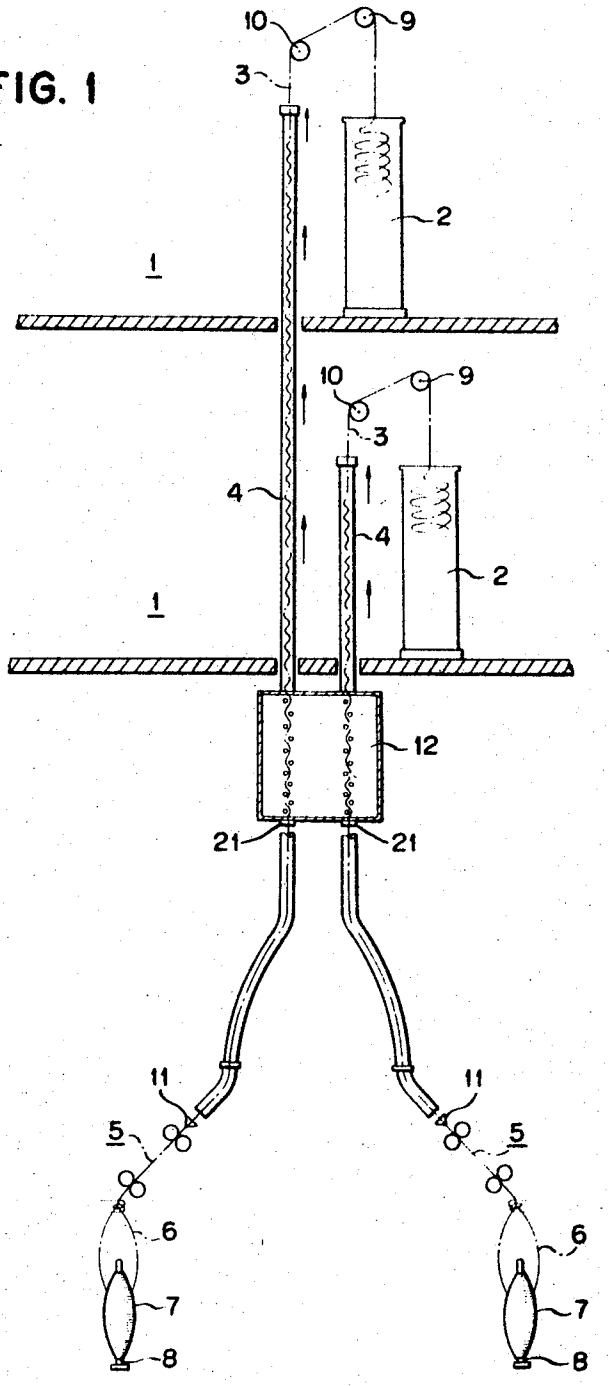
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METHOD FOR FEEDING SPINNING MATERIAL TO SPINNING MACHINE AND ITS APPARATUS

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FIG. 1



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FIG. 2

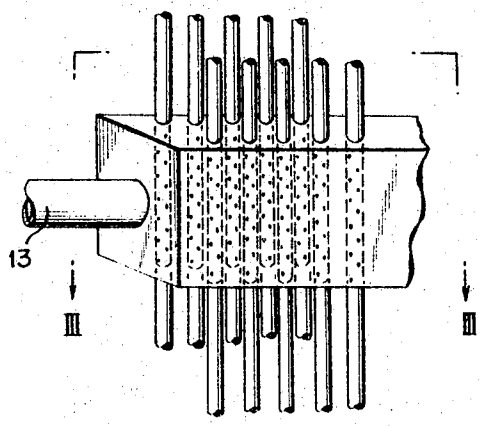


FIG. 5A

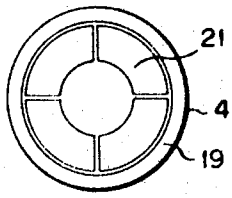


FIG. 5B

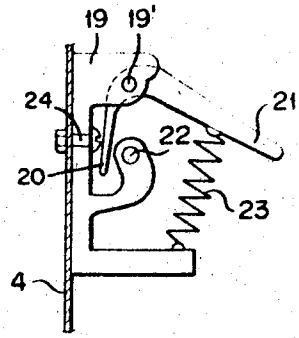


FIG. 3

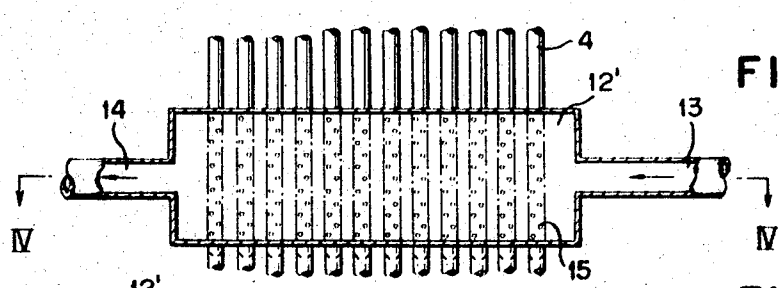
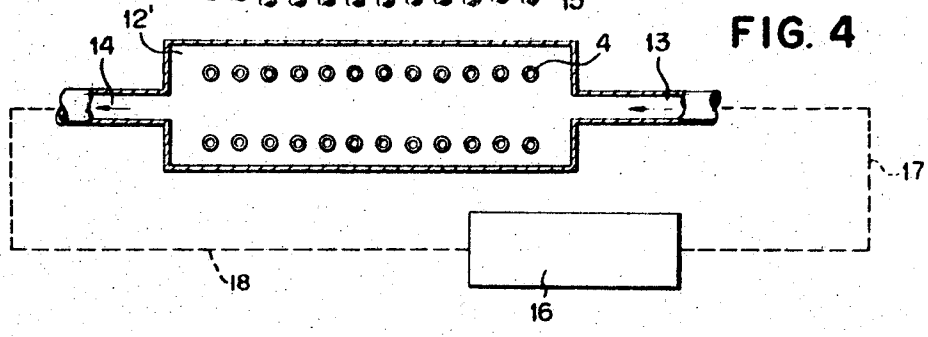
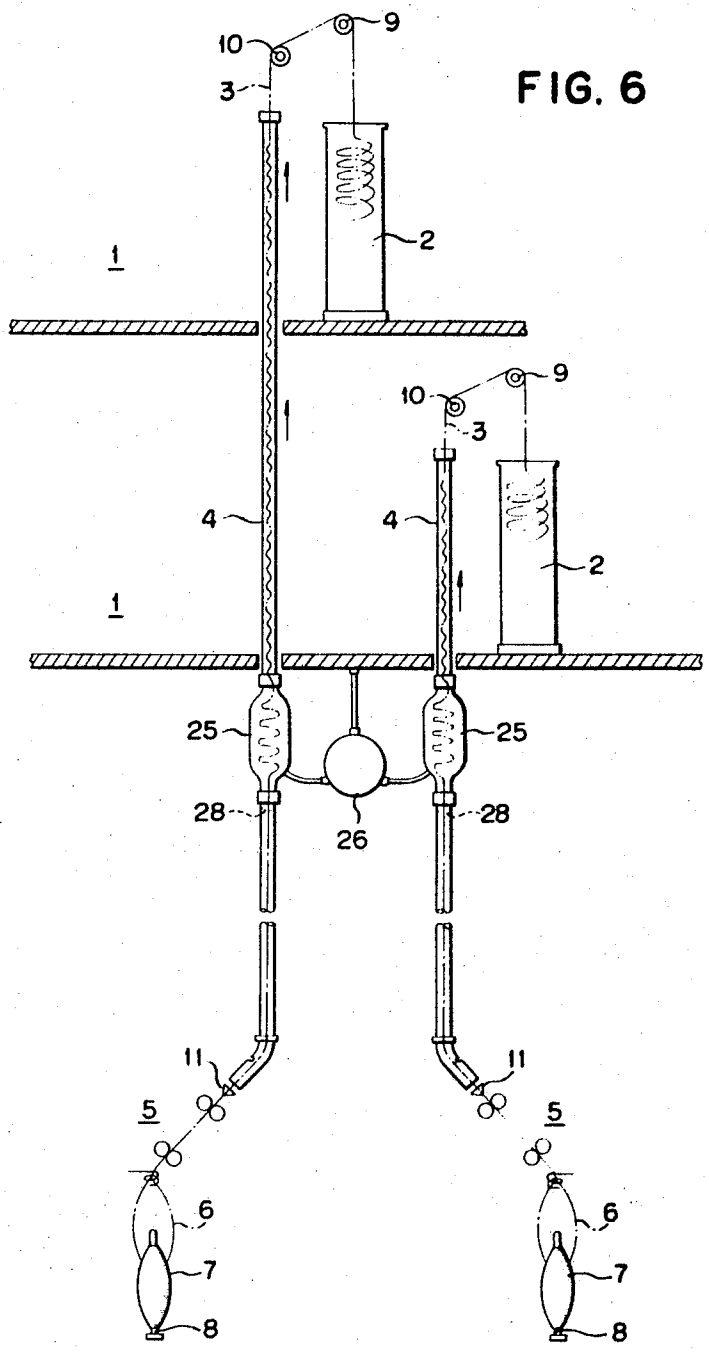


FIG. 4



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FIG. 6



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FIG. 8

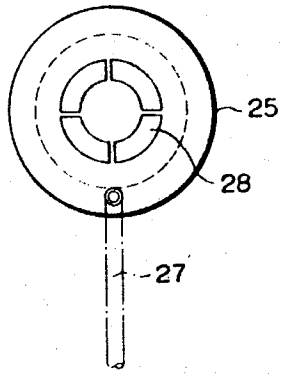


FIG. 7

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Patented Sept. 30, 1969

3,469,385

METHOD FOR FEEDING SPINNING MATERIAL TO SPINNING MACHINE AND ITS APPARATUS

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Claims priority, application Japan, Feb. 15, 1967, 42/9,195
Int. Cl. D01h *13/26, 13/30*
U.S. Cl. 57—34 10 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for feeding in the form of roving or sliver strands of fibers from packages having a plurality of upstanding pipes for individually receiving strands of fibers from the packages for advancement therethrough in a downward direction at a substantially uniform speed in each pipe under control of gravity through a variable restriction within each pipe defined by a plurality of plates in each pipe increasing and decreasing the restriction within a pipe in response to the weight of the fibers in the individual pipes upstream of the restriction therein. A moisture-content control device treats the strands as they are advanced longitudinally through the pipes.

The present invention relates to an improved method for feeding spinning material to a spinning machine and its apparatus, and particularly relates to a method and apparatus for feeding sliver or roving whose moisture content has been automatically adjusted, to a respective spinning machine while feeding from respective containers of sliver or roving which are disposed upstairs or at a higher level relative to the respective spinning machine installed downstairs. A spinning method by feeding the spinning material stocked upstairs to the respective spinning machine installed downstairs has been illustrated in U.S. Patent No. 3,070,948 granted to another invention of the applicant. And another method for feeding material to a spinning machine and its apparatus has been filed in the Patent Office in application Ser. No. 605,661, entitled Method for Feeding Spinning Material to Spinning Machine and Its Apparatus, filed on Dec. 29, 1966. The present invention provides a method for feeding spinning material to the respective spinning machine and its apparatus, and is particularly for the spinning method according to the U.S. Patent No. 3,070,948.

A principal object of the present invention is to provide a method and apparatus for adjusting moisture content of sliver or roving while feeding from the reserve position upstairs to the respective spinning machine installed downstairs.

Another object of the invention is to provide an economical and effective method for adjusting moisture content of sliver or roving.

According to the invention the apparatus comprises a plurality of vertically disposed pipes through which strands of fibers, from reserve packages at a level higher than a spinning machine, are delivered. A conditioning device treats the fibers as they advance through the pipes to insure that they have optimum moisture content. The fibers are advanced by driven rolls and move through the pipes and conditioning device at a uniform speed gravity controlled by plates defining a variable restriction in each pipe increased or decreased variably in response to the weight of the fibers on the plates defining the various restrictions.

Other objects and features of the invention will more

fully appear from the following description and the accompanying drawings and will be particularly pointed out in the claims.

FIG. 1 is a general elevational view of the feeding apparatus to which is attached the respective moisture regulating device according to the invention;

FIG. 2 is a perspective view of a portion of the moisture regulating device shown in FIG. 1;

FIG. 3 is a sectional view of the moisture regulating device taken along section line III—III in FIG. 2;

FIG. 4 is a sectional view of the moisture regulating device taken along section line IV—IV in FIG. 3;

FIG. 5A and FIG. 5B are an explanatory drawing and an enlarged side view, respectively, of a device for controlling the delivery speed of the spinning material of the invention;

FIG. 6 is a general elevational view of the feeding apparatus to which is attached another embodiment of a moisture regulating device of the invention;

FIG. 7 is an enlarged side view of another embodiment of the moisture regulating device shown in FIG. 6;

FIG. 8 is an explanatory drawing for showing the method of reversing fed sliver or roving in the respective pipes of the moisture regulating device shown in FIG. 7;

FIG. 9 is an explanatory drawing of a regulating plate disposed under the reserve pipe shown in FIG. 8.

Referring to FIGS. 1, 2, 3 and 4, a reserve sliver **3** is contained in a can **2** disposed in an upstairs room **1** where it is not necessary to maintain moisture in a controlled condition. The sliver **3** reserved in the can **2** is fed to a draft part **5** of a spinning frame so as to produce yarn **6** which is twisted and wound around a bobbin **7** supported by a spindle **8** rotating at high speed. The sliver **3** is fed to individual feed pipes **4** by way of guide rollers **9, 10** and then goes to a trumpet **11** disposed behind the draft part **5**. The guide rolls **9, 10** are rotated positively so as to feed sliver **3** uniformly as later described. A moisture regulating device **12** is disposed in an intermediate portion of the feed pipe **4** in such a way that the respective feed pipe **4** passes through the device as shown in the drawings. The moisture regulating device comprises, FIG. 3, a main chamber **12'** and an inlet pipe **13** for conditioned air and outlet **14** for overflow air. A plurality of feed pipes **4** pass through the chamber **12** and the portions of the respective pipes passing through the chamber **13** are provided with a plurality of small apertures **15** for permitting passage of the conditioned air from the chamber **12'** to the inside of pipes **4**. The conditioned air is supplied from an air conditioning device **16** by way of a supply conduit **17** to the inlet pipe **13**, and overflow air is returned to the air conditioning device from the outlet pipe **14** by way of a return conduit **18**. By means of the above-mentioned circulation of the conditioned air, the moisture content of the air in the chamber **12'** is always maintained in a desired, predetermined condition. As the pipes **4** are provided with apertures **15**, the conditioned air of predetermined moisture content enters the respective pipes through the aperture **15** and moves toward the upper portion of the pipes **4** if the air pressure of the upstairs room is lower than that of the spinning room. Sliver or roving regulating plates **21** are disposed to the inside wall of pipes **4** under the moisture regulating device **12** as shown in FIG. 1. Each regulating plate **21** is pushed or biased upwardly by a spring **23**, but excessive upward turning motion is restricted by a respective stop **22** disposed on a bracket **19**, which is secured to the pipe **4** by fastening bolts **24**. The regulating plate **21** is turnably supported on the bracket **19** by a pin **19'**. The spring **23** is connected at one end with the plate **21** and at the other end

with a projected portion of the bracket **19** as shown in FIG. 5B. The plate **21** can turn counterclockwise till the other end **20** of the plate **21** makes contact with the stop **22**. As shown in FIG. 5A, the regulating plate **21** is positioned in the pipe **4** in such a way that it restricts the opened space for permitting the free passage of sliver or roving and the feed speed of the sliver or roving **3** fed is regulated so that it is uniform. Consequently, the moisture content of sliver or roving **3** is conditioned while passing through the feed pipe **4**. The quantity of air which is used for conditioning the moisture content of the feeding sliver or roving is much smaller when compared with that of the conventional system in which the moisture content of the air in the entire room must be adjusted. Moreover, the feed speed of the spinning material **3** in the pipes **4** is very slow and the moisture content the spinning material **3** passing through the pipes **4** is controlled completely, by which the spinning condition is greatly improved.

The guide rolls or rollers **9, 10** are driven at uniform speeds and deliver the strands of fibers into the individual pipes **4**. Restriction apertures in the pipes **4** are defined by the plates **21** which extend inwardly into the individual pipes. If there is overfeed the strands of fiber will weigh more heavily on the plates **21** and the restriction aperture will tend to open up. If the speed of advancement of the fibers is substantially at the proper speed the plates keep the restriction aperture at the proper setting. It is, of course, understood that the feed through the pipes is at a higher rate of longitudinal advancement than the delivery rate required to the drafting zone **5**. Thus, in effect, there is a constant overfeed that is compensated for by the plates **21**. The plates actually maintain a gravity-controlled rate of feed because as the overfeed takes place there tends to be less friction between the strands of fibers and the guide rollers **9, 10** so that the rate of delivery decreases and there is constantly a rate of delivery that is substantially gravity controlled and, therefore, the rate of advancement is substantially constant and uniform in each individual pipe.

Referring to FIGS. 6, 7 and 8, another embodiment fo moisture content regulation device of the feeding material is shown. In FIG. 6, the feeding method and apparatus of the spinning material are almost the same as those of the first embodiment shown in FIG. 1 with the exception of the moisture regulating device. The moisture regulating device comprises an enlarged pipe **25** which is disposed at an intermediate position of the feeding pipe in place of the moisture content regulating device **12** in FIG. 1. A plurality of main ducts **26** for feeding conditioned air to the respective enlarged pipe **25** are disposed under the ceiling of the spinning room (in FIG. 6, a main duct **26** is shown), the respective enlarged pipes **25** are connected with the main duct **26** by a respective connecting pipe **27** so as to supply the conditioned air from the main duct **26** to the enlarged pipe **25**. At the portion of the respective pipe **4** adjacent to the bottom end portion of the enlarged pipe **25**, a plurality of regulating plates **28** are disposed inside of the respective pipe **4** as shown in FIG. 8. The regulating action of the moisture content of the feeding sliver or roving **4** by the enlarged pipe **25**, and the circulation of the controlled air through the main duct **26** are also the same as those of the first embodiment. Consequently, almost the same effect of regulating moisture content of the sliver or roving fed and the consequent improvement of the spinning conditions as that accomplished by the first embodiment can be obtained.

While the invention has been described in conjunction with certain embodiments thereof it is to be understood that various modifications and changes may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. Apparatus for feeding in the form of roving or sliver strands of fibers from packages comprising, a plurality of feed pipes for individually receiving strands of fibers from said packages for advancement longitudinally therethrough and delivery therefrom, and feed control means in each pipe controlling the speed of advancement and effective to maintain said speed substantially uniform at a selected speed within the individual pipes comprising variable control means defining a variable restriction within each pipe.

2. Apparatus for feeding in the form of roving or sliver strands of fibers from packages according to claim **1**, in which said pipes are vertically disposed and said strands of fibers advance therethrough in a downward direction, and including means driven at constant speeds for delivering said strands of fibers from said packages to said pipes cooperative with said variable control means in advancing said strands of fibers under the control of gravity through the vertical pipes individually at substantially a uniform speed in each pipe.

3. Apparatus for feeding in the form of roving or sliver strands of fibers from packages according to claim **2**, in which said means driven at constant speeds comprise driven guide rollers over which said strands of fibers advance.

4. Apparatus for feeding in the form of roving or sliver strands of fibers from packages according to claim **2**, in which said variable control means comprises for each pipe a plurality of plates defining a constriction through which the strands of fibers advance longitudinally and means resiliently mounting said plates for increasing and decreasing the restriction within a pipe in response to the weight of fibers in an individual pipe upstream of said restriction.

5. Apparatus for feeding in the form of roving or sliver strands of fibers from packages according to claim **1**, including means for treating the strands of fibers within the individual pipes to regulate the moisture content of the strands of fibers.

6. Apparatus for feeding in the form of roving or sliver strands of fibers from packages according to claim **5**, in which each of said pipes is substantially vertically disposed and each has a given length having perforations, and which said means for treating said strands of fibers comprises means to supply conditioned air through said perforations of each pipe to regulate the moisture content of said fibers.

7. Apparatus for feeding in the form of roving or sliver strands or fibers from packages according to claim **5**, in which said means for treating the strands of fibers within the individual pipes to regulate the moisture content of the strands of fibers is disposed in a position such that said strands of fibers pass through the individual restriction in said pipes before treatment thereof in said means for treating whereby said strands of fibers advance through said means for treating at a respective substantially uniform selected speed of advancement for proper regulation of the moisture content therein.

8. Apparatus for feeding in the form of roving or sliver strands of fibers from packages according to claim **7**, in which said means for treating the strands of fibers to regulate the moisture content therein comprises means for applying conditioned air to each pipe individually along a length of each of said pipes to treat said strands of fibers as they advance longitudinally through said length.

9. A method of feeding in the form of roving or sliver strands of fibers from packages comprising, advancing the strands of fibers from said packages each along a substantially vertical path and variably restricting each path at a point thereof to cause the individual strands to pass through each restriction in said path substantially at a uniform rate of longitudinal advancement.

10. A method of feeding in the form of roving or sliver strands of fibers from packages according to claim

9, including treating the strands of fibers at each individual path along a length of said path downstream of each restriction to regulate the moisture content of said strands of fibers.

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