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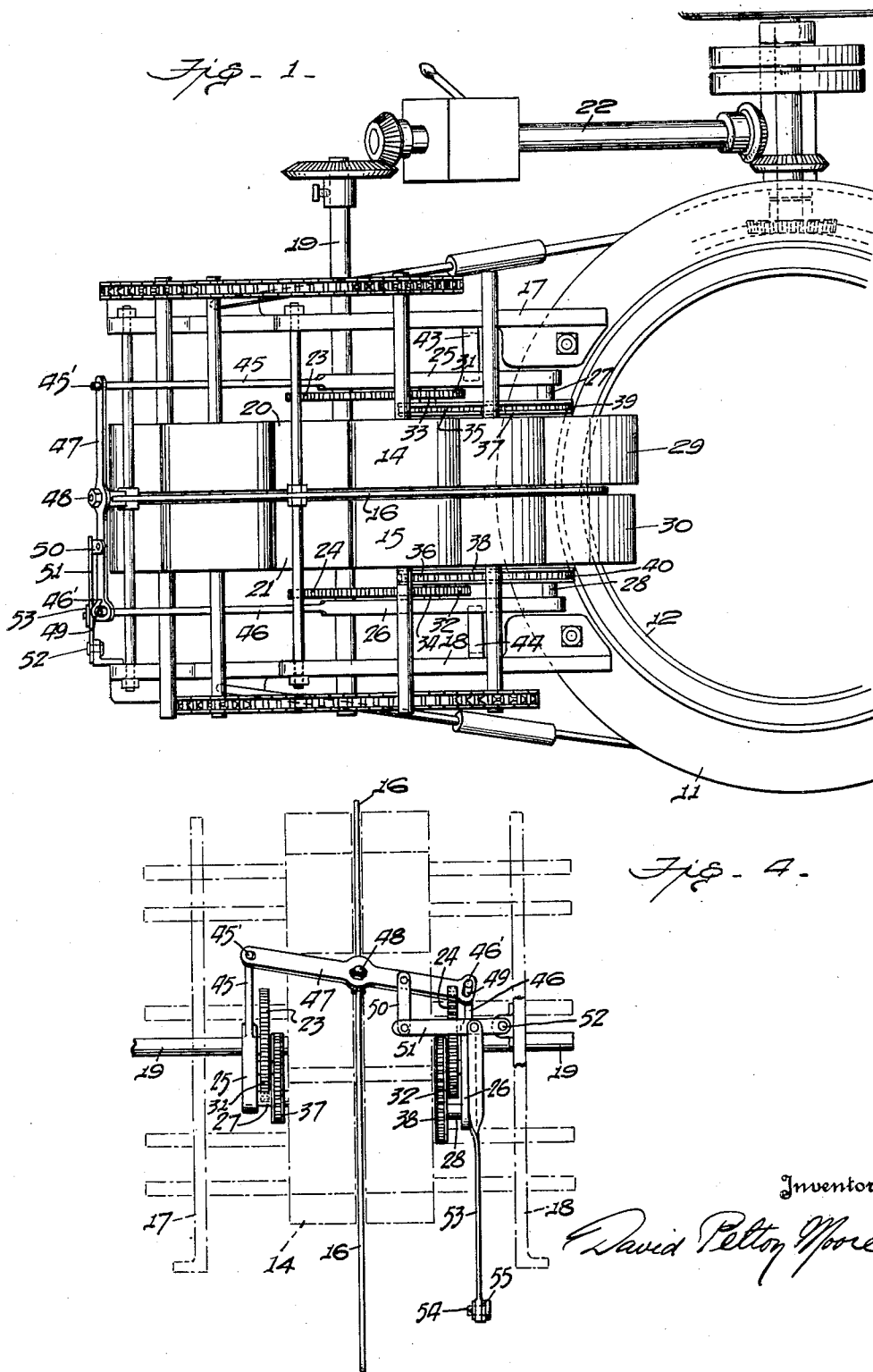
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APPARATUS FOR AND METHOD OF MAKING KNITTED PILE FABRICS

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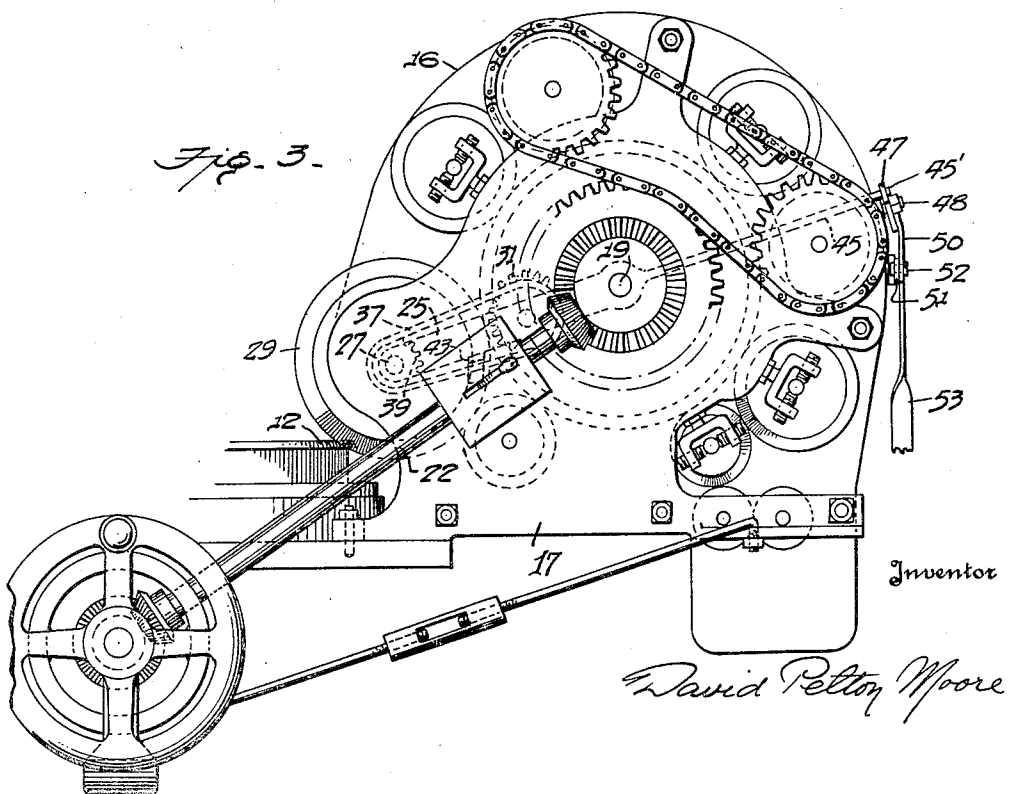
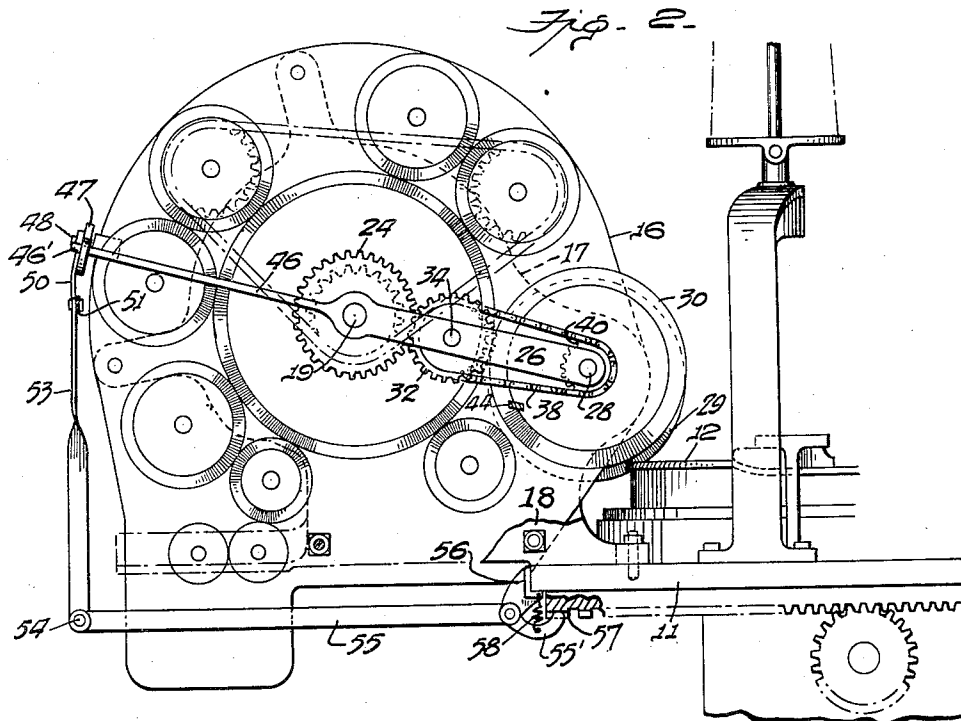
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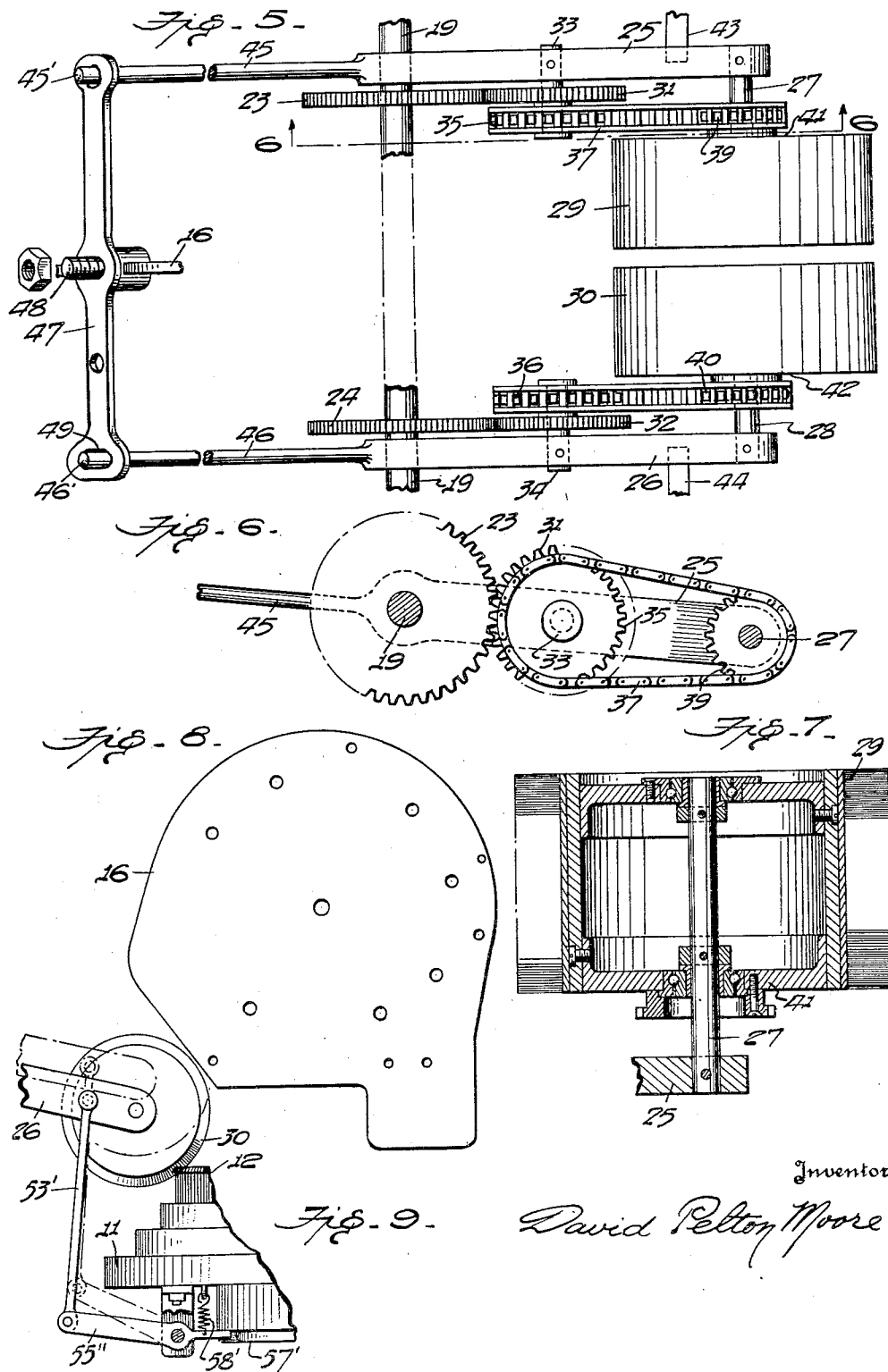
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APPARATUS FOR AND METHOD OF MAKING KNITTED PILE FABRICS

Application filed February 17, 1931. Serial No. 516,339.

This invention relates to improvements in apparatus for and methods of making knitted pile fabrics, one object of the invention being the provision of a machine of this type by means of which different patterned knitted pile fabrics can be produced.

Another object of this invention is the provision of a machine of this character by means of which two different and independently fed fibers, that is differing in colors, types and the like, are operated upon by the knitting machine to produce a knitted pile fabric of varied patterns and designs.

Still another object of this invention is the provision of a knitting machine having one or more fiber feeding devices, each device of which is a tandem feeding machine, so that with two feeds, four colors can be used, with automatic mechanism for bringing into play the various feeds according to the patterns or designs desired, thus providing a machine of this type that will be as diversified as the Jacquard loom for making pattern and design fabrics.

Still another object of this invention is the production of a knitted pile fabric in which the pile elements made of short loose fibers are selectively fed to the needles of a knitting machine so as to produce various patterned knitted pile fabrics.

Various constructions and arrangements of elements may be produced to accomplish this result, but it is intended to illustrate herein one or more, merely by way of example.

In the accompanying drawings:—

Figure 1 is a top plan view of the complete machine with one tandem feeding device, a portion only of the knitting machine being shown.

Figure 2 is a side elevation thereof.

Figure 3 is a view taken from the opposite side.

Figure 4 is a view taken from the feed-in end, showing the frame and cards in dotted lines.

Figure 5 is a plan view of the fiber feeding members and their operating mechanism.

Figure 6 is a side elevation of one of the levers and driving means for one of the fiber feeding members or brushes.

Figure 7 is a horizontal sectional view through one of the fiber feeding brushes.

Figure 8 is a plan view of the partition per se.

Figure 9 is a view illustrating a modified construction of automatic means for operating the feeding brushes.

Referring to the drawings, the numeral 11 designates the bed plate of the knitting machine, which is indicative of any type of machine upon which the pile fabric can be made, this particular knitting machine being of the latch needle type, and provided with the rotary needle cylinder 12.

The fiber feeding device or miniature carding machine 13, is provided with two carding elements 14 and 15 separated by a thin sheet metal partition 16, the detail construction of which is shown in Figure 8. This partition is of such shape as to be held rigidly between the two elements and be supported by the side frames 17 and 18, which in turn provide the supports for the shafts that operate the members of the elements in unison. The main or drive shaft 19 has secured thereto for movement therewith the two large drums 20 and 21, which as illustrated are operated from the knitting machine through the change speed drive shaft 22. Also attached to this shaft, one at each side of the respective drum is a gear 23—24. Mounted upon the shaft 19 for swinging movement and with the shaft their centers are the two arms or levers 25 and 26, which in turn support in their free ends the fixed shafts 27 and 28. Upon these shafts are rotatably mounted fiber feeding brushes 29—30, and each brush is driven by its respective gear 23—24, through a gear 31—32, journaled upon its stub shaft 33—34 carried by its lever. Fast to the gears 31 and 32 are the respective sprockets 35 and 36, over which are trained the chains 37 and 38 to the sprockets 39 and 40, respectively, the latter of which are rotatably mounted upon the respective shafts 27 and 28, and secured to the outer ends 41 and 42, of the respective brushes 29 and 30. Thus as the main card drums are rotated, the two feed brushes are also rotated and at a slightly greater speed.

To limit the downward positions of the levers 25 and 26, the two lugs 43 and 44 are carried by the frames 17 and 18. When both brushes are feeding one type of fiber, as for one color, mixes or heathers, the same are held upon the lugs 43 and 44, but when it is desired to raise and lower them alternately, and thus bring one into feeding position and move the other out of feeding position, the extension arms 45 and 46, are attached to the cross head or lever 47. This lever 47 is pivotally supported centrally upon the pin or stud 48, attached to and carried by the partition 16, or by a reinforcement attached thereto as may be found most desirable and expedient, the end 45' of the arm 45 being pivotally connected in one end of the lever 47 without any lost motion, while the end 46' of the arm 46 is fitted through the elongated slot 49 of the walking-beam or lever 47. This is done, due to the fact that the needle cylinder in its travel would receive no fiber from either brush, if there was not a delayed action in raising the brush 30, before the brush 29 came into action, whereas it is desirable to raise and lower positively the brush 29, so that the brush 30 can be brought into play as soon as possible after the brush 29 is elevated.

By this means, two colors of fibers may be fed to the knitting machine, as each carding element with its fiber feeding brush 29—30, may be fed separately and independently its proper sliver or slubber, and the lever 47 oscillated to in turn place the respective brushes 29—30 into and out of operative relation to the needles of the cylinder. This can be done manually, but it is desirable that this be accomplished automatically and in synchrony with the needle cylinder. One method is illustrated in Figs. 1, 2 and 5, wherein a link or rod 50 is attached to the walking beam or lever 47, and is itself pivotally connected to the short lever 51, fulcrumed to the frame at 52. A depending rod 53 is connected to the lever 51 and is connected through a pin 54 to the lever 55. This lever 55 is journaled in the bracket 56 depending from the underside of the bed plate of the knitting machine, and has its free inner end 55', in the path to be depressed by the cams 57, (one only being shown) carried by the needle cylinder. A spring 58 is used to return the lever 55 to its upper position, and the lever 47 to an opposite position to the cam moved position. Thus by means of the cams 57, which may be placed at any desired position upon the needle cylinder the brushes 29 and 30 are alternately brought into fiber feeding position relatively to the needle cylinder, and it is now possible to produce designs or patterns, such as parallel stripes, checks and diagonal stripes and blocks in a knitted pile fabric. Thus the cams 57 may be placed so that brush 29 feed for say ten

needles and brush 30 for ten needles, thus producing a knitted pile fabric with parallel stripes longitudinally of the fabric, or by permitting this action for ten rows, and then changing the action of the lever 55 to push instead of pull the lever 47, checks can be produced. Where the cylinder can be divided into an uneven number of cams, a diagonally stripped fabric will result.

Another method of oscillating the lever 47 is shown in Fig. 9, wherein a rod 53' is connected to the lever or arm 26, and is operated by the cam actuated lever 55'', which is similar to the lever 55, and cam 57'. Thus as the lever 55'' is actuated by the cam 57', the lever 26 is pulled down, lowering its brush 30 upon the cylinder needles in to feeding position, and through the lever 47 actuating the lever or arm 25 to elevate the brush 29. The release of the lever 55'' from the cam permitting the spring 58' to reverse the position of the brushes 29 and 30.

This invention lends itself to many adjustments and changes, and yet at the same time can be operated with both cards in unison that is where it is desired to produce a knitted pile fabric of one or mixed colors. When this is desired, the automatic connection to the walking-beam 47 and the feed brushes 29 and 30 are disconnected and both brushes are lowered in fiber feeding position, or one can be raised and held out of use and the other only used, this latter being desirable when lighter weight pile is desired.

With this machine it is evident that many designs or patterns, such as transverse alternate stripes, checks and alternating longitudinal stripes in knitted-pile fabrics can be secured, and that also by so actuating the brushes 29 and 30, fabrics having portions of pile and portions of jersey only may be secured. To do this it is merely necessary to lower both brushes when pile is being formed, and elevate both when jersey is desired.

Thus where two or four feeds are employed, necessitating a twin card to each feed, it is apparent that designs of all characters, patterns and colors is made possible with this invention.

What is claimed, as new, is:—

1. A pile fabric knitting machine including in combination a knitting machine having a movable needle carrying member, a plural fiber feeding device operatively associated therewith, and cooperative means carried by the needle carrying member and the fiber feeding device whereby one feeding member at a time of the plural fiber feeding device is brought into cooperative relation with the needles.

2. A pile fabric knitting machine as claimed in claim 1, in which the plural fiber feeding device has two fiber delivering brushes and the cooperative means is actu-

ed to move one brush into feeding position while the other is moved out of position and vice versa.

3. A pile fabric knitting machine as claimed in claim 1, in which the plural fiber feeding device is a tandem miniature carding machine, each member of which is provided with an independent fiber feeding brush.

4. A pile fabric knitting machine including in combination a knitting machine having a rotary needle cylinder, means for operating the cylinder, a tandem miniature carding machine operably connected to the cylinder operating means, said machine having two fiber feeding brushes, and means controlled from the cylinder for alternately raising and lowering said brushes into and out of operative relation to the needle cylinder.

5. A pile fabric knitting machine as claimed in claim 4, in which the controlling means includes a cam carried by the cylinder, a lever and spring associated therewith, two swingingly mounted arms, each carrying a fiber feeding brush, an oscillatory lever connecting both arms for alternate swinging movements, and an operative connection between said arms and said first lever, whereby the cylinder and cam actuates the brushes.

6. The combination with a knitting machine having a needle carrying member, of a miniature carding machine for feeding fibers to the needles including a plurality of side-by-side independent carding elements, a fiber feeding brush for each element, and means for placing one of said brushes at a time in fiber feeding relation to the needles.

7. The combination as claimed in claim 6, wherein the latter means is automatically operated from the knitting machine.

8. A device for feeding fibers to the needles of a knitting machine, including a plurality of associated carding elements, each constituting a miniature carding machine, and a fiber feeding brush for each carding machine, whereby said carding machines may operate independently or cooperatively.

9. A pile fabric knitting machine for making patterned knitted pile fabrics, including in combination knitting mechanism, a plurality of fiber feeding mechanisms associated therewith, and means for operating the latter mechanisms relatively to the knitting mechanism to feed fibers as and when desired to the needles of the knitting mechanism.

10. A pile fabric knitting machine as claimed in claim 9, wherein the latter means is operated automatically and in unison with the knitting mechanism.

11. A process for making patterned knitted pile fabrics, which consists in knitting in with the basic web of the knitted material separately fed and variously colored one color to each feed, loose short fibers in predetermined needle quantities.

12. A process for making patterned knitted pile fabrics, which consists in knitting in with the basic web of the knitted material predetermined tufts of pile made from short loose fibers and in accordance to the needles selected to carry predetermined colored fibers, whereby transverse, longitudinal and checked stripes of varying colors of pile, or alternating pile and jersey is formed in the completed fabric.

13. A pile fabric knitting machine as claimed in claim 6, wherein the fiber feeding brushes are each mounted for individual movement and have means connected to both brushes whereby when one brush is in fiber feeding position, the other brush is in non-feeding position.

14. A pile fabric knitting machine as claimed in claim 6, wherein the fiber feeding brushes are each mounted for individual movement, there being means connected to said brushes so that when one brush is in fiber feeding position the other brush is in non-feeding position, and means associated with the latter means and the knitting machine to actuate the brushes automatically.

15. A pile fabric knitting machine as claimed in claim 6, wherein each fiber feeding brush is carried by a pivoted arm, a walking-beam fulcrumed intermediate its ends and having its terminals operatively connected to both of said pivoted arms, and means for actuating the walking-beam to alternately actuate the arms to place the brushes one at a time in fiber feeding relation to the needle carrying member.

16. A pile fabric knitting machine as claimed in claim 8, wherein the fiber feeding brushes are each mounted for individual movement, and have means connected to both brushes whereby when one brush is in fiber feeding position the other brush is in non-feeding position.

17. A pile fabric knitting machine as claimed in claim 8, wherein the fiber feeding brushes are each mounted for individual movement, there being means connected to said brushes so that when one brush is in fiber feeding position the other brush is in non-feeding position, and means associated with the latter means and the knitting machine to actuate the brushes automatically.

In testimony whereof I affix my signature.

DAVID PELTON MOORE.