaft 20 of the machine.

Rotatively adjustable on the reel shaft 9 is a guard 21 which, by coaction with a stud 13a on the pawl 13, restricts the latter to pick but one tooth of ratchet wheel 12 at each actuation. As shown, the pawl guard 21 has a rearwardly extending tail 21a whereof the end is forked to straddle a fixed longitudinal rod 22 and provided with set screws 23 which bear upon said rod from above and below, and by which the adjustments of said guard may be made. Retrogression of the draw-off reel 8 is prevented by cooperation of spring urged detent pawl 24 with a stop ratchet wheel 25 (Figs. 2 and 4) which is a duplicate of the ratchet wheel 12, and which is likewise affixed to the shaft 9. By means of a relatively strong tension spring 28, the pawl carrier 26 is normally held in the position in which it is illustrated in Fig. 4, with a finger projection 26a thereof engaging a fixed stop 29 on the front bed rail 30 on the machine framework.

For the purpose of gradually turning the reel 8 to draw the stocking fabric F away from the knitting needles 31 (Fig. 1) during its formation, I have provided means including a weight mass W which is hung from one end of a cable 32. As shown, the cable 32 passes over and under guide sheaves 33 and 34 free to rotate about shafts 35 and 36 supported by brackets 37 and 38 which are secured respectively to a fixed longitudinal rod 39 in the rear of the machine at the top and to the rear bottom longitudinal frame rail 40 of the machine. The opposite end of the cable 32 is connected to a clevis 41 which straddles another horizontally arranged lever 42 pivoted at 43 on

a fixed upstanding bracket 44 on the rail 40. A roller 45 carried between the ends of the clevis 41 is arranged to ride upon and to be shifted along the lever 42 for the purpose of varying the tension imposed upon the fabric F by the mechanism in a manner later on explained. At its distal end, the lever 42 is coupled to the lever 16 by a short vertical link 46. The laterally turned end 47*a* (Fig. 7) of a round section horizontal link rod 47 serves as the axis about which the roller 45 revolves, and also as the pivotal connection for the terminal clevis 41 of the cable 32, the other end of said link rod being pivotally connected at 48 to the pendant extremity 49*a* of a rocker arm 49 free on the shaft 35 of the cable guiding sheave 33. The short upward extremity 49*b* of rocker arm 49 is coupled, by means of a forwardly-extending link rod 50, with the upper arm of a lever 51 affixed to a longitudinal rock shaft 52 at the front of the machine. The lower arm of said lever is coupled in turn, by means of a link 53, with a pendant arm 54 on another longitudinal rock shaft 55. As shown, the arm 54 has a lateral cam projection 54*a* which bears against a rotary cam 56 on a longitudinally-extending auxiliary or control shaft 57 at the front of the machine, said cam having peripheral segmental rises 56*a* and 56*b*. The arm 54 is held to the cam 56 by the pull of a spring 58 upon the arm 49 as will be readily understood from Fig. 1. Secured to the control shaft 57 alongside the cam 56 is another rotary cam 59 (Figs. 1 and 6) with peripheral rises 59*a* and 59*b* which are adapted to act, at different times, upon a finger 60 free on the rock shaft 55. As shown, the finger 60 is subject to a spring 61 in tension between it and a fixed anchorage 62 on the bottom front rail 63 of the machine framing. The rearward tail 60*a* of finger 60 is apertured for sliding passage through it of the lower end of an angular link rod 64 whereof the upper end is connected to the lateral extremity 65*a* of a detaining arm 65 free on the rod 22 hereinbefore referred to. By suitable mechanism, not illustrated, operated from the main cam shaft 20 of the machine, the control shaft 57 is intermittently racked through a complete rotation for each knitting cycle. Secured to the link rod 64, with interposition of cushioning springs 66 and 67 above and below the tail 60*a* of finger 60, are collars 68 and 69. At certain times, as presently explained, the detaining arm 65 is moved clockwise so that its angular end 65*b* will intercept the pivot stud 15*a* by which the link 15 is connected to lever 16 and so prevent operation of the latter as in Fig. 3. In the event of either premature or belated actuation of the finger 60 by the rises 59*a* and 59*b* on cam 59, one or the other of the springs 66, 67 will yield to prevent bending of the link rod 64 or injury to the detaining arm 65.

*Operation*

Normally, as the knitting proceeds after closing of the welt of the stocking blank, the projection 54*a* of arm 54 bears upon the concentric portion of rotary cam 56 on auxiliary cam shaft 57. At each rotation of the main cam shaft 20, the rotary cam 19 thereon, in acting upon the roler 18, imparts a momentary kick to the lever 16 to lift it to the broken line floating position of Fig. 1, with the result that, through the link rod 15, the pawl carrier 14 is moved counterclockwise and the pawl 13 thereby brought into engagement with a new tooth of the ratchet wheel 12, retrogression of the draw-off roll 8 being



incidently prevented by action of the detent pawl 24 upon the stop ratchet 25. Upon passage of the rise or high spot 19*a* of the cam 19 from beneath the roller 18, the floating lever 16 is released to the influence of the weight mass by virtue of its connection, through the link 46, to the lever 42 upon which the roller 45 associated with the clevis 41 at the end of the weight cable 32 bears. Thus during the remainder of the current rotation of the main cam shaft 20, the stocking fabric is maintained under a definite degree of tension by reason of the yielding torsional pressure exerted on the draw-off reel 8, as will be readily understood. Thus, by successive actuations of the floating lever 16, the draw-off reel 8 will be rotatively shifted incrementally and the stocking fabric thereby taken up gradually at a uniform rate.

During the knitting cycle of the machine, the auxiliary cam shaft 57 is intermittently shifted rotatively as hereinbefore explained for actuation, by the cam 56, of the follower arm 54 which, through the interposed parts 52, 51, 50, 49, and 47, causes the terminal clevis of the weight cable 32 to be moved rearwardly to different extents toward the fulcrum 43 of lever 47. In this way, the eflect of the weight mass W upon the floating lever 16 is automatically decreased, with corresponding reduction in the tension imposed upon uniform fabric loop size throughout the length the fabric as required for determination of a of the stockings.

During certain phases of the knitting cycle, as for example, in hooking up the starting course incident to formation and turning of the welt by automatic means such as disclosed in U. S. Patent 2,269,463 granted to K. R. Lieberknecht on January 13, 1942, or incident to fashioning of certain types of heels with suspension of the knitting by a central group of instep needles in the manner described in my Patent 2,432,108 granted to me on December 9, 1947, it is desirable to lock out, i. e., to prevent operation of the take-up. This is accomplished, at the proper times, under control of the rotary cam 59 on auxiliary cam shaft 57 by action of the rises 59*a* of cam 59 on auxiliary cam shaft 57 upon the finger 60 whereby, through the link 64, the stop arm 65 is swung inward about the rod 22 as an axis, into the path of the stud 15*a* as in Fig. 3, to keep the lever 16 temporarily in the broken line floating position of Fig. 1 with the pawl 13 held retracted from the ratchet wheel 12 by the guard 21 as the rise of cam 19 passes beneath the roller 18. At these times, the fabric is tensioned by the influence of spring 28 upon the pawl arm 26 and, in turn, of the pawl 24 upon the ratchet wheel 25. During automatic welt closing, after connection of the pull straps 8*a* of the reel 8 to the welt rod R (Fig. 1), and after transfer of the initial course of the fabric back to the needles 31, the reel will respond to the pull of the fabric and be rotated counterclockwise through approximately a quarter revolution. All the while, the fabric is tensioned by action of the spring 28 upon the pawl arm 26 which latter is forced to turn with the reel due to engagement of the detent pawl 24 with the stop ratchet 25. The fabric will thereafter be tensioned for a time solely under the influence of the spring 28 until the rise 59*a* of cam 59, on the auxiliary cam shaft, passes from beneath the finger 60 to permit retraction of the detaining arm 65 and release of the lever 16 for actuation by cam 19 on the main cam shaft 20 of the machine.

While, for the purposes of exemplification herein, I have shown and described my invention in association with a straight flat fashioned stocking knitting machine, it is not to be construed as being thus limited, since, by suitable modifications within the scope of the broader of the appended claims, it can be adapted for use in connection with other types of knitting machines as well as other forms of fabric producing machines as will be readily understood by those skilled in the textile arts.

Having thus described my invention, I claim:

1. In fabric take-up mechanism for textile machines, a fabric draw-off reel and racking means for turning it; means to prevent reverse rotation of the reel; a floatingly-supported horizontal lever with a weight thereon operative, through the racking means, to normally torsion the reel for maintenance of the fabric under tension; means for periodically actuating said lever for communication, through the racking means, of incremental rotary shifts to the reel to take up the fabric; and means for shifting the weight along the lever to vary the tension on the fabric during its formation.

2. Fabric take-up mechanism according to claim 1, for a textile machine having a rotary shaft, wherein the actuating means for the floatingly-supported lever includes a cam on the shaft and interposed means adapted to impart a momentary kick to said lever at each rotation.

3. Fabric take-up mechanism according to claim 1, further including lock-out means to prevent operation of the racking means by the floatingly-supported lever at predetermined times.

4. In fabric take-up mechanism for textile machines, a fabric draw-off reel and racking means for turning it; means to prevent reverse rotation of the reel; a horizontally-arranged floatingly-supported lever connected to the reel racking means; a second horizontally-arranged lever with its distal end coupled with the first lever; weight means connected to the second lever to influence the first lever for maintenance, through the racking means, of yielding torsion on the reel to hold the fabric under tension; and means automatically operative to shift the connection of the weight means along the second lever for the purpose of varying the tension on the fabric during its formation.

5. In fabric take-up mechanism for a textile machine, a fabric draw-off reel and racking means for turning it; means to prevent reverse rotation of the reel; a weight influenced floatingly-supported member operative, through the racking means, to normally torsion the reel for maintenance of the fabric under tension; means for periodically actuating said member for communication, through the racking means, of incremental rotary shifts to the reel to take up the fabric; lockout means to prevent operation of the racking means by the floatingly-supported member at predetermined times; and auxiliary means for maintaining the fabric under tension during the lockout periods.

6. In fabric take-up mechanism for textile machines, a fabric draw-off reel; racking means for turning the reel comprising a ratchet wheel on the reel and a carrier with a pawl thereon for picking the ratchet wheel; a weight-influenced floatingly-supported member operative, through the racking means, to normally torsion the reel for maintenance of the fabric under tension; means operatively connecting the pawl carrier of the racking means to the floatingly-supported member for actuation thereby; reverse rotation prevention means comprising a second ratchet wheel on the reel axis and a detent pawl to cooperate with said second ratchet wheel; means for periodically actuating the floatingly-supported member for communication, through the racking means, of rotary shifts to take up the fabric; lockout means to prevent operation of the racking means by said member at predetermined times; and auxiliary means for maintaining the fabric under tension during the lockout periods.

7. In fabric take-up mechanism for a straight flat-fashioned stocking blank knitting machine having a series of needles, and a cam shaft from which the needles are operated to produce the fabric, a draw-off reel and racking means for turning it; means to prevent reverse rotation of the reel; a weight-influenced floatingly-supported member operative, through the racking means, to normally torsion the reel for maintenance of the fabric under tension; a cam on the cam shaft adapted, at each rotation, to impart a momentary kick to the floatingly-supported member for communication, through the racking means, of an incremental rotary shift to the reel to take up the fabric; lockout means to prevent operation of the racking means by the floatingly-supported member at certain times during the knitting of each stocking blank; and auxiliary means for maintaining the fabric under tension during the lockout periods.

8. In fabric take-up mechanism for a straight flat-fashioned stocking blank knitting machine having a series of needles and a cam shaft from which the needles are operated to produce the fabric, a draw-off reel and racking means for turning it; means to prevent reverse rotation of the reel; a weight-influenced floatingly-supported member operative, through the racking means, to normally torsion the reel for maintenance of the fabric under tension; a cam on the cam shaft adapted, at each rotation, to impart a momentary kick to the floatingly-supported member for communication, through the racking means, of an incremental rotary shift to the reel to take up the fabric; and lockout means to prevent operation of the racking means by the floatingly-supported member at certain times during the knitting of each stocking blank, comprising a normally retracted stop arm adapted for movement into the path of the floatingly-supported member to arrest it in floating position, an intermittently rotated auxiliary cam shaft with a cam thereon, and interposed connections whereby said stop arm is controlled from the latter cam.

9. In fabric take-up mechanism for a straight flat-fashioned stocking blank knitting machine having a series of needles and a cam shaft from which the needles are operated to produce the fabric, a draw-off reel; racking means for turning the reel comprising a ratchet wheel, a carrier having a pawl thereon for picking the ratchet wheel, and a guard for controlling the pawl; a weight-influenced floatingly-supported member operative, through the racking means, to normally torsion the reel for maintenance of the fabric under tension; means operatively connecting the pawl carrier of the racking means to the floatingly-supported member for actuation thereby; lock-out means to hold the floatingly-supported member in floating position at certain times during the knitting of each stocking blank,

with the pawl of the racking means retracted from the ratchet wheel by the pawl guard; and auxiliary means for maintaining the fabric under tension during the lock-out periods.

10. In fabric take-up mechanism for a straight flat-fashioned stocking blank knitting machine having a series of needles and a cam shaft from which the needles are operated to produce the fabric, a draw-off reel; racking means for turning the reel comprising a ratchet wheel, a carrier having a pawl thereon for picking the ratchet wheel, and a guard for controlling the pawl; a weight-influenced floatingly-supported member operative, through the racking means, to normally torsion the reel for maintenance of the fabric under tension; means operatively connecting the pawl carrier of the racking means to the floatingly-supported member for actuation thereby; lock-out means to hold the floatingly-supported member in floating position during the welt turning phase of each knitting cycle with the pawl of the racking means retracted from the ratchet wheel by the pawl guard; and reverse rotation prevention means comprising a second ratchet wheel on the reel axis, a second pawl to cooperate with the second ratchet wheel, and spring means for normally holding the second pawl carrier in engagement with a fixed stop, but allowing reverse rotation of the reel incident to welt turning when the floatingly-supported member is locked out as aforesaid.

11. In fabric take-up mechanism for a straight flat-fashioned stocking blank knitting machine having a series of needles and a cam shaft from which the needles are operated to produce the fabric, a fabric draw-off reel and racking means for turning it; means to prevent reverse turning of the reel; a horizontally-arranged floatingly-supported lever connected to the racking means; a second horizontally-arranged lever with its distal end operatively coupled to the first lever; a weight-influential upon the first lever to maintain, through the racking means, yielding torsion on the reel to tension the fabric; a cam on the cam shaft adapted, at each rotation, to impart a momentary kick to the first lever, through the racking means, and in turn, an incremental rotary shift to the reel to take up the fabric; a cable with one end thereof connected to the second lever having a weight suspended from its other end; and idler sheaves over which the cable is guided.

12. Fabric take-up mechanism according to claim 11, further including means for shifting the connection of the weight cable along the second lever for the purpose of varying the tension on the fabric during the knitting of each stocking blank.



13. Fabric take-up mechanism according to claim 11, further including an intermittently-rotated auxiliary cam shaft with a rotary cam thereon; and interposed instrumentalities controlled by said cam for shifting the connection of the weight along the second lever for the purpose of varying the tension on the fabric during the knitting of each stocking blank.

14. In fabric take-up mechanism for a straight flat-fashioned stocking knitting machine having a series of needles, a cam shaft from which the needles are operated to produce fabric, and a draw-off reel; racking means for turning the reel including a ratchet wheel, a carrier arm oscillatable about the reel axis and having a pawl thereon for picking the ratchet wheel, a guard for controlling the pawl; a weight-influenced floatingly-supported lever connected to the carrier arm, and a cam on the cam shaft adapted, at each rotation, to impart a momentary kick to the floatingly-supported member for communication, through the pawl, of an incremental rotary shift to the reel to take up the fabric; lock-out means for holding the floatingly-supported member locked in floating position with the pawl retracted from the ratchet wheel by the guard during the welt turning phase of each stocking knitting cycle; reverse rotation prevention means including a second ratchet wheel on the reel, a second carrier arm with a pawl thereon for normally holding the detent arm to cooperate with the second ratchet wheel, and spring means for normally holding the second pawl arm in engagement with a fixed stop but allowing reverse rotation of the reel incident to welt turning when the floatingly-supported member is locked out as aforesaid; and means for controlling the lock-out means including an intermittently-rotated auxiliary cam shaft and interposed connections between said lock-out means and said auxiliary cam shaft.

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