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LOOPER MECHANISM FOR MULTIPLE NEEDLE LOOPING MACHINES

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2 Sheets-Sheet 1

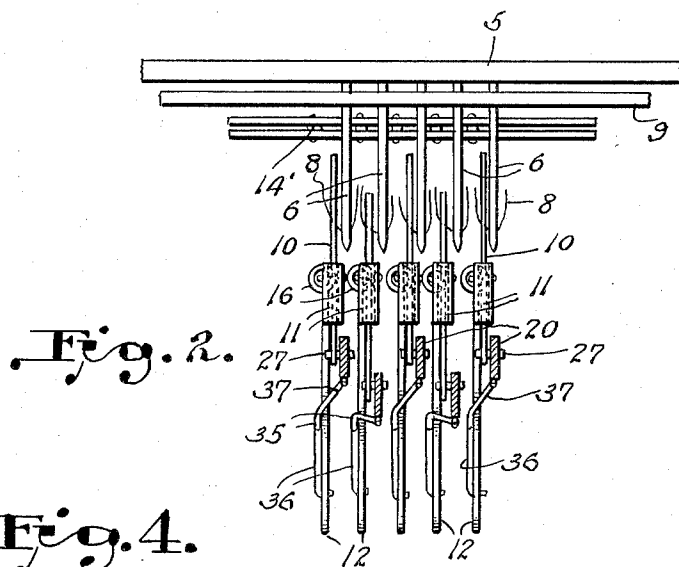
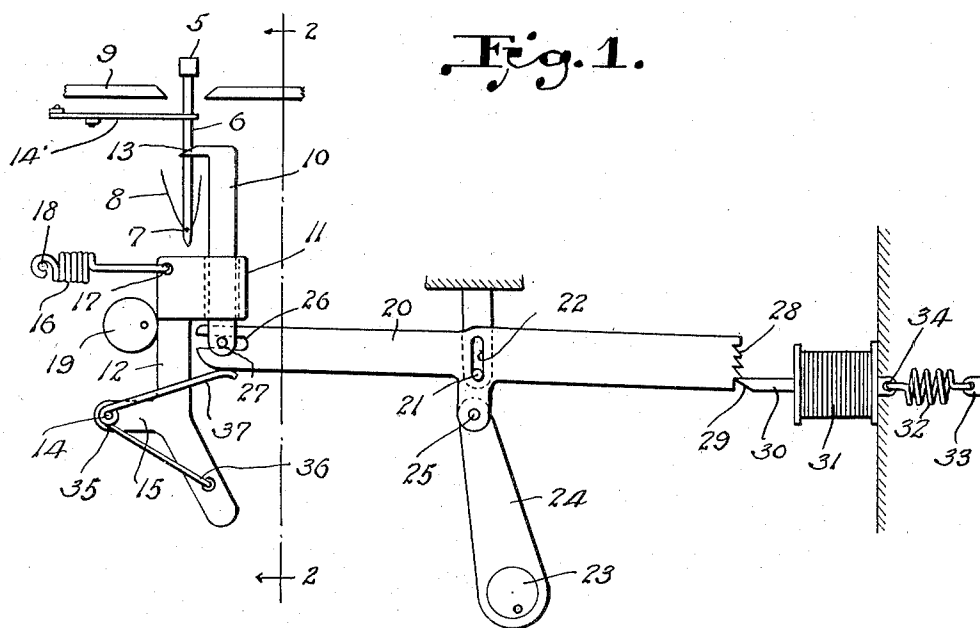
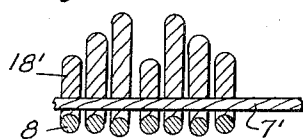


Fig. 4.



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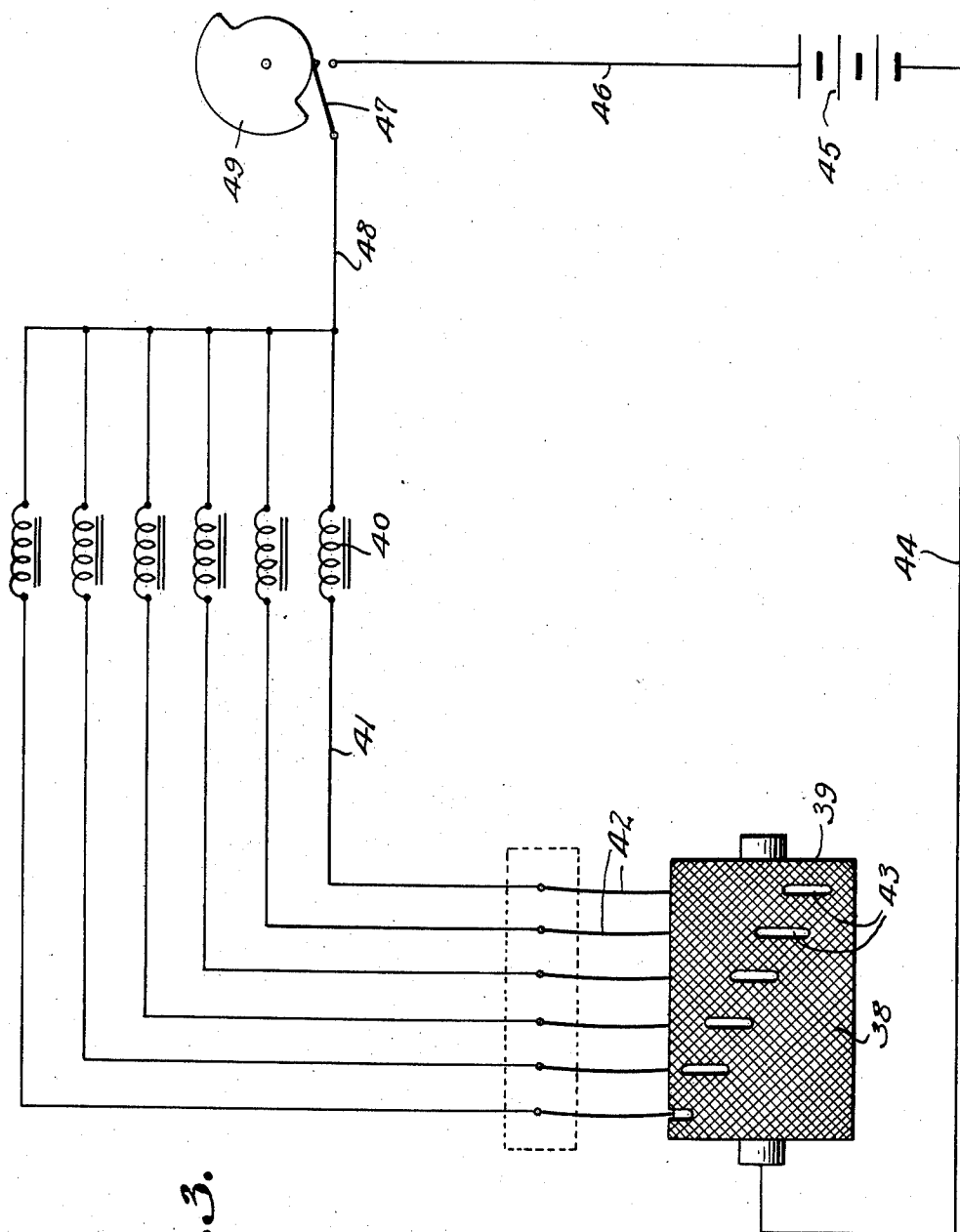


Fig. 3.

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LOOPER MECHANISM FOR MULTIPLE NEEDLE LOOPING MACHINES

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13 Claims. (Cl. 112—79)

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

In my prior application, Serial No. 382,077, filed September 24, 1953, now Patent No. 2,827,866, dated March 25, 1958, I disclosed a looper mechanism wherein the loopers were alternately raised and lowered prior to engagement of the loopers with the yarns to form a row of high and low loops in a fabric such as a carpet and it is an object of the present invention to provide a mechanism for selectively raising and lowering the loopers to various heights to form a loop pile of varying heights arranged in accordance with a pattern.

A further object of the invention resides in mounting a series of adjustable loopers for movement in cooperating relation to the yarn carrying needles, with means for selectively adjusting the loopers to various heights in accordance with a pattern.

A still further object of the invention resides in providing means for adjusting the loopers to various heights having electronic means for controlling the same in accordance with a pattern.

Another object of the invention resides in providing a mechanism of the above-mentioned character which is simple 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 description.

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

Fig. 1 is a side elevational view showing the adjusting means for the looper arms,

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

Fig. 3 is a diagram of the pattern controlled electric circuits, and,

Fig. 4 is a weftwise section of the fabric showing loops of varying heights.

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 lower ends of the needles are provided with eyes 7 to receive the yarns 8 that are carried through the fabric 7' upon downward movement of the needle bar. Mounted below the bed 9 of the machine in parallel relation to the path of movement of the needles are a series of looper arms 10 which are slidably mounted in the head 11 of pivoted levers 12 for vertical sliding movement. A hook 13 is formed at the upper end of the looper arms adapted to intersect the needles at various points depending upon vertical adjustment of the looper arms when the looper arms are oscillated by movement of the levers 12. The levers 12 are pivotally mounted on shaft 14 by lateral arms 15 and are moved to loop forming position by coil springs 16 having one end attached to the upper ends of the levers, as at 17, and their opposite ends attached to a rod 18. A cam

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shaft having cams 19 is mounted below the springs with the cams in engagement with the levers 12 for moving the levers to swing the looper arms in a direction away from the needles. When the needles carrying the yarns descend, the springs 16 actuate the levers 12 to position the hooks 13 of the looper arms between the yarn and needle so that when the needles are raised the hooks will hold the yarns to form loops and then the cams 19 actuate the levers to swing the looper arms to disengage the hooks from the loops just formed. Mounted between the bed 9 and upper ends of the loopers are a series of spring fingers 14' which engage and hold the yarns while the loopers are withdrawn from the loops, as more fully disclosed in my prior application.

The adjusting mechanism for the looper arms comprises a series of rocker arms 20 extending at right angles to the looper arms which are pivotally mounted intermediate their ends on a shaft 21 that extends through a vertical slot 22 formed in the rocker arms. A series of eccentrics 23 mounted below the rocker arms, are connected by crank arms 24 to the rocker arms, as at 25, below the shaft 21 and upon rotation of the eccentrics a reciprocating motion in a vertical direction is imparted to the rocker arms. One end of the rocker arms is slotted at 26 to engage a pin 27 projecting laterally from the lower end of the looper arms and the opposite end of the rocker arms has its vertical edge provided with a series of ratchet teeth 28 adapted to be engaged by the beveled end 29 of the core 30 of a solenoid 31 when the latter is energized. A spring 32 having one end attached to a bracket 33 and its opposite end connected to the core, as at 34, normally holds the core in a retracted position. A spring 35 mounted on shaft 14 has one arm 36 fixedly attached to the angularly bent lower end of lever 12 and its other end 37 in engagement with the end of the rocker arm beneath the lower end of the looper arm and normally holds the looper arm in a raised position.

When the solenoid 31 is de-energized the core 30 is retracted so that the rocker arm is free to pivot on the pin 27 upon vertical reciprocation of the rocker arm by the crank arm 24. Thus, the movement of the rocker arm does not alter the position of the looper arm which is held in its uppermost position by the tension of spring 35. To change the position of the looper arm, solenoid 31 is energized to project the core into engagement with one of the ratchet teeth 28 on the end of the rocker arm and thereby cause the rocker arm to fulcrum at the point of contact between the core and tooth so that when the rocker arm is pulled down by the crank arm the spring 35 will be compressed allowing the looper arm to move down to a lower position. The extent of downward movement of the looper arm is determined by which tooth is engaged by the core of the solenoid and the number of teeth provided on the end of the rocker arms determines the number of variations in the position of the looper arms.

The energizing of the solenoids is controlled by a perforated pattern 38 mounted on a conductor drum 39 in circuit with the solenoids. The electric circuits for the solenoids are shown in Fig. 3 wherein the winding 40 of each solenoid is connected by a wire 41 to a contact arm 42 mounted for engagement in the perforations 43 of the pattern 38 as the conductor drum 39 rotates. The conductor drum is connected by wire 44 to a source of electric current 45 and wire 46 connects the source of current with a micro-switch 47 connected to the windings 40 by wire 48. A cam 49 is provided for actuating the micro-switch to close the circuits in synchronism with the movement of the looper arms. The conductor drum is rotated by suitable gearing and the pattern carried by the drum selectively controls the closing of the circuits to energize the solenoids.

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In operation, as the needles move downwardly to carry the yarns through the fabric backing 7' the micro-switch 47 closes and those circuits whose contact arms 42 are engaged in perforations of the pattern 38 are closed thus energizing the solenoids. The solenoids are energized in timed relation to the downward movement of the rocker arms so the cores of the energized solenoids engage the desired tooth to form the fulcrum point of the rocker arm thus controlling the downward movement of the looper arm. Thus, it is seen the looper arms are selectively positioned at different heights so that when the needles are moved upwardly loops 18' of various heights are formed in accordance with a pattern.

The form of the invention herein shown and described is to be taken as a preferred example of the same and changes in shape, size and arrangement of the parts may be made without departing from the spirit of the invention or scope of the subjoined claims.

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 carrying yarns through a fabric comprising a series of looper arms slidably mounted for movement towards and from the fabric support, means for moving said looper arms across the path of movement of said needles to engage the yarns, rocker arms at right angles to said looper arms mounted for pivotal and vertical movement having ends pivotally connected to said looper arms, means for reciprocating said rocker arms and releasable fulcrum means for engagement with the other ends of said rocker arms at various points vertically of the other ends whereby the down stroke of said rocker arms is controlled to move said looper arms to various distances from the fabric support.

2. A looper mechanism of the character described in claim 1 including spring means normally holding said looper arms in a raised position.

3. A looper mechanism of the character described in claim 1 including electronic means for operating said releasable fulcrum means.

4. A looper mechanism of the character described in claim 1 including pattern controlled electronic means for operating said releasable fulcrum means.

5. A looper mechanism for a multiple needle looping machine having a fabric support and a plurality of reciprocating needles for carrying yarns through a fabric comprising a series of rocker arms mounted for pivotal and vertical movement, means for reciprocating said rocker arms, looper arms pivotally connected to ends of said rocker arms for movement across the path of movement of said needles to engage the yarns, and releasable fulcrum means for engaging the other ends of said rocker arms at various points vertically of the other ends whereby the downward stroke of said rocker arms is altered for adjusting said looper arms to various distances from the fabric support.

6. A looper mechanism of the character described in claim 5 including spring means for normally holding said looper arms in a raised position.

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7. A looper mechanism of the character described in claim 5 including electronic means for operating the releasable fulcrum means.

8. A looper mechanism of the character described in claim 5 including pattern controlled electronic means for operating said releasable fulcrum means.

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 positioned on the support to form a row of loops comprising a series of looper arms below the fabric support, means for moving said looper arms into engagement with the loops formed by the needles, means for moving each looper arm to various distances from said fabric support, and means releasably securing said last-mentioned means in its adjusted position.

10. 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 for moving said looper arms into engagement with the loops formed by the needles, a lever connected to each looper arm for moving the arm to different distances from the fabric support, and adjustable fulcrum means for controlling the movement of each lever.

11. 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, a mounting for said looper arms operable to engage the looper arms with the loops formed by the needles, a lever for each looper arm operable to move the arm along the path of movement of the needle, and changeable fulcrum means for each lever to control the stroke of the lever whereby the looper arm is positioned at different distances from the fabric support.

12. 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 for moving said looper arms to engage the arms with the loops formed by the needles, means for adjusting said looper arms at different distances from the fabric support, and electronic means for selectively holding said last mentioned means in its adjusted position.

13. A looper mechanism of the character described in claim 12 wherein the electronic means includes a pattern controlled electric circuit.

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