Aug. 9, 1949. A. E. CHARLES 2,478,743

TUFTING MACHINE

Filed April 2, 1947 3 Sheets-Sheet 1

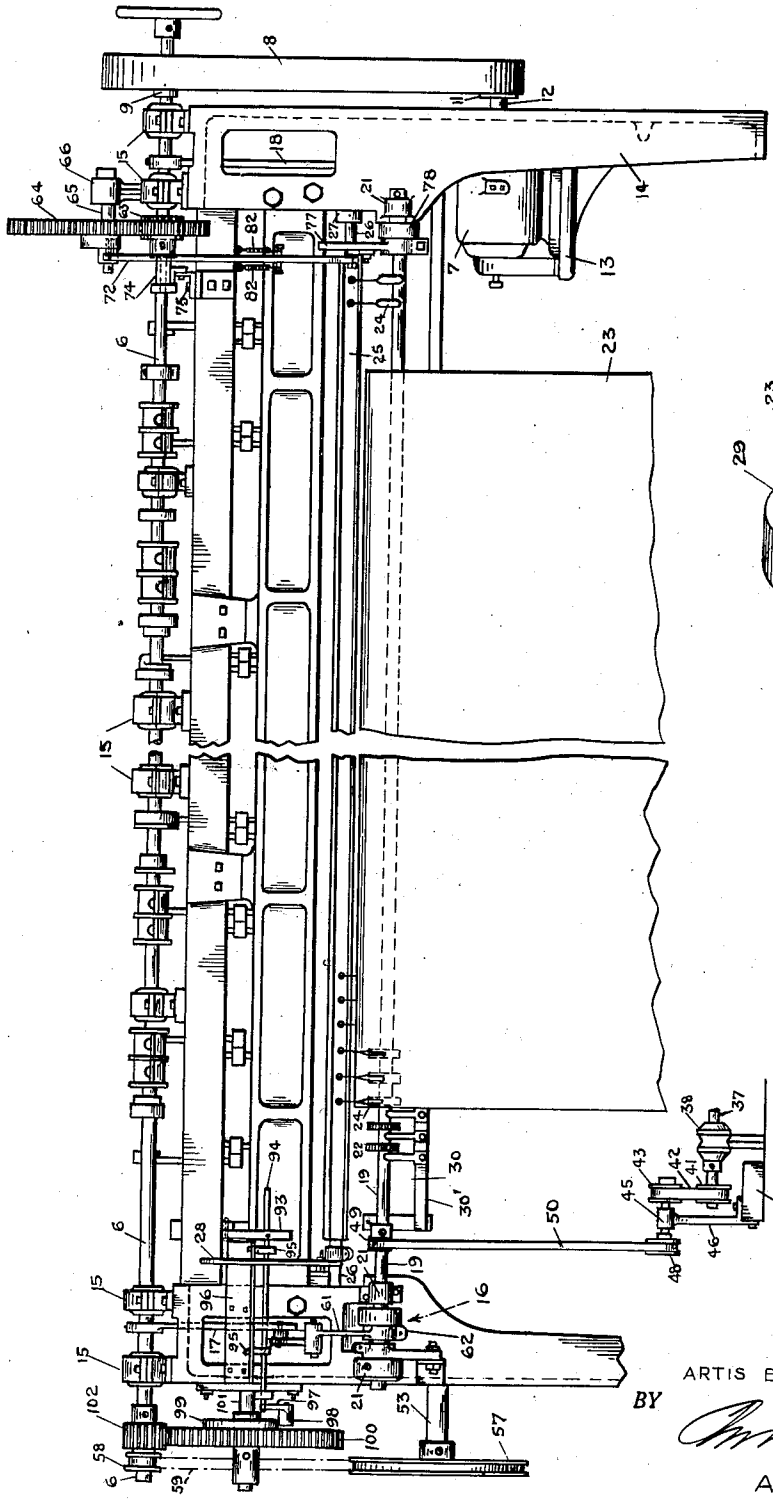


FIG. 1

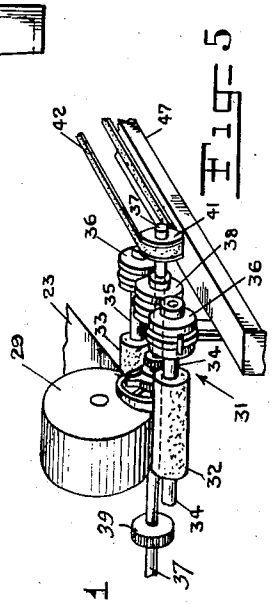


FIG. 5

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TUFTING MACHINE

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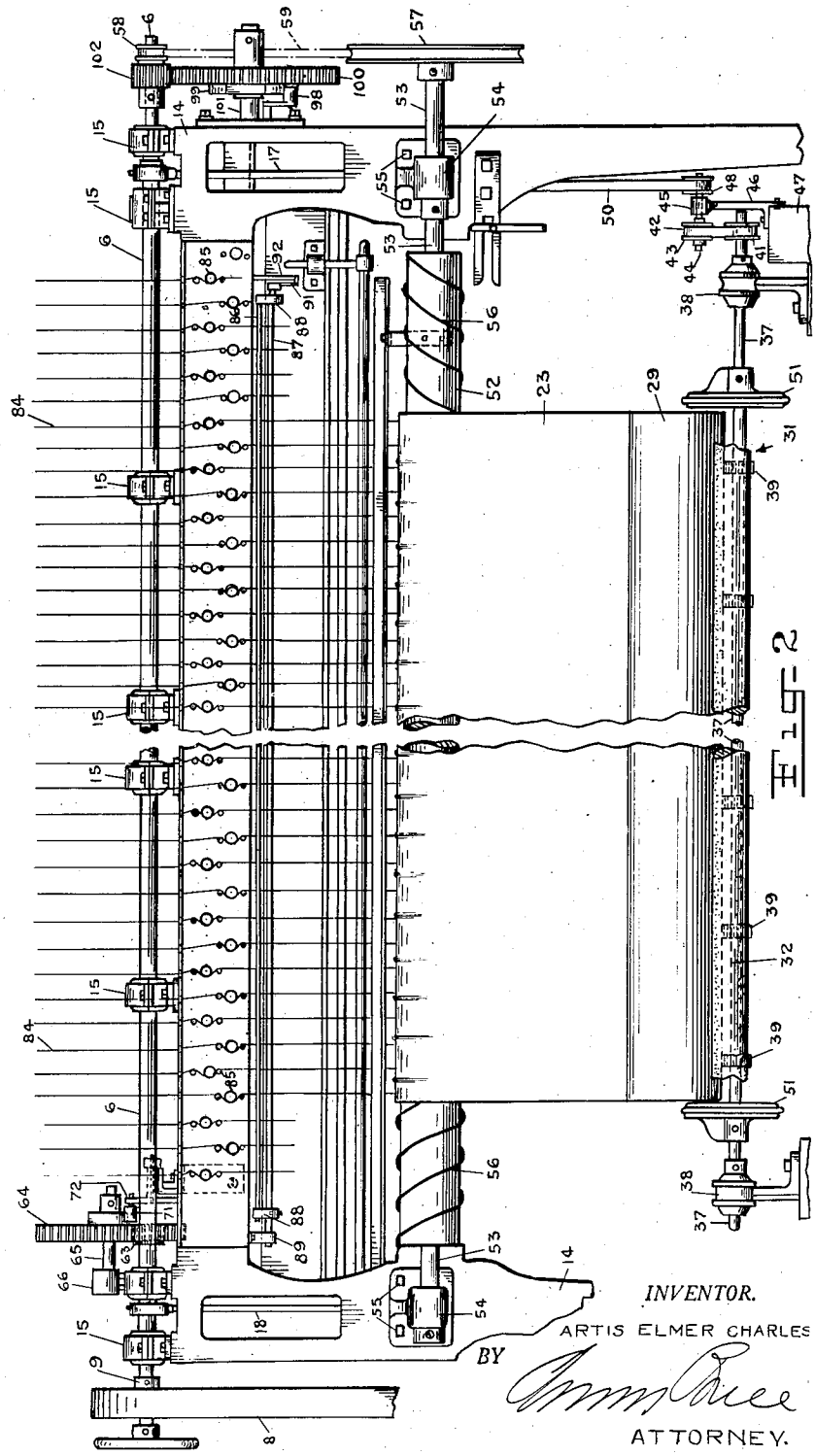


FIG 2

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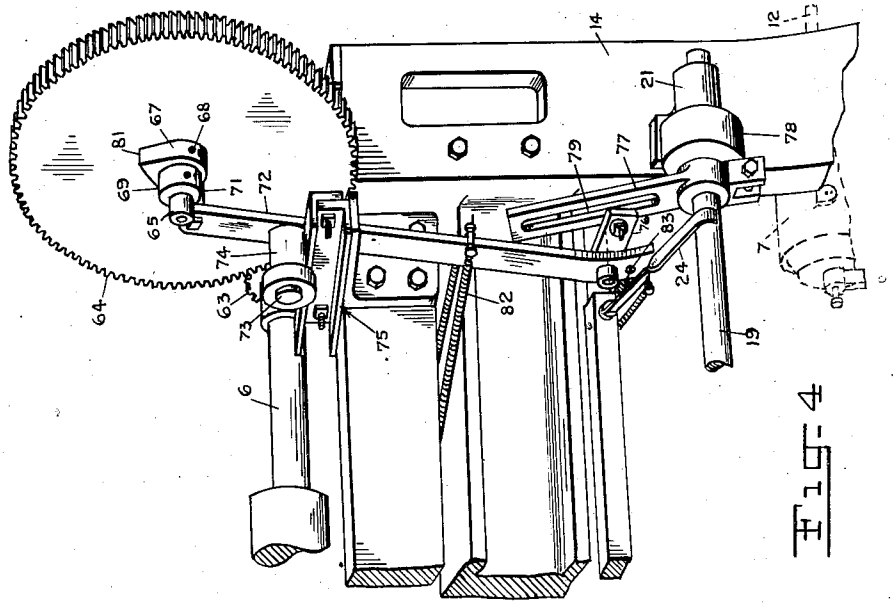


FIG. 4

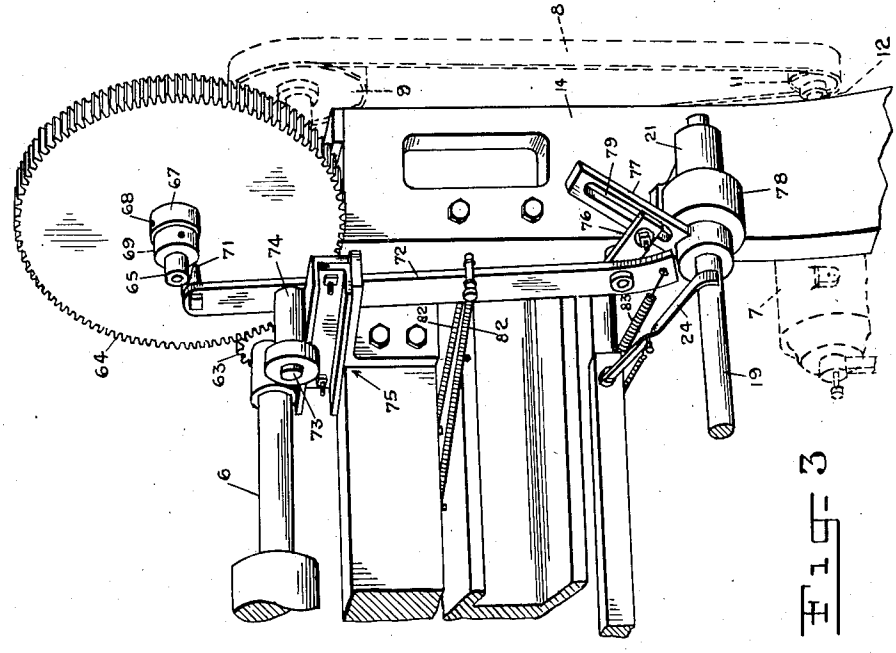


FIG. 3

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UNITED STATES PATENT OFFICE

2,478,743

TUFTING MACHINE

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Application April 2, 1947, Serial No. 738,848

4 Claims. (Cl. 112—79)

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This invention relates to a process and machine for producing tufts on a base material, and relates more particularly to a novel process and machine for simultaneously producing a plurality of tufts on a web of textile, which tufts may be spaced from each other a predetermined distance.

In Patent No. 2,335,487 to Cobble et al. there is shown and described a multiple needle tufting machine which is designed to produce in a single operation up to over two hundred stitches, or tufts, running laterally of the machine. By omitting certain of the needles on said machine, the lateral spacing of the tufts is easily effected. It is an important object of this invention to provide a novel process and means for longitudinally spacing the tufts which may be formed of one or more stitches.

Another object of this invention is the provision of auxiliary drive means for the feed shaft of a multiple needle tufting machine so that, at a predetermined interval in the normal feed of the fabric web, the rate of rotation of the feed shaft is increased momentarily, thus causing a greater than normal length of fabric to be fed past the needles, whereby a space of predetermined extent is formed between the tufts being produced longitudinally of the fabric web, without affecting the normal reciprocation of the needle bank.

A further object of this invention is to provide means for relieving the tension on the yarns being led to the needles of the needle bank during the operation of the auxiliary drive means on the drive means.

Still another object of this invention is to provide a means for progressively unwinding textile web from the web supply and a longer length of web concomitantly with the operation of the auxiliary drive means on the drive shaft to feed the textile web past the needle bank.

Other objects and advantages of this invention, together with certain details of construction and combinations of parts, will appear from the following detailed description and will be pointed out in the appended claims.

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

Fig. 1 is a front elevational view of a multiple needle tufting machine modified in accordance with my invention;

Fig. 2 is a rear elevational view thereof;

Figs. 3 and 4 are detail views, on an enlarged scale of the mechanism for operating the clutch for superimposing an auxiliary fabric web feeding movement on the feed shaft; and

Fig. 5 is a fragmentary view of the means for

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unrolling fabric from the supply roll, and supporting the same.

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

Since the multiple needle tufting machine, which I have modified, is fully shown and described in the above-mentioned Cobble et al. patent, I will describe this well-known mechanism only to such extent as is necessary to disclose the present inventive features.

Referring particularly to Figs. 1 and 2 of the drawings, the multiple needle tufting machine is shown as comprising a drive shaft 6 which is driven by a motor 7 through a belt 8 connecting a pulley 9 fixed to drive shaft 6 and a pulley 11 carried by motor shaft 12. The motor 7 is supported on a bracket 13 suitably fixed to the framework 14 of the tufting machine.

The drive shaft 6, which is journaled in bearings 15 mounted on the top of the tufting machine, actuates the bar supporting the needle bank of the machine (not shown); the fabric web feed mechanism, generally indicated by reference numeral 16, through a connecting rod 17, and the looping and loop cutting mechanisms of the machine (not shown) through connecting rod 18.

More specifically, the fabric web feed mechanism comprises a shaft 19 which is journaled in bearings 21 attached to the framework 14 of the machine. Along shaft 19 are fixed suitably spaced, serrated or toothed discs 22 over which the fabric web 23 being tufted is trained after it is fed under the needle band. For holding the fabric web against the serrated discs 22 there are provided grippers 24, one for each disc, which are mounted on a bar 25 extending across the width of the machine. The bar 25 is fixed to a rod 26 rotatably mounted in bearings, such as bearing 27, on the framework 14 of the machine. A handle 28 is fixed to rod 26 and is adapted simultaneously to move all of the grippers 24 to and from the serrated discs 22. Fingers 30 carried on a bracket 30' fit in between the serrated discs 22 to keep the fabric web from being fouled between said discs.

The fabric web 23 is taken from a supply roll 29 carried by a support and unrolling arrangement generally indicated by reference numeral 31 (see Figs. 2 and 5). This arrangement comprises two idler rollers 32 and 33 carried by shafts 34 and 35, respectively, journaled in bearings, such as bearings 36, on and between which idler rollers is supported the supply roll 29. Between and below said idler rollers 32 and 33 is a shaft 37, journaled in bearings 38, on which are fixed

spaced serrated or toothed discs 39. At one end of shaft 37 is fixed a pulley 41, which is connected by means of a belt 42 to a pulley 43 fixed to a stub shaft 44 journaled in bearing 45 integral with bearing bracket 46 suitably fixed to a block 47 which may be attached to the floor. A pulley 48 is fixed to the other end of stub shaft 44 and is operatively connected to a pulley 49 fixed to shaft 19 by a belt 50. By this arrangement, the fabric web is unrolled from the supply roll 29 a length of fabric web equal in length to the length fed by the feed shaft 19 upon each rotation thereof. Discs 51 are fixed to shaft 37 to prevent the supply roll from moving laterally out of desired position.

The fabric web 23 is led from the supply roll 29 over a roller 52, mounted on a shaft 53 journaled in bearing brackets 54 fixed to framework 14 by bolts 55, then under the needle bank of the machine and then trained over serrated discs 22 on feed shaft 19. On the surface of roller 52 are helical ribs 56 which are oppositely directed from substantially the center of the roller. The roller may be turned by the fabric web passing over the same, or it may be turned by the drive shaft 6 of the machine. For the latter purpose, a pulley 57 is fixed to one end of shaft 53, a pulley 58 fixed to the corresponding end of drive shaft 6 and these pulleys connected by a belt 59.

Operatively connected to connecting rod 17 is a rocker arm 61 which is attached to a clutch mechanism 62 and reciprocates the same giving intermittent rotational movement to feed shaft 19. This rotational movement of shaft 19 moves serrated discs 39 on shaft 37 as well as serrated discs 22 on shaft 19, thus unrolling the fabric web from the supply roll and pulling the same past the needle bank a stitch length, usually about one-sixteenth of an inch, while the needle bank is in raised position. Thus, the stitches or loops will be equally spaced and relatively close together to form a tuft of the desired number of stitches or loops.

In order to produce tufts which are spaced longitudinally from each other, the fabric web, after a tuft of any predetermined number of stitches or loops is completed, is caused to be fed past the raised needle bank a distance greater than the stitch length normally caused to be fed by clutch 62, thereby providing a space between the tufts in the fabric web. This space may be of any length. To give the effect of a "candlewick" spread, the space may be one and one-eighth inches, but may be greater or less as desired. To effect the variation in the feed of the fabric web, I have provided an auxiliary feed mechanism which may readily be mounted on the multiple needle tufting machine referred to above with little modification of the elements thereof, as will hereinafter appear.

On drive shaft 6 is fixed a gear 63 which is adapted to mesh with and rotate a gear 64 fixed to a stub shaft 65 journaled in bearing bracket 66 suitably mounted on top of the machine. Also carried on stub shaft 65 is a cam 67 which is held thereon by set screws 68 and collar 69. The cam 67 cooperates with a cam follower 71 pivotally mounted at the upper end of a lever arm 72. Fixed to the lever arm 72 is a stub shaft 73 which is journaled in a bearing 74 carried by a bracket, generally indicated by reference numeral 75, mounted on the framework of the machine. The lower end of lever arm 72 is attached, as by a link 76, to the arm 77 of a clutch mechanism 78. The arm 77 is slotted at 79 to receive link 76 so that the throw of the clutch may be adjusted to the degree of auxiliary rotation of the feed shaft desired.

Referring to Fig. 3 of the drawings, the cam 67 is shown as having been rotated to the position where the point 81 of the cam 67 is in contact with cam follower 71 and has moved lever arm 72 to give the clutch 78 an operative movement. The clutch 78 at this point has superimposed on feed shaft 19 an auxiliary feeding movement which is far in excess of the normal stitch length feeding movement thereof. At the same time, the shaft 37 is also caused to turn to unroll from the supply roll a length of fabric web equal to that pulled past the raised needle bank by the rotational movement of the feed shaft. Thus, regardless of the size of the supply roll there will be no drag on the fabric web being fed by the feed shaft and, therefore, there will be no variation in the length of the spaces between the tufts.

In Fig. 4 of the drawings, the point 81 of cam 67 is shown as having moved away from the cam follower on lever arm 72, permitting the latter to be moved backward to inoperative position by the action of the springs 82 and 83 which also act to maintain the cam follower in contact with the cam surface.

Since the auxiliary movement of the fabric web causes yarns 84 to be pulled along with the fabric web, thus putting an undue tension thereon which may cause the same to break, I have provided means for relieving the tension thereon. Thus, the yarns 84, after they pass tension guides 85 on their way to the needles of the needle bank, are caused to pass under a guide rod 86 and over a guide rod 87 to which guide rod 86 is attached as by links 88. Guide rod 87 is journaled at one end in a bracket 89 and the other end thereof is fixed to an arm 91 which is pivotally attached to a lever 92, which is in turn connected to a lever 93. Lever 93 is fixed to a shaft 94 journaled in bearings 95 fixed to a bracket 96 mounted on the framework of the machine. To shaft 94 is fixed an arm 97 carrying a cam follower 98 adapted to cooperate with a cam 99. This cam is fixed to a gear 100 mounted on a stub shaft 101 carried by the framework. Gear 101 meshes with and is rotated by a gear 102 fixed to drive shaft 6.

During the stitch length feeding of the fabric web, the bars 86 and 87 are in a position such as to form a loop or bulge in the yarns being fed to the needle. At the moment that clutch 78 is moved to rotate feed shaft 19, cam 99 causes cam follower 98 to move to rotate shaft 94 and thus through levers 93 and 92 cause the rocking of arm 91. This movement of arm 91 momentarily moves the guide rods 86 and 87 away from the yarns, leaving a length of each yarn to be taken up by movement of the fabric web. Further movement of the cam slowly moves the guide rods 86 and 87 back to their extended position.

As indicated above, the tuft may be composed of any number of stitches or loops. Where it is desired to have four stitches or loops in each tuft, the gears 63 and 64 are of such dimension that the point 81 of the cam 67 is caused to strike cam follower 71 after the fourth complete rotation of gear 63.

The extent of the auxiliary rotational movement of the feed shaft may be varied or adjusted by changing the position of the link 76 in the slot 79 of clutch arm 77.

It is believed that the operation of the multiple needle tufting machine as modified in accordance with my invention will be readily apparent from the above description.

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

What is claimed is:

1. In a machine for forming in a fabric web a plurality of tufts each composed of a predetermined number of stitches or loops, wherein a plurality of yarns are stitched by a bank of needles into said fabric web progressively fed to the needle bank from a supply roll a stitch length at a time by a feed shaft intermittently rotated by means operatively connected to the drive shaft of the machine, the combination therewith of means for unrolling said web from said supply roll at the same rate as it is fed past the needle bank by said feed shaft, said latter means comprising a roller on which said supply roll is mounted, and means operatively connected to said feed shaft for rotating said roller.

2. In a machine for forming in a fabric web a plurality of tufts each composed of a predetermined number of stitches or loops, wherein a plurality of yarns are stitched by a bank of needles into said fabric web progressively fed to the needle bank from a supply roll a stitch length at a time by a feed shaft intermittently rotated by means operatively connected to the drive shaft of the machine, means for spacing said tufts longitudinally of said web comprising a clutch mounted on said feed shaft, means, including a lever arm attached to said clutch, a cam for moving said lever arm, a gear on which said cam is mounted for rotation therewith and a gear fixed to said drive shaft for meshing with and driving said first-mentioned gear, for reciprocating said clutch to rotate said feed shaft to move said web a distance greater than a stitch length, and means for unrolling said web from said supply roll at the same rate as it is fed past the needle bank by said feed shaft, said latter means comprising a roller on which said supply roll is mounted, and means operatively connected to said feed shaft for rotating said roller.

3. In a machine for forming in a fabric web a plurality of tufts each composed of a predetermined number of stitches or loops, wherein a plurality of yarns are stitched by a bank of needles into said fabric web progressively fed to the needle bank from a supply roll a stitch length at a time by a feed shaft intermittently rotated by means operatively connected to the drive shaft of the machine, means for spacing said tufts longitudinally of said web comprising a clutch mounted on said feed shaft, means, including a lever arm attached to said clutch, a cam for moving said lever arm, a gear on which said cam is mounted for rotation therewith and

a gear fixed to said drive shaft for meshing with and driving said first-mentioned gear, for reciprocating said clutch to rotate said feed shaft to move said web a distance greater than a stitch length, means for unrolling said web from said supply roll at the same rate as it is fed past the needle bank by said feed shaft, said latter means comprising a roller on which said supply roll is mounted, and means, operatively connected to said feed shaft for rotating said roller, bars for applying tension on said yarns, and means for moving said bars at predetermined spaced intervals for relieving the tension on said yarns.

4. In a machine for forming in a fabric web a plurality of tufts each composed of a predetermined number of stitches or loops, wherein a plurality of yarns are stitched by a bank of needles into said fabric web progressively fed to the needle bank from a supply roll a stitch length at a time by a feed shaft intermittently rotated by means operatively connected to the drive shaft of the machine, means for spacing said tufts longitudinally of said web comprising a clutch mounted on said feed shaft, means, including a lever arm attached to said clutch, a cam for moving said lever arm, a gear on which said cam is mounted for rotation therewith and a gear fixed to said drive shaft for meshing with and driving said first-mentioned gear, for reciprocating said clutch to rotate said feed shaft to move said web a distance greater than a stitch length, means for unrolling said web from said supply roll at the same rate as it is fed past the needle bank by said feed shaft, said latter means comprising a roller on which said supply roll is mounted, and means, operatively connected to said feed shaft for rotating said roller, bars for applying tension on said yarns, and means for moving said bars at predetermined spaced intervals for relieving the tension on said yarns comprising a cam driven from said drive shaft, a cam follower movable by said cam and levers connected to said cam follower and said bars.

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