Oct. 11, 1966 R. T. CARD 3,277,852

KNIFE BLOCK FOR A TUFTING MACHINE

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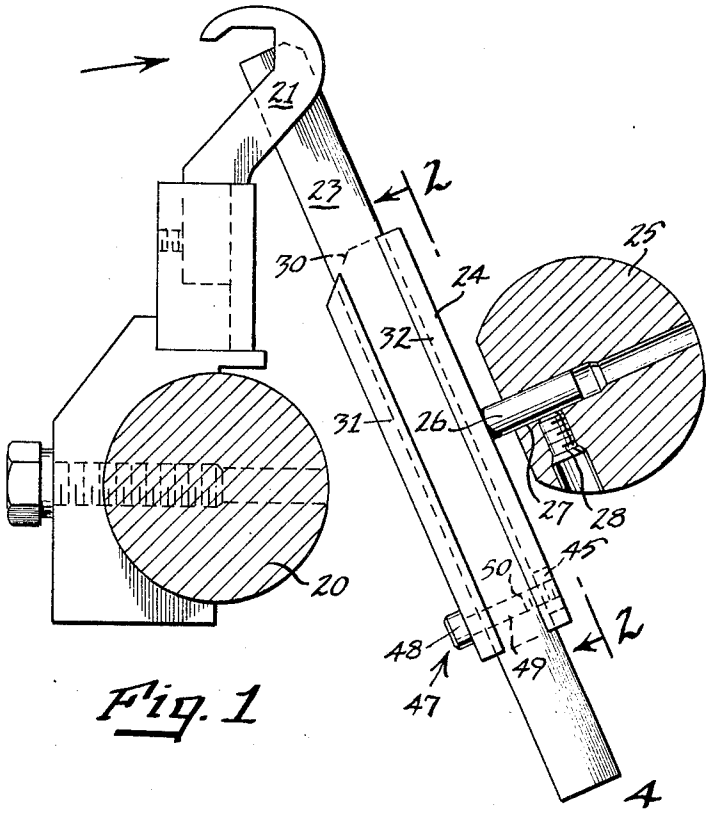


Fig. 1

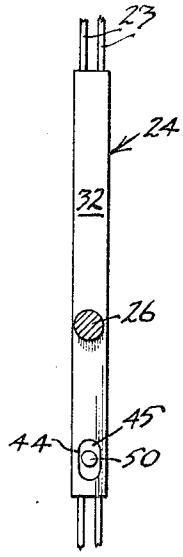


Fig. 2

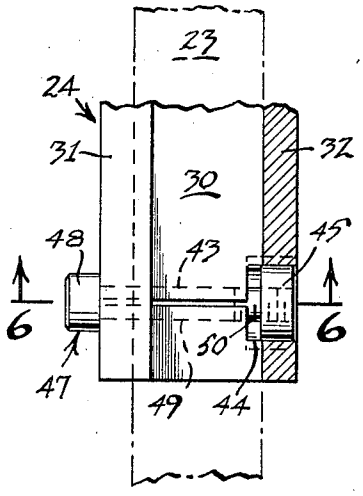


Fig. 4

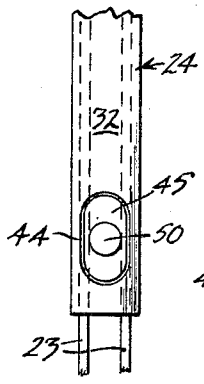


Fig. 5

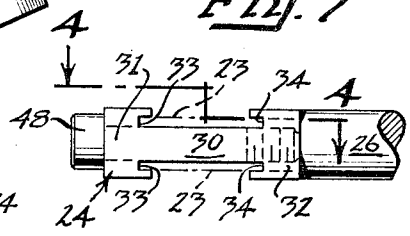


Fig. 6

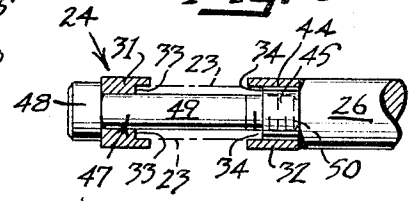


Fig. 3

INVENTOR:
ROY T. CARD
BY
Harrington A. Lackey
ATTORNEY

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KNIFE BLOCK FOR A TUFTING MACHINE

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PRIOR ART

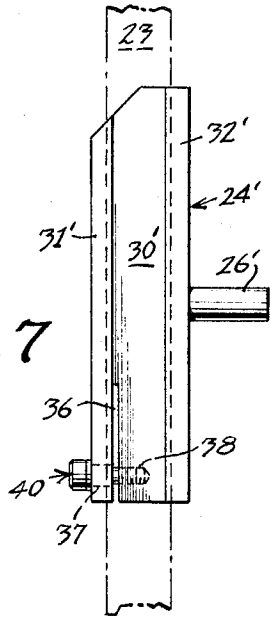


Fig. 7

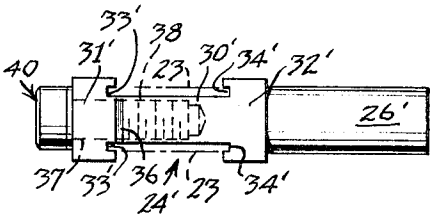


Fig. 8

Fig. 12

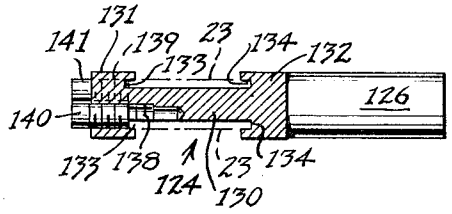


Fig. 10

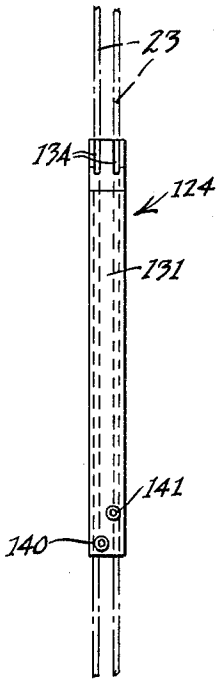
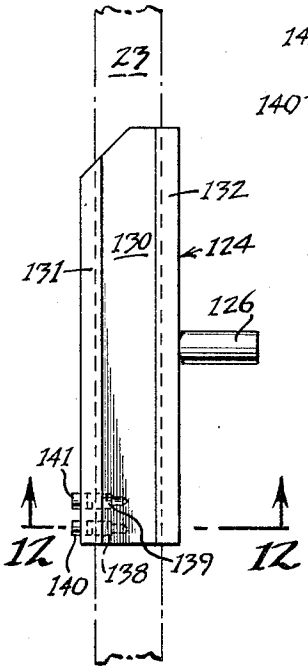


Fig. 9



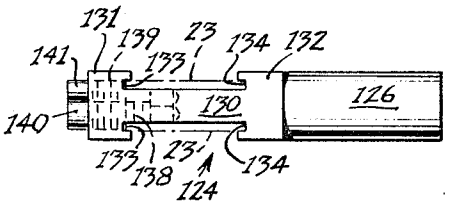


Fig. 11

INVENTOR:
ROY T. CARD
BY
Harrington A. Lackey
ATTORNEY

United States Patent Office 3,277,852 Patented Oct. 11, 1966

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3,277,852

KNIFE BLOCK FOR A TUFTING MACHINE

Roy T. Card, 1532 Riverside Drive, Chattanooga, Tenn.

Filed Jan. 7, 1965, Ser. No. 423,923
5 Claims. (Cl. 112—79)

This invention relates to a knife block for a tufting machine, and more particularly to a means for securing or holding the tufting knife in a knife block.

A typical tufting machine for making cut pile fabric includes a plurality of needles for sewing yarns through a moving base fabric. For each needle there is a cooperating looper or cut pile hook for engaging and holding the loop formed by the needle, and a knife cooperating with each cut pile hook to cut the loop to form cut pile. Each knife is received and held in a knife block, which in turn is mounted on a reciprocable knife shaft, for reciprocating the knife in timed relation with the cut pile hook which also reciprocates, to effect a scissors action for cutting the yarn loops. The knives are held in tension against the sides of the cut pile hooks to provide a better cutting action. However, the tensioned mounting and the continuous and rapid reciprocable motion subjects the knives to considerable wear and strain.

A typical knife block includes an elongated channel-shaped body having a web and a pair of flanges on opposite sides of the web forming opposing grooves for slidably receiving a single knife. The knife is secured or locked in the knife block usually by means of a threaded bolt which threadedly engages a tapped hole extending transversely through one flange and in communication with one of the grooves, so that when the bolt is turned in the tapped hole, the inner end of the bolt will engage one edge of the knife and force it into binding engagement in the opposite groove.

Another example of a locking means is to provide a separated flange and web secured together by a threaded bolt for moving the flange transversely toward and away from the web to engage and disengage the edge of the knife.

Both the above means for securing the knife in the knife block include tapped holes in some portion of the block itself. Thus, eventually, the repetitive wear and strain upon the knife and knife block will cause the threads within the knife block to strip, so that the entire knife block must be discarded and replaced by a new one.

It is therefore an object of this invention to overcome the above disadvantages by providing a knife block for a tufting machine, including an improved means for securing the knife in the knife block.

Another object of this invention is to provide an improved means for securing a tufting knife in a knife block in which no threaded openings are formed within the body of the knife block itself.

Another object of this invention is to provide an improved means for securing a tufting knife in a knife block employing relatively inexpensive securing elements which may be readily replaced upon failure of the securing elements, without disposing of the knife block.

A further object of this invention is to provide an improved means for securing a tufting knife in a knife block, including a bolt member and a nut member received in a knife block for engaging and dis-engaging the knife without excessive strain upon the knife or knife block.

Further objects and advantages of the invention will be apparent from the following description taken in conjunction with the drawings, wherein:

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FIG. 1 is a side sectional elevation taken through the hook shaft and knife shaft of a conventional cut pile tufting machine, and disclosing a knife block incorporating this invention;

FIG. 2 is a section taken along the line 2—2 of FIG. 1;

FIG. 3 is a bottom end view of the knife block disclosed in FIG. 1, with the knives in phantom;

FIG. 4 is a section taken along the line 4—4 of FIG. 3;

FIG. 5 is an enlarged fragmentary edge view of the bottom portion of the knife block disclosed in FIG. 2;

FIG. 6 is a section taken along the line 6—6 of FIG. 4;

FIG. 7 is a side elevation of a knife block incorporating one type of prior art securing means;

FIG. 8 is an enlarged bottom end view of the knife block disclosed in FIG. 7;

FIG. 9 is a side elevation of a knife block incorporating another prior art form of securing means;

FIG. 10 is a left edge view of the knife block disclosed in FIG. 9;

FIG. 11 is a bottom end view of the knife block disclosed in FIG. 9; and

FIG. 12 is a section taken along the line 12—12 of FIG. 9.

Referring now to the drawings in more detail, FIG. 1 discloses a reciprocable hook shaft 20 supporting a cut pile hook 21 pointing toward the front of a cut pile tufting machine and in the opposite direction from the fabric feed, not shown, so that the loops on the moving fabric are carried over the end of the bill toward the rear of the cut pile hook 21. These loops, not shown, are then cut by a knife 23 carried in a knife block 24, which in turn is mounted in a reciprocable knife shaft 25 for reciprocating the knife 23 in timed relation with the hook 21.

The knife block 24 is provided with a laterally extending shank 26 for insertion into a mating hole 27 in the knife shaft 25. A set screw 28 is provided in the knife shaft 25 for securing the shank 26 in the hole 27. The knife block 24 itself is disclosed as having an I-shaped cross-section for supporting a pair of knives 23 for a narrow gauge, multiple needle cut pile tufting machine. It will be understood that for a wider gauge machine a knife block having a channel shaped cross-section may be employed for supporting only a single knife 23. The disclosed knife block 24 has a flat elongated web 30 and a pair of flanges 31 and 32 thicker than and extending along opposite sides of the web 30. The interior faces of the flanges 31 and 32 are undercut flush with the surfaces of the web 30 to form opposing grooves 33 and 34. Thus, the knife 23 is adapted to slidably fit flush against the surface of the web 30, with the edges of the knife 23 slidably fitting within the opposing grooves 33 and 34. The parts thus far described are conventional in a cut pile tufting machine.

Before proceeding with the detailed structure and function of the invention, some typical prior art devices for securing the knife 23 in a knife block, as disclosed in FIGS. 7–12, will first be discussed.

Referring now to the prior art device in FIGS. 7 and 8, the knife block 24′ includes a web 30′, flanges 31′ and 32′ and grooves 33′ and 34′. The web 30′ includes an elongated slot 36 adjacent the flange 31′ and having an open bottom end. A smooth bore 37 is formed through the flange 31′ opening into the slot 36. A tapped hole 37 is formed in the web 30′, and also opens into the slot 36 in alignment with the bore 37. A bolt member 40 having a threaded end is inserted through the bore 37, across the slot 36, and threadedly engages the tapped

hole 38. By turning the bolt 40 the bottom portion of the flange 31' is forced toward the web 30' to tend to close the slot 36 and wedge the knife 23 between the bottom portions of the grooves 33' and 34'.

The prior art device disclosed in FIGS. 9–12 includes a knife block 124 having a web 130, flanges 131 and 132 and opposed grooves 133 and 134. Tapped holes 138 and 139 extend transversely through the flange 131 into the web 130 so that they intercept each groove 133. Because of the narrow gauge of the knives 23, and therefore the grooves 133, the tapped holes 138 and 139 are vertically spaced or staggered, as well as being spaced according to the gauge of the knives, as best disclosed in FIG. 10. Set screws 140 and 141 threadedly engage the tapped holes 138, and 139, respectively. When each set screw 140 and 141 is turned to move inwardly, the free end of the set screw will engage the corresponding edge of each knife blade 23 to force the opposite edge of the knife to frictionally engage the opposite groove 134. By counter-rotating the set screws 140 and 141, the knives 23 may be released for adjustment or replacement.

It will be noted that in both the prior art devices the tapped holes 38, and 138 and 139, are formed in the body of the respective knife blocks 24' and 124, such as in the web or the flange. The knife block 24' of FIGS. 7 and 8 develops strain upon the bolt 40 and the threads in the tapped hole 38, not only because of the normal operating stresses upon the knives 23, but also because the web 31' is distorted in tension, as long as the knife 23 is secured in knife block 24'. Such pressures and stresses will tend to strip the threads, not only on bolt 40, but in the tapped hole 38. When the threads in the tapped hole 38 are stripped, then the knife block 24' must be discarded and replaced by a new one, which is considerably more expensive than the bolt 40.

In a similar manner, when the tapped holes 138 and 139 are stripped, the knife block 124 must be replaced by a new one. Another problem inherent in the securing means of the knife block 124, arises because of the location of the tapped holes 138 and 139 for proper alignment of the set screws 140 and 141 with the corresponding edges of knives 23. The portion of the flange 131 overlapping each groove 133 is very thin adjacent the tapped hole 138 or 139, and consequently is subject to bending or failure by virtue of stresses exerted through the knife 23 upon set screws 140 and 141, which in turn are transmitted to the side walls of the tapped holes 138 and 139.

Referring now to FIGS. 1–6, applicant's invention overcomes the disadvantages inherent in the prior art devices disclosed in FIGS. 7–12 by providing an elongated hole or bore 43 extending transversely through the flange 31 and web 30 and opening into an elongated cavity 44 of greater cross-section than the bore 43 and formed through the opposite flange 32. The cavity 44 not only extends transversely through the flange 32, but also intersects the grooves 33 and 34 sufficiently that an elongated internally threaded member 45 may be received or seated in the cavity 44 deep enough to extend into the grooves 34, as disclosed in FIG. 4.

A bolt member 47 having a head 48 and a shank 49 substantially equal to the transverse width of the knife block 24 is inserted through the bore 43 with the head 49 abutting the outside edge of the flange 31. The opposite end of the shank 49 from the head 48 forms the threaded portion 50 to threadedly engage the nut member 45. The cavity 44 and the nut member 45 are both elongated, substantially oval-shaped, as best disclosed in FIG. 5, to prevent rotation of the nut member 45 as the bolt member 48 is rotated within the bore 43. The bolt 47 may be turned by hand or by a socket wrench adapted to engage a socket, not shown, formed in the bolt head 48. With the knife 23 inserted in either side of the knife block 24, as disclosed in the drawings, the bolt 47 may be turned to draw the nut member 45 into the cavity 44 gradually until the nut member 45 engages the edge of knife 23 received in the groove 34. Continued rotation of the bolt 47 will then force the opposite edge of the knife 23 into the opposite groove 33 to securely bind the knife 23 in fixed position within the knife block 24. Release of the knife 23 is easily accomplished by merely counter-rotating the head 48 and consequently the bolt member 47 to back off the nut member 45.

It will be noted in this invention that there are no tapped or threaded holes within the body of the knife block 24 itself, neither in the web 30 nor the flanges 31 or 32. The total thread engagement is between the threaded end 50 of the bolt 47 and the internally threaded opening in the nut member 45, both of which are inexpensive elements relative to the knife block 24 itself. Thus, if the threads on either or both the bolt member 47 or the nut member 45 are stripped, then either or both the bolt or nut elements may be replaced at not only a nominal cost, but in a minimum of time.

Moreover, in addition to the absence of any possibility of stripping parts of the knife block 24 itself, there is also no other part of the knife block which is materially stressed or weakened by virtue of the use of the nut member 45 and the bolt member 47 as a knife securing means. The flange 31 would be under compression between the bolt head 48 and the adjacent edge of the knife 23. However, this "squeezing" action is actually a stronger construction than prior devices, because the conventional knife edge is forced against the groove 33 without any support, such as the bolt head 48 on the opposite edge of the flange 31. The bore 43 is formed transversely through the middle of the web 30, no closer to one side of the knife block 24 than the other, so that there are no thin portions in flanges 31 or 32 subject to undue bending or failure.

Although FIGS. 1–6 disclose the maximum width of the bolt shank 49, which is equal to the thickness of the web 30, smaller bolt shanks 49 and bores 43 may be employed where desired.

It will be apparent to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof, and therefore the invention is not limited by that which is shown in the drawings and described in the specification, but only as indicated in the appended claims.

What is claimed is:

1. A knife block for a tufting machine comprising:
   (a) an elongated channel-shaped body having a web and first and second flanges extending along opposite sides of said web for slidably receiving a tufting knife,
   (b) an elongated bore extending transversely through said first flange and said web,
   (c) a cavity having a larger cross-section than said bore formed through said second flange and communicating with said bore,
   (d) an internally threaded nut member received in said cavity, and
   (e) a bolt member extending through said bore, said bolt member having a threaded end portion threadedly engaging said nut member so that when said bolt member is turned said nut member will be drawn toward said web to engage the adjacent edge of a tufting knife received in said block.

2. The invention according to claim 1 in which said cavity is elongated, and said nut member is elongated to prevent rotational movement of said nut in said cavity.

3. The invention according to claim 1 in which said bolt member comprises an enlarged head, and said head is provided with means for turning said bolt member.

4. In a knife block for a tufting machine including an elongated channel-shaped body having a web and first and second flanges extending along opposite sides of said web with opposed grooves formed in said flanges for slid-

ably receiving a tufting knife, means for securing said knife in said block comprising:

(a) an elongated bore extending transversely through said first flange and said web,

(b) a cavity having a large cross-section than said bore formed in said second flange and communicating with said bore and the groove in said second flange,

(c) an internally threaded nut member non-rotatably received in said cavity,

(d) a bolt member having a head and a threaded end portion, said bolt member extending through said bore and said end portion threadedly engaging said nut member so that when said head is turned said nut member will be drawn into said groove to engage the adjacent edge of a tufting knife received in said block.

5. The invention according to claim 4 in which said cavity and said nut member are elongated to prevent rotatable movement of said nut member.

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JORDAN FRANKLIN, *Primary Examiner.*

J. R. BOLER, *Assistant Examiner.*