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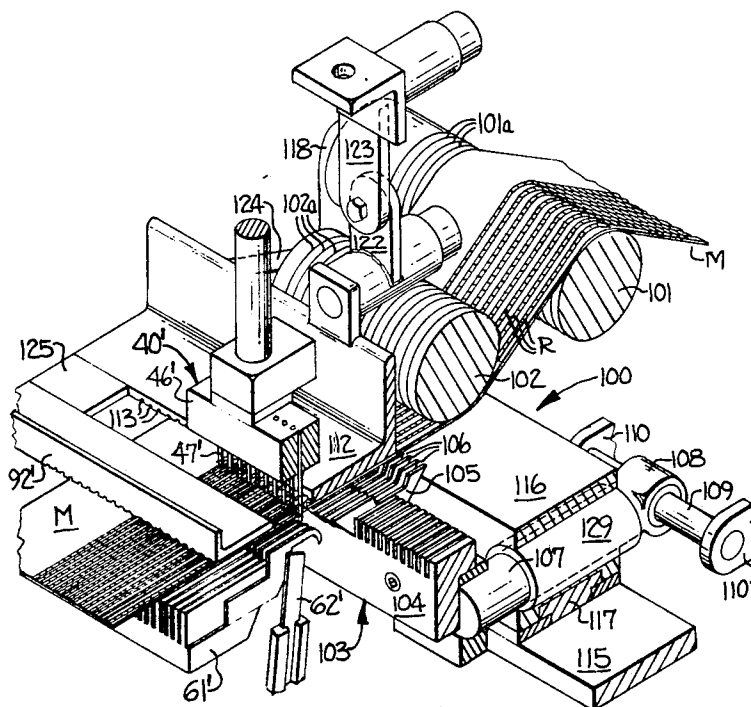
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[54] **TUFTING MACHINE FOR FORMING NARROW GAUGE PILE CARPETING**
14 Claims, 8 Drawing Figs.

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[51] Int. Cl. D05c 15/12,
D05c 15/28
[50] Field of Search. 112/79 R,
79 A, 266, 410

[56] **References Cited**
UNITED STATES PATENTS
2,679,218 5/1954 Jones 112/79 R
2,889,791 6/1959 Fedevich 112/79 R
3,282,235 11/1966 Crawford 112/79 R
3,301,205 1/1967 Card 112/79 R
3,396,687 8/1968 Nowicki 112/79 A

ABSTRACT: A tufting machine characterized in its ability to form narrow gauge pile carpeting and particularly narrow gauge cut pile carpeting comprising means for feeding elongate backing material longitudinally along a predetermined path, first and second spaced-apart rows of tufting needles mounted for reciprocation in a direction transverse to the path of the backing material and arranged to carry yarn through the backing material, pile forming means disposed beneath the path of the backing material and operatively associated with each of the needles, and additionally including tracking means disposed between the first and second rows of needles for guiding the backing material from the first row of needles to the second row of needles so that the rows of tufts formed by the first row of needles pass through the spaces between the needles of the second row of needles. Furthermore, the tracking means is mounted for lateral movement relative to the path of the backing material for effecting a corresponding lateral shifting of the backing material so that a zigzag pattern may be formed in the rows of tufts formed by said second row of needles.



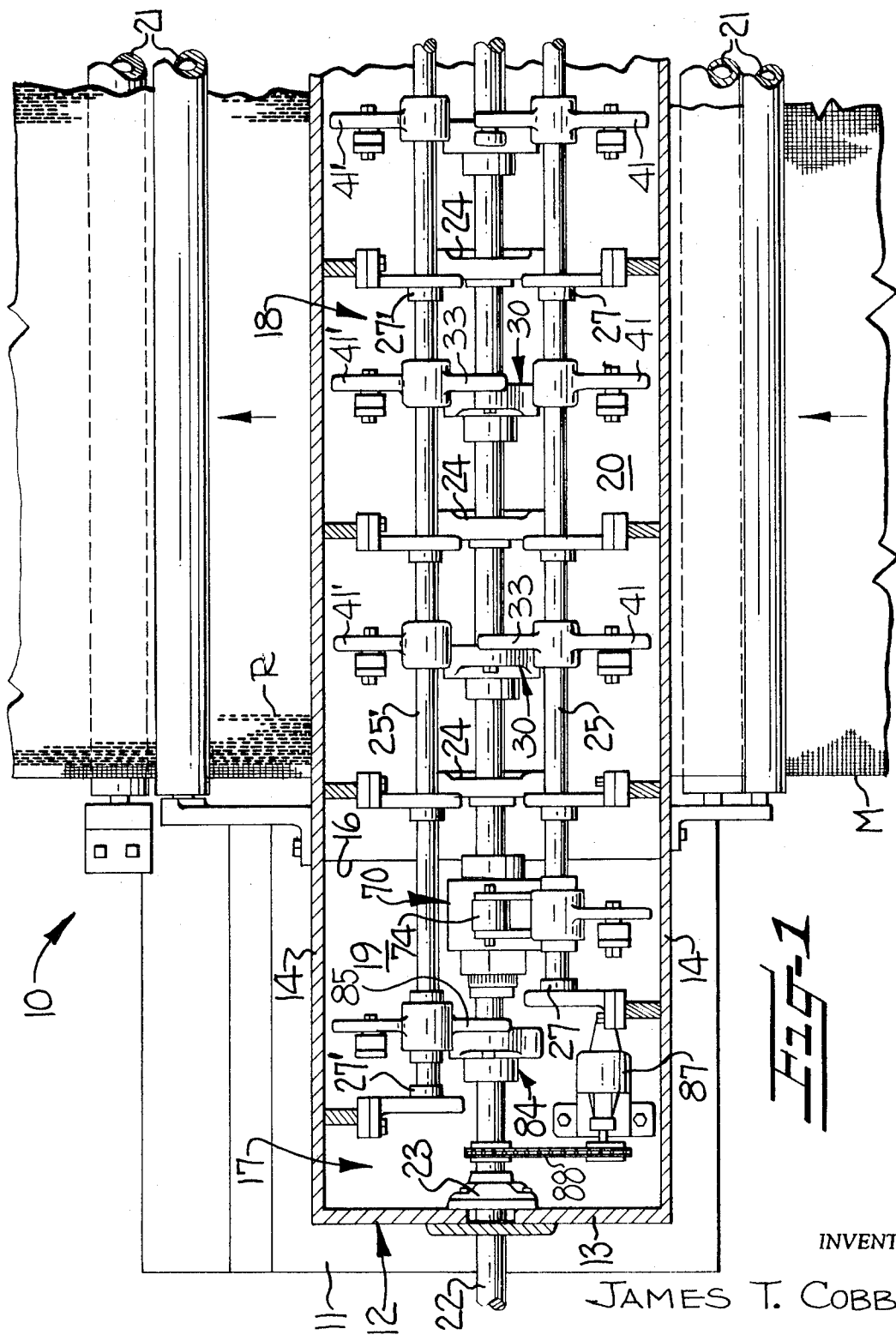


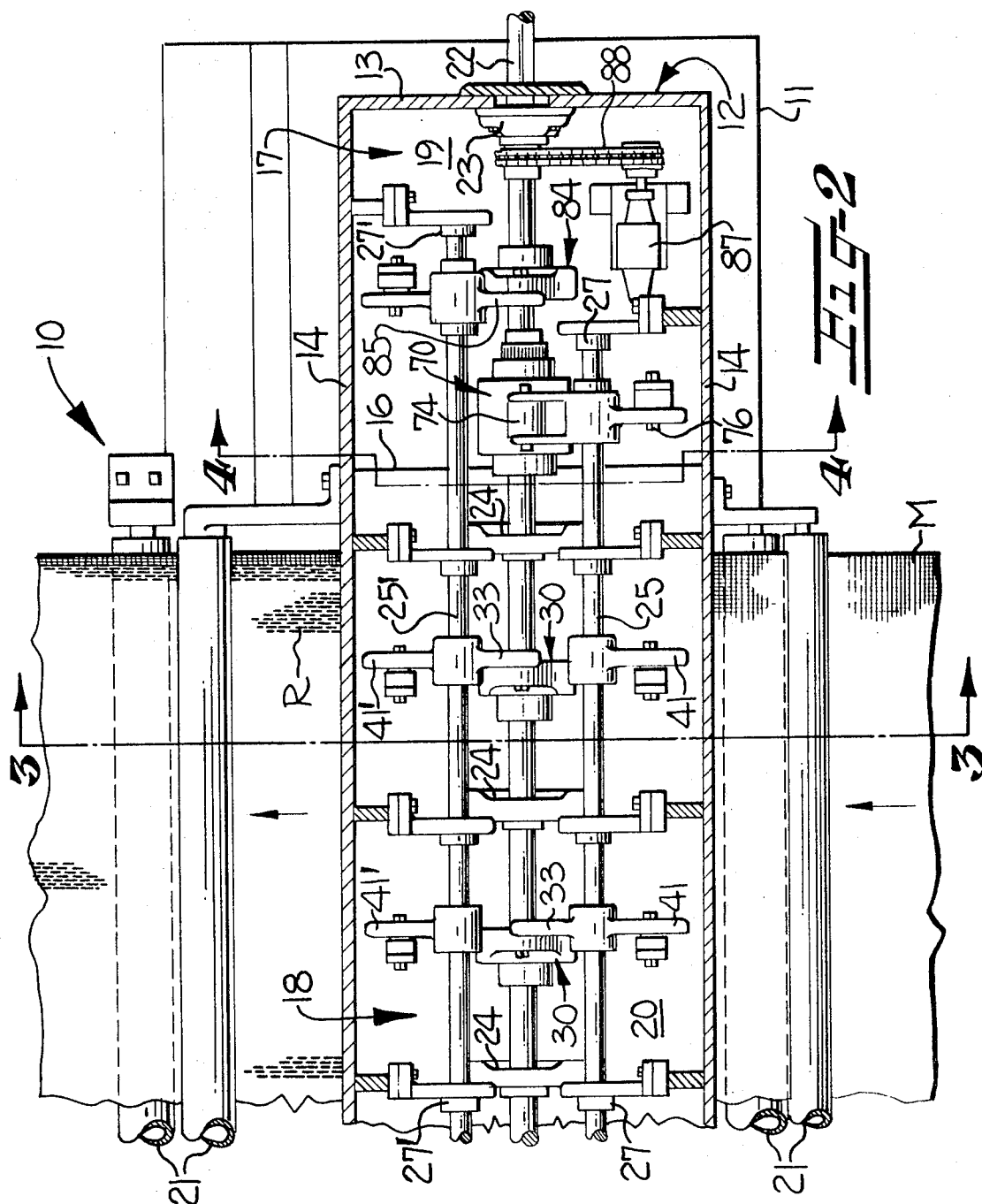
Fig. 1

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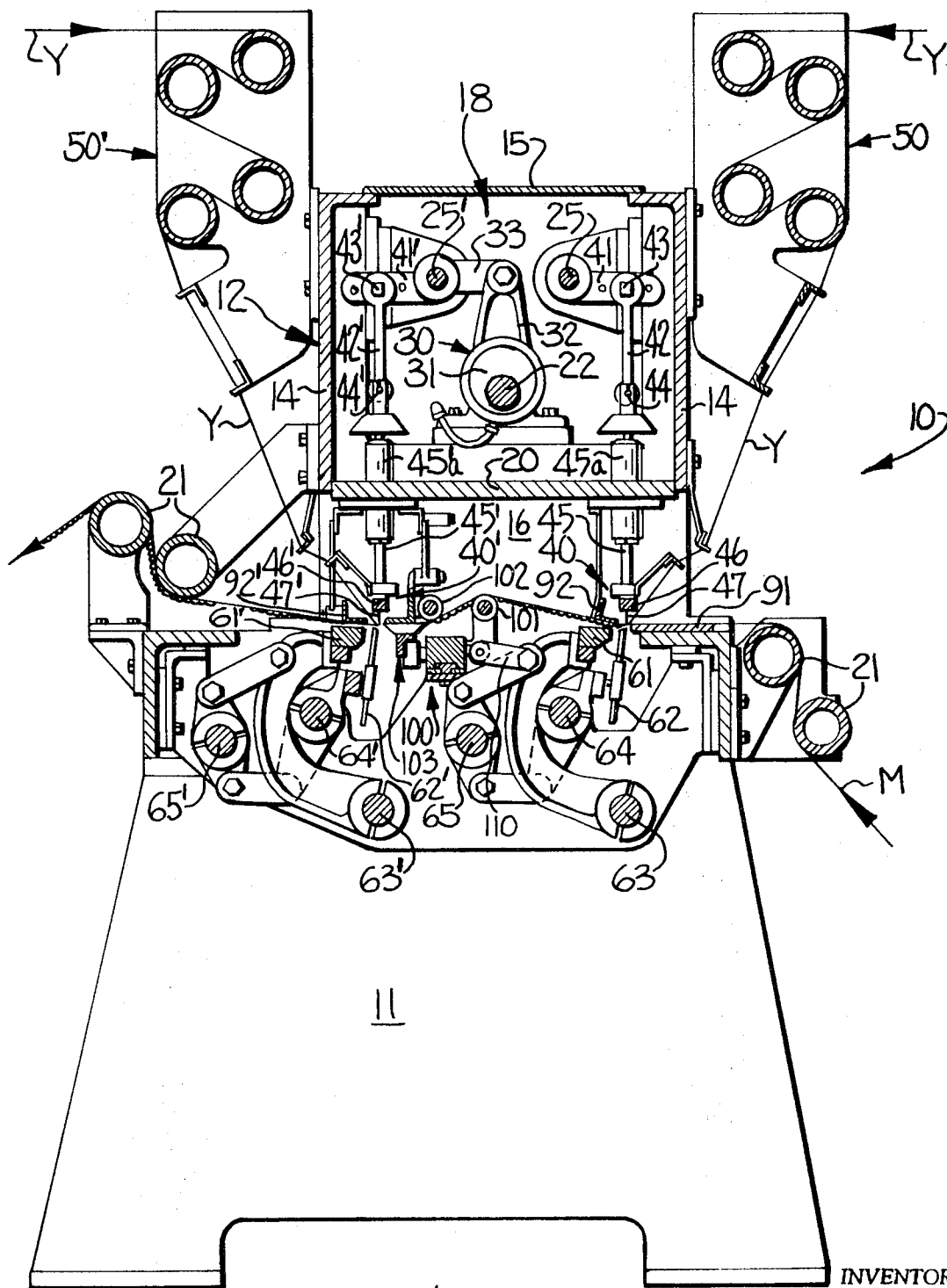
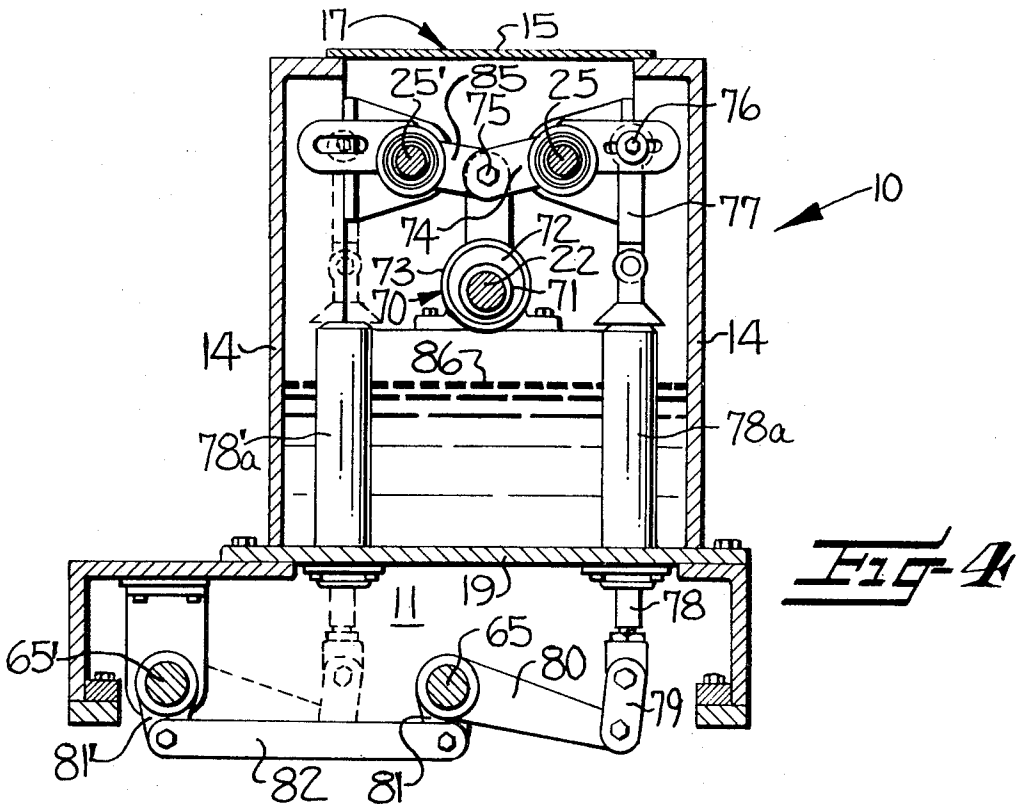
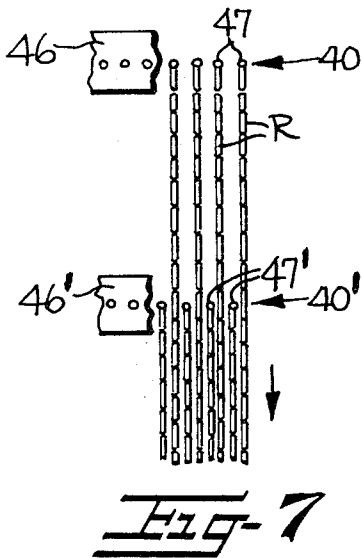
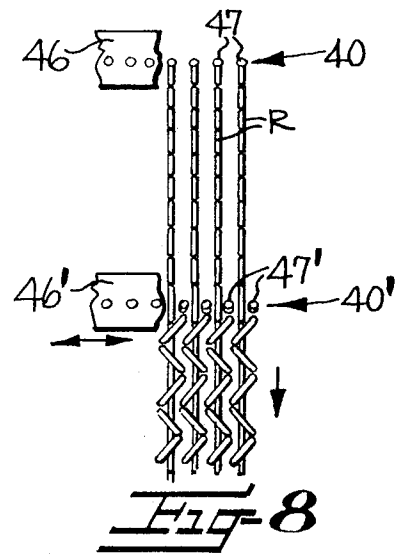


Fig-3

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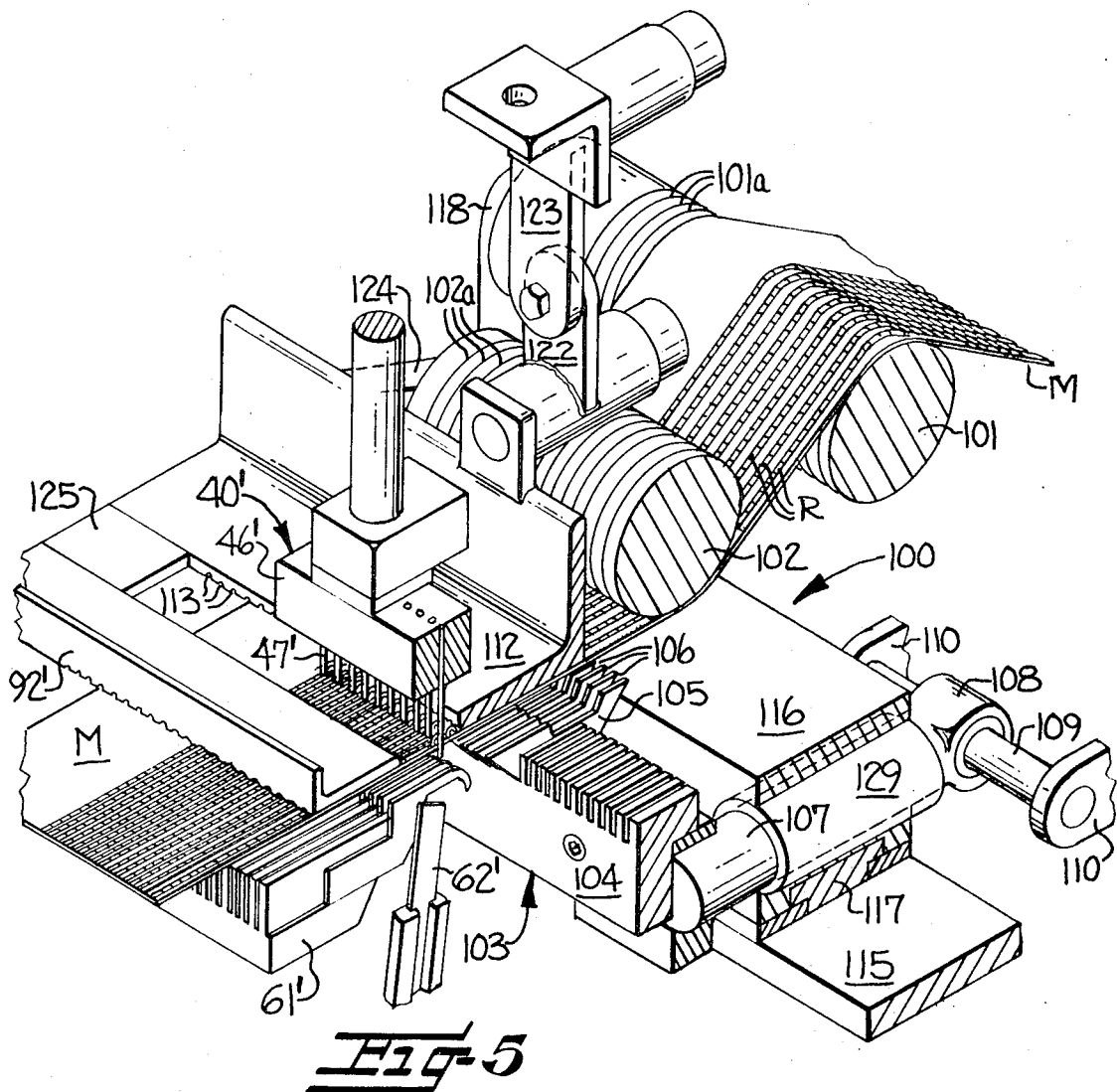
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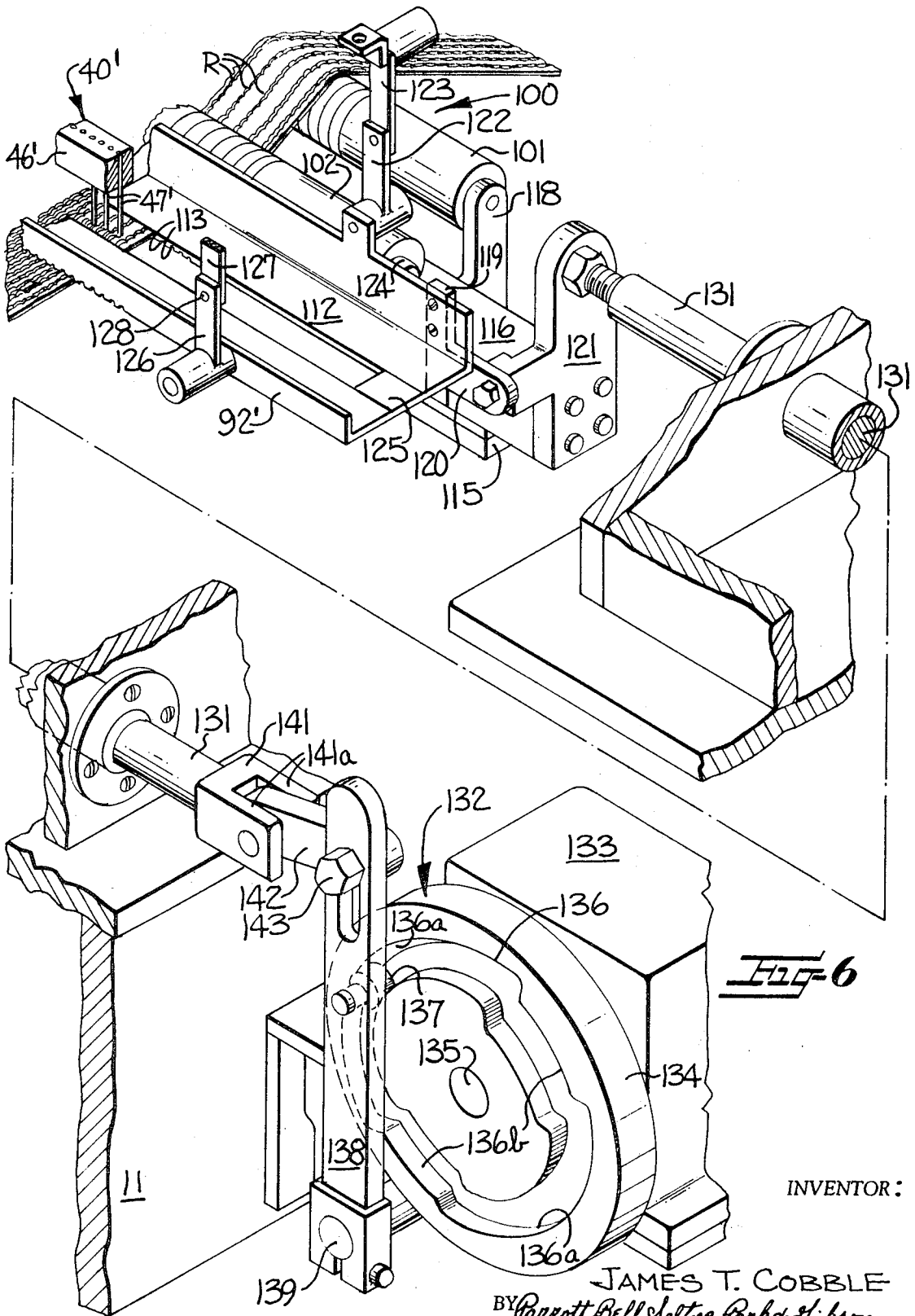


Fig. 6

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TUFTING MACHINE FOR FORMING NARROW GAUGE PILE CARPETING

This invention relates to a tufting machine for forming narrow gauge pile carpeting and the like and more particularly to a tufting machine for forming narrow gauge cut pile carpeting and the like.

The tufting industry has for many years been highly involved with the manufacture of pile carpeting of both the cut and loop type. Conventionally, a single row of laterally spaced needles have been employed. However, due to the physical limitations imposed in the lateral spacing of the pile forming instrumentalities cooperating with the needles, the gauge of pile carpeting formable with these tufting machines has been severely limited.

In tufting machines for forming narrow gauge pile carpeting of the loop type, these physical limitations have been overcome to some extent by employing closely spaced rows of tufting needles with the needles in each row being staggered so that a loop pile carpeting of a narrower gauge than possible with a single row of needles may be formed.

Heretofore, it has not been possible to form a satisfactory narrow gauge pile carpeting of the cut type. The pile forming instrumentalities for forming cut pile require considerably more space than the pile forming instrumentalities for forming loop pile and therefore narrow gauge cut pile cannot be formed by closely spaced rows of needles. The broad spacing necessitated between rows of needles by the cut pile forming instrumentalities has presented such problems of alignment of the backing material relative to the rows of needles that the production of an acceptable narrow gauge cut pile carpeting with tufting machines heretofore available has not been feasible.

Accordingly, it is an object of the present invention to provide a tufting machine for forming acceptable narrow gauge cut pile carpeting in a feasible manner.

It is another object of this invention to provide a tufting machine having spaced apart rows of tufting needles wherein means are provided for guiding the backing material between the rows of needles and for properly presenting the backing material to the second row of needles for tufting.

Another object of this invention is to provide a tufting machine having spaced apart rows of tufting needles wherein, in addition to having means for guiding the backing material between the rows of needles, there is provided means for laterally shifting the backing material between the rows of needles.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which:

FIGS. 1 and 2 combined are a top plan view with parts in section of a tufting machine of the present invention;

FIG. 3 is a sectional view taken substantially along the line 3-3 of FIG. 2;

FIG. 4 is a sectional view taken substantially along the line 4-4 of FIG. 2;

FIG. 5 is a perspective view with parts in section and other parts broken away illustrating means for guiding the backing material;

FIG. 6 is a perspective view with parts broken away illustrating means for laterally shifting the backing material; and

FIGS. 7 and 8 are enlarged schematic top plan view of portions of the stitch side of backing material illustrating rows of tufts that may be formed with the tufting machine of the present invention.

Referring more specifically to the drawings wherein like reference characters are used to indicate like parts, there is illustrated in the various Figures a tufting machine, generally indicated at 10, incorporating the features of the present invention. As shown in FIGS. 1-3, the tufting machine 10 includes spaced-apart vertical frame members 11 supportable from any horizontal surface such as the floor of a building or the like

and which provide support for a housing 12 extending horizontally therebetween. Housing 12 comprises end walls 13, sidewalls 14 and top wall 15 (FIG. 3) and is divided by vertical partitions 16 (FIGS. 1 and 2) to include end portions 17 (FIG. 4) and a central portion 18 (FIG. 3). Each of the end portions 17 additionally include a bottom wall 19 and the central portion additionally includes a bottom wall 20, walls 19 and 20 being disposed at different elevations.

An elongate backing material *M* is tautly gripped and longitudinally advanced along a predetermined path beneath the central portion 18 of housing 12 and between vertical frame members 11 by means of a plurality of spike or feed rolls 21, FIG. 3, one or all of which may be positively driven by any conventional drive means (not shown).

A drive shaft 22 hereinafter referred to as the "main drive shaft" extends through the housing 12 and is journaled in the end walls 13 by suitable bearings 23 and is additionally supported throughout the central portion 18 of housing 12 by other suitably spaced bearings 24 which are mounted from the bottom wall 20 thereof. The main drive shaft 22 is continuously driven by any conventional drive means (not shown) and preferably at both ends to insure positive rotation thereof at all times. Additional rotatable shafts 25 and 25' are disposed parallel to the main drive shaft 22 on opposite sides thereof and while not being journaled in the end walls 13 of the housing 12 are mounted within the housing 12 by suitably spaced bearings 27 and 27' respectively, which are carried by the sidewalls 14 of housing 12.

The main drive shaft 22 has mounted thereon a plurality of spaced needle drive cams 30 each of which include, FIG. 3, an eccentric disc 31 mounted on the main drive shaft 22 for rotation therewith and strap or cam follower 32 surrounding eccentric disc 31. Each of the cams 30 has the strap 32 pivotally connected to a needle rocker arm 33, which rocker arms are alternately, FIGS. 1 and 2, connected to shafts 25 and 25' so that rotation of main drive shaft 22 oscillates shafts 25 and 25' to impart a reciprocating motion to the needle mechanism to be hereinafter described.

The needle mechanism of the tufting machine 10 of the present invention comprises first and second spaced-apart rows 40 and 40' of tufting needles mounted for reciprocation in a vertical direction transverse to the path of the backing material *M* and arranged to carry yarns *Y* through the backing material *M*. More particularly, shafts 25 and 25' have at spaced intervals rocker arms 41 and 41', respectively, mounted thereon for oscillation therewith. The rocker arms 41 and 41' are rigidly connected to needle drive bar connecting links 42 and 42' as at 43 and 43' which are pivotally connected as at 44 and 44' to needle drive bars 45 and 45'. Needle drive bars 45 and 45' are mounted through the bottom wall 20 of the central portion 18 of housing 12 in needle drive bar housings 45a and 45a' in spaced-apart relation to each other for reciprocating linear movement in a vertical direction transverse to the longitudinal path of the backing material *M*. Needle bars 46 and 46' have a plurality of conventional tufting needles 47 and 47' positioned therein respectively and are mounted on the free ends of needle drive bars 45 and 45' with the needles arranged in spaced-apart rows. Upon rotation of main drive shaft 22 the rows of needles 40 and 40' reciprocate in a direction transverse to the path of the backing material *M*. Preferably, the needles 47 and 47' are uniformly and equally spaced with the needles 47' being staggered relative to the needles 47. In addition, the needles 47 and 47' are arranged relative to the backing material *M* to penetrate the backing material *M* during reciprocation. Each of the needles 47 and 47' have yarn *Y* continuously fed thereto from any conventional source (not shown) through a conventional tension control and guide means, generally indicated at 50 and 50'. Thus, upon penetration of the backing material *M* by the needles 47 and 47', the yarns *Y* are carried through the backing material *M*.

Pile forming means are disposed beneath the path of the backing material *M* and are operatively associated with each

of the needles 47 and 47' for forming rows of tufts *R* in the backing material *M* with the yarns *Y* carried by the needles 47 and 47'. Preferably and as illustrated in FIGS. 3 and 4, the pile forming means forms cut pile and comprises loopers 61 and 61' operatively associated with needles 47 and 47', respectively, and operative when the needles penetrate through the backing material *M* for catching the loops of yarn, and knives 62 and 62' operatively associated with loopers 61 and 61', respectively, for severing the loops to form cut pile.

More particularly, below each row of needles 40 and 40' and beneath the backing material *M* are looper shafts 63 and 63' having conventional loopers 61 and 61' and knife shafts 64 and 64' having conventional knives 62 and 62'. The drive for the loopers 61 and 61' and knives 62 and 62' comprises looper and knife drive shafts 65 and 65', respectively, which are drivingly connected with the looper shafts 63 and 63' and knife shafts 64 and 64' for actuation of the loopers 61 and 61' and knives 62 and 62' in predetermined timed relationship to the reciprocation of the needles 47 and 47' to form rows of tufts *R* with the yarns *Y* carried by the needles 47 and 47' through the backing material *M* as best illustrated in FIG. 3.

The drive for looper and knife drive shafts 65 and 65' is best illustrated in FIGS. 1, 2 and 4 and comprises a pair of looper and knife drive cams 70 mounted on main drive shaft 22 in each of the end portions 17 of housing 12 and each includes a timing hub 71 adjustably mounted on shaft 22 for rotation therewith, an eccentric disc 72 mounted on timing hub 71 and surrounded by a strap or cam follower 73 which is pivotally connected to one end of a rocker arm 74 and 75. The rocker arms 74, FIGS. 1, 2 and 4, are pivotal intermediate their lengths about shaft 25. The free ends of rocker arms 74 are adjustably attached as at 76 to connecting links 77 which are in turn pivotally connected to drive rods 78. The drive rods 78 are mounted through the bottom wall 19 of end portions 17 of housing 12 in drive rod housings 78a for reciprocating linear movement in a vertical direction transverse to the path of the backing material *M*. The end of the drive rods 78 have links 79 pivotally connected thereto which are in turn pivotally connected to jack levers 80 that are fixed to the looper and knife drive shaft 65. The looper and knife drive shafts 65 and 65' are interlocked for synchronized oscillation at each end by arms 81 and 81', one of which is shown in FIG. 4, that depend from shafts 65 and 65' and pivotal connecting links 82 extending between the ends of arms 81 and 81'.

Thus, the rotation of main drive shaft 22 oscillates the looper and knife drive shafts 65 and 65' to oscillate looper shafts 63 and 63' and knife shafts 64 and 64' to actuate the loopers 61 and 61' and knives 62 and 62' to form cut pile with the yarns *Y* carried by the needles 41 and 41'. It will be understood that the timed operation of the loopers 61 and 61' and knives 62 and 62' in respect to the reciprocation of needles 41 and 41' may be adjusted and controlled by properly adjusting timing hub 71 on main drive shaft 22. Furthermore, the amount of movement of the loopers 61 and 61' may be adjusted by adjusting the effective length of rocker arm 74 and 74'. Thus, loops of the desired characteristics may be formed by control of the latter two adjustments. If desirable, the knives 62 and 62' may be rendered inoperative and the loopers reversed in a conventional manner to form loop pile.

To insure positive driving of the looper and knife drive shafts 65 and 65', a pair of supplementary or optional looper and knife drive cams 84, FIGS. 1, 2 and 4, substantially identical to cams 70 are mounted on main drive shaft 22 in each of the end portions 17 of housing 12 and includes a rocker arm 85 pivotal intermediate its length about shaft 25' through a drive rod housing 78a' drivingly connected to looper and knife drive shafts 65 and 65' in a manner equivalent to cams 70. A portion of these connections are illustrated in phantom lines in FIG. 4 and since they are identical to that for cams 70 will not be described.

With reference to FIGS. 1, 2 and 4 the end portions 17 of housing 12 contain oil supply 86 which is circulated to the various bearings 23, 24, 27 and 27' and cams 30, 70, and 84

through suitable means (not shown) by oil pumps 87 to lubricate the various moving parts thereof. The pumps 87 are driven by main drive shaft 22 through pulley and belt assemblies 88.

To facilitate penetration of needles 47 of row 40 through the backing material *M*, a conventional throat plate 91 is provided beneath the backing material *M* in supporting relation thereto adjacent the needles 47 and supports the backing material *M* as they penetrate therethrough. In addition, a conventional stripper bar 92 is disposed above the path of the backing material *M* in stripping relation thereto adjacent the needles 47 and causes the backing material *M* to be stripped from the needles 47 as they rise to prevent rising of the backing material *M* with the needles 47. Preferably, the stripper bar 92 includes laterally extending grooves (not shown) disposed in matching relation to the row of tufts *R* formed by the needles 47 in row 40 for guiding the rows of tufts *R* formed by needles 47 toward the second row of needles 40'. The needles 47' in the second row 40' have a similar stripper bar 92' to the hereinafter more fully described operatively associated therewith to facilitate in stripping the backing material *M* therefrom as the needles 47' rise. However, the needles 47' in the second row 40' preferably do not have a conventional throat plate associated therewith but instead have specially designed backing material support means operatively associated therewith also to be hereinafter more fully described.

Tracking means 100 is provided between the first and second row of needles 40 and 40' for guiding the backing material *M* from the first row of needles 40 to the second row of needles 40' so that the rows of tufts *R* formed by the first row of needles 40 will pass between the needles 47' of the second row of needles 40'. The novel tracking means of the present invention is best illustrated in FIGS. 3 and 5 and comprises first and second rotatable tracking rolls 101 and 102 disposed on either side of the backing material *M* between the first and second rows of tufting needles 40 and 40' and extending transversely thereof in pressing engagement with the backing material *M* for rotation thereby. Each of the tracking rolls 101 and 102 includes circumferentially extending, axially spaced grooves 101a and 102a, respectively. The spacing of the grooves 101a and 102a corresponds with the spacing of the needles 47 in the first row of needles 40 for receiving the pile and stitch side of the rows of tufts *R* formed by the first row of needles 40, respectively. The tracking rolls 101 and 102 are disposed in cooperating relation with each other, that is, with the grooves 101a and 102a aligned relative to each other whereby the pile side of the rows of tufts *R* will be received by the grooves 101a of tracking roll 101 and the stitch side of the rows of tufts *R* will be received in the grooves 102a of tracking roll 102. Furthermore, the tracking rolls 101 and 102 are preferably positioned with the grooves 101a and 102a aligned with the needles 47 of the first row 40 and staggered relative to the needles 47' of the second row 40'. Thus, as the backing material *M* passes between the rows of needles 40 and 40' the backing material *M* will be guided in a substantially straight line longitudinally of the backing material whereby the second row of needles 40' will form rows of tufts *R* between the rows of tufts *R* formed by the first row of needles 40. Accordingly, it is readily apparent that a cut or loop pile carpeting can be manufactured employing the tracking rolls of the present invention to form a narrow gauge carpeting having a gauge much narrower than that possible with a single row of needles and which alleviates the problems heretofore encountered of guiding the backing material between rows of tufting needles.

In addition, the tracking means 100 includes a backing material support means 103 disposed beneath the path of the backing material *M* between the first and second row of needles 40 and 40' closely adjacent the second row of needles 40' in supporting relation to the backing material *M* for supporting it as the needles 47' penetrate therethrough. Preferably, the backing material support means 103 includes longitudi-

dinally extending, laterally spaced grooves spaced correspondingly with the spacing of the needles 47 in the first row of needles 40 for receiving the pile side of the rows of tufts *R* formed by the first row of needles 40 and supplementing the tracking rolls 101 and 102 for guiding the backing material *M* between the rows of needles 40 and 40'. As illustrated in FIG. 5 the backing material support means 103 comprises a bar 104 having a plurality of thin plates 105 mounted thereon in spaced relation and extending upwardly into supporting relation to the backing material *M* and defining grooves 106 therebetween corresponding to the spacing of the needles 47 in the first row of needles 40.

To further improve the effect of the backing material support means 103 in both supporting the backing material *M* as the needles 47' penetrate therethrough and for guiding the backing material *M*, the backing material support means 103 is mounted for longitudinal movement relative to the backing material *M* toward and away from the second row of needles 40' in timed relationship with the reciprocation of the needles 47' in the second row 40' to be immediately adjacent to the needles 47' as the needles penetrate the backing material *M* and to be away from the needles 47' after penetration so as not to interfere with the operation of the loopers 61' and knives 62'. In particular, a longitudinally extending shaft 107 has one end thereof connected to support bar 104 and the other end has a collar 108 carried thereby which surrounds a shaft 109 extending transversely of the path of the backing material *M* and which is connected by crank arms 110 to the looper and knife drive shaft 65 as illustrated in FIGS. 3 and 5. Thus, the backing material support means 103 is mounted for longitudinal movement toward and away from the second row of needles 40' and will be so moved by the oscillation of looper and knife shaft 65' in the required timed relationship.

A stripper member 112 is mounted above the path of the backing material *M* between the first and second row of needles 40 and 40' adjacent the second row of needles 40' directly above the backing material support means 103. The stripper member 112 includes longitudinally extending, laterally spaced grooves 113 and cooperates with the backing material *M* and backing material support means 103 for maintaining the pile side of the rows of tufts *R* formed by the first row of needles 40 in the grooves 106. The grooves 113 are spaced according to the spacing of the needles 47 in the first row of needles 40 and thus, receive the stitch side of the rows of tufts *R* formed by the first row of needles 40.

The tracking rolls 101 and 102, the backing material support means 103 and stripper member 112 in addition to being disposed for building the backing material *M* are mounted for lateral movement to and fro relative to the path of the backing material *M* and parallel to the backing material *M* relative to the second row of needles 40' whereby a zigzag pattern may be formed by the rows of tufts *R* formed by the second row of needles 40'.

In particular, a support plate 115 is mounted beneath the path of the backing material *M* and extends transversely thereof and is supported (not shown) from vertical frame members 11 in any conventional manner. A mounting bar 116 is slidably mounted as at 117 on support plate 115 for linear movement in a direction, as indicated, transverse to the path of the backing material *M*. Tracking roll 101, FIG. 6, is journaled at opposite ends in arms 118 (only one of which is shown) carried by mounting bar 116. Stripper member 112, previously described, is also mounted at opposite ends through connecting members 119 and 120 to a drive plate 121 which is in turn carried by mounting bar 116. Stripper member 112 is additionally supported from above at spaced points intermediate its length by links 122 and 123, FIGS. 3, 5 and 6, from the bottom wall 20 of the central portion 18 of housing 12. The links 122 and 123 are pivotally connected whereby the stripper member 112 may be moved laterally to and fro a limited amount. Tracking roll 102, FIG. 6, is journaled at opposite ends in arm 124 (only one of which is

shown) which extends from stripper member 112. In addition it will be noted in FIG. 6 that the stripper bar 92' is connected at opposite ends to stripper member 112 by joining plates 125 (only one of which is shown). The stripper bar 92' is additionally supported from above at points intermediate its length by links 126 and 127 from the bottom wall 20 of the central portion 18 of housing 12. The links 126 and 127 are pivotally connected as at 128 whereby the stripper member bar 92' may be moved laterally to and fro with stripper member 112. Thus, the tracking rolls 101 and 102, the stripper member 112 and stripper bar 92' are interconnected with mounting bar 116 for lateral movement to and fro therewith.

The backing material support means 103 in addition to being mounted for longitudinal movement relative to the path of the backing material *M* is mounted for movement laterally to and fro with mounting bar 116. As illustrated in FIG. 5, connecting shaft 107 is slidably mounted in a collar 129 that is mounted through mounting bar 116 longitudinally relative to the path of the backing material *M*. Accordingly, upon lateral shifting of the mounting bar 116, connecting shaft 107 is likewise shifted to shift the backing material support means 103. It will be noted that the lateral shifting of the backing material support means 103 in no way interferes with the longitudinal shifting thereof.

To laterally shift the mounting bar 116, a reciprocating drive shaft 131 is drivingly connected to drive plate 121 parallel with mounting bar 116. Reciprocating shaft 131 may be driven by any conventional reciprocating drive means. A typical drive means generally indicated at 132 is shown in FIG. 6. Drive means 132 comprises a motor 133 and drive cam 134 concentrically mounted on the output shaft 135 of motor 133. Drive cam 134 is of the dwell type and includes a groove 136 having opposed dwell regions 136a and opposed drive regions 136b. A cam follower 137 is disposed in groove 136 and follows the groove through the dwell regions 136a and drive regions 136b as the cam rotates.

The motion of cam follower 137 is transmitted to reciprocating drive shaft 131 by lever 138 which is connected to cam follower 137 intermediate its length. One end of lever 138 is mounted for pivotal movement as at 139 in a plane parallel to reciprocating shaft 131. The other end of lever 138 is drivingly connected to shaft 131 for imparting reciprocating movement thereto. More particularly, drive shaft 131 has a bifurcated member 141 mounted on the end thereof furthest from drive plate 121 and includes opposed leg portions 141a. A connecting link 142 has one end thereof pivotally connected to the bifurcated member 141 between leg portions 141a while the other end is adjustably connected to lever 138 as at 143. Thus, as drive cam 134 rotates cam follower 137 will cause lever 138 to pivot back and forth about pivot 139 so as to reciprocate drive shaft 131 which in turn reciprocates mounting bar 116. It will be readily apparent that connecting link 142 may be adjusted relative to lever 138 to limit the reciprocating movement imparted to drive shaft 131.

In the operation of the tufting machine 10, the elongate backing material *M* is continuously or intermittently fed by spike or feed rolls 21 along a predetermined longitudinal path of travel from right to left in FIG. 3 beneath the spaced-apart rows of needles 40 and 40'. The needles 47 and 47' reciprocate in a direction transverse to the path of the backing material *M* and carry yarns *Y* through the backing material *M* where loopers 61 and 61' and knives 62 and 62' cooperate with the needles for forming rows of tufts *R* of the cut pile type in the backing material *M*.

If the tufting machine 10 is to be used to form narrow gauge pile carpeting, the tracking means 100 is positioned to guide the backing material between rows of needles 40 and 40' whereby the rows of tufts *R* formed by the first row of needles 40 will pass between needles 47' in the second row 40'. In this way, the second row of needles 40' will form rows of tufts *R* between the rows of tufts *R* formed by the first row of needles 40 as best illustrated in FIGS. 5 and 7 to produce a carpeting having a gauge twice as narrow as possible with the first row of

needles 40 alone. It is apparent that the pile side of the rows of tufts *R* formed by the first row of needles 40 will be received in the grooves 101a of tracking roll 101 and the stitch side will be received in the grooves 102a of tracking roll 102. Due to the pressure these rolls 101 and 102 maintain against the backing material *M* the backing material *M* will be guided from the first row of needles 40 to the second row of needles 40' so that the rows of tufts *R* formed therein will pass between the needles 47' in the second row 40'. Similarly, the backing material support means 103 and stripper member 112 will insure that the rows of tufts *R* formed by the first row of needles 40 remain between the needles 47' as the backing material *M* passes beneath the second row of needles 40'. Thus, the tracking means 100 between the first and second row of needles 40 and 40' eliminates guiding problems heretofore encountered in forming narrow gauge carpeting with a tufting machine and particularly narrow gauge cut pile carpeting.

If the tufting machine 10 is to be used to form a zigzag pattern with the rows of tufts *R* formed by the second row of needles 40', the tracking means 100 is shifted laterally to and fro in the desired manner in timed relationship to the reciprocation of second row of needles 40' to effect a corresponding lateral shifting of the backing material *M* relative to the second row of needles 40'. By reciprocation of the tracking means 100 in this manner, a carpeting will be produced having rows of tufts *R* similar to that illustrated in FIG. 8 wherein the rows of tufts *R* formed by the second row of needles 40' form a zigzag pattern.

While the tufting machine 10 of the present invention has been described for forming cut pile, it will be readily apparent that loop pile or combinations of cut and loop pile may be formed. In addition, the characteristics of both the cut and loop pile may be effected by making minor adjustments well known in the art.

In the drawings and specification there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation:

What I claim is:

1. In a tufting machine for forming narrow gauge pile carpeting or the like, means for feeding elongate backing material longitudinally along a predetermined path, first and second spaced-apart rows of spaced tufting needles mounted for reciprocation in a direction transverse to the path of the backing material and arranged to carry yarns through the backing material to form rows of tufts therein, pile forming means disposed beneath the path of the backing material and operatively associated with each of said needles for forming pile from the yarns carried by said needles, and tracking means disposed between said first and second rows of needles for guiding the backing material from said first row of needles to said second row of needles so that the rows of tufts formed by said first row of needles pass through the spaces between the needles of said second row of needles.
2. The tufting machine as set forth in claim 1, wherein said needles in said row are staggered relative to the needles in said first row and wherein said tracking means guides the backing material in a substantially straight line longitudinally of the backing material between said first and second rows of needles.
3. The tufting machine, as set forth in claim 1, wherein said tracking means includes means for moving the backing material transversely of its path of travel between said first and second rows of needles and in the plane of the backing material for a predetermined distance to offset the rows of tufts formed by said second row of needles in a predetermined pattern from the rows of tufts formed by said first row of needles.
4. The tufting machine, as set forth in claim 1, wherein said tracking means includes means for shifting the backing

material laterally to and fro of its path of travel between said first and second rows of needles and in the plane of the backing material in timed relationship with the reciprocation of said second row of needles for forming a zigzag pattern in the rows of tufts formed by said second row of needles.

5. The tufting machine, as set forth in claim 1, wherein said tracking means comprises:

at least one rotatable tracking roll disposed on one side of the backing material between said first and second rows of needles and extending transversely thereof in pressing engagement therewith, said tracking roll having circumferentially extending, axially spaced grooves therein with said grooves being spaced correspondingly with the spacing of the needles in said first row for receiving the rows of tufts formed by said first row of needles therein.

6. The tufting machine, as set forth in claim 1, wherein said tracking means comprises:

first and second rotatable tracking rolls disposed on either side of the backing material between said first and second rows of needles and extending transversely thereof in pressing engagement therewith, said tracking rolls having circumferentially extending, axially spaced grooves therein with said grooves being spaced correspondingly with the spacing of the needles in said first row for receiving the rows of tufts formed by said first row of needles therein.

7. The tufting machine, as set forth in claim 6, wherein said first and second rotatable tracking rolls are mounted for movement laterally of the path of travel of the backing material and parallel to the plane of the backing material and wherein said tracking means includes means operatively connected to said first and second tracking rolls for shifting said tracking rolls laterally to and fro of the path of travel of the backing material and parallel to the plane of the backing material for effecting a correspondingly lateral shifting of the backing material in timed relationship with the reciprocation of said second row of needles for forming a zigzag pattern in the rows of tufts formed by said second row of needles.

8. The tufting machine, as set forth in claim 6, wherein said tracking means includes backing material support means disposed beneath the path of the backing material between said first and second rows of needles adjacent the needles in said second row for supporting the backing material as said second row of needles penetrate therethrough and having longitudinally extending, laterally spaced grooves therein with said grooves spaced correspondingly with the spacing of the needles in said first row and cooperatively associated with said first and second tracking rolls for receiving the pile side of the rows of tufts formed by said first row of needles from said tracking rolls therein.

9. The tufting machine as set forth in claim 8, wherein said backing material support means is mounted for longitudinal movement parallel with the path of travel of the backing material toward and away from said second row of needles in timed relationship with the reciprocation of the needles in said second row for supporting the backing material upon penetration of said second row of needles through the backing material.

10. The tufting machine, as set forth in claim 8, wherein said tracking means includes stripper means disposed above the path of the backing material between said first and second rows of needles adjacent the needles in said second row, said stripper means cooperating with said backing material support means for maintaining the pile side of the rows of tufts in said grooves of said backing material support means and for stripping the backing material from said needles upon withdrawal of said second row of needles from the backing material, and means for shifting in synchronism said tracking rolls, backing material support means and stripper means laterally to and fro of the path of travel of the backing material and parallel to the backing material for effecting a correspondingly lateral shifting of the backing material in timed relationship with the reciprocation of said second row of needles.

dles for forming a zigzag pattern in the rows of tufts formed by said second row of needles.

11. In a tufting machine for forming narrow gauge pile carpeting or the like,

means for feeding elongate backing material longitudinally along a predetermined path,

first and second spaced-apart rows of spaced tufting needles mounted for reciprocation in a direction transverse to the path of the backing material and arranged to carry yarns through the backing material to form rows of tufts therein,

pile forming means disposed beneath the path of the backing material and operatively associated with each of said needles for forming pile from the yarns carried by said needles, said pile forming means comprising:

a looper operatively associated with each of said needles and operative when the needles penetrate through the backing material for catching the loop of yarn and holding the same as the needles retract, and

a knife operatively associated with each of said loopers for severing the loops thereon to form cut pile, and

tracking means disposed between said first and second rows of needles for guiding the backing material from said first row of needles to said second row of needles so that the rows of tufts formed by said first row of needles pass in predetermined relation to the needles of said second row of needles.

12. The tufting machine, as set forth in claim 11, wherein said tracking means includes means for shifting the backing material laterally to and fro of its path of travel between said first and second rows of needles and parallel to the plane of

the backing material in timed relationship with the reciprocation of said second row of needles for forming a zigzag pattern in the rows of tufts formed by said second row of needles.

13. The tufting machine, as set forth in claim 11, wherein said needles in said second row are staggered relative to the needles in said first row and wherein said tracking means comprises at least one rotatable tracking roll disposed on one side of the backing material between said first and second rows of needles and extending transversely thereof in pressing engagement therewith for rotation thereby, said tracking roll having circumferentially extending, axially spaced grooves therein with said grooves being spaced correspondingly with the spacing of said needles in said first row and in alignment therewith and in staggered relation to said needles in said second row for receiving the rows of tufts formed by said first row of needles therein and for guiding the backing material in a substantially straight line longitudinally of the backing material between said first and second row of needles.

14. The tufting machine, as set forth in claim 13, wherein said at least one tracking roll is mounted for movement laterally of the path of travel of the backing material and parallel to the plane of the backing material and wherein said tracking means includes means for shifting said tracking roll laterally of the path of travel of the backing material and parallel to the plane of the backing material and the backing material a corresponding amount in timed relationship with the reciprocation of said second row of needles for forming a zigzag pattern with the rows of tufts formed by said second row of needles.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,585,948 Dated June 22, 1971

Inventor(s) James T. Cobble

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 1, line 60, after "illustrating" insert --tracking--;
line 64, change "view" to --views--;

Col. 2, line 4, after "(FIGS. 1 and 2)" delete -- 2) --;

Col. 3, line 29, delete "and" and insert in lieu thereof --as at--;

Line 58, delete the word "he" and add in lieu thereof --the--;
line 62, delete the numerals "6540" and add in lieu thereof --65' --;

Col. 4, line 20, change "the" to --be--;

Col. 5, line 51, after "material M" (2nd occurrence), delete
"relative" and insert in lieu thereof --for effecting--;

Col. 6, line 8, after "stripper", delete --member--;

Col. 7,

line 61, after "said" (first occurrence) and before "row",
insert --second--.

Signed and sealed this 4th day of January 1972.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Acting Commissioner of Patents