United States Patent [19]

Rosen

[11] **3,807,199**

[45] **Apr. 30, 1974**

[54] **STOP MOTION DEVICE FOR FLAT KNITTING MACHINES**

[76] Inventor: **Karl Isac Joel Rosen,** Villa Haya, S-523 00, Ulricehamn, Sweden

[22] Filed: **June 7, 1972**

[21] Appl. No.: **260,361**

[30] **Foreign Application Priority Data**

June 8, 1971 Germany 2128476

[52] **U.S. Cl.** **66/163**

[51] **Int. Cl.** **D04b 35/14**

[58] **Field of Search** 66/163

[56] **References Cited**

UNITED STATES PATENTS

379,832 3/1888 Talcott 66/163

FOREIGN PATENTS OR APPLICATIONS

619,488 3/1949 Great Britain 66/163

Primary Examiner—Robert R. Mackey

Attorney, Agent, or Firm—Woodhams, Blanchard & Flynn

[57] **ABSTRACT**

A thread delivery and control device for a flat weft knitting machine having a machine drive which can be switched off by the control device. A thread storage device is positioned between the bobbin and the thread processing parts of the machine, and a stop motion device is located between the bobbin and thread storage device. A signal transmitter, as controlled by the machine, occupies one of two control positions when the machine is in given recurrent positions in which idling of the machine has little or no disadvantageous effect. A coincidence circuit connects the stop motion device and signal transmitter to the control device.

6 Claims, 4 Drawing Figures

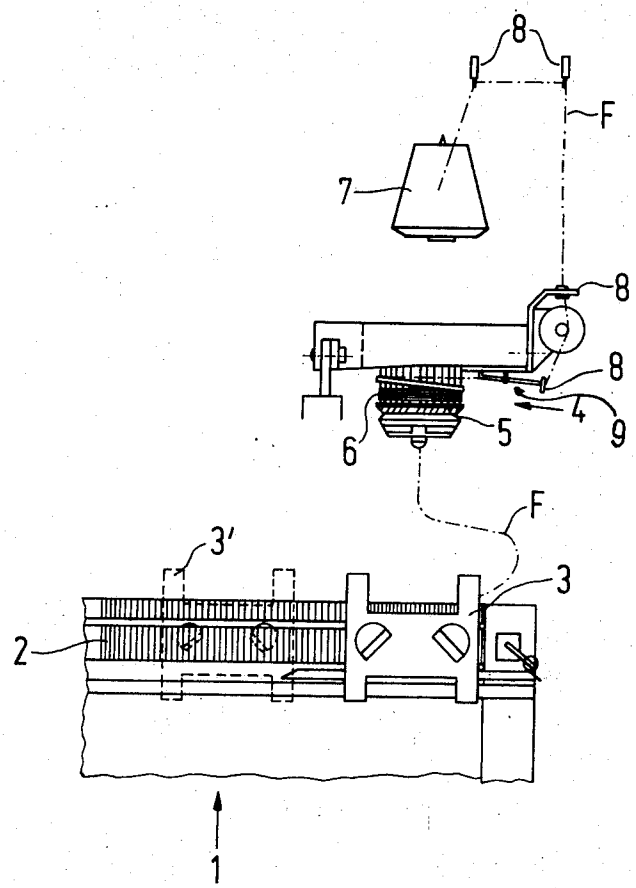


Fig. 1

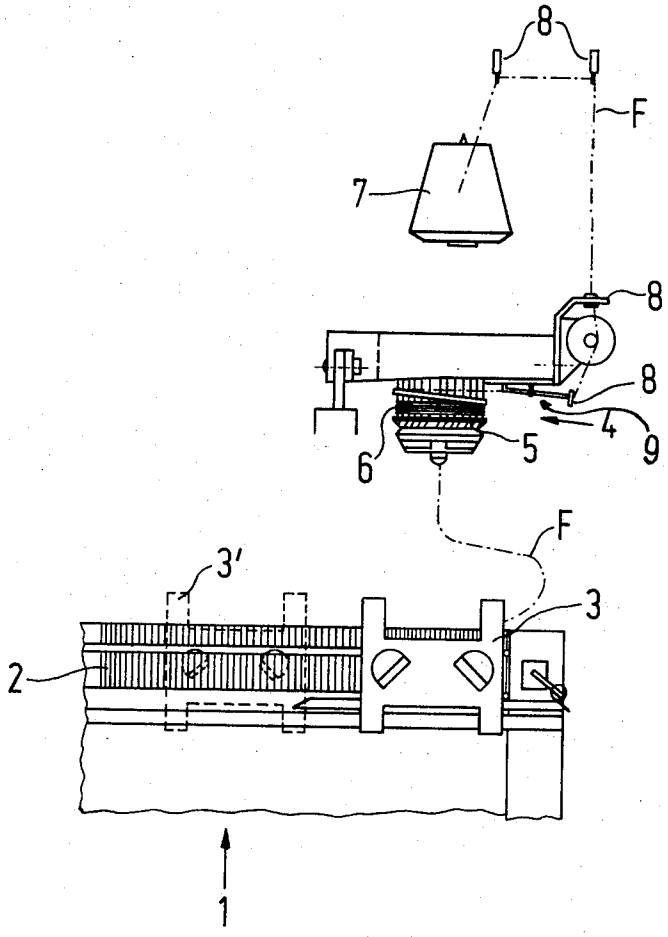


Fig. 2

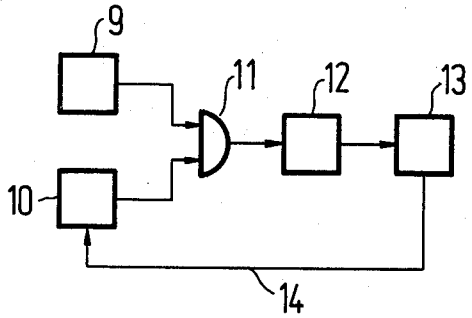
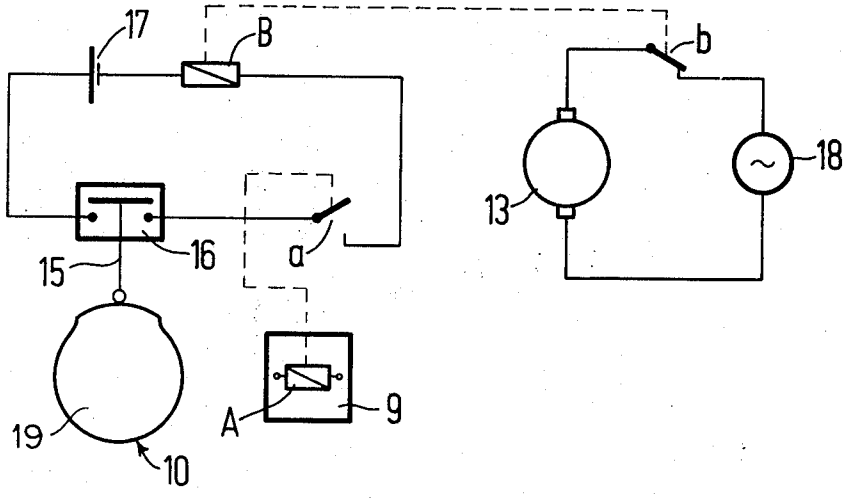


Fig. 3



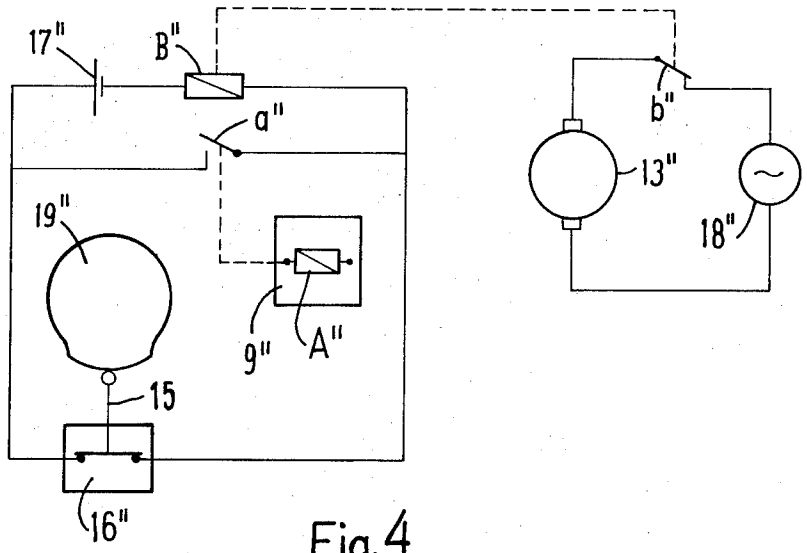


Fig. 4

STOP MOTION DEVICE FOR FLAT KNITTING MACHINES

The invention relates to a thread delivery and control device on flat weft knitting machines (Cotton machines) and similar machines, such as flat machines and Raschel machines, having a drive which can be turned off by a switch device.

A considerable number of defects in articles manufactured by the said knitting machines are caused by thread breakages during delivery. Such a thread breakage is often not discovered until the produced thread end is already knitted into the article. In the case of flat weft knitting machines the result is that the knitted article is severed from the needles. In this case the quantity of thread which is processed incorrectly in this manner is lost. In addition, the flaw must be subjected to additional treatment which is time consuming. For example, in a machine having a plurality of knitting systems, that knitting system on which a thread breakage has been detected must be corrected while the other knitting systems are inoperative until parallel operation is restored.

Even if a thread breakage is discovered before the produced thread end is worked into the knitted article, this can cause flaws in the knitted article. If the slide feeding the thread is stopped on its path between the two points of reversal, there occurs a change in the tension of the delivered thread which is manifested in irregularity in the manufactured article.

The problem underlying the invention is to provide a thread delivery and control device for the said knitting machines, whereby a fluent mode of operation is made possible and whereby the described irregularities in the knitted article are prevented by stopping the sliding carriage in the event of a thread breakage.

This problem is solved in accordance with the invention by a basically known storage means between the thread supply bobbin and the thread processing parts of the machine, a stop motion device between said bobbin and storage means, a signal generator which can be controlled by the machine and occupies one of two switch positions when the machine is in certain recurrent positions in which idling of the machine has little or no disadvantageous effect, and a coincidence circuit by which the stop motion device and signal generator are connected to the switch device.

The invention is based on the theory that in the case of the said knitting machines there are periodic time intervals during motion in which an idling machine does not have a disadvantageous effect on the knitted article. While, for example, in the case of a flat weft knitting machine stopping of the machine during weft knitting has a particularly disadvantageous effect, stopping during application and cutting of the thread does not interfere with the process. The same applies to flat machines with which it is considerably more advantageous to stop the sliding carriage at one of its reversal points and not between them. The use of a thread storage means makes it possible for the machine to continue moving as far as one of these points. On the storage device there must be at least a quantity of thread so that, after a thread breakage is detected, there is sufficient thread available so that the machine can continue moving until it reaches one of the said selected points. In this connection control of the machine is effected as follows. A signal is given by the stop motion

device whenever a thread breakage is detected. The signal generator gives a periodic sequence of signals whenever the machine is in an interval of movement in which it can easily be rendered inoperative. The drive of the machine is only switched off by the coincidence circuit and the provided control device when a thread breakage has been detected and the machine is located in one of these intervals of movement In practice it seems that after a thread breakage the machine continues moving until it is located in an interval of movement in which it may be switched off and then rendered inoperative, thereby avoiding costly checking and repair work and at the same time producing a knitted article without the described irregularity.

A particularly simple arrangement is produced if the coincidence circuit comprises two switches connected in series, one of which can be operated by the stop motion device and the other by the signal generator. The control device which switches off the drive of the machine disconnects said drive whenever the two switches are simultaneously closed.

A preferred embodiment of the signal generator comprises a cam which is moved by the machine. One of the switch positions is reached if a plunger which moves over the cam is located in a section of small radius, and the other switch position is reached if said plunger is located in a section of large radius.

Other features and advantages of the invention are shown in the following description of a practical embodiment with the aid of the drawings.

FIG. 1 shows a schematic representation of a flat machine provided with a thread storage device,

FIG. 2 shows a block circuit diagram of the control device according to the invention,

FIG. 3 shows a schematic representation of several control units of a preferred embodiment, and

FIG. 4 is a schematic representation of a modified control system.

The part of a flat machine 1 shown in FIG. 1 comprises the needle bed 2 with the sliding carriage 3 mounted thereon. The carriage 3 can be moved on the needle bed and is shown in a second position by broken lines 3'. The thread F to be processed is fed to the flat machine 1 via a thread storage device 4. The storage device 4 comprises a storage drum 5 on which a given quantity of thread 6 is constantly stored. This type of thread storage device is described in U.S. Pat. No. 3,606,975 in the name of the same applicant. Mounted on a vertical pin (not shown) on the storage device 4 is a bobbin 7 from which the thread F is unwound and fed to the storage drum 5 via thread guiding elements 8 which at the same time form part of a conventional stop motion device. Stop motion devices are known per se and are usually used to detect a thread breakage. There are also known stop motion devices which are susceptible to irregularities in the thread.

The block diagram shown in FIG. 2 inlcudes the stop motion device 9 which is connected to a coincidence circuit 11 by a signal generator 10. On its output side the coincidence circuit 11 is connected to a control device 12 for controlling the machine drive 13. The back coupling 14 shown between the machine drive 13 and the signal transmitter 10 indicates that the signal transmitter 10 is controlled by the machine drive 13. The coincidence circuit 11 only transmits a "stop signal" on its output side to the control device 12, when it simultaneously receives a signal, on its input side, from the

stop motion device 9 and the signal transmitter 10. The stop motion device 9 only transmits a signal in the event of a located thread breakage. The signal transmitter 10 is designed so that it periodically transmits a signal whenever the flat machine is in a position in which it can be easily stopped. In the case of the flat machine shown in FIG. 1 this is the position in which the carriage 3 is, as shown, located at its point of reversal. When a thread breakage is located the coincidence circuit 11 does not therefore transmit a signal to its output until the sliding carriage 3 has reached this point of reversal. The control device 12 which is connected to the coincidence circuit 11 then causes the machine drive 13 to be stopped. A dead time which occurs between the transmission of the output signal to the coincidence circuit 11 and the eventual stopping of the machine drive 13 or flat machine 11 can be taken into account if the signal transmitter 10 is controlled by the machine drive 13 with a given phase displacement. As shown in FIG. 3, the signal transmitter 10 is formed by a cam 19 controlled by the machine drive 13. A plunger 15 which actuates a switch 16 moves over the circumference of the cam. The switch 16 is closed whenever the plunger 15 is located in the area of the cam 19 having a smaller radius. A second switch *a* is connected in series to the switch 16. The series connection comprising a voltage supply 17 and a relay B is connected in parallel to these two switches. The switch *a* is operated by a relay A located in the stop motion device 9. It is closed whenever the stop motion device 9 locates a thread breakage. The closed position of the switch 16 designates that position of the flat machine 1 in which the machine can be switched off. It can be seen that current only flows through the relay B when the two switches 16 and a are closed.

Another circuit as shown in FIG. 3 shows the machine drive 13 which is connected in parallel to the series connection comprising a voltage supply 18 and a switch *b*. The switch *b* represents a contact of the relay B which is opened when current flows through said relay. The machine drive 13 is therefore switched off as soon as current flows through the relay B.

A comparison between the block diagram shown in FIG. 2 and the circuit diagrams in FIG. 3 shows that the coincidence circuit 11 corresponds to the series connection comprising the two switches 16 and *a*. The circuit controlling the relay B is only closed when both switches 16 and *a* are simultaneously closed. The control device 12 corresponds to the relay switch *b*. The cam 19 can also be provided with a plurality of separate sections of smaller radius if the machine has several positions in which it can be easily stopped. Furthermore, the two switches 16 and *a* may as shown in FIG. 4 be also connected in parallel, instead of in series, the position for switching off the machine drive being given when both switches are open. In FIG. 4 the same reference numerals as appearing in FIG. 3 have been used except for the addition of a double prime ('') thereto. The operation of the FIG. 4 embodiment is believed self-evident, and thus a detailed description of same is not believed necessary. The control device according to the invention may be generally applied to textile machines in which there occur intervals during movement in which it is more advantageous than in other intervals of movement to switch off the machine.

What I claim is:

1. In a flat knitting machine having a movable carriage, a drive means for controlling the movement of said carriage, a control device for switching on and off the drive means, a plurality of thread processing parts for knitting a thread, and a bobbin for supplying the thread to said thread processing parts, the improvement comprising a thread delivery and control device associated with said machine for permitting at least a limited quantity of thread to be supplied to said thread processing parts after breakage of the thread as supplied from said bobbin for permitting continued operation of said machine until said carriage reaches a preselected position, said thread delivery and control device including:

a thread storage device coacting with the thread as supplied from the bobbin to the thread processing parts for storing thereon a limited amount of thread so that sufficient thread will be available for supply to said thread processing parts even after breakage of the thread as supplied from the bobbin so as to enable the movable carriage of the knitting machine to continue to move until same reaches said preselected position;

a stop motion device coacting with the thread between the bobbin and the thread storage device, said stop motion device including means associated therewith for indicating when the thread as supplied from the bobbin to the thread storage device is broken;

a signal transmitting device controlled by said knitting machine and movable between two different control positions and occupying one of said control positions when the machine is in a given recurrent position in which idling of the machine has little or no disadvantageous effect; and

coincidence circuitry means operatively connected to said control device for switching off the machine drive means when said coincidence device is activated, said coincidence device being operatively interconnected to said stop motion device and said signal transmitting device and being activated only when said signal transmitting device is in said one control position and said stop motion device indicates a thread breakage.

2. In a knitting machine according to claim 1, wherein the coincidence circuitry means includes first and second switches, one of said switches being operatively connected to and actuated by said stop motion device, the other switch being operatively connected to and actuated by said signal transmitting device.

3. In a knitting machine according to claim 2, wherein said first and second switches are connected in series with one another.

4. In a knitting machine according to claim 2, wherein said signal transmitting device includes a rotatable cam movable by said machine and positioned for actuating said other switch.

5. In a knitting machine according to claim 1, wherein said thread storage device includes a drum having a substantially constant quantity of thread wound thereon.

6. In a knitting machine according to claim 1, wherein said preselected position comprises the point where the motion of said carriage is reversed.

* * * * *