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YARN-TENSIONING DEVICE

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Fig. 1.

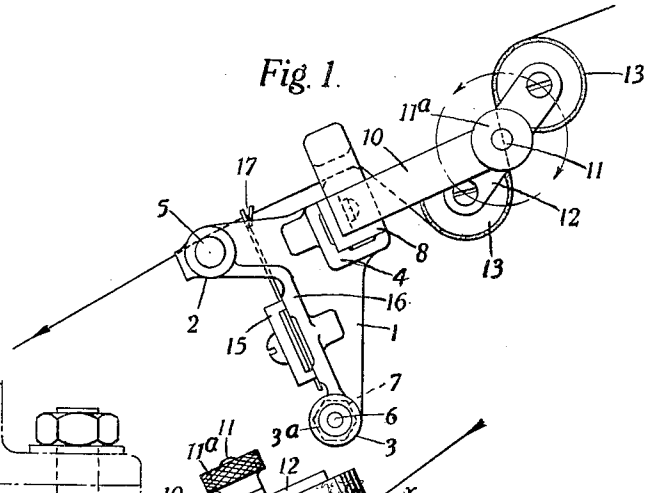


Fig. 2.

Fig. 3.

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YARN-TENSIONING DEVICE

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6 Claims. (Cl. 242—153)

This invention relates to and consists of a yarn-tensioning device, and is applicable inter alia to the tensioning of yarns being fed to the working parts of a braiding, knitting or like machine. For example, the machine described in our earlier application No. 305,986, filed November 24, 1939, now Patent No. 2,250,008, for forming knitted tubular sheaths on to flexible cord-like bodies (e. g. electric conductors) may usefully be fitted with the tensioning devices of the present invention.

For its main object, the invention has the provision of a tensioning device in which the tension is readily adjustable within a wide range, and which is capable of use with yarns of the cheaper qualities which have occasional solid particles attached to them. With the types of tensioning device hitherto employed, where friction is applied to the yarn by passing the yarn between the members pressed together, or in a like manner, any solid particles carried by the yarn tend to obstruct the passage of the yarn through the tensioning devices and, by accumulating at the spring-pressed friction members, tend to hold those members apart and thus reduce or even eliminate the desired tensioning effect. This defect has meant that, where automatic stop mechanisms are provided, the undue slackening of the yarns due to the loss of tension has resulted in frequent stoppages of the machines. The present invention avoids these drawbacks and in addition makes possible the use of cheaper yarns, of inferior (uncleaned) quality, where, hitherto, the limitations imposed by the tensioning devices have necessitated the use of better yarns.

Another object of the invention is to provide with such improved tensioning devices, improved automatic stop devices to operate in the event of a breakage in the yarn, which stop devices also are immune from interference by seeds or other clogs carried by the yarn. Finally, the invention contemplates a simplified general construction and arrangement of parts making the device adaptable for easy manufacture and assembly.

According to the invention, the improved tensioning device comprises a fixed open-channelled yarn guide giving free passage to the yarn, and a pair of additional yarn guides having external yarn-engaging parts, at least one of which last-named guides may be set in fixed positions in an orbital path, where it deflects the yarn, such additional yarn guides being on the supply side of the fixed yarn guide, and at least one of them having its yarn-engaging surface adapted to impose a drag on the yarn.

In the preferred embodiments of the invention, the two additional yarn guides are adapted for simultaneous orbital movement about a fixed centre, and they each consist of a non-rotary, felt-covered or like friction roller or drum. Instead of felt, other material (e. g. some forms of rubber) having a drag effect on the yarn, may be employed to cover the non-rotary guides. The fixed guide may be of glass or porcelain, or metal, and will usually be of a quick-thread type, i. e. adapted to receive the yarns transversely.

In use, the yarns coming from a supply source, such as a series of cops, are passed first between the additional guides and then through the fixed guides, and the necessary tension is obtained by moving the orbital guide or guides to a point where the deflection of the yarn on its way from the supply to the fixed guide, and the consequent engagement of the yarn with the friction surface offers the required resistance to the yarn's movement. The relatively rough surface of the additional guide or guides not only provides the required tension, but allows seed and other matter sometimes found in yarn to pass over it without disadvantage. Also the rough surface has the effect of detaching some of those solid particles from the yarn.

According to another feature of the invention the improved tensioning device includes an insulated contact bar, and a number of slidable contact pins, the pins being mounted in a guide plate secured to the frame, and being looped to ride on the respective yarns as they pass to the fixed yarn guide. The pins are of a length such, and are positioned so that, when riding on unbroken yarns they are clear of the contact bar, but when a yarn breaks the associated pin falls on to that bar to complete an electric circuit to electric stop mechanism and thus stop the machine.

In the accompanying drawing—

Fig. 1 is an end view of a yarn-tensioning device according to the preferred form of the invention;

Fig. 2 is a plan of the same (the two views not being arranged in true projection); and

Fig. 3 is a diagram to illustrate another form of the invention.

Referring first to Figs. 1 and 2, the several parts of the device are co-ordinated by a supporting frame which comprises two substantially triangular end parts 1 connected together by some of the elements mentioned below, each end

part 1 having two hollow bosses 2 and 3, and also a right-angled recess or socket 4. Mounted in the hollow boss 2 of each end part 1 is a round glass rod 5 forming a final yarn support, whilst mounted in insulating bushes 3a in the other hollow boss 3 of each end part 1 is a contact rod 6, supplied with suitable terminal connections 7 at one end. Secured in the said right-angled recess or socket 4 in the end parts 1 is an angle bar 8 forming a support for a porcelain thread guide 9, in one or more lengths, which guide 9 has a number of open-topped undercut notches 9a of an open form, that is, of a form much larger than the yarn to be passed through them, into any one of which notches a yarn x may be passed from the top, as it travels towards the glass rod 5. The end parts 1 are connected together by the elements 5, 6 and 8.

At each end of the angle bar 8 is mounted an arm 10 whose outer extremity is drilled to receive a short stud 11 projecting from the centre of a plate or bar 12, and between the two plates or bars 12, are mounted a pair of non-rotary felt-covered rollers 13. The said short studs 11 are screwed at their extremity, to receive a milled or knurled nut 11a by which the angle of the plates or bars 12 with respect to the short arm 10 may be fixed. Rotation of the plates 12 about their studs 11 causes the non-rotary rollers 13 to move in an orbital path around the axis of the studs 11.

The supporting frame also includes a projecting lug or bracket 14 by which the whole device may be fixed in position on a machine.

Secured to the said end parts 1, above the contact rod 6, is a trough-sectioned bar 15, whose edges are notched to form, in conjunction with a cross piece 16 extending from end part 1 to end part 1, guides for a number of wire strips 17. The upper end of each strip 17 is looped to receive a yarn, and when resting on a taut yarn as shown in Fig. 1, its lower end is held clear of and a slight distance away from the contact bar 6. If a yarn breaks or becomes unduly slack, the associated wire strip 17 drops on to the bar 5 and by so doing establishes electrical connection between the bar 5 and the bar 15, earths the bar 5, and operates stop-mechanism (not shown) to stop the machine.

In use, the yarn ends are first passed between the two rollers 13, then into the notched porcelain bar 9, then through the wire loops 17 and finally over the glass rod 5 to the working parts of the machine (not shown). By slackening the nuts 11a and revolving the rollers 13 bodily around them, the yarns x may be deflected until they have so much contact with the friction surfaces as will give the desired tension whereon the nuts 11a are re-tightened. The tension of the yarns may also be varied slightly by varying the notches in the porcelain bar.

As applied to a machine according to our said earlier application No. 305,986, there will be four of the improved tensioning devices, one at each side of each knitting head, and each tensioning device will control four yarns coming from a creel of four cops.

Referring now to Fig. 3, only one of the friction rollers 13 has an orbital movement, such movement being around the axis of the other roller 13. This arrangement requires a greater angular displacement of the roller to obtain the same deflection of yarn as in the first example described, but thereby allows of finer adjustment, and moreover the angular relationship of the yarn to the base of the notches 9a in the guides 9 is fixed.

In either of the examples illustrated, one only of the rollers 13 may be non-rotary in cases where a less amount of drag is required. Accordingly, the spindles of the rollers 13 may have means for arresting them or freeing them, at will.

What we claim is:

1. A yarn-tensioning device, comprising a frame for attachment to the machinery, a pair of non-rotary yarn-deflecting rollers revolubly mounted for simultaneous movement in the frame, clamping means to hold the rollers in any set position in their path of revolution, each roller being covered with friction material to impose a drag on the yarn, and a fixed yarn guide carried by the frame, having a series of open-topped undercut notches to receive the yarn transversely.

2. A yarn-tensioning device, comprising a frame for attachment to the machinery, a pair of non-rotary yarn-deflecting rollers in the frame, one fixed and the other revolvable about the first, clamping means to hold the revolvable roller in any set position in its path of revolution, each roller being covered with friction material to impose a drag on the yarn, and a fixed yarn guide carried by the frame, having a series of open-topped undercut notches to receive the yarn transversely.

3. A yarn-tensioning device, comprising a frame for attachment to the machinery, a pair of non-rotary yarn-deflecting rollers revolubly mounted for simultaneous movement in the frame, clamping means to hold the rollers in any set position in their path of revolution, each roller being covered with friction material to impose a drag on the yarn, and a fixed yarn guide carried by the frame, having a series of open-topped undercut notches to receive the yarn transversely, an insulated contact bar in the frame, a final yarn support in the frame, a series of contact members shaped to float on taut yarns passing from the fixed yarn guide to the final yarn support, guide means to direct the contact members on to the insulated contact bar when not floating on a taut yarn, and means to connect the contact bar and the said guide means to the circuit of electric stop mechanism.

4. A yarn-tensioning device, comprising a frame for attachment to the machinery, a pair of non-rotary yarn-deflecting rollers in the frame, one fixed and the other revolvable about the first, clamping means to hold the revolvable roller in any set position in its path of revolution, each roller being covered with friction material to impose a drag on the yarn, and a fixed yarn guide carried by the frame, having a series of open-topped undercut notches to receive the yarn transversely, an insulated contact bar in tne frame, a final yarn support in the frame, a series of contact members shaped to float on taut yarns passing from the fixed yarn guide to the final yarn support, guide means to direct the contact members on to the insulated contact bar when not floating on a taut yarn, and means to connect the contact bar and the said guide means to the circuit of electric stop mechanism.

5. A yarn-tensioning device, comprising two frame ends, a glass rod, an insulated contact bar and an angle member carried by and connecting the two frame ends, a smooth-surfaced fixed yarn guide carried by the said angle member and having open-topped undercut yarn-guid-

ing notches therein, a pair of arms extending from the frame, a plate pivotally connected to the outer end of each arm, a pair of felt-covered yarn-deflecting rollers non-rotatably carried by those plates and screw means to clamp the plates in any set position about their pivots.

6. A yarn-tensioning device, comprising two frame ends, a glass rod, an insulated contact bar and an angle member carried by and connecting the two frame ends, a smooth-surfaced fixed yarn guide carried by the said angle member and having open-topped undercut yarn-guiding notches therein, a pair of arms extending from the frame, a plate pivotally connected to the outer end of each arm, a pair of felt-covered yarn-deflecting rollers non-rotatably carried by those plates, screw means to clamp the plates in any set position about their pivots and a series of contact members in guides above the contact bar, those members being of a length such as to be clear of the bar when floating on taut yarns passing from the fixed yarn guide to the glass rod, with means for connecting the contact bar and contact members in the circuit of electric stop mechanism.

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