March 25, 1958 M. B. PENMAN 2,827,866

LOOPER MECHANISM FOR MULTIPLE NEEDLE TUFTING MACHINES

Filed Sept. 24, 1953 2 Sheets-Sheet 1

FIG. 1

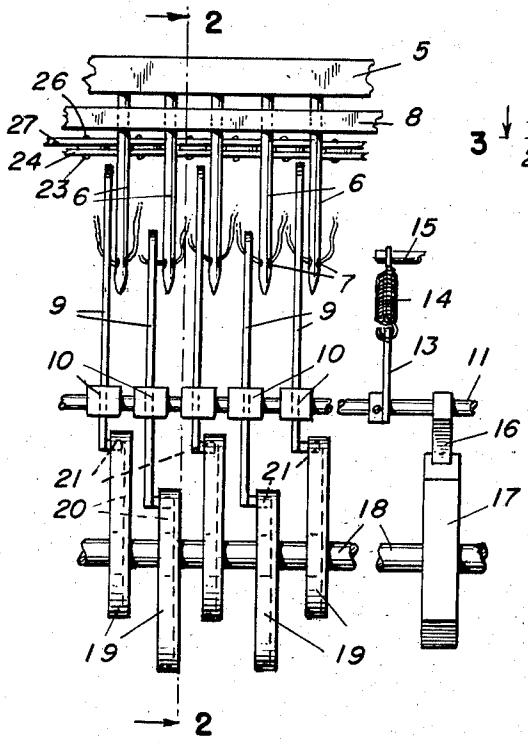
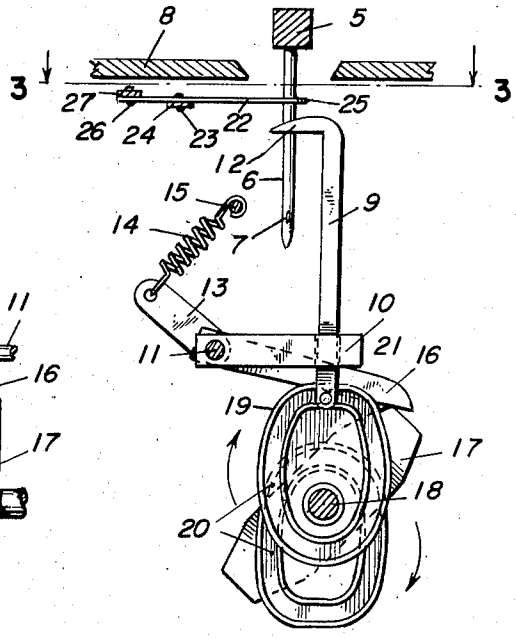


FIG. 2



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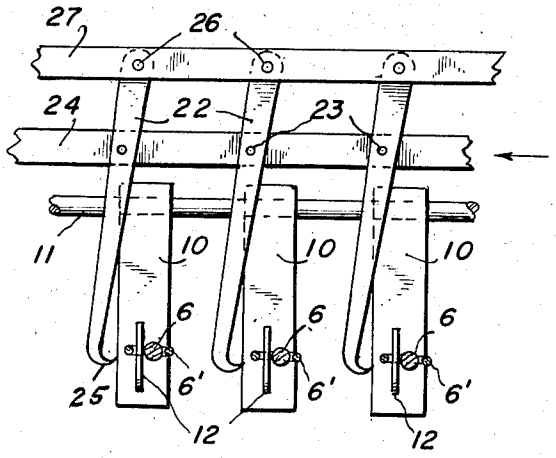


FIG. 3

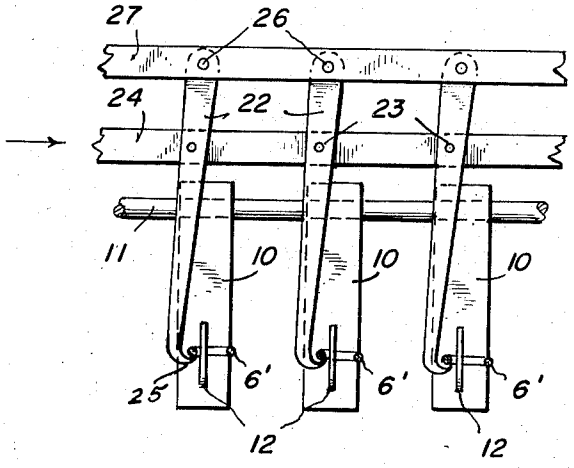


FIG. 4

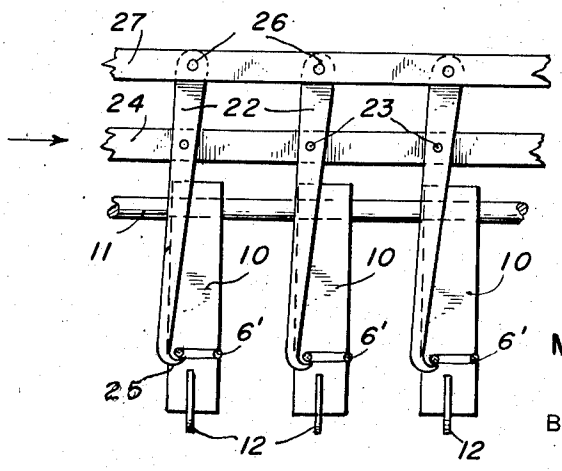


FIG. 5

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LOOPER MECHANISM FOR MULTIPLE NEEDLE TUFTING MACHINES

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Application September 24, 1953, Serial No. 382,077

12 Claims. (Cl. 112—79)

This invention relates to improvements in multiple needle tufting machines and more particularly to the hopper mechanisms of such machines.

Multiple needle tufting machines employed at present in the manufacture of loop pile carpets have a looper mechanism which forms rows of loops of a uniform height and it is an object of the present invention to provide a looper mechanism for producing high and low loops, alternately, in both weftwise and warpwise rows of loops to provide a carpet having a loop pile surface of both high and low loops.

A further object of the invention resides in mounting a series of loopers for oscillating and reciprocating movement in cooperating relation to the yarn carrying needles, with means for raising and lowering the loopers alternately prior to engagement of the loopers with the yarns to form a row of high and low loops.

A still further object of the invention resides in providing means for engaging the loops while still engaged with the hooks of the loopers to hold the loops while the hooks are withdrawn upon oscillation of the loopers in a direction away from the loops.

Another object of the invention resides in providing a mechanism of the above-mentioned character which is simple and durable in construction, reliable and efficient in operation and inexpensive to manufacture.

Other objects and advantages of the invention will be apparent during the course of the following specification:

In the accompanying drawing forming a part of this specification and in which like numerals are employed to designate like parts throughout the same,

Fig. 1 is a fragmentary front elevational view showing the looper mechanism in cooperative relation with the needles of a tufting machine,

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1,

Fig. 3 is a section taken on line 3—3 of Fig. 2 showing the hooks of the looper arms inserted between the yarns and needles and the spring fingers in disengaged position,

Fig. 4 is a view similar to Fig. 3 showing the hooks of the looper arms engaged with the yarn loops and the spring fingers engaged with the yarns, and,

Fig. 5 is a view similar to Fig. 4 showing the hooks of the looper arms withdrawn from the yarn loops.

Referring to the drawing wherein for the purpose of illustration a preferred example of the invention is shown, the numeral 5 denotes the needle bar of a multiple needle tufting machine having a series of needles 6 depending therefrom in spaced apart relation. The needles 6 are provided with eyes 7 to receive the yarns 6' that are carried through the fabric, not shown, upon downward movement of the needle bar. Mounted below the bed 8 of the machine are a series of looper arms 9 in parallel relation to the path of movement of the needles, which are slidably mounted in one end of blocks 10 fixedly attached at their opposite ends to an oscillating

shaft 11. The looper arms at their upper ends are formed to provide hooks 12 which upon oscillation of shaft 11 are moved into and out of engagement with the yarns carried by the needles. An arm 13 attached to one end of shaft 11 is connected to one end of a coil spring 14 having its opposite end attached to a support 15 and the tension of spring 14 normally rotates shaft 11 to move the looper arms in a direction away from the needles to disengage the hooks 12 from the loops that have been formed when the needles have been raised. A pawl 16 carried by shaft 11 engages with a rotating cam 17 fixedly mounted on cam shaft 18, the cam having a surface to intermittently impart to the shaft 11 a rotating movement to move the loopers in a direction towards the needles to engage the hooks with the yarns when the needles are in a lowered position.

A series of cam wheels 19 are fixedly mounted on cam shaft 18, there being a cam wheel for each of the looper arms 9. The cam wheels are substantially oval shape and are eccentrically mounted on shaft 18 with every other cam in inverse relation to the next adjacent cam. A groove 20 is formed in one face of each cam wheel adapted to slidably receive a boss 21 formed on the lower end of the looper arm and upon rotation of the cam wheel the boss 21 travels in the groove 20 and reciprocates the looper arm to raise or lower the hook. With every other looper arm in a raised position, the intermediate looper arms are in a lowered position and upon each half revolution of cam shaft 18 the relative position of the looper arms are reversed.

Arranged above the hooks 12 of the looper arms are a series of spring fingers 22 pivotally mounted intermediate their ends, as at 23, on a bar 24 to swing in a horizontal plane. The spring fingers extend adjacent the needles aand have hooked ends 25 for engaging the yarns and at their opposite ends are pivotally connected, as at 26, to a reciprocating bar 27 which moves the spring fingers to engage or disengage the hooked ends with the yarns.

In operation, the vertical reciprocation of the needle bar 5 causes the needles 6 to penetrate the fabric and carry the yarns 6' below the bed 8 of the machine. As the needles move downwardly the looper arms 9 are rotated by shaft 11 to swing the hooks 12 past one side of the needles between the needles and yarn, as shown in Fig. 3. The point at which the hooks of the looper arms intersect the needles is controlled by the cams 19 with the hooks of alternate looper arms intersecting the needles nearer the eyes 7 than the hooks of other looper arms. When the needles move upwardly the yarns are held by the hooks of the looper arms and are pulled from the needles to form loops of a height dependent on the position of the hooks with respect to the eye of the needles. After the needles are raised and just prior to removal of the looper arm hooks from the yarn loops, the spring fingers 22 are swung, by reciprocating bar 27, to engage the hooked ends 25 of the fingers around the yarns forming the loops, as shown in Fig. 4. With the spring fingers engaged with the yarns the looper arms are swung by rotation of shaft 11 to withdraw the hooks 12 from the yarn loops, the yarns being held by the spring fingers so that the loops are removed from the hooks, as shown in Fig. 5. After the hooks are disengaged from the loops, the cam wheels 19 are rotated a half a revolution by cam shaft 18 to change the relative positions of the looper arms so that the hooks of the arms which crossed the needles near the eyes will be raised to cross the needles at a higher point and the hooks of the other arms will be lowered to cross the needles near the eyes. Thus, it will be seen

that a row of loops will be formed having loops of different heights.

Having thus described my invention, I claim:

1. A looper mechanism for a multiple needle looping machine having a fabric support and a plurality of reciprocating needles for passing yarns through a fabric positioned on the support to form a row of loops comprising a series of looper arms below the fabric support, means mounting the looper arms for movement along and across the path of movement of said needles to engage the loops, said looper arms being movable independently of each other in said mounting along the path of the needles, and said mounting means including means for simultaneously varying the position of some of said looper arms relative to other looper arms for engagement with the loops at different distances from the fabric support whereby a row of loops of varying heights is formed when the needles are withdrawn.

2. A looper mechanism for a multiple needle looping machine having a fabric support and a plurality of reciprocating needles for passing yarns through a fabric positioned on the support to form a row of loops comprising a series of looper arms below the fabric support, means mounting the looper arms for movement along and across the path of movement of said needles to engage the loops, said looper arms being movable independently of each other in said mounting along the path of the needles, and automatic means for simultaneously varying the position of some of the looper arms in relation to other looper arms for engagement with the loops at different distances from the fabric support whereby a row of loops of varying heights is formed when the needles are withdrawn.

3. A looper mechanism for a multiple needle looping machine having a fabric support and a plurality of reciprocating needles for passing yarns through a fabric positioned on the support to form a row of loops comprising a series of looper arms below the fabric support, an oscillating mounting for said looper arms adapted to move said looper arms across the path of movement of said needles to engage the loops, said looper arms being movable independently of each other in said mounting along the path of the needles, and means for simultaneously varying the position of some of said looper arms in relation to other looper arms for engagement with the loops at different distances from the fabric support whereby a row of loops of varying heights is formed when the needles are withdrawn.

4. A looper mechanism for a multiple needle looping machine having a fabric support and a plurality of reciprocating needles for passing yarns through a fabric positioned on the support to form a row of loops comprising a series of looper arms below the fabric support, means mounting the looper arms for movement along and across the path of movement of said needles to engage the loops, said looper arms being movable independently of each other in said mounting along the path of the needles, and a series of cams operably engaged with said looper arms for simultaneously varying the position of some of the looper arms in relation to other looper arms for engagement with the loops at different distances from the fabric support whereby a row of loops of varying heights is formed when the needles are withdrawn.

5. A looper mechanism for a multiple needle looping machine having a fabric support and a plurality of reciprocating needles for passing yarns through a fabric positioned on the support to form a row of loops comprising a looper arm mounting below the fabric support, a series of looper arms carried by said mounting for movement across the path of movement of said needles, said looper arms being movable independently of each other in said mounting along the path of movement of said needles, and means for simultaneously varying the position of some of the looper arms in relation to other looper arms for engagement with the loops at different distances from the fabric support whereby a row of loops of varying heights is formed when the needles are withdrawn.

6. A looper mechanism for a multiple needle looping machine having a fabric support and a plurality of reciprocating needles for passing yarns through a fabric positioned on the support to form a row of loops comprising a series of looper arms below the fabric support, an oscillating mounting for said looper arms adapted to move said looper arms across the path of movement of said needles to engage the loops, said looper arms being movable independently of each other in said mounting along the path of the needles, and a series of cams operably engaged with said looper arms for simultaneously varying the position of some of the looper arms in relation to other looper arms for engagement with the loops at different distances from the fabric support whereby a row of loops of varying heights is formed when the needles are withdrawn.

7. A looper mechanism for a multiple needle looping machine having a fabric support and a plurality of reciprocating needles for passing yarns through a fabric positioned on the support to form a row of loops comprising a series of looper arms below the fabric support, means mounting the looper arms for movement along and across the path of movement of said needles to engage the loops, said looper arms being movable independently of each other in said mounting along the path of the needles, said mounting means including means for simultaneously varying the position of some of said looper arms relative to other looper arms for engagement with the loops at different distances from the fabric support whereby a row of loops of varying heights is formed when the needles are withdrawn and fingers adjacent the path of movement of said needles movable into engagement with the loops on the looper arms to hold said loops when the looper arms are withdrawn.

8. A looper mechanism for a multiple needle looping machine having a fabric support and a plurality of reciprocating needles for passing yarns through a fabric positioned on the support to form a row of loops comprising a series of looper arms below the fabric support, means mounting the looper arms for movement along and across the path of movement of said needles to engage the loops, said looper arms being movable independently of each other in said mounting along the path of the needles, a cam shaft, and a series of cam wheels mounted on said cam shaft having cam tracks operably engaged with said looper arms for simultaneously varying the position of some of said looper arms relative to other looper arms for engagement with the loops at different distances from the fabric support whereby a row of loops of varying heights is formed when the needles are withdrawn.

9. A looper mechanism for a multiple needle looping machine having a fabric support and a plurality of reciprocating needles for passing yarns through a fabric to form a row of loops comprising a series of looper arms below the fabric support, an oscillating looper block supporting said looper arms, means for oscillating said block to move said looper arms across the path of movement of said needles to engage the looper, said looper arms being movable independently in said block along the path of the needles, a cam shaft below said looper block and cam wheels mounted on said cam shaft and operably engaged with said looper arms to simultaneously vary the position of some of the looper arms in relation to other looper arms for engagement with the loops at different distances from the fabric support whereby a row of loops of varying heights is formed when the needles are withdrawn.

10. A method of making a pile fabric floor covering on a multiple needle looping machine comprising passing a series of reciprocating yarn carrying needles through a backing material to a predetermined distance from the backing to form a row of loops, and simultaneously

holding some of the loops at different distances in relation to other loops from the backing material while withdrawing the needles to form a row of loops of varying heights.

11. A method of making a pile fabric floor covering on a multiple needle looping machine comprising passing a series of reciprocating yarn carrying needles through a backing material to a predetermined distance from the backing to form a row of loops of uniform height, and withdrawing the needles from the backing while independently holding some of the loops at different distances in relation to other loops from the backing material to form a row of loops of varying heights.

12. A method of making a pile fabric floor covering on a multiple needle looping machine comprising passing

a series of reciprocating yarn carrying needles through a backing material to a predetermined depth to form a row of loops, simultaneously withdrawing the needles while independently holding some of the loops at different distances in relation to other loops from the backing to form a row of loops of varying heights.

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