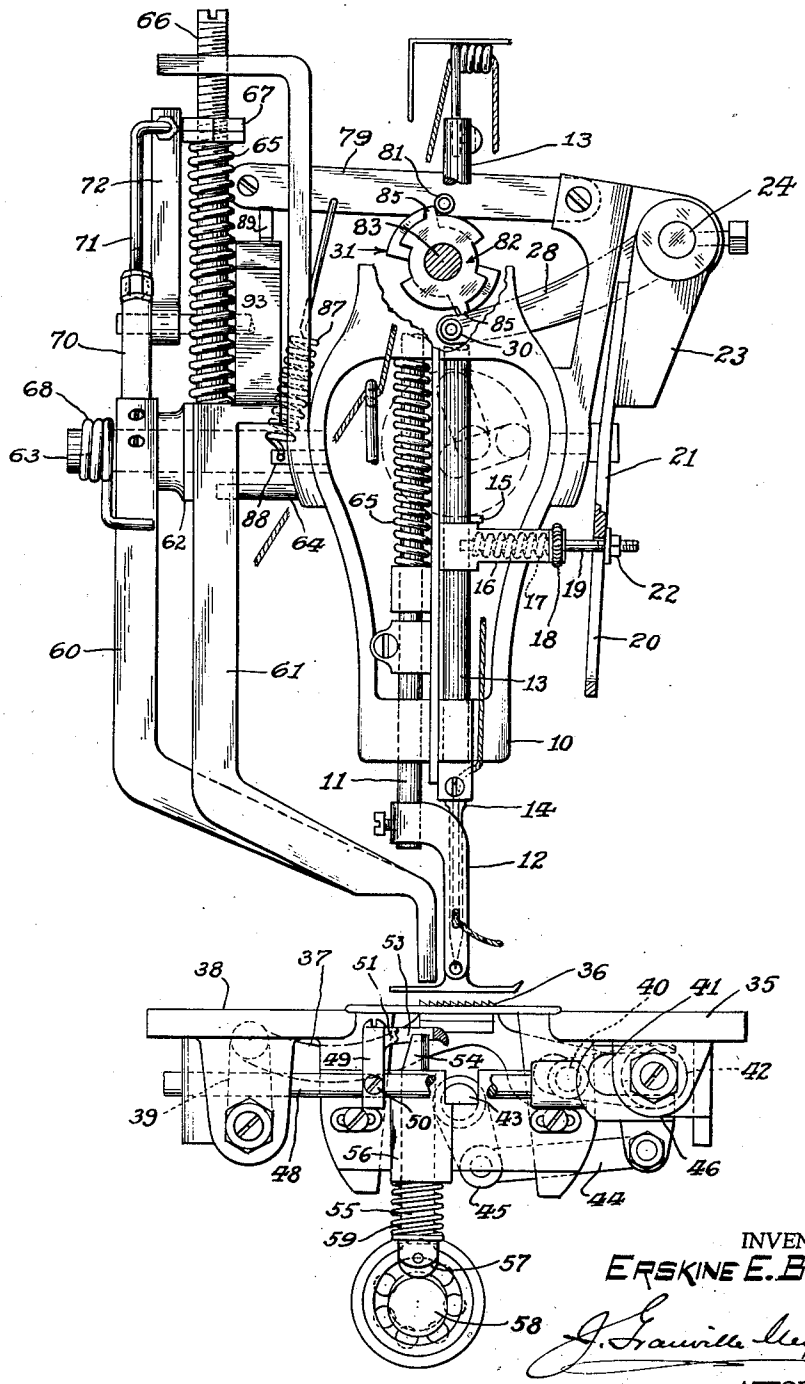
Dec. 11, 1934. E. E. BOYCE 1,984,332

SEWING MACHINE

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Fig. 1.



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SEWING MACHINE

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Fig. 4.

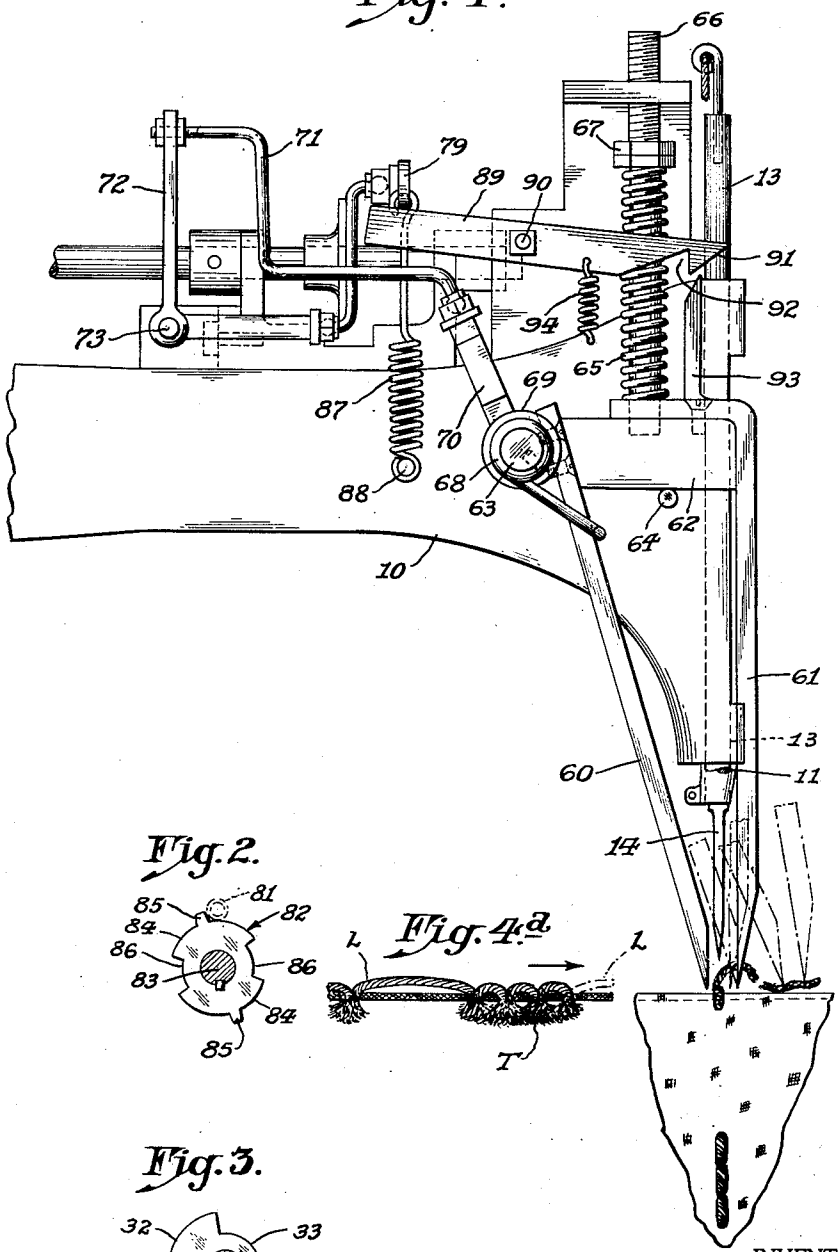
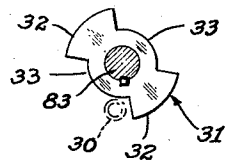


Fig. 2.

Fig. 4a.

Fig. 3.



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Fig. 6.

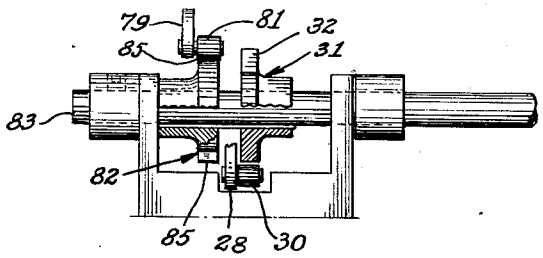
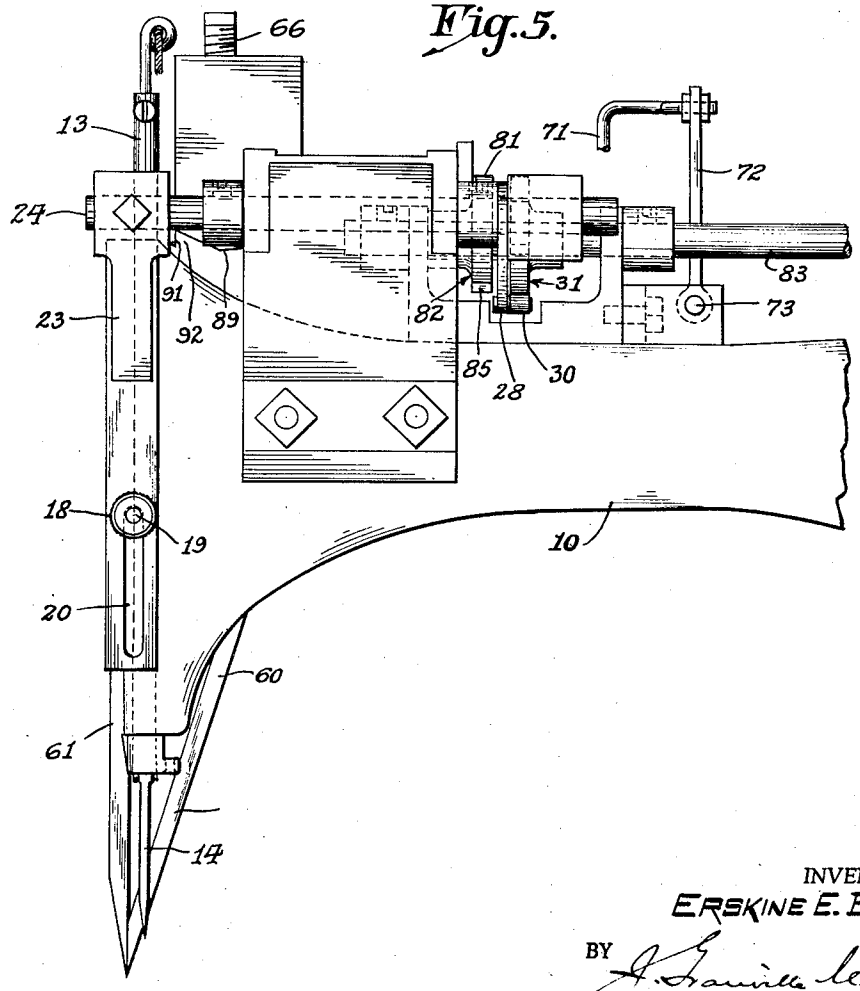


Fig. 5.



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SEWING MACHINE

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Fig. 7.

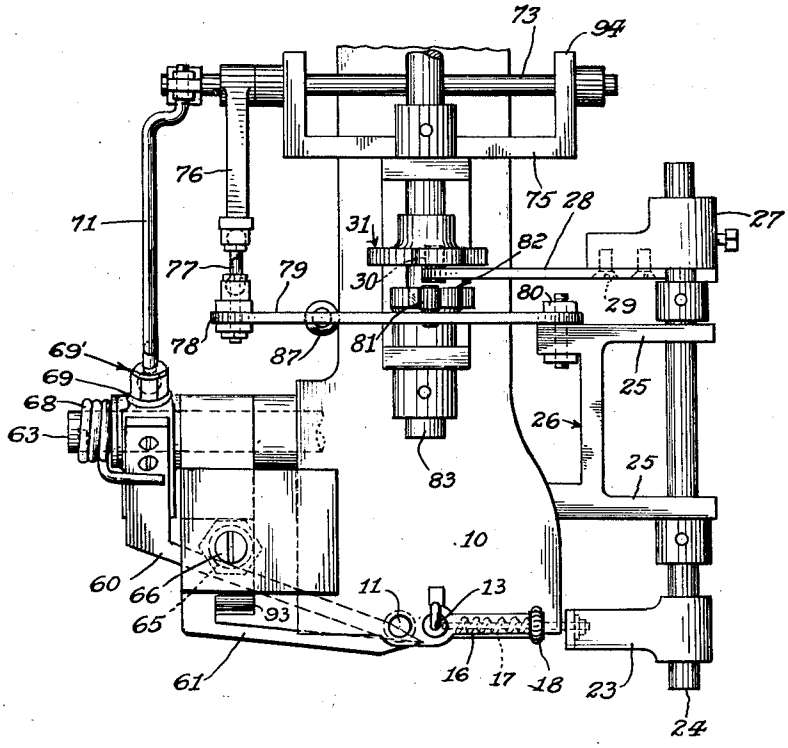
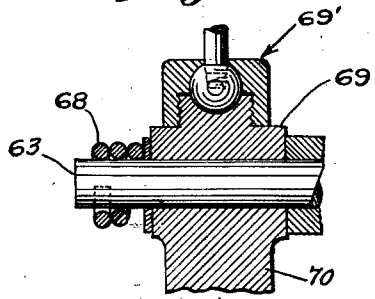


Fig. 8.



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Patented Dec. 11, 1934 1,984,332

UNITED STATES PATENT OFFICE

1,984,332

SEWING MACHINE

Erskine E. Boyce, Gastonia, N. C., assignor to The Boysell Company, Gastonia, N. C., a corporation of North Carolina

Application October 31, 1933, Serial No. 696,095

18 Claims. (Cl. 112—79)

My invention relates to sewing machines and particularly to apparatus for and method of producing tufted articles such as bedspreads and the like, wherein a plain or woven fabric is decorated by tufts along predetermined lines or in predetermined groups forming designs on the fabric.

Old fashioned bedspreads of the above type are generally known as "candle wick" spreads and were generally produced for many years by hand, that is, the decorative tuftings were made by inserting yarn or the like with a needle and clipping the yarn of certain stitches to form tufts. It is generally desirable and customary in making such old fashioned candle wick bedspreads to provide skips or spaces in the lines of tufts.

The general principal object of the present invention is to provide apparatus or means for and the method of making candle wick bedspreads or the like of the character mentioned above on sewing machines without slowing up the stitching operation of the machine and at the same time providing spaces in the lines of tufting.

Stated generally as to method, the foregoing object may be said to be accomplished by feeding the fabric across the bed of a sewing machine, causing the needle with the yarn threaded therethrough to pierce the fabric to form loops on one side thereof, retaining and severing certain of the loops to provide the tufts, and causing the needle to idle or not pierce the fabric at predetermined times, whereby a loop is formed on the surface of the fabric opposite that on which the tufts are formed, and then removing said second loops to form the spaces.

The invention so far as the apparatus or mechanism is concerned generally embodies a mechanical or automatic control for the needle, whereby the same is at certain times locked to the actuating shaft for sewing movement therewith, and at other times is unlocked so that the needle does not pierce the fabric; also the provision of mechanical or automatic means for gripping the portion of the yarn which is not forced through the fabric and subsequently removing the same to provide the said spaces.

Another object is to provide for synchronous movements of the foregoing means so that the stitching, tufting, and loop removing operations, and feeding of the cloth across the machine bed is continuous.

The foregoing and other objects and advantages of the invention and the preferred mechanism for accomplishing the same will be better understood and will be pointed out in detail, during the course of the following detailed description of the accompanying drawings, in which

Fig. 1 is an end elevation of parts of the sewing machine with mechanism embodying my invention applied thereto;

Fig. 2 is a detailed view of a cam for effecting operation of the loop removing means;

Fig. 3 is a view similar to Fig. 2 of the cam for effecting operation of the needle latching and unlatching mechanism;

Fig. 4 is a rear elevation of a fragment of the sewing machine head and mechanism embodying my invention;

Fig. 4a is a sectional view through a fragment of fabric illustrating how the tufts and spaces are formed;

Fig. 5 is a front view similar to Fig. 4;

Fig. 6 is a fragmentary top view of the cams of Figs. 2 and 3 and their associated parts;

Fig. 7 is a top plan view of the mechanism shown in Figs. 1, 4 and 5; and

Fig. 8 is an enlarged fragmentary sectional view showing one of the connections in the gripper actuating mechanism.

Referring to the drawings, the numeral 10 designates generally the head of the sewing machine, through which extends rod 11 to which is attached presser foot 12, the said rod being reciprocated or actuated in known manner by standard parts of sewing machines. There is also a tubular needle shaft or sleeve 13 projecting out from the head and receiving the needle 14 to which is secured a laterally projecting pin 15. A shell 16 is attached to the sleeve 13 containing in its bore, coil spring 17 which bears against a cap 18 on the outer end of the shell and anchored or secured at its inner end to the rod 19, said spring normally urging the inner end of the rod 19 into a slot in the shaft or shank of the needle through an opening in the tubular shaft 13 to normally lock the needle shaft 14 and sleeve 13 together for movement as a unit. The outer end of the rod 19 extends through a slot 20 in a plate 21, and is screw threaded to receive a washer and nut 22 bearing against the plate 21 to maintain the spring under tension so that it normally urges the inner end of the rod 19 into interlocking engagement with the needle shaft 14. The sleeve 13 is reciprocated by any known or usual mechanism, through the head of the sewing machine the same as the presser foot rod 11,

and no detailed description of the means for reciprocating the sleeve 13 need be given in this application, since the mechanism for operating the same forms no part of this invention.

The plate or arm 21 is secured at its upper end to a lever 23 keyed on a shaft 24 which (see Fig. 7) is journaled through openings in arms 25 of a bracket 26 fixedly supported on the head. Also keyed on the shaft 24 is a lever 27 to which is connected an arm 28 as by screws 29. A roller 30 is journaled on the inner end of the arm 28 immediately below a cam 31, the formation of which depends upon the number of stitches to be skipped in making the design. In the embodiment illustrated, the cam 31, as appears clearly in Fig. 3, has two oppositely disposed wing portions 32 and oppositely disposed notches or reduced arcuate portions 33. The spring 17 normally urging the rod 19 inwardly exerts a pull on the arm or plate 21 through the washer and screw 22 sufficient to turn the lever 23 in a clockwise direction to move the arm 28 upwardly to urge the roller 30 against the cam 31. Obviously, when the cam is in the position shown in Fig. 3, the arm 28 is in its uppermost position and the inner end of the rod 19 is within the groove of the needle shaft locking the same to the sleeve 13 for movement therewith; and when the wings 32 on the cam 31 engage the roller the arm 28 is moved downwardly, the lever 23 and plate 21 are moved in a contra-clockwise direction and the rod 19 is retracted from engagement with the notch of the needle shaft, so that the needle shaft is not locked to the sleeve 13 and the latter may reciprocate without forcing the needle through the fabric as hereinafter more fully explained.

At this point, I would point out that since the pin or lug 15 is disposed above the shell 16 which moves up and down with the shaft 13, the slot 20 being provided in plate 21 to permit up and down movement of the rod 19 also, it is impossible for the needle to remain in a downward position or at the bottom of the stroke when unlatched, because the shell 16 contacting the pin or lug 15 forces the needle shaft to follow it on the up stroke. This assures positioning of the needle shaft for engagement of the rod 19 in its notch at the proper times as determined by the cam formations.

The type of cam illustrated will insert three stitches, that is, the needle will be locked to the reciprocating sleeve 13 for four down strokes so that the yarn will be forced through the fabric to form three loops and then the needle will be unlatched during five down strokes of the sleeve 13, so that five stitches will be skipped, or in other words, the needle will idle for five stitches during which it will not be forced through the fabric.

The tufts are formed on the under face of the fabric, and the loop between the tufts which is removed is on the upper face of the fabric, as shown in Fig. 4*a*, wherein the tufts are designated by "T" and the loops to be removed between the groups of tufts are designated by "L".

Although the mechanism for forming the tufts "T" may be of several different types such as shown in my copending application, Serial No. 577,817, filed Nov. 28, 1931, I have here shown that type which is disclosed and claimed in my copending application 538,845, filed May 20, 1931. Since the tufting apparatus is there fully disclosed in detail, I will only describe it here more or less generally, reference being had to the lower portion of Fig. 1 which corresponds to Fig. 3 of my said copending application, and wherein the numeral 35 designates the bed or top of the sewing machine through which projects the feed dog 36 to feed the fabric across the bed and beneath the needle and presser foot 12. The mechanism for operating the feed dog comprises a link 37 which extends transversely beneath the top and which is journaled at 38 on an arm 39. The opposite end of the link 37 is forked to receive an extension 40 of an arm 41 connected at 42 to a shaft, not shown, which is oscillated to move the link 37 up and down. A shaft 43 is connected to an arm 44 by a link 45 and the other end of the link 44 is connected to a frame 46. The foregoing mechanism gives the feed dog an up and down and back and forth motion in known manner. A shaft 48 is connected to the frame 46 for reciprocating movement therewith transversely to the top or bed 35, and a block 49 is secured on the shaft 48 for reciprocating movement therewith, the connection preferably being adjustable as through the medium of the set screw 50. The loop receiving bill 51 is carried by the block 49 and has an opening or slot 52 immediately behind its hooked end within which is disposed a blade 54. The blade is preferably operated from a separate source of power from that which operates shaft 43 and the other elements of the tufting mechanism above described. This is accomplished in the instance shown by mounting the knife on a shaft 55 which extends through an opening in a bracket 56. The lower end of the shaft 55 carries a roller 57 in engagement with a cam 58, the spring 59 around the shaft 55 maintaining the roller against the cam. The cam may be rotated by any means so that the roller 57 and shaft 55 and the knife blade 54 carried thereby will be reciprocated continuously. Obviously, the hook 51 receives the loops formed on the underside of the fabric when the needle pierces the fabric and such loops are severed by the knife 54 to form the tufts "T".

As previously mentioned, an important object of the invention is to provide spaces in the tufting which is accomplished by the unlatching of the needlebar through the medium of the cam 31 and parts operated thereby. When the needle is unlatched it does not pierce the fabric and, therefore, the fabric is fed along so that there is a relatively long loop "L" on top of the fabric between the groups of stitches. I will now describe the mechanism for automatically removing these loops when the ends thereof are severed, it being understood that such ends are parts of the stitches or loops beneath the fabric and the severing is accomplished by the mechanism just described above.

A pair of grippers 60 and 61, the ends or tips of which terminate adjacent the cloth being fed across the bed of the machine and also adjacent the needle, are pivotally mounted, as presently described, for cooperation in a tweezer-like manner. The gripper 61 is attached to a block 62 which is pivotally mounted on the stud 63, the block 62 being urged against a stud 64 by a coil spring 65 which surrounds bolt 66 secured at one end to the gripper 61 and block 62, and screw threaded at its other end to receive the nuts 67 bearing against the top of the spring and compressing the spring to force the block 62 against the stud 64, so that the gripper 61 is normally held in the full line position of Fig. 4.

The gripper 60 is also pivotally mounted on the stud 63 and a spring 68 is coiled about the stud having one end anchored thereto and its other end engaging the gripper 60 to hold it in the full line position of Fig. 4. The upper end of the gripper 60 is attached to a collar 69 on the stud 63, and the collar 69 is attached by ball and socket joint 69' (Fig. 8) to arm 70 extending thereabove and connected at its top also by a ball and socket joint to a link 71, the other end of which is connected to an arm 72 mounted on the shaft 73 for oscillation therewith. The shaft 73, as shown best in Fig. 7, is journaled through arms 74 of a bracket 75 secured to any fixed part of the machine. An arm 76 is keyed at one end to the shaft 73 and at its other end is connected to a link 77, which, at its top, is connected at 78 to a lever 79, the other end of which is pivotally connected at 80 to the bracket 26. The lever 79 carries a roller 81 intermediate its ends disposed above a cam 82 which, and like the cam 31, is keyed on the shaft 83 rotated by any suitable mechanism. The cam 82 is shown in detail in Fig. 2 as having four curved portions 84 with projections 85 between the pairs of curved portions at the ends of the cam, and notches 86 on its opposite sides intermediate the curved portions 84. A spring 87 has one end attached to the lever 79 and its other end attached to a lug 88 on the frame or head of the machine, the spring normally pulling downwardly on the lever 79 to urge roller 81 against cam 82.

A latch 89 is pivoted to a bracket, or any suitable fixed part, at 90 and has one end disposed beneath the lever 79 and its other end is beveled as indicated by the numeral 91 and provided with a notch 92. The gripper 61 has secured to its top an upwardly extending arm 93 having a tapered end disposed beneath the beveled end 91 of the latch 89. A coil spring 94 is secured to the latch 89 at one end and to the frame at its other end between the pivot 90 and the beveled end 91 and maintains the latch 89 in engagement with the lever 79.

Before proceeding with the detailed description of the operation of the mechanism, I would point out that the gripper 60 is movable toward, against, and with the gripper 61, and then away from gripper 61 by the mechanism actuated by the cam 82, namely, lever 79, link 77, arm 76, shaft 73, arm 72, link 71 and arm 70, which turns the collar 69 to which the gripper 60 is attached. Furthermore, the gripper 61 is moved by the griper 60 against the action of the spring 65 but returns to its normal full line position of Fig. 4 by the action of the spring 65 when the gripper 60 no longer urges the gripper 61 against the action of the spring.

With the foregoing in mind and the cams 31 and 82 properly adjusted on the shaft 83 for engagement with their respective rollers at proper intervals, the operation is as follows: With the actuating mechanism for the needle shaft sleeve 13, presser foot 12, and feed dog operating and with the shaft 83 rotating one revolution to eighteen revolutions of the main shaft which reciprocates sleeve 13, the roller 30 on arm 28 is first in one of the notches 33 of the cam 31, the rod 19 is locking the needle shaft to the sleeve 13, and, therefore, the needle pierces the cloth to force the yarn therethrough and form loops on the underside of the fabric which are engaged by the hook 51 and severed by the knife 54, in the manner previously explained. However, when the roller 30 is engaged by the outer surface of the arcuate wings 32 of the cam 31, the lever 28 is depressed moving the block 23 and plate 21 outwardly or to the right of the position shown in Fig. 1 and withdrawing the rod 19 from engagement with the needle bar, and consequently unlatching the needle and needlebar 13, so that the bar 13 reciprocates but the needle does not pierce the cloth to form loops on the underside so long as the rod 19 is withdrawn. While the needle is stitching, that is, piercing the cloth, the roller 81 on the lever 79 is disposed in one of the notches 86 or one of surfaces 84 of cam 82 so that the latch 89 is in the position shown in Fig. 4 with the notch 92 above and out of contact with the projection 93 on the gripper 61, complete release being effected when roller 81 drops into notches 86. As the roller 30 moves along one of the surfaces 32 of the cam 31 the needle is idling and the gripper 60 is moving toward the gripper 61, so that the length of yarn on the upper surface of the fabric is gripped between the members 60 and 61, as shown in Fig. 4 where the first dotted line position of the gripper 60 shows it against the full line or normal position of the gripper 61 with the yarn between their ends, and when both ends of the length of yarn held by the grippers is severed, it is pulled out and the grippers carry it to the side of the needle and line of stitching. When the roller 81 reaches a projection 85, the notch 92 engages the upper end of the projection 93 holding the gripper 61 against return movement, and when the roller passes beyond the projection 85 the gripper 61 is held by the latch 89 but the gripper 60 begins to return and as the grippers separate the length of yarn pulled out is released and dropped. When the roller 81 passes projection 85 the lever 79 drops, raising the latch 89 to release the projection 93 and permit the spring 65 to return the gripper 61 to its normal position for a repetition of the operation between the next group of tuftings. Fig. 4*a* shows in dot and dash lines a loop "L" removed, and in full lines a loop "L" to be removed between groups of tufting, but, of course, on the side of the fabric opposite to the tufts.

I claim:

1. In apparatus of the character described, a reciprocating needle bar and a needle carried thereby, means to lock the needle and needle bar together whereby the needle will pierce fabric at predetermined times to form loops on one side of the fabric and to unlock the needle from said bar at other times whereby the needle will not pierce the fabric at said other times but will carry the thread along the other side of the fabric, means to sever said loops, and means to pull the ends of the portions of the thread on said other side out of the fabric.

2. In a sewing machine including means to feed fabric thereacross, a reciprocating needle bar and a needle carried thereby, means to lock the needle and needle bar together whereby the needle will pierce fabric at predetermined times to form loops on one side of the fabric and to unlock the needle from said bar whereby the needle will not pierce the fabric at other predetermined times but will carry the thread along the other side of the fabric, means to sever said loops, and means to pull the ends of the portions of the thread on said other side out

of the fabric during feeding of the fabric and operation of said needle bar.

3. The method of forming tufting on a fabric with the tufts arranged in spaced groups, which comprises feeding the fabric across the path of movement of a reciprocating needle, causing the needle to pierce the fabric to form loops on one side of the fabric, progressively severing said loops, causing the needle to idle at predetermined times so as to carry the thread across the other side of the fabric between the groups of loops, and removing the portions of the thread on said last side of the fabric between said spaced groups during feeding movement of the fabric.

4. The method of forming tufting on a fabric with the tufts arranged in spaced groups which comprises forming loops on both sides of the fabric, progressively severing the loops on one side to form the tufts, and removing selected loops from the other side between the groups of tufts.

5. In a sewing machine for the purpose described including a reciprocating needle carrier and means to move a fabric across the end of the carrier during reciprocation thereof, means to selectively latch and unlatch a needle to and from said carrier during reciprocation thereof to cause the needle to pierce the fabric at predetermined times to form loops on one side thereof and at other times to idle and form loops on the other side thereof, means to sever said first loops, and means to pull said second loops out of the fabric.

6. In a sewing machine for the purpose described including a reciprocating needle carrier and means to move a fabric across the end of the carrier during reciprocation thereof, means to selectively latch and unlatch a needle to and from said carrier during reciprocation thereof to cause the needle to pierce the fabric at predetermined times to form loops on one side thereof and at other times to idle and form loops on the other side thereof, means to sever said first loops, and means to pull said second loops out of the fabric, said last means being synchronized with the operation of said second and third means.

7. In apparatus of the character described, a reciprocable needle bar and a needle therein, means to selectively latch and unlatch the needle to and from the needle bar at predetermined times to cause the needle to pierce the fabric at certain times and form loops on one side thereof and at other times to carry the thread across the other side of the fabric, a pair of cooperating grippers adjacent the needle and terminating adjacent the fabric, means to sever the loops on said first side of the fabric, and means to move said grippers to cause them to pull out the portion of the thread on said second side of the fabric between said first loops.

8. In apparatus of the character described including a reciprocable bar and a needle therein, means to selectively latch and unlatch said needle to and from the needle bar at predetermined intervals, a pair of grippers terminating adjacent the needle, a pivotal support for each of said grippers, means normally holding said grippers in spaced relation at their ends adjacent the needle, and means for moving one gripper toward and against the other to pick up stitches formed by the needle at predetermined intervals.

9. In apparatus of the character described, a reciprocable needle bar, means to selectively latch and unlatch a needle to and from said bar at predetermined times during a stitching operation whereby at certain times the needle will pierce the fabric to form loops on one side thereof and at other times will idle to carry the yarn or thread across the other side of the fabric, a pair of grippers terminating adjacent the fabric, means normally holding the grippers apart with their lower ends on opposite sides of the line of stitching, and means to bring the grippers together to grasp and pull the yarn on said other side of the fabric at predetermined intervals in the stitching operation.

10. In apparatus of the character described, a reciprocable needle bar, means to selectively latch and unlatch a needle to and from said bar at predetermined times during a stitching operation whereby at certain times the needle will pierce the fabric to form loops on one side thereof and at other times will idle to carry the yarn or thread across the other side of the fabric, means to sever said loops on said one side of the fabric, a pair of grippers terminating adjacent the fabric, means normally holding the grippers apart with their lower ends on opposite sides of the line of stitching, and means to bring the grippers together to grasp the thread or yarn on said other side of the fabric at predetermined intervals during the stitching operation to pull the ends of the thread or yarn between the groups of tuftings out of the fabric.

11. In apparatus of the character described, a reciprocable needle bar, means to selectively latch and unlatch a needle to and from said bar at predetermined times during a stitching operation whereby at certain times the needle will pierce the fabric to form loops on one side thereof and at other times will idle to carry the yarn or thread across the other side of the fabric, means to sever said loops on said one side of the fabric, a pair of grippers terminating adjacent the fabric, means normally holding the grippers apart with their lower ends on opposite sides of the line of stitching, and means to move one gripper across the line of stitching into engagement with the thread or yarn on said other side of the fabric and to carry said thread or yarn against the other gripper and beyond the line of stitching whereby the ends of said thread are pulled out of the fabric, and means to return said grippers to their normal positions at different intervals whereby they separate to drop said thread or yarn.

12. In apparatus of the character described, a reciprocable needle bar, means to selectively latch and unlatch a needle to and from said bar at predetermined times during a stitching operation whereby at certain times the needle will pierce the fabric to form loops on one side thereof and at other times will idle to carry the yarn or thread across the other side of the fabric, means to sever said loops on said one side of the fabric, a pair of grippers terminating adjacent the fabric, means normally holding the grippers apart with their lower ends on opposite sides of the line of stitching, and means to move one gripper across the line of stitching into engagement with the thread or yarn on said other side of the fabric and to carry said thread or yarn against the other gripper and beyond the line of stitching whereby the ends of said thread are pulled out of the fabric, means to return said grippers to their normal positions, and means to retard the re-

turn of the second gripper to normal position until after the first gripper has started to return whereby the thread is released.

13. The structure of claim 2 wherein the said first means comprises a pin, a spring normally urging said pin through the needle bar into locking engagement with the needle, a lever, means on said lever receiving the outer end of the pin, and means for oscillating said lever at predetermined intervals to move the pin into and out of engagement with the needle.

14. The structure of claim 2 wherein the said first means comprises a pin, a spring normally urging said pin through the needle bar into locking engagement with the needle, a lever, means on said lever receiving the outer end of the pin, means for oscillating said lever at predetermined intervals to move the pin into and out of engagement with the needle, said pin being reciprocable with the needle bar when not locking the needle to the bar, and means to retain the needle when not engaged by the pin in position for engagement by the pin when released by said means on the lever.

15. The structure of claim 2 wherein the said last means comprises a pair of grippers, each mounted for pivotal movement and resiliently held normally in spaced relation with their lower ends adjacent the line of stitching and one on each side thereof, means to swing one of the grippers toward, against and with the other, and means to retard return movement of said other gripper until after the first has moved toward normal position.

16. The structure of claim 5 wherein the means to latch and unlatch the needle, and the means to pull said second loops out of the fabric are each actuated by a cam, and said cams are removably mounted on and driven by a common shaft and are relatively adjustable thereon to provide synchronized movements to said means.

17. The method of forming tufting on a fabric with the tufts arranged in spaced relation forming designs on the fabric, which comprises feeding the fabric across the path of movement of a reciprocating needle, causing the needle to pierce the fabric to form loops on one side of the fabric, progressively severing said loops, causing the needle to idle at predetermined times so as to carry the threads across the other side of the fabric between the said loops, and removing the portions of the thread on said last side of the fabric between said loops during feeding movement of the fabric.

18. The method of forming tufting on a fabric with the tufts arranged in spaced relation forming designs on one side of the fabric, which comprises forming loops on both sides of the fabric, progressively severing the loops on said first side of the fabric to form the tufts, and removing loops from the other side of the fabric between selected tufts.

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