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2,879,731

TUFTING IMPLEMENT FOR PRODUCING HIGH AND LOW PILE

Filed Oct. 24, 1956

2 Sheets-Sheet 1

Fig. 1

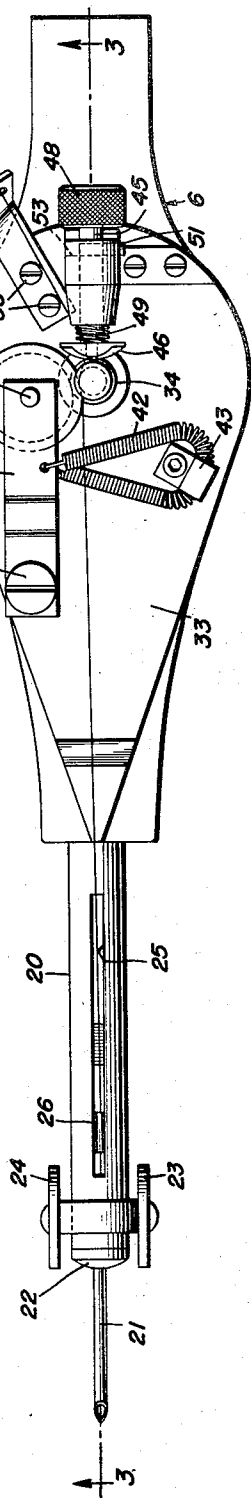
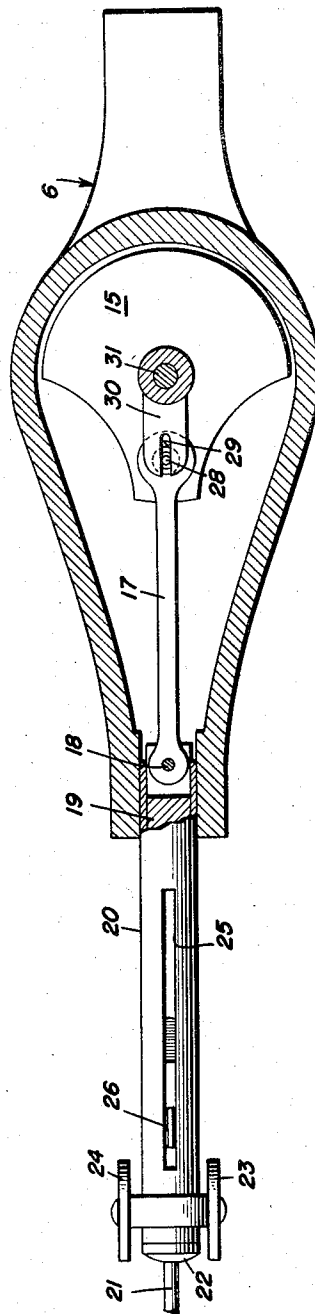


Fig. 2



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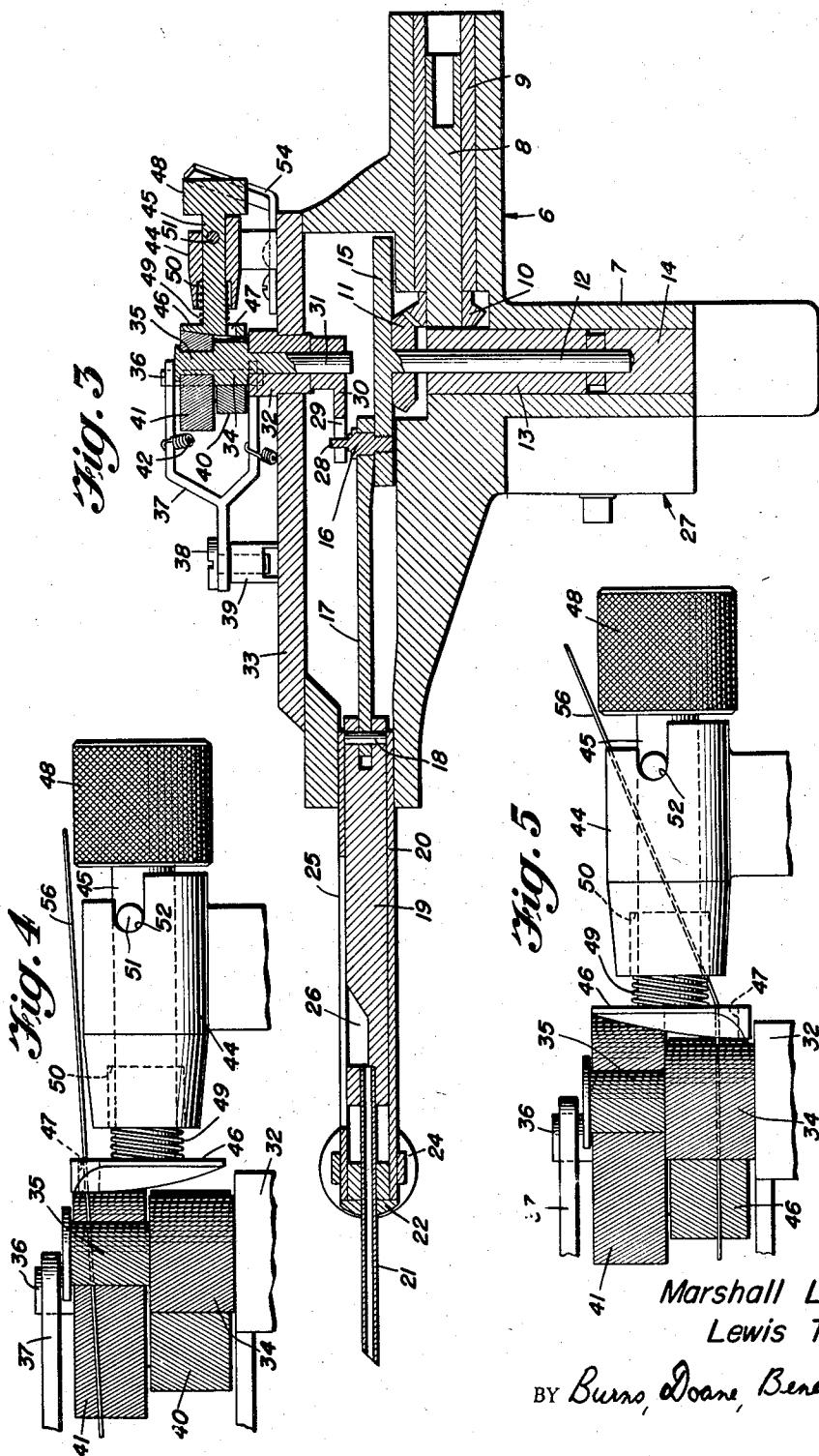
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TUFTING IMPLEMENT FOR PRODUCING HIGH AND LOW PILE

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2 Claims. (Cl. 112—80)

The present invention relates to a tufting implement capable of producing pile of different heights. More particularly, the invention relates to mechanism for feeding a yarn at different rates of feed to the needle of a tufting implement to enable the implement to produce pile of different heights.

Tufted fabrics such as tufted rugs and carpets are conventionally produced on multiple needle tufting machines. Such machines are provided with a sufficient number of needles to tuft the entire width of a fabric backing as the backing passes through the machine. A tufting yarn is fed to each needle of the multiple needle tufting machine. It occasionally happens that one of the tufting yarns or one of the needles of the machine will break and this results in failure of the machine to tuft a portion of the backing until the defect is detected and corrected. It is not commercially practical to discard that portion of the tufted fabric having the defect therein. It is therefore customary to "mend" the tufted fabric by using a single needle tufting machine to fill in the missing stitches or tufts. This mending is done by an operator who inspects the tufted fabric as it leaves the multiple needle tufting machine.

Some multiple needle tufting machines produce tufted fabrics in which the pile loops or tufts are all of the same height. No particular problem exists in mending defects in such tufted fabric because the tufting implement used for mending can be designed to produce pile of the same height as those produced by the multiple needle machine. However, some multiple needle tufting machines produce tufted fabric having pile of different heights in order to form a pattern in the fabric. In such multiple needle tufting machines the length of the pile loops formed by any given yarn will change from time to time. If such a yarn or its needle breaks, it is necessary to mend the defect in the fabric by the use of a tufting implement which is capable of producing loops of different heights. It is also necessary to change at the proper time the height of the loops being formed by the tufting implement so that the pattern in the fabric will not be distorted.

One of the primary objects of the present invention is to provide a single needle tufting implement which is easily and quickly adaptable for forming pile loops or tufts of different heights.

Another object of the invention is to provide a tufting implement in which mechanism is provided for positively advancing the tufting yarn toward the needle at different rates of feed to enable the implement to form pile of different heights and in which the rates of yarn feed can be quickly and easily changed.

Another object of the invention is to provide a simple and inexpensive yarn feed attachment for a tufting implement which is capable of feeding the tufting yarn to the needle at different rates of feed.

Other objects and advantages of the invention will be referred to in the following description which has reference to the accompanying drawings wherein:

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Figure 1 is a top plan view of a tufting implement having the yarn feed mechanism attached thereto;

Figure 2 is a view partly in top plan and partly in horizontal section of the tufting implement;

Figure 3 is a longitudinal sectional view taken in the direction of the arrows along the line 3—3 of Figure 1;

Figure 4 is an enlarged side elevational view of portions of the apparatus, showing the yarn feed mechanism in position to feed yarn to the needle at a low rate of feed; and

Figure 5 is a view similar to Figure 4 but illustrating the mechanism in position to feed yarn to a needle at a higher rate of feed.

The portions of the tufting implement which cause the needle to perforate the backing fabric may be more or less conventional. As illustrated, the implement comprises a body member, designated generally by the reference numeral 6, having a pistol grip portion 7. Power from any suitable source, not shown, is supplied to a shaft 8 rotatable in a bushing 9. A miter gear 10 is fixed to the shaft 8 and drives a miter gear 11 on a shaft 12. The shaft 12 is rotatable in a bushing 13 and in an end thrust bearing 14 in the grip portion 7 of the body member. Also fixed to the shaft 12 is a crank arm 15, which may be counterbalanced as best illustrated in Figure 2. The crank arm 15 carries a crank pin 16 which drives a connecting rod 17. The connecting rod 17 is attached by means of a wrist pin 18 to a plunger 19 which is reciprocable within a tube 20. A hollow needle 21 is secured in the forward end of the plunger 19 and is reciprocable in a needle guide 22 secured to the forward end of the tube 20. A pair of rollers 23 and 24 may be mounted at the forward end of the tube 20 to facilitate movement of the implement over the fabric to be tufted. Yarn is supplied to the needle 21 through a slot 25 in the tube 20 and through a recessed portion 26 of the plunger 19.

The implement may be provided with an electric switch designated generally by the reference numeral 27 for controlling the source of power for the shaft 8.

The crank pin 16 is provided with a vertical extension 28 which is positioned in a slot 29 in a crank 30. The crank 30 is fixed to a shaft 31 which is rotatable in a bearing 32 fixed in a cover plate 33. Either fixed to or integral with the shaft 31 are a first feed roll 34 and a second feed roll 35 of smaller diameter than the feed roll 34. Feed rolls 34 and 35 will thus be driven through one revolution for each excursion of the needle 21.

An idler shaft 36 is mounted in the free ends of a bifurcated lever 37 which is pivotally mounted on a bolt 38 threaded in a boss 39 carried by the cover plate 33. The idler shaft 36 has a first idler roll 40 rotatable thereon and a second idler roll 41 which is rotatable relative to the idler roll 40. The diameter of the idler roll 41 is greater than that of the idler roll 40 to such an extent that the periphery of the idler roll 40 can be in engagement with the periphery of the feed roll 34 while the periphery of the idler roll 41 is in engagement with the periphery of the feed roll 35. A tension spring member 42 has its ends connected to the bifurcated legs of the lever 37 and has its intermediate portion clamped to the cover plate 33 by means of a clamp 43. The spring member 42 thus resiliently urges the idler rolls into engagement with their respective feed rolls.

Fixed to the upper surface of the cover plate 33 is a bearing 44 in which a bolt 45 is both reciprocable and rotatable. The forward end of the bolt 45 is provided with a yarn guide member 46 having a yarn guide aperture 47 therein. The yarn guide aperture 47 is eccentric to the longitudinal axis of the bolt 45. The bolt 45 is provided with a knurled head 48. The bolt 45 is urged in the forward direction by means of a compression

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spring member 49, one end of which abuts against the rear surface of the yarn guide member 46 and the other end of which abuts against a shoulder 50 on the bearing 44. The bolt 45 is provided with a pin 51 which extends radially therefrom. The bearing member 44 is provided with diametrically opposed notches 52 and 53 in either of which the pin 51 may be received. A stationary yarn guide 54, having an aperture 55 therein, is secured to the cover plate 33 by means of screws 56.

A tufting yarn 56 from any suitable source of supply is threaded through the aperture 55 in the fixed yarn guide 54 and through the aperture 47 in the yarn guide member 46. The tufting yarn passes between one of the feed rolls and its respective idler roll and is then threaded through slot 25 and into the hollow needle 21. If the bolt 45 is in the position illustrated in Figure 4, the yarn 56 will be guided between the feed roll 35 and the idler roll 41 and will be advanced toward the needle at a low rate of feed because of the small diameter of the driven feed roll 35. This low rate of yarn feed will supply an insufficient length of yarn 56 during an excursion of the needle 21 to permit the formation of a loop of a height corresponding to the depth of penetration of the needle through the backing fabric. As a result the needle will pull yarn from a previously formed loop and there will be produced loops or tufts of low height in the fabric being tufted. By grasping the knurled head 48 and withdrawing the pin 51 from the notch 52 and then turning the bolt 45 through 180 degrees the yarn feed mechanism will be in the condition illustrated in Figure 5. In this condition the aperture 47 in the yarn guide member 46 will guide the yarn 56 between the feed roll 34 and the idler roll 40. Under these conditions the yarn 56 will be advanced toward the needle 21 at a higher rate because of the greater diameter of the driven feed roll 34. This higher rate of yarn feed supplies sufficient yarn 56 during each excursion of the needle 21 to enable the formation of loops of a height corresponding to the depth of penetration of the needle through the backing fabric with the result that the implement will form loops of greater height in the fabric. The change from one rate of yarn feed to the other can usually be made merely by the foregoing rotation of the bolt 45. However, with some yarns it may be found advisable to pivot the bifurcated lever 37 slightly in order to separate the idler rolls from the feed rolls while the bolt 45 is being rotated.

The yarn feed mechanism is simple, inexpensive, and troublefree in operation. The transition from one yarn feed rate to the other can be made almost instantly and this enables the operator to change from one loop length to another to conform to the pattern in the fabric.

We have illustrated and described what we now be-

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lieve to be the preferred embodiment of our invention. It will be understood, however, that various changes may be made in the apparatus without departing from the broader scope of the invention as defined by the following claims.

Having thus described our invention we claim:

1. In a tufting implement, yarn feed mechanism for feeding a yarn at different rates of feed comprising a first feed roll, a second feed roll of lesser diameter than said first feed roll, means for driving said feed rolls at the same angular speed, a first idler roll having its periphery in engagement with the periphery of said first feed roll, a second idler roll having its periphery in engagement with the periphery of said second feed roll, a bolt mounted on said implement for rotation about the axis of the bolt, a yarn guide member carried by said bolt, a yarn guide aperture in said yarn guide member eccentric to the axis of said bolt, said bolt being rotatable from a first position in which said yarn guide aperture guides a yarn between said first feed roll and said first idler roll to a second position in which said yarn guide aperture guides a yarn between said second feed roll and said second idler roll, and releasable means for retaining said bolt in either of said positions.

2. In a tufting implement, means for advancing a yarn to the needle at different rates of feed comprising a driven shaft, first and second feed rolls of different diameters fixed to said driven shaft, a lever pivotally mounted on said implement, an idler shaft carried by said lever in parallel relation to said driven shaft, first and second idler rolls on said idler shaft, said idler rolls being of different diameters and being rotatable relative to each other, resilient means urging said lever and said idler shaft in a direction to cause said first and second idler rolls to engage said first and second feed rolls respectively, a bolt mounted for rotary movement on said implement, a yarn guide aperture in said bolt, said yarn guide aperture being eccentric to the axis of said bolt to such an extent that in a first position of said bolt yarn will be guided between said first feed roll and said first idler roll and when said bolt is turned to a second position yarn will be fed between said second feed roll and said second idler roll, and releasable means for retaining said bolt in either of said first or second positions.

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