

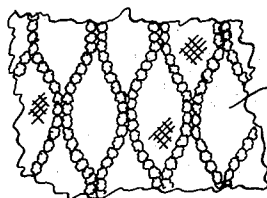
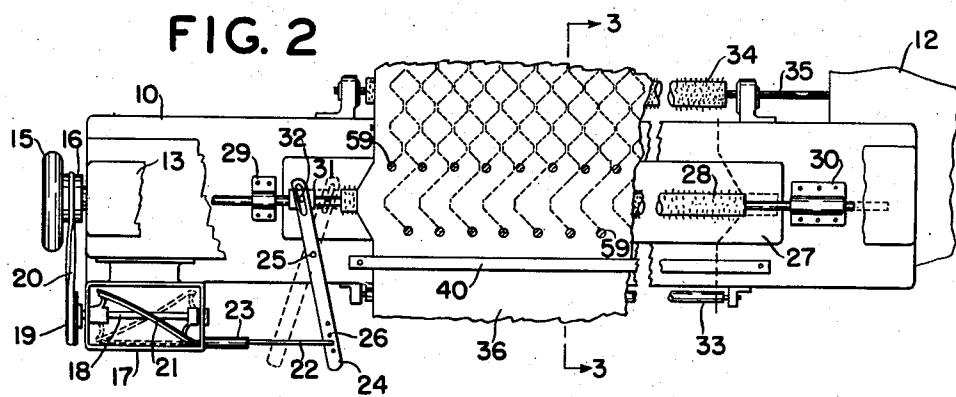
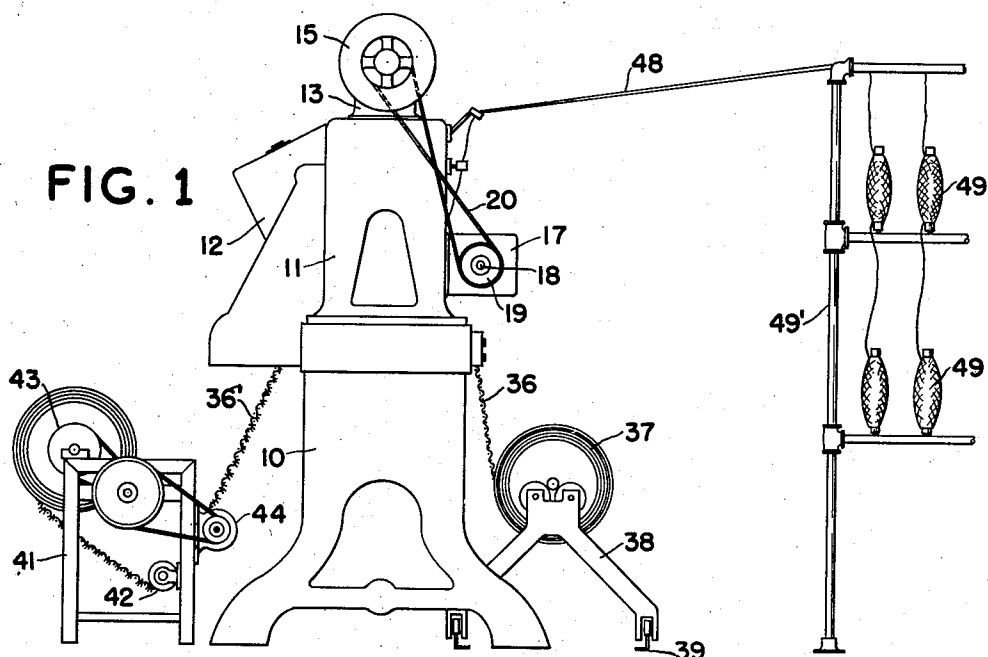
May 25, 1954

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CHENILLE TUFTING MACHINE

2,679,218

Filed March 31, 1951

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

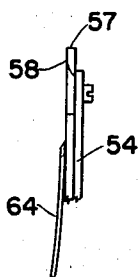


FIG. 6

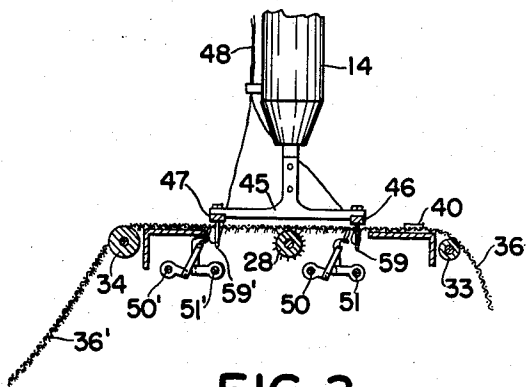


FIG. 3

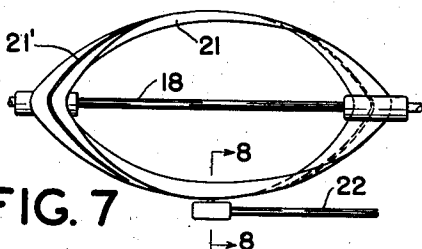


FIG. 7

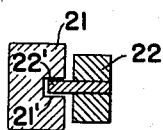


FIG. 8

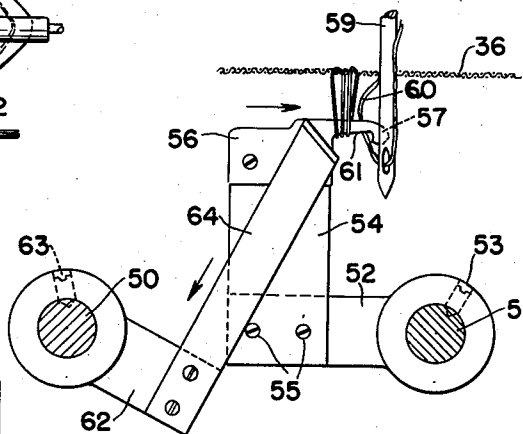


FIG. 4

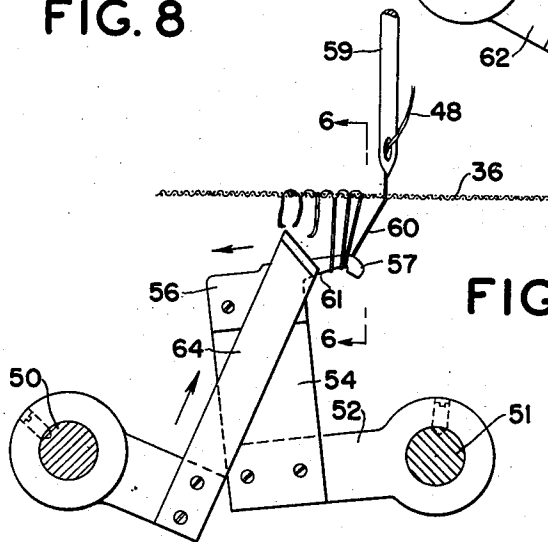


FIG. 5

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CHENILLE TUFTING MACHINE

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4 Claims. (Cl. 112-79)

1

My invention relates to chenille tufting machines generally, but more in particular to mechanisms adapted to chenille tufting machines to perform two-directional stitching.

During the rapid growth of the chenille industry from a relatively few hand operators to the many factories employing large machines, it has been the constant effort of manufacturers to vary the design of the product and improve its quality so that the mass-produced goods might be delivered to the consumer at the lowest possible cost. The tuft of the product has been both lengthened and shortened to produce various effects and the rows of stitches have been varied with odd and pleasing results.

In the rug industry, where rugs of a given width are made in a continuous process, it has been extremely difficult to vary the stitching pattern from the conventional parallel rows of stitches running lengthwise the rug as it is fed through the stitching machine under the needle bar. When it is desired to produce this same stitching crosswise the rug, it has been formerly necessary to cut the material to length and run the individual rugs back through the machine to produce the "waffle" or "squared" pattern. It is readily apparent that this has been both expensive and tedious.

It is an object of the present invention to provide a machine for producing chenille fabric wherein the machine is made to perform two-directional stitching while the base material is being fed substantially uni-directionally through the machine.

It is another object of the invention to provide an improved chenille tufting machine having two, spaced, needle bars; the needles of one bar being successively spaced in alignment in the spaces between the needles of the other bar.

It is a further object of the invention to provide a picker roll engageable with the under side of the fabric being fed beneath the spaced needle bars for tufting, the picker roll being arranged to reciprocate transversely of the machine to pull the fabric alternately in two directions so that the stitching of the front needle bar is made to touch that of the back needle bar before the fabric movement is reversed, giving a final stitching pattern resembling a series of connected "diamonds."

Another object of the invention is to provide a novel rotary cam arrangement for alternately pulling the fabric from one side to the other as the fabric passes beneath the needle bars, the

2

cam being timed with the machine so that its movement affecting the picker roll is automatically adjusted with the speed of movement of the fabric through the machine and with the needle speed.

Another object of the invention is to provide such a cam which is removable so that other cams effecting other patterns of stitching might be substituted without necessitating the removal of the needle bars or other working parts of the machine itself.

A further object of the invention is to provide such an improved chenille tufting machine wherein any and all of the component parts are relatively simple, may be removed for repair or replacement or may be adjusted to produce many of the difficult patterns of stitching now known and used in the chenille rug industry.

Further objects and advantages of the invention will become apparent in the course of the following detailed description when viewed together with the accompanying drawing in which:

Fig. 1 is an end view of a chenille tufting machine made in accordance with the teachings of the present invention.

Fig. 2 is a broken plan view rotated through 90°.

Fig. 3 is a detail cross-sectional view taken along line 3-3 of Fig. 2.

Fig. 4 is an enlarged detail view of the loop forming and cutting mechanism, the same being shown in the act of receiving a loop made by one of the needles.

Fig. 5 is a view similar to that of Fig. 4 with the mechanism shown in the act of severing some of the loops previously formed by the needle.

Fig. 6 is a broken view taken along line 6-6 of Fig. 5.

Fig. 7 is an enlarged view of a detail.

Fig. 8 is a cross-sectional view taken along line 8-8 of Fig. 7 on a further enlarged scale.

Fig. 9 is an enlarged view of the completed fabric, showing my novel pattern.

In the drawing, numeral 10 designates a base for the machine which is usually a large metal casting of a shape and size conforming to those of the prior art. Most of the actual components of the machine are either supported upon or enclosed by an upper framework 11 bolted or otherwise fastened to the base.

Numeral 12 designates removable covers for a gear train positioned at the opposite end of the machine as shown in Fig. 1, which gear train is connected to an electric motor or other driving

means (not shown) in the same manner as in machines of the prior art.

Across the top of the machine is a housing 13 which encloses the main crank shaft of the machine, the connecting rods of which are extended downwardly through a bearing support 14 much in the same manner as shown in Fig. 3. The lower ends of the rods are connected to the needle bar which is made to reciprocate vertically upon turning the crankshaft to perform the stitching.

As seen in Fig. 1, the crankshaft is extended through the end of the housing 13 and provided with a small hand wheel 15. The inside hub of the hand wheel is provided with a pulley sheave 16.

Affixed on the front of the frame 11 I have provided a box-shaped housing 17 having a shaft 18 rotatably journaled therein. The end of the shaft extends through the housing at one end and is provided with a pulley sheave 19 arranged so that the shaft may be rotated with the hand wheel 15 by means of a connecting belt 20.

Fixed to the shaft 18, inside the housing 17, is a cam frame 21, having a groove 21' machined on its outer rim, as shown in Fig. 7, in a manner to co-act with the inner end of an actuating shaft 22 which is extended through a bearing 23 made integral with the housing 17. The inner end of the shaft 22 is provided with a pin 22' which is slidably hooked to the machined rim of the cam frame 21, as shown in Fig. 8, so that when the same is rotated by the hand wheel in the above described manner, the shaft 22 is made to reciprocate longitudinally.

The outer end of the shaft 22 is pivotally connected to a bar 24 which is pivotally mounted on the upper bed of the machine frame 10 by a stud 25. The shaft 22 may either be made in pivotally joined lengths or made of flexible material so that its outer end may be pivotally connected to one of several spaced holes 26 in the end of the bar 24 to adjust the final movement of the bar by the cam action.

As seen in Fig. 2, the top of the machine bed is provided with a rectangular opening 27 to permit the needles to co-act with mechanisms beneath to complete the looping and tufting. Across this opening I have provided a picker roll 28. Such a roll is commonly used in other places in the textile industry and is provided with many needle-point projections scattered over its periphery so as to grip and guide a fabric in any manner desired. Opposite ends of this picker roll are slidably and rotatably journaled in bearings 29 and 30, respectively, so as to permit longitudinal movement of the roll. Connected to the roll near one end is a coupling 31 provided with a pin 32 positioned in an elongated slot formed in the forward end of the pivoted bar 24. Now it can be seen that by rotating the cam 21, the picker roll 28 is made to reciprocate longitudinally in its bearings 29 and 30.

In the present instance the front of the machine base 10 is provided with a guide roll 33 while the feeder roll 34 is mounted on the back of the base 10. The shaft 35 of the feed roll is extended through the gear train cover 12 where it finally connects to the driving gear train of the machine in the manner disclosed by the prior art.

The base fabric, or ducking, 36, is carried as a roll 37 placed upon a portable stand 38, the legs of which ride upon rails 39 placed parallel to the axis of the machine bed so that the fabric 36

may be fed in correct alignment through the machine. As the rear feed roll 34 is rotated by the gear train of the machine, the fabric is carried up over the front guide roll 33 where it passes beneath a removable steel bar 40 which serves as a weight to give tension to the fabric. Simultaneously with the feeding of the fabric through the machine, the cam 21 is put into action, which reciprocates the picker roll 28, pulling the fabric 36 from one side to the other, forming a pattern as illustrated in Figs. 2 and 9 and which will be described in detail later in the specification.

As the tufted fabric 36' passes over the feed roll 34, it is wound upon another roll at the rear of the machine, from which it is finally removed for trimming and dyeing. In the present instance the means of winding the product coming from the machine consists of a fabricated steel stand 41 being more or less box-like in structure and provided with a guide roll 42 rotatably mounted between the front legs thereof. The tufted material 36', coming over the rear feed roll 34, passes beneath the guide roll 42 on the stand 41 and is wound upon a receiving roll 43 which is rotated, in the present instance, by an electric motor 44 which is connected to the roll 43 by means of driving belts and pulleys.

As pointed out above, prior art machines generally of the present type are provided with an upper crankshaft arranged to vertically reciprocate rods, the lower ends of which are fastened to the needle bar of the machine. These rods are extended through bearing supports depending from the lower side of the crankshaft and are spaced, according to the width of the machine, to give sufficient rigidity as the needle bar is driven up and down to push the needles through the base fabric to form the loops. In Fig. 3 it can be seen that I have dispensed with the single needle bar commonly used in the prior art, and have attached a bracket 45 in its place. Each of the rods of the machine extending through its bearing 14 is provided with such a bracket 45 which is made as a metal casting and arranged for attachment to a needle bar at each of its outer ends. Thus, instead of the former single needle bar, I have provided two needle bars 46 and 47 spaced equidistantly from and parallel to, the transverse axis of the machine. Each of the needle bars 46, 47 is provided with a row of equidistantly spaced needles 50, 50', respectively, through the same in the manner of the prior art. However, in my machine the needles of one bar are arranged so that they will lie in the spaces of the other bar. For example, if the fabric were drawn through the machine without any relative sidewise movement of the fabric between the two bars, the stitching pattern would assume simply a series of parallel lines. The yarn 48 is fed to the needles from the bobbin 49 which may be conveniently held upon the rack 49'.

Beneath the machine bed I have placed certain mechanisms associated with each needle of both needle bars to complete the loop forming and cutting operations which will now be described.

Extending transversely through the machine, I have placed four shafts 50, 50', 51, 51'. One end of each of these shafts is mechanically associated with suitable timing mechanism (not shown) driven by the machine's driving means. Since all of the shafts are made to reciprocate in short, arcuate movements, any known method of providing such action may be employed together with timing the action to the needle stroke. Figs. 4 and 5 will illustrate more clearly

5

the actions of the shafts necessary to complete the loops made by the needles and the means of severing the loops.

It will be remembered that the mechanisms now described are spaced along the shafts above mentioned and associated with each needle of both needle bars. On the shafts 51, 51' I have placed a small arm 52 locked to the shaft by means of a set screw 53. This arm supports a short standard 54 which is fastened to the arm by means of screws 55. The top of the standard 54 is provided with a removable head 56 having a hook 57 formed on its forward end. As shown in Fig. 6, the forward side edge 58 of the hook is beveled and polished smooth so that the same will slide easily by the needle 59 as illustrated in Fig. 4. The action of the shaft 51 is so timed that when the needle 59 is being withdrawn from the fabric 36, the hook 57 is slid into the loop 60 of the thread to hold the same a given distance below the fabric. Were it not for the hook mechanism, it is readily apparent that the thread would be withdrawn from the fabric with the needle and no loop would be left.

Rearwardly of the hook member I have provided a recess 61 serving as a pocket so that several loops might be "stacked" for cutting. In this manner the needle is always ahead of the loops being cut and therefore does not lose its thread.

Upon the shafts 50, 50', I have provided an arm 62 held to the shaft by means of a set screw 63. Affixed to the outer end of this arm 62 is a thin, flexible knife blade 64, held by its own spring tension against the side of the hooked head member 56 in the manner illustrated in Fig. 6. As shown in Fig. 4, the timing of both shafts 50 and 51 is such that when the hooked head member is receiving the loop of yarn formed by the receding needle, the knife is drawn downwardly away from a cutting position. These movements are more clearly pointed out by the directional arrows on the drawing.

In Fig. 5, however, the movements of the shafts are illustrated as being reversed, as shown by the directional arrows. The timing here is such that when the needle 59 leaves the fabric 36, and the loop has been properly hooked, the head member 56 recedes away from the path of the needle, bringing a portion of the "stacked" loops into the path of the knife 64 which is now made to travel upwardly in the direction of the arrow. As shown, the knife is made to sever only a portion of the loops held in the pocket 61 so that perfect stitching by the needle is not interfered with. When the needle 59 descends again and begins to leave the fabric 36 the mechanism will again assume the position as shown in Fig. 4 and the cycle is repeated. It will be remembered that the above described actions take place rapidly and may be adjusted for the speed of the fabric as it is pulled through the machine by the feed roll 34.

With the details of the machine thus far described it is readily apparent that by pulling the fabric from one side to the other between the two needle bars the final stitching is made to simulate a series of connected "diamonds" as illustrated in Figs. 2 and 9.

It is known that buyers in the rug industry not only inspect the face or tufted side of the rug for beauty and texture but also inspect the reverse side to see that the stitching is tight and close enough to give sufficient rigidity to the rug itself. While the patterns of stitching in

6

machine-made rugs has been heretofore limited, it is apparent that considerable variation may be had by use of the presently improved machine. Various shapes and sizes of cams may be used to move the picker roll in any desired fashion. Although not shown in the present application, it is within the scope of my invention to gear the feed roll with the cam 21 in such a manner that the fabric may be made to hesitate in its movement through the machine to allow the cam to move the picker roll 28 through several successive stages so that the final stitching may assume many patterns. The invention, since it employs many components of the prior art, is inexpensive to manufacture and so arranged that repair or replacement of any part is relatively easy.

While I have described by invention in detail and shown a structure incorporating the invention, it is to be understood that such structure may assume various shapes and forms without departing from the invention as falls within the purview of the following claims.

I claim:

1. In a machine for forming chenille patterns on a fabric, a work support, means for feeding fabric across said work support from front to rear, front and rear needle bars mounted for reciprocation in a direction transverse to said fabric, a plurality of spaced needles mounted upon each of said needle bars and arranged to carry yarn through the fabric, pile forming means arranged in cooperative relation with each of said needles, the needles on said rear needle bar being offset from the needles on said front needle bar, reciprocative means mounted between said needle bars to engage said fabric as it is fed between said needle bars, and drive means imparting a reciprocating motion to said reciprocative means, said reciprocative means being provided with tractive means to move said fabric from side to side between the needles on said front needle bar and the needles on said rear needle bar to form a pattern.

2. In a machine for forming chenille patterns on a fabric, a work support, means for feeding fabric across said work support from front to rear, front and rear needle bars mounted for reciprocation in a direction transverse to said fabric, a plurality of spaced needles mounted upon each of said needle bars and arranged to carry yarn through the fabric, pile forming means arranged in cooperative relation with each of said needles, the needles on said rear needle bar being offset from the needles on said front needle bar by a distance approximately one-half the spacing between adjacent needles on said front needle bar, reciprocative means mounted between said needle bars to engage said fabric as it is fed between said needle bars, and drive means imparting a reciprocating motion to said reciprocative means, said reciprocative means being provided with tractive means to move said fabric from side to side between the needles on said front needle bar and the needles on said rear needle bar to form a pattern having substantially diamond shaped interstices.

3. In a machine for forming chenille patterns on a fabric, a work support, means for feeding fabric across said work support from front to rear, front and rear needle bars mounted for reciprocation in a direction transverse to said fabric, a plurality of equally spaced needles mounted upon each of said needle bars and arranged to carry yarn through the fabric, pile

forming means arranged in cooperative relation with each of said needles, the needles on said rear needle bar being offset from the needles on said front needle bar by a distance approximately one-half the spacing between adjacent needles on said front needle bar, reciprocative means mounted between said needle bars to engage said fabric as it is fed between said needle bars, and drive means imparting a reciprocating motion to said reciprocative means, said reciprocative means being provided with tractive means to move said fabric from side to side between the needles on said front needle bar and the needles on said rear needle bar to form a pattern in which each needle traces a zig-zag line and wherein the lines traced by the needles on said rear needle bar are substantially 180° out of phase with the lines traced by the needles on said front needle bar so as to form rectangular interstices in the pattern.

4. In a machine for forming chenille patterns on a fabric, a work support, means for feeding fabric across said work support from front to rear, front and rear needle bars mounted for reciprocation in a direction transverse to said fabric, a plurality of equally spaced needles mounted upon each of said needle bars and arranged to carry yarn through the fabric, pile forming means arranged in cooperative relation with each of said needles, the needles on said

rear needle bar being offset from the needles on said front needle bar by a distance approximately one-half the spacing between adjacent needles on said front needle bar, reciprocative means including a picker bar rotatably mounted between said needle bars to engage said fabric as it is fed between said needle bars, and drive means including a cam imparting a reciprocating motion to said picker bar to move said fabric from side to side between the needles on said front needle bar and the needles on said rear needle bar to form a pattern in which each needle traces a zig-zag line and wherein the lines traced by the needles on said rear needle bar are substantially 180° out of phase with the lines traced by the needles on said front needle bar so as to form diamond shaped interstices in the pattern.

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