Feb. 6, 1962 I. C. HOWES 3,019,623

PILE FABRIC KNITTING MACHINES

Filed April 10, 1959 5 Sheets-Sheet 1

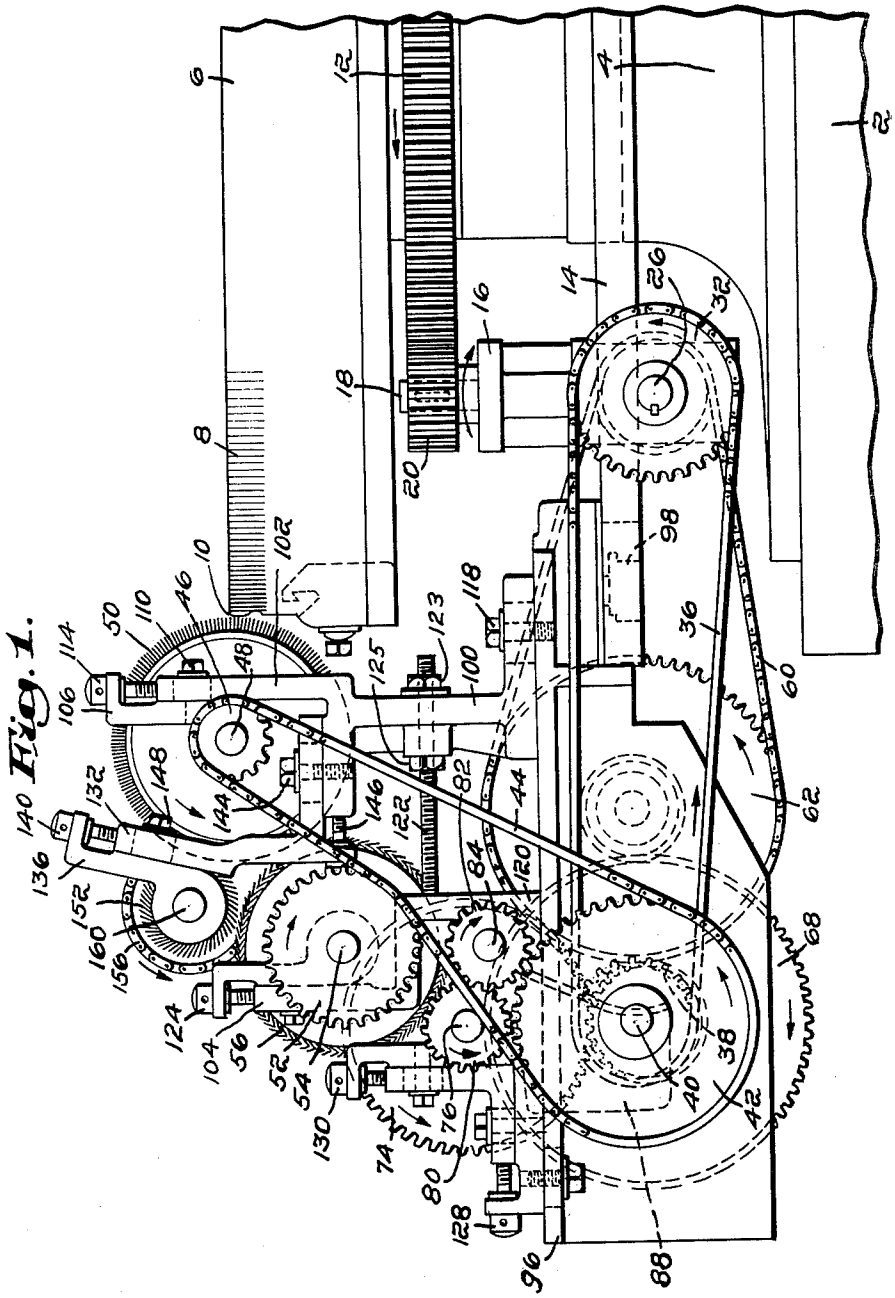


Fig. 1.

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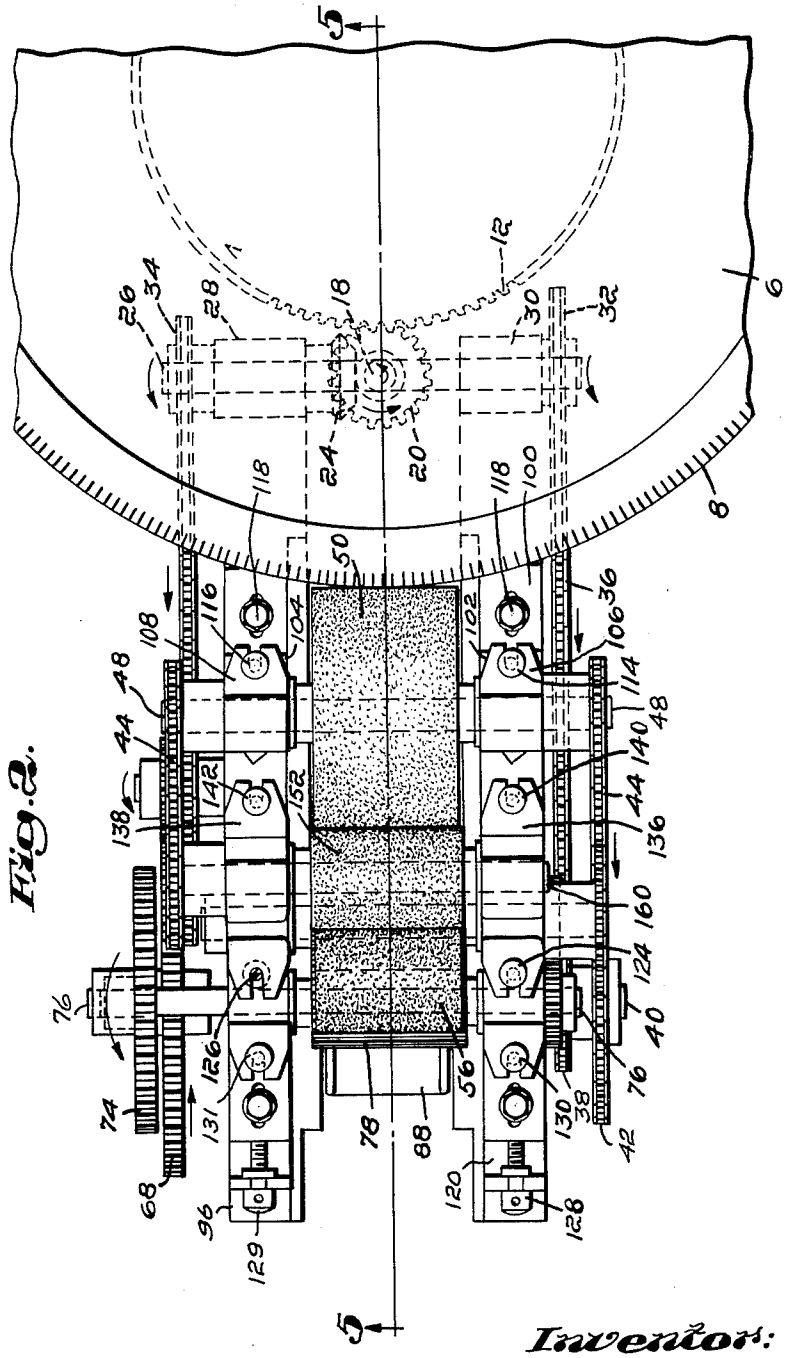


Fig. 2.

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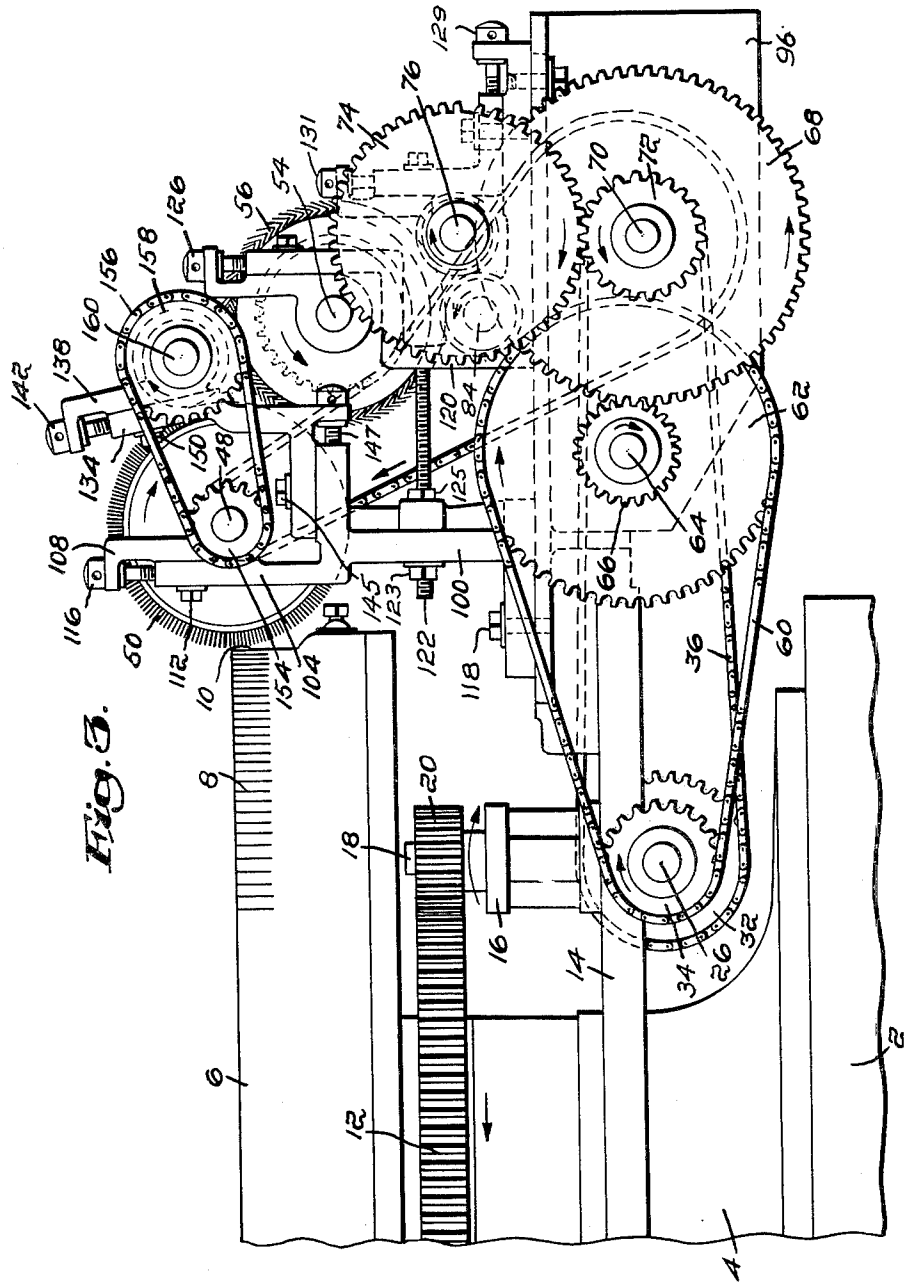


Fig. 3.

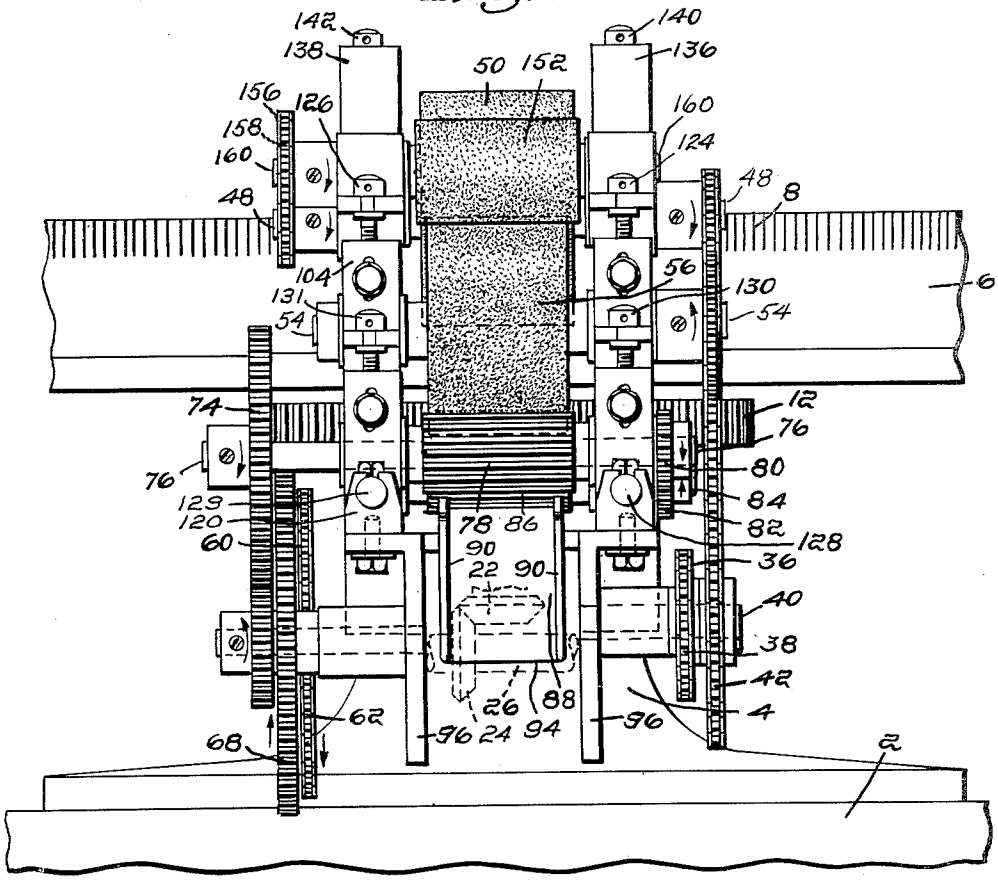
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PILE FABRIC KNITTING MACHINES

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Fig. 4.



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PILE FABRIC KNITTING MACHINES

Filed April 10, 1959 5 Sheets-Sheet 5

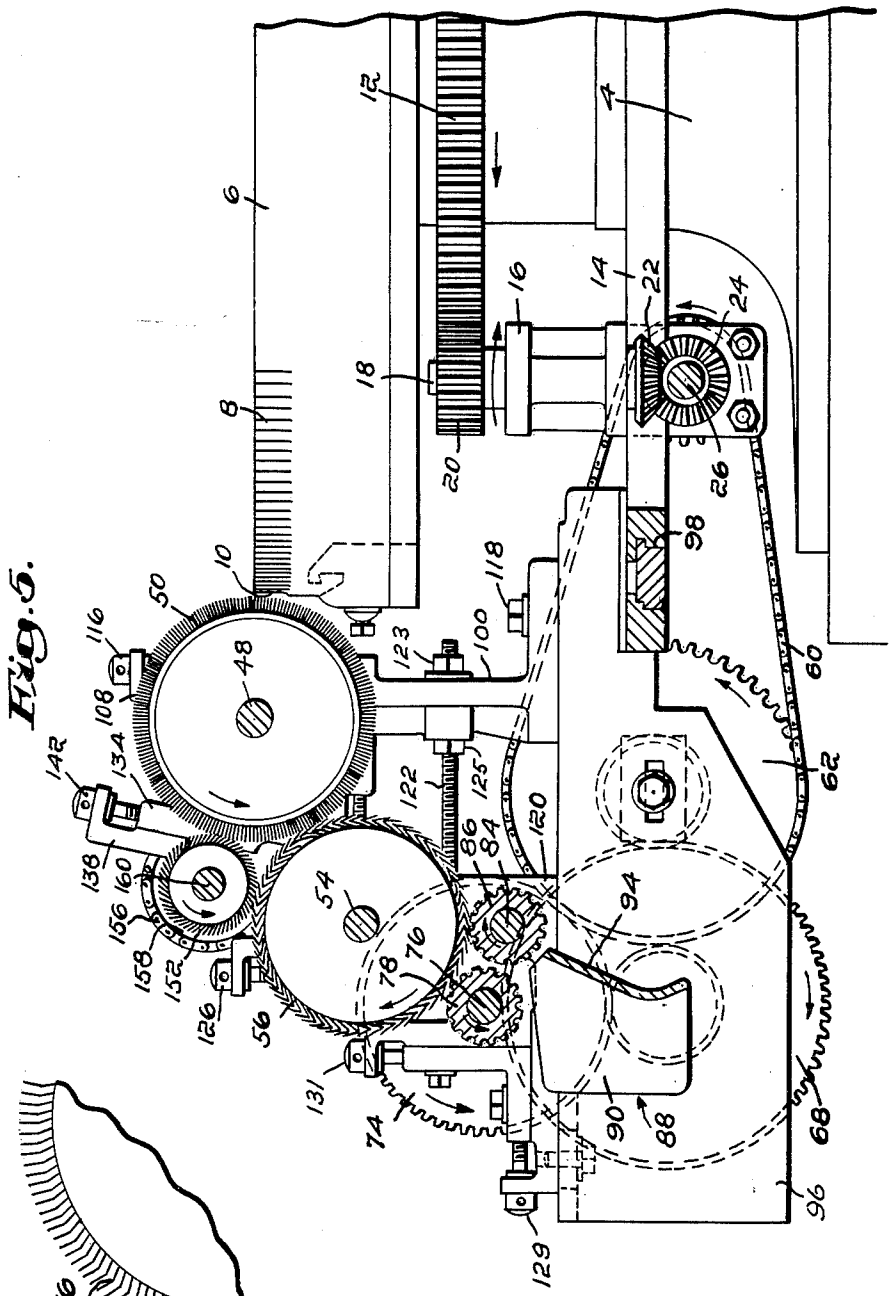


Fig. 5.

Fig. 6.

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United States Patent Office 3,019,623 Patented Feb. 6, 1962

3,019,623

PILE FABRIC KNITTING MACHINES

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3 Claims. (Cl. 66—9)

This invention relates to knitting machines and is particularly concerned with that type of knitting machine having one or more carding head attachments whereby carded fibers may be introduced to the knitting needles near the point of knitting to be bound immediately thereafter into the knitted fabric thereby to produce a knitted fabric with pile on one side.

Machines for introducing pile into knitted fabrics are well known, but the carding head attachments heretofore used to produce this result have been of a relatively complicated nature. By the construction disclosed hereinafter, it will be seen that I have provided a carding head of relatively simple structure that delivers the carded fibers to the needles just ahead of the knitting position, and each carding head, of which there will be at least one and may be as many as four, will be driven by the motor that drives the knitting machine.

According to the present invention, existing circular knitting machines may be readily adapted to produce pile knitted fabric by a relatively simple, inexpensive conversion procedure. The power requirements of the carding heads are relatively small (in the order of ¼ horsepower) so that a slightly larger knitting machine motor will have adequate capacity to carry the added load.

All of the carding elements are carried in bearings that are readily adjustable so that optimum carding results may be obtained. On the other hand, a minimum of carding elements are used. These consist of a pair of feed rolls that feed the fibers to the lickerin and a doffer which carries the fibers directly from the lickerin to the needles. If desired (and the results may be improved somewhat thereby), a brush or doffer clearer roll may be introduced to act jointly with the lickerin and doffer. This, however, is a refinement and may or may not be used as preferred.

Since the carding head includes only three principal elements and a fourth subsidiary element, if desired, it will be appreciated that the supporting frame and driving mechanism will be of equal simplicity, thus enabling the costs to be held to a low figure while producing a knitted pile fabric of as good, if not better, quality than those produced by the more complicated carding heads now in use.

These and other objects of the invention will become more apparent as the description proceeds with the aid of the accompanying drawings in which:

FIG. 1 shows the carding head in side elevation looking from the right.

FIG. 2 is a plan view of FIG. 1.

FIG. 3 is a side elevation similar to FIG. 1 but looking from the left.

FIG. 4 is a front elevation.

FIG. 5 is a vertical section taken approximately on the line 5—5 of FIG. 2.

FIG. 6 is an enlarged view of a portion of the lickerin to show more accurately the shape of the wires.

Referring first to FIG. 1, there is shown in the right-hand portion thereof a conventional circular knitting machine, which comprises a table **2** that customarily stands on the floor. On this is the knitting machine base **4** which supports in known fashion the circular knitting cylinder **6**. The knitting cylinder has a large number of circularly arranged knitting needles **8** which rotate continuously and

cooperate with the yarn introduced at the knitting point **10** to produce in a well known manner a tubular knitted fabric.

The introduction of individual fibers at the knitting point **10** has been a process practiced for many years, and it results in the production of a pile on the exterior of the knitted tubular fabric. The present invention is concerned with the specific mechanism that is used to present carded fibers to the knitting needles at the knitting point **10**. This structure will now be described.

On the under side of the knitting head, there is affixed a gear **12** concentric with the knitting head. A radially extending platform **14** is secured to the base **4** and on this platform is mounted a bearing **16** in which is a vertically extending shaft **18** having on its upper end a gear **20** which coacts with gear **12**. On the lower end of shaft **18** is a beveled gear **22**, which coacts with a second beveled gear **24** on a crosswise extending shaft **26** carried by suitable bearings indicated at **28** and **30** in FIG. 2.

On the righthand end of shaft **26**, as viewed in FIGS. 2 and 4, is a sprocket **32** which is arranged to drive the lickerin, doffer and doffer clearer roll while a second sprocket **34** on the opposite end of shaft **26** is arranged to drive the feed rolls.

Referring now to FIG. 1, the mechanism for driving the lickerin, doffer and doffer clearer roll will be described. Sprocket **32**, rotating counter-clockwise, drives chain **36** and sprocket **38** mounted on shaft **40**. To sprocket **38** is affixed a larger sprocket **42**, having thereon a chain **44** which travels over a small sprocket **46** attached to the shaft **48** of the doffer **50**. Chain **44** also engages a somewhat larger sprocket **52** which is affixed to shaft **54** on which is the lickerin **56**. By this arrangement, it will be seen that the doffer will have a considerably higher peripheral speed than the lickerin in accord with normal practice. It should also be noted that the doffer shaft **48** is approximately on the same level as the needles so that the fibers will be swept into the hooks of the needles in a manner to provide maximum fiber density.

Turning now to the other side of the machine as shown in FIG. 3, the shaft **26** has thereon a sprocket **34** which rotates clockwise and drives chain **60** over a larger sprocket **62**. This sprocket is affixed to the shaft **64**, having thereon a small gear **66** which coacts with a large gear **68** fixed on shaft **70**. To this latter shaft is affixed a small gear **72** which coacts with a large gear **74** fixed on shaft **76**, which shaft carries the top feed roll **78**. On the righthand end of shaft **76**, as viewed in FIG. 4, is a gear **80** which coacts with a similar gear **82** mounted on shaft **84**, on which is mounted the bottom feed roll **86**.

The two feed rolls, which are best seen in FIGS. 4 and 5, are numbered **78** and **86** and rotate counter-clockwise and clockwise respectively, with their nip located directly above a guide trough **88**. This trough, which has sides **90** and a rear wall **94**, acts to direct the entering fibers to the feed rolls.

By virtue of the drive shown in FIG. 3 and heretofore described, it will be clear that the feed rolls **78** and **86** rotate relatively slowly in relation to the speeds of the lickerin and doffer. These relative speeds are factors that are well known in the carding art and need not be gone into here in further detail. Suffice it to say that the fibers fed by the feed rolls to the lickerin and thence placed on the needles by the doffer **50** will be in sufficient quantity to produce a pile of the required density.

All of the elements just described are carried by an outer extension of platform **14**, which extension is numbered **96**, and hereinafter together with platform **14** will be referred to as the carding head frame. The extension **96** is shiftable tangentially of the needles by the transverse slide shown at **98** in FIGS. 1 and 5. When

properly set, it may be bolted to maintain its position. A bracket 100 mounted on and extending crosswise of extension 96 is capable of adjustable movement in a radial direction with respect to the needles 8. Bracket 100 has two upwardly extending spaced supports 102 and 104 to which are affixed in vertically adjustable relation bearing carrying elements 106 and 108, which in turn support shaft 48 of the doffer 50. By loosening the nuts 110 and 112 and turning the screws 114 and 116, the shaft 48 may be adjusted to bring the doffer in proper vertical relation with respect to needles 8. By loosening bolts 118, bracket 100 may be shifted radially to complete the adjustment of doffer 50 with respect to the needles.

With the doffer adjusted, the adjustment of the other elements may then proceed. By generally similar means which need not be described in further detail, it will be seen that the bracket 120 carrying the lickerin on shaft 54 may be adjusted horizontally with respect to bracket 100 by rotation of the nuts 123 and 125 on screw 122, which screw is fixed to bracket 120 and slidable through bracket 100. The shaft 54 may be adjusted vertically with respect to bracket 120 by rotation of the screws 124 and 126. Shaft 84 of the bottom feed roll is in fixed relation to bracket 120 but shaft 76 carrying the top feed roll may be adjusted horizontally with respect to bracket 120 by rotation of screws 128 and 129 and vertically by rotation of screws 130 and 131 thus to produce proper feeding of fibers to the lickerin.

The doffer clearer roll 152, if used, is driven by a sprocket 154 on the left end of shaft 48, over which sprocket passes chain 156, which in turn drives sprocket 158 secured to the clearer roll shaft 160. This shaft is carried by bearings 136 and 138 which are adjustable vertically with respect to supporting brackets 132 and 134 by rotation of screws 140 and 142 after loosening bolts 148 and 150. Horizontal adjustment of the clearer roll is achieved by loosening bolts 144 and 145 and turning adjusting screws 146 and 147.

Since the carding head just described requires less than a 90 degree sector of the knitting machine, it is apparent that as many as four carding heads may be applied to each circular knitting machine, assuming of course that the knitting machine has a corresponding number of knitting points. With four carding heads, the production of pile fabric will be four times as fast as the production using a single carding head. The character of the pile fabric, however, will be the same in either case.

Since all of the points of adjustment are easy to get at, the machine may readily be put in proper adjustment and so maintained. All of the chain and gear drives are conventional and of inexpensive, readily obtained parts which lend themselves to low cost and long life.

It is my intention to cover all changes and modifications of the example of the invention herein chosen for purposes of the disclosure which do not constitute departures from the spirit and scope of the invention.

I claim:

1. Means for feeding fibers to a circular knitting machine which includes a base and a needle cylinder carrying a plurality of hooked needles, said means comprising a carding head frame and carding elements mounted thereon, said frame comprising a pair of spaced vertical plates having extended horizontal upper surfaces to which bearings may be attached, said plates fastened to the base of the knitting machine, pairs of spaced bearings mounted on the upper surfaces of said

spaced plates, said bearings being adjustable vertically and lengthwise of said plates, said pairs of bearings supporting a pair of feed rolls, a lickerin and a doffer, a horizontal drive shaft at right angles to said plates mounted on bearings fixed to said machine under the needle cylinder, gearing driven by said machine for rotating said shaft, and means mounted on the said plates and driven by said shaft for causing appropriate rotation of said feed rolls, lickerin and doffer.

2. Means for feeding fibers to a circular knitting machine as set forth in claim 1, the shaft of the said doffer being substantially at the same level as the hooks of the needles whereby the fibers will be traveling upwardly when disposed in the hooks of said needles, the shaft of the lickerin being substantially below that of the doffer, and the shafts of the feed rolls being substantially below the shaft of the lickerin, and a guide trough positioned between said plates and below said feed rolls for directing said fibers upwardly to said feed rolls.

3. Means for driving the elements of a carding head associated with a circular knitting machine which includes a base and a needle cylinder rotatably mounted thereon, said means comprising a ring gear in fixed relation and concentric with the needle cylinder of said machine, a vertical shaft mounted in a bearing on said machine base, a gear on one end of said shaft meshing with said ring gear, a bevel gear on the other end of said vertical shaft, a horizontal drive shaft which is at right angles to a radius of said ring gear, a bevel gear on said drive shaft meshing with said bevel gear of said vertical shaft, first and second sprockets on the ends of said drive shaft for driving the elements of said carding head through the use of chains, a pair of spaced vertical plates having upper surfaces to which bearings may be attached, said plates fastened to the said base of the knitting machine, pairs of spaced bearings mounted on the upper surface of said plates, said bearings supporting in parallelism the shafts of the elements of said carding head, said elements comprising a pair of feed rolls, a lickerin and a doffer, a third sprocket on one of said plates driven by a chain from said first drive shaft sprocket, a fourth sprocket affixed to said third sprocket, and fifth and sixth sprockets on the shafts of said lickerin and doffer, a chain engaging said fourth, fifth and sixth sprockets for driving the lickerin and doffer, and means on the other of said plates driven by a chain on said second sprocket for causing rotation of said feed rolls.

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