

Jan. 10, 1933.

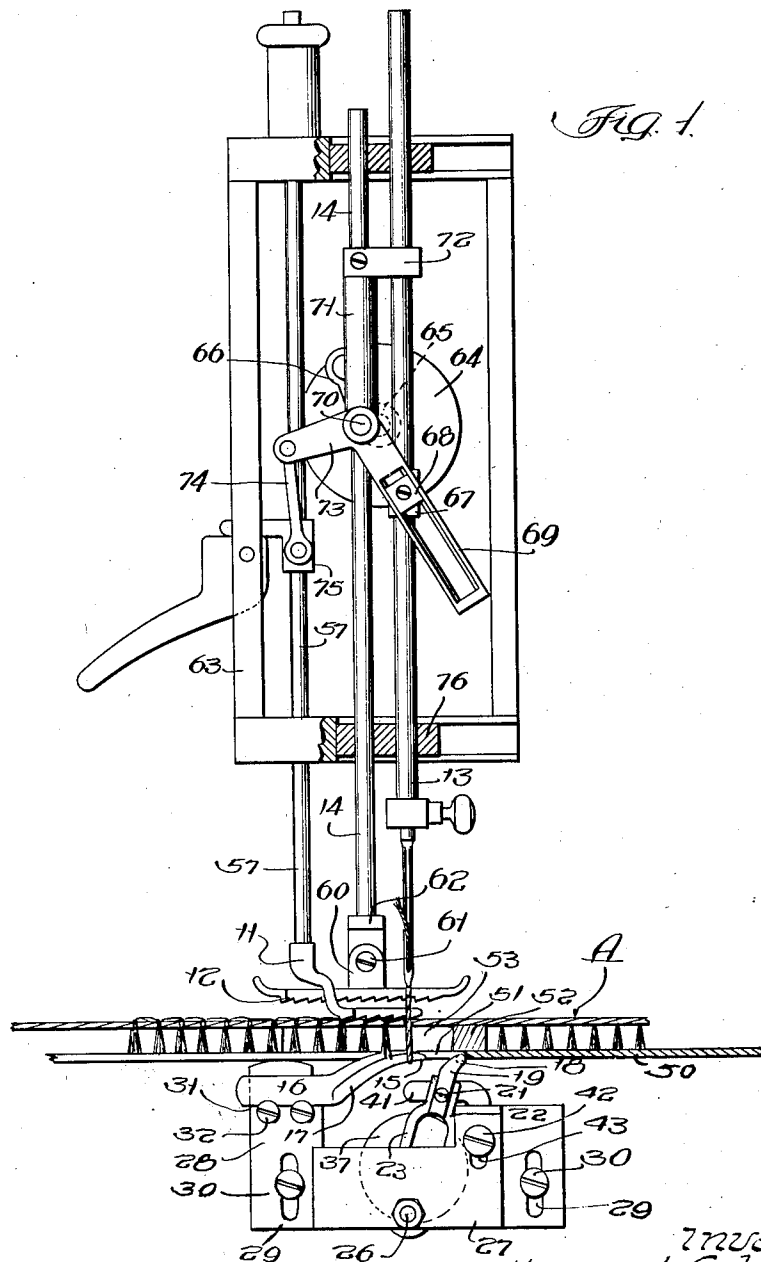
H. J. SCHOMER

1,893,660

TUFTING MECHANISM

Filed Feb. 17, 1930

3 Sheets-Sheet 1



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TUFTING MECHANISM

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3 Sheets-Sheet 2

Fig. 2.

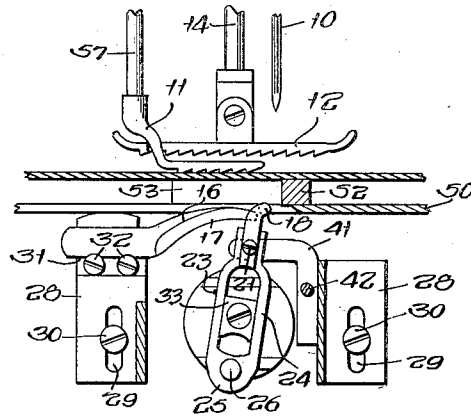


Fig. 3.

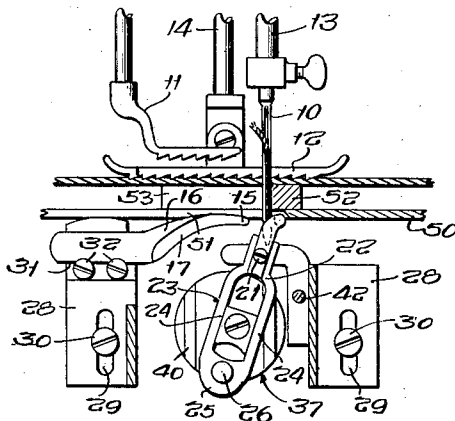


Fig. 4.

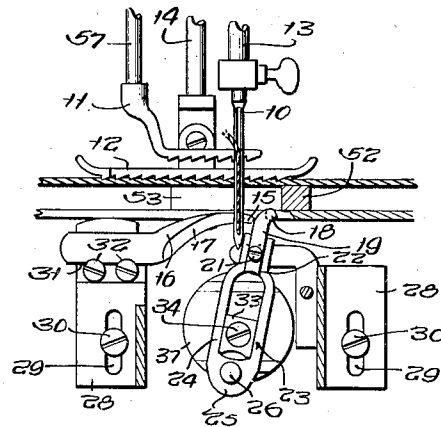
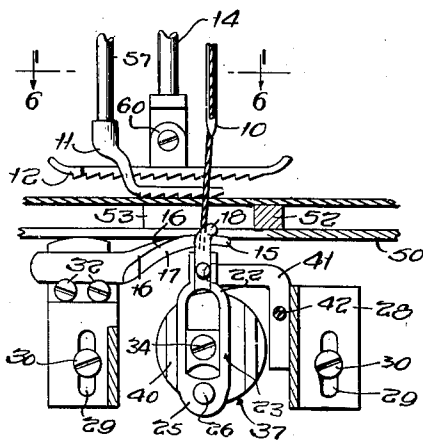


Fig. 5.



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3 Sheets-Sheet 3

Fig. 6.

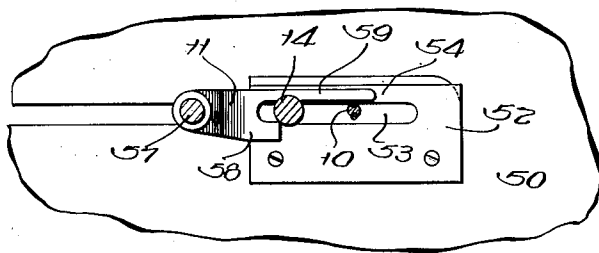


Fig. 7.

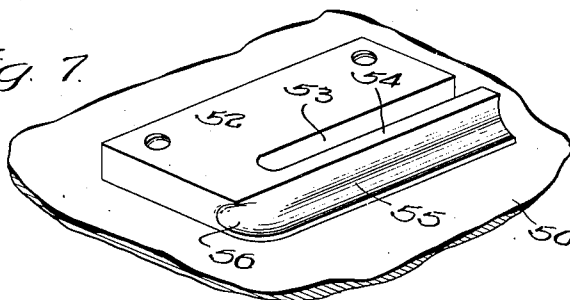


Fig. 8.

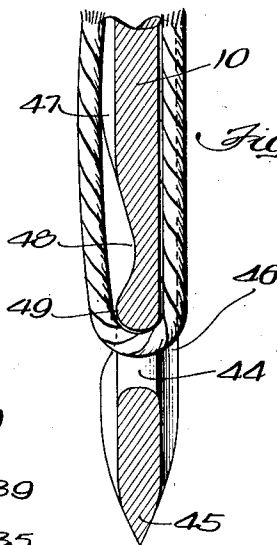
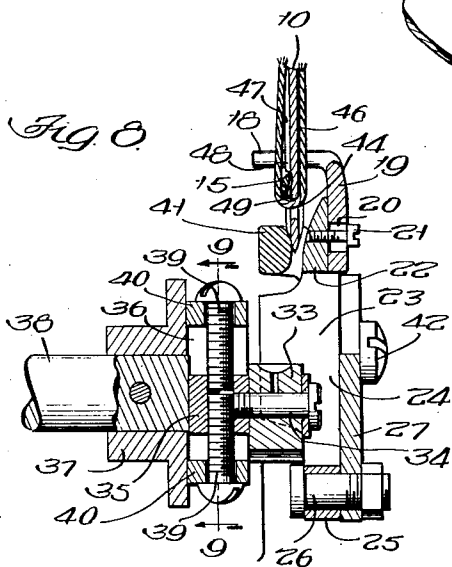
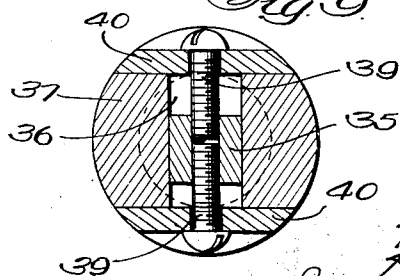


Fig. 9.



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UNITED STATES PATENT OFFICE

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TUFTING MECHANISM

Application filed February 17, 1930. Serial No. 428,872.

This invention relates to a tufting mechanism.

The device of the present invention relates to a tufting mechanism of the general character described and claimed in the pending application, Serial No. 401,021, filed October 21, 1929, by Charles Kadlec, and embodies certain additions to and improvements in said mechanism.

The device in question is intended to be incorporated into a sewing machine for the purpose of drawing out the thread in a series of loops and cutting the same to form the tufts, so that the resulting product will exhibit the characteristics of a tufted rug. In mechanism of this class, it is necessary to provide means associated with the needle for engaging the loop of thread carried down by the needle and holding the loop while the needle recedes, and also to provide mechanism for cutting the loop to present the cut ends as the constituents of a tuft in the completed product.

The loop carried down by the needle is carried onto a stationary looper, by the movement of the needle, and in the present invention additional feeding means are provided for positively forcing a series or procession of loops along the looper to effect cutting of the loops, so that the needle itself is relieved from the pressure required in cutting the loops.

The present invention also relates to certain improvements in the form of the needle itself, to better adapt it to co-operate with the looper in carrying the loops onto the point of the looper.

The present invention also relates to the means provided for permitting the previously formed rows of tufts to clear the surface of the feed table and to advance as the fabric is fed, without becoming entangled with the needle or interfering with its operation on a previously untufted section of the fabric, the operation being performed in such a way as to gauge the distance between the rows of tufting with a resulting uniformity in the structure of the fabric.

Further objects and details of the invention will appear from a description thereof,

in conjunction with the accompanying drawings, wherein,—

Figure 1 is an end elevation of the working parts of a Singer sewing machine, with the looping and cutting devices of the present invention associated therewith;

Figs. 2, 3, 4, and 5 are details, partly in section, showing the feeding and looping mechanisms in various positions of adjustment during a single cycle of operation;

Fig. 6 is a detail in plan showing the construction of the gauge plate and shoe, taken on line 6—6 of Fig. 5;

Fig. 7 is a perspective view of the gauge plate;

Fig. 8 is a sectional view of the loop feeder and associated parts;

Fig. 9 is a cross sectional view taken on line 9—9 of Fig. 8; and

Fig. 10 is a greatly enlarged sectional view of the point of the needle.

The mechanism as a whole comprises a reciprocating needle 10 of special formation presently to be described, a presser foot 11 of the general character employed in a standard Singer sewing machine, somewhat modified to comply with the requirements of the present invention, and a feeding plate 12 which is likewise generally similar to the Singer construction.

The needle is carried by a reciprocating needle rod 13 and the feeding plate by a reciprocating feed rod 14. The needle rod and the feed rod operate to some extent in unison, and are mounted to afford a four-way motion, during the course of which the feeding plate will be initially lifted and thrust rearwardly, while the needle is also lifted, after which the feeding plate and needle will descend together, the needle, however, being given a much longer stroke in order to pierce the fabric and carry through the loop-forming thread or yarn. Thereafter, both needle and feeding plate will move to feed the fabric forward or to the left in Figure 1, which feeding action serves to draw the yarn loop over the point 15 of a bill-shaped looper 16.

The looper is of relatively thin or blade-like formation so that it will not tend unduly to spread the loop, and the lower edge of the

looper is sharpened to afford a knife edge 17 for severing the loop at the proper time. The knife edge of the looper is slightly curved and stands in generally oblique relation to the line of advance of the fabric, so that as the fabric is moved forward in a step by step advance, it will draw the loops which are hooked onto the looper, more and more tightly against the knife edge until the loops are successively severed.

However, it is desirable to assist the needle in carrying the loops beyond the tip of the looper and in packing them forward to facilitate the cutting operation and the present invention provides special means for effecting this result, which will now be described.

Immediately adjacent to the tip end of the looper is located a feeding finger 18 which is illustrated in detail in Fig. 8. The finger is secured to and extends inwardly from an arm 19 which is provided with a slot 20 receiving a screw bolt 21 for adjustably securing the arm and finger to the head 22 of a swinging yoke 23.

The finger 18 is mounted to reciprocate back and forth immediately above the upper edge of the bill-shaped looper, and to engage the loops carried down by the needle and hooked onto the tip end of the looper; that is to say, after the needle recedes upwardly, having hooked a loop onto the tip of the looper, the finger will swing forwardly and engage the loop and force it forwardly until it is well engaged upon the stationary looper, thereby preventing the loop from becoming disengaged and clearing the tip of the looper for the reception of the next succeeding loop.

The loop feeding yoke 23 is of an open loop-shaped construction, best shown in Figs. 2 to 5, comprising spaced side arms 24 which unite together in the head 22 at the upper end and which unite at the lower end in a pivot head 25, which is journaled upon a pivot pin 26 carried by a bridge plate 27, best shown in Fig. 1.

The bridge plate stands outwardly in offset relation to side flanges 28—28 provided with slots 29 which receive screws 30—30, which serve to adjustably secure the bridge plate to the fixed framework of the machine.

The looper is socketed within a slot 31 in the forward flange plate 28 and is removably held in position by headed screws 32, so that the looper can be removed from time to time for sharpening or substitution.

The loop feeder 23 is oscillated by the action of a slide block 33 which is swivelly mounted upon a pintle 34 outstanding from an adjusting block 35, which is slidably mounted within a slot 36 in a head 37 fixedly carried by a rock-shaft 38, which constitutes one of the working parts of a standard Singer sewing machine, and is oscillated by

means which it is not deemed necessary to describe in detail.

The adjusting block 35 may be adjusted by a pair of screws 39—39, which are entered through bridge plates 40 which span the slot 36, so that by adjusting the block 35 the pintle 34 can be moved to different positions with respect to the axis of the rock shaft 38, thereby varying the eccentricity of the pintle 34 and correspondingly varying the range of oscillation of the yoke 23 which carries the finger 18.

In order to more perfectly gauge the reciprocations of the needle and to bring the needle each time accurately into register with the tip of the looper, a fixed guide finger 41 is provided, which is adjustably secured by a screw 42 within a slot 43 in the bridge plate 27, and the forward acting face of the guide finger 41 is rounded, as shown in Fig. 8, so that as the needle descends the tip of the needle will engage the side face of the guide finger which holds the needle accurately in line with the tip of the looper. From an inspection of Fig. 8 it will be noted that the face of the guide finger and the tip of the looper stand in vertical alignment, so that the needle will be guided as it hooks the loop onto the tip of the looper.

The formation of the needle 10 is best shown in Fig. 10, from which it will be noted that the needle is provided with an eye 44 which is located near the tip or point 45 of the needle, and the needle is provided with a groove 46 on one side and a corresponding groove 47 on the other side.

The groove 47 near the eye 44 is cut away or gouged out to afford a scarf 48, but between the scarf and the eye the body of the needle is uncut to afford a hump 49. This formation serves to distend the thread loop sufficiently to bridge over the scarfed recess immediately above the hump, which affords an open space at this point between the needle and the thread to permit the thread loop to be hooked over the tip end of the fixed looper. It will be understood that the scarf 48 extends completely across the needle on the side groove 47, thereby cutting away the walls of the groove and leaving the space completely open between the narrow scarfed surface and the thread or yarn.

The fabric A is supported upon the surface of a table plate 50 which is provided with a slot 51 for the reciprocation of the needle, and in order to elevate the fabric being stitched above the level of the table, a gauge block 52 is provided immediately above the slot 51, which plate is also provided with a registering slot 53 through which the needle reciprocates.

The slot 53 is located in close proximity to the rear edge of the gauge block 52, leaving a narrow flange 54 which serves to gauge the distance between the rows of stitching, and

the edge of the gauge block is grooved or gouged as at 55, and is rounded off at the rear corner 56, as shown in Fig. 7. The gouging serves to give a flaring edge which engages a previous line of stitching and serves to divert the previously formed tufts away from the needle and at the same time by such engagement serves to guide the material forwardly in parallel relation to the previous line of stitching and at the proper distance therefrom. The rounded corner 56 serves to divert the previous tufts outwardly without affording an obstruction to the advance of the material.

The presser foot 11 and the feeding plate 12 are both serrated on their lower edges, and the presser foot is carried by a rod 57 in alignment with the needle rod 13 and the feeding plate rod 14. The formation of the presser foot is best shown in Fig. 6, from which it will be noted that it comprises a widened heel portion 58 of sufficient width to bridge across the slot 53, and a narrow toe portion 59 of slightly less width than the flange 54 of the gauge block with which it co-operates. This arrangement enables the heel to hold the fabric firmly across the slot, and at the same time the narrow toe serves to engage the fabric at a point in close proximity to the needle.

The feeding plate 12 is provided with ears 60 which receive a pintle 61 which serves to pivotally secure the feeding plate to a head 62 carried at the lower end of the rod 14, so that the feeding plate is mounted to afford free rocking contact with the fabric.

A brief résumé of the operating mechanism for the rods 13 and 14 and 57 will be given, although these parts constitute the standard features of construction of a Singer sewing machine, so that detailed description thereof is not deemed necessary. The three rods extend upwardly into a housing 63 which constitutes the end portion of the sewing machine, and motion is derived from a disk 64 mounted on the end of the power shaft 65 of the machine. Through suitable linkage 66, motion is derived from the rotating disk 64.

The rod 13 is provided with a collar 67 which is reciprocated through the linkage 66, and the collar 67 is pivoted to a slide block 68 which is guided within a rectangular guide frame 69, the upper end of which is pivoted at 70 to a sleeve 71 rigidly mounted upon the rod 14, and provided with a head 72 through which the rod 13 is slidably mounted.

The frame 69 constitutes one of the arms of a bell crank device, the other arm 73 of which is pivoted to a link 74, the lower end of which is in turn pivoted to a collar 75 which is fast to the rod 57.

The rods 13 and 14 are reciprocally mounted through a slide block 76 which is carried by the lower wall of the housing 63 and permits of a limited back and forth horizontal

movement commensurate with the feeding back and forth movements imparted to the feeding plate and the needle. The upper ends of the rods 13 and 14 are guided through the upper wall of the housing 63, free play being afforded to accommodate back and forth movements of the lower ends of the respective rods. This system of links, levers and connections is one which imparts an extended range of reciprocating movement to the needle, and a slight range of reciprocating movement to the feeding plate, and also imparts to these two instrumentalities a back and forth movement in unison with the feeding of the fabric in conformity with the principle of feeding and needle operation embodied in Singer sewing machines of standard construction.

In operation, with the parts in what may be termed the initial position illustrated in Fig. 2, the feeding plate and needle will both stand in elevated relation and the presser foot in depressed relation upon the fabric to be tufted. As the needle and feeding plate descend, the presser foot will be lifted and the needle will pierce the fabric, carrying with it the thread or yarn, until it reaches the position indicated in Fig. 3.

This brings the needle into guiding contact with the curved surface of the guide finger 41 and into immediate proximity with the tip of the looper.

With the parts in this position, the needle and feeding plate in unison will move forwardly to the position indicated in Fig. 4, and this will carry the impaled fabric forward under the conjoint feeding action of the feeding plate and the needle, and will also carry the loop onto the tip of the looper, so that the loop will be spread and held against withdrawal on the final recession of the needle, which occurs as the presser foot descends to re-engage the fabric. This is the position indicated in Fig. 5, and before the feeding plate and needle have moved rearwardly to again resume the feeding operation.

It will be noted from Fig. 4 that at this stage of the operation, the feeding finger 18 still stands in the rearward position to permit the needle to recede, but as the needle is lifting to the position shown in Fig. 5, the feeding finger will be swung forwardly above the looper and will thus engage the previously laid loop and positively thrust it forward more tightly upon the looper, and as successive loops are thus engaged by the looper, the entire procession of loops will in each instance be moved forward by the oscillation of the feeding finger until the foremost loop of the procession has been cut through by the knife edge of the looper, and thus released, which permits the severed loop to be drawn out through the slots and proceed forwardly with the completely tufted portion of the fabric.

During these operations, the gauge plate serves to block off the next adjacent line of previously formed tufts, so that the loose ends will not become enmeshed or entangled with the needle or otherwise interfere with current operations, and at the same time the line of previous tufts affords an offset for engagement with the grooved edge of the gauge block, so that accurate stitching is facilitated.

The obliquity at which the knife edge of the looper is presented to the advance of the loops serves better to cut the loops through the effect of the progressively increasing pressure which is imparted to the procession of loops by the feeding of the material, assisted by the packing operation of the loop feeding finger, so that at no time will undue resistance be afforded to the even and uniform advance of the fabric during the stitching operation.

The mechanism is one which enables the operations to proceed in a rapid and precise manner, and by properly adjusting the length of the needle stroke, and by providing a gauge block of appropriate thickness, the lengths of the tufts may be varied and thereafter maintained uniform throughout the operation of the machine.

Other modifications in detail may be introduced without departing from the spirit of the invention.

I claim:

1. In tufting mechanism of the class described, the combination of a reciprocating needle, a looper in coacting relation with the needle and provided with a cutting edge presented to the line of movement of loops formed around the looper, feeding means associated with the needle and adapted to feed the fabric forwardly to carry loops onto the looper and along the cutting edge, and a reciprocating loop feeder adapted to force the loops along the looper after the recession of the needle.

2. In tufting mechanism of the class described, the combination of a reciprocating needle, a looper in coacting relation with the needle and provided with a cutting edge presented to the line of movement of loops formed around the looper, feeding means associated with the needle and adapted to feed the fabric forwardly to carry loops onto the looper and along the cutting edge, and a reciprocating loop feeder adapted to force the loops along the looper after the recession of the needle, said fabric feeding means including a feeding plate and a presser foot adapted to engage the fabric in alternation to one another.

3. In tufting mechanism of the class described, the combination with a reciprocating needle, a looper in coacting relation with the needle and provided with a cutting edge standing in oblique relation to the line of advance of the fabric and presenting said cut-

ting edge to the line of movement of the loops formed around the looper, feeding means associated with the needle and adapted to feed the fabric forwardly and to carry the loops to the looper and along the cutting edge to sever the same and form tufts and a loop feeder coacting with the needle and the feeding means and adapted to force the loops along the looper.

4. In tufting mechanism of the class described, the combination with a reciprocating needle, a looper in coacting relation with the needle and provided with a cutting edge standing in oblique relation to the line of advance of the fabric and presenting said cutting edge to the line of movement of the loops formed around the looper, feeding means associated with the needle and adapted to feed the fabric forwardly and to carry the loops to the looper and along the cutting edge to sever the same and form tufts, said feeding means including a feeding plate and a presser foot adapted to engage the fabric in alternation to one another and a loop feeder coacting with the needle and the feeding means and adapted to force the loops along the looper.

5. In tufting mechanism of the class described, the combination with a reciprocating needle, a looper in coacting relation with the needle and provided with a cutting edge standing in oblique relation to the line of advance of the fabric and presenting said cutting edge to the line of movement of the loops formed around the looper, and feeding means associated with the needle and adapted to feed the fabric forwardly and to carry the loops to the looper and along the cutting edge to sever the same and form tufts, and a reciprocating loop feeder adapted to force the loops along the looper after the recession of the needle.

6. In tufting mechanism of the class described, the combination with a reciprocating needle, a looper in coacting relation with the needle and provided with a cutting edge standing in oblique relation to the line of advance of the fabric and presenting said cutting edge to the line of movement of the loops formed around the looper, and feeding means associated with the needle and adapted to feed the fabric forwardly and to carry the loops to the looper and along the cutting edge to sever the same and form tufts, said feeding means including a feeding plate and a presser foot adapted to engage the fabric in alternation to one another, and a reciprocating loop feeder adapted to force the loops along the looper after the recession of the needle.

7. In tufting mechanism of the class described, the combination with a needle, a fixed looper having a cutting edge standing in oblique relation to the line of advance of the fabric, a guide for the tip of the needle

to maintain the same when lowered into closely adjacent relation to the tip of the looper to present a newly formed loop thereto, means for reciprocating and forwardly feeding the needle to introduce the loops onto the looper, means for feeding the fabric and carrying the loops along the cutting edge with the advance of the fabric and a loop feeder adapted to force the loops along the looper after the recession of the needle.

8. In tufting mechanism of the class described, the combination with a needle, a fixed looper having a cutting edge standing in oblique relation to the line of advance of the fabric, a guide for the tip of the needle to maintain the same when lowered into closely adjacent relation to the tip of the looper to present a newly formed loop thereto, means for reciprocating and forwardly feeding the needle to introduce the loops onto the looper, and means for feeding the fabric and carrying the loops along the cutting edge with the advance of the fabric, and a reciprocating loop feeder adapted to force the loops along the looper after the recession of the needle.

9. In tufting mechanism of the class described, the combination with a needle, a fixed looper having a cutting edge and having its tip end in close relation to the needle when lowered, means for reciprocating and forwardly feeding the needle, to introduce loops onto the looper, means for feeding fabric and carrying the loops along the cutting edge with the advance of the fabric, a table for the fabric, and a slotted gauge block standing above the plane of the table, through which the needle reciprocates, said gauge block being adapted to present its edge against a previously formed line of tufts to hold the same away from the needle and gauge the spacing of the lines of stitching.

10. In tufting mechanism of the class described, the combination with a needle, a fixed looper having a cutting edge and having its tip end in close relation to the needle when lowered, means for reciprocating and forwardly feeding the needle to introduce loops onto the looper, means for feeding fabric and carrying the loops along the cutting edge with the advance of the fabric, a table for the fabric, and a slotted gauge block standing above the plane of the table, through which the needle reciprocates, said gauge block being adapted to present its edge against a previously formed line of tufts to hold the same away from the needle and gauge the spacing of the lines of stitching, and a reciprocating loop feeder adapted to force the loops along the looper after the recession of the needle.

11. In tufting mechanism of the class described, the combination of a needle provided with an eye for the passage of a thread and scarfed above the eye and having an outstanding hump between the scarf and the eye

to space the thread away from the body of the needle, a bill-shaped looper provided with a cutting edge and presenting its tip in proximate relation to the scarfed portion of the needle when lowered, means for reciprocating and forwardly feeding the needle to carry the scarfed portion of the needle over the tip of the looper for introducing a loop thereon, and means for feeding fabric and carrying the loops along the cutting edge of the looper with the advance of the fabric.

12. In tufting mechanism of the class described, the combination of a needle provided with an eye for the passage of a thread and scarfed above the eye and having an outstanding hump between the scarf and the eye to space the thread away from the body of the needle, a bill-shaped looper provided with a cutting edge and presenting its tip in proximate relation to the scarfed portion of the needle when lowered, a guide for the tip of the needle to maintain the same when lowered in closely adjacent relation to the tip of the looper, means for reciprocating and forwardly feeding the needle to carry the scarfed portion of the needle over the tip of the looper for introducing a loop thereon, and means for feeding fabric and carrying the loops along the cutting edge of the looper with the advance of the fabric.

13. In tufting mechanism of the class described, the combination of a needle provided with an eye for the passage of a thread and scarfed above the eye and having an outstanding hump between the scarf and the eye to space the thread away from the body of the needle, a bill-shaped looper provided with a cutting edge and presenting its tip in proximate relation to the scarfed portion of the needle when lowered, means for reciprocating and forwardly feeding the needle to carry the scarfed portion of the needle over the tip of the looper for introducing a loop thereon, and means for feeding fabric and carrying the loops along the cutting edge of the looper with the advance of the fabric, and a reciprocating loop feeder adapted to force the loops along the looper after the recession of the needle.

14. In tufting mechanism of the class described, the combination of a needle provided with an eye for the passage of a thread and scarfed above the eye and having an outstanding hump between the scarf and the eye to space the thread away from the body of the needle, a bill-shaped looper provided with a cutting edge and presenting its tip in proximate relation to the scarfed portion of the needle when lowered, a guide for the tip of the needle to maintain the same when lowered in closely adjacent relation to the tip of the looper, means for reciprocating and forwardly feeding the needle to carry the scarfed portion of the needle over the tip of the looper for introducing a loop thereon,

means for feeding fabric and carrying the loops along the cutting edge of the looper with the advance of the fabric, and a reciprocating loop feeder adapted to force the loops along the looper after the recession of the needle.

15. In tufting mechanism of the class described, the combination of a reciprocating needle, a fixed bill-shaped looper coacting with the needle and presenting its tip at a point adjacent to the position of the needle when lowered, means for imparting a loop feeding movement to the needle to throw a loop onto the tip of the looper, a loop feeding finger standing transversely of the position occupied by the loop on the looper, and means for imparting a feeding movement to the feeding finger to force the loop along the looper after the recession of the needle.

16. In tufting mechanism of the class described, the combination of a reciprocating needle, a fixed bill-shaped looper coacting with the needle and presenting its tip at a point adjacent to the position of the needle when lowered, means for imparting a loop feeding movement to the needle to throw a loop onto the tip of the looper, a loop feeding finger standing transversely of the position occupied by the loop on the looper, and means for imparting an oscillatory feeding movement to the feeding finger to force the loop along the looper after the recession of the needle.

17. In tufting mechanism of the class described, the combination of a reciprocating needle, a looper in coacting relation with the needle and provided with a cutting edge presented to the line of movement of loops formed around the looper, feeding means associated with the needle and adapted to feed the fabric forwardly to carry loops onto the looper and along the cutting edge, and a loop feeder coacting with the needle and with the feeding means to force the loops along the looper to cut the same to form tufts.

18. In tufting machines of the class described, a bill-shaped looper having a cutting edge along its lower side, a needle and means for reciprocating the needle in a line substantially transverse to the cutting edge of the looper, the needle being provided with an eye extending therethrough near its tip and having above the eye a scarfed portion merging at its lower end into an outwardly protruding portion constituting a hump intermediate the eye and the base of the scarfed portion, and adapted to distend the thread sufficiently to bridge over the scarfed portion and afford a space immediately above the hump for the entrance of the tip of the bill-shaped looper, and means for effecting relative feeding movement between the needle and the tip of the looper for bringing the tip of the looper into the space thus afforded to introduce loops onto the looper and to ultimately cut

the same by contact of the cutting edge therewith as the succeeding loops are crowded along the looper.

19. In tufting machines of the class described, a bill-shaped looper having a cutting edge along its lower side, a needle and means for reciprocating the needle in a line substantially transverse to the cutting edge of the looper, the needle being provided with longitudinal grooves along opposite sides thereof to receive the turns of a thread and being provided with an eye near its tip extending through the body intermediate the grooves, and having above the eye a scarfed portion merging at its lower end into an outwardly protruding portion constituting a hump intermediate the eye and the base of the scarfed portion, and adapted to distend the thread sufficiently to bridge over the scarfed portion and afford a space immediately above the hump for the entrance of the tip of the bill-shaped looper, and means for effecting relative feeding movement between the needle and the tip of the looper for bringing the tip of the looper into the space thus afforded to introduce loops onto the looper to ultimately cut the same by contact of the cutting edge therewith as the succeeding loops are crowded along the looper.

In witness that I claim the foregoing I have hereunto subscribed my name this 12th day of February, 1930.

HENRY J. SCHOMER.

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