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METHOD AND DEVICE FOR MIXING TEXTILE FIBERS

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FIG. 1

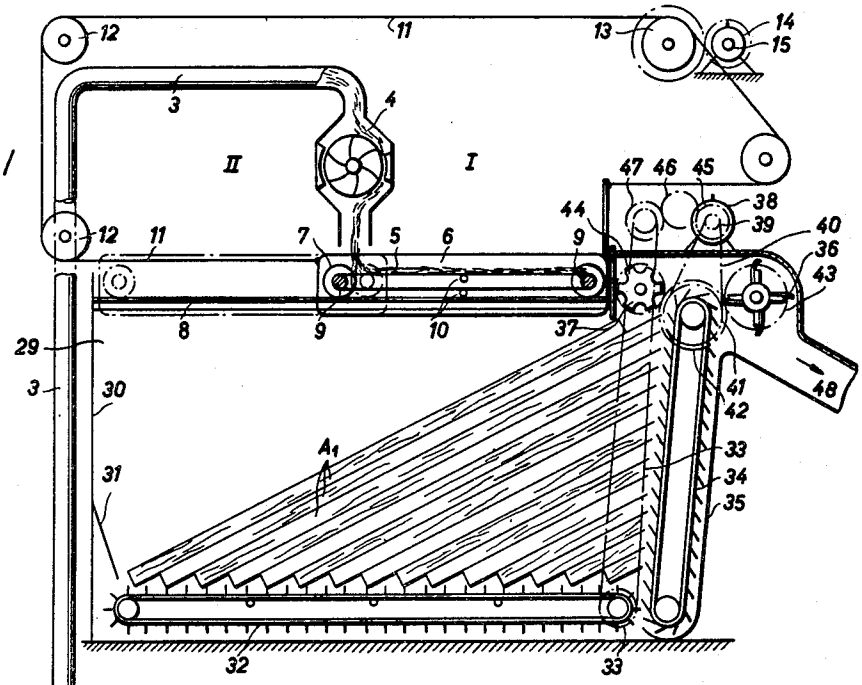
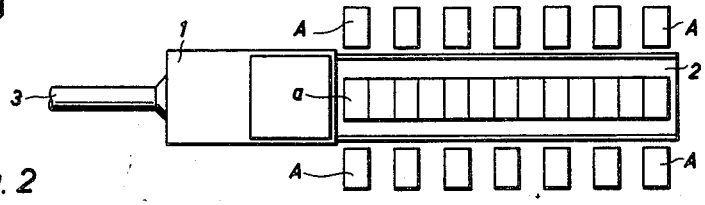



Fig. 2



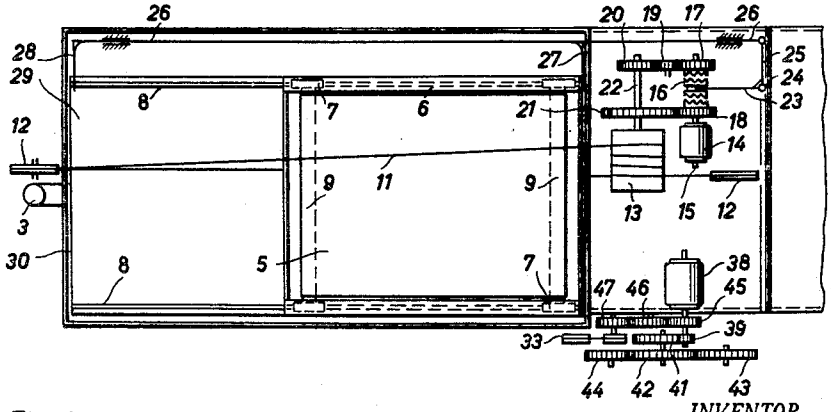




Fig. 3

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## METHOD AND DEVICE FOR MIXING TEXTILE FIBERS

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7 Claims. (Cl. 19—146)

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The present invention relates to a method and a device for intimately mixing textile fibres.

Intimate mixing of the textile fibres of different batches of supply, for example cotton from different bales, or of fibres of different kinds, for example cotton and rayon staples or of differently dyed fibres, is of prime importance for producing high quality threads and yarns, i. e. having uniform strength, elongation, and color. Intimate mixing also reduces failures during spinning.

It has been proposed to place the fibres to be mixed in superimposed layers and to remove fibres along a vertical plane from the so produced stack; this is usually done in mixing chambers of sufficient capacity to receive a great number of opened bales. With this method, satisfactory mixing depends on the workmanship of the operators. In another conventional method, a plurality of bales are fed into each of a plurality of bale opener machines which discharge the opened material into the hopper of an additional bale opener. Though this produces good mixing of the fibres, it does not assure that the yarn produced from the mixture does not have lengths consisting predominantly of one kind of fibre in the mixture. In many cases there is not enough space for placing the great number of bale openers required for this method. It has also been proposed to place alternatingly layers of different origin in a reciprocating chamber to produce a pile containing superimposed layers of different fibres. The so produced stack is transferred into an elongated chamber in which the fibre material is removed from the stack along a substantially vertical plane. This method is satisfactory as long as the stack is large. When removing fibre material from the last portion of the stack, the latter collapses and the fibres are not taken equally from all layers.

The method according to the invention avoids the aforedescribed disadvantages of conventional systems by first spreading the fibres of the same batches in layers, placing the layers of different fibres scale-like on top of each other to form a pile whose height increases toward the side of the pile from which the fibres are subsequently removed and at which side the number of superimposed layers coincides with the number of fibre batches to be mixed.

Further and other objects of the present invention will be hereinafter set forth in the accompanying specification and claims, and shown in the drawings which, by way of illustration, show what I now consider to be preferred embodiments of my invention.

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In the drawings:

Fig. 1 is a diagrammatic vertical sectional view of a mixing apparatus according to the invention;

Fig. 2 is a diagrammatic top view of a bale opener and feed lattice with bales ready to be processed laid out along the lattice;

Fig. 3 is a diagrammatic top view of the apparatus shown in Fig. 1 with certain parts omitted.

Like parts are designated by like numerals in all figures of the drawings.

The bale opener 1 shown in Fig. 2 comprises a feed lattice 2 on whose longitudinal sides the raw fibres which must be mixed are placed; in the illustrated example seven cotton bales A are lined up on the floor on each side of the lattice. The operator pulls a layer from each bale and places the layers on the lattice in a row. After the compressed cotton is loosened in the opener 1, it travels through conduit 3 and is preferably opened further in several additional horizontal and vertical opener machines which are not shown. The opened cotton is received in a discharging device 4 which throws it on the lattice 5. The latter is disposed in a frame 6 which is provided with wheels 7 rolling on rails 8. Rollers 9 coaxial with wheel pairs 7 serve for moving the lattice 5. Support rollers 10 supported by frame 6 and disposed halfway between rollers 9 prevent sagging of the lattice 5, which is preferably made of rubber. A rope, chain, or belt 11 whose ends are connected with the frame or carriage 6 is wound several times about a drum 13 and guided by a plurality of rollers 12 for moving the carriage 6 on the rails 8. Drum 13 is driven by a motor 14 through a gear comprising two spur gear wheels 17 and 18 which are rotatable on shaft 15 of motor 14. Wheel 17 drives spur gear wheel 20 mounted on shaft 22 of the drum 13 through an intermediate spur gear wheel 19, whereas wheel 18 directly drives a spur gear wheel 21 also mounted on shaft 22. Wheels 17 and 18 are selectively driven by the shaft 15 through a claw clutch member 16 which is axially movable but not rotatable on shaft 15 and adapted to engage either claws provided on wheel 17 or claws provided on wheel 18. Clutch member 16 is engaged by a fork having a stem 23 which is swingable on pin 24. A lever 25 is rigidly connected with stem 23 and actuated by a rod 26 having two transversely extending arms 27 and 28 which are individually abutted by the frame 6 when the latter reaches its extreme positions. This causes axial displacement of clutch member 16 on shaft 15 and reversal of movement of the

frame whenever it has reached an extreme position. Since the rollers 9 are rotated by the wheels 7 of the frame, the upper part of the lattice 5 always moves in the same direction as the frame, which is continuously pulled back and forth by the rope 11. The illustrated mechanical reversing gear may be replaced, for example, by a reversing electric motor without departing from the scope of the present invention. Such motors are conventional and need not be illustrated.

A chamber 29 is placed below the lattice 5, the chamber having a rear wall 30 provided with a guide plate 31. A horizontal lattice 32 is arranged at the bottom of chamber 29 and provided with a rope or chain drive 33 at its forward end. An almost vertical lattice 34 is placed at the forward end of the lattice conveyor 32 and provided with spikes. Escape of fibers is prevented by a casing 35 having a trough-like configuration at its bottom extending toward the forward end of the lattice 32. The spikes of the lattice 34 are cleaned by a clearer roller 36 after they have reached their uppermost position. A fluted roller 37 compresses the fibre material in front of the top of lattice 34. Parts 34, 36 and 37 are driven by a motor 38 placed on top of chamber 29. The upper roller of the upright or elevator lattice 34 has a drive wheel 41 which is driven by motor 38 through a belt or chain 40. A spur gear wheel 42 is arranged on the same shaft as wheel 41 and meshes with a wheel 43 on the shaft of the clearer roller 36 and with a wheel 44 driving the fluted roller 37. Motor 38 also drives a set of spur gears 45, 46, 47 for driving the rope or chain 33.

*Operation*

At first, layers *a* of fibre material are lined up on lattice 2, said layers corresponding in size to the weight of a layer $A_1$ in chamber 29. The fibres of previously adjacent layers *a* are mixed to a certain degree when the cotton is turned over within the bale opener 1. This does not interfere with the result ultimately produced by the new process. The discharge device 4 throws the fibre material, after being loosened in the opener 1, onto the lattice 5 which is moved with the frame 6 from the position shown in solid lines and designated "I" in Fig. 1 to the left to the position shown in dotted lines and designated "II" and thereupon back to the right, and again to the left and so on. The traveling speed of the lattice 5, whose upper portion always moves in the same direction as the frame 6, is as great as that of the frame.

When the lattice 5 is in position I, it is loaded with fibres. While the frame with lattice 5 moves to the left, to position II, more fibres are placed on the lattice. The latter, moving in the same direction as the frame, throws the fibres over the left end of the lattice and down on the pile in chamber 29. While the frame travels back to position I, fibres are placed on the lattice and are thrown by the advancing lattice down on the pile.

Lattice 32 in chamber 29 continuously pushes the fibre material forming the layers $A_1$ toward the elevator lattice 34. The spikes of the latter equally tear off cotton from all layers and move it upward. The reel 36 moves the torn-off fibres into the discharge duct 48 from which the fibre material moves to machines completing the mixing process.

For causing layers $A_1$ to assume an inclined position in chamber 29, the device may be operated as follows:

While motor 38 is stopped, as many layers are piled horizontally on lattice 32 as there are bales A, the total height of the piled fibre material not exceeding one half of the height of chamber 29. Thereupon the pile is parted in the middle between wall 30 and elevator 34 and the left half of the pile mixed somewhat by hand and part of it placed on top of the right half of the pile to form a wedge-shaped pile as shown in Fig. 1. Thereupon motor 38 is started and fibre material thrown into chamber 29 from lattice 5 in the aforedescribed manner.

As shown in Fig. 1, fourteen layers are piled on lattice 32, the fifteenth or top layer, which is of the same composition as the bottom layer, reaches underneath the fluted roller 37. By moving the bottom layer, the top layer reaches the lattice 34 so that all layers are always in a position to be worked and removed by the spikes of lattice 34.

A more intimate mixing of the fibres may be obtained by making the layers thinner, whereby more, for example, thirty, layers may be piled in chamber 29.

To assure that fibres of all layers are worked, the speed of lattice 34 is maintained in proper relation to that of lattice 32. This may be done by selecting a suitable ratio of the gears 45, 46, 47.

While I believe the above described embodiments of my invention to be preferred embodiments, I wish it to be understood that I do not desire to be limited to the exact details of method, design, and construction shown and described, for obvious modifications will occur to a person skilled in the art.

What is claimed is:

1. Method of mixing individual batches of textile fibres, comprising placing the individual batches in a row, forming layers of the fibre material of said batches consecutively in the order in which they are in said row scale-like, continuously and consecutively superimposing said layers to form a pile whose height increases toward one of its sides and in which said layers are substantially equally thick and correspond in consecutive order to the order in which said layers are formed from said batches, and removing the fibre material from the side of said pile toward which its height increases and simultaneously from all layers and in relative amounts corresponding to the relative amounts of the fibre material in said row.

2. Method of mixing individual batches of textile fibres, comprising placing the individual batches in a row, transforming said batches into layers consecutively in the order in which they are in said row, continuously, consecutively and scale-like placing said layers on top of each other in the same order in which they were formed from said batches to form a pile having a vertical section of substantially the configuration of a rectangular triangle standing on one of its sides, the sequence of said layers in said pile and their relative thickness corresponding to the sequence in which the layers were formed from and to the relative amounts of fibres in said batches, and removing the fibre material from said pile at the other side of said triangle simultaneously from all layers and in proportionate amounts corresponding to the amounts of the batches as they are in said row.

3. A device for mixing textile fibres, comprising a longitudinal chamber having a bottom and an

open top; a first horizontal conveyor lattice disposed at the bottom of said chamber; a second horizontal conveyor lattice receiving the fibres to be mixed, being substantially half as long as and longitudinally reciprocatingly movable along the top of said chamber, and discharging the fibres alternatingly over one of its ends for piling the fibres on said first lattice; and an elevator lattice disposed in said casing on one side thereof, having an end adjacent to an end of said first lattice, and having spikes tearing fibres from one side of the pile of fibres stacked on said first lattice and pushed by the latter toward said elevator lattice, and removing the torn-off fibres from said casing.

4. A device for mixing textile fibres, comprising a longitudinal chamber having an open top; a horizontal frame substantially half as long as and being disposed in the top of said chamber and being horizontally reciprocatingly rollingly supported longitudinally thereof; a first horizontal conveyor lattice placed at the bottom of said chamber; a second horizontal conveyor lattice mounted on said frame for receiving the fibres to be mixed and discharging same over its ends for piling the fibres on said first lattice; and an elevator lattice disposed in said casing on one side thereof, having an end adjacent to an end of said first lattice, and having spikes tearing fibres from one side of the pile of fibres stacked on said first lattice and pushed by the latter toward said elevator lattice, and removing the torn-off fibres from said casing.

5. A device for mixing textile fibres, comprising a longitudinal chamber having an open top; horizontal rails extending longitudinally of said chamber in the top thereof; a carriage substantially half as long as said chamber and having wheels rolling on said rails, two rollers individually connecting two wheels rolling on different rails and rolling with said wheels; means for reciprocatingly moving said carriage on said rails;



a first horizontal conveyor lattice placed at the bottom of said chamber; a second horizontal conveyor lattice supported and moved by said rollers and receiving the fibres to be mixed and discharging same over its ends for piling the fibres on said first lattice; and an elevator lattice disposed in said casing on one side thereof, having an end adjacent to an end of said first lattice, and having spikes tearing fibres from one side of the pile of fibres stacked on said first lattice and pushed by the latter toward said elevator lattice, and removing the torn-off fibres from said casing.

6. A device as set forth in claim 5, said means for moving the carriage on the rails comprising a flexible member having an end connected with said carriage, a drum on which a portion of said flexible member is wound, drive means for rotating said drum, and means connected with said drive means and adapted to be actuated by said carriage for changing the direction of rotation of said drive means according to the position of said carriage.

7. A device as set forth in claim 5, said means for moving the carriage on the rails comprising a flexible member having an end connected with said carriage, a drum on which a portion of said flexible member is wound, drive means for rotating said drum, and means responsive to the position of said carriage and interposed between said drive means and said drum for changing the direction of rotation of the latter according to the position of said carriage.

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