

[54] **THREAD SUPPLY DEVICE FOR TEXTILE MACHINES**

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[58] Field of Search **242/47.01, 47.12; 66/132**

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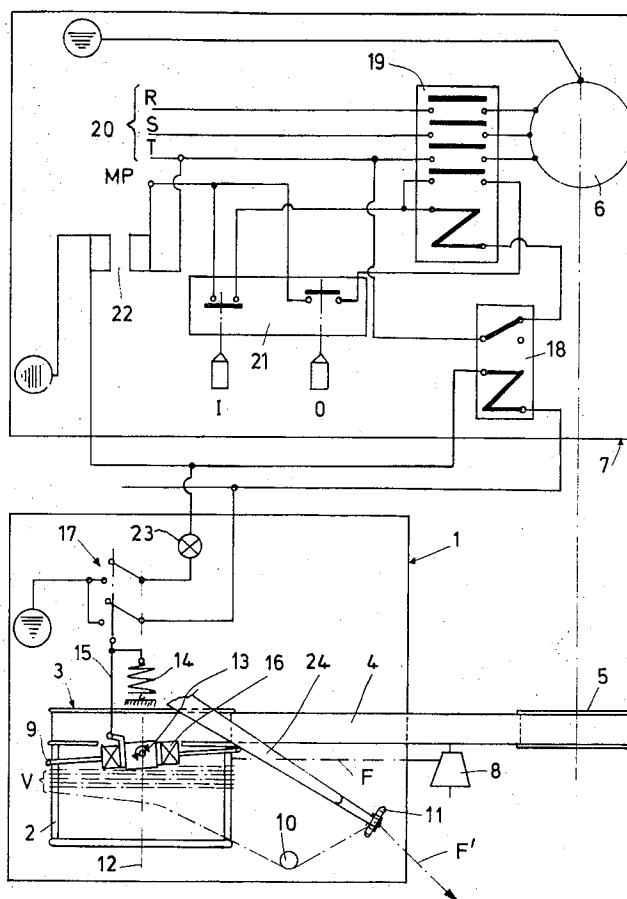
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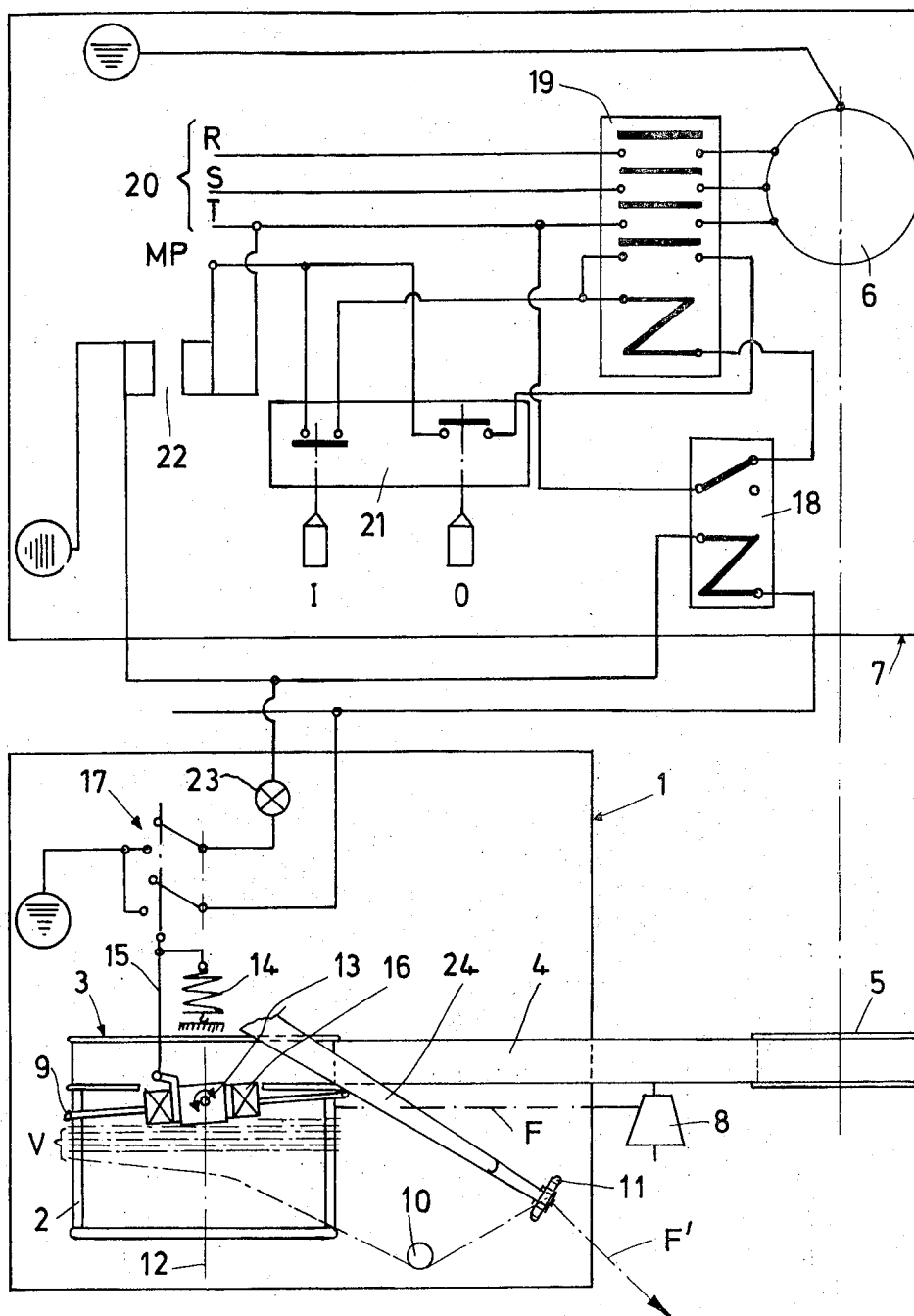
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[57] **ABSTRACT**

A device for monitoring the thread supply available in the thread supply means for textile machines. In a thread supply device for a textile machine it is known to provide a transport device movable axially of the thread storage drum for effecting axial movement of said thread along said drum. Means, which in the illustrated embodiment are mechanical means, are provided in connection with said transport device which means, when said transport device in acting on said thread reaches a predetermined axial position, in turn operate to initiate a switching sequence for stopping the textile machine.

7 Claims, 1 Drawing Figure





THREAD SUPPLY DEVICE FOR TEXTILE MACHINES

This invention relates to a thread supply device for effecting a positive thread supply to textile machines. A preferred embodiment of said device comprises a drum upon which the thread issuing from a storage bobbin is tangentially wound and from which the thread can be unwound at a speed not exceeding the winding speed, further comprises a transport element associated with the drum for axially moving the thread windings on the drum to form an intermediate thread storage and, lastly, comprises monitoring means which scan said intermediate thread storage and which trigger a switching operation when said intermediate thread storage falls below a predetermined value.

A thread supply device of this type is known from German patent publication DOS 1 760 600. The known apparatus is optionally employed for providing either a positive or an intermittent thread supply. It has for this purpose a thread supply element which, in a first position, limits the speed of the thread unwinding from the drum (positive thread supply) and, in a second position, enables the thread to be freely removed from the drum in an upward direction (intermittent thread supply). The monitoring instruments are disconnected in the first position of the thread supply element. The drum or a thread winding means revolves continuously in this position. During positive thread supply in the known thread supply apparatus, the size of the intermediate thread storage is not monitored at all. In the second position of the thread supply element, the monitoring means switch on the drive of the drum or winding means when the intermediate thread storage falls below a specific minimum amount and switch off the same when the intermediate thread storage exceeds a specific maximum amount. These switching operations only affect the drive of the drum or the winding means and are made independently of the textile machine drive which cooperates with the thread supply device.

If such a thread supply device is used predominantly or exclusively for positive thread supply, regardless of whether it has the reversible thread supply element mentioned above or whether it is only equipped for positive thread supply, the problem arises that an occasional breaking of the thread which is being wound on the drum cannot be prevented. A disconnecter which stops the textile machine drive in the case of a break is of course arranged in this thread path. However, since the machine cannot be stopped immediately due to inertia, it continues to run a bit after the break has occurred and after the drive has been shut off. The operating elements of the textile machine thus remove some of the intermediate thread storage from the drum without replacing it on the drum by winding thereon a corresponding amount of thread. The advantage of the fact that some thread continues to be removed is that no flaws or defects are made in the textile material when the thread breaks between the storage bobbin and the drum of the thread supply device which would be the case if an end of the thread were pulled through the material. However, when the thread is removed from the intermediate thread storage without being replaced, the thread storage is gradually exhausted so that after a number of thread breaks an end of the thread will sooner or later be pulled into the workpiece and thereby cause a flaw.

The invention is directed toward the objective of preventing flaws or defects from being formed in thread supply devices of the type mentioned above due to the intermediate thread storage on the drum becoming exhausted. In accordance with the invention, this objective is accomplished in that the monitoring means switch off the drive means of the textile machine when the intermediate thread storage falls below the predetermined limit.

Unlike known cases where the monitoring device only acts on the drum or winding means drive in the case of intermittent thread supply, the monitoring means in the thread supply device in accordance with the invention regulate the main drive of the textile machine. Hence, when the intermediate thread supply becomes sufficiently small, due to a series of breaks in the thread, that there is danger of the end of the thread being drawn into the material during the next break, the monitoring instruments shut down the textile machine. The operators can then refill the intermediate thread storage by hand or by means of auxiliary devices.

One embodiment of the invention is illustrated in the single FIGURE of the drawing which shows in schematic elevation a thread supply device in accordance with the invention together with the accompanying electrical circuit.

The thread supply device is symbolized by the box 1 in the drawing. Same has a drum 2 which can be designed in a known manner, as a bar cage for example. The upper end of the drum 2 forms a belt pulley 3 which is engaged by a belt 4. The belt also encompasses a drive pulley 5 which is driven by the main drive motor 6 of a textile machine 7, for example, a knitting machine, which is symbolized by a further box area. This causes the drum 2 to rotate at all times synchronously with the movement of the operating elements of the textile machine, for example with the needle cylinder of a round bed knitting machine.

A thread F issuing from the thread storage bobbin 8 is tangentially wound on the drum 2. By means of a transport element 9 which will be explained in more detail hereinbelow, the thread windings are axially moved on the drum and form an intermediate thread storage V. The thread is radially removed from the drum 2 at F' by first passing it under a stationary thread support element 10 and then through a thread eye 11. The thread is removed in a tangential direction so that only exactly as much thread can be removed as is wound on the drum 2. This is the characteristic of positive thread supply.

In the embodiment shown in the drawing, the transport element 9 is designed, as set forth in detail in U. S. Pat. No. 3,419,225, as a spoke wheel whose radial arms extend outwardly through the openings in the bar cage forming the drum 2. The wheel is pivotally journaled about an axis 13 which extends transversely to the drum axis 12 and is continuously biased by a compression spring 14 via a switch rod into the inclined position shown. A rotary bearing 16 enables the pulley forming the transport element 9 to rotate simultaneously with the drum 2. The thread windings slide downwardly along the drum jacket in an axial direction by virtue of the inclined position of the pulley. Further details of said spoke wheel and its operation will be found in said U. S. Pat. No. 3,419,225.

The transport element 9 has its arms supported on the intermediate thread storage V in axial direction of the drum 2. If the intermediate storage becomes smaller, then the inclination of the transport element 9 becomes greater due to the action of the spring 14. This movement is transmitted to a double switch 17 by the switch rod 15. If the intermediate thread storage V reaches a minimum, the double switch 17 closes, thereby shutting off the motor 6. This minimum, however, must be sufficiently large that the remaining intermediate thread storage on the drum 2 is not exhausted by the subsequent take-up of the textile machine when the machine is shut off by means of a disconnecter which is arranged between the storage bobbin 8 and the drum 2 and which monitors the thread.

For this purpose there is provided a cut-off relay 18 which is connected with the switch 17 and which when energized de-energizes the relay 19 through which the motor 6 is supplied with current from a three-phase main supply 20. Reference numeral 21 indicates a double push button switch by means of which the motor 6 can be switched on and off. Reference numeral 22 is a transformer which supplies the cut-off relay 18 as well as the warning light 23 with low-voltage current via the double switch 17. The warning light 23 thus lights at the same time the motor 6 is disconnected to indicate to the operator that the intermediate thread storage V on the drum must be filled.

In the embodiment shown in the drawing, the thread eye 11 is journaled on a pivoting arm 24 which is a part of a conventional disconnecter. If the thread breaks in the region F', i.e., between the drum 2 and the operating elements of the textile machine, this disconnecter acts in any convenient conventional manner to shut off the drive means of the textile machine. For example, the swivel arm 24 is conventionally connected with a switch which can be parallel to the switch 17, for example, but can otherwise be connected in the same manner as the switch 17.

This invention is not restricted to the embodiment shown in the drawing. Other structural means, for example, a conical flange which causes the thread to collect tangentially in this area or a further cage which oscillates up and down inside the bar cage forming the drum 2, can also be employed to move the thread windings axially on the drum 2. The monitoring instruments must be designed separately from the transport element in this case and can be designed as a light barrier means which scans the thread storage or as a scanning contact which moves from the inside to the outside of the drum, by way of example. All these transport elements and monitoring instruments are known in the art.

The thread supply device can also be switched over to intermittent thread supply, for example, by pivoting the swivel arm 24 with the thread eye 11 into a vertical position in which the thread is removed from the drum 2 in an upward direction. This principle is described in German patent publication DOS 1,760,600. Intermittent thread supply can, however, only be employed in the illustrated embodiment as an auxiliary function, for example, when adjustment or repair work which entails removing thread from the stationary drum 2 is to be carried out on the stationary or manually driven textile machine. If full intermittent thread supply operation is to be provided with the thread supply device in accordance with the invention, a change-over switch must be activated at the same time the thread eye 11 is shifted

into the position for intermittent thread supply operation. This switch disconnects the switch 17 from the cut-off relay 18 and establishes a connection with the supply circuit of a clutch or a separate drive motor by means of which the drum 2 can be driven independently of the main drive of the textile machine.

The embodiments of the invention in which exclusive property or privilege is claimed are defined as follows:

1. In a thread supply device for effecting a positive thread supply to at least one textile machine having drive means for activating same, said thread supply device including drum means upon which a thread issuing from a storage bobbin is tangentially wound for forming thread winding thereon and from which the thread can be unwound at a speed not exceeding the winding speed, said supply device also having transport means associated with the drum means for axially moving the thread windings on the drum to form an intermediate thread storage, the improvement comprising monitoring means which scan said intermediate thread storage and which trigger a switching operation when said intermediate thread storage falls below a predetermined value, said monitoring means switching off the drive means of the textile machine when the intermediate thread storage falls below said predetermined value.

2. The device of claim 1, wherein said monitoring means includes said transport means for sensing the size of said intermediate thread storage, and said monitoring means further including switching means activated by movement of said transport means to a predetermined position for triggering said switching operation.

3. The device of claim 2, wherein said switching means is operatively connected to said drive means for deactivating said drive means and for thus deactivating said textile machine when said switching means is activated due to said intermediate thread storage falling below said predetermined value.

4. The device of claim 1, wherein said monitoring means includes sensing means for sensing the size of the intermediate thread storage and switching means activated by said sensing means when said sensing means determines that the size of said intermediate thread storage is below said predetermined value, said switching means being operatively connected to said drive means and when activated by said sensing means causing termination of the supply of power to said drive means so as to deactivate said textile machine.

5. The device according to claim 1, including first means for permitting thread to be supplied to said drum means, second means for causing relative rotation between said first means and said drum means for causing said thread windings to be formed on said drum means, and third means associated with said drum means for causing thread to be unwound from said drum means substantially tangentially thereof for effecting a positive thread supply to said textile machine, and said monitoring means also stopping the relative rotation between said drum means and said first means when said intermediate thread storage falls below said predetermined value.

6. The device according to claim 5, wherein said drum means is mounted for rotation and is rotatably driven by said second means.

7. The device according to claim 5, wherein said transport means comprises a transport element mounted on said drum and movable axially relative

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thereto for urging said thread windings axially of said drum means, said transport element also comprising a part of said monitoring means for sensing the size of said intermediate thread storage, said monitoring means further including switching means operatively 5 connected to said transport element and actuated

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thereby when said intermediate thread storage falls below said predetermined value, said switching means being operatively associated with the drive means of said textile machine for deactivating same when said switching means is activated.

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