J. D. MORLEY.

TENSION MECHANISM FOR KNITTING MACHINES.

APPLICATION FILED FEB. 8, 1908.

1,039,989.

Patented Oct. 1, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

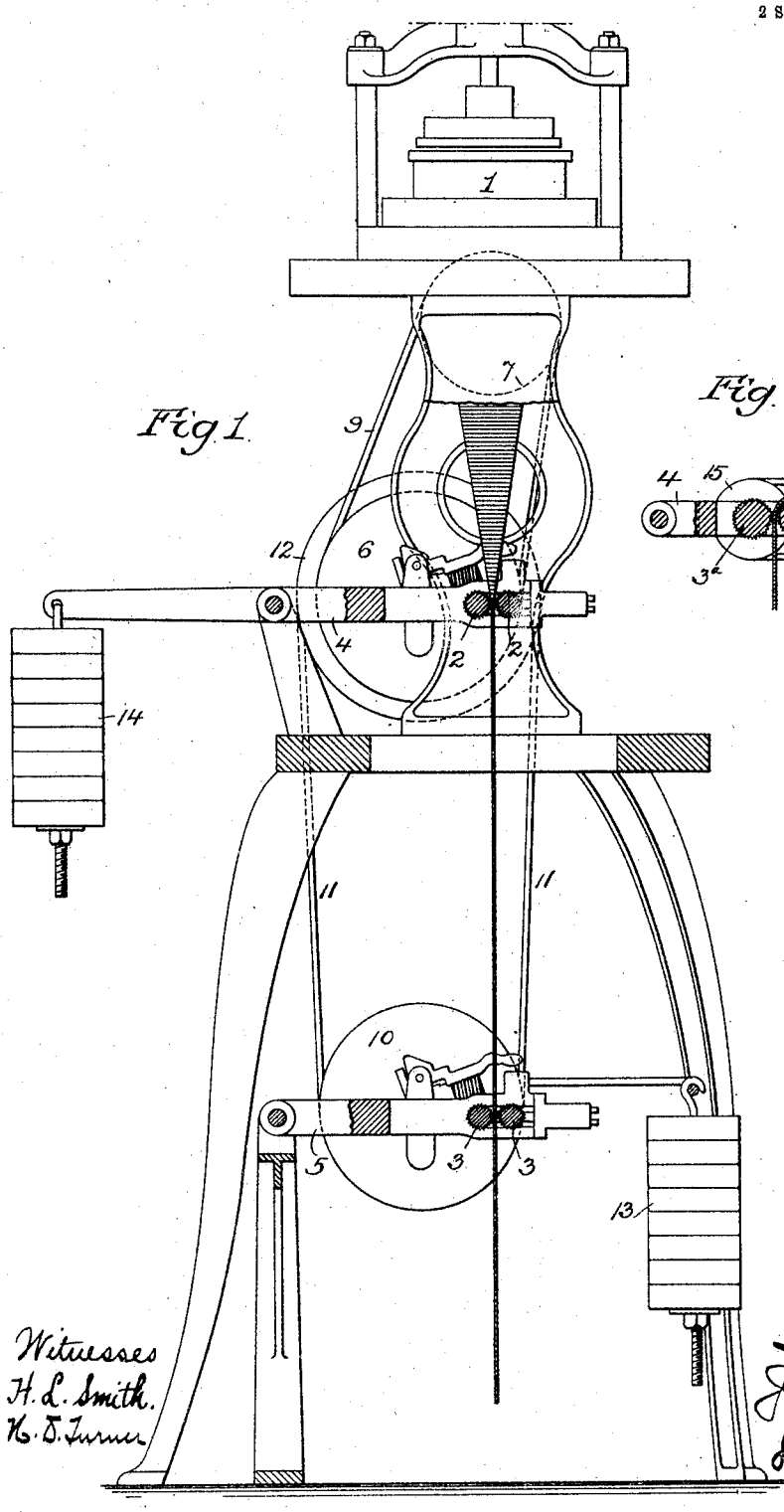
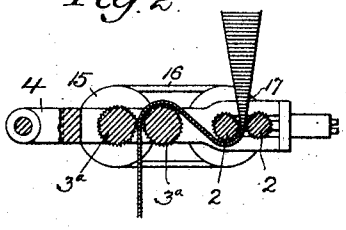


Fig. 2.



Witnesses
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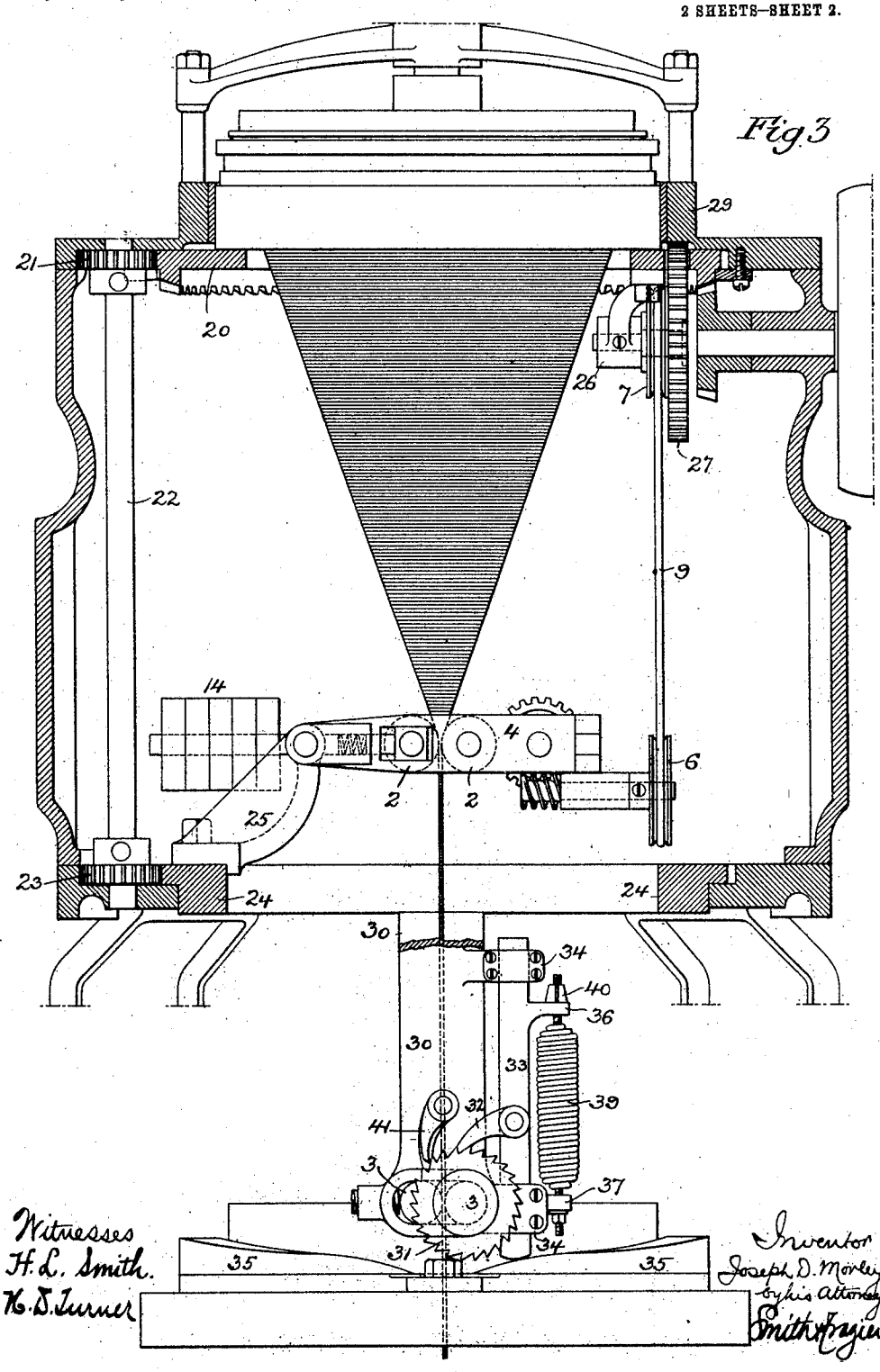
Fig 3



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UNITED STATES PATENT OFFICE.

JOSEPH D. MORLEY, OF UTICA, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO SCOTT & WILLIAMS, INCORPORATED, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

TENSION MECHANISM FOR KNITTING-MACHINES.

1,039,989. Specification of Letters Patent. Patented Oct. 1, 1912.

Application filed February 8, 1908. Serial No. 414,898.

To all whom it may concern:

Be it known that I, JOSEPH D. MORLEY, a citizen of the United States, residing at Utica, New York, have invented certain Improvements in Tension Mechanism for Knitting-Machines, of which the following is a specification.

The object of my invention is to so construct tension mechanism for knitting machines and especially for rib knitting machines, that the knitted web will be of closer texture or will have a closer disposition of the needle wales than would be possible in the absence of such tension mechanism. This object I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a view, partly in side elevation and partly in section, of sufficient of a rib knitting machine to illustrate my invention, the machine being one of that class in which the needle cylinder and dial are non-rotating; Fig. 2 is a view illustrating a modified arrangement of take-up mechanism for accomplishing the desired result, and Fig. 3 is a view, partly in side elevation and partly in section, illustrating one application of my invention to a rib knitting machine of that type in which rotating needle carriers are employed.

In the operation of an ordinary knitting machine it is not practicable to impart a heavy tension to the knitted web, the limit in this respect being determined by the amount of strain to which it is safe to subject the stitches upon the needles. If, however, the knitted web is subjected to a relatively heavy tension shortly after its production, or before its stitches have time to become "set", as by conditions of heat and moisture effecting, after a time has elapsed, a more or less permanent impressed bend or curve at each knit loop, a closer texture, or a closer disposition of the needle wales of the web, can be produced than would normally be possible with a given gage or degree of separation of the needles of the machine, although this result cannot be accomplished by subjecting the web to heavy tension after its stitches have thus become "set".

My invention therefore consists in providing the machine with means whereby the freshly knitted ribbed web can be subjected to relatively heavy tension without imparting a like heavy tension to the stitches upon the needles. One means for accomplishing this result is represented in Fig. 1 of the drawing, in which 1 represents a rib knitting machine of any ordinary construction, 2—2 a pair of take-up rolls for the knitted web, and 3—3 a pair of supplementary take-up rolls located below the first and acting upon the web as it passes down from said first pair. The primary take-up rolls 2—2 are carried by a swinging frame 4, and the secondary take-up rolls 3—3 by a swinging frame 5. One of the primary take-up rolls is positively driven by gearing of such character that there can be no rotative movement of said roll by reason of downward pull upon the web passing between the rolls, and consequently no transmission of tension from the web below the rolls to that above the rolls, without movement of the frame carrying the rolls. It is not essential that the secondary take-up rolls should be similarly driven, although in the present instance I have shown like driving devices for both sets of rolls. A number of take-up mechanisms of this character have heretofore been devised and are now in use, and I have, in the present case selected, for purposes of illustration, mechanism similar to that shown and described in the patent of R. W. Scott, No. 783,144, dated February 21, 1905, as to which it will be sufficient to say that the take-up roll is driven by bevel and worm gears from a shaft having a pulley for receiving a belt from a driving pulley on a shaft above the same, whereby when the swinging frame carrying the take-up rolls descends, so as to tighten this belt, power will be transmitted to the driving take-up roll and the web will be taken up until the roll-carrying frame has been lifted sufficiently to slacken the tension on the belt, when the take-up will cease until the roll-carrier has again descended sufficiently to tighten the belt, whereupon the take-up will be resumed and these operations will be repeated indefinitely.

In Fig. 1 of the drawing, the belt pulley of the primary take-up mechanism is represented at 6, the driving pulley 7 being mounted upon the main driving shaft of the machine and the connecting belt being re-

resented at 9. The belt pulley of the secondary take-up mechanism is indicated at 10 and the same is driven by a belt 11 from a pulley 12 on the same shaft which carries the pulley 6. The swinging frame of the lower or supplementary take-up mechanism is weighted as at 13, to provide the required tension, and the swinging frame of the upper or primary take-up mechanism is counterweighted as at 14, in order to relieve said primary take-up mechanism from any desired portion of this tension, whereby the web passing between the primary and secondary take-up mechanisms will be subjected to a heavier tension than the web between the needles and the primary take-up mechanism. If for instance the lower take-up mechanism is weighted so as to exert a downward pull of one-hundred pounds upon the web, and the upper take-up mechanism is counterweighted so as to exert an upward pull of ninety pounds upon said web, that portion of the web between the two take-ups will be subjected to a tension of ninety pounds, while the web between the needles and the upper take-up will be subjected to a downward pull or tension of but ten pounds. The same result may be accomplished by driving the secondary pair of take-up rolls by friction when said take-up rolls are mounted in the same swinging structure as the primary take-up rolls, and in Fig. 2 I have illustrated an instance of a take-up device of this type, the supplementary take-up rolls 3^a being mounted in the same frame as the primary take-up rolls and the driving roll of the supplementary pair being secured to a shaft which has a belt pulley 15, driven by means of a belt 16 from a pulley 17 on the shaft of the driving roll of the primary pair, the secondary take-up rolls being so constructed as to have normally, a somewhat higher surface speed than the primary take-up rolls, as for instance by making them of somewhat larger diameter than the said primary take-up rolls, as shown in Fig. 2, or by the use of equivalent means, the tension upon the web between the two sets of rolls being dependent upon the tension of the belt 16, which may, if desired, be susceptible of graduation.

If desired, the secondary take-up rolls may be mounted in fixed bearings, and in Fig. 3 I have illustrated such a modification of my invention, selecting for the purpose of such illustration a machine of that type in which the needle cylinder and dial of the machine rotate, as distinguished from the type of machine shown in Fig. 1, in which the needle cylinder and dial are stationary. The needle cylinder is carried by a toothed ring 20 rotated in any suitable manner, spur teeth on the periphery of this ring meshing with a spur pinion 21 on the upper end of a shaft 22, whose lower end is provided with a spur pinion 23 meshing with teeth around the periphery of a ring 24, the latter being mounted in a suitable bearing on the fixed structure of the machine and being provided with a bracket 25 upon which is pivotally mounted the counterweighted frame 4, carrying the primary take-up rolls 2, the driving pulley 6 for these rolls being operated by a belt 9 which depends from a pulley 7, free to rotate on a spindle which projects from a depending bracket 26 on the ring 20, said pulley 7 being connected to a spur wheel 27, and the latter meshing with a rack on the underside of the cam cylinder 29 of the machine, whereby, as the ring 20 is rotated, rotating movement will likewise be imparted to the spur wheel 27 and to the parts driven thereby. Depending from the ring 24 are legs 30 and to bearings at the lower ends of these legs are adapted the shafts of the secondary or supplementary take-up rolls 3, the shaft of the driving take-up roll having a ratchet wheel 31, which is engaged by a pawl 32 on a vertically reciprocable bar 33, mounted in bearings 34 on one of the legs 30, the lower end of this bar being acted upon by cams 35 suitably mounted upon any available fixed member of the machine. The bar 33 has a projecting lug 36, and from the latter to a lug 37, projecting from the lower bearing 34, extends a coiled spring 39, whose lower end is rigidly connected to the lug 37, its upper end passing through an opening in the lug 36 and being threaded for the reception of a thumb nut 40, whereby its tension can be readily adjusted.

One or more detents 41 engage the teeth of the ratchet wheel 31 and prevent any back movement of the same or of the supplementary take-up rolls 3. On each rotation of the machine therefore the lower end of the bar 33 will be acted upon by the cams 35 and said bar will be lifted so as to retract the pawl 32, the descent of the bar 33 and forward movement of the pawl being effected by the action of the spring 39, consequently, whenever the pawl 32, on the upward movement of the bar 33, engages a fresh tooth of the ratchet wheel 31, said pawl will, on the descent of the bar under the action of the spring, push forward said ratchet wheel with a force dependent upon the tension of said spring and will thus cause forward movement of the driving take-up roll 3 and forward pull upon the web depending from the primary take-up rolls, the tension thus exerted upon this portion of the web being directly proportionate to the tension of the spring 39 and being therefore as heavy as desired, while the tension exerted by the primary pair of feed rolls 2 will be much less because of the action of the counterweight 14 upon the swinging frame 4 which carries said pri-

mary take-up rolls. One of the tension rolls of each set may be dispensed with if desired, if the driving tension roll is provided with a surface of such character as to properly grip the knitted web and prevent the same from slipping backward over the roll, and springs may be substituted for counterweights, although the latter are preferred as being more uniform and reliable in their action.

With the information which I have given as to different means for carrying out my invention, other modifications within its scope will readily suggest themselves to those skilled in the art to which said invention appertains.

I claim:—

1. A knitting machine having take-up mechanism for the knitted web, comprising primary and secondary members, means for imparting tension to the web after it has passed said primary member, and means for relieving from a portion of such tension the web which is acted upon by the primary tension member.

2. A knitting machine having take-up mechanism for the knitted web, comprising primary and secondary members, the secondary member being weighted and the primary member counterweighted.

3. A knitting machine having take-up mechanism comprising primary and secondary members, each having one or more take-up rolls carried by a movable frame, the frame of the secondary member being weighted and the frame of the primary member being counterweighted in order to relieve the same from a portion of the weight of the secondary member.

4. A knitting machine having take-up mechanism comprising primary and secondary members acting in succession upon the web delivered by the needles of the machine, and means whereby the primary member is caused to exert a pull upon the web between said primary member and the needles and the secondary member is caused to exert a stronger pull upon the web between the primary and secondary members.

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

JOSEPH D. MORLEY.

Witnesses:

MARGREATA SPACE,

MERTON LIVERMORE.