Nov. 14, 1939. L. A. SMITH 2,180,073

TUFTING MECHANISM FOR SEWING MACHINES

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Fig. 1.

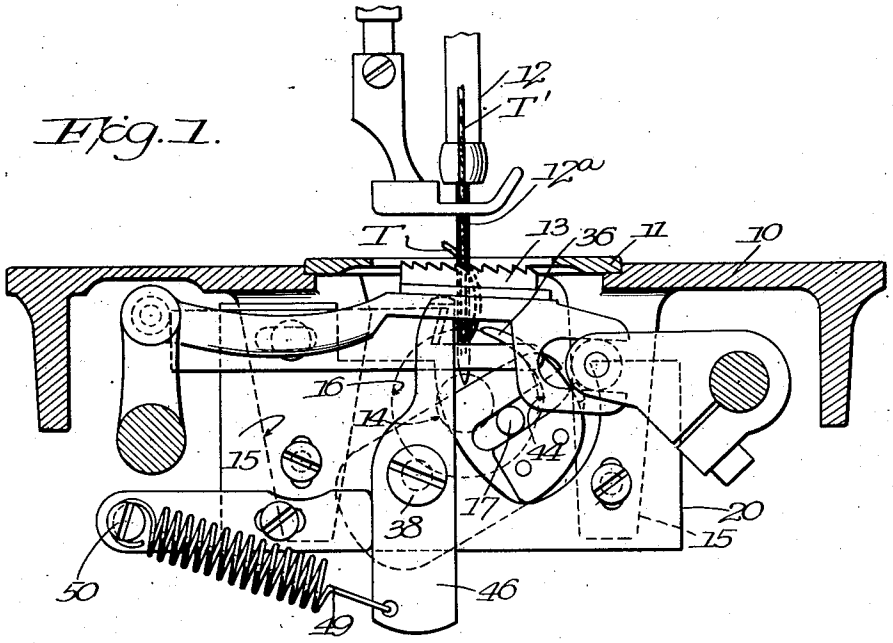
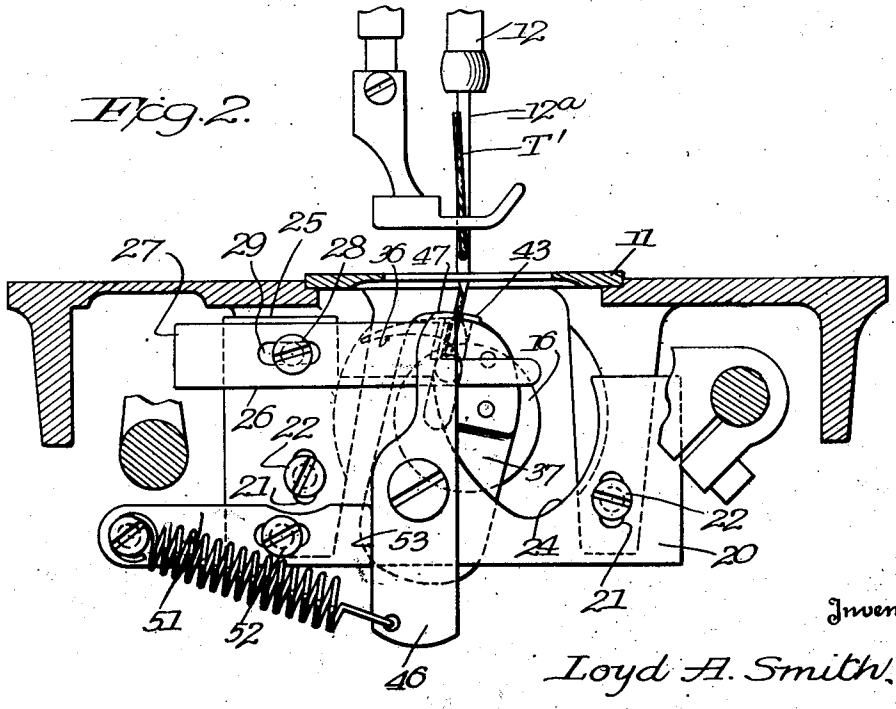


Fig. 2.



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Fig. 3.

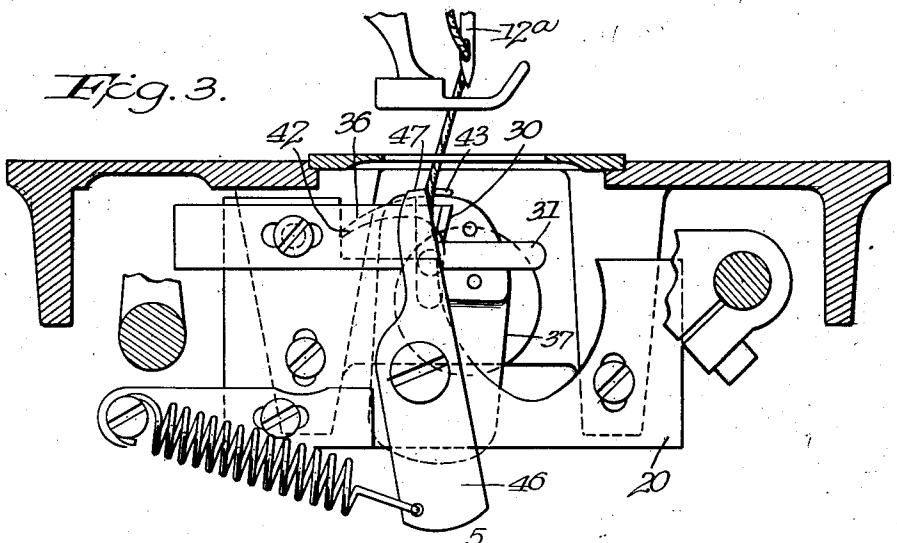


Fig. 4.

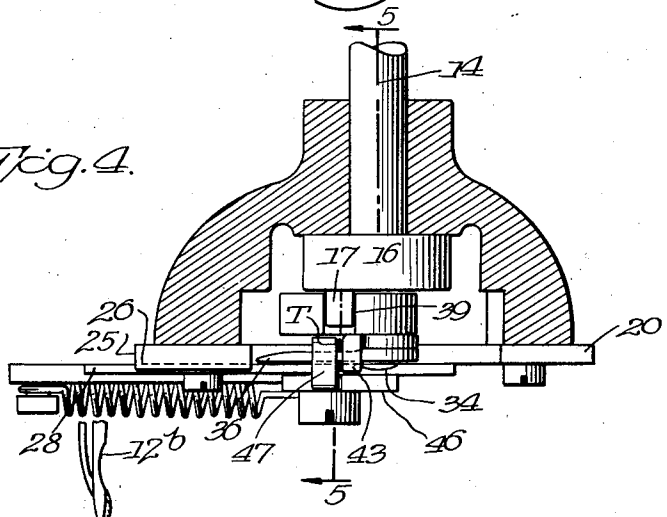
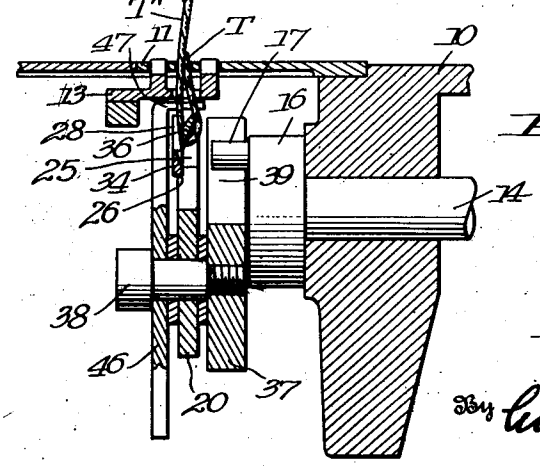


Fig. 5.



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UNITED STATES PATENT OFFICE

2,180,073

TUFTING MECHANISM FOR SEWING MACHINES

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Application August 2, 1938, Serial No. 222,711

11 Claims. (Cl. 112—79)

The present invention relates to a tufting mechanism for sewing machines.

The principal objects of the invention are to provide a tufting mechanism which can be readily applied to a sewing machine, and which is simple in construction and efficient in operation.

Other objects and advantages of the invention will be apparent from the following description and accompanying drawings, wherein

Figure 1 is a transverse vertical sectional view through the table of a sewing machine, showing the tufting mechanism of the invention in position, and with the machine needle in substantially its lowermost position.

Figure 2 is a view similar to Figure 1 except that the feed bar is omitted, and that the elements of the tufting mechanism are in the position they occupy when the loop for tufting is completely formed.

Figure 3 is a view similar to Figure 2 but showing the position of the elements at substantially the moment that the loop is cut.

Figure 4 is a top view showing the mechanism applied and with the machine table and feed bar omitted, and

Figure 5 is a vertical longitudinal sectional view on the line 5—5 of Figure 4.

In the drawings, the numeral 10 designates the base plate or a table of a sewing machine of usual construction and provided with a throat plate 11, needle bar 12, feed bar 13 and rock shaft 14. The table 10 is provided with the usual depending lugs 15 on each side of the throat plate aperture and ordinarily used to support the bobbin retainer. The rock shaft 14 has the usual disk 16 fixed to its lower end, this disk including an eccentrically mounted pin 17.

The mechanism of the present invention comprises a plate-like supporting element or base plate 20 which has vertically extending slots 21 therein. A machine screw 22 extends through each of the slots 21 and into the depending lugs 15 of the machine base plate 10 so that the supporting element 20 and the parts carried thereby can be secured in fixed relation to the sewing machine. The provision of the slots 21 enables the tufting mechanism to be positioned at various distances below the throat plate 11, thus regulating the length of the tufts formed upon the sewing machine. The supporting element or base plate 20 is cut away at its upper central portion to form a recess 24 of generally arcuate form.

The left hand upper edge of the base plate 20, as viewed in Figures 1 to 4, includes a vertical extension or upstanding portion 25, this upstanding portion having a horizontal groove 26 across its outer face, as best shown in Figures 4 and 5, to receive a fixed gripping element and looper guide 27, the latter element being fixed to the base plate 20 by means of a machine screw 28 extending through a horizontal slot 29 and into the base plate. The provision of the horizontal slot 29 enables the position of the gripping and guide element 27 to be adjusted. A fixed cutting blade or edge 30 is provided at the right hand or innermost end of the element 27, the blade edge being slightly inclined as shown in Figures 1 to 3 and extending from the upper edge of the element 27 to a point midway of its depth. A looper guide arm 31 extends from the element 27 below the cutting blade 30, the guide portion 31 being slightly recessed as indicated at 34 in Figures 4 and 5 from its upper edge to a point adjacent its lower edge and on its side surface which faces the base plate 20.

A looper 36 of generally arcuate form is positioned to move within the recess 24 of base plate 20, looper 36 having its trailing and larger end secured to a looper carrier or arm 37, which carrier is pivotally supported in the base plate 20 by means of a shouldered machine screw 38 threaded in the looper carrier 37 and journalled in the base plate. The upper end of the looper carrier 37 is forked as indicated at 39 to receive the pin 17 carried by the rock shaft 14. By this arrangement, the looper carrier and the looper will be swung or oscillated from the position shown in Figure 1 to the position shown in Figure 3, and return, by the motion of the rock shaft 14.

The looper 36 is of pointed form at its leading end 42, and is of gradually increasing cross-section, at least in a vertical plane, toward its trailing portion. A horizontally and outwardly projecting shoulder or arm 43 is provided on the upper surface of the looper 36 at the trailing portion thereof, this shoulder being so positioned that during the final tufting action of the looper, it will serve as one portion of a thread gripping device. It will be noted from Figure 4 that the shoulder 43 projects over the base plate 20. The lower trailing portion of the looper 36 is ground to a cutting blade as indicated at 44 and is adapted to coact with the fixed cutting blade 30 in an overlapping or scissors relation when the two are positioned adjacent each other as shown in Figure 3.

The other element of the gripping device is provided by a vertically extending arm 46 swing-

ably supported on the set screw 38 and on the near side of the base plate 20 as viewed in Figures 1 to 3. The arm 46 includes the horizontally extending portion 47 at its upper end which normally generally overlies the fixed cutting blade 30. Left-handed or loop forming movement of the looper 36 will bring the gripping shoulder 43 carried by the looper into engagement with the shoulder 47 so that the thread will be gripped between these two elements for subsequent cutting by the cutting device of the mechanism. The arm 46 which carries the gripping shoulder 47 is normally held in the position shown in Figure 1 by means of a coil spring 49 which extends from the lower end of the arm 46 to a suitable stud 50 at one end of a stop plate 51 adjustably secured to the base plate 20 by a set screw 52. The inner end 53 of the stop plate 51 abuts against the lower portion of gripper arm 46 to serve as a stop, the position of the stop plate being adjustable due to the fact that the set screw 52 extends through a horizontal slot in the stop plate as shown in Figure 2.

In the operation of the tufting mechanism of the present invention, with the mechanism fixed beneath the throat plate of the sewing machine, for example, in the manner illustrated in the drawings, and with a piece of material upon the table 10 of the machine, when the needle bar 12 carries the needle 12a downwardly to its extreme, lowest position illustrated in Figure 1, the looper 36 will swing to the left on the pivot 38. Such movement of the looper will spread the run of thread T which extends back from the previous tuft in the material to the eye of the needle, thereby forming a loop as diagrammatically indicated in Figure 1. The thread to form this loop will be drawn from the stretch of thread T', which extends between the needle eye and up the opposite side of the needle and then through an aperture, not shown, in the extreme upper end of the needle bar. The looper will of course move inwardly to form the loop while the needle is still lowered, the needle being recessed as shown at 12b in Figure 5 on its side facing the looper and to permit such movement of the looper. The recess 12b also insures that the looper point will be able to get between the needle and the stretch of thread T.

When the looper 36 has reached the position illustrated in Figure 2, the needle point will be just above the shoulders 43 and 47. The gripping shoulder 43 on the looper may therefore come into contact with the gripping shoulder 47 of the gripping bar 46, so that the upper portion of the loop of thread now formed about looper 36 will be gripped between these two elements as indicated in Figure 2.

Continued swinging movement of the looper carrier 37 to the left by the rotation of rock shaft 14 will cause the gripping element 46 to be moved from its normal position shown in Figure 2 to the position illustrated in Figure 3, by reason of the fact that the gripping shoulder 43 of the looper will be pressing against the gripping shoulder 47 of the gripping element 46. At the same time, the cutting blade 44 of the looper will move past the fixed cutting blade 30, with the result that the loop of thread will be sheared and the bight T of thread will form one leg of a U-shaped tuft, as is common practice.

During the operation described in the preceding paragraph, the needle bar 12 will be moving upwardly, and such upward movement will cause additional thread to be drawn from the thread spool, not shown.

It will be observed that at the moment that the thread is sheared, as described above, the loop of thread will be swung to the left by the gripping device, that is, from the position almost directly below the needle 12a as shown in Figure 2 to the position shown in Figure 3. At the same time, as is usual in sewing machines at the moment just prior to descent of the needle, the feed bar 13 will be moving the fabric to the left. In other words, the thread will be moving to the left with the fabric at the moment that the thread is cut. This eliminates all possibility of the tuft being pulled partly through the fabric, as can occur with tufting mechanisms in which the thread is gripped and firmly held at the moment that the fabric is being moved over the table of the sewing machine by the feed bar.

After the thread the thread has been cut in the manner described above, the looper 36 will be swung backwardly to the position shown in Figure 1. When the looper has reached the position shown in Figure 2, the gripping element 46 will have been restored to normal position by the spring 49.

I claim:

1. In a tufting mechanism, a supporting element, a looper oscillatable with respect to said element, a gripping element facing said looper, gripping means on said looper arranged to cooperate with said first-named gripping element, and opposed cutting edges on said supporting element and said looper, respectively.

2. In a tufting mechanism, a supporting element, a looper oscillatable with respect to said element, a gripping element normally urged towards said looper, gripping means on said looper arranged to cooperate with said first-named gripping element, and opposed cutting edges on said supporting element and said looper, respectively.

3. In a tufting mechanism, a supporting element, a looper oscillatable with respect to said supporting element, a gripping element pivoted on said element, spring means to normally urge said gripping element toward said looper, gripping means on said looper to cooperate with said first-named gripping element, and opposed cutting edges on said supporting element and said looper, respectively.

4. In a tufting mechanism, a supporting element, a looper movable with respect to said supporting element and including gripping means and a cutting edge, a second cutting edge carried by said element, and gripping means supported by said element and adapted to cooperate with said first-named gripping means, said last named gripping means being movable with respect to said element, and means to hold said gripping means in engagement with the thread to be cut during movement with respect to the supporting element.

5. In a tufting mechanism, a supporting element, a looper movable with respect to said supporting element and including gripping means and a cutting edge, a second cutting edge carried by said element, and gripping means supported by said element and adapted to cooperate with said first-named gripping means, said last-named gripping means being movable with respect to said element, and spring means to hold said gripping means in engagement with the thread to be cut during movement with respect to the supporting element.

6. In a tufting mechanism, a supporting element, a looper movable with respect to said supporting element and including gripping means and a cutting edge, a second cutting edge adjustably carried by said element, and gripping means supporting by said element and adapted to cooperate with said first-named gripping means, said last named gripping means being movable with respect to said element, and adjustably tensioned spring means to hold said gripping means in engagement with the thread to be cut during movement with respect to the supporting element.

7. In a tufting mechanism, a supporting plate, an arcuate looper movable with respect to said supporting plate and adapted to be oscillated by a sewing machine rock shaft, said looper having a gripping shoulder on its upper surface and a cutting edge below said gripping shoulder, a cutting edge on said supporting plate adapted to cooperate with said first named cutting edge, and a gripping element on said supporting plate and adapted to cooperate with the gripping shoulder on said looper.

8. In a tufting mechanism, a supporting plate, an arcuate looper movable with respect to said supporting plate and adapted to be oscillated by a sewing machine rock shaft, said looper having a gripping shoulder on its upper surface and a cutting edge below said gripping shoulder, a cutting edge on said supporting plate adapted to cooperate with said first named cutting edge, a gripping element pivotally mounted on said supporting plate, and resilient means to normally hold said last named gripping element toward the gripping shoulder on said looper.

9. The combination in a sewing machine of a needle, presser foot, feed bar, and rock shaft, a supporting plate, a looper operatively connected to the rock shaft and movable with respect to said supporting plate, said looper having a gripping shoulder and a cutting edge thereon, a second cutting edge rigid with said supporting plate, a gripping element carried by said supporting plate, means to hold said last named gripping element toward said gripping shoulder, said needle having a cutout adjacent its end to permit it to move between said looper and said fixed cutting edge, said supporting plate having a recess therein to receive the needle.

10. The combination in a sewing machine including a needle and a feed bar, of a looper, means to grip a loop formed upon said looper, means to move said gripping means and loop with the feed bar during the fabric-feeding motion of the latter, and means including a stationary element to cut the loop during such movement.

11. In a tufting mechanism, a supporting element, a looper movable in opposite directions with respect to said supporting element and needle, a gripping element facing said looper, gripping means on said looper arranged to cooperate with said first named gripping element, and opposed cutting edges on said supporting element and said looper, respectively.

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