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Yarn Feeder with Weight-Relieved Shutoff Means

The invention relates to a yarn feeder for feeding at least one yarn to a textile machine, having a base support on which at least one lever, which can be pivoted around an essentially horizontal pivot axis, is provided, one end of which, located at the end remote from the pivot axis, is in contact with the yarn under the force of its own weight.

Elements for monitoring whether the yarn running to or out of the yarn feeder is correctly present, and whether the yarn delivered by the yarn feeder is provided in the correct amount or with the correct tension, are often provided on yarn feeders. In both cases hoop-shaped levers are often provided, which are pivotably seated on the yarn feeder and rest on the yarn with one end.

For example, such a yarn feeder is known from US Patent 5,860,298. The yarn feeder has a yarn feeding drum fastened on a vertical shaft and arranged in a yarn delivery path. The yarn feeler levers, which extend obliquely downward and rest with their free ends on the yarn, are arranged in the yarn delivery path upstream and downstream of the yarn feeding drum. If the yarn breaks, or too large an amount of yarn is present, the levers pivot downward under the force of their own weight and in the process actuate switches, which for example can be used for stopping the downstream-located textile machine.

The levers are pivoted under the force of their own weight. This must be a minimum weight in order to assure a dependable pivot movement, even if the yarn feeder is subjected to a certain amount of soiling in the course of the actual operating conditions. On the other hand, this results in increased friction at the yarn guide lever, which can be disadvantageous in particular in connection with thin and/or delicate yarns. If a particularly low yarn tension is desired, problems arise from too large a contact force, particularly because the yarn feeler lever tensions the yarn. The minimal yarn tensioning force must be great enough for the yarn to lift the yarn feeler lever.

Based on the foregoing, it is the object of the invention to provide a remedy here.

This object is attained by means of a yarn feeder having the characteristics of claim 1.

In accordance with the invention, the lever, which is pivotably seated on the base support, is connected with a relief device, which reduces the weight of the lever by means of a spring



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force in at least a portion of its pivot range. Thus, the relief device leads to the lever resting on the yarn with a comparatively reduced force. By means of this it is possible to reduce the friction between the yarn and the respective location of the lever. It is moreover possible to monitor even relatively thin yarn and/or to operate at reduced yarn tension.

Preferably the reduction of the weight of the lever is a function of the pivot angle. It is possible in this way to realize a deflection-dependent contact force on the yarn, which depends on the deflection angle of the lever in a non-linear manner. This can increase the triggering dependability, even if the yarn feeder is subjected to soiling.

Spring elements for generating a force which counters the weight permit a weight reduction without causing a noticeable increase in the moment of inertia of the lever, so that the latter can rapidly respond to a yarn break or decreasing yarn tension.

Wear-reducing ceramic elements can be arranged on the yarn feeler element. The weight relief compensates their weight at least partially. The service life of the elements which are in contact with the yarn is increased by the ceramic elements.

Preferably the spring element acts on the lever by means of a lever arm of such a type, that a neutral point is provided in the pivot range, wherein the spring element does not introduce a torque into the lever. The sign of the torque is reversed in this neutral point, so that the spring element switches from a weight relief to an additional weight. This can increase the switch-off dependability.

Preferably the spring element is a part of an electrical switch, so that no additional switch actuation forces need be provided. The force generated for the weight relief is also the switch-off force. This has the considerable advantage that the full (not relieved and not reduced) weight of the lever is available for actuating the switch, although the lever has been relieved of the weight from the viewpoint of the yarn.

For example, the spring element can be constituted by a U-shaped spiral spring. In addition, the latter can be advantageously used as a switching element. If the spiral spring has comparatively long legs, i.e. the legs are longer than their distance from each other, the spiral spring element is pivoted out relatively strongly, even at a small pivot movement of the lever.

It can be used as a switching member of a switch, wherein good and clearly defined switching points are provided because of the possible gearing, i.e. the comparatively greater pivot movement of the spiral spring in comparison with the pivot movement of the lever.

Further advantageous details of the invention ensue from the drawings, the description or the dependent claims.

An exemplary embodiment of the invention is represented in the drawings. Shown are in:

Fig. 1, a yarn feeder in a perspective representation,

Fig. 2, the yarn feeder in Fig. 1 in a lateral view,

Fig. 3, a housing element of the yarn feeder in Figs. 1 and 2 with inserted contact elements and a weight relief mechanism for the yarn feeler levers, and

Fig. 4, the weight relief mechanism of the yarn feeler in Figs. 1 and 2 in a schematic lateral view.

A yarn feeder 1 is represented in Fig. 1, which is used to deliver yarn 2 to a textile machine, not further shown. The yarn feeder 1 has a base support 3, which is to be connected by means of a fastening device 4 with the textile machine, or with a holder provided on the latter, and which forms a dual-shell housing. A yarn feeding drum 5 on a vertically arranged, rotatably seated shaft and connected at one end with the shaft, is provided on the base support 3. The other end of the shaft can be connected via a clutch disk 6 with drive disks 7, 8.

The yarn 2 is wound several times around the yarn feeding drum 5 and, when the latter is rotatably driven, is positively delivered to the downstream-connected textile machine. Yarn guide elements 9, 11 are arranged in its running path for continued guidance of the yarn 2. Part of these is a yarn inlet eye 12, a yarn brake device 14 and an inlet eye 15 arranged between the yarn brake device 14 and the yarn feeding drum 5.

A feeler lever 16 is arranged on the yarn inlet side between the yarn brake device 14 and the inlet eye 15. The feeler lever 16 is embodied to be hoop-shaped. With two legs 17 it extends around the base support 3 and is seated on or respectively in the latter and is pivotable around a pivot axis 18. The yarn feeler lever 16 rests with its end 19, which is provided with a wear-reducing coating or a wear-reducing element, on the yarn 2. This can be seen in Fig. 2 in particular.

A further feeler lever 21 is provided on the outlet side of the yarn feeder 1, which is seated, pivotable around a horizontal pivot axis 22, on the base support 3. The yarn feeler lever 21 is

also embodied in a hoop shape and on its lower free end has an eye 23 made of a resistant, for example ceramic material. In this case the eye 23 is essentially arranged between two yarn eyes 24, 25, which are a part of the yarn guide elements 11, and rests on the yarn 2. If the latter is tensed, it lifts the eye 23 between the yarn guide eyes 24, 25. In the area of contact with the yarn,

the eye 23 has a very large radius. Sharp yarn deflections are prevented by this. The eye 23 is wear-resistant to a large extent in respect to the yarn, but has a not negligible mass. The eye 23

can also be a ceramic-coated shaped element which, however, also increases the weight of the shutoff element.

Both levers 16, 21 have been lifted out of their freely downwardly suspended position by the yarn 2. If the yarn tension ceases, the levers 16, 21 pivot downward. In the process they actuate an electrical switch, which is connected with contact elements 26 arranged in the area of the fastening device 4. An indicator lamp 27 is additionally triggered to signal the status which has occurred.

The yarn guide levers 16, 21 are weight-relieved. This means that they do not rest on the yarn 2 with their entire force caused by their weight.

A weight-relieving device 31 is represented in Fig. 4, which acts on the lever 16 with a torque indicated by an arrow 32, which acts counter to the torque caused by the weight of the lever 16 (arrow 33). A spring element 34 embodied as a compression spring is part of the weight-relieving device 31. It is formed by a spiral spring 37 having two legs 35, 36 and is made of spring metal. The two legs 35, 36 are angled away from each other.

The lever 16 is connected with a body 38, which is arranged concentrically in respect to the pivot axis 18 and, on its side facing the spiral spring 37, has a seating recess 39. The latter receives the free end of the leg 36. But the other leg 35 is supported in a seating recess 41 of a contact element 42. The contact point between the leg 35 and the bottom of the recess 41

constitutes a seating or hinge point. In the same way, the contact point between the free end of the leg 36 and the bottom of the recess 39 is a seating or hinge point. The distance of the

bottom of the seating recess 39 from the pivot axis 18 forms a short lever L, which forms an obtuse angle in respect to the connecting line between the recesses 39, 41.

The spiral spring element 37 extends in the direction toward a contact element 43, on whose free end a contact spring 44 is maintained. The latter is arranged in such a way that its free, tongue-like, resilient end projects into the pivot range of the spiral spring 37. Here, the pivot range is of such dimensions that the spiral spring element 37 does not touch the contact tongue 44 when the lever 16 is in the desired position, while the spiral spring element 37 comes into contact with the contact tongue 44, when the lever 16 is pivoted downward. The angular

position of the lever L and the connecting line between the support points 41, 39 is of such dimensions that the torque 32 decreases when the lever 16 is pivoted downward. It initially moves toward zero and, when the support point 39 moves below the connecting line between the pivot axis 18 and the support point 41, it can also change its sign and thereby further increase the downward pivoting of the lever 16.

As can be seen in Fig. 3, the lever 21 can also be provided with a similar relief device 31. Thus, both relief devices constitute electrical switches, which can be connected to the strip conductors 50, 51, 52. The strip conductors can be used for contacting the signal lamp 27, or respectively the contacts 26 (Fig. 2).

The yarn feeder 1 described so far operates as follows:

As represented in Fig. 2, during operation the yarn 2 maintains both levers 16, 21 in the raised position, in which the spiral springs 37 are not in contact with their respectively assigned contact tongues 44. Here, the spiral springs 37 support the levers 16, 21 and generate a torque acting opposite the torque generated by the respective inherent weight of the levers 16, 21 and partially compensates it. It is slightly less than the inherent torque of the respective levers 16, 21, so that the latter rests on the yarn 2 with a clearly reduced weight.

If, for example, a yarn break occurs at the yarn inlet, the yarn force maintaining the lever 16 in position falls off and the lever 16 initially pivots downward with a reduced force.

However,

the weight compensation is simultaneously reduced, so that now the lever is clearly and strongly pivoted downward and closes the associated switch. The same action occurs if a yarn break takes

place on the outlet side of the yarn feeder, or too large an amount of yarn is delivered, so that the yarn starts to sag between the yarn guide eyes 24 and 25.

One or several yarn guide levers 16, 21 are provided in a yarn feeder 1, which rest on the yarn 2 with a force which is small in the desired position of the lever, i.e. when the yarn run is correct. If the lever pivots out because the yarn tension is reduced or the yarn has broken, the force with which the lever 16, 21 rests on the yarn 2 increases. This is caused, for example, by

a weight-relieving device 31, which partially compensates the weight of the lever and provides a compensating force as a function of the pivot angle. With an increase in pivoting out the compensation force is preferably reduced.

Claims:

1. A yarn feeder (1) for feeding at least one yarn to a textile machine, having a base support (3) on which at least one lever (16), which can be pivoted around an essentially horizontal pivot axis (18), is provided, one end of which, located at the end remote from the pivot axis (18), is in contact with the yarn (2) under the force of its own weight, characterized in that

the lever (16) is connected with a relief device (31), which has a spring element (31) as power source and which reduces the weight of the lever (16) at least in a portion of its pivot range.

2. The yarn feeder in accordance with claim 1, characterized in that in a pivot range in which the yarn (2) has lifted the lever (16) into its desired position, the relief device (31) clearly reduces the weight, and that it reduces the weight less or not at all or even increases it in a pivot range, in which the yarn (2) has lowered the lever (16) into a lower position.

3. The yarn feeder in accordance with claim 1, characterized in that the spring element (37) acts on the lever (16) via a lever arm (L) and, in case the spring element (37) is a compression spring element, the pivot range of the lever (16) includes a position in which the angle between the lever arm (L) and the pressure spring element is 180° and, if the spring element (37) is a tension spring element, it includes a position, in which the angle between the lever arm (L) and the pressure spring element is 0° .

4. The yarn feeder in accordance with claim 1, characterized in that the lever (16) is provided on its end (19) with a wear-reducing coating or a wear-resistant element (23).

5. The yarn feeder in accordance with claim 4, characterized in that the element (23) is a ceramic element, whose weight is at least partially compensated by the spring element (37) in the desired position.

6. The yarn feeder in accordance with claim 1, characterized in that the spring element (37) is a part of an electrical switch.

7. The yarn feeder in accordance with claim 1, characterized in that the spring element is a spiral spring (37) bent in a U-shape, whose one leg (35) is supported on an abutment (41) and whose other leg (36) on a lever arm (L) which is connected with the lever (16).

8. The yarn feeder in accordance with claim 7, characterized in that the spiral spring (37) has legs (35, 36), which are clearly longer than their distance from each other.

9. The yarn feeder in accordance with claim 7, characterized in that a contact element (44) is associated with the spiral spring (37), by means of which the spiral spring (37) comes in or out of contact, when the lever (16) is pivoted.

10. The yarn feeder in accordance with claim 9, characterized in that the contact element (44) is arranged in the vicinity of the spiral spring (37) on the end of the latter at which the legs (35, 36) are connected with each other.