Jan. 10, 1939. R. H. BRADWELL 2,143,677

TUFTING MACHINE

Filed May 24, 1938 3 Sheets-Sheet 1

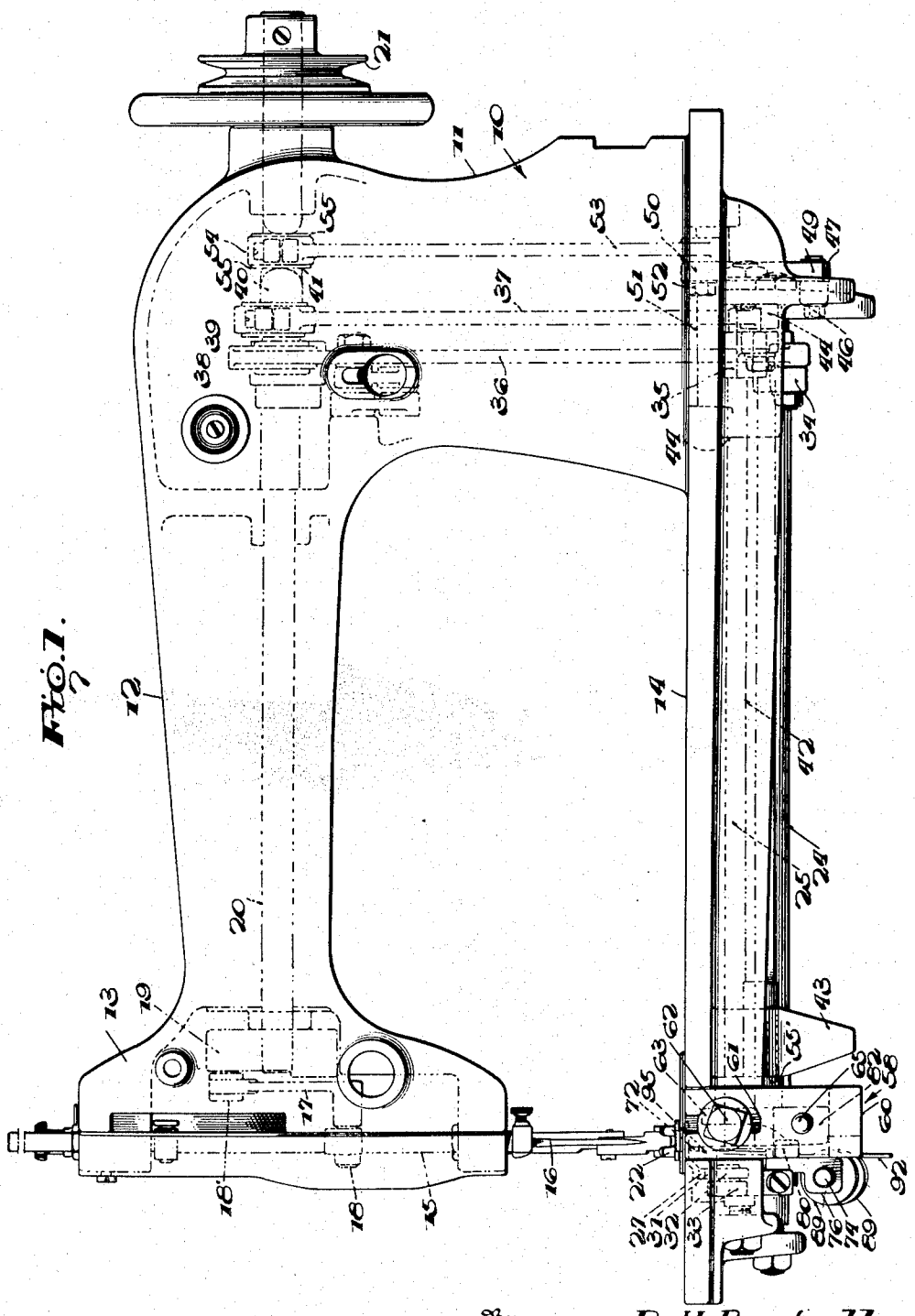


Fig. 1.

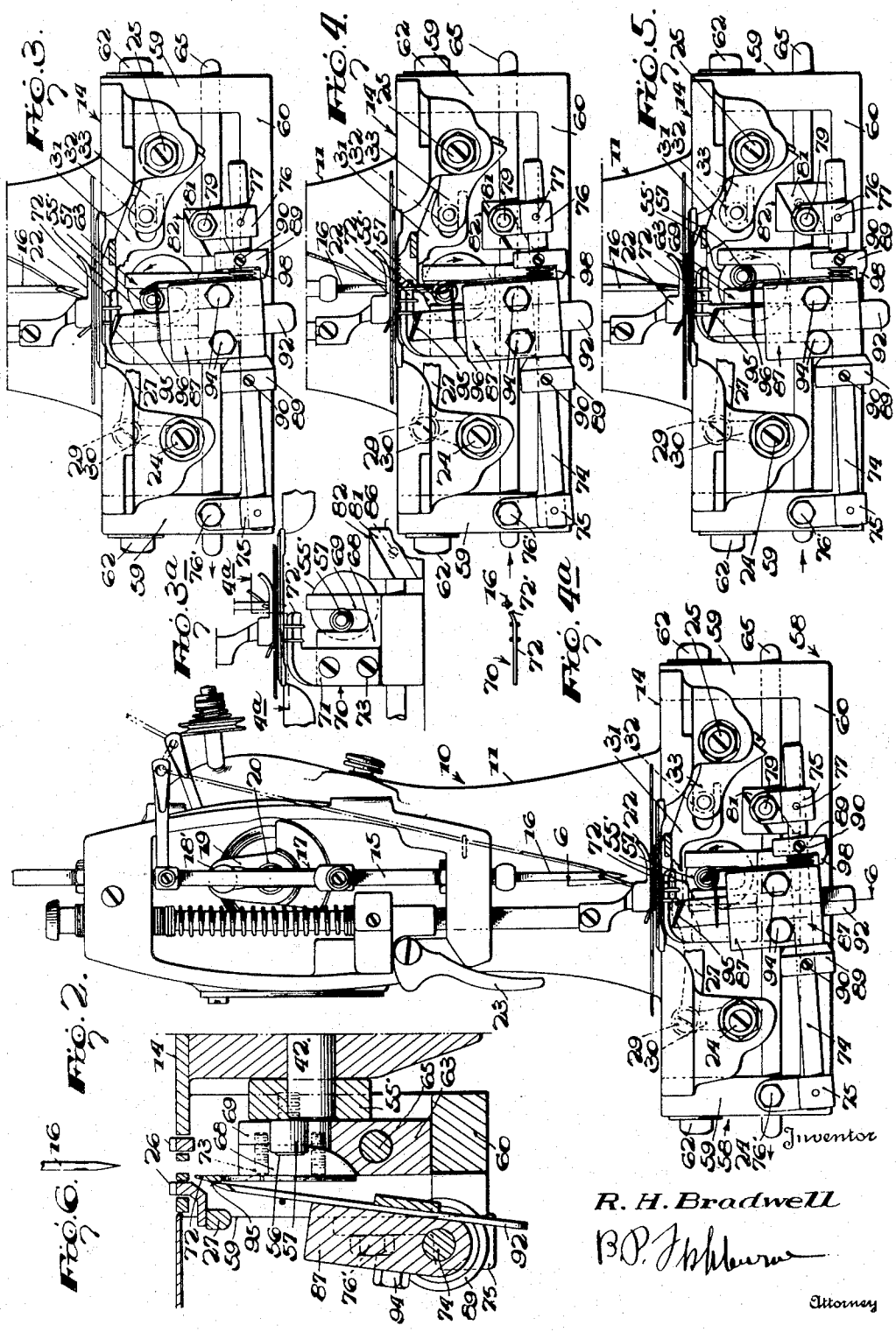
By R. H. Bradwell

B. P. Fahlberg Attorney

Jan. 10, 1939. R. H. BRADWELL 2,143,677

TUFTING MACHINE

Filed May 24, 1938 3 Sheets-Sheet 2



Jan. 10, 1939. R. H. BRADWELL 2,143,677

TUFTING MACHINE

Filed May 24, 1938 3 Sheets-Sheet 3

FIG. 7.

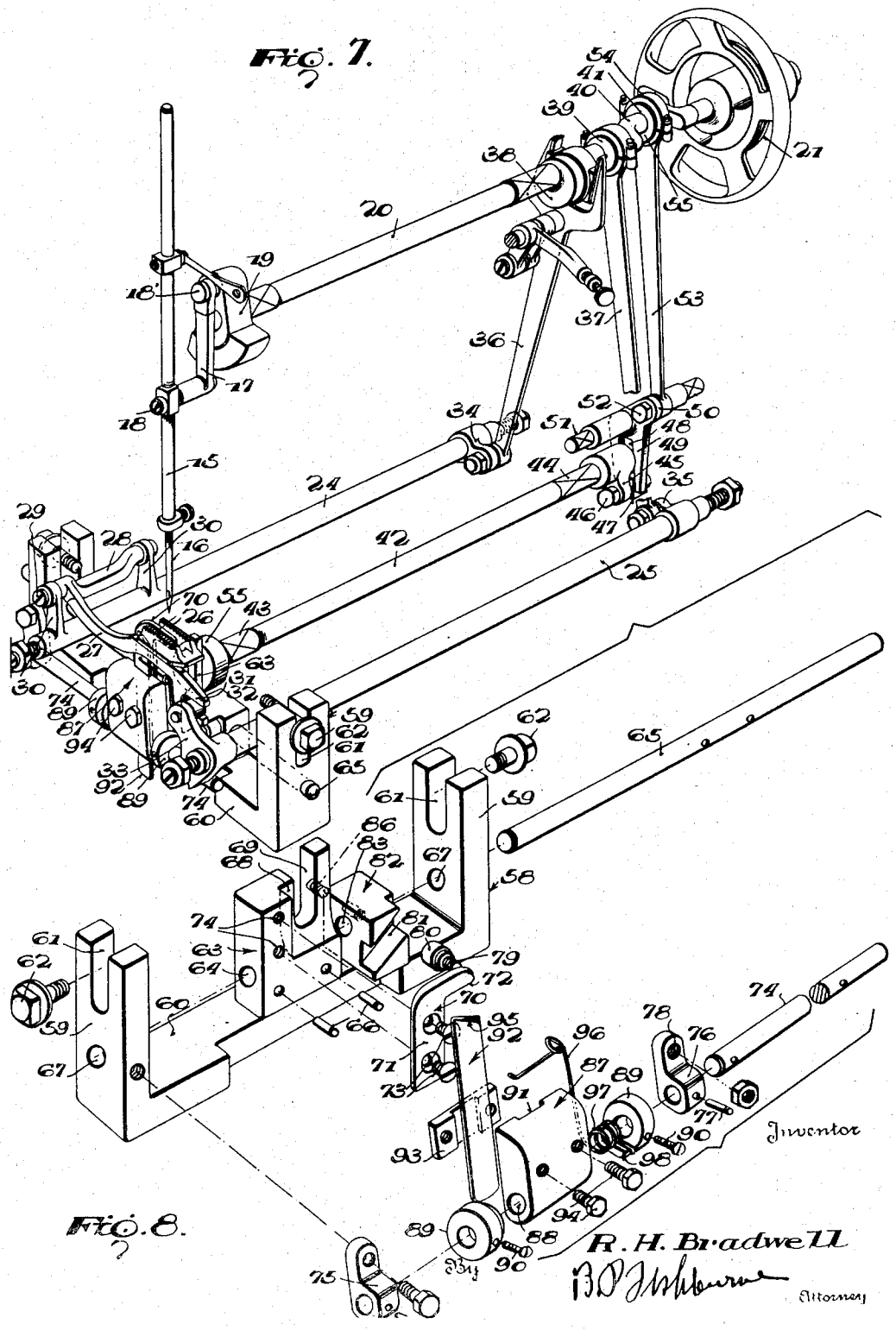


FIG. 8.

Inventor

R. H. Bradwell

By

Attorney

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TUFTING MACHINE

Robert Hugh Bradwell, Dalton, Ga., assignor to Polly Prentiss, Inc., Sumter, S. C., a corporation of South Carolina

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15 Claims. (Cl. 112—79)

My invention relates to tufting machines.

An important object of the invention is to provide a tufting machine in which the cutter is mounted separately or independently of the looper, and has a rubbing or sliding engagement with the looper to produce a shearing action.

A further object of the invention is to provide means whereby the cutter or blade is moved out of engagement with the loop entering portion of the looper, at intervals, thus freeing the looper and cutter of any yarn or thread which might improperly accumulate thereon.

A further object of the invention is to provide a tufting machine having the looper and cutter operating in a manner to leave one or more uncut loops upon the looper, so that the yarn will not pull out of the fabric upon the upward movement of the needle.

A further object of the invention is to provide means separate from the work feed means and the rock shafts of the work feed means, for operating the looper and cutter.

A further object of the invention is to provide means whereby the looper may be readily vertically adjusted for controlling the length of the loops.

Other objects and advantages of the invention will be apparent during the course of the following description.

This application is a continuation in part of my application for Tufting machine, filed December 5, 1936, Serial No. 114,484.

In the accompanying drawings forming a part of this application and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a side elevation of a tufting machine embodying my invention,

Figure 2 is a head end elevation of the machine, the looper and associated elements in side elevation, showing the needle at the maximum raised position, and the looper still projecting forwardly over the path of travel of the needle,

Figure 3 is a similar view showing the needle moving from the uppermost position downwardly to a lowered position, above the fabric, showing the looper near the rear or retracted position and the cutter in the cutting position,

Figure 3*a* shows the needle lowered still further and the looper shifted to the rearmost position from the needle, to permit the loop to pass the free end of the looper element,

Figure 4*a* is a horizontal section taken on line 4*a*—4*a* of Figure 3*a*,

Figure 4 is a similar view showing the needle moved down to its lowermost position through the fabric and the looper moved forwardly to enter the loop, and the cutter somewhat lowered,

Figure 5 is a similar view showing the needle moving from the lowermost position to a raised position just above the fabric, with the looper shifted to the forwardmost or completely projected position and the cutter further lowered and out of contact with the bill or looper element of the looper,

Figure 6 is a transverse section taken on line 6—6 of Figure 2,

Figure 7 is a perspective view of the looper, and associated elements, parts omitted, and,

Figure 8 is an exploded perspective view of the looper and associated elements.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of my invention, the numeral 10 designates a sewing machine of any well known or preferred type, such as the ordinary Singer sewing machine. This machine comprises a stock 11, arm 12 and head 13. The stock 11 is mounted upon a flat base or bed 14, constituting the work support. The head 13 is provided with the usual vertical reciprocatory needle bar 15, carrying the needle 16. The needle bar is reciprocated by a link 17, pivotally connected therewith at 18 and pivotally connected at 18' with a cam crank 19, which is clamped to the horizontal drive shaft 20, extending through the arm 12, and rotated by a grooved pulley 21, which may be power driven. The head 13 carries the usual presser foot 22, raised and lowered by the usual means including a lever 23.

Arranged below the base 14 are horizontal rock shafts 24 and 25, which are journaled in suitable stationary bearings. The sewing machine further comprises work feed means, to advance the work from the operator, including feed dogs 26, operating through a suitable opening in the usual throat plate, and these dogs are rigidly mounted upon a rigid dog supporting link or bar 27. At one end, the link 27 is rigidly connected with a transverse head 28, pivoted at 29 with cranks 30, in turn rigidly mounted upon the rock shaft 24. At its opposite end, the rigid link 27 is provided with a fork 31, receiving the roller 32, pivotally mounted upon a crank 33, in turn rigidly mounted upon the rock shaft 25. The rock shafts extend longitudinally of the drive shaft 20 and are parallel therewith. The rock shafts 24 and 25 are provided adjacent to the stock 11 with cranks 34 and 35 respectively. The cranks 34 and 35 are pivotally connected with connecting rods 36 and 37 respectively, which are actuated by cams 38

and 39 respectively, in turn carried by the drive shaft 20. It might be stated at this point that the rock shaft 24 serves to move the dog carrying link 27 longitudinally while the rock shaft 25 serves to raise and lower the same. The drive shaft 20 is also provided with a crank 40, including a crank pin 41. The foregoing description is that of the ordinary sewing machine, such as a Singer sewing machine.

Arranged between the rock shafts 24 and 25 and extending parallel therewith is a third or auxiliary rock shaft 42 journaled in stationary bearings 43 and 44. The rock shaft 42 is provided at its rear end with a depending crank 45, rigidly secured thereto and this crank carries a pin or pivot element 46 upon which is pivoted a block 47, sliding in a longitudinal slot 48 in the long arm 49 of the bell crank lever having a short arm 50. This bell crank lever turns about the longitudinal axis of a shaft or pivot 51, held in suitable bearings. Pivotally connected with the short arm 50 of the bell crank lever, as shown at 52, is a connecting rod 53, provided at its upper end with a circular strap 54, pivotally receiving a circular disk 55, mounted upon the pin 41 of the crank 40. It is thus seen that the rotary movement of the shaft 20 in one direction will be transferred to the rock shaft 42 to turn the same in opposite directions. At its forward end, the rock shaft 42 has a crank disk 55 rigidly secured thereto, carrying a pin 56 which is eccentric to the rock shaft and the disk 55 and this pin preferably carries a rotatable roller 57.

Arranged beneath the bed 14, at the head end of the machine, is a U-shaped supporting bracket 58, including vertical arms 59 and a horizontal base 60. The arms 59 are provided at their upper ends with elongated vertical slots 61 to receive bolts 62, having screw threaded engagement with portions or flanges of the base 14. The supporting bracket 58 is therefore rigidly attached to the base 14 and may be vertically adjusted with relation thereto. Arranged within the supporting bracket 58 is a looper carrier or block 63, having a horizontal opening 64 to receive a horizontal reciprocatory guide rod 65. The looper carrier or block is rigidly clamped to the guide rod 65 by set pins 66. The guide rod 65 is slidably mounted within openings 67. The looper carrier or block 63 is held against vertical swinging movement or displacement and for this purpose its lower end or bottom may slidably contact with the base 60, or other suitable means may be employed for this purpose. The same result may be effected by forming the rod 65 square in cross-section and also having the openings 64 and 67 square in cross-section, in which event the looper carrier or block need not contact with the base 60.

The looper carrier or block 63 is provided upon its face next to the needle 16 with a vertical recess 68, providing a passage for the travel of the needle so that it will not contact with the block or carrier. The block or carrier 63 is also provided with a vertical slot 69, receiving the roller 57, Figure 6. The numeral 70 designates the looper, including an arm 71 and a looper element 72, to enter the loop. The looper element 72 is not provided with the usual depending end or bill, at its forward end, but may be so provided, if desired. The looper element has a laterally bent portion 72', at its free end, which travels close to the needle when the looper travels across the needle to enter the loop. The portion 72' prevents the loop from slipping off of the free end of the looper element. The arm 71 is rigidly secured to the carrier or block 63 by screws 73, engaging within openings 74. The heads of these screws are preferably flush with the outer face of the arm 70. It is thus seen that the rocking movement of the shaft 42 will reciprocate the carrier or block 63 and the looper in a straight line, toward and from the needle.

Means are provided to sever the loops upon the looper, including a cutter mounted separately or independently of the looper. The cutting means comprises an arm or rod 74, which is preferably cylindrical and one end of the rod 74 is clamped within a knuckle 75, which is pivoted to one vertical arm 59 by means of a bolt 76'. The arm or rod 74 is therefore free to swing vertically. A collar 76 is adjustably mounted upon the rod 74 and may be clamped thereto by a set pin 77 or the like, and this collar has a screw-threaded opening 78 to receive the screw-threaded end of a bolt or pin 79, carrying a roller 80, operating within a vertically inclined groove 81, formed in a shifting block or element 82. This block or element has an opening 83 to receive the shaft 85 and is clamped to the shaft by a set screw 86 or the like. The numeral 87 designates a mounting-block having a horizontal opening 88 at its lower end to pivotally receive the shaft 74 so that the mounting-block is free to turn thereon. This mounting-block is arranged between stop collars 89, clamped to the shaft 74 by set screws 90 or the like. The mounting-block has a vertical groove 91 to receive a blade or cutter 92 held within the groove by a plate 93, secured to the mounting-block 87 by clamping bolts 94 or the like. The blade 92 has an upper inclined cutting edge 95, which has a sliding or rubbing engagement with the looper element 72 to produce a shearing action therewith. The blade 92 is retained in sliding engagement with the looper element by means of a spring 96, engaging therewith, above the shaft 74 and this spring has a coiled portion 97, surrounding the shaft, adjacent to one of the stop collars 89, the other end of the spring engaging the flange 98 of the stop collar, as shown.

The operation of the apparatus is as follows:

Figure 2 shows the needle 16 fn the uppermost position. The looper element 72 is projected forwardly beyond the path of travel of the needle, while the blade or cutter 92 is somewhat lowered with respect to the looper element, as the roller 80 is now in the intermediate position within the inclined groove 81. Figure 3 shows the needle descending but still arranged above the fabric. The crank disk 55 is now turned counter-clockwise, Figure 3, and the looper element is swinging from the needle and its free end is at about the center of the path of travel of the needle. The roller 80 is now at the upper end of the inclined groove 81 and the blade or cutter 92 is therefore shifted to the upper or cutting position, to cut the loop or loops at the rear end of the looper element, but leaving one or more loops at the forward end of the looper element uncut. In Figure 3*a*, the needle has moved down further, and the looper has moved further from the needle, so that the free end of the looper element is out of the path of travel of the needle and will enter the loop when moved toward the needle. Figure 3*a* shows the position of parts at the end of the clockwise movement of the disk 55. In Figure 4, the needle is at the lowermost position and has carried the yarn through the fabric to produce the loop, the crank

disk 55 now turning clockwise, Figure 4. By this time, the looper element has been shifted to the right sufficiently to enter the loop for a short distance, while the cutter or blade 92 has descended somewhat, as the roller 80 is now near the center of the inclined groove 81. In Figure 5, the needle has traveled from the lowermost position to an elevated position just above the fabric, while the crank disk 55 continues to turn clockwise. The looper element 72 is therefore projected a further distance to the right through the loop, and the blade or cutter 92 has moved further downwardly to about its lowermost position, since roller 80 is at the lowermost end of the inclined groove 81. As the needle moves upwardly from the position, Figure 5, to the uppermost position, Figure 2, the crank disk 55 turns counter-clockwise, Figure 2, thus shifting the looper element to the left, and somewhat raising the blade or cutter 92, so that the parts assume the position shown in Figure 2. The cycle of operation is repeated. As clearly shown in Figures 4a and 6, the looper element is positioned close to and upon one side of the needle, and its bent portion 72' will clear the needle and enter the loop when the needle is in the lowered position.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. In a machine for producing a tufted article, stitching mechanism including a reciprocatory needle to carry the tufted thread through a fabric and produce loops, a vertically adjustable substantially U-shaped bracket beneath the stitching mechanism, a reciprocatory rod carried by said bracket crosswise thereof, a block adjustably secured to the rod and having an upper fork for accommodating a wrist pin driven by an oscillatory bobbin shaft, a loop-forming hook carried by said block, a rod-like arm secured at one end of the bracket for vertical swinging movement, a block-like cutter holder hinged on said arm and adjustable longitudinally thereof, an adjustable knife blade carried by the holder, means active upon the holder to urge the blade in close relation to the hook, and a connection on the rod and arm for effecting vertical swing of the latter.

2. In a machine for producing a tufted article, stitching mechanism including a reciprocatory needle to carry the tufted thread through a fabric and produce loops, a vertically adjustable substantially U-shaped bracket beneath the stitching mechanism, a reciprocatory rod carried by said bracket crosswise thereof, a block adjustably secured to the rod and having an upper fork for accommodating a wrist pin driven by an oscillatory bobbin shaft, a loop-forming hook carried by said block, a rod-like arm secured at one end of the bracket for vertical swinging movement, a block-like cutter holder hinged on said arm and adjustable longitudinally thereof, an adjustable knife blade carried by the holder, means active upon the holder to urge the blade in close relation to the hook, an actuator member on said rod and having a cam slot, an ear on the arm, and a shift lug projecting from said ear into the cam slot for activity of the actuator member relative to the arm.

3. In a tufting machine, a reciprocatory needle to carry the yarn through the fabric and produce a loop, work feed means, means to actuate the work feed means, a reciprocatory looper to enter the loop produced by the needle, driving means independent of the work feed actuating means to move the looper, and a movable cutter mounted independently of the looper and having slidable engagement with the looper to produce a shearing action therewith and operated by said driving means.

4. In a tufting machine, a reciprocatory needle to carry the yarn through the fabric and produce a loop, work feed means, means to actuate the work feed means, a reciprocatory looper to enter the loop produced by the needle, driving means independent of the work feed actuating means to move the looper, a movable cutter separately mounted from the looper and having permanent slidable engagement with the looper to produce a shearing action therewith and operated by the independent driving means.

5. An attachment for use with the reciprocatory needle, and work feed means of a sewing machine, said attachment comprising a reciprocatory looper to coact with the needle, a cutting device, an element for supporting the cutting device and cause the same to travel in a circular path throughout its entire travel, the cutting device being separately mounted from the looper and rubbing against the same to produce a shearing action to cut the yarn, a second element connected with the looper to move it, and means to simultaneously move said elements counterclockwise and then simultaneously move them clockwise.

6. An attachment for use in connection with the reciprocatory needle, and work feed means of a sewing machine, said attachment comprising a reciprocatory looper to coact with the needle, a cutting device mounted separately from the looper to coact therewith and having a sliding rubbing engagement therewith to produce a shearing action, and means to move the looper and cutting device.

7. An attachment for use with the reciprocatory needle, and work feed means of a sewing machine, said attachment comprising a reciprocatory looper to coact with the needle, a reciprocatory cutter mounted separate from the looper, the cutter having rubbing engagement with the looper to produce a shearing action therewith, and means to move the looper toward and from the needle and to move the cutter to sever the loop upon the looper when the looper is moved from the needle.

8. In a tufting machine, a movable needle to carry the yarn through the fabric and produce loops, work feed means, a looper mounted to partake of rectilinear reciprocatory movements with relation to the needle, a swinging lever mounted separately from the looper to be raised and lowered with relation thereto, a cutter mounted upon the swinging lever and separately mounted from the looper and adapted to sever the loops upon the looper, a part movable with the looper and having an inclined cam groove, and a member connected with the lever and having an element engaging within the inclined cam groove.

9. In a tufting machine, a movable needle to carry the yarn through the fabric and produce loops, a looper mounted to have a rectilinear reciprocatory movement with relation to the needle, a vertically swinging lever mounted separately from the looper, a cutter mounted upon the lever

and mounted separately from the looper and having rubbing engagement with the looper for affording a shearing action therewith to cut the loops, and driving means actuated by the rectilinear reciprocatory movement of the looper to swing the lever vertically.

10. An attachment for use in connection with the reciprocatory needle, and work feed means of a sewing machine, said attachment comprising a reciprocatory looper to coact with the needle, a pivoted cutter mounted separately from the looper and having rubbing engagement with the looper for producing a shearing action, and means to move the looper and the cutter for producing a relative movement between the same.

11. In a tufting machine, a movable needle, work feed means, a reciprocatory looper for movement toward and from the needle, a lever mounted separately from the looper and adapted to be swung in opposite directions in a plane generally parallel with the plane of movement of the looper, means timed in operation with respect to the movement of the looper to swing the lever upwardly when the looper moves from the needle, a cutter pivotally mounted upon the lever to swing substantially at a right angle to the plane of movement of the looper and separately mounted from the looper, and means to swing the cutter upon its pivot to cause the same to have rubbing engagement with the looper to produce a shearing action to cut the loops.

12. In a tufting machine, a reciprocatory needle, means to operate the needle, work feed means, a looper, a cutting device mounted separately from the looper to sever the loops thereon, means timed in operation with respect to the movement of the needle to move the looper toward the needle when the needle is in the lower position so that the looper enters the loop and to move the looper from the needle when the needle rises, and means timed in operation with respect to the movement of the looper for moving the cutting edge of the cutting device from the needle as the looper moves from the needle and effecting a relative movement between the cutting device and looper to sever the loop upon the looper when the looper is moved from the needle.

13. In a tufting machine, a reciprocatory needle, means to operate the needle, work feed means, a looper, a cutting device mounted separately from the looper to sever the loops thereon, means timed in operation with respect to the movement of the needle to move the looper toward the needle when the needle is in the lower position so that the looper enters the loop and to move the looper from the needle, and means timed in operation with respect to the movement of the looper to move the cutting device when the looper has moved from the needle to sever the loop upon the looper.

14. In a tufting machine, a reciprocatory needle mounted upon one side of the work, work feed means, a looper mounted upon the opposite side of the work with respect to the mounting of the needle, the looper moving in a direction longitudinally of the line of work, means to move the looper so that it enters the loop when the needle is lowered, a cutter mounted separately from the looper and having rubbing engagement with the looper to produce a shearing action therewith, the free end of the looper extending beyond the cutting range of the cutter so that the cutter severs some but not all of the loops upon the looper upon each cycle of operation of the machine, and means to move the cutter.

15. An attachment for use with the needle, work support, and work feed of a sewing machine, said attachment comprising a looper, means to mount the looper upon the opposite side of the work support with respect to the mounting of the needle, the looper moving in a direction longitudinally of the line of work and facing in an opposite direction to the feed of the work, means to move the looper so that it enters the loop when the needle is lowered, a cutter mounted separately from the looper to sever the loops upon the looper, the cutter having sliding engagement with the looper to produce a shearing action therewith, the free end of the looper extending beyond the cutting range of the cutter so that the cutter severs some but not all of the loops upon the looper upon each cycle of operation of the machine, and means to move the cutter.

ROBERT HUGH BRADWELL.