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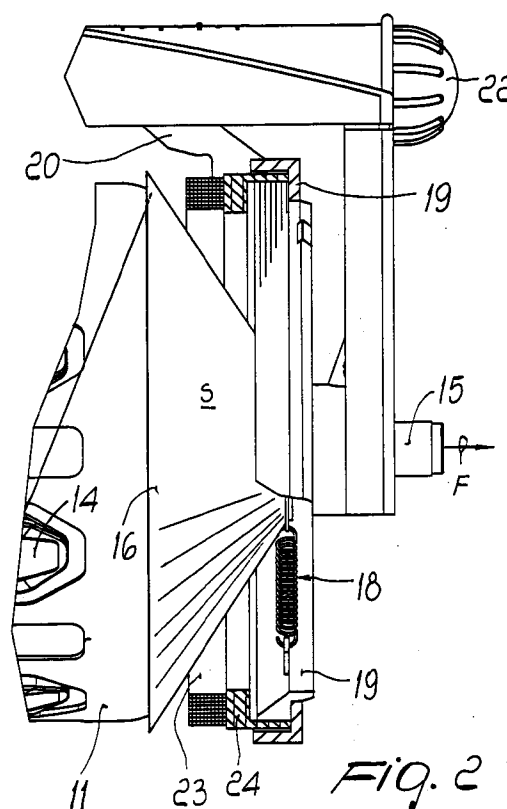
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(54) **Improvement to self-adjusting thread braking devices for weft feeders**

(57) The device comprises: a frustum-shaped braking body (16); means (18-19) for elastically suspending the frustum-shaped body and for pushing it elastically into tangent contact engagement with the drum (11) of the weft feeder (10); and a retention element (23) made of flexible material, which is associated with the suspension ring (19) of the frustum-shaped braking body (16) and is adapted to elastically engage, by abutment, the outer surface (S) of the frustum-shaped braking body in order to limit its axial movements. The retention element is constituted by a ring (23) made of soft, natural or synthetic elastomeric material, advantageously having a cellular structure.



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Description

The present invention relates to an improvement to self-adjusting thread braking devices for weft feeders.

More specifically, the invention relates to a self-adjusting braking device of the kind described in the prior Italian patent no. 1,251,209 and hereinafter referenced as conventional device for the sake of brevity.

Weft feeders are devices which typically comprise: a fixed cylindrical drum, on which a windmilling hollow arm winds a plurality of turns of thread which constitute a thread reserve; means for producing the advancement of the reserve turns from the base toward the free end of the drum; and means for braking at the output the thread that unwinds from the drum and feeds the loom or other textile machine, passing through a final thread guide supported in a fixed manner coaxially to the drum.

The conventional self-adjusting braking device is constituted by a substantially frustum-shaped braking body which is arranged so that its larger circumference is in front of the fixed drum of the feeder, with respect to which it is tangent at an output circumference which is slightly smaller than the maximum circumference of the cylindrical body of the drum. Said braking body is supported by elastic suspension means which are shaped like a lamina or an elastic diaphragm and is more typically suspended at the center of a radial arrangement of traction springs which react on an annular suspension element, which is rigidly coupled to a movable support, controlled by an axial movement mechanism which allows to vary the static contact pressure that the frustum-shaped braking body applies to the drum if the thread is not advancing.

The thread advances between the drum and the braking body, onto which it discharges the axial component of its mechanical tension. When the tension increases -- as the advancement speed of the thread increases -- said axial component tends to move the braking body axially in contrast with the action of the elastic suspension means, separating it from the drum and causing a consequent and corresponding decrease in the braking action, which is thus modulated as a function of said advancement speed.

In particular, the self-adjusting action of said conventional brake is such as to decrease the braking of the weft thread as the thread advancement speed increases and viceversa. The lower the rigidity of the suspension springs of the frustum-shaped body, which react elastically to said axial movements of the braking body, the greater the effect.

In some applications, typically in high-speed looms, the excessive decrease in the mechanical tension of the weft thread can form a so-called "balloon" of thread ahead of the frustum-shaped braking body. This has a negative effect on the correct execution of the weaving action, because it can generate tangles of thread but most of all because it causes the mechanical tension of the thread to be substantially uncontrollable, so that the

brake at least partially loses the ability to self-adjust.

Currently, an attempt is made to obviate this drawback by increasing the static pressure of the braking body, but this entails a corresponding and sometimes undesirable overall increase in the mechanical tension of the thread during the entire beating cycle of the weaving loom.

The essential aim of the present invention is to eliminate this drawback by improving known self-adjusting braking systems in order to make them adapted to avoid the forming of the so-called "balloon" of thread without resorting to an increase in the static pressure of the braking body on the drum of the weft feeder and therefore without undesirably altering the values of the overall mechanical tension that acts on the thread during the beating cycle of the loom or the like.

According to the present invention, this aim and other important objects are achieved by an improved self-adjusting braking device which has the specific characteristics stated in the appended claims.

Substantially, the invention is based on the concept of limiting the axial movements for the disengagement of the frustum-shaped braking body from the drum of the feeder through a retention means made of flexible material. Typically, and according to an embodiment of the invention, the retention means is constituted by a ring made of soft, natural or synthetic elastomeric material, advantageously having a cellular structure, which is vulcanized onto a threaded ring which mates with a correspondingly threaded seat formed in the annular suspension element of the frustum-shaped body, so that by adjusting the extent to which said ring is screwed into said annular element, the distance of the elastomeric ring from the outer surface of the frustum-shaped body is adjusted, consequently adjusting the axial stroke that said frustum-shaped body can perform before elastically abutting against the retention ring.

As an alternative, and according to a variation of the invention, the elastomeric retention ring is supported directly by the annular suspension element of the frustum-shaped body, so that the distance between the outer surface of the frustum-shaped body and said elastomeric ring is adjusted by elastic deformation of the suspension spring of the frustum-shaped body, adjusting the axial position of said supporting ring by means of the movement mechanism.

Said variation, which provides considerable simplification, can however be applied only if the suspension springs of the frustum-shaped braking body have a very low rigidity, so that the axial movement of said supporting ring does not entail a significant increase in said static pressure.

The present invention is described in detail with reference to the accompanying drawings, provided by way of non-limitative example and wherein:

figure 1 is a partially sectional lateral elevation view of a weft feeder with the improved self-adjusting

braking device according to the present invention; figure 2 is an enlarged-scale view of a detail of figure 1.

The weft feeder 10 shown in the figure is of the conventional type which comprises a fixed cylindrical drum 11, which is adapted to receive a plurality of turns of weft thread F which constitutes a weft reserve R to be fed to a loom or other textile machine. A hollow radial arm 12, rigidly coupled to a rotating ring 13 arranged at the base of the drum, winds the turns of thread onto said drum, and a known system with oscillating rods 14 transfers the turns from the base to the head of the drum 11 in order to form the weft reserve R.

When requested by the loom, the thread unwinds from the drum 11 and passes through a fixed thread guide 15, which is coaxial to said drum, and its mechanical tension is controlled by the modulated and self-adjusting braking action produced by a frustum-shaped braking body 16, which is arranged so that its larger circumference faces the drum, against which it is pushed so as to engage it by tangent elastic contact. For this purpose, the frustum-shaped body 16 is suspended at the center of a radial arrangement of helical springs 18, typically a set of three springs, which react against an annular support 19 which is arranged frontally and coaxially to the drum 11 and is supported by a slider 20 so that it can be adjusted axially. Said slider can move along a guide 21 which is parallel to the drum 11 and is controlled by a mechanism of the screw-and-nut type, which can be operated by a knob 22, through which it is possible to vary the static pressure that the frustum-shaped braking body 16 applies to the drum 11.

In a per se known manner, said braking system reacts automatically to the variations in the mechanical tension of the thread produced by corresponding variations in the advancement speed of said thread, by means of corresponding axial movements of the braking body 16, which moves away from the drum 11, in contrast with the action of the springs 18, correspondingly reducing the braking action applied to the thread and therefore the mechanical tension of said thread. However, if the mechanical tension of the thread decreases excessively, as a consequence of a large axial movement of the braking body 16, a balloon of thread forms in the region directly before of the braking body 16.

According to the present invention, this drawback is overcome by means of an improvement to said braking system, which consists of the fact that the movement of said frustum-shaped braking body 16 is limited by a flexible retention element.

Said retention element is constituted by a ring 23 made of soft elastomeric material, advantageously having a cellular structure, such as natural or synthetic rubber, adapted to engage by abutment the outer surface S of the frustum-shaped body 16.

According to a preferred embodiment of the invention, the elastomeric ring 23 is vulcanized onto a

threaded ring 24, which engages a correspondingly threaded seat formed in the annular support 19, allowing to adjust, according to the extent to which it is screwed in, the distance of the elastomeric ring 23 from the outer surface S of the frustum-shaped body 16 and therefore the maximum axial stroke that said body can perform in order to abut against the retention ring 23.

In practice, the position of the retention ring 23 is adjusted by means of the following procedure: since the ring 24 is fully screwed into the respective threaded seat of the annular support 19, the static pressure that the frustum-shaped body 16 applies to the drum 11 when the thread does not advance is set to the minimum value through the knob 22. The loom is started with this minimum setting of the static pressure, so that the frustum-shaped body 16 undergoes a sudden and large axial movement, triggering the forming of said balloon. Starting from this initial configuration, the degree to which the ring 24 is screwed into the seat of the support 19 is decreased, moving the retention ring 23 closer to the frustum-shaped body 16 until it almost skims its surface while still allowing a minimum axial mobility to the latter.

The position thus assumed by the ring 23 is the optimum configuration of the system for retaining the frustum-shaped body by abutment, after which the static pressure can be set by the knob 22 to the correct operating value without generating said balloon of thread.

According to a simplifying variation of the invention, the elastomeric ring 23 is vulcanized directly onto the supporting ring 19 and its axial distance from the frustum-shaped braking body 16 is adjusted by the knob 22 by means of flexing of the springs 18 and of the consequent variation in the mutual relative position of said body 16 and said ring 23. However, this is possible only if the springs 18 are highly elastic, so that the movement of the annular support 19 and accordingly of the frustum-shaped body 16 and of the retention ring 23 does not entail a significant increase in the static pressure with which the frustum-shaped body 16 engages the drum 11.

Of course, without altering the concept of the present invention, the details of execution and the embodiments may be altered extensively, with respect to what has been described and illustrated by way of non-limitative example, without thereby abandoning the scope of the invention.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A self-adjusting thread braking device for weft feeders (10), comprising a frustum-shaped braking body (16) and means (18-19) for elastically suspending said frustum-shaped body and for pushing it elastically into tangent contact engagement with the drum (11) of the weft feeder (10), characterized in that it comprises a retention element (23) made of flexible material, which is associated with the suspension means (19) of the frustum-shaped braking body (16) and is adapted to elastically engage, by abutment, the outer surface (S) of said frustum-shaped braking body in order to limit its axial movements.

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2. A device according to claim 1, characterized in that said retention element is constituted by a ring (23) made of natural or synthetic soft elastomeric material, advantageously having a cellular structure.

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3. A device according to claims 1 and 2, characterized in that said retention ring (23) is rigidly coupled to a threaded ring (24) which mates with a correspondingly threaded seat provided in a rigid annular element (19) which constitutes the suspension support of said frustum-shaped braking body (16); the extent to which said ring (24) is screwed into said seat of the annular supporting element (19) being used in order to adjust the distance of the elastomeric retention ring (23) from the outer surface (S) of the frustum-shaped braking body (16).

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4. A device according to claims 1 and 2, characterized in that said elastomeric retention ring (23) is supported directly by a rigid ring (19) which constitutes the suspension support of the frustum-shaped braking body (16), which is supported by a radial arrangement of suspension springs (18) which react on said rigid ring; in that the rigid ring (19) is controlled by an axial movement mechanism which can be operated by a knob (22); and in that the adjustment of the mutual relative distance between the outer surface (S) of the frustum-shaped body (16) and the elastomeric retention ring (23) occurs by elastic deformation of the suspension springs (18) by adjusting, through said knob (22), the axial position of said rigid ring (19) that constitutes the suspension support of the frustum-shaped braking body (16).

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