Fig. 1

Fig. 2

Fig. 3

Fig. 4
This invention relates to a cut pile tufting machine and has as its primary object to provide a cut pile tufting machine capable of high speed operation.

In a cut pile tufting machine, there is provided an oscillating hook including a loop-seizing blade having a cutting edge along its lower edge and an oscillated knife blade having one surface in abutment with one surface of the hook and having a cutting edge along its upper edge that cooperates in a scissor-like manner with the cutting edge of the hook to cut a loop of yarn on the loop-seizing blade of the hook.

During operation of the machine, friction between the hook and the knife blade generates a considerable amount of heat which limits the operating speed of the machine. When it is attempted to operate the machine at a speed in the neighborhood of 3,000 stitches per minute, the heat which is generated is so intense that the knife blade is destroyed within a few minutes. Besides initially destroying the temper of the metal, the heat causes the knife blade to burn through the loops of yarn instead of cutting them; and when synthetic yarn is used, the cut pile fuses together. Oil, and all similar lubricants, cannot be used because of the intimate association of the hook and the knife blade with the pile yarn.

It is, therefore, another object of the invention to provide an improved means for reducing the heat generated between the opposed surfaces of a hook and a knife blade in a cut pile tufting machine.

Another object of the invention is to provide means in accordance with the foregoing object for lubricating the opposed surfaces of a hook and a knife blade in a cut pile tufting machine without soiling the pile yarn.

A still further object of the invention is to provide an improved means for biasing a knife blade against one face of a hook in a cut pile tufting machine.

Other objects and a fuller understanding of the invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawings in which:

FIG. 1 is a side elevation of the device of the invention.

FIG. 2 is an exploded perspective view of the hook and the knife blade shown in FIG. 1.

FIG. 3 is a section view taken along the line 3—3 in FIG. 1, and

FIG. 4 is a top plan view of the device of the invention.

With reference to the drawings, there is provided a hook mechanism 10 and a knife mechanism 11. The hook mechanism 10 includes a hook bracket 12 connected to an oscillatory hook shaft 13 by means of a screw 14. Centered in the hook bracket 12 is a hook bar 15 having a hook receiving slot 16.

A hook 17 having a mounting portion 18 at its lower end is removably secured in the slot 16 in the hook bar 15 by means of a setscrew 19. The hook 17 has a loop-seizing blade 20 at its upper end, and a cutting edge 21 is formed along the lower edge of the loop-seizing blade 20.

A block 22 having a bore 23 therethrough is secured to one surface of the hook 17. One end of the bore 23 in the block 22 is in communication with a bore 24 in the hook 17 having an opening 25 on the surface of the hook 17 opposite from the block 22. The other end of the bore 23 is connected to a tube or conduit 26 which is in turn connected to a source of air under pressure.

While the bore 23 could be formed in the hook 17 without the use of the block 22, the use of the block 22 facilitates manufacture because its thickness provides added substance for the bore 23.

The knife mechanism 11 of the machine includes a knife bracket 27 connected by means of a screw 28 to an oscillatory knife shaft 29 that is parallel to the hook shaft 13. Lever means including a knife carrier 30 is pivotally secured to the end of the knife bracket 27 by means of its shaft 31 held by a bushing plate 32 and screws 33.

The knife carrier 30 has an arm 34 connected to the top of the shaft 31 with an aperture 35 in its free end. A knife blade 36 having a lug 37 projecting from one surface is removably connected to the free end of the arm 34 of the knife carrier 30 by means of a snug fit between the lug 37 and the complementary aperture 35 formed in the free end of the arm 34. A cutting edge 38 is formed along the upper edge of the knife blade 36. It is within the scope of the invention to have the cutting edge opening 25 on the surface of the hook 17 on the opposed surface of the knife blade 36 instead, with attendant necessary structural changes.

A crank 39 having a crankpin 40 is connected to the bottom of the shaft 31 of the knife carrier 30. A bore 41 is formed in the intermediate portion of the knife bracket 27 with its outlet end opening in proximity to the crankpin 40 of the crank 39. A piston 42 is slidable connected in the outlet end of the bore 41 for coaction with the crankshaft 40 of the crank 39. A tube or conduit 43 is connected to the inlet end of the bore 41 and directs air under pressure.

In operation, air under pressure is introduced between the opposed surfaces of the hook 17 and the knife blade 36 through the opening 25 in the surface of the hook 17. Simultaneously, the surface of the knife blade 36 opposes the lug 37 of the knife carrier 30. A bore 41 is formed in the intermediate portion of the knife bracket 27 to cut the end of the loop of yarn by the scissor-like action of the cutting edge 21 of the loop-seizing blade 20 and the cutting edge 38 of the knife blade 36.

Thus, the introduction of air under pressure between the opposed surfaces of the hook 17 and the knife blade 36 not only reduces the generation of heat caused by friction by interposing a cushion of air between the opposed surfaces of the hook 17 and the knife blade 36 but further dissipates heat through the circulation of air. Instead of heating up at high speeds, tests have indicated that the knife blade 36 is actually run cooler than the ambient air. In addition, the air will not soil the pile yarn as would be the case with oil and all similar lubricants, and the circulation of air prevents the accumulation of lint about the hook 17 and the knife blade 36.

The use of a pneumatic piston 42 in opposition to the force existing by the introduction of air under pressure between the opposed surfaces of the hook 17 and the knife blade 36 makes it possible to adjust the characteristics of the cushion of air between the opposed surfaces of the hook 17 and the knife blade 36 by coordinating the pressure of the air to the piston 42 with the pressure of the air introduced between the opposed surfaces of the hook 17 and the knife blade 36.

Although the invention has been described in its preferred form with a certain degree of particularity, it is
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understood that the present disclosure of the preferred form has been made by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention.

What is claimed is:

1. In a tufting machine, a hook including a loop-seizing blade having a cutting edge along its lower edge, a knife blade having a cutting edge along its upper edge, means for effecting relative motion between said hook and said knife blade, said knife blade having one surface disposed in abutment with one surface of said hook for cooperation of the cutting edge of said knife blade with the cutting edge of said hook during relative movement of said hook and said knife blade to cut a loop of yarn on the loop-seizing blade of said hook to produce cut pile, means for biasing said one surface of said knife blade against said one surface of said hook, and means for introducing air under pressure between said opposed surfaces of said hook and said knife blade for reducing friction between said opposed surfaces of said hook and said knife blade.

2. In a tufting machine, an oscillatable hook including a loop-seizing blade having a cutting edge along its lower edge, an oscillatable knife blade having a cutting edge along its upper surface, said knife blade having one surface disposed in abutment with one surface of said hook for cooperation of the cutting edge of said knife blade with the cutting edge of said hook during coordinated oscillation of said hook and said knife blade to cut a loop of yarn on the loop-seizing blade of said hook to produce cut pile, pneumatic means for biasing said one surface of said knife blade against said one surface of said hook, and means for introducing air under pressure between said opposed surfaces of said hook and said knife blade for reducing friction between said opposed surfaces of said hook and said knife blade.

3. In a tufting machine, an oscillatable hook including a loop-seizing blade having a cutting edge along its lower edge, an oscillatable knife blade having a cutting edge along its upper edge, said knife blade having one surface disposed in abutment with one surface of said hook for cooperation of the cutting edge of said knife blade with the cutting edge of said hook during coordinated oscillation of said hook and said knife blade to cut a loop of yarn on the loop-seizing blade of said hook to produce cut pile, level means connected to said knife blade, pneumatic means disposed for coaction with said lever means for biasing said one surface of said knife blade against said one surface of said hook, and means for introducing air under pressure between said opposed surfaces of said hook and said knife blade for reducing friction between said opposed surfaces of said hook and said knife blade.

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