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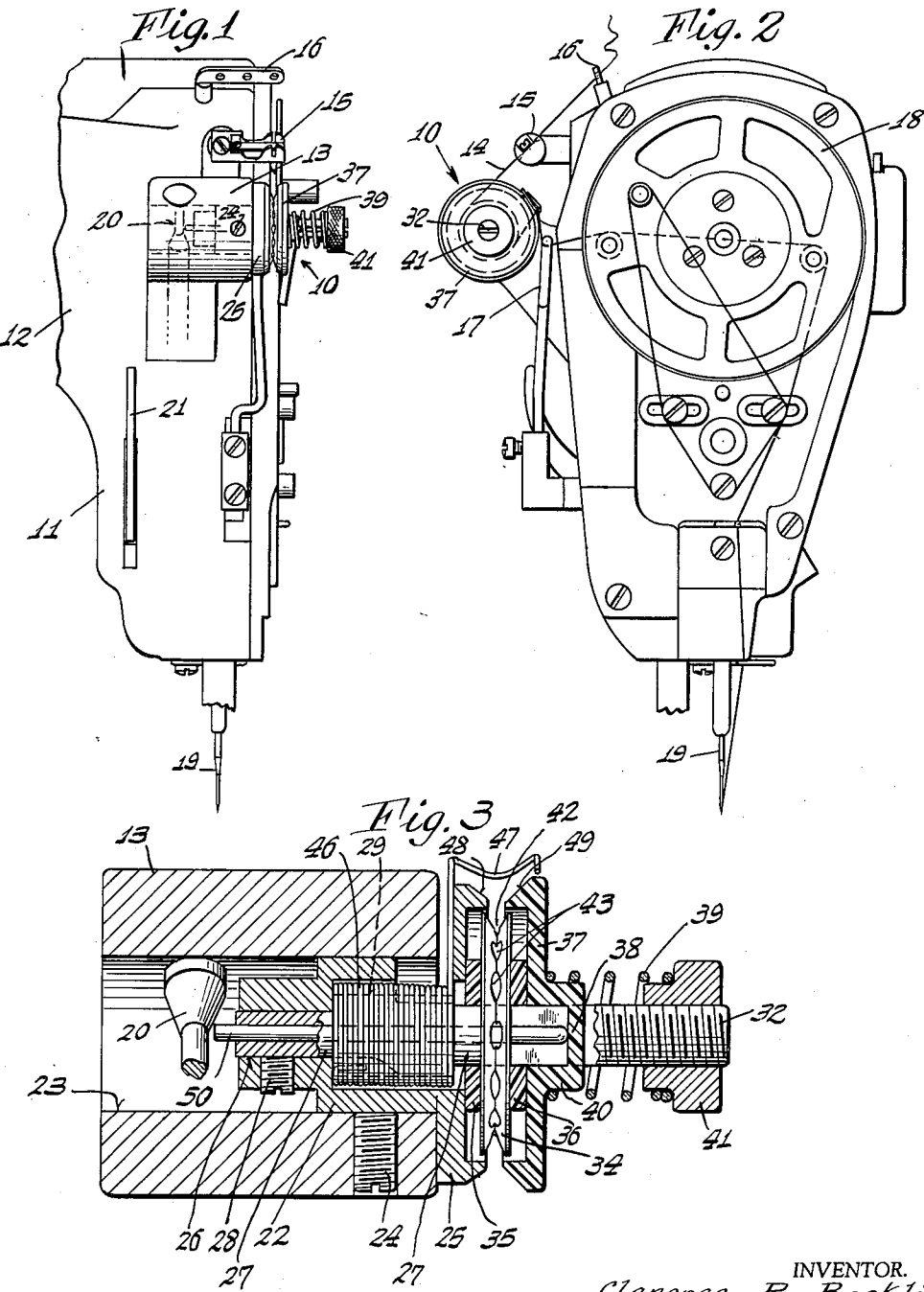
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3,000,591

ROTARY TENSION DEVICE FOR SEWING MACHINES

Filed Oct. 7, 1958

2 Sheets-Sheet 1



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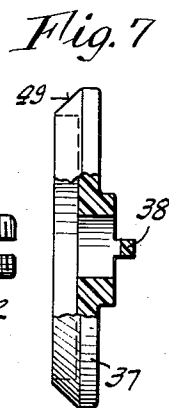
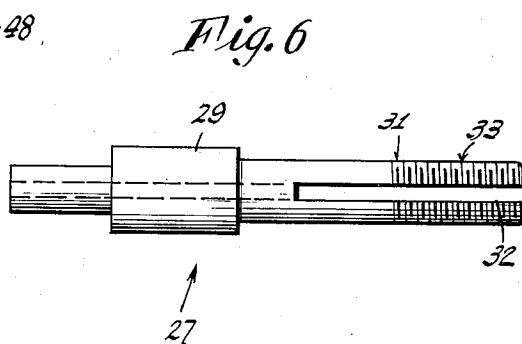
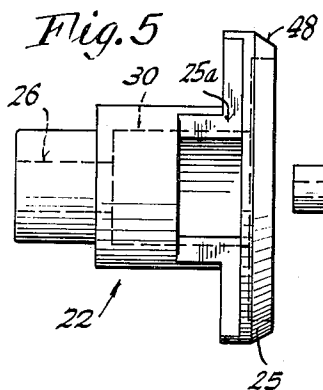
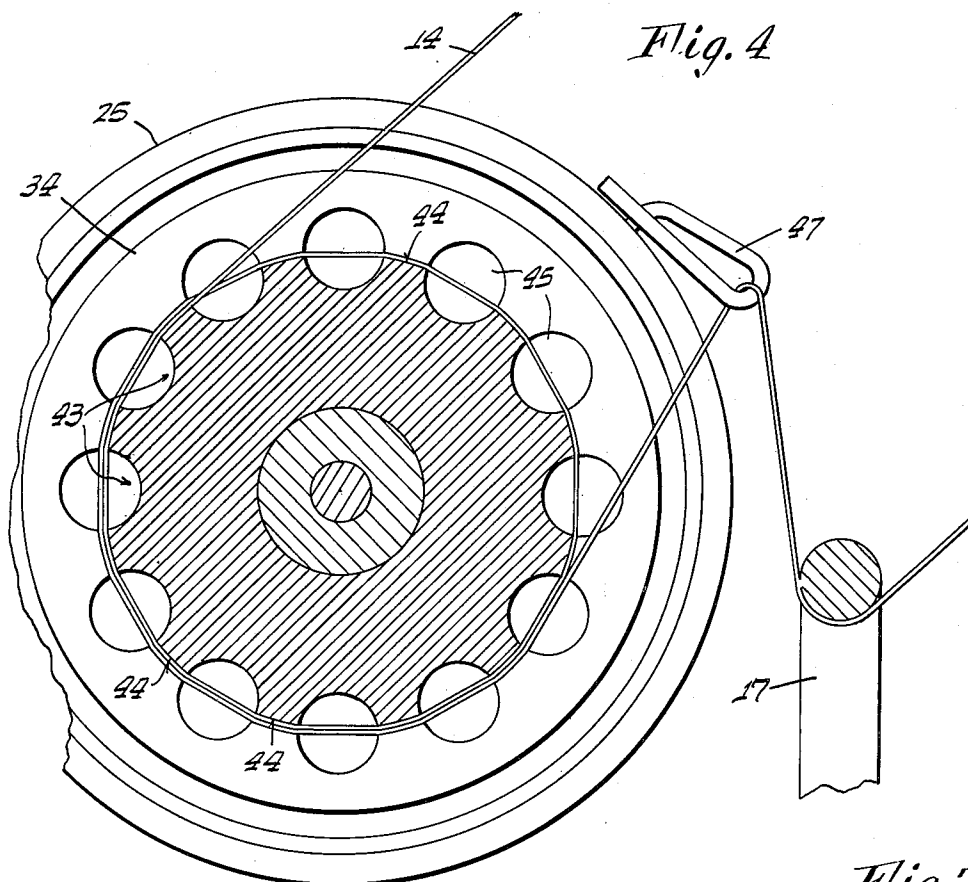
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3,000,591 ROTARY TENSION DEVICE FOR SEWING MACHINES

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2 Claims. (Cl. 242—155)

The present invention relates to rotary take-up devices for sewing machines.

With the advent of high speed sewing machines and the use of synthetic threads, problems of tensioning said threads during a sewing operation have arisen. With synthetic threads, they are more elastic or stretchier than the conventional cotton threads and hence the tensions must be more sensitive so that they will not distort the threads. With threads, such as cotton or silk which are not properly surface finished, tension devices, particularly in high speed sewing machines, must be employed which minimize friction upon the thread.

It is an object of the present invention to provide a sensitive rotary tension device which is capable of producing very light tensions on a thread and also one which provides more positive traction without undue surface friction on the thread such as might cause inadvertent breakage thereof.

This is accomplished, according to the present invention, by providing a tension device with lightweight parts and a unique tension wheel and brake means therefor. While aluminum and other similar materials may be used for the tension wheel and coating parts, it is at present preferred to use nylon because of its lightness in weight and its free running without the need of lubricants. The unique tension wheel has a peripheral thread-receiving groove and the groove is provided with recesses in the bottom thereof to produce a more positive traction of the thread therewith to rotate the same. Preferably, the recesses are formed by holes passing through the tension wheel and intersecting the bottom of the groove as this structure also lightens the weight of the tension wheel.

Other features and advantages of the invention will be apparent from the specification and claims when considered in connection with the accompanying drawings in which:

FIGURE 1 shows a back view of the head portion of a sewing machine showing the tension device in position thereon.

FIG. 2 shows an end view of the sewing machine head of FIG. 1.

FIG. 3 shows a longitudinal sectional view through the tension device and mounting boss.

FIG. 4 shows an enlarged sectional view of the tension wheel.

FIG. 5 shows a side view of the tension housing.

FIG. 6 shows a side view of the tension stud.

FIG. 7 shows a side view of the outer disk.

As shown in FIG. 1, the rotary device 10 of the present invention is mounted on a head 11 of a sewing machine 12 and is disposed in a mounting boss 13 provided thereon so that it projects rearwardly beyond the head and in position to engage a thread 14 fed thereto from a supply (not shown) through a preliminary light tension means 15 and guide 16. The thread, after leaving the tension device, passes under a fixed guide 17, to the rotary take up 18 of the machine, and from the rotary take-up to the sewing needle 19. The head carries the usual tension release pin 20 which cooperates with the tension device to release the tension on the thread when the usual presser foot lever 21 is raised to move the presser foot (not shown) out of contact with the material being sewn.

The tension device as shown in the drawings com-

prises a tension housing 22, as shown in FIGS. 3 and 5, adapted to be mounted in a bore 23 in the boss 13 and secured therein by a set screw 24. It has an enlarged head 25 at the forward end and is provided with a bore 26 in which a tubular tension stud 27, shown in FIG. 6, is mounted. The stud is fixed to the housing by a set screw 28. The tension stud has an enlarged section 29 which is adapted to be positioned in spaced relation with the walls of an enlarged portion 30 of bore 26 in the housing and is provided on its outer end with a portion 31 of reduced diameter having a bifurcated end 32 which is threaded at 33. Mounted for rotation on the tension stud is a tension wheel 34 and a pair of tension or braking washers 35, 36. The inner tension washer 35 engages the face of the enlarged section 25 of the housing and one face of the tension wheel. The other tension washer 36 engages the other face of the tension wheel and is engaged by an outer tension disk 37 which is slidably mounted on the end of the stud and is provided with a cross-piece 38 which extends through the kerf forming the bifurcated end of the stud to prevent rotation of the disk on the stud. A light tension spring 39 surrounds the hub 40 of the outer disk and has its other end engaged by a knurled nut 41 threaded on the end of the bifurcated stud.

With this arrangement it will be seen that the spring causes the outer disk to press the tension washer 36 against the tension wheel 34 and the second tension washer 35 against the enlarged section 25 of the fixed housing, thus applying a braking action to the tension wheel to retard its rotation by the thread passing thereover and to produce the required tension on the thread.

By adjusting the pressure of the spring by the knurled nut 41 it will be seen that the amount of tension pressing the outer disk to clamp the tension wheel and braking washers between it and the housing will be varied and alter the braking action on the rotating tension wheel. The resistance to rotation by the thread as it is fed to the needle during the sewing operation provides the required tension in the thread during the sewing operation.

While the lightweight tension wheel and associated elements, such as the tension washers and outer disk, may be made of aluminum, fiber or the like, it is at present preferred to form them of nylon which may be readily formed, is light in weight, and has smooth contacting surfaces which are free running without requiring lubricants. This results in a highly sensitive lightweight device for accurately controlling the tension on the thread.

A feature of the present invention resides in the construction of the tension wheel which includes a peripheral thread-engaging groove 42, preferably a V-shaped groove, and has a plurality of recesses 43 formed in the bottom wall of the groove. Thus when the thread is wound once or twice around the wheel it will have greater traction with the wheel. This will be clear from FIG. 4 of the drawings in which it will be apparent that the thread is supported by the arcuate surfaces 44 between the recesses and extends in a straight line between the edges of said surfaces as it passes over the recesses. In this way the thread is given an added traction with the wheel since the edges of the recesses provide feeding surfaces for engagement by the thread to enhance the traction with the wheel. However, the edges are not sufficiently sharp to have an abrasive action on the thread as it passes there-through.

While the recesses may be formed in many ways, it is at present preferred to form them as transversely extending holes 45 passing through the tension wheel. As herein illustrated the holes are arranged in an annular row with the walls of the holes intersecting the bottom of the groove to provide the recesses between the arcuate surfaces. This greatly simplifies the manufacture of the

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wheel, particularly when nylon or the like lightweight plastic material is employed.

If desired, a check spring 46 can be provided on the device and as herein illustrated in FIG. 4, it is mounted in the enlarged bore 30 of the tension housing surrounding the stud portion 29. It has one end anchored to the stud and the other end is formed into a check loop 47 extending outwardly therefrom through slot 25a in the housing to overlie the tension wheel and yieldingly support the thread as it passes from the tension device to the fixed guide 17. This tends to keep the thread taut as it passes from the tension wheel to the rotary take-up 18 during the starting and stopping of the sewing machine and eliminates any sharp pulls or jerks in the thread which might cause the thread to break.

If desired, the tension housing and outer disk can be provided with bevelled edges as shown at 48, 49 in FIG. 3 which overlie the sides of the tension wheel and serve to guide the thread into the peripheral groove as the thread is wound into place on the tension device during a threading-up of the machine.

When it is desired to release the braking action of the device on the passage of thread therethrough, the tension release pin 20 is operated to the conical head thereof to engage a stud release pin 50 carried in the tubular stud so as to project at one end beyond the end of the tension stud. The other end of the stud release pin bears against the transverse portion 38 of the outer disk and is operated to move the disk outwardly and release the pressure of the tension spring from the tension washers and tension wheel whereby the tension wheel is free to rotate as the thread is pulled therethrough.

It will be seen, therefore, that I have provided a novel tension device which is lightweight in construction and smooth and sensitive in its operation whereby an accurate control of the tension may be had on a sewing thread during the sewing operation to prevent stretching of synthetic fibers or undue breaking of cotton or silk fibers which do not have surface lubrication thereon.

A feature of the present invention resides in the novel friction wheel which is preferably of unitary construction and having an improved traction surface for the thread which is wrapped therearound and tends to rotate the wheel against the braking action of the tension device to produce the accurate control of the tension on the thread.

Variations and modifications may be made within the scope of the claims and portions of the improvements may be used without others.

I claim:

1. In a rotary tension device for a high speed sewing machine, a tension housing adapted to be mounted on a sewing machine and having a tubular tension stud fixed

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therein to project therefrom, said stud having a shoulder thereon and a bifurcated end portion, a tension wheel having a pair of braking washers on opposite sides thereof rotatably mounted on the stud with one washer engaging the housing, an outer disk slidable on the stud and having a portion cooperating with the bifurcated portion of the stud to prevent rotation thereof on the stud, and adjustable spring means urging the outer disk toward the housing and applying braking pressure on the tension wheel disposed therebetween, the improvement wherein said wheel and braking washers are formed of nylon and said wheel has a peripheral groove and has transverse spaced holes extending through the wheel and intersecting the bottom of said peripheral groove whereby a lightweight wheel having improved thread traction is provided.

2. In a rotary tension device for a high speed sewing machine, a tension housing adapted to be mounted on a sewing machine and having a tubular tension stud fixed therein to project therefrom, said stud having a shoulder thereon and a bifurcated end portion, a tension wheel having a pair of braking washers on opposite sides thereof rotatably mounted on the stud with one washer engaging the housing, an outer disk slidable on the stud and having a portion cooperating with the bifurcated portion of the stud to prevent rotation thereof on the stud, and adjustable spring means urging the outer disk toward the housing and applying braking pressure on the tension wheel disposed therebetween, the improvement wherein said outer disk, wheel and braking washers are formed of nylon and said wheel has a V-shaped peripheral groove and has an annular row of transverse holes extending through the wheel and intersecting the bottom of said peripheral groove whereby a lightweight wheel having improved thread traction is provided.

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