Jan. 31, 1950 W. C. BOYER 2,496,117

THREAD CONTROLLING DEVICE FOR SEWING MACHINES

Filed March 23, 1948

Fig. 1

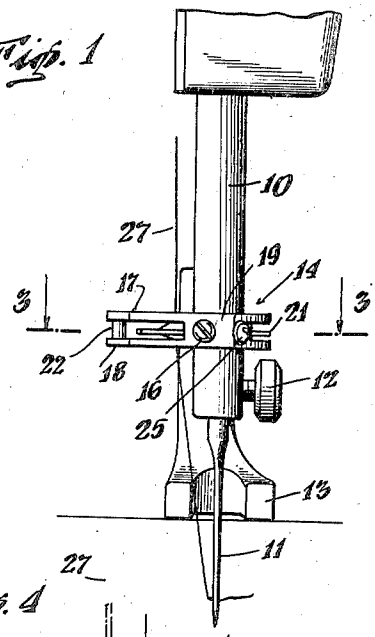


Fig. 2

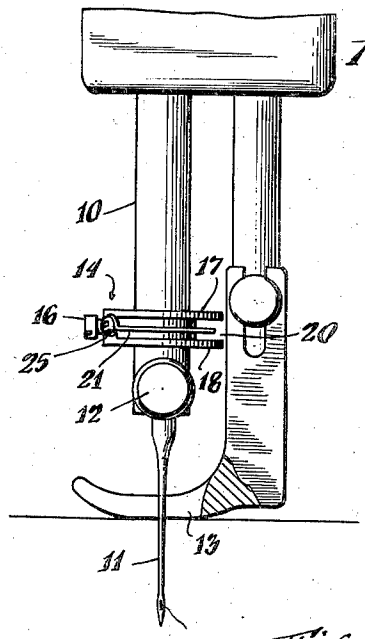


Fig. 4

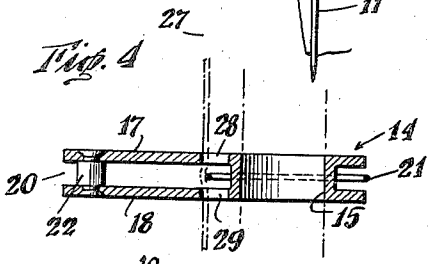


Fig. 7

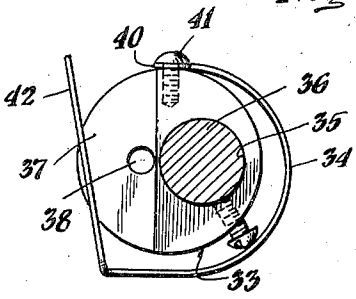


Fig. 3

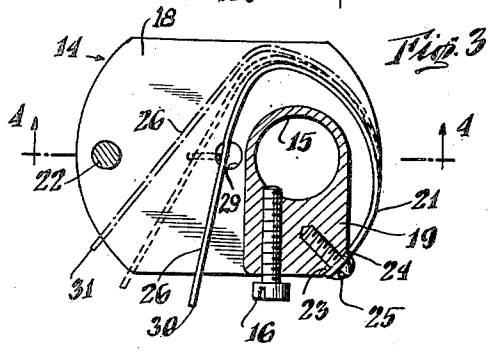


Fig. 6

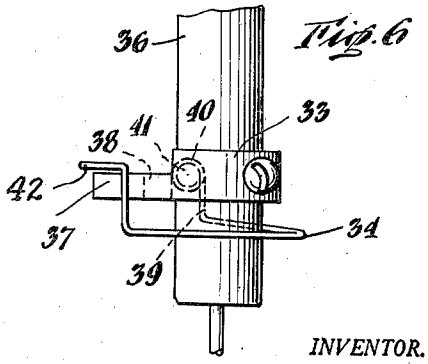
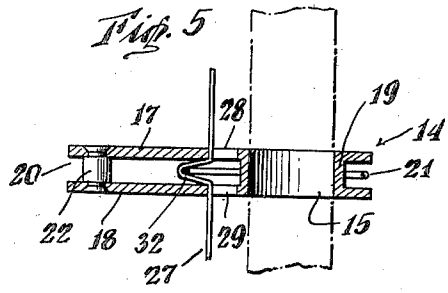


Fig. 5



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Patented Jan. 31, 1950 2,496,117

UNITED STATES PATENT OFFICE

2,496,117

THREAD CONTROLLING DEVICE FOR SEWING MACHINES

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Application March 23, 1948, Serial No. 16,464

6 Claims. (Cl. 112—254)

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This invention relates to thread-controlling devices for sewing machines and particularly to devices for enabling high speed sewing with thread made from synthetic organic plastic materials, such as nylon.

Among the objects of the invention is to provide a device for controlling a thread during the reciprocating strokes of a needle of a sewing machine so as to enable sewing at high speeds. Commercial sewing machines, such as are used in the garment trade, operate to form 50 to 80 and more stitches per second, and sewing is satisfactorily accomplished at these speeds with cotton and silk threads. When a thread made from synthetic organic plastic material, such as nylon, is employed, the same machines do not adequately control the thread and failures often occur because of breakage of the thread. At high speeds of operation, the acceleration which the thread acquires as the thread is pulled by the movement of the needle becomes very high. The high acceleration of the thread tends to cause the thread to over-shoot and pull more thread to the vicinity of the needle than is necessary; consequently, the thread assumes various curvilinear courses in the vicinity of the hold-down foot of the machine and sometimes there is a lengthening of thread above the eye of the needle sufficient to hook around the foot or other part of the machine. When this occurs the thread is broken and sewing is interrupted.

The reasons for the breaking of the thread even when the hold-down foot of the machine does not snare the thread are not fully understood, but the present invention does obviate the breaking of the thread even though the machine is operated at high speeds. At the same speeds of operation loops are not as apt to form with a cotton thread and this is probably because the individually twisted strands offer considerable resistance to one another. With nylon thread the friction between the twisted strands is practically nil. As one strand moves past another one whenever the thread is bent, the thread tends to form a loop as it endeavors to untwist. It has been observed that loops are formed with nylon thread in the vicinity of the hold-down foot as the needle reciprocates and that such loops thrash about erratically above the material being sewed as well as below. The thread extending to the needle eye tends to deflect laterally almost immediately after the needle starts to descend, and as the needle advances downwardly the tension in the thread is lessened and the deflection from a lineal course increases. Near the bottom of the stroke

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and when tension has been removed from the thread the deflection tends to form into a loop as the thread thrashes about and the loop enlarges as the needle rises.

With the thread-controlling device of the present invention detrimental looping of the thread is avoided. This is probably because of the ability of the device resiliently to take up just sufficient thread to avoid the enlargement of a loop while maintaining the thread under proper tension. Whatever the explanation may be, the device of the present invention enables sewing with nylon thread at high speeds without interruption caused by breakage of the thread.

Referring to the drawings,

Fig. 1 illustrates an elevational view of the device of the present invention attached to the needle bar of a sewing machine;

Fig. 2 is a view from the right side of Fig. 1;

Fig. 3 is a sectional view of the device on line 3—3 of Fig. 1;

Fig. 4 is a sectional view on line 4—4 of Fig. 3;

Fig. 5 is a sectional view similar to Fig. 4 showing a different position of the thread as it passes the device;

Fig. 6 is an elevational view of a modified form of the device; and

Fig. 7 is a plan of the device illustrated in Fig. 6.

In Figs. 1 and 2 there is illustrated a head of a conventional sewing machine and a needle bar 10 slidably mounted in the head and adapted to support a needle 11. In the present instance the upper end of the needle is contained in a socket in the needle bar and held in place by a thumb screw 12 although it is immaterial how the needle is supported. The hold-down foot 13 is supported from the head.

The device of the present invention comprises a member and a spring for engaging a thread. The spring resiliently displaces the course of the thread with respect to the member, the thread-engaging portion of the spring being so disposed as to bend a thread passing said member in a direction transverse to the normal course of the thread to the eye of the needle. The member is mounted to reciprocate with the needle and is preferably located close to the needle. As shown in Figs. 1 and 2, the device is attached to the needle bar in the vicinity of its lower end. While the device may assume various forms and be fabricated in different manners, a form which has proven satisfactory is illustrated in the drawings. This device comprises a member 14 which is bored to provide an opening 15 for accommodating the needle bar 10. A set screw 16 is conveniently lo-

cated in the member to extend into contact with the needle bar firmly to secure the member thereto. The member has a pair of parallel flanges 17 and 18 which extend from a core 19 and provide a space 20 for the accommodation and protection of a spring 21. These flanges may be produced by milling a solid block of metal or of other durable material in such a manner as to leave the core 19. The rigidity of the flanges may be reinforced by a spacing pin 22 which is shouldered and riveted to each of the flanges.

The spring is preferably made of round spring wire. The core has a flat surface 23 for seating one end of the spring. The spring is bent to provide a ring 24 which is engaged by a screw 25 whereby the spring is securely anchored in cantilever fashion. Extending from the ring 24 the spring is curved about the axis of the bore 15 and is provided with a bend which extends into a substantially straight portion 26. The spring lies midway between the flanges 17 and 18 and is free to flex considerably when pressure is applied thereto. The substantially straight portion 26 is adapted to engage a thread as it travels past. The spring is of sufficient length to extend beyond the perimeter of the flanged member to enable manipulation of the spring for threading the thread through the device.

The thread 27 passes through the device through openings 28 and 29 in flanges 17 and 18, respectively. These openings preferably are aligned with respect to each other on an axis parallel to the bore 15. For threading the thread through these openings the spring is forcibly flexed towards the core 19 and over or beyond the openings 28 and 29. When the spring is released it will engage the thread and assume a position between the positions 30 and 31, depending upon the tension in the thread, Fig. 3. As the needle reciprocates in a sewing operation, the tension in the thread varies and the spring fluctuates with the varying tension. As an excess of thread presents itself during the stroking of the needle and the tension in the thread diminishes, the spring tends to take up the thread by displacing it between the two flanges in a manner generally illustrated in Fig. 5. The thread is thereby displaced from the edges of the openings 28 and 29 by a bend 32 extending between the flanges. This action results in preventing excess looping of the thread between the device and the eye of the needle and attendant fouling of the thread with some part of the machine, such as the hold-down foot. The spring fluctuates during the stroking of the needle as the bend 26 varies in size.

The form of the device illustrated in Figs. 6 and 7 comprises a member 33 in the form of a disk and a spring 34. The member is bored at 35 to engage the exterior of a needle bar 36. The member is provided with a flange 37 extending from one side of the bore 35. An aperture 38 for accommodating the thread through the member is located in the flange relatively close to the needle bar. The spring 34 is bent circularly for a portion of its length and is provided with a projection 39 at one end which terminates in a ring 40 by which the spring is fastened to the member 33 with a screw 41.

The movable end of the spring is upturned and provided with a relatively straight length 42 which extends parallel to the surface of the flange 37 but spaced therefrom so as to be free to fluctuate. The thread passing the member is engaged by the movable portion 42 of the spring

and the edge of the aperture 38, and is displaced laterally from the aperture as the tension in the thread varies. This device operates similarly to the device previously described and resiliently takes up upon the thread above the needle eye by laterally urging the thread in a direction crosswise of the aperture 38.

The invention is capable of numerous forms and various applications without departing from the essential features herein described. It is therefore intended that the specific forms of construction herein described be deemed illustrative and that the patent shall cover all patentable novelty herein set forth; reference being had to the following claims rather than to the particular forms herein shown to indicate the scope of this invention.

What is claimed is:

1. A sewing machine device for controlling a thread between a source of supply and the eye of a needle and comprising a member having a pair of flanges spaced from one another, said flanges having aligned openings for the passage of thread therethrough, a cantilevered spring secured to said member and having a movable portion disposed between said flanges and adapted to flex in a plane substantially parallel to said flanges, said portion of the spring being movable in a direction crosswise of the axis of said openings and having such resiliency as to displace a thread passing through said openings laterally thereof and between said flanges, and means for mounting said member to reciprocate with said needle.

2. A sewing machine device for controlling a thread between a source of supply and the eye of a needle and comprising a block, said block having a bore for engaging the needle bar of a machine, a pair of flanges cut from said block, said flanges being spaced from one another, said flanges having aligned openings for the passage of thread therethrough, a cantilevered spring secured to said block and having a movable portion disposed between said flanges and adapted to be flexed in a plane substantially parallel to said flanges, said portion being movable crosswise of the axis of said openings with such resiliency as to displace the thread passing through said openings laterally of the thread adjacent the outer surfaces of said flanges.

3. In a sewing machine wherein a needle is supported by a reciprocatory bar and thread is supplied through training devices to the eye of the needle as the needle reciprocates, the combination with said training devices of a thread controlling device constructed and arranged to engage a thread extending to the eye of a needle, said thread controlling device comprising a member having an opening therein for the passage of the thread therethrough, a spring attached to said member and having a movable portion disposed to be moved in a direction perpendicular to the axis of said opening, the resilience of said spring being such as to normally dispose the movable portion of said spring laterally away from said opening, said spring serving to engage a thread between itself and an edge of said opening and to flex during a sewing operation and variably bend the thread adjacent said opening, and means for attaching said thread controlling device to the needle supporting bar of the sewing machine.

4. In a sewing machine wherein a needle is supported by a reciprocatory bar and thread is supplied through training devices to the eye of the needle as the needle reciprocates the com-

bination with said training devices of a thread-controlling device constructed and arranged to engage a thread extending to the eye of the needle, said thread-controlling device comprising a member extending laterally with respect to the needle-supporting bar and having means for engaging a thread travelling past the member, a cantilevered spring mounted on said member and having a thread-engaging portion extending in a plane substantially normal to said needle-supporting bar and spaced vertically from said thread-engaging means of said member, said spring being adapted to fluctuate with respect to said member and change the course of the thread adjacent said thread-engaging means of said member in accordance with changing tension in the thread during a sewing operation, and means for attaching said thread-controlling device to the needle-supporting bar of the sewing machine.

5. A sewing machine device for controlling a thread between a source of supply and the eye of a needle and comprising a member having an opening for the passage of a thread therethrough, a spring mounted on said member and having a portion thereof resiliently movable in a direction crosswise of said opening, said movable portion of said spring being adapted to engage a thread passing through said opening and direct the course of the thread extending over the spring and the edge of said opening into variable bends

in accordance with changes in tension of the thread as the thread passes said member and spring during a sewing operation, and means for mounting said member to reciprocate with the needle.

6. A sewing machine device for controlling a thread between a source of supply and the eye of a needle and comprising a member having an opening for the passage of a thread therethrough, and a hair-pin spring having one end secured to said member and a free end with a substantially straight portion for engaging a travelling thread, said free end of the spring being adapted to move in a direction crosswise of and beyond the opening in said member subject to the influence of a travelling thread engaged by the edge of said opening and said free end of the spring during a sewing operation, and means for mounting said member to reciprocate with the needle.

WILLIAM CLIFFORD BOYER.

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