

June 20, 1944.

W. B. PATEY

2,352,153

MULTIPLE NEEDLE TUFTING MACHINE

Filed Aug. 29, 1941

5 Sheets-Sheet 1

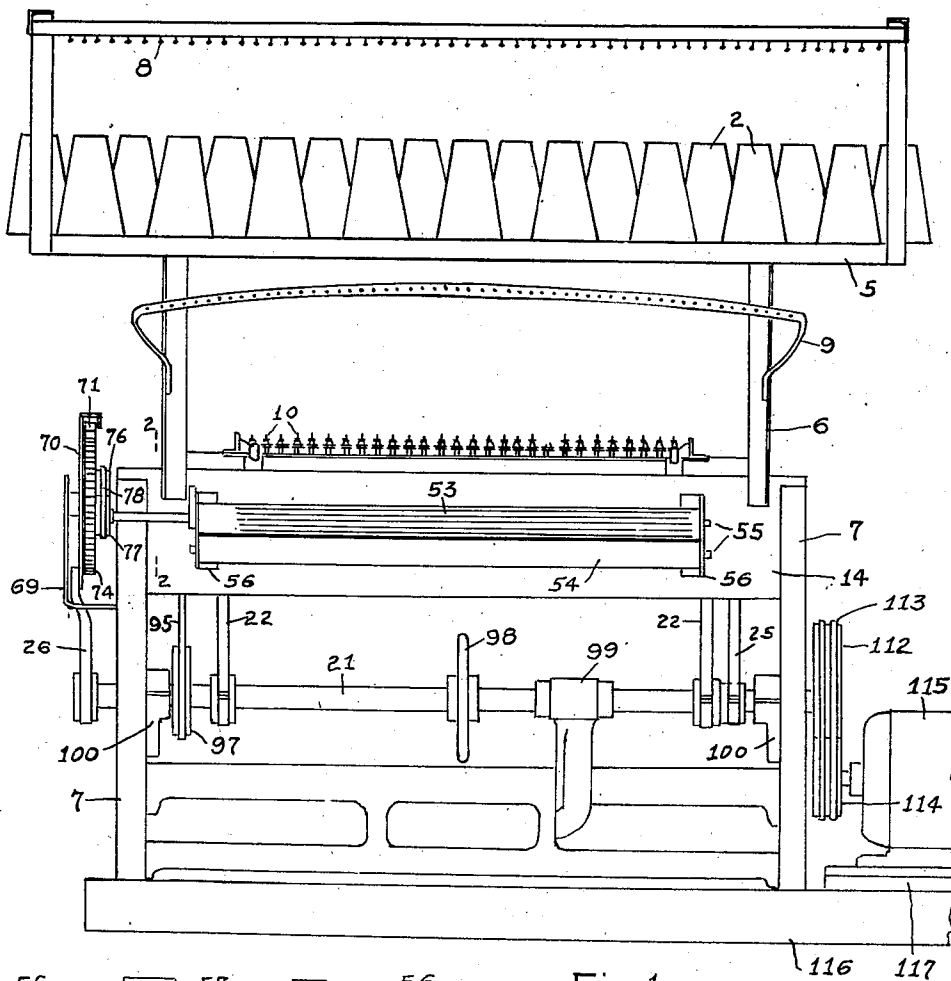


Fig. 1.

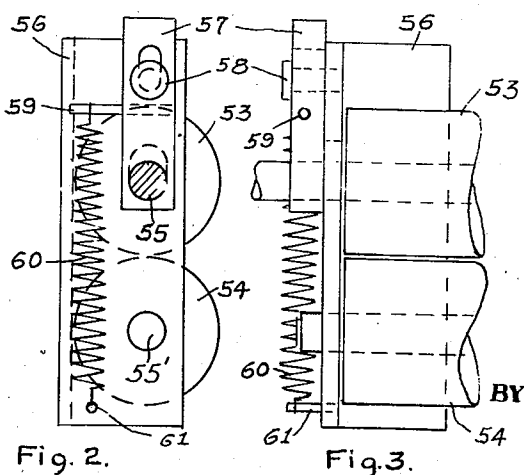


Fig. 2.

Fig. 3.

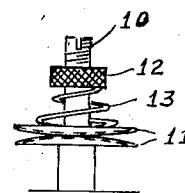


Fig. 4.

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5 Sheets-Sheet 2

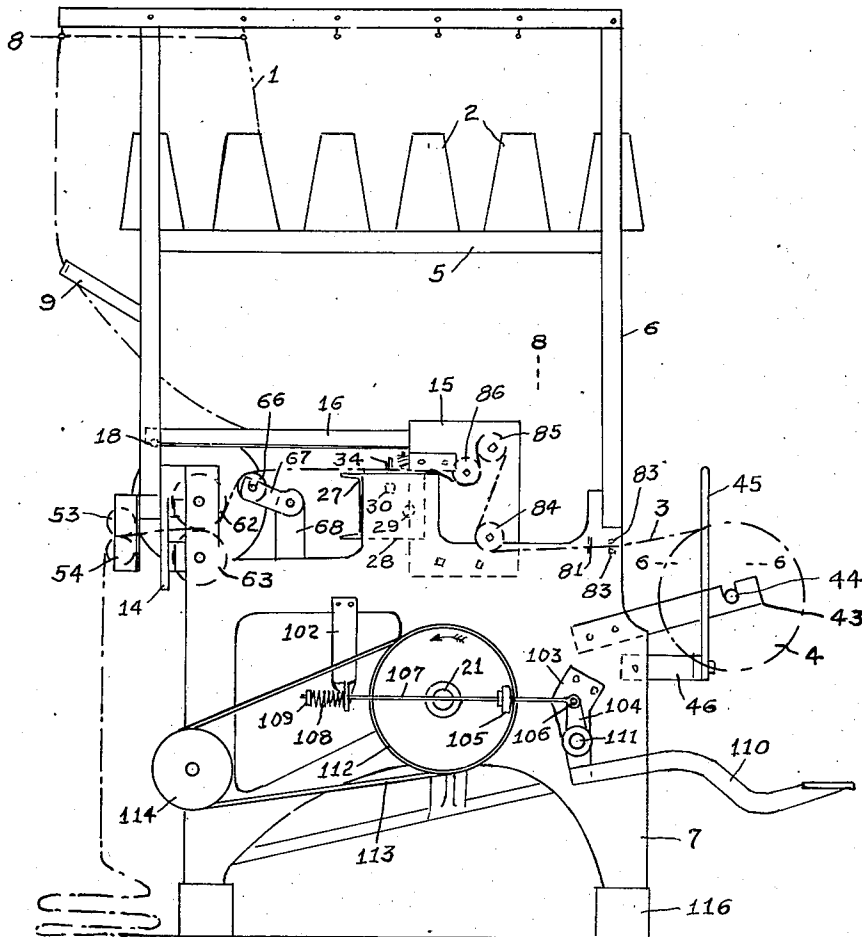


Fig. 5.

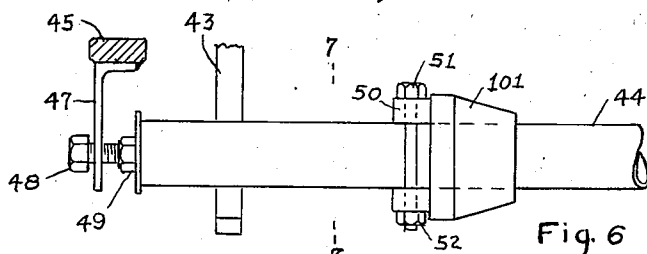


Fig. 6

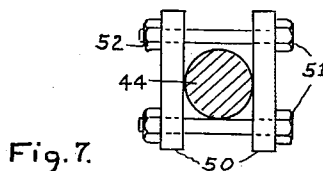


Fig. 7.

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5 Sheets-Sheet 3

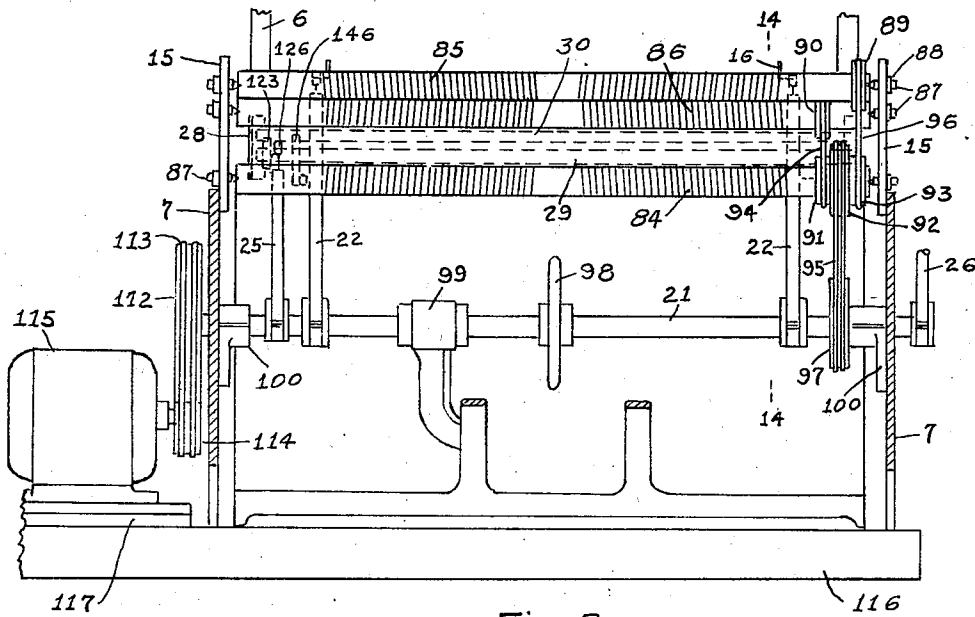


Fig. 8.

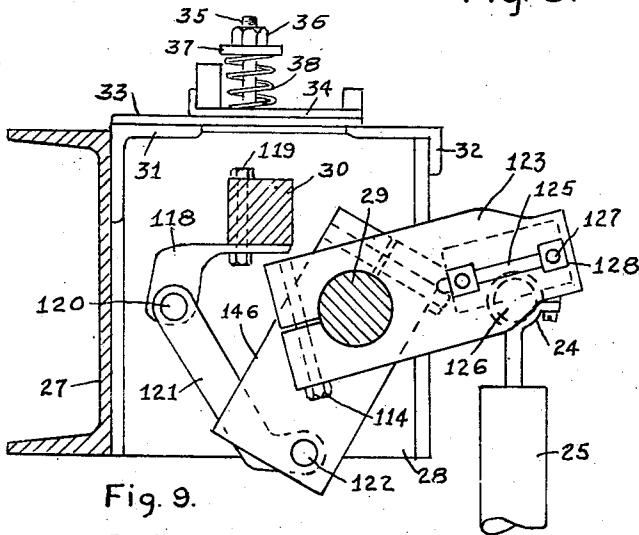


Fig. 9.

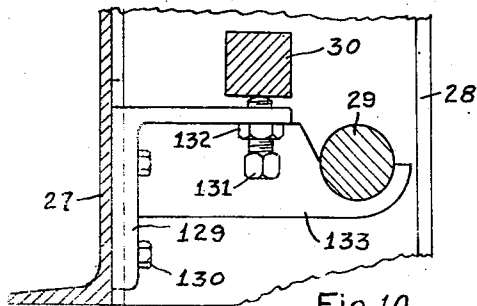


Fig. 10.

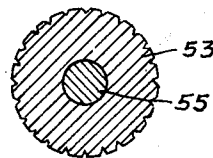


Fig. 11.

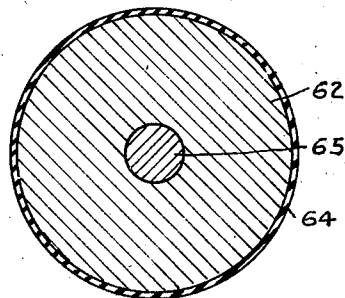


Fig. 12.

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5 Sheets-Sheet 4

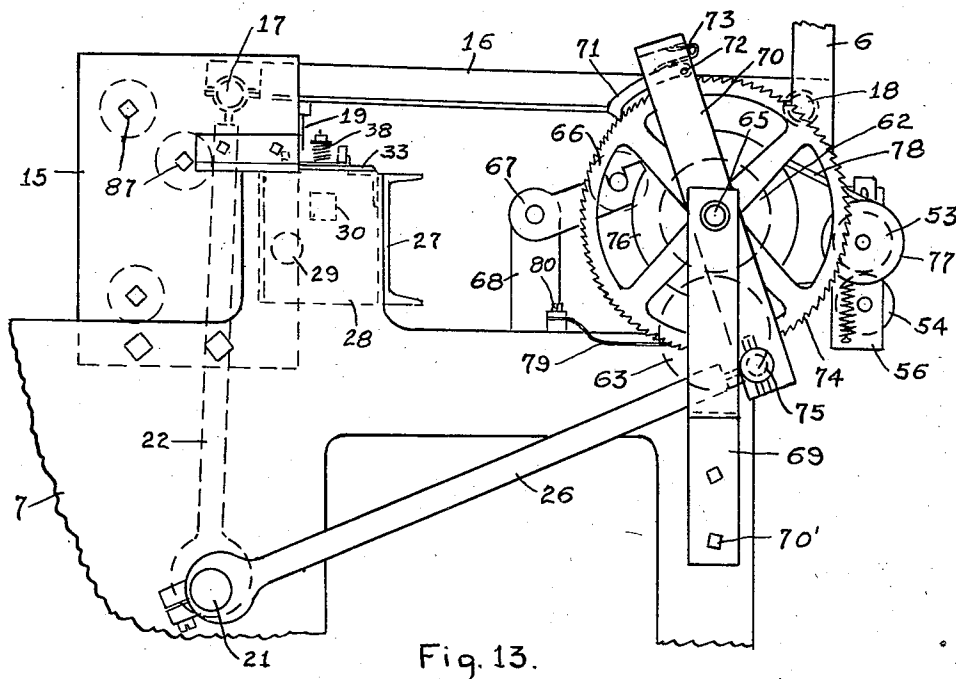


Fig. 13.

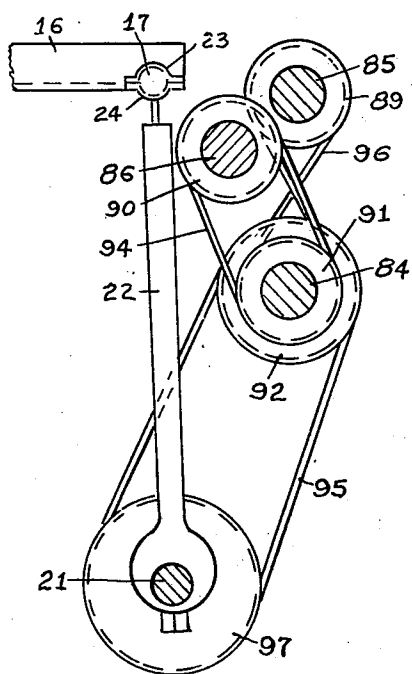


Fig. 14.

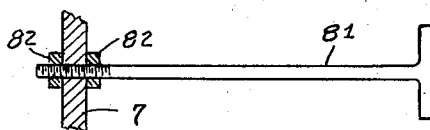


Fig. 15.

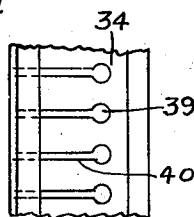


Fig. 16.

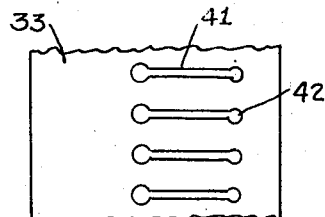


Fig. 17.

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5 Sheets-Sheet 5

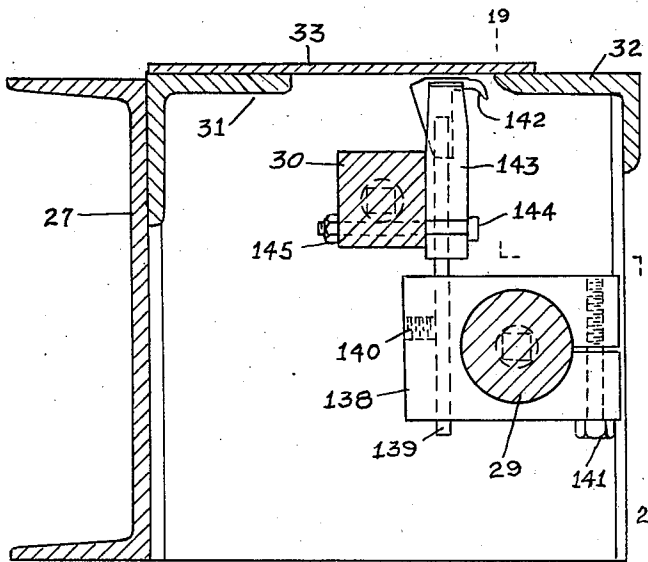


Fig. 18.

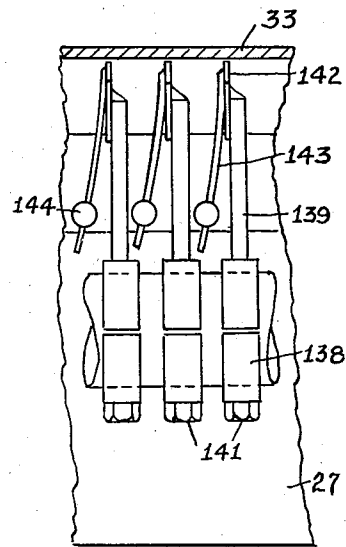


Fig. 19.

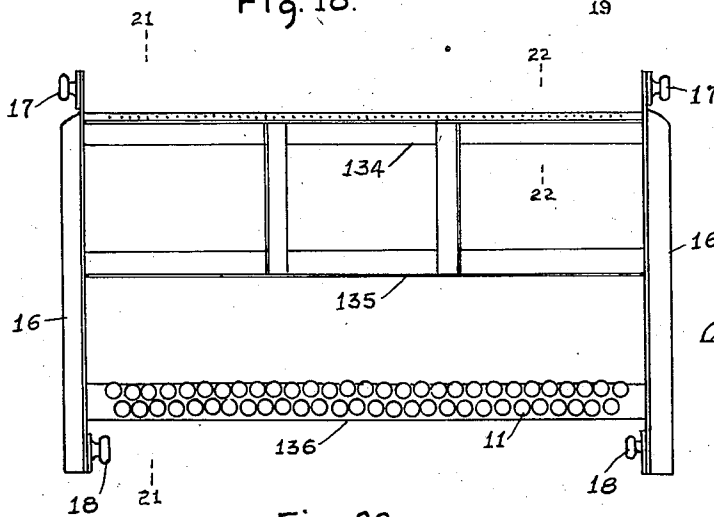


Fig. 20.

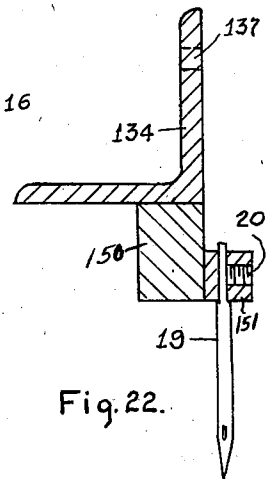


Fig. 22.

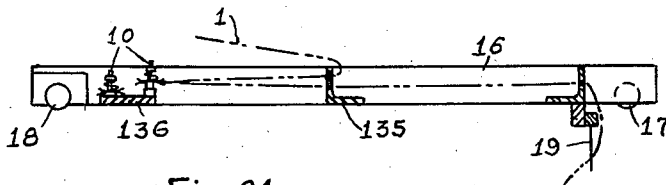


Fig. 21.

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UNITED STATES PATENT OFFICE

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MULTIPLE NEEDLE TUFTING MACHINE

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Application August 29, 1941, Serial No. 408,784

6 Claims. (Cl. 112—79)

My invention relates to tufting machines and more particularly to tufting machines of the multiple needle class for simultaneously forming rows of chenille on relatively long sections of cloth as it progressively passes through the machine.

This invention has particular reference to piece goods from which chenille garments of various characters may be made although it may be adapted to the production of bedspreads, and bath mats as well. Heretofore in the art it has been the general practice to cut out the parts of the garments from the backing, apply the chenille to those parts and sew them together. This work is ordinarily done with a single needle machine due to irregularities in the shapes of the pieces that go to make up the garment, although in rare instances chenille has been applied to the backing before it is cut or to the backing after the garment has been made up therefrom. In these various instances the backing is progressively scanned with either a single or plural needle machine. These plural needle machines are ordinarily of the two, four, eight, or ten needle class wherein the needles are ordinarily carried by a single needle bar. In these types of machines the needles are hung or mounted on the standard needle bar while the loopers and cutters are ordinarily mounted beneath and bedplate thereof. Since these types of machines are not designed for such heavy loads a great deal of trouble from breakdowns due to strains and stresses resulting from overloads occur. This keeps the machine out of operation a very substantial part of the time and greatly hampers production.

In the instances where the chenille is applied to the backing before parts of the garments are cut out it is necessary to ordinarily cut the backing into convenient lengths in order to facilitate the progressive scanning of its surface by the single or multiple machines. If it were attempted to apply the chenille to long sections of the fabric or backing there would be an endless task of rolling and unrolling the fabric as each row or set of rows of chenille is progressively applied until the entire width of the fabric is covered.

Applicant with the knowledge of all of these defects in and the objections to the prior art has for an object of his invention the provision of a multiple needle tufting machine whose needles completely span the width of the section of cloth, so that the machine in the single operation may insert tufting across the entire

width of the section and thereby eliminate the necessity for progressively spanning the cloth.

Applicant has as another object of his invention the provision of a multiple needle tufting machine having a plurality of needles positioned at spaced intervals across the entire width of the fabric, which needles swing in an arc on a reinforced supporting structure which will withstand the impact of the piercing operation of the needles without material deflection or warping thereof.

Applicant has as another object of his invention the provision of a multiple needle tufting machine having an improved feed mechanism for progressively moving long pieces of cloth through the machine.

Applicant has as another object of his invention an improved mechanism for spreading a relatively long section of cloth transversely to remove the wrinkles therein just before the cloth passes under the needles of the machine whereby to secure uniformity of spacing of rows of chenille throughout the width thereof.

Applicant has as another object of his invention the provision of a tufting machine having a plurality of spaced needles for moving on an arc to pierce the fabric and a plurality of individual cutters and loopers for coacting with the needles to simultaneously produce loops and sever them to form tufts, which loopers and cutters are mounted on relatively long shafts which bridge the ends of the frame of the machine and supports having engagement with intermediate portions of both of the shafts to provide additional support for them and to constantly maintain the spacing between the shafts during their movement and during the cutting operation while force is being applied thereto.

Applicant has as a still further object of his invention the provision of a plural needle tufting machine which will automatically feed and guide the cloth therethrough and which will automatically insert the chenille therein and deliver the finished goods therefrom.

Applicant has as another object of his invention the provision of a tufting machine which will apply tufting to fabric as it is removed from the roll and which will provide for movement of the roll endwise to compensate for irregularities in the cloth and its wrapping.

Other objects and advantages of my invention will appear from the following specifications and accompanying drawings and the novel fea-

tures thereof will be particularly pointed out in the annexed claims.

In the drawings Fig. 1 is a rear elevation of my improved tufting machine. Fig. 2 is an enlarged detail of the end of the rear or outer feed rollers of my improved machine. Fig. 3 is a fragmental detail of the same feed rollers taken in side elevation. Fig. 4 is a detail of one of the devices for tensioning the thread before it reaches the needles. Fig. 5 is an end elevation of my improved machine showing the cloth and thread passing therethrough. Fig. 6 is a sectional detail of my improved means for moving the roll of cloth back and forth to insure uniformity of feeding and is taken along the line of 6,6 of Fig. 5. Fig. 7 is a cross-sectional detail taken along the line 7,7 of Fig. 6 showing how a cloth supporting member is mounted on the shaft. Fig. 8 is a fragmental front elevation of my improved machine, partially in section, taken along the line 8,8 of Fig. 5. Fig. 9 is a cross-sectional detail taken adjacent one end of the machine of the bedplate and other loop forming elements of the machine. Fig. 10 is a fragmental cross-sectional end elevation of the looper and cutter actuating shafts and other tufting elements and their supports. Fig. 11 is a cross-section of one feed roller and its shaft. Fig. 12 is a cross-section of another feed roller and its shaft. Fig. 13 is a fragmental end elevation of my improved machine showing the feed actuating mechanism. Fig. 14 is a detail of the spreader or guide rollers and their actuating mechanism. Fig. 15 is a detail of a cloth guide. Fig. 16 is a fragmental detail in plan of my improved presser foot. Fig. 17 is a fragmentary plan view of the throat plate. Fig. 18 is a fragmental detail of an intermediate portion of my improved machine showing the mountings, loopers and cutters in end elevation. Fig. 19 is a fragmental sectional detail taken along the line 19, 19 of Fig. 18, showing a portion of the machine taken in front elevation and showing the relation of the loopers and cutters to each other. Fig. 20 is a plan view of the reinforced needle carrier. Fig. 21 is a cross-section of the same carrier taken along the line 21, 21 of Fig. 20. Fig. 22 is a sectional detail of a portion of the same carrier taken along the line 22, 22 of Fig. 20.

Referring to the drawings in detail 7 designates the frame of my improved machine and may conveniently be the frame of a conventional loom which has been converted. This frame may be of structural steel and may have base members 116, 116 which join the ends 7, 7 of the frame. The frame may also be comprised of lower steel side portions or members which join the lower portions of the ends 7, 7. Mounted on one end of the base elements 116, 116 and bridging them is a supporting base 117 for an electric motor 115. This motor may be of the conventional type, that is a single, double, or triple phase induction motor or an appropriate D. C. motor. Of course, the conventional electrical leads or conductor (not shown) pass from a source of electrical energy to the motor. The motor has adjacent one of its ends a shaft extension and having one or more grooves for co-action with V belts or other appropriate means. Mounted intermediate the frame and bridging its ends is a central drive shaft 21 journaled in appropriate bearings 100, 100 mounted preferably on the inner faces of the ends 7, 7 of the frame. Shaft 21 extends beyond either end

thereof and mounted on one end is a pulley 112 having grooves therein for cooperation with V belts 113 bridging the pulley on the motor 115 and the pulley 112 on the machine. The shaft 21 is also supported intermediate its ends in a bearing 99 on the end of an arm extending upwardly from the side members of the frame. Mounted on and intermediate of drive shaft 21 is a hand wheel 98 for turning the drive shaft manually and independent of the motor 115 primarily for use when threading up the machine.

Positioned on an intermediate portion of the frame and adjacent the top thereof is a V shape angle iron or channel element 27 (see Fig. 9) which bridges the ends 7, 7 of the frame. Mounted on and carried by the angle iron 27 is an L shaped angle iron 31 which bridges the ends 7, 7 of the frame and abuts against the interfaces of an extension of such frame. Spaced from the angle iron 31 is a similar L shaped angle iron 32 secured in overlapped relation to a plate 28 mounted on the extension of the ends 7, 7 of the frame. Bridging the angle irons 31, 32 and extending across the frame and carried by such angle irons is a throat plate 33. Positioned beneath the throat plate 33 and mounted on the plates 28 at either end of the machine are rock shafts 29, 30. Adjacent one or both ends of the rock shaft 29 is mounted an expansible block 146. Located opposite each block 146 and mounted on rock shafts 30 through bolt 119 is an arm 118. Joining the block 146 and the arm 118 is a pivoted link 121 being joined thereto by pivot pins 122, 120, respectively. Mounted adjacent one or both of the blocks 146 is an expansible block 123 having a bore for the reception of shaft 29 and having clamping jaws actuated by clamping bolt 114 for tightly gripping shaft 29. Adjacent the other end of clamping block 123 is formed a longitudinal slot 125 through which studs 127 and washers or nuts 128 pass for mounting a socket on one face of the arm in adjusted relation thereto. It will be understood that the bolts 127 screw thread into the socket and may be tightened to maintain such socket in any desired position as is well known in screw and slot connections. Disposed within the socket 24 is a ball 126 mounted on the upper end of arm 25 whose lower end is disposed about a cam on shaft 21 for reciprocating the rod and oscillating the shaft 29.

Mounted on the channel iron 27 (see Fig. 10) at one or more places intermediate the end thereof is a bracket 133 having a portion 129 for engagement with channel member 27 and secured thereto through studs 130 passing through the bracket and screwthreaded or otherwise secured to channel 27. A lateral portion extends at right angles from portion 129 and is resilient or yieldable for supporting shafts 29 and 30. The outer end has a curved finger thereon for engagement with and reception of shaft 29. Stud 131 passes through the bracket and is brought into supporting engagement with shaft 30. It is maintained against turning by locking nut 130. This maintains a constant relation between the two shafts 29, 30. Positioned over the bedplate 31, 32, and 33 of the machine is a needle carriage, shown in detail in Figures 20, 21, and 22. This frame is made up of end members 16, 16 bridged at spaced intervals by side members 134, 135, and 136, which frame members are in turn reinforced by cross-members providing a strongly fabricated and reinforced carriage of angle irons. Depending from the lower front edge and extending sub-

stantially the full length of angle iron 134 are blocks 150, 151 providing spaced sockets for the reception of the upper ends of needles 19 which are locked in place in such sockets by set screws 20 which extend into the side walls thereof. Formed in the upper flange of said member 134 are a series of spaced openings 137 for the passage of thread 1 to needles 19. Intermediate member 135 may have like double aligned openings in its upper flange. Mounted on the upper surface of the rear side member 136 are a series of tighteners 11 for tensioning the strands of yarn as they are fed to the needles 19. These tighteners are preferably staggered in the two rows in Fig. 20. These tension devices are of conventional structure such as shown in Fig. 4, consisting of an upright shank mounted on member 136 having an upper reduced threaded portion adjacent its upper free end 10 with a nut 12 having a roughened outer surface coacting with the screw threads of the shank, a helical spring 13, two disk plates 11, 11 are interposed between the shoulder defined by the reduced portion of shank 10 and the nut 12. The compression of spring 13 may be altered by the action of nut 12, and the pressure or force with which disks 11, 11 are urged towards each other may be varied. Of course, it is understood, that the strand is disposed between the plates 11, 11 and its relative movement controlled by the pressure of the plates thereon in a well known manner.

Mounted on the inner faces of the rear ends of members 16, 16 are balls 18, 18 which coact with sockets in brackets (not shown) carried by extensions 6, 6 of the frame 7. This permits the carriage to rock about balls 18, 18 as a pivot so that needles 19 mounted on the front thereof move in an arcuate path. Mounted on the outer face of the front end of members 16, 16 are balls 17, 17 which coact with and are received in sockets 23, 23 on the upper ends of rocker rods 22. The lower ends of rods 22 are formed into sockets for disposition about cams on the drive shaft 21 for reciprocating the rods 22, 22 to rock the carriage about its pivots 18, 18 in a swinging movement.

Mounted in advance of and positioned above and below the bedplate of the machine are a plurality of spreader rollers 84, 85 and 86. See Fig. 14. These rollers each have a plurality of spiral ribs extending outwardly towards each end thereof from the center. These rollers are preferably cylindrical in configuration and rollers 85, 86 receive their power from roller 84 being connected therewith by belts 96, 94 through such pulleys as 89, 90 and 91, the belt on pulley 89 being reversed or crossed so that it rotates in a direction opposite to that of its corresponding pulley on roller 84. Roller 84 in turn receives its power through pulley 92 mounted thereon and belt 95 which coacts with pulley 97, mounted adjacent one end of drive shaft 21.

Mounted on the opposite end of drive shaft 21 from that of the driving pulley 112 is a cam for actuating the feed mechanism to be hereinafter described (see Fig. 13). Rearwardly of the bedplate of the machine and in substantially vertical alinement and extending across the machine are upper and lower feeder rollers 62, 63. The lower roller 63 is mounted on a shaft carried by the frame 7 of the machine but may be adjusted towards and away from the upper roller by any appropriate means. The upper roller is mounted at one end in the frame 7 and at the other end

its shaft 65 is carried by an angle bracket 69 having a lower end secured through stud 70' to the frame 7 and the upper end extending outwardly from such frame. This provides clearance for movement of the arm 26 which actuated cross member 70. The upper roller 62 has a coating of rubber 64 (see Fig. 12) formed on the metal base of the roller 62. This gives the roller better adherence to the cloth which is being progressively pulled through the machine. Mounted on the shaft 65 adjacent the standard or bearing 69 is a pivoted cross member 70, heretofore referred to. The lower end of this member 70 is slotted or grooved to receive the pivot pin 75 in adjusted relation in order to somewhat vary the length of the stroke. Mounted pivotally by pin 72 on the upper end of cross member 70 is a pawl 71 which is actuated into contact with the teeth of a ratchet wheel 66 in the usual manner by a spring 73 set in the innerface of the cross arm adjacent its upper end. The ratchet wheel 66 is mounted on the shaft 65 adjacent the cross arm 70 and is keyed or secured to the shaft 65 by appropriate means. A resilient finger 79 is mounted on the frame 7 by a stud or other support 80 which tensions the resilient finger 79 against the ratchet wheel 66 to retard its moving, and act as a brace in the usual and well known manner.

Mounted rearwardly of the initial feed rollers 62, 63 and carried by the upright extensions 6, 6 of the frame are additional feed rollers 53, 54 (see Figs. 2 and 3) mounted in vertical alined adjusted relation. These rollers are mounted on flanged plates 56, which flanges are secured adjacent their upper ends to the extensions 6, 6 of the frame. The lower plain surface roller 54 is mounted on a shaft 55' or otherwise bridges the plates 56, 56. The upper roller 53 has a knurled outer surface as indicated in a detail of Fig. 11. It is mounted on a shaft 55 which extends or projects some distance beyond the roller at one end. This upper shaft 55 passes through slots in the supporting brackets 56 and is journaled on either end on blocks 57. These blocks in turn have slots therein to receive retainer pins 58 loosely passing therethrough and seating therein. Mounted on block 57 and extending laterally therefrom is a finger 59 which engages and interlocks with one end of a tension spring 60 whose other end is secured to bracket 56, as at 61. The purpose of this arrangement is to tension the upper roller 53 against the lower roller 54. The extending free end of the upper shaft 55 has a pulley 77 mounted thereon, which pulley is joined through belt 78 to a pulley 76 on shaft 65, which latter pulley is positioned adjacent the ratchet wheel 66 for transmitting the power therefrom to pulley 77 on the upper shaft 55 for rotating that shaft. Mounted on either end of frame 7 is a standard 68 carrying a pivoted arm 67 for adjustment to any desired or appropriate position. Formed in the upper end of each arm 67 is a groove which serves as a bearing for supporting a roller or stationary cloth guide 66 abridging the space therebetween.

Extending upwardly from the frame 7 at its corners are four uprights or extensions 6, 6 having a supporting structure 5 made of fabricated steel for supporting various cones of yarn 2. Additional members extend up from the supporting structure 5 and additional members bridge the upper ends of these extensions and extend on beyond them at the rear of the machine as shown in Fig. 5. To these cross members are secured a series of pins or thread guides 8 for directing

the removal of the thread or yarn from the cones 2. Mounted on the uprights 6, 6 intermediate their ends is a bowed thread guide 9 of relatively thin material having a great many openings thereto for the passing of yarn.

Mounted forwardly of the frame 7 on projecting arms 43 is a roll of fabric or backing 4. Passing through the roll of backing 4 is a shaft 44 having portions thereof seated in grooves of the arms 43. Extending upwardly from one side of the frame adjacent one of the arms 43 is a lever 45 pivotally mounted on a bracket 46 on frame 7 to move longitudinally of shaft 44. Intermediate the ends of lever 45 is a projecting finger 47 having a slot therein adjacent its outer free end. Mounted on the end of shaft 44 adjacent the opening in finger 47 and freely passing through said opening is a stud 48 which may be locked in adjusting position by a lock nut 49. To clarify the mounting of shaft 44 this finger and stud and lock nut have been omitted from Fig. 5 although it is clearly shown in Fig. 6. To limit the endwise movement of the roll of cloth on shaft 44 cone shaped collars 101, shown in detail in Figures 6 and 7, are clamped about shaft 44 by means of resilient extensions 50 through which bolts 51 pass and which are clamped by nuts 52 thereon.

Mounted on the frame adjacent the roll 4 of cloth 3 are guides 83, 83 which project inwardly from the ends of frame 7 above and below the cloth for limiting the upward and downward movement thereof. On beyond the first cloth guides 83, 83 is located a guide 81 (see Fig. 15) for limiting the endwise movement of the fabric as it is fed through the machine. This guide consists of a shank 81 having a cross-member on its end for engagement with cloth, and this shank is mounted on frame 7 in adjusted relation thereto through nuts 82, 82 which engage the screw threaded end portion thereof. It will be understood that a guide of this character is provided on either end of the machine.

As will be seen from Figures 18 and 19 a series of loopers 142 are mounted in spaced relation along shaft 29 by means of split collars or blocks 138, which collars or blocks are clamped about the shaft 29 by clamping studs 141. Each of these blocks 138 have transverse bores for reception of the shafts or shanks 139 of the loopers positioned opposite clamping studs 141. They may be clamped in adjusted relation in the bore by means of set screws 140. The upper ends of the loopers terminate in a hook of thin hardened steel which is welded or otherwise secured to the shank 139. Mounted on the rock shaft 30 in coacting relation with the loopers 142 and tensioned against them for sliding engagement thereon are a series of cutter blades 143 each having a sharpened upper end for coacting with the sharpened edge of the conventional looper. The mounting for the cutter blade 143 consists of a bolt passing through a bore in a rectangular or square shaft 30 and held in place by clamping nut 145. Formed in the shank of the bolt 144 adjacent its head is a longitudinal slot for the reception of the lower part of the body of the cutter blade 143 so that upon tightening of the nut 145 the cutter blade is clamped in adjusted relation between the head of bolt 144 and the flat wall of shaft 30. Positioned above the throat plate 33 is a presser foot 34 which is normally tensioned against the upper face of the throat plate 33 by means of studs extending upwardly from the bed plate of the machine and passing through presser

foot 34 and having a nut 36 screw threaded on the upper end thereof and a washer 37 and a compression spring 38 interposed between nut 36 and presser foot 34 for tensioning the presser foot against the throat plate 33 (see Fig. 9). Formed in intermediate portions of presser foot 34 are a series of needle passages or openings 39 with connecting grooves or slots 40 extending rearwardly towards the rear edge of the presser foot (see Fig. 16).

Reinforcing or strengthening blocks are positioned over the presser foot 34, engaging it, and are secured thereto, and extend along it throughout substantially the whole of its length. Registering with the openings and grooves or slots of the presser foot are formed elongated openings in the throat plate 33 as indicated at 41 of Fig. 17. The central portion of these slots are reduced while each end is enlarged as indicated at 42. The needles reciprocate in the large forward openings 42 while the strands or tufts progressively move rearwardly through the reduced portions of the slots and are removed from the bedplate through the enlarged rear portions thereof.

For stopping a machine after the power has been cut off an appropriate brake is provided. This brake consists of a foot lever 110 pivotally mounted on a bracket 103 carried on one side of frame 7 by appropriate studs or other means. Pivot pin 111 pivotally mounted on the bracket 103 carries an arm 104 which in turn pivotally supports a rod 107 at one end. The rod 107 is also supported by a strap 102 secured to a side of the frame 7 through studs or other means. The end of rod 107 extends through an out turned portion of the strap and at the free end of the rod 107 is a compression spring 108 and nut or washer 109. Rigidly mounted on the rod 107 is a brake shoe 105 which is adapted to engage and work against the inner surface of the rim or flange of the drive pulley 112.

In its operation the cloth 3 is mounted on the shaft 44 in the form of a roll 4. Cones of yarn, one to each needle, are positioned on support 5 and the cloth 3 is threaded through the machine passing between guides 83, 83 past guide 81, under spreader roller 84, over spreader roller 85, under spreader roller 86, over the bed plate and under the presser foot 34, on to and over guide 66, between feed rollers 62, 63 and on between feed rollers 53, 54. The thread 1 is then passed through the hook guides 8, 8 through an opening in guide 9, through an opening in side member 135 then about tensioning element 10 and then back through openings in side elements 134 and 135 and then through the eyes of the needles 19.

The switch is now closed completing the electric circuit to the motor supplying the necessary power thereto. This causes the pulley 114 and in turn pulley 112, when viewed from the end of the machine where these pulleys are located, to rotate in a counter-clockwise direction causing drive shaft 21 to turn in a counter-clockwise direction and to rotate the various cams and pulleys mounted thereon in such direction. This reciprocates the driving rods 22, 22 up and down and causes the needle carriage to oscillate in an arcuate path, intermittently passing the needles mounted thereon through the slots in the presser foot and bed plate and successively piercing the fabric as it moves across the bed plate and through the machine. Likewise reciprocating rod 25 is made to reciprocate and to rock shafts 29

and 30 through the linkage 123, 146, 121, 118, thereby actuating the series of loopers and cutters in a manner to be described in more detail hereinafter. Drive rod 26 also reciprocates back and forth causing the cross arm 70 to oscillate about its pivot 65. This causes the pawl 71 to progressively engage the teeth on the ratchet wheel 66 and intermittently rotates shaft 65 in a counter-clockwise direction for rotating pulley 76 and roller 62 in a counter-clockwise direction, and in turn rotates roller 53 in the same direction. This progressively moves the cloth through the machine. The rotation of shaft 21 in a counter-clockwise direction rotates pulley 97 with it and imparts through belt 95 a counter-clockwise rotation to rollers 84 and 86 and a clockwise rotation to roller 85 through belts 96, 94, as heretofore indicated.

These various operations cause the needles 19 to move down through the fabric on the base plate and to pierce such fabric and be extended on below the base plate passing their strands of yarn through the fabric. Upon reaching the lowermost position of their travel the needles again start their upward movement developing slack in the loops thus drawn. At this time the loopers 142 swing towards the needles and pass between them and their respective strands of yarn, catching the loops and holding them as the needles move on up out of the fabric. After the needles leave the fabric the feed rollers 62, 63 and 53, 54 move the cloth rearwardly and during this interval the loopers 142 also move back out of the plane of the path of travel of the needles. The cutter blades now ride up the face of their respective loopers and coast with the cutting edges on the looper hooks to shear or otherwise sever the loops thereon. Ordinarily, the bill of the looper is made somewhat longer than the width of the cutter blade 143 so that the cutter blade does not ordinarily sever the first loop placed on the looper. If the first operation of the blade does not find a loop over its cutting edge during the first cycle, no cutting occurs but the various loops still remain uncut on the loopers.

This cycle is now repeated with the needles again piercing the fabric and carrying the yarn therethrough to form loops after which the loopers again pass between the needles and their loops and catch them, forming a second set of loops which push the first uncut loops back along the cutting edge of their looper after which the cutter blades come up and clip or sever the loops forming piles. This operation is completed over and over again simultaneously forming rows of tufts across the width of the fabric. A great many needles are used in such a machine, usually in excess of 57 needles and their spacing is ordinarily from a quarter to five-eighths inch although this may be changed to suit the convenience of the user.

As raised portions of cloth or tufts pass between the feed rollers, and particularly the last set, they move apart and facilitate the passage of such enlarged portions.

It will be understood that in moving the roll 4 of cloth endwise to compensate for irregularities in the cloth and for poor wrapping, lever 45 is swung about its pivot on bracket 46 engaging the finger 47 with nut 49 or bolt head 48 and transmitting movement to shaft 44 lengthwise thereof in either direction since shaft 44 is slidably mounted on arms 43.

Another advantage in the use of swinging

needles which may not be apparent from an inspection of the drawings is that it reduces or prevents looping, tearing of cloth and etc. Since the loopers 142 only move a relatively short distance, and must move in synchronism, it sometimes happens that slight irregularities in adjustment or lost motion, or looseness or bending of needles or loopers prevent one or more of the loopers from catching their loops, thus causing looping, especially where the distance to be traveled by the loopers is great. The use of a swinging needle carriage which results in moving the needles toward the loopers on their downward swing reduces the necessary length of travel of the loopers and aids in moving the loops back on the hooks of the loopers.

Having thus described my invention, I claim:

1. In a multiple needle tufting machine including a bed plate, a throat plate mounted on the bed plate having needle openings therethrough over which the fabric is adapted to travel, a presser foot plate supported on said throat plate above the fabric having needle openings in register with the openings of said throat plate, a horizontal needle carriage pivotally mounted at one end for oscillation above said presser foot, said carriage carrying a plurality of depending needles adjacent its free end adapted to simultaneously pass through the openings of the presser foot and throat plate and carry yarns through the fabric to form loops upon oscillation of the carriage, loopers positioned beneath said throat plate to catch said loops, and cutters coacting with said loopers to sever the loops thereon.

2. In a multiple needle tufting machine including a bed plate, a throat plate mounted on the bed plate having needle openings therethrough over which the fabric is adapted to travel, a presser foot plate yieldably supported on said throat plate above the fabric having needle openings in register with the openings of said throat plate, a horizontal needle carriage pivotally mounted at one end for oscillating movement above said presser foot, said carriage carrying a plurality of depending needles adjacent its free end adapted to pass simultaneously through the registering openings of the presser foot and throat plate upon oscillation of the carriage and carry the yarns through the fabric to form loops, loopers positioned beneath said throat plate to catch said loops, and cutters coacting with said loopers to sever the loops thereon.

3. In a multiple needle tufting machine including a bed plate, a throat plate mounted on the bed plate having slots therein enlarged at each end over which the fabric is adapted to travel, a presser foot plate yieldably supported on said throat plate above the fabric having corresponding slots in register with the slots of said throat plate and enlarged at one end to form a needle passage, a horizontal needle carriage pivotally mounted at one end for oscillating movement carrying a plurality of depending needles adjacent its free end adapted to simultaneously pass downwardly through the needle passages in the presser foot and one end of the slots of said throat plate to carry the yarns through the fabric to form loops upon oscillation of the carriage, loopers positioned beneath said throat plate to catch the loops, and cutters coacting with said loopers to sever the loops.

4. In a multiple needle tufting machine comprising a throat plate over which the fabric is

adapted to travel, said plate having a plurality of needle openings therethrough, a horizontal needle carriage pivotally mounted at one end to oscillate above said throat plate, said carriage having a series of depending needles adjacent its free end adapted to carry the yarn downwardly and upwardly in an arcuate path through the fabric and throat plate upon oscillation of said carriage, means for oscillating said carriage, loopers beneath said throat plate to catch the loops formed by the yarn, and cutters coacting with said loopers to sever the loops.

5. In a multiple needle tufting machine comprising a throat plate over which the fabric is adapted to be progressively moved, said plate having a plurality of needle openings therethrough, a horizontal needle carriage disposed above said throat plate and pivotally mounted at one end, reciprocating means connected to the free end of said carriage for oscillating said carriage, a row of needles depending from said car-

riage adjacent its free end adapted to carry yarn through the fabric in a vertical arcuate path upon oscillation of the carriage, loopers beneath said throat plate to catch the loops formed by the yarn, and cutters coacting with said loopers to sever the loops.

6. In a multiple needle tufting machine comprising a horizontal needle carriage pivotally mounted at one end for oscillating movement and carrying a plurality of depending needles adjacent its free end adapted to carry the yarn through the fabric in a vertical arcuate path to form a succession of loops, loopers movable in a horizontal arcuate path, the downward and forward direction of movement of said needles and loopers, respectively, being towards each other to facilitate collection of the loops on the looper arm, and means coacting with said looper to sever the loops collected thereon.

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