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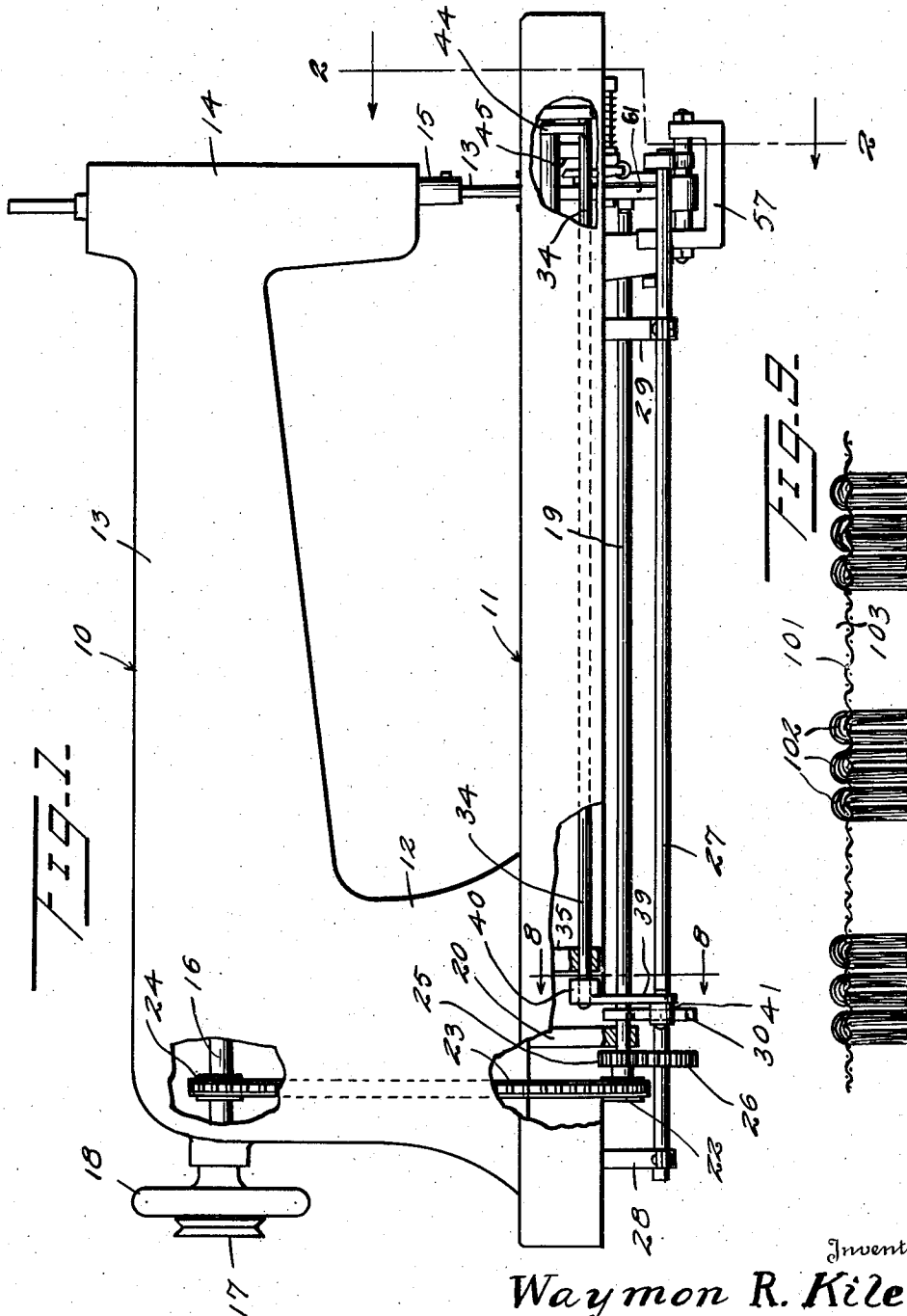
W. R. KILE

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SKIP STITCH TUFTING MACHINE

Filed Aug. 26, 1940

3 Sheets-Sheet 1



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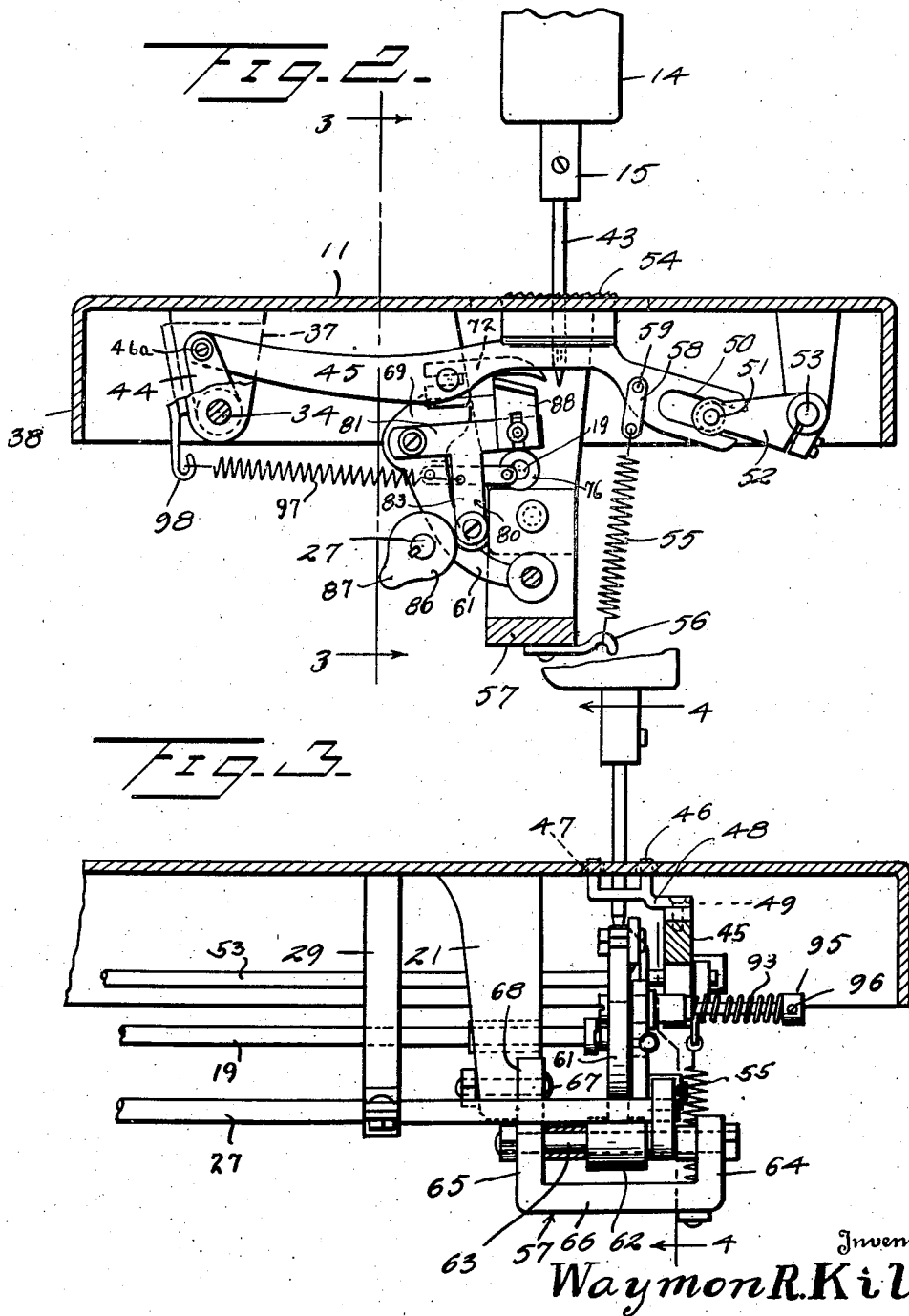
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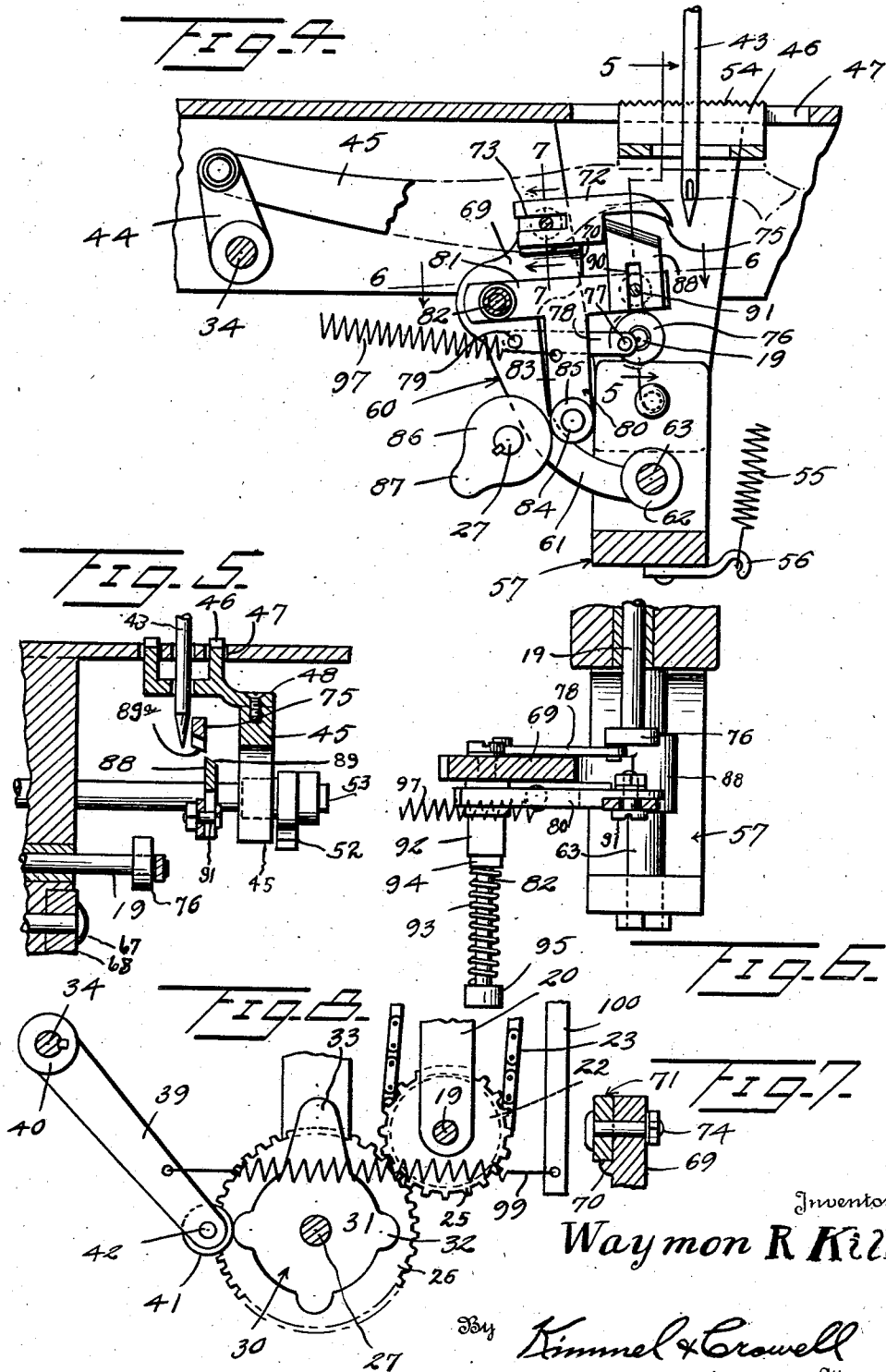
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SKIP STITCH TUFTING MACHINE

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6 Claims. (Cl. 112-79)

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This invention relates to tufting machines.

An object of this invention is to provide an improved looper and cutting mechanism for looping and cutting the threads.

Another object of this invention is to provide in combination with a looper and cutting mechanism, means whereby the material may be advanced relative to the table so as to provide spaced groups of tufts.

A further object of this invention is to provide an improved material feeding means which is simple in construction and which is adapted to intermittently move the material for the space of several stitches or tufts so as to form evenly spaced groups of tufts.

A still further object of this invention is to provide an improved looper and cutter together with an improved operating means therefor so that the looper may be moved to a loop receiving position and subsequently shifted to a loop cutting position at which time the cutting means is rendered active to cut one or more of the loops on the looper.

A further object of this invention is to provide an improved cutting means for cutting the loop mounted on the looper, the cutting means including a pivoted support mounted on the looper structure and means for adjustably securing the cutter on the support.

To the foregoing objects and to others which may hereinafter appear, the invention consists of the novel construction, combination and arrangement of parts as will be hereinafter referred to and illustrated in the accompanying drawings, wherein is shown an embodiment of the invention, but it is to be understood that changes, variations and modifications may be resorted to which fall within the scope of the invention as claimed.

In the drawings—

Figure 1 is a detail side elevation partly broken away and in section of a skip stitch tufting machine constructed according to an embodiment of this invention.

Figure 2 is an enlarged sectional view taken on the line 2-2 of Figure 1.

Figure 3 is a fragmentary sectional view taken on the line 3-3 of Figure 2.

Figure 4 is a sectional view taken on the line 4-4 of Figure 3.

Figure 5 is a sectional view taken on the line 5-5 of Figure 4.

Figure 6 is an enlarged fragmentary sectional view taken on the line 6-6 of Figure 4.

Figure 7 is a fragmentary sectional view taken on the line 7-7 of Figure 4.

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Figure 8 is an enlarged fragmentary sectional view taken on the line 8-8 of Figure 1.

Figure 9 is a longitudinal section showing a piece of fabric for tufts formed therein according to this invention.

Referring to the drawings, the numeral 10 designates generally a sewing machine structure constructed according to an embodiment of this invention which includes a base or table structure 11, an upstanding support or standard 12, an arm 13 and a head 14. The support 12 is preferably of hollow construction and the arm 13 is also hollow and extends above the base or table 11 and the head 14 is also of hollow construction and includes the conventional means by means of which the needle chuck 15 may be vertically reciprocated relative to the table 11.

A drive shaft 16 is journaled through the arm 13 being disposed in substantially parallel relation to the table 11 and is provided at its rear end with a grooved pulley 17 and a fly wheel 18. The pulley 17 is adapted to be engaged by a belt which is connected to a suitable driving mechanism which may be either a manual mechanism in the form of a treadle structure or may be connected to a power driven pulley. A shaft 19 is disposed below the table 11 being journaled in a rear bearing 20 extending below the table 11 and also journaled in a forward depending bearing structure 21. The shaft 19 at its rear end has secured thereto a sprocket 22 and a chain 23 is trained about the sprocket 22 and extends upwardly through the standard 12 and engages about a driving sprocket 24 which is fixed to the drive shaft 16. The sprockets 22 and 24 are of the same size.

The shaft 19 adjacent the sprocket 22 has secured thereto a spur gear 25 which is adapted to mesh with a second spur gear 26 which is fixed to a shaft 27. The gears 25 and 26 have a ratio of 1 to 4 respectively. The shaft 27 is journaled in depending bearing members 28 and 29 which extend below the table 11. The shaft 27 is disposed laterally of the shaft 19. The shaft 27 also has secured thereto a cam member 30 adjacent the gear 26 and as shown in Figure 8, the cam member 30 comprises a plate 31 which is formed with a plurality of cam lobes 32 which are of equal height and equal distance apart. The plate 31 is also formed with a relatively long cam lobe 33, the purpose for which will be hereinafter described.

A rock shaft 34 is rockably mounted in bearings 35 and 36 and as shown in Figure 2, the rock shaft 34 is disposed closely adjacent a side flange 38 depending below the table 11. The rock shaft

34 adjacent the rear end thereof has fixed thereto a rock lever 39 which is formed with a bushing or hub 40 engaging about the shaft 34. The lever 39 at its free end has mounted thereon a roller 41, the roller 41 being mounted on a pin or shaft 42 which is fixed to the lever 39. The lever 39 comprises a cam operated feeding lever and the shaft 34 is a material feeding shaft for feeding the material across the table 11 during the vertical reciprocation of the needle 43 which is fixed to the chuck 15.

The shaft 34 adjacent the forward end thereof has secured thereto an arm or short lever 44 as shown in Figure 2 and one end of a feeding dog lever 45 is pivotally secured as at 45a to the rock arm 44. The reciprocating feed dog arm or lever 45 has secured thereto at a point intermediate the ends thereof a substantially U-shaped feed dog 46 which is slidable in a slot 47 formed in the table 11. The dog 46 is formed with a lateral extension 48 which is secured by fastening devices 49 to the lever or arm 45. The lever or arm 45 at its free end is formed with a slot 50 which opens through the free end of this lever or arm and a roller 51 loosely engages in the slot 50. The roller 51 is rotatably carried by an arm 52 which is fixed to a rock shaft 53.

The operation of the rock shaft 53 is conventional and is of the type shown in conventional sewing machines particularly a "Singer" sewing machine and the operation of this shaft 53 in conjunction with the remaining apparatus is believed well known. The dog 46 on its upper edge is formed with serrations 54 which are adapted to engage with the fabric or material moving transversely across the table 11 so that when the free end of the lever 45 is raised by means of the rock arm 52 and the lever 45 is also shifted transversely of the table 11 by means of the rock arm 44, the material will be moved relative to the needle 43. In practice the cam lobes 32 are adapted to actuate the rock shaft 34 so as to move the material relative to the table 11 for substantially one stitch and the long cam lobe 33 is adapted to shift the lever 45 for a distance substantially equal to three stitches although the spacing effected by the long cam lobe 33 may be more or less than this number of stitches. The free end of the lever 45 is constantly urged downwardly by means of a contracting spring 55 which at its lower end is connected to a hook 56 secured to a U-shaped supporting member 57. The opposite or upper end of the spring 55 is connected to a link 58 which is pivotally secured as at 59 to the lever 45 inwardly from the slot 50.

In order to provide a means whereby the strand of material may be formed into a loop below the table 11 and subsequently the loops may be cut, I have provided a combined loop forming structure and cutter generally designated as 60. The loop forming structure includes an upwardly extending and longitudinally arcuate arm 61 which at its lower end is formed with a bushing 62 mounted on a stationary shaft 63. The stationary shaft 63 extends between the two upwardly extending arms 64 and 65 of the U-shaped support 57 and the shaft 63 is disposed in parallel relation to the bight 66 of the U support 57. The rear leg 65 of the U-member 57 is substantially longer than the forward leg 64 and is secured by a fastening device 67 to the bearing structure 21. Preferably the bearing structure 21 is formed with a recess 68 within which the rear leg 65 engages. The arm 61 of the looper structure is formed at its upper end with a head 69 and the head 69 as

shown in Figure 7 is formed with a guide rib 70 at a point downwardly from the upper end thereof. A loop forming member 71 is secured to the head 69 and comprises a body 72 having a slot 73 therein through which a fastening member 74 engages. The fastening member 74 also engages through the head 69 and by means of the slot 73, the body 72 may be adjusted relative to the head 69 and relative to the needle 43. The body 72 at its forward end has formed therewith a loop engaging member or hook 75 which is directed downwardly at its forward end as shown in Figure 4 so that when the hook or looper 75 is moved forwardly as will be hereinafter described, the hook 75 will project through the strand of material engaging through the needle 43 at the time the needle 43 is at its lowermost position.

The hook or looper 75 is of such a length that two or more loops may be retained thereon and the downward curvature of the hook or member 75 is provided in order that the looped strand of material will not slide off thereof when the hook 75 is moved to the left as shown in full lines in Figure 4.

The arm 61 is rocked by means of the shaft 19 which at its forward end has secured thereto a collar 76. The collar 76 has secured thereto an eccentrically disposed pin 77 which engages through one end of a link 78. The link 78 at its opposite end is pivotally secured as at 79 to the upper end of the arm 61 so that for each rotation of the shaft 19, the hook 75 will be pulled forwardly to a loop receiving position and will also be shifted rearwardly or to the left as shown in Figure 4 to a loop cutting position.

The arm 61 at its upper portion has pivotally secured thereto a substantially T-shaped cutter support generally designated as 80. This support 80 has the head or flanged portion 81 thereof pivotally mounted as at 82 on the upper portion of the arm 61 and the stem 83 of the support 80 has rotatably mounted on a pin 84 a roller 85. The roller 85 rotatably engages a cutter operating cam 86 which is fixed to the shaft 27 at the forward end of this shaft. The cam 86 is formed with a single cam lobe 87 so that for each rotation of the shaft 27, the cutter supporting member 80 will be rocked to a cutting position. The flanged portion 81 of the support 80 has secured at the end thereof opposite from the pivot 82, a cutter member 88. The cutter member 88 is formed with an upper cutting edge 89 and the cutter member 88 is also formed with a downwardly opening slot 90 through which a fastening member 91 engages so that the cutter member 88 may be fixed to the support 80 in vertically adjusted position. The cutting edge 89 is inclined upwardly toward the rear portion of the loop forming hook 75 so that when the cutter 88 is raised to a cutting position, the rear or high portion of the cutting edge 89 will initially cut the rearmost of the loops carried by the hook or looper 75.

The pivotal member 82 comprises an elongated headed shaft which extends through the upper portion of the arm 61 and upon which the cutter supporting member 80 is pivotally mounted. A bushing or sleeve 92 is disposed about the shaft 82 and bears against the outer side of the flanged portion 81 of the supporting member 80. A tensioning spring 93 is disposed about the shaft 82 and at one end bears against a collar 94 interposed between the sleeve or bushing 92 and the spring 93. The opposite end of the spring 93 bears against a collar 95 which is secured in

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adjusted position relative to the shaft 82 by means of a set screw 96. The spring 93 is adapted to tension the cutting blade 88 against the adjacent side of the hook member or looper 75, which adjacent side is formed with a cutting edge 89a. Figure 5, coacting with the cutting edge 89 of the cutter 88 so as to cut the looped strands of material engaged about the looper hook 75. The roller 85 is yieldably maintained against the cam 86 by means of a spring 97 which at one end is connected to the stem 83 and at the other end is connected to a depending hook 98 which is fixed to the bearing member 37.

In the use and operation of this machine, the drive shaft 16 is operated by any suitable driving means and rotation of the shaft 16 will effect vertical reciprocation of the needle chuck 15 and the needle 43 with a strand of tuft forming material threaded through the eye of the needle 43. It will be understood that the machine may have suitable guide means for the strand and also suitable tensioning means therefor, such guide means and tensioning means being conventional and well understood.

When the needle 43 is in its lowermost position through the feeding dog 46, the link 78 will pull the combined looper and cutter 60 forwardly so that the looper hook 75 will engage between the needle and one strand of the material threaded through the needle. The needle is adapted to engage closely adjacent the rear face of the looper hook 75 so that when this member is drawn forwardly, it will be disposed above the eye of the needle and between the adjacent side of the needle 43 and one strand of the material threaded through the needle. When the needle 43 is raised the looper hook 75 is moved to the left as viewed in Figures 2 and 4 with the looped strand of material engaged about the hook 75. When the looper hook 75 is in its furthest position to the left of the needle 43, the cam lobe 87 will engage the roller 85 so as to raise the cutter 88.

When only one loop is positioned on the hook 75, this strand may be positioned forwardly of the forward edge of the cutter 88 so that this one strand will not be cut when the cutter 88 is raised. However, with each forward movement of the looper hook 75 to a loop receiving position, the succeeding loop is pushed rearwardly so that the succeeding loop or loops will be cut by the cutter 88 when this cutter is raised by means of the cam member 86.

The feeding dog 46 is reciprocated back and forth in an even stroke by means of the feeding lobes 32 which will evenly rock the cam engaging lever 39. The lever 39 is held with the roller in contacting relation with the cam 30 by means of a spring 99 which at one end is secured to the lever 39 and at the other end secured to a depending supporting member 100 which is fixed to the underside of the table 11. When the large lobe 33 engages the roller 41, the lever 39 is given a greater movement so as to effect a greater movement of the dog carrying lever 45. This will cause the dog 46 to move a greater distance than the distance effected by the even lobes 32. The effect of this greater movement of the feeding dog 46 will be to move the fabric or base 101 forwardly a distance substantially equal to three stitches. When the lever 39 is rocked by means of the lobe 32, the fabric 101 will be moved forwardly only one space or one stitch as shown by the stitches 102. In the present instance there are three stitches 102 in each group and the space 103 between each group of stitches 102 is formed

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by the greater rocking effected by means of the cam lobe 33.

It will be understood that there may be more or less cam lobes 32 and the cam lobe 33 may be any desired length depending upon the space desired between each group of stitches 102. In order to change the space between the groups of stitches and change the number of stitches in each group, it is only necessary to change the cam 30 and provide a cam with the desired number of short cam lobes 32 and the desired length of the long cam lobe 33.

What I claim is:

1. A tufting machine comprising a reciprocable needle, a loop holding member, means supporting said member for swinging movement from a cutting position to a loop receiving position, a loop cutting means carried by said member, said cutting means comprising a pair of angularly related parts, means pivotally mounting one end of one of said parts to said member, a cutting element fixed to the other end of said one part, a rotary cam, and a roller carried by an end of the other part engaging said cam to thereby rock said cutting means relative to said member.

2. A tufting machine comprising a reciprocable needle, a loop holding member, means supporting said member for swinging movement from a cutting position to a loop receiving position, a loop cutting means carried by said member, said cutting means comprising a pair of angularly related parts, means pivotally mounting one end of one of said parts to said member, a cutting element fixed to the other end of said one part, a rotary cam, a roller carried by an end of the other part engaging said cam to thereby rock said cutting means relative to said member, and a means constantly holding said roller in contacting relation with said cam.

3. In a tufting machine a material feeding means comprising a reciprocal feeding dog having a lateral extension at its bottom, an elongated supporting lever arranged below and fixed intermediate its ends to the lateral extension of said dog, a rock shaft disposed at right angles to said lever, an upstanding arm fixed at its lower end to said shaft adjacent one end thereof, means pivotally securing an end of said lever to the upper end of said arm, a depending spring controlled arm fixed at its upper end to said shaft adjacent the opposite end of the latter, a rotatable cam below said shaft for shifting said spring controlled arm, and a roller carried by said spring controlled arm engaging said cam to thereby effect rocking of said shaft, said cam including a disc-shaped plate formed on its outer edge with a plurality of evenly spaced apart cam lobes, at least one of said cam lobes being of greater height than the remaining cam lobes to thereby effect greater rocking of said shaft.

4. A tufting machine comprising a reciprocable needle, a loop holding member below said needle, means supporting said member for swinging movement from a cutting position to a loop receiving position, a loop cutting means carried by said member, said cutting means comprising an elongated substantially horizontal bar, means pivotally mounting one end of said bar on said supporting means, a cutting element carried by said bar adjacent the opposite end thereof, a depending bar carried by said first bar, a roller carried by said depending bar, and a rotary cam engaging said roller to thereby rock said cutting means relative to said member.

5. A tufting machine comprising a reciprocable

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needle, a loop holding member below said needle, means supporting said member for swinging movement from a cutting position to a loop receiving position, a loop cutting means carried by said member, said cutting means comprising an elongated substantially horizontal bar, means pivotally mounting one end of said bar on said supporting means, a cutting element carried by said bar adjacent the opposite end thereof, a depending bar carried by said first bar, a roller carried by said depending bar, a rotary cam engaging said roller to thereby rock said cutting means relative to said member, and means holding said roller in contacting relation with said cam.

6. In a tufting machine an oscillatable loop former including a rock arm, means for rocking said arm, a head carried by said arm, an elongated rib carried by one side of said head and disposed in proximity to the top of the latter, a rectangular plate disposed in face abutting re-

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lation to said head and engaging at one of its lengthwise edges against said rib, a downturned loop forming hook carried by said plate at one end thereof, said plate having an elongated opening therein, a fastening device engaging through said opening for securing said plate in longitudinally adjusted position relative to said rib, a spring controlled T-shaped cutter support on the said side of said head below said plate and bodily shiftable with said rock arm, tensionable means engaging through an end of the cross arm of said support for rockably mounting said support on said head, a roller carried by a free end of said T-shaped support, a loop cutter, means securing said cutter on the opposite end of the cross arm of said support below said hook, and means engageable with said roller for rocking said support on said head to thereby shift said cutter to a cutting position relative to said hook.

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