APPARATUS FOR THE PRODUCTION OF TUFTED CARpets

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ABSTRACT OF THE DISCLOSURE

Apparatus using needles with a single eye wherein two yarns feed thereto from opposite directions, one at constant feed length and the other at a variable, alternating feed length per needle stroke, both yarns penetrating the carpet base and the loops thereof being caught by the tip of an oscillating gripper with said gripper always releasing the alternating feed length yarn before the release of the other yarn at the commencement of the next needle stroke, whereby the first-released loop may be a shorter loop than the other loop or of substantially equal length thereto.

The invention relates to apparatus for the production of flat surfaced color patterns in the manufacture of tufted carpets.

As is well known, the tufting process offers numerous patterning possibilities in the manufacture of carpets. Thus, with alternate taking of differently colored yarns into the needles of the tufting machine a colored longitudinal stripe patterning is obtained. The so-called "high-low technique," in which, with patterned control of the circumferential speeds of the yarn feed rollers, different yarn lengths are drawn in by the needles, leads to a texture pattern of relief character. The longitudinal stripe color pattern and the texture patterning may also be combined. Further types of patterning can be attained through traverse motion of the base fabric or shifting of the feed sheet and thereby lateral shifting of the whole carpet.

It is characteristic of these processes that only one thread is drawn into each needle, accordingly, in each tuft in the base fabric only one thread loop forms.

It was now found that according to the tufting process, with use of the so-called "high-low technique," in which threads of different length are drawn into the needles, special color patterns can be produced if a yarn of constant length and a second, different-colored yarn of alternating length, coming from the opposite direction, are drawn over delivery rollers with corresponding circumferential velocity into the needle with the gripper, on swinging back in each case, first releasing the yarn which forms the loops of differing lengths.

In this manner, at each penetration of the needle two loops of differing height are formed which more or less overlap, so that their different colorings appear alternately with differing strength and special variegated color patterns result. Further patterning possibilities are given if needles with double yarns are used—alternately with needles which conduct only one thread along the needle bar.

The apparatus according to the invention is explained below in detail with the aid of drawings.

In the drawings:

FIG. 1 represents in side view an isolated needle bar of a tufting machine in operating position; and FIG. 2 shows the same needle bar with an alternate form of yarn feed.

In FIGS. 1 and 2, the needle bar 2 containing a row of needles is reciprocated by a reciprocal drive (not shown) through thrust rod 1. The needles 3 are fed with two yarns (in some cases only one yarn) guided through hole plate 4 or hole plates 4 and 10 on the needle bar. Usually, one yarn is guided over a yarn run-over rod 5. The needles 3 penetrate the carpet base fabric 7, and the yarn loops are caught by the hooked, oscillating gripper 6 as the needle retracts, thus forming the tuft loops 8. The yarn 9 is fed at a constant rate to the needle while yarn 9 is fed at two or more alternatingly different rates in a predetermined pattern.

In the needle bar 2 of FIG. 1, the hole plate 4 is arranged on one side of the needle bar 2 and the thread run-over rod 5 is arranged under the needle bar 2. In the embodiment of FIG. 2 there is a hole bar 4 and 10 on each side of the needle bar on each side of the needle bar 2, and the yarn run-over rod 5 lies above the needle bar 2.

The manner of operation of the two embodiments is fundamentally alike. The two yarns 8 and 9 of constant and alternating feed, respectively, run through the guides of the hole bar 4, oppositely to one another, into the eye of the needle 3. The yarn 9 is deflected over the run-over rod 5 so that it travels toward the eye of the needle 3 in a direction having a lateral vector opposite to the direction in which the base fabric 7 moves relative to the needle bar 2.

After the puncture of the base fabric 7 by the needle, the two yarns 8 and 9 are grasped by the gripper 6 and held by this until the commencement of the next needle puncture stroke. At this moment the gripper 6 swings back and releases first the yarn 9 of alternating feed rate per needle stroke and then the yarn 8 with constant feed rate per needle stroke. The needle 3, as it again penetrates into the base fabric 7, draws the yarn 9 partially out of the preceding puncture if this has been fed with less feed length than the constant feed length of yarn 8.

At this point of the sequence, the yarn 8 is still securely held by the gripper, and the pulling back of the yarn of alternating length feed is further facilitated by the fact that it is drawn into the needle 3 from the direction toward which the base fabric 7 moves, because it thereby always lies over the yarn 8 of constant length feed.

It proves especially expeditious to feed the yarns supplied with constant length per needle stroke to the eyes of the needles in the working direction of the machine, i.e., the direction having a lateral vector which is the same as the direction at which base fabric 7 moves relative to the needle bar. This prevents the yarn of alternating length feed, which is partly drawn back in the following needle puncture, from dragging with it the loops of yarn 8, which provides the continuously uniform loops.

The patterned tufted carpets produced according to the invention have, in consequence of the two loops present in them at each puncture place, one of which is of constant height, a densely closed pile of practically uniform height and are thereby advantageously distinguished from the known texture patterning of tufted carpets with relief character. In the three tuft loops shown in FIG. 1, the left hand tuft loop has approximately two equal height loops of yarns 8 and 9. In the other two tuft loops, only the loop of yarn 8 is of the height of the left hand loops, whereby the color of yarn 8 dominates over the color of the underlying, shorter loops of yarn 9.

The invention is hereby claimed as follows:

1. Apparatus for production of carpeting comprising a needle having a single needle eye, means to reciprocate said needle longitudinally, to pierce and retract from a carpet base movable substantially at right angles thereto means to feed two yarns simultaneously to said needle eye at a constant feed length per needle stroke for one
yarn and at a variable, alternating feed length per needle stroke for the other yarn, said means to feed said other yarn to said needle eye including yarn guide means to guide said other yarn toward said needle eye in a lateral vector opposite to the direction in which said carpet base moves relative to said needle and additional guide means to guide said one yarn toward said needle eye in a lateral vector which is the same as the direction in which said carpet base moves relative to said needle, and gripper means coacting with said needle to catch intermittently the loops of said yarns in said needle after said needle has punctured a carpet base for said carpeting and to always release first said other yarn as said needle begins its next stroke toward said carpet base, whereby the loop of said other yarn may be drawn back from the previous loop a short distance as said needle begins said next stroke without dragging with it the loop of said one yarn when said variable feed length per needle is less than said constant feed length.

2. Apparatus as claimed in claim 1 wherein said gripper means includes an oscillating arm having a yarn-gripping tip oscillating toward and away from said needle and adapted to oscillate toward said needle and catch said loops when said needle penetrates the carpet base, and said arm adapted to oscillate the other direction to release said yarns as said needle begins its next stroke in the aforesaid order of release.

3. Apparatus as claimed in claim 1 wherein said yarn guide means comprises a yarn run-over bar over which said other yarn runs, said bar deflecting said yarn so that it travels toward said needle eye in a direction having a lateral vector opposite to the direction in which said carpet base moves relative to said needle.

4. Apparatus as claimed in claim 1 wherein said means to reciprocate is a needle bar operably connected to a reciprocating drive, a plurality of said needles mounted in said bar in a row, and wherein said yarn guide means comprises a plate along one edge of said needle bar with pairs of holes therein for conducting said yarns through said plate, and a yarn run-over rod on the side of said needles opposite to said plate and below said bar for deflecting the path of said other yarn from said plate to said needle eye.

5. Apparatus as claimed in claim 1 wherein said means to reciprocate is a needle bar operably connected to a reciprocating drive, a plurality of said needles mounted in said bar in a row, and wherein said yarn guide means comprises a plate along one edge of said needle bar with holes therein for conducting the running yarns corresponding to said one yarn to the respective eyes of said needles, a second plate along the other edge of said bar with holes therein for conducting the running yarns corresponding to said other yarn, and a yarn run-over rod above said second plate.

6. Apparatus for production of tufted carpets comprising a needle having one eye, driving means to reciprocate said needle in its longitudinal direction, to pierce and retract from a carpet base movable substantially at right angles thereto means for supplying a first yarn at constant feed length to said eye and for supplying a second yarn at alternating variable feed lengths to said eye per reciprocally cycle of said needle, guide means for guiding said second yarn to said eye of said needle, in a direction having a lateral vector opposite to the direction of movement of said carpet base additional guide means for guiding said first yarn to said eye of said needle in a lateral vector which is the same as the direction in which said carpet base moves relative to said needle, and a moving gripping device having a tip with a free end which moves into position to grip the two loops formed by said yarns after puncture of said needle and passage of said eye through said carpet base with said loops lying side-by-side on said tip and with said second yarn closest to the free end of said tip, which tip moves back as said needle begins its next puncture cycle and releases first said second yarn, which lies closest said tip, whereby said said second yarn may be drawn back from the previous loop thereby forming a shorter loop than the loop of said first yarn when said variable feed length is less than said constant feed length.

References Cited

UNITED STATES PATENTS
1,976,349 10/1934 Kleinert
3,019,748 2/1962 Card
3,075,482 1/1963 Card
3,091,199 5/1963 Ballard
3,259,088 7/1966 Rockholt

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