Aug. 22, 1961 H. W. BALLARD 2,997,009

TUFTING MACHINE CLAMP CUTTER

Filed March 12, 1958

FIG. 1.

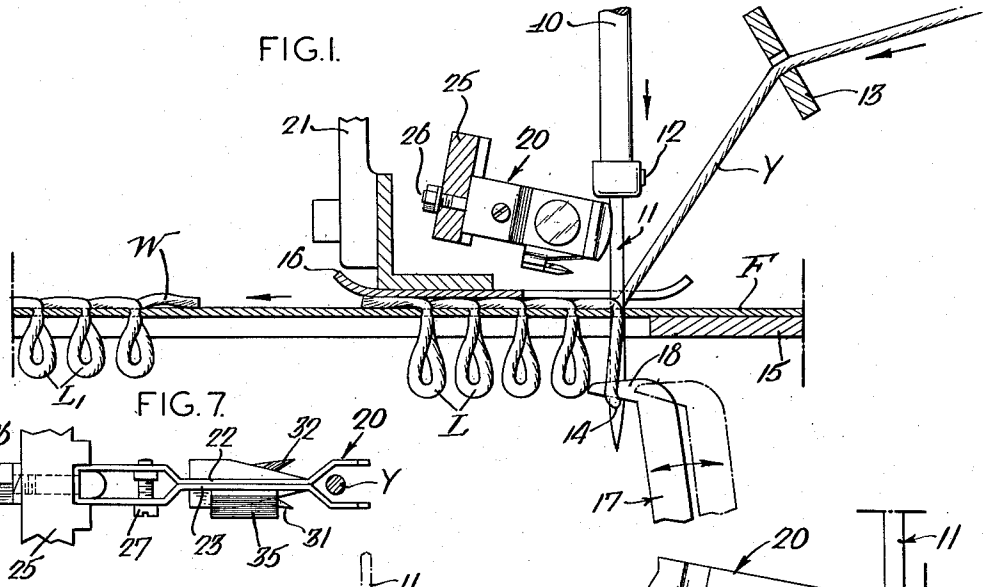


FIG. 7.

FIG. 2.

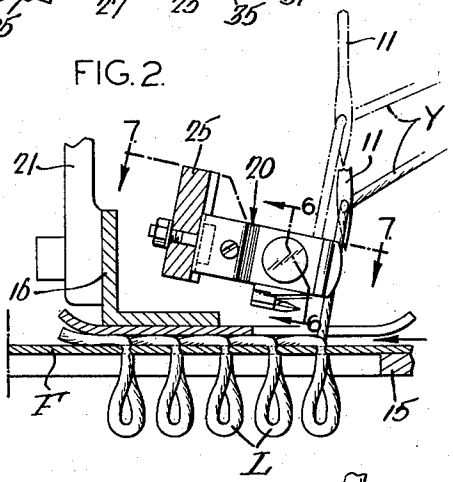


FIG. 4.

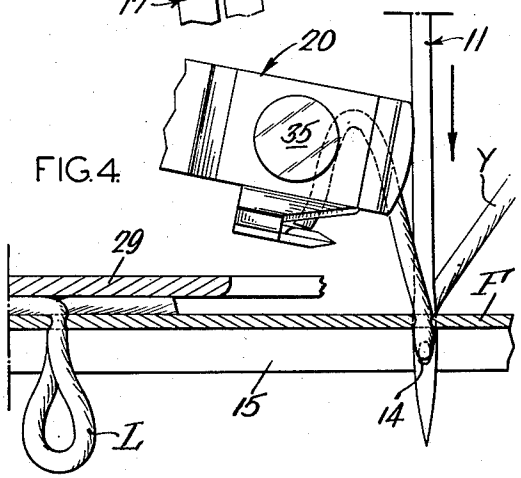


FIG. 3.

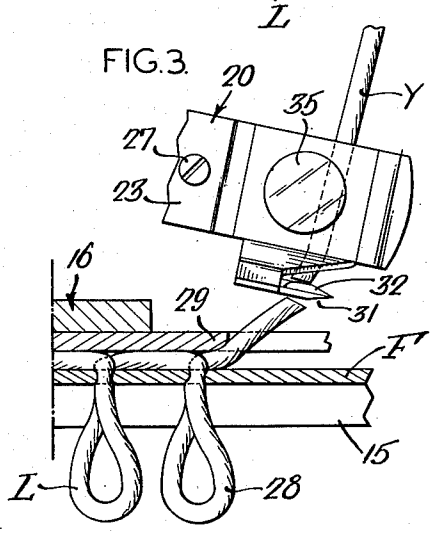


FIG. 6.

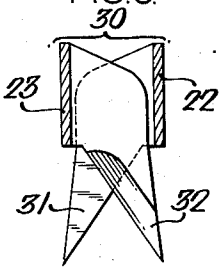
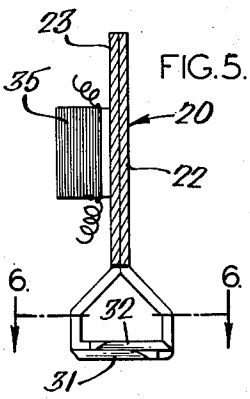


FIG. 5.



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TUFTING MACHINE CLAMP CUTTER

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This invention relates to pile fabric tufting machines and more particularly to apparatus for intermittently producing uncut pile projections in accordance with a predetermined pattern.

So-called "skip-stitch" tufting machines are well known for producing intermittently tufted pile fabrics such as bedspreads, floor coverings, etc. These machines have in the past operated only with cut pile because it has been considered impossible or impractical to carry a length of uncut pile yarn on the back of the fabric across the void areas. Where the pile is all cut, the last leg of a cut loop would be pulled out and whatever tail would be left over when the particular needle or needles again resume the formation of pile could be trimmed off either manually or by a special attachment. In the case of pile projections which are intended to remain uncut in the form of loops, such a procedure obviously could not be employed because, even though the yarns were carried on the back of the fabric when the particular tufting needle was retracted in accordance with the pattern mechanism, the tension due to the advancing on the fabric would pull out or ravel all the previously inserted loops in that particular row.

The present invention overcomes the above disadvantages by cutting the pile yarn soon after the last loop of the series has been tufted. The cutter retains the end of the yarn in a spring clip or tension finger with sufficient tension to insure that the cut end will not be pulled through the eye of the needle when tufting in the particular row or rows is resumed.

A primary object of the invention, therefore, is to provide means positioned over the presser foot of a tufting machine and in line with a tufting needle for intercepting and gripping a pile yarn when said needle is retained in an inoperative position.

A further object of the invention is to provide means for cutting a pile yarn fed through the eye of a tufting needle when the needle is retained in a retracted position and after the fabric has advanced beyond a predetermined distance.

A further object of the invention is to provide means for cutting selected ends of yarn in a pile fabric tufting machine and preventing ravelling of previously tufted pile projections.

Further objects will be apparent from the specification and drawings in which:

FIGURE 1 is a schematic longitudinal section of a portion of a tufting machine constructed in accordance with the present invention,

FIGURE 2 is a view showing a part of the structure of FIGURE 1 with the apparatus in a moved position and just prior to the formation of a void in the uncut pile projections,

FIGURE 3 is an enlarged sectional detail showing the operation of the mechanism at the beginning of a void and in a slightly advanced position than seen in FIGURE 2,

FIGURE 4 is a view showing the apparatus of FIGURE 1 when the tufting of loop pile projections is resumed after a void,

FIGURE 5 is an enlarged sectional detail as seen at 5—5 of FIGURE 2,

FIGURE 6 is an enlarged sectional detail as seen at 6—6 of FIGURE 5, and

FIGURE 7 is an enlarged sectional detail as seen at 7—7 of FIGURE 2.

The invention comprises essentially the provision of means supported on or adjacent the presser foot of a loop pile tufting machine which enables a skip-stitch attachment to be used without cutting the pile projections. When one or more of the tufting needles in a skip-stitch machine is held in an upwardly retracted position to prevent insertion of pile projections through the backing fabric, the yarn end carried by such retracted or inoperative needle is clipped or cut and retained until the pattern calls for operation of the needle again.

Referring now to the drawings, a pile fabric tufting machine is shown schematically in FIGURE 1 in which a vertically oscillating needle bar **10** carries anywhere from 1 to 1200 tufting needles **11** and retained therein by means of setscrews **12**. The pile yarn Y is fed from a source not shown through a guide **13** and thence to the eye **14** of needle **11**. The backing fabric F is fed across a throat plate **15** in the usual manner and a presser foot assembly **16** serves to retain the fabric on the throat plate. A non-cutting looper **17** is oscillatably mounted to engage the yarn Y as it is inserted through the fabric F by needles **11**. Looper **17** is provided with a bill **18** which faces in the direction of fabric travel and forms a series of uncut pile projections or loops L, L which may be of various heights in accordance with a predetermined pattern if desired. A series of lower loops L', L' is shown at the left of FIGURE 1.

The present tufting machine is of the type commonly referred to as a skip-stitch machine in which means is provided for disengaging one or more of the needles **11** from the actuating mechanism. In this condition the needles are retained in an upwardly retracted position. Such machines for cut pile are well known and form no part of the present invention. However, when it is desired to operate a skip-stitch machine without cutting the pile projections, complications have arisen which have prevented the use of such machines for loop pile fabrics. I provide a spring loaded clamp assembly **20** which may be mounted on the presser foot bracket **21** or elsewhere on the tufting machine. The spring clip assembly shown clearly in FIGURE 7 comprises a pair of resilient fingers **22** and **23** which flare outwardly to engage a particular yarn end in its path from a retracted needle **24** to the fabric F (FIGURE 2). As the fabric F continues to feed to the left in FIGURE 2, the yarn Y from retracted needle **24** advances between the fingers **22** and **23** and is pressed and retained therein. The fingers are mounted on a bracket **25** by means of a suitable bolt or other connection **26** and the tension between the fingers may be adjusted by means of screw **27**. As the fabric F continues to move to the left the last pile loop projection **28** (FIGURE 3) is held under the leading edge **29** of the presser foot **16** and at approximately the same time the yarn Y becomes engaged in and is severed by a cutter **30** secured to the bottom of the fingers **22** and **23**.

The cutter assembly **30** may be of any desired shape or location bearing in mind the pressure needed to retain the yarn in fingers **22** and **23** as well as the pressure of the presser foot needed to retain the last loop **28** in the fabric F. One form of such a cutter has biased scissor-like blades **31** and **32** which are secured to opposite fingers **22** and **23** so that as the yarn Y enters the V between blades **31** and **32** any pressure tends to press fingers **22** and **23** more firmly against the yarn Y. Under certain conditions, it may be preferred to provide independent electrical or mechanical cutting means, or electrical or mechanical actuation for the cutting means **30** but ordinarily such is not required. Such a device is indicated diagrammatically as actuated by means of an electrical vibrating coil **35** secured to the cutter assembly

30. High frequency oscillation of the cutters may be helpful in certain conditions.

The device is inexpensive, simple, and permits an entirely new design area to be explored in the manufacture of pile fabrics where voids in loop pile projections are indicated.

Having thus described my invention, I claim:

1. In a pile fabric tufting machine the combination which comprises an oscillating pile yarn needle, a throat plate over which a backing fabric is fed to be penetrated by said needle and said pile yarn when normally tufting, a presser foot to retain and hold down the backing fabric against the throat plate, a yarn engaging looper oscillatable below the throat plate to form pile projections spaced from said throat plate, a fixed stationary clamp mounted in spaced relation to the path of needle oscillation and positioned to engage and retain the pile yarn when said yarn is displaced to a non-tufting position, and a cutter secured to the clamp for severing the pile yarn when moved to a further displaced non-tufting position.

2. A pile fabric tufting machine comprising at least one oscillating pile yarn needle, a throat plate penetrated by said needle, a yarn engaging looper oscillatable below the throat plate to form pile projections spaced from said throat plate, a presser foot for holding a backing fabric against the throat plate and in line with the path of travel of the needle, said path of travel of the needle defining a normal pile forming path for the yarn passing therethrough, a stationary clamp positioned in close spaced relation to said path of travel to intercept yarn secured in the needle at one end and to the fabric at the other end when said fabric has progressed to a moved position, and fixed stationary cutter means for severing the yarn between the clamp and the presser foot after the yarn has been engaged by the clamp.

3. Apparatus in accordance with claim 1 in which the clamp comprises a pair of resilient spring fingers.

4. Apparatus in accordance with claim 2 in which the clamp comprises a pair of resilient spring fingers.

5. Apparatus in accordance with claim 2 having means for vibrating the cutting means.

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