May 4, 1937. J. WACHSMAN 2,079,341

YARN CONTROLLING DEVICE FOR KNITTING MACHINES

Filed June 5, 1935

FIG. 6

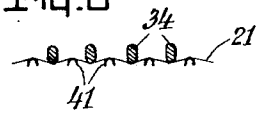


FIG. 2

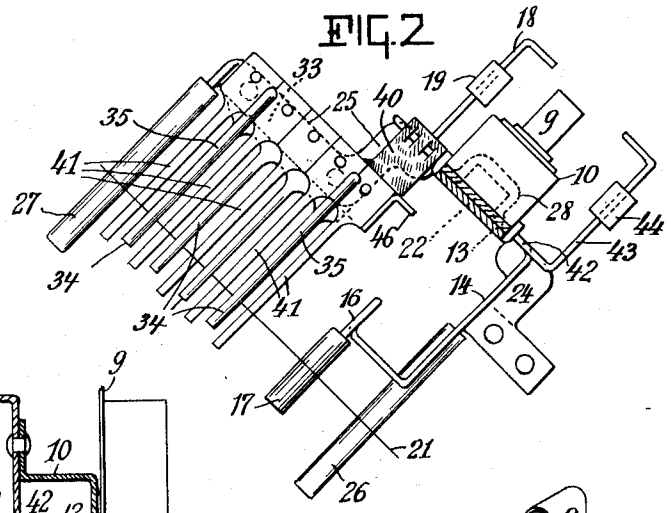


FIG. 7

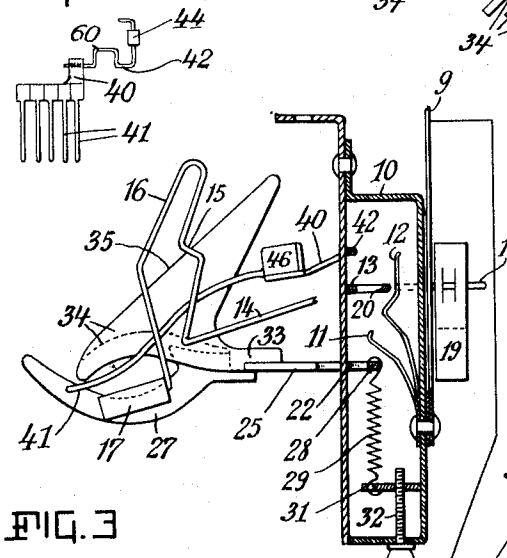
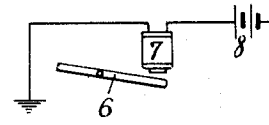


FIG. 3



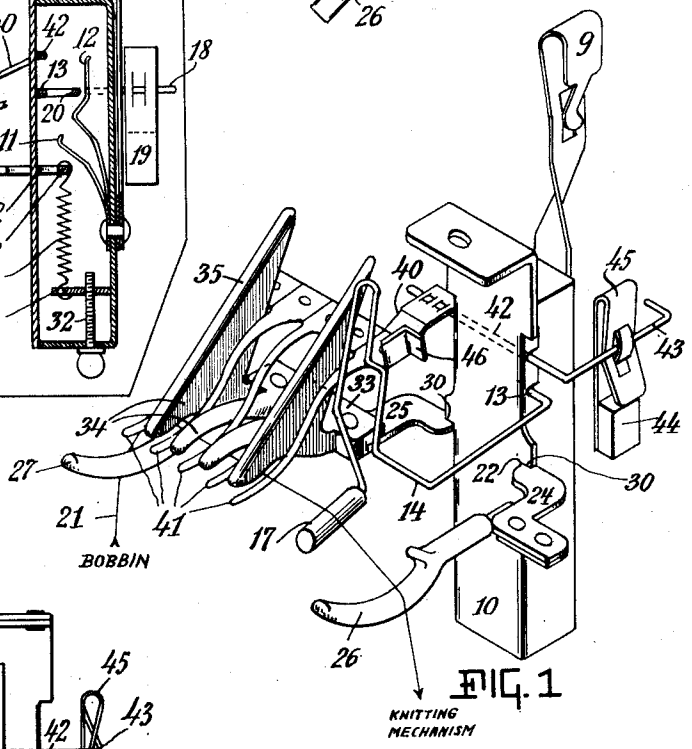


FIG. 1

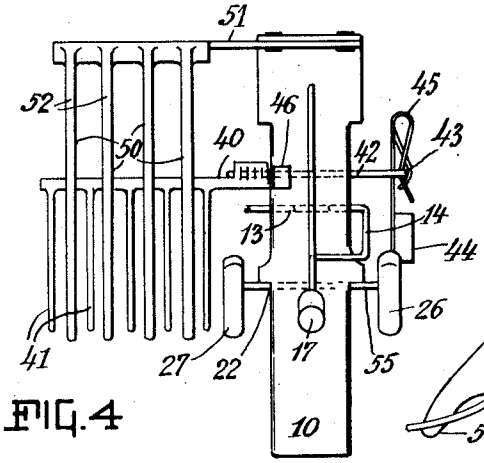
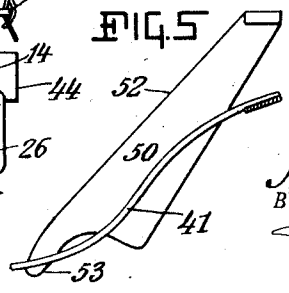


FIG. 4

FIG. 5



INVENTOR.
JACOB WACHSMAN
BY
Joan E. A. Konigsberg
ATTORNEY

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YARN CONTROLLING DEVICE FOR KNITTING MACHINES

Jacob Wachsman, Brooklyn, N. Y.

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3 Claims. (Cl. 66—163)

This invention relates to improvements in yarn controlling devices for knitting machines and more particularly to devices of the type disclosed in my U. S. patents, Reissue No. 19,069, February 6, 1934, and No. 2,013,529, Sept. 3, 1935. Such and other similar devices in the prior art are commonly called stop motions or stop mechanisms for knitting machines and refer generally to devices under the control of a travelling thread so arranged that when the thread breaks or runs out, or when the free run of the thread is obstructed for any reason, by a knot for instance, then the machine is automatically stopped. In the first case as when the thread breaks the device may be called an end detector, in the second case it may be called a knot detector. These terms are more or less arbitrary and for convenient explanatory or defining purposes only.

Such devices embody usually a plurality of cooperating, balanced, spring or gravity operated levers or fingers which interengage or interlock in the sense that the travelling thread passes above or below the fingers which operate to close an electric circuit to stop the knitting machine when a particular trouble arises which makes such stoppage necessary. All of this is generally well known in the art.

However, it has been found that when a knitting machine operates on very fine thin threads or yarns, the run of the thread by reason of its inherent fineness is very jumpy and uneven in its passage from the bobbin to the said controlling mechanisms of whatever type they may be. Hence the unevenness or jumpiness inherent in the feeding or the run of such very fine threads cause the stop motions to operate and stop the machine because the jumpiness effects the operations of the stop motions irregularly in the same manner as when a thread breaks or a knot appears. Consequently the stop motions function though they should not do so and such unnecessary operations cause trouble and waste in the operations of the knitting machine to an even greater extent perhaps than when the machine is stopped because of a break in the thread or the like. One reason for this is of course that when a machine is stopped though the thread is not broken or when no knot appears, it is more difficult to discover the cause of such stoppage. With threads of medium or less fineness such jumpiness in the feed may be and often is taken care of by so-called tension devices, but such devices cannot be used successfully, if at all, with very fine threads. The jumpy, jerky feed or run of a very fine thread as it is being pulled off the bobbin by the knitting mechanism results in numerous slack portions in the thread. When such a slack portion reaches the stop mechanism, the latter will operate and stop the machine unnecessarily.

The broad object of this invention is to provide a thread controlling device in the nature of a slack take up mechanism to insure an even run of the thread through the stop motions whereby to eliminate unnecessary and undesirable operations of the stop motion. Another object of the invention is to provide such a controlling device for the thread or yarn which will operate upon the yarn or thread in a manner to frictionally seize the same and insure a smooth even run of the yarn or thread through the machine. Still another object is to incorporate such a controlling device in the stop mechanism for purposes of efficiency and economy. Other objects will appear as this specification proceeds. Accordingly, my invention is embodied in a yarn or thread controlling device arranged and constructed as hereinafter set forth with reference to the accompanying drawing in which

Fig. 1 is a perspective view of a unitary structure which embodies in combination an end detector, a knot detector and a slack take up mechanism for fine threads or yarns.

Fig. 2 is a plan view thereof with parts in section and some details omitted.

Fig. 3 is a vertical sectional view of the device with some details omitted.

Fig. 4 is a front view showing a modification.

Fig. 5 is a view of some of the parts shown in Fig. 4.

Fig. 6 is a diagrammatic view illustrating the operation of the slack take up mechanism.

Fig. 7 illustrates a modification.

A knot or end detector or stop motion or under whatever name such a device may be known is essentially a circuit closer which is included in a usually normally open electric circuit which is closed to actuate the knitting machine stopping mechanism when such circuit closer is operated by the yarn or thread. Referring to Figure 3 of the drawing the numeral 6 denotes the stop lever of a knitting machine. When the stop lever is actuated the machine stops. The function and operation of such a stop lever is so well known that no further description thereof is necessary. The stop lever is actuated by a magnet 7. One side of the magnet is grounded, the other side is connected to a source of electric energy 8 which in turn is connected to a terminal clip 9, see Figure 1. The terminal clip is carried by a housing

10 and is suitably connected inside the housing to two spring contacts 11 and 12.

In the housing there is pivoted at 13 a lever 14 in the form of a bent wire forming a stop portion 15 and a yarn threading portion 16. The forward end of the lever 14 is covered with a porcelain sleeve 17. The lever 14 is extended to the rear on the left side of the housing, Figure 2, where it has a lever portion 18 carrying an adjustable weight 19. The lever 14 constitutes a knot detector pivoted at 13 and having a yarn receiving portion 17 in front of the housing and a weighted arm 18 to the rear of the housing on opposite sides of the pivot 13. Inside the housing the pivot portion 13 is bent to form a heel 20 which is adapted to contact with the one spring terminal contact 12. In operation the weight 19 is adjusted to overbalance the lever 14 tending to raise the porcelain covered end. This makes the lever gravity operated. The yarn or thread 21 is placed upon the porcelain sleeve 17 and normally keeps the front end of the lever down and the heel 20 away from the spring 12. When however, the thread runs out and no longer keeps the lever in normal position, the weight 19 swings the lever 14 in a clockwise direction and brings the heel into engagement with the spring 12. Consequently, the circuit is closed and the machine stops.

In the housing 10 there is pivoted at 22 a spring operated lever in the form of a flat piece of brass having a short forward arm 24 extending in front of the housing on the right side and a similar larger arm 25 on the left side. Each arm carries forwardly a porcelain covered thread receiving portion 26 and 27 respectively. Inside the housing the lever 23 is formed with a heel 28 adapted to contact with the other spring finger 11. A spring 29 is attached to the heel 28 and keeps the lever in a normal upper position against stops 30, Figure 1. A screw 32 operates a keeper 31 to adjust the tension of the spring. The yarn or thread 21 is placed upon the hook portions 26 and 27 which are kept in a normal upper position by the spring 29. When, however, a knot or like obstruction prevents the free run of the thread, then the thread pulls down the porcelain hooks 26 and 27 against the tension of the spring 29, the heel 28 engages the other spring contact 11, the circuit is closed and the machine is stopped.

The construction and operation of the parts described so far are substantially disclosed in my aforesaid patents. In the present instance the spring operated lever 24—25 serves another purpose besides that of a knot detector. Upon the longer arm 25 to the left of the housing there is mounted a porcelain casting forming a base 33 and four forwardly extending porcelain fingers 34. Two of these form also yarn or thread guides 35, 35. The base 33 is secured to the larger spring operated lever arm 25.

In the housing 10 there is pivoted a third lever 40 which carries five slack take up fingers 41 extending forwardly between the four porcelain fingers 34. The lever 40 is carried by a pivot 42 in the housing. The pivot extends through the housing to the right side and is bent to form an arm 43 upon which is placed a weight 44. The weight may conveniently be secured to a terminal clip number 45 for easy attachment and slidable engagement.

When the operator wishes to place the thread in the aforesaid mechanism he takes hold of a portion of the thread between his hands and then moves the thread towards the mechanism with a downward movement, placing the thread against the slanting thread guiding surfaces 16 and 35 of the levers 14 and 24—25, and slides the thread downwardly in under the porcelain fingers 34 and deposits the thread upon the porcelain hooks and portions 17, 26 and 27 and upon the fingers 41. Inasmuch as the stop motions are usually positioned on a knitting machine as high as possible away from the bobbins, it is clear that the downwardly slanting thread guiding elements, which are also formed in the bending of the fingers 41, are a matter of importance and convenience. Without them it would be a troublesome task to place the thread properly and breakage might occur.

Inasmuch as the porcelain fingers 34 are carried by the spring operated lever which is held against the stops 30 by the spring 29, said fingers form what may be called a relatively rigid upper thread jaw or friction element, they being incapable of any upward movement upon the pivot 22.

On the other hand, the fingers 41 which are of very thin metal and preferably of an inverted U-shape, see Figure 5, constitute a cooperating lower relatively movable thread jaw or friction element, said fingers being capable of downward movement upon the pivot 42 to yield in response to the tautness or pull of the thread upon said fingers, and also being capable of lifting the thread upward against the undersides of the porcelain fingers 34 because of the weight 44. When the thread breaks the fingers 41 are swung upwards by the weight 44 but are being stopped in an upper position by a stop 46 on the lever 40, the stop 46 then hitting the housing 10.

During operation the thread is being pulled upwards from the bobbin, through the mechanism described and then to the knitting mechanism. The run of the thread from the bobbin is very irregular and jerky with many slacks or looped free portions. Ordinarily, such slacks would permit the end detector lever 14 to be operated by its weight 19 to close the circuit. Such slack portions might also cause the thread to slide off from the porcelain hooks 26 and 27. However, with the relatively fixed and movable jaws and fingers 34 and 41 such troubles are eliminated in that the slack portion of the fine thread is taken up or compensated for by the fact that as soon as such slackness occurs, the thin and rather delicate fingers 41 lift the thread against the porcelain fingers 34 as diagrammatically illustrated in Figure 6. The slack portions therefore or rather the loosening effect of the slackening in the thread never reaches the stop motions in a manner to actuate them needlessly. The result is a smooth even run of the fine thread through the stop motions which therefore function only in response to such irregularities in the feed of the thread for which the stop motions are designed. It may be said that the function and operation of the cooperating fingers 34 and 41 is that of smoothing out the irregularities which inevitably occur in knitting with a very fine thread and prevent such irregularities from affecting the stop motions. On the other hand, it will be obvious that the running out of the thread or the breaking thereof will cause the end detector to operate as intended. Similarly, if a knot appears or some other obstruction to the feed occurs, the knot detector will operate as intended. With respect to the number of fingers 34 and 41 it is sufficient to state that there must be enough of them to operate as herein described. The number illus-

trated in the drawing has been found effective. The number may obviously be varied.

Figures 4 and 5 illustrate a modification in which one set of the said cooperating fingers is immovable. In this instance the fingers 50, corresponding to the fingers 34 in Figure 1, are immovably carried by an extension 51 secured to the housing 10. In this construction all the fingers 50 have thread guiding portions 52 and their forward noses 53 dip below the normal position of the lifting fingers 41, see Figure 5. This is to insure that the thread does not slip off the fingers 41. This is not apt to happen with the fingers 34 in Figure 1 which are capable of slight downward movements. In Figure 4 the knot detector hooks 26 and 27 are both placed close to the housing being carried by a short lever 55 pivoted at 22 and corresponding in all other respects to the lever 24—25.

Figure 7 illustrates a modification in which the lever 40 is constructed to operate as an end detector in addition to its function as a slack take up member. The pivot 42 of the lever is in this instance bent to form a contact heel 60 which corresponds to the contact heel 20 in Figure 3. When the lever 40 is constructed to operate also as an end detector it is pivoted in the place of the pivot 13, see Figure 1. The end detector 14 is then omitted. The shifting of the pivot 42 to a lower position does not affect the operation of the lever 40.

The device is preferably produced as a complete article of manufacture as illustrated in Figure 1 ready to be installed in the knitting machine, though conceivably, the slack take up mechanism might be produced separately and installed adjacent the stop motions. However, for close cooperation and efficient function the preferable construction is that shown.

Again it may be stated that while the preferred construction has been illustrated and described, changes and alterations may be made without departing from the principle of the invention and within the scope of the appended claims.

I claim:—

1. In a device under the control of a traveling thread, a thread controlling device comprising a pivoted member consisting of a plurality of spaced thin fingers adapted to support the traveling thread, means constantly urging said fingers to lift the thread, a second pivoted member consisting of a plurality of spaced porcelain fingers in staggered relation to the said thin fingers, some of said porcelain fingers supporting the thread, some of said porcelain fingers resisting upward movement of the thread caused by the lifting action of the said thin fingers and means supporting the said two sets of fingers in cooperative relation.

2. In a device under the control of a traveling thread, an overbalanced pivoted member consisting of a plurality of thin thread supporting fingers, a second pivoted member consisting of a plurality of porcelain fingers for supporting the thread and resisting upward movement thereof caused by the said overbalanced pivoted member, the fingers of the said two sets being in staggered relation, a spring for maintaining the said second set in normally relatively fixed relation to the fingers of the overbalanced member, a single thread supporting member interposed between two of the fingers of the said two members and a housing for pivotally supporting the said single member and the said two first named members in cooperative relation.

3. In a device under the control of a traveling thread, a housing, a member consisting of a plurality of spaced porcelain fingers pivoted in said housing, some of said fingers extending underneath and supporting the thread, some of said fingers extending above the thread, a second member pivoted in said housing above the said first member and consisting of a plurality of thin spaced fingers extending downwardly underneath the thread between the said porcelain fingers, said thin fingers and the said porcelain fingers extending above the thread forming thread enclosures preventing accidental removal of the thread from the device during the normal operation thereof and means maintaining the said porcelain fingers in relatively fixed relation to the said thin fingers.

JACOB WACHSMAN.