Feb. 5, 1957 L. S. ZYGMUNTOWSKI 2,780,498

FIBER STOCK SPREADER

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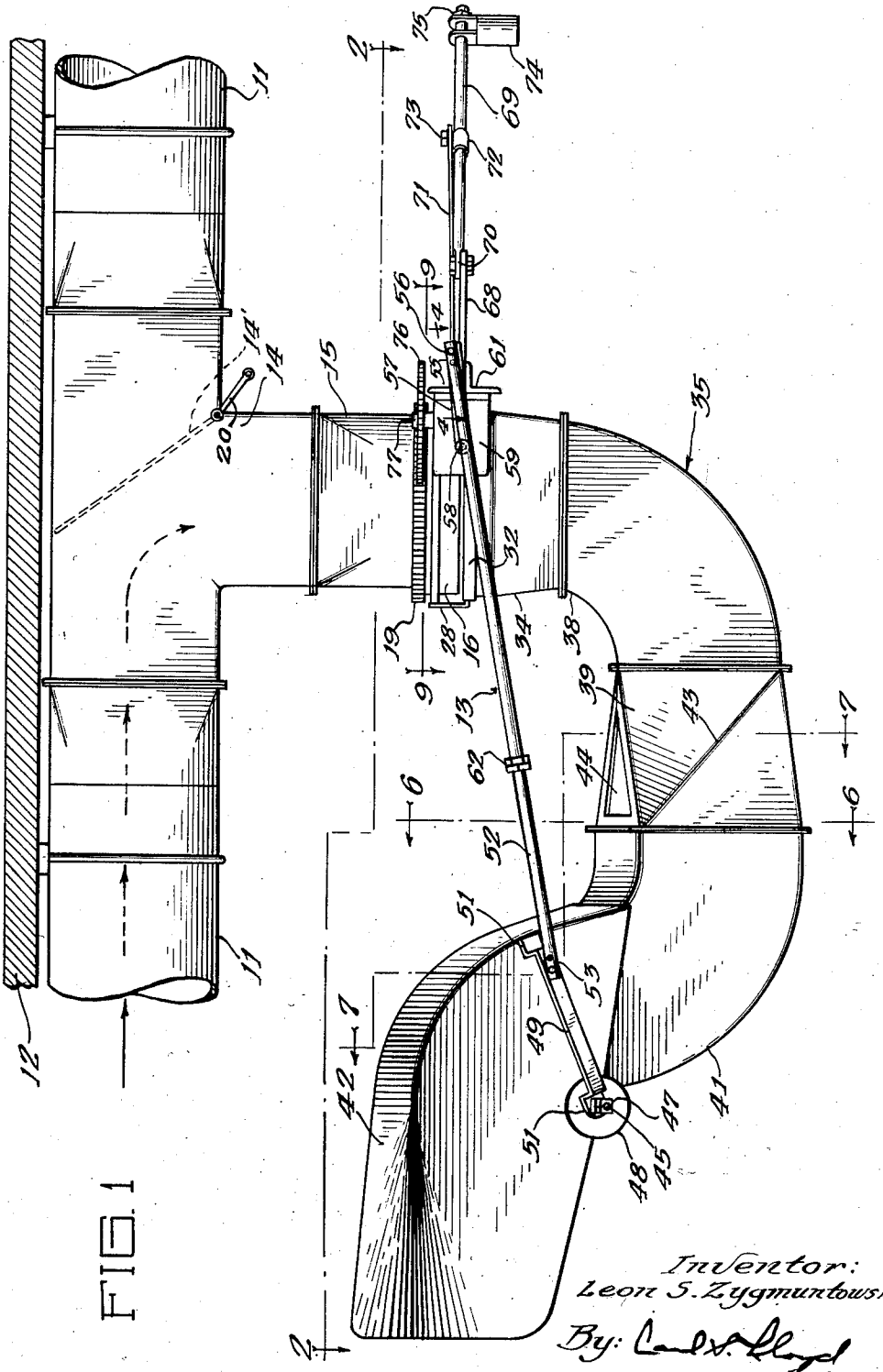


FIG. 1

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FIBER STOCK SPREADER

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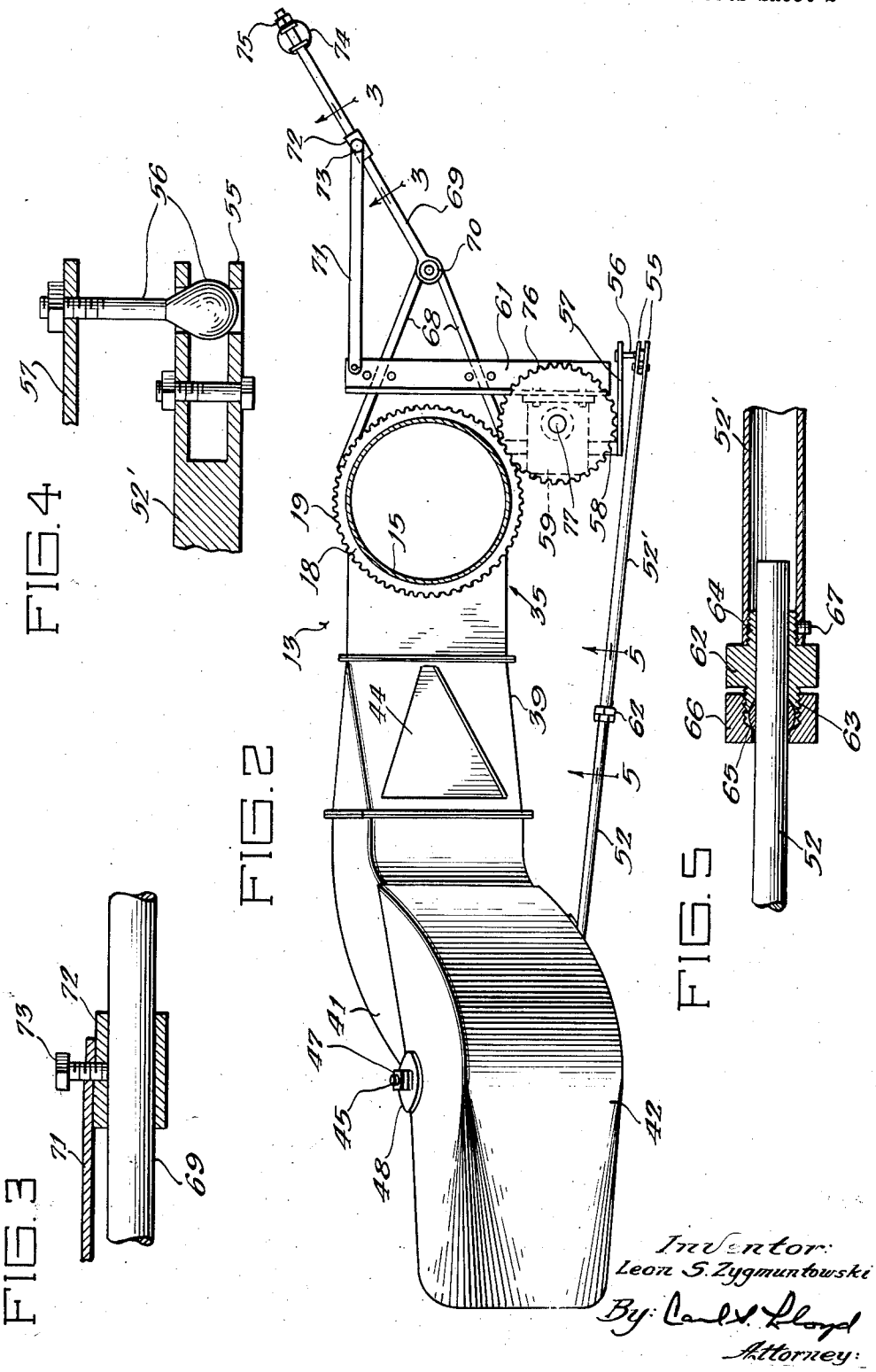


FIG. 2

FIG. 4

FIG. 5

FIG. 3

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FIG. 7

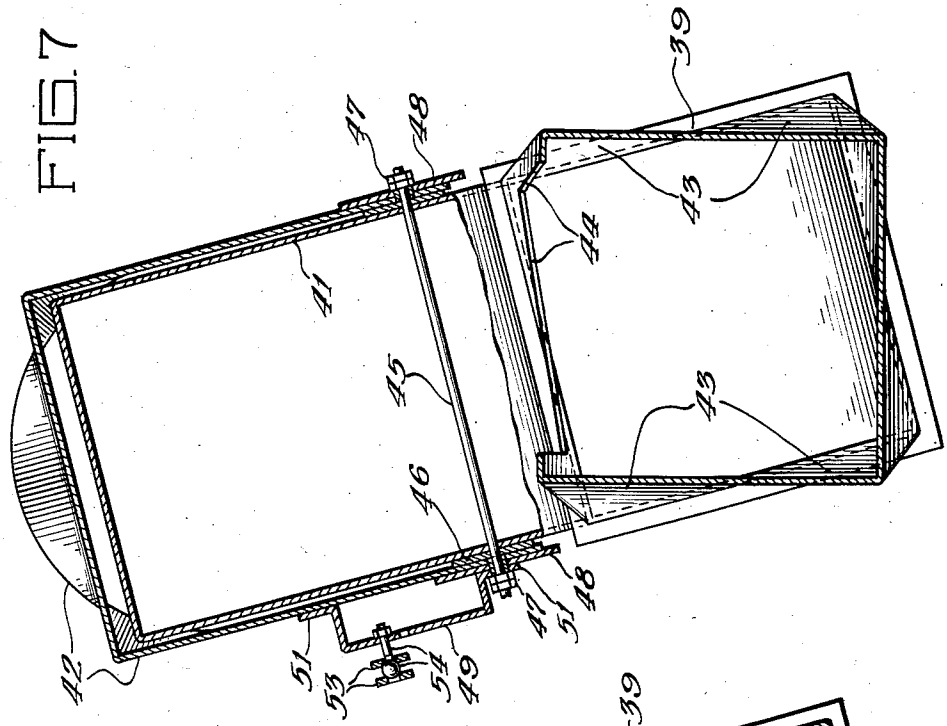
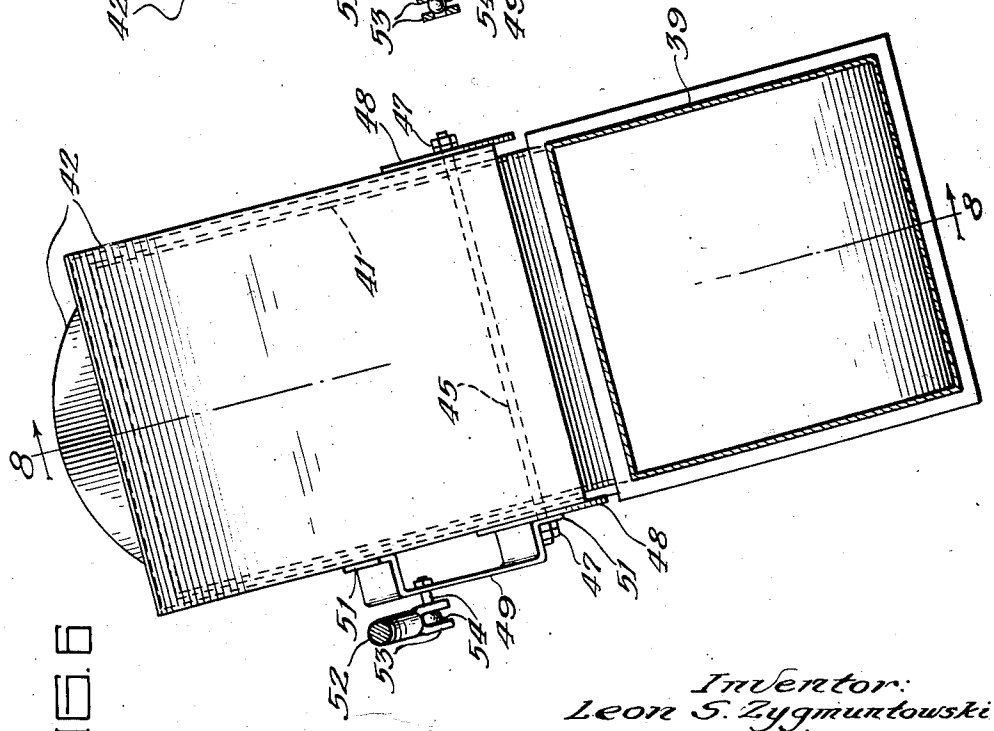


FIG. 6



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FIG. 8

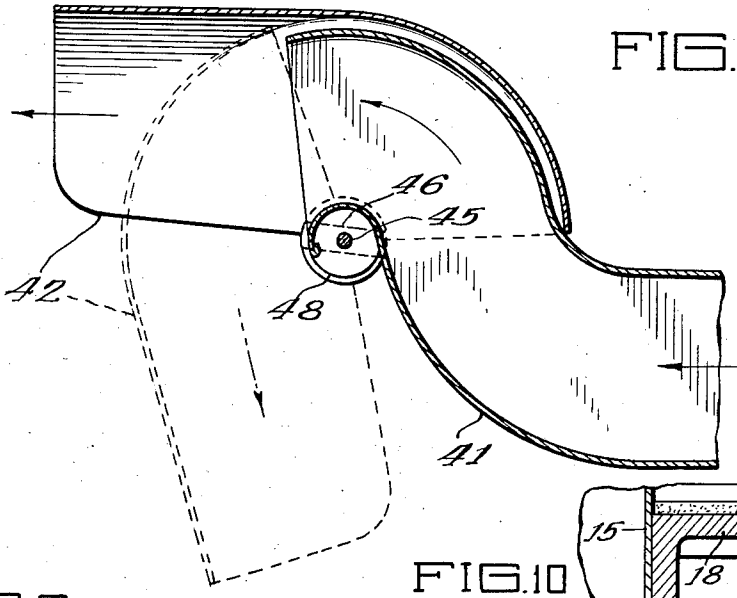


FIG. 9

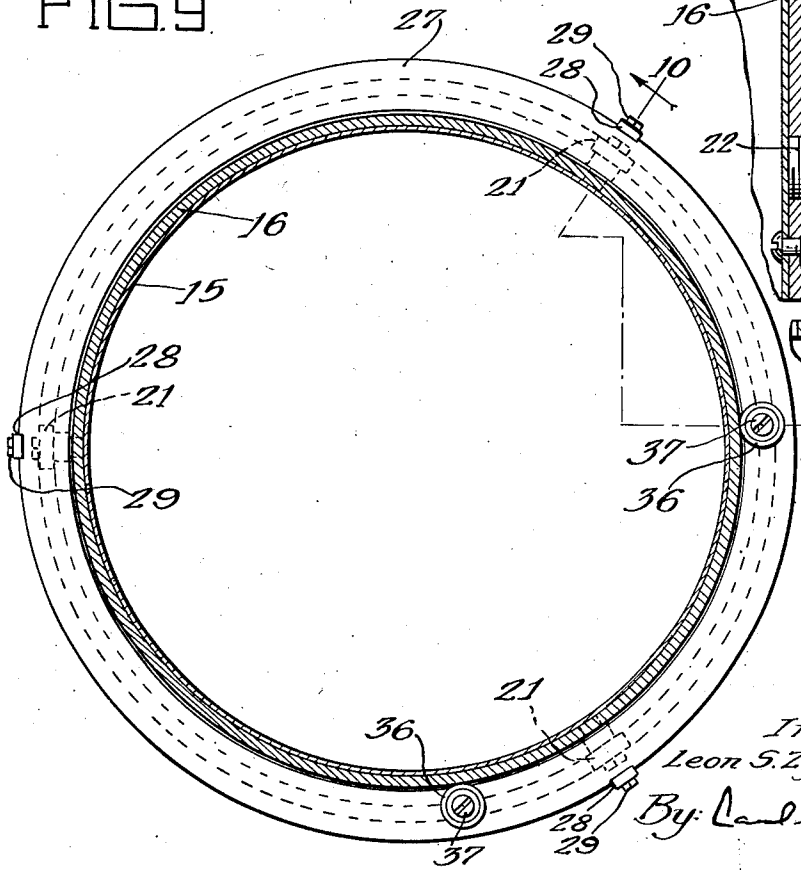
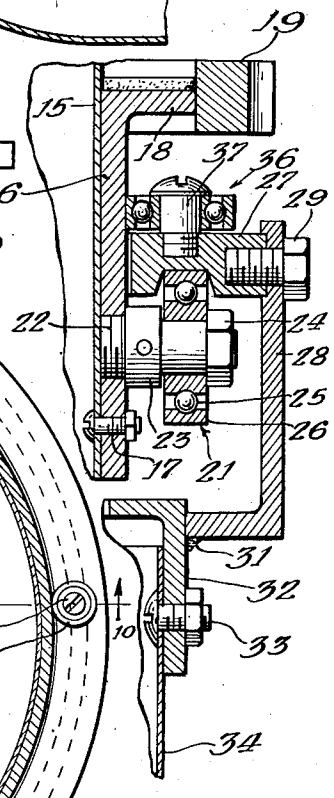


FIG. 10



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2,780,498

FIBER STOCK SPREADER

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Application July 14, 1955, Serial No. 522,038

12 Claims. (Cl. 302—28)

This invention relates to a fiber stock distributing and spreading apparatus for conveying the stock to receiving points, such as storage bins, in large plants, such as rug or textile factories, and spreading the same therein in such manner as to thoroughly intermix and blend the fibers.

In such plants the fiber stock, after preliminary processing, including dyeing and drying, must be conveyed to remote points, perhaps on different floors or at distant points on the same floor, and, in the system to which my invention especially relates, this is done by a blower system in which the fibers are forced through ducts or blowpipes by air under pressure to outlets located in, and near the top of, bins or like enclosures to which the stock is to be delivered. Such bins, which may be, and often are, room-like enclosures formed by hanging fabric sheets on curtains from the ceiling to provide temporary walls, are ordinarily located near carding machines or other processing equipment at points that are remote from the place of completion of the preliminary processing of the wool or other fibrous material.

If the stock were merely discharged from an outlet opening or pipe section in the blower system, there would normally be a separation of the long, medium and short fibers, due to the force of the air and gravity, and the result would be that the different categories of fibers would be deposited, respectively, in different parts of the bin, with no adequate mixing or blending of the long, medium and short fibers. This obviously would be disadvantageous, in that it would result in a lack of uniformity in the strands made from the stock, and hence in different areas in the rugs or other textile products to be made therefrom.

It is therefore the general object of my invention to provide in such a system spreader devices whereby the fibers are thoroughly mixed and blended as they are delivered into the bins.

A further object is to provide apparatus of this character arranged and constructed for operation by the force of the air which constitutes the carrier medium for conveying the stock through the blower system.

Another object is to provide a spreader for the purpose stated, comprising a rotary hollow body and a deflector at the discharge end thereof which is moved to different positions in a predetermined cycle by the rotary movement of said body effected by the air pressure.

These and other objects and advantages of my invention will be apparent from the following description and claims, taken in connection with the accompanying drawings, in which:

Fig. 1 is a side elevational view of a spreader apparatus in which the invention is embodied;

Fig. 2 is a plan view thereof, taken substantially on the line 2—2 in Fig. 1;

Fig. 3 is a detail sectional view taken substantially on the line 3—3 in Fig. 2;

Fig. 4 is a similar view taken substantially on the line 4—4 in Fig. 1;

Fig. 5 is a similar view taken along the line 5—5 in Fig. 2;

Fig. 6 is a cross-sectional and elevational view of the spreader taken substantially on the line 6—6 in Fig. 1;

Fig. 7 is a similar view taken substantially on the line 7—7 in Fig. 1;

Fig. 8 is a longitudinal section of the discharge end of the spreader, taken substantially on the line 8—8 in Fig. 6, showing the hinged deflector in its two extreme positions, in full and dotted lines, respectively;

Fig. 9 is a horizontal sectional view taken substantially on the line 9—9 in Fig. 1; and

Fig. 10 is a vertical sectional view taken substantially on the irregular section line 10—10 in Fig. 9.

In the embodiment of the invention thus illustrated, I have shown a segment of a distribution duct or blowpipe 11 suspended from the ceiling 12 of a room, bin or other enclosure in which a spreader unit, generally indicated in Figs. 1 and 2 by the numeral 13, is located. In a large establishment, such as a rug or other textile factory, there may be a number of such enclosures, which may be formed merely by hanging curtains or sheets of suitable fabric, and the units may be positioned along the blowpipe in appropriately spaced relationship, or arranged in groups each served by different blowpipes, as may be most convenient in particular installations. Of course only one, or any desired number, of the units could be used (although only one in a series would be in operation at any one time), and, for purposes of illustration and explanation, one unit only need be illustrated and described.

As shown, the unit is suspended from a T-section 14 of the blowpipe which has a hinged gate 14' therein. The vertical portion 15 of such T-section fits within a metal ring or collar 16, which may be a casting, these parts being secured together in any suitable manner, as by a series of screw bolts 17 (see Fig. 10). The upper part of said collar has a flange 18 thereon and a stationary ring gear 19 is rigidly secured to the periphery of said flange.

The collar 16 has a plurality (three being shown) of wheels 21 mounted thereon in spaced relationship around the circumference thereof by means of studs 22 screwed into said collar, such wheels being carried on said studs between a collar 23 and a nut 24 and having ball bearings 25 therein providing for free rotation of the rims 26 thereof. A grooved ring 27 is supported on said wheels and has a plurality (three being shown) of legs 28 secured thereto by screw bolts 29 and depending therefrom. Said legs are secured, as by welding (indicated at 31), to a cast metal ring 32 which in turn is secured by screw bolts 33 to a vertical portion 34 of a hollow sheet metal body 35 of the spreader. As thus supported, said body 35 may freely rotate about the fixed vertical portion 15 of the blowpipe through travel of the grooved ring 27 on the ball-bearing wheels 21.

A second series of ball bearinged wheels 36 is provided, the same being mounted on vertical studs 37 screwed into the top of the ring 27, such wheels bearing against the ring or collar 16 and serving as side thrust bearings between said ring and the rotating elements of the spreader unit.

The unit is so formed as to be rotated by the force of compressed air admitted thereto from the blowpipe 11 when the pressure is on and the relevant gate 14' is open, no other motive power being required.

The hollow body 35 comprises an elbow section 38, a substantially horizontal mid-section 39 and an upwardly

curved outer section 41, to which a hood or deflector 42 is pivotally connected in manner that will later be described.

The formation of the mid-section 39 is best shown in the cross-sectional views of Figs. 6 and 7, from the latter of which it will be seen that the body is twisted to provide irregular surfaces against which the air is directed, so that the force of the impact will cause the body to turn in a counterclockwise direction, viewing Fig. 2.

The counterclockwise direction of rotation tends to tighten, rather than loosen, the right-hand screws by which the spreader body is connected to the blowpipe.

The angle of the twist in said mid-section 39 is such as to obtain the desired speed of rotation. When a number of the units are connected to a single blowpipe in series the successive units may be designed, if desired, to have progressively greater angles of twist, so that the more remote units in the series will be operated at substantially the same speed of rotation as those nearer the compressor, despite decreasing force of the air pressure toward the end of the series. It will be understood that when any particular unit is to be operated the appropriate hinged gate 14' will be opened, a handle 20 being provided for this purpose, and will be raised to the position indicated in Fig. 1 to direct the air into such unit.

The areas of greatest air impact are in the twisted walls, indicated at 43, of the section 39 of said spreader body, as will be evident from Fig. 7, but the misalignment of the outer section 41 with the elbow section 38 of the body, due to the twist in said mid-section 39 causes the air to also have turning impact with the interior of the walls of said outer section 41.

An opening 44 is provided in the top of the mid-section 39.

The hood or deflector 42 is pivotally mounted on a rod 45 which is supported from plates 46 attached to the upwardly curved section 41 of the air duct or body of the spreader unit, said rod being disposed on the outside of said section 41 beneath the forward end thereof. The hood is held in place on said rod by nuts 47 and washers 48, and an angular strap 49 is secured to one side of the hood 42, said strap having attaching feet 51 thereon, one of which is welded to one side of the hood and the other of which is clamped between the washer 48 and nut 47 on said side of the hood.

A connecting rod 52, 52', having a bifurcated forward end 53, is pivotally connected to the strap 49 by means of a ball-headed stud 54 and extends rearwardly as shown in Figs. 1 and 2. The rear end of said rod is also bifurcated, as indicated at 55, and is similarly connected by a ball-headed stud 56 to a crank arm 57 which is rigidly mounted on the end of a shaft 58 protruding from a gear box 59 which is supported from a frame structure, including an angle frame member 61, on the upper part of the elbow section 34, 35 of the rotatable spreader unit.

The rod 52, 52' is, or may be, provided with means for effecting lengthwise adjustment thereof to permit varying of the range of movement of the hood 42, which is moved in and out by said rod 52, as will presently be described. Said adjusting means is shown in Fig. 5 and comprises a collar 62 mounted on the rod section 52, said collar having forwardly and rearwardly extending threaded extensions indicated by the numerals 63 and 64, respectively. In the extension 63 there is a split oval collar 65 which is adapted to be clamped onto the rod section 52 by a nut 66. The extension 64 has a threaded connection with a hollow section 52' of the rod. A set screw 67 is, or may be, employed to hold the rod section 52' fixedly to the collar extension 64. It will be evident that with this construction the rod sections 52 and 52' may be telescoped and set in desired relationship to effect appropriate adjustment in the length of the connecting rod.

The frame structure on the upper part of the elbow 34 above mentioned includes a triangular bracket 68 connected to the elbow and a rod 69 extends rearwardly at an angle from the apex 70 of the triangle. Said rod 69 is rigidly connected by a bar 71 with the angle bracket member 61, the attachment of said bar to the rod being effected by a collar 72 and a set screw 73. At its outer end the rod 69 carries a weight 74 to provide a counterbalance for the spreader body during the rotation of the unit. The weight is held in place by a nut 75 and of course may be replaced or supplemented to vary the amount of weight used, as desired.

A spur gear 76 is mounted on a vertical shaft 77 of a conventional gear reduction unit in the gear box 59 and is in mesh with the stationary gear 19 on the blowpipe outlet section 15. When the unit is rotating by reason of air pressure in the system, the gear 76 is turned as it revolves around said stationary gear and, through said reduction unit, the crank 57 and the rod 52, 52', the hood or deflector 42 is slowly moved in and out.

The gear ratio may, and ordinarily will, be such that the complete cycle of in-and-out movement of the hood takes place only in the course of many revolutions of the spreader unit. Thus, starting with the hood in the full-line position shown in Fig. 8, the stock that is blown through the unit will be directed outwardly, following the path indicated by the full-line arrows in this figure, and will be deposited in the outer part of the room or bin. Gradually the hood will be moved inwardly and, after a large number of revolutions of the unit, it will ultimately be brought to the position shown in dotted lines in said Fig. 8, the stock then being directed in the path indicated by the dotted-line arrow and being deposited in or near the center of the bin.

After reaching its innermost position, the deflector will start to move outwardly and upwardly and will gradually work back to the position shown in full lines in said Fig. 8. Rotation of the spreader unit about its axis, with the deflector slowly traversing the distance between its two extreme positions back and forth, will cause spreading of the fibers of the stock circumferentially and radially in the bin so that the long, medium and short fibers will be thoroughly intermixed in all parts of the pile. Thus concentration of fibers of any of these categories in one area of the bin will be avoided and the stock will be in proper condition to be fed into the carding machines and converted into uniform strands of yarn for the weaving of the rugs or other fiber products to be made therefrom.

Although the apparatus of the invention is particularly adapted for the handling of fibrous material, such as wool, cotton, rayon and jute stock, in textile factories and like establishments, it may also be useful in the handling of other materials and references to a particular material or materials are to be regarded as illustrative and not limiting.

It will be evident that various changes and modifications in the illustrative embodiment of the apparatus of the invention above described may be made without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. A fiber stock spreader, comprising: a blower conduit adapted to have fiber stock directed therethrough by air pressure, said conduit having an outlet opening therein located within a room-like bin or other enclosure into which the stock is to be delivered; and a hollow spreader body communicably connected with said conduit and mounted for rotation in the upper part of said bin, said body having a downwardly curved section adjacent the inlet end thereof, a substantially horizontal intermediate section having a twist therein to provide irregular surfaces against which the air is directed to cause rotation of the body and an upwardly curved and outwardly opening discharge section from which the stock is discharged during rotation of said body, thereby spreading said stock about said bin and intermixing the fibers thereof.

2. A spreader for volatile material, comprising: a blower conduit adapted to have the material directed therethrough by air pressure, said conduit having an outlet opening therein located within a room-like bin or other enclosure into which the material is to be delivered; and a hollow spreader body communicably connected with said conduit and mounted for rotation in the upper part of said bin, said body having a downwardly curved section adjacent the inlet end thereof, a substantially horizontal intermediate section having a twist therein to provide irregular surfaces against which the air is directed to cause rotation of the body and an upwardly curved and outwardly opening discharge section from which the material is discharged during rotation of said body, thereby spreading said material about said bin and intermixing the particles thereof.

3. A fiber stock spreader, comprising: a blower conduit adapted to have fiber stock directed therethrough by air pressure, said conduit having an outlet opening therein located within a room-like bin or other enclosure into which the stock is to be delivered; a hollow spreader body communicably connected with said conduit and mounted for rotation in the upper part of said bin, said body having a downwardly curved section adjacent the inlet end thereof, a substantially horizontal intermediate section having a twist therein to provide irregular surfaces against which the air is directed to cause rotation of the body and an upwardly curved and outwardly opening discharge section from which the stock is discharged during rotation of said body, thereby spreading said stock about said bin and intermixing the fibers thereof; a deflector pivotally mounted on said body over said outlet opening; and means operable by rotation of said body for pivotally actuating said deflector to vary the inclination of discharge of said stock.

4. A fiber stock spreader, comprising: a blower conduit adapted to have fiber stock directed therethrough by air pressure, said conduit having an outlet opening therein located within a room-like bin or other enclosure into which the stock is to be delivered; a hollow spreader body communicably connected with said conduit and mounted for rotation in the upper part of said bin, said body having a downwardly curved section adjacent the inlet end thereof, a substantially horizontal intermediate section having a twist therein to provide irregular surfaces against which the air is directed to cause rotation of the body and an upwardly curved and outwardly opening discharge section from which the stock is discharged during rotation of said body, thereby spreading said stock about said bin and intermixing the fibers thereof; a deflector pivotally mounted on said body over said outlet opening; and means operable by rotation of said body for pivotally actuating said deflector to vary the inclination of discharge of said stock, said means including driving gearing and a gear reduction unit operably connected with said deflector arranged to move the latter gradually between two extreme positions during the course of a considerable number of revolutions of the spreader unit.

5. A spreader for volatile material, comprising: a blower conduit adapted to have the material directed therethrough by air pressure, said conduit having an outlet opening therein located within a room-like bin or other enclosure into which the material is to be delivered; a hollow spreader body communicably connected with said conduit and mounted for rotation in the upper part of said bin, said body having a downwardly curved section adjacent the inlet end thereof, a substantially horizontal intermediate section having a twist therein to provide irregular surfaces against which the air is directed to cause rotation of the body and an upwardly curved and outwardly opening discharge section from which the material is discharged during rotation of said body, thereby spreading said material about said bin and intermixing the particles thereof; a deflector pivotally mounted on said body over said outlet opening; and means operable by rotation of said body for pivotally actuating said deflector to vary the inclination of discharge of said material.

6. In a fiber stock spreader including a blower conduit adapted to have fiber stock directed therethrough by air pressure, said conduit having an outlet section therein located within a room-like bin or other enclosure into which the stock is to be delivered; a hollow spreader body communicably connected with said outlet section of the conduit and mounted for rotation in the upper part of said bin, said body being so formed as to be rotated by pressure of the air directed thereinto from said conduit and having a discharge opening in the outer part thereof from which the stock is discharged during rotation of said body, thereby spreading said stock about said bin and intermixing the fibers thereof; a deflector and hood pivotally mounted on said body over said outlet opening: the combination of means for rotatably suspending said spreader body from said outlet section of the conduit; a ring gear on said outlet section; a driving gear carried by said spreader body and in mesh with said ring gear; a gear reduction unit operatively connected with said driving gear; and means including a crank arm operable from said gear reduction unit and a connecting rod between said arm and said hood for pivotally actuating the latter to vary the inclination of discharge and thus the radial distribution of said stock.

7. In a fiber stock spreader including a blower conduit adapted to have fiber stock directed therethrough by air pressure, said conduit having an outlet section therein located within a room-like bin or other enclosure into which the stock is to be delivered; a hollow spreader body communicably connected with said outlet section of the conduit and mounted for rotation in the upper part of said bin, said body being so formed as to be rotated by pressure of the air directed thereinto from said conduit and having a discharge opening in the outer part thereof from which the stock is discharged during rotation of said body, thereby spreading said stock about said bin and intermixing the fibers thereof; a deflector and hood pivotally mounted on said body over said outlet opening: the combination of means, including roller-bearing supporting and centering devices, for rotatably suspending said spreader body from said outlet section of the conduit; a ring gear on said outlet section; a driving gear carried by said spreader body and in mesh with said ring gear; a gear reduction unit operatively connected with said driving gear; and means, including a crank arm operable from said gear reduction unit and a connecting rod between said arm and said hood, for pivotally actuating the latter to vary the inclination of discharge and thus the radial distribution of said stock during rotation of said spreader body.

8. In a fiber stock spreader including a blower conduit adapted to have fiber stock directed therethrough by air pressure, said conduit having an outlet section therein located within a room-like bin or other enclosure into which the stock is to be delivered; a hollow spreader body communicably connected with said outlet section of the conduit and mounted for rotation in the upper part of said bin, said body being so formed as to be rotated by pressure of the air directed thereinto from said conduit and having a discharge opening in the outer part thereof from which the stock is discharged during rotation of said body, thereby spreading said stock about said bin and intermixing the fibers thereof; a deflector and hood pivotally mounted on said body over said outlet opening: the combination of means for rotatably suspending said spreader body from said outlet section of the conduit, a ring gear on said outlet section; a driving gear carried by said spreader body and in mesh with said ring gear; a gear reduction unit operatively connected with said driv-

ing gear; and means, including a crank arm operable from said gear reduction unit and a connecting rod between said arm and said hood, for pivotally actuating the latter to vary the inclination of discharge and thus the radial distribution of said stock during rotation of said spreader body, said rod being adjustable in length to vary the range of pivotal movement of the deflector hood.

9. A fiber stock spreader, comprising: a blower conduit adapted to have fiber stock directed therethrough by air pressure, said conduit having an outlet opening therein located within a room-like bin into which the stock is to be delivered; and a hollow spreader body communicably connected with said conduit and mounted for rotation in the upper part of said bin, said body including a substantially horizontal section intermediate its inlet and outlet ends having a twist therein to provide irregular surfaces whereby the body is rotated by impact of the air against said surfaces, said body having a discharge opening in the outer part thereof from which the stock is discharged during rotation of the body, thereby spreading said stock about said bin and intermixing the fibers thereof during such rotation.

10. A fiber stock spreader, comprising: a blower conduit adapted to have fiber stock directed therethrough by air pressure, said conduit having an outlet opening therein located within a room-like bin into which the stock is to be delivered; a hollow spreader body communicably connected with said conduit and mounted for rotation in the upper part of said bin, said body including a substantially horizontal section intermediate its inlet and outlet ends having a twist therein to provide irregular surfaces whereby the body is rotated by impact of the air against said surfaces, said body having a discharge opening in the outer part thereof from which the stock is discharged during rotation of the body, thereby spreading said stock about said bin and intermixing the fibers thereof during such rotation, a deflector hood mounted on said body adjacent said discharge opening; and means operable by rotation of said body induced by the air pressure for pivotally actuating said deflector hood to vary the inclination of discharge and thus the radial distribution of the stock.

11. In combination with a blower distribution system for fiber stock or the like, a spreader unit rotatably mounted to receive air-borne material from said blower system, said unit including an air duct having a substantially horizontal twisted section presenting impact surfaces to incoming air under pressure from the blower system, whereby said unit is rotated by the force of such air, and an outlet opening at the outer end of said duct through which the air-borne material is discharged during rotation of the unit.

12. In combination with a blower distribution system for fiber stock or the like, a spreader unit rotatably mounted to receive air-borne material from said blower system, said unit including an air duct having a substantially horizontal twisted section presenting impact surfaces to incoming air under pressure from the blower system, whereby said unit is rotated by the force of such air, and an outlet opening at the outer end of said duct through which the air-borne material is discharged during rotation of the unit, said unit also including a movable deflector hood mounted adjacent said outlet opening and means operable by rotation of the unit for moving the hood to vary the angle of discharge, and hence the radial distribution, of the material during such rotation.

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