Sept. 5, 1939. R. H. BRADWELL 2,171,825

TUFTING MACHINE

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FIG. 1.

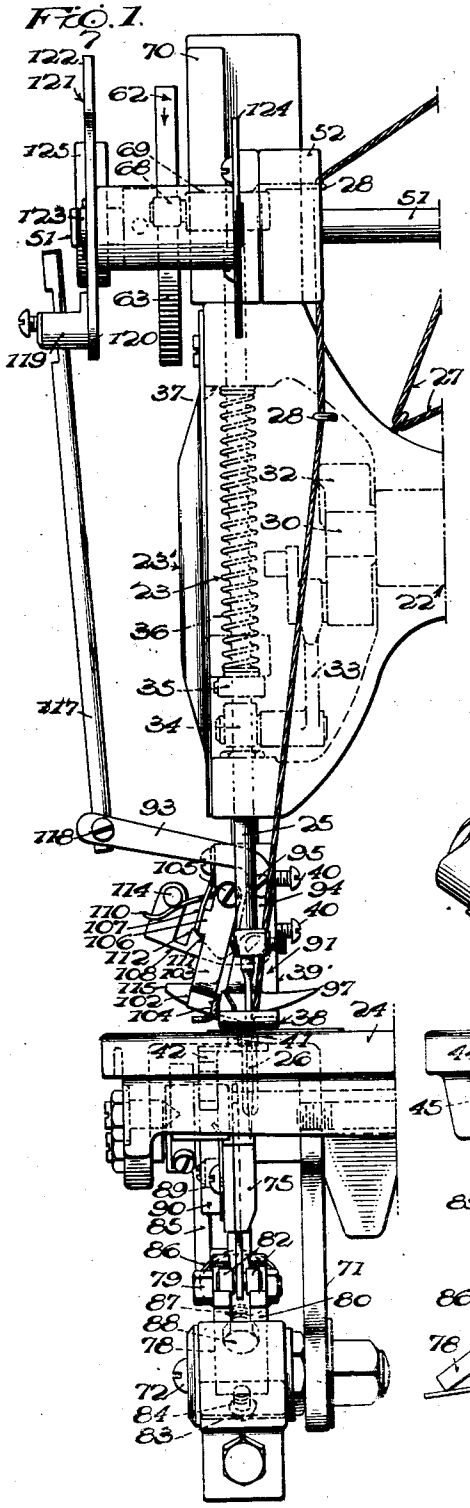
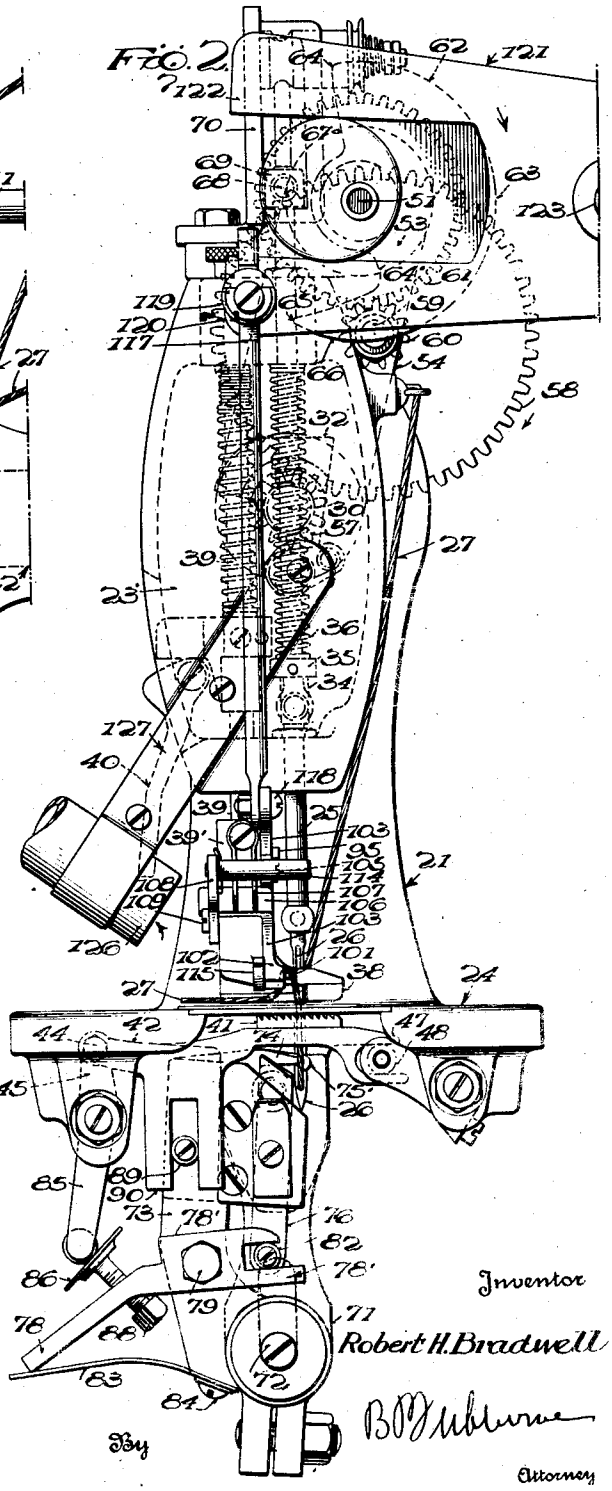


FIG. 2.



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TUFTING MACHINE

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FIG. 1a

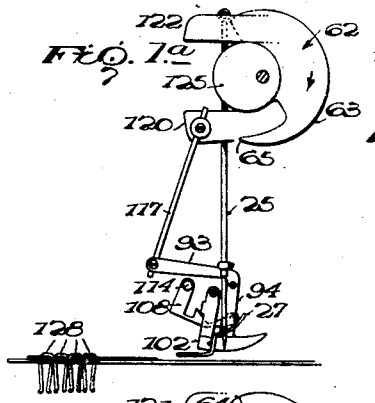


FIG. 2a

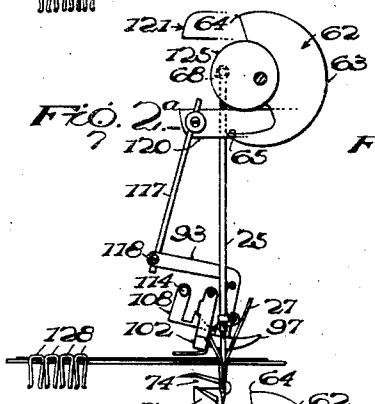


FIG. 3a

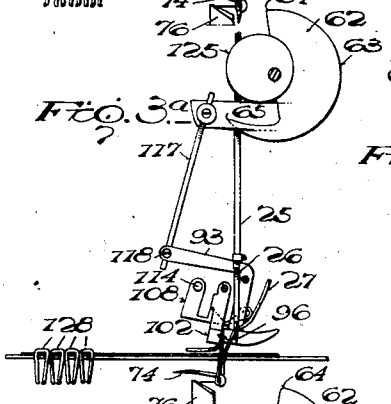


FIG. 4a

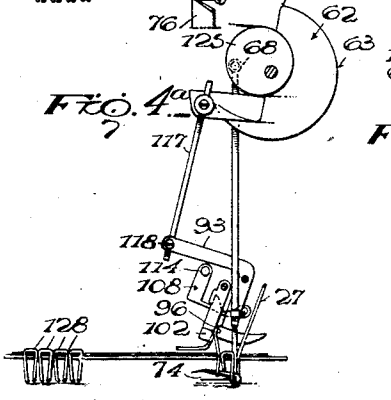


FIG. 5a

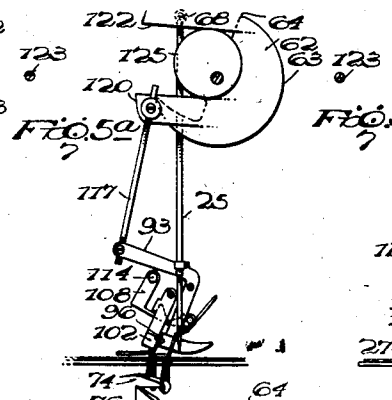


FIG. 6a

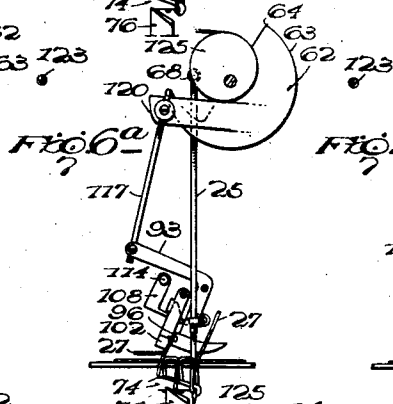


FIG. 7a

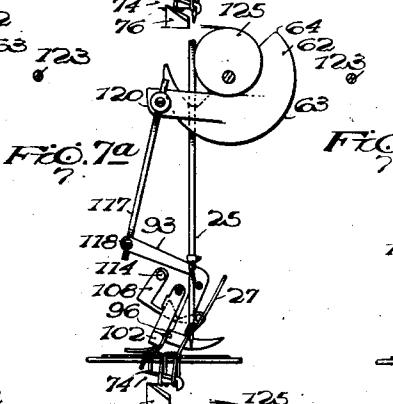


FIG. 8a

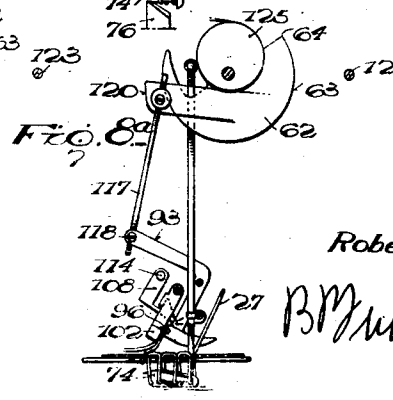


FIG. 9a

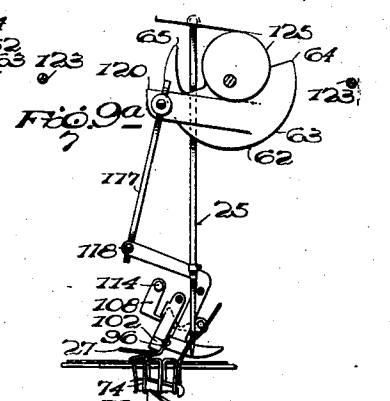


FIG. 10a

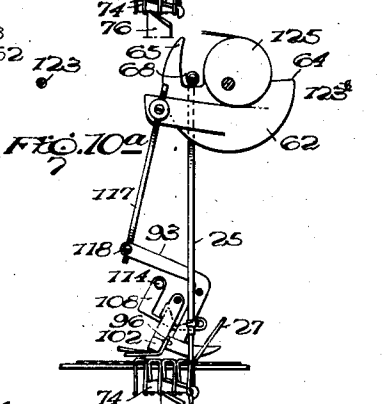
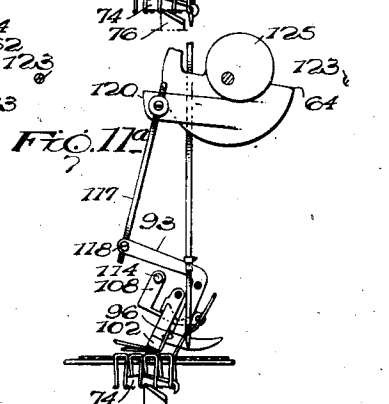


FIG. 11a



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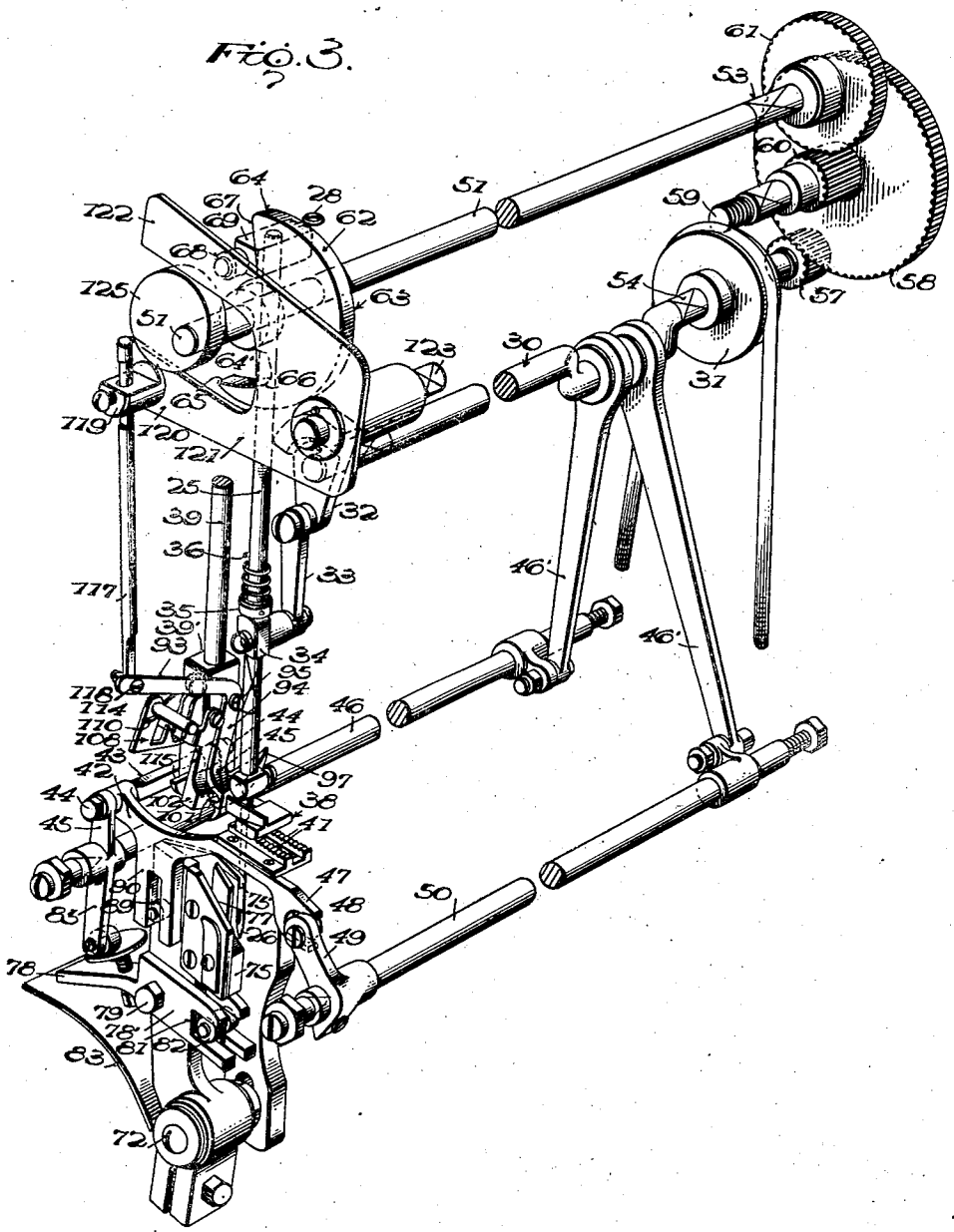
Attorney

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TUFTING MACHINE

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Fig. 3.



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TUFTING MACHINE

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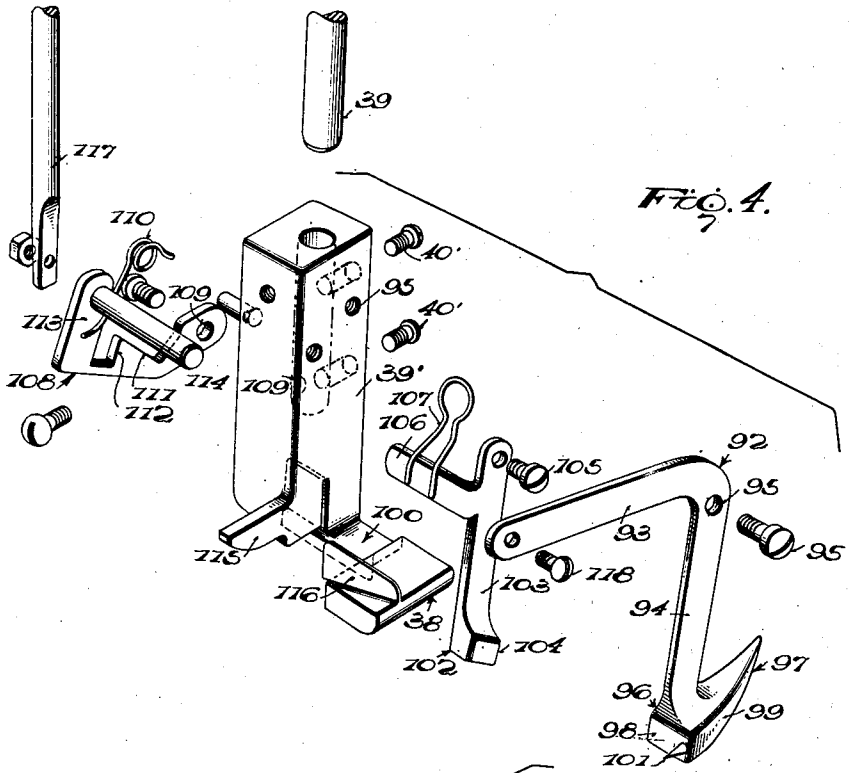


FIG. 4.

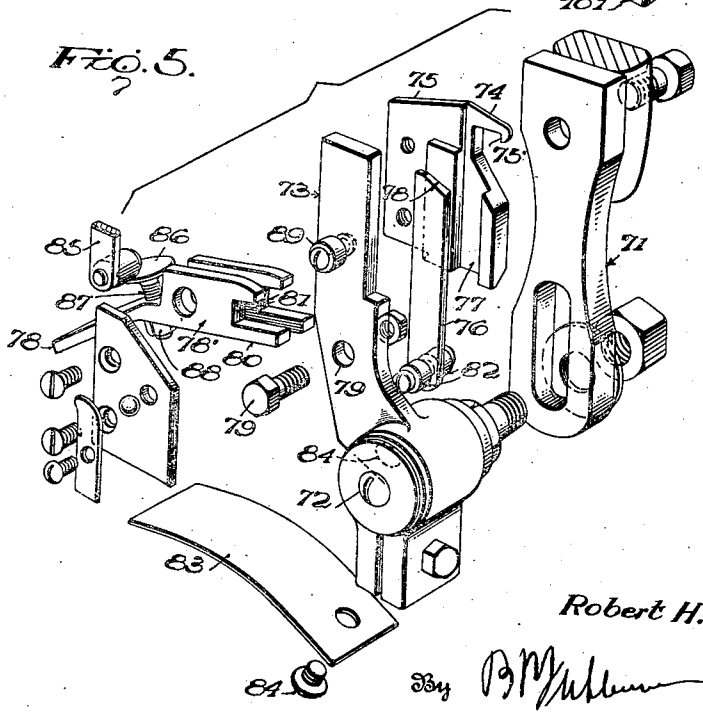


FIG. 5.

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Sept. 5, 1939. R. H. BRADWELL 2,171,825

TUFTING MACHINE

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FIG. 12a

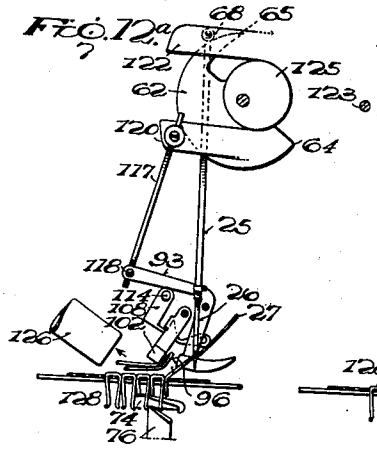


FIG. 15a

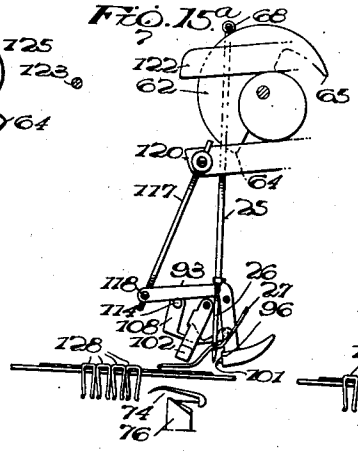


FIG. 18a

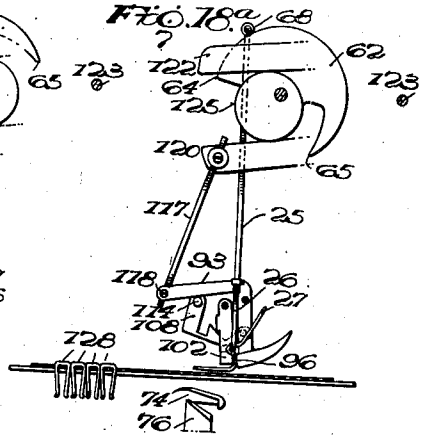


FIG. 13a

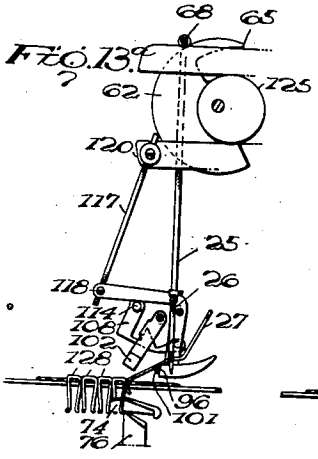


FIG. 16a

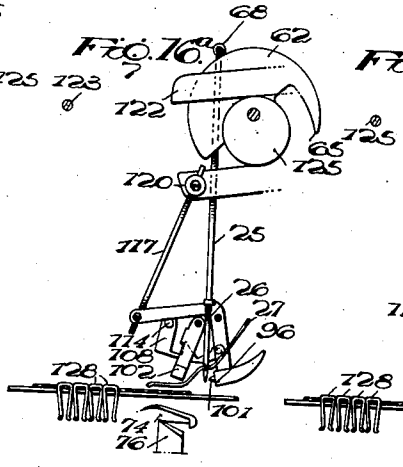


FIG. 19a

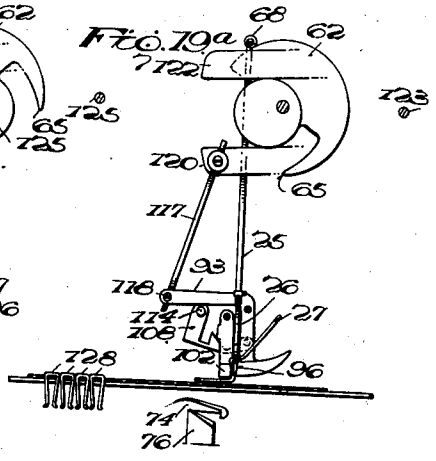


FIG. 14a

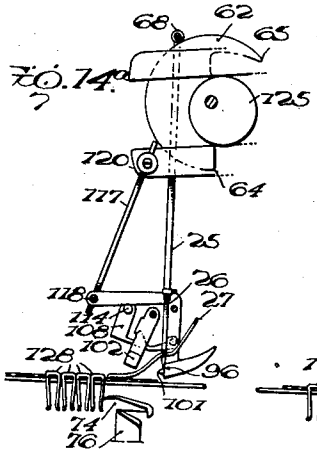
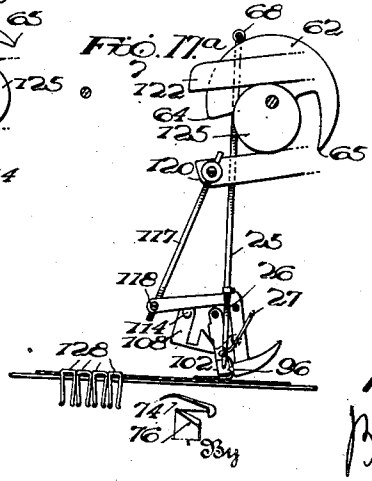


FIG. 17a



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By B. F. Mehlenbacher

Attorney

Patented Sept. 5, 1939

2,171,825

UNITED STATES PATENT OFFICE

2,171,825

TUFTING MACHINE

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

Application October 20, 1936, Serial No. 106,661

12 Claims. (Cl. 112—79)

My invention relates to a method of and machine for producing spaced tufts, or spaced groups of tufts on fabric.

An important object of the invention is to provide a machine of the above mentioned character for producing the spaced tufts or the spaced groups of tufts from a continuous yarn, and removing, during the feeding movement of the work, cut portions of the yarn, whereby the spaced tufts or spaced groups of tufts are not connected and the removal of the connecting loops after the tufting operation is eliminated.

A further object of the invention is to provide a machine of the above mentioned character which will separate the yarn from the leading tuft or group of tufts before the next trailing tuft or group of tufts is produced and will subsequently separate the yarn from the trailing tuft or group of tufts.

A further object of the invention is to provide a machine which will not carry the yarn across the fabric between the spaced tufts or group of tufts, but moves the yarn laterally with respect to the line of the feed of the work so that the yarn is not carried on the fabric between the spaced tufts or groups of tufts.

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

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 elvation of the head end of a machine embodying my invention,

Figure 2 is an end elevation of the same,

Figure 3 is a perspective view of the operating parts of the machine,

Figure 4 is an exploded perspective view of the yarn clamp and associated elements,

Figure 5 is a similar view of the hook and associated elements, and,

Figures 1^a to 19^a are diagrammatic views showing the mode of operation of the needle and the yarn clamp.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of my invention, the numeral **20** designates a sewing machine, as a whole, of any well known or preferred type, such as of the Singer sewing machine, as shown in my Patent 2,038,923, or my pending application for Method of and machine for producing spaced groups of tufts on fabric, Serial Number 83,400, filed June 3, 1936. This machine comprises a stock **21**, an arm **22**, and a head **23**. The usual head plate **23'** is provided, in Figure 2. The stock **21** is mounted upon the flat base **24**. The head **23** is provided with the usual vertical reciprocating needle bar **25**, carrying a needle **26**, which is rigidly clamped thereto, for permanent movement therewith. This needle has the usual eye for receiving the tufting thread or yarn **27**. The tufting thread is passed through guides **28** and a suitable tension device, not shown, such as the tension device **29** in my said pending application. The tension device is so adjusted that it places the thread or yarn under very slight tension, just enough to prevent improper feeding of the thread. The tufting yarn is fed from the usual cone spool. The machine embodies the usual driving shaft **30**, driven by a grooved pulley **31** of the like. At its forward end, the drive shaft **30** is provided with a crank disk **32** rigidly secured thereto, and having pivotal connection with a link **33**. This link **33** is pivotally connected with a sleeve **34**. The sleeve **34** is a part of the original sewing machine. This sleeve is ordinarily clamped to the needle bar **25**, to reciprocate it, by means of a set screw. In accordance with my invention, this set screw is removed and the sleeve **34** therefore is slidably mounted upon the needle bar **25**. This sleeve is capable of raising the needle bar, but the needle bar may be held in the raised position when the sleeve **34** is lowered, as will be explained. Arranged above the sleeve **34** is a ring **35**, rigidly clamped to the needle bar, and this ring is engaged by a compressible coil spring **36**, surrounding the needle bar, engaging the ring **35** and the end wall **37** of the head **23**, as shown. The spring **36** serves to move the needle bar downwardly while the sleeve **34** raises the needle bar upwardly, but the needle bar is permanently slidable within the sleeve **34**.

The machine embodies a presser-foot **38**, carried by a block or sleeve **39'**, which is rectangular in cross-section. This sleeve is rigidly clamped to a reciprocatory pressure bar **39** by set screws **40'** or the like. The presser bar may be raised by a finger engaging lever **40** or any other suitable means.

The sewing machine further comprises the work feeding means, to advance the work in a line of work from the operator, in a stitch-by-stitch manner, including dogs **41**, operating through a suitable opening in the base plate **24**, and these dogs are rigidly mounted upon a rigid dog support link or bar **42**. At one end, the link **42** is rigidly connected with a head **43**, pivotally connected at **44** with generally vertical cranks **45**,

in turn rigidly mounted upon a rock shaft 46 extending longitudinally of and beneath the base 24, and held by suitable stationary bearings. At its opposite end, the link 42 is provided with a fork 47, receiving a roller 48, pivotally mounted upon a generally horizontal crank 49, in turn rigidly mounted upon a rock shaft 50. This rock shaft is arranged beneath the base 24 and extends longitudinally thereof in spaced parallel relation to the rock shaft 46 and is supported by stationary bearings. These rock shafts are driven from the drive shaft 30, by the usual drive means 46', as is well known in the art. The arrangement of the rock shafts 46 and 50 correspond to the rock shafts 27 and 33 in my said Patent 2,038,923. It might be stated at this point that the movement of the rock shaft 46 moves the dog carrying link 42 longitudinally, while the movement of the rock shaft 50 serves to raise and lower this link. When the link 42 is moved longitudinally in a forward feeding direction, crank 49 raises the same to feed the fabric and when the link 42 is moved rearwardly in a longitudinal direction, crank 49 lowers the link 42, thus releasing the work so that it is held in the new position by the presser foot. The foregoing description of the feed mechanism is that of the ordinary sewing machine, such as a Singer sewing machine as shown in my Patent 2,038,923.

Means are provided to hold or lock the needle bar in the raised position, comprising a horizontal shaft 51, one end of which is journalled in a stationary bearing 52 and its opposite end in a bearing 53, carried by a stationary arm 54, suitably clamped to the stock 21. The drive shaft 30 is equipped with a small gear 57, rigidly mounted thereon, engaging a larger gear 58, in turn rotatably mounted upon a stub shaft 59, supported by the arm 54. Preferably formed integral with the large gear 58, for rotation therewith, is a small gear 60, engaging a larger gear 61, rigidly mounted upon the shaft 51. The gear ratio between the shafts 30 and 51 is preferably such that the shaft 51 is turned for one complete revolution when the shaft 30 has made 14 complete revolutions. Of course the invention is not necessarily restricted to this gear ratio.

Rigidly connected with the forward end of the shaft 51 is a mutilated disk or element 62, which has a circularly curved edge 63, extending throughout 9/14 of the circle, the cut away portion representing the remaining 5/14 portion of the complete circle. The circularly curved portion 63 extends from the point 64 to the point 65. The disk 62 includes a hook portion 66, having a generally circularly extending recess 64'. From the point 64, the disk 62 has a straight generally radial shoulder 67. Adapted to coact with the disk 62 is a roller 68, rotatably mounted upon a block 69 which is rigidly clamped to the upper portion of the needle bar 25, and this block operates within a stationary vertical guide 70. It might be stated at this point that when the roller 69 engages the circularly curved face 63 of the disk 62 that the needle bar is held or locked in the raised position, and when the roller trips off of the point 64, the needle bar is free to reciprocate for its entire stroke, until again picked up by the point 65 of the hook 66. The recess 64' is provided so that the roller 68 may move therein during the reciprocation of the needle bar, so that the reciprocating movement will not be interfered with until the point 65 picks up the roller 68. The downward movement of the needle bar is limited by the position of the sleeve 34 and the lower end of the guide 70. The disk 62 turns in the direction of the arrow and when point 65 reaches the raised position, roller 68 is elevated, so that point 65 passes beneath the roller.

Means are arranged beneath the base 24 for coaction with the needle, for holding and cutting the loops to produce the tufts. This means comprises a stationary arm or bracket 71, upon which is suitably pivoted at 72, a vertically swinging arm 73 arranged to swing parallel with the feeding movement of the work. This arm is arranged near and upon one side of the needle, and carries a generally horizontal hook 74, rigidly connected therewith. This hook has a downturned bill 75', and the hook moves across the path of travel of the needle, upon one side of the needle, to enter the formed loops, and to hold the loop against upward movement when the needle rises. The hook 74 is directly mounted upon a head or plate 75, which is rigidly attached to the swinging arm 73. A vertically movable reciprocatory blade 76 is slidably mounted within a groove 77, formed in the head 75, and this blade has an inclined cutting edge 78 at its top to coact with the longitudinal edge of the hook 74, to cut the loop or loops accumulated thereon. The arrangement and operation of the blade and hook are somewhat similar to the corresponding arrangement in my Patent 2,038,923. When the needle descends and at about the time the same starts to rise, the hook moves forward to enter the loop. When the needle rises, the hook moves rearwardly, and the blade 76 rises to cut the loop. The blade 76 is so adjusted that the last loop remains unsevered on the hook, when the needle rises. The operating means for the blade comprises a lever 78', having a forked end which straddles the swinging arm 73, and is pivoted thereto at 79. The sides 80 of the forked lever are in turn forked to provide notches 81, receiving rollers 82, pivoted upon the lower end of the reciprocating blade 76. The lever 78' is bent or extended downwardly and its free end 78 engages a stiff leaf spring 83, which is attached to the arm 73, at 84. The spring 83 acts upon the lever 78' to raise its free end, whereby its forked end is moved downwardly and the blade 76 lowered. The lever 78' is moved in an opposite direction to raise the blade, by a crank 85, depending from the rock shaft 46, and engaging a relatively large flat head 86, carried by a bolt 87 adjustably mounted upon the free end of the lever 78' and adapted to be locked in adjustment by a nut 88. The pivoted arm 73 carries a roller 89, operating within a fork 90, depending from and rigidly secured to the dog carrying link 42. The pivoted arm 73 is swung by the movement of the link 42, although it may be swung by other means.

A yarn clamping or holding device 91 is provided, which is preferably arranged upon the leading side of the needle and is mounted upon the block 39'. This yarn clamping or holding device comprises a bell crank lever 92, including an upper horizontal arm 93, and a lower vertical arm 94. The bell crank lever is pivoted at 95, to the block 39. The bell crank lever is pivoted to swing in a vertical plane transversely of the line of feed of the work. Rigidly secured to the lower end of the arm 94 and preferably formed integral therewith is a jaw 96, having an extension or tail 97. This tail is tapered toward its free end remote from the face 98 of the jaw. The tapering is effected upon the trailing side 99 of the tail, and the lower edge or surface of the jaw and the tail are circularly curved so that such

surface or edge is concentric with the pivot 95 of the arm 94. The jaw and tail are arranged to move above the presser-foot 38 and operate within a recess 100 thereof. The jaw 96 is provided upon its face 98 and near its trailing side with a pin 101, preferably formed integral therewith, and this pin tapers toward its free end. A coacting jaw 102 is provided, formed integral with a generally vertical arm 103. This jaw has an engaging face 104, for coaction with the engaging face 98. The trailing edge of the jaw 102 terminates short of the trailing edge of the jaw 96, and when the jaw 102 is in the inner position so that the face 104 is adjacent to the face 98, the pin 101 will project across the engaging face 104 of the jaw 102, and prevent the yarn being pulled from between the faces 104 and 98 if the faces do not have clamping engagement with the yarn, which would occur before the clamping device had moved laterally and outwardly to any considerable extent. The arm 103 is pivoted at its upper end to the block 39' by means of a screw or pivot element 105, and this pivot is near the pivot 95, and the pivot 105 is beneath the horizontal arm 93, as shown. The arm 103 is provided near and spaced from its pivot 105 with a lateral extension 106, rigidly secured thereto and this extension is engaged by a spring 107, attached to the block 39'. The spring 107 thus swings the arm 103 downwardly and inwardly toward the arm 94. The extension 106 is disposed upon one edge of the block 39' and projects beyond the opposite side thereof, to coact with a swinging latch 108, pivoted upon the block 39' at 109. The latch 108 is swung upwardly by a spring 110, also attached to the block 39'. The latch 108 has an inclined face 111 and a shoulder 112. When the arm 103 is swung laterally and outwardly with respect to the line of feed of the work, extension 106 engages the inclined face 111 and depresses the latch 108 until the extension trips off of the inclined face 111 and engages behind the shoulder 112. The arm 103 will then be held in the shifted or open position until the latch 108 is depressed so that the extension 106 may clear the shoulder 112. In order that the latch may be depressed it is provided with an extension 113, at its free end, to which is rigidly attached a rod 114, arranged beneath the horizontal arm 93, to be engaged and depressed thereby. The extension 106 engages the adjacent edge of the block 39' to limit the inward movement of the arm 103, and the block 39' is provided with a guide extension 115, extending laterally beyond the line of feed of the work and slidably engaging the jaw 102 as it moves laterally and outwardly with respect to the line of work. The presser-foot 38 is provided with a guard 116, arranged upon the opposite side of the needle with respect to the jaw 96 and is spaced from the needle but extends slightly beyond the needle in the line of feed of the work. The forward end of this guard is in substantial transverse alignment with the trailing edge of the engaging face 98 and the base of the tapered pin 101. The function of providing the tapered tail 97 for the jaw 96 is to prevent the jaw being caught in the yarn when the jaw is moving inwardly upon its return movement and to guide the yarn to the base of the pin 101 and at the same time hold the yarn taut. The function of the guard 116 is to engage with the section of the yarn which has been separated from both the leading and trailing groups of tufts and shifted laterally outwardly of this guard and thereby prevent this removed section of yarn improperly returning to a position upon the inner side of the guard, in close proximity to the needle where it might interfere with the operation of the needle and associated elements or become sewed to the fabric. It is thus seen that the jaw 102 is retained in close proximity to the jaw 96 by the spring 107, and when the jaw 96 is swung laterally and outwardly beyond the line of feed of the work, the jaw 96 will carry the jaw 102 with it, and the spring 107 will then have its tension increased and the two jaws will securely clamp the yarn between them. When the clamping device has been shifted to the outermost position, the jaw 102 will be latched in the outer position, hence separated from the jaw 96 when the jaw 96 again moves transversely of the line of work to the inner position. The outer jaw 102 will be subsequently released and its spring will then throw it to the inner position in close relation to the jaw 96.

Means are provided to swing the bell crank lever 92 and the jaw 96 carried thereby, comprising a link 117, pivotally connected with the arm 93 at 118. The link 117 is longitudinally adjustably connected with a coupling 119 and this coupling is pivotally mounted upon the free end of the arm 120 of a pivoted yoke 121, having an arm 122, disposed opposite to the arm 120. The yoke 121 is pivotally supported by a pin 123, carried by a stationary plate 124, in turn rigidly secured to the bearing 52. Operating between the arms 120 and 122 of the pivoted yoke is a circular cam or eccentric 125, which is rigidly and eccentrically mounted upon the shaft 51. As more clearly shown in Figure 3 of the drawings, the maximum diameter of the eccentric 125 is substantially horizontally arranged when the edge 67 of the cam 62 is generally vertical, and the maximum diameter of the eccentric 125 extends in an opposite direction to the circularly curved face 63 of the cam 62.

The numeral 126 designates a suction pipe, supported by a stationary bracket 127. The intake end of the suction pipe 126 is arranged near and spaced from the bed plate 24, and will instantly suck up and remove the cut sections of yarn, when pulled from the fabric and released by the holding means. This prevents the accumulation of these cut sections on the surface of the fabric.

The operations of the apparatus is as follows: The needle bar controls disk 62 is regarded as having its periphery divided into 14 equal parts. Nine of these equal parts constitute the curved edge 63, while the remaining five of these equal parts extend between the points 64 and 65, about the recessor passage 64'. When the loops 128 are being produced, the roller 68 is operating within the recess 64'. The needle completes a cycle of operation for each of the equal circumferential spaces of the needle bar control disk or element 62, and hence the needle makes five complete cycles of operation during the loop sewing period after the roller 68 slips off of the point 64 and before it is again held up by the point 65. This will produce four complete loops 128, in each group, the yarn being pulled from the presence of the leading end of the group and from the trailing end. As the needle makes its cycles of operation, the formed loops are severed in succession, with the last loop remaining unsevered in accordance with the operation set forth in my copending application Serial Number 83,400, filed June 3, 1936, and my Patent 2,038,923. When the trailing end of the group of tufts is reached, and

upon the next cycle of operation of the shaft 30, and the next feeding movement of the work for a stitch, the last loop is cut, while the needle bar is retained elevated. The shaft 30 and block 34 make nine cycles of operation while the needle bar is held elevated, and hence there will be a nine stitch distance between the groups of tufts.

The operation of the machine will be best understood from a consideration of Figures 1ª to 17ª inclusive. It being assumed that a group of tufts have been formed and the work has been advanced by 14 stitches, the next trailing group of tufts is about to be started, Figure 1ª. Before the next trailing group of tufts is started, the yarn in the needle has been pulled out of the fabric and separated from the leading groups of tufts and there is no long stitch or loop which connects two of the groups of tufts at any one time. The first cycle of operation in producing the next trailing group of tufts is about to start in Figure 1ª. The roller 68 has just cleared the shoulder 64, and the needle is ready to descend. At this time the jaw 102 is adjacent to the jaw 96 and the yarn is being held between these jaws, the closed jaws being now in the normal starting position, and not shifted laterally as a unit. In Figure 2ª the down stroke of the first cycle is made and the needle passes through the fabric to produce the loop which is caught on the hook 74, and in Figure 3ª the up stroke of the needle is made and the first cycle of operation of the needle is completed. Starting with Figure 1ª it will be seen that the maximum diameter of the clamp shifting cam, eccentric, or element 125 is horizontally arranged, while this maximum diameter moves upwardly, as indicated in Figures 2ª and 3ª, with the result that the closed yarn engaging clamp is gradually swinging laterally, in an outward and upward direction. In Figure 4ª the needle moves upon its down stroke, and in Figure 5ª it has moved upon its up stroke, completing the second cycle of operation. At this time the first loop produced has been severed in succession, with the last loop remaining unsevered until the trailing end of the group is reached and the work advanced for another stitch, at which time the last loop is severed. In Figure 6ª the needle makes its down stroke and in Figure 7ª its up stroke, to complete its third cycle of operation. in Figure 8ª the needle makes its down stroke and in Figure 11ª its up stroke to complete its fifth cycle of operation, after which it is held in the raised position by the needle bar holding disk or element 62 and the spacing cycles occur, as will be explained. While the needle was making its sewing cycles, the yarn clamp controlling cam or element 125 has its maximum diameter turning upwardly, as stated in connection with Figures 1ª and 3ª and this movement continues to about Figure 8ª, when this maximum diameter is at substantially a vertical position, and then the maximum diameter begins to gradually travel downwardly, starting with the position shown in Figure 9ª. By the time the eccentric or element 125 has reached the position shown in Figure 8ª, the yarn clamp, still closed, has reached the maximum laterally shifted and raised position, and the clamp has almost completely pulled the cut section of yarn from within the fabric, the complete removal being effected by the lateral movement of the clamp and by the feed movement of the work, Figures 9ª and 10ª and 11ª. Before and after being thus pulled from the fabric, this cut section of yarn is still held between the jaws 102 and 96, as both jaws are still in the laterally shifted or outer position. When the jaws 102 and 96 move laterally and upwardly, due to the swinging action of the arm 94 the latch extension 106 engaged behind the shoulder 112, and is also capable of moving outwardly beyond the same within limits. The cut and removed section of yarn which was thus pulled from the fabric, must be released by the yarn clamping device, so that it may be removed from the presence of the fabric by the suction pipe 126. As stated, the maximum diameter of the clamp controlling element or cam 25 is at a substantially vertical position in Figure 8ª and then swings downwardly toward the horizontal position, until substantially the horizontal position is reached, Figure 13ª. While this occurs, the still closed yarn clamp swings inwardly and downwardly, with extension 106 behind the shoulder 112, but the clamp does not begin to open to release the cut section of yarn until the element or eccentric 125 is in about the position shown in Figure 12ª, the jaw 96 then moving away from the jaw 102, which is now latched in the outer position. Starting with Figure 12ª, the needle bar controlling disk or element 62 now holds the needle bar raised so that the spacing stitching cycles are performed. Nine of these cycles occur until the parts assume the position shown in Figure 19ª, and after this position is reached, one more spacing cycle will return the parts to the positions shown in Figure 1ª to repeat the sewing cycle. The yarn clamp has started to open in Figure 12ª, and this opening movement increases as the maximum diameter of the eccentrical element 125 travels from the horizontal toward the lower vertical position, until the maximum opening movement is obtained, Figure 17ª, at which time the arm 93 has moved downwardly sufficiently to engage and depress pin 114 of latch 108 and the extension 106 will clear the shoulder 112 and spring pressed jaw 102 will return to the closed position, Figure 17ª, and the free end of the yarn is again held between these jaws during the remainder of the spacing cycles of operation of the needle. The eccentrical element 125 continues to turn until its maximum diameter approaches the horizontal position to the left, Figures 18ª and 19ª, and finally reaches the horizontal position to the left, Figure 1ª. As soon as the cut section of yarn was released from the yarn clamping device, Figure 12ª, it was removed from the presence of the fabric by the suction tube 126.

In connection with the Figures 1ª to 19ª inclusive, it should be stated that the line of work is actually disposed at a right angle to the plane of swinging movement of the yarn clamping device, but the line of work has been shown as extending parallel with this plane for the purpose of illustration, it being understood the Figures 1ª to 19ª inclusive are largely diagrammatic for the purpose of illustration.

It is to be understood that the form of my invention 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 tufting mechanism, a tufting sewing machine comprising a reciprocatory needle and work feeding means, means to reciprocate the needle and then hold the needle elevated to prevent reciprocation, a yarn gripper, and means to actuate the yarn gripper so that it grips the yarn during the reciprocatory movement of the needle

and releases the yarn when the reciprocatory movement is stopped.

2. In a tufting mechanism, a tufting sewing machine including a reciprocatory needle, means to reciprocate the needle and then hold the same elevated, a yarn gripper, means to actuate the yarn gripper so that it grips the yarn during the reciprocatory movement of the needle and releases the yarn when the needle is held elevated, and means to move the yarn gripper with relation to the needle to aid in pulling the yarn from the fabric.

3. In a tufting mechanism, a tufting sewing machine comprising a reciprocatory needle to pass the yarn through the fabric to produce loops and work feed means, a yarn gripper, means to throw the yarn gripper into action to grip the yarn prior to and during the sewing action of the needle, means to actuate the yarn gripper to release the yarn during the idling of the needle, and means to reciprocate the needle to effect the loop sewing operation and to subsequently hold the needle against reciprocatory movement.

4. In a tufting mechanism, a tufting sewing machine comprising a reciprocatory needle to pass the yarn through the fabric to produce loops and work feed means, means to reciprocate the needle to effect the sewing operation and subsequently hold the needle against reciprocatory movement, a yarn gripper to pull the cut yarn from the fabric, means to cause the yarn gripper to grip the yarn during the sewing operation of the needle and to release the yarn when the needle is held against reciprocatory movement, and means to remove the cut yarn pulled from the fabric from the presence of the fabric.

5. In a tufting mechanism, a tufting sewing machine comprising work feed means, means to drive the work feed means to feed the work, a reciprocatory needle and a presser foot bar, means to reciprocate the needle and hold the same elevated while the work feed means is operating to feed the work, a yarn clamp bodily mounted upon the presser foot bar, means to actuate the yarn clamp to cause the same to automatically hold and release the yarn.

6. In a tufting mechanism, a tufting sewing machine comprising a reciprocatory needle bar, a spring to move the needle bar in one direction, a block slidable upon the needle bar to move it a direction in opposition to the spring, a drive shaft having means to move the block, work feed means to cooperate with the needle bar, a yarn clamp operating near the needle bar, a shaft driven by the drive shaft, a needle bar control element mounted upon the second shaft, and a yarn clamp control cam mounted upon the second shaft.

7. In a tufting mechanism, a tufting sewing machine comprising a reciprocatory needle to receive the yarn, means to reciprocate the needle and subsequently hold it against reciprocatory movement, a yarn clamp comprising a pair of pivoted jaws adapted to be swung in one direction as a unit, a spring to swing one jaw toward the other and both jaws in the same direction as a unit, a pivoted yoke, driving connecting means between the pivoted yoke and one pivoted jaw, a cam to move the yoke, a latch device to hold one jaw in the open position when shifted thereto, and means operated by the driving connecting means to actuate the latch device for releasing the jaw.

8. In a tufting mechanism, a tufting sewing machine comprising a reciprocatory needle, means to reciprocate the needle and then hold it elevated, a yarn clamp arranged near the path of travel of the needle and shiftable transversely of the line of work, said clamp comprising a pair of jaws having meeting faces, and a tapered pin carried by one jaw and adapted to extend across the meeting faces of said jaws.

9. In a tufting machine for producing spaced tufts, a sewing machine comprising work feed means, a reciprocatory needle bar having a needle, a looper to co-act with the needle, means to sever the loops upon the looper, means to drive the needle for producing a tuft and then cause the needle to idle for producing a space, a yarn gripper having gripping engagement with the yarn throughout the complete driving action of the needle, and means to actuate the yarn gripper so that it releases the yarn after the completion of the driving action of the needle and at substantially the starting of the idling of the needle.

10. In a tufting mechanism, a tufting sewing machine including work feed means, a reciprocatory needle bar, means to reciprocate the needle bar and to cause the same to idle, a yarn gripper comprising a pivoted bell-crank lever, a jaw carried by the bell-crank lever, a co-acting pivoted lever having a jaw arranged opposite the first named jaw and provided with an extension, a spring to move the second named lever towards the jaw of the bell-crank lever, a spring actuated latch for detachable engagement with the extension of the lever, said latch having a part to be engaged and shifted by the bell-crank lever, and means to move the bell-crank lever.

11. In a tufting mechanism, a tufting sewing machine including work feed means, a reciprocatory needle bar, means to reciprocate the needle bar and to cause the same to idle, a yarn gripper comprising a pivoted bell-crank lever, a jaw carried by the bell-crank lever, a co-acting pivoted lever having a jaw arranged opposite the first named jaw and provided with an extension, a spring to move the second named lever towards the jaw of the bell-crank lever, a spring actuated latch for detachable engagement with the extension of the lever, said latch having a part to be engaged and shifted by the bell-crank lever, a pivoted yoke, connecting means between the pivoted yoke and the bell-crank lever, and an eccentric operating within the pivoted yoke to actuate the same.

12. In a tufting machine, a needle movable to a position to pass through the fabric and to a remote position from the fabric, means to move the needle to the remote position, yielding means to move the needle to the position to pass the same through the fabric, means to hold the needle in the remote position in opposition to the yielding means, work-feeding means, means to drive the work-feeding means to feed the work when the needle is operating to produce the loops and when it is held in the remote position, means co-acting with the needle to produce loops, means to sever the loops, and a gripper to grip the yarn and remove severed portions thereof.

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