Oct. 15, 1940. L. A. SMITH 2,218,123

THREAD EXTRACTING ATTACHMENT

Filed March 26, 1935 2 Sheets-Sheet 1

Fig. 1.

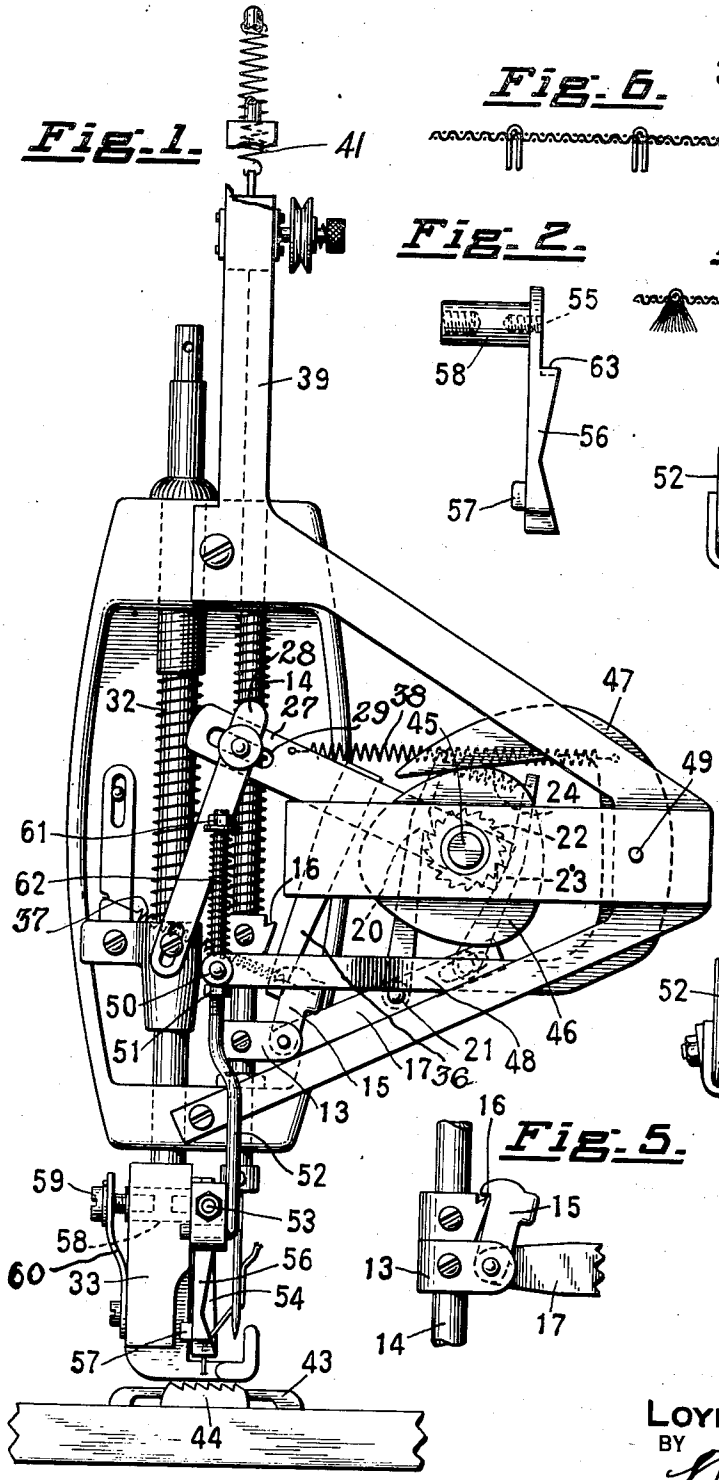


Fig. 6.

Fig. 2.

Fig. 7.



Fig. 4.

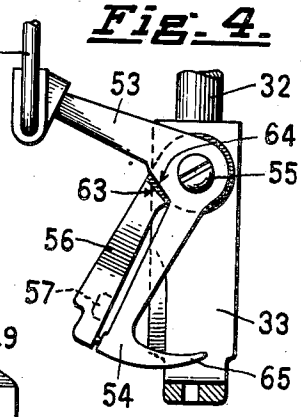


Fig. 3.

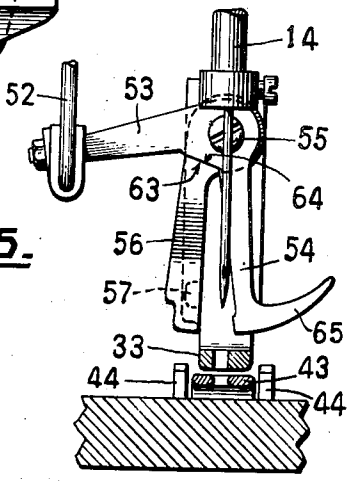


Fig. 5.

INVENTOR
LOYD A. SMITH,
BY
ATTORNEY

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Filed March 26, 1935 2 Sheets-Sheet 2

Fig. 9.

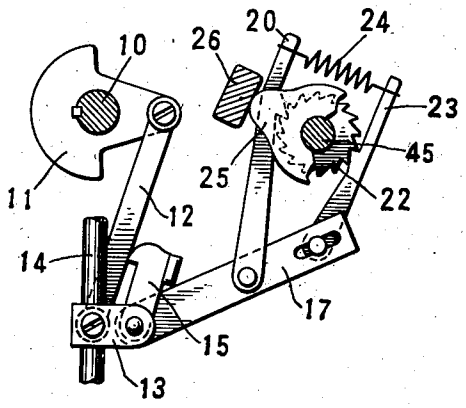


Fig. 8.

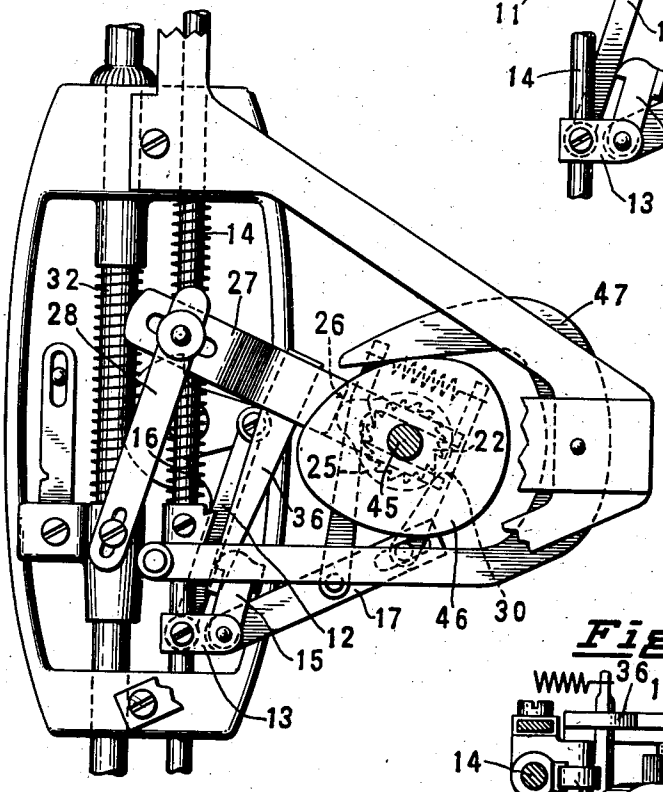
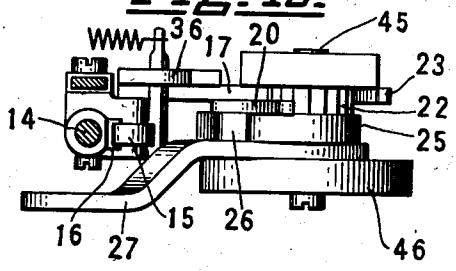


Fig. 10.



INVENTOR
LOYD A. SMITH,
BY
ATTORNEY

Patented Oct. 15, 1940

2,218,123

UNITED STATES PATENT OFFICE

2,218,123

THREAD EXTRACTING ATTACHMENT

Loyd A. Smith, La Grange, Ga., assignor to Callaway Mills, La Grange, Ga., a corporation of Georgia

Application March 26, 1935, Serial No. 13,104

30 Claims. (Cl. 112—79)

This invention relates to tufting machines, and especially those adapted to form tufts in spaced groups such as are found in candle-wick bedspreads and other work.

An object of this invention is to provide an attachment for pulling out some of the tufts automatically and in regular order.

Another object is to provide a device of this class which may be applied to existing tufting machines.

A further object is to provide such a device especially adapted for machines capable of automatically forming candle-wick spreads and tufts, which are unequally spaced, so that at least some of the threads connecting the more widely spaced tufts may be automatically extracted whereby the necessity for hand operation is eliminated.

Referring to the drawings:

Fig. 1 is a side view of one embodiment of this invention.

Fig. 2 is a side view of one of the jaw members 56 removed from the machine.

Fig. 3 is a front view of the jaw members for gripping the thread to be pulled out.

Fig. 4 shows the gripping members after they have been swung laterally far enough to pull out the gripped thread from the work.

Fig. 5 is a detail showing the clutching and unclutching mechanism for the needle bar.

Fig. 6 is a side view showing the grippers in cooperation with the thread.

Fig. 7 represents one embodiment of the finished work or product of this machine.

Fig. 8 is a view corresponding to a portion of Fig. 1 but with some parts shown more in detail than others.

Fig. 9 illustrates the mechanism for actuating the pawl and ratchet and the cam for causing the clutch parts to be engaged.

Fig. 10 is a top plan view of a right end portion of a part of the device shown in Figs. 1 and 8.

In my prior copending and abandoned application Serial Number 709,552 filed February 3rd, 1934, for Tufting machine of which this application is a continuation in part has been described an attachment for a tufting machine enabling the needle bar to be unclutched from its actuating mechanism in response to operation of the machine and while continuing operation of the work feeding means in order that non-uniformly spaced tufts such as are found in candle-wick bedspreads and the like may be formed.

This invention relates to an improvement on the device of this prior application whereby the threads connecting the widely spaced tufts may be automatically extracted without the necessity of doing so by hand upon completion of the work by the machine.

In the drawings the numerals below 43 refer to correspondingly numbered parts in said previous application.

In this prior application a cross-head 13 is freely movable on the needle bar 14 except when the same is connected for moving the needle bar by means of the latch 15 engaging the catch 16. An oscillating bar 17 works the pawl 20 which is pivotally secured thereto at 21, for engagement with the ratchet 22, which is rotated in a counterclockwise direction as shown in Fig. 1. A locking member 23 engages the ratchet to prevent its rotation when the pawl 20 is not in engagement with the ratchet teeth. A spring 24 maintains the members 20 and 23 in engagement with the ratchet. A presser foot bar 32 carries the presser foot 33 on its lower end portion.

A slidable bar 27 is supported at its left end by the bar 28 having a pin engaging the slotted portion 29. The right end of the bar 27 is slotted and supported on the ratchet shaft 45. A spring 38 slides the bar to the right into engagement with the cam 25 on the ratchet shaft 45, which cam moves the bar 27 to the left in Fig. 1. Fixed on the bar 27 is a downwardly extending projection or finger 36 shaped to engage a lateral projection on the latch 15 for the purpose of holding the latch out of engagement with the catch 16. When the bar 27 has been slid to the left by its cam the finger 36 is moved out of the way so that the latch may then engage the catch 16. The spring 37 holds the latch 15 against the finger 36 or against the catch 16. The spring 37 is attached to some upstanding projection as illustrated at a height about midway between the uppermost and lowermost positions of the latch. The spring 38 should be stronger than the spring 37. A spring 41 attached to the needle bar holds the needle bar up after it has been released by the latch.

In operation the continually reciprocating cross head 13 oscillates the bar 17 and at each downward movement of the pawl 20 the ratchet 22 is turned an angular distance equal to the space between the teeth. After turning the required angular distance the cam for actuating the bar 27 moves this bar to the left, moving the finger 36 to the left and out of the way of the latch so that the latch may be pressed by the spring 37 into engagement with the catch 16. Preferably the latch and catch are in engagement for two strokes after which the bar 27 is released by its

cam and allowed to be moved to the right by the spring 38 so that the finger 36 keeps the latch from engagement with the catch 16. The latch and catch function as clutch members, their engagement and disengagement being obtainable automatically in response to the operation of the machine by means of the slow motion mechanism comprising the ratchet 22. So long as the needle bar is rendered inactive by the finger 36 holding the latch out of engagement with the needle bar, the long stitch is being formed and the goods is being advanced in successive steps by the usual feed dog mechanism below the work support. The size or pitch of the teeth on the ratchet determines the length of the long stitch and the shape of the cam actuating the bar 27 determines how long the bar is held to the left and also how long the bar is held to the right by the spring 38.

The shaft 10, crank 11, and connecting rod 12, continuously reciprocate the cross head 13. When the finger 36 is moved far enough to the right for it to engage the lateral projection shown in Fig. 10 as being on the latch 15, the inclined right edge of this finger 36 shown in Figs. 1 and 8 causes the latch to be moved away from the catch 16 as the latch rises.

The needle bar 14 is guided by the bearing 39, as described in said aforementioned application.

In the drawing the work support 43 is provided with the usual feed dog 44 for feeding the work through the machine during the time the needle bar is unclutched from its actuating mechanism. The shaft 45 carrying the ratchet 22 has keyed thereon a cam 46 engaging the yoke 47 pivoted at 49. One arm 48 of said yoke is elongated to engage the cross-head 50 which is reciprocated by the yoke and cam. Below this cross-head 50 is an adjustable stop 51 on the rod 52 so that on downward movement of the arm 48 the rod 52 is moved down. To the lower end portion of the rod 52 is secured one end of the bell crank lever 53, whose other arm 54 constitutes one of the thread gripper portions.

This bell crank lever 53 is pivoted at 55 within the axis of the other thread gripping arm 56. A stop 57 on the arm 56 engages the presser foot to limit movement of the arm 56 to the right in Fig. 3. The arm 56 has its pivoted portion 58 extending within the presser foot as shown in Fig. 1. At the other end of the pivot 58 is mounted an adjustable screw 59, the head of which engages the leaf spring 60 fastened to the presser foot 33. The spring 60 is thus a friction device pressing the gripper arm 56 against the presser foot.

The rod 52 is provided on its upper end portion with a spring 62 cooperating at one end with the cross-head 50 and at its upper end with the adjustable nut 61. As the arm 48 moves up in Fig. 1 the cross-head 50 slides on the rod 52 compressing the spring 62 until such time as the strength of the spring 62 is sufficient to overcome the inertia of the friction device 60.

The grippers 54 and 56 are provided with cooperative lug surfaces 64 and 63 respectively. The gripper arm 54 is provided with a wedge shaped elongated portion 65 which is adapted to push the thread to one side and out of the way as the arm 54 is moved to the right in Fig. 3.

As the long stitch shown in Fig. 6 is approaching its completion, and before the needle moves into the work, the cam 46 moves the gripping jaw 54 to the left in Fig. 3 causing the thread to be engaged by the jaw members as shown in Fig. 1.

After being engaged the needle descends through the work and is drawn upward for the completion of the tuft or loop and its subsequent cutting as is well known in the art. After being cut the pair of grippers with the thread engaged between them is then swung to the left in Fig. 3 far enough to pull the thread from the work at each end. The pause in the movement of the grippers after the strand has been engaged may be effected either by the shape of the cam 46 or by continued upward movement of the arm 48 against the action of the spring 62 until the pressure of the spring is sufficient to overcome the friction of the gripping member 56 on the presser foot.

From the position shown in Fig. 4 in which the strand has been pulled out of the work, continued movement of the cam 46 results in lowering the arm 48 causing the rod 52 to move downward and swinging the arms 53 and 54 in a counterclockwise direction as shown in Figs. 3 and 4.

At first the gripping member 56 does not move with the member 54 but remains stationary for a time sufficient to allow the pulled out thread to be released and fall. After the gripper 54 has moved a certain angular distance its continued movement causes the arm 56 to follow in the counterclockwise motion until the stop 57 engages the presser foot.

The early counterclockwise movement of the arms 53 and 54 is free of the arm 56 due to the separation of the lug surfaces 63 and 64, but after the arms 53 and 54 have moved a certain angular distance, these lug surfaces 63 and 64 engage with the result that the gripping member 56 is moved in the counterclockwise direction with the arms 53 and 54, by engagement of the lug surfaces 63 and 64.

As the gripping member 54 approaches the needle the wedge shape portion 65 engages the strand to push it to one side toward the needle. After the arm 54 has moved beyond the needle to the position shown in Fig. 3 the strand is pulled by the moving work into a position between the gripping portions 54 and 56 ready to be engaged as the arm 56 is again moved in a clockwise direction in Fig. 3. Instead of pulling out each long stitch as contemplated by the device illustrated it will be understood that the cam 46 and its movement may be so constructed as to cause only certain of the long stitches to be withdrawn if desired.

While this invention has been illustrated in connection with a tufting machine of the type adapted to form candle-wick tufts, it will be understood that it is applicable to other types of tufting machines and is even susceptible of application to machines in which the tufts are uniformly spaced, certain of the connecting threads being withdrawn according to the shape and manner of actuation of the extractors or grippers, as will be apparent to one skilled in the art after an appreciation of this invention and its purposes.

While the embodiment illustrated is adapted for attachment to existing machines, it will be understood that this invention is susceptible of embodiment in other forms. By changing the pressure of the spring 60 and also the pressure on the spring 62 by the nut 61 it will be understood that the amount of friction on the gripping arm 56 can be changed as well as the amount of spring pressure necessary to overcome that friction, and in this way the timing of the move-

ment of the pair of jaws away from the presser foot may be varied with respect to the position of the arm 48.

Instead of having the needle bar moved upwardly by a spring as shown in my prior application Serial Number 709,552 it will be understood that by making the cross-head 13 substantially contiguous the catch 16 when the latch 15 is engaged, that the cross-head 13 may effect both an upward as well as downward movement of the needle bar 14.

If desired, in order to reduce the shock of impact of the stop 57 against the presser foot 33 the abutment 51 may be yieldably mounted upon a stiff spring not shown.

The short portion of the presser foot on the left side in Figs. 3 and 4 and on the right side in Figs. 1 and 6, prevents the needle from pushing work down into the throat plate.

I claim:

1. In a tufting machine comprising a needle, actuating mechanism therefor, a work support and work feeding means, the improvement which comprises a pivotal latch carried by said actuating mechanism and adapted to engage and disengage said mechanism and needle, and means for extracting from the work some of the threads placed therein by the needle.

2. In a tufting machine comprising a needle, actuating mechanism therefor, a work support and work feeding means located on the opposite side of the work support from said needle, the improvement which comprises means for automatically unclutching the needle from said actuating mechanism at regular intervals in the machine operation, said last mentioned means including a pawl and ratchet located adjacent the needle and its actuating mechanism, and a thread extractor actuated by said pawl and ratchet.

3. In a tufting machine comprising a needle, actuating mechanism therefor, a work support and work feeding means, the improvement which comprises an attachment located adjacent said needle and its actuating mechanism and being adapted to regularly and automatically interrupt movement of the needle during some of the cycles of the needle actuating mechanism, and a thread extractor pivoted to the presser foot for pulling out some of the tufts being formed.

4. In a sewing machine, the combination with a presser foot, of a thread extractor pivoted adjacent thereto, an actuator for the extractor, a friction device for said extractor, a yieldable means for cooperation with said actuator and extractor, and means for adjusting the relation between said friction device and yieldable means to control the timing of said extractor with respect to said actuator.

5. In a tufting machine, loop forming means, thread extracting means comprising a pair of grippers, a friction device secured to one of said grippers, an actuator for the other gripper, yieldable means in said actuator whereby the friction device may delay movement of said pair of grippers, and a lost motion connection between said grippers for relative angular movement.

6. A tufting machine comprising, a needle, actuating mechanism therefor, a work support, means to regularly and automatically interrupt movement of the needle during some of the cycles of the needle actuating mechanism, and a thread extractor actuated in timed relation to the needle actuating mechanism, said thread extractor including a pair of grippers pivoted below the head of said machine and close to the work support.

7. A tufting machine comprising, a needle, actuating mechanism therefor, a work support, means to regularly and automatically interrupt movement of the needle during some of the cycles of the needle actuating mechanism, a thread extractor actuated in timed relation to the needle actuating mechanism, and a presser foot, said thread extractor being mounted so as to be moved out of the way of the work on raising said presser foot.

8. A tufting machine comprising, a needle, actuating mechanism therefor, a work support, means to regularly and automatically interrupt movement of the needle during some of the cycles of the needle actuating mechanism, a thread extractor actuated in timed relation to the needle actuating mechanism, a presser foot, and a support therefor, said thread extractor including a pair of grippers pivotally supported in front of said presser foot support.

9. A tufting machine comprising, a needle, actuating mechanism therefor, a work support, means to regularly and automatically interrupt movement of the needle during some of the cycles of the needle actuating mechanism, a thread extractor actuated in timed relation to the needle actuating mechanism, a timing cam for the thread extractor, and additional means for controlling the timing of said thread extractor.

10. A tufting machine comprising, a needle, actuating mechanism therefor, a work support, means to regularly and automatically interrupt movement of the needle during some of the cycles of the needle actuating mechanism, a thread extractor actuated in timed relation to the needle actuating mechanism, said thread extractor including a pair of grippers, and actuating means therefor located substantially below the top of the head of said machine.

11. A tufting machine comprising, a needle, actuating mechanism therefor, a work support, means to regularly and automatically interrupt movement of the needle during some of the cycles of the needle actuating mechanism, a thread extractor actuated in timed relation to the needle actuating mechanism, said needle actuating mechanism including a needle bar, and a spring engaging said needle bar to hold it in raised position.

12. 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, one jaw having a relatively long tapered tail.

13. A tufting machine comprising a needle, actuating mechanism therefor in the machine head, a work support, work feeding means, said needle actuating mechanism comprising a drive shaft, means for rectilinearly driving a member from said shaft, and means for clutching and unclutching said needle to and from said member, said last mentioned means being automatically operated in response to operation of the machine, said clutching and unclutching being accomplished by a cam located close to said needle and below the top of the machine head.

14. A tufting machine comprising a needle, actuating mechanism therefor, a work support, work feeding means, said needle actuating mechanism comprising a drive shaft, means for rectilinearly driving a member from said shaft, and

means for clutching and unclutching said needle to and from said member, said last mentioned means being automatically operated in response to operation of the machine, said clutching and unclutching being accomplished by a slow motion cam actuating a slidable cam.

15. A tufting machine comprising work feeding means, a needle, a rotatable drive shaft for actuating the needle, a crank and connecting rod driven by said shaft, a cross-head driven by said connecting rod, a pawl and ratchet driven by said cross-head, a rotatable cam driven by said ratchet, a shiftable cam operated by said rotatable cam, a latch carried by said cross-head and movable by said shiftable cam to engage and disengage the needle with said cross-head.

16. In a tufting machine comprising a needle, actuating mechanism therefor, a work support and work feeding means, the improvement which comprises a pivotal latch carried by said actuating mechanism and automatic means adapted to engage and disengage said latch and needle in timed relation to said actuating mechanism.

17. In a tufting machine comprising a needle, actuating mechanism therefor, a work support and work feeding means, the improvement which comprises means for automatically unclutching the needle from said actuating mechanism at regular intervals in the operation of the machine, and a spring for holding the needle in a position in which it is withdrawn from the work while unclutched from said actuating mechanism.

18. In a tufting machine comprising a needle, actuating mechanism therefor, a work support, the improvement which comprises means for automatically unclutching the needle from said actuating mechanism at regular intervals in the machine operation, said last mentioned means including a shiftable cam located adjacent said needle and its actuating mechanism.

19. In a tufting machine comprising a needle, actuating mechanism therefor, a work support, the improvement which comprises means for automatically unclutching the needle from said actuating mechanism at regular intervals in the machine operation, said last mentioned means including a pawl and ratchet located adjacent the needle and its actuating mechanism.

20. In a tufting machine comprising a needle, actuating mechanism therefor, a work support, the improvement which comprises means for automatically unclutching the needle from said actuating mechanism at regular intervals in the machine operation, said last mentioned means including a shiftable cam located adjacent said needle and its actuating mechanism and a pawl and ratchet also located adjacent said needle mechanism for shifting said cam.

21. In a tufting machine comprising a needle, actuating mechanism therefor, a work support, work feeding means, the improvement which comprises means for automatically unclutching the needle from said actuating mechanism at regular intervals in the machine operation, and means for changing the timing of said automatic unclutching means, said timing changing means including a replaceable mechanism independent of the work feeding means.

22. A tufting machine comprising a needle, a needle bar, actuating mechanism for the needle bar including a rotatable shaft in the machine head, a reciprocating member, means for actuating said reciprocating member from said shaft, and an attachment for automatically engaging and disengaging said needle bar with and from said reciprocating member in timed relation to the rotation of said shaft, said attachment being located in front of and below the top of the machine head.

23. A tufting machine comprising a needle, a needle bar, actuating mechanism for the needle bar including a rotatable shaft in the machine head, a reciprocating member, means for actuating said reciprocating member from said shaft, means for automatically engaging and disengaging the needle bar with and from said reciprocating member in timed relation to the rotation of said shaft, and non-frictional and positive means for holding the needle bar when disengaged in a position with the needle withdrawn from the work.

24. A tufting machine comprising a needle, a needle bar, actuating mechanism for the needle bar including a rotatable shaft in the machine head, a reciprocating member, means for actuating said reciprocating member from said shaft, means for automatically engaging and disengaging the needle bar with and from said reciprocating member in timed relation to the rotation of said shaft, and non-frictional and positive means for holding the needle bar when disengaged in a position with the needle withdrawn from the work, said last mentioned means acting continually on the needle bar and tending to always hold it with the needle withdrawn from the work irrespective of whether said needle bar is operating.

25. A tufting machine comprising a needle, a needle bar, actuating mechanism for the needle bar including a rotatable shaft in the machine head, a reciprocating member, means for actuating said reciprocating member from said shaft, means for automatically engaging and disengaging the needle bar with and from said reciprocating member in timed relation to the rotation of said shaft, and non-frictional and positive means for holding the needle bar when disengaged in a position with the needle withdrawn from the work, said last mentioned means including a spring acting to yieldably retain the needle withdrawn from the work.

26. A tufting machine comprising a needle, a needle bar, actuating mechanism for the needle bar including a rotatable shaft in the machine head, a reciprocating member, means for actuating said reciprocating member from said shaft, means for automatically engaging and disengaging the needle bar with and from said reciprocating member in timed relation to the rotation of said shaft, a guide bar extending upwardly from the machine head and a projection on said needle bar cooperating with the guide bar above the machine head to prevent the needle from turning.

27. A tufting machine comprising a needle, a needle bar, actuating mechanism for the needle bar including a rotatable shaft in the machine head, a reciprocating member, means for actuating said reciprocating member from said shaft, means for automatically engaging and disengaging the needle bar with and from said reciprocating member in timed relation to the rotation of said shaft, the means for automatically engaging and disengaging the needle bar and reciprocating member including a reciprocating hook movable into engagement with a projection on the needle bar.

28. A tufting machine comprising a needle, a needle bar, actuating mechanism for the needle bar including a rotatable shaft in the machine

head, a reciprocating member, means for actuating said reciprocating member from said shaft, means for automatically engaging and disengaging the needle bar with and from said reciprocating member in timed relation to the rotation of said shaft, the means for automatically engaging and disengaging the needle bar and reciprocating member including a reciprocating hook movable into engagement with a projection on the needle bar, a spring tending to move the hook into engagement with the said projection on the needle bar, and a shiftable means for holding said hook away from engagement with the needle bar projection.

29. A tufting machine comprising a needle, a needle bar, actuating mechanism for the needle bar including a rotatable shaft in the machine head, a reciprocating member, means for actuating said reciprocating member from said shaft, means for automatically engaging and disengaging the needle bar with and from said reciprocating member in timed relation to the rotation of said shaft, the means for automatically engaging and disengaging the needle bar and reciprocating member including a rotating cam and a bar longitudinally movable when engaged and disengaged by said cam.

30. A tufting machine comprising a needle, a needle bar, actuating mechanism for the needle bar including a rotatable shaft in the machine head, a reciprocating member, means for actuating said reciprocating member from said shaft, means for automatically engaging and disengaging the needle bar with and from said reciprocating member in timed relation to the rotation of said shaft, said automatic means for engaging and disengaging the needle bar and reciprocating member including an attachment to one side of the machine head and having a slow motion mechanism and cam located below the top of the machine head.

LOYD A. SMITH.