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(54) **TOP APRON CRADLE FOR AN APRON DRAFTING SYSTEM OF A TEXTILE MACHINE**

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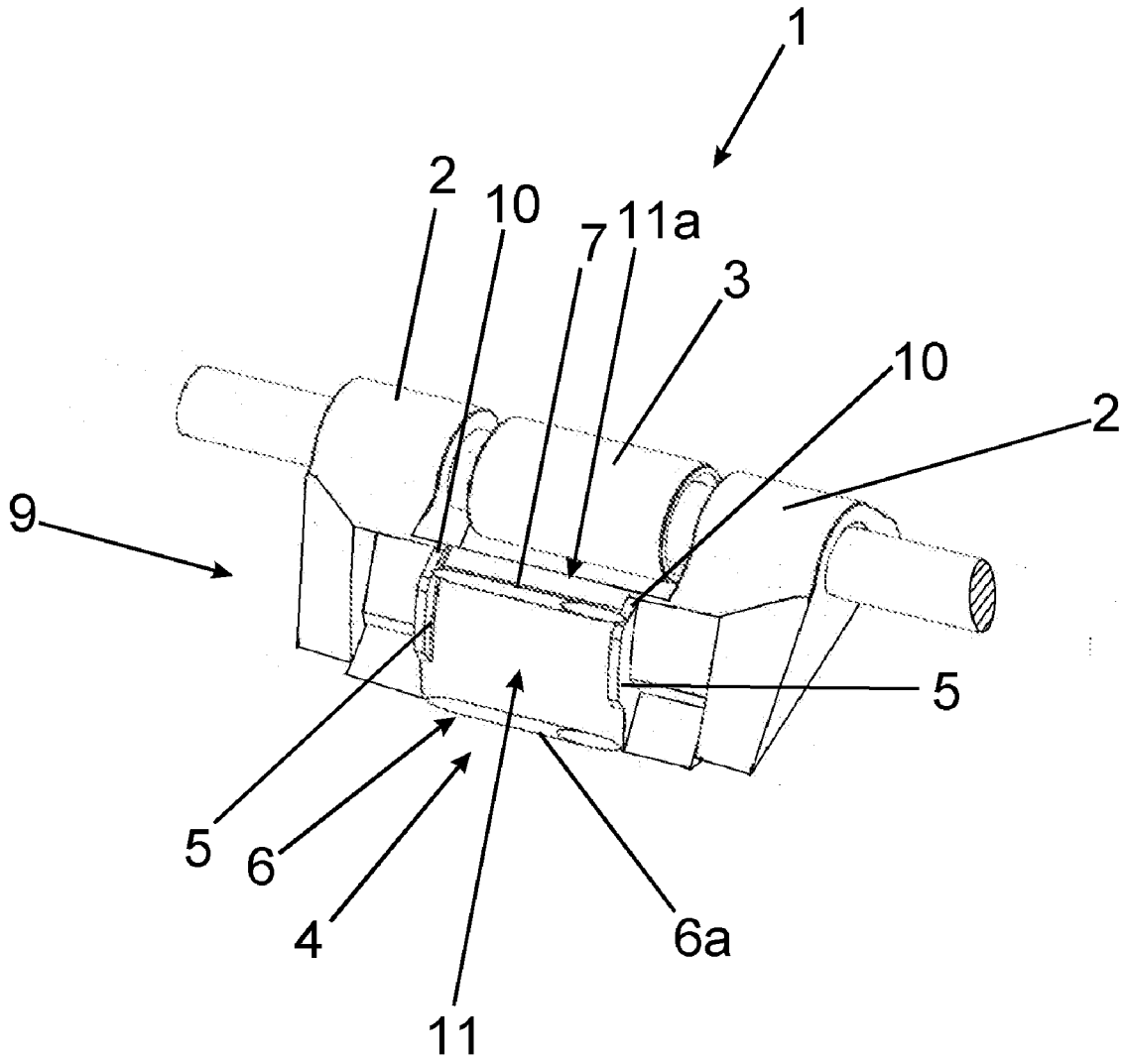
(57) **ABSTRACT**

A top apron cradle for an apron drafting system of a textile machine with an apron guide unit for circumferentially guiding a top apron looped around a top roller of the apron drafting system. The apron guide unit has an apron guide section for guiding the top apron, the apron guide section having an entrance section and a deflection section. The apron guide unit has a receptacle, which is assigned to the entrance section, for a replaceable tensioning element which can be brought into pressure contact with an inner side of the top apron, and the tensioning element. For guiding the top apron via the tensioning element and the deflection section, the receptacle and the tensioning element replaceably accommodated in the receptacle are formed at a distance from the area of the apron guide section enclosed by the tensioning element and the deflection section.



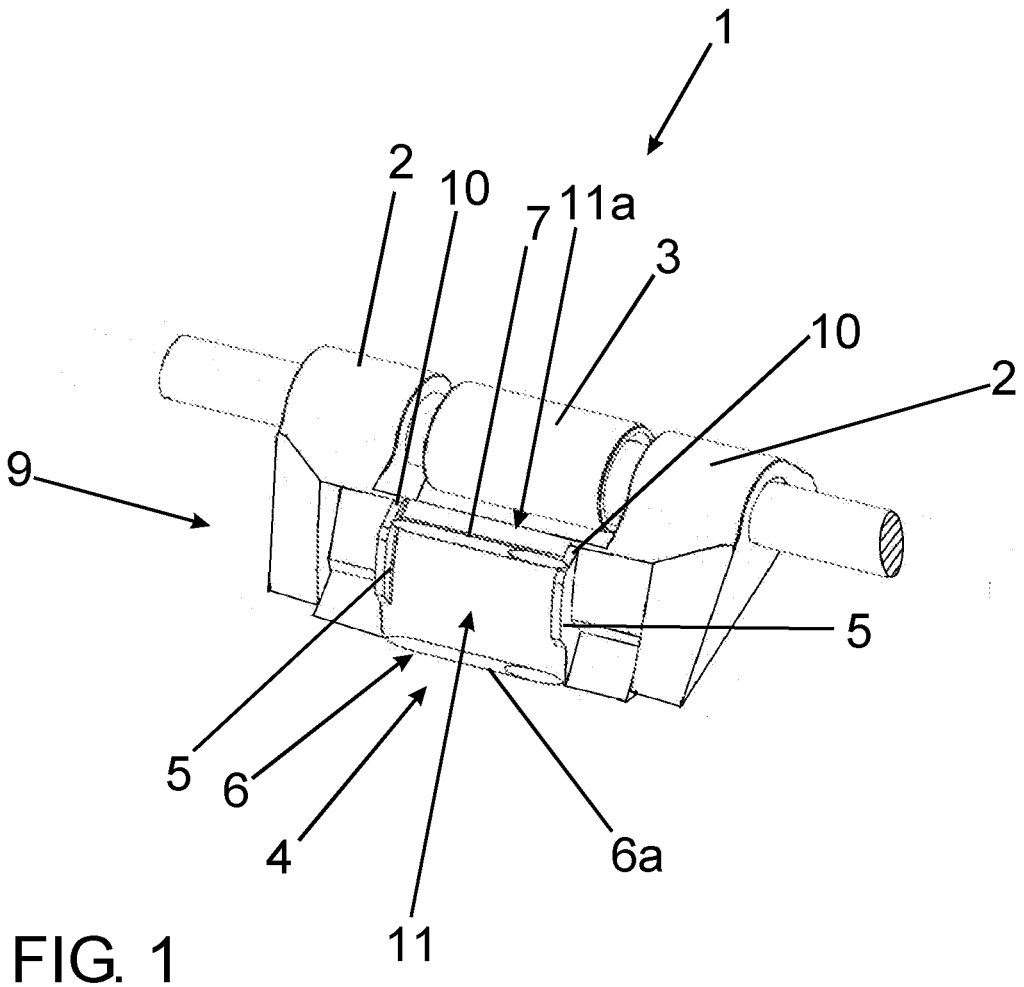


FIG. 1

FIG. 2a

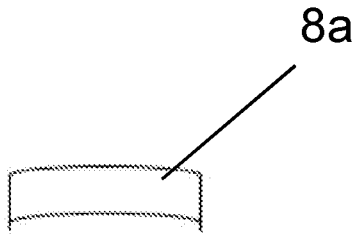


FIG. 2b

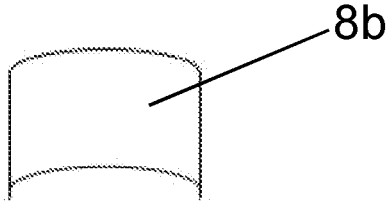
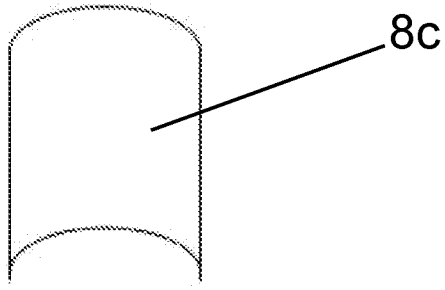


FIG. 2c



TOP APRON CRADLE FOR AN APRON DRAFTING SYSTEM OF A TEXTILE MACHINE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority from Luxembourg Patent Application No. LU102828, filed Jun. 10, 2021, entitled "Oberriemchenhalter für ein Riemchenstreckwerk einer Textilmaschine", the entire contents of which are incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

[0002] The present invention relates to a top apron cradle for an apron drafting system of a textile machine, in particular a pre-spinning machine such as a roving frame and a spinning machine such as a ring spinning machine or air-spinning machine, with an apron guide unit for circumferentially guiding a top apron wrapped around a top roller of the apron drafting system, with an apron guide section for guiding the top apron, in which case the apron guide section has an entrance section for receiving and guiding the top apron, and a deflection section spaced apart from the entrance section for deflecting the guided top apron, and a top roller bearing unit for bearing the top apron cradle and for positioning the apron guide unit downstream of the top roller in the circumferential direction of the top apron.

BACKGROUND OF THE INVENTION

[0003] Many different drafting system configurations are known from the prior art. They are used to draft or draw a fibre band in which case the cross-section of the fibre band is reduced. During the draft, the fibres must be slid next to one another as evenly as possible so that an even fibre band is achieved, which is a prerequisite for producing an even yarn.

[0004] In order to draft the fibre band, the drafting systems generally have a plurality of roller pairs arranged one after the other, which roller pairs, arranged lying on each other, transport the fibre band running clamped between them. A roller pair usually consists of a bottom roller and a top pressure roller adjacent to the bottom roller, one of which is driven and the other is set in rotation via the pressure contact. A draft of the fibre band is achieved in that the circumferential velocity increases from roller pair to roller pair in the transport direction of the fibre band defined by the direction of rotation of the roller pairs, with the different circumferential velocities of the roller pairs immediately following one another in the transport direction determining the drafting ratio.

[0005] The bottom rollers are each arranged on a carrying device, in particular a drafting system carriage, are arranged one behind the other in the transport direction of the fibre band and form a drafting system bottom section of a drafting system. Since the fibres of the fibre band lose their cohesion in the main drafting zone where the fibre band is drafted with high drafting values, drafting systems configured as apron drafting systems have already been disclosed, in which the fibre band is guided by aprons between the nip lines of the roller pairs immediately succeeding one another. Apron drafting systems are particularly widespread in this context, in which one apron each is guided around a top and bottom roller in the area of the main drafting zone and is deflected by an apron guide unit towards the output roller pair into the return direction, so that the fibre band can be guided between the top and bottom apron.

[0006] Usually, the aprons which are configured as an endless belt are guided further around a tensioning apparatus which keeps the aprons at the pretension required for operation. Tensioning devices of prior art are usually aligned axially to the running direction and thus influence the depth of the guided apron in the running direction, which hinders precise distance adjustments. If devices for adjusting the tension of the apron are not used, this will require a very small tolerance of the apron length to ensure proper operation.

[0007] On this basis, the problem addressed by the present invention is one of providing a top apron cradle for an apron drafting system as well as an apron drafting system having such a top apron cradle, in which tolerances in the apron length can be compensated quickly and variably in a simple manner.

SUMMARY OF THE INVENTION

[0008] The present invention solves the problem by a top apron cradle for an apron drafting system of a textile machine with an apron guide unit for circumferentially guiding a top apron looped around a top roller of the apron drafting system, with an apron guide section for guiding the top apron, the apron guide section having an entrance section for receiving the top apron and a deflection section spaced apart from the entrance section for deflecting the guided top apron, and a top roller bearing unit for bearing the top apron cradle and positioning the apron guide unit downstream of the top roller in the circumferential direction of the top apron. The apron guide unit has a receptacle, which is assigned to the entrance section, for a replaceable tensioning element which can be brought into pressure contact with an inner side of the top apron, and the tensioning element, in which case the receptacle and the tensioning element replaceably accommodated in the receptacle for guiding the top apron via the tensioning element and the deflection section are formed at a distance from the area of the apron guide section enclosed by the tensioning element and the deflection section.

[0009] The present invention solves the problem by an apron drafting system having a drivable first roller pair and a drivable second roller pair for drafting a fibre band, the first and second roller pairs being arranged at a distance from one another in the fibre band transport direction between a top and bottom roller of each roller pair for clamping transport of the fibre band, the first and second roller pairs being drivable at different rotational speeds in the operating condition of the apron drafting system to form a drafting zone located between the clamping lines of the first and second roller pairs, a top apron cradle, which is arranged between the first and second roller pairs and, in the drafting zone, circumferentially guides a top apron having a top roller of the first roller pair looped around it circumferentially along the fibre band transport direction, characterised in that the top apron cradle is a top apron cradle having the above described features.

[0010] Advantageous further developments of the present invention are set forth herein.

[0011] It is characteristic of the present invention that the apron guide unit has a receptacle associated with the entrance section for a replaceable tensioning element that

can be brought into pressure contact with an inner side of the top apron, as well as the tensioning element. Preferably, the receptacle can be integral with the apron guide section in the region of the entrance section or can be formed as a separate component that can be coupled to the entrance section, for example via a support unit, as described in more detail below. For guiding the top apron via the tensioning element and the deflection section, the receptacle and the tensioning element replaceably accommodated in the receptacle are formed at a distance from the area of the apron guide section enclosed by the tensioning element and the deflection section. In other words, in the operating condition of the top apron cradle, the top apron is guided by the tensioning element while forming an air gap interposed between the tensioning element and the deflection section and between the inner side of the top apron and the opposite surface side of the apron guide section. The guide plane formed by the tensioning element and the deflection section, which corresponds to an inside surface section of the feeding top apron, extends at a distance from the surface section of the apron guide section, which is enclosed by the tensioning element and the deflection section in the guiding direction or along the guide plane, respectively. The tensioning element, which can generate a uniform tension depending on its configuration due to it being arranged inside the top apron in the operating condition, enables individual adjustment of the apron tension depending on the configuration of the tensioning element. Tolerances in the apron length can be compensated for by selecting the size of the tensioning element, in which case the apron tension can be set with high accuracy.

[0012] According to a preferred embodiment of the present invention, the apron guide section has, at its end forming the deflection section, a further receptacle which is configured for receiving a replaceable deflection element for deflecting the circumferentially guided top apron, as well as the deflection element. This allows the guide of the top apron, which is raised towards the surface side of the apron guide section, to be supported in a simple manner. The deflection section or deflection element with the further receptacle are thus configured for defined guidance of the top apron. In particular, the use of a deflection element formed separately from the apron guide section also enables precise adjustment of the distance between the apron and the downstream output roller pair, which is crucial for a uniform yarn and piecing quality. By using the deflection element, the distance can be precisely adjusted in a reproducible manner. Furthermore, depending on its configuration, the deflection element can form an additional tensioning element by means of which the adjustment of the apron tension can be favourably supported with high precision.

[0013] The embodiment of the tensioning element and its arrangement on the top apron cradle in the area of the entry section of the apron guide section and the embodiment of the deflection element and its arrangement on the top apron cradle in the area of the deflection section of the apron guide section are basically freely selectable. According to a particularly advantageous embodiment of the present invention, however, there is provision for the receptacle and/or the further receptacle to be formed by two guiding means or guides that are spaced apart for lateral guidance of the top apron, and for the tensioning element or the deflection element to be configured as a guide bar which is arranged in the region between the guiding means and extending in its longitudinal axis direction in the direction of the guiding means until the receptacle or further receptacle, the two guiding means being arranged in particular at a lateral edge of the apron guide section and in particular being integrally formed with that.

[0014] An alignment of the guide bar to the guiding means which thereby runs transversely to the circumferential direction of the top apron ensures uniform application of the tension applied to the top apron by the guide bar, in which case the transverse alignment of the guide bar to the guiding means guiding the top apron laterally ensures that no forces acting transversely to the circumferential direction of the top apron are applied to the top apron by the guide bar. In particular, the transverse alignment effectively prevents twisting of the top apron in the contact area with the guide bar. Particularly preferably, the tensioning element or the deflection element is accommodated in the respective receptacle or further receptacle perpendicular to the circumferential direction of the top apron, as a result of which compressive forces directed exclusively in the guiding direction are applied to the tensioning element and its receptacle or to the deflection element and its further receptacle.

[0015] The arrangement of the tensioning element or the deflection element, in particular as a corresponding or individually configured guide bar, can basically be carried out in any way. For example, it is possible for the tensioning element or the deflection element to be arranged detachably on the top apron cradle in a fixed position so that, depending on the tension to be set on the top apron and/or with reference to the deflection element, differently configured guide bars with different lengths of contact area can be used depending on the distance to be set from the outlet roller in order to achieve optimum alignment of the top apron.

[0016] According to a preferred embodiment of the present invention, the tensioning element and/or the deflection element has at least one retaining pin, the receptacle or the further receptacle being configured to accommodate the retaining pin for interchangeably accommodating the tensioning element or the deflection element, the retaining pin, of which there is at least one, extending transversely to a guide bar of the tensioning element or of the deflection element, which guides the top apron. For example, in a preferred variant with only one retaining pin, the tensioning element or the deflection element forms a cross-sectional T-shape in a sectional plane running along the guide bar through the guide bar and the retaining pin. In a particularly preferred variant with two retaining pins, such a cross-sectional shape transitions into a Tr-shape, which allows greater stability than the T-cross section.

[0017] According to a preferred further embodiment of the present invention, a support unit associated with the apron guide unit is provided, which forms the receptacle for the tensioning element or the further receptacle for the deflection element and on which the tensioning element or deflection element, in particular configured as a guide bar, is detachably arranged, the support unit being supported on the top apron cradle, in particular on the apron guide unit.

[0018] According to this embodiment of the present invention, there is provision for a support unit to be arranged on the top apron cradle, which is configured to receive the tensioning element or the deflection element in a detachable and thus exchangeable manner. The use of a support unit ensures that it can be adapted to the embodiment of the tensioning element or the deflection element and that it can

be easily replaced in order to set the desired apron tension or to adjust the distance from the outlet roller. The support unit accommodating the tensioning element or the deflection element is supported on the top apron cradle at such a point that, in the operating condition of the top apron cradle, reliable contact of the tensioning element or the deflection element with the inner side of the top apron can be ensured and, at the same time, the top apron can be easily replaced if necessary. Further preferably, the support unit is arranged in such a way that the receptacle or the further receptacle is arranged adjacent to the lateral guiding means in the circumferential direction or guiding direction of the top apron.

[0019] According to a preferred embodiment of the present invention, there is provision for the tensioning element to be mounted or accommodated in the receptacle and/or the deflection element to be mounted or accommodated in the further receptacle in a direction opposite to the apron guide section, i.e. in the direction of the top apron, pretensioned, in particular spring-pretensioned. A pretensioned contact of the tensioning element or the deflection element on an inner side of the top apron ensures that the latter can be pretensioned in a particularly uniform manner and that fluctuations occurring during operation can be compensated for by the pretension, in particular spring-pretension, so that a particularly trouble-free operation of an apron drafting system equipped with the top apron cradle can be ensured.

[0020] Particularly preferably, a spring unit is provided assigned to the receptacle and/or the further receptacle. The spring unit can further preferably be arranged in the receptacle or the further receptacle. The spring unit makes it possible, if necessary, to replace the tensioning element or the deflection element while maintaining a pretension created by the spring unit, thereby making it possible to adapt quickly to different top aprons in a simple and convenient manner. It is particularly advantageous for the spring unit to be configured to adjust the pretension acting on the tensioning element or the deflection element.

[0021] The possibility of adjusting the pretension makes it possible to make adjustments to the apron length and the apron tension to be achieved or the distance from the downstream outlet roller in a particularly precise and convenient manner, without it being absolutely necessary to replace the tensioning element or the deflection element for the desired adjustment.

[0022] Supplementary or alternatively, according to a further preferred embodiment of the present invention, there is provision for the receptacle and/or the further receptacle to be configured for interchangeably accommodating at least one adapter element, in which case the adapter element, of which there is at least one, can be coupled to the tensioning element and/or to the deflection element in order to change or adapt the position of the tensioning element and/or of the deflection element relative to the apron surface section in the coupled and accommodated condition. According to this embodiment of the present invention, the apron tension can be individually adjusted using different adapter elements. The selected apron tension can thus be easily determined by exchanging the differently configured adapter elements. For example, the adapter elements can be slotted so that they can be placed on the tensioning element or on the deflection element or on an associated retaining pin and easily removed again if required.

[0023] According to a further aspect of the present invention, an apron drafting arrangement is proposed for a textile machine such as a pre-spinning machine, in particular for a roving frame, or a spinning machine, in particular for a ring spinning or air-spinning machine, having a first drivable roller pair and a second drivable roller pair for drafting a fibre band, the first and second roller pairs being arranged at a distance from one another in the fibre band transport direction between a top and bottom roller of each roller pair for the clamping transport of the fibre band, the first and second roller pairs being drivable at different rotational speeds in the operating condition of the apron drafting system to form a drafting zone lying between the nip lines of the first and second roller pairs, and with a top apron cradle arranged between the first and second roller pairs, the top apron cradle in the drafting zone guiding a top apron having a top roller of the first roller pair looped around it circumferentially along the fibre band transport direction. The apron drafting system is characterised in that the top apron cradle is configured in accordance with an embodiment preferred above.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] An embodiment example of the present invention is explained below with reference to the drawings. In the drawings:

[0025] FIG. **1** is a perspective view of a top apron cradle;

[0026] FIG. **2***a* illustrates a first embodiment of an adapter element;

[0027] FIG. **2***b* illustrates a second embodiment of an adapter element and

[0028] FIG. **2***c* illustrates an third embodiment of an adapter element.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0029] FIG. **1** shows a perspective view of a top apron cradle **1** of an apron drafting system not shown here, according to an embodiment example.

[0030] The top apron cradle **1** has two top roller bearing units **2** at a distance from one another, which are connected to a base carrier **9** of an apron guide unit **4**.

[0031] The apron guide unit **4** has an apron guide section **11** which is laterally bounded by bar-like guiding means **5** which, in an operating condition of the top apron cradle **1**, bounds a lateral running path of an endless top apron which is not shown here. During operation, the top apron is guided over the top roller **3** in the direction of the apron guide section **11**. For receiving the top apron, the apron guide section **11** has an entrance section **11***a* and a deflection section **6** spaced apart from the latter. The deflection section **6** has a bar-shaped deflection element **6***a* which the top apron is guided around. The deflection element **6***a* is held in a replaceable manner in a further receptacle which is not shown. The deflection element **6***a* is configured as a guide bar. Depending on the embodiment of the deflection element **6***a*, the distance from a downstream top roller of an output roller pair, which is not shown, of the apron drafting system can be variably adjusted in the fibre band transport direction.

[0032] To generate a desired apron tension, a tensioning element **7** in the form of a guide bar extends between the guiding means **5** and is detachably connected to the guiding means **5**. In operation, the tensioning element **7** rests against an inner side of the top apron and causes the apron pretension via its contact area. The tensioning element **7** is

interchangeably held in receptacles **10**, the receptacles **10** being formed by the guiding means **5** according to this preferred embodiment example. Alternatively, according to an embodiment example not shown, the receptacle can be part of a support unit associated with the apron guide unit **4**, on which the tensioning element **7** is detachably arranged, the support unit being supported on the top apron cradle **1**. In this case, the receptacle can be arranged adjacent or next to the guiding means **5** in the guiding direction.

[0033] The apron tension as well as the distance from the outlet roller can be changed by the arrangement of different adapter elements **8***a*, **8***b*, **8***c* (see FIGS. **2***a* to **2***c*) correspondingly on the tensioning element **7** or the deflection element **6***a*, in which case the respective adapter element **8***a*, **8***b*, **8***c* can be accommodated by the receptacle **10** or the further receptacle. The adapter elements **8***a*, **8***b*, **8***c*, when in the accommodated status and coupled to the tensioning element **7** or the deflection element **6***a*, cause a change in position of the same relative to the apron surface section **11** and thus, depending on the adapter element **8***a*, **8***b*, **8***c* used or its embodiment, the apron tension or the distance to the outlet roller, correspondingly. The adapter elements **8***a*, **8***b*, **8***c* can be detachably connected to the tensioning element **7** and/or the deflection element **6***a*, allowing them to be pushed on and thus easily removed from the element if required.

LIST OF REFERENCE SIGNS

[0034] **1** Top apron cradle
[0035] **2** Top roller bearing unit
[0036] **3** Top roller
[0037] **4** Apron guide unit
[0038] **5** Guiding means
[0039] **6** Deflection section
[0040] **6***a* Deflection element
[0041] **7** Tensioning element/guide bar
[0042] **8***a*, **8***b*, **8***c* Adapter element
[0043] **9** Base carrier
[0044] **10** Receptacle
[0045] **11** Apron guide section
[0046] **11***a* Entrance section

What is claimed is:

1. A top apron cradle for an apron drafting system of a textile machine with an apron guide unit for circumferentially guiding a top apron looped around a top roller of the apron drafting system, with an apron guide section for guiding the top apron, the apron guide section having an entrance section for receiving the top apron and a deflection section spaced apart from the entrance section for deflecting the guided top apron, and a top roller bearing unit for bearing the top apron cradle and positioning the apron guide unit downstream of the top roller in the circumferential direction of the top apron,

characterised in that

the apron guide unit has a receptacle, which is assigned to the entrance section, for a replaceable tensioning element which can be brought into pressure contact with an inner side of the top apron, and the tensioning element, in which case the receptacle and the tensioning element replaceably accommodated in the receptacle for guiding the top apron via the tensioning element and the deflection section are formed at a distance from the area of the apron guide section enclosed by the tensioning element and the deflection section.

2. The top apron cradle according to claim **1**, characterised in that the apron guide section has, at its end forming the deflection section, a further receptacle which is configured for receiving a replaceable deflection element for deflecting the circumferentially guided top apron, as well as the deflection element.

3. The top apron cradle according to claim **2**, characterised in that the receptacle and/or the further receptacle is formed by two guides that are spaced apart for lateral guidance of the top apron, and that the tensioning element or the deflection element is configured as a guide bar which is arranged in the region between the two guides and extending in its longitudinal axis direction in the direction of the two guides until the receptacle or further receptacle, the two guides being arranged at a lateral edge of the apron guide section and being integrally formed with that.

4. The top apron cradle according to claim **1**, characterised in that the tensioning element and/or the deflection element has at least one retaining pin and the receptacle or the further receptacle is configured to accommodate the retaining pin for interchangeably accommodating the tensioning element or the deflection element, the retaining pin, of which there is at least one, extending transversely to a guide bar of the tensioning element or of the deflection element which guide bar guides the top apron.

5. The top apron cradle according to claim **1**, characterised in that the receptacle is part of a support unit associated with the apron guide unit, on which the tensioning element is detachably arranged, the support unit being supported on the top apron cradle.

6. The top apron cradle according to claim **1**, characterised in that the tensioning element in the receptacle and/or the deflection element in the further receptacle is pretensioned in a direction opposite to the apron guide section.

7. The top apron cradle according to claim **6**, characterised in that the receptacle and/or the further receptacle has a spring unit assigned to it which is configured to adjust the pretension acting on the tensioning element or the deflection element.

8. The top apron cradle according to claim **1**, characterised in that the receptacle and/or the further receptacle is configured for interchangeably accommodating at least one adapter element, in which case the adapter element, of which there is at least one, can be coupled to the tensioning element and/or to the deflection element in order to change the position of the tensioning element or the deflection element relative to the apron surface section in the coupled and accommodated condition.

9. The top apron cradle according to claim **1**, characterised in that the textile machine is a pre-spinning machine, a ring spinning machine or an air-spinning machine.

10. The top apron cradle according to claim **6**, characterised in that pretensioned is spring-pretensioned.

11. An apron drafting system for a textile machine having a drivable first roller pair and a drivable second roller pair for drafting a fibre band, the first and second roller pairs being arranged at a distance from one another in the fibre band transport direction between a top and bottom roller of each roller pair for clamping transport of the fibre band, the first and second roller pairs being drivable at different rotational speeds in the operating condition of the apron drafting system to form a drafting zone located between the clamping lines of the first and second roller pairs,

a top apron cradle, which is arranged between the first and second roller pairs and, in the drafting zone, circumferentially guides a top apron having a top roller of the first roller pair looped around it circumferentially along the fibre band transport direction,

characterised in that

the top apron cradle is a top apron cradle according to claim **1**.

12. The apron drafting system according to claim **11**, characterised in that the textile machine is a roving frame, a ring spinning machine or an air-spinning machine.

* * * * *