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2,696,181

METHOD FOR FORMING PILE FABRIC

Original Filed April 4, 1950

2 Sheets-Sheet 1

Fig. 1

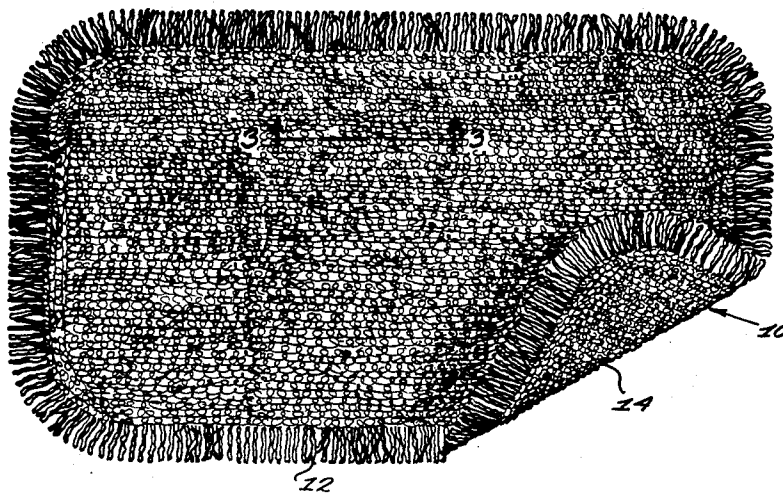
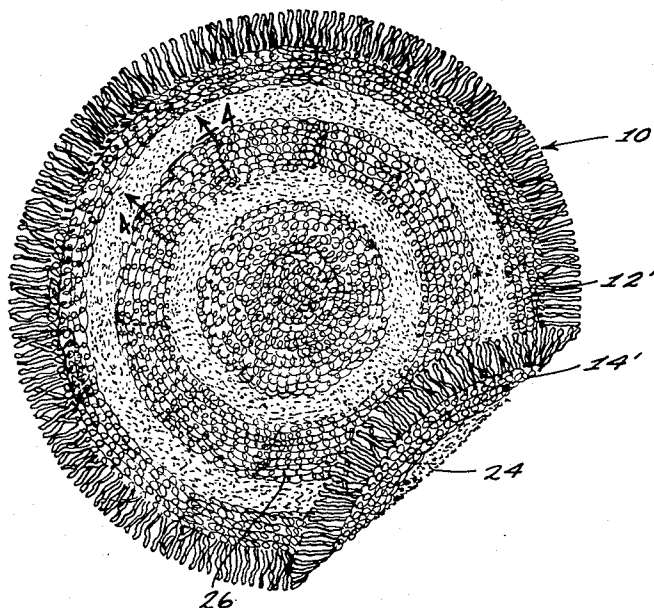


Fig. 2



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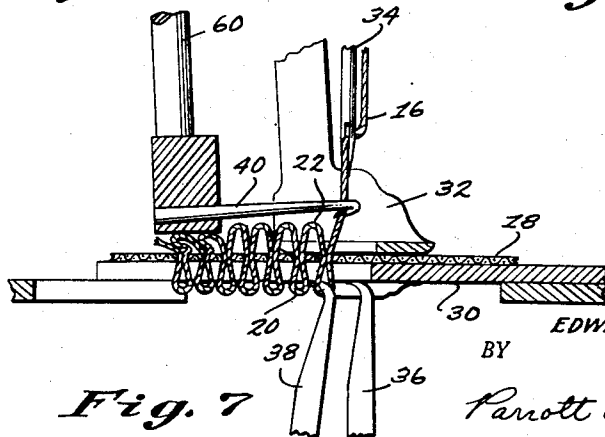
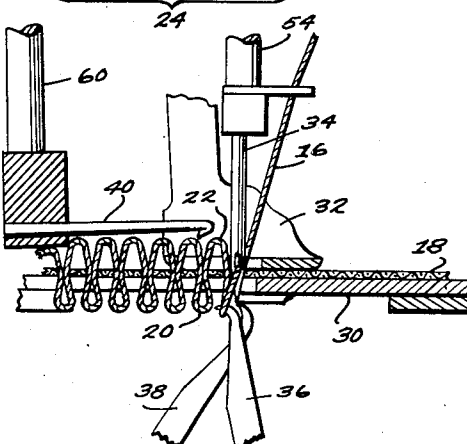
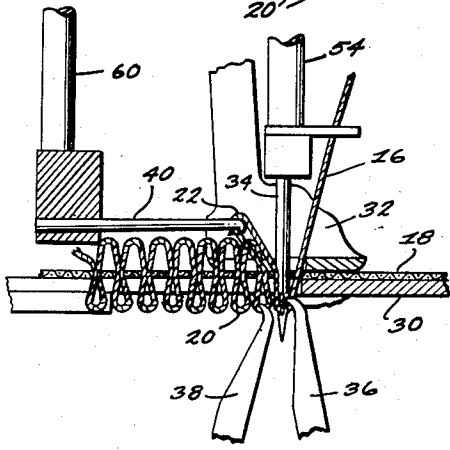
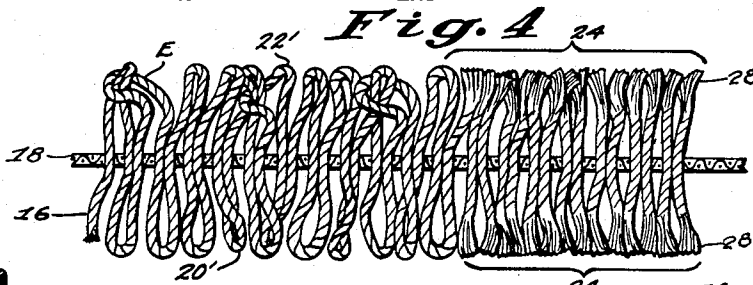
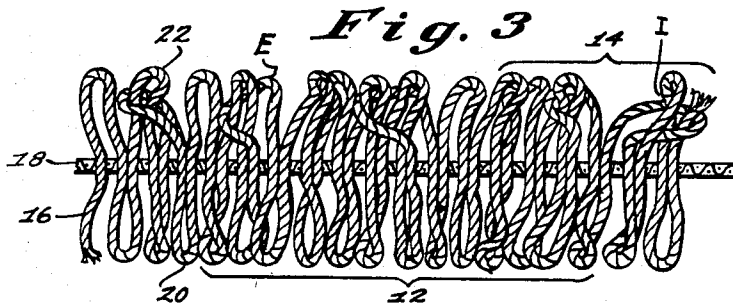
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METHOD FOR FORMING PILE FABRIC

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Original application April 4, 1950, Serial No. 153,928, now Patent No. 2,662,227, dated December 15, 1953. Divided and this application September 11, 1952, Serial No. 311,439

2 Claims. (Cl. 112—266)

This invention relates to pile fabrics of the type having pile tufts inserted in a fabric base, and more particularly to a pile fabric of this sort in which pile tufts are provided in the form of loops and a pile surface is formed on both faces of the fabric base, and to a method and means for forming the same. This is a division of my copending application Serial No. 153,928, filed April 4, 1950.

It has long been common practice to form pile fabrics, usually referred to as "chenille," by inserting doubled portions of a pile yarn through a fabric base and cutting the extending ends of the inserted yarn portions to form a surface of chenille ends on one face of the fabric base. In some cases, too, the inserted yarn portions have been left uncut so that a pile surface of loops was formed instead, although this practice has always had the serious objection of leaving the continuous pile yarn used in forming the loops unsevered so that the loops were interconnected and were accordingly easily subject to objectionable unraveling if any portion of the continuous pile yarn was caught and pulled away from the fabric base.

More recently pile fabrics have been developed as disclosed in U. S. Patents 2,482,682 and 2,482,683 to Moore, in which pile tufts are inserted in a fabric base in a unique manner so that a pile surface is provided on both faces of the fabric base, by inserting the doubled yarn portions to form loops on one face and cutting the pile yarn in spaced relation to the other face to form chenille ends.

In accordance with the present invention a pile fabric of this same general type is provided in which a pile surface of loops is formed on both faces of the fabric base in a manner which obviates the difficulties heretofore encountered with unraveling, and which accordingly provides a pile fabric that is equally as serviceable as those disclosed in the above noted Moore patents and that has the further advantage of allowing exactly duplicate pile patterns to be produced on each face of the fabric base. Briefly described, this result is accomplished according to the present invention by inserting the doubled pile yarn portions at closely spaced intervals in the fabric base so that a random entanglement and interlocking of adjacent loops is obtained as the pile fabric is formed which effectively prevents later withdrawal of the continuous pile yarn to unravel the loops.

The pile fabric of the present invention and the method and means by which it is formed are described in further detail below in connection with the accompanying drawings, in which:

Fig. 1 is a plan view of a pile fabric rug formed in accordance with the present invention having both faces covered with loops;

Fig. 2 is a plan view representing a variation of the rug shown in Fig. 1, having sections of double loops alternating with sections of double chenille;

Figs. 3 and 4 are enlarged sectional details taken substantially along the lines 3—3 and 4—4 in Figs. 1 and 2, respectively;

Figs. 5, 6, and 7 are fragmentary details illustrating the manner in which the loops are formed in producing a pile fabric in accordance with the present invention;

Fig. 8 is an elevation of a tufting machine adapted for forming a pile fabric according to the present invention; and

Figs. 9 and 10 are left and elevational views of the machine shown in Fig. 8, illustrating further the arrangement of the loop-forming mechanism.

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Referring now in detail to the drawings, and more particularly at first to Fig. 1, a reversible pile fabric rug formed in accordance with the present invention is shown, as indicated generally by the reference numeral 10, with pile surfaces of loops arranged on both of its faces as at 12 and 14. The nature of the loops forming the pile surfaces 12 and 14 is further illustrated in Fig. 3 in which successive doubled portions of a continuous pile yarn strand 16 are inserted through a fabric base 18 to form loop 20 extending from one face of the fabric base 18. Between the successive inserted loops 20, the continuous pile yarn 16 is trained in relation to the opposite face of the fabric base 18 to form bights or loops extending from this other face as at 22. The loops 20 are inserted in the fabric base 18 contiguously in rows so that a random entanglement and interlocking of at least the trained loops 22, and of the inserted loops 20 to some extent too, occurs as the pile fabric 10 is formed which results in effectively preventing withdrawal of the continuous pile yarn 16 from the fabric base 18 after the loops 20 and 22 are formed, as will appear more in detail presently.

It will be noted that formation of the loops 20 and 22 in the manner just described above arranges them to form exactly duplicate pile patterns on both faces 12 and 14 of the pile fabric rug 10, and this feature of the present invention may be employed advantageously as illustrated in Fig. 2 to obtain modified pile patterns in which pile surface portions of chenille ends as at 24 may be arranged alternatively with pile surface portions of loops as at 26, and with the pile surface patterns on each face of the pile fabric rug 10' shown in Fig. 2 still maintained as exact duplicates. Such alternate pile surface portions of chenille ends 24 may be formed by means such as is shown in U. S. Patent 2,482,647 to Bradwell and Brock. Fig. 4 shows an enlarged illustration of this modified arrangement of the pile fabric rug 10', in which the chenille ends forming the pile surface portions 24 are indicated at 28, and the inserted and trained loops forming the pile surface portions 26 are indicated at 20' and 22', respectively.

The method of forming a reversible pile fabric rug in accordance with the present invention is illustrated in Figs. 5, 6, and 7 of the drawing, in which a suitable work support as at 30, and an associated presser foot 32, are shown arranged to dispose the fabric base 18 for insertion of doubled portions of the continuous pile yarn 16 by a reciprocating needle 34 to form the inserted loops 20 on each downstroke. Lower loopers as at 36 and 38 are arranged below the work support 30 to take each doubled pile yarn portion after insertion by the needle 34 and hold the resulting inserted loop 20 at a predetermined length against withdrawal as the reciprocating needle 34 is withdrawn on its upstroke. With the inserted loops 20 held in this manner, the upstroke of the reciprocating needle 34 results in extending the continuous pile yarn 16 upwardly from the other face of the fabric base 18, and a lateral looper 40 is arranged above the work support 30 to train the loops 22 from this face.

The lateral looper 40 is shown in Fig. 5 at its farthest retracted position holding a trained loop 22, taken from the needle 34 during its previous cycle of operation, against withdrawal and at a predetermined length during the downstroke of the needle 34 to insert the next succeeding loop 20. It will be noted that this lateral looper 40 operates to pull each trained loop 22 to a position extending laterally from the fabric base 18 toward the trained loops 22 already formed. This lateral pulling of the trained loops 22 results in stretching them taut which has a tendency to remove the twist temporarily from the yarn portion forming the trained loop 22, so that upon release the trained loop 22 tends to snap back from its taut position as it regains its twist, which has the further effect of inducing a pronounced curl in the trained loops 22, and because these loops 22 are extended laterally toward the previously formed trained loops 22 as they are formed, the random entanglement of each trained loop 22 as it is released with the previously trained loops 22 is made possible.

In the event that a given trained loop 22 does not become entangled with the previously trained loops 22 as it is released, the manner in which it snaps back to

regain its twist after release may further result in disposing it in the path of the needle 34 so that it becomes interlocked with a succeeding trained loop 22 as the needle 34 passes through the fabric base 18 to insert a succeeding doubled portion of the pile yarn 16. The resulting entanglement of trained loops 22 as just described above is illustrated in Fig. 3 at E, and interlocking of the trained loops 22 at I, and it will be seen that this entanglement and interlocking of the trained loops 22 as they are formed effectively prevents withdrawal of the continuous pile yarn 16 from the pile fabric rug 10.

The release of each trained loop 22 takes place as the lateral looper 40 moves forward, as illustrated in Fig. 6, toward the needle 34 from its retracted position to take and form the next succeeding trained loop 22. This forward movement of the lateral looper 40 takes place during the upstroke of the needle 34, so that it passes the needle 34 and is in position to pass beneath the needle 34 and take the pile yarn strand 16 at about the time the needle 34 reaches the top of its stroke as illustrated in Fig. 7. The arrangement and operation of a lateral looper 40 of this sort is described in detail and claimed in the copending application of W. V. Williams, Serial No. 153,959, filed April 4, 1950, now U. S. Patent No. 2,625,125, issued January 13, 1953, to which reference is made for further details.

The arrangement of a machine in accordance with the present invention for forming pile fabric rugs as described above, is illustrated in Figs. 8, 9, and 10, and as shown includes the previously mentioned work support 30 and associated presser foot 32, and the reciprocating needle 34, the lower loopers 36 and 38, and the lateral looper 40, all of which may suitably be arranged in multiples as illustrated.

The reciprocating needles 34 are arranged in a needlehead 42 formed at the extending end of an overhanging arm portion 44 of an upstanding stock 46 mounted at the rear portion of the work support 30. A drive shaft 48 is supported longitudinally in the overhanging arm portion 44 and carries the usual hand wheel 50 and driving sheave 52. The reciprocating needles 34 are carried in the needlehead 42 by a needle bar 54, which has a mounting block 56 at its lower end for the needles 34, and which is reciprocated in the usual manner from a crank plate 58 arranged at the forward end of the drive shaft 48.

The lateral looper 40 is carried at the lower end of a supporting bar 60, which is mounted on the needlehead 42 in a support bracket 62 for rocking and oscillating movement as described in the previously mentioned copending Williams application. The rocking motion of the support 60 results in moving the lateral looper 40 toward and away from the needles 34 to take and form the trained loops 22, and the oscillating movement shifts the extending end of the lateral looper 40 sufficiently in a transverse direction to clear the needle 34 as it moves forward to loop-forming position.

Suitable feed dogs 64 are also arranged on the work support 30 below the presser foot 32 for advancing the fabric base 18 through the machine as the doubled portions of the continuous pile yarn 16 are inserted, and these feed dogs are operated according to the present invention in timed relation with the reciprocation of the needles 34 so that the doubled portions of the continuous pile yarn 16 are inserted with a spacing substantially less than the length of the inserted loop 20 and trained loops 22 so that the random entanglement and interlocking of these loops is characteristically obtained.

I claim:

1. The method of forming a reversible pile fabric which comprises inserting doubled portions of a continuous pile yarn in a fabric base at closely spaced intervals to form loops extending from one face of said fabric base, holding each inserted loop against withdrawal while training a succeeding portion of said yarn to form a loop on the opposite face of said fabric base, holding each trained loop against withdrawal while inserting the succeeding doubled pile yarn portion in said fabric base, and pulling each trained loop while held to a position extending laterally toward the trained loops already formed, the spacing of said inserted loops in said fabric base being substantially less than the length of either said inserted loops or said trained loops, whereby each trained loop upon release tends to become entangled with trained loops already formed or to become interlocked with succeeding trained loops as they are formed and thereby prevent withdrawal of said continuous pile yarn from said fabric base.

2. The method of forming a reversible pile fabric which comprises inserting succeeding doubled portions of a continuous pile yarn contiguously in rows in a fabric base to form loops extending from one face of said fabric base, holding each inserted loop at a predetermined length against withdrawal while training a succeeding portion of said yarn to form a loop on the opposite face of said fabric base, holding each trained loop at a predetermined length against withdrawal while inserting the succeeding doubled pile yarn portion in said fabric base, pulling taut each trained loop while held to a position extending laterally toward the trained loops already formed, and releasing each tautly trained loop before training of a succeeding trained loop is commenced, the spacing of said inserted loops in the rows thereof being substantially less than the length of either said inserted loops or said trained loops, whereby each trained loop upon release tends to become entangled with trained loops already formed or to become interlocked with succeeding trained loops as they are formed and thereby prevent withdrawal of said continuous pile yarn from said fabric base.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,482,683	Moore	Sept. 20, 1949