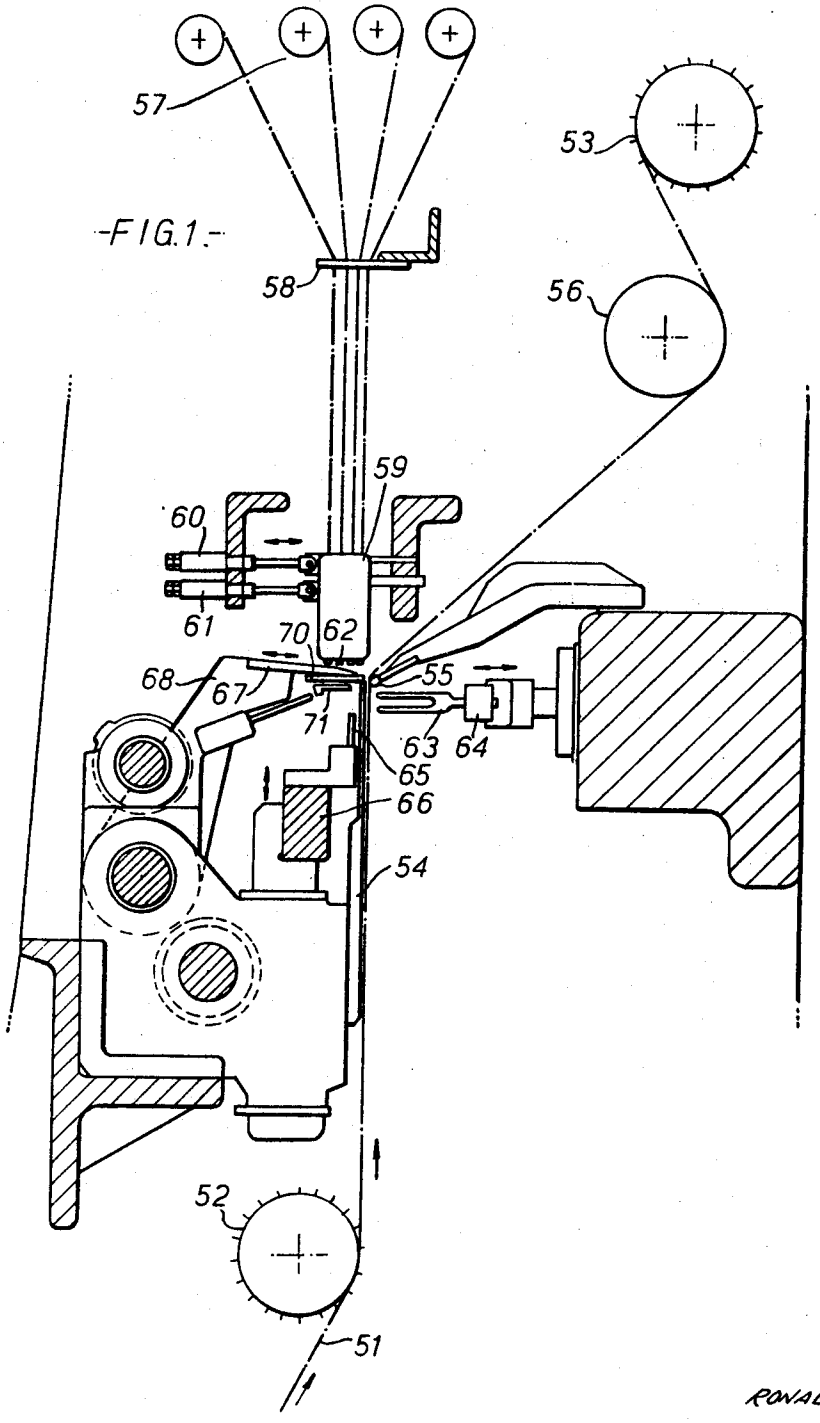
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TUFTING MACHINES FOR MAKING CARPETS AND LIKE FABRICS

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FIG. 1



INVENTOR:
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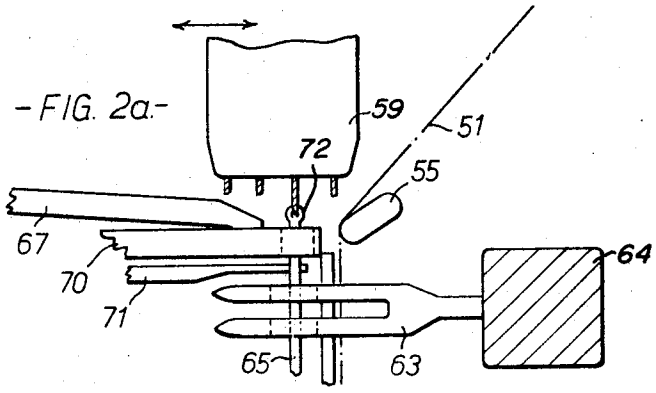
BY
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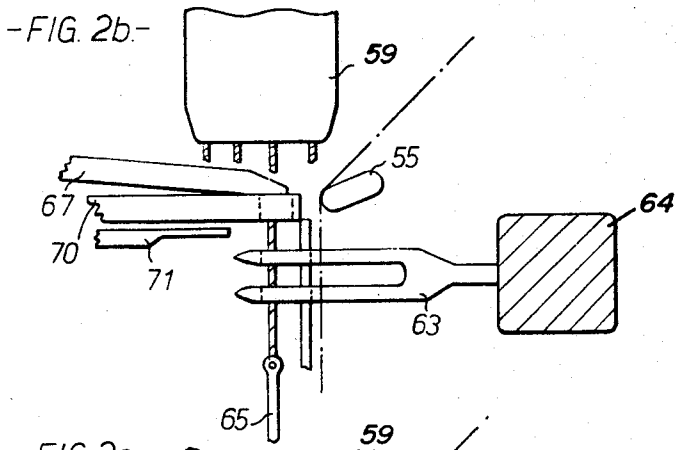
TUFTING MACHINES FOR MAKING CARPETS AND LIKE FABRICS

Filed March 23, 1967 2 Sheets-Sheet 2

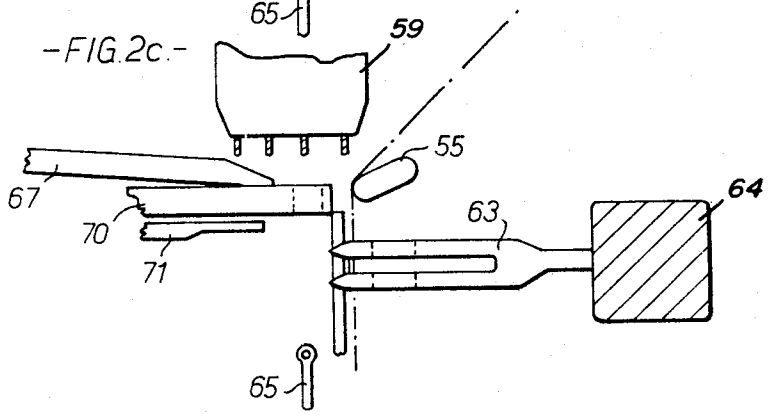
-FIG. 2a.-



-FIG. 2b.-



-FIG. 2c.-



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United States Patent Office

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TUFTING MACHINES FOR MAKING CARPETS AND LIKE FABRICS

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Claims priority, application Great Britain, Dec. 14, 1966, 55,910/66

5 Claims. (Cl. 112—79)

ABSTRACT OF THE DISCLOSURE

A machine for prdoucing a tufted fabric from a plurality of differently constituted yarns, a plurality of pronged eyed needles, means for moving a backing fabric past said needles, a supply of a plurality of yarns for each needle, said supply passing from a creel to a supply head, control means actuated by a pattern for moving each head relative to its associated needle, a gripper for each needle, means for moving each gripper through the eyes of its associated needle to grip the yarn presented to said needle and draw said yarn through said needle eyes, means for severing said yarn after the drawing motion, and means for reciprocating said needle through said backing fabric so as to form a loop or stitch of yarn.

The invention relates to a machine for making patterned carpets and like fabrics, and has for its principal object the production of a machine for making a tufted fabric with a pattern in several colours or types of yarn.

Another object of the invention is a table tufting machine for producing a coloured fabric under control of a pattern, with means from presenting a yarn of selected colour to a forked needle, and yarn gripper means advanced through the eyes of said needle to grip the selected yarn and thread it through the needle.

In an embodiment of the invention, I provide a table over which a length of backing fabric is drawn at a suitable speed. A row of forked needles is provided on one side of the table, there being an eye in each of the two forks of each needle. There are means for reciprocating the row so that the needles pierce the fabric. On the other side of the table we provide a row of yarn grippers, one gripper for each needle, the grippers being mounted on a common bar which is given a reciprocating motion suitably phased with the row of needles.

On the side of the row of needles remote from the grippers I provide a movable yarn feed head for each needle, with channels in the head for each yarn, of which there are several, derived from a creel, to be supplied alternatively to the needle. The head is adapted to be moved by electromagnetic or pneumatic means under control of a pattern by a varying amount so as to present the correct yarn at each stroke of the needle mechanism. Between the end of the yarn head and its associated needle there is a fixed stop plate with a hole therein for each yarn path, and a knife mechanism adapted to be reciprocated also at the speed of the needle bar and phased accordingly therewith, so as to sever the yarns supplied to the needles during each needle stroke. The operation of the device is as follows.

Considering a particular needle, the needle is advanced so as to pierce the fabric, with one fork of the needle on each side of a weft thread of the backing fabric. When the needle has fully entered its yarn gripper is advanced through the two eyes of the needle and through the stop plate, whereupon the jaws of the gripper open and close, seizing the yarn presented to it by the yarn head. This head is moved so as to bring the appropriate yarn into the path of the gripper by the control means, the particular

yarn to be supplied at any particular instant being selected and energised by pickup means from a pattern moved synchronously with the base fabric cylinders. When the gripper has seized the appropriate yarn, it returns to its normal position, drawing the yarn through the stop plate and through the two eyes of the needle. The knife bar now severs the yarn at the plate, the position of the gripper and of the plate being such that the amount of yarn projecting beyond the eyes of the needle on each side is substantially of the same length. Thereafter the needle is withdrawn through the fabric, carrying the two ends of the selected yarn, one end on each side of a thread of weft yarn in the base fabric so that two tufts appear above the base material. The yarn is therefore locked in the base fabric by being bent round this thread of weft material. If necessary, the yarn may be held against the thread of weft material by a pressure plate during the upward motion of the forked needle.

This action is repeated on all subsequent strokes of the forked needle, the yarn supply head presenting the appropriate colour or form of yarn to the yarn gripper at each stroke of the needle. A similar action takes place with all the other needles in a row, so that a multi-colour pattern of tufts is formed on the surface of the backing fabric. When the pattern is completed, the back of the fabric is treated with a suitable adhesive such as a rubber emulsion, thus locking all the tufts in position.

Reference should now be made to the accompanying drawings, in which:

FIG. 1 shows an embodiment of the invention; and

FIGS. 2*a*, 2*b*, and 2*c* show three phases in the operation of the mechanism shown in FIG. 1.

Referring to FIG. 1 it can be seen that this figure discloses a machine for applying a coloured pattern of yarn to a base fabric by a tufting machine. In this machine, a base fabric **51** is withdrawn from a roll by a spiked roller **52** and passed up through the machine to a further spiked roller **53** which draws the fabric through the machine. Thereafter the fabric is rolled up on a suitable roll, which may be the roller **53**. The fabric progresses over a base plate **54** and over a guide bar **55** before reaching a guide roller **56**.

Each needle is supplied with any one of four colours from a creel **57**. Yarns pass a guide plate **58**, and then through a supply head **59**. This latter is capable of movement in the direction shown by the double-headed arrow, under the control of the pneumatic cylinders **60**, **61**, each cylinder having a different length of piston stroke and being controlled by a pattern (not shown). The pistons can locate the head in any one of four positions, these being

(1) Piston **1** urged to right (in drawing)
(2) Piston **1** urged to left
(3) Piston **2** urged to right
(4) Piston **2** urged to left.

The head **59** has four exits **62** for the four yarns, the yarns being fed through these exits in which the yarn is held by spring tensioners, so as to leave a small length protruding. Any one of the four yarns can be brought above a gripper **65**.

On one side of the base fabric there is a row of forked needles one of which is shown at **63**. Each of the tines of the needle has an eye, and each needle is supported on a needle bar **64** which is reciprocable in the direction shown by the double-headed arrow. Besides the needle **63** there is also for each needle position a yarn gripper **65** mounted on a reciprocating bar **66**, a knife **67** mounted on a reciprocating support **68**, and a guide **55**.

The operation of the machine is best seen in connection with FIGS. 2*a*, 2*b* and 2*c*. Just before the parts of the apparatus adopt positions shown in FIG. 2*a*, the needle **63** is withdrawn entirely to the right hand side of the backing fabric **51**. The supply head **59** is first moved by

the pattern control mechanism into a position so as to bring the required yarn above the end of the gripper **65**, whereupon the needle bar advances the needle **63** to the position shown in FIG. 2*a*, and the gripper **65** moves upwards through the two eyes of the needle **63** and through a hole in the stop plate **70**; the plate **71**, which carries a series of projections on its front end, moves between the two halves of the gripper **65** so as to separate the front ends thereof, these two ends being springy and having gripping fingers **72**. The fingers pass up both sides of the selected yarn, whereupon the bar **71** is withdrawn and the fingers grip the yarn. The gripper bar now moves downwards so as to draw yarn through the eyes of the needles into the position shown in FIG. 2*b*. Thereafter the knife **67** advances and severs the selected yarn at the stop plate, and the gripper releases its end of yarn. Finally the forked needle **63** is withdrawn through the fabric, carrying the two ends of the loop, i.e. the one which has been released by the gripper **65** and the one which is being severed by the knife **67**, these two ends being drawn through the base fabric one on each side of a weft thread of the fabric as shown in FIG. 2*c*. This ensures that the loop so formed is firmly fixed in the backing fabric so that it can be transferred to the roll **53** without any possibility of yarn displacement out of the fabric. After withdrawal of the needle **63**, the fabric is moved on one loop space and the cycle is repeated, each needle across the width of the fabric producing a single loop. After the base fabric has been suitably looped with a coloured design of tufts, the back of the fabric is treated with a rubber latex adhesive.

The tuft yarns may be of different texture or denier rather than different colour, and several stitches may be formed of the same colour or type of yarn in succession if required.

Because each loop formed is half wrapped around a weft yarn of the base fabric, there is no need to produce several stitches of the same yarn before severing the yarn.

I claim:

1. In a machine for producing a tufted fabric with a backing from a plurality of differently constituted yarns, the combination comprising a plurality of pronged double-eyed needles, means for moving the backing past said needles, means for reciprocating each needle between a position withdrawn from the backing and a position piercing the backing, a plurality of the differently constituted yarns associated with each needle, a supply head associated with each needle, the yarns passing through the head to a location adjacent its associated needle, pattern-

actuated control means for moving the head so that any desired one of the yarns is presented to the associated needle, a gripper for each needle, means for moving each gripper, when said needle is in its piercing position, through the eyes of its associated needle to grip a portion of the yarn presented to said needle and to draw said yarn through the eyes of said needle, and means for severing a length of the yarn after the drawing motion, the length of yarn forming a loop on the backing when the needle moves to its withdrawn position.

2. The combination as set forth in claim **1** wherein the backing includes weft yarn, a needle bar mounts and reciprocates the plurality of needles in common and the prongs of each needle are spaced apart a distance at least equal to the width of a weft yarn so as to ensure that the loop formed during each reciprocation embraces at least one weft yarn of said backing.

3. The combination as set forth in claim **1** wherein the gripper moves along a path and the control means for the supply head includes pneumatic piston means, the control means slidably mounting and driving the head so as to bring the desired yarn into the path of the gripper.

4. The combination as set forth in claim **1** wherein each gripper includes a pair of jaws, the combination further including gripper jaw actuating means for opening the jaws of a gripper, drive means for energizing the gripper jaw actuating means after each gripper with its jaws has passed through the eyes of a needle to open the jaws, and retracting means to withdraw the gripper jaw actuating means so that the jaws grip the desired yarn presented to their associated needle.

5. The combination as set forth in claim **1** wherein the severing means includes a yarn supply plate having an aperture through which the desired yarn passes from the head and a knife, the knife being mounted to slide over the plate to sever the length of yarn.

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HERBERT F. ROSS, *Primary Examiner.*