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CUT PILE TUFTING MACHINE

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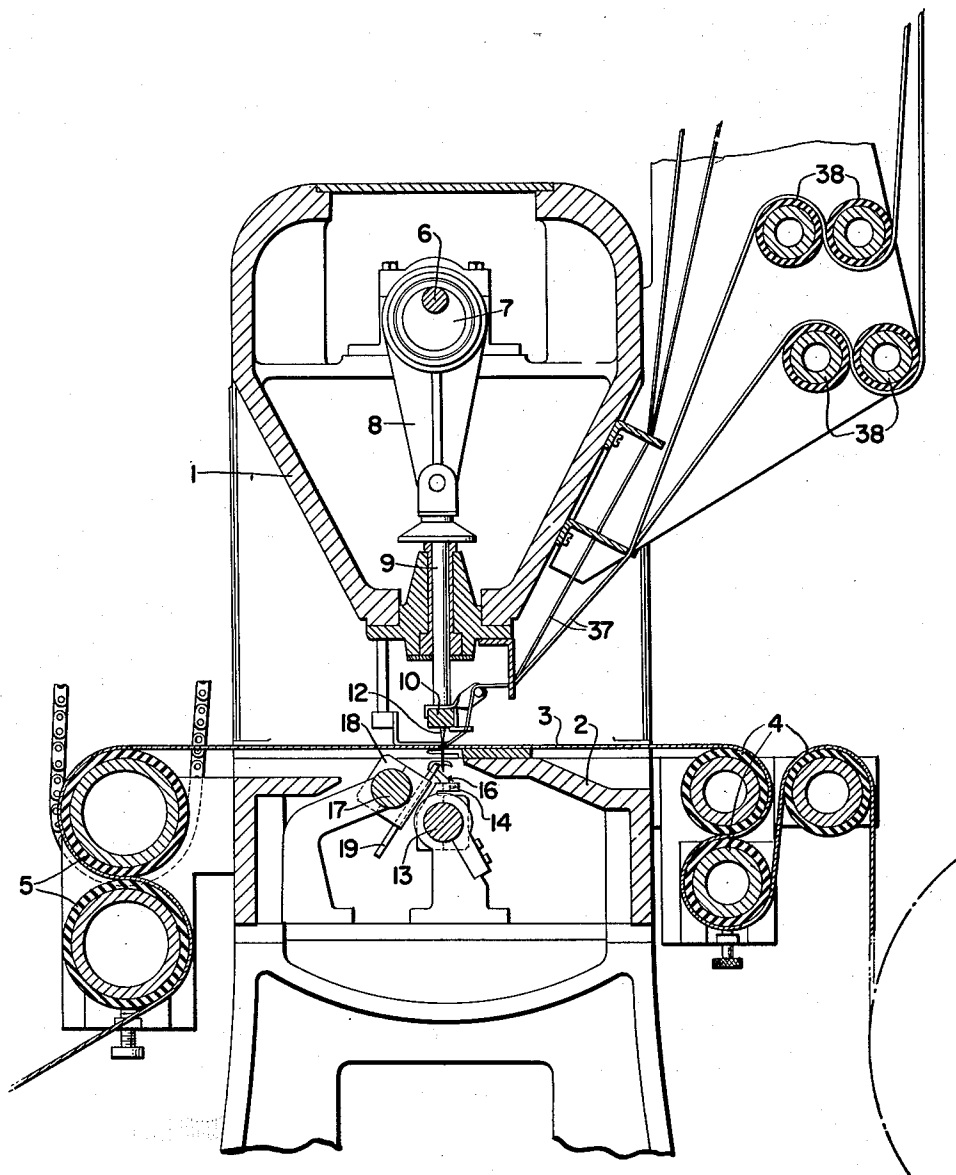


Fig. 1

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CUT PILE TUFTING MACHINE

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The present invention relates to tufting machines and particularly to a tufting machine for making selectively uniform and non-uniform cut pile.

It is an object of this invention to provide a simple and effective means for producing in a tufted article, a pile effect which, in accordance with a predetermined pattern, consists of pile loops that are severed selectively to form cut pile with legs of equal length or with legs of unequal length.

Having in mind the above and other objects that will be evident from an understanding of this disclosure, the invention comprises the devices, combinations and arrangements of parts as illustrated in the presently preferred embodiment of the invention which is hereinafter set forth in such detail as to enable those skilled in the art readily to understand the function, operation, construction and advantages of it when read in conjunction with the accompanying drawings in which:

FIG. 1 is a sectional view of a tufting machine embodying the present invention.

FIG. 2 is a fragmentary sectional view of the loop forming and severing mechanism of the machine of FIG. 1 with the mechanism operating to form cut pile with legs of unequal width.

FIG. 3 is a fragmentary sectional view similar to FIG. 2 but with the mechanism operating to form cut pile with legs of equal width.

FIG. 4 is a detail sectional view illustrating the loop cutting action with the parts in the position of FIG. 2.

FIG. 5 is a detail sectional view illustrating the loop cutting action with the parts in the position of FIG. 3.

FIG. 6 is a fragmentary sectional view of a work piece produced by the mechanism in accordance with this invention.

With reference to the drawings, there is illustrated a tufting machine comprising a frame 1 having a work supporting bed plate 2 across which a backing fabric 3 is adapted to be fed by feeding mechanism including front feed rolls 4 and rear feed rolls 5.

Journaled longitudinally of the frame 1 in the upper portion thereof is a main shaft 6 which, upon rotation thereof imparts reciprocation through eccentric 7 and pitman 8 to a rod 9. It will be understood that, while only one eccentric 7, pitman 8 and rod 9 are shown, the machine includes several such elements spaced along the machine, the number of which depends upon the total length of the machine. The rods 9 carry a needle bar 10 in which is secured, as by set screw 11, a needle 12 that is adapted to penetrate the backing fabric 3 on the bed plate 2.

Beneath the bed plate 2 a hook shaft 13 is journaled in the frame 1 for oscillation. Mounted on the hook shaft 13 is a hook supporting bracket 14 in which is secured as by set screw 15, a hook 16 that cooperates with the needle 12 in the formation of yarn loops. Adjacent and parallel to the hook shaft 13 there is provided a knife shaft 17 journaled for oscillation in the frame 1 and carrying a knife bracket 18 in which is secured a knife 19.

While only one such needle 12, hook 16 and knife 19 are illustrated, it will be understood that the machine includes a plurality of similar elements.

The hook 16 is a planar sheet metal element having a mounting portion 20, a shank 22 rising from the mounting

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portion 20, and a blade 23 extending laterally from the shank 22 and terminating in a loop seizing point 24. The edge on the inside of the blade 23 on the face of the hook adjacent to the knife 19 constitutes a cutting edge 25 which cooperates with the cutting edge 26 of the knife to sever loops of yarn on the blade to form cut pile. The face of the hook opposite from the face on which the cutting edge 25 is formed has a cut away or reduced thickness portion 27 that extends from adjacent the loop seizing point 24, and across the blade 23 and the upper portion of the shank 22, and which defines a shoulder 28 adjacent to the loop seizing point 24 and a shoulder 29 extending across the shank 22.

A finger 30 is disposed on the reduced thickness portion 27 and is pivotally mounted intermediate its end as on a pin 31. The finger 30 includes a yarn engaging end 32, the bottom or inside edge of which constitutes a yarn engaging edge that, upon pivoting of the finger 30, is movable between a first position in which it is disposed in spaced parallel relation to the cutting edge 25 of the blade 23, as illustrated in FIG. 2, and a second position in which it is disposed substantially juxtaposed with relation to the cutting edge 25, as illustrated in FIG. 3.

The shoulder 29 is formed with a point at the end adjacent to the cutting edge 25, which point constitutes a stop 33 that is adapted to be engaged by the finger 30 and thereby define the above mentioned first position. A spring 34 is secured by a stud 35 on the reduced thickness portion 27 and has its opposite ends in engagement with the shoulder 29 and the end 36 of the finger 30, which is the end opposite from the yarn engaging end 32. The finger 30 is thus biased in the direction of pivotal movement in which it is held in engagement with the stop 33.

In the usual fashion, the needle 12 is threaded with a yarn 37, a loop of which is carried by the needle 12 through the backing fabric 3 as the needle penetrates the backing fabric. The hook 16 is then advanced to enter the loop of yarn on the needle and to hold the same as the needle is withdrawn. The movement of the backing fabric across the bed plate 2 carries the loops of yarn back on the blade 23 into the cutting area at the back of the blade 23 adjacent to the shank 22, when the loops are severed to form cut pile.

With reference to FIG. 4, when the finger 30 is in the first position, that is, in spaced relation to the cutting edge 25, the loop of yarn extends about the finger and the center of the loop is removed from the cutting edge 25. Thus, when the loop of yarn is severed, the two legs thereof will be uneven in length by the amount of yarn extending from the cutting edge 25, about the finger 30, and to a point on the other face of the finger 30 corresponding to the position of the cutting edge 25. When the finger 30 is in the second position as illustrated in FIG. 5, that is, juxtaposed with relation to the cutting edge 25, the loop of yarn is severed substantially at the center thereof and the two legs thereof are substantially equal in length.

To effect pivotal movement of the finger 30, the illustrated machine is provided with a yarn feeding mechanism of the type illustrated in the United States patent of J. L. Card, No. 2,977,866. This mechanism comprises a plurality of yarn feed rolls 38, each of which is adapted to be driven at two different speeds in accordance with a predetermined pattern and which is thereby adapted to feed one of two different lengths of yarn to the needle upon each loop forming cycle.

The two lengths of yarn fed by the yarn feeding mechanism comprise a first length that is sufficiently long to form a loop of yarn about the blade 23 with the finger 30 in spaced relation to the cutting edge 25, as illustrated in FIG. 4, and a second length that is less than the

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first length and is sufficient only to form a loop of yarn about the blade 23 with the finger 30 juxtaposed with relation to the cutting edge 25, as illustrated in FIG. 5. Thus, the tension in the yarn when an insufficient length is fed, causes the finger 30 to move into the juxtaposed position in opposition to the action of the spring 34. When the longer length of yarn is fed, the spring 34 moves the finger 30 against the stop 33 to expand the loop of yarn so that the center of the loop is removed from the cutting edge 25.

In FIG. 6 there is illustrated a sample of the work produced. The work comprises a series of cut pile formed upon successive loop forming cycles and includes centrally severed loops A having legs B of uniform lengths and unevenly severed loops C having a short leg D and a long leg E. The finished product, which comprises a plurality of parallel arranged rows of severed loops similar to that illustrated in FIG. 6, thus has a patterned surface in which the pattern is defined by the variations in pile height. The arrangement of the severed loops A and C in each row depends upon the actuation of the yarn feeding mechanism which may be controlled by a pattern device. It will be understood that the present invention is not limited to use with any specific yarn feeding mechanism.

Numerous alterations of the structure herein disclosed will suggest themselves to those skilled in the art. However, it is to be understood that the present disclosure relates to a preferred embodiment of my invention which is for purposes of illustration only and not to be construed as a limitation of the invention. All such modifications which do not depart from the spirit of the invention are intended to be included within the scope of the appended claims.

Having thus set forth the nature of the invention, what I claim herein is:

1. In a tufting machine, means for supporting a backing fabric, a yarn carrying needle disposed on one side of said backing fabric and adapted to penetrate and to carry a loop of yarn through said backing fabric, a hook disposed on the opposite side of said backing fabric from said needle and including a loop penetrating blade adapted to enter loops of yarn presented by said needle, said blade having a cutting edge, a knife having a cutting edge cooperating with said cutting edge of said blade to sever loops of yarn on said blade to form cut pile, yarn loop engaging means carried by said hook and movable between a position juxtaposed with relation to said cutting edge of said blade wherein said cutting edge substantially defines the path of a loop of yarn about said blade and a position in spaced relation to said cutting edge of said hook in the direction away from said backing fabric to lengthen the path of a loop of yarn about said blade, and means for moving said yarn loop engaging means between said positions upon successive loop forming cycles.

2. In a tufting machine in accordance with claim 1 in which said yarn loop engaging means comprises a finger movably carried by said hook and resilient means for biasing said finger into said position in spaced relation to said cutting edge.

3. In a tufting machine in accordance with claim 2 in which said finger is pivotally mounted on said hook.

4. In a tufting machine in accordance with claim 3 in which said hook has a cut away portion on the face thereof for accommodating said finger and defining a shoulder, said hook is pivotally mounted intermediate its ends on said hook, said resilient means comprises a spring carried by said hook and acting at its ends against said shoulder and the one end of said finger, said shoulder including a point adapted to be engaged by said finger to limit movement of the same in the one direction to said position in spaced relation to said cutting edge.

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5. In a tufting machine, means for supporting a backing fabric, a yarn carrying needle disposed on one side of said backing fabric and adapted to penetrate and to carry a loop of yarn through said backing fabric, a hook disposed on the opposite side of said backing fabric from said needle and including a loop penetrating blade adapted to enter said loop of yarn, said blade having a cutting edge, a knife having a cutting edge cooperating with said cutting edge of said blade to sever loops of yarn on said blade to form cut pile, a yarn feeding mechanism for feeding a selected one of two different lengths of yarn to said needle upon each loop forming cycle, a finger carried by said hook and movable between a position juxtaposed with relation to said cutting edge of said blade and a position in spaced relation to said cutting edge of said blade in a direction away from said backing fabric, and resilient means for biasing said finger into said position in spaced relation to said cutting edge, said two different lengths of yarn comprising a first length sufficient to form a loop of yarn about said blade with said finger in said position in spaced relation to said cutting edge of said blade and a second length that is less than said first length and is sufficient to form a loop of yarn only about said blade with said finger in said position juxtaposed with relation to said cutting edge of said blade.

6. A hook for a tufting machine comprising a mounting portion, a shank rising from said mounting portion and a loop penetrating blade extending laterally from said shank, said blade having a substantially straight bottom edge including a cutting edge adapted to cooperate with the cutting edge of a knife to sever loops of yarn on said blade, a finger having substantially straight yarn engaging edge and carried by said blade for movement of said yarn engaging edge between a position juxtaposed with relation to said cutting edge of said blade and a position in spaced substantially parallel relation to said cutting edge, and resilient means for biasing said finger into said position in spaced relation to said cutting edge of said blade.

7. A hook for a tufting machine, said hook being planar and comprising a mounting portion, a shank rising from said mounting portion and a loop penetrating blade extending laterally from said shank, said blade having on one face thereof a substantially straight inside edge defining a cutting edge adapted to cooperate with the cutting edge of a knife to sever loops of yarn on said blade, said hook on the face opposite from said cutting edge having a portion of reduced thickness extending from a point adjacent to the free end of said blade and into said shank, a finger mounted on said hook on said portion of reduced thickness and having a substantially straight yarn engaging edge, said finger being movable from a position juxtaposed with relation to said cutting edge and a position in spaced substantially parallel relation to said cutting edge, said portion of reduced thickness defining a shoulder including a point adapted to be engaged by said finger to limit movement of the same in the one direction to said position in spaced relation to said cutting edge of said blade, and resilient means for biasing said finger into said position in spaced relation to said cutting edge.

8. A hook in accordance with claim 7 in which said finger is pivotally mounted intermediate its ends on said shank and said resilient means comprises a spring carried by said hook and having opposite ends engaging said shoulder and the end of said finger remote from said cutting edge of said blade.

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