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PILE FABRIC LOOM

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ABSTRACT OF THE DISCLOSURE

A carpet loom comprising means for shedding ground warps, means for inserting wefts into ground warp sheds, means for supplying pile yarns, warpwise-extending stationary pile wires, a plurality of movable flexible pile yarn positioners for engaging the pile yarns and moving a portion of the pile yarn alternately into a position below the point at which the wefts are inserted and into a position above a portion of the pile wires, a weftwise movable member for engaging the positioners and flexing them to move their parts in engagement with the pile yarns weftwise alternately from one side to the other of the pile wires to cause the pile yarns to form loops over the pile wires, and a reed for beating the wefts to the fell.

The present invention relates to a loom for the manufacture of pile fabric, such as pile fabric floor covering, and more particularly to such a loom wherein the pile is formed over stationary warpwise extending pile wires.

Pile fabric looms of the general character described are known, for example as disclosed in the Park et al. Patent 2,896,671. The present invention provides a loom of this character which is improved in that it may be operated at greater speed and is free from certain causes for loom stoppage which were inherent in prior loom constructions.

An object of the invention is to provide a pile fabric loom, wherein, the pile is woven over stationary warpwise extending pile wires from pile warp yarns, which may be operated at increased speed.

A further object of the invention is to provide a pile fabric loom of this character in which there is substantially no possibility of a pile yarn being inserted into the backing on the wrong side of a ground warp.

A further object of the invention is to provide a pile fabric loom employing longitudinally extending stationary pile wires which is so constructed as to afford reliable and relatively trouble-free operation.

Other objects, features and advantages of the invention will become apparent from the following description of an illustrative embodiment thereof in which description reference is made to the accompanying drawing, wherein—

FIG. 1 is a side elevation of the principal operating parts of the loom, partly in section and somewhat diagrammatic.

FIG. 2 is a vertical sectional view taken on line 2—2 of FIG. 1.

FIG. 3 is a bottom plan view of the fabric produced by the loom diagrammatically showing the appearance of the back of the fabric,

FIG. 4 is a warpwise sectional view of the fabric, with the wefts more widely separated than in the completed fabric for clarity of-illustration of the fabric construction, and

FIG. 5 is a detail side elevation showing a modification of the pile wire.

In accordance with the invention there is provided a loom for weaving pile fabrics including mechanism for supplying ground warp threads to the weaving point, means such as heddles for engaging ground warp threads

for shedding them, mechanism, typically a needle of the Axminster type, for inserting wefts into the ground warp sheds, means such as a beam for supplying a warp of pile warp yarns to the weaving point, warpwise-extending pile wires, over which the pile yarns are looped to form the pile, together with movable flexible pile yarn positioners, one for each pile yarn, engaging the pile yarn and movable to position a portion of the pile yarn adjacent the fell alternately into a position below the point at which the weft shots are inserted and into a position above a portion of the pile wire over which the yarn is to be woven, together with means for engaging the pile yarn positioners and flexing them so as to move the part thereof in engagement with the pile yarn weftwise alternately to one side or the other of the pile wire to cause the pile yarn to be looped over the pile wire between successive descents into the backing fabric to be looped under a weft, together with a reed for beating the wefts and associated pile yarn to the fell of the woven fabric.

The pile in the finished fabric may remain in the form of loops or the pile wires may be provided with knives adjacent their free ends for severing the pile yarns to form pile tufts. It is preferred that the pile yarn positioners be constructed and arranged so that at least a part of the positioner remains between the same ground warp threads throughout its movement. Desirably the pile yarn positioners are mounted so as to extend through the heddles which raise and lower the ground warps. Preferably also the pile wires are supported on one side of the heddles and have their free ends on the other side of the heddles, intermediate portions of the wires passing through the heddles.

Each pile wire extends between two dents of the reed forming a pair of dents, these two dents being connected together at their upper ends, leaving spaces at the top of the reed between the adjacent pairs of dents into which the pile yarn positioners enter as they move into position to lower the pile yarns below the point at which the wefts are inserted. Preferably the threads of the ground warps pass through the reed between the pairs of dents.

Referring now to the drawing, the particular illustrative embodiment shown is essentially an Axminster loom in its basic structure, but modified in accordance with the invention. The loom comprises two spaced side frames, a portion of one of which appears at 2, connected by the usual transverse girths (not shown). The conventional breast beam 4 also extends between the side frames 2. Two warps 6, 8 of ground warp threads, in effect binder warp threads, are provided from a conventional source such as beams 7 and 9, respectively. The threads of ground warp 6 pass through the eye 10 of heddle 12 and the warp threads of ground warp 8 through eye 14 of heddle 16, whereby the ground warps 6, 8 are moved upwardly and downwardly to form sheds therebetween for the reception of the weft shots. The weft shots are inserted by a conventional Axminster loom needle 18. A warp of pile warp yarns 20 is supplied from a beam 21 to the weaving point. The completed fabric is drawn forward at 22 over the breast beam 4 by conventional take-up mechanism. A lay 24 of conventional construction carries a reed 26 through which the ground and pile warps pass and which is operated in the conventional manner as indicated by the arrow 27 to beat the wefts to the fell of the fabric.

The loom is provided with a transverse series of stationary pile wires 28, one for each pile yarn 20. The pile wires 28 are mounted on a transverse rod or bar 30 which has its opposite ends anchored in the respective side frames 2 of the loom. The bar 30 is located rearwardly of the heddles 12, 16 so that the pile wires 28 extend forwardly through the heddles and have their forward free ends 32 disposed above the breast beam 4. The free ends 32 of the

pile wires may be provided with cutters 33 for forming cut pile, as is well known in the art.

The dents of the reed 26 are arranged in pairs, as appears to best advantage in FIG. 2. The dent 34 constitutes one dent of a pair and the dent 36 the other dent of that pair, the two dents 34, 36 being connected to each other at their upper ends by a connecting portion 38. The next pair of dents, to the left in FIG. 2, comprises the dent 40 and the dent 42 connected together at the top by connecting portion 44. Adjacent dents 36 and 40 are not connected together at their tops, with the result that the space between the adjacent pairs of dents is open at the top. The pile wires 28 pass between the two dents (e.g. 34, 36) of a pair.

The pile wrap yarns 20 are operated by a series of pile yarn positioners 46, one for each pile yarn. The positioners 46 are in the form of flexible blades and are mounted on a transverse shaft 47 supported at its ends for rocking movement on the side frames 2. The positioners 46 are spaced along the shaft 47 by a distance equal to the spacing between pairs of reed dents, as appears in FIG. 2. Each positioner 46 is provided with an eye 48 adjacent its free end through which its pile yarn 20 reeves.

The pile yarn positioners 46 are adapted to be moved by oscillation of the shaft 47 through a bell crank 50 thereon and a pull rod 52 operated by a cam in timed relationship with the other loom movements. The pile yarn positioners 46 move between a lower position in which their free ends enter, as appears in FIG. 2, between pairs of reed dents, moving downwardly into the space between the connecting members 38 and 44, and an upper position as shown in dotted lines in FIG. 1. In their upper position the pile yarn positioners 46 enter the spaces between the teeth 54 which are carried on a transversely movable bar 56. The bar 56 is supported for sliding movement in a transverse fixed member 57 and is moved weftwise of the loom by a pull rod 58 operated through suitable connections by a cam in timed relationship with the other loom movements. The bar 56 in its transverse movement causes the free ends of the pile yarn positioners 46 to be moved by the teeth 54 transversely of the loom to flex the pile yarn positioners 46 and position their free ends to be opposite an open space between pairs of reed dents on one side or the other of the pile wire 28 with which the particular pile yarn positioner 46 is associated.

The operation of the loom is as follows: With the parts positioned as shown in full lines in FIG. 1, a double weft 18' is inserted by the needle 18 into the shed between the ground warps 6, 8. The pile yarns 20 are positioned beneath the weft inserting needle and the ground warp 6 is above the needle and the ground warp 8 below the needle. Upon withdrawal of the weft inserting needle, the pile yarn positioners 46 start their upward movement toward the dotted line position of FIG. 1, in which they enter between the teeth 54. At the same time, the lay 24 starts forward to cause the reed 26 to beat up the weft shot. When the reed completes its forward beat-up movement, the yarn positioners 46 are all the way up. The lay 24 then starts its rearward movement at which time the bar 56, with the pile yarn positioners 46 engaged by their free ends in the slots between the teeth 54, is shifted weftwise to cross the pile yarns 20 over the wires. When the reed 26 is all the way back, again in the full line position of FIG. 1, the pile yarn positioners 46 are brought down on the opposite side of the wires, bringing the pile yarns 20 which pass through the eyes 48 again into position beneath the needle 18. The heddles 12, 16 have in the meantime been operated to reverse the shed of the ground warps 6, 8. The completed fabric at 60 is drawn forward over the breast beam 4 by a conventional take-up mechanism. In this position the following weft 18' is inserted by the needle. In each cycle, the pile yarns 20 will be moved over the wires by the weftwise shift of the bar 56 in the direction opposition to that of its previous shift so that the pile yarns 20 are brought down on opposite sides of the pile wires 28 on successive descents of the

pile yarn positioners 46. Accordingly, a series of pile loops is formed over the pile wires 28 in each of the pile yarns 20 as they are laid over the pile wires in successive cycles.

The resulting fabric, as appears in FIGS. 3 and 4, comprises a warpwise series of pile loops 62 in each of the pile yarns 20 as each yarn is alternately looped under the double weft 18' and raised into a loop over the pile wire. Each pile yarn remains throughout between the same two pairs of ground warp threads 6, 8. The portions 64 of the yarn appearing on the back of the fabric, FIG. 3, are staggered within the course along which they extend due to having been looped beneath the weft 18' first on one side and then on the other side of the pile wire 28.

As the pile yarn positioners 46 are constructed and disposed in the loom so that at least a part of each positioner remains continuously between the same two pairs of ground warp threads, the pile yarns 20 are always brought down properly on the proper side of the ground warp threads. The closed ends 38, 44 of the pairs of dents help to prevent descent of the pile yarn positioners 46 in a wrong position. The ground warp threads 6, 8 and the pile yarns 20 all lead easily through the heddles and the pile yarn positioners and reed dents, without excessive change of direction at any point, so that none of the strands is subjected to extreme variation of tension during a cycle, which reduces the probability of yarn breakage. The pile yarn positioners keep the ground warps separated so that the pile yarns are easily operated as required. The various features of the loom as described above contribute to operation of the loom at higher speeds without difficulties.

I claim:

1. A loom for weaving pile fabrics comprising mechanism for supplying ground warp threads to the fell, means for engaging the ground warp threads for shedding them, mechanism for inserting wefts into ground warp sheds, mechanism for supplying a warp of pile yarns to the fell, warpwise extending pile wires, a plurality of movable flexible pile yarn positioners for engaging the pile yarns and moving a portion of the pile yarn alternately into a position below the point at which the wefts are inserted and into a position above a portion of the pile wires, a weftwise movable member for engaging the positioners and flexing them to move their parts in engagement with the pile yarns weftwise alternately from one side to the other of said pile wires to cause the pile yarns to form loops over said pile wires, other parts of the positioners remaining substantially stationary as respects weftwise movement during said flexing movement, and a reed for beating wefts to the fell.

2. The loom of claim 1 wherein said pile wires are provided with knives for cutting the pile loops to form pile tufts.

3. The loom of claim 1 wherein at least a portion of each pile yarn positioners remains between the same ground warp threads throughout its movement.

4. The loom of claim 1 wherein said pile yarn positioners extend between the means which engage the ground warp threads for shedding them.

5. The loom of claim 1 wherein said pile wires extend between the means which engage the ground warp threads for shedding them.

6. The loom of claim 1 wherein said reed includes dents, wherein each of said pile wires extends between the two dents of a pair of dents of the reed, wherein said pile yarn engaging portions of said positioners when in raised position are above the reed dents and wherein said pile yarn positioners when in lowered position enter between said pairs of dents of the reed.

7. The loom of claim 6 wherein the upper ends of the two dents of said pairs are connected to each other.

8. The loom of claim 7 wherein the threads of the ground warps pass between said pairs of dents.

9. The loom of claim 8 wherein the mechanism for inserting wefts is a reciprocating needle.

10. The loom of claim 9 wherein said pile wires extend

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between the means which engage the ground warp threads for shedding them.

11. The loom of claim 10 wherein at least a portion of each pile yarn positioner remains between the same ground warp threads throughout its movement.

12. The loom of claim 11 wherein said pile yarn positioners extend between the means which engage the ground warp threads for shedding them.

13. A loom for weaving pile fabrics comprising mechanism for supplying ground warp threads to the fell, means for engaging the ground warp threads for shedding them, mechanism for inserting wefts into ground warp sheds, mechanism for supplying a warp of pile yarns to the fell, warpwise extending stationary pile wires, a plurality of movable flexible pile yarn positioners for engaging the pile yarns and moving a portion of the pile yarn alternately into a position below the point at which the wefts are inserted and into a position above a portion of the pile wires, a weftwise moveable member for engaging the positioners and flexing them to move their parts in engagement with the pile yarns weftwise alternately from one side to the other of said pile wires to cause the pile yarns to form loops over said pile wires, at least a portion of each pile yarn positioner remaining between the same ground warp threads throughout its movement, and a reed for beating wefts to the fell.

14. The loom of claim 13 wherein said mechanism for inserting wefts into ground warp sheds is a reciprocating needle, said positioners and said pile wires extend between the means which engage the ground warp threads for shedding them, said reed includes dents, each of said pile wires extend between the two dents of a pair of dents of the reed, the upper ends of the two dents of said pairs are connected to each other, the threads of the ground warps pass between said pairs of dents, said pile yarn engaging portions of said positioners when in raised position are above the reed dents and said pile yarn positioners when in lowered position entered between said pairs of dents of the reed.

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