

Sept. 19, 1967

SHINZO KITAMURA

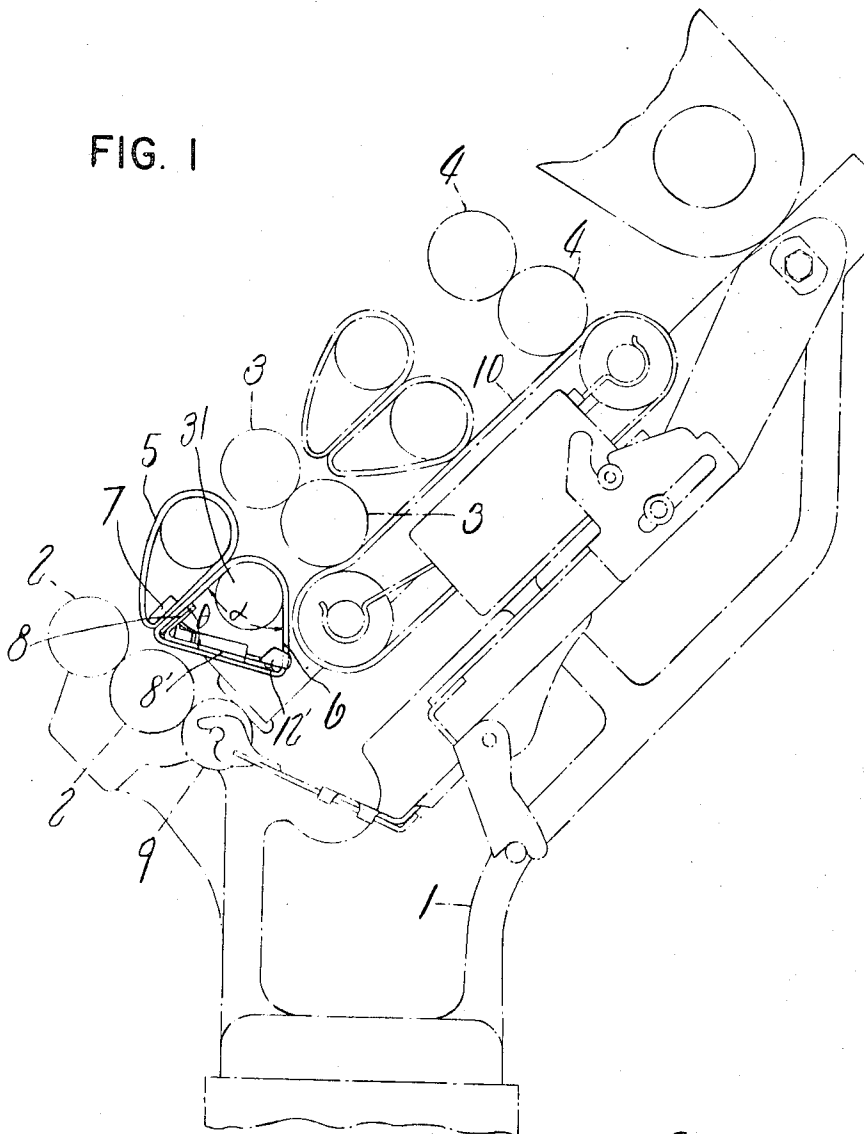
3,341,901

LONG APRON TYPE DRAFT APPARATUS USED IN TEXTILE MACHINES

Filed Aug. 16, 1965

5 Sheets-Sheet 1

FIG. 1



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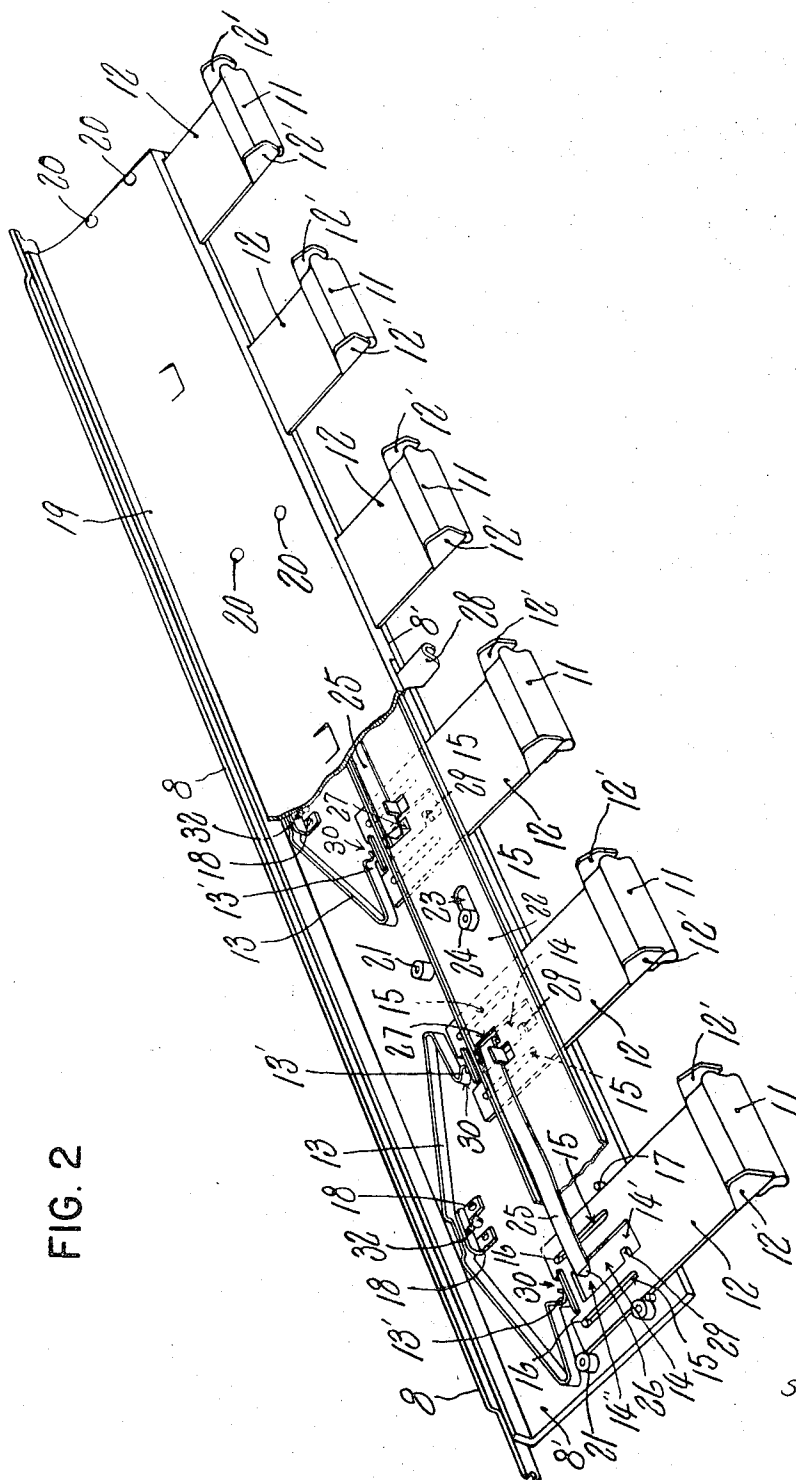
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FIG. 3

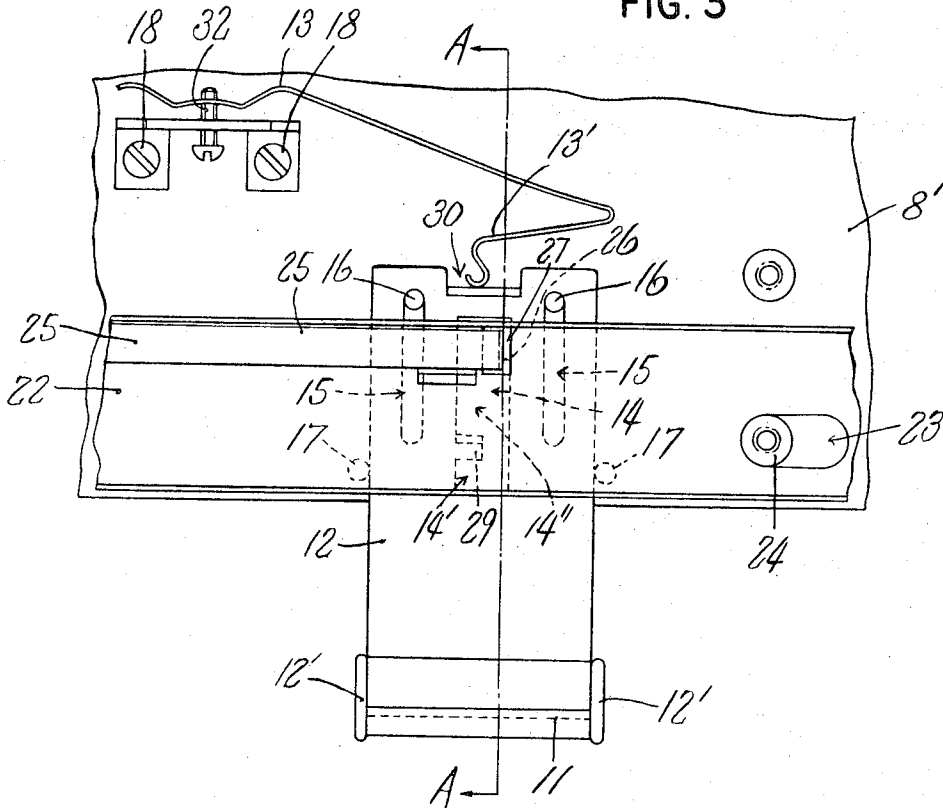
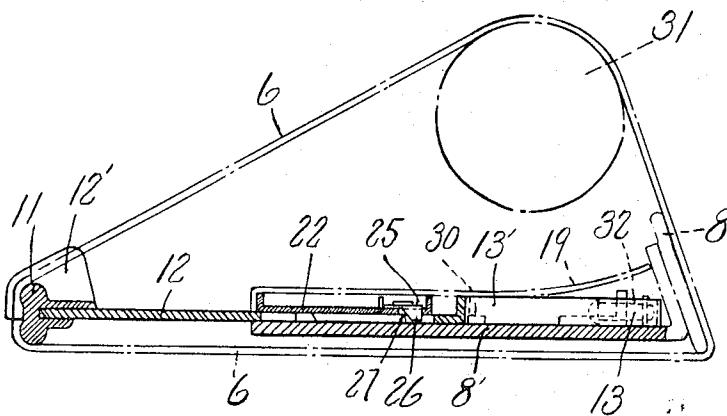


FIG. 5



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FIG. 4

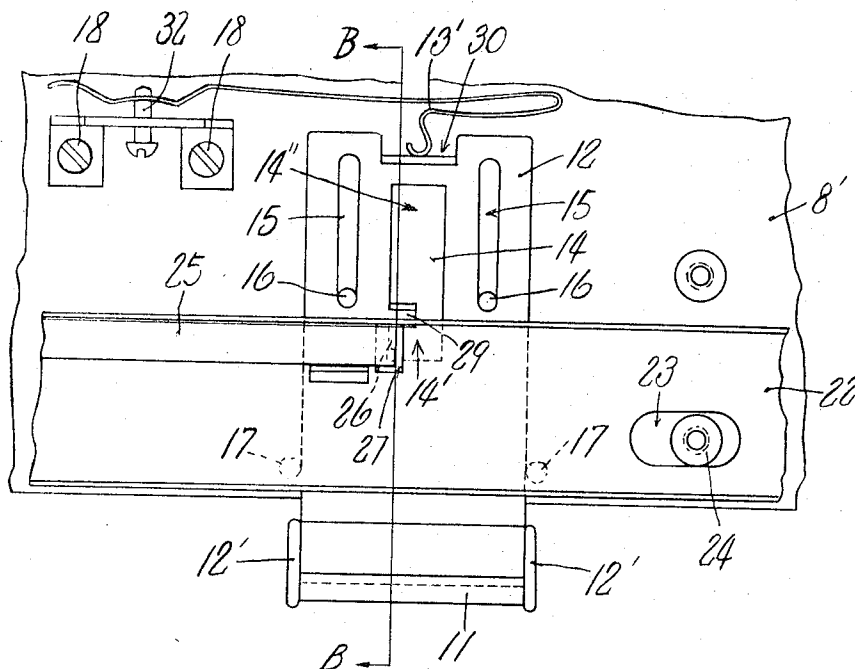
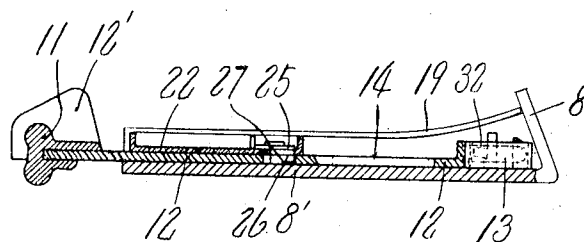


FIG. 6



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FIG. 7

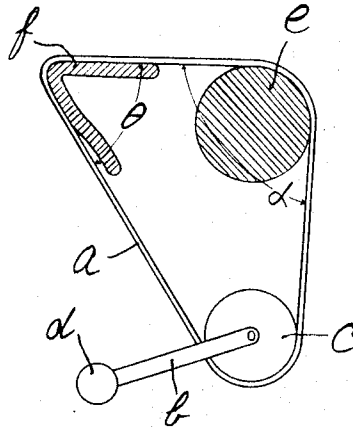
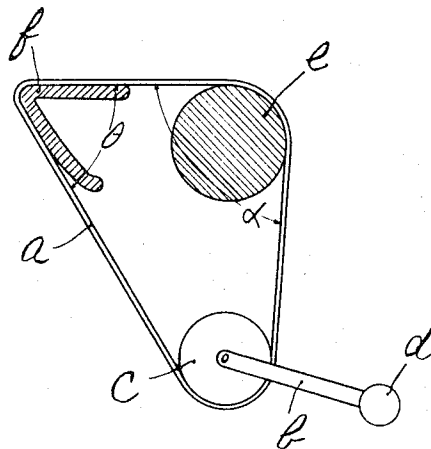


FIG. 8



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LONG APRON TYPE DRAFT APPARATUS USED IN TEXTILE MACHINES

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3 Claims. (Cl. 19—250)

ABSTRACT OF THE DISCLOSURE

Conventional long apron draft apparatus (FIGS. 7 and 8) is tensioned by tensioning rollers and is bulky, has but a small arc of contact with the saw tooth roller, and has other drawbacks. Herein a tensor bar is provided inside the loops of the long aprons, which carries a separate tensioning lever for each long apron, the tensioning levers being spring advanced to tighten the aprons. The assembly is provided with transversely slidable means for releasing the tensioning levers to tension the aprons, which means is positionable to latch retracted tensioning levers in retracted position when the aprons might otherwise be in danger of breaking.

SPECIFICATION

Background of the invention

(1) *Field of the invention.*—The invention pertains to long apron type draft apparatus used in textile machines.

(2) *Description of the prior art.*—The conventional long apron type draft apparatus is hereinafter described in connection with FIGS. 7 and 8.

Summary of the invention

The invention provides improved means for tensioning the long aprons and releasable means for holding them retracted when necessary to prevent breakage.

Brief description of the drawings

The invention will be described with reference to a preferred embodiment thereof and in comparison with conventional tension means of this kind illustrated in the accompanying drawings, in which:

FIG. 1 is a side elevational view of a draft apparatus according to the invention;

FIG. 2 is a perspective view of a tension device;

FIGS. 3 and 4 are enlarged views showing the manner of working of a tension lever;

FIGS. 5 and 6 are sectional views taken on lines A—A and B—B in FIGS. 3 and 4 respectively; and

FIGS. 7 and 8 are side elevational views of conventional tension means of the long apron type.

Description of preferred embodiments

In conventional tension means of the long apron type, as illustrated in FIGS. 7 and 8, there is provided at the lower end of a long apron *a* a tension roller *c* rotatably mounted at one end of an arm *b* having a spring contained in the pivot mounting *d* thereof, whereby a predetermined tension is applied to the long apron *a* by depressing the tension roller *c* or applying a weight to the arm *b*.

However, in such a structure, the angle of contact α of the apron *a* due to a saw tooth roller *e* is increased, so that the contact area of the apron *a* with respect to the saw tooth roller *e* is decreased, rendering the apron *a* liable to slip with respect to the saw tooth roller *e*, thus involving the danger of causing lack of smoothness in the run of the apron *a*. Further, although it is de-

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sirable that the length of the long apron *a* be rather small, the conventional structure makes it necessary to have such an apron long enough to droop as shown in FIGS. 7 and 8 in order to facilitate the mounting and dismounting of the apron, it being impossible to make it shorter any further, and yet even if the apron *a* is made longer than is necessary, the mounting and dismounting of the same are still troublesome. Furthermore, owing to the arrangement of such a long apron, the lower portion of the roller part of the draft means occupies a considerably large space, so that the handling of the textile machine becomes correspondingly more troublesome, particularly the maintenance of clearers is seriously interfered with. Also, if a collector is used in the draft means using the conventional long apron, the apron tends to be easily broken, which accounts for the fact that no collector has generally been used in such draft means.

In view of these drawbacks of this kind of conventional long apron draft means, the present invention provides substantial improvements, that is, it provides an improved arrangement comprising a front depending portion integrally provided on a bottom tensor bar, and tension levers each slidably provided on said front depending portion and having an apron slide metal attached thereto, said tension levers being caused to constantly project downwardly by means of springs thereby applying tension to long aprons.

A preferred embodiment of the invention will now be described.

In FIG. 1, the reference numeral 1 denotes a roller stand on which are mounted front rollers 2, 2, middle rollers 3, 3 and back rollers 4, 4. Provided between the front rollers 2, 2 and the middle rollers 3, 3 is a cradle (not shown) around which are entrained an upper apron 5 and a lower apron 6. An upper tensor bar 7 and a lower tensor bar 8 are mounted within the upper and lower aprons 5 and 6 at their front ends, respectively, thereby supporting said front ends as the upper and lower aprons 5 and 6 are rotated. As shown in FIGS. 1 and 2, the lower tensor bar 8 is formed of a single elongated piece of sheet metal which extends through a plurality of aprons 6. The tensor bar is provided with a front depending portion 8'. The tensor bar 8 and the front depending portion 8' are retained at a predetermined angle of run θ of the apron 6. Therefore, when the lower tensor bar 8 is fixed in a horizontal condition, the front depending portion 8' is somewhat rearwardly and downwardly inclined. At the rear of the front depending portion 8' of the tensor bar 8, there are slidably provided tension levers 12 each having an apron slide metal 11 attached to the lower end thereof. Each of the apron slide metals 11 is adapted to be engaged with the lower end of the respective long aprons 6. Plate springs 13 provided on the front depending portion 8' depress adjacent tension levers 12 to cause the apron slide metals 11 to depress the lower end of each long apron 6, thereby applying a predetermined tension to the latter.

The tension lever 12 is a rectangular plate having leg plates 12', 12' on either side at the lower end thereof. The leg plates serve to guide the apron 6 so that the latter will not move laterally off the slide metals 11. The tension lever 12 has an engagement opening 14 formed in the middle and introduction openings 15, 15 formed on either side thereof. On one side of the engagement opening 14, there is integrally formed a projection 29 dividing the engagement opening 14 into front and rear openings 14' and 14''. On the rear side of the front depending portion 8', there are provided projec-

tions 16, 16 loosely fitted in the introduction openings 15, 15 of the tension lever 12, and projections 17, 17 disposed so as to abut against either side of the tension lever 12. These four projections 16, 16, 17, 17 cooperate to control the tension lever 12 so that the latter may slide only vertically. The plate spring 13 is of a bilaterally symmetrical shape in the form of an angularly shaped body having its middle portion attached to the rear side of the front depending portion 8' by means of set screws 18, 18, the bends 13', 13' on the right and left ends thereof being urged against recesses 39 in the upper surface of the tension lever 12, thereby depressing the latter, as shown in FIG. 2. That is, it is so arranged that a single plate spring 13 depresses two tension levers 12. A cover plate 19 is attached to the rear surface of the front depending portion 8' by means of set screws 20 in such a manner as to cover the entire surface thereof. 21 denotes threaded holes to receive the set screws 20 therein. An operating plate 22 is interposed between the cover plate 19 and tension levers 12. The mounting of the operating plate 22 is such that it is reciprocable for some distance longitudinally of the tensor bar 8. Since an opening 23 provided in the operating plate 22 loosely receives therein a projection 24 provided on the rear side of the front depending portion 8', the operating plate 22 is allowed to move only right and left for a distance corresponding to the length of the opening 23. Attached to the surface of the operating plate 22 are anchoring springs 25 adapted to be selectively engaged with the engagement openings 14 in the tension levers 12. Each of the anchoring springs has its opposed ends downwardly bent to form pawl portions 26, 26. The pawl portions 26, 26 each downwardly project through their respective slits 27 formed in the operating plate 22. The operating plate 22 has an operating knob 28 projecting from the middle of the bottom surface thereof. Thus, the operating plate can be moved right and left from the outside by manipulating the operating knob 28.

When it is desired to tighten the long aprons 6 by the apron slide metals 11, the operating knob 28 is manipulated to move the operating plate 22 to the right as viewed in FIG. 2 so as to disengage the pawl portions 26 of the anchoring springs 25 from the projections 29 of the engagement openings 14, thereby canceling the control established by the pawl portions 26. The tension levers 12 are thus allowed to assume their free condition as shown in FIGS. 3 and 5 in which they have been downwardly moved as guided by the projections 16, 16 and 17, 17, to tighten the long aprons 6.

When the operating plate 22 is moved to the left as viewed in FIG. 2, the pawl portions 26 of the anchoring springs 25 enter the rear openings 14' at the engagement openings 14. In this condition, if the apron slide metals 11 are inwardly pushed against the pressing force of the springs 13 to consequently shift the tension levers 12 until the anchoring projections 29 abut against the side slopes of the pawl portions 26 of the anchoring springs 25, these springs 25 are guided by the slopes to be lifted therealong until the pawl portions 26 are dislodged from the engagement openings 14 to clear the anchoring projections 29 thereby entering the front openings 14' at the engagement openings 14. Therefore, even though the tension levers 12 are under the pushing action of the plate springs 13, they do not project downwardly because of the engagement between the anchoring projections 29 and pawl portions 26. Thus, the long aprons 6 are in a relaxed condition.

As mentioned above, since in the apron tension apparatus according to the present invention the tension levers 12 for the apron slide metals 11 can be retained in the predetermined retracted position by the operation of the operating plate 22, in case of the occurrence of the objectionable rolling-in of aprons the tension levers 12 are immediately retracted to the restricted position

so that there is no danger of breaking aprons, and, further, the mounting and dismounting of aprons are very easy. Also, according to the invention since the tensor bars and the tension apparatus are integral, changes in cradle gauge can be effected merely by changing the tensor bars without the need of modifying other parts. Further, according to the invention such tensor bars and tension apparatus can be separated from each other and secured in position relative to each other. Further, with the invention employed, the replacement of the apron slide metals 11 attached to the tension levers 12 with others having a different diameter will make it possible to adjust the bent angle α of the apron 6 with respect to the tensor bar to the optimum value, the predetermined angle of run being maintained owing to the improved structure. Further, the pressing force for tension can be easily adjusted by turning the set screw 32 at the middle of the plate spring 13. Further, since the tension apparatus according to the invention is not complicated in structure and does not occupy a large space as contrasted with the conventional arrangement, it can be handled very easily and particularly the time required for servicing clearers is greatly reduced, thereby much contributing to the promotion of efficiency in textile operation. Turning to an aspect of spinning, it is seen that the improved mechanism of the invention allows the setting of the free gauge of yarn to a minimum value, so that the quality of yarn is further improved.

Another important advantage of the invention is that the long apron 6 can be made short so that the angle of contact α of the apron 6 due to the saw tooth roller is small and the contact area of the apron 6 with respect to the saw tooth roller 31 is large, thereby preventing the apron 6 from slipping and rendering its rotation smooth.

Since the tension apparatus according to the invention is provided with restricting means in the retracted position of the tension levers 12, there is no possibility of causing breakage of aprons which would otherwise take place owing to the objectionable winding-around of long aprons. Therefore, it has now been made possible to use collectors. (The use of collectors was impossible with the conventional long apron type draft system owing to the occurrence of the objectionable winding-around of long aprons.)

As mentioned above, the present invention is advantageous in that coupled with the reduction in the cost of manufacture, the improved structure and operation of the tension apparatus for long aprons contribute to increased productivity.

While the preferred form of the invention has been shown and described herein, it is to be understood that the same is not so limited but shall cover and include any and all modifications of the invention which fall within the purview thereof.

What is claimed is:

1. A draft apparatus for textile machines, which apparatus is of the type that includes a plurality of longitudinally aligned assemblies each comprising
 - (a) a saw tooth roller element,
 - (b) a front end supporting element,
 - (c) a tensioning element, and
 - (d) a long apron trained about said elements and tensioned by said tensioning element,
 particularly characterized in that
 - (e) said front end supporting element comprises an elongated tensor bar extending through a plurality of said aprons, and
 - (f) said tensioning element for each apron consists of an independently retractable apron tensioning lever carried by said tensor bar inside the respective apron,
 - (g) each tensioning lever being provided with spring means for extending it from said tensor bar for tensioning the respective apron.

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2. A draft apparatus as claimed in claim 1, further characterized in that

(h) said tensor bar comprises an inclined depending portion on which said tension levers are slidably mounted, and in that

(i) said spring means are mounted on said inclined depending portion in position to urge said tension levers outwardly parallel to said depending portion.

3. Apparatus as claimed in claim 1, further characterized in that

(h) said apparatus comprises means movable transversely of the tensioning levers for releasably maintaining the levers in retracted position.

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