Dec. 27, 1932. F. M. MURPHEY 1,892,161

TUFTING MACHINE

Filed Aug. 1, 1930 4 Sheets-Sheet 1

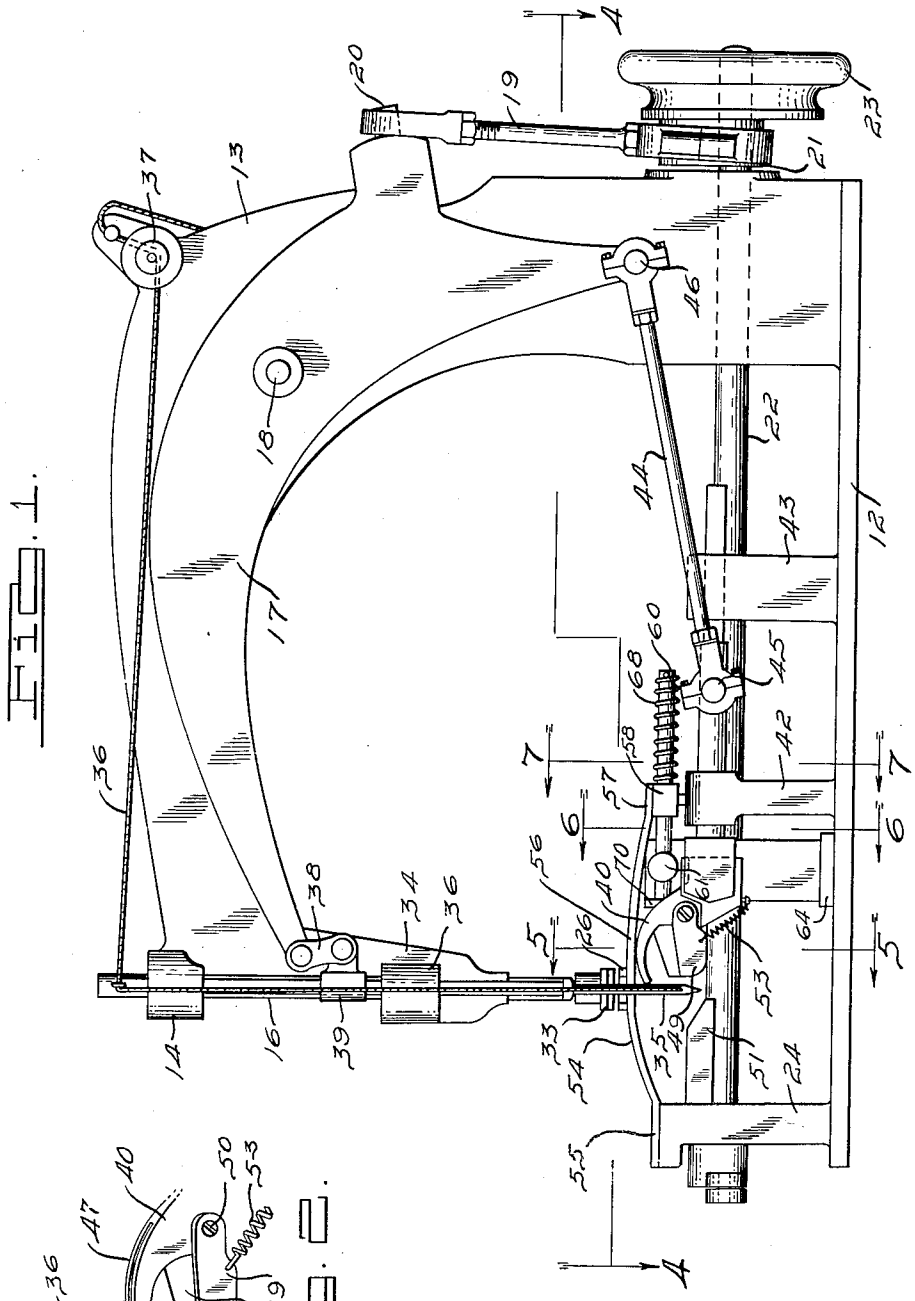


Fig. 1.

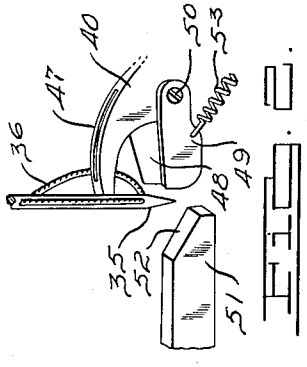


Fig. 2.

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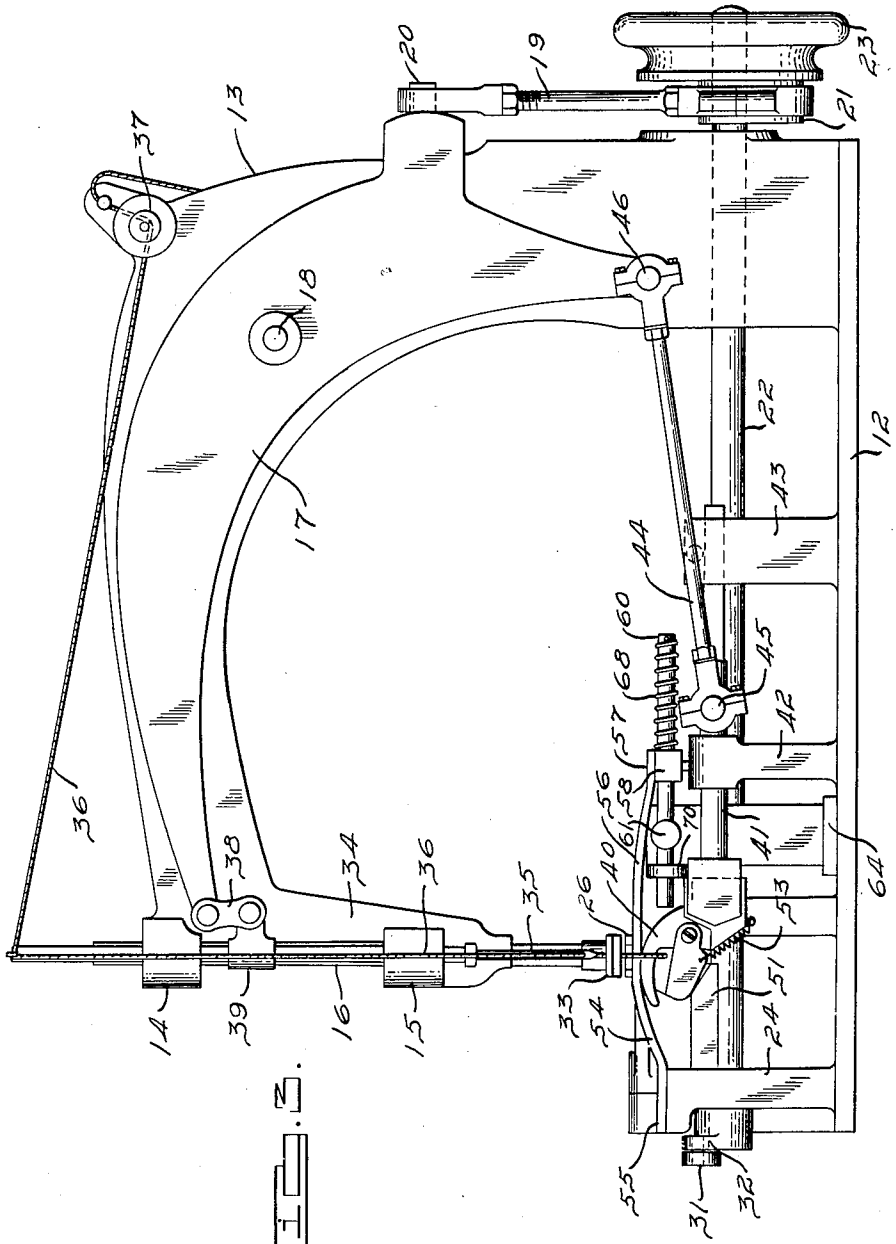


FIG. 2.

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Filed Aug. 1, 1930 4 Sheets-Sheet 3

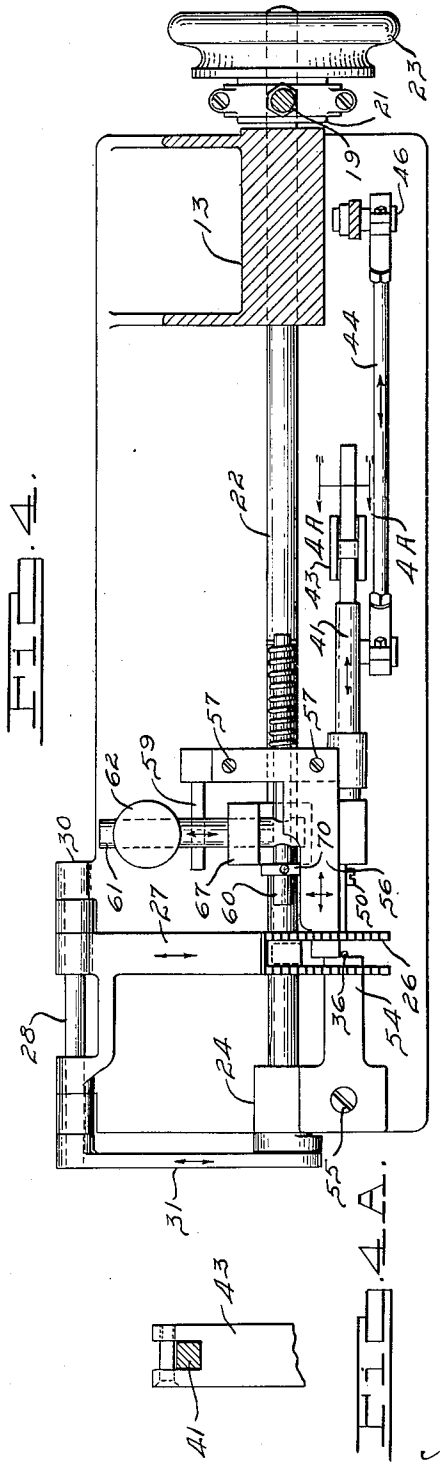


Fig. 4.

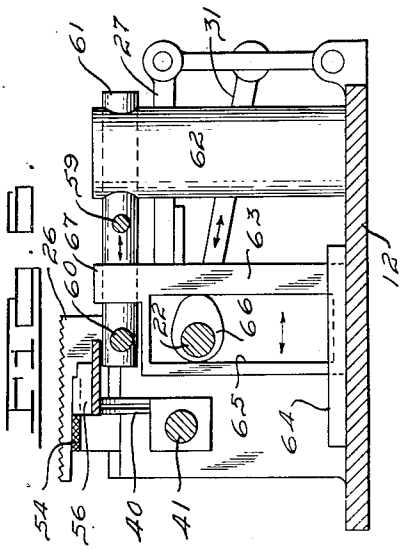


Fig. 5.

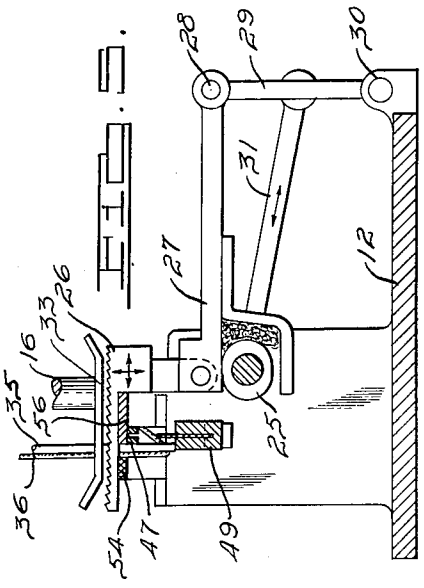


Fig. 5.

Fig. 4A.

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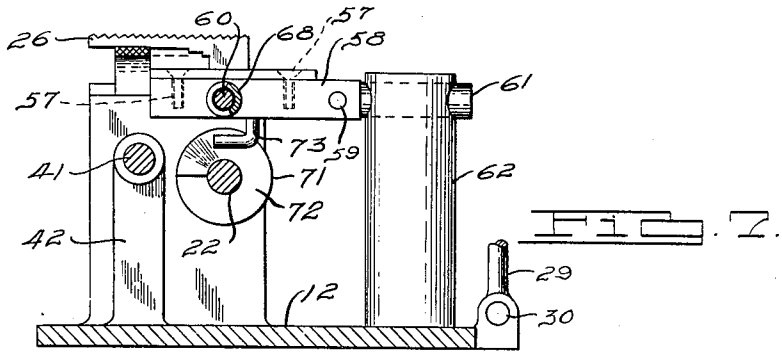


Fig. 7.

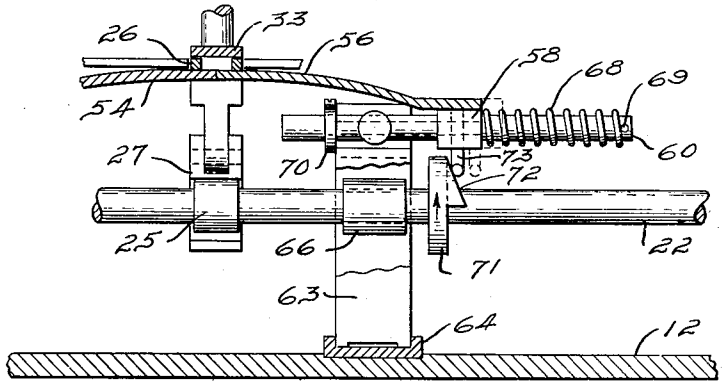


Fig. 8.



Fig. 9.



Fig. 10.

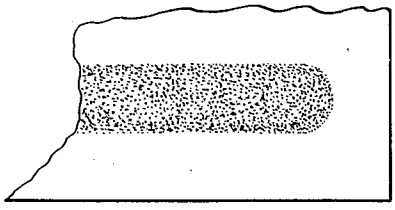


Fig. 11.

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UNITED STATES PATENT OFFICE

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TUFTING MACHINE

Application filed August 1, 1930, Serial No. 472,268.

This invention relates to machines for forming loops or tufts on fabric.

The main objects of this invention are to provide a machine of this character which has a minimum number of parts and extreme simplicity in design; to provide a machine which will form a succession or series of loops and then cut the loops successively as formed so as to produce a long pile which is securely held in the sheet of fabric to which it is attached, and to provide improved mechanism of extremely simple character which can be readily applied to a standard form of sewing machine with a minimum of modification to the sewing machine.

An illustrative embodiment of this invention is shown in the accompanying drawings, in which

Fig. 1 is a view in front elevation of my improved mechanism adapted to a standard form of sewing machine.

Fig. 2 is an enlarged fragmentary view in perspective showing the loop forming hook engaging the strand.

Fig. 3 is a view similar to Fig. 1, but with the mechanism moved to a different position, showing the loop being severed by the knife.

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 1, looking in the direction indicated.

Fig. 4A is a fragmentary cross sectional view taken substantially upon the line 4A—4A of Fig. 4.

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 1, looking in the direction indicated.

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 1, looking in the direction indicated.

Fig. 7 is an enlarged fragmentary sectional view taken on the line 7—7 of Fig. 1.

Fig. 8 is an enlarged fragmentary detail partly in section and partly in elevation showing the gripping means for holding the loop when formed and the actuating mechanism for releasing the same.

Fig. 9 is a sectional view showing a series of tufts formed in my improved illustration.

Fig. 10 is an end view of the same.

Fig. 11 is a face view of the same.

My improved mechanism embodying the subject-matter of this invention is shown applied to a standard well known form of sewing machine comprising a base or bed plate 12, an upwardly and outwardly projecting fixed arm or neck 13, integrally formed on the base 12, the outer free end of which is provided with vertically spaced guides 14 and 15 for supporting an axially slidable vertically disposed needle bar 16.

A bell crank arm 17 is pivoted at 18 on one side of the fixed arm 13 and is rocked on its pivot by a pitman arm 19, the upper end of which engages a stud 20 on the bell crank 17 and the lower end of which is provided with a yoke which surrounds a cam 21 rigidly mounted on a main drive shaft 22. A combined pulley and fly wheel 23 is also rigidly mounted on the main shaft 22 through which suitable power may be applied for rotating the shaft.

The main shaft 22 is horizontally disposed and suitably journalled in the lower end of the fixed arm 13 and in an upstanding bearing support 24, located at the end of the bed plate opposite to the base of the arm 13.

The shaft 22 drives the customary four motion feeding mechanism through the medium of a double cam 25, which imparts vertical reciprocatory movement to a serrated feeder 26 pivotally mounted on one end of a horizontally disposed feeder arm 27. The other end of the arm 27 is pivoted at 28 to the top end of a vertically disposed rocker arm 29. The lower end of the rocker arm 29 is pivoted at 30 to the base plate 12, and rocking motion is imparted to the arm by a crank arm 31 driven by a crank 32 on the main shaft 22.

In the drawings, the usual work support has been omitted to more clearly show the details of the mechanism, but it will be understood that the feeder 26 passes through suitable slots in the work support and throat plate associated therewith in the usual manner for feeding the material through the machine.

A presser foot 33 is mounted on the head end 34 of the fixed arm 13 and suitable mechanism provided for raising and lowering the presser foot in the customary manner.

The needle bar 16 has a needle 35 removably mounted in the lower end thereof in the usual manner and carries a thread or strand 36 which passes through a tensioning device 37.

The end of the rocker arm 17 adjacent the head 34 is pivoted to one end of a link 38 which has its other end pivotally connected to a fitting 39 rigidly secured on the needle bar 16 so that rocking movement of the arm 17 imparts vertical reciprocation to the needle bar in the usual manner.

My improved mechanism for making tufts by means of a series of severed loops comprises a loop forming hook 40 rigidly mounted on a horizontally disposed axially reciprocable bar 41 which is journalled in upstanding bearings 42 and 43 integrally formed on the bed plate 12. The end of the rod 41 which passes through the bearing support 43 is square or rectangular in cross-section, as shown most clearly in Fig. 4A, so as to maintain the hook 40 in an upright and definitely guided position. The bar 41 is horizontally reciprocated in its bearings by a pitman arm 44, one end of which is pivoted at 45 to the arm and the other end of which is pivoted at 46 to the lower depending end of the rocker arm 17.

The outer tip end of the hook 40 is positioned so as to pass closely along the side of the needle 35 and thereby pass through a loop of the strand 36 which is formed when the needle passes downwardly through the material and begins its return movement. The hook 40 is provided with a vertical longitudinally disposed slot 47 for receiving a loop cutting knife blade 48 which is mounted rigidly on a frame 49 pivoted at 50 on the hook 40.

Means are provided for actuating the knife 48 and comprise a cam 51 rigidly mounted on the upstanding bearing support 24 in the path of movement of the hook 40. The cam 51 has a sloping face 52 against which the forward end of the knife frame 49 abuts and rides up as shown most clearly in Fig. 3, causing the knife blade 48 to enter the slot 47 and thus sever the strand 36 through which the hook 40 has passed. A helical tension spring 53 has one end attached to the knife frame 49 and the other end attached to the lower end or base of the hook 40 for normally holding the knife in open position as shown in Figs. 1 and 2.

Means are provided for holding the free end of the strand 36 until after the needle has taken its next stitch so as not to withdraw the free end which has been severed from the material and comprise a stationary abutment 54 mounted at the top end 55 of the bearing support 24 and terminating just below the throat plate and feeder 26, as shown most clearly in Figs. 4 and 5. A gripper arm 56 is secured at 57 to a horizontal transversely disposed bar 58 which is rigidly secured to one end of a stud 59 and slidable on a rod 60. The stud 59 and rod 60 are slidable through a bar 61 which is axially slidably supported in the upper end of a vertically disposed rigidly mounted support post 62 attached to the bed plate 12.

Means are provided for reciprocating the bar 61 axially for imparting transverse movement to the arm gripper 56 through the medium of bar 58, supporting stud 59 and rod 60, and comprise an upstanding frame 63 having its base transversely slidable in a guide 64 mounted on the top surface of the base plate 12. The frame 63 is provided with a rectangular opening 65 for embracing a cam 66 rigidly secured on and rotated by the main shaft 22.

The rod 60 is slidable through the supporting bar 58, and the end thereof which protrudes rearwardly is surrounded by a helical compression spring 68, one end of which abuts against the supporting bar 58 and the other end of which bears against a pin 69 which passes transversely through the tip end of the rod 60. A set collar 70 is provided on the opposite end of the rod 60 for adjusting and maintaining tension on the spring 68.

Means are provided for reciprocating the gripper arm 56 longitudinally of the base 12 against the action of the spring 68 and comprises a cam 71 rigidly secured to the main shaft 22. The cam 71 has an inclined face 72 against which bears and rides a depending arm 73 rigidly mounted on the underside of the supporting bar 58.

In the operation of this machine, a suitable source of power is connected to the combined pulley and fly wheel 23 for imparting rotary motion to the main shaft 22 and for driving the cam 21 so as to impart a rocking movement to the bell crank arm 17 in the usual manner of such machines.

The feeding mechanism is actuated in the usual manner for progressively and intermittently feeding the material after each stitch of the needle 35. Vertical reciprocation of the needle 35 carries the strand 36 down through the material to form a loop on the underside, which loop is engaged by the free end of the gripper arm 56 abutting against the free end of the fixed arm 54.

The loop forming hook 40 is reciprocated through the medium of the bell crank arm 17, pitman 44 and supporting bar 41. The end of the hook passes through the loop of the strand, as shown in Figs. 3 and 5, and as the hook approaches its limit of movement, the knife frame 49 rides up the inclined face 52 of the cam 51, thus causing the knife blade to sever the loop as it enters the slot 47 of the hook.

The gripper arm 56 holds the severed end of the strand so as to prevent the needle from

pulling the severed end out of the material which is being operated upon. As the needle moves downwardly to take a new stitch or form a new loop, the gripper arm 56 is moved transversely of the machine so as to be out of the way of the down-coming needle, such transverse movement being imparted by the cam 66 on the main shaft 22 through the medium of the frame 63, bar 61 and supporting bar 58.

As will be seen from the foregoing description, this mechanism is extremely simple, containing but a relatively few parts and is of rugged construction so as to give a maximum of efficient service without need of repair or adjustment.

Although but one specific embodiment of this invention has been herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

I claim:

1. In a sewing machine, a base frame, a main shaft journaled on said frame, a bell crank rocker arm fulcrumed on said frame, connections between said shaft and arm for rocking said bell crank, a strand carrying needle reciprocated by one end of said bell crank, fabric feeding mechanism actuated by said main shaft, linearly reciprocating loop forming mechanism actuated by the other end of said bell crank, and means for cutting the loops successively as formed.

2. In a sewing machine, a base frame, a main shaft journaled on said frame, a bell crank rocker arm fulcrumed on said frame, connections between said shaft and arm for rocking said bell crank, a strand carrying needle reciprocated by one end of said bell crank, fabric feeding mechanism actuated by said main shaft, reciprocating loop forming mechanism actuated by the other end of said bell crank, a knife for cutting the loops successively as formed, and a cam stationarily mounted on said frame for actuating said knife to cut the formed loops.

3. In a sewing machine, a base frame, a main shaft journaled on said frame, a bell crank rocker arm fulcrumed on said frame, connections between said shaft and arm for rocking said bell crank, a strand carrying needle reciprocated by one end of said bell crank, fabric feeding mechanism actuated by said main shaft, reciprocating loop forming mechanism actuated by the other end of said bell crank, a knife pivoted on said loop forming mechanism for cutting the loops successively as formed, and a cam stationarily mounted on said frame for actuating said knife to cut the formed loops.

4. In a sewing machine, a base frame, a main shaft journaled on said frame, a bell crank rocker arm fulcrumed on said frame, connections between said shaft and arm for rocking said bell crank, a strand carrying needle reciprocated by one end of said bell crank, fabric feeding mechanism actuated by said main shaft, linearly reciprocating loop forming mechanism actuated by the other end of said bell crank, and retaining means for holding the loop when formed.

5. In a sewing machine, a base frame, a main shaft journaled on said frame, a bell crank rocker arm fulcrumed on said frame, connections between said shaft and arm for rocking said bell crank, a strand carrying needle reciprocated by one end of said bell crank, fabric feeding mechanism actuated by said main shaft, linearly reciprocating loop forming mechanism actuated by the other end of said bell crank, retaining means for holding the loop when formed, and means for cutting the loops successively as formed.

6. In a sewing machine, a base frame, a main shaft journaled on said frame, a bell crank rocker arm fulcrumed on said frame, connections between said shaft and arm for rocking said bell crank, a strand carrying needle reciprocated by one end of said bell crank, fabric feeding mechanism actuated by said main shaft, reciprocating loop forming mechanism actuated by the other end of said bell crank, a knife for cutting the loops successively as formed, a cam stationarily mounted on said frame for actuating said knife to cut the formed loops, and retaining means for holding the loop when formed.

7. In a sewing machine, a base frame, a main shaft journaled on said frame, a bell crank rocker arm fulcrumed on said frame, connections between said shaft and arm for rocking said bell crank, a strand carrying needle reciprocated by one end of said bell crank, fabric feeding mechanism actuated by said main shaft, reciprocating loop forming mechanism actuated by the other end of said bell crank, a knife pivoted on said loop forming mechanism for cutting the loops successively as formed, and a fixed cam positioned in the path of movement of said knife for engaging and actuating said knife to cut the formed loops.

8. A tufting machine comprising a reciprocating needle, loop forming mechanism cooperating with the needle, a pair of gripping jaws cooperating with the needle for holding the end of the strand carried by the needle and thus preventing the needle during reciprocatory motion from pulling the previously formed loop from the fabric and means for moving one of said jaws away from the other jaw for purposes of releasing one loop and grasping another and additional means for linearly moving said jaw in a direction transverse to the first mentioned motion.

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