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[21] Appl. No. **45,693**
[22] Filed **June 12, 1970**
[45] Patented **Sept. 14, 1971**
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3,277,852 10/1966 Card..... 112/79 R
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[54] **KNIFE BLOCK FOR CUT PILE TUFTING MACHINE**
8 Claims, 4 Drawing Figs.
[52] U.S. Cl..... 112/79 R
[51] Int. Cl..... D05c 15/24
[50] Field of Search..... 112/79 R,
79 A, 266, 410
[56] **References Cited**
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ABSTRACT: A knife block for a tufting machine having provision for securely retaining a pair of aligned cutting knives therein and having spaced lateral slots therein permitting a clamping bracket to engage one of the edges of each knife at spaced points. Also, provision is made for easily aligning and securing the block to an oscillating knife bar of a tufting machine by a structure which includes a cylindrical shaft connected to the block and having a slot positioned in the end thereof at a predetermined angle, an opening in the bar for receiving the shaft, and a key secured to the bar and adapted to enter the slot in the cylindrical shaft to maintain a predetermined alignment.

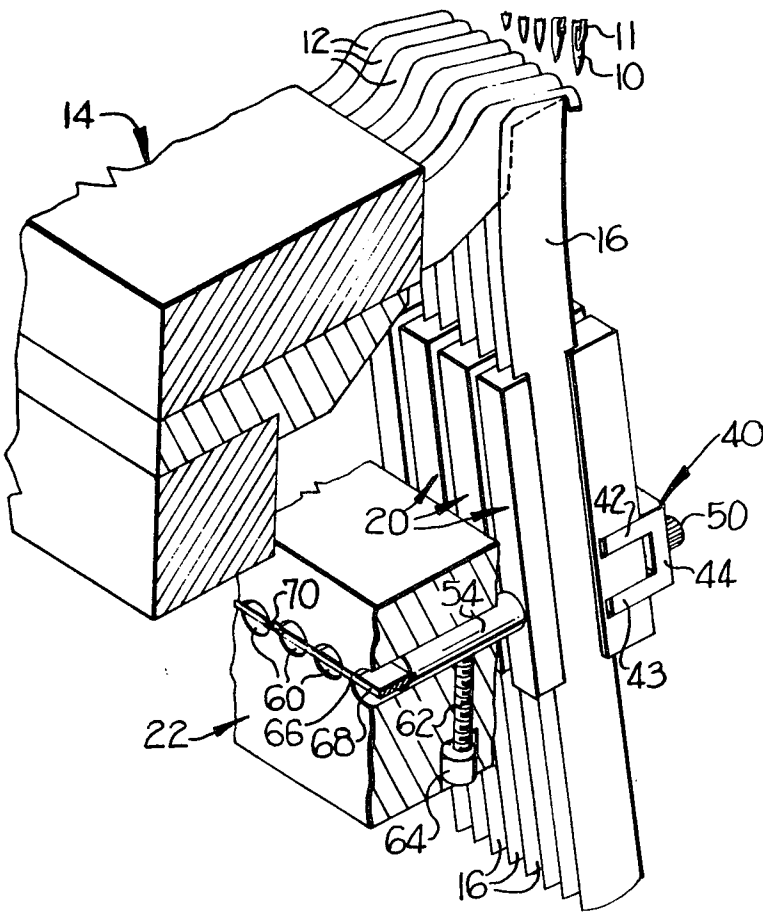


Fig-1

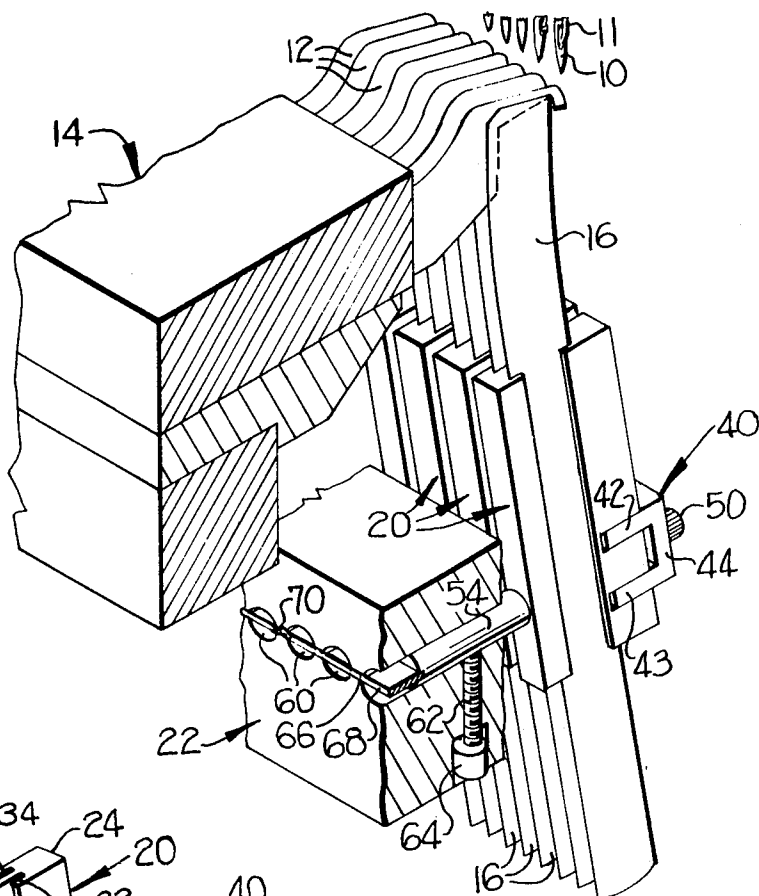


Fig-2

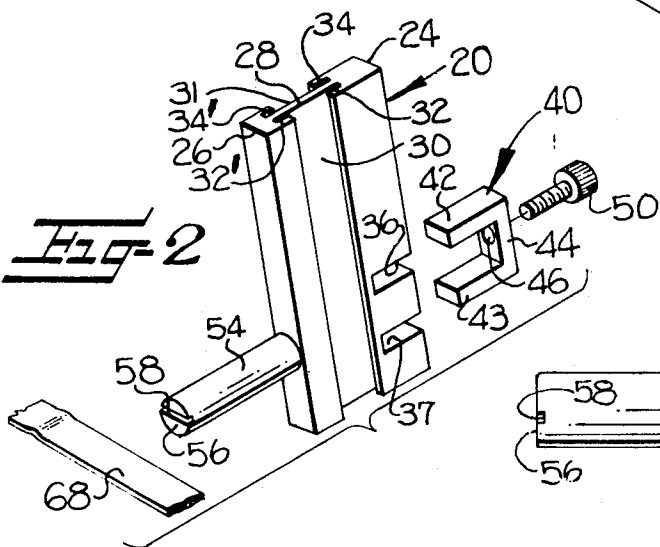
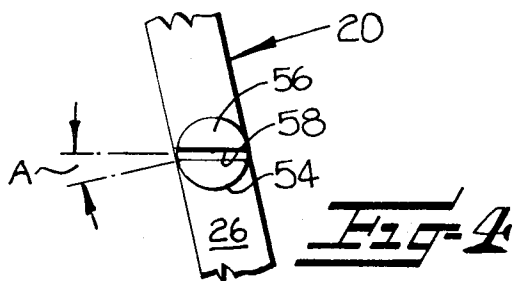
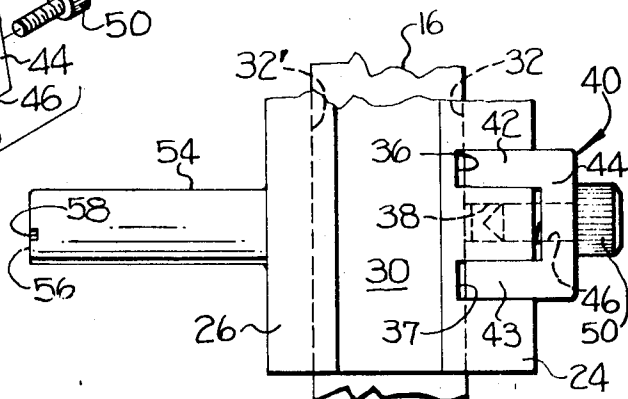


Fig-3



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KNIFE BLOCK FOR CUT PILE TUFTING MACHINE

The present invention relates to a tufting machine for forming cut pile fabric, and more particularly to the means for mounting the cutting knives in a tufting machine.

In the tufting industry, many varied machines have been developed for carrying a yarn through a backing fabric to form a plurality of tufting loops, and for severing the loops to form the cut pile. A machine of this type is disclosed and described in my copending application, Ser. No. 26,603, filed Apr. 8, 1970, and generally includes a plurality of needles for carrying the yarn strands through the backing, a cooperating looper associated with each needle for engaging and retaining the formed yarn loops, and a knife mounted on an oscillating mounting bar for severing the yarn loops retained on the looper.

In tufting machines of the above-described type, it is conventional for the knife to be retained and held in a knife block, which in turn is carried by the oscillating knife bar such that the knife is reciprocated across the looper with a scissorlike cutting action. Typically, the knife block comprises a body member which includes a pair of side edge portions and a connecting web, with a pair of opposed grooves formed in the side edge portions to receive the knife. To retain the knife in proper position, a bore extends through the length of the connection web for receiving a threaded member such that the threaded member communicates with one of the grooves and is thereby able to engage the edge of the knife. It has been found however, that the above locking structure not only severely weakens the web, but also the single point of engagement with the knife is often insufficient to properly retain the knife during long periods of use.

The prior tufting machines have also experienced difficulty in establishing and maintaining proper alignment between the knife block and knife bar. This can cause serious problems since the angular alignment between the knife and looper must be closely maintained to assure proper cutting action.

It is accordingly an object of the present invention to provide an improved mounting structure for the cutting knives in a tufting machine which is not subject to loosening or misalignment during prolonged use.

It is another object of this invention to provide a block for mounting one or more cutting knives in a tufting machine wherein the edge of each knife is securely engaged or locked at more than one point along its length.

It is a further object of this invention to provide means for easily establishing the proper alignment between a knife block and an oscillating knife bar in a tufting machine, and for maintaining this alignment under the stress and vibration encountered during long periods of use.

These and other objects and advantages of the present invention are achieved in the embodiment illustrated herein by the provision of a knife block which comprises a body member having side edge portions and a connecting web, and a pair of opposed grooves extending into the side edge portions for receiving and mounting the knife. A pair of spaced slots extend laterally into one of the side edge portions and into communication with the associated groove, and a clamping bracket including a pair of spaced-apart legs is positioned such that the legs enter the slots to engage and lock the knife at spaced points. A threaded member is employed to attach the bracket to the block and to translate the legs into the slots such that they firmly engage the knife.

The knife block is aligned and secured to the oscillating knife bar by a connecting structure which comprises a cylindrical shaft extending from the knife block and which includes a transverse slot positioned at a predetermined angle in the remote free end thereof. A cylindrical opening extends through the bar and is adapted to closely receive the cylindrical shaft of the block. A channel is positioned in the bar at a predetermined angle and which communicates with the cylindrical opening, and a key is adapted to be received in the channel and shaft transverse slot for maintaining the shaft in the desired angular relationship with respect to the bar.

Some of the objects and advantages of the invention having been stated, others will appear as the description proceeds when taken in connection with the accompanying drawings, in which

5 FIG. 1 is a fragmentary perspective view, partly sectioned, of a cutting mechanism in a cut pile tufting machine which embodies the present invention;

FIG. 2 is an exploded perspective view of the knife block and locking key of the present invention;

10 FIG. 3 is a fragmentary side elevational view of the knife block and a retained knife;

FIG. 4 is a fragmentary end view of the knife block illustrating the angular disposition of the transverse slot at the free end of the mounting shaft.

15 Referring to the drawings, FIG. 1 illustrates a yarn-cutting mechanism embodying the features of the present invention and utilized in a conventional multiple needle cut pile tufting machine. Further details of a typical machine of this type may be obtained by reference to my aforementioned copending application. Generally however, the machine includes a plurality of reciprocating needles 10, each of which carries a yarn 11 through a backing fabric (not shown) to form a plurality of tufting loops, a plurality of loopers 12 secured to a looper head 14 such that each looper is operatively associated with one of the needles to engage and retain the tufting yarn loops, and a cutting knife 16 operatively associated with each looper to sever the yarn loops. The knives 16 are mounted for oscillatory movement in relation to the loopers, and are carried by a knife block 20, which in turn is mounted on an oscillating knife bar 22. As will become apparent from the following description, a plurality of blocks 20 are mounted on the bar 22 in a predetermined angular relationship with respect to the bar such that each knife will properly engage the associated looper 12 and sever the yarn with a scissorslike oscillating movement.

The knife block 20 comprise a generally rectangular unitary body member having an I-shaped cross-sectional configuration, and which includes first and second side edge portions 24 and 26 respectively, and a central connecting web 28. The central web 28 defines a pair of oppositely directed planar faces 30 and 31 which are bounded by the side edge portions 24 and 26, and with the side edge portions extending transversely beyond each of the faces. For the reason set forth hereinafter, the first side edge portion 24 has a somewhat greater lateral dimension than does the second side edge portion 26.

The juncture between the web faces 30 and 31, and the two side edge portions is in each case undercut along a line flush with the associated face to define a pair of longitudinally extending opposed grooves 32, 32' and 34, 34' for receiving a pair of the knives 16. To secure the knives in the opposed grooves, a pair of spaced-apart slots 36 and 37 are provided which extend laterally into the first side edge portion 24 and into communication with the grooves 32 and 34 (note FIG. 3), and a laterally extending threaded bore 38 is positioned in the side edge portion intermediate the two slots. Clamping means for engaging the edges of the knives at spaced points include a U-shaped bracket 40 comprising a pair of spaced-apart legs 42 and 43 which are adapted to enter the lateral slots 36 and 37 respectively, and an intermediate segment 44 having an aperture 46 therethrough. An externally threaded cap screw 50 extends freely through the aperture 46 and into threaded engagement with the bore 38 to thereby attach the bracket to the block 20 and provide means for translating the legs 42, 43 into the slots 36, 37 such that the legs will engage the two knives positioned in the opposed grooves at two longitudinally spaced positions. By this arrangement, a secure, yet easily released mounting for the knives is provided.

70 It will be noted from FIG. 3 that the bore 38 extends substantially the full lateral length of the first side edge portion 24, but is somewhat less than the lateral extent of the slots 36 and 37. Thus the bore 38 terminates short of the web 28, and this permits the diameter of the cap screw to be greater than the thickness of the web. Also, the web will not be weakened

by the presence of a bore. While the above configuration is somewhat preferred since a stronger cap screw may be employed, it will be apparent that by proper selection of the cap screw diameter, and web thickness, the bore 38 could be extended laterally into the web.

The structure for connecting the knife block 20 to the oscillating bar 22 in a predetermined angular relationship includes a laterally extending cylindrical shaft 54 which is connected to the second side edge portion 26 adjacent the lower end of the block 20 and opposite the slots 36 and 37. The shaft 54 terminates in a remote free end 56 and includes a transverse slot 58 extending a short distance thereinto. As seen in FIG. 4, the slot 58 is set in a predetermined angular relationship which is offset from a line perpendicular to the sides of the portion 26 by the angle A. In actual practice, the angle A may be for example approximately 12°.

A number of aligned cylindrical openings 60 extend through the bar 22 along the length of the machine, and each opening is adapted to closely receive the cylindrical shaft 54 of one block 20 as described above. For the reasons to become apparent, the lateral dimension of each opening 60 (or the thickness of the bar 22) is somewhat greater than that of the shaft 54. A longitudinally extending threaded aperture 62 communicates at substantially right angles with each of the openings 60, and is designed to threadedly receive a socket head cap screw 64 for securing the shaft 54 in the opening 60 in the manner shown in FIG. 1.

To facilitate establishment and maintenance of the desired angular alignment of the block 20 in relation to the bar 22, the ends of the openings 60 remote from the bar 22 include a continuous transverse channel 66 communicating with each of the openings 60. An elongated flat key 68 which may be fabricated from spring steel or other suitable material, is adapted to be received in the channel 66 and slot 58 of the shaft 54 as shown in FIG. 1 to preclude rotation of the shaft 54 in the opening 60. Thus by proper placement of the slot 58 on the end 56 of the shaft, the desired angular positioning can be readily obtained. Also, the channel 66 may be indented as shown at 70 after the key 68 is in position to thereby prevent subsequent withdrawal of the key.

From the above description, it will be apparent that the present invention provides a novel structure for mounting the cutting knives 16 in the block 20 which includes a clamping bracket 40 adapted to engage the knives at a pair of spaced contact points and which is easily operable by the tightening of a single cap screw. In addition, a simple and foolproof mounting structure for securing the block 20 to the bar 22 in a predetermined angular alignment is provided.

In the drawings and specification, there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation.

I claim:

1. In a tufting machine for forming a cut pile fabric and including means for carrying a yarn through a backing fabric to form a plurality of tufting loops therein, the combination therewith of

looper means operatively associated with said yarn-carrying means for engaging and retaining the tufting loops,

severing means operatively associated with said looper means and including a knife bar mounted for oscillatory movement in relation to said looper means, a knife block, means for connecting said knife block to said bar in a predetermined angular relationship, and a knife carried by said knife block and adapted to cooperate with said looper means in severing the yarn loop upon relative oscillatory movement between the knife bar and looper means,

said connecting means including a cylindrical shaft having one end connected to said knife block and terminating in a remote free end, a transverse slot positioned in said free end at a predetermined angle, a cylindrical opening extending through said bar and adapted to closely receive

said cylindrical shaft, a channel in said bar communicating with one end of said cylindrical opening, and a key adapted to be received in said channel and transverse slot when said shaft is received in said opening for maintaining said shaft in a predetermined angular relationship with said bar.

2. The tufting machine as defined in claim 1 wherein said connecting means further includes a threaded aperture extending into said bar and communicating at substantially right angles with said cylindrical opening, and a locking screw adapted to be threadedly received in said threaded aperture and engage the shaft.

3. The tufting machine as defined in claim 1 wherein said knife block comprises a body member having side edge portions and a connecting web, means defining a pair of opposed grooves extending into said side edge portions and receiving said knife, means defining a pair of spaced slots extending laterally into one of said side edge portions and into communication with the associated groove, and clamping means for retaining said knife in said grooves and comprising a U-shaped bracket including a pair of spaced-apart legs adapted to enter said spaced slots and engage said knife at spaced points.

4. A knife block for cut pile tufting machine comprising, a body member having side edge portions and a connecting web, means defining a pair of opposed grooves extending into said side edge portions for mounting a knife therein, means defining a pair of spaced slots extending laterally into one of said side edge portions and into communication with the associated groove, and

clamping means for securing a knife in said opposed grooves and comprising a bracket including a pair of spaced-apart legs adapted to enter said lateral slots, and means for translating said legs into said slots such that said legs will engage a knife positioned in said opposed grooves.

5. A knife block as defined in claim 4 wherein said means for translating said legs into said slots comprises a threaded bore extending laterally into said one side edge portion intermediate said slots, an aperture in said bracket, and a threaded member adapted to extend freely through said bracket aperture and into engagement with said threaded aperture.

6. A knife block as defined in claim 5 wherein said bore extends laterally into said one side edge portion a distance less than the lateral extent of said slots.

7. A knife block as defined in claim 6 further comprising means for mounting said block to a tufting machine knife bar in a predetermined angular relationship and including a laterally extending cylindrical shaft connected to the side edge portion opposite said one side edge portion and terminating in a remote free end, and means defining a transverse slot in said remote free end at a predetermined angle for aligning said block with said knife bar.

8. A knife block for a cut pile tufting machine comprising, a body member having side edge portions and a connecting web, said web defining a pair of oppositely directed planar faces, and said side edge portions extending transversely beyond each of said faces,

means defining a first pair of opposed grooves lying flush with one of said planar faces and extending into said side edge portions for mounting a first knife therein, and means defining a second pair of opposed grooves lying flush with the other of said planar faces and extending into said side edge portions for mounting a second knife therein,

means defining a pair of spaced slots extending laterally into one of said side edge portions and into communication with each of the associated grooves, a threaded bore extending laterally into said one side edge portion intermediate said slots, and

clamping means for securing a pair of knives in said opposed grooves and comprising a U-shaped bracket including a pair of spaced-apart legs and an intermediate segment, said intermediate segment including an aperture

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and said legs being adapted to enter said spaced slots, and a threaded member adapted to pass freely through said aperture in said intermediate segment and into threaded

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engagement with said bore whereby said legs may be advanced into said slots to engage at spaced points a pair of knives positioned in said opposed grooves.

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