United States Patent

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[31] 43/28228

[54] **TOP CRADLE MECHANISM USABLE FOR A TEXTILE MACHINE**
10 Claims, 7 Drawing Figs.

[52] U.S. Cl. 19/250
[51] Int. Cl. D01h 5/86
[50] Field of Search .... 19/244—256

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ABSTRACT: A top cradle mechanism used for a common tensor bar-type fiber drafting system having more than one movable tensor on positioned of respective drafting equipment and a stationary plate common to respective drafting equipment. The movable tensors can perform a three-dimensional movement relative to the stationary plate according to respective drafting conditions in the corresponding drafting equipment. No interference between the neighboring drafting equipment results.

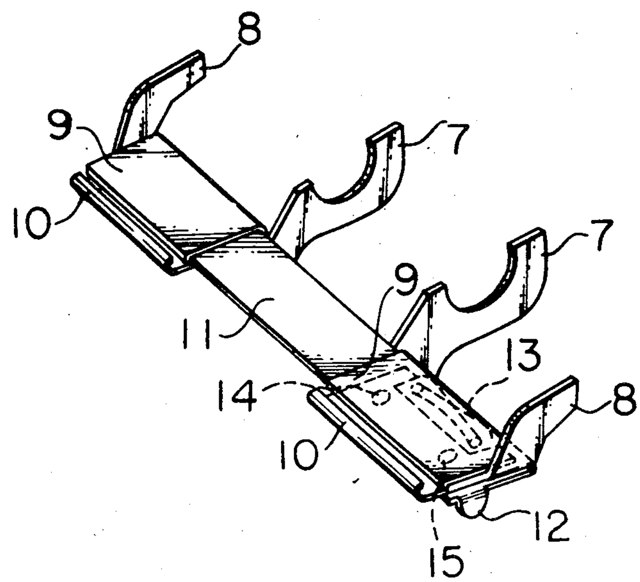

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Fig. 1 PRIOR ART

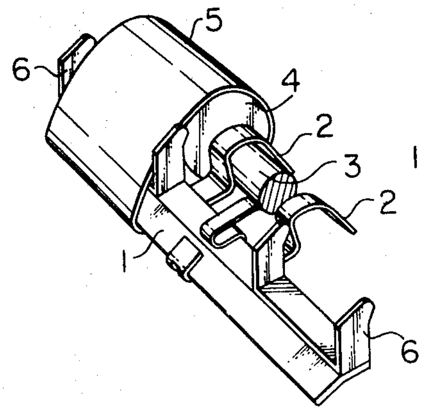


Fig. 2

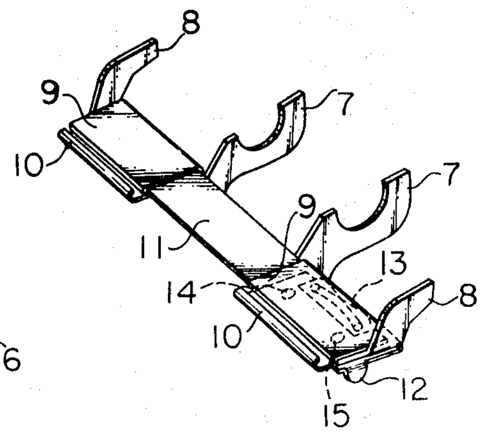


Fig. 3

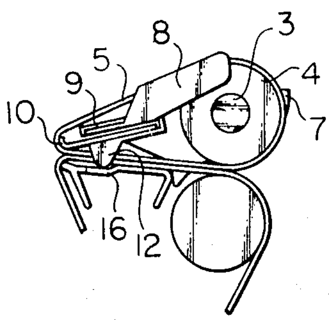


Fig. 4

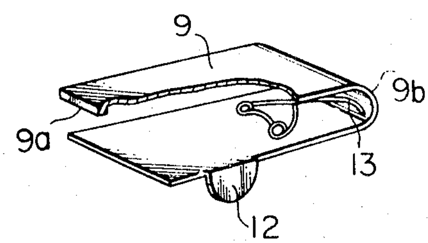


Fig. 5

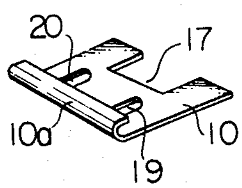


Fig. 6

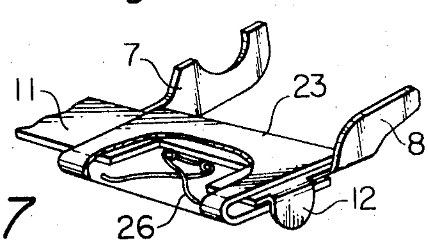
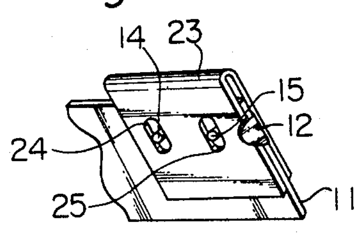


Fig. 7



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TOP CRADLE MECHANISM USABLE FOR A TEXTILE MACHINE

The present invention relates to an improved top cradle mechanism usable for a textile machine, more particularly relates to an improvement in the top cradle mechanism commonly used for two neighboring drafting equipment in a spinning machine. As is well known, the presently known drafting equipment is classified into two groups regarding the manner of top tensor installation. In one group, respective draft equipment are provided with their own set of tensor bars while, in another group, a pair of neighboring draft equipment have a set of tensor bars in common. In this regard, the top cradle mechanism of the present invention obviously belongs to the latter group.

In the conventional mechanism of this type, a single top tensor bar is adapted in common for a pair of neighboring drafting equipment. On both drafting equipment, a top apron is disposed to the equipment encircling the top tensor bar and a loose boss roller inserted over an arbor. A pair of supporter bands are secured onto the top tensor bar in a condition receptive of the arbors of the respective draft equipment and are adapted for holding the respective arbors in a given positional relation to the top tensor bar.

Because of the above-described definitely given positional relationship between the arbors and the top tensor bar, the conventional mechanism of this type is not provided with a suitable flexibility for allowing probable dimensional errors in the relative mechanical setting of the top apron, front rollers and a bottom apron or probable warps in the dimension of the top apron due to continuous use. Such an irregular mechanical condition of the apron roller of one draft equipment not only results in abnormal drafting operation in that drafting equipment but is also apt to induce an undesirable effect on the drafting condition in the neighboring drafting equipment.

Further, the top apron ordinarily used in the drafting equipment is generally made up of natural leathers or synthetic rubbers and this inevitably brings about small variations in the dimensions of the top apron acquired. In case of the conventional top cradle mechanism of the above-described type, even such small dimensional variations of the top apron often effect a nonnegligible bar in the troubleless production of a highly qualified spinning yarn because of the above-described characteristic dimensional relationship between the arbors and the top tensor. For example, if one of the top aprons is not sufficient in its length, it strongly pulls the top tensor bar towards the arbor and the parallelism between the top tensor bar and the front rollers will be lost. Such a breakage of the definitely given dimensional relationship in the draft zone of the processed fibers results in an abnormal drafting operation and the manufactured spinning yarn will be provided with an increased unevenness and lowered qualities.

In order to eliminate the above-described drawbacks possessed by the conventional top cradle mechanism of the above-described type, the top cradle mechanism of the present invention is provided with a stationary plate disposed downstream of the arbors of the drafting equipment in a parallel arrangement and the top tensor bar of the conventional type is eliminated. The stationary plate is provided with a pair of rearwardly protruding arms adapted for holding arbors of the neighboring drafting equipment. The stationary plate is further provided with a pair of movable tensor plates slidably disposed thereonto and the movable tensor plates are purposed for always urging the top apron forward inserted over them. Because the movable tensor plates are provided for respective draft equipment, there is no operational interference between the neighboring drafting equipment and the tension control can be effectively and independently carried out on the respective draft equipment.

A principal object of the present invention is to provide an improved top cradle mechanism used in the common tensor bar type draft equipment which has an appreciable flexibility for allowing probable dimensional errors in the mechanical setting.

Another object of the present invention is to provide an improved top cradle mechanism which can assure a constant production of a highly qualified spinning yarn of little unevenness regardless of probable warps in the structure of the top apron due to continuous use of the drafting equipment.

A further object of the present invention is to provide a novel top cradle mechanism which can assure a complete elimination of operational interference between the neighboring drafting equipment and an independent tension control on the top aprons of the respective draft equipment.

A still further object of the present invention is to provide a highly advanced top cradle mechanism which can eliminate all the drawbacks possessed by the conventional top cradle mechanisms of the above-described type.

Further features and advantages of the present invention will be apparent from the following descriptions, reference being made to the accompanying drawings; wherein

FIG. 1 is a perspective view of a conventional common tensor bar type top cradle mechanism installed in an ordinary draft equipment,

FIG. 2 is a perspective view of an embodiment of the top cradle mechanism of the present invention,

FIG. 3 is a side view of the embodiment shown in FIG. 2 in a condition installed in the ordinary drafting equipment,

FIG. 4 is a perspective view of a U-shaped plate used in the embodiment shown in FIG. 2,

FIG. 5 is a perspective view of a movable tensor plate used in the embodiment shown in FIG. 2,

FIG. 6 is a perspective view, partly cut off, of another embodiment of the top cradle mechanism of the present invention,

FIG. 7 is a perspective representation of the embodiment shown in FIG. 6 seen from below.

Referring to FIG. 1, a brief introduction of the construction of the conventional common tensor bar type top cradle mechanism is given for the purpose of better understanding the scope of the present invention. In the mechanism, a top tensor bar **1** is commonly possessed by a pair of neighboring drafting equipment in a parallel arrangement with respect to respective front rollers positioned downstream. Being secured onto this top tensor bar **1**, a pair of supporter bands **2** extend rearwardly and are adapted for holding arbors **3** of the respective drafting equipment in a given positional relationship to the top tensor bar **1**. Over the arbor **3**, a loose boss roller **4** is inserted. A top apron **5** made of natural leather or synthetic rubber is disposed to the equipment encircling the top tensor bar **1** and the loose boss roller **4** and a pair of upwardly protruding top apron guides **6** are secured on the top tensor bar **1** in order to limit a lateral displacement of the top apron **5**.

An embodiment of the top cradle mechanism of the present invention is shown in FIG. 2 with omission of the related parts of the drafting equipment. In the embodiment, a stationary plate **11** is disposed upstream of the front rollers in a manner the same with that of the conventional mechanism shown in FIG. 1. The stationary plate **11** is also provided with a pair of rearwardly protruding arbor holders **7** and a pair of upwardly protruding top apron guides **8**. The arbors, loose boss rollers and top aprons are disposed to the drafting equipment in a manner the same with that of the mechanism shown in FIG. 1. In a space between the facing arbor holder **7** and the top apron guides **8**, a U-shaped tensor holder **9** having a pair of opposed legs defining a space therebetween is disposed around the stationary plate **11** with its open end facing forwardly and a movable tensor plate **10** is slidably inserted into the space remaining between the stationary plate **11** and the tensor holder **9** with its upper surface facing the lower surface of the stationary plate **11**.

An embodiment of the U-shaped tensor holder **9** is illustrated in FIG. 4 in detail. An open end of the upper leg of the tensor holder **9** is provided with a downwardly bent portion **9*a*** adapted for releasable engagement with the forward brim of the stationary plate **11**. The lower portion of the tensor holder **9** is provided with a downward spacing projection **12** formed on a side brim thereof. This spacing projection **12** is purposed for keeping the top tensor mechanism at a suitable distance from the bottom tensor mechanism by its contact with the bottom tensor bar (not shown).

The construction of the movable tensor plate **10** is given in FIG. **5** in detail. The movable tensor **10** is provided with an upwardly curved front portion **10***a* adapted for holding the forward end of the top apron **5**. Just rearward of the curved front portion **10***a*, a pair of long slats or apertures **19** and **20** are formed through the movable tensor **10** and a rear end of the movable tensor **10** is provided with a recess or cutoff **17**. The lower surface of the stationary plate **11** is provided with a pair of projections or protuberances **14** and **15** as shown in FIG. **2** adapted for engagement with the long apertures **19** and **20** of the movable tensor **10**.

The combined arrangement of the U-shaped tensor holder **9**, the movable tensor **10** and the stationary plate **11** is shown in FIGS. **2** and **3**. In this combined arrangement, the U-shaped tensor holder **9** is disposed over the stationary plate **11** with its open end facing forward (downstream) and its bent portion **9***a* releasable hooked onto the forward end of the stationary plate **11**. Within a space formed between the lower leg of the tensor holder **9** and the stationary plate **11**, the movable tensor **10** is placed with its curved portion **10***a* facing forward. A spring **13** is inserted within a room formed by an inside wall of the curved apex **9***b* of the tensor holder **9** and the recess or cutoff **17** of the movable tensor **10** for the purpose of urging the movable tensor **10** forwardly (downstreamly). In this arrangement, the above-described protuberances **14** and **15** of the stationary plate **11** are received by the long apertures **19** and **20** of the movable tensor **10**. The dimension of the apertures **19** and **20** should be so selected as to form a slight yet sufficient clearance between the protuberances and the apertures. Because of the presence of such clearance, it is feasible for the movable tensor **10** to perform a two-dimensional or 2° of free sliding movement relative to the stationary plate **11**. In case the apertures **19** and **20** are duly designed, the movable tensor **10** can perform even a three-dimensional free movement relative to the stationary plate **11**. The height of the protuberances **19** and **20** should be so selected as to slightly exceed the thickness of the movable tensor **10**. Because of this mechanical setting, the height of the gap formed between the lower portion of the tensor holder **9** and the stationary plate **11** is large enough to permit the above-mentioned free movement of the movable tensor **10** within the gap.

In the combined arrangement shown in FIG. **3**, the arbor **3** for supporting the loose boss roller **4** is downwardly loaded by a suitable known loading means (not shown). Owing to this loading, the top apron **5** is pressed against the bottom apron and is driven by the rotation of the latter. An end of the arbor **3** is rotatably mounted on an upper recess of the arbor holder **7** also. The arbor holder **7** plays a role of apron guide and maintains or guides the apron along a constant path of travel. The downward spacing projection **12** of the U-shaped tensor holder **9** contacts the upper surface of a bottom tensor bar **16** in order to define the position of the top tensor mechanism relative to the bottom tensor mechanism and thereby effect the proper spacing between the top and bottom aprons. The movable tensor **10** is urged or biased forwardly by the spring **13** as already explained and the top apron **5** is placed under a constant and uniformly tensioned condition. Because of the independency of respective movable tensors **10**, a processing condition of one drafting equipment is not disturbed by that of any other drafting equipment under any kind of situation. Lateral displacement of the top apron **5** is prevented by the installation of the apron holder **7** and the top apron guide.

Although the stationary plate **11** is purposed for only the two neighboring drafting equipment in the above explanation, it can be purposed for more than two sets of drafting equipment only by elongating the stationary plate **11** with increase in the number of related parts such as the U-shaped tensor holder **9**, the movable tensor **10** and the arbor holder **7**.

Another embodiment of the top cradle mechanism of the present invention is shown in FIGS. **6** and **7**. The fundamental construction of the mechanism is almost the same as that of the foregoing embodiment. In this embodiment, a movable tensor plate **23** of U-shaped cross section and having a pair of opposed legs defining a space therebetween is slidably inserted over the stationary plate **11** with its curved apex portion facing forward (downstream). The curved portion interconnects the opposed legs and provides the tensor plate into with open end and a closed end. A lower portion of the movable tensor **23** is provided with a pair of long apertures **24** and **25** adapted for receiving the corresponding protuberances **14** and **15** of the stationary plate **11** as shown in FIG. **7**. At a position covered by the movable tensor **23**, a forward brim or edge portion of the stationary plate **11** is provided with a plurality of recesses or cutoffs and a spring **26** is placed in each cutoff so as to urge or bias the movable tensor **23** forward into pressure contact with its corresponding apron.

By employing the top cradle mechanism of the present invention having the above-described construction, interference of the drafting operation of the respective drafting equipment can be effectively prevented and every top apron of the respective drafting equipment can be placed under individually and optimumly tensioned condition while assuring stable and uniform drafting operations thereof.

Further, the so-called tensor gauge can be easily adjusted by changing the tensor holder **9** in the embodiment shown in FIG. **2** or the stationary plate **11** in the embodiment shown in FIG. **6**.

What I claim is:

1. In a fiber drafting system having a series of top and a series of bottom movable aprons cooperative together to transport fibers therebetween, the improvement comprising: an elongated stationary plate; a plurality of tensor plates slidably mounted on said stationary plate in axially spaced-apart relationship; a plurality of U-shaped tensor holders each having a pair of opposed legs defining a space therebetween removably connected to said stationary plate and wherein said stationary plate and tensor plates are disposed within respective ones of said tensor holder spaces and wherein each said tensor plate slidably extends outwardly from the legs of its corresponding tensor holder; a rotatably mounted boss roller positioned adjacent each said tensor holder; an apron positioned around each said boss roller and corresponding slidable tensor plate defining one of said series of movable aprons; and biasing means for independently biasing said slidable tensor plates into pressure contact with their respective aprons.

2. A drafting system according to claim **1**; wherein each said tensor plate has means therein defining a recess; and wherein said biasing means comprises a spring disposed within each said recess in engagement with corresponding ones of said tensor holders to effectively bias each tensor plate into pressure contact with its respective apron.

3. A drafting system according to claim **1**; wherein each said tensor plate has means therein defining a plurality of elongated slots extending transversely to the longitudinal axis of said stationary plate; and wherein said stationary plate has a plurality of projections extending therefrom each slidably disposed within individual ones of said slots; and wherein said slots and projections are dimensioned to allow sliding movement of said tensor plates relative to said stationary plate with 2° of freedom.

4. A drafting system according to claim **1**; wherein each of said tensor holders has means on one leg thereof for releasably engaging with said stationary plate.

5. A drafting system according to claim **1**; wherein each said tensor holder is provided with a spacing projection dimensioned to effect the proper spacing between said top and bottom movable aprons.

6. A drafting system according to claim **1**; further including guide means connected to said stationary plate for guiding said aprons along a constant path of travel.

7. In a fiber drafting system having a series of top and a series of bottom movable aprons cooperative together to transport fibers therebetween, the improvement comprising: an elongated stationary plate having means therein defining a plurality of axially spaced-apart recesses along one edge thereof; a plurality of U-shaped tensor plates each having a pair of opposed legs interconnected at one end by a curved portion slidably disposed on said stationary plate overlying respective ones of said recesses; a rotatably mounted boss roller positioned adjacent the open end of each said tensor plate; an apron positioned around each said boss roller and corresponding slidable tensor plate defining one of said series of movable aprons; and biasing means disposed interiorly of said tensor plates for independently biasing said slidable tensor plates into pressure contact with their respective aprons.

8. A drafting system according to claim 6; wherein said biasing means comprises a spring disposed within each said recess in engagement with corresponding ones of said tensor holders to effectively bias each tensor plate into pressure contact with its respective apron.

9. A drafting system according to claim 7; wherein each said tensor plate has means therein defining a plurality of elongated slots extending transversely to the longitudinal axis of said stationary plate; and wherein said stationary plate has a plurality of projections extending therefrom each slidably disposed within individual ones of said slots; and wherein said slots and projections are dimensioned to allow sliding movement of said tensor plates relative to said stationary plate with 2° of freedom.

10. A drafting system according to claim 7; further including guide means connected to said stationary plate for guiding said aprons along a constant path of travel.