May 20, 1969 J. R. WHITEHURST 3,444,594

FEEDING APPARATUS FOR PLIABLE MATERIALS

Filed April 3, 1967 Sheet 1 of 3

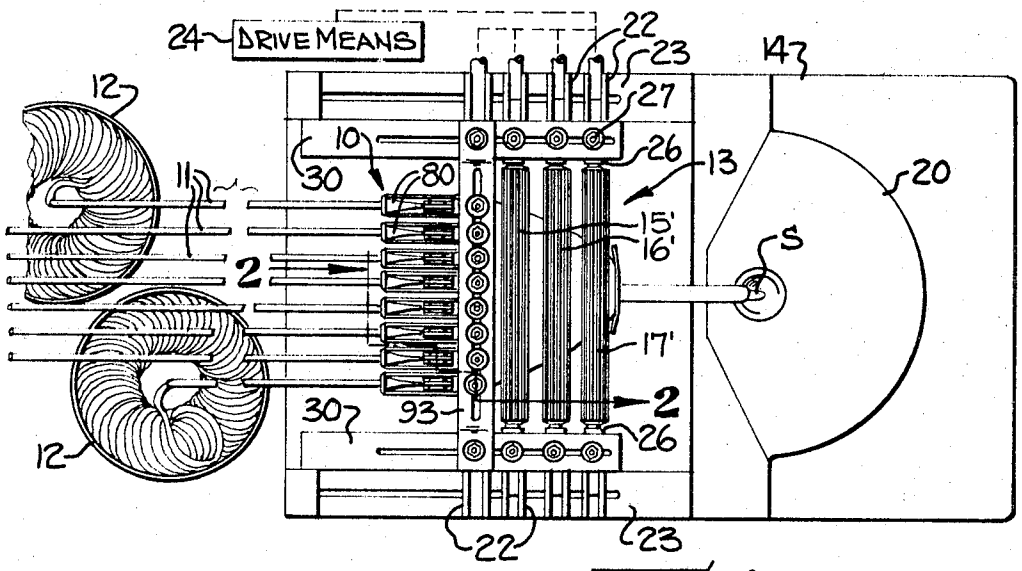


FIG-1

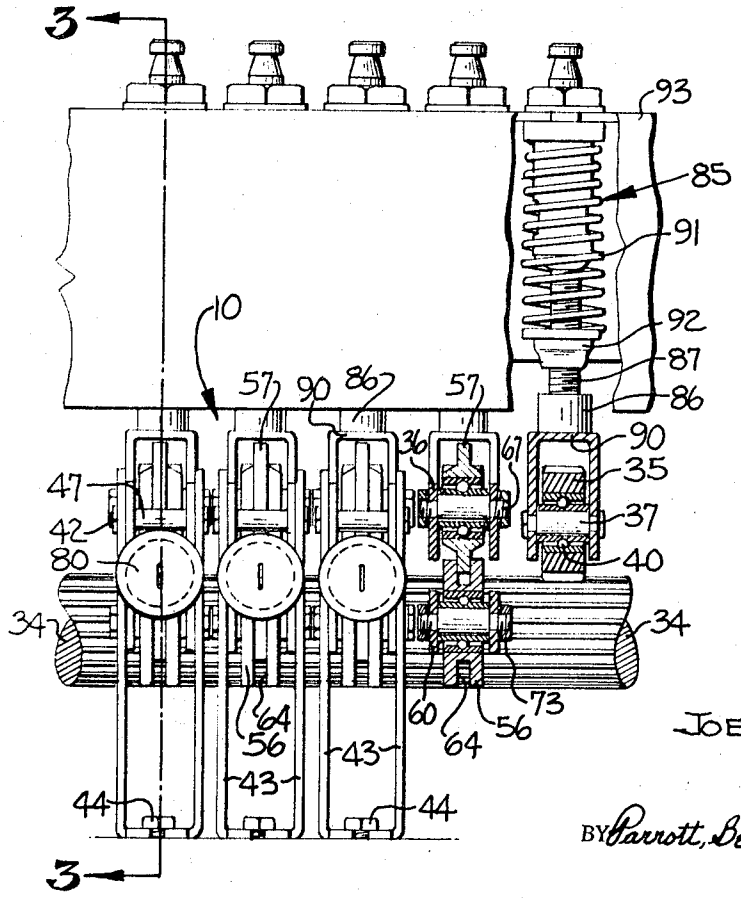


FIG-2

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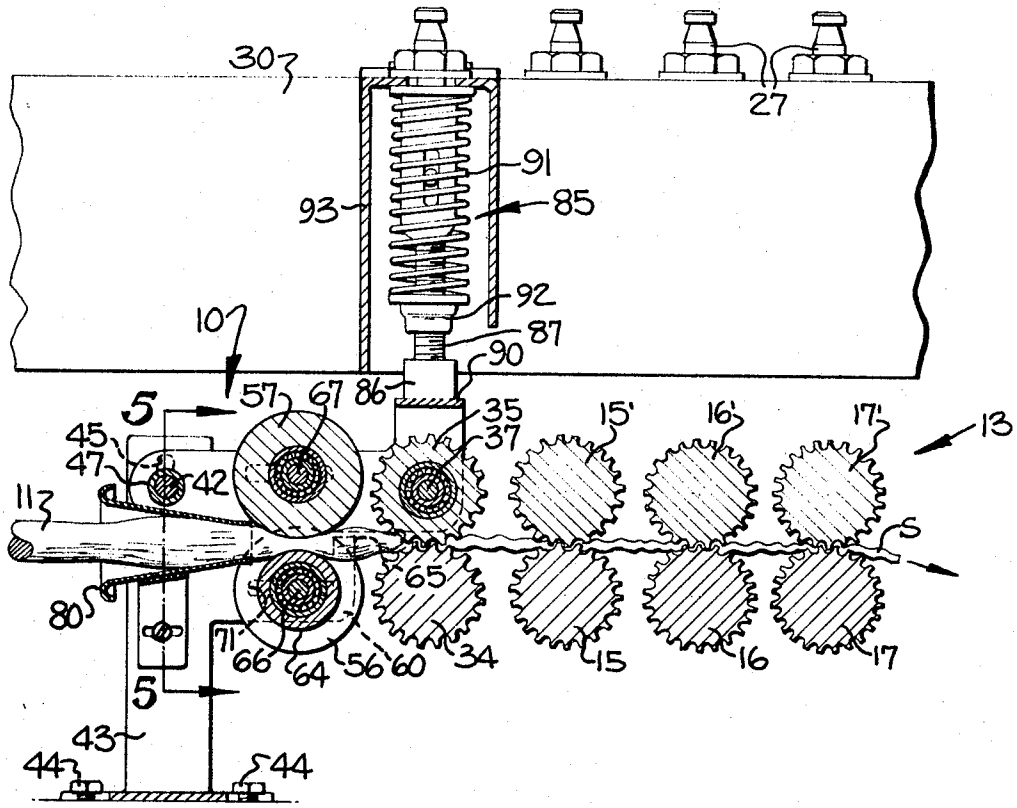


Fig-3

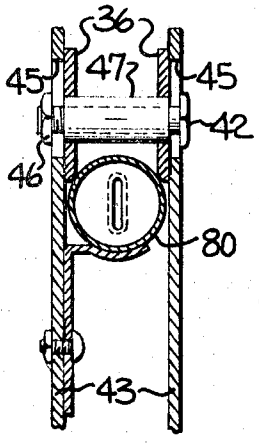


Fig-5

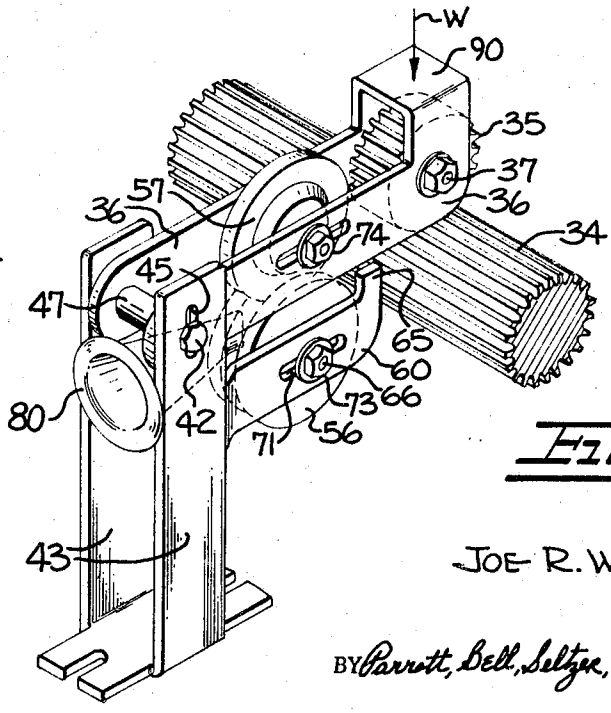


Fig-4

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FEEDING APPARATUS FOR PLIABLE MATERIALS

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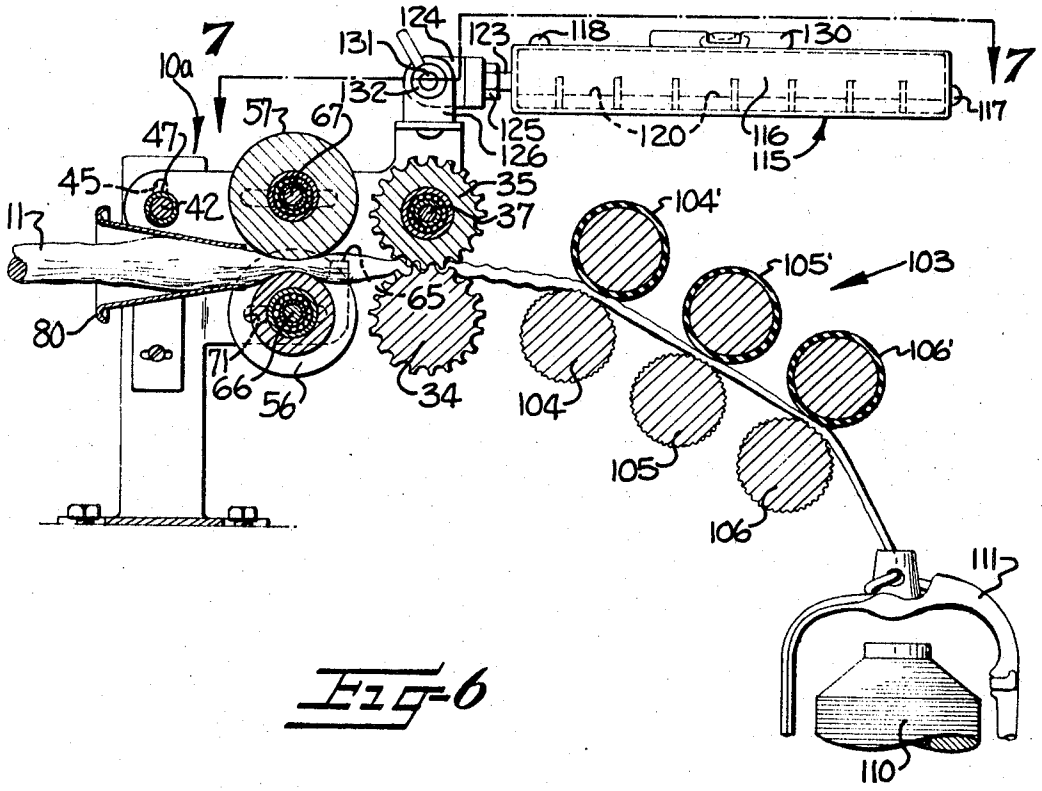


Fig-6

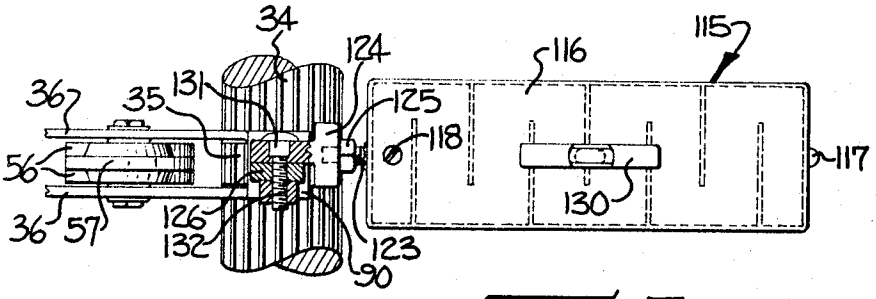


Fig-7

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United States Patent Office 3,444,594 Patented May 20, 1969

3,444,594

FEEDING APPARATUS FOR PLIABLE MATERIALS

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Filed Apr. 3, 1967, Ser. No. 627,874
Int. Cl. D01h 5/32, 5/22
U.S. Cl. 19—239 13 Claims

ABSTRACT OF THE DISCLOSURE

An apparatus for feeding textile slivers or other pliable material to a drafting unit or other processing apparatus, in which the depth of intermeshing relationship of fluted feed rolls, and thus the rate of feed of the material by the fluted feed rolls, is controlled by a detecting device which detects variations in weight or thickness of the material in its course from a supply source to the feed rolls.

This invention relates to an improved apparatus for feeding pliable materials and is particularly concerned with the feeding of fibrous textile material from a source to a processing machine, such as a drafting unit, in such a manner as to form a product of more uniform weight per unit length.

Since the quality of yarn and textile products largely depends upon the degree of uniformity in the weight of lengths of textile materials in early stages of processing, various apparatuses have been proposed heretofore for rectifying inconsistencies in the weight of textile material between a source of supply and the processing machinery. Among the known prior art directed to improving the uniformity in the weight of fibrous material being fed to a processing machine are U.S. Patent No. 2,964,803, issued Dec. 20, 1960 to Sydney Robinson, and my U.S. Patents Nos. 2,738,554 and 3,203,051, issued Mar. 20, 1956 and Aug. 31, 1965, respectively. The apparatus disclosed in the Robinson patent includes a detecting means which controls the speed of a pair of driven feed rolls of a gill box in response to detected variations in weight or thickness of textile sliver, and wherein an electrical system operated by the detecting means is connected to a variable-speed drive mechanism for driving the feed rolls.

The apparatuses of my said patents do not require electrical systems or variable-speed drive mechanisms, thus obviating the need for extensive modification of the existing drives of the associated processing machines. Also, they have contributed materially to the quality of textile material being drafted, by detecting, at fluted feed rolls, variations in the weight or thickness of textile material passing therebetween and compensatively varying the rate of feed of the material by the feed rolls so that the textile material being received by the drafting unit is of substantially uniform weight. The variations in the rate of feed are the direct result of variations in the intermeshing relationship of the fluted feed rolls as thick and thin portions of the textile material pass between the rolls.

However, at high speeds, it has been found that the response of fluted feed rolls to sudden substantial changes in thickness of the textile material therebetween has been sluggish with respect to the linear speed of the material. Consequently, at least the leading end of a suddenly occurring relatively thin portion, for example, might pass beyond the nip of the feed rolls before the intermeshing relation of the feed rolls has increased to the extent necessary to so speed up the travel of the material as to fully compensate for such thin portion. A similar situation may develop upon the sudden occurrence of a relatively thick or heavily dense portion passing through the feed rolls.

Therefore, it is an object of this invention to provide an improved apparatus for feeding textile material which is of improved sensitivity to variations in the weight of the material to compensatively vary the rate of feed of the material in response to the detection of such variations in weight.

A more specific object of this invention is to provide an improved apparatus utilizing intermeshing fluted feed rolls for feeding fibrous textile material; e.g., slivers, at varying speeds according to variations in the weight of the material being fed, without varying the speed of the feed rolls, but wherein the intermeshing relationship of the feed rolls, and thus the linear speed of the textile material, is controlled in response to and concomitantly with the detecting of variations in the weight of the material before respective detected portions of the material reach the fluted feed rolls.

In its preferred embodiment, the apparatus of this invention is located rearwardly of and closely adjacent a drafting unit and comprises a pair of driven intermeshing fluted feed rolls, preferably arranged one above the other. The upper feed roll, serving as an idler evener roll, is journaled on a downwardly biased lever means pivotally supported rearwardly of the feed rolls. In its course from a supply source to the feed rolls, textile material is condensed between the closely spaced sidewalls or flanges of a rotatable member. A freely rotatable detector roll carried by the lever means and spaced between the pivot point of the lever means and the feed rolls is in pressure engagement with the upper surface of the condensed material engaging the rotatable member. Thus, any variations in weight or thickness of the material are detected by and impart substantially vertical motion to the evener feed roll, which vertical motion is amplified and transmitted by the lever means to the evener roll, thus ensuring that the desired change in intermeshing relationship of the feed rolls occurs by the time each detected variation reaches the feed rolls to effect the desired change in linear speed of the material issuing from the feed rolls.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings in which—

FIGURE 1 is a plan view of one embodiment of the feeding apparatus of the present invention as applied to the drafting unit of a drawing frame;

FIGURE 2 is an enlarged fragmentary rear elevation, partially in section, taken substantially along line 2—2 in FIGURE 1;

FIGURE 3 is a fragmentary vertical sectional view through one of the feeding devices taken substantially along line 3—3 in FIGURE 2;

FIGURE 4 is a perspective view of the feeding device shown in FIGURE 3;

FIGURE 5 is a fragmentary vertical sectional view taken substantially along line 5—5 in FIGURE 3;

FIGURE 6 is a vertical sectional view similar to FIGURE 3, but showing a second embodiment of the feeding device as applied to the drafting unit of a roving frame; and

FIGURE 7 is a fragmentary plan view of the feeding device shown in FIGURE 6

Referring more specifically to the drawings, and to FIGURES 1–5 in particular, the first embodiment of the invention is shown in the form of a plurality of evener feeding devices **10** for feeding respective lengths of textile material **11**, such as slivers, from separate sources of supply **12**; e.g., coiler cans, to a processing apparatus or machine shown in the form of the drafting unit **13** of a drawing frame **14**.

As shown, drafting unit **13** includes a series of bottom and top drafting rolls **15, 16, 17** and **15', 16', 17'** (FIG-

URE 3) which receives slivers 11 from the feeding devices 10 and draft them into a web which is then condensed into a composite sliver S and coiled into a can, not shown, through a coiling mechanism 20, as is usual. The reduced end portions or roller necks of the bottom drafting rolls 15, 16, 17 are rotatably supported in bearing blocks 22 carried by roll stands 23 and are connected to a suitable drive means 24 shown schematically in FIGURE 1. The bottom drafting rolls 15, 16, 17 are of the usual fluted type and the top drafting rolls 15', 16', 17' may be either of the fluted type or so-called cushion rolls, as desired. Roll 15 is driven at a given speed and rolls 16, 17 are driven at progressively increasing speeds, as usual, to draft the fibrous material being directed thereto.

As is conventional, opposed ends of top drafting rolls 15', 16', 17' are journaled in respective bearings 26 which may be guided for vertical movement in the bearing blocks 22 and are engaged by respective pressure-applying devices 27 carried by pressure-applying arms 30 overlying bearing units 26 adjacent opposite ends of the top drafting rolls. The pressure-applying arms 30 are normally latched in the position shown in FIGURE 1, but may be released and pivoted upwardly, as is well known, to permit access to the drafting rolls, when desired. Accordingly, the rear portions of the pressure-applying arms 30 extend rearwardly of drafting unit 13 and are pivotally mounted on posts 31 of drawing frame 14.

Feeding devices 10 comprise lower and upper intermeshing fluted evener feed rolls 34, 35, the nip of which is spaced rearwardly of the nip of drafting rolls 15, 15' a distance equal to or slightly greater than the maximum staple length of the fibers in slivers 11. In this instance, lower feed roll 34 is common to all the feeding devices 10 and may be mounted and driven at a constant speed with respect to, and in the same manner as, bottom drafting rolls 15, 16, 17. In fact, lower feed roll 34 and all the bottom drafting rolls 15, 16, 17 may be of the same construction, although the lower feed roll serves as a driven evener roll in this instance. In combination with the drafting unit, the evener feed rolls serve as back drafting rolls of the corresponding drafting unit. A separate idler evener roll 35 is provided for each feeding device 10. The upper rolls 15', 16', 17', 35 are driven by contact with the bottom rolls 15, 16, 17, 34 and/or the stock passing therebetween.

Only one of the feeding devices 10 will be described and all the feeding devices will bear the same reference characters.

Each idler evener roll 35 is rotatably mounted between a pair of closely spaced lever arms 36, embodying lever means. As shown in FIGURE 3, idler evener roll 35 is rotatably mounted on a shaft 37, preferably by means of an anti-friction bearing 40, and opposed ends of shaft 37 are mounted in the forward portions of lever arms 36. Rear end portions of lever arms 36 are fulcrumed, by means of a bolt 42, in the upper portion of a bifurcated standard 43 which extends downwardly and whose lower portion may be adjustably mounted, as at 44, on the frame of drawing frame 14.

To accommodate the feeding of a wide range of different sizes of slivers at different times through each feeding device 10 without changing the effective diameter of either feed roll 34 or 35 or either of a pair of idler or freely rotatable measuring rolls, to be later described, the fulcrum bolt 42 of each feeding device may be vertically adjustable relative to its standard 43. Accordingly, as shown in FIGURE 5, bolt 42 loosely penetrates a pair of substantially vertical adjustment slots 45, provided in the bifurcations of standard 43, and has a nut 46 threaded thereon for clamping the bifurcations against opposite ends of a sleeve 47. Sleeve 47 surrounds the stem of bolt 42 and loosely penetrates lever arms 36. Thus, the rear ends of lever arms 36 may be adjusted vertically and may pivot freely on sleeve 47 in FIGURE 5.

According to the instant invention, the linear advancing speed imparted to each sliver 11 by feed rolls 34, 35 is controlled by a pair of cooperating lower and upper measuring rolls 56, 57 arranged to condense each respective sliver 11 at a point spaced rearwardly of feed rolls 34, 35, and to measure and detect variations in weight or density and thickness of the condensed sliver. The condensing of the sliver expurgates air from the sliver and ensures accurate detection of variations in weight of the material. Each pair of measuring rolls also is arranged to impart concommitant amplified motion to the respective idler evener feed roll 35 relative to driven feed roll 34 to vary the intermeshing relationship thereof, and thus the linear speed they impart to each respective sliver, in response to the detection of such variations in weight of the sliver.

Therefore, lower measuring roll 56 serves as a freely rotatable condenser roll or member, and upper measuring roll 57 serves as a detector roll or member. Condenser roll 56 is rotatably supported between a pair of support arms 60 projecting forwardly from standard 43 (FIGURES 3 and 4), and detector roll 57 is rotatably supported between lever arms 36. Condenser roll 56 has a narrow peripheral groove 64 in a medial portion thereof which is of substantially greater depth than the width thereof and whose sidewalls are spaced substantially closer together than the normal diameter of the corresponding sliver 11, thus serving as a confining passage for condensing sliver 11 in its course from the source to feed rolls 34, 35 so that weight variations in the sliver may be more readily detected. It follows that condenser roll 56 serves as a support for engaging the sliver 11 in its course to the fluted evener feed rolls 34, 35.

The condensed material passing through annular groove 64 in condenser roll 56 is engaged by the respective detector roll 57. The width or thickness of at least the outer peripheral portion of detector roll 57 is sufficiently smaller than the width of groove 64 in the respective condenser roll 56 so that detector roll 57 may rotate freely with its peripheral surface resting upon the condensed sliver passing through groove 64 of the corresponding condenser roll.

The relationship of detector roll 57 and idler feed roll 35 is such, with respect to condenser roll 56 and lower feed roll 34, that rolls 35, 57 and the portions of lever arms 36 forwardly of each fulcrum bolt 42 are supported solely by the condensed portion of the traveling sliver 11 then passing through groove 64 of condenser roll 56. Thus, any squeezing pressure applied to each textile sliver 11 at the nip of the corresponding upper evener feed roll 35 and the lower evener feed roll 34 is dependent upon the pressure or lateral force being applied to the material passing through the groove 64 in condenser roll 56, as well as the displacement of detector roll 57 with respect to the bottom of groove 64 in condenser roll 56.

Since feed rolls 34, 35 are in intermeshing relationship, however, the textile slivers conform somewhat to the configuration of the intermeshing flutes of feed rolls 34, 35, depending upon the extent to which the ridges of the flutes of each idler evener roll 35 extend into the grooves of the flutes of the driven evener feed roll 34. As is well known, the deeper the intermeshing relationship of the feed rolls 34, 35, the greater is the length of the corresponding portion of the sliver passing through the nip thereof, and thus, the greater is the linear speed at which the corresponding sliver is fed by feed rolls 34, 35 to the succeeding pair of drafting rolls 15, 15'.

The thickness of each sliver 11 passing through groove 64 in a corresponding condenser roll 56 may be substantially greater than the maximum variation in intermeshing relationship permitted by the depth of the flutes on feed rolls 34, 35. Therefore, suitable means may be provided to prevent the ridges of the flutes of each feed roll 34, 35 from bottoming in the respective grooves of the other feed roll. By way of example, the front portion of each arm 60 (FIGURES 3 and 4) has an abutment 65

projecting upwardly therefrom and normally spaced beneath the respective lever arms **36**, but being located so as to engage and support lever arms **36** whenever ridges of the flutes of the respective upper feed roll **35** are within about .001 to .005 inch of the bottoms of the grooves of the flutes in lower feed roll **34**.

Both measuring rolls **56**, **57** of each feeding device **10**, being idler rolls, are rotated solely by pressure engagement with the respective sliver **11** being pulled forwardly by feed rolls **34**, **35**. Consequently, in order to prevent the sliver from being pulled apart between each pair of measuring rolls and the feed rolls, the distance from the nip of each pair of measuring rolls **56**, **57** to the nip of feed rolls **34**, **35** should be no greater, and preferably less than, the average staple length of the fibers in the respective sliver **11**. On the other hand, best results may be obtained by spacing the nip of the measuring rolls **56**, **57** as far as possible from the nip of the feed rolls **34**, **35**, without exceeding the average staple length.

Therefore, measuring rolls **56**, **57** are rotatably mounted on respective adjustable shafts **66**, **67** extending between support arms **60** and lever arms **36**, respectively. Reduced opposite ends of shafts **66**, **67** of each feeding device **10** loosely penetrate forwardly and rearwardly extending slots **71**, **72** in the respective arms **60**, **36** and are secured in adjusted position by respective lock nuts **73**, **74** (FIGURE 4)

As shown, the fulcrum bolt **42** of lever arms **36** is spaced about twice the distance from the axis of each idler evener feed roll **35** than it is from the axis of detector roll **57**, but it is apparent that this distance may be varied depending upon the extent of amplification of the movement of detector roll **57** desired to be transmitted to the corresponding upper feed roll **35**, or such as may occur by adjusting measuring rolls **56**, **57** toward or away from feed rolls **34**, **35** to accommodate corresponding fiber lengths.

Preferably, each feeding device **10** is provided with a condensing trumpet **80** whose smaller end is disposed closely adjacent the nip of condenser roll **56** and detector roll **57** to aid in directing the corresponding sliver **11** into the groove **64** of the corresponding condenser roll **56**. As shown, each trumpet **80** may be suitable adjustably secured to the corresponding standard **43**.

The peripheral surface of detector roll **57** and the bottom of the groove **64** in condenser roll **56** preferably are smooth and extend parallel with the axes of the respective rolls. However, such peripheral surfaces may be concave or convex, or they may have roughened or fluted peripheral surfaces for increasing traction if found desirable for processing certain types of material. Generally, the distance between the sidewalls of each groove **64**; i.e., the width of each groove **64**, may be about one-sixteenth inch, and the distance between the peripheral surface of detector roll **57** and the peripheral surface defining the bottom of the groove **64** in condenser roll **56** may be about three-sixteenths to seven thirty-seconds of an inch when a portion of sliver of the desired weight per unit length is passing through the corresponding groove **64**. Such dimensional relationship between the condenser and detector rolls **56**, **57** may accommodate many different sizes of textile slivers, with the mean size of sliver being about sixty grains per yard, without the necessity of vertically adjusting fulcrum bolt **42** in the manner heretofore described.

It is preferred that the sliver passageway through each trumpet **80** is so shaped as to gradually condense and form the respective sliver into an oblong cross-sectional configuration of a size similar to that of the confining passage defined by the peripheral groove **64** in the respective condenser roll **56** and by the cooperating detector roll **57**. As shown in FIGURES 4 and 5, the inlet end of trumpet **80** may be circular and of an internal diameter substantially greater than that of the unconfined sliver. The outlet end or egress orifice of the trumpet, however, is substantially smaller than the inlet end, is generally oval-shaped or elliptical-shaped, and preferably is slightly smaller than the aforementioned confining passage. Since each confining passage is of greater height than width, the egress orifice of the respective trumpet **80** should be similarly arranged. It is preferred that the smaller end of trumpet **80** is positioned within groove **64** of condenser roll **56** so the textile material is controlled more effectively as it enters the groove **64** and the nip of measuring rolls **56**, **57**.

The amount of weight or downward pressure applied to each detector roll **57** toward its condenser roll **56** can beat be determined empirically. Satisfactory results have been obtained by subjecting a detector roll **57** to a downward force of about four pounds. The means for applying downward pressure to the detector rolls **57** and the respective upper evener feed rolls **35** may comprise respective adjustable pressure-applying devices **85** which are shown as being of the well-known type of spring-loaded pressure-applying device used for applying downward pressure to the top drafting rolls of many drawing frames currently in use by the industry. In this instance, each pressure-applying device **85** is shown (FIGURES 2 and 3) as comprising a pressure foot **86** mounted on the lower end of a vertically movable threaded plunger **87** and engaging the upper surface of a bridging portion **90** extending between lever arms **36** and spaced above the respective upper evener feed roll **35**. A compression spring **91** surrounding each plunger **87** is adjustable by means of a nut **92** threaded on the lower portion of plunger **87**. The upper end of each spring **91** bears against a carrier member **93**. Carrier member **93** is common to and supports all the pressure-applying devices **85**. Opposed end portions of carrier member **93** may be suitably secured to pressure-applying arms **30** of drawing frame **14**. The upper portions of plungers **87** loosely penetrate carrier arm **93**.

From the foregoing description, it can be appreciated that, while a detector roll **57** is supported in a median or optimum position by a respective sliver of the optimum desired weight per unit length, feed rolls **34**, **35** then would be feedng the sliver at a median linear speed into the first or rear drafting zone between rolls **34**, **35** and rolls **15**, **15'**. However, upon movement of a thin place in the sliver of less than the optimum weight being detected by detector roll **57**, it moves downwardly toward its condenser roll **56**, thus increasing the depth of intermeshing relationship of the respective upper feed roll **35** with feed roll **34** by the time the thus detected thin place reaches the nip of feed rolls **34**, **35**. Assuming the configuration of the flutes of feed rolls **34**, **35** are properly correlated with the amount of motion to which the upper evener rolls **35** may be subjected, the increased depth of intermeshing relationship of feed rolls **34**, **35** then causes the desired increased linear speed to be imparted to the sliver so the weight per unit of time entering the first drafting zone remains the same as it was when a portion of the sliver of optimum weight was being fed into the first drafting zone.

It follows that the linear speed of the sliver would be decreased compensatively upon movement of a thicker-than-normal place in the sliver being directed by a corresponding detector roll **57**. Thus, although the weight per unit length of any of the slivers may vary substantially at the source, the feed rolls **34**, **35** will feed a substantially uniform weight of fibers per unit of time into the first drafting zone.

When the feeding device of this invention is used in association with a drafting unit, as described, the effective speed of drafting rolls **15**, **15'** must be sufficient to ensure that some draft is being applied to the slivers **11** in the first drafting zone, even though there may be a substantial variation in the linear speed of slivers entering the first drafting zone. Good results have been obtained utilizing a draft on the order of 1.25 to 1.75 in the first drafting zone, and the material emerging from drafting rolls

15, 15' had a high degree of uniformity in weight per unit length as compared to the weight of the material at the source.

Although the size and configuration of feed rolls 34, 35 may vary, typical fluted feed rolls have been used having an external diameter of 1.75 inches, and provided with nineteen flutes .120 inch deep formed at an included angle between adjacent ridges of about 16 degrees. Utilizing the typical feed rolls, if the sliver is to weight 60 grains per yard, the median depth of intermeshing relationship of the typical feed rolls is about .060 inch, and about five inches of 60-grain sliver emerge from the feed rolls with each revolution thereof. With each .001 inch variation in the intermeshing relationship of the feed rolls, a change of about .218 inch may occur in the length of material advanced by the feed rolls with each revolution thereof.

The amplified radial motion of the upper evener feed rolls 35 in response to movement of the respective detector rolls 57 contributes to the efficiency of the fiber feeding apparatus of this invention. Such amplified motion ensures that the magnitude of the variations in intermeshing relationship of the feed rolls is such as to effect the desired compensatory changes in the liner speed of the sliver without the need of applying such high downward pressure to the detector rolls 57 as to overcondense the respective slivers in the grooves 64 of condenser rolls 56. Overcondensing of the slivers would interfere with proper drafting of the slivers by producing a hard core therein causing subsequent sudden formation of slubs or "pull-out" of slubs or tufts in the first drafting zone between the feed rolls 34, 35 and the drafting rolls 15, 15'.

In the development of intermeshing fluted rolls, such as those serving as the evener feed rolls 34, 35, it has been determined that, with a given change in the depth of intermeshing relationship thereof, very little, if any, increase in the magnitude of the consequent change in linear speed of a sliver was effected by utilizing various rolls having different flute configurations, although differences in the external diameter of driven fluted rolls have varied the magnitude of the changes in linear speed of the sliver. In other words, the greater the diameter of a bottom fluted roll of this type, the greater many be the magnitude of the change in linear speed of a sliver effected by a given variation in intermeshing relationship between the latter roll and another fluted roll meshing therewith.

It follows, therefore, that amplification of the radial movement of the upper feed rolls 35 in the manner described would not be required if a larger diameter bottom evener feed roll were used. However, the diameter of the feed rolls 34, 35 must be limited to accommodate the average staple length of the fibers being fed. For example, when feeding a sliver of 1¼ inches average staple length, the nips of rolls 34, 35 and 56, 57 should be spaced about 1¼ inches apart. Thus, the combined external diameters of the bottom feed roll 34 and the respective condenser roll 56 should be less than 2½ inches. Each feed roll 34, 35 then could be about 1.175 inches in diameter, and each measuring roll 56, 57 then could be about 1 5/16 inches in diameter, for example. It can thus be seen that the amplified motion of the feed rolls 34, 35 obviates the need for abnormally large diameter evener rolls or excessively high pressure at the nip of the measuring rolls 56, 57, while ensuring the desired extents of variation in the intermeshing relationship of feed rolls 34, 35 to compensate for the detected variations in the weight of the material being fed.

In the second embodiment of the invention shown in FIGURES 6 and 7, with the exception of the feeding device being broadly designated at 10*a*, those elements thereof which correspond to elements of each feeding device 10 of the first embodiment of the invention shall bear like reference characters, where applicable, to avoid repetitive description. Essentially, the feeding device 10*a* differs from that of feeding device 10 in that it is provided with a different form of pressure-applying means than that indicated at 85 in association with the first embodiment of feeding device and, also, feeding device 10*a* is shown in association with a roving frame.

The roving frame of FIGURE 6 is of the usual type having a plurality of drafting units along its length, to each of which a separate textile sliver 11 is directed. The drafting unit shown in FIGURE 6 is broadly designated at 103 and includes a set of three bottom drafting rolls 104, 105, 106 and respective top drafting rolls 104', 105', 106' which receive a sliver 11 from the corresponding feeding device 10*a* and draft the same as it passes in a downwardly and forwardly inclined path and thence is directed onto a rotating bobbin 110 by means of the usual rotating flyer 111. As is the case with respect to the first embodiment of the invention, the bottom feed roll 34 of feeding device 10*a* may extend throughout the length of the corresponding machine, or it may be suitably journaled in the same standard 43 which supports the remaining elements of the feeding device 10*a*. However, lower feed roll 34 must be driven positively regardless of the type of textile machine with which it is used, and is driven at such speed relative to the adjacent pair of drafting rolls that some draft is imparted to the material being fed by feed rolls 34, 35 in both embodiments of the invention.

In the second embodiment of the invention, instead of being provided with the spring-loaded type of pressure-applying device such as is indicated at 85 in FIGURES 2 and 3, the lever arm 36 of feeding device 10*a* have means connected thereto for varying the amount of downward pressure applied to detector roll 57 in such a manner that the weight or downward pressure applied to detector roll 57 of feeding device 10*a* progressively increases as the thickness of the sliver being engaged thereby decreases, and vice versa. Of course, such changes in pressure applied to detector roll 57 are also reflected to a substantial degree in the position of the corresponding upper evener feed roll 35 and effect a very sensitive response in the movement of the latter evener feed roll 35 relative to the driven lower feed roll 34. The pressure-applying means 115 of the second embodiment of the invention is of a type such as is disclosed in my said U.S. Patent No. 3,203,051 and comprises an elongate hollow body or housing 116 shown spaced above and overlying drafting unit 103 in FIGURE 6.

Housing 116 is normally tightly sealed, but is provided with a pair of removable stoppers 117, 118 for admitting a suitable liquid 120, such as mercury, into housing 116. A threaded stud 123 is fixed to and extends rearwardly from the rear wall of housing 116 and is threaded into a pivot arm 124 to which it is adjustably secured by means of a lock nut 125. Pivot arm 124 is pivotally mounted on a bearing block 126 carried by the bridging portion 90 extending between lever arms 36 of feeding device 10*a*. To facilities adjustment of housing 116 so that it may occupy substantially horizontal position when the intermeshing relationship of feed rolls 34, 35 in FIGURE 6 corresponds to the desired or optimum weight of the sliver 11, a spirit lever 130 may be provided on the upper wall of housing 116, and the pivot block 124 is adjustably secured to the bearing block 126 by means of a shoulder bolt 131 which loosely penetrates pivot block 124, is threaded through bearing block 125 and is provided with a lock nut 132 thereon.

From the foregoing description, it is apparent that, whenever a relatively thin place occurs in sliver 11 of FIGURE 6, such as to cause the housing 116 to tilt downwardly, the liquid 120 will flow toward the free or forward end of housing 116 to increase the effective weight being applied to top roll 35, the reverse being true whenever a relatively thick place occurs in the corresponding portion of the sliver 11 passing between feed rolls 34, 35. Therefore, it can be appreciated that the top evener roll 35 is highly sensitive to any variation in the density and/or

thickness of the sliver 11 passing between measuring rolls 56, 57.

In the drawings and specification there have been set forth preferred embodiments of the invention and although specific terms are employed, they are used in a generic and descriptive sense only, and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. Apparatus for feeding pliable textile material from a source to a processing machine, wherein the material being fed is of varying weight along its length, said apparatus comprising a pair of intermeshing fluted feed rolls, means for driving said rolls, a detecting device capable of detecting variations in weight of the material in its course from the source to said rolls and at a point spaced rearwardly from said rolls, and means responsive to the detecting of such variations for varying the intermeshing relationship of said rolls to regulate the feed of the material by said rolls.

2. Apparatus according to claim 1, in which said detecting device comprises a support for engaging the material at said point, and a movable detector member for engaging and pressing the material against said support and being movable by the material in accordance with variations in the weight and thickness of the material passing in engagement with said support.

3. Apparatus according to claim 2, wherein said fluted feed rolls serve as back drafting rolls and including at least one additional pair of drafting rolls spaced forwardly of said fluted rolls, said driving means being connected to one of said additional drafting rolls and rotating the same at a peripheral speed such as to impart draft to the material issuing from said feed rolls whereby the material issuing from said additional drafting rolls will be of uniform weight along its length.

4. Apparatus according to claim 2, wherein said means for varying the intermeshing relationship of said fluted feed rolls includes means for varying the intermeshing relationship of said fluted rolls a substantially greater extent than the corresponding movement of said detector member.

5. Apparatus according to claim 2, in which said responsive means comprises lever means rotatably supporting one of said fluted rolls and said detector member in fixed relative positions, a fulcrum for said lever means located rearwardly of said detector member and extending substantially parallel with the axes of said fluted rolls, and pressure means applying yielding pressure to said level means such as to urge said detector member toward said support and to urge said one fluted roll toward the other fluted roll.

6. Apparatus according to claim 5, in which said pressure means includes means for applying greater pressure to said lever means when said fluted rolls are in deep intermeshing relationship than that pressure applied when said fluted rolls are in relatively shallow intermeshing relationship.

7. Apparatus according to claim 1, in which said detecting device comprises a passage defining means capable of condensing said material in its course to said rolls, and laterally movable means applying a predetermined yielding force to the material at said passage defining means, said movable means being movable by and in accordance with weight variations in the material.

8. Apparatus according to claim 7, in which said responsive means comprises lever means supporting one of said fluted rolls and said movable means, a fulcrum for said lever means located rearwardly of said movable means, and means applying pressure to said lever means toward the other of said fluted rolls and said passage defining means.

9. Apparatus according to claim 7, in which said passage defining means comprises a freely rotatable condenser roll supported for rotation on a fixed axis adjacent said feed rolls, said condenser roll having a peripheral groove therein whose sidewalls are spaced more closely together than the diameter of the material so as to condense the material passing through said groove, and said movable means including a freely rotatable detector roll having an outer portion fitting closely between the sidewalls of said groove and engaging the material passing through said groove.

10. Apparatus according to claim 9, in which said responsive means comprises lever means supporting one of said fluted rolls and said detector roll, means supporting said lever means for pivotal movement on an axis spaced rearwardly from said detector roll and extending substantially parallel with the axes of said rolls, and pressure means applying yielding pressure to said lever means in a direction generally toward said condenser roll and the other of said fluted rolls.

11. Apparatus according to claim 9, in which the textile material is a sliver, and including a trumpet adjacent the nip of said condenser roll and said detector roll for precondensing and guiding the sliver into said groove, and said trumpet having an elongate narrow discharge orifice for shaping the sliver into substantially that form it will take thereafter while passing through said groove in said condenser roll.

12. Apparatus according to claim 11, wherein said trumpet is positioned with its discharge end portion located between the sidewalls of said groove.

13. Apparatus for improving the uniformity of a plurality of textile slivers which vary in weight along the length thereof, said apparatus comprising a plurality of fluted evener feed rolls, a common fluted feed roll meshing with said plurality of evener feed rolls and between which the plurality of slivers pass from a source with a separate one of the slivers passing between said common feed roll and each respective evener feed roll, means for driving said common feed roll, a detecting device capable of detecting variations in weight of the slivers independently of each other in their course from the source to the respective evener feed rolls and at points spaced rearwardly from the respective evener feed rolls, and means responsive to the detecting of such variations in any of the slivers for varying the intermeshing relation of the respective evener feed rolls independently of each other with respect to said common feed roll to regulate the feed of the slivers by said rolls.

References Cited

UNITED STATES PATENTS

2,738,554	3/1956	Whitehurst	19—260 XR
2,749,573	6/1956	McAngus	19—240

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PO-1050
(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,444,594 Dated May 20, 1969

Inventor(s) J. R. Whitehurst

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, Line 62, after "Figure 6," insert --.--. Column 5, Line 27, after "(Figure 4)" insert --.--; Column 5, Line 43, "suitable" should be --suitably--. Column 7, Line 24, "liner" should be --linear--; Column 7, Line 43, "many" should be --may--. Column 8, Line 29, "arm" should be --arms--; Column 8, Line 55, "facilities" should be --facilitate--. Column 9, Line 50, "level" should be --lever--.

SIGNED AND
SEALED
APR 28 1970

(SEAL)
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