United States Patent

Sanders

[15] **3,635,010**

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[54] ENDS DOWN DETECTOR

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[52] **U.S. Cl.** **57/84**, 57/86

[51] **Int. Cl.** **D01h 13/18**

[58] **Field of Search** 57/78, 80, 83, 84, 85, 86, 57/87

[56] **References Cited**

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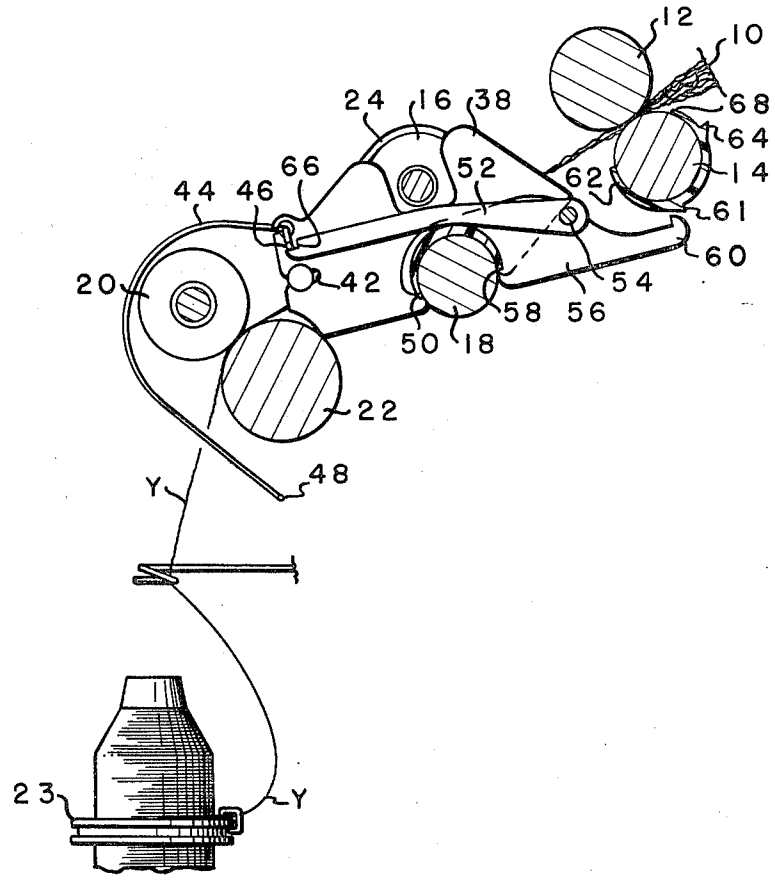
[57] **ABSTRACT**

Method and apparatus to detect the breakage of a yarn end, commonly called an ends down, and in response to the detection actuate, a roving stop to rotate the roving stop into the path of travel of the roving being supplied into the fiber handling system.

10 Claims, 6 Drawing Figures



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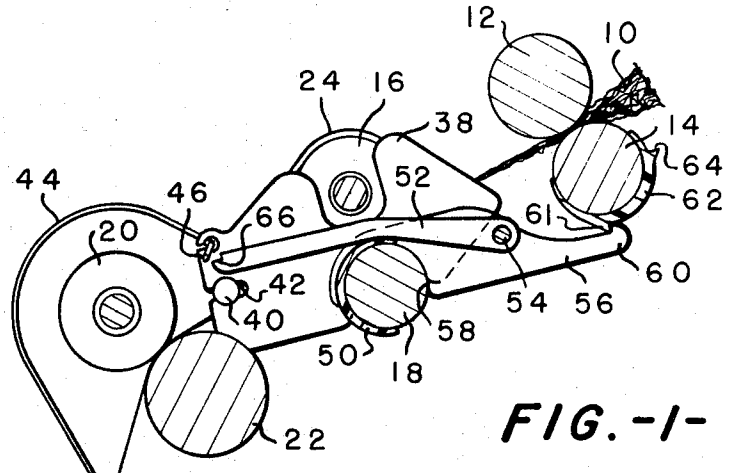

FIG. -1-

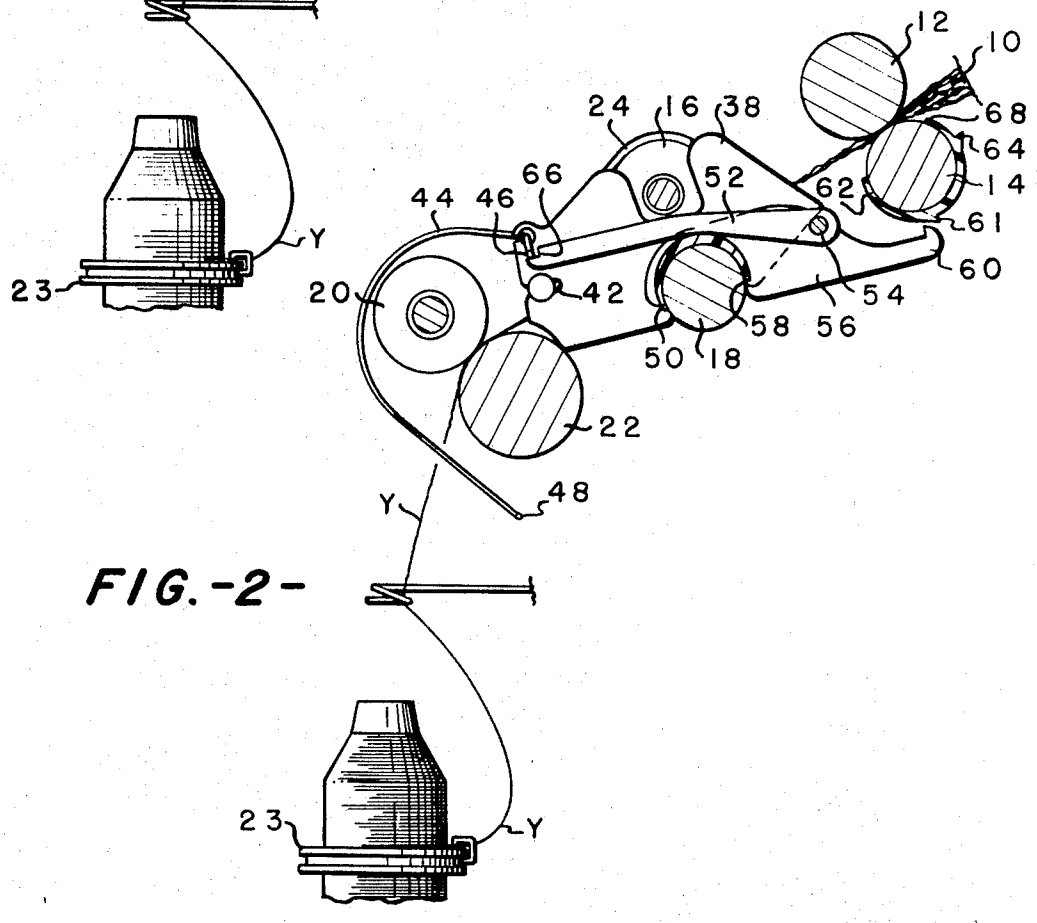

FIG. -2-

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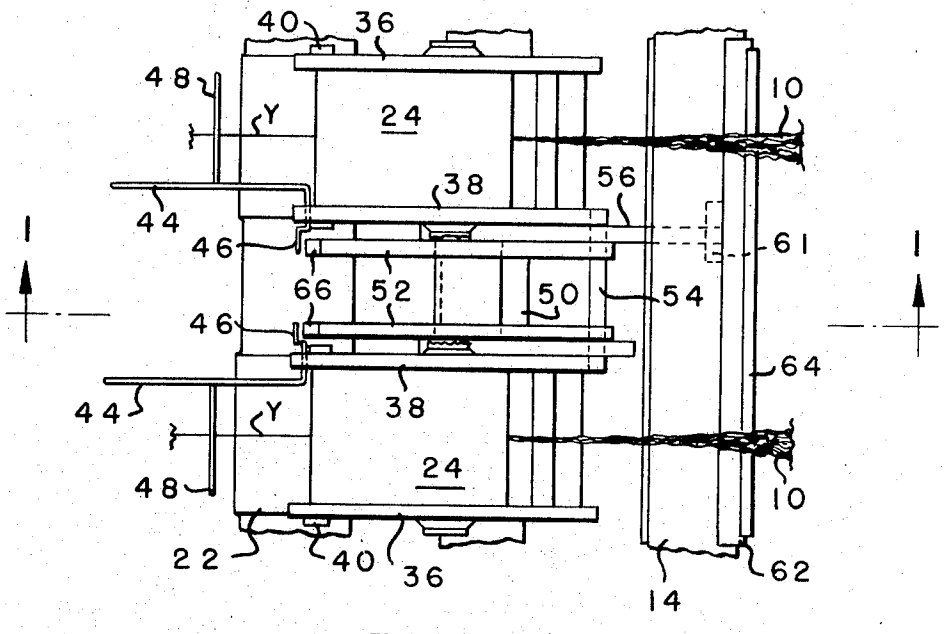

FIG.-3-

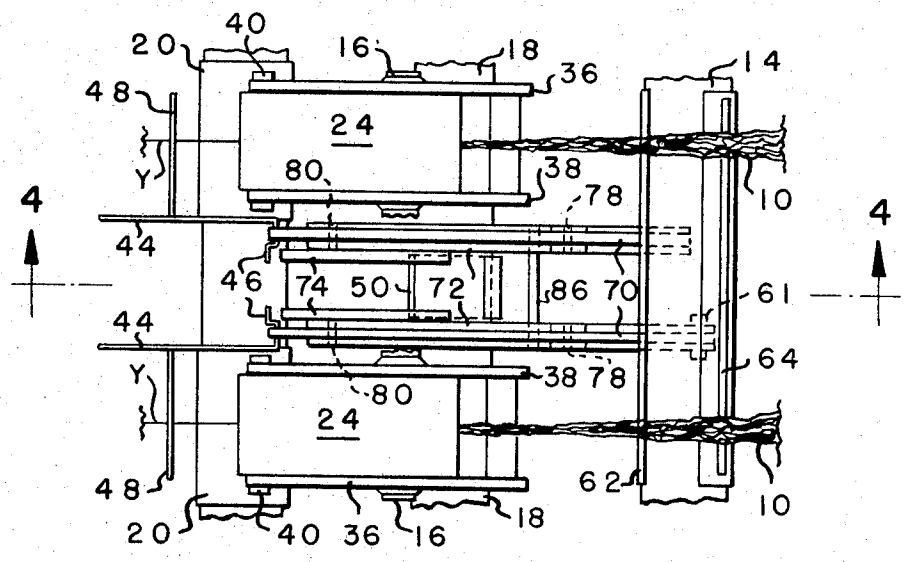

FIG.-6-

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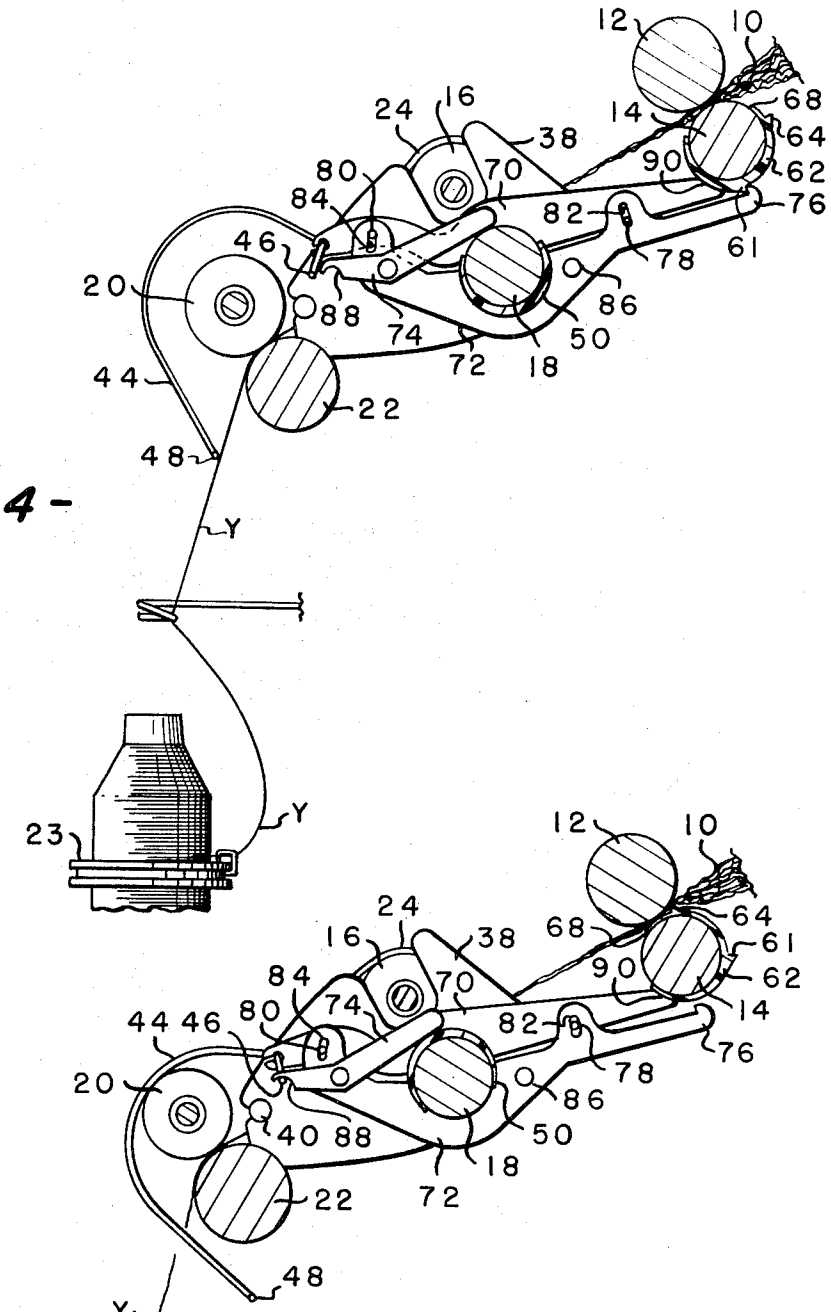

FIG.-4-

FIG.-5-

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ENDS DOWN DETECTOR

This invention relates generally to fiber handling systems and in particular to drafting systems for spinning frames which include apparatus to prevent the buildup of a lap after an end has come down.

When drafting roving or sliver prior to spinning into yarn, very often a break will occur between the rear drafting rolls and the ring and traveler of the spinning frame. Normally, the break will occur between the front drafting rolls and the ring and traveler of the spinning frame. When this condition happens, the roving or sliver being supplied to the drafting system will continue to be supplied to the front rolls causing the roving or sliver to wrap around the front rolls and pile up between the front and middle drafting rolls. Commercially available are devices to stop the spinning frame after a lap occurs but these devices are normally not designed to prevent the buildup of a lap. Mainly, these devices are operative after the fact rather than acting to prevent the lap buildup before it occurs.

It is therefore an object of this invention to detect the breakage of a yarn end and stop the supply of roving or sliver being delivered to the position where the yarn end is broken.

A further object of the invention is to provide a method and apparatus to prevent the buildup of a lap on the front rolls of a drafting system on a spinning frame.

Other objects and advantages of the invention will become readily apparent as the specification proceeds to describe the invention with reference to the accompanying drawings, in which:

FIG. 1 is an elevation view taken on line 1—1 of FIG. 3 showing the new and improved drafting system;

FIG. 2 is a view similar to FIG. 1 except the absence of yarn has been detected and the roving stop released;

FIG. 3 is a top view of FIG. 1 with the top rear drafting rolls removed; and

FIGS. 4–6 correspond, respectively, to FIGS. 1–3, showing a modified drafting system.

Looking now to the drawings, FIGS. 1 and 2 show the improved drafting system in conventional operation with a roving or sliver of staple fiber 10 passing into the nip of upper and lower rear drafting rolls 12 and 14, middle drafting rolls 16 and 18, front drafting rolls 20 and 22 to a conventional ring and traveler 23 to form yarn Y by placing twist therein between the ring and traveler and the nip of front drafting rolls 20 and 22. Conventionally, top drafting rolls 12 and 20 are rubber covered rolls while intermediate top drafting roll 16 is knurled. Bottom front and bottom rear drafting rolls 22 and 14 are fluted rolls while the middle bottom roll is knurled.

Inasmuch as the major amount of drafting is conventionally accomplished in the zone between the middle rolls 16 and 18 and the front rolls 20 and 22 from which the fibers proceed and are either twisted into yarn or drafted further, and since the running mass of fibers is also brought to a minimum size in this zone, it is most desirable that the fibers be controlled as closely as possible and to this purpose a double apron drafting system is preferred. In a manner exemplified in the e.g., U.S. Pat. No. 3,386,136, upper and lower aprons 24 and 26 are supported by upper and lower apron clearing and roll engaging members (not shown), each of which has a concave surface at one end to engage the rolls 16 and 18 to clean the peripheral surface thereof and an apron reversing portion at the other end. These apron clearing and roll engaging members are supported in operative position by cradle wall members 36 and 38. Preferably, the lower apron clearing and roll engaging member is rigidly secured between the wall members 36 and 38 while the upper member is slidably held in position by tab members 40 which engage notches 42 in the side walls of the cradle.

For reasons hereinafter explained, a wire member 44 is provided at one end with inwardly directed hook portion 46 which projects through an opening in the cradle wall 38. At the other end of the wire member is an outwardly projecting portion 48 which in normal operation of the drafting system rides on the yarn Y being twisted.

Snapped onto the lower middle roll 18 between two drafting positions is a cam member 50. The cam member 50 has a diameter slightly less than the diameter of roll 18 to insure a snug fit so that the cam member 50 will rotate with the roll 18. Located adjacent the cradle walls 38 of each cradle is an elongated cam follower 52 actuated by the cam member 50. The cam followers 52 are pivotally mounted and operably associated with two adjacent cradle wall members 38 through a pin member 54 which projects under the cradle wall members. Pin member 54 also projects through roving stop release member 56 which is mounted on the boss of the lower middle roll 18 by means of a notch 58 which engages the roll boss. The roving stop release member 56 has an elongated hook portion 60 which in normal operation engages the projection 61 on the roving stop, generally designated 62.

The roving stop 62 is generally circular in shape and encircles a portion of the diameter of the lower back roll 14 and extends across two drafting positions. The roving stop 62 has an elongated fairly sharp roving stop portion 64 which bites into the incoming roving or sliver 10 when allowed to rotate with the roll 14. The roving stop 62 has a diameter slightly less than the diameter of the roll 16 and is prevented from rotation therewith by the engagement of the hook portion 60 with the projection 61.

OPERATION

Looking at FIGS. 1 and 3, the new and improved drafting system is shown in normal operation when the roving or sliver 10 is being drafted and spun into yarn. As shown in normal operation, the wire member 44 will be in the raised position since the projection 48 will be riding on the yarn Y and the hook portion 45 will be out of the path of travel of the cam follower 52 as it is pivoted up and down by the cam 50 as the cam 50 rotates with the lower middle roll 18. The roving stop release member 56 will be in the position with the hook portion 60 thereof engaging the projection 61 on the roving stop 62 to prevent the roving stop from rotating with the lower bottom roll 14.

As described, preferably the roving stop 62 spans two drafting positions and therefore, stops the input of roving or sliver into both systems when only one of the ends come down but, obviously, a single position roving stop could be employed. Looking to FIG. 2, the drafting system is shown just after one of the ends has come down. When this happens, the wire member 44 will rotate counterclockwise rotating the hook portion 46 into the path of travel of the cam follower 52. On the next upward movement of the cam follower 52, the notch 66 on the front end of the cam follower 52 engages the hook portion 46 causing the cradle to rotate clockwise since the tab members 40 are free to slide in the notch 42. As the cradle rotates clockwise, the pin member 54 engages the roving stop release member 56 and rotates it clockwise around the lower middle roll 18. As the roving stop release member 56 rotates the hook portion 60 will be disengaged from the projection 61 and the roving stop will be released to rotate with the lower rear roll 14. The roving stop will then rotate with the roll 14 until the leading edge 68 goes into the nip of the rolls 12 and 14 and the roving stop portion 64 bites into the roving 10 and prevents further fibers from going into the drafting system until the operation pieces up the end and resets the roving stop mechanism.

Looking now to the modifications of FIGS. 4–6, like parts will have the same reference numbers as in FIGS. 1–3. FIGS. 4–6 show a modified type of ends down detector and roving stop release. The modified system, as in FIGS. 1–3, operates across two drafting positions so that an ends down at either position will stop the supply of roving to both positions. The modified devices consists of the detector wire member 44 pivotally mounted in the elongated members 70 supported by the roll boss of the lower middle drafting roll 18, the roving stop release member 72 mounted on the under side of the lower middle roll 18, a cam 50 mounted on the lower middle

roll 18 between two roving stop release members 72 and a cam follower 74 pivotally secured to the inside of the roving stop release member 72.

As with the embodiment shown in FIGS. 1–3, the cam 50 rotates continuously with the lower middle roll 18 and pivots the cam follower on each rotation. Since the hook portion 46 of the wire member 44 is held in the position shown in FIG. 4 by the yarn Y, the hook portion 76 of the roving stop release mechanism 72 remains engaged with the projection 61 on the roving stop 62 to prevent rotation thereof with the lower rear roll 14. To provide cooperation between the elongated support member 70 and the roving stop release mechanism 72, pin members 78 and 80 mounted on the support member 70 project through elliptical grooves 82 and 84 in the roving stop release mechanism 72. The roving stop release mechanisms for two adjacent drafting positions are interconnected though a support member 86 so that detection of an ends down at either position will actuate the roving stop member 62.

When either of the yarn ends Y breaks, the wire member 44 will rotate counterclockwise to rotate the hook portion 46 into the path of travel of the notch 88 on the cam follower 74 as shown in FIG. 5. On the next downward movement of the cam follower 74 caused by the cam 50, the notch 88 will engage the hook portion 46 and the roving stop release mechanism 72 will rotate clockwise around the lower middle roll 18 since the elongated support member is prevented from rotation by the engagement of the curved surface 90 with the lower rear roll 14. As the roving stop release mechanism is rotated the hook portion 76 is rotated away from the tab projection 61 on the roving stop 62. When the hook portion 76 has cleared the projection 61, the roving stop 62 is free to rotate with the rear roll 14. Then the roving stop 62 will rotate to the position shown in FIG. 5 and the roving stop portion 64 will bite into the roving 10 to stop the supply of roving into the drafting system until an operation pieces up the broken end and resets the ends down detector and roving stop mechanism.

It is obvious that the herein disclosed drafting systems provide an efficient and economical control to detect the absence of a yarn end and act to prevent the buildup of a lap on either of the front rolls of the system.

Although I have described in detail the preferred embodiment of my invention, I contemplate that many changes may be made without departing from the scope or spirit of my invention.

I claim:

1. A spinning system comprising: a first pair of drafting rolls in nip forming engagement, a second pair of drafting rolls in nip forming engagement spaced from said first pair of rolls, means to twist fibers operably associated with said first pair of rolls, means to supply fibers to said second pair of rolls, means operably associated with said system to detect the absence of yarn between said first pair of rolls and said twist means to stop the supply of fibers to said second pair of rolls when the absence of yarn is detected, said means to stop the supply of fibers including a cam and follower and said means to stop the supply of fibers further including a substantially cylindrical member partially encircling one of said second rolls.

2. A spinning system comprising: a first pair of drafting rolls in nip forming engagement, a second pair of drafting rolls in nip forming engagement spaced from said first pair of rolls, means to twist fibers operably associated with said first pair of rolls, means to supply fibers to said second pair of rolls, means operably associated with said system to detect the absence of yarn between said first pair of rolls and said twist means to stop the supply of fibers to said second pair of rolls when the absence of yarn is detected, said means to stop the supply of fibers including a cam and follower and said spinning system including a second set of drafting rolls spaced axially from said first and second pair of rolls, said cam being located between said second set of drafting rolls and said first and second pairs of rolls.

3. A spinning system comprising: a first, second and third pair of drafting rolls, each roll in each pair of rolls being in nip forming engagement with the other roll in each pair, each pair of rolls being spaced from the other pairs of rolls, means supplying fiber to be drafted to said third pair of rolls, a fiber stop means operably associated with one roll of said third pair of rolls to stop the supply of fibers when actuated, a drafting cradle operably associated with said second set of rolls, means to twist fibers operably associated with said first set of rolls, means operably associated with said system to detect the absence of yarn between said first pair of rolls and said twist means to actuate said fiber stop means when the absence of yarn is detected, said means to detect the absence of yarn including a feeler member and said means to stop the supply of fibers including a cam and follower, and said cradle has sidewalls, said feeler member being pivotally mounted in one of said sidewalls.

4. A spinning system comprising: a first, second and third pair of drafting rolls, each roll in each pair of rolls being in nip forming engagement with the other roll in each pair, each pair of rolls being spaced from the other pairs of rolls, means supplying fiber to be drafted to said third pair of rolls, a fiber stop means operably associated with one roll of said third pair of rolls to stop the supply of fibers when actuated, a drafting cradle operably associated with said second set of rolls, means to twist fibers operably associated with said first set of rolls, means operably associated with said system to detect the absence of yarn between said first pair of rolls and said twist means to actuate said fiber stop means when the absence of yarn is detected, said means to detect the absence of yarn including a feeler member and said means to stop the supply of fibers including a cam and follower, and one roll of said second pair of rolls extending axially from said roll, said cam being mounted on said roll extension.

5. The structure of claim 2 wherein said means to detect the absence of yarn includes a feeler member which in normal operation rides on the yarn being twisted, said feeler member having a hook portion projecting adjacent the path of travel of said follower.

6. The structure of claim 3 wherein said cradle has sidewalls, said feeler member having a hook portion projecting through one of said sidewalls adjacent said follower.

7. The structure of claim 7 wherein said follower has a notch therein adapted to engage said hook portion when said feeler member detects the absence of yarn.

8. The structure of claim 6 wherein said fiber stop means encircles a portion of one roll of said third pair of rolls, said fiber stop means having a projection thereon, and a fiber stop release member mounted on one roll of said second pair of rolls having a hook portion engaging said projection to prevent the rotation of said fiber stop means.

9. The structure of claim 8 wherein said follower is pivotally mounted on said fiber stop release member.

10. The structure of claim 9 wherein said follower has a notch therein adapted to engage said hook portion when said feeler member detects the absence of yarn.

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