May 5, 1953 O. GRANT, JR., ET AL 2,637,289

TUFTING MACHINE

Filed Oct. 10, 1947 3 Sheets-Sheet 1

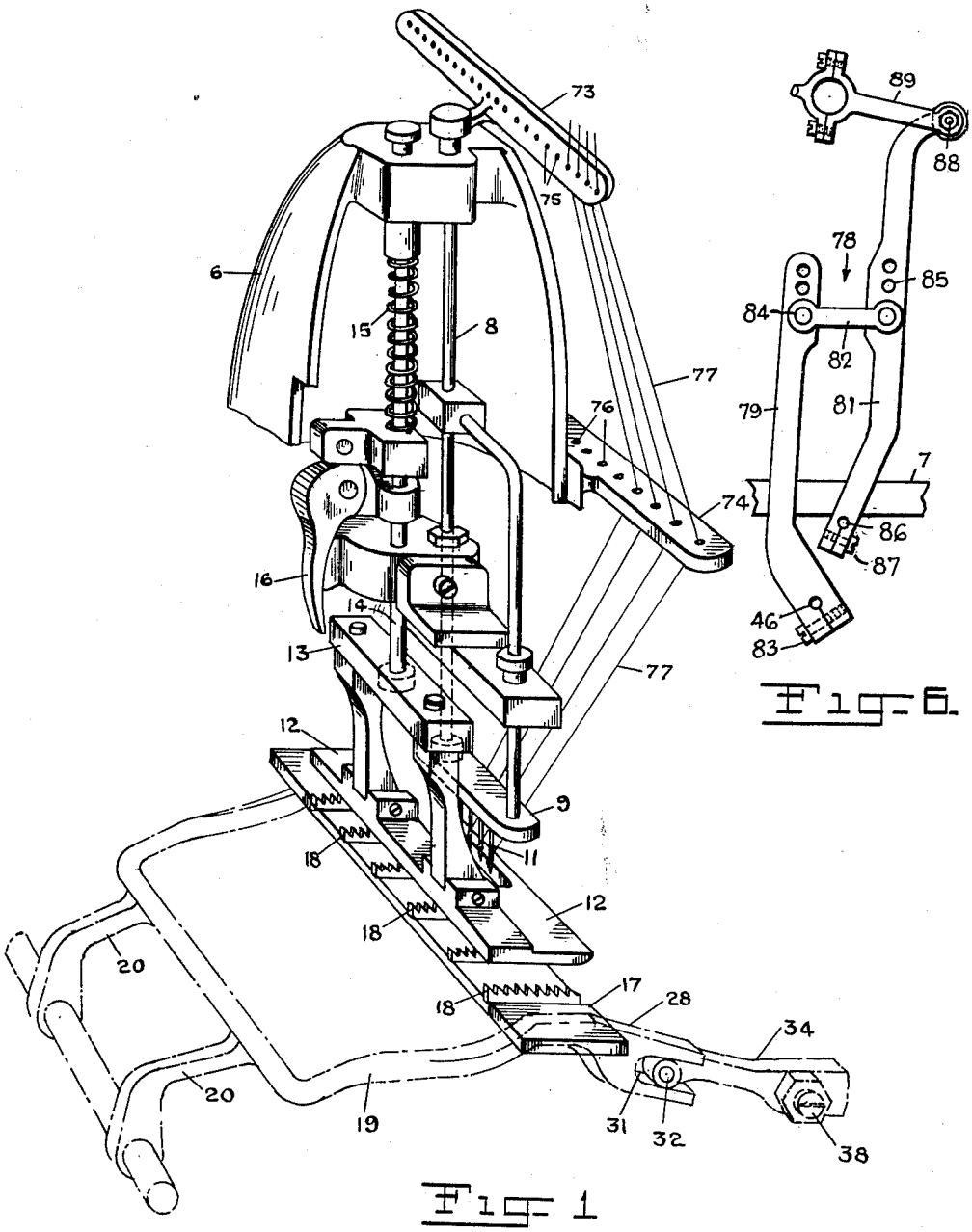


Fig. 1

Fig. 6.

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TUFTING MACHINE

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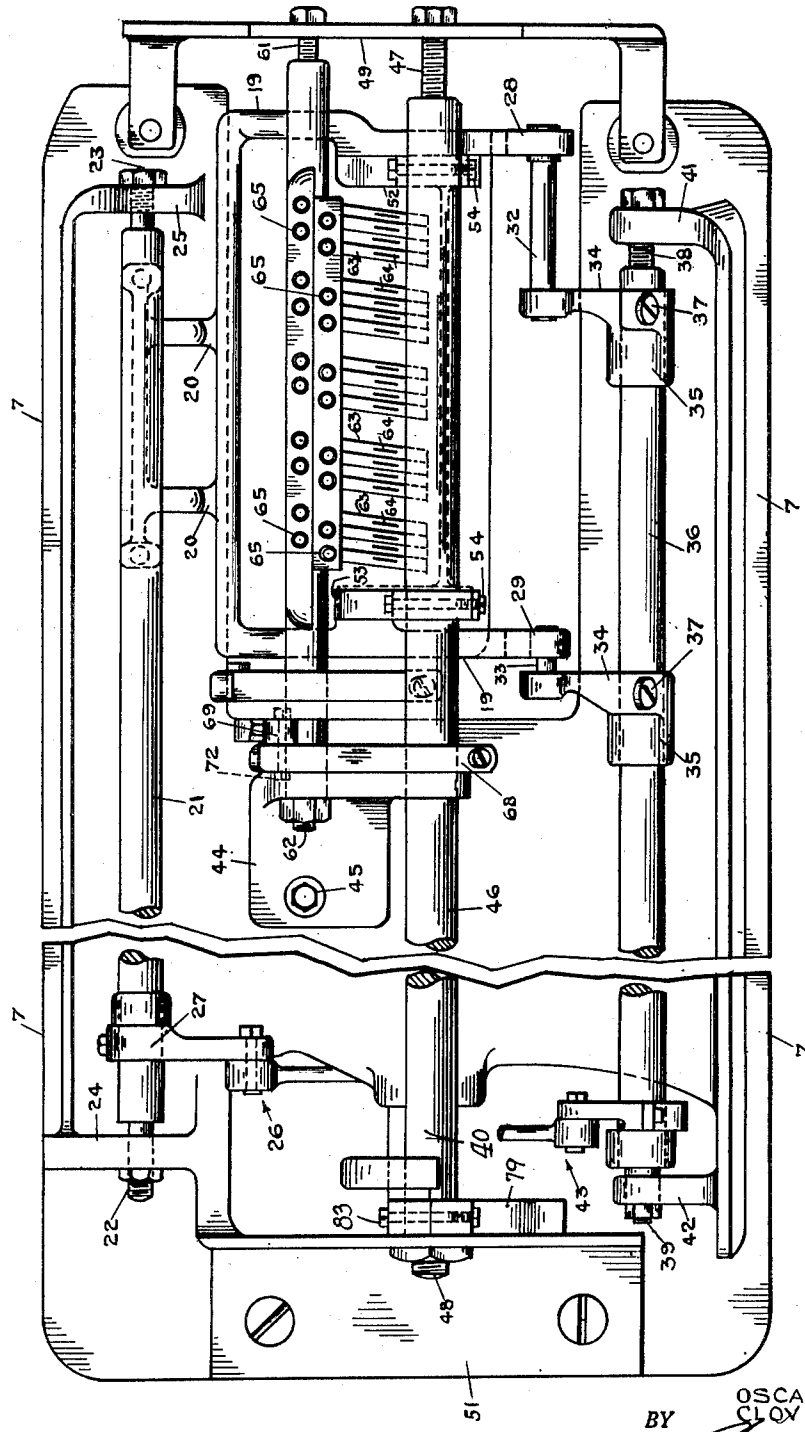


FIG. 2

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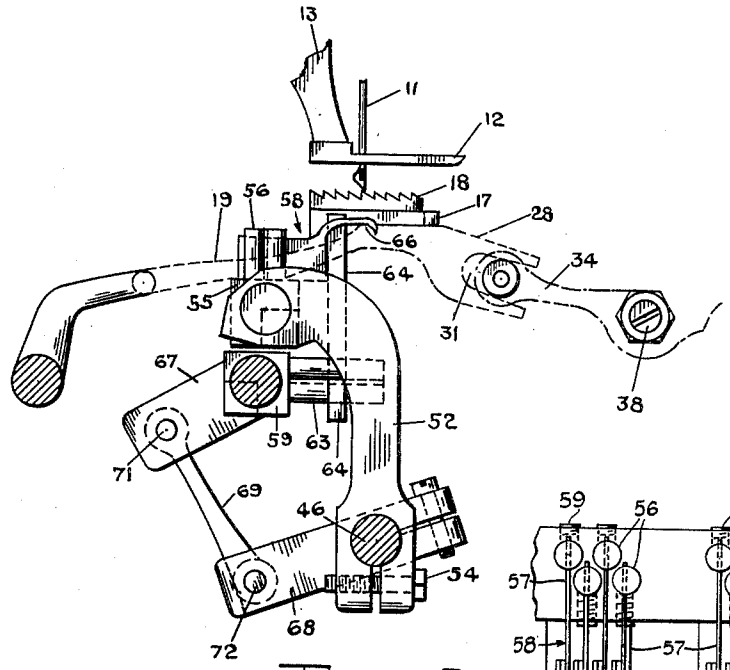


Fig- 3

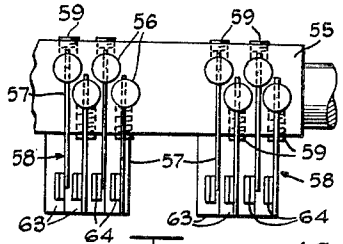


Fig-4a

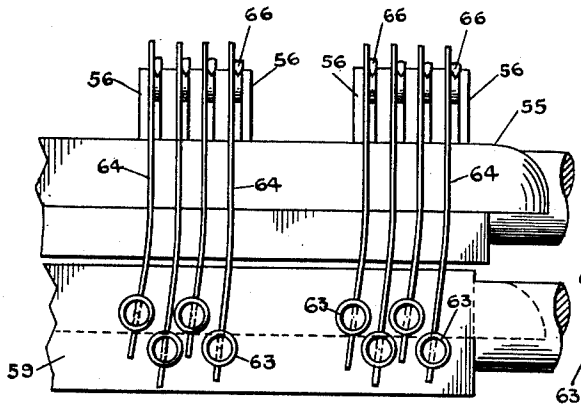


Fig- 4

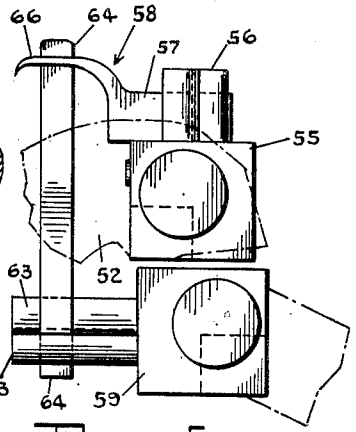


Fig- 5

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2,637,289

UNITED STATES PATENT OFFICE

2,637,289

TUFTING MACHINE

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Application October 10, 1947, Serial No. 779,148

10 Claims. (Cl. 112—79)

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This invention relates to tufting machines, and relates more particularly to tufting machines for automatically and simultaneously producing a series of aligned loops or tufts in a single operation.

It is an important object of our invention to provide a novel arrangement for mounting for the looper arms and cutters whereby adjacent longitudinal rows of loops or tufts may be closely spaced.

Another object of our invention is to provide a novel means for holding the looper arms and cutters and for oscillating the holding means in predetermined relationship.

A further object of our invention is the provision of a novel driving connection for moving the looper arm block whereby the stroke of the looper arms may be adjusted to the desired degree.

Other objects of our invention, together with certain details of construction and combinations of parts, will appear from the following detailed description and appended claims:

In the drawings wherein a preferred embodiment of our invention is shown,

Fig. 1 is a fragmentary view, in perspective, of a sewing machine head and mechanism in connection with which our invention is employed;

Fig. 2 is a bottom plan view, showing the mountings for the looper arms and cutters in position;

Fig. 3 is a detail view of the means for mounting the looper arms and cutters and for rocking said mountings;

Fig. 4 is a fragmentary detail view, on an enlarged scale, showing particularly the arrangement for mounting the cutters;

Fig. 4*a* is a fragmentary top plan view showing the staggered relationship of the looper arm holders.

Fig. 5 is a side elevational view, on an enlarged scale, of the mountings for the looper arms and cutters; and

Fig. 6 is a detail view of the means for rocking the looper arm block from the main drive shaft.

Like reference numerals indicate like parts throughout the several views of the drawings.

Referring now to the drawings for a detailed description of this invention, the reference numeral 6 indicates a portion of the head of a sewing machine of a well known type, the base 7 of which is shown in Fig. 2. Mounted for reciprocation in the head by the usual main drive shaft (not shown) passing horizontally through the head is a needle bar rod 8 to the lower end of which is secured a needle holding bar 9 in which

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is held a plurality of needles 11. Also mounted in the head is a presser bar 12 carried by a bracket 13 fixed to the end of a vertical rod 14. A spring 15 surrounds rod 14 and a finger lever 16 is provided to lower and raise the presser bar 12 against the action of said spring 15. The feeder mechanism for feeding the fabric through the machine in cooperation with the presser bar 12 includes a feeder plate 17 on which is mounted a plurality of serrated feed dogs 18. Normally a slotted throat plate is provided between the presser bar 12 and feeder plate 17 through openings in which plate the feed dogs are adapted to reciprocate. This throat plate has been omitted in the interest of clarity.

Feeder plate 17 is rigidly mounted on a bracket 19 which through arms 20 is attached to rear feed shaft 21 mounted on bolts 22 and 23, which bolts are pivotally supported in brackets 24 and 25 respectively integral with the base 7. The rear feed shaft 21 is given a rocking movement by means of a linkage, generally indicated by reference numeral 26, connected to the rear feed shaft at 27 and, through the usual arm and eccentric (not shown), to the main drive shaft. Bracket 19 is provided with bifurcated arms 28 and 29 in the slots 31 of which are slidably carried the ends of stub shafts 32 and 33 respectively. These stub shafts are carried in collar brackets 34, the collars 35 of which are adjustably mounted on front feed shaft 36, a set screw 37 holding the collars in adjusted position. The front feed shaft 36 is mounted on bolts 38 and 39 which are pivotally supported in brackets 41 and 42 respectively, integral with base 7. The front feed shaft 36 is given a rocking movement by means of a linkage, generally indicated by reference numeral 43, connected by an arm and eccentric (not shown) to the main drive shaft of the machine. The construction and arrangement set forth above is such that the feeder plate 17 with its feed dogs 18 is not only given an up and down movement but also a back and forth movement, thus effecting the desired feeding motion.

Journaled in a bracket 44 fixed to the underside of base 7 by a bolt 45 is a shaft 46. The extremities of the shaft are provided with bolts 47 and 48 which are adapted to be pivotally carried in brackets 49 and 51, respectively, suitably fixed to the base 7. The shaft 46 is adapted to be rocked by the main drive shaft through suitable connections hereinafter described.

Hooked arms 52 and 53, the lower extremities of which are attached to and rockable with shaft 46, being held thereon by means of clamping

screws 54, carry at their upper or hooked ends thereof a looper arm block 55. Set in staggered relation and predetermined pattern in said block 55 are a plurality of slotted, cylindrical looper arm holders 56 for holding the shanks 57 of looper arms 58. Set screws maintain holders 56, which are vertically and angularly adjustable, in position.

A cutter block 59 is pivotally supported in brackets 43 and 44 by means of bolts 61 and 62. Set in staggered relation and predetermined pattern in said cutter block are a plurality of slotted, cylindrical cutter holders 63. The cutter holders, which are adapted to hold cutter blades 64, are horizontally and angularly adjustable, and are held in position by means of set screws 65. Cutter blades 64 are made of any suitable metal which may be sharpened, and which may be flexed to engage, in sliding relationship, the sides of the bills 66 of the looper arms.

Means are provided to rock the cutter block 59 in timed relation to the rocking movement of the looper arm block 55 in order to give a cutting movement to the cutter blades 64 for cutting the loops on the looper bills, which loops are formed when the needles 11 pierce the fabric, as is well understood in the art. To this end, a lever arm 67 is fixed to the cutter block 59 and a lever arm 68 is adjustably mounted on rocker shaft 46, a link 69 is pivotally attached at 71 and 72 to operatively connect said lever arms. The construction outlined above is such as to produce a shorter stroke in the movement of the looper arms and the cutters, making for more efficient operation of the tufting machine.

On the head 6 are mounted guide bars 73 and 74 having guide eyes 75 and 76 through which thread 77 from a suitable source (not shown) passes on the way to the needles.

The arrangement set forth above for mounting the looper arms and cutters is such that the number of looper arms and cutters which can be mounted on the holders therefor is substantially increased. For example, as shown in Fig. 2, twenty cutters are shown mounted on the cutter block. In similar fashion, twenty looper arms may be mounted on the looper arm block in cooperating relation to the cutters. More cutter and looper arms can be added to each block if an over-all tuft effect is desired. Moreover, the novel mountings of the present invention permit of the placing of the looper arms and cutters in many arrangements to produce many desirable ornamental effects: Thus, with the arrangement shown in Fig. 2, there is produced a tufted fabric having spaced longitudinal rows of stripes, each of which is formed of four rows of tufts so closely spaced, i. e., on the order of about one-eighth of an inch apart at the stitch, with respect to each other as to give the appearance of a single broad stripe.

Novel means are provided for rocking shaft 46. This rocking means is adjustable so as to limit the stroke of the looper arms to produce loops of such size as that required by the very short nap desired, and comprises a drive rod, generally indicated by reference 78, made up of levers 79 and 81 connected by a linkage 82. The lower extremity of lever 79 is split and is attached to shaft 46, being held in position by means of a clamping screw 83. The upper extremity of lever 79 is provided with a series of holes 84 in which one end of linkage 82 may be adjustably and pivotally mounted. The other end of linkage 82 is similarly mounted in one of a series of holes 85 in lever 81. The lower extremity of lever 81 is split and is pivotally carried on a stub shaft 86 fixed to the base 7 of the machine, being held on said stub shaft by means of a clamping screw 87. The upper extremity of said lever 81 is pivotally mounted at 88 on a link 89 which is fixed to and operated by the main drive shaft of the machine.

A most distinctive feature of the present invention resides in the provision of looper arms and cutters mounted on staggered elements but extending in a straight line for coaction with a straight line of needles. The looper arms and cutters are aligned with their mounting portions being staggered. The elements 56 are staggered and the looper arms 66 are of different length so as to extend outwardly with their bill edges in line.

The embodiment of our invention shown and described herein is to be considered merely as illustrative, as our invention is susceptible to variation, modification and change within the spirit and scope of the appended claims.

What we claim as new and desire to secure by Letters Patent is:

1. In a tufting machine for simultaneously producing a series of aligned tufts in a base material, the combination with a plurality of reciprocable needles, a plurality of looper arms and a plurality of cutters cooperating with each other to form tufts, of a block for carrying said looper arms, a block for carrying said cutters, a shaft operatively connected to said blocks, and adjustable means, extending transversely the width of said machine and being positioned below said looper arms and cutters, and being adjustable so as to limit the stroke of the looper arms to produce loops of such size as to regulate the thickness of the nap for rocking said shaft, said looper arms and said cutters being provided with holders mounted in staggered relationship of said respective blocks for carrying the looper arms and for carrying the cutters, but extending in a straight line for coaction with a straight line of needles.

2. In a tufting machine for simultaneously producing a series of aligned tufts in a base material, the combination with a plurality of reciprocable needles, a plurality of looper arms and a plurality of cutters cooperating with each other to form tufts, of a block for carrying said looper arms, a block for carrying said cutters, a shaft operatively connected to said blocks, and means, extending transversely the width of said machine and being positioned below said looper arms and cutters, and being adjustable so as to limit the stroke of the looper arms to produce loops of such size as to regulate the thickness of the nap comprising a plurality of levers adjustably connected to each other for rocking said shaft, said looper arms and said cutters being provided with holders mounted in staggered relationship of said respective blocks for carrying the looper arms and for carrying the cutters, but extending in a straight line for coaction with a straight line of needles.

3. In a tufting machine for simultaneously producing a series of aligned tufts in a base material, the combination with a plurality of reciprocable needles, a plurality of looper arms and a plurality of cutters cooperating with each other to form tufts, of a block for carrying said looper arms, mounts on said looper arm block for holding said looper arms, a block for carrying said cutters, mounts on said cutter block for holding

said cutters, a single shaft, extending transversely the width of said machine and being positioned below said looper arms and cutters, and being adjustable so as to limit the stroke of the looper arms to produce loops of such size as to regulate the thickness of the nap for rocking said blocks in predetermined relation to each other, and a drive rod comprising a pair of relatively adjustable levers for rocking said shaft, said looper arms and said cutters being held by said mounts respectively in staggered relation on said respective blocks, but extending in a straight line for coaction with a straight line of needles.

4. In a tufting machine for simultaneously producing a series of aligned tufts in a base material, the combination with a plurality of reciprocable needles, a plurality of looper arms and a plurality of cutters cooperating with each other to form tufts, of a block for carrying said looper arms, mounts on said looper arm block for holding said looper arms, a block for carrying said cutters, mounts on said cutter block for holding said cutters, a single shaft, extending transversely the width of said machine and being positioned below said looper arms and cutters, and being adjustable so as to limit the stroke of the looper arms to produce loops of such size as to regulate the thickness of the nap for rocking said blocks in predetermined relation to each other, and a drive rod comprising a pair of relatively adjustable levers for rocking said shaft, one of said levers being connected to said shaft and the other of said levers being pivotally mounted on the base of said tufting machine, said looper arms and said cutters being held by said mounts respectively in staggered relation on said respective blocks, but extending in a straight line for coaction with a straight line of needles.

5. In a tufting machine for simultaneously producing a series of aligned tufts in a base material, the combination with a plurality of reciprocable needles, a plurality of looper arms and a plurality of cutters cooperating with each other to form tufts, of a block for carrying said looper arms, mounts on said looper arm block for holding said looper arms, a block for carrying said cutters, mounts on said cutter block for holding said cutters, a single shaft, extending transversely the width of said machine and being positioned below said looper arms and cutters, and being adjustable so as to limit the stroke of the looper arms to produce loops of such size as to regulate the thickness of the nap for rocking said blocks in predetermined relation to each other, and a drive rod comprising a pair of levers and a link adjustably and pivotally connecting said levers for rocking said shaft, said looper arms and said cutters being held by said mounts respectively in staggered relation on said respective blocks, but extending in a straight line for coaction with a straight line of needles.

6. In a tufting machine for simultaneously producing a series of aligned tufts in a base material, the combination with a plurality of reciprocable needles, a plurality of looper arms and a plurality of cutters cooperating with each other to form tufts, of a block for carrying said looper arms, mounts on said looper arm block for holding said looper arms, a block for carrying said cutters, mounts on said cutter block for holding said cutters, a single shaft, extending transversely the width of said machine and being positioned below said looper arms and cutters, and being adjustable so as to limit the stroke of the looper arms to produce loops of such size as to regulate

the thickness of the nap for rocking said blocks in predetermined relation to each other, and a drive rod comprising a pair of levers and a link adjustably and pivotally connecting said levers for rocking said shaft, one of said levers being connected to said shaft and the other of said levers being pivotally mounted on the base of said tufting machine, said looper arms and said cutters being held by said mounts respectively in staggered relation on said respective blocks, but extending in a straight line for coaction with a straight line of needles.

7. In a tufting machine for simultaneously producing a series of aligned tufts in a base material, the combination with a plurality of reciprocable needles, of a plurality of looper arms, a plurality of deformable cutters, said needles, looper arms and cutters cooperating to form tufts, a block for carrying said looper arms, angularly adjustable slotted, mounts for holding said looper arms arranged on said looper arm block, a block for carrying said cutters, angularly adjustable slotted, mounts for holding said cutters arranged on said cutter block, means, including a rocker shaft, extending transversely the width of said machine and being positioned below said looper arms and cutters, and being adjustable so as to limit the stroke of the looper arms to produce loops of such size as to regulate the thickness of the nap, an arm connecting said rocker shaft with said looper arm block and a linkage connecting said rocker shaft with said cutter block, for rocking said blocks in predetermined relation to each other, and a drive rod comprising a pair of relatively adjustable levers for rocking said shaft, said looper arms and said cutters being held by said mounts respectively in staggered relation on said respective blocks, but extending in a straight line for coaction with a straight line of needles.

8. In a tufting machine for simultaneously producing a series of aligned tufts in a base material, the combination with a plurality of reciprocable needles, of a plurality of looper arms, a plurality of deformable cutters, said needles, looper arms and cutters cooperating to form tufts, a block for carrying said looper arms, angularly adjustable slotted, mounts for holding said looper arms arranged on said looper arm block, a block for carrying said cutters, angularly adjustable slotted, mounts for holding said cutters arranged on said cutter block, means, including a rocker shaft, extending transversely the width of said machine and being positioned below said looper arms and cutters, and being adjustable so as to limit the stroke of the looper arms to produce loops of such size as to regulate the thickness of the nap, an arm connecting said rocker shaft with said looper arm block and a linkage connecting said rocker shaft with said cutter block, for rocking said blocks in predetermined relation to each other, and a drive rod comprising a pair of relatively adjustable levers for rocking said shaft, one of said levers being connected to said shaft and the other of said levers being pivotally mounted on the base of said tufting machine, said looper arms and said cutters being held by said mounts respectively in staggered relation on said respective blocks, but extending in a straight line for coaction with straight line of needles.

9. In a tufting machine for simultaneously producing a series of aligned tufts in a base material, the combination with a plurality of reciprocable needles, of a plurality of looper arms, a plurality of deformable cutters, said needles, looper arms and cutters cooperating to form tufts,

a block for carrying said looper arms, vertically and angularly adjustable slotted, mounts for holding said looper arms arranged on said looper arm block, a block for carrying said cutters, horizontally and angularly adjustable slotted, mounts for holding said cutters arranged on said cutter block, means, including a rocker shaft, extending transversely the width of said machine and being positioned below said looper arms and cutters, and being adjustable so as to limit the stroke of the looper arms to produce loops of such size as to regulate the thickness of the nap, an arm connecting said rocker shaft with said looper arm block and a linkage connecting said rocker shaft with said cutter block, for rocking said blocks in predetermined relation to each other, and a drive rod comprising a pair of relatively adjustable levers for rocking said shaft, said looper arms and said cutters being held by said mounts respectively in staggered relation on said respective blocks, but extending in a straight line for coaction with a straight line of needles.

10. In a tufting machine for simultaneously producing a series of aligned tufts in a base material, the combination with a plurality of reciprocable needles, of a plurality of looper arms, a plurality of deformable cutters, said needles, looper arms and cutters cooperating to form tufts, a block for carrying said looper arms, vertically and angularly adjustable slotted, mounts for holding said looper arms arranged on said looper arm block, a block for carrying said cutters, horizontally and angularly adjustable slotted, mounts for holding said cutters arranged on said cutter block, means, including a rocker shaft, extending transversely the width of said machine and being positioned below said looper arms and cutters, and being adjustable so as to limit the stroke of the looper arms to produce loops of such size as to regulate the thickness of the nap, an arm connecting said rocker shaft with said looper arm block and a linkage connecting said rocker shaft with said cutter block, for rocking said blocks in predetermined relation to each other, and a drive rod comprising a pair of relatively adjustable levers for rocking said shaft, one of said levers being connected to said shaft and the other of said levers being pivotally mounted on the base of said tufting machine, said looper arms and said cutters being held by said mounts respectively in staggered relation on said respective blocks, but extending in a straight line for coaction with a straight line of needles.

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