Feb. 8, 1938. P. H. WALSH 2,107,458

TEXTILE MANUFACTURE

Filed March 21, 1935 3 Sheets-Sheet 1

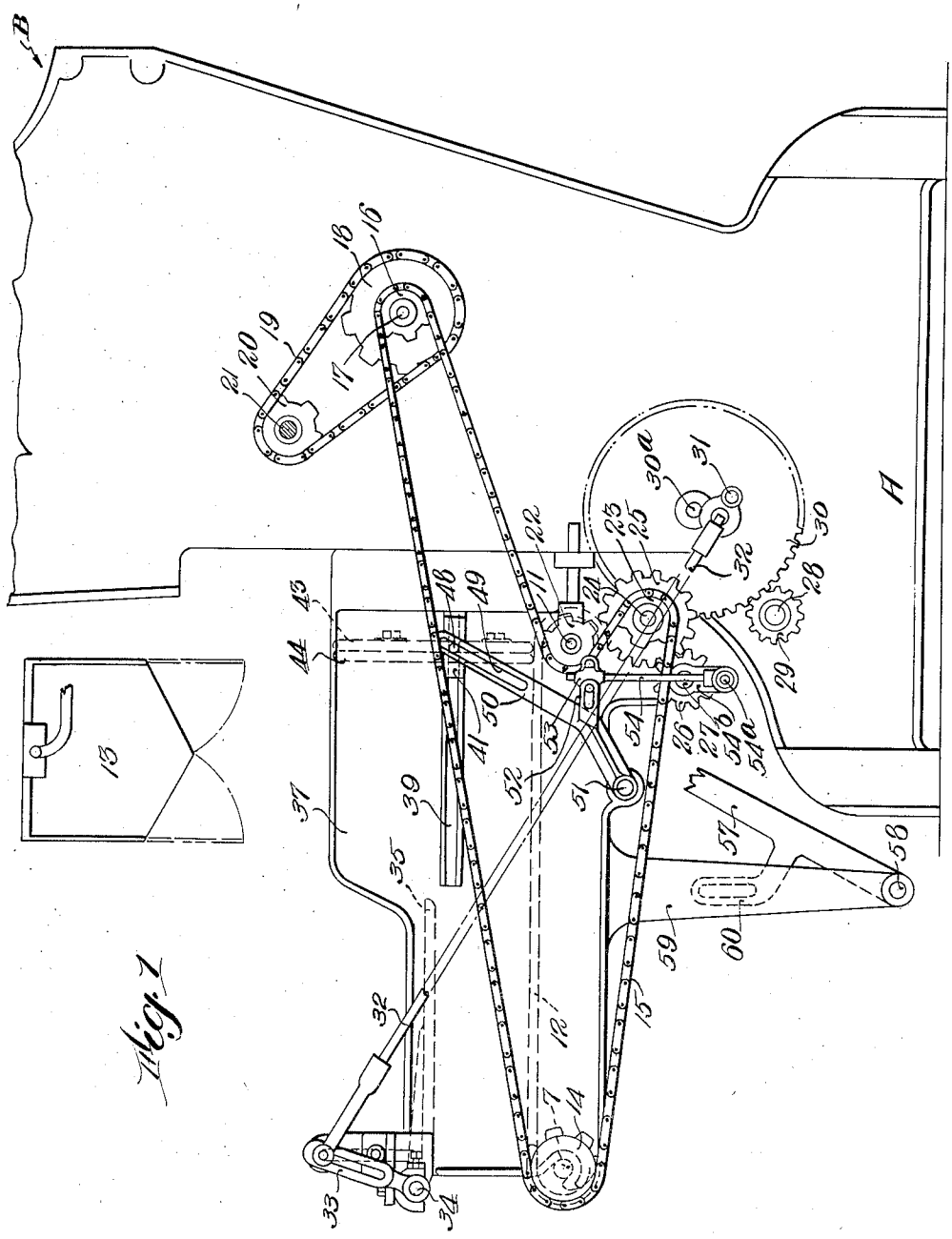


Fig. 1

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TEXTILE MANUFACTURE

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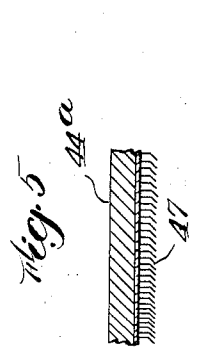


Fig. 5

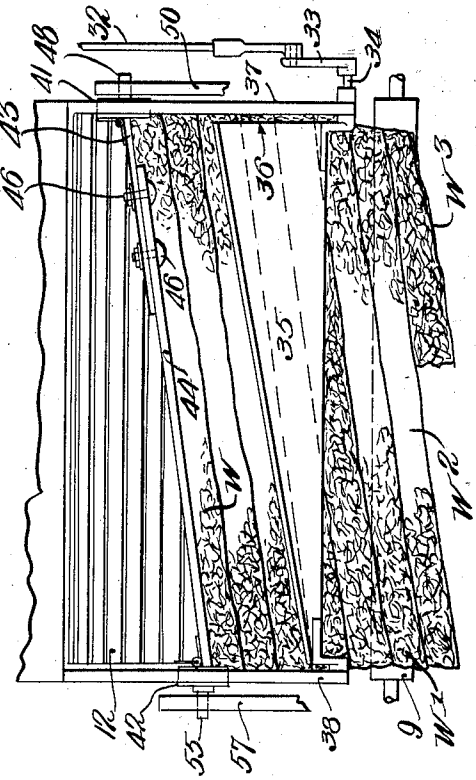


Fig. 4

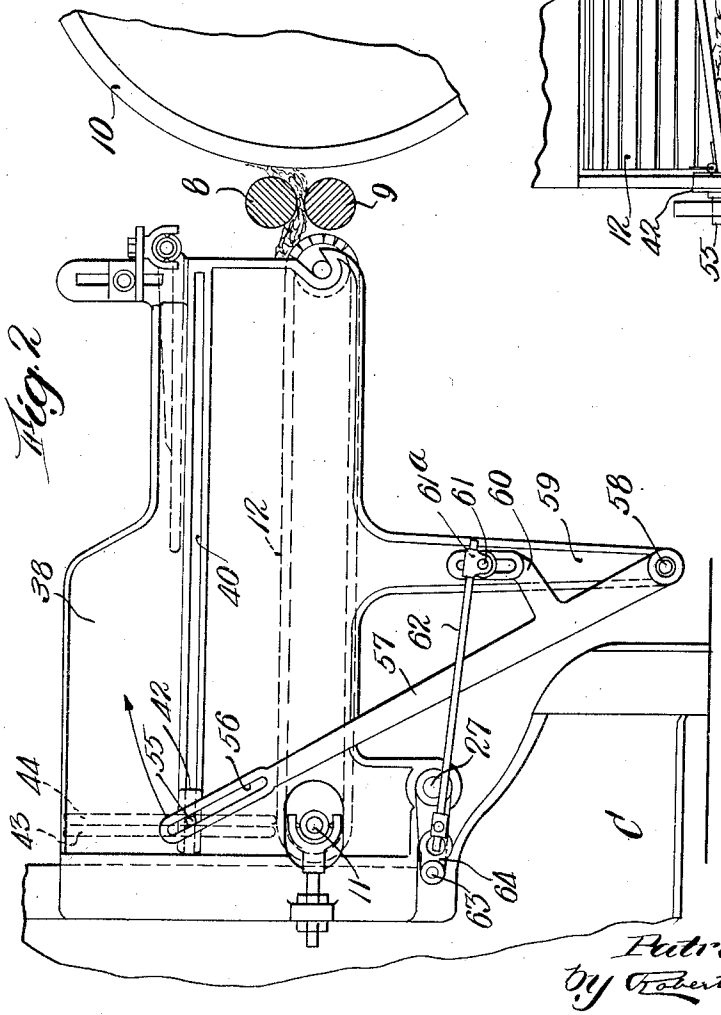


Fig. 2

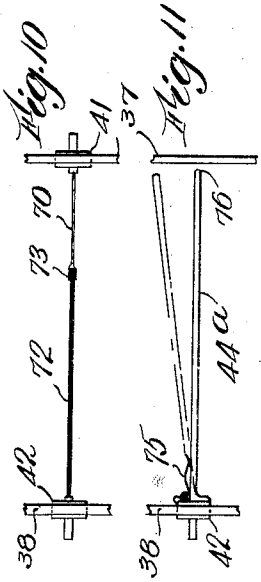


Fig. 10

Fig. 11

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TEXTILE MANUFACTURE

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Fig. 5

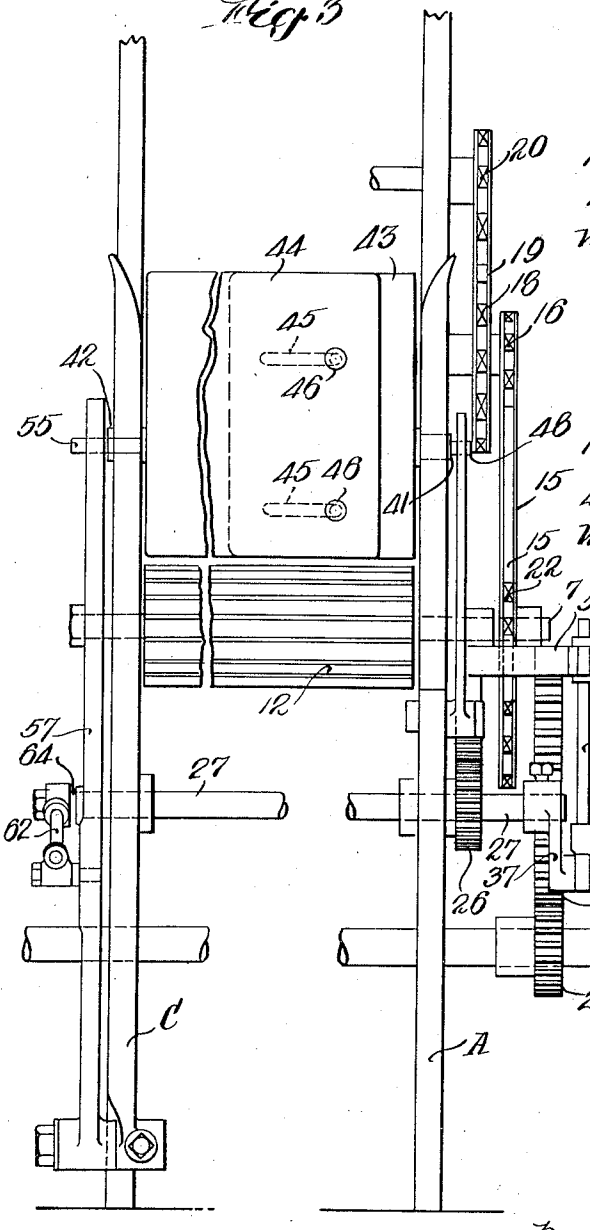


Fig. 6

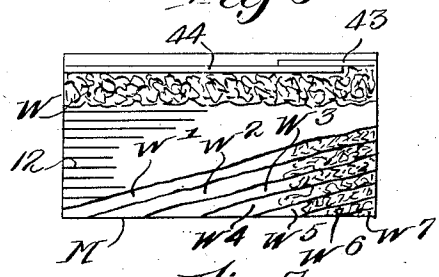


Fig. 7

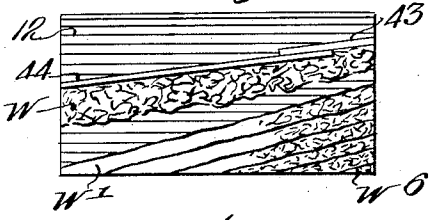
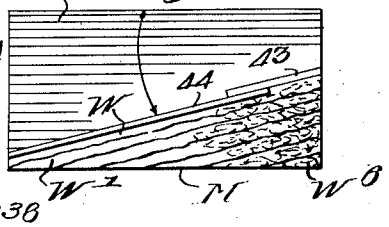


Fig. 8



Fig. 9



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2,107,458

UNITED STATES PATENT OFFICE

2,107,458

TEXTILE MANUFACTURE

Patrick H. Walsh, East Orange, N. J., assignor to Geo. S. Harwood & Son, Boston, Mass., a copartnership composed of John H. Harwood and John H. Harwood, Jr.

Application March 21, 1935, Serial No. 12,185

8 Claims. (Cl. 19—105)

This invention pertains to textile manufacture and relates more particularly to a method of and apparatus for feeding fibrous material to carding or other fiber-working apparatus. Substantially every textile operation preparatory to spinning is designed either to obtain a uniform mixture or blend of the fibrous material; to dispose the fibers in substantially parallel relation; or to secure uniformity of weight per unit of length in the bat, sliver, roving, or yarn which is ultimately produced.

Apparatus capable of accomplishing two or more of such general objects at the same time is obviously desirable, either for the cumulative effect of as many repetitions of a particular step as possible or, in some cases, to permit a decrease in the number of handlings to which the material must be subjected. For example, the carding apparatus has for its principal purpose the disposal of the fibers in more or less parallel relation, while in order to obtain uniformity of weight per unit of length of carded sliver, it is customary to supply the fibers to the card by the use of a "card feeder", which automatically weighs out the fiber in batches of substantially equal weight and delivers such batches successively to the card at uniformly spaced intervals of time.

While the card, with its feeder, thus accomplishes two of the desired results, it has little, if any, effect in securing uniformity in blend or mix of the fibers, so that if, for example, the fibrous material delivered to the bin of the card feeder has not previously been mixed thoroughly or is of such nature that it tends to separate again after being mixed, the unevenness of mix is not remedied by the operation of the feeder or card but appears in the sliver or roving. Moreover, while the automatic weighing of the material by the card feeder is designed to ensure uniformity of weight per unit of length, the character of the fibrous material, atmospheric conditions, the degree to which the fiber has been oiled, etc., make it almost impossible to secure absolute accuracy in operation, so that some weighings may be more bulky than others and in consequence the sliver from the card shows thin and thick places. In dealing with some materials, for example shoddy, the sliver may thus become so weak at its thinner portions that it will not support itself and thus breaks frequently.

One object of the present invention is to provide a method of and apparatus for feeding fibrous material to a carding machine or the like in such a way as to obtain greater uniformity of weight per unit of length than is at present commonly obtainable and at the same time to ensure greater uniformity of blend or mix of the constituent fibers. To this end, successive weighings delivered by the card feeder are so oriented and assembled that portions from a plurality of such successive weighings are concomitantly introduced into the carding machine, the successive weighings being so overlapped that there is no break or appreciable diminution in the stream of material entering the card, while, by reason of the concomitant delivery of portions from several weighings, inaccuracy of individual weighings is to a large extent compensated for.

Furthermore, since each weighing usually takes the form of an elongate windrow of fiber gathered from the entire width of the feeder bin, the disposal of such windrows in echelon relation and their delivery in a direction more or less longitudinal of the windrow ensures a thorough mixing and blending of the material from all parts of the bin.

I am aware that it has heretofore been proposed to impart a slight orientation to successive weighings from the card feeder with the intent to produce a slight diagonal delivery of the weighings to the carder, but no prior apparatus known to me has been capable of producing a sufficient orientation of the weighings to be of any practical utility, while, on the other hand, such prior efforts have been based upon a principle which, if so applied as to produce a greater orientation of the weighings, would result in very substantially narrowing the lap delivered to the card,—with consequent inaccuracy and inefficiency of operation of the latter.

A further object of the invention is to provide apparatus of simple and effective kind applicable to known types of card feeder, if desired, without substantial change in the feeder or card with which it is associated, and which is wholly automatic in action and which is inexpensive to install and operate.

In the accompanying drawings, wherein I have disclosed one desirable embodiment of the invention by way of example,

Fig. 1 is a fragmentary side elevation of a card feeder embodying the present invention;

Fig. 2 is a fragmentary elevation of the feeder of Fig. 1, viewed from the opposite side, showing a portion of an associated carding machine;

Fig. 3 is a fragmentary front elevation of the improved feeder, omitting many of the parts and viewed from the delivery end of the feeder;

Fig. 4 is a fragmentary plan view of the improved feeder, showing details of the delivery

mechanism forming the immediate subject matter of the present invention;

Fig. 5 is a fragmentary horizontal section, to larger scale, illustrating a modified form of push board having a highly frictional surface for engagement with the fibrous material;

Figs. 6 to 9 inclusive are diagrammatic plan views illustrative of successive steps in the operation of the delivery mechanism; and

Figs. 10 and 11 are diagrammatic plan views illustrating modified forms of pusher.

Referring to the drawings, the invention has been illustrated by way of example as embodied in a Bramwell feeder of the improved type disclosed in the patent to Howe No. 1,675,756, dated July 3, 1928, to which reference may be had for a description of details of the machine and method of operation not herein shown nor specifically described, but it is to be understood that the invention is not necessarily limited to use in such apparatus as is shown in detail in said patent but is of general application to textile apparatus where similar conditions prevail and where like results are desirable.

Bramwell feeders of the type disclosed in the aforesaid Howe patent (commonly referred to as "card feeders") are customarily associated with the first or breaker card in a textile mill in order that the fibrous raw material, which is lumpy and non-uniform when received, may be delivered to the card in as uniform a stream as possible so that the sliver produced by the card may be of as nearly uniform weight per unit of length as possible. Customarily, the fiber-delivering mechanism of the card feeder is driven by suitable connections leading from the card, so that the speed of the delivery and carding mechanisms may at all times be definitely related.

Thus, referring to the drawings, it may be assumed that the shaft 7 of the card feeder (Fig. 1) is driven by connections (not shown) from a moving part of the card with which the improved feeder is associated,—the rolls 8 and 9 (Fig. 2) forming a part of the carding mechanism, which also comprises the carding drum 10.

The improved card feeder embodying the present invention comprises the spaced side frames A and C (Figs. 1, 2 and 3) defining between them the bin B (Fig. 1) which receives the fiber to be weighed out and delivered to the card, these frame members providing the necessary supports and bearings for the operative mechanism of the machine.

The shaft 7, which is parallel to the axes of the rolls 8 and 9 and which, as above noted, is driven in time with the carding machine, carries a roller or drum which is disposed quite close to the rolls 8 and 9. The machine frame also carries bearings, preferably adjustable, for a shaft 11 (Figs. 1 and 2) parallel to the shaft 7 and also provided with a roller or drum, and an endless delivery conveyor or slat apron 12 embraces the rollers or drums on the shafts 7 and 11, respectively, and is constantly driven by the rotating shaft 7. The upper run of the conveyor or slat apron 12 is preferably substantially horizontal and is so disposed, with reference to the dumping scale pan 13 of the feeder, that when a batch of the fibrous material is dropped from the pan, the material falls in the form of an elongate windrow upon the upper run of the conveyor 12 at the rear end of the latter, that is to say, the end nearest to shaft 11.

The shaft 7 also carries a sprocket wheel 14 about which passes a sprocket chain 15. This chain embraces a sprocket wheel 16 on a stub shaft 17 projecting from the frame member A. Another sprocket wheel 18 is secured to the sprocket wheel 16 so as to turn with the latter, and a chain 19 embraces the sprocket wheel 18 and also a sprocket wheel 20 on another stub shaft 21 also projecting from the frame member A. The shaft 21 may be considered as corresponding to the shaft 44 of the Howe patent above referred to, and the sprocket wheel 20 actuates the various elements of the weighing mechanism.

The operation of weighing out the material need not herein be described at length, it sufficing to say that the feeder mechanism of the card (not here illustrated) raises fibrous material from the bin B and delivers it into the scale pan 13, and that after the scale pan has received a predetermined load, the loading mechanism ceases to function, and at a predetermined time the scale pan is opened to release the batch of fiber which has been deposited therein. Thereafter the scale pan closes and the loading operation is repeated. Reference may be had to the above Howe patent for a more detailed description of the weighing operation.

The sprocket chain 15 also passes about a sprocket 22 on the shaft 11 and about a sprocket 23 on a stub shaft 24 projecting from the frame member A. A gear 25 is secured to the sprocket wheel 23 and meshes with a pinion 26 on a shaft 27 (Figs. 1, 2 and 3) which extends transversely across the width of the machine and which turns in bearings carried by the spaced side frame members A and C.

The main drive shaft 28 of the card feeding mechanism also extends across the width of the machine at its lower part,—turning in bearings in the frame members A and C, and is driven from any suitable and convenient source of power. This shaft carries a pinion 29 which meshes with a gear 30 mounted on a stub shaft 30a projecting from the frame member A, and this gear 30 is provided with a crank pin 31 to which is pivotally secured one end of a connecting rod 32 whose opposite end is pivotally and preferably adjustably connected to a rocker arm 33 secured to a shaft 34 extending across the delivery end of the machine at a point above and substantially parallel to the shaft 7. To the shaft 34 there is connected the patter or compressor board 35 which is rocked up and down during the operation of the machine and which, by pressing downwardly upon the fibrous material upon the slat apron, compacts such fibrous material just prior to the entry of the material between the rolls 8 and 9. Preferably in accordance with the present invention, this patter or compressor board 35 is of more or less triangular contour, being widest at the end 36 (Fig. 4) and gradually narrowing toward its opposite end.

The frame members A and C are provided respectively with spaced parallel extensions 37 and 38 (Figs. 1, 2 and 4) disposed at opposite sides of the machine and in parallel relation, and these members 37 and 38 are furnished with substantially horizontal slots 39 and 40, respectively, which constitute guideways disposed in a substantially horizontal plane above that of the upper run of the conveyor 12. These guideways 39 and 40 form guides for a pair of pusher board actuators 41 and 42 (Figs. 1 and 2), respectively, which slide in substantially rectilinear and parallel paths defined by the guideways 39 and 40.

The preferred form of pusher board, in accord-

ance with the present invention, comprises two independent members 43 and 44 (Fig. 4), respectively, the member 43 being provided with elongate horizontal slots 45 (Fig. 3) which receive bolts 46 passing through holes in the member 44. The parts 43 and 44 of the push board are hinged to the push board actuators 41 and 42, respectively, so that the outer ends of the push board are constrained to move in parallel rectilinear paths. The composite pusher board thus constructed is of variable length, the parts 43 and 44 telescoping one on the other during operation of the machine, thereby to change the effective length of the board. The board is of proper height for engagement with a batch of fibrous material dropped upon the upper run of the slat apron by the scale pan and to push such batch toward the delivery end of the slat apron as the pusher board is actuated. It may be noted that the forward member 44 of the pusher board, that is to say, the member which is nearest to the delivery end of the machine, is substantially longer than the rear member 43, so that during the elongation of the pusher board the part 44 moves lengthwise to a greater extent than the part 43. This longitudinal movement of the part 44 tends to elongate the long narrow heap or windrow of fiber lying in contact with the pusher board, that is to say, frictionally to drag the fiber endwise as the member 44 moves endwise. If desired, this fiber-dragging action may be increased or made more positive by providing the forward face of the member 44 with a frictional surface; for example, as illustrated in Fig. 5, the member 44^a is furnished at its forward face with card clothing 47. For a less positive action, the forward face of the pusher board might, for example, be covered with an abrasive such as sandpaper or with soft brush bristles, preferably inclined in the direction in which it is desired that the windrow of fiber be elongated, or even a covering of textile material such as velvet or the like might provide the desired frictional action. Under ordinary conditions it is found that a plain board provides sufficient elongation of the windrow, although, as above noted, circumstances may make it desirable to provide for greater friction.

The pusher actuator 41 is provided with a pin 48 projecting outwardly substantially in the plane of the slot 39 and this pin enters an elongate slot 49 in a rocker arm 50 pivoted at its lower end upon a stub shaft 51 projecting from the frame member 37. This arm 50 is provided with a bracket member 52 (Figs. 1 and 3) to which is pivotally secured a sleeve 53 which receives the upper end 54 of a connecting rod whose lower end is pivotally secured to a crank pin 54^a projecting from a crank arm 54^b secured to the shaft 27.

The pusher board actuator 42 is provided with a pin 55 (Fig. 2) projecting outwardly in the plane of the slot 40 and entering an elongate slot 56 in a rock arm 57 pivoted at 58 on a stub shaft carried by a downwardly directed bracket arm 59 forming a part of the frame member 36. It will be noted that the rock arm 57 is substantially longer than the arm 50 at the opposite side of the machine.

The arm 57 is provided with a slotted bracket 60 which receives a pivot pin 61 on which rocks a sleeve member 61^a to which is secured one end of a connecting rod 62. The opposite end of this rod is secured to a crank pin 63 carried by a crank arm 64 secured to the shaft 27. Thus as the shaft 27 rotates, both rock members 50 and 57 are rocked backwardly and forwardly, thereby moving the actuators 41 and 42 along the guideways 39 and 40, respectively.

The arrangement of parts is such that when the rock arms 50 and 57 are at the rearward limits of their movement, as shown in Figs. 1 and 2, respectively, the pins 48 and 55 of the push board actuators are substantially in alignment, and the push board extends transversely across the upper run of the slat apron 12 in a plane substantially perpendicular to the direction of travel of the slat apron and at a point to the rear of that at which the batches of material fall from the scale pan onto the slat apron.

However, by reason of the difference in length of the arms 50 and 57, the actuator 42 moves forward toward the delivery end of the apron much faster than the actuator 41, and accordingly the opposite ends of the push board travel at different speeds, whereby the push board is oriented through a substantial angle as it progresses bodily lengthwise of the slat apron from its initial position shown in Figs. 1 and 2 to its final position, as illustrated in Fig. 4. In thus moving, the push board may be considered as swinging as a whole, about a vertical axis in space disposed to the right (as viewed in Fig. 4) of the frame member 37. As shown, the angle through which the push board is oriented is of the order of 30°, but it is contemplated that this angle may be varied as desired, for example, by changing the relative throw of the arms 50 and 57, which may be done, for example, by adjusting the pivot pin 61 in the slot in the bracket 60 and by adjusting the pivot pin for the sleeve 53 in the slot in bracket 52. It will further be noted that during this orientation of the push board, as it progresses bodily along the slat apron, its opposite ends, (being hinged to the actuators 41 and 42, respectively), travel in parallel, substantially rectilinear paths, but since the distance between the two actuators varies during the orientation of the push board, the latter elongates, the parts 43 and 44 telescoping with respect to each other as above described.

Referring to Figs. 6 to 9 inclusive, the character W indicates the general shape and position of a batch of fibrous material dropped from the scale pan onto the slat apron, it being noted that this batch of material takes the form of an elongate windrow extending from one side to the other of the apron and in front of the push board, which is now at the rearward limit of its movement.

In Fig. 6 the characters W^1, W^2, W^3, W^4, W^5, W^6, W^7, indicate the positions of previously deposited windrows of fiber after their orientation by the action of the push board and their transverse and vertical compression by the push board and the patter device 35, respectively. If, in this view the line M may be taken to indicate the bite of the rolls 8 and 9, it will be noted that the successive, previously deposited windrows have been disposed in overlapping echelon arrangement. A transverse section through the material on the slat apron would cut three or more of the windrows. Thus, as shown, portions of seven of the previously deposited batches or windrows of fibrous material are entering the bite of the rolls simultaneously so that the carding mechanism is thus receiving material from seven successive batches all at the same time. Obviously such an arrangement provides for greater uniformity in the carded sliver, since any lack of uniformity in the fibrous material, as found in successive individual weighings by the card feeder, tends to be compensated for by thus simultaneously feeding

portions of a substantial number of weighings at the same time to the carder.

In Fig. 7 the push board is shown as having advanced the last deposited windrow W a short distance along the surface of the slat apron, and it may be noted that at this time the last of the previous windrows W^7 has entirely passed into the card so that the latter is now taking portions of windrows W^1, W^2, W^3, W^4, W^5, W^6, inclusive.

In Fig. 8 the windrow W is shown as having been oriented nearly into parallel relation to the previously deposited windrow W^1, and it will also be seen that this windrow W has been elongated so that whereas in Fig. 6 it extends substantially perpendicular to the direction of movement of the slat apron, it now extends diagonally of the slat apron but still reaches from one side to the other of the apron.

In Fig. 9 the windrow W is shown as having been fully oriented and as having been fully compacted during the final movement of the push board into close contact with the last previous windrow W^1, the several previously deposited windrows being kept compressed vertically by the repeated downward movement of the patter board 35. The left-hand end of the windrow W (Fig. 9) is now about to enter between the delivery rolls 3 and 8, and the push board is on the point of returning to its initial position in readiness to advance the next deposited batch of material in the same way.

In Fig. 4 it will be noted that the windrows of material have not been oriented to so great an extent as in Figs. 6 to 9, so that in the arrangement of Fig. 4 there will not be more than three or four windrows entering the bite of the rolls 8 and 9 simultaneously. However, in order to obtain the desired advantages of the present invention, I believe that it is substantially essential that at least three such windrows be delivered to the rolls 8 and 9 simultaneously, and I contemplate such an orientation of the windrows as to produce simultaneous delivery of portions of three or more windrows simultaneously to the card as an essential characteristic of the invention.

As previously stated, I am aware of prior suggestions for disposing successive weighings from a card feeder in a slightly diagonal direction in feeding them to the card, but so far as I am aware, no such practice has ever been adopted in the textile trade. I attribute this failure of the trade to adopt such practice to inherent limitations in the apparatus heretofore available for the purpose and in particular to its tendency to narrow the lap delivered by the card and its failure to orient the weighings to any practical degree, and while I do not herein claim broadly apparatus for moving the weighings to a card feeder in a diagonal direction, I regard the apparatus and process herein disclosed, together with equivalents thereof, as constituting a distinctly novel and patentable improvement over any prior apparatus or method known to me.

Obviously the orientation and elongation of the windrows of fiber may be accomplished by means specifically different from but broadly equivalent to the two-part telescopic push board hereinabove described. For example, a pusher consisting in part at least of stretchable material may be employed. Thus, as diagrammatically illustrated in Fig. 10, a flexible band of proper vertical width takes the place of the rigid push board. This band may comprise the inextensible part 70 of cloth, for example, connected to the actuator 41 and the extensible portion 72 of rubber sheeting or the like connected to the actuator 42, the parts 70 and 72 being united at 73. Such a pusher operates in a manner generally similar to that of the pusher previously described, although possibly not so efficiently, the parts 70 and 72 swinging as a unit about an imaginary axis to the right of the actuator 41 (Fig. 10), while the part 72 stretches as the actuator 42 moves along its guideway, and in so stretching exerts a frictional elongating drag on the material.

Under some conditions it may be possible to dispense with the rear member 43 of the telescopic push board, depending wholly upon the forward member 44 to accomplish the desired result. As illustrated in Fig. 11, for example, the long member 44^a itself constitutes the push board, such member reaching nearly, but not quite all of the way across the slat apron. The left-hand end of this member 44^a (Fig. 11) is hinged to the actuator 42 and preferably a spring 75 is arranged so as to tend to swing the member 44^a about the hinge pivot until it lies perpendicular to the path of the part 42. However, the spring permits the free end 76 of the pusher 44^a to lag as the actuator 42 advances toward the delivery end of the conveyor, thus orienting the windrow of material which lies in front of the member 44^a as the latter advances. In this arrangement the frictional drag of the windrow of material against the slowly moving slat apron performs substantially the same function as that of the rear member 43 of the push board of the previously described construction, cooperating with the part 44^a to elongate the windrow of material as the pusher advances.

While I have herein illustrated a desirable embodiment of the invention by way of example, I wish it to be understood that the invention is not necessarily to be limited to the precise arrangement disclosed but that other and equivalent means of accomplishing the same result are to be regarded as within the scope of the invention as defined in the appended claims.

I claim:

1. That method of feeding fibrous material to a carding machine, which comprises weighing out successive batches of such fibrous material, depositing each successive batch upon a moving apron in a windrow extending substantially perpendicular to the direction of movement of the apron and of a length substantially equaling the width of the apron, orienting each windrow after its deposit upon the apron so that it lies diagonally of the direction of movement of the apron, and concomitantly elongating said windrow so that in the diagonal position it extends substantially from one edge of the apron to the other.

2. That method of delivering fibrous material to a carding machine, which comprises preparing substantially equal batches by weight of the material, disposing each batch successively in the form of an elongate windrow, applying transverse force to each windrow along substantially its entire length in such a manner as to orient it about a center beyond one of its ends and so that the end of the windrow most remote from said center moves through a distance substantially greater than the opposite end, said ends moving in substantially rectilinear parallel paths, keeping the windrows substantially straight while so moving them, and, during such orientation,

applying force longitudinally of the windrows to elongate them.

3. The combination with a fiber weighing mechanism having means operative to deposit successive batches of fibrous material in elongate windrows, and a support for the reception of such windrows, of a pusher extending longitudinally of the windrows, actuating means to advance said pusher bodily in a direction substantially perpendicular to the length of a windrow positioned as when first deposited on the support, said actuating means also being operative to orient the pusher as it advances, the pusher being constructed and arranged to exert force in a direction lengthwise of the windrow with which it contacts, thereby to elongate the windrow simultaneously with orientation of the latter.

4. The combination with a fiber weighing mechanism having means operative to deposit successive batches of fibrous material in elongate windrows, a support for the reception of such windrows, and a push board, of means for advancing and orienting the push board so as to move the windrow away from the position in which it is first deposited, the push board comprising relatively movable members which slide one with respect to the other as the push board advances thereby elongating the push board and concomitantly elongating the windrow with which it contacts.

5. The combination with a fiber weighing mechanism having means operative to deposit successive batches of fibrous material in elongate windrows, and a support for the reception of such windrows, of a longitudinally extensible push board, and means operative concomitantly to advance the push board so as to move a windrow away from the position in which it is first deposited while concomitantly elongating the push board and thereby elongating the windrow with which it contacts.

6. The combination with a fiber weighing mechanism having means operative to deposit successive batches of fibrous material in elongate windrows, and a support for the reception of such windrows, of a push board comprising telescoping, relatively movable members, and means operative to advance the push board in a direction transverse of its length while concomitantly causing its telescoping members to slide relatively to one another thereby extending the push board and elongating the windrow with which it contacts.

7. The combination with a fiber weighing mechanism having means operative to deposit successive batches of fibrous material in elongate windrows, a support for the reception of such windrows, and a pusher, the pusher comprising a stretchable elastic part which elongates as the pusher advances, and means for advancing and orienting the pusher so as to move the windrow away from the position in which it is first deposited and simultaneously to elongate the windrow.

8. The combination with a fiber weighing mechanism having means operative to deposit successive batches of fibrous material in elongate windrows, a moving conveyor for the reception of the windrows, said conveyor moving in a direction transverse to the length of the windrows as the latter is first deposited, an actuator moving in a substantially rectilinear direction adjacent and parallel to one edge of the conveyor, a pusher comprising an elongate member hingedly united to the actuator and extending longitudinally of the windrow, and resilient means tending to maintain the pusher substantially perpendicular to the path of travel of the actuator, but allowing its free end to lag as the actuator advances toward the delivery end of the conveyor.

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