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1,860,072

TENSIONING DEVICE

Filed April 24, 1929

Fig. 1.

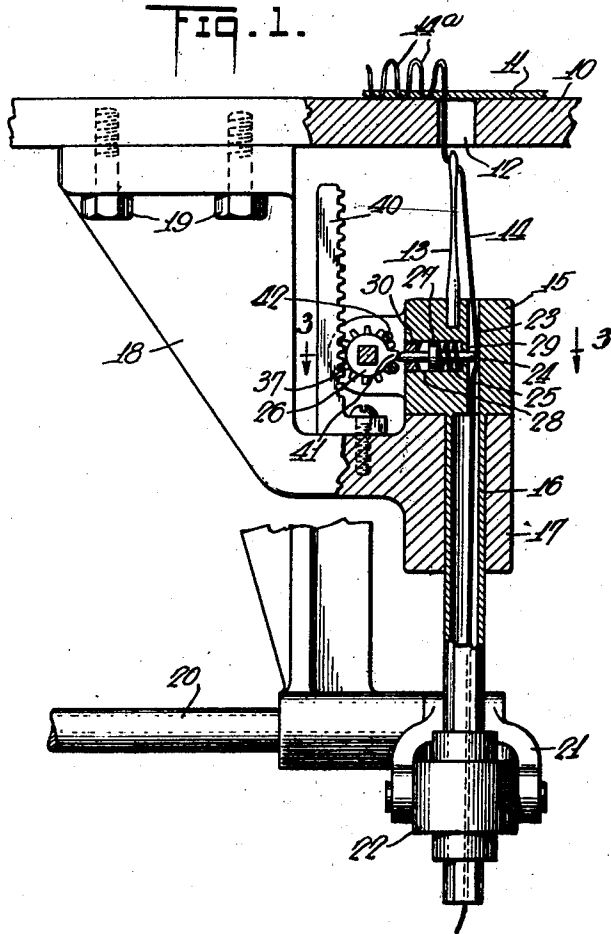


Fig. 2.

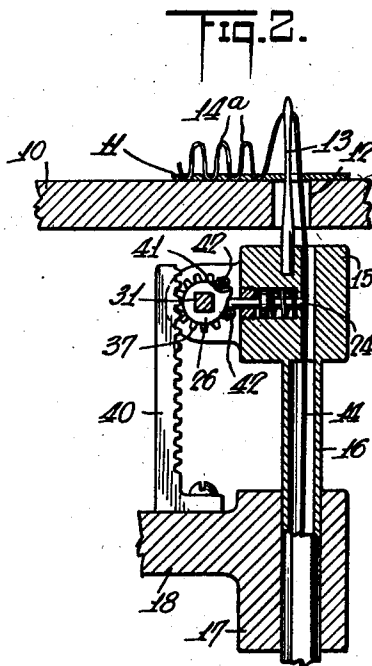
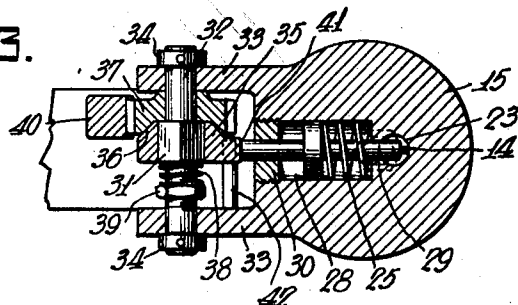


Fig. 3.



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TENSIONING DEVICE

Application filed April 24, 1929. Serial No. 357,822.

The present invention is concerned with a yarn or thread tensioning device which may have a wide range of utility wherever an intermittent or constant tension on a thread is desired.

It is peculiarly applicable, however, for use in connection with a looping and tufting machine of the character in which a needle having an eye therein carries a bight of thread through a fabric in one direction, and as the needle is withdrawn that portion of the bight between the needle and the source of thread supply must be withdrawn with the needle leaving a loop on the surface of the fabric formed by only a portion of the thread which was carried through by the needle.

In machines of this character, in the absence of some mechanism for definitely tensioning the thread so that part of it will be drawn back with the needle, the needle will withdraw, leaving two loops of thread, these loops being formed, of course, by the folding of the two sides of the bight on opposite sides of the needle eye.

Obviously, the formation of such a double loop is undesirable since neither of the loops will be properly anchored to the fabric and furthermore the loops would be of non-uniform size. In addition, in the absence of some tensioning means the thread would tend to bunch around the needle as the latter was withdrawn, forming a lump on the fabric surface and possibly breaking the thread as the needle withdraws.

In accordance with the present invention above noted difficulties are overcome and any possibility of double loop formation, bunching or lumping of the thread or breaking of the thread is avoided.

The needle moves through the fabric carrying a bight of thread of considerably greater length than the loop to be formed, the two portions of this bight lying on opposite sides of the needle eye. As the needle starts on its return stroke, however, my improved tension device comes into play gripping the thread between the needle eye and the spool or other source of thread supply whereby that half of the bight lying between the needle eye and the spool is positively withdrawn through

the fabric as the needle recedes. In most instances the end of the other portion of the bight which lies most closely adjacent the needle eye will also be withdrawn and the remainder of such side of the bight folded upon itself to form a loop of the required size on the face of the fabric after each reciprocation of the needle.

The invention may be applied to looping and tufting machines, embroidering machines, rug-making machines and all other machines wherein individual threads are used, regardless of whether such machinery is of the single needle type or employs a battery of needles operating either independently or in unison and regardless of whether the tension on the thread is to be a constant tension or is to be intermittently applied.

Whether or not cutter mechanism is used to cut the loops and form a pile fabric is immaterial to the present invention, although the tension device may efficiently serve to sustain the thread against being drawn through the fabric by the cutter, that is to say, the cutting operation may be conveniently performed during the time that the thread is tensioned.

Other and more general objects of the invention are to provide a device of the character noted above and which is of extremely simple, practical construction, which will be rugged, durable and efficient in use and well suited to the requirements of economical manufacture.

With the above noted and other objects in view, the invention consists in certain novel features of construction and combinations and arrangements of parts which will be more fully hereinafter described and pointed out in the claims.

The invention may be more fully understood from the following description in connection with the accompanying drawings, wherein:

Fig. 1 is a vertical sectional view through that portion of a looping and tufting machine which embodies the invention.

Fig. 2 is a view generally similar to Fig. 1, but showing the needle and carriage in their uppermost instead of their lowermost posi-

tion and showing the yarn released by the tensioning devices.

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

The drawings in the present case omit all showing of the portions of the machine which are non-essential to the invention, although reference may be had to my copending application Serial No. 454,469, filed May 21st, 1930, for a more complete understanding of the general nature of this type of machine.

The illustrated machine is of the character in which the fabric to be operated upon is supported in any suitable manner and a bight of yarn is carried upwardly through the fabric, then partially withdrawn so that a loop is formed upon the top of the fabric within view of the operator and any inaccuracies in the loop formation may be readily observed and corrected. 10 represents the fabric support of any suitable type, usually a table upon which the fabric 11 is retained. The support is provided with a needle opening 12 through which the needle 13 carrying the yarn 14 may move upwardly through the support and the fabric thereon, forming a series of loops 14a on the upper surface of the fabric. Showing of the means for feeding the fabric transversely of the plane of the needle movement has been omitted.

The needle 13 is mounted on a carriage block 15 having a hollow pendent extension 16 guided for vertical reciprocating movement in a bearing sleeve 17 formed at the end of a bracket 18 bolted or otherwise secured at 19 to the underface of the table 10.

The means for imparting a vertical reciprocating motion to the carriage block 15 may assume many forms and constitute no part of the present invention.

I have illustratively shown, however, a carriage reciprocating mechanism consisting of a rock shaft 20 carrying a yoke 21 straddling a collar 22 fixed upon the needle carriage extension 16 and operating to vertically reciprocate the carriage as the shaft 20 is rocked or oscillated.

The yarn 14 after being threaded through the needle passes downwardly through a relatively restricted yarn guide passage 23 in the carriage block 15, thence through the hollow carriage extension 16 and from the bottom of this carriage to the spool or other source of supply.

It will be seen that as the needle carriage moves upwardly in the position of Fig. 2 a bight of yarn is carried upwardly through the fabric, this bight being considerably longer than the proposed loop. The purpose of my improved tensioning means in the present case is to grip the yarn at a point between the needle and the source of supply and cause the portion of the bight lying between the needle eye and the source of supply to be withdrawn through the fabric as

the needle is retracted to the position of Fig. 1, the other portion of the bight folding over to form the loop.

I have shown a very simple form of mechanism for accomplishing this result, including a plunger 24 normally held in retracted position by coiled spring 25 but adapted to be projected at proper intervals by the cam 26 and in projected position serving to clamp the yarn against the wall of the yarn guide 23. Yarn tensioning or clamping plunger 24 is caused to move into yarn gripping position as the needle starts on its downstroke and is released as the needle starts on its upstroke, whereby the yarn runs freely through the guide 23 on the upstroke of the needle and is held against movement on the downstroke.

The plunger carries a guiding collar 27 travelling in a transverse cylindrical bore 28 in the carriage block. The reduced portion 29 of this bore communicates with the passage 23 and provides a shoulder against which the plunger retracting spring 25 bears, this spring encircling the plunger between the shoulder and the collar 27. The other end of the bore 28 is closed by a plug 30 providing a guide bearing for the end of the plunger.

The cam 26 is mounted upon the squared intermediate portion 31 of a transverse shaft 32 mounted in ears 33 extending laterally from one side of the carriage block.

The cam 26 is allowed limited endwise sliding movement over the squared intermediate portion 31, the shaft 32 being retained against endwise movement by the provision of collars 34 on the ends of the shaft. This sliding movement may be just enough to permit slip-page between a circular extension 35 extending laterally from the cam and a circular tapered pocket 36 in one face of gear 37 free to turn on the shaft.

A coiled tensioning spring 38 encircles the shaft 32 between the cam 26 and a tension adjusting nut 39 and tends to urge the cam into frictional engagement with the gear 37.

This gear is constantly in mesh with a rack 40 fixed in upright position upon the bracket 18, and as the needle carriage reciprocates the gear is alternately rotated in opposite directions by the rack.

The high side 41 of the cam 26 coacts with the end of the plunger 24 and rotary movement of the shaft 32 and its fixed cam is limited by a pair of pins 42 projecting from one of the ears 33.

The operation of the device is as follows: The needle carriage in Fig. 1 has reached the limit of its downward movement. As it starts to move upwardly the gear 37 starts to turn under the influence of the rack, and since the cam is frictionally clutched to the gear, cam projection 41 will immediately move out of engagement with the plunger 24, permitting this plunger to be retracted under the influ-

ence of spring 25 and relieving tension on the yarn. The rotary motion of the cam is very slight, since as soon as the projection 41 engages the upper pin 42, the cam will slip relatively to the gear for the remainder of the upward motion of the carriage.

As the needle moves upwardly through the fabric as shown in Fig. 2, a certain amount of yarn will be drawn upwardly and the large bight will be formed. As soon as the carriage starts on its downward movement, however, the direction of rotation of the gear 37 will be reversed, the cam projection will move against the plunger 24, thereby forcing the plunger into yarn clamping position and causing that portion of the bight which is located between this plunger and the eye of the needle to be retracted through the fabric as the needle carriage descends, and folding over the other side of the bight to form a loop of accurately predetermined size upon the upper face of the fabric.

What I claim is:

1. As a new article of manufacture, a needle carriage and a movable thread tensioning device mounted thereon, means for operating said thread tensioning device comprising a gear on the needle carriage coacting with a stationary rack as the carriage reciprocates, a cam frictionally clutched to the gear, means to limit the friction impelled movement of the cam and means whereby the position of the cam controls the operativeness or inoperativeness of the tensioning device.

2. In a tensioning device of the character described, a reciprocable needle carriage, a thread guide, and thread tensioning means for restraining the thread against movement in its guide, said means including a fixed member mounted below the machine table and operable by movement of the needle carriage to periodically tension the thread.

Signed at New York, in the county of New York and State of New York this 15th day of April, A. D. 1929.

CLARENCE A. BRAUDES.