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(54) **Looper for tufting machine**

Greifer für Tuftingmaschine

Boucleur pour machine à tufter

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a looper for use in a tufting machine for manufacturing carpets.

[0002] Fig. 6 shows a conventional looper 1 which includes a hook throat portion 2 having a bottom edge 3. Loops B are formed on a backing cloth A by moving the looper 1 back and forth as shown by the arrow while feeding the backing cloth A in the direction of the arrow. Since the bottom edge 3 is a straight and smooth ground surface, when the backing cloth A and the looper 1 move, the tips of the loops B slide along the bottom edge 3 toward the opposite end to the tip of the hook throat portion 2 as shown. When the loops B are cut by the knife C, the loops B tend to be pushed by the knife C toward the front corner of the hook throat portion 2 because the knife C has a shear angle D. Some of such loops may not be cut at all or partly cut. Such loops will be either cut again at different positions of the cutting edge or simply torn and will damage the backing cloth and carpet. So, the cut piles thus formed tend to have widely different lengths S from each other. Thus, during a later shearing step, a large amount of cut piles have to be removed by shearing so that the cut piles have to be removed by shearing so that the cut piles have uniform lengths. A large amount of yarn material is thus wasted. If the pile yarns are made of a material having no remaining elongation or a markedly low remaining elongation compared to ordinary tufting yarn, such as yarns for artificial turf, natural fiber yarns, and thick monofilaments, it is especially difficult to cut loops uniformly with conventional loopers having flat edges. Thus, large amounts of defective carpets tend to be produced. In the worst case, tufting is simply impossible.

[0003] A looper for use in a tufting machine comprising a hook throat portion having a bottom edge formed with a corrugation is known from DE 37 09 977A1. This known looper has a single corrugation located at the outward end of the bottom edge where the latter merges into the hook. This single corrugation has the purpose of avoiding a sharp edge directly behind the hook.

[0004] An object of the present invention is to provide a looper which can form cut piles having uniform lengths, and which allows the knife to reliably, precisely and cleanly cut all the required loops by the cutting edge which has various corrugated shapes and/or a rough surface.

SUMMARY OF THE INVENTION

[0005] According to the present invention, there is provided a looper for use in a tufting machine comprising a hook throat portion having a bottom edge formed with corrugations or a rough surface along the entire length thereof or partly along the length thereof. The corrugations may have uniform pitches and heights, or may have uneven pitches and/or uneven heights. Preferably, the

corrugations have pitches in the range of about 0.01 to 6 mm and heights in the range of about 0.01 to 2 mm.

[0006] With this arrangement, the corrugations formed along the bottom edge of the hook throat portion will provide suitable resistance to loop piles hooked by the hook throat portion, thereby preventing the loop piles from being held in an unexpected position of the hook throat portion. This makes it possible to form loop piles having uniform lengths. Also, the corrugations will prevent the loop piles from sliding away from the knife, so that the loop piles can be reliably and precisely cut at constant positions. Thus, using the looper according to the present invention, it is possible to smoothly cut yarns which have been difficult to cut, such as single yarns having a large denier, monofilaments, filaments, tape yarns and natural fibers like cotton.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Other features and objects of the present invention will become apparent from the following description, made with reference to the attached drawings, in which:

Fig. 1 is a side of a looper embodying the present invention;

Fig. 2 is a partial enlarged side view of a tufting machine on which the looper of Fig. 1 is mounted;

Fig. 3 is a partial enlarged side view of the tufting machine of Fig. 2, showing how the looper of Fig. 1 operates;

Figs. 4A to 4F and to are perspective views of portions of different loopers embodying the present invention, having their respective corrugations arranged so as to extend in different directions from each other;

Figs. 4A' to 4C' are top plan views of Figs. 4A to 4C, respectively;

Figs. 5A to 5C are side views of different loopers embodying the present invention; and

Fig. 6 is a partial enlarged side view of a conventional looper.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0008] Now the embodiment of the present invention is described with reference to Figs. 1 to 5. As shown in Fig. 1, the looper 10 according to the present invention comprises a base portion 11 supported on a looper block, which is described later, a neck portion 12 extending substantially vertically upwardly from the base portion 11, and a hook throat portion 13 extending substantially horizontally from the neck portion 12 and having a bottom edge 14 which is formed with corrugations along the entire length thereof or partly along the length thereof. The corrugations are typically formed with equal pitches p and heights h. But the corrugations may be formed such that their pitches and/or heights decrease gradually to-

ward the tip of the hook throat portion 13. Preferably, the corrugations have heights h in the range of about 0.01 to 2 mm, more preferably in the range of about 0.1 to 2 mm, and pitches p in the range of about 0.01 to 6 mm, more preferably in the range of about 0.1 to 6 mm.

[0009] The looper 10 according to the present invention is mounted on a looper block H of a tufting machine (in the case of a "mold" type, the looper is directly mounted on a looper bar LB). Loop piles B are formed on a backing cloth A which is being fed in the direction of the arrow in Fig. 2 by moving the looper block H back and forth, and vertically moving the knife C and the needle N, in synchronization with each other. When the looper 10 is in the backward position, shown in Fig. 2, the knife C is raised to cut the piles B to form cut piles. When the piles B are cut by the knife C, the corrugations formed along the edge 14 provide suitable resistance to the respective piles B, thus preventing the piles B from sliding along the edge 14 away from the knife C even though the knife C has a shear angle D. Thus, the piles B can be cut reliably and precisely and smoothly at constant positions, so that cut piles of uniform lengths are formed.

[0010] Now referring to Figs. 4A to 4C and Figs. 4A' to 4C', the crests and troughs forming the corrugations may extend substantially parallel to the width direction of the hook throat portion 13 of the looper (i.e. the direction perpendicular to the side surface of the looper to be brought into sliding contact with the knife C) as shown in Fig. 4A and 4A', or may extend obliquely toward or away from the tip of the hook throat portion 13 with respect to the width direction of the hook throat portion 13 as shown in Figs. 4B, 4B' and 4C, 4C'. By adjusting the inclination angle of the crests and troughs forming the corrugations with respect to the width direction of the hook throat portion, it is possible to adjust the movement of the pile yarns.

[0011] Referring next to Figs. 4D to 4F, the crests and troughs forming the corrugations may extend substantially horizontally (i.e. perpendicular to the height direction of the hook throat portion 13 of the looper) as shown in Fig. 4D, or may extend obliquely upwardly or downwardly from the side surface of the hook throat portion 13 as shown in Figs. 4E and 4F. By adjusting the inclination angle of the crests and troughs of the corrugations with respect to the height direction of the hook throat portion 13, it is possible to extend the life of the knife C and to adjust the movement of the pile yarns and cutting energy.

[0012] The looper 10 according to the present invention is not limited to the looper shown in Fig. 1. For example, the looper 10 according to the present invention may include a vertically downwardly extending base portion 11 as shown in Fig. 5A, may include a spring 16 extending along a groove 18 formed in the base portion 11 as shown in Fig. 5B, or may include a clip 17 connected to the neck portion 12 to sandwich loop piles between the clip 17 and the hook throat portion 13 as shown in Fig. 5C. Further, the looper 10 according to the present invention may be of a molded modular type which com-

prises 5 to 20 loopers that are formed into a one-piece body by molding.

[0013] Instead of the corrugations, the bottom edge may be formed with a rough surface.

Claims

1. A looper (10) for use in a tufting machine comprising a hook throat portion (13) having a bottom edge (14) formed with a corrugation, **characterised in that** said bottom edge (14) is formed with a plurality of corrugations along the entire length thereof or partially along the length thereof.
2. The looper (10) of claim 1 wherein said corrugations have uniform pitches (p) and heights (h).
3. The looper (10) of claim 1 wherein said corrugations have uneven pitches (p) and/or uneven heights (h).
4. The looper (10) of any of claims 1 to 3 wherein said corrugations have pitches (p) in the range of about 0.01 to 6 mm and height (h) in the range of about 0.01 to 2 mm.

Patentansprüche

1. Greifer (10) zum Einsatz in einer Tufting-Maschine, der einen Haken-Halsabschnitt (13) umfasst, der eine untere Kante (14) hat, die mit einer Wellenform versehen ist, **dadurch gekennzeichnet, dass** die untere Kante (14) über ihre gesamte Länge oder einen Teil ihrer Länge mit einer Vielzahl von Wellenformen versehen ist.
2. Greifer (10) nach Anspruch 1, wobei die Wellenformen einheitliche Teilungen (p) und Höhen (h) haben.
3. Greifer (10) nach Anspruch 1, wobei die Wellenformen ungleichmäßige Teilungen (p) und/oder ungleichmäßige Höhen (h) haben.
4. Greifer (10) nach einem der Ansprüche 1 bis 3, wobei die Wellenformen Teilungen (p) im Bereich von ungefähr 0,01 bis 6 mm und eine Höhe (h) im Bereich von ungefähr 0,01 bis 2 mm haben.

Revendications

1. Boucleur (10) destiné à être utilisé dans une machine à touffeter comprenant une partie de gorge de crochet (13) ayant un bord inférieur (14) formé avec une ondulation, **caractérisé en ce que** ledit bord inférieur (14) est formé avec une pluralité d'ondulations sur toute la longueur de celui-ci ou sur une partie de

la longueur de celui-ci.

2. Boucleur (10) selon la revendication 1, dans lequel lesdites ondulations présentent des pas (p) et des hauteurs (h) uniformes. 5
3. Boucleur (10) selon la revendication 1, dans lequel lesdites ondulations présentent des pas (p) irréguliers et / ou des hauteurs (h) irrégulières. 10
4. Boucleur (10) selon l'une quelconque des revendications 1 à 3, dans lequel lesdites ondulations présentent des pas (p) qui se situent dans une plage comprise entre 0,01 mm et 6 mm environ et une hauteur (h) qui se situe dans une plage comprise entre 0,01 mm et 2 mm environ. 15

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Fig.1

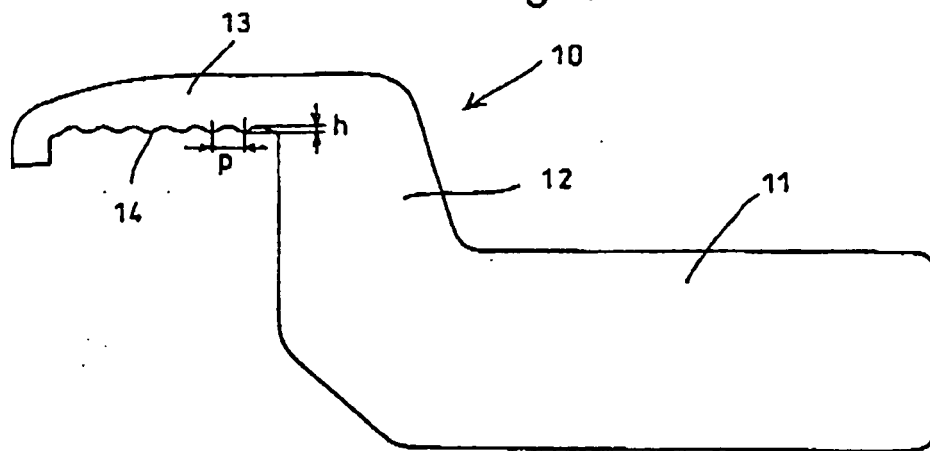


Fig.2

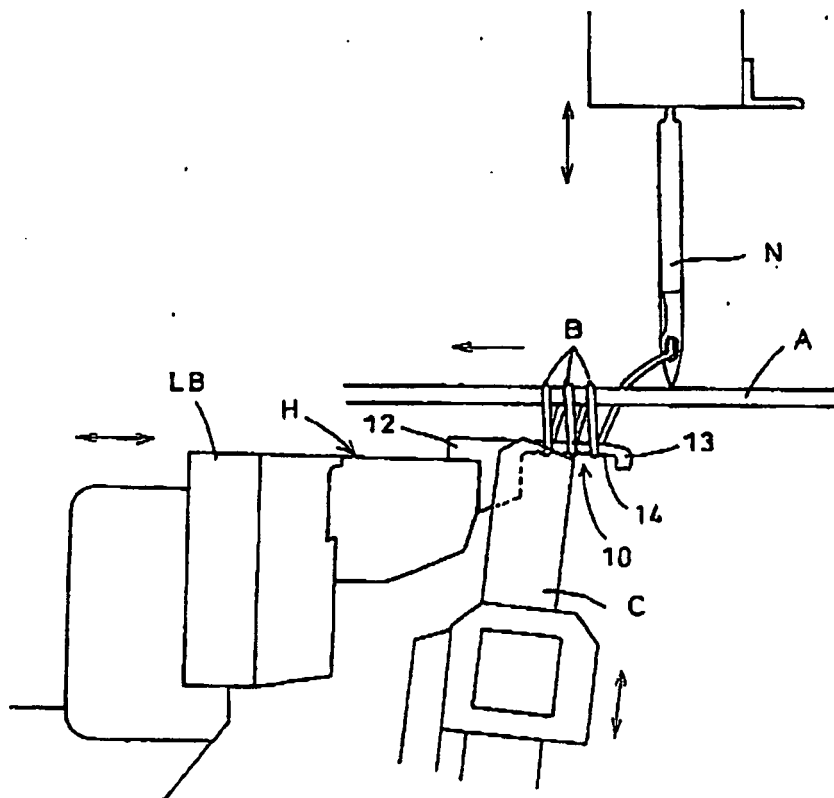


Fig.3

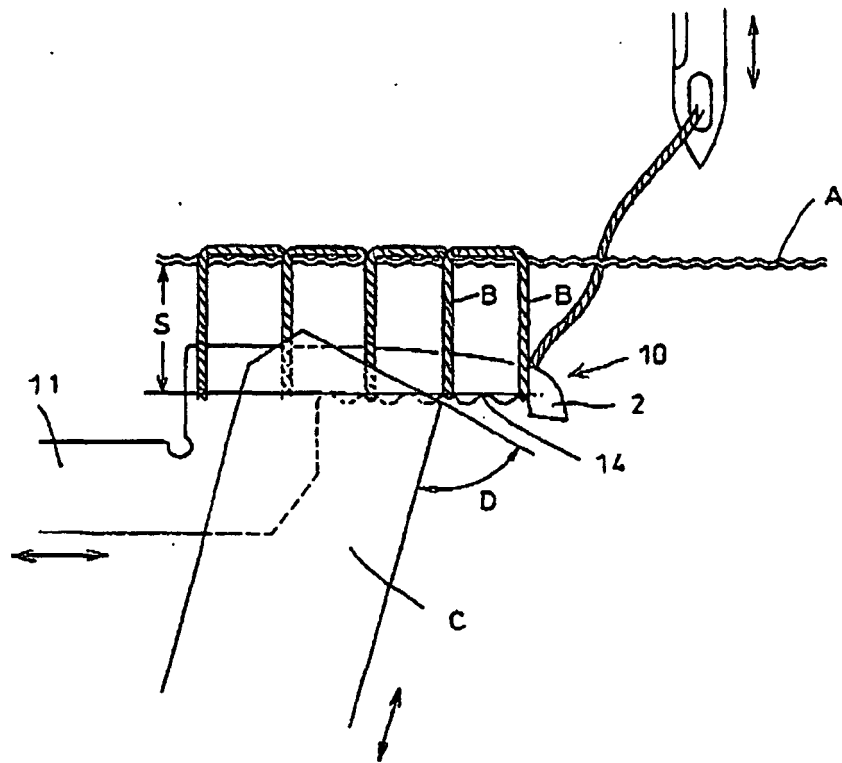


Fig.4A

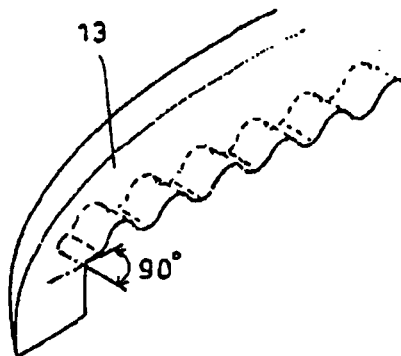


Fig.4A'

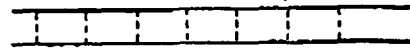


Fig.4B

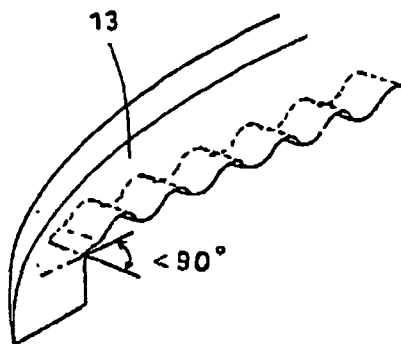


Fig.4B'

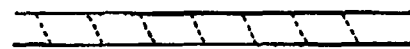


Fig.4C

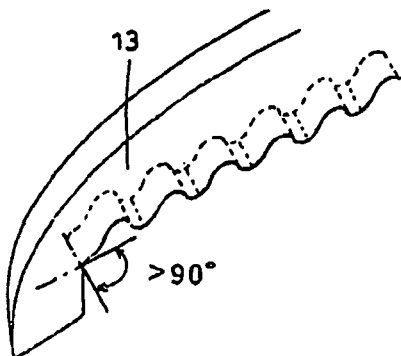


Fig.4C'

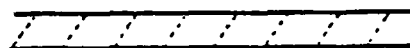


Fig.4D

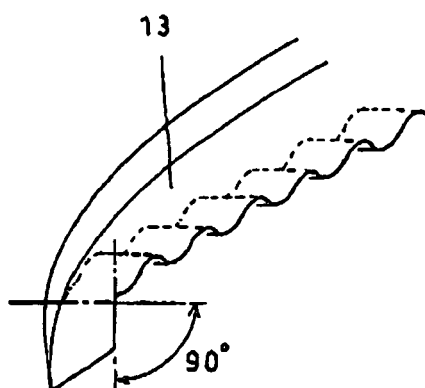


Fig.4E

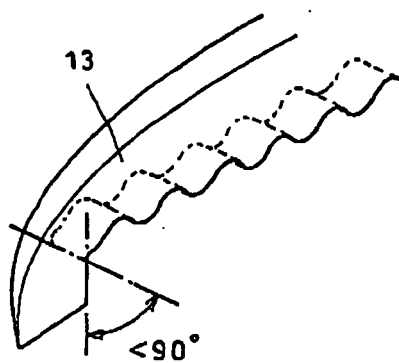


Fig.4F

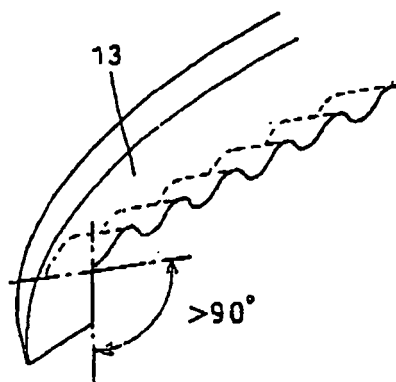


Fig.5A

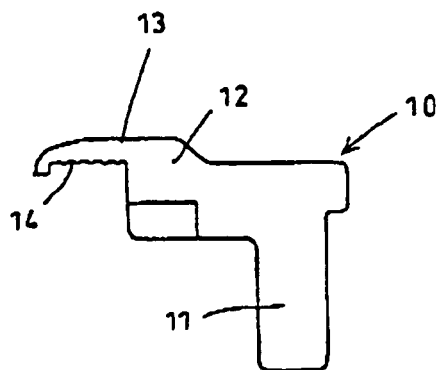


Fig.5B

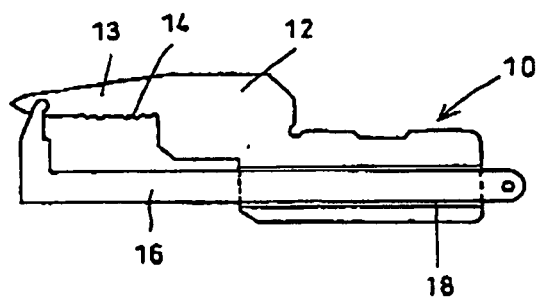


Fig.5C

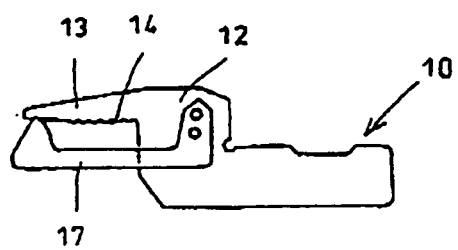
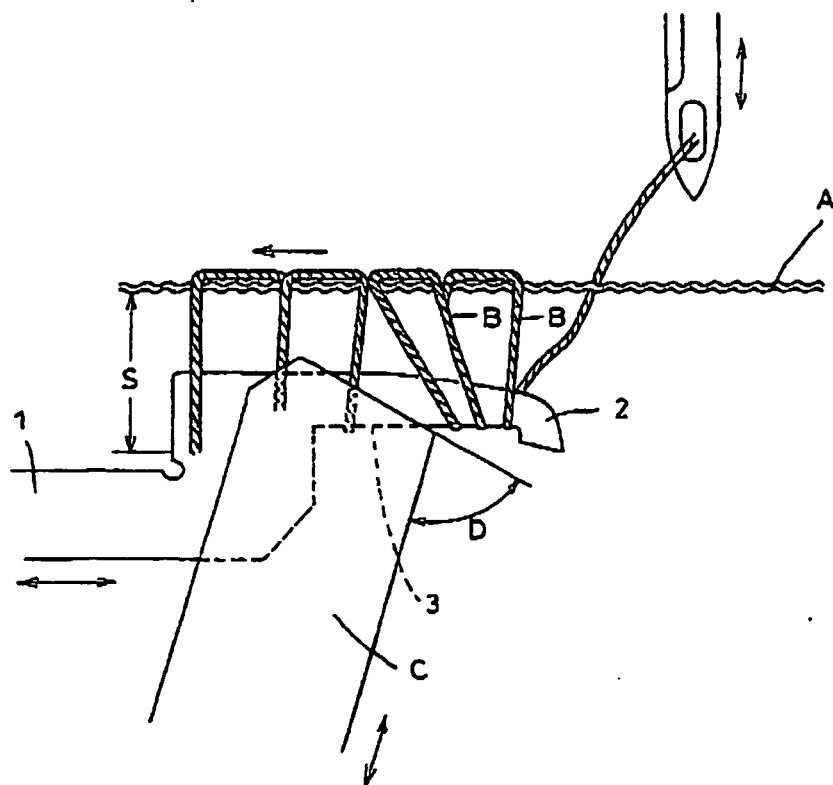


Fig.6



REFERENCES CITED IN THE DESCRIPTION

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