Feb. 3, 1942. M. CHINNICI ET AL 2,271,853

TUFTING MACHINE

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FIG. 1.

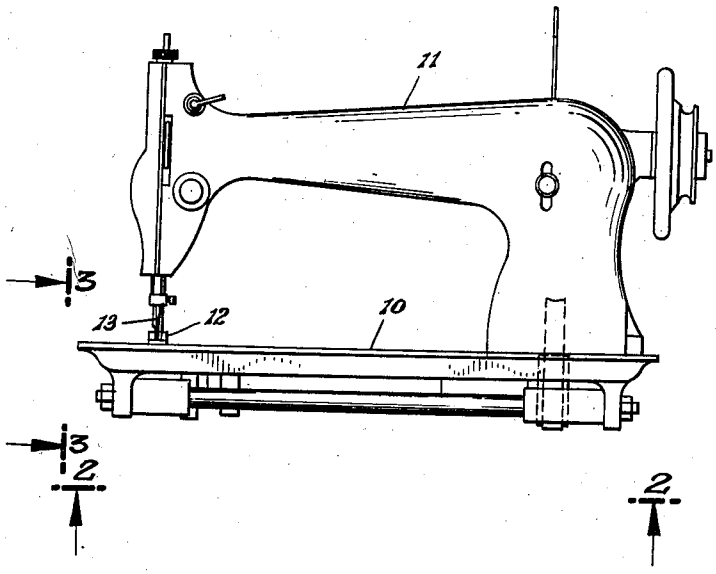
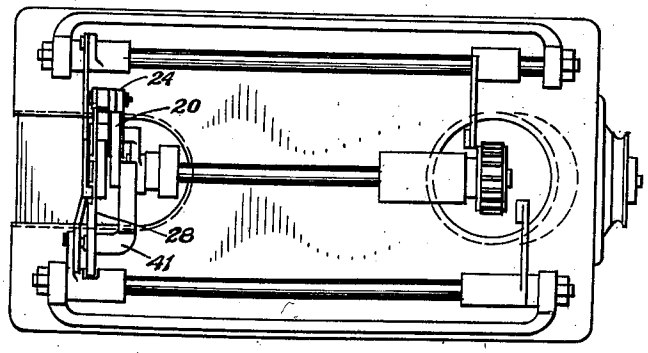



FIG. 2.




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FIG. 9.

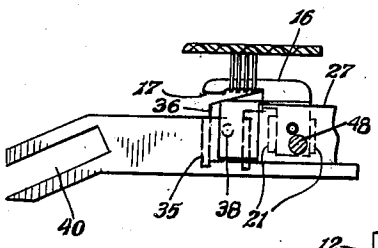


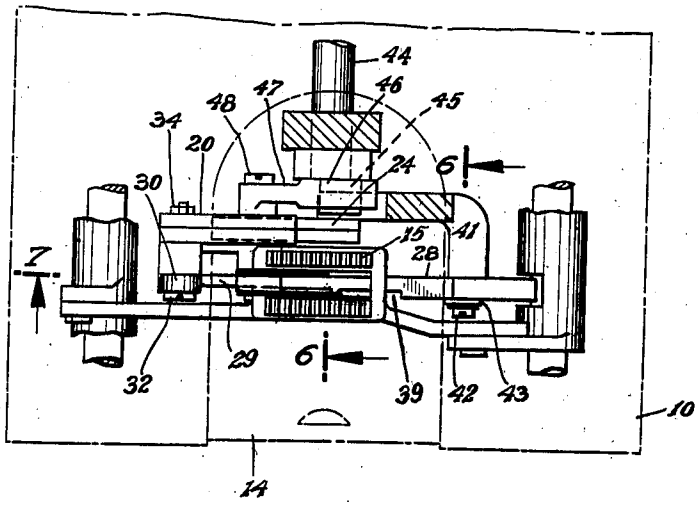

FIG. 3.




FIG. 8.




FIG. 4.




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FIG. 10.

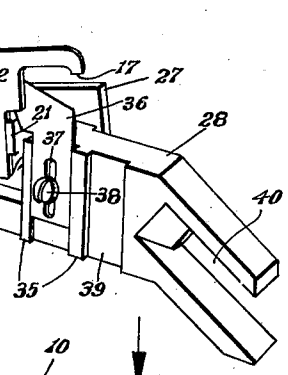



FIG. 5.




FIG. 6.

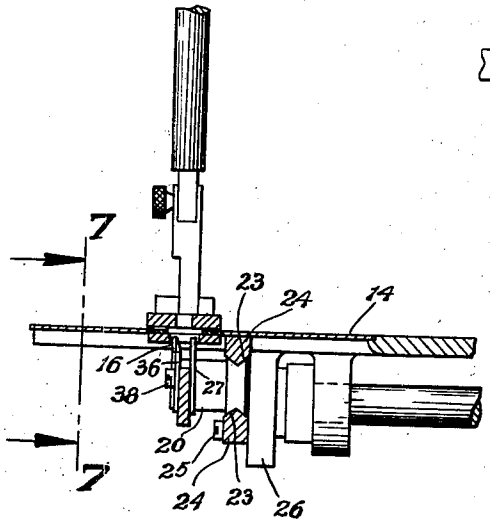
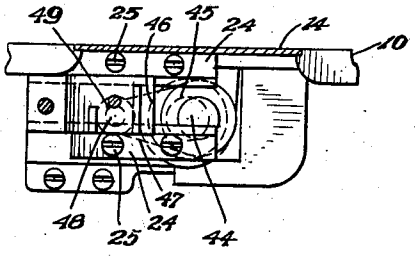



FIG. 7.




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# UNITED STATES PATENT OFFICE

2,271,853

## TUFTING MACHINE

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Brooklyn, N. Y.

Application October 15, 1938, Serial No. 235,133

5 Claims. (Cl. 112—79)

This invention relates to tufting machines, and particularly to tufting machines which automatically form and cut loops to comprise the tufts.

The objects of the invention are to provide an improved tufting machine for obtaining more rapid and better formation of even-length tufts; to reduce moving parts and movement of the moving parts to a minimum; to utilize reciprocal movement of the loop hook to also operate the loop cutter with a reciprocal and swinging motion; to provide for adjustment of cutters; to provide for adjustment of the loop hook; to provide improved linkage and operating connections; to secure simplicity of construction and operation; to improve the retention of the cutters in shearing contact; and to obtain other advantages and results as may be brought out in the following description.

Referring to the accompanying drawings in which like numerals of reference indicate similar parts through the several views:

Fig. 1 is a front elevation of a tufting machine embodying our invention;

Fig. 2 is an underneath view of the same;

Figs. 3 and 5 are end views taken on line 3—3 of Fig. 1 showing the needle and other working parts of the tufting mechanism in different operative positions;

Fig. 4 is a sectional plan as upon line 4—4 of Fig. 5;

Fig. 6 is a sectional view taken on line 6—6 of Fig. 4;

Fig. 7 is a sectional view taken on line 7—7 of Fig. 6;

Fig. 8 is a sectional view taken on line 8—8 of Fig. 3 showing the adjustable mounting between the rider and cutter lever;

Fig. 9 is an elevation of the hook and cutter assembly showing several loops of the tufting thread on the hook; and

Fig. 10 is a perspective view of the hook and cutter assembly.

In the specific embodiment of the invention illustrated in said drawings, the reference numeral 10 designates the bed plate of the machine having the usual overlying gooseneck 11 from which depends presser foot 12 and in which operates a vertically reciprocable needle 13 as is common practice with sewing machines and the like. A removable throat plate 14 is shown in the area of the bed plate surrounding the place where the needle passes through; this throat plate having an opening therein of appropriate size and shape for the serrated feed dog 15 to move as usual therein under influence of usual supporting and operating mechanisms. Suffice it to say that the several parts so far described are common in the sewing machine art, and obtain a synchronized vertical reciprocation of the needle and horizontal reciprocation of the feed dog together with a simultaneous limited vertical movement of the dog for feeding the work under the presser foot.

The present machine does not have a bobbin as usually found in sewing machines, but instead, provides a prong or hook 16 movable toward the needle from the side thereof at a position of the needle when below the throat plate and dog. Said hook 16 is movable in a plane closely adjacent to the needle so as to enter between the needle and the bite of thread depending from the work to the needle eye, whereby the retraction of the needle will leave the thread looped under the said hook. The said prong or hook 16 likewise constitutes one member of a scissor cutter by which the loop is ultimately cut, the successively cut loops thus providing a plurality of closely associated ends projecting from the work and constituting the tufts which it is the purpose of the machine to make.

As here shown, hook 16 is of goose-neck shape with the outer end directed substantially horizontally to a point and with its under side providing a depending barb 17 adjacent the point and providing a straight underside rearward from the barb to the rigid rear or body portion of the hook. The straight portion of the hook is sufficiently resilient to maintain its cutting engagement with the other cutter or scissor member. The inner end or body portion of the hook widens and depends to form a base portion 18 which is attached, as by screw 19 to the mid-portion of a carriage 20 disposed transverse to the line of travel of the needle and disposed in the same general direction of travel of the work, that is, in a forward-rearward direction. This carriage 20 is given a longitudinal reciprocal motion, but not any swinging or other motion as will presently appear. Vertical adjustment of the hook body portion or base 18, and hook 16, is obtained by suitable means, here shown as effected by including the vertical edges of the body portion 18 between vertical guiding ribs 21, 21 integrally formed on the outer side face of the carriage 20 and by providing a slot 22 in the said hook body portion 18 parallel to the ribs, the shank of said attaching screw 19 passing through the slot enabling the head of the screw to overlie and clamp against the outer face of the hook body portion.

At the other side of the carriage from that on

which the hook body portion is attached, the carriage provides lengthwise thereof in a horizontal direction suitable ways 23, here shown as V-shaped grooves in top and bottom edges of the carriage. These ways 23 receive tracks 24 secured by screws 25 to a suitable depending bracket 26 depending from the underside of the bed plate 10 of the machine. The carriage is thereby mounted with only a reciprocating motion permitted and thus the hook member may be correspondingly reciprocated without deviation from its straight-line path of movement. The said carriage provides a plate 27 projecting forwardly substantially parallel to the hook member 16, said plate being slightly resilient in a direction toward the hook member for obtaining the desired shearing contact of the cutters, as will be more fully explained herein as the description proceeds.

Next the rear end of the carriage at the outer side whereof the hook member is attached, is pivotally carried a forwardly projecting arm 28 which parallels the carriage and is reciprocated simultaneously with the carriage by virtue of its attachment thereto. However, said arm is pivoted to the carriage on a horizontal axis so as to have a vertical swinging motion in addition to its reciprocal motion. As here shown, said arm provides a shank portion 29 underlying the hook member so that, one will not interfere with the other in operation. At the rear end of the shank portion 29 is an upstanding lug 30 which receives a cylindrical bearing portion 31 of a stud 32 which constitutes the pivotal support for the said arm. The inner end of this bearing portion 31 of the stud bears against the outer face of the carriage, said stud having a reduced portion 33, axially eccentric with respect to the stud portion, the reduced portion passing through the said carriage and secured by a nut 34 screw threaded thereon. By virtue of the eccentricity of the two parts of the stud, the arm 28 may be longitudinally adjusted with respect to the carriage by turning the stud by a screw driver or otherwise.

Turning of the stud effects a change in the projecting relation of the arm with respect to the hook for varying the number of loops cut as the arm swings.

At the forward end of shank portion 29 of arm 28 is provided a more corpulent portion having characteristics and purposes which will now be described. The outer face of this corpulent portion of the arm provides about midway of the length of the arm a pair of substantially vertical ribs 35 parallel to each other and receiving therebetween a complementary scissor or cutter blade 36. The parts are so proportioned and positioned that the said complementary cutter blade 36 has its outer face in the plane of the inner face of the hook member so that these members will be juxtaposed flatwise against each other and when the cutting edges of each move relatively toward each other there is a shearing action therebetween. This complementary cutter member is provided with a vertical slot 37 receiving a clamping screw 38 therethrough by which the cutter is secured in vertically adjusted position at the arm. Next forwardly of the corpulent portion, immediately in advance of the most forward rib 35 thereon is a substantially vertical groove 39 which enables the needle to move up and down substantially in the plane of the front shearing face of the complementary cutter. Forwardly of this vertical groove 39, the arm slopes downwardly and is bifurcated so as to provide downwardly sloping slot 40, which for convenience in machining, is shown open at its forward end. Projecting forwardly from a bracket 41 depending from the bed plate 10 of the machine is a stud 42 having a rotatable collar 43 thereon, said stud projecting laterally into said sloping slot 40 and the collar riding against the upper and lower walls of that slot as the arm 28 reciprocates. It is by virtue of this sloping slot and the fixed stud 42 therein with rotatable collar 43 thereon that said arm 28 is given a vertical swinging motion when reciprocated.

I now call attention to the fact that the plate 27 forming part of the carriage is positioned at the back-side of the arm 28 substantially opposite the complementary cutter 36. The said plate will therefore function to press the arm so that said cutter will maintain a close surface engagement with the hook member, it being recalled that said plate and hook member are parts of the carriage. The arm and complementary cutter accordingly are interposed and slightly squeezed by the said plate and hook member, by means of which shearing is assured at all times.

In order to reciprocate the carriage, I have shown the forward end of the main shaft 44 provided with an eccentric 45, one plane of rotation of which is parallel to the plane of travel of the carriage. Around the eccentric is an eccentric strap 46 having a lateral extension 47 from which, parallel to the main shaft projects a stud 48. This stud 48 enters a bearing socket 49 in the carriage. Consequently, as the eccentric rotates the extension thereon will move back and forth and through the said motion with the carriage will reciprocate the carriage a corresponding amount. By this means, I apply the power from the main shaft to the carriage with a minimum of parts and with minimum movement of the moving parts. Likewise, the assembly of carriage and arm 28 reciprocate together and have only a relative swinging movement with respect to each other. There is accordingly little opportunity for lost motion or lag in operation, and a minimum of connections subject to wear are present.

In operation, it will be observed that as the needle descends so its eye comes to about the level of the hook, said hook moves inward close to the needle so as to enter the loop of thread. As the needle moves upward, the hook is then in the loop, so it catches and loops the thread which slides in the needle eye, leaving the loop on the hook below the work. Successive loops applied to the hook push previously applied loops rearward thereon, so there are always several loops on the hook. The hook moves back at the upper end of the stroke of the needle, and as the needle again comes down through the work, rearward movement of the hook and carriage has caused a swinging of the arm by virtue of sloping slot 40 and the scissor members or blades thereupon cut the loop innermost on the hook as the needle is in process of forming the next loop to be applied to the hook. By having several loops always on the hook, pull of the needle will not be transmitted to the one cut and therefore the cut ends remain even in the finished work.

Obviously detail modifications and changes may be made in the construction and use of our improved tufting machine, and we do not wish to be understood as limiting ourselves to the exact construction shown except as set forth in the following claims when construed in the light of the prior art.

We claim:

1. A tufting machine comprising a reciprocal carriage, tracks for guiding said carriage in a straight-line reciprocal motion, an arm pivoted at one end next one end of said carriage and having a downwardly sloping slot at its other end beyond the other end of the carriage, a fixed stud and rotatable collar thereon projecting into said slot whereby the arm is caused to swing, said arm being positively actuated successively in both directions of swing during a complete cycle of reciprocation as it is reciprocated by the carriage, and cutter members on said carriage and arm juxtaposed to shear as the arm swings.

2. A tufting machine comprising a hook member for retaining a loop formed by the machine, means for supporting said hook member to reciprocate with a straight-line motion, an arm longitudinally movable with the hook member and pivoted to swing with respect to the hook member, an eccentric stud pivotally joining the hook supporting means and arm, said stud when turned changing the projecting relation of said arm with respect to the hook for varying the number of loops cut, and a fixed means engaging said arm as it reciprocates for causing said arm to swing, said arm being positively actuated successively in both directions of swing during a complete cycle of reciprocation, and cutter members on said hook member and arm juxtaposed to shear as the arm swings.

3. A tufting machine comprising a reciprocable carriage, tracks for guiding said carriage in a straight-line reciprocal motion, an arm pivoted at one end to said carriage and having a downwardly sloping slot at its other end, a fixed stud and rotatable collar thereon projecting into said slot whereby the arm is caused to swing as it is reciprocated by the carriage, an eccentric stud for adjustably and pivotally joining the carriage and arm, and cutter members on said carriage and arm juxtaposed to shear as the arm swings.

4. A tufting machine comprising a horizontally reciprocable carriage, fixed tracks supporting and guiding said carriage, means for reciprocating said carriage, an arm disposed substantially horizontally next said carriage and pivoted thereto at one end and projecting at its other and outer end beyond the carriage and having a slot sloping downwardly and toward said outer end, fixed means projecting into said slot for swinging the arm up and down as reciprocated, a forwardly projecting blade on the carriage, and a rearwardly projecting blade on the arm, said blades being in slidable engagement with each other and cooperating to cut tufts looped on the forwardly projecting blade of the carriage.

5. A tufting machine comprising a horizontally reciprocable carriage, fixed tracks supporting and guiding said carriage, means for reciprocating said carriage, an arm disposed substantially horizontally next said carriage and pivoted thereto at one end and projecting at its other and outer end beyond the carriage and having a slot sloping downwardly and toward said outer end, fixed means projecting into said slot for swinging the arm up and down as reciprocated, the carriage having a pair of spaced vertical ribs on its front face next the outer end of the carriage, said arm also having a pair of spaced and substantially vertical ribs at a front part thereof beyond the outer end of the carriage, and blades guided in and prevented from tilting by each pair of ribs, said blades being in slidable engagement with each other and cooperating to cut tufts looped on the blade of the carriage.

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