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R. H. LAWSON ET AL

2,124,001

TENSION DEVICE

Filed June 12, 1936

FIG. 1.

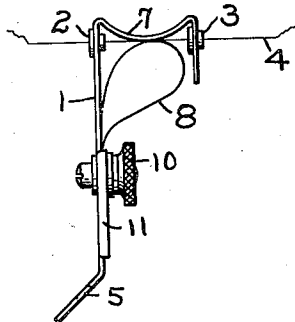


FIG. 2.

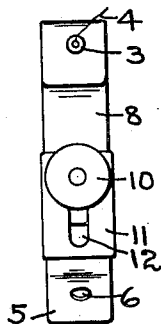


FIG. 3.

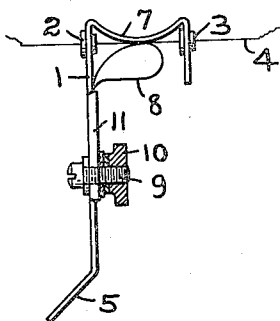


FIG. 4.

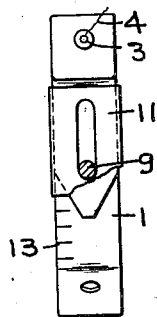


FIG. 5.

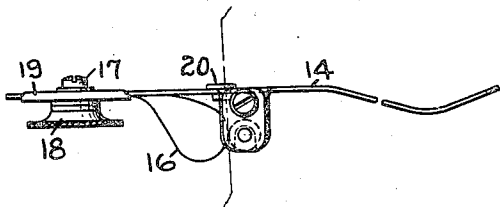


FIG. 6.

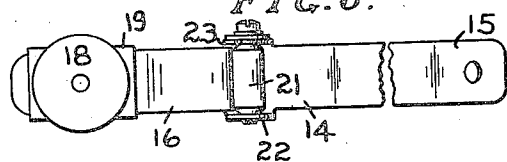
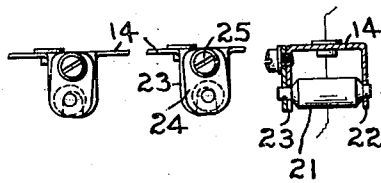


FIG. 7. FIG. 8. FIG. 9.



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2,124,001

TENSION DEVICE

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11 Claims. (Cl. 242—149)

The invention herein described concerns a yarn tension device for use with all manners of textile machines and especially adapted for use with knitting machines. This tension device is simple in construction, cheap to manufacture, easily adjustable and is designed to maintain a constant tension once it has been adjusted properly. It is a special purpose of this tension device to exert a very light drag upon its yarn and to maintain this drag or tension constant despite the passage of knots or slubs. The tension device has been found to greatly improve fabric produced on multi-feed knitting machines and also allows the production of better plated fabrics as well as rendering better service in knitting machines of all descriptions. This tension device, while developed in conjunction with knitting machines and particularly desirable for use in such machines, is not limited to any single field in the textile arts, but has definite advantages which recommend it for use in tensioning yarn or filaments passing through all types of textile apparatus.

In the drawing:

Fig. 1 is an elevation showing a simple form of the tension device;

Fig. 2 is an elevation showing this tension device as seen from another angle;

Fig. 3 shows this same tension device, partly in section, and further illustrating the tensioning loop adjusted to give a different degree of tension;

Fig. 4 shows the same yarn tension device, parts being omitted, but illustrating a method of graduating one of the elements so that adjustment may be more accurately determined;

Fig. 5 shows a modified form of tension device wherein a cleaning roller is employed as one of the yarn engaging elements;

Fig. 6 illustrates this same tension device as seen from another view point; and

Figs. 7, 8 and 9 show details of the cleaning element and a manner of adjusting the same.

It is a special requirement of yarn tension devices as employed with knitting machines that the device may exert a very slight drag upon the yarn or filament passing therethrough and that this drag be exerted continuously at as nearly a constant amount as is possible. Such tension devices must not be influenced by different speeds at which the yarn passes through them or by variations of speed of a passing yarn. The adjustment as to the amount of drag exerted should be positive, and once set, should remain at that amount without any appreciable change.

In all tension devices which have been employed previously the passage of knots or slubs has always had such an influence upon the action of the device that their effect has been transferred through to the fabric being produced and thus the inability of the device properly to compensate for these inequalities has been an annoying problem in the knitting of fine fabrics.

In overcoming the difficulties above outlined, we have found that an extremely light and sensitive tension device may be constructed by forming one of the yarn engaging elements as a loop of very thin spring steel. This spring steel is obtainable in strips of varying widths and may be easily bent back upon itself in the form shown and when suitably secured to the other element of the tension device itself, can be employed to exert almost any reasonable drag upon a yarn passing between said loop and another yarn engaging element against which the loop presses the yarn or filament. This strip material is commercially obtainable down to a thickness of .001 of an inch and, of course, up to any thickness desired. For practical purposes thicknesses of about .003 of an inch would probably be a maximum limit insofar as ordinary knitting machines are concerned. The loop thus formed of this thin strip steel may be closed or opened and thus the degree of tension may be varied within definite limits.

The employment of such ultra-thin spring steel allows us to obtain an extremely light tension and a constant one which would be practically impossible with any other tension means heretofore devised. A further advantage in the employment of the strip material bent upon itself to form a loop as shown is that this loop can move away from the other yarn contacting element and further, in a direction in which the yarn itself is traveling. When a knob or slub or other imperfection is passing through the tension device this movement automatically prevents any jerk on the yarn and thus irons out the tensioning action into one that is extremely delicate but which does not vary throughout a degree which can be evident from imperfections in the fabric when it has been produced. We know of no other tension imposing means capable of exerting an extremely light drag upon a yarn and which is sensitive in the respect noted so that the light tension necessary may be maintained at a substantially constant figure.

Referring to Figs. 1-4 a simple form of our device has been illustrated wherein an angular element 1 has a pair of porcelain or other guides

2 and 3 through which a yarn 4 passes in a direction from left to right, Fig. 1. Said angular element has an extension 5 with an aperture 6 therein by means of which it is to be attached to the machine wherein employed in any suitable manner. Between the guides 2 and 3 said angular element is formed into a curved portion 7, this portion 7 being one of the yarn engaging elements and constituting one part of said tension means against which the yarn itself is pressed by the upper portion of loop 8 formed of very thin strip steel as above described. This loop 8 has been bent back upon itself and the two ends have been formed with holes therein through which a screw 9 having an adjusting thumb nut 10 passes to maintain said spring loop in position on the shank of angular element 1. A slider 11 having turned edges which guide it upon element 1 is provided with an elongated slot 12 which encompasses a screw 9. This slider 11 may be moved lengthwise of element 1 to vary the size of the loop as has been illustrated in Figs. 1 and 3 these figures showing the extreme positions. This adjustment may be facilitated by means of graduations 13 on one of the members, preferably on stationary element 1.

The adjustment herein described is effected by means of loosening thumb nut 10 and moving slider 11 in either direction as desired and then tightening said thumb nut to fix said adjustment permanently. Skilled textile workers may be able to determine from the feel of the yarn running through the tension device when the proper adjustment has been reached, or it may be possible to use any of the known types of tension gauges whereby all devices on machines having several yarns feeding may be adjusted to impose like amounts of drag on said yarns.

For larger yarns or for those which are abrasive in nature, it is contemplated to attach a wear resistant shoe to the loop. Either or both yarn engaging surfaces may be plated with a wear resistant substance such as chromium or cadmium.

Referring to Figs. 5-9 another form of the invention is illustrated, the same principle applying here as in the first form described except that a rotating element has been employed in opposition to the resilient loop whereby the tension device is rendered self-cleaning. This tension means has a shank 14 with one end 15 provided for attaching to some support on the machine and the other end having a loop of thin spring steel 16 attached by means of screw 17, thumb nut 18 and slider 19 all in a manner similar to that described with respect to securing and adjusting loop 8, Fig. 1. About midway of the shank a porcelain guide 20 is inserted for passage of the yarn to be tensioned by means of loop 16 and cooperating roller 21. The shank 14 has been constructed having ears turned down at 22 and 23, best illustrated in Fig. 9. One of the ears is provided with an aperture which acts as a bearing within which one end of roller 21 is free to turn, the other ear being slotted as illustrated in Figs. 7, 8 and 9. A plate 24 is attached to ear 23 by means of screw 25 and has an opening within which it is free to turn. As illustrated in Figs. 7 and 8, this plate 24 may be swung through a limited arc so that the position of roller 21 may be varied whereby its parallel engagement with loop 16 will be assured. Otherwise loop 16 might engage at one end of the roller and the yarn in working back and forth along the roller as it does to a slight extent, would feed with varying amounts of tension. The slot

in ear 23 is somewhat larger than the reduced end of roller 21 to allow the adjustment which has been described. In effecting this adjustment the operator merely loosens screw 25, swings the plate 24 until the axis of roller 21 aligns properly with the face of loop 16 with which it engages, and then tightens screw 25 to maintain the adjustment permanently.

It is possible to adjust this loop in the same way loop 8 was adjusted and the function of roller 21 is to prevent a collection of lint or other foreign matter at the area where the yarn is drawn through between the loop and cooperating tensioning surface. A second porcelain guide is not employed in this form of the invention.

Either of these tension means is easy to thread and assures very light starting tension in comparison to the drag exerted after the yarn or thread has started to run. As before stated tension may be extremely light without any noticeable fluctuation as knots and the like are passed through during operation of the device to which the tension means is attached. The weight of loops 8 and 16 is comparatively negligible and compared to other known tension devices, the inertia of the parts which must be moved as knots or other imperfections pass offers almost no resistance to changes of position. Due to the peculiar action of the loop constructed of such ultra-thin material, the loop itself moves in the direction of the passing yarn to compensate the tendency for the yarn to jerk as it would on passage of imperfections in other known tension means. Very little wear occurs on the loop or on the roller and practically no tendency for the yarn to groove these elements is evident. While two particular forms of the tension means have been described in this case and the action of devices has been described relative to a knitting machine, it is not to be understood that the invention is in any way limited except by the scope of the appended claims.

We claim:

1. A yarn tension device including cooperating yarn engaging members between which a yarn is drawn, one of said members being formed as a loop of relatively thin, resilient material and so disposed relatively to the other that it presses the yarn against the other, but moves away from it and with the yarn upon passage of a knot or the like.

2. A yarn tension device having opposed yarn engaging members, one member being formed as a loop of thin, strip spring steel and the other member being formed to present a non-resilient surface between which and said loop a yarn is to be guided, and means for adjusting the size of said loop, the thin metal being readily susceptible of such adjustment.

3. A yarn tension device as defined in claim 2 wherein said adjusting means includes a slider with a slot therein and a clamping member passing through said slot for retaining the slider in an adjusted position.

4. A yarn tension device having opposed yarn engaging members, one member being formed as a loop of thin, resilient material and the other member comprising a roller.

5. A yarn tension device having opposed yarn engaging members, one member being formed as a loop of thin, strip spring steel and the opposed member comprising a roller rotatable in bearings which maintain it parallel to the surface of said loop and means for adjusting one of said bearings to adjust the position of the roller.

6. A yarn tension device having opposed yarn engaging members one member being formed as a loop of thin strip spring steel and the other member being movable whereby lint is prevented from accumulating on either member.

7. A yarn tension device having opposed yarn engaging members, one member being formed as a loop of thin, strip spring steel, said loop being so disposed relatively to the passing yarn that deflection of the loop moves the yarn engaging surface of the same in the direction in which the yarn is passed.

8. A yarn tension device including two opposed tensioning members one of which is constructed as a closed loop of strip material less than .004 of an inch in thickness.

9. A yarn tension device including cooperating yarn engaging members between which a yarn is drawn, one of said members being formed as a loop of relatively thin resilient material and so

disposed relatively to the other that it presses the yarn against the other, but moves away from it and with the yarn upon passage of a knot or the like, and means for retaining said loop of resilient material so constructed and arranged as to allow adjustment of the size of said loop.

10. A yarn tension device having opposed yarn engaging members, one said member comprising a closed loop of thin, strip spring metal and retaining means for said loop movable to vary the size of said loop.

11. A yarn tension device having opposed yarn engaging members, one member being formed as a loop of thin, strip spring metal and the other member being formed to present a surface between which and said loop a yarn is to be guided, and means including a member for retaining said loop movable to vary the size thereof.

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