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(54) **CRADLE ASSEMBLY FOR A DRAFTING DEVICE OF A SPINNING MACHINE**

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Description

[0001] The present invention relates to a cradle assembly for a drafting device of a spinning machine comprising an apron cradle for a first top apron and a second top apron, wherein said apron cradle is provided for supplying a common front roller with two types of bundle of fibres.

Background of the invention

[0002] The production of fancy yarn of the type that it combines the use of two types of roving or fibres of different colours or nature is known.

[0003] Patent WO201533811 discloses a production method of fancy yarn wherein the feeding of a first type of bundle and a second type of bundle is operated to form a yarn that combines different blending ratios of these two types of fibres. This fancy yarn production method requires the use of a drafting device that has two rows of apron pairs located behind the front rollers and provided for supplying a common front roller with the two types of bundle of fibres.

[0004] Patent document EP3124658 A1 discloses a drafting device with a cradle assembly comprising two apron cradles and each apron cradle for both a first top apron and a second top apron mounted adjacent the first top apron for supplying a front roller with two types of bundle of fibres in a common spinning position. The drafting device includes a pressing portion that increases the contact pressure between a back bottom apron and a back top apron without changing the contact pressure between a middle bottom apron and a middle top apron.

[0005] The drafting devices disclosed in the above-mentioned patents include front rollers, a middle apron pair which is disposed behind the front rollers and supplies a first type of bundle of fibres to the front rollers, and a back apron pair which is disposed behind the front rollers and supplies a second type of bundle of fibres to the front rollers. The first type of bundle supplied to the middle apron pair is drafted between the front rollers and the middle apron pair, while the second type of bundle supplied to the back apron pair is drafted between the front rollers and the back apron pair. These middle apron pair and the back apron pair are controlled for the start and stop thereof during spinning by controlling the operation of the middle bottom roller and the back bottom roller. Thus, with a simple structure of the drafting device, the blending ration of two different types of fibres can be changed within a range and a desired fancy yarn can be spun continuously.

[0006] The middle apron pair disclosed in the drafting device of the above-mentioned patent includes a middle bottom apron and a middle top apron, and said middle top apron is wrapped around and between a middle top roller and an apron cradle. The back apron pair of the same drafting device includes a back bottom apron and a back top apron, and said back top apron is wrapped

around and between a back top roller and the same apron cradle. Both said middle top apron and said back top apron use a common top apron tensioner on the same apron cradle that is intended to keep in position the top aprons over the rotating top rollers.

[0007] It is known that top apron tensioners are needed for the top aprons to move smoothly and uniformly over the top rollers so that fibres are effectively guided in the main draft zone to achieve a good quality yarn. The shape of the top aprons over the top rollers may vary depending on the apron lengths and also on the frictional forces. Top apron tensioners help keeping the top aprons in position during rotation. However, in the particular case of the yarn production method disclosed in patent WO201533811, it has been found difficult to achieve a proper adjustment of the tension of the middle and back top aprons since although the two rows of top aprons are guided by the same apron cradle, they have a different length and they are wrapped around different top rollers. This difference in length makes difficult to regularizing the tension in the apron during rotation over the top rollers.

[0008] It is therefore necessary to provide a solution to the state of the art which covers the gaps found therein, by the provision of an assembly which overcomes the above-mentioned shortcomings, and hence provides an optimum tension in top aprons during rotation over the rollers of a drafting device of a spinning machine that produces a fancy yarn that combines two types of bundle of fibres.

Description of the invention

[0009] The objective of the present invention is that of providing an improved cradle assembly for a drafting device of a spinning machine, comprising an apron cradle for a first top apron and a second top apron, wherein said apron cradle is provided for supplying a common front roller with two types of bundle of fibres.

[0010] In accordance with this objective, according to a first aspect, the present invention provides a cradle assembly that is characterized in that the apron cradle includes;

- a first tensioning means for a first top apron, and
- a second tensioning means for a second top apron,

wherein said first and second tensioning means comprise first and second movable tensioning surfaces, and said movable tensioning surfaces are movably mounted on said apron cradle to be able to independently act on the first top apron and the second top apron upon movement to a tensioning working position.

[0011] According to a second aspect, the present invention provides a drafting device for a spinning machine, comprising the claimed cradle assembly, that includes;

- a first top apron with a first apron length for supplying

a first type of bundle of fibres to a front roller, said first top apron being wrapped around a first movable tensioning surface of the apron cradle and a middle top roller of the drafting device, and

- a second top apron with an apron length different from the length of the first top apron for supplying a second type of bundle of fibres to the same front roller, said second top apron being wrapped around a second movable tensioning surface of the same apron cradle and a back top roller of said drafting device,

wherein said first and second movable tensioning surfaces are movably mounted on the said apron cradle to be able to independently act on the first top apron and the second top apron upon movement to a tensioning working position.

[0012] According to a third aspect, the present invention provides a method of drafting a fancy yarn with the claimed cradle assembly. The method is characterized in that it includes the steps of;

a) drafting a first type of bundle of fibres by means of a middle apron pair that supplies a front roller with said first type of bundle of fibres, the top apron of said middle apron pair being wrapped around a first movable tensioning surface of an apron cradle and a middle top roller,

b) drafting a second type of bundle of fibres by means of a back apron pair that supplies the same front roller with said second type of bundle of fibres, the top apron of said back apron pair being wrapped around a second movable tensioning surface of the same apron cradle and a back top roller, and the step of,

c) independently acting on the top aprons of said middle and back apron pair by moving said first and second movable tensioning surfaces of the same apron cradle to attain an independent working tension position during rotation of said top aprons over the middle and back top rollers.

[0013] According to fourth aspect, the present invention provides a ring spinning machine provided with the claimed cradle assembly for producing and drafting a fancy yarn according to the claimed method, said machine comprising;

- a middle apron pair to which a first bundle of fibres is supplied,
- a back apron pair to which a second bundle of fibres is supplied,
- wherein said middle apron pair and said back apron pair are controlled by operating a middle bottom roller and a back bottom roller, and
- a processing and control unit configured to allow the simultaneous feeding of said first bundle of fibres and said second bundle of fibres to a drafting device

of a single spindle position, so that said both bundles of fibres are susceptible of being simultaneously drafted between the front rollers and the middle apron pair, and between the front rollers and the back apron pair.

[0014] The present invention provides an improved cradle assembly that includes two movable tensioning surfaces that are movably mounted on the same apron cradle to be able to independently act on the first top apron and the second top apron upon movement to a tensioning working position. In this way, each movable tensioning surface is able to attain an independent tensioning working position.

[0015] Thanks to these characteristics, the tension of a first top apron, for example, the middle top apron, and the tension of a second top apron, for example, the back top apron, may be simultaneously adjusted as required during rotation of said top aprons over the top rollers, by independently acting on the middle and back top aprons with two tensioning surfaces movably mounted on the same apron cradle. In this manner, a uniform movement of each top apron over the top rollers is ensured to guarantee a high quality yarn despite the fact that these top apron have a different length and rotate over different top rollers.

[0016] Indeed, the movement of each tensioning surface helps to regulate the tension in its corresponding top apron during rotation of said apron over the top rollers, such that smooth and uniform movement of the two top aprons is enabled without the tension of one top apron influencing or changing the tension of the other. Thus, the quality of the fancy yarn production is ensured.

[0017] According to a preferred embodiment, the first movable tensioning surface is movably mounted on the apron cradle such that it is able to act on the first top apron upon movement, and the second movable tensioning surface is movably mounted adjacent to the first one such that it is able to independently act on the second top apron upon movement.

[0018] Preferably, said first, or said second, tensioning movable surface comprise an apron lateral separator element arranged to prevent the first top apron from sliding laterally over the adjacent second top apron.

[0019] Advantageously, each of said first and second movable tensioning surfaces is foreseen on a different top apron support movably mounted on a cradle frame of said apron cradle and, preferably, according to an embodiment, each of said movable top apron supports includes a convex and, optionally, engraved movable tensioning surface over which a corresponding top apron moves on.

[0020] Thanks to these characteristics, each top apron rotates over its own convex surface provided on a different top apron support and said top apron supports are movably mounted on the cradle frame of the apron cradle to be able to attain an independent tensioning working position upon movement, for example, upon rotation from

a first resting position to a second tensioning working position to act on its corresponding top apron.

[0021] For a preferred embodiment, each of said movable top apron supports is movably mounted on the cradle frame such that each of them is able to accumulate, in a tensioning working position, potential energy capable of being independently transmitted as a tension force to the corresponding top apron while said top apron moves over its corresponding movable top apron support. This cumulated potential energy may come from the compression force applied to a spring or, for example, to a pneumatic element, or to any other similar element or device.

[0022] This embodiment has the advantage that helps to maintain consistent nip position and adjusts in real time for any fluctuations in apron length during rotation.

[0023] Preferably, the cradle frame of the apron cradle includes a fixed wedge-shaped top apron support and the movable top apron supports of both said first and second top aprons are movably mounted on said fixed wedge-shaped top apron support.

[0024] In this way, both the first and second top aprons may be wrapped around said common fixed wedge-shaped support so that an accurate position of the top aprons next to the front rollers is ensured.

[0025] According to an embodiment, the claimed cradle assembly comprises the apron cradle with one movable top apron support with a first width and another movable top apron support with a second width different from the first width, and preferably, said cradle assembly comprises one of said apron cradle for a first spinning position S1, and another of said apron cradle for a second spinning position S2, said apron cradles being mounted on the cradle frame, a single cradle frame, attachable to the weighting bar of an spinning machine.

[0026] Advantageously, according to the same embodiment;

- the first apron cradle has one of said top apron supports narrower than the other top apron support of the same apron cradle, said narrower top apron support being provided with a guide element and the apron lateral separator element,
- the second apron cradle has one of said top apron supports wider than the other top apron support of the same apron cradle, said wider top apron support being provided with a second laterally displaced guide element and another apron lateral separator element and, preferably,
- the movable top apron supports of the first and second apron cradles are mounted interchangeably on said cradle frame such that the distance (d1, d2) between the apron lateral separator elements of both apron cradles is set to vary in order to modify the position of the spinning positions S1, S2 of the spinning machine.

[0027] It has been found that the position of the apron lateral separator element of each apron cradle deter-

mines the spinning position of the fancy yarn so that by providing top apron supports of different width and by interchanging the top apron supports of both apron cradles, it is possible to change the distance (d1, d2) between apron lateral separator elements of both apron cradles and therefore, it is possible to change very easily the spindle gauge of the spinning machine (that is to say the distance between the spinning positions S1, S2 of the spinning machine) without the need to modify the distance between rollers and avoiding to provide different cradle assemblies for each spindle gauge.

In the present invention;

[0028] Fancy yarn shall be understood to be yarn formed from a first type of bundle of fibres and a second type of bundle of fibres, said first type of bundle of fibres being, for example, a bundle selected from among natural, artificial or synthetic fibres, and said second type of bundle of fibres being, for example, a bundle selected from among natural, artificial or synthetic fibres.

[0029] Roller pair shall be understood to be a top roller and a bottom roller of a drafting device. The bottom rollers are positively driven and the top rollers are driven by the friction between the top rollers and the bottom rollers.

[0030] Apron shall be understood to be an endless belt made from rubber or any other suitable material. The apron helps in guiding the fibres from one roller pair to the other roller pair of the drafting device.

[0031] Apron cradle shall be understood to be an element that has the function of keeping top aprons in position over the rotating top roller so that fibres are effectively guided in the draft zone.

[0032] Apron pair shall be understood to be the pair of aprons that are provided on the top rollers and the bottom rollers to transfer the fibres from the middle roller pair to the front roller pair (middle apron pair), or from the back roller pair to the front roller pair (back apron pair). The aprons on the top rollers are guided by apron cradles and the aprons on the bottom rollers are guided by nose bars. For drafting the fibres, each of the bottom rollers are driven at different rotational speeds such that the front bottom roller is driven at a higher speed than the middle bottom roller and that the back bottom roller. Due to the speed difference, the fibres of each type of bundle are distributed and parallelized (drafted) while passing between a corresponding apron pair.

[0033] Spindle gauge shall be understood to be the distance between the axes of two adjoining spindles or the distance between two adjacent spinning positions S1, S2.

Brief description of the drawings

[0034] For a better understanding of that which is described herein, a set of drawings is attached which, schematically and solely by way of non-limiting example, represent a practical case of embodiment.

Figure 1 shows a perspective view of an embodiment of a cradle assembly of the present invention including a first apron cradle for a spinning position and a second apron cradle for a second spinning position. Each apron cradle has a first and a second tensioning movable surfaces foreseen on different movable top apron supports.

Figure 2 shows a perspective view of the cradle assembly of figure 1 wherein one top apron support of each apron cradle have been represented in a different tensioning working position.

Figure 3 shows four isolated different top apron supports of the cradle assembly of figure 1 wherein each first and second top apron support of each apron cradle has a different width.

Figure 4 shows two front views of two cradle assemblies wherein each cradle assembly is set with a different distance (d1, d2) between apron lateral separator elements of apron cradles.

Figure 5 shows a perspective view of the cradle assembly of figure 1 with a cut section on a first top apron support movably mounted on the cradle frame of one of the apron cradles. This figure 5 shows the spring upon which the top apron support acts when in a tensioning working position.

Figure 6 shows a perspective view of a drafting device of a machine for spinning fancy yarn that incorporates the cradle assembly of figure 1. This figure 6 shows the top aprons supports of each apron cradle independently acting on the first and second top aprons of the drafting device.

Figure 7 shows a side view of the drafting device of figure 7 incorporating the cradle assembly of figure 1.

Description of one preferred embodiment

[0035] Following is a description of an embodiment of the cradle assembly for a drafting device of a spinning machine. In particular a cradle assembly for a drafting device including two rows of apron pairs for supplying a common front roller with two types of bundle of fibres.

[0036] As shown in the appended figures, the present invention relates to a cradle assembly, comprising a first 1 apron cradle and a second 2 apron cradle mounted on a single cradle frame 3 attachable to the pressure or weighting bar 4 of a ring spinning machine.

[0037] The first 1 apron cradle has a first and a second top apron support for the first 5 and second 6 top aprons of a first spinning position S1, and the second 2 apron cradle has a first and a second top apron supports for the first 7 and second 8 top aprons of a second spinning position S2.

[0038] Each top apron support defines a tensioning movable surface that may independently act on the first 5, 7 and second 6, 8 top apron upon movement to a tensioning working position. Figure 2 depicts the second top apron support of each apron cradle 1, 2 displaced to a tensioning working position different from the position

of the first top apron supports of the same apron cradles 1, 2.

[0039] For the illustrated embodiment, each of the above-mentioned top apron supports including its corresponding movable tensioning surfaces A1, A2, a1, a2, is mounted movably on a common fixed wedge-shaped support 9 of the cradle frame 3 to be able to attain an independent tensioning working position upon rotation on a shaft 11 of the support 9. In its working position each top apron support is able to accumulate potential energy from the compression force applied to a spring 14. Figure 5 shows the spring 14 upon which the top apron support a1 acts. Although not represented in the figures, each top apron support is arranged to act on an independent spring so that the cumulated potential energy of each top apron support may be independently transmitted as a tension force to the corresponding top apron 5, 6, 7, 8 whereas each top apron 5, 6, 7, 8 moves over its corresponding movable top apron support.

[0040] As stated in the description of the invention, the claimed cradle assembly allows the tension of two top aprons 5, 6 or 7, 8 to be simultaneously adjusted and to be regularized in real time during rotation on the same apron cradle 1, 2 without the tension of one top apron 5, 7 influencing or changing the tension of the other top apron 6, 8. Thus, the claimed cradle assembly provides an optimum tension in top aprons 5, 6 or 7, 8 of the same apron cradle 1, 2 and ensures that the drafted fibres of each type of bundle of fibres of the fancy yarn are transferred to a common front roller in optimum conditions.

[0041] As can be seen on the figures, the first top apron support including first movable tensioning surfaces A1, a1 of each apron cradle 1, 2 comprises an apron lateral separator element 10a, 10b arranged adjacent to the second top apron support to prevent the first top apron 5, 7 from sliding laterally over the adjacent second top apron 6, 8. In fact, this apron lateral separator elements 10a, 10b divide the tensioning movable surface of each apron cradle 1, 2 in two different tensioning surfaces A1, A2, a1, a2 that can independently act on the first and second top aprons 5, 6, 7, 8 to attain different independent tensioning working positions. For the illustrated embodiment, the tensioning movable surface A1, a1, A2, a2 of each top apron support is slightly convex and, preferably, engraved to decrease the contact surface with the corresponding top apron 5, 6, 7, 8.

[0042] Figure 3 shows isolated top apron supports including movable tensioning surfaces A1, A2, a1, a2 of the cradle assembly of figure 1, wherein it can be observed that the first and second top apron supports of each apron cradle 1, 2 have been designed with a different width. As it is clear from figure 3 and also from figure 4, the first apron cradle 1 has a narrower first top apron support having a first movable tensioning surface A1 that is provided with a guide element 12a and an apron lateral separator element 10a, whereas the second apron cradle 2 has a wider first top apron support having a first movable tensioning surface a1 that is provided with a guide ele-

ment 12b and an apron lateral separator element 10b. As it can be observed, the guide element 12a of the said first top apron support of the second apron cradle 2 has been arranged laterally displaced to delimit the tensioning surface a1 of the top apron 7.

[0043] In fact, in the embodiment described, the width of the top apron supports including the movable tensioning surfaces A1, A2, a1, a2 of both apron cradles 1, 2 has been designed so that the position of the apron lateral separator element 10a, 10b when mounted on the cradle frame 3 is set to be different and, thus, it is different the spinning position S1, S2 on each apron cradle 1, 2. Moreover, as top apron supports of each apron cradle 1, 2 are mounted interchangeably on the cradle frame 3, the distance d1, d2 between the apron lateral separator elements 10a, 10b of both apron cradles 1, 2 may set to vary in order to modify the position of the spinning positions S1, S2 of the drafting assembly (that is to say the spindle gauge of the spinning machine).

[0044] Figure 4 shows two front views of two cradle assemblies wherein each apron cradle is set with a different distance (d1, d2) between apron lateral separator elements 10a, 10b of apron cradles 1, 2. As stated in the description, the claimed cradle assembly allows to modify the spindle gauge of the spinning machine (the distance between spinning positions S1, S2) without the need to modify the distance between rollers and avoiding to provide different cradle assemblies for each spindle gauge.

[0045] Figures 6 and 7 show a perspective and side view of a drafting device 13 of a machine for spinning fancy yarn that incorporates the cradle assembly of figure 1.

[0046] As it is shown in the figures 6 and 7, for each spinning position S1, S2, the drafting device 13 comprises a middle apron pair to which a first type of bundle of fibres is supplied and an adjacent back apron pair to which a second type of bundle of fibres is supplied. These two rows of adjacent apron pair are provided for supplying a common front roller pair R1a, R1b of the said drafting device 13 with two types of bundle of fibres that are to be combined to form a particular fancy yarn.

[0047] The first top apron 5, 7 of each apron cradle 1, 2 is wrapped around its corresponding first movable top apron support of the apron cradle 1, 2 and a middle top roller R2a of the drafting device 13, whereas the second top apron 6, 8 of the same apron cradle 1, 2 is wrapped around its corresponding second adjacent movable top apron support and a back top roller R3a of the drafting device 13.

[0048] As stated on the description, the length of the top aprons 5, 6 or 7, 8 that move over the same apron cradle 1, 2 is different as well as it is also different the type of bundle of fibres that are transferred by each of said top aprons 5, 6 or 7, 8. These length variations result in different friction forces and changes in the apron tension during rotation. By virtue of the claimed cradle assembly, the tension of the top aprons 5, 6 or 7, 8 that move over the same apron cradle 1, 2 may be simulta-

neously adjusted and regularized during rotation without the tension of one top apron 5, 7 influencing or modifying the tension of the other top apron 6, 8.

[0049] Following is a description of a method of spinning a fancy yarn that uses a drafting device with the claimed cradle assembly.

[0050] The drafting device of the spinning machine shown on figures 6 and 7 is a known three-roller pair R1a, R1b, R2a, R2b, R3a, R3b drafting device including for each spinning position S1, S2 a weighting arm 4 and an apron cradle 1, 2.

[0051] The bottom rollers R1b, R2b, R3b of each pair of rollers are configured by cylinders which are mounted on trestles that support a rod whereon the weighting arms are mounted (a weighting arm 4 for each two spindle positions S1, S2). These weighting arms have the function of positioning and securing the top rollers of the three lines of rollers (back R3a, middle R2a, and front R1a) under pressure on their respective bottom rollers.

[0052] As can be observed in figures 6 and 7, the drafting device 13 includes, for each spindle position S1, S2, two rows of top drafting aprons 5, 6 or 7, 8 that encircle the middle top rollers R2a and back top rollers R3a and its corresponding top apron supports having movable tensioning surfaces A1, A2, a1, a2 of the apron cradles 1, 2. In each spindle position S1, S2, the middle rollers R2a, R2b are responsible for feeding a first type of bundle of fibres that are drafted between the middle apron pair, while the back rollers R3a, R3b are responsible for feeding a second type of bundle of fibres that passes parallel to the first bundle of fibres, and are drafted between the back apron pair.

[0053] The feeding of the two bundles of fibres is carried out in parallel when the back rollers R3a, R3b and the middle rollers R2a, R2b are actuated by corresponding servomotors through a processing and control unit which is programmed for simultaneously or alternatively feeding said two type of bundle of fibres for the purpose of forming fancy yarn that combines different blending ratios of these two types of fibres.

[0054] During drafting, rotation of the top aprons 5, 6, 7, 8 takes place over the movable tensioning surface A1, a1, A2, a2 of the top apron supports of each apron cradle 1, 2 so that the tensioning surfaces of said top apron supports are able to independently act on the each top apron 5, 6, 7, 8 upon movement to a tensioning working position. Figures 6 and 7 represent the top aprons supports of each apron cradle 1, 2 on a different tensioning working position. In this working position, potential energy is being accumulated on each top apron support from the compression force applied to a different spring 14. This potential energy is being transmitted as a tension force to its corresponding top apron 5, 6, 7, 8 whereas said top aprons 5, 6, 7, 8 rotate over the movable surfaces A1, a1, A2, a2 of the top apron supports and the top rollers R2a, R3a, guided by the guide elements 12a, 12b and the apron separator elements 10a, 10b.

[0055] As stated on the description, the movement of

each tensioning surface A1, a1, A2, a2 of the top apron supports helps to regulate in real time and during rotation the tension of its corresponding top apron 5, 6, 7, 8 to ensure an optimum tension to guarantee an optimum quality of the fancy yarn.

[0056] Despite the fact that reference has been made to a specific embodiment of the invention, it is evident for a person skilled in the art that the claimed cradle assembly and method is susceptible to many variations and changes, and that all the aforementioned details may be replaced by other technically equivalent ones, without detracting from the scope of protection defined for the attached claims. For example, although it has been disclosed a cradle assembly with two apron cradles and each apron cradle provided with top apron supports of different width, it would be possible to provide the same cradle assembly with top apron supports of the same width on condition that said top apron supports are independently movably mounted on the cradle frame. Likewise, although it has been disclosed a cradle assembly wherein each apron cradle is provided with two top apron supports, the number of movable top apron supports for each apron cradle could not be limited to the number of two. Besides, although the first top apron supports having movable tensioning surfaces A1, a1 have been depicted comprising said apron lateral separator elements 10a, 10b, these separator elements could have been depicted on the second top apron supports having movable tensioning surfaces A2, a2 if they were designed and arranged to prevent the first top apron 5, 7 from sliding laterally over the adjacent top apron 6, 8.

Claims

1. A cradle assembly for a drafting device (13) of a spinning machine, comprising an apron cradle (1, 2) for a first top apron (5, 7) and a second top apron (6, 8), wherein said apron cradle (1, 2) is associated with one single spinning position (S1, S2) and is provided for supplying a common front roller (R1a) with two types of bundles of fibres in said spinning position (S1, S2), **characterized in that** said apron cradle (1, 2) comprises;
 - a first tensioning means for said first top apron (5, 7), and
 - a second tensioning means for said second top apron (6, 8),
 - wherein said first and second tensioning means comprise first (A1, a1) and second (A2, a2) movable tensioning surfaces, and said movable tensioning surfaces (A1, a1, A2, a2) are movably mounted on said apron cradle (1, 2) to be able to independently act on the first top apron (5, 7) and the second top apron (6, 8) upon movement to a tensioning working position.
2. A cradle assembly according to claim 1, wherein said first (A1, a1) movable tensioning surface is movably mounted on the apron cradle (1) such that it is able to act on the first top apron (5, 7) upon movement, and the second (A2, a2) movable tensioning surface is movably mounted adjacent to the first one such that it is able to independently act on the second top apron (6, 8) upon movement.
3. A cradle assembly according to claim 2, wherein said first (A1, a1) or said second (A2, a2) tensioning movable surface comprises an apron lateral separator element (10, 10b) arranged to prevent the first top apron (5, 7) from sliding laterally over the adjacent second top apron (6, 8).
4. A cradle assembly according to any of claims 1 to 3, wherein said first (A1, a1) movable tensioning surface is foreseen on a first top apron support movably mounted on a cradle frame (3) of said apron cradle (1, 2) and said second (A2, a2) movable tensioning surface is foreseen on a second top apron support movably mounted on said cradle frame (3) of said apron cradle (1, 2).
5. A cradle assembly according to claim 4, wherein each of said movable tensioning surfaces (A1, a1, A2, a2) includes a convex movable tensioning surface over which the corresponding top apron (5, 6, 7, 8) moves on.
6. A cradle assembly according to any of claims 4 to 5, wherein each of said movable top apron supports is movably mounted on said cradle frame (3) to independently rotate from a first resting position to a second tensioning working position to act on its corresponding top apron (5, 6, 7, 8).
7. A cradle assembly according to any of claims 4 to 6, wherein each of said movable top apron supports is movably mounted on said cradle frame (3) such that each of them is able to accumulate, in a tensioning working position, potential energy capable of being independently transmitted as a tension force to the corresponding top apron (5, 6, 7, 8) while said top apron moves over its corresponding movable top apron support.
8. A cradle assembly according to claim 7, wherein each of said movable top apron supports accumulates, in its tensioning working position, potential energy from the compression force applied to a spring (14).
9. A cradle assembly according to any of claims 4 to 8, wherein said cradle frame (3) includes a fixed wedge-shaped top apron support (9) and said movable top apron supports of both first and second top

aprons (5, 6, 7, 8) are movably mounted on said fixed wedge-shaped top apron support (9).

10. A cradle assembly according to any of claims 4 to 9, wherein it comprises the first (A1, a1) movable tensioning surface provided on the first top apron support with a first width, and the second (A2, a2) movable tensioning surface provided on the second top apron support with a second width different from the first width.

11. A cradle assembly according to any of the claims 4 to 10, wherein it comprises said apron cradle (1), being a first apron cradle (1), for a first spinning position (S1) and another one of said apron cradle (2), being a second apron cradle (2), for a second spinning position (S2), said apron cradles (1, 2) being mounted on the cradle frame (3) attachable to a weighting bar (4) of a spinning machine, each of said apron cradles (1, 2) including at least one of said first (A1, a1) and one of said second (A2, a2) tensioning movable surfaces movably mounted on each apron cradle (1, 2).

12. A cradle assembly according to claim 11, when dependent on claims 3 and 10, wherein;

- the first apron cradle (1) has one of said top apron supports narrower than the other top apron support of the same apron cradle (1), said narrower top apron support being provided with a first guide element (12a) and the apron lateral separator element (10a), and

- the second apron cradle (2) has one of said top apron supports wider than the other top apron support of the same apron cradle (2), said wider top apron support being provided with a second laterally displaced guide element (12a) and another apron lateral separator element (10b).

13. A cradle assembly according to claim 12, wherein;

- said movable top apron supports of the first and second apron cradles (1, 2) are mounted interchangeably on said cradle frame (3) such that the distance (d1, d2) between the apron lateral separator elements (10a, 10b) of both apron cradles (1, 2) is set to vary in order to modify the distance between two adjacent spinning positions (S1, S2) of the spinning machine.

Patentansprüche

1. Riemchenkäfiganordnung für ein Streckwerk (13) einer Spinnmaschine, welche einen Riemchenkäfig (1, 2) für ein erstes oberes Riemchen (5, 7) und ein

zweites oberes Riemchen (6, 8) umfasst, wobei der Riemchenkäfig (1, 2) einer einzelnen Spinnposition (S1, S2) zugeordnet ist und zur Versorgung einer gemeinsamen Frontwalze (R1a) mit zwei Arten von Faserbündeln in der Spinnposition (S1, S2) vorgesehen ist,

dadurch gekennzeichnet, dass der Riemchenkäfig (1, 2) umfasst

- eine erste Spanneinrichtung für das erste obere Riemchen (5, 7), und

- eine zweite Spanneinrichtung für das zweite obere Riemchen (6, 8),

- wobei die erste und die zweite Spanneinrichtung erste (A1, a1) und zweite (A2, a2) bewegliche Spannflächen umfasst, und die beweglichen Spannflächen (A1, a1, A2, a2) beweglich an dem Riemchenkäfig (1, 2) montiert sind, um in der Lage zu sein, bei Bewegung zu einer Spannarbeitsposition unabhängig auf das erste obere Riemchen (5, 7) und das zweite obere Riemchen (6, 8) einzuwirken.

2. Riemchenkäfiganordnung nach Anspruch 1, wobei die erste (A1, a1) bewegliche Spannfläche derart beweglich an dem Riemchenkäfig (1) montiert ist, dass sie in der Lage ist, bei Bewegung auf das erste obere Riemchen (5, 7) einzuwirken, und die zweite (A2, a2) bewegliche Spannfläche derart beweglich neben der ersten montiert ist, dass sie in der Lage ist, bei Bewegung unabhängig auf das zweite obere Riemchen (6, 8) einzuwirken.

3. Riemchenkäfiganordnung nach Anspruch 2, wobei die erste (A1, a1) oder die zweite (A2, a2) bewegliche Spannfläche ein seitliches Riemchentrenelement (10, 10b) umfasst, das angeordnet ist, um zu verhindern, dass das erste, obere Riemchen (5, 7) seitlich über das benachbarte zweite obere Riemchen (6, 8) rutscht.

4. Riemchenkäfiganordnung nach einem der Ansprüche 1 bis 3, wobei die erste (A1, a1) bewegliche Spannfläche an einem ersten oberen Riemchenträger vorgesehen ist, der beweglich an einem Käfigrahmen (3) des Riemchenkäfigs (1, 2) montiert ist, und die zweite (A2, a2) bewegliche Spannfläche an einem zweiten oberen Riemchenträger vorgesehen ist, der beweglich an dem Käfigrahmen (3) des Riemchenkäfigs (1, 2) montiert ist.

5. Riemchenkäfiganordnung nach Anspruch 4, wobei jede der beweglichen Spannflächen (A1, a1, A2, a2) eine konvexe bewegliche Spannfläche umfasst, über die sich das entsprechende obere Riemchen (5, 6, 7, 8) bewegt.

6. Riemchenkäfiganordnung nach einem der Ansprü-

- che 4 bis 5, wobei jeder der beweglichen oberen Riemchenträger beweglich an dem Käfigrahmen (3) montiert ist, um sich unabhängig von einer ersten Ruheposition in eine zweite gespannte Arbeitsposition zu drehen, um auf sein entsprechendes oberes Riemchen (5, 6, 7, 8) einzuwirken.
7. Riemchenkäfiganordnung nach einem der Ansprüche 4 bis 6, wobei jeder der beweglichen oberen Riemchenträger beweglich an dem Käfigrahmen (3) montiert ist, so dass jeder von ihnen in der Lage ist, in einer gespannten Arbeitsposition potentielle Energie aufzunehmen, die unabhängig als Spannkraft an das entsprechende obere Riemchen (5, 6, 7, 8) übertragen werden kann, während sich das obere Riemchen über seinen entsprechenden oberen Riemchenträger bewegt.
8. Riemchenkäfiganordnung nach Anspruch 7, wobei jeder der oberen Riemchenträger in seiner gespannten Arbeitsposition potentielle Energie von der auf eine Feder (14) aufgebrachten Kompressionskraft aufnimmt.
9. Riemchenkäfiganordnung nach einem der Ansprüche 4 bis 8, wobei der Käfigrahmen (3) einen festen, keilförmigen oberen Riemchenträger umfasst und die beweglichen oberen Riemchenträger von sowohl dem ersten als auch dem zweiten oberen Riemchen (5, 6, 7, 8) beweglich an dem festen keilförmigen oberen Riemchenträger (9) montiert sind.
10. Riemchenkäfiganordnung nach einem der Ansprüche 4 bis 9, wobei sie die erste (A1, a1) bewegliche Spannfläche, die an dem ersten oberen Riemchenträger mit einer ersten Breite vorgesehen ist, und die zweite (A2, a2) bewegliche Spannfläche, die an dem zweiten oberen Riemchenträger mit einer zweiten, sich von der ersten Breite unterscheidenden Breite vorgesehen ist, umfasst.
11. Riemchenkäfiganordnung nach einem der Ansprüche 4 bis 10, wobei sie den Riemchenkäfig (1), der ein erster Riemchenkäfig (1) ist, für eine erste Spinnposition (S1), und einen weiteren Riemchenkäfig (2), der ein zweiter Riemchenkäfig (2) ist, für eine zweite Spinnposition (S2) umfasst, wobei die Riemchenkäfige (1, 2) an dem Käfigrahmen (3) montiert sind, der an einer Gewichtsstange (4) einer Spinnmaschine befestigt werden kann, wobei jeder der Riemchenkäfige (1, 2) zumindest eine erste (A1, a1) und eine zweite (A2, a2) bewegliche Spannfläche umfasst, die beweglich an jedem Riemchenkäfig (1, 2) montiert sind.
12. Riemchenkäfiganordnung nach Anspruch 11, wenn abhängig von Anspruch 3 und 10, wobei:
- der erste Riemchenkäfig (1) einen der oberen Riemchenträger aufweist, der schmaler ist als der andere obere Riemchenträger des gleichen Riemchenkäfigs (1), wobei der schmalere obere Riemchenträger mit einem ersten Führungselement (12a) und dem seitlichen Riemchentrennelement (10a) versehen ist, und
 - der zweite Riemchenkäfig (2) einen der oberen Riemchenträger aufweist, der breiter ist als der andere obere Riemchenträger des gleichen Riemchenkäfigs (2), wobei der breitere obere Riemchenträger mit einem zweiten, seitlich verlagerten Führungselement (12a) und einem weiteren seitlichen Trennelement (10b) versehen ist.
13. Riemchenkäfiganordnung nach Anspruch 12, wobei
- die beweglichen oberen Riemchenträger der ersten und zweiten Riemchenkäfige (1, 2) austauschbar an dem Käfigrahmen (3) montiert sind, so dass der Abstand (d1, d2) zwischen den seitlichen Riemchentrennelementen (10a, 10b) beider Riemchenkäfige (1, 2) derart eingestellt ist, um zu variieren, um den Abstand zwischen zwei benachbarten Spinnpositionen (S1, S2) der Spinnmaschine zu verändern.

30 Revendications

1. Ensemble de berceau pour un dispositif d'étirage (13) d'une machine à filer, comprenant un berceau de manchon (1, 2) pour un premier manchon supérieur (5, 7) et un second manchon supérieur (6, 8), dans lequel ledit berceau de manchon (1, 2) est associé à une seule position de filage (S1, S2) et est disposé pour distribuer un rouleau avant commun (R1a) avec deux types de faisceaux de fibres dans ladite position de filage (S1, S2), **caractérisé en ce que** ledit berceau de manchon (1, 2) comprend ;
- un premier moyen de tension pour ledit premier manchon supérieur (5, 7), et
 - un second moyen de tension pour ledit second manchon supérieur (6, 8),
 - dans lequel lesdits premier et second moyens de tension comprennent une première (A1, a1) et une seconde (A2, a2) surfaces mobiles de tension, et lesdites surfaces mobiles de tension (A1, a1, A2, a2) sont montées de façon mobile sur ledit berceau de manchon (1, 2) pour pouvoir agir indépendamment sur le premier manchon supérieur (5, 7) et le second manchon supérieur (6, 8) lors du déplacement vers la position de travail de tension.
2. Ensemble de berceau selon la revendication 1, dans

- lequel ladite première (A1, a1) surface mobile de tension est montée de façon mobile sur le berceau de manchon (1) de sorte qu'elle peut agir sur le premier manchon supérieur (5, 7) lors du déplacement, et la seconde (A2, a2) surface mobile de tension est montée de façon mobile, adjacente à la première surface mobile de tension de sorte qu'elle peut agir indépendamment sur le second manchon supérieur (6, 8) lors du déplacement.
3. Ensemble de berceau selon la revendication 2, dans lequel ladite première (A1, a1) ou ladite seconde (A2, a2) surface mobile de tension comprend un élément séparateur latéral de manchon (10, 10b) agencé pour empêcher le premier manchon supérieur (5, 7) de coulisser latéralement sur le second manchon supérieur (6, 8) adjacent.
 4. Ensemble de berceau selon l'une quelconque des revendications 1 à 3, dans lequel ladite première (A1, a1) surface mobile de tension est prévue sur un premier support de manchon supérieur monté de façon mobile sur un cadre de berceau (3) dudit berceau de manchon (1, 2) et ladite seconde (A2, a2) surface mobile de tension est prévue sur un second support de manchon supérieur monté de façon mobile sur ledit cadre de berceau (3) dudit berceau de manchon (1, 2).
 5. Ensemble de berceau selon la revendication 4, dans lequel chacune desdites surfaces mobiles de tension (A1, a1, A2, a2) comprend une surface mobile de tension convexe sur laquelle le manchon supérieur (5, 6, 7, 8) correspondant se déplace.
 6. Ensemble de berceau selon l'une quelconque des revendications 4 et 5, dans lequel chacun desdits supports mobiles de manchon supérieur est monté de façon mobile sur ledit cadre de berceau (3) pour tourner indépendamment d'une première position de repos à une seconde position de travail de tension afin d'agir sur son manchon supérieur (5, 6, 7, 8) correspondant.
 7. Ensemble de berceau selon l'une quelconque des revendications 4 à 6, dans lequel chacun desdits supports mobiles de manchon supérieur est monté de façon mobile sur ledit cadre de berceau (3) de sorte que chacun d'entre eux peut accumuler, dans une position de travail de tension, de l'énergie potentielle pouvant être transmise indépendamment comme une force de tension au manchon supérieur (5, 6, 7, 8) correspondant lorsque ledit manchon supérieur se déplace sur son support mobile de manchon supérieur correspondant.
 8. Ensemble de berceau selon la revendication 7, dans lequel chacun desdits supports mobiles de manchon supérieur accumule, dans sa position de travail de tension, de l'énergie potentielle à partir de la force de compression appliquée à un ressort (14).
 9. Ensemble de berceau selon l'une quelconque des revendications 4 à 8, dans lequel ledit cadre de berceau (3) comprend un support de manchon supérieur fixe en forme de coin (9) et lesdits supports mobiles de manchon supérieur des premier et second manchons supérieurs (5, 6, 7, 8) sont montés de façon mobile sur ledit support de manchon supérieur fixe en forme de coin (9).
 10. Ensemble de berceau selon l'une quelconque des revendications 4 à 9, comprenant la première (A1, a1) surface mobile de tension disposée sur le premier support de manchon supérieur ayant une première largeur, et la seconde (A2, a2) surface mobile de tension disposée sur le second support de manchon supérieur ayant une seconde largeur différente de la première largeur.
 11. Ensemble de berceau selon l'une quelconque des revendications 4 à 10, comprenant ledit berceau de manchon (1), qui est un premier berceau de manchon (1), pour une première position de filage (S1) et un autre berceau de manchon (2), qui est un second berceau de manchon (2), pour une seconde position de filage (S2), lesdits berceaux de manchon (1, 2) étant montés sur le cadre de berceau (3) pouvant être fixé à une barre de pression (4) d'une machine de filage, chacun desdits berceaux de manchon (1, 2) comprenant au moins une desdites première (A1, a1) et seconde (A2, a2) surfaces mobiles de tension montées de façon mobile sur chaque berceau de manchon (1, 2).
 12. Ensemble de berceau selon la revendication 11, lorsqu'elle dépend des revendications 3 et 10, dans lequel ;
 - le premier berceau de manchon (1) a un desdits supports de manchon supérieur plus étroit que l'autre support de manchon supérieur du même berceau de manchon (1), ledit support de manchon supérieur plus étroit étant doté d'un premier élément de guidage (12a) et de l'élément séparateur latéral de manchon (10a), et
 - le second berceau de manchon (2) a un desdits supports de manchon supérieur plus large que l'autre support de manchon supérieur du même berceau de manchon (2), ledit support de manchon supérieur plus large étant doté d'un second élément de guidage déplacé latéralement (12a) et d'un autre élément séparateur latéral de manchon (10b).
 13. Ensemble de berceau selon la revendication 12,

dans lequel ;

- lesdits supports mobiles de manchon supérieur du premier et du second berceaux de manchon (1, 2) sont montés de façon interchangeable sur ledit cadre de berceau (3) de sorte que la distance (d1, d2) entre les éléments séparateurs latéraux de manchon (10a, 10b) des deux berceaux de manchon (1, 2) est définie pour varier afin de modifier la distance entre deux positions de filage adjacentes (S1, S2) de la machine de filage.

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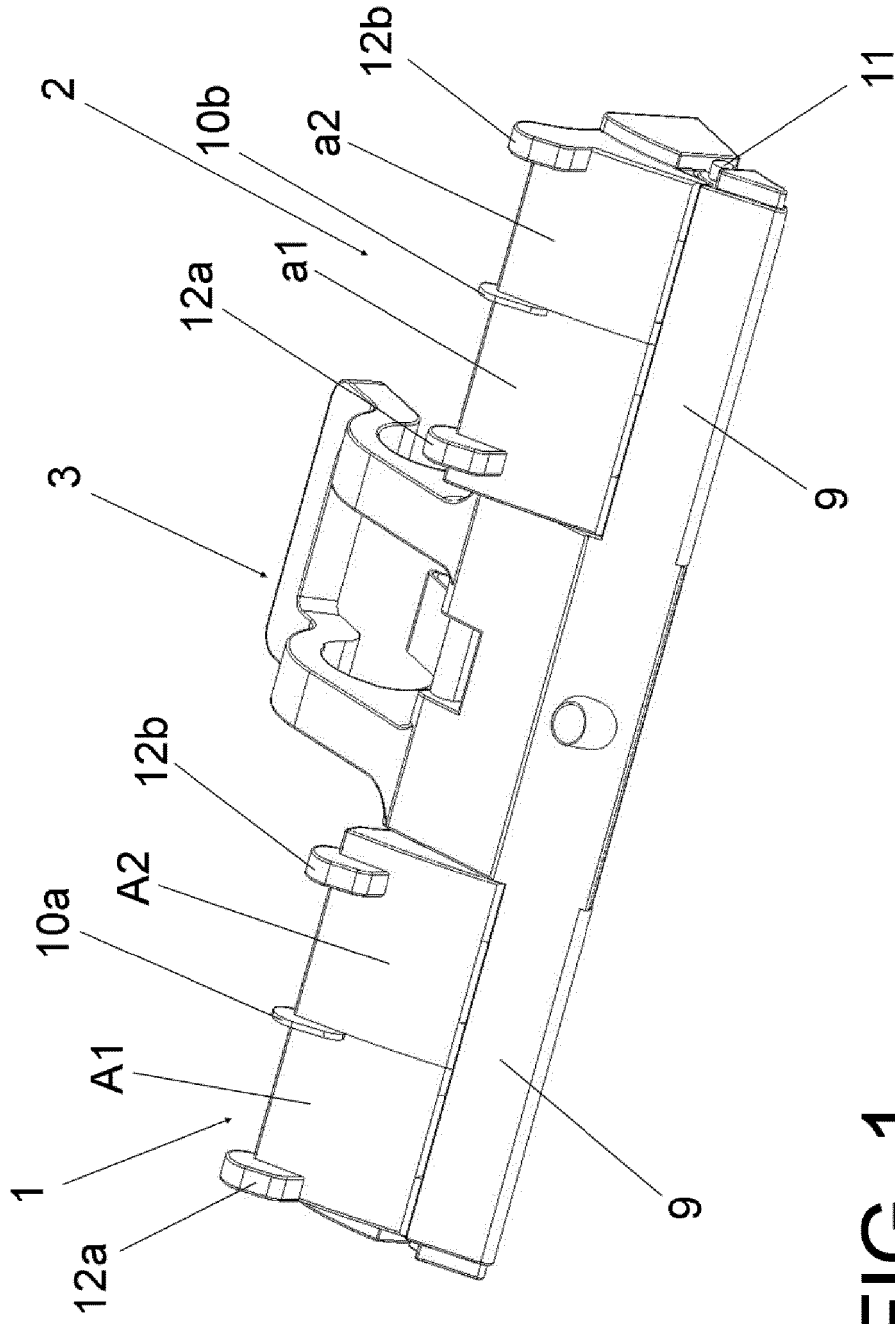


FIG. 1

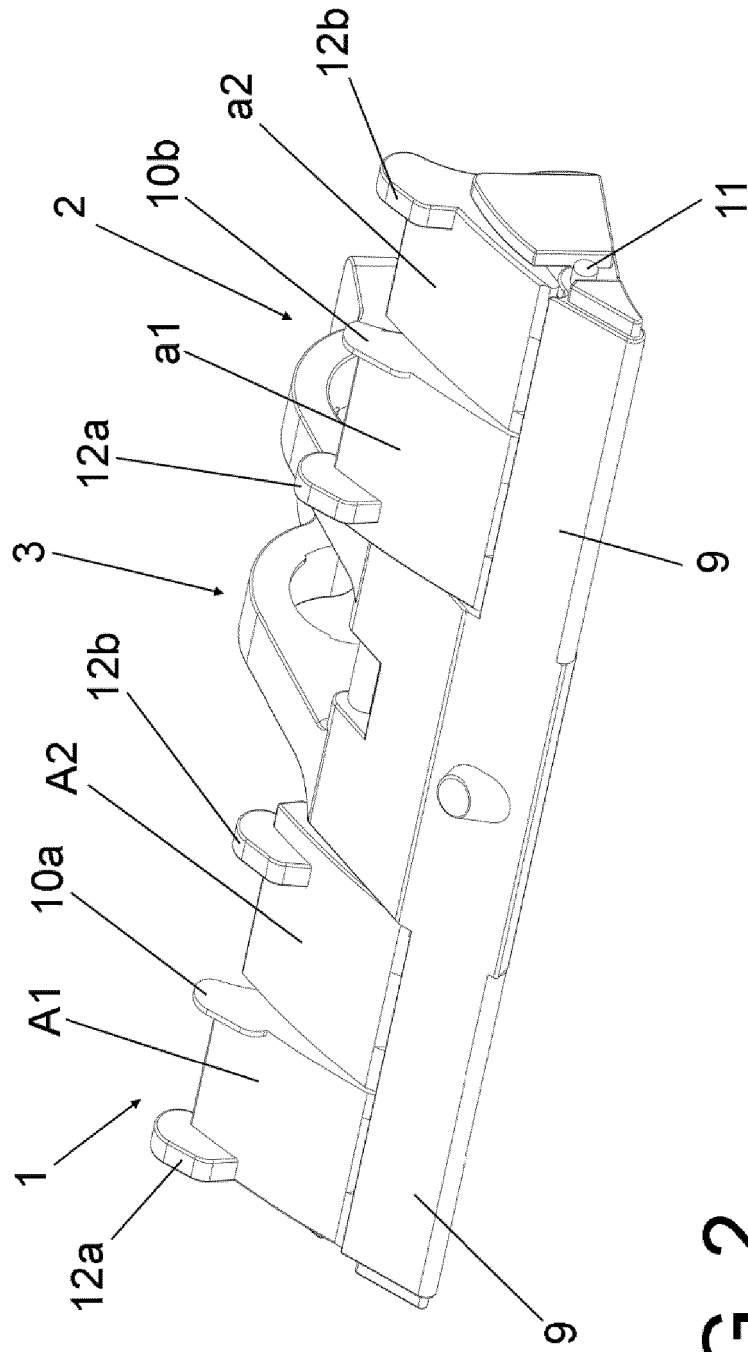


FIG. 2

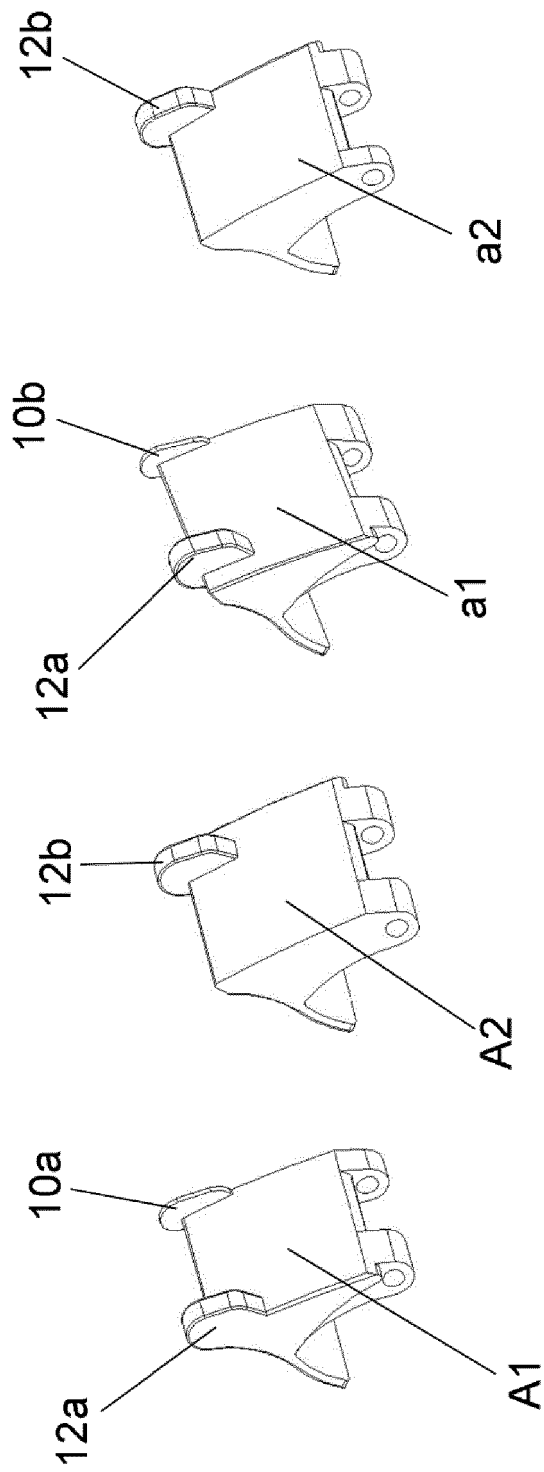


FIG. 3

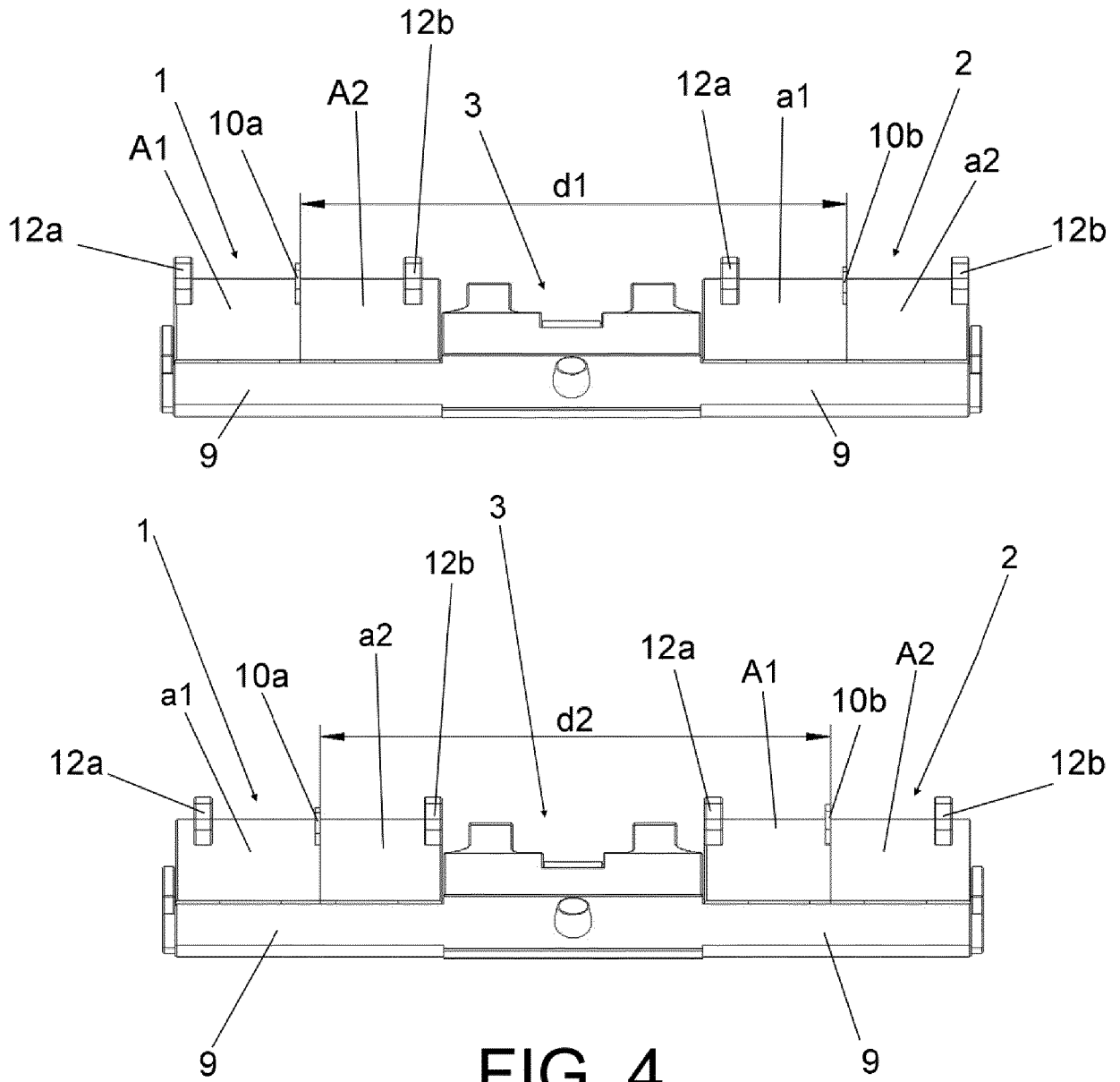


FIG. 4

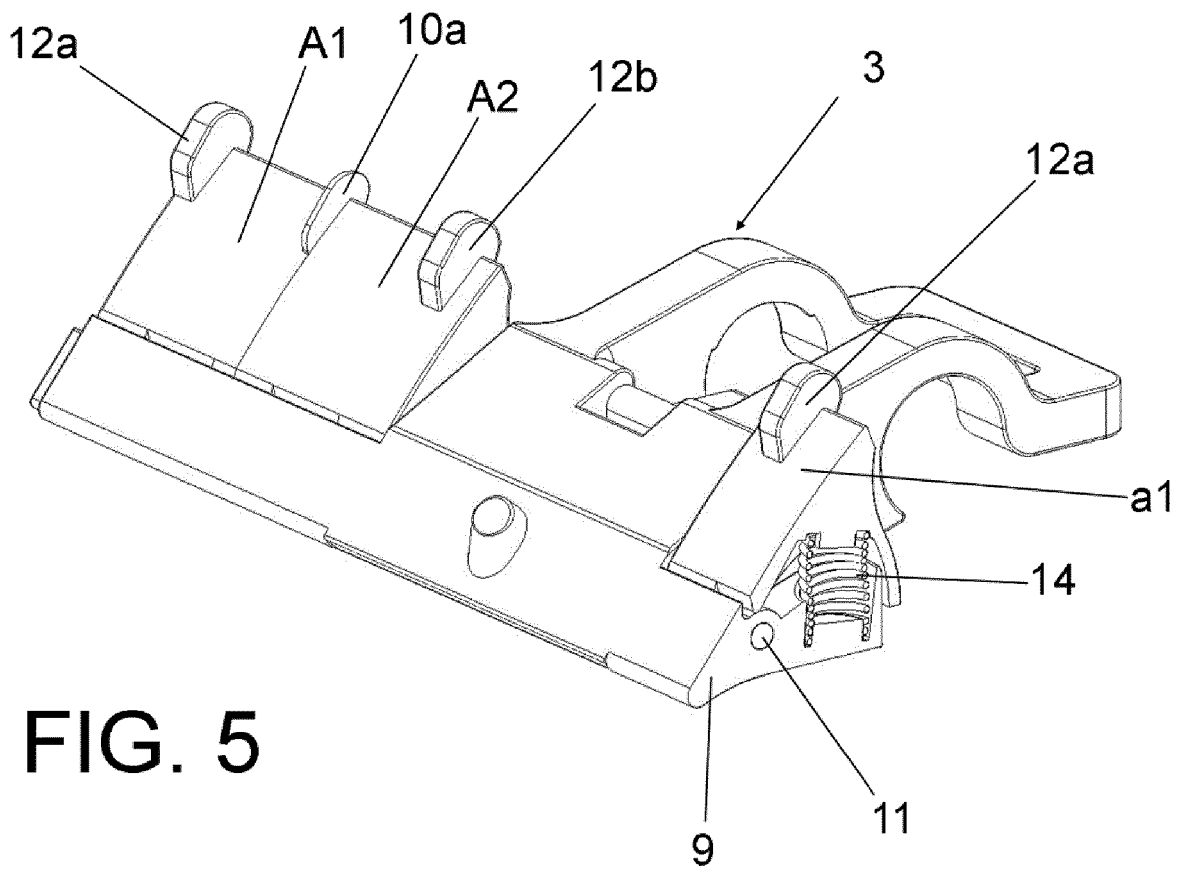


FIG. 5

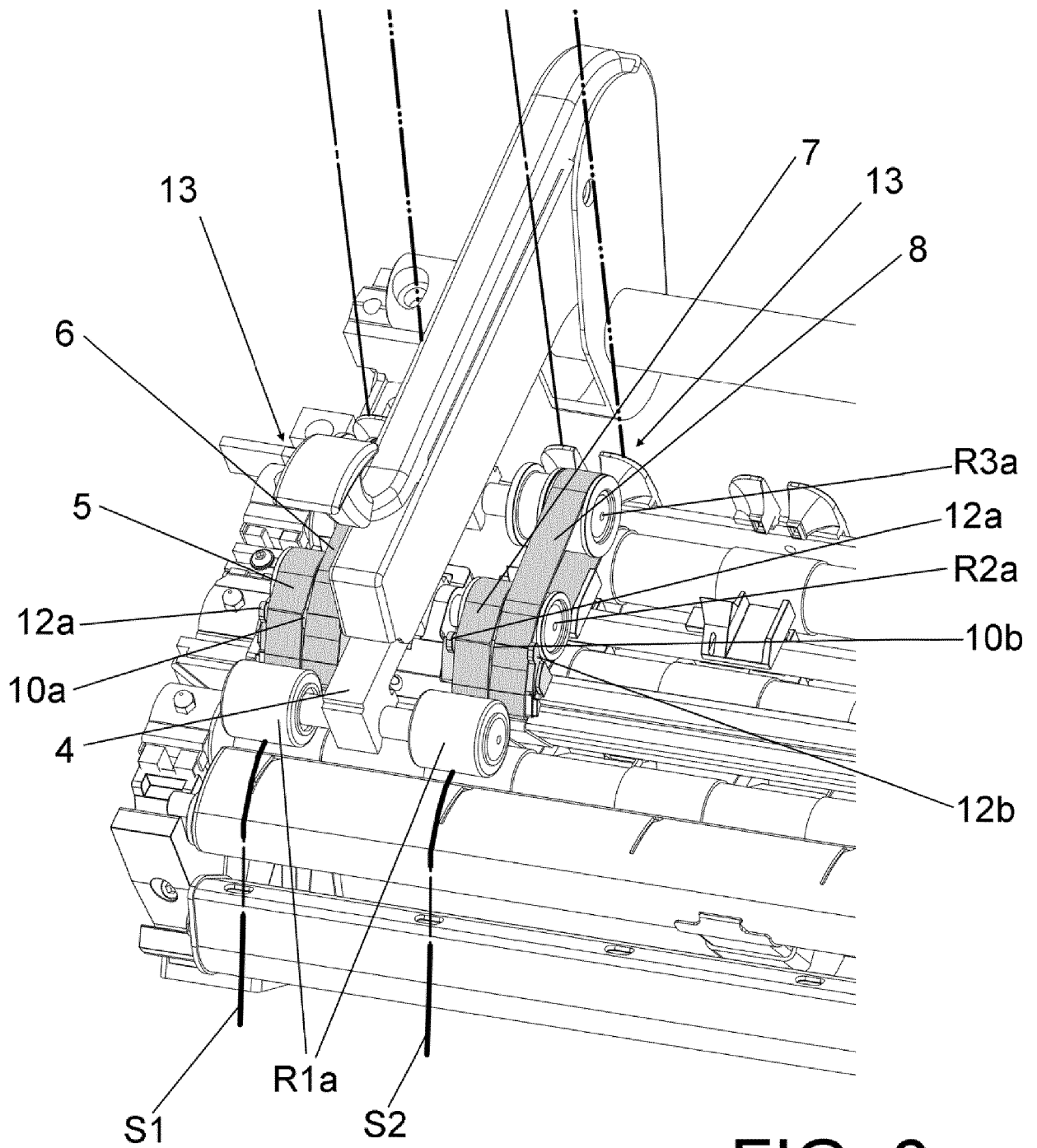


FIG. 6

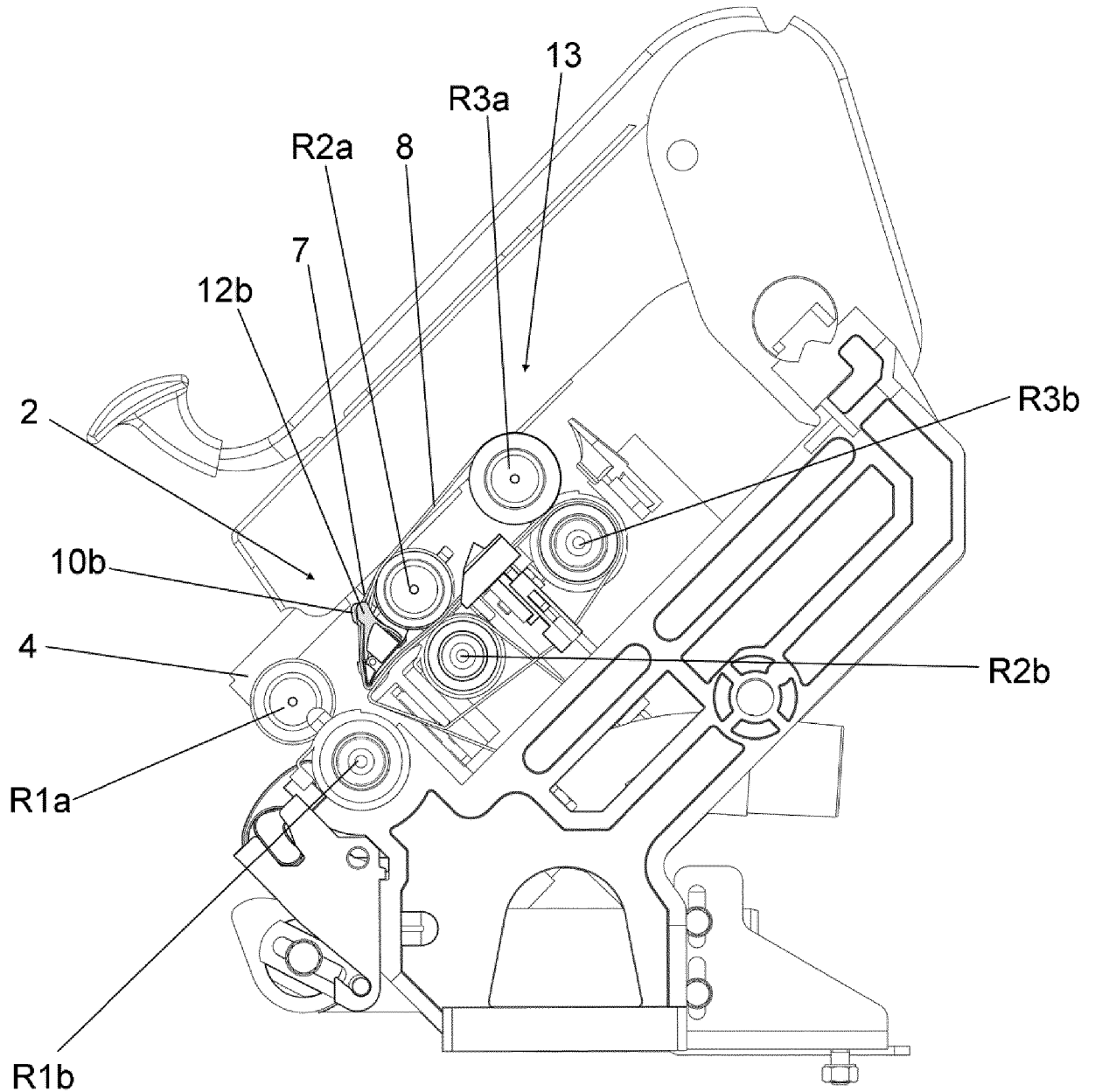


FIG. 7

REFERENCES CITED IN THE DESCRIPTION

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