April 4, 1961 T. E. WESTALL ET AL 2,978,203

TENSION ROLLER DEVICE

Filed Sept. 25, 1958 3 Sheets-Sheet 1

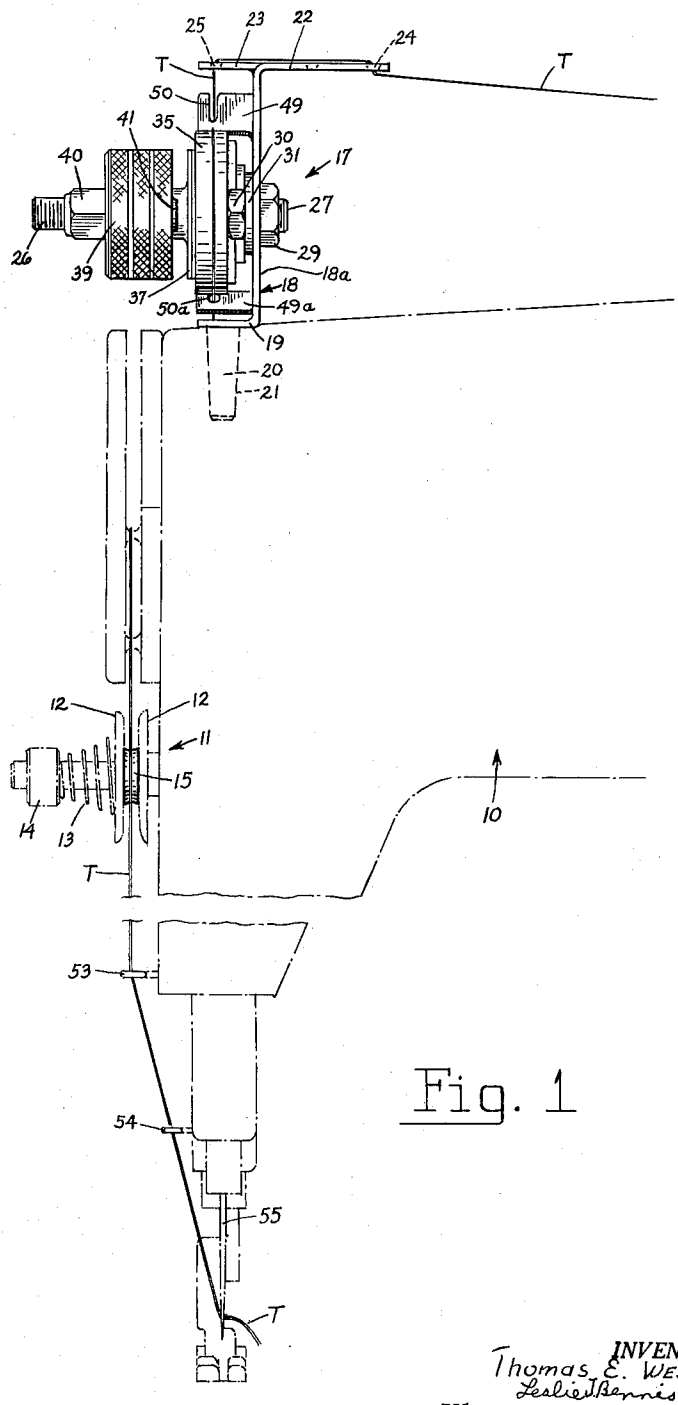



Fig. 1

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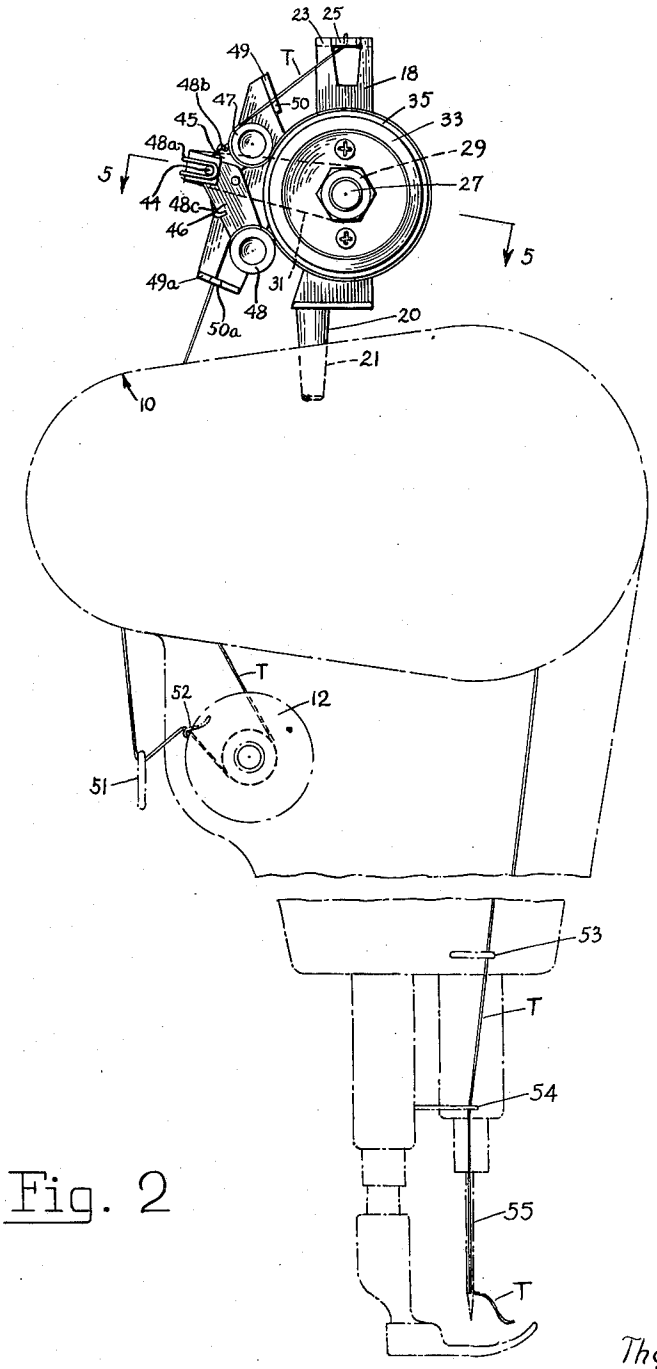



Fig. 2

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TENSION ROLLER DEVICE

Filed Sept. 25, 1958 3 Sheets-Sheet 3

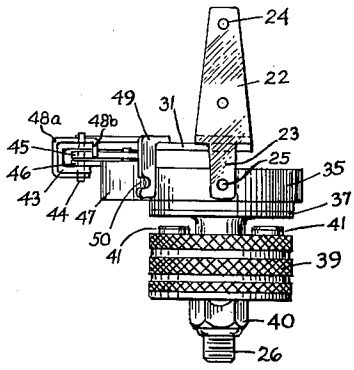



Fig. 4

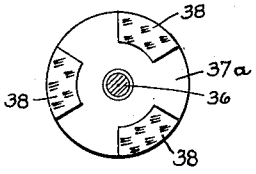



Fig. 6

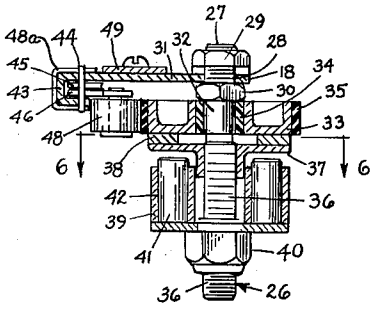



Fig. 5

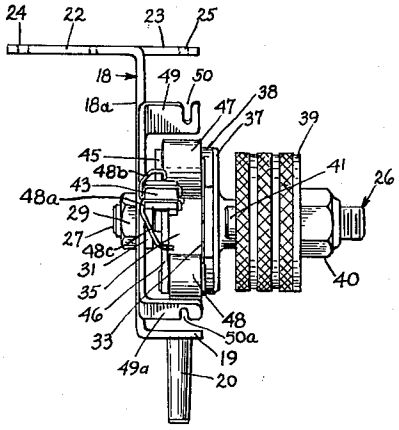



Fig. 3

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United States Patent Office

2,978,203

Patented Apr. 4, 1961



2,978,203

# TENSION ROLLER DEVICE

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3 Claims. (Cl. 242—155)

This invention relates to textile machinery and more particularly to tensioning devices for controlling thread tension in sewing machines and thread and/or tension in winding machines, warping and beaming machines and the like, on threads and yarns made of cotton or other natural fibre and/or synthetics.

Sewing machines and other textile machines presently, are equipped normally with spring and disc type or with all magnetic type or gravity type tensioning devices. It is found, however, that such tensioning devices do not always control thread tension in a satisfactory manner. This is especially true when the thread being used is subjected to some or all of the following conditions, irregularities, lint, and variable or poor surface lubrication. Moreover, in the use of twisted synthetic yarns, the squeezing effect of conventional tension discs causes the twist to run back, bringing about a very undesirable sewing condition.

Objects and features of the present invention are the provision of a roller type tension device that will maintain the desired control of tension when the thread or yarn is subjected to the conditions hereinabove enumerated and also will allow twisted thread or yarn to pass over the rollers of the device without affecting the twist.

Further objects and features of the invention are the provision of a roller type tension device that will yield a good stitch with less tension on the thread or yarn, which will permit longer sewing or other thread runs between thread breaks than those available with conventional tensioning means and which also will yield more uniform stitches or the like than possible with the aforementioned conventional means.

Other objects and features of the invention are the provision of a roller tension device that may be readily installed in existing as well as new machines.

Still further objects and features of the invention are the provision of a roller tension device of simple mechanical structure that is easy to install and operate and requires a minimum of servicing over long periods of time.

Yet other objects and features of the invention are the provision of a roller tension device that is simple and relatively inexpensive.

Other objects and features of the invention are the provision of a roller tension device, enabling operation of the machine at higher speeds with automatic compensation for thread imperfections, variations in wax treatment of the thread and the generation of static electricity particularly in synthetic threads which affect the formation of the loop in the bobbin when forming a stitch.

Other objects and features of the invention will become apparent from the following specifications and the accompanying drawings wherein:

Figure 1 is an elevational view of a sewing machine on which the roller tension device of this invention has been installed;

Figure 2 is an end elevation of the arrangement of Figure 1 seen from the left end of the machine;



Figure 3 is an elevational view of the roller tension device of this invention;

Figure 4 is a plan view of the device of Figure 3;

Figure 5 is a section of the tension device taken along line 5—5 of Figure 2 viewed in the direction of the arrows and illustrating structural details of the tensioning device; and

Figure 6 is a section taken along line 6—6 of Figure 5.

Referring to the drawing and first to Figures 1 and 2, the reference character 10 denotes a conventional sewing machine. This machine is equipped, for example, with a conventional tensioning arrangement 11 consisting of a pair of groove forming discs 12 which are urged together by an adjustable biasing spring 13 whose biasing pressure is adjustable as by a threaded nut 14. In utilizing the present invention, a spacer 15 is inserted between the discs 12 to maintain them spaced apart at a distance greater than thickness of thread used in the machine so that thread T passing between the disc 12 is merely guided by them without friction or tension.

The roller tension device 17, in the embodiment shown, comprises a frame or bracket part 18 having a lateral foot part 19 which is supported from and secured to the machine frame as by a tapered pin 20 extending from foot part 19 and adapted to be rammed into a tapered hole 21 in the frame of machine 10 or by any other suitable means to maintain the bracket 18 in position thereon. In other types of machines different securing and supporting devices may be used. Oppositely extending arms 22 and 23 forming a cross head on the bracket 18 at its upper end are provided with thread receiving guide holes 24 and 25 through which the thread T from a source (not shown) may be passed.

A mounting stud 26 has a threaded end portion 27 extending through a hole 28 in the upright portion 18*a* of the bracket 18. This stud 26 projects laterally from portion 18*a* and is tightened into position as by nuts 29 and 30 which are screwed on the threaded stud portion 27. A support arm 31 is carried on the threaded portion 27 of stud 26 and its angular position thereon is adjustable for purposes presently to be described by loosening and tightening of the nut 29. The nut 30 may be replaced by an enlarged shoulder (not shown) on stud 26 if desired.

The stud 26 is provided in its length with a smooth surfaced bearing portion 32 on which a tension roller 33 is rotatably supported by bearing 34. The roller 33 is also axially movable on portion 32 of stud 26. A friction surface 35 of rubber or the like is provided for the periphery of roller 33.

A threaded portion 36 at the other end of stud 26 serves to threadedly receive a disc 37. The latter may be screwed onto threaded portion 36 to bring its side surface 37*a* into proximity with a surface of roller 33. The latter is preferably of magnetic material such as iron or steel while disc 38 is of non-magnetic material such as brass, copper or plastic. Friction pads 38 of cork, rubber or the like are provided on the surfaces 37*a* of disc 37 to provide a friction surface engageable with the side surface of the tensoin roller 33. Roller 33 is free to rotate on smooth surfaced portion 32 and is also movable axially on the latter between the nut 30 and disc 37. The braking action of surface pads 38 of disc 37 on the side surface of roller 33 is a function of the pressure between such said friction pads and said side surface of said roller.

A barrel 39 is adjustably secured on the threaded portion 36 of stud 26 and may be adjustably movable axially of stud 26 toward and away from roller 33 by appropriate rotation on said threaded portion. A lock nut 40 serves to lock the barrel 39 in any adjusted position.

A plurality of permanent magnets 41 extend in axial recesses 42 in barrel 39 in axial parallelism with stud 26. These magnets 41 are secured fixedly to the barrel in said holes 42. The magnetic attractive force exerted by these magnets 41 on the roller 33 depends upon the distance thereof from the ends of said magnets and this distance is adjustable as described by appropriate threaded rotation of barrel 39 on threaded portion 36 of stud 26. Other means of creating drag on roller 33 as by use of springs or friction are contemplated and possible.

A yoke 43 is provided on the outer end of the support arm 31. This yoke provides adjustable, independent pivotal support as by a pivot pin 44 for a pair of separate arms 45 and 46 which respectively carry pressure roller 47 and idler roller 48. A biasing spring 48*a* is carried by the yoke 43. This spring has arms 48*b* and 48*c* which respectively engage the arms 45 and 46 and this tends to bias the said arms so that the rollers 47 and 48 are biased to bear on the surface 35 of tension roller 33 and the individual movability on pivot pin 44 of the arms 45 and 47 permits separate movement under the biasing action of spring 48*a* of these arms and consequently of rollers 47 and 48 against said surface 35.

Lateral extensions 49 and 49*a* are carried by the support arm 31 and are respectively provided with a thread receiving passage, eyelet or slot 50 or 50*a*.

The thread T from a source such as a spool (not shown) is passed respectively through guide holes 24, 25 and slot 50, then around pressure roller 47 then around the frictional surface 35 of tension roller 33, then around idler roller 48, then through eyelet or slot 50*a* and then through the conventional loop 51 of machine 10 and spring eyelet 52, then through the guide space between the separated discs 12 and finally through loops 53 and 54 and through the eye of machine needle 55.

The rollers 12 as explained before act merely as guides and no longer function as tensioning means. Tension of the thread T is effected by the drag on tension roller 33 as a result of the frictional engagement of its surface with the surfaces of the braking pads 38 on the surface of disc 37. The extent of frictional drag is a function of the pressure between the braking surfaces and the degree of magnetic attraction of magnets 41 on the tension roller 33, the closer said magnets are to said roller, the stronger the attraction and the higher the pressure. This magnetic effect is adjustable by threaded rotation of barrel 39 on stud 26 and may be closely regulated to desired requirements of tensioning action by roller 33 on thread T. Since the thread T passes over the flat frictional surface 35 of roller 33 the adjustable frictional drag on the latter under action of magnets 41 and brake pads 36 provides desired tension on the thread passing to needle 55 because the thread acts as a driving medium for roller 35.

The retarding force of magnets 41 and brake surfaces 36 on roller 33 affects the tension of the thread T, increasing as said roller 33 becomes harder to rotate. As tension increases, the thread would have a tendency to slip. To prevent this the rubber friction surface 35 is provided for said roller. In addition, the pressure roller 47 and idler roller 48 are biased by spring 48*a* to apply pressure to the thread T on the surface 35. This pressure causes the thread to have a greater surface drag. Also, because of the adjustable arrangement of arm 31 and rollers 47 and 48, pressure of thread T may be increased or decreased by changing the angular location of arm 31 with its flanges 49 and 49*a* through whose slots 50 and 50*a* the thread T passes, and also by individual biasing by spring 48*a* of arms 45 and 46 on pivot pin 44. In the embodiment shown, pressure of thread T on surface 35 of tension roller 33 increases as arm 31 is moved counterclockwise and decreases when it is moved clockwise. When the machine is stopped there is no tension on thread T. However, rollers 47 and 48 may be moved away from roller 33 to permit threading. Although the tension device has been described in connection with a sewing machine, it may be used on other textile machines such as those mentioned at the outset of this specification.



The tension roller device of this invention has inherent advantages over conventional tensioning arrangements in that it compensates for changes in thread drag when the needle is on its upstroke and prevents breaking of the thread. The roller in effect evens out the flow of the thread and does not reflect the uneven pull pattern caused by the stitching operation. When operating at high speeds of the order of 4000 to 6000 r.p.m. any uneven pull can break the thread. High speed operation of the machine equipped with the present invention does not cause thread breaks.

While a specific embodiment of the roller tension device has been described, variations within the scope of the appended claims are possible and are contemplated. There is no intention, therefore, of limitation to the exact details shown and described.

What is claimed is:

1. A roller tension device for a textile machine comprising a bracket attachable to said machine, a stud carried by said bracket, a tension roller rotatably carried by said stud and also movable axially thereon, said roller having a peripheral friction surface a friction brake member carried on said stud and having a braking surface against which a surface of said roller may be moved to effect braking action on the latter as a function of pressure between the surfaces, magnetic means also carried by said stud and movable thereon toward and away from said roller to vary its magnetic attractive force on the latter and thus vary said pressure and the consequent braking action of said braking means, said roller being adapted to have thread of the machine passed around its peripheral friction surface, a support arm carried on said stud, means for adjusting the position of said support arm, a pair of flanges carried on said support arm having thread receiving openings, a yoke on said support arm, a pair of individually movable separate arms carried pivotally by said yoke, a biasing spring carried by said yoke and having portions engaging both said arms, and a separate roller carried by each of said separate arms and individually biased toward said peripheral friction surface of said tension roller by action of said biasing spring on said separate arms for pressing said thread against said last-named surface.

2. A roller tension device for a textile machine comprising a bracket attachable to said machine, a stud carried by said bracket, a roller rotatably carried by said stud and also movable axially thereon, a peripheral friction surface for said roller, a disc member having brake pads providing a braking surface carried by said stud against which a surface of said roller may be pressed to effect braking action on the roller as a function of the pressure between the latter two surfaces, a barrel adjustably mounted on said stud for movement toward and away from said roller, magnets carried by said barrel whose attractive force on said roller is a function of their distance therefrom and of the position of said barrel to thereby vary said pressure and consequently the braking action on said roller, a support arm carried on said stud, means for adjusting the position of said support arm, a pair of flanges on said support arm and having thread receiving openings, a yoke on said support arm, a pair of individually movable separate arms pivotally mounted on said yoke, a biasing spring carried by said yoke and having portions engaging both said arms, and a separate roller carried by each of said separate arms and individually biased toward said peripheral friction surface of said tension roller by the action of said biasing spring on said separate arms for pressing said thread against said last-named surface.

3. A roller tension device for a textile machine comprising a bracket attachable to said machine, a stud carried by said bracket, a roller rotatably carried by said stud and also movable axially thereon, a peripheral fric-

tion surface for said roller, a disc member having brake pads providing a braking surface carried by said stud against which a surface of said roller may be pressed to effect braking action on the roller as a function of the pressure between the latter two surfaces, means for varying the said pressure and consequently the braking action on said roller, a support arm adjustably carried on said stud, means for securing the support arm in adjusted position on said stud, a pair of flanges having thread receiving openings carried by said support arm, a yoke on said support arm, a pair of individually adjustable separate arms pivotally carried by said yoke, a separate roller pivotally carried by each of said two last-named arms



and individually movable with its carrying arm into pressing engagement with the periphery of said friction surface and spring biasing means carried by said yoke to maintain the pressing engagement of said rollers relative to said periphery.

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