United States Patent [19]

Staneff

[11] **3,748,694**

[45] **July 31, 1973**

[54] **DRAFTING SYSTEM HAVING A SUPPORTING ROLL FOR OFFSET TOP FEED ROLL**

[75] Inventor: **Stefan Staneff,** Herzongenaurach, Germany

[73] Assignee: **Industriewerk Schaeffler, OHG,** Herzongenaurach, Germany

[22] Filed: **Nov. 3, 1971**

[21] Appl. No.: **195,160**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 153,615, June 16, 1971.

[52] **U.S. Cl.** **19/258,** 19/293

[51] **Int. Cl.** **D01h 5/70**

[58] **Field of Search** 19/236, 244, 246–261, 19/293, 294, 295

[56] **References Cited**

UNITED STATES PATENTS

3,537,145	11/1970	Meert et al.	19/258

FOREIGN PATENTS OR APPLICATIONS

500,677	11/1954	Italy	19/261
22,605	1896	Great Britain	19/260
321,806	6/1920	Germany	19/258
654,469	6/1963	Italy	19/258

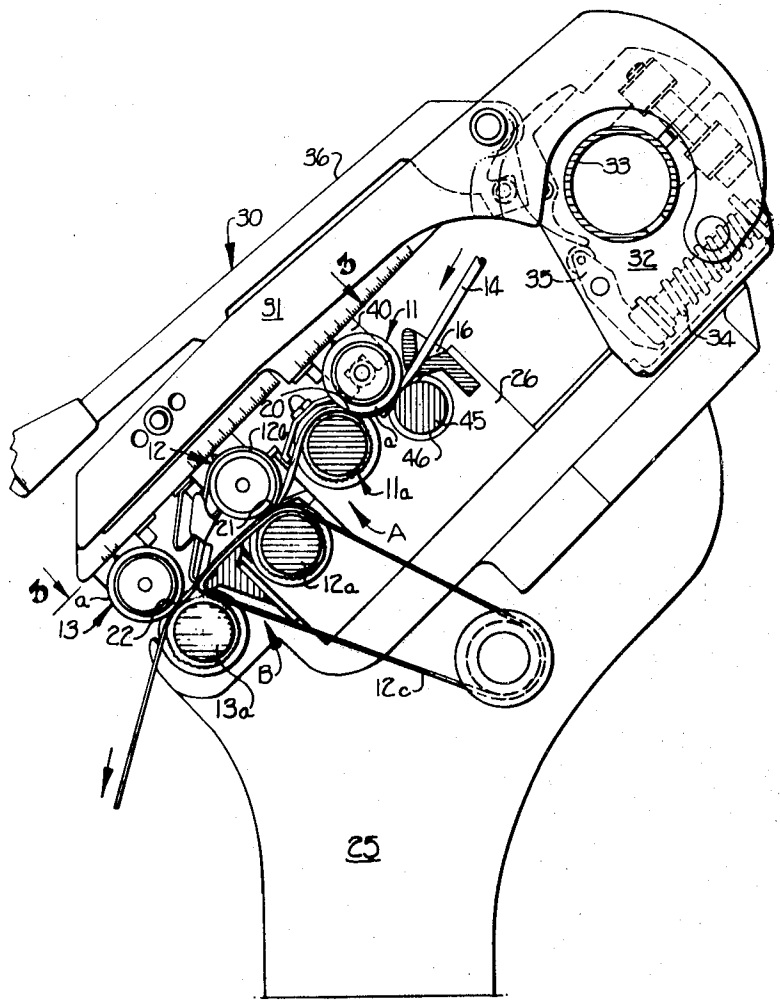
Primary Examiner—Dorsey Newton

Attorney—Donald M. Seltzer

[57] **ABSTRACT**

The axially aligned top roller pairs of adjacent drafting units of a spinning, twisting or roving machine are journaled on respective shafts, and that top roller pair which serves as the top feed roll of two adjacent drafting units is positioned in nipping relation to a corresponding bottom feed roll, but the top feed roller pair is offset rearwardly of the bottom feed roll. Therefore, in order to prevent the top feed roller pair from tilting excessively about the point at which the load is being applied to the shaft therefor, an idler supporting roll is positioned beneath and in nipping relation to the top feed roller pair and is rotatable by the top feed roller pair and the strands passing between the same and the idler roll.

5 Claims, 3 Drawing Figures



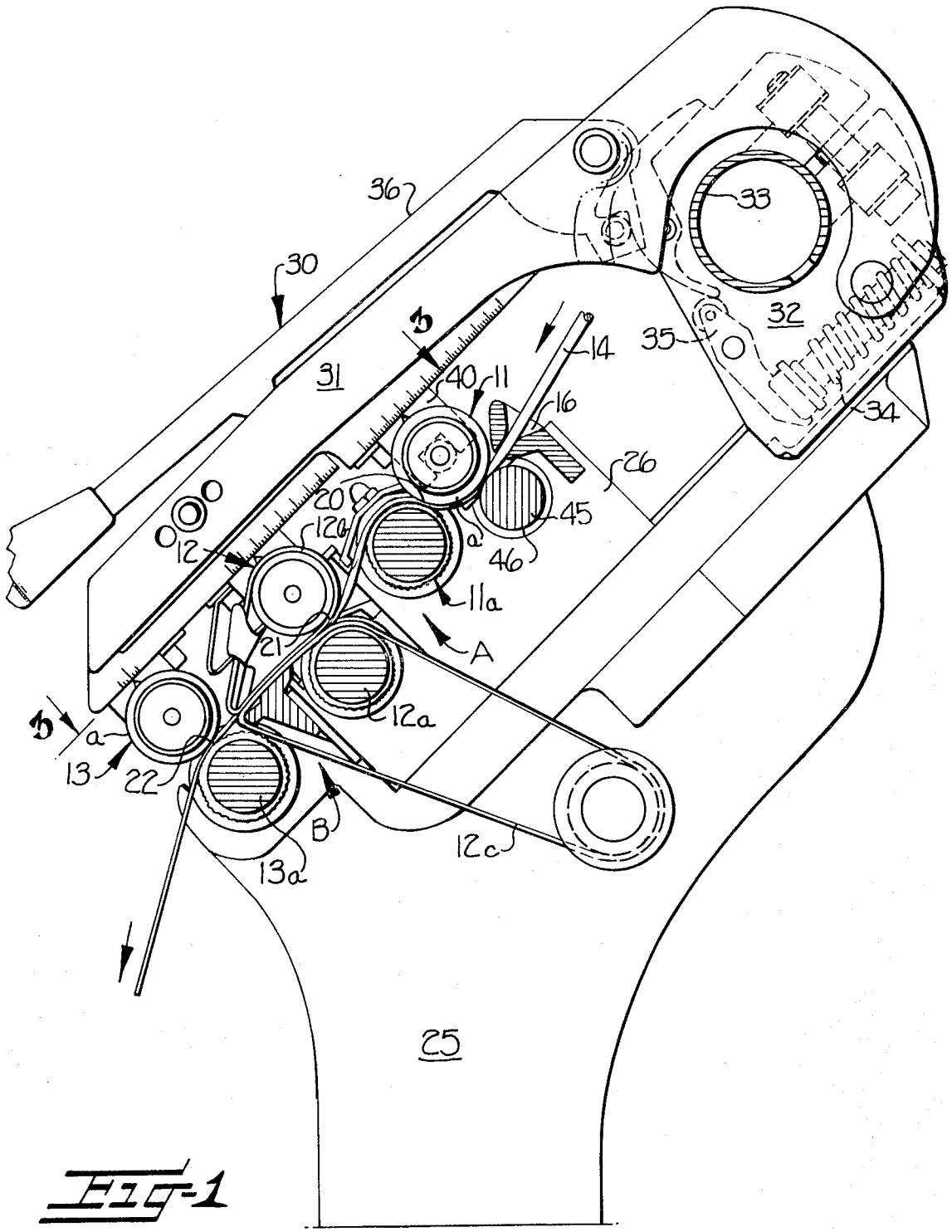

36
30
33
32
35
34
31
40
11
14
16
26
45
46
20
12
12a
11a
A
21
12a
13
22
B
12c
13a
25

Fig-1

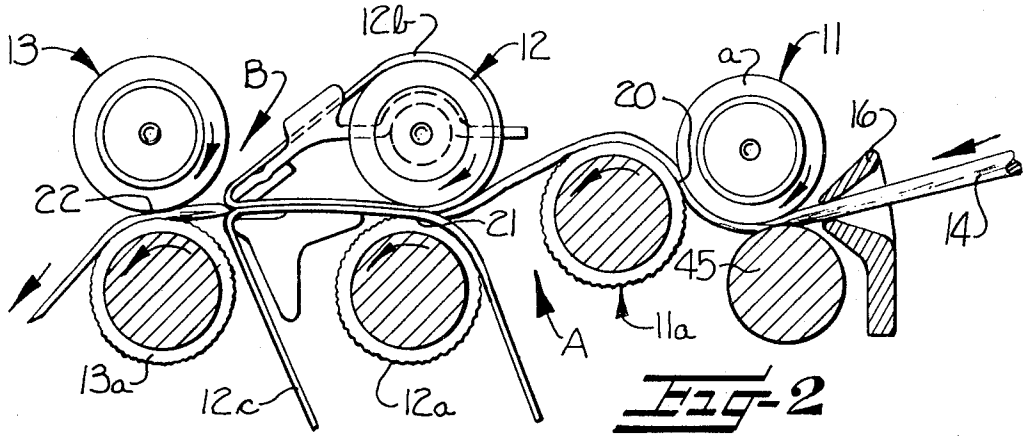

13
B
12b
12
a
11
20
16
22
21
14
45
A
11a
13a
12c
12a

Fig-2

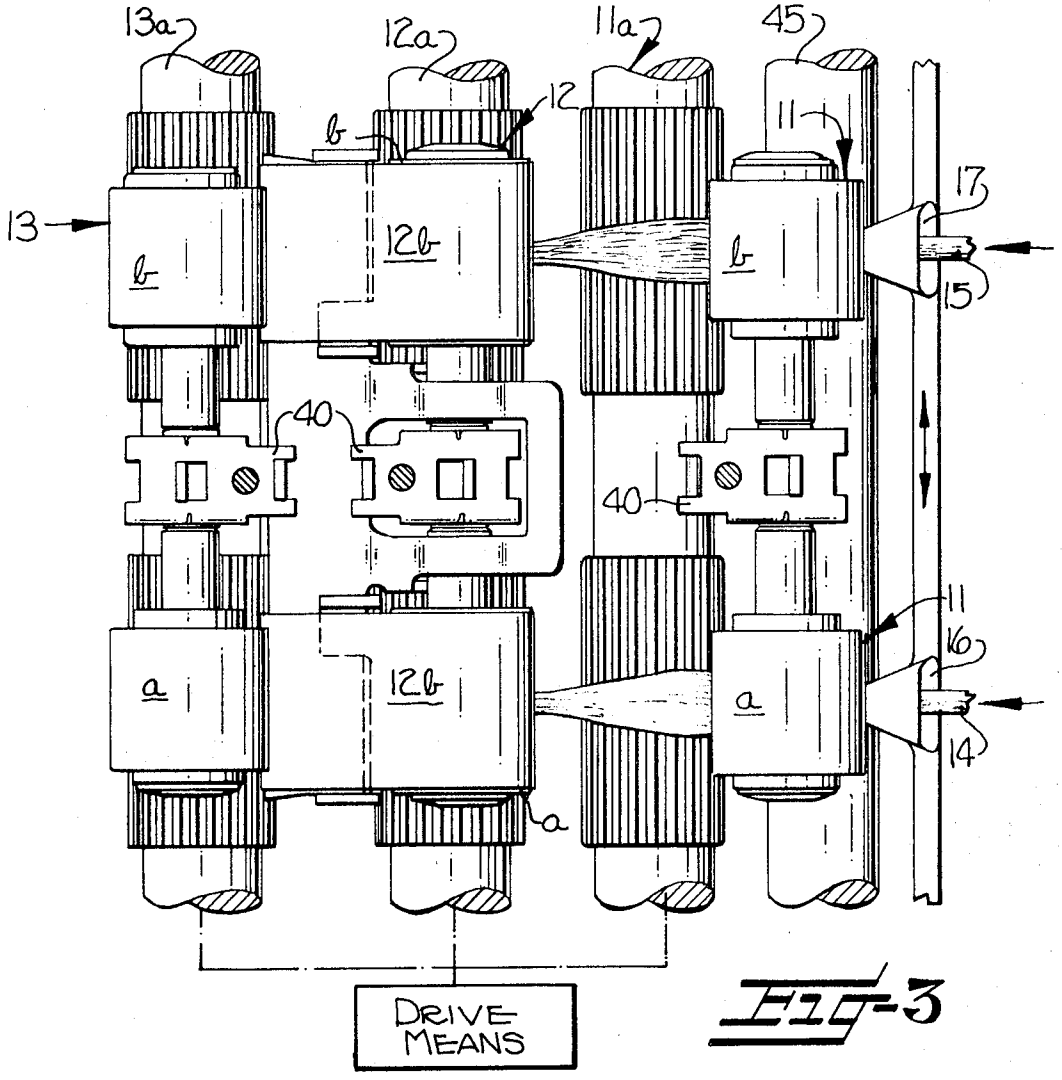

13a
12a
11a
45
12
b
11
17
13
b
12b
b
15
40
40
11
16
a
12b
a
14
a
DRIVE MEANS

Fig-3

DRAFTING SYSTEM HAVING A SUPPORTING ROLL FOR OFFSET TOP FEED ROLL

This application is a continuation-in-part of my copending application, Ser. No. 153,615, filed June 16, 1971 and entitled HIGH DRAFT TEXTILE DRAFTING SYSTEM AND METHOD.

The drafting system of said copending application includes a driven bottom feed roll which is offset upwardly out of a plane passing through the axes of the other bottom drafting rolls by an amount about equal to one-half of its own diameter, and a top feed roll, in the form of a pair of axially spaced cots or rollers journaled on a roller neck shaft, is offset rearwardly with respect to the bottom feed roll in such a manner that the textile strands, upon passing through the nips formed by the top feed roller pair and the bottom feed roll, are looped about the bottom feed roll through an arc of about 90° to 110° as they pass through the respective breaker drafting zones in their course to the next succeeding set of top and bottom drafting rolls. The total length of the path of each strand of textile fibers between the nips of the feed rolls and the next succeeding set of drafting rolls is greater than the maximum staple length of the fibers in the strands, and the uncontrolled length of the path of each strand between the bottom feed roll and said next succeeding set of drafting rolls is less than the average staple length of the fibers, thus providing a highly effective control of the fibers in the strands passing through the breaker drafting zones. Such fiber control in the breaker drafting zones permits substantially higher break drafts and substantially higher total drafts than drafting systems which do not have such fiber control.

Since the top feed roller pair is rearwardly offset considerably with respect to the bottom feed roll and the downward pressure or load is applied to a relatively narrow medial portion of the roller neck shaft of the top feed roller pair, the top feed roller pair tends to tilt about the medial portion of the roller neck shaft due to the differing tensile forces of the textile strands acting on the two cots or rollers thereof as caused by the normal differences in the tension in the strands in the breaker drafting zones forwardly of the feed roll nips and as by the parting of one or the other of the strands. Thus, the axis of the top feed roller pair may not extend parallel with the axis of the bottom feed roll. This problem is even more critical in relatively wide gauge spinning, twisting or roving machines. For example, the gauge or distance between the spindles of a spinning machine may be up to 100 to 260 millimeters (about 3 15/16 inches to 10 ¼ inches), and the relatively narrow control of the top feed roller pair by the top roll holders or carriers of the usual loading arms engaging the medial portion of the roller neck shaft will not prevent, with certainty, the tilting of the top feed roller pair if it is set back in the manner described with respect to the bottom feed roll.

It is therefore an object of this invention to provide means for preventing the two rollers or cots of the top feed roll from tilting excessively relative to the bottom feed roll when the top feed roll is offset relative to the bottom feed roll in a direction parallel to the travel of the textile strands between the feed rolls.

In the disclosed and preferred embodiment there is provided an adjacent pair of three-roller drafting units of the type disclosed in said copending application, but wherein an idler supporting roll is positioned beneath

and in nipping relation with the top feed roller pair for the two adjacent drafting units, which idler supporting roll is rotated solely by the top feed roller pair and the strands passing therebetween to the nips between each top feed roller and the bottom feed roll. Thus, the idler supporting roll stabilizes the top feed roller pair relative to the bottom feed roll and substantially eliminates any tendency for the top feed roller pair to tilt relative to the bottom feed roll regardless of whether the load or downward pressure is applied to the roller neck shaft of the top feed roller pair in a direction perpendicular to the mean plane of the paths of the strands through the drafting units or in a direction inclined thereto. By utilizing the idler supporting roll of this invention, the load on the top feed roll can be effected at a right angle to the mean drafting plane so that practically any known form of weighting arms may be used with the drafting system.

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

FIG. 1 is a schematic side elevation of one of a pair of drafting units embodying the invention and showing a top roll loading device in association therewith;

FIG. 2 is an enlarged view of the drafting unit shown in FIG. 1, but omitting the roll stand and the top roll loading device; and

FIG. 3 is a schematic plan view taken substantially along line 3—3 in FIG. 1, and showing both of the drafting units.

Referring more specifically to the drawings, the drafting system is embodied in a pair of side-by-side, three-roller, double apron drafting units including three sets or pairs of top and bottom drafting rolls common to both drafting units. The top and bottom rolls of the first set serve as feed rolls and are broadly designated at **11, 11a**, the top and the bottom rolls of the second pair serve as middle, intermediate or apron-supporting drafting rolls and are indicated at **12, 12*a***, and the top and bottom rolls of the third pair serve as delivery rolls and are indicated at **13, 13*a***.

Each top drafting roll includes a pair of axially spaced cots or rollers *a*, *b* journaled or rotatably mounted on opposing end portions of a corresponding roller neck shaft *c*, and strands **14, 15** of textile staple fibers; e.g., rovings, pass from suitable sources through openings or passages in respective laterally reciprocating guide members, trumpets or condensers **16, 17** and beneath the respective rollers *a*, *b* of top feed roll **11**. Each roller *a*, *b* of top feed roll **11** forms a nip **20** with a corresponding boss of bottom feed roll **11*a***, and each strand **14, 15** extends upwardly through nip **20** and partially around the bottom feed roll **11*a*** and into a respective breaker drafting zone A defined between the nips **20** of feed rolls **11, 11a** and the nips **21** formed by intermediate drafting rolls **12, 12*a*** and by respective draft aprons **12*b*, 12*c*** looped thereover. The proximal reaches of aprons **12*b*, 12*c*** of the double apron draft mechanism extend into a main or secondary drafting zone B defined between the intermediate nips **21** and front nips **22** formed by delivery rolls **13, 13*a***.

Although top feed roll **11** is slightly lower than the succeeding top rolls **12, 13**, the axes of all of the top drafting rolls **11–13** are disposed in a substantially common plane which is substantially parallel to the mean plane of the draft path of each of the strands **14, 15** of

textile fibers through the drafting unit. The intermediate and delivery bottom drafting rolls **12***a*, **13***a* also have their axes disposed in a plane extending substantially parallel with the plane through the axes of the top drafting rolls **11–13.** However, the axis of the bottom feed roll **11***a* is offset upwardly, out of the plane passing through the axes of the bottom intermediate or apron-supporting roll **12***a* and the bottom delivery roll **13***a*, by a distance equal to about one-half the diameter of bottom feed roll **11***a*, so that the upper portion of bottom feed roll **11***a* is disposed above the plane of the imaginary straight line extending between the lowermost surfaces of the first and second top drafting rolls **11, 12.** Thus, top feed roll **11** is considerably set back or rearwardly with respect to bottom feed roll **11***a*, and the nip **20** between each roller *a*, *b* of top feed roll **11** and bottom feed roll **11***a* is located rearwardly of the axis of bottom feed roll **11***a* with respect to the direction of movement of strands **14, 15** through the drafting unit.

Consequently, each strand **14, 15** is fed into the corresponding breaker drafting zone A by being directed upwardly and forwardly through the respective nip **29,** and a break draft is imparted to the strand in its course to nip **21** while each strand is partially looped over and partially around bottom feed roll **11***a*. The relative positions of feed rolls **11, 11***a*, apron supporting rolls **12, 12***a* and the aprons **12, 12***c* thereover are such that, although the angle between nip **20** and the point of tangency of bottom feed roll **11***a* may be as low as 85°, each strand is looped in moving engagement with the upper surface of the bottom feed roll through an arc in the range of about 90° to 110° from and forwardly of nip **20** as the strand passes out of engagement with roll **11**a at a point forwardly of the point of tangency of bottom feed roll **11***a* and to nip **21.**

It is preferred that the arc of contact of each strand **14, 15** with bottom feed roll **11***a* is about 100° with respect to the axis of bottom feed roll **11***a*. Additionally, the relative positions of the drafting rolls are such that each strand passes through the main or secondary drafting zone B in a different angular plane than that of each such strand between feed roll **11***a* and intermediate rolls **12, 12***a*. The relationship of such relatively different planes of the passage of each strand and the diameters and relative positions of rolls **11***a*, **12***a* are such that each strand also is partially looped around the respective top draft apron **12***b* between a point rearwardly of the point of tangency of apron **12***b* and the nip **21** through an arc of no more than about 25° and preferably in the range of about 18° to 25°.

The total length of the actual path of each strand **14, 15** between the hips **20, 21** is longer than the longest fibers in the strands while the unguided length of the path of the strand between the bottom feed roll **11***a* and top apron **12***b* is no greater than the average staple length of the fibers being drafted.

Although aprons **12***b*, **12***c* are preferred, it is to be understood that they may be omitted, if desired, in which instance all of the top rolls **11–13** may be cushion rolls all having the same diameter of cots *a*, *b* thereon, and the bosses of all of the bottom rolls **11***a*, **12***a*, **13***a* then should be of the same diameter with respect to each other. Such bosses usually are fluted as shown in FIG. **3.**

As is conventional, bottom delivery roll **13***a* is supported for rotation in suitable bearings carried by the front portions of a plurality of spaced roll stands **25,** only one of which is shown in FIG. **1.** Also, bottom feed roll **11**a and intermediate bottom roll **12**a are mounted in suitable bearings positioned in slide blocks **26** carried by the roll stands **25.** The bottom drafting rolls **11***a–13a* are driven by suitable connections to a drive means **27** (FIG. **3**) to, in turn, drive the rollers *a*, *b* of top drafting rolls **11–13** through the strands **14, 15** passing therebetween so as to impart the desired draft to the textile strands, as is well known.

Any suitable loading or pressure means may be provided for maintaining top drafting rolls **11***a–13a* in the desired spaced relationship and for applying the desired load or yielding downward pressure thereto. By way of example, a loading device **30** is provided which is of a type such as is disclosed in my said copending application, Serial No. 153,615.

Briefly, loading device **30** comprises a releasable loading arm or weighting arm **31** pivotally mounted on a bracket **31** carried by a fixed frame member **32** spaced rearwardly of the drafting rolls **11–13, 11***a–13a*. A suitable spring **34,** acting through linkage **35** and a releasing lever **36,** imparts downward pressure to the forward portion of weighting arm **31,** which forward portion overlies the medial portion of the roller neck shafts *c* of top drafting rolls **11–13.**

The forward portion of weighting arm **31** has a plurality of inverted substantially U-shaped top roll holders or carriers **40** projecting downwardly therefrom and adjustably mounted thereon, there being one of the top roller holders **40** for each of the top rolls **11–13.** The top roll holders **40** are relatively narrow and each of them receives and engages a relatively small medial portion of each respective roller neck shaft *c*, thus transmitting downward pressure from loading or weighting arm **31** to relatively narrow medial portions of the roller neck shafts *c* of top rolls **11-13** so that the rollers *a*, *b* of top feed roll **11** and top delivery roll **13** press the respective strands **14, 15** against the respective bottom rolls **11***a*, **13***a* and so that the top aprons **12***b* press the textile strands **14, 15** against the respective bottom aprons **12***c* under predetermined pressures during operation of the drafting units. Since the drafting units and loading device **30** are disclosed in said copending application, a further description thereof is deemed unnecessary.

Since the nips between the top feed roller pair *a*, *b* and bottom feed roll **11**a are located rearwardly of the axis of bottom feed roll **11***a* with respect to the direction of travel of the textile strands **14, 15** through the drafting unit, it follows that the axis of top feed roll **11** is spaced a considerable distance rearwardly of the axis of bottom feed roll **11***a*. Consequently, the force of the downward pressure acting on only a relatively narrow medial portion of the roller neck shaft *c* of top feed roll **11, the differing tensile forces of the textile strands 14, 15** acting on the top feed roller pair *a*, *b* the spacing between the latter rollers and the spacing between the adjacent textile strands **14, 15** are factors which separately and collectively tend to tilt the top feed roll **11** in a direction transversely of the direction of the paths of travel of the textile strands **14, 15** through the drafting units and about the point at which the pressure is being applied to the top feed roller neck shaft *c*.

It should be noted that, if top feed roll **11** is permitted to tilt excessively, the axis of top feed roll **11** will be inclined relative to the axis of bottom feed roll **11**a and thereby cause variation in the distance between the

nips **20** at the top feed roller pair *a*, *b* and the nips **21** at the respective pairs of draft aprons **12***b*, **12***c*. Also, this may vary the effective widths of the two nips **20** such that each strand **14, 15** might not be equally restrained across its entire width by the top and bottom feed rolls **11, 11***a* and repeated variations in the position of the top feed roll **11,** as caused by tilting the same, will increase the temperature of the rollers *a*, *b* thereof, cause the latter rollers *a*, *b* to become damaged or worn excessively in less than their normal useful life, and reduce the quality of the textile strands **14, 15** being drafted.

According to the invention, however, an idler supporting roll **45** preferably of substantially lesser diameter than either of the feed rolls **11, 11***a*, is positioned beneath and in nipping relation with top feed roll **11,** and is rotatable solely by top feed roll **11** and the strands passing therebetween so as to prevent top feed roll **11** from tilting excessively relative to bottom feed roll **11**a under the force of the loading device **30.** The idler supporting roll **45** preferably has a smooth peripheral surface and is loosely or freely rotatably mounted in suitable bearings **46,** preferably roller bearings, mounted in the slide blocks **26** carried by the roll stands **25** (FIG. **1**).

It is preferred that the supporting roll **45** is relatively short and, accordingly, it may be made of a length about equal to the distance between the centers of adjacent roll stands **25** so that the top feed roll **11** need overcome relatively little inertial force in order to transmit rotation to the corresponding idler supporting roll **45.** It is to be noted that idler supporting roll **45** forms an additional pair of nips with the two rollers *a*, *b* of top feed roll **11** with such additional pair of nips as illustrated in FIG. **2,** being about **90°** from the nips defined by the feed rolls **11, 20,** with respect to the axis of top feed roll **11,** so as to cause the textile strands to arcuately engage about one quarter of the surface of top feed roll **11.** To facilitate guiding the strands **14, 15** into the respective additional pair of nips and the threading of the strands therethrough and upwardly through the feed roll nips **20,** the trumpets or strand guide members **16, 17** are positioned rearwardly of and closely adjacent the respective pair of additional nips and the openings or passages through strand guide members **16, 17** are substantially tangentially aligned with the proximal portions of idler roll **45** and the top feed roller pair *a*, b forming the additional pair of nips.

It is thus seen that the supporting roll **45** supports the rearwardly offset top feed roll **11** by its nipping relation with the top feed roller pair *a*, *b* thereof in the adjacent pair of side-by-side drafting units thereby providing stabilizing means preventing the top feed roll from being tilted excessively about the relatively narrow medial portion of the respective roller neck shaft *c* being engaged by the respective top roll holder **40** of the loading or pressure means **30.** Thus, the tilting of the top feed roll relative to bottom feed roll **11***a* as by differing tensile forces of the strands **14, 15** acting on the top feed roller pair *a*, *b*, is eliminated except for slight fluctuations of the top feed roller pair which may be effected by variations in mass and/or density of the strands **14, 15** being fed to the next succeeding set of drafting rolls **12, 12***a* and the aprons **12***b*, **12***c* thereon. Also, it is to be noted that the idler supporting roll **45** facilitates positioning the trumpets or guide members **16, 17** so that an operator may easily thread the strands through the guide members **16, 17** to the feed rolls **11, 11***a* in a direction generally parallel to the mean path of travel of the strands through the drafting units.

In the drawings and specification, there has been set forth a preferred embodiment 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.

That which is claimed is:

1. A textile drafting system comprising a pair of side-by-side drafting units for drafting respective spaced-apart textile strands therethrough, a series of sets of drafting rolls common to both drafting units and including a set of top and bottom feed rolls, a set of top and bottom intermediate rolls and a set of top and bottom delivery rolls, the top roll of each set comprising a roller neck shaft having a pair of axially spaced rollers thereon forming a respective pair of nips with the corresponding bottom roll through which the respective strands pass during drafting thereof, said bottom feed roll being offset upwardly by about one-half of its diameter with respect to a substantially common plane through the axes of said bottom intermediate roll and said bottom delivery roll, said top feed roll being offset rearwardly of said bottom feed roll whereby the nips of the bottom feed roll and the pair of rollers of said top feed roll are offset rearwardly of the axis of said bottom feed roll, pressure means engaging relatively narrow medial portions of said roller neck shafts between the respective pairs of rollers and applying a downward force thereto, stabilizing means preventing excessive tilting of said rearwardly offset top feed roll about the engaged medial portion of the roller neck shaft thereof by differing tensile forces of the strands acting on the respective rollers of said top feed roll during drafting, said stabilizing means including an idler roller positioned beneath said top feed roll and forming an additional pair of nips with the respective rollers thereof, said idler roll being so positioned relative to said top feed roll that the additional pair of nips formed therewith cause the textile strands in their path of travel to said first recited nips to arcuately engage about one quarter of the surface of the top feed roll, means supporting said idler roll for free rotation by the rollers of said top feed roll, and means guiding the strands into the respective additional pair of nips to facilitate threading the strands therethrough and upwardly through the nips of said feed rolls.

2. A drafting system according to claim **1,** wherein said pressure means is provided with inverted substantially U-shaped holders thereon engaging the respective roller neck shafts at points about halfway between the respective pairs of said rollers.

3. A drafting system according to claim **2,** wherein said idler supporting roll is of substantially less diameter than said feed rolls and has a substantially smooth peripheral surface engaging said strands.

4. A drafting system according to claim **3,** wherein said strand guiding means includes a pair of guide members positioned rearwardly of and closely adjacent said additional pair of nips and having openings therethrough for guiding the respective strands into said additional pair of nips.

5. A drafting system according to claim **4,** wherein the openings in said guide members are positioned in substantially tangential alignment with the proximal portions of the peripheral surfaces of said rollers of said top feed roll and said idler roll forming said additional pair of nips.

* * * * *