United States Patent

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[33] **Germany**
[31] **1,635,902**

[54] **YARN FEEDER**
2 Claims, 4 Drawing Figs.

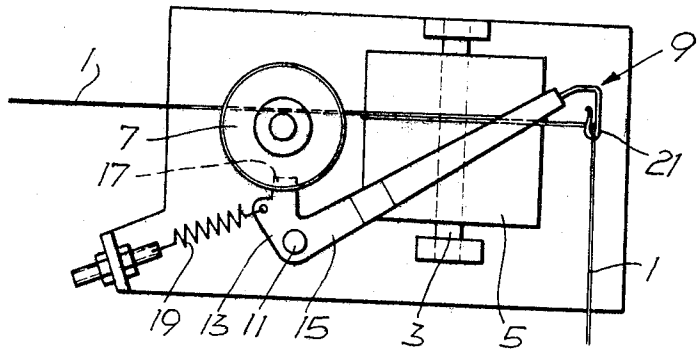
[52] **U.S. Cl.** **226/39,** 226/44
[51] **Int. Cl.** **B65h 23/18**
[50] **Field of Search** 242/75.2, 156, 156.1, 156.2; 226/11, 39, 44, 195

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ABSTRACT: A yarn feeder with a friction roller for the yarn, the friction roller being driven with a peripheral speed larger than the yarn speed, which comprises an axle, and a friction roller rotatably mounted on the axle and adapted to loop yarn once about the friction roller. Brake means are provided which have an adjustable braking force. Means are arranged for sensing the yarn tension following the friction roller, and the sensing means is coupled with the brake means such, that an increase of the yarn tension causes a reduction of the braking effect.



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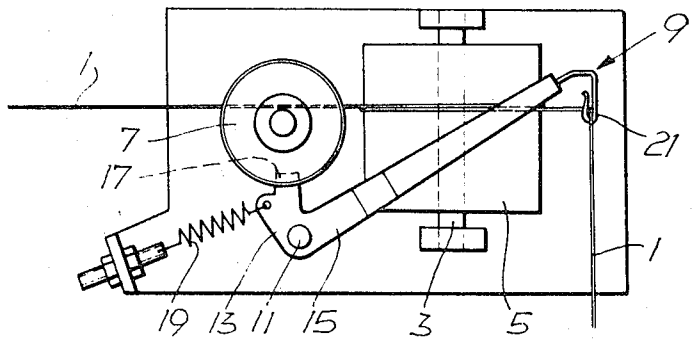


Fig. 1.

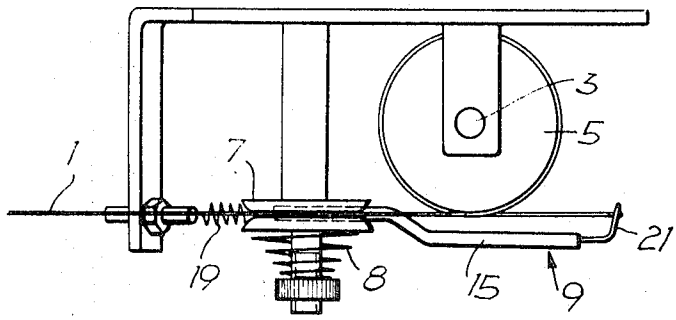


Fig. 2.

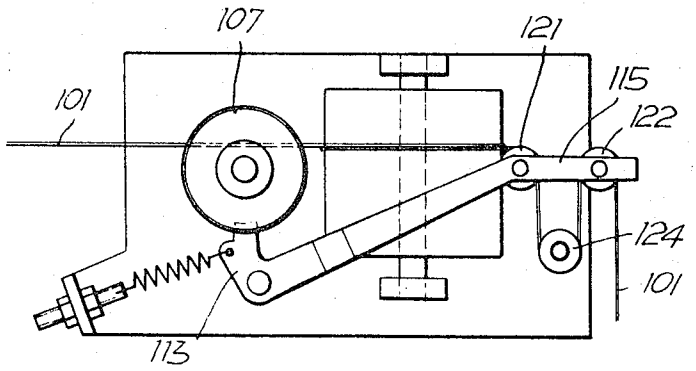


Fig. 3.

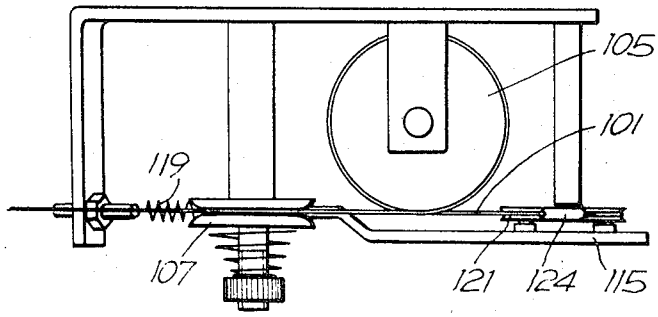


Fig. 4.

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YARN FEEDER

The present invention relates to a yarn feeder, in general, and to such yarn feeder having a friction roller for the yarn, which friction roller can be driven with a peripheral speed which is greater than the yarn speed and which has disposed in front thereof a brake for the yarn, in particular.

In a known yarn feeder of this type, in case of too much friction on the friction roller, the yarn winds itself on the friction roller or winds too fast and thereby the yarn is fed to a position for consumption without tension, for instance, to a knitting position of a knitting machine, which can lead to appreciable disturbances, and should be avoided by the present brake. In order to avoid this, however, the surface of the friction roller must be sufficiently smooth, in order to overcome always with certainty, the friction between the yarn and the friction roller also in case of greater tensile stress by the braking effect of the brake, and thereby assuring slipping. Since, however, during the feeding of the yarn the braking effect always must be overcome, on the unwinding yarn portion a predetermined minimum stress always must be present. This is, however, not desirable in many instances. Each attempt, however, to remove this minimum stress by roughening the surface of the friction roller or by a multiple winding of the yarn about the friction roller again increases the winding danger.

For this reason, it has already been proposed, that instead of providing a friction roller with a smooth cylindrical surface, rather to arrange a cage roller with circular shaped rods having parallel axes. This cage roller has not been accepted in the practice, however, because the rods promote the formation of downy hair which clogs itself by means of oil and paraffin and, thereby, causes a winding of the yarn on the cage roller.

It is one object of the present invention to provide a yarn feeder and a friction roller by which the yarn tension or stress can be maintained constant as much as possible, and selectively small at the exit of the yarn feeder, and by which the yarn winding on the friction roller can be safely avoided.

It is another object of the present invention to provide a yarn feeder, in which a brake with an adjustable braking force is provided and in which the friction roller has following thereto a member sensing the tensile stress of the yarn, which member is coupled with the yarn brake such, that an increase of the tensile stress causes a reduction in the braking effect. By this arrangement, it is obtained in a surprisingly simple manner that each time when the yarn adheres so rigidly to the friction roller that the danger exists that the yarn is wound onto the roller, by this joining of the yarn, a sudden stress reduction is caused in the yarn run behind the friction roller, and thus on the sensing member, so that by the tension drop of the yarn on the sensing member, the brake immediately pulls stronger and thereby holds back the yarn to such a degree that the latter again starts slipping, and a winding of the yarn on the friction roller is rendered impossible. Beyond that, however, by the sensing member it is assured that the yarn always emerges from the yarn feeder, in accordance with the present invention, with a substantially constant tension. This tension can be retained selectively small by a corresponding setting of the return force of the sensing member.

Devices are known for maintaining the tension of a yarn content, which include a sensing member and a brake controlled by the latter and engaging the yarn in front of the sensing member, Since, however, by the known yarn feeders with a drivable friction roller, the tension of the yarn emerging from the yarn feeder is likewise maintained constant as a rule, it was not obvious to the man skilled in the art to combine these two known devices for maintaining constant the yarn tension together in the above-described manner.

It is still another object of the present invention to provide a yarn feeder wherein, in addition to the sensing member formed as a yarn return movably disposed against the return force, at least one further immovable yarn return is provided, which forms with the sensing member a pulley blocklike arrangement translating the effect of the yarn tension onto the movement of the sensing member. By such arrangement, it is brought about in a surprisingly simple manner that the oscillations of the sensing member, and thereby the vibrations of the yarn tension, are completely avoided, and the tension is maintained very constant.

With these and other objects in view, which will become apparent in the following detailed description, the present invention, which is shown by example only, will be clearly understood in connection with the accompanying drawing, in which;

FIG. 1 is elevation of one embodiment of a yarn feeder designed in accordance with the present invention;

FIG. 2 is a top plan view of the yarn feeder disclosed in FIG. 1;

FIG. 3 is an elevation of a second embodiment of the yarn feeder designed in accordance with the present invention; and

FIG. 4 is a top plan view of the yarn feeder disclosed in FIG. 3.

Referring now to the drawing, and in particular to FIGS. 1 and 2, the yarn feeder, designed in accordance with the present invention, serves the purpose of removing a yarn 1, for instance, from a spool not shown of a circular knitting machine and of feeding the same to a system of the circular knitting machine. For this purpose, the yarn feeder has a friction roller 5 which can be driven by a drive (not shown) and which is rotatably mounted for rotation about an axle 3, which friction roller 5 is looped around once by the yarn 1. The friction roller 5 is disposed in the run of the yarn between a brake 7, having an adjustable braking force, and a sensing member 9, sensing the yarn tension and setting accordingly the braking effect of the brake 7.

The brake 7 comprises in known manner two platelike discs pressed towards each other by the force of a spring 8, between which discs the yarn 1 is fed through.

For adjusting of the braking force of the brake 7, a two-armed lever 13, 15 is swingably mounted about an immovable axle 11. One of the arms 13 of the two-armed lever engages with a wedge-shaped end 17 in known manner between the two plate discs of the brake 7. The lever 13, 15 is retained by a pulling spring 19 out of engagement on an abutment (not shown) with the discs of the brake 7. At the free end of the lever 15, and eye 21 is provided for sensing the tension of the yarn 1, which eye 21 guides the yarn 1 to the system of the knitting machine.

The operation of the above-described yarn feeder takes place such, that in case of an increase of the yarn tension, the lever 13, 15 swings against the force of the spring 19 and thereby the brake 7 is released. In case of slight tension increases, it is possible that the friction roller 5 does not become effective. If, however, the friction roller 5 becomes effective, then the tension at the eye 21 drops immediately, so that the brake 7 becomes effective, and a winding of the yarn on the friction roller 5 is prevented. One can, therefore, form the surface of the friction roller 5 so rough that, in case of a predetermined yarn tension, the movement of the yarn by the friction roller 5 is always assured.

Referring now again to the drawing, and in particular to the embodiment disclosed in FIGS. 3 and 4, those parts which correspond with the parts contained in the embodiment disclosed in FIGS. 1 and 2 are indicated with numerals increased by 100, so that in this manner reference can be made to the description of the previous embodiment.

The embodiment in accordance with FIGS. 3 and 4 differs from the previously described embodiment by the fact that instead of the eye 21, two guide rollers 121 and 122 are provided on the lever 113, 115. In addition to these two rollers 121 and 122, also there is provided an immovably mounted guide roller 124, which in the run of the yarn 101 is disposed between the two guide rollers 121 and 122. In addition, this yarn feeder has in the same manner as in the first embodiment a brake 107 and a friction roller 105.

Due to the fact that the yarn 101 runs over the three guide rollers 121, 124 and 122, a pulley blocklike arrangement is brought about, by which, upon a swinging out of the lever 113, 115 as a result of tension increases, the length of the path of

the yarn between these rollers is appreciably reduced, so that during each swinging out of the levers **113**, **115** simultaneously, an effect is achieved which reduces the tension increase of the yarn, which has the consequence that the yarn tension increases more slowly. This slower increase of the yarn tension causes, however, a very quiet and uniform effect of the tension control by the yarn feeder in accordance with the present invention. So that thereby a swinging of lever **113**, **115**, and thereby also a vibration of the yarn tension is avoided with certainty.

This effect, avoiding vibrations and oscillations of the arrangement of a plurality of yarn guides at the sensing member of the yarn feeder, in accordance with the present invention, can be easily accommodated by the choice of a selective number of guide members to all requirements occurring in practice. Thus, in many instances, it will suffice if the yarn is guided merely at first about an immovable roller and then about a roller mounted on the arm **115**. It is possible, however, to provide more than three guide rollers in a manner different from that shown in FIG. **3**, so that thereby a pulley blocklike arrangement with a greater transmission ratio is obtained.

In the same manner as in the embodiment disclosed in FIGS. **1** and **2**, in which a guide roller is used instead of the eye **21**, also in the embodiment disclosed in FIGS. **3** and **4** corresponding guide eyes can be provided instead of the guide rollers **121**, **122** and **124**.

The lever **13**, **15**; **113**, **115** can also be used for the purpose to stop the devices of consumption of the thread **1**, **101** if the thread **1**, **101** breaks. In case of a thread break, the lever **13**, **15**; **113**, **115** swings for a comparatively large angle, whereby a control switch can be operated. Particularly of advantage is thereby that, due to the pulley block effect, the force of the pulling spring **19**, **119** can be comparatively large, so that also a robust control switch can be operated.

I claim:

1. A yarn feeder with a friction roller for the yarn, said friction roller being driven with a peripheral speed larger than the yarn speed, comprising:

an axle;

a drivable friction roller in order to feed the yarn rotatably mounted on said axle, and adapted to loop yarn at least once about said friction roller;

brake means having an adjustable braking force and disposed in front of said friction roller, and acting directly upon a part of the yarn running to said friction roller;

means for adjusting the braking effect of said brake means on said yarn;

means for sensing the yarn tension of the part of the yarn leaving said friction roller; and

means for coupling said sensing means with said brake means by means of which with an increase of the tension of the yarn part leaving said friction roller, the effect of said brake means on the yarn part running to said friction roller is reduced.

2. The yarn feeder, as set forth in claim **1**, where:

said sensing means comprises at least one yarn guide means movably disposed against a return force, and which includes at least one further immovable guide means; and

said last mentioned immovable guide means forms with said sensing means a pulley-blocklike arrangement transmitting the effect of said yarn tension to the movement of said sensing means.