Jan. 12, 1943. I. E. BILLS ET AL 2,308,438

CHENILLE TUFTING MACHINE

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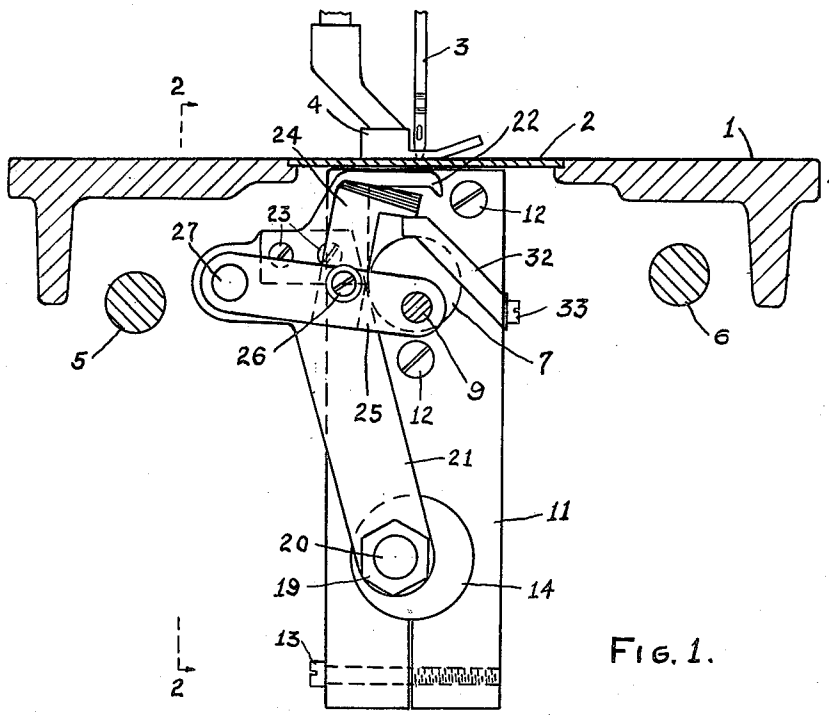



FIG. 1.

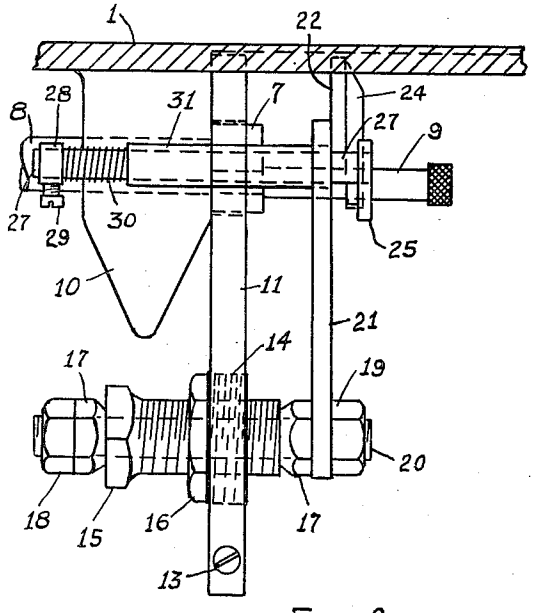



FIG. 2.

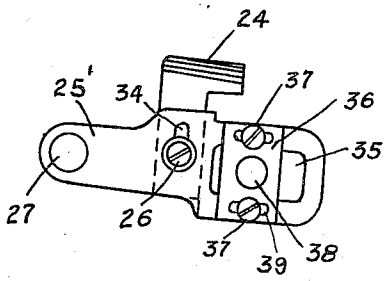



FIG. 3.

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## CHENILLE TUFTING MACHINE

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8 Claims. (Cl. 112—79)

My invention relates to sewing machines and more particularly to sewing machines with attachments thereon for forming loops of yarn in fabric and clipping them to produce a series of tufts, commonly referred to as chenille.

In the prior art, various forms of attachments have been employed to produce chenille products. It is common practice to use a conventional sewing machine head and to mount beneath the bed plate adjacent the path of travel of the needle an attachment employing a looper for catching and holding the loops of yarn as they are formed by the needle in the fabric on the bed plate. It is also common practice to provide some form of cutter to clip either independently or in cooperation with a cutting edge on the loop, successive loops to form piles.

Keeney 1,855,196 and Boyce 1,963,349 illustrate a type of attachment employing a cutter blade pivotedly mounted on and carried by the looper and which responds to the movements of the looper to bring such cutting blade into and out of cutting relation to said looper.

In the Keeney structure the spring for urging the knife often weakens and permits it to sag and the looper runs off of and places undue strain upon the feed dog shafts. Since movable with the feed dogs, it is difficult to keep the looper and blade in synchronism with the needle due to the lack of adjustment. It may be said that the Boyce actuating structure is large, cumbersome and inaccurate, due to play and lost motion.

Since all of these structures work upon the principle of always holding an uncut loop to prevent the needle from pulling the strand of yarn out of the fabric, slack always develops in these slow-moving looper machines causing the loops to pile up on each other on the looper and often results in the cutter clipping the last formed loop and leaving the first formed loop on the looper, resulting in skip stitching, double stitching and choking up, and occasionally tearing of the cloth.

Other structures in the prior art, such as White 2,110,385 mounts the cutter and looper on separate pivots, then joins them through a common pivot at the upper end. He also provides a separate pivot for driving the looper through the cutter. The use, however, of a separate pivot for the cutter and for the blade prevents them from traveling in the same arc, and requires that the arc of either the blade or the looper be altered continuously to conform to the other and necessitates the use of a floating pivot, and in the case of White, the lower end of the looper is separate to accomplish this result. This greatly increases the vertical movement of the looper and makes it difficult to cut all loops evenly.

Applicants with a knowledge of all of these defects in and objections to the prior art have as an object of their invention the provision of an attachment for sewing machines employing a swinging looper mounted on a stationary and fixed pivot actuated by a cutter pivotally joined therewith and mounted on a floating pivot which acts both as a mounting for the knife and as a means for swinging such knife into and out of cutting relation with the looper, while serving by the movement of the cutter to swing the looper into and out of operating position.

In this way, the separate stationary pivot for the cutter is dispensed with. The use of the stationary pivot for the looper gives it a fixed path, reduces its vertical movement and aids in the uniformity of cutting of the tufts.

Applicants have, as another object of their invention, the provision of a tufting attachment for a sewing machine which is actuated from the central shaft and independently from the feed dogs thus rendering it easier to synchronize with and be adjusted with respect to the needle bar and feed mechanism.

Applicants have, as a further object of their invention, the provision of removable and replaceable cutter blades and hooks of harder tool steel than the other elements of the attachments to withstand the wear on their cutting portions.

Applicants have, as another object of their invention, the provision of his attachment for sewing machines including the adjustments for the looper and the cutter to vary the number of loops held on the looper and to adjust thee cutter with respect to the looper, and the provision of adjusting means and moving the looper towards and away from the needle.

Applicants have, as a still further object of their invention, the provision of an attachment having a looper that moves with a varying speed whereby it moves very rapidly near the plane of the path of the needle and very slowly near the opposite end of its path, thus acting quickly to catch the loop and move it away from the needle and to be almost stationary during the cutting operation, so that the cutting blade moves but slightly during the loop catching operation and very rapidly at the rear of the stroke of the looper to clip the innermost loop very quickly.

Other objects and advantages of my invention

will appear from the following specification and accompanying drawing and the novel features thereof will be particularly pointed out in the annexed claims.

In the drawing, Figure 1 is a fragmental end view partly in section of a sewing machine upon which is mounted our improved tufting attachment. Figure 2 is a fragmental sectional view of the same machine and attachment taken along the lines 2, 2 of Figure 1. Figure 3 is a detail of a modified cutter for my improved attachment.

Referring to the drawing in detail, 1 designates the conventional bed plate of a sewing machine carrying a conventional throat plate 2 which is recess seated in the upper face of the bed plate. A reciprocating needle is designated at 3 which needle is carried by the usual reciprocating needle bar and sewing head (not shown). The needle 3 has a conventional eye through which the strand of yarn passes and above the eye is a groove for the passage of the hook of the attachment as more particularly described hereinafter. Adjacent the needle 3 and in cooperation therewith is the conventional presser foot 4 which is mounted upon and carried by the head of the sewing machine (not shown) in the usual manner. Beneath the bed plate a foot 10 projects downwardly and serves as a mounting for the frame 11 of the attachment and also serves as a bearing for the conventional central shaft 8 of the machine.

On either side of the central shaft 8 is mounted the usual rocker shafts 5 and 6 which serve to actuate the feed dog mechanism in the usual and well known manner. As is well known in the art, the central shaft 8 and the rocker shafts 5, 6 are actuated from the main shaft in the head of the machine (not shown) and are joined to it by individual connecting rods in the conventional manner. These features, however, are well known in the art and no novelty is claimed upon them.

The frame 11 is mounted on the foot 10 by means of 3 or more set screws 12 which pass through the frame 11 and screw thread into the foot 10. The lower end of the frame 11 is split or bifurcated and the split terminates into a transverse bore through the frame which accommodates or receives a disc 14 which in turn has an off center opening interiorly screw threaded to receive a gland nut 15 which carries a lock nut 16. The disc 14 is exteriorly threaded and screws into the bore in frame 11. The gland nut 15 has a bore extending therethrough for the accommodation of shaft 20 and has beveled inner faces at the opening of such gland. The shaft 20 is partially threaded having nuts 17 with conical faces for cooperation with the gland nut 15 to form a bearing. There are also lock nuts 18 and 19 to maintain the conical faced nuts in position. Interposed between the front conical faced nuts 17 and the lock nut 19 is a looper mounted rigidly thereon for rotation therewith. The looper extends upwardly from the shaft 20 in the form of an arm 21 and has a laterally extending portion adjacent to the top with an opening therethrough and a sleeve 31 to form a bearing on the rear of said arm and registered with said opening. Disposed within the opening and carried by the arm is a shaft 27 which extends through the sleeve 31 and projects on beyond it. Mounted upon the end of the shaft 27 by means of a set screw 29 is a collar 28 and disposed between the collar 28 and the end of sleeve 31 and passing about the shaft 27 is a coil spring 30 for urging the shaft through the sleeve 31 for a purpose to be indicated hereinafter.

Joined to the front end of the shaft 27 is a cutter arm 25, having a blade 24 adjustably mounted thereon by means of a set screw 26 which passes through a slot in the arm 25 and screws into or passes through the blade 24.

The free end of the cutter arm 25 has passing therethrough an opening for the reception of a pin 9 which is in turn mounted upon a disc 7 on the shaft 8. The disc 7 passes through and is partially disposed within an opening in the upper part of the frame 11. The pin 9 is set in off center relation to the shaft and disc and describes an arc during the oscillation of the disc 7.

To the upper end of the arm 21 is mounted a removable hook 22 of hard tool steel by means of set screws passing through the hook into or through the arm 21. If desired, the hook 22 may be recess seated in the arm 21, and the heads of the screws 23 may be counter sunk therein as is the case with screw heads 12. To the side of the frame 11 is mounted a needle guide 32 by means of a set screw 33.

Passing through the lower end of the frame and bridging the split portions thereof is a machine screw 13 having a screw threaded end which is threaded into one portion of the frame passing through the other portion for the purpose of drawing the portions together and reducing the size of the split to clamp disc 14, in any desired position.

In its operation, the needle 3 reciprocates up and down in a vertical plane carrying a strand of yarn (not shown) through a fabric on the upper surface of the bed plate 1. 2 is provided with the usual tufting slot for the reception of the needle and removal of the tufts. The needle passing through the fabric with its strand of yarn on down through the throat plate forms a loop in the fabric as it moves back up. At the beginning of this operation, the pin 9 is swung over to the left to its furthest extremity so that the hook 22 is to the left of the needle viewed in Figure 1 and the cutter blade 24 is in closed position with the cutting edge on the looper hook 22. During this downward movement of the needle, the pin 9 gradually moves in a counterclockwise direction and this movement being from the mid-vertical position towards the lower extremity of the arc quickly opens the blade 24, 25, but it first slowly moves the hook 22 towards the plane of the path of the needle 3 since the path of the pin's movement is in an almost vertical plane. As the pin 9 nears its lower extremity of travel, it begins to move more in a horizontal plane and less in a vertical plane so that the hook greatly accelerates its speed towards the needle and quickly intersects the plane of the path of the needle as such needle begins to rise. The hook 22 passing along the groove above the eye of the needle 3, catching the loop of yarn. It then passes on up and out of the fabric to the position indicated in Figure 1. At this time, the loop is held by the hook 22 and the pin 9 has reversed its direction of travel, moving in a clock-wise direction from its lower extremity towards the mid-vertical position on the extreme left. This causes the hook to quickly move back out of the plane of the path of the needle and as the pin continues its upward movement the hook greatly decreases its speed while the cutter blade 24 quickly moves towards the cutting edge of the hook 22 and would clip the loop on the hook if it were co-extensive with such hook. This operation is repeated and another loop is thrown upon the hook, resulting

in the clipping of the innermost loop contained on such hook. This operation is completed over and over again successively forming piles or tufts in the cloth. During these operations, the conventional feed dogs are actuated by the oscillation of shafts 5 and 6 causing the cloth to be progressively moved through the machine as the tufts are formed and clipped.

Figure 3 shows a detail in modified form of cutter, employing an adjustable bearing 36 mounted upon the ring end of the arm 25' by means of screws 37—37 passing through slots 39. The screws 37—37 may either screw into the arm or pass through it where they engage individual screws to maintain them in position.

So it will be noted that the arm 25 is pivotally joined through shaft 27 to the looper 21 and serves to swing the looper back and forth upon its pivot. The spring 30 always urges the blade 24 into close engagement with the hook 22, clipping the loops of yarn on such hook and always maintaining the hook and blade in tight rubbing engagement to realize a maximum shearing effect.

Having thus described our invention, we claim:

1. A combination of the character described comprising a reciprocating needle for carrying a strand of yarn down through a fabric to form loops, a looper positioned beneath the fabric to pass between the strand of yarn and the needle, a cutter pivotally joined to and supported on the looper, a shaft positioned beneath the fabric, said cutter being also pivotally supported on said shaft in off center relation thereto, whereby said shaft acting on said cutter actuates said looper and cutter.

2. A combination of the character described comprising a reciprocating needle for carrying a strand of yarn down through a fabric to form loops, a swinging looper pivotally mounted beneath the fabric to pass between the needle and the strand of yarn, a cutter pivotally joined to the looper, said cutter being mounted on and carried by a moving pivot positioned beneath the fabric, whereby the said pivot acting through said cutter actuates the cutter and looper to catch said loops and clip them.

3. A combination of the character described comprising a reciprocating needle for carrying a strand of yarn down through a fabric to form loops, a looper positioned beneath the fabric to pass between the needle and the strand of yarn, a cutter, an oscillating shaft, means for pivotally mounting said cutter on said looper and said oscillating shaft, said means including a swinging pin, which pin acts through said cutter to actuate said cutter and looper into and out of cutting relation with each other.

4. A combination of the character described comprising a reciprocating needle for carrying a strand of yarn down through a fabric to form loops, a looper pivotaliy mounted beneath the fabric to pass between the needle and the strand of yarn to catch the loops and hold them, a central shaft, a pin in off-center position on said shaft, a cutter pivotally joined to said looper and pin and carried solely by them to clip the loops on the looper.

5. A combination of the character described comprising a reciprocating needle for carrying a strand of yarn down through a fabric to form loops, a looper positioned beneath the fabric to pass between the strand of yarn and the needle, a shaft positioned beneath the fabric, a pin on said shaft, and a cutter pivotally mounted on said pin and said looper solely, whereby movement of said pin is transmitted to said looper through said cutter for catching said loops and clipping them.

6. A combination of the character described comprising a reciprocating needle for carrying a strand of yarn down through a fabric to form loops, a looper pivotally mounted beneath the fabric to pass between the needle and the strand of yarn to catch and hold the loops, a cutter pivotally mounted on to the looper, a central shaft positioned beneath the fabric, a pin on said central shaft, said cutter being also pivotally mounted on said pin, whereby movement of the pin actuates the looper and cutter into and out of cutting relation.

7. A combination of the character described comprising a reciprocating needle for carrying a strand of yarn down through a fabric, a bed plate for supporting said fabric, a frame mounted on the under side of the bed plate, a looper pivoted on the frame, a shaft, a cutter carried by said shaft, said cutter being also pivotally mounted on the looper to actuate it into and out of cutting relation with the cutter.

8. A combination of the character described comprising a reciprocating needle for carrying a strand of yarn down through a fabric to form loops, a looper pivotally mounted beneath said fabric to pass between the strand of yarn and the needle, a shaft beneath said fabric, a cutter bridging said shaft and looper and pivotally mounted upon them, whereby the movement of said shaft actuates the cutter and looper to catch and sever said loops.

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