July 5, 1966 J. T. ROCKHOLT 3,259,088

MULTI-COLOR TUFTING MACHINE

Filed Aug. 10, 1961 2 Sheets-Sheet 1

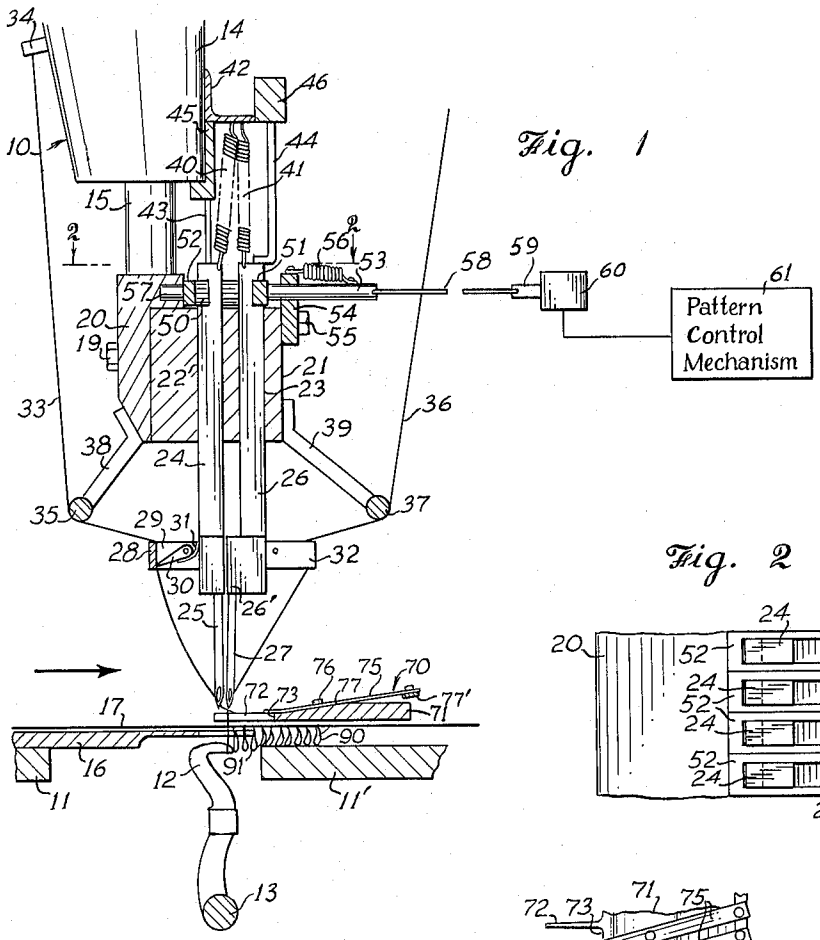


Fig. 1

Fig. 2

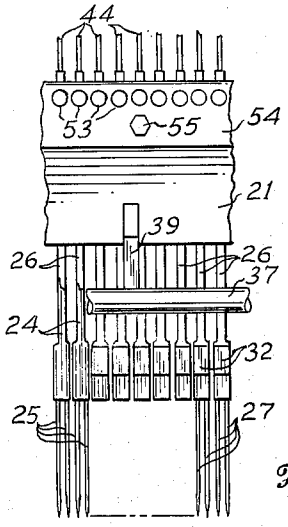


Fig. 3

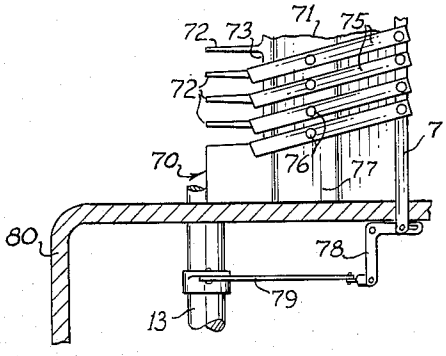


Fig. 4

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MULTI-COLOR TUFTING MACHINE

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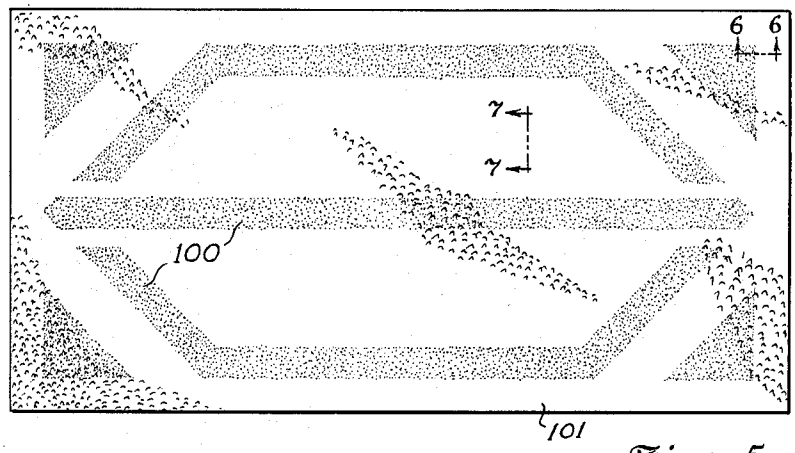


Fig. 5

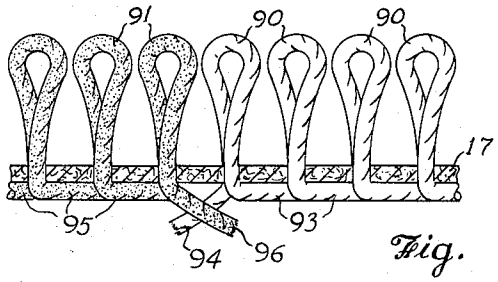


Fig. 6

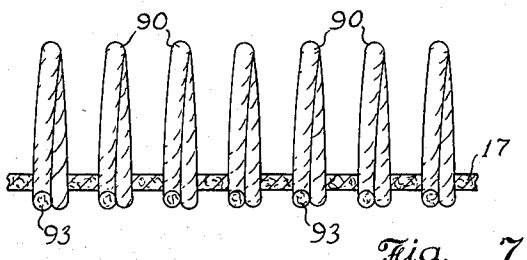


Fig. 7

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United States Patent Office 3,259,088 Patented July 5, 1966

3,259,088

MULTI-COLOR TUFTING MACHINE

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Filed Aug. 10, 1961, Ser. No. 130,604
9 Claims. (Cl. 112—79)

This invention relates to tufting machines, and is more particularly concerned with a multi-color tufting machine which will produce a single longitudinal row of continuous tufts in a base fabric from a plurality of yarns.

In the past, the tufting industry has attempted to reproduce, utilizing tufting machines, the effects created in woven carpets. While high and low tufts have readily been produced, the industry has sought in vain to produce a practical multi-color tufting machine.

In the past, multi-color cut pile tufting machines have been produced; however, the cut pile multi-color goods produced thereon have not been widely accepted. To my knowledge, no multi-color tufting machine which will produce loop pile fabric has been devised.

I have, however, devised a multi-color tufting machine which will produce loop pile fabric having a pattern created by different colored or different characteristic yarns in a single longitudinal line or a plurality of such lines. The device of the present invention, briefly, includes a single horizontal reciprocating member disposed transversely of the feed of the base fabric which carries a plurality of pairs of tandem arranged needle bars selectively actuated by the reciprocating member, the needle bars being urged out of engagement with the base fabric by means of springs or the like. The needles of each pair of needle bars are so closely adjacent each other that when either needle penetrates the base fabric, the yarn carried by the needle may be engaged by a single looper. Immediately above the base fabric and adjacent the pair of needles is a cutting mechanism which cuts the yarn from the base fabric after it has been sewn and thereby leaves a relatively short tail in the backstitch of the base fabric which may be subsequently covered with latex.

Accordingly, it is an object of the present invention to provide a tufting machine which will sew a plurality of yarns in a single continuous longitudinal row.

Another object of the present invention is to provide a multi-color tufting machine which is inexpensive to manufacture, durable in structure and efficient in operation.

Another object of the present invention is to provide a tufting machine which will produce in a single longitudinal row a plurality of different characteristic loop pile tufts in continuous fashion.

Another object of the present invention is to provide a novel loop pile fabric having multi-characteristic tufts and a machine for and method of producing the same.

Other objects, features and advantages of the present invention will become apparent from the following description taken in conjunction with the accompanying drawings wherein like characters of reference designate corresponding parts throughout the several views, and wherein:

FIG. 1 is a fragmentary side elevational front view of a tufting machine constructed in accordance with the present invention.

FIG. 2 is a cross sectional view taken along line 2—2 in FIG. 1.

FIG. 3 is a fragmentary front elevational view of a portion of the tufting machine shown in FIG. 1.

FIG. 4 is a top plan view of the cutting mechanism of the tufting machine shown in FIG. 1.

FIG. 5 is a plan view of a carpet produced on the machine of FIG. 1.

FIG. 6 is a cross sectional view taken along line 6—6 in FIG. 5.

FIG. 7 is a cross sectional view taken along line 7—7 in FIG. 5.

Referring now in detail to the embodiment chosen for the purpose of illustrating the present invention, it being understood that the present invention in its broader aspects is not limited to the exact details herein depicted, numeral **10** denotes generally a multi-needle tufting machine having a cross bed with inwardly turned flanges **11**, **11'**, and a plurality of loop pile loopers, such as looper **12**, all reciprocated from a single looper shaft **13** operating in the usual manner. The tufting machine **10** also includes a conventional cross head supporting by stanchions, such as stanchion **18**, the cross head being provided with spaced, downwardly extending bearings, such as bearing **14**. A main shaft (not shown) within the cross head reciprocates a plurality of connecting rods, such as rod **15**, in a vertical path within the bearings such as bearing **14**. The conventional tufting machine also includes the usual throat plate **16** mounted on flange **11** and over which the base fabric **17** is fed in the direction of the arrow in FIG. 1.

According to the present invention, the reciprocating connecting rods, such as rod **15**, carry a transversely disposed mounting bar **20** which is also reciprocated in a vertical path continuously when the machine is operating. Bolts **19** connect the bar **20** and a needle bar carrying member **21** in side by side relationship so that member **21** is reciprocated with the bar **20**. Member **21** is provided with a plurality of aligned, vertically disposed forward slots **22** and a like number of rear slots, such as slot **23**, aligned transversely with the slots **22** in spaced parallel relationship thereto.

Slidably carried within the front or forward slots, such as slot **22**, are a plurality of vertically disposed, forward needle bars **24** which project above and below the member **21**, each needle bar **24** carrying a pair of needles **25**. In like manner, the slots, such as slot **23**, are provided with a plurality of complementary, vertically disposed, rear needle bars **26** which are complementary to and aligned transversely parallel to the needle bars **24**. The lower ends of needle bars **26** are offset forwardly to provide a needle carrier **26'** closely adjacent the lower end of the forward needle bars **24**. The needle carriers **26'** each carry a pair of needles **27** which are aligned with the needles **25**, longitudinally of the path of travel of base fabric **17**. Each of the needles **27** is thus closely adjacent its associated needle **25** and may be slanted forwardly slightly, if desired, the needles **25** and **27** projecting from the lower ends of bars **24** and **26** downwardly toward the throat plate **16** as indicated in FIG. 1 to terminate above the base fabric **17**. The length of needle bars **24** and **26** is each greater than the stroke of the member **21**, so that the needle bars **24** or **26** may remain stationary while the member **21** reciprocates.

The lower ends of the forward needle bars are provided respectively with forwardly extending uni-directional yarn feed mechanisms, each of which includes a rectangular yarn feed block provided with a pair of vertically disposed slots, such as slot **29**. Each slot **29** receives a downwardly and outwardly protruding pawl or finger **30** which is urged against an outer wall **28** defining the slot **29** by a spring **31**. Each needle bar **26** is provided with a rearwardly extending uni-directional yarn feed mechanism **32**, identical to the yarn feed mechanism of the needle bars **24**.

Yarns, such as yarn **33**, lead from a creel (not shown) via the holes in the usual guide bar **34** and around a circular guide bar **35** to the feed mechanisms of the needle bar **24**. Each such yarn **33** passes between its associated downwardly and outwardly extending finger **30** and the outer wall **28**, as shown in FIG. 1, and thence to the eye at the lower end of its associated needle **25**. Likewise,

yarns, such as yarn 36, lead from the creel (not shown) via a guide bar 37 to their associated needles 27. Thus, upon reciprocation of the needle bars 24 and 26 by the member 21, the yarns, such as yarns 33 and 36, will be inserted through the base fabric 17 to a depth sufficient for the yarns to be caught and temporarily held by the associated loopers, such as looper 12.

The guide bars 35 and 37 are supported from bar 20 and member 21 by means of outwardly and downwardly extending brackets, such as brackets 38 and 39. The needle bars 24 and 26 are held with their needles 25 and 27 out of engagement with the base fabric 17 by means of individual springs, such as coiled springs 40 and 41, the upper ends of springs 40 and 41 being carried by a transverse flange of an angle iron bracket 42 mounted on the bearings, such as bearing 14, of the cross head. The lower ends of springs 40 and 41 are connected respectively to the upper ends of the needle bars 24 and 26 and urge them upwardly at all times. The upward movements of the needle bars 24 and 26, however, are arrested by individual stops 43 and 44. The stops 43 are a plurality of vertically disposed rods, spaced parallel to each other and aligned with their respective associated needle bars 24 so as to be engaged by the upper ends thereof. The upper end portions of the stops 43 are received in bores in a transverse stop supporting member 45 carried by the bearings, such as bearing 14. A set screw (not shown) adjustably fixes the position of each stop 43.

Each stop 44 is an L-shaped member, the upper end of which is received in a bore in a transverse stop carrying member 46 mounted on the bracket 42. Set screws (not shown) adjustably fix the position of each stop 44. It will be understood that each individual stop 43 or 44 may be raised or lowered to adjust the limit of upward travel of its associated needle bar 24 or 26.

It will be seen in FIG. 1 that the upper end portions of needle bars 24 and 26 are each provided with a notch or recess, such as notch 50 of needle bar 24 and notch 51 of needle bar 26. The notches 50 and 51 face outwardly in opposite directions and, when needle bars 24 and 26 are in their uppermost positions, the notches 50 and 51 are above the upper surface of member 21 at its top dead center position.

For reciprocatory movement forwardly and rearwardly along the plane of the upper surface of member 31 so as to selectively engage in either notch 50 or 51, each pair of needle bars 24 and 26 is provided with a selector plate 52 which encompasses the pair of needle bars 24 and 26, the plate 52 having a central rectangular slot of a width equal to or slightly greater than the width of needle bars 24 and 26 and a length slightly greater than the distance from the inner portion of notch 50 to the outer surface of needle bar 26. The length of the slot of plate 52 is thus greater than the distance from the inner portion of notch 51 to the outer surface of needle bar 24 but, preferably, is not greater than the distance between the outer surfaces of needle bars 24 and 26. Therefore, the plate 52 has spaced flanges, one of which is engaged in either notch 50 when plate 52 is in its rearmost position or notch 51 when plate 52 is in its forward position. In either extreme position, the non-engaged needle bar 24 or 26 is free to remain stationary as the member 21 reciprocates. It is therefore seen that the plate 52 serves as a means for selectively coupling needle bar 24 or 26 to member 21.

For guiding the plates 52, parallel rods 53 protrude rearwardly of the machine from the plates 52, passing through holes in an upstanding guide plate 54 bolted by bolts, such as bolt 55, to member 21. Each rod 53 is provided with a spring 56 connected between an eyelet at the upper edge of guide plate 55 and the outer or rearmost end of rod 53. This spring 56 urges the rod 53 and therefore plate 52 to the left in FIG. 1 and hence causes plate 52 to engage in notch 51. Aligned with each rod 53 and protruding forwardly from the front edge of each plate 52 is a guide rod or plunger 57 which is slidably received in an appropriate hole in bar 20. Thus, while each plate 52 is reciprocated up and down with the bar 20 and member 21, it is free to shift longitudinally, i.e. back and forth from left to right to left in FIG. 1, the plate 52 being urged normally to the left in FIG. 1 by spring 56.

An overriding cable 58 is connected to the outer end of the rod 53 for urging plate 52 to the right. This cable 58 is sufficiently long and in an essentially horizontal position so that the reciprocation of the rod 53 up and down does not appreciably effect the effective length of the cable 58. The outer end of the cable 58 is connected to a plunger 59 of a solenoid 60 which is selectively actuated by a pattern control mechanism, denoted generally by numeral 61. When solenoid 60 is energized, the plunger 59 is retracted to pull, via cable 58 and rod 53, its associated plate 52 to the right in FIG. 1.

While I have selected an electric control mechanism (referred to as electronic pattern control in the trade), it will be understood that a mechanical control, such as illustrated in U.S. Patent No. 2,989,014, may be employed for actuating each cable 58. It will also be understood that the pattern control mechanism is synchronized with the reciprocation of the member 21 so that the solenoid is preferably energized during or only when the member 21 approaches top dead center. At this position, the notches 50 and 51 are aligned to permit shifting of plate 52. At any other position, the energization or de-energization of solenoid will be ineffective to shift plate 52 since at all times either needle bar 24 or 26 is held in its uppermost position by springs 40 or 41 and hence notches 50 and 51 are in misalignment.

It will be understood that the mechanism thus far described can be employed as a cut pile tufting machine by providing cut pile loopers and knives in place of the loopers such as looper 12 and by actuating these cut pile loopers and knives in an appropriate manner as will be understood by those skilled in the art.

Since the present embodiment is for producing loop pile, there must be a mechanism for severing the yarns at the backstitch or on the back side of base fabric 17. This mechanism for severing the yarns includes a clipping device, denoted generally by numeral 70, the clipping device 70 being spaced sufficiently rearwardly of the needles 25 and 27 that it is incapable of severing the yarns as they are being inserted through the base fabric 17 but so positioned that the yarn from a particular needle 25 or 27 will be carried into the clipping device 70 soon after the needle carrying that yarn has stopped sewing.

In more detail, clipping device 70 includes a base 71 mounted transversely between the end pillows or stanchions, such as stanchion 18, and supported, if need be, by straps (not shown) extending down from the cross head (not shown). The base 71 is immediately above the flange 11' of the cross bed and sufficiently spaced therefrom that the fabric 17 and its tufts may pass therebetween. The front end of base 71 is provided with forwardly extending flat tines or guide fingers 72, the forward ends of which are spaced apart by a distance slightly greater than the transverse distance between two adjacent needles 25 or 27. The edges of the tines 72 taper or converge rearwardly to terminate at a U-shaped throat 73 so that as the fabric 17 is moved beneath the base 70, any yarn segments, such as segment 74 in FIG. 1, which lead from an inactive needle (say needle 25) to fabric 17, will be drawn into the throat 73 and cut. Preferably, the forward ends of tines 72 terminate at or slightly forwardly of the transverse plane of the forward needle 25.

For the purpose of cutting the yarn segments, such as segment 74, each throat 73 is provided with an elongated rectangular shaped flat knife 75 pivotally carried by a pivot pin 76 passing through an intermediate portion of knife 75. Preferably, the pivot pins 76 are mounted adjacent throats 73 on the forwardly sloping upper surface 77 of base 71. The knives 75 protrude forwardly beyond the throats 73 and are urged into a flexed position by pins 76

so that upon pivotal movement, the sharpened edges of knives **75** pass across the throats **73** from one tine **72** to the next. The knives **75** are arranged parallel to each other and are respectively pivotally connected at their rear end portions to a common actuator bar **77'** which is rapidly reciprocated by a bellcrank **78** at one end thereof. The bellcrank **78**, in turn, is reciprocated from say the main drive shaft or from a looper shaft **13** through an appropriate linkage **79**.

Operation

From the foregoing description the operation of the present device should be apparent. A suitable pattern is selected and installed on the pattern control mechanism so as to actuate the various solenoids, such as solenoid **60**, according to a prescribed pattern and in timed relationship to the reciprocation of the member **21**. The yarns, such as yarns **33** and **36**, are then appropriately threaded through the machines to the needles **25** and **27**. The base fabric **17** is then fed from the front over the flanges **11**, **11'**, throat plate **16**, and beneath the clipping device **70**. It will be understood by those skilled in the art that rolls (not shown) on a conventional tufting machine will feed the base fabric in the direction of the arrow in FIG. 1, in timed relationship to the reciprocation of the member **21**. The loopers, such as looper **12**, are set so as to pass a line midway between the two needles **25** and **27** at the bottom dead center position of the machine. Minor variations of this setting may be found desirable.

The machine is now started by the energization of the main motor (not shown) whereby the rods **15** are moved up and down vertically to reciprocate, in a vertical path, the member **21**. If a solenoid **60** is de-energized, the spring **56** urges the rod **53** to the left, as shown in FIG. 1. Under these conditions, the plate **52** is engaged in slot **51**, and therefore upon downward movement of the member **21**, the needle bar **26** will be carried downwardly, therewith. On the other hand, since the needle bar **24** is free to slide in the slot **22** and is not engaged by the plate **52**, the spring **40** will retain the needle bar **24** in its original uppermost position, permitting the member **21** to slide with respect to the needle bar **24**. Thus, the needle **27** is inserted through the base fabric to a predetermined depth and the looper **12** will engage the yarn **36** carried thereby and temporarily retain the yarn **36** to produce a loop in the base fabric **17**. As the needle **27** is retracted and approaches top dead center, the looper **12** is rocked out of engagement with the loop thus formed and hence releases this loop in the usual manner.

If, as the member **21** approaches its top dead center position, the solenoid **60** is energized, it exerts a pull on the plunger **59** which tends to urge the cable **58** to the right and hence urge the rod **53** against spring tension of spring **56** to the right. When the plate **52** becomes aligned with the notch **50**, i.e. at or near top dead center, the plate will slide into the notch **50** while, simultaneously, sliding out of the notch **51**. Thus, the needle bar **24** will be coupled to and carried downwardly by member **21**, while the needle bar **26** remains in its original position, the spring **41** holding it in that position. During this cycle of the machine, needle bar **24** will move needle **25** through the base fabric **17** and the looper **12** will engage the yarn **33** to produce a loop from that yarn in the manner in which it produced a loop from the yarn **36**, previously. It is recommended, however, that the pattern control mechanism be permitted to actuate or deactuate solenoid **60**, only after at least two and preferably three loops have been sewn by the selected needle **25** or **27**. In this way, the danger of providing a loop which can be easily pulled out is minimized.

Assume that several loops, such as loops **90**, have been sewn by the yarn **33** and then several loops **91** have been sewn by the yarn **36**, the base fabric **17** being moved progressively rearwardly during this operation; a yarn segment, such as segment **74**, will extend from the last loop **90** through the base fabric to the eye of the needle **27**. This yarn segment **74** must be severed to prevent the accumulation of long and unsightly extensions of yarns, which may impede or impair the operation of the machine. The yarn segment **74** is pulled by movement of fabric **17** into the clipping device **70**, passing between the tines **72** into the throat **73**, and is cut by the actuation of the knives **75**. It is advisable to adjust the position of the clipping device **70** so as to leave a sufficiently long tail, such as tail **94**, on the back of the base fabric **17** leading from the last loop sewn, while at the same time leaving sufficient yarn leading to the needle that when it is again actuated, a tail, such as tail **96**, of sufficient length will be connected to the first loop sewn thereby. Thus, in subsequent processing, the loop connected to these tails **94** and **96** will not pull the tails through the base fabric **17** and hence produce an unsightly tail on the face yarn side of the fabric **17**, necessitating inspection and clipping of such tails. The tails of the back side of the fabric, however, do not materially interfere with the quality of the goods produced since latex is applied to the back of base fabric **17** to retain the loops in place and adhere the backstitch to the base fabric.

It will be understood that while I have described the operation of a single pair of needles **25** and **27**, there are, in reality, a plurality of closely aligned needles **25** transversely across the machine and there are a like number of needles **27** transversely across the machine. Each such pair is controlled by a solenoid, such as solenoid **60**, and all such solenoids are controlled by the pattern control mechanism.

Fabric

Referring now to FIGS. 5, 6 and 7 of the drawings, it will be seen that the fabric produced by the mechanism disclosed in FIGS. 1–4 includes a plurality of transversely aligned loops which form a first row of loops. These loops are produced on the first cycle of the machine. Some of these loops are formed from yarns, such as yarn **33**, and other of the loops are formed from yarns, such as yarn **36**. Upon the second cycle, the preselected needles **25** or **27** will sew a second row of loops which are spaced longitudinally from the first row of loops but transversely aligned therewith. In each longitudinal row, depending of course upon the actuation of solenoid **60**, there will be loops, such as loops **90**, and loops, such as loops **91**, formed respectively from yarns **33** and **36**. The adjacent loops **90**, in each group of loops in a longitudinal row, are all joined by backstitches **93** on the back side of fabric **17**. The first loop **90** and the last loop **90** of each group has a tail, such as tail **94**, on the back side of fabric **17**. Similarly, the loops **91** have backstitches **95** with the end loops **91** of each group having tails, such as tail **96**. The groups of loops **90** and **91** in each longitudinal row abut each other so as to form a continuous row. It is therefore seen that with an appropriate pattern a predetermined design formed of one color yarn **33** is produced, and adjacent thereto are the other colored yarns, such as yarns **36**. In FIG. 5, the design formed by one color yarn is designated by numeral **100**, while the design formed by the other color is designated by numeral **101**.

It will be obvious to those skilled in the art that many variations may be made in the embodiments here chosen for the purpose of illustrating the present invention without departing from the scope thereof as defined by the appended claims.

I claim:

1. A tufting machine comprising a frame, a needle bar carrying member provided with a pair of slots, means for reciprocating said needle bar carrying member, a pair of parallel needle bars slidably and essentially wholly carried within said slots by said carrying member, said means for reciprocating said needle bar carrying member reciprocating the same in a path parallel to said needle bars, needles projecting from the ends of said needle bars

and reciprocal in planes displaced from each other for inserting yarns through a base fabric passed therebeneath at intervals displaced from one another, said needles being closely adajcent each other and aligned along the path of travel of said base fabric, a single looper means for said pair of needles carried by said frame beneath said base fabric for temporarily engaging and holding and thereafter releasing in an uncut condition the yarns inserted by said needles through said base fabric, and selector means carried by said needle bar carrying member for selectively coupling said needle bars to said carrying member for reciprocation therewith.

2. A tufting machine comprising a frame, a needle bar carrying member provided with a pair of parallel slots, means for reciprocating said needle bar carrying member, a pair of parallel needle bars slidably and essentially wholly carried within said slots by said carrying member, said means for reciprocating said needle bar carrying member reciprocating the same in a path parallel to said needle bars, needles projecting from the ends of said needle bars and reciprocal in planes displaced from each other for inserting yarns through a base fabric passed therebeneath at intervals displaced from one another, said needles being closely adjacent each other and aligned along the path of travel of said base fabric, a single looper for said pair of needles carried by said frame beneath said base fabric for temporarily engaging and holding and thereafter releasing in an uncut condition the yarns inserted by either of said needles through said base fabric, and selector means carried by said needle bar carrying member for selectively coupling one needle bar or the other needle bar to said needle bar carrying member for reciprocation therewith, said selector means being so constructed and arranged as to simultaneously uncouple one needle bar while coupling the other needle bar to said needle bar carrying member.

3. A tufting machine comprising a frame, a needle bar carrying member provided with a pair of vertically disposed parallel slots, means for reciprocating said needle bar carrying member, a pair of closely adjacent, parallel, vertically disposed needle bars slidably and essentially wholly carried within said slots by said carrying member, said means for reciprocating said needle bar carrying member reciprocating the same in a path parallel to said needle bars, needles projecting from the ends of said needle bars and reciprocal in planes displaced from each other for inserting yarns through a base fabric passed therebeneath, one of said needles being offset toward the other of said needles with respect to its needle bar so that said needles are closely adjacent each other and aligned along the path of travel of said base fabric, a single looper for said pair of needle bars carried by said frame beneath said base fabric for temporarily engaging and holding and thereafter releasing in an uncut condition the yarns inserted by either of said needles through said base fabric, means for urging said needle bars away from engagement with said base fabric, and selector means carried by said needle bar carrying member for selectively coupling one needle bar or the other needle bar to said needle bar carrying member for reciprocation therewith, said selector means being so constructed and arranged as to simultaneously uncouple one needle bar while coupling the other needle bar to said needle bar carrying member.

4. A tufting machine comprising a frame, a needle bar carrying member provided with a pair of vertically disposed parallel slots, means for reciprocating said needle bar carrying member, a pair of closely adjacent, parallel, vertically disposed needle bars slidably carried within said slots by said carrying member, needles projecting from the ends of said neele bars and reciprocal in displaced from each other for inserting yarns through a base fabric passed therebeneath, said needles being closely adjacent each other, a single looper for said pair of needle bars carried by said frame beneath said base fabric for temporarily engaging and holding and thereafter releasing in an uncut condition the yarns inserted by either of said needles through said base fabric, means for urging said needle bars away from engagement with said base fabric, selector means carried by said needle bar carrying member for selectively coupling one needle bar or the other needle bar to said needle bar carrying member for reciprocation therewith, said selector means being so constructed and arranged as to simultaneously uncouple one needle bar while coupling the other needle bar to said needle bar carrying member, and a clipping mechanism arranged above said base fabric and beyond said needles in the direction of travel of said base fabric for severing the yarn segments on the same side of said base fabric as said needles, after the needle carrying the segment has discontinued sewing and the other needle has sewn at least one loop.

5. A tufting machine comprising a frame, a needle bar carrying member provided with a pair of vertically disposed parallel slots, means for reciprocating said needle bar carrying member, a pair of closely adjacent, parallel, vertically disposed needle bars slidably and essentially wholly carried within said slots by said carrying member, said means for reciprocating said needle bar carrying member reciprocating the same in a path parallel to said needle bars, needles projecting from the ends of said needle bars and reciprocal in planes displaced from each other for inserting yarns through a base fabric passed therebeneath, said needles being closely adjacent each other and aligned along the path of travel of said base fabric, a single looper for said pair of needle bars carried by said frame beneath said base fabric for temporarily engaging and holding yarns inserted by either of said needles through said base fabric, means for urging said needle bars away from engagement with said base fabric, selector means carried by said needle bar carrying member for selectively coupling one needle bar or the other needle bar to said needle bar carrying member for reciprocation therewith, stops above each of said needles and carried by said frame for limiting the upward movement of said needle bars, a cable leading essentially horizontally from said selector means, a plunger connected to said cable, a solenoid carrying said plunger, and pattern controlled means for actuating said solenoid, said plunger being movable by and upon energization of said solenoid to move said cable and move said selector means to a position coupling one needle bar remote from said solenoid with said needle bar carrying member and uncoupling the other needle bar adjacent said solenoid from said needle bar carrying member, and spring means for moving said selector means to a position uncoupling said one needle bar and coupling said other needle bar.

6. A tufting machine comprising a frame, a needle bar carrying member provided with a pair of vertically disposed parallel slots, means for reciprocating said needle bar carrying member, a pair of closely adjacent, parallel, vertically disposed needle bars slidably and essentially wholly carried within said slots by said carrying member, said means for reciprocating said needle bar carrying member reciprocating the same in a path parallel to said needle bars, needles projecting from the ends of said needle bars for inserting yarns through a base fabric passed therebeneath, said needles being closely adjacent each other and aligned along the path of travel of said base fabric, a single looper carried by said frame beneath said base fabric for temporarily engaging and holding yarns inserted by either of said needles through said base fabric, means for urging said needle bars away from engagement with said base fabric, selector means carried by said needle bar carrying member for selectively coupling one needle bar or the other needle bar to said needle bar carrying member for reciprocation therewith, said selector means being so constructed and arranged as to simultaneously uncouple one needle bar while coupling the other needle bar to said needle bar

carrying member, said needle bars being provided with oppositely and outwardly facing notches aligned with each other when said needles are retracted from said base fabric, said selector means surrounding said needle bar and having flanges respectively engageable with said notches.

7. Method of producing a tufted fabric comprising the steps of successively inserting loops of a first yarn through a base fabric in a predetermined plane at spaced intervals therealong while moving said base fabric in a longitudinal path and engaging each loop of said first yarn with a looper to form a longitudinal row of loops of the first yarn on one side of the base fabric all connected by backstitches on the opposite side of the base fabric and in which the last loop formed is connected to the remaining first yarn by a segment of yarn leading from said opposite side of said base fabric, successively inserting loops of a second yarn through a base fabric in a plane removed from said predetermined plane at the same spaced intervals as said first yarn while continuing to move the base fabric and engaging each loop of said second yarn with said looper to form a row of loops of second yarns aligned with said row of loops of first yarns and forming a continuous row therewith, and in the same operation severing said segment of yarn immediately after commencing the formation of the row of loops of second yarns

8. Method of producing a tufted fabric comprising the steps of successively inserting loops of a first yarn at one position through a base fabric while moving said base fabric in a longitudinal path to form a longitudinal row of loops of the first yarn on one side of the base fabric all connected by backstitches on the opposite side of the base fabric, simultaneously stopping the insertion of loops of said first yarn whereby the last loop formed of said first yarn is connected to the remaining first yarn by a segment of yarn leading from said opposite side of said base fabric, and beginning successive insertion of loops of a second yarn at a second position through said base fabric while continuing to move said base fabric to form a longitudinal row of loops of the second yarn aligned with said row of loops of first yarn and forming a continuous row therewith, and in the same operation severing said segment of said first yarn immediately after commencing the formation of the row of loops of second yarn at a spaced distance from said base fabric to provide a tail; and at a subsequent preselected time period, simultaneously stopping the insertion of loops of said second yarn whereby the last loop formed is connected to the remaining second yarn by a segment thereof and beginning successive insertion of loops from said first yarn, and in the same operation severing said segment of said second yarn immediately after recommencing the formation of the row of loops of said first yarn at a spaced distance from said base fabric to provide a tail.

9. In a tufting machine of the type having reciprocating needles which insert yarns through one side of a base fabric and wherein the yarns are caught on the other side of the base fabric by loopers, the base fabric being fed along a predetermined path in a given direction, the combination therewith of a cutting device mounted behind the needles in spaced relationship thereto, said cutting device extending across said one side of said fabric for severing yarns pulled by the base fabric from beneath the needles, the cutting device being so spaced from the needles by at least the space between adjacent loops whereby said yarns are severed only after the fabric has pulled the yarns from the needles by that amount, said cutting device including a base extending across said one side of said fabric and beneath which said fabric moves, and knife means movable with respect to said base for engaging and cutting said yarns including spaced tines extending from said base toward said needles and a plurality of individual knives pivotally mounted on said base and extending over said tines, and a common actuator bar connecting all said knives together.

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