United States Patent

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[15] **3,670,367**

[45] **June 20, 1972**

[54] DRAFTING APPARATUS

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[73] Assignee: **Deering Milliken Research Corporation**, Spartanburg, S.C.

[22] Filed: **April 2, 1970**

[21] Appl. No.: **29,362**

Related U.S. Application Data

[62] Division of Ser. No. 809,867, March 24, 1969.

[52] **U.S. Cl.** **19/255**, 19/.26

[51] **Int. Cl.** **D01h 5/88**

[58] **Field of Search** 19/.26, 255; 57/85, 86, 87, 57/84

[56] **References Cited**

UNITED STATES PATENTS

608,731 8/1898 Tolman et al. ..... 57/87 X

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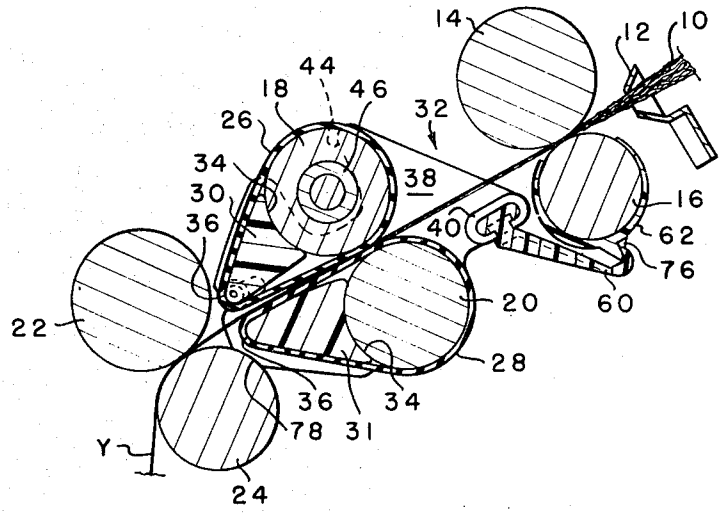
[57] **ABSTRACT**

Method and apparatus to stop the supply of roving to a drafting system when an end breaks to prevent lap damage to the drafting system by physically rotating a serrated member into the path of flow of the roving supply.

12 Claims, 10 Drawing Figures



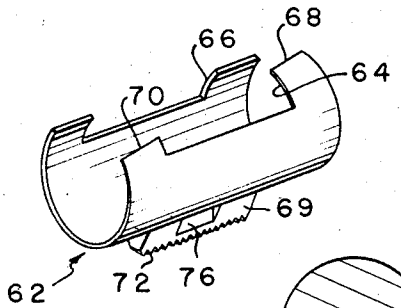


FIG.-4-

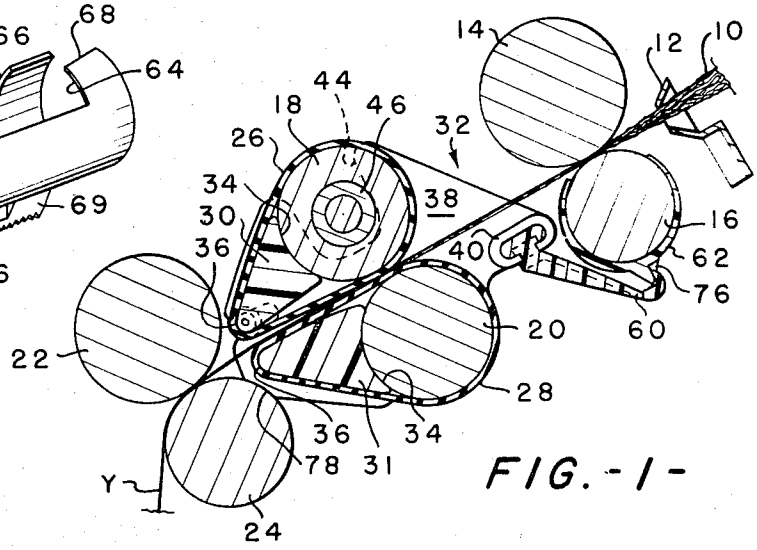


FIG.-1-

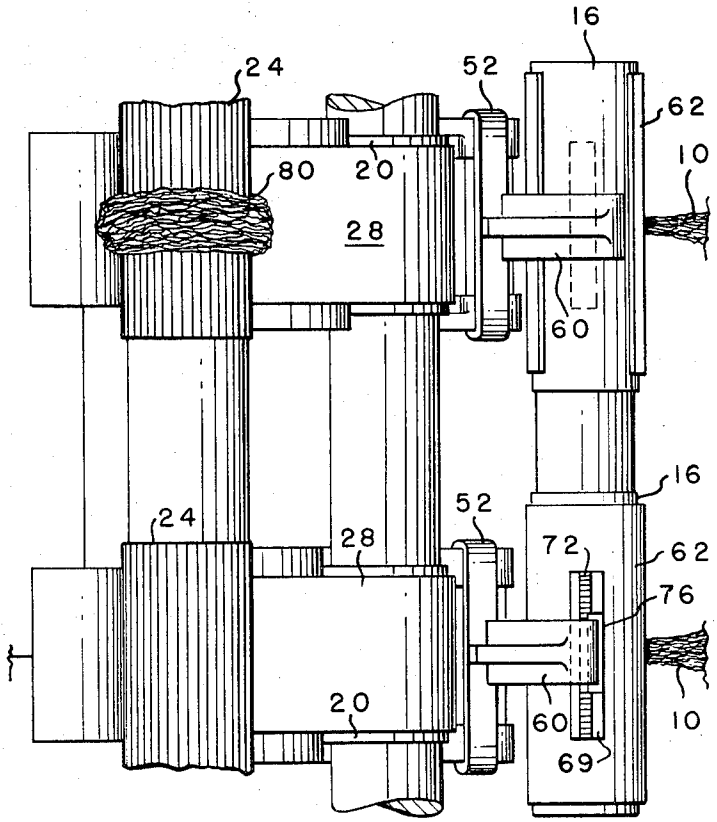


FIG.-3-

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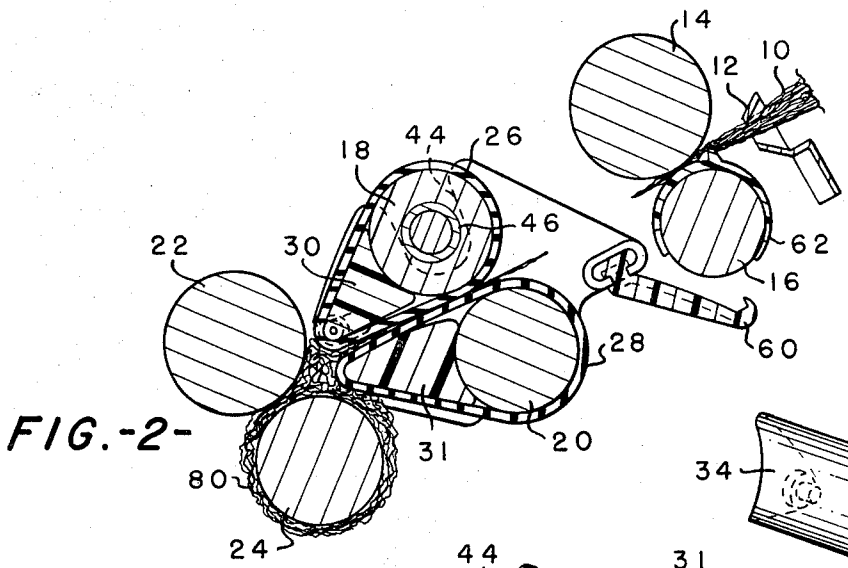

FIG.-2-

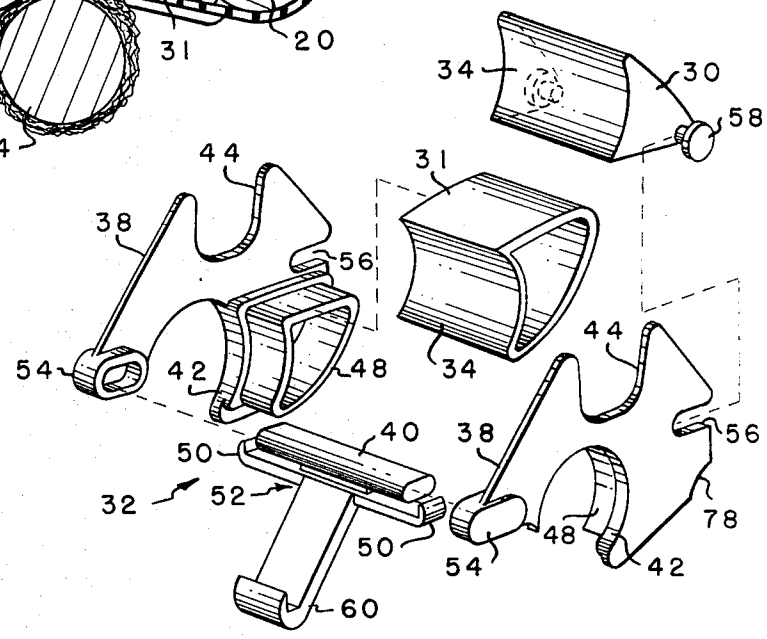

FIG. -6-

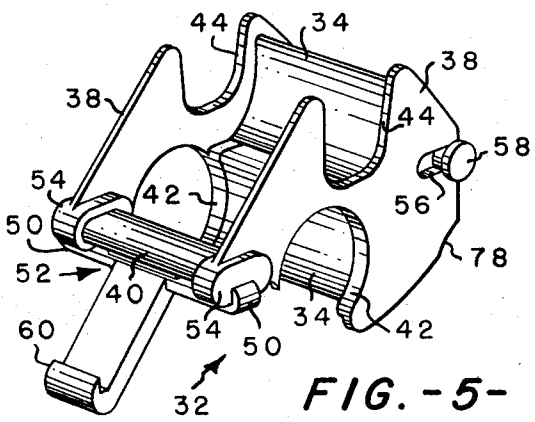

FIG. -5-

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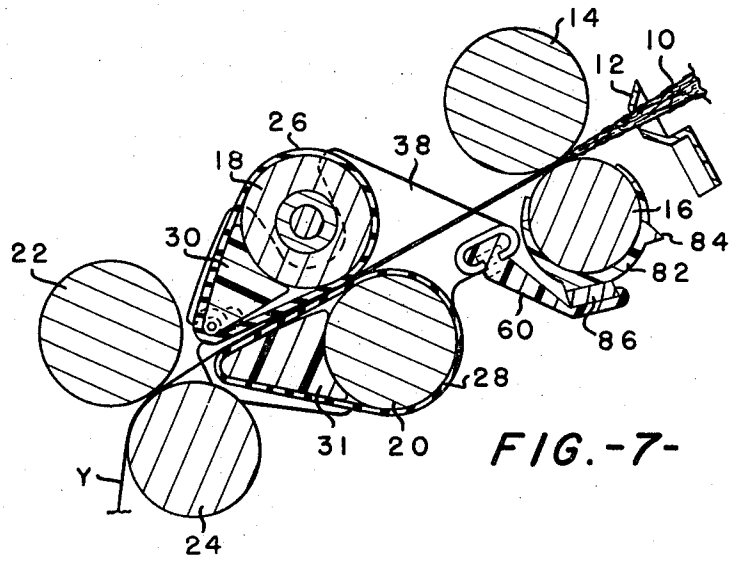

FIG.-7-

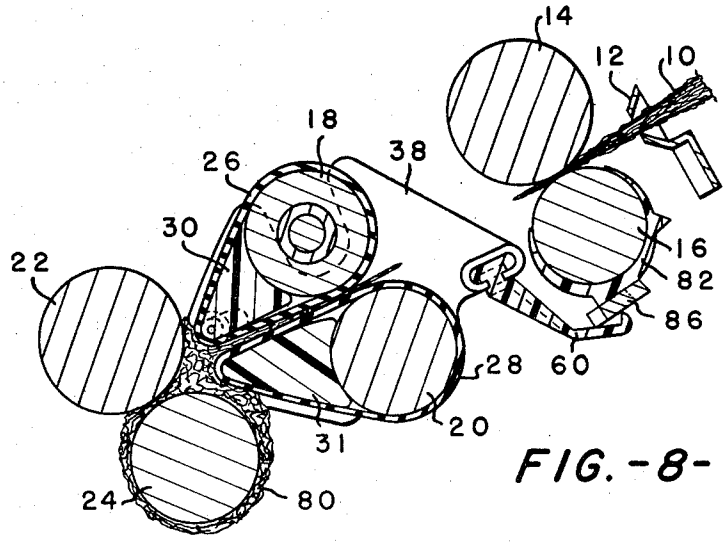

FIG.-8-

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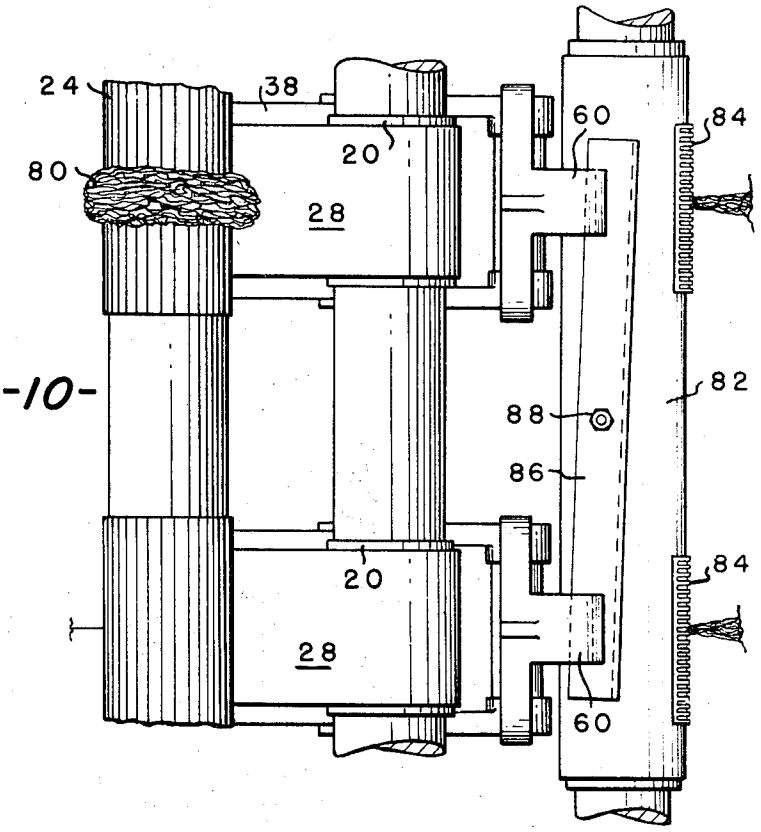

FIG.-10-

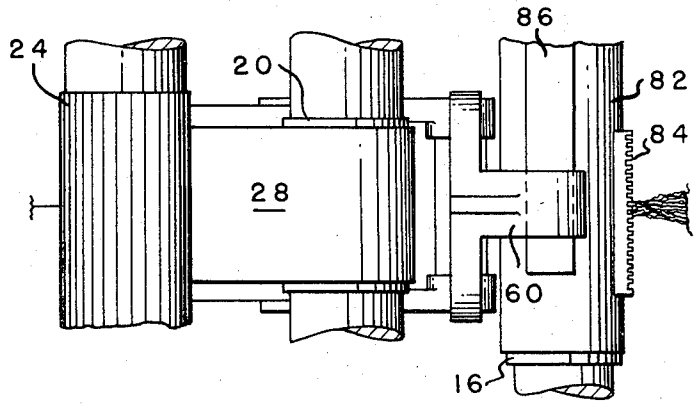

FIG.-9-

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DRAFTING APPARATUS

This is a division of application, Ser. No. 809,867, filed Mar. 24, 1969.

This invention relates generally to drafting systems for spinning frames and in particular to the prevention of lap damage to a drafting system when an undetected yarn break occurs between the ring rail and the front rolls of the drafting system.

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 then pile up between the front and middle drafting rolls. This pile up of fibers between the rolls can cause the aprons to freeze and be torn up by the rotating rolls. This condition is very severe on the lower drafting apron since the middle lower drafting roll is normally knurled which chews up the inside of the apron. If the condition occurs very often it causes a lot of inconvenience since only a limited number of spare aprons are available on the lower rolls and when these run out it is necessary to use spliced aprons which are inefficient in operation, thereby lowering the spinning frame efficiency and the yarn quality. Further, if there is a large build-up of fibers between the rolls, there will be a tendency for the drafting cradle to e broken and thereby not only require replacing of the cradle but also resulting in the destruction of both the drafting aprons.

It is therefore an object of the invention to provide a method and apparatus to prevent lap damage to a drafting system.

Another object of the invention is to provide a lap damage preventer for a drafting system which will stop the delivery of the roving or sliver being supplied to a drafting system when a break occurs in the fiber being drafted and/or spun.

A still further object of the invention is to provide a method and apparatus which will allow the vital elements of a drafting system to be moved out of the area where damage can occur upon the generation of a lap on the front rolls of a drafting system.

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 a schematic view of a drafting system in normal position and incorporating the herein disclosed invention;

FIG. 2 is a view similar to FIG. 1 illustrating the condition of the drafting system when an end break occurs;

FIG. 3 is a bottom view of two drafting positions shown one in normal position and the other in the condition indicated in FIG. 2;

FIG. 4 is a blown-up perspective view of the new and improved roving stop incorporated in the drafting system of FIGS. 1–3;

FIG. 5 is a blow-up view of the new and improved cradle employed in the drafting systems of FIGS. 1–3;

FIG. 6 is a view similar to FIG. 5 with the cradle taken apart to illustrate the various components thereof;

FIG. 7 is a view similar to FIG. 1 showing a modification wherein the roving stop spans two drafting positions;

FIG. 8 is a view similar to FIG. 2 showing the modified drafting system after a break in the fiber being drafted;

FIG. 9 is a bottom view of FIG. 7 showing only one drafting position; and

FIG. 10 is a bottom view of FIG. 8.

Looking now to the drawings, FIG. 1 shows the improved drafting system in conventional operation with a roving or sliver of staple fibers 10 passing through a condenser 12 into the nip of upper and lower rear drafting rolls 14 and 16, middle drafting rolls 18 and 20, front drafting rolls 22 and 24 to a ring and traveler (not shown) to form yarn Y by placing twist

therein between the ring and traveler and the nip of front drafting rolls 22 and 24. Conventionally, top drafting rolls 14 and 22 are rubber covered rolls while intermediate top drafting roll 18 is knurled. Bottom front and rear drafting rolls 24 and 16 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 18, 20 and the front rolls 22, 24 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 the zone between the middle and front pair of rolls, it is most desirable that the fibers be controlled as closely as possible and to this purpose a double apron system, consisting of upper endless apron 26 and lower endless apron 28, is used. In a manner exemplified in the art, e.g., U.S. Pat. No. 3,386,136, upper and lower apron clearing and roll engaging members 30 and 31 connected to cradle 32 are supported within the aprons 26 and 28 and at one end have a concave surface 34 engaging the rolls to clean the peripheral surface thereof and at the other end an apron reversing nose portion 36. Cradle 32 which has two upstanding wall members 38, one of which is shown, has a conventional roving shelf 40 secured therebetween to guide the roving into the nip of the drafting rolls and between the aprons 26 and 28. This prevents the roving from falling down between the middle and back rolls, thereby preventing a lap up due to improper feed of the roving into the drafting system 10.

Looking at FIGS. 5 and 6, the cradle 32 is shown in detail. Cradle 32 preferably is made from a material which is readily moldable and has good stability and wear characteristics such as for instance, Delrin acetal resin, nylon or Bakelite. Notches 42 in the side walls 38 are of sufficient size to accommodate the lower middle roll 28 while notches 44 in the side walls 38 are larger than the supporting shaft 46 of the upper roll 18 for reasons hereinafter explained. Lower apron clearing member 31 is hollow and telescopes over hollow projections 48 molded to side walls 38 and is secured in such position by fingers 50 which are integral with bar member 52 and engage the outsides of roving bar receptacles 54 to urge walls 38 toward one another. A notch 56 is provided in each of the cradle side walls 38 to allow circular tab projections 58 on the upper apron clearing member 30 to slide therein to position member 30. Tabs 58 in conjunction with apron 26 positions the member 30 in operative position against the upper drafting roll 18. For reasons hereinafter explained a hook member 60 is molded or otherwise secured to bar member 52 and projects outwardly therefrom.

FIG. 4 shows in detail the roving stop 62 which, as shown in FIGS. 1–3, encircles a portion of the diameter of the lower back roll 16. The roving stop 62, like the cradle 32, is made from a readily moldable material which has good stability and wear characteristics. The roving stop 62 is circular in shape and has a diameter slightly less than the diameter of roll 16. Elongated notches 64 and 66 are provided in the roving stop 62 to allow for traverse of the roving 10. The edge of the roving stop 62 adjacent to the incoming roving is thinner than the opposite edge to provide for ease of movement into the nip of rolls 14 and 16. Also the edge 68 is higher than the edge 70 so that only a small portion of the stop 62 has to enter the nip of rolls 14 and 16 initially. Molded to the bottom of the roving stop 62 is a molded serrated roving stop portion 70 which has a serrated edge 72 and a notch 76 for engagement and axial retention by the hook member 60.

FIG. 1 shows the drafting system under normal operation when roving 10 is being drafted and spun into yarn. In this form of the invention there is one cradle 32 and one roving stop 62 for each drafting position. In operative position the hook member 60 engages the notch 76 in the roving stop preventing the rotation of the roving stop with the roll 16 about which it is mounted. In this position, the curved portion 78 of the cradle walls 38 will normally rest on or be close to the lower front roll 24, thereby preventing further rotation of the cradle and apron system in the counterclockwise direction.

Looking now to FIGS. 2 and 3, the action of the cradle assembly is illustrated when the yarn end breaks. Since the yarn end between the nip of the front rolls 22 and 24 is broken and roving is still being supplied, the roving will tend to lap around the bottom roll and build up in the area between the nip of the front rolls and the nose portion of the apron. As the lap 80 increases in diameter it will contact the apron 28 causing the cradle to rotate clockwise around the rolls 18 and 20. This is accomplished since the notches 56 in the cradle side walls allow the tabs 58 to move forward as the cradle rotates and the upper roll 18 does not restrict such movement. As the cradle assembly rotates in the clockwise direction the hook member 60 rotates away from the notch 76 in the roving stop 62. When the hook member 60 has cleared the notch 76 the roving stop member will be free to rotate with the rear lower roll 16. The roving stop member 62 will rotate with the roll 16 until the serrated portions 72 and 74 bite into the roving 10 to stop the flow thereof and the roving stop 62 is prevented from further rotation by the rear surface of rolls 14 and 16.

It should be noted that having the angled edge 68 of the roving stop 70 allows gradual insertion of the roving stop 62 into the nip of the rolls 14 and 16 so that the rolls can grip the roving stop gradually and aid in rotating the roving stop into operative relationship with the roving 10.

FIGS. 7–10 show a modification of the invention shown in FIGS. 1–6 with like elements being denoted by like reference numbers. The basic distinction in this modification is that the roving stop member spans two drafting positions. The roving stop 82 is generally similar in shape to roving stop 62 in that it is cylindrical and encircles a portion of the bottom drafting roll 16. The roving stop 82 spans two drafting positions and has a serrated roving stop portion 84 molded thereto adjacent each drafting position to stop the supply of roving when rotated into a position adjacent the nip of the rolls. To retain the roving stop 82 in inoperative position when the drafting system is operating normally, an elongated bar 86 is pivotally secured to the bottom of the roving stop 82 by suitable means 88 and is engaged, as shown in FIG. 7, by hook members 60 at both drafting positions.

As in the modification of FIGS. 1–6, the cradle assembly will rotate clockwise upon the occurrence of a lap build-up freeing the hook member 60 from the bar 86 at the drafting position where the lap occurs. As the roving stop starts to rotate the bar 86 will push down on the hook member 60 at both positions, thereby freeing both hook members 60 and allowing the roving stop to rotate into the position where the serrated portion 84 bites into the roving, thereby stopping the supply of roving.

It can now be seen that the rotation of the cradle assembly has prevented damage to the cradle as well as to the aprons and at the same time has positively stopped the supply of roving to the system until reset by an operator and the end pieced up.

Although I have described in detail the preferred embodiments of my invention, I contemplate that any changes may be made without departing from the scope or spirit of my invention and I desire to be limited only by the claims.

That which is claimed is:

1. A drafting system comprising: at least three pairs of drafting rolls spaced from one another in operative relationship, each of said pairs of drafting rolls being in nip forming relationship, means supplying fibers to be drafted to the first pair of rolls, said fibers successively being delivered to the second set of rolls and to the third set of rolls, a cradle and apron drafting means operably associated with said second pair of rolls to detect the build-up of a lap on one of said third set of rolls and to aid in drafting fibers supplied to said second set of rolls, means operably associated with one of said rolls of said first pair of rolls to stop the supply of roving when a lap occurs on one roll of said third pair of rolls and means connected to said cradle and apron drafting system holding said roving stop means in inoperative position until a lap occurs on one of said rolls of said third pair of rolls and to release said roving stop means when a lap is detected on one of said third pair of rolls by said cradle and apron drafting means.

2. The structure of claim 1 wherein said roving stop means is arcuate shaped and encircles a portion of one roll of said first pair of rolls.

3. The structure of claim 2 wherein roving stop means includes a serrated portion which bites into the roving upon the occurrence of a lap.

4. The structure of claim 2 wherein said arcuate roving stop means extends across two drafting positions.

5. The structure of claim 4 wherein said roving stop means includes a serrated portion adjacent each drafting position.

6. The structure of claim 5 wherein said roving stop means includes a pivoted bar member on the bottom thereof, said means preventing operation of said roving stop means being a hook member operably associated with each drafting position.

7. The structure of claim 1 wherein said cradle and apron drafting system includes spaced apart wall members, a pair of apron guiding members extending therebetween, an apron around each of said rolls of second pair of rolls and extending around one of apron guiding members and a notch in each of said wall members, one of said apron guiding members slidably engaging said notch.

8. The structure of claim 7 wherein said means to hold said roving stop means in inoperative position is a hook member engaging said roving stop means.

9. The structure of claim 8 wherein said roving stop means is arcuate shaped and encircles a portion of one roll of said first pair of rolls.

10. The structure of claim 9 wherein roving stop means includes a serrated portion which bites into the roving upon being released, said serrated portion having a notch therein and wherein said hook member engages said notch.

11. The structure of claim 1 wherein said cradle and apron drafting system includes spaced apart wall members with portions thereof extending toward said third pair of rolls and having a surface portion thereof engaging one of said third pair of rolls.

12. The structure of claim 11 wherein said surface portion is curved.

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