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THREAD TENSIONING DEVICE FOR SEWING MACHINES

Frederick F. Zeier, Stratfield, and Edward S. Skowronski, Bridgeport, Conn., assignors to The Singer Manufacturing Company, Elizabeth, N. J., a corporation of New Jersey

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1 Claim. (Cl. 242—155)

This invention relates to sewing machine thread tensioning devices, and more particularly, to drum-type thread tensioning devices wherein the thread is tensioned by engagement with a frictionally braked rotatable drum.

It is an object to provide a device operative to impose a selected tension on a thread irrespective of the thread characteristics so that a wide variety of threads and a wide range of thread sizes may be accommodated, and so that a constant tension may be maintained despite the existence of irregularities in the diameter of the thread.

Another object is to provide a tension device of the above character with a novel combination of thread-guiding and tensioning instrumentalities arranged to provide optimum engagement of the thread with the thread-engaging drum.

Still another object of this invention is to provide, in a thread tensioning device of the above character, friction brake members formed of nonmetallic material such as nylon and disposed in engagement with the thread-engaging drum to provide uniform frictional drag upon the drum.

With the above and other objects and advantages in view, as will hereinafter appear, the invention comprises the devices, combinations, and arrangements of parts hereinafter described and illustrated in the accompanying drawing of a preferred embodiment thereof, in which:

Fig. 1 represents a cross-sectional view taken substantially along the axis of the drum thread tensioning device of our invention;

Fig. 2 is a top plan view of the tensioning device having a portion of the friction brake broken away; and

Fig. 3 represents an enlarged view of the free extremity of the tension stud, partly in cross-section, taken substantially along line 3—3 of Fig. 2.

As is illustrated in the drawing, the rotatable thread-engaging drum of this thread tensioning device is preferably provided in the form of a stamped sheet metal wheel **10** formed at its center with a bearing aperture **11** through which extends a stud **12**. Peripherally, the wheel **10** is formed with a series of tooth-like radial extensions **13** bent alternately to opposite sides of the wheel to provide a flared rim for the reception of a loop of the thread to be tensioned. In Figs. 1 and 2, such a thread *t* is illustrated clearly as it passes through the tensioning device and into engagement between the alternately outturned teeth of the wheel **10**. The thread path about the periphery of the wheel is slightly sinuous between the alternately outturned teeth and this has the advantage that a positive grip is provided between the thread and the wheel, serving to prevent the thread from slipping with respect to the wheel.

The stud **12**, upon which the wheel **10** is freely rotatable, is formed with an enlarged flange **14** and a threaded extremity **15** adapted to engage a threaded hole formed in a boss **16** on the sewing machine frame **17**. At its free extremity, the stud **12** is split lengthwise by a slot **18** and formed with external threads **19**.

Clamped between the machine frame boss **16** and the flange **14** of the stud **12**, is a plate **20** formed with a slot

21 to accommodate the threaded extremity **15** of the stud. As is illustrated in Fig. 2, the plate preferably is formed with an elongated arm **22** provided with a series of thread-guiding apertures **23** to facilitate the introduction of a thread from a supply to the thread tensioning device.

As best illustrated in Fig. 1, a pair of disk-like brake members **24—24** are provided, each being apertured loosely to embrace the stud **12**. It has been found that superior frictional characteristics will result with this drum-type tensioning device when the material for the brake members is of nylon. The brake members **24—24** are preferably made identical in form, each with a smooth flat back **25** and with a face formed with a raised annular land **26**. The brake members are disposed on the stud **12** in opposed relation, one at each side of the thread-engaging wheel **10**. The back **25** of the innermost brake member is seated against the stud flange **14**, and means are provided on the free extremity of the stud for biasing the brake members together with the lands **26—26** thereof in frictional engagement with the opposite sides of the thread-engaging drum. To this end, an arched pressure plate **27** is arranged on the stud **12** against the flat back **25** of the outermost brake member. The pressure plate **27** is formed with a diameter bar or tongue **28** disposed to enter the slot **18** in the stud **12** to lock the plate against turning with respect to the stud. Slidably disposed on the stud is a first spring-guarding sleeve **29** having a flange **30** arranged to engage the pressure plate **27**. A second spring-guarding sleeve **31** is slidably disposed on the stud **12** and is formed with an inturned tongue **32** adapted to enter the stud slot **18** to lock the sleeve against turning with respect to the stud. The second sleeve **31** is formed, nearest the free extremity of the stud, with a heavy flange **33** arranged to abut an adjusting nut **34** threaded on the stud **12**. Disposed about the stud over each of the spring-guarding sleeves **29** and **31** and between the flanges **30** and **33** thereof is a coil spring **35**. The pressure exerted by the coil spring **35** may be adjusted to provide the desired frictional resistance between the brake members **24—24** and the thread-engaging drum by merely turning the adjusting nut **34**. In order to prevent accidental loosening of the adjusting nut, the abutting surfaces of both the adjusting nut **34** and of the flange **33** of the spring-guarding sleeve **31** are formed with intermeshing radially extending serrations **36**.

One advantage attainable with the use of this drum-type thread tensioning device is that the thread can be consistently and evenly tensioned. By preventing the brake members from rotating, frictional resistance will be imposed upon the thread only by the action of the annular lands **26—26** of the brake members against the thread-engaging drum **10**, and the characteristics of the thread, therefore, will have no effect upon the tension imposed by this device.

In order that the brake members may be restrained from rotation with the thread-engaging wheel **10**, the peripheral portion of each brake member is formed with a recess **37**. As illustrated in Fig. 2, the recesses are preferably semicircular in form and are disposed to accommodate a stop member in the form of a pin **38** secured to the plate **20** and arranged to extend transversely across the brake members and adjacent to the periphery of the thread-engaging drum **10**. By means of the slot **21** in the plate **20**, the position of the stop member may be adjusted until it is seated snugly in the recesses **37** of the brake members.

In addition to providing a stop member preventing rotation of the brake members, the pin **38** serves as a thread guide to direct the thread properly to and away from the thread-engaging drum. To this end, the pin **38** is formed preferably with a pair of thread-guiding eyelets **39** and **40** arranged substantially transversely one with respect to the other, and each opening at one side into the space be-

tween the brake members **24—24**. As illustrated in Fig. 2, the pin **38** is ideally located to direct the thread *t* by means of the eyelets **39** and **40** practically about the entire periphery of the thread-engaging drum **10**. This substantially complete wrapping of the thread about the drum acts to prevent slippage of the thread with respect to the flared rim of the thread-engaging wheel **10** and thereby insures consistency of the tension which will be imposed upon the thread.

It is desirable in a sewing machine thread tensioning device that substantially the same tension be imposed upon the thread while it is moving through the tensioning device as imposed during those periods while the thread is not being drawn through. By the use of nylon brake members **24—24**, a substantially constant degree of tension is attained whether the thread is stationary in the tensioning device or is moving through the tensioning device at any one of a wide range of speeds.

The thread tensioning device of this invention is designed to operate satisfactorily without lubricants of any description, however, lubricants are used extensively about commercial type sewing machines, and it is likely that lubricant will occasionally make its way into the thread tensioning device. When nylon braking members are used, the tension imposed upon the thread by the device of this invention will not be diminished in the event that lubricant does

make its way to the surfaces of the brake members and the thread-engaging drum that are in frictional engagement.

Having thus described the nature of the invention, what we claim herein is:

A thread-tensioning device for a sewing machine comprising a stud, a thread-engaging drum rotatable on said stud, a pair of nylon brake members disposed in spaced relation on said stud, one at each side of said thread-engaging drum, means carried on said stud for biasing said brake members into frictional engagement one with each side of said thread-engaging drum, and a cylindrical stop-pin fixed in substantially parallel relation to said stud and disposed in engagement with both of said brake members, said pin being formed with a pair of thread guiding eyelets arranged transversely with respect to each other and each opening into the space between said brake members so as to direct a thread to and away from said thread engaging drum.

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