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ABSTRACT
A thread supply device for a textile machine, in particular a knitting machine, having a thread drum upon which there is tangentially wound the thread issuing from a storage bobbin in order to form an intermediate thread supply and from which drum the thread may be unwound vertically over a withdrawal rim of the drum and through a central withdrawal eye. A movable thread control element is disposed adjacent to the withdrawal path of the thread near the withdrawal rim, which element is not in contact with the unwinding thread in a first position and laterally engages the unwinding thread in a second position to prevent it from being laterally displaced relative to the direction of rotation of the thread drum such that the speed at which the thread is unwound is limited to the speed at which the thread is wound onto said drum when the thread guide element is in the second position. The thread control element is designed as a hook and in the case of a thread drum which is set in rotation, the mouth of the hook opens in the direction of rotation of the thread drum. The hook is mounted on a stationary support arm extending outside the thread drum from the axis thereof toward and beyond the withdrawal rim.

10 Claims, 5 Drawing Figures
THREAD SUPPLY DEVICE FOR TEXTILE MACHINES

This invention relates to a thread supply device for textile machines, in particular knitting machines, comprising a thread drum upon which there is tangentially wound the thread issuing from a storage bobbin in order to form an intermediate thread supply and from which drum the thread may be withdrawn axially over a withdrawal rim of the drum and through a central withdrawal eye. A movable thread control element is disposed adjacent the withdrawal path of the thread near the withdrawal rim, said element not being in contact with the unwinding thread in a first position and laterally engaging the unwinding thread in a second position and preventing it from being laterally displaced such that the speed at which the thread is withdrawn is limited to the speed at which the thread is wound onto said drum when the thread control element is in said second position.

Such a thread supply device, which may selectively be used for positive or intermittent thread supply, is already known. In an embodiment of this known thread supply device, the thread control element is designed as a finger which is pivotally journaled beneath the lower front end of said thread drum about a pin which extends transversely to the stationary thread drum axis. In the position for positive thread supply, the finger is pivoted into a position in which it projects a bit beyond the withdrawal rim and in which it is located transversely to the thread drum axis. This embodiment of the known thread supply device functions absolutely perfectly. It necessitates, however, a stationary axis which passes through the drum which, of course, is accompanied by certain constructional limitations. In addition, in the case of intermittent thread supply, the finger which is located in alignment with the thread drum axis is difficult to get at because the unwinding thread passes about it. Hence, a switch-over to positive thread supply during continuous operation is not entirely without difficulty. In another embodiment of the known thread supply device, the withdrawal eye also serves as a thread control element. It is journaled on a pivotal arm which is pivotally journaled on the framework of the thread supply device outside of the thread drum about an axis which extends transversely to the thread drum axis such that the thread eye can selectively be brought into alignment with the thread drum axis or into another position in which it lies radial to the thread drum. This embodiment also functions absolutely satisfactorily, but suffers from the drawback that in the case of positive thread supply the withdrawal eye is located laterally of the thread drum, thereby changing the path of the unwinding thread. In order to prevent this, a stationary auxiliary withdrawal eye must be provided in practice.

The object of this invention is to simplify the construction and manipulation of a thread supply device of the type cited at the outset.

This object is accomplished in accordance with the invention in that the thread control element is designed as a hook and in the case of a thread drum which is set in rotation, the mouth of said hook opens in the direction of rotation of said thread drum and the hook is mounted on a stationary support arm extending outside the thread drum from the axis thereof toward and beyond the withdrawal rim.

In the inventive thread supply device, a switch-over from positive to intermittent supply and vice-versa can be made by simply pivoting or sliding the hook which is easily accessible at all times due to its location outside the area through which the unwinding thread passes. When switching-over to positive thread supply, the unwinding thread is reliably caught in the mouth of the hook which opens in the direction of drum rotation. The withdrawal eye remains at the same location in both operational positions of the thread supply device. The inventive thread supply device is thus simple in design and easy to operate.

The support arm is advantageously extended beyond the hook and supports at its free end the withdrawal eye as well as a thread monitoring device if desired. In this case, the support arm also accomplishes additional functions which contributes further to the structural simplification of the device.

In another embodiment of the thread supply device, the hook is advantageously mounted on the winding means when the thread drum is stationary and the thread is wound upon the drum by means of a winding means passing around one edge of the drum.

The hook, which passes around the drum together with the winding means, does not make contact with the unwinding thread in its first position so that intermittent thread supply is possible. In its second position, it limits the withdrawal of the thread from the drum to the speed of rotation of said unwinding means, thereby limiting the winding speed at the same time as well. This means that positive thread supply is ensured. This switch-over is possible in the easiest and simplest manner because the hook merely needs to be displaced. The hook catches the thread in the open mouth automatically in the second position so that a reliable switch-over to positive thread supply is possible.

A thread supply device is already known which comprises a stationary thread drum and an annular winding means which passes about the free drum rim and includes a thread eye for guiding the winding thread, a further eye being provided in the annular winding element for guiding the unwinding thread during position thread supply. It is necessary, however, to thread the thread into the withdrawal eye of the winding element when switching over from intermittent to positive thread supply which, of course, is bothersome and awkward.

Embodiments of the invention are illustrated in the drawing in which:

FIG. 1 is a schematic side elevation of an inventive thread supply device in the position for positive thread supply,
FIG. 2 is the thread supply device according to FIG. 1 during intermittent thread supply,
FIG. 3 is a side elevation in partial section illustrating another embodiment of an inventive thread supply device,
FIG. 4 is an elevation of the thread supply device according to FIG. 3 from below during positive thread supply and
FIG. 5 is an elevation corresponding to FIG. 4 during intermittent thread supply.

In the drawings, 1 is a thread drum which is rotatably journaled in a housing 2. The housing 2 is secured to a textile machine, in particular a knitting machine, by means which are not shown in the drawing, a plurality of supply devices corresponding to the number of knitt-
ting systems being provided in the knitting machines. The drum 1 is driven via a pin wheel 3 and a perforated belt (not shown) which cooperates with the pin wheel and which is driven synchronously with the textile machine. The thread F issues from a supply bobbin (not shown), passes through a preliminary braking means 4, a disc brake S and a thread monitoring device 6 to be wound tangentially upon the thread drum 1 which rotates in the direction indicated by the arrow P. The thread drum 1 is associated with an inclined displacement disc 7 which displaces the thread windings which are formed in axial direction along the thread drum so that an intermediate thread supply V is formed on the drum. The thread is unwound from the intermediate supply V through a braking ring 8 in the axial direction and over a lower withdrawal rim 1a of the thread drum. Coaxial to the axis of the thread drum 1, a twopart withdrawal eye 9 is provided with an engaging thread monitoring device 10 for guiding the unwinding thread F' to the textile machine.

The withdrawal eye 9 and the thread monitoring device 10 are mounted at the free end of a support arm 11 which extends outside the thread drum 1 parallel to the axis thereof and which is mounted in the housing 2 at its other end.

Directly below the withdrawal rim there is journaled on the support arm 11 by means of a hub 12 a thread control element or hook 13 which can selectively be brought into the positions evident from FIGS. 1 and 2 by rotating the hub 12 about the support arm 11. In order to secure the hook in these positions, a ball detent means 14 may be provided.

In the position according to FIG. 1, the hook 13 engages the unwinding thread F'. The hook mouth is open in the direction of rotation P of the thread drum 1. The unwinding thread F', which attempts to pass over the withdrawal rim 1a contrary to the direction of rotation of the thread drum 1 due to the tension acting on the thread in the direction of withdrawal, is thus caught up in the open hook mouth and is prevented by the hook 13 from additionally moving laterally about the withdrawal rim 1a. Hence, only that amount of thread can be unwound which is released by the drum due to its rotation in direction P. This limits the speed of thread withdrawal to the speed of thread winding. This is the normal mode of operation of the creel bobbin which is primarily intended for positive thread supply.

If thread should have to be pulled out of the intermediate supply V when the textile machine is inoperative or moved manually for purposes of adjustment or repair, the hook 13 is pivoted into the position according to FIG. 2 in which it is positioned outside the path of withdrawal of the thread F'. Thread can then be arbitrarily removed from the thread drum 1 in a downward direction. In particular, the speed of withdrawal is no longer dependent on the winding speed. In this position, the inventive thread supply device may also be employed for intermittent thread supply during continuous operation.

Instead of pivotally journaling the hook 13 on the support arm 11, a replaceable mounting which could be moved transversely to the axis of the thread drum is also feasible.

In FIGS. 3 to 5, 21 indicates a thread drum which is secured to a housing 22 so as to prevent rotation. The housing 22 is secured to a support ring of a textile machine by means of a clamping device schematically indicated at 24. The drum 21 and the housing 22 are traversed by a hollow shaft 23 to which a pin wheel 25 is keyed. The pin wheel 25 operates together with a perforated drive belt (not shown) to set the hollow shaft 23 in rotation. At the lower free end of the hollow shaft 23, there is a disc 26 which is nonrotatably connected to shaft 23 and which bears at its outer edge a flange-like ring 27 surrounding the lower free edge of the thread drum 21. The ring 27 contains a thread eye 28. Parts 26 to 28 form a rotating winding element for the thread F issuing from a supply bobbin (not shown) which passes through the hollow shaft 23, is then deflected outwardly in a radial direction, is conducted through the thread eye 28 and is wound tangentially upon the thread drum 21. A ball bearing 29 is journaled on the hub 26a of the disc 26 in an inclined position and has a displacement disc 30 supported thereon. This displacement disc 30 has arms 31 which extend outwardly through longitudinal slots 32 in the jacket of the thread drum 21. The arms 31 are interconnected externally by a ring 33.

Due to the inclined arrangement of the displacement disc 30 on the hub 26a the displacement disc executes a wobbling movement during rotation of the hollow shaft thereby pushing the thread windings on the thread drum 21 upwardly in the axial direction of the thread drum so that an intermediate thread supply V is formed on the drum.

The thread is removed from the thread drum 21 in a vertical direction from this intermediate thread supply V as is indicated at F' in the drawing. In so doing, the thread passes over the outer surface of the ring 27 into a central withdrawal eye 34.

A hook 36 is journaled on the underside of the disc 26 so as to be pivotal about a vertical axis 35. The hook lies within the circumference of the disc 26 when in a first position as shown in FIG. 5 and the mouth of the hook projects radially beyond the circumference of the disc 26 when in a second position as illustrated in FIG. 4.

In the position according to FIG. 5, the hook 36 does not make contact with the unwinding thread F' so that the thread can be unwound from the thread drum 21 vertically independently of the winding speed. Intermittent thread supply is thus possible in this manner.

If the hook is located in the position according to FIG. 3, the unwinding thread F' cannot pass about the lower rim of the drum 21 more quickly than the ring 27. The thread F' is caught in the mouth 36a of the hook 36 and thus cannot "outrun" the hook 36. Since the rotational speed of the ring 27 and of the eye 28 determines the winding speed of the thread, the unwinding speed is thus limited to the winding speed. Hence, positive thread supply is ensured.

What is claimed is:
1. In a thread supply device for a textile machine, in particular a knitting machine, said thread supply device including drum means upon which a thread can be tangentially wound to form an intermediate thread storage and from which the thread can be unwound axially over a withdrawal rim associated with the drum means, a stationary thread guide member disposed in substantial alignment with the longitudinal axis of said drum means for guiding the thread withdrawn from said drum means after it passes over the withdrawal rim, and thread control means positioned adjacent the withdrawal rim of said drum means and movable between
a first position wherein said control means does not engage the thread being withdrawn from said drum means for permitting intermittent thread supply and a second position wherein the control means engages the thread being withdrawn from said drum means to limit the withdrawal of thread from said drum means substantially to the rate at which thread is wound on the drum means to thereby provide a positive thread supply, comprising the improvement wherein said thread control means includes a thread control element positioned adjacent the withdrawal rim of said drum means and mounting means supporting said thread control element for movement within a plane which is substantially perpendicular to the longitudinally extending axis of said drum means to permit movement of said thread control element between said first and second positions, said control element having a thread engaging portion which is adapted to engage the thread being withdrawn from the drum means when said thread control element is in said second position, said portion of said thread control element when in said second position preventing lateral displacement of the withdrawn thread in one rotational direction relative to said drum means while permitting lateral displacement of the withdrawn thread in the opposite rotational direction relative to said drum means.

2. A thread supply device according to claim 1, wherein said mounting means includes a support member pivotally supporting said thread control element between said first and second positions about a support axis which is substantially parallel to and transversely spaced from the longitudinal axis of said drum means.

3. A thread supply device according to claim 2, wherein said portion of said thread control element is shaped as an open hook.

4. A thread supply device according to claim 3, wherein said drum means is mounted for rotation about its longitudinally extending axis, said mounting means being stationarily positioned and disposed outwardly from the withdrawal rim of said drum means, the support axis for said control element being spaced radially outwardly from the withdrawal rim of said drum means so that said support axis is spaced outwardly from the circular pattern which is generated by the withdrawn thread as it moves around the periphery of said withdrawal rim during intermittent thread supply.

5. A thread supply device according to claim 3, wherein the drum means is stationarily mounted, and said withdrawal rim being rotatably supported on said drum means for rotation about the longitudinally extending axis thereof, said withdrawal rim having winding means associated therewith for permitting the thread to be wound on said drum means, drive means interconnected to said withdrawal rim for causing rotation thereof, and said mounting means being pivotally journaled on said withdrawal rim so that said support axis lies within the circumference of said withdrawal rim.

6. In a thread supply device for a textile machine, in particular a knitting machine, said thread supply device including drum means upon which a thread can be tangentially wound to form an intermediate thread storage and from which the thread can be unwound axially over a withdrawal rim associated with the drum means, a stationary thread guide member disposed in substantial alignment with the longitudinal axis of said drum means for guiding the thread withdrawn from said drum means after it passes over the withdrawal rim, and thread control means positioned adjacent the withdrawal rim of said drum means and movable between a first position wherein said control means does not engage the thread being withdrawn from said drum means for permitting intermittent thread supply and a second position wherein the control means engages the thread being withdrawn from said drum means to limit the withdrawal of thread from said drum means substantially to the rate at which thread is wound on the drum means to thereby provide a positive thread supply, comprising the improvement wherein said thread control means includes a thread control element designed as an open hook having the mouth thereof opening in the direction of rotation of said drum means when said hook is in said second position, and support means disposed outside the drum means beyond the withdrawal rim thereof for movably supporting said thread control element for movement between said first and second positions within a plane which is substantially perpendicular to the rotational axis of said drum means, said thread control element being disposed outside the circular pattern generated by the withdrawn thread during intermittent thread supply so that said thread control element is freely accessible at all times.

7. A thread supply device according to claim 6, wherein said support means pivots supports said thread control element for swinging movement between said first and second positions about a support axis which is substantially parallel to the rotational axis of said drum means and is spaced radially outwardly from said withdrawal rim.

8. A thread supply device according to claim 6, wherein said support means includes an elongated stationary support arm movably supporting thereon said thread control element, said support arm extending beyond said thread control element and having means associated with the free end thereof for stationarily supporting the thread guide member spaced from one end of said drum means but substantially aligned with the longitudinal axis thereof.

9. In a thread supply device for a textile machine, in particular a knitting machine, said thread supply device including drum means upon which a thread can be tangentially wound to form an intermediate thread storage and from which the thread can be unwound axially over a withdrawal rim associated with the drum means, a stationary thread guide member disposed in substantial alignment with the longitudinal axis of said drum means for guiding the thread withdrawn from said drum means after it passes over the withdrawal rim, and thread control means positioned adjacent the withdrawal rim of said drum means and movable between a first position wherein said control means does not engage the thread being withdrawn from said drum means for permitting intermittent thread supply and a second position wherein the control means engages the thread being withdrawn from said drum means to limit the withdrawal of thread from said drum means substantially to the rate at which thread is wound on the drum means to thereby provide a positive thread supply, and rotatable winding means coating with said drum means for winding thread onto said drum means to form said intermediate thread supply, said winding means including a ringlike member supported for rotation about the longitudinal axis of said drum means and defining said withdrawal rim, comprising the improve-
A thread supply device according to claim 9, wherein said thread control element is pivotally supported on the exposed end of said ringlike member for rotation about a pivot axis which is substantially parallel to the rotational axis of said winding means, said pivot axis being radially spaced from said rotational axis and also being radially spaced inwardly from the periphery of said rim, said hook projecting radially beyond the circumference of said rim when the hook is in the second position, and said winding means including a hollow rotatable shaft fixedly connected to said ringlike member and extending axially of said drum means along the longitudinal axis thereof for permitting the supply thread to be conducted therethrough, said ringlike member also having a thread eye extending axially therethrough adjacent the periphery thereof whereby the thread passing through said hollow shaft then extends radially outwardly of said ringlike member and through said thread eye for winding onto said drum means, said hook being pivotally mounted on said ringlike member in an angularly spaced relationship relative to said thread eye.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 3 908 921
DATED : September 30, 1975
INVENTOR(S) : Kurt Arne Gunnar Jacobsson

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 5, line 30; before "between" insert ---for pivotal movement---.

Signed and Sealed this
thirtieth Day of December 1975

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks