

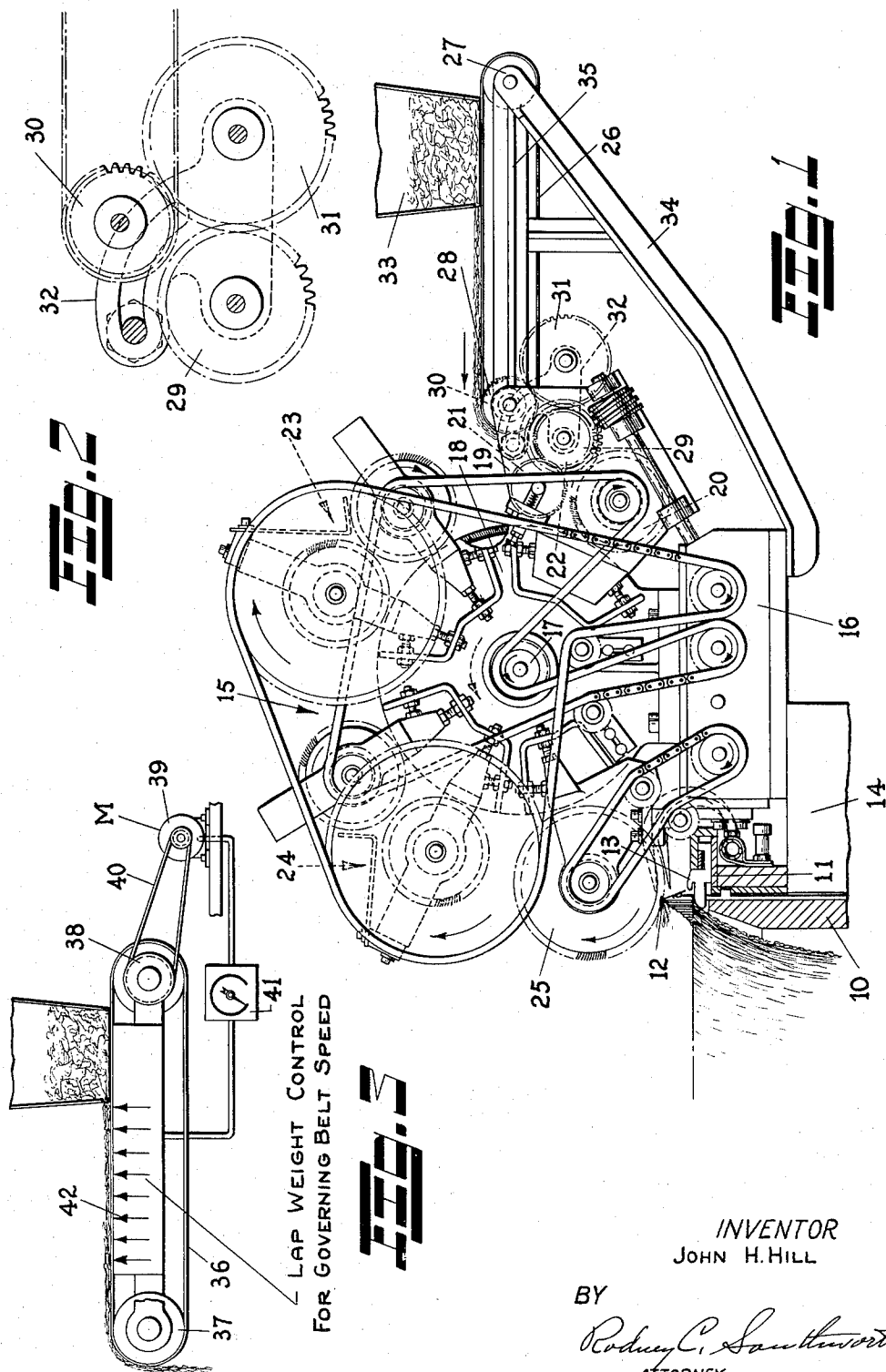
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KNITTING MACHINE AND METHOD FOR FEEDING FIBERS THERETO

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KNITTING MACHINE AND METHOD FOR FEEDING FIBERS THERETO

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This invention relates to knitting machines of the type adapted to knit "high pile" fabrics and, more specifically, to improvements by which fibers in bulk form are delivered to each card cylinder in such knitting machines.

It is a general object of the invention to devise means by which a knitting machine for producing "high pile" fabrics may be fed directly from a source of bulk fibers sometimes referred to as "raw stock" or "staple" instead of from staple in the form of a sliver as has heretofore been the accepted practice.

It is a more specific object to feed this raw stock or staple to each of the cards of such a knitting machine from a bulk supply and in a definite, continuous and uniform quantity, that is, to meter the material within acceptable tolerances as it is delivered at the card.

Other objects will appear from the following, more complete disclosure.

In knitting machines of the type adapted to incorporate staple fibers in a base fabric during the knitting process so that these fibers will appear at a face thereof and may be finished to constitute a high pile material, it has been considered necessary up to now, to prepare these fibers into a sliver or similar strip of material to be drawn into each of the cards of the machine from a can or other container. This system functions very well, but is open to the serious objection that the material has to be formed into the sliver and, of course, in handling such a strand, there is always considerable chance for breakage or other difficulty caused by low tensile strength of the material, or it is easily affected by air currents, friction as drawn out of the container, improper winding or coiling and for several other reasons, and therefore does not present a wholly suitable form in which to handle the fibers which, after all, have been thus prepared at considerable expense. Before this, it has been thought that there was no other suitable way of introducing them to the card units. Of course, once in the card, the fibers are parallelized, thinned out greatly and worked into a lap to be doffed, the ultimate suitability of which has little to do with the manner in which the stock was originally presented.

According to the instant invention, the raw stock is fed to each card without any preparation other than that of proper mixing of acceptable fibers of proper staple length. Such fibers are taken from any available bulk supply and are advanced by a conveyor system which is driven by or, at least, in proper synchronism with the card and the knitting machine with which it may be associated. These conveyors may, for more precise delivery of staple, be independently driven, but controlled to deliver a uniform weight of fiber to each card by a control system such as that used for governing the weight of a lap as delivered and being responsive to increases or decreases in weight on the conveyor system to decrease or increase the belt speed accordingly.

The invention will be described in greater detail by reference to a specific embodiment and modification

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thereof as illustrated in the accompanying figures of drawing wherein:

Fig. 1 is a view showing part of a knitting machine in section and a card unit with the invention applied.

Fig. 2 is a detail view of a gear change means used to vary the quantity of fibers delivered.

Fig. 3 is a view showing a modified form of the invention in which the conveyor is independently driven and controlled.

Now referring to Fig. 1, a knitting machine such as that manufactured by Wildman Jacquard Co. of Norristown, Pennsylvania, has a needle cylinder 10, a sinker head 11 in which needles 12 and sinkers 13 are operatively carried. These needles and sinkers, broadly denoted as knitting instrumentalities, are caused to pass through the customary knitting waves by cam means of usual type.

On a circular base 14 and suitable extensions, there are mounted any convenient plurality of card units, generally indicated by numeral 15, and including, among other parts, a base 16, a central shaft and bearing member 17 about which a card cylinder 18 is rotated.

At the outer part of this unit there is rotatably carried in suitable frame brackets one of which is indicated at 19, a licker-in cylinder 20 for depositing fibers on the card teeth. The fibers are fed to the cylinder 20 through fluted or other pinch or feed rolls 21 and 22. All these rolls as well as cylinders 18 and 20 are positively driven at correct speeds and in the proper directions so that fibers once introduced to the feed rolls will be deposited on the licker-in cylinder which has teeth heavily inclined in the direction of rotation. The surface speed of the card cylinder is greater than that of cylinder 20 so that the card teeth doff the stock from the licker-in. As the card cylinder rotates, one or more sets of worker cylinders act upon the fibers to take them from the card clothing, parallelize them and in other ways, add to the uniformity of the bat of material and return it to the card. Here two such sets 23 and 24 perform this function and, of course, more or fewer may be utilized.

A doffer cylinder 25 takes the fiber from the card and, as the needles 12 rise in a suitable wave to take a body yarn, their hooks also enter the teeth of the doffer and take a tuft of fibers to be drawn along with the next loop of body yarn drawn by that needle.

These cylinders, rolls and all members are driven by gears, chains or other means all, in turn, preferably deriving motive power from some part of the knitting machine so as to function in synchronism therewith. Such drive means and the details of these cards are now well known and need no further description here. An example is to be found in French Patent 527,671 of 1921.

At each card bulk stock is fed by a conveyor means of some suitable type, such, for example, as the belt delivery system herein shown. This belt 26 is stretched about rollers 27 and 28, the latter being driven by meshing gears 29, 30 and 31. Gear 29 is fast to the end of a shaft which is rotatable with one of the fiber feed rolls while gear 30 is fast to a shaft by which it may turn the roller 28 and thus drive the belt.

The intermediate gear 31 serves to reverse the direction of rotation of gear 30 from that which would result from direct meshing of the gears 29 and 30, but also, as shown better in Fig. 2, it may be swung on an arm 32 so that gear 30 may be changed to vary the linear speed of travel of the belt and thereby the rate of delivery of the stock to the card.

The bulk stock may be delivered to the belt in any acceptable manner. Here it is delivered by gravity through a chute 33 leading from a mixing chamber. Of course, other means such as air delivery may serve,

Preferably, the conveyor means including the belt is enclosed in a casing to prevent undesired effects due to air currents. The bulk stock might otherwise be scattered or, at least, delivered in a less uniform state.

The brackets 19 are extended to support the inner roller and its drive means while braces 34 or the like along with tie rods 35 serve to support the outer bearings, those for roller 27. While only one of each of these parts is evident in Fig. 1, two of each are utilized.

In Fig. 3, a modification by which relatively infinite variation in delivery rate is provided along with a control by which the conveyor speed may be automatically varied so as to maintain uniform the weight of stock delivered per unit of time. A belt 36 is stretched about rollers or pulleys 37 and 38 rotatable in suitable bearing members. The roller 38 is driven by any convenient source of power, e.g., motor 39 and belt 40. Preferably motor 39 may have its speed varied within a wide range by a rheostat or other current control means 41 which is, in turn, responsive to the weight or thickness of staple or other stock on the active portion of belt 36 and which is borne upon a lap weight control means 42. The latter is well known and need not be described further here. United States Patents 2,028,698; 2,361,217; 2,770,843 and 2,805,449 describe such devices in detail. The belt is, of course, not tightly drawn between the pulleys since it must be free to bear upon the unit 42 so as to take full advantage of the sensitivity of that means. Alternatively, the lap may pass between rolls and belt or may pass over the well known articulated pedal means after leaving the belt.

These belts may be of rubber or other suitable material and of a type to be driven more or less positively with little tension. If desired, the inner face and the rolls may be cleated for that purpose. Any of the usual expedients may be availed of to alleviate undesired conditions.

The chute is so formed at the end adjacent the belt with which it functions that it will be narrower than the belt, but should practically bear on the belt surface except at the side from which the belt emerges with a fiber layer sustained on it. At that side the height of the barrier above the belt affects the amount of stock picked up and carried along, and for that purpose, the chute or, at least, the critical portion thereof may be adjustable to or from the belt surface.

Various fibers may be worked upon and the material or mode by which they are originally prepared forms no part of this invention. The terms "stock," "fibers" and "staple" are used more or less synonymously here and the staple may be naturally formed or may be cut or broken, or may be further altered as to length during its working through the card. The term "bulk form" is used to describe these fibers or staple as fed in a loosely associated state rather than in sliver or like form.

While in the modification, the drive and control is electrically operated, the device may be mechanically driven through a speed reducing and/or change unit, e.g., a Reeves drive unit or the like. In that event the lap weight will function to vary the output of the speed change unit as required.

While one embodiment and a modification of the invention have been disclosed, it is to be understood that the inventive concept may be carried out in a number of ways. This invention is, therefore, not to be limited to the precise details described, but is intended to embrace all variations and modifications thereof falling within the spirit of the invention and the scope of the claims.

I claim:

1. In a knitting machine of the type described having knitting instrumentalities and means for causing said instrumentalities to draw stitches to form a fabric, a carding means including a card cylinder, means for working fibers into a uniformly disposed layer on said card cylinder and a doffer cylinder for doffing fibers from the card cylinder and presenting them directly to said instrumentalities, conveyor means comprising belts for receiving said fibers and for feeding them in bulk form to said card cylinder and means for governing the delivery of said fibers thereby to feed a predetermined weight of stock to the card during a given time interval.

2. Mechanism as defined in claim 1, wherein said means for governing the delivery of the fibers is responsive to a variation from a predetermined weight of fibers conveyed per unit of time.

3. Mechanism as defined in claim 1, wherein said means for feeding bulk fibers comprises a belt conveyor system and independent, variable speed drive means therefor.

References Cited in the file of this patent

UNITED STATES PATENTS

506,960	White et al.	Oct. 17, 1893
864,515	Collins	Aug. 27, 1907
1,369,776	Bray	Mar. 1, 1921
1,395,877	Tillotson	Nov. 1, 1921
1,980,841	Wuest	Nov. 13, 1934
2,028,698	Curley et al.	Jan. 21, 1936
2,205,304	Mutter	June 18, 1940
2,361,217	Lewis	Oct. 24, 1944
2,710,525	Brandt	June 14, 1955
2,737,702	Schmidt et al.	Mar. 13, 1956
2,770,843	Strother	Nov. 20, 1956
2,805,449	Martin	Sept. 10, 1957
2,840,859	Powischill	July 1, 1958

FOREIGN PATENTS

195,802	Great Britain	Apr. 12, 1923
527,671	France	July 29, 1921