June 25, 1929. W. F. ROLSTON 1,718,835

YARN FEED MECHANISM

Filed April 30, 1927

Fig. 3.

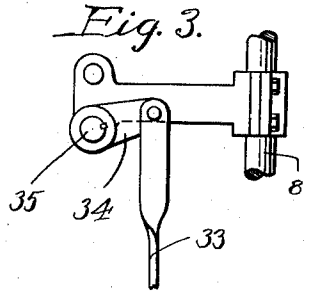


Fig. 2.

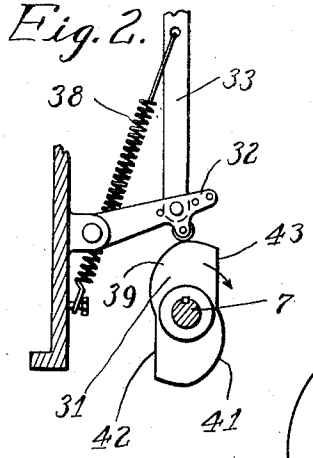


Fig. 1.

Inventor:
Walter F. Rolston
By
Wilson & McCanna
Attys.

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UNITED STATES PATENT OFFICE.

WALTER F. ROLSTON, OF ROCKFORD, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-HALF TO BURSON KNITTING COMPANY, OF ROCKFORD, ILLINOIS, A CORPORATION OF ILLINOIS.

YARN-FEED MECHANISM.

Application filed April 30, 1927. Serial No. 187,737.

This invention relates in general to straight knitting machines and has more particular reference to mechanism for feeding the yarn to the reciprocating yarn carrier or distributer and for controlling such delivery of yarn.

In the operation of straight knitting machines it is common practice to draw the yarn from a source of supply, such as a cone, and to pass the yarn through some sort of tensioning or take-up device before passing through the distributing eye on the reciprocating yarn-carrier through which the yarn is fed to the needles. These tensioning devices are variously constructed with a view to imposing a substantially uniform tension drag on the yarn and invariably include or employ additional means for actuating an automatic stop mechanism in the event that the pull on the yarn becomes excessive or is stopped because of the presence of a knot or some other obstruction or because of a break in the yarn. In such prior constructions the supply of yarn for a given course was drawn from the cone through the various intermediate tensioning, take-up, and control devices, directly by the pull resulting from the travel of the yarn-carrier back and forth across the needles, the pull of the yarn being direct to the needles. Since the drawing of new yarn was direct from the needles and might occur at any time in the stroke when the supply needed replenishing, the tension or pull on the yarn was irregular as to time and degree. For example, the overdraw of yarn by said prior devices being insufficient to knit entirely across the bed, the new yarn might be drawn at any time in the knitting. This would put added stress on the yarn while knitting and if of sufficient severity would cause a streak in the fabric. This condition was accentuated when knitting with silk in the gum because of the variable resistance caused by the yarn unwinding from the cone having the tendency to adhere to the adjacent strands because of the gummed condition thereof. The disadvantage in prior constructions of friction of the yarn coming off the cone applied as well to any cone that had been moistened or sized.

The foregoing and other disadvantages have been overcome by my present invention which provides for drawing new yarn only at the end of each stroke so that variable tension or yarn pull is not imposed on the needles in action, and further provides for drawing a supply of new yarn at these times sufficient for filling the complete knitting requirements of each succeeding stroke. By this means I am able to obtain more uniform tension on the yarn being fed to the needles, thus improving the knitting and avoiding streaks.

I have also aimed to provide feed mechanism for the purpose described operated in timed relation with the reciprocating yarn-carrier to draw a new supply of yarn at predetermined times sufficient for knitting a complete stroke, and to properly control this supply of new yarn. This yarn feed mechanism is also designed so that it may be employed in conjunction with the usual, or any preferred, automatic stop mechanism.

Another object of my invention is to provide mechanism of this character which may be readily applied as an attachment to straight knitting machines.

Other objects and attendant advantages will be appreciated by those skilled in this art as the invention becomes better understood by reference to the following description when considered in connection with the accompanying drawing in which—

Figure 1 is a fragmentary end elevation of a straight knitting machine, looking at the home or transfer end, equipped with yarn feed mechanism embodying my invention;

Fig. 2 is a fragmentary section taken substantially on the line 2—2 of Fig. 1; and

Fig. 3 is a fragmentary end elevation of the connection at the upper end of the parts shown in Fig. 2.

My invention is intended for application to any straight knitting machine, that shown in the present drawing being of the Burson type shown in my copending application Serial No. 76,142, filed December 18, 1925, and being merely for purpose of illustration. Fig. 1 shows the home or transfer end of the machine at which is located the main drive shaft 4 to which is fixed a spur pinion 5 which meshes with a gear 6. This gear operates a

pitman or connecting rod 6', well known in this art, which through suitable connections reciprocates a yarn-carrier (not shown) having a distributor eye through which the yarn is fed to the needles. In this particular type of machine the gear 6 actuates the transfer mechanism which causes a change of one yarn-carrier for another at the knitting position so that different yarns may be used at predetermined times in the knitting. The changing of yarns is, however, immaterial so far as the present invention is concerned. The gear 6 also rotates a shaft 7 from which motion is taken for operating one of the parts of my improved yarn feed mechanism, as will be presently described.

In this instance the yarn guiding means and the automatic stop mechanism are carried on one or more upstanding posts 8 suitably mounted in fixed relation to the machine. The yarn may be taken from any suitable source of supply such, for example, as the usual cone. In the present illustration the yarn 9 comes from the cone (not shown) and is passed through a suitable guide, designated generally by 11, which places a slight tension on the yarn. From here the yarn passes through an eye 12 carried by the spring arm 13 of a stop device adapted for stopping the machine in the event that feed of the yarn is stopped as, for example, by a knot or some other obstruction catching at some point in the guide or control means. The stop device referred to is of such common occurrence on knitting machines that the same is neither shown nor described in this application. The yarn passes from eye 12 through an eye 14 at the end of what may be termed a floating tension means which, in this case, is a wire arm 15 pivoted at 16 to a suitable fixed support 17 mounted on the post 8. The yarn next passes over a suitable guide 18 which may be in the form of a horizontal wire, in this case fixed to a part 19 mounted on the post 8. The yarn then passes through spaced, fixed eyes 21 and 22 and through an eye 23 on the end of a spring take-up arm 24, and thence down to the yarn-carrier. In this instance, the take-up arm 24 is part of an automatic stop and serves to actuate a stop mechanism in the event that the yarn breaks. Between the eyes 22 and 23 the yarn passes through an eye 25 on one end of a bite lever 26 which is pivoted at 27 on a fixed part 28 which, in this instance, supports the eyes 21 and 22. This lever 26 has an end 29 adapted to press down on the yarn for gripping and holding it against a suitable fixed part. When yarn is being drawn to the needles the down pull on the take-up arm 24 lowers the latter sufficiently to cause release of the bite lever 26 at its end 29 from the yarn, thus allowing the yarn to draw freely through the bite device. As soon as the consumption of yarn to the needles ceases the take-up arm 24 raises and causes the yarn passing through the eye 25 to swing the bite lever 26 to the yarn holding position shown, thus automatically stopping further passage of yarn until it is needed for knitting. This is merely one example of an automatic yarn stop shown for purpose of illustration.

My invention provides means for actuating the floating tension arm 15 to draw new yarn at predetermined intervals with respect to the travel of the yarn-carrier. To this end I have provided a double cam 31 fixed to the shaft 7 adapted to actuate a follower 32 to which is pivotally connected a link 33 connected at its upper end to an arm 34 in turn fixed to a rock shaft 35 mounted on the supporting structure on the post 8. To the shaft 35 is fixed an arm 36 which has a horizontal end 37 overreaching the arm 15. A coiled contractile spring 38 acting between the main frame and the link 33 holds the cam follower roller down against the cam and serves to actuate said link and to swing the arm 26 in a clockwise direction viewing Fig. 1 when permitted by a fall in the cam. This action of the arm 36 swings the floating tension arm 15 down to the position shown in dotted lines in Fig. 1. This action draws new yarn from the cone rather than drawing back yarn leading to the needles because the latter yarn is held by the bite lever 26. Inasmuch as the shaft 7 makes a complete revolution for each course of knitting (during which the yarn-carrier knits forward across the bed and then back to the home position) the cam 31 actuates the arm 36 twice, that is, produces two yarn drawing actions for each revolution of the shaft. These yarn drawing actions are produced by the cam surfaces 39 and 41, each action occurring at the end of the stroke. This phrase is used broadly to define the inactive period between the completion of knitting in one stroke and the start in the next following stroke. In actual practice in machines of this type each inactive period comprises approximately one-third of a revolution of the shaft 7, thus permitting the yarn drawing action to be slower and less severe on the yarn than with prior constructions. According to my present invention, therefore, by drawing the new yarn at the end of each stroke, I mean at the inactive periods between knitting, without limitation as to the particular time in these respective periods that the drawing of yarn actually starts and stops. It is essential, however, that the yarn shall be drawn when the needles are not knitting, and that a sufficient length of new yarn shall be drawn to supply the requirements for knitting during each succeeding stroke. In other words, a supply of new yarn is drawn in each inactive period sufficient for filling the complete knitting requirements of the succeeding active period. The yarn guiding means are so constructed

and arranged as not to impose undue resistance to the yarn being drawn to the needles; in other words, the tension on the yarn being drawn to the needles from this supply during knitting is approximately uniform and not subject to irregular periodic drawing of yarn and the consequent variable stress or tension on the yarn when knitting. It will be observed that with the present construction the yarn drawing arm 36 is returned from the dotted line position shown in Fig. 1 to the full line position by the action of the cam surfaces 42 and 43 in a quick movement so as not to interfere with the newly drawn yarn. The floating tension arm 15 serves to keep the new yarn from twisting or tangling and the tension imposed is merely for this purpose.

It is believed that the foregoing description conveys a clear understanding of the objects prefaced above and while I have illustrated but a single working embodiment it should be understood that in practice suitable mechanism may be employed for performing the desired functions and changes may be made in the construction and arrangement without departing from the spirit and scope of the invention as expressed in the appended claims.

I claim:

1. In a straight knitting machine of the character described, means for drawing new yarn from a source of supply only during inactive periods of the needles between knitting sufficient to supply the requirements of succeeding active periods of the needles.

2. In a straight knitting machine the combination with suitable means for guiding the yarn from a source of supply to the needles, of means active only during the inactive periods of the needles for drawing new yarn sufficient to supply the requirements of the succeeding active periods of the needles.

3. In a straight knitting machine the combination with suitable means for guiding the yarn from a source of supply to the needles, of means for drawing a supply of new yarn only at the end of each stroke sufficient for filling the complete knitting requirements of the succeeding stroke.

4. In a straight knitting machine, in combination, means for guiding yarn from a source of supply to the needles including a floating tension arm, and means operated during inactive periods of the needles for actuating said arm to draw new yarn sufficient to supply the requirements of succeeding active periods of the needles.

5. In a straight knitting machine, in combination, means for guiding the yarn from a source of supply to the needles including an automatic stop device for holding the yarn from pulling back, and means acting on the yarn between said stop device and the source of supply and operated during inactive periods of the needles for drawing new yarn sufficient to supply the requirements of succeeding active periods of the needles.

6. In a straight knitting machine, in combination, means for guiding the yarn from a source of supply to the needles including an automatic stop device for holding the yarn from pulling back and a floating tension arm acting on the yarn between said stop device and the source of supply, and means adapted to actuate said arm to draw new yarn sufficient to supply the knitting requirements of a stroke.

7. In a straight knitting machine the combination with suitable means for guiding the yarn from a source of supply to the needles, of means independent of said yarn guiding means for drawing a supply of new yarn only at the end of each stroke sufficient for filling the complete knitting requirements of the succeeding stroke.

8. In a straight knitting machine, in combination, means for drawing a supply of new yarn only at the end of each stroke sufficient for filling the complete knitting requirements of the succeeding stroke, and means for imposing a slight tension on the newly drawn yarn merely to prevent it from kinking and tangling while being drawn to the needles.

9. In a straight knitting machine the combination with suitable means for guiding the yarn from a source of supply to the needles, of means operated in timed relation with the operating yarn-carrier in inactive periods of the needles for drawing a predetermined amount of new yarn sufficient to supply the requirements of succeeding active periods of the needles.

10. In a straight knitting machine, the combination of means for guiding yarn from a source of supply to the needles including a floating tension arm, and means operated during inactive periods of the needles for actuating said arm to draw new yarn sufficient to supply the knitting requirements of succeeding active periods of the needles, said means comprising yielding means for moving said arm in the drawing of the yarn and positive means for returning said arm.

11. In a straight knitting machine, the combination of suitable means for guiding the yarn from a source of supply to the needles, a reciprocating yarn carrier, and means operable only when the yarn carrier arrives at either end of its stroke arranged to draw a supply of new yarn sufficient for filling the knitting requirements for the next stroke.

12. In a straight knitting machine, the combination of suitable means for guiding the yarn from a source of supply to the needles, a reciprocating yarn carrier, and means operable only when the yarn carrier arrives at either end of its stroke arranged to draw a supply of new yarn sufficient for

filling the knitting requirements for the next stroke, said last mentioned means comprising an oscillating arm arranged on the forward stroke to draw the new yarn and on the return stroke to return to a predetermined position, a link having connection with said arm for oscillating the same, spring means tending to move said link in one direction so as to move the arm forward to draw yarn, and positive means operating in timed relation with the yarn carrier for moving said link in the opposite direction.

In witness of the foregoing I affix my signature.

WALTER F. ROLSTON.