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(71) Applicant: **Pinter Caipo, S.A.U.**
08251 Santpedor (ES)

(72) Inventor: **BOURIO CASTRO, Julio Cesar**
08251 SANTPEDOR (ES)

(74) Representative: **Ponti & Partners, S.L.P**
C. de Consell de Cent 322
08007 Barcelona (ES)

(54) DRAFTING ASSEMBLY FOR A RING SPINNING MACHINE AND DRAFTING KIT FOR DRAFTING FIBRES ON A RING SPINNING MACHINE

(57) A drafting assembly (1) for a ring spinning machine, **characterised** in that it includes; a first drafting roller (4) coupled to a removable roller apron support (2) in a forward position, a second drafting roller (5) coupled to said removable roller apron support (2) in a backward position with respect to said first drafting roller (4), and an apron profile (6) attached to said removable roller apron support (2) for at least one drafting apron (10a, 10b, 18) to be wrapped around said first drafting roller and/or said second drafting roller at a spinning position S1,S2, wherein said drafting assembly includes a the drafting frame (7) of the ring spinning machine configured to either raise the working position of an existing front bottom drafting roller (14) or to lower the working position of the existing middle and back bottom drafting rollers (4, 5).

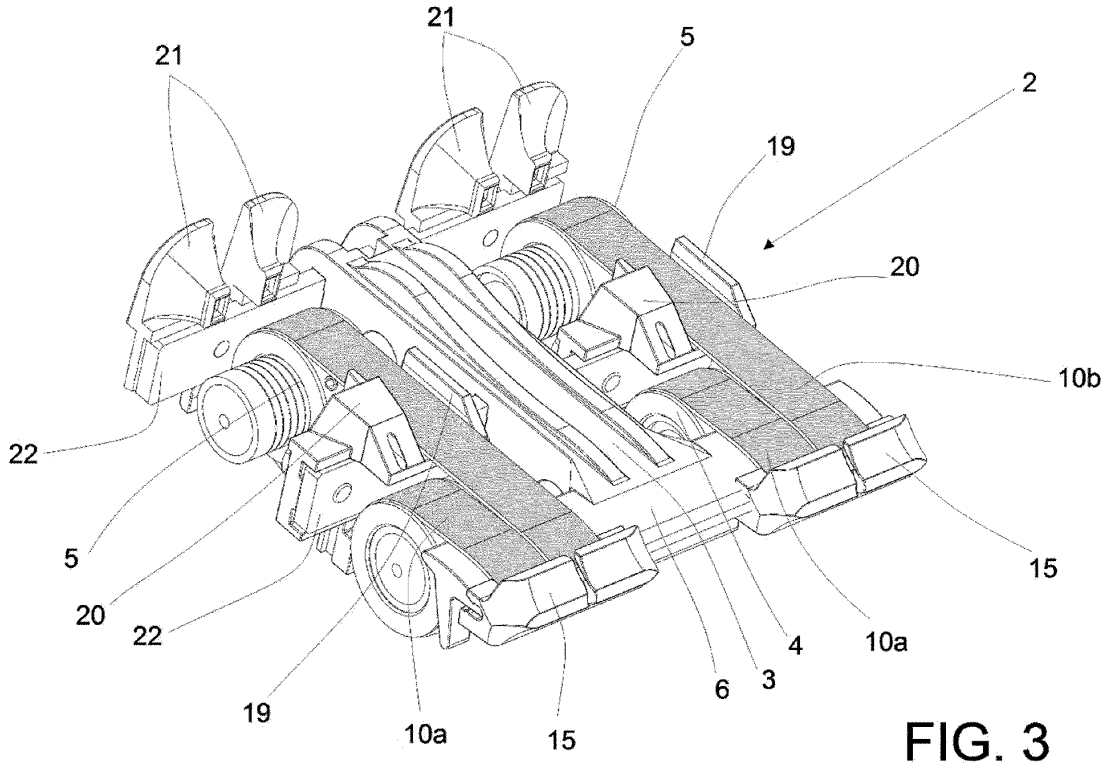

FIG. 3

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Description

[0001] The present invention generally relates to a drafting assembly for a ring spinning machine including a roller apron support that allows said ring spinning machine to draft either fancy yarn or normal yarn. In particular, the present invention relates to a drafting kit for drafting fibres on a ring spinning machine.

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 WO2015/033811 discloses a production method of fancy yarn wherein the feeding of a first type of roving and a second type of roving is operated to form a yarn that combines different blending ratios of these two types of roving. This fancy yarn production method requires the use of a drafting assembly that has two adjacent drafting apron pairs located behind the front rollers and provided for supplying a common spinning position with the two types of roving. The first type of roving supplied to the middle apron pair is drafted between the top and bottom front rollers and the middle apron pair, while the second type of roving supplied to the back apron pair is drafted between the top and bottom front rollers and the back apron pair. The 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, respectively. Thus, with a simple structure of the drafting assembly, the blending ration of two different types of fibres can be changed at each spinning position within a range and a desired fancy yarn can be spun continuously.

[0004] The drafting assembly of the above-mentioned patent includes a middle bottom apron wrapped around a middle drafting bottom roller and an apron profile, and a back bottom apron arranged adjacent the middle bottom apron and wrapped around the back drafting bottom roller and the same apron profile. The top aprons of the same drafting assembly are wrapped around top drafting rollers and apron profiles of apron cradles mounted on a top arm of the drafting assembly.

[0005] It is known that replacing bottom drafting aprons it's a time consuming and annoying task that requires the bottom drafting rollers do not run. This task is particularly annoying when in a production method of fancy yarn as the one disclosed by the above-mentioned patent because of the presence of two adjacent bottom aprons of different length wrapped around different bottom drafting rollers. The difference in length of the aprons complicates far more the replacing of the aprons during rotation over the bottom rollers.

[0006] It is known to use a drafting assembly including a roller apron support removably attached to the drafting frame of the ring spinning machine to facilitate replacing of the bottom aprons. This removable roller apron support includes a pair of drafting rollers coupled to a support arm and able to act as middle bottom drafting rollers over the existing middle bottom drafting rollers at two spinning positions. This drafting assembly allows the middle bottom aprons to be wrapped around middle bottom rollers attached to removable roller apron support so that replacement of these middle bottom aprons can take place easily. To this end, the drafting roller apron support is detached and its drafting aprons are easily replaced while the existing bottom drafting rollers keep running.

[0007] Nevertheless, the above-mentioned drafting assembly has the drawback that it does not make easy handling and replacing of drafting aprons when fancy yarn is to be produced by means of the method disclosed by patent WO2015/033811. Besides, with the above-mentioned drafting assembly, handling of other drafting components remains time consuming and annoying.

Description of the invention

[0008] The objective of the present invention is that of providing a drafting assembly and a drafting kit that overcome the above-mentioned shortcomings.

[0009] In accordance with this objective, according to a first aspect, the present invention provides a drafting assembly, which comprises, in a known manner, a roller apron support removably attached to the drafting frame of a ring spinning machine and, in a characteristic manner;

- a first drafting roller coupled to said removable roller apron support in a forward position to be able to act in a spinning position S1, S2 as a middle bottom drafting roller over an existing middle bottom drafting roller of said ring spinning machine,
- a second drafting roller coupled to said removable roller apron support in a backward position with respect to said first drafting roller to be able to act in the said spinning position as a back bottom drafting roller over an existing back bottom drafting roller of said ring spinning machine, and
- an apron profile attached to said removable roller apron support for at least one drafting apron to be wrapped around said first drafting roller and/or said second drafting roller in a spinning position S1,S2,
- wherein said drafting assembly includes a drafting frame of the ring spinning machine configured to modify either the working position of an existing front bottom drafting roller or the working position of the existing middle and back bottom drafting rollers for said first and second drafting rollers of the roller apron support to be able to operate as middle and back bottom drafting rollers over the existing middle and back bottom drafting rollers of the ring spinning machine.

[0010] For a preferred embodiment suitable for working two adjacent spinning positions S1, S2 with a single

removable roller apron support, the claimed drafting assembly comprises;

- a pair of first drafting rollers (4) for a pair of adjacent spinning positions S1, S2 of said ring spinning machine, said pair of first drafting rollers (4) being coupled to said roller apron support (2) in a forward position to be able to act on each spinning position S1, S2 as middle bottom drafting rollers over existing middle bottom rollers (13) of said ring spinning machine,
- a pair of second drafting rollers (5) for said pair of adjacent spinning positions S1, S2 of said ring spinning machine, said pair of second drafting rollers (5) being coupled to said same roller apron support (2) in a backward position with respect the pair of first drafting rollers (4) to be able to act on each spinning position S1, S2 as back bottom drafting rollers over existing back bottom rollers (12) of said ring spinning machine,
- wherein said apron profile (6) is dimensioned to extend between said adjacent spinning positions S1, S2, for at least one drafting apron (10a, 10b, 18) to be wrapped around one of said first drafting rollers (4) and/or one of said second drafting rollers (5) on each of said adjacent spinning positions S1, S2, and
- wherein said drafting assembly includes a drafting frame (7) of the ring spinning machine configured to modify either the working position of an existing front bottom drafting roller or the working position of the existing middle and back bottom drafting rollers for said pair of first and second drafting rollers of the roller apron support to be able to operate as middle and back bottom drafting rollers over the existing middle and back bottom drafting rollers of the ring spinning machine.

[0011] According to this embodiment, preferably, a support arm is arranged centred on the roller apron support between each pair of first and second drafting rollers and the apron profile extends between the two adjacent spinning positions so that it is able to act on two pair of drafting aprons.

[0012] Preferably, the drafting frame is configured to modify the working position of an existing front bottom drafting roller by means of a raiser removably mounted on the drafting frame of the ring spinning machine to raise the working position of an existing front bottom drafting roller for said existing front bottom drafting roller to be able to receive when in its raised working position at least one type of bundle of fibres coming from said first and/or second drafting rollers mounted on said removable roller apron support.

[0013] Thanks to the claimed features it is provided a drafting assembly that drastically improves handling of components necessary for drafting fibres in a ring spinning machine. In fact, the claimed invention allows the existing drafting frame to easily and quickly switch to different methods of production of yarns avoiding the user the annoying task of changing aprons and mounting required drafting components.

[0014] Besides, the claimed drafting assembly does not need the existing drafting frame of the ring spinning machine to be substantially modified. As a matter of fact, by means of just a raiser mounted on the drafting frame of the ring spinning machine, the working position of the existing front roller is changed to be able to receive bundles of fibres coming from said first and/or second drafting rollers mounted on said removable roller apron support. The known drafting assemblies of the prior art have the drawback that the working position of the middle bottom roller must be modified to a lower position which makes compulsory to also modify the actuation and transmission mechanism operating this bottom drafting roller. In the claimed invention the mechanisms operating the existing bottom rollers does not need to be modified.

[0015] In the present invention, the first and second drafting rollers are coupled on a roller apron support which is removable attached to the existing drafting frame of the ring spinning machine. These first and second drafting rollers may act as middle and back bottom rollers over the existing bottom rollers of the ring spinning machine when the removable roller support is attached to the drafting frame of this ring spinning machine. Middle and back bottom drafting aprons wrapped around those first and second drafting rollers and said apron profile can be easily replaced by removing the roller apron support while the existing bottom rollers of the drafting frame keep running.

[0016] By virtue of the presence of said first and second drafting rollers which are able to act as middle and back bottom rollers at a spinning position of the ring spinning machine, the claimed drafting assembly is easily and quickly made compatible with different methods of production of yarn. For example, the claimed drafting assembly may be used either to produce a fancy yarn combining different sections of different bundles of fibres or to produce normal yarn (i.e. a yarn that combines predrafting and main drafting of fibres).

[0017] According to one embodiment suitable for a method of production of fancy yarn, the claimed drafting assembly comprises;

- a first drafting apron wrapped around each one of said first drafting rollers and said apron profile and configured for drafting a first roving at a spinning position S1, S2, and
- a second drafting apron wrapped adjacent to the first drafting apron around each one of said second drafting rollers and the said apron profile, and configured for drafting a second roving in the same ring spinning position S1, S2,

[0018] This embodiment of the claimed drafting assembly is suitable for a production method of fancy yarn as the one disclosed in patent WO2015/033811 wherein

feeding of a first type of roving and a second type of roving is operated to form a yarn that combines different sections of these two types of fibres.

[0019] According to this method of production of fancy yarn, a first roving is drafted by means of said first drafting apron wrapped around one first drafting roller and said apron profile, and a second roving is drafted by means of said second drafting apron wrapped around a second drafting roller and the same apron profile. The first and second apron are controlled for the start and stop thereof during spinning by controlling the operation of the existing back and middle bottom rollers of the drafting frame so that feeding of roving is interrupted alternately to combine sections of different types of fibres in a single yarn. The existing middle and back bottom rollers are responsible for operating the first and second drafting rollers attached to the roller apron support.

[0020] Advantageously, according to the above-mentioned method of production of fancy yarn, the body of the apron profile attached to the roller apron support defines, at each spinning position S1, S2, a fitting for receiving and guiding said first and second drafting aprons and preferably, each of said first and second drafting rollers comprises a first roller portion of wider radius provided with a recess for receiving and guiding one of said first or second drafting aprons.

[0021] Thanks to these features, the first and second adjacent drafting aprons remain in a correct and optimum working position without the risk one drafting apron overlaps the other.

[0022] According to another embodiment suitable for pre-drafing and drafting fibres of at least one roving, the claimed drafting assembly comprises at each spinning position S1, S2;

- a single drafting apron wrapped around each one of said first drafting rollers and the said apron profile and configured for drafting fibres coming from at least one roving.

[0023] This embodiment is suitable for producing a yarn wherein a roving is drafted in a spinning position by means of a single drafting apron wrapped around said first drafting roller and the apron profile. This single drafting apron is controlled for the start and stop thereof during spinning by controlling operation of the existing middle bottom rollers of the drafting frame which are responsible for operating the first drafting roller attached to the roller apron support.

[0024] According to the present invention, the drafting assembly of the ring spinning machine may easily adapt to either the production of the above-mentioned fancy yarn or to the production of other yarn by simply interchanging drafting aprons on the drafting rollers of the roller apron support while the existing bottom rollers keep running. Thus, the drafting assembly drastically improves the managing of the drafting components in a ring spinning machine.

[0025] Indeed, if two adjacent aprons are required at a spinning position S1, S2 for the production of fancy yarn, the single drafting apron wrapping one of the first drafting rollers and the apron profile of the removable roller apron support is removed and replaced in place by two adjacent drafting aprons. One of these drafting aprons is arranged to wrap a first drafting roller and the apron profile, and the other one is arranged to wrap a second drafting apron and the same apron profile.

[0026] Preferably, the removable roller apron support comprises a support arm wherein said first and second drafting rollers are attached, and wherein a back end of said support arm is pivotally attached to the drafting frame of the ring spinning machine.

[0027] The roller apron support may be pivotally attached to a bar of the drafting frame which is arranged behind the back bottom roller so that the support arm is able to rotate from a working drafting position to an upper position to facilitate removing the drafting aprons.

[0028] Advantageously, the removable roller apron support is a one-piece support wherein a first portion of said piece defines the apron profile and a second portion of the same piece defines this support arm.

[0029] According to an embodiment suitable for the production of fancy yarn, or for the production of other type of yarn different from Fancy yarn, the support arm is extendable for varying the distance between one of said first drafting rollers and one of said second drafting rollers attached to the support arm of the roller apron support.

[0030] In this manner, the roller apron support adapts to different distances between existing middle and back bottom rollers of the existing drafting frame. The distance between bottom rollers of an existing drafting frame may be modified depending on the kind of fibres used to manufacture the yarn so as to obtain a yarn of maximum quality.

[0031] Advantageously, according to one embodiment suitable for a method of production of fancy yarn that dispenses with the use of pneumatic devices for compacting fibres coming at the outlet of the drafting aprons, the claimed drafting assembly comprises a fibre joining component removably attached to the apron profile of the roller apron support, wherein said fibre joining component includes a fibre joining channel defining a support bed (L) dimensioned to receive and support in parallel two bundles of fibres at the outlet of said adjacent drafting aprons at a spinning position S1, S2.

[0032] Preferably, the apron profile of the roller apron support is adapted, for example with a pair of notches, to receive and removably secure a pair of clamps which are configured on said fibre joining component so that they can be snap fitted into the apron profile.

[0033] Thanks to these features, the fibre joining channel fits the drafting aprons in such a manner that the channel may receive and support various fibre bundles, in parallel. Thus, according to a production method of fancy yarn, a cut end of one of the bundles of fibres can

rest on the aforementioned support bed "L" when the feeding of a roving is interrupted.

[0034] According to the aforesaid embodiment suitable for the production of fancy yarn, the claimed drafting assembly, preferably comprises;

- a first fibre condenser component removably attached to the roller apron support so that it remains located between one of said first drafting roller and one of said second drafting roller for receiving a first bundle of fibres at a spinning position S1, S2, and advantageously, it also comprises;
- an apron guiding component removably attached to the roller apron support so that it remains located between one of said first drafting roller and one of said second drafting roller for guiding one of said second drafting aprons at a spinning position S1, S2.

[0035] The claimed drafting assembly has the advantage that allows most of the components needed for the production of the aforesaid fancy yarn to be removably attached to the roller apron support, which in turn is also removably attached to the drafting frame. Thus, handling drafting components is easier and maintenance works consume much less time.

[0036] Optionally, the claimed drafting assembly comprises at least one second fibre condenser component removably attached to the roller apron support so that it remains located behind at least one of said second drafting rollers at a spinning position S1 or S2.

[0037] This second fibre condenser component may be attached to the roller apron support by means of a bar that is removably attached to the back end of the roller apron support. This second fibre condenser component helps joining fibres of a bundle entering the drafting assembly.

[0038] According to a second aspect, the present invention provides a drafting kit for drafting fibres of a yarn on a ring spinning machine, that in a characteristic manner comprises;

- a removable roller apron support,
- a pair of first drafting rollers for a pair of adjacent spinning positions S1, S2 of said ring spinning machine, said pair of first drafting rollers being removably coupled to said apron support in a forward position to be able to act at each spinning position S1, S2 as middle bottom drafting rollers over the existing middle bottom rollers of said ring spinning machine,
- a pair of second drafting rollers for said pair of adjacent spinning positions S1, S2 of said ring spinning machine, said pair of second drafting rollers being removably coupled to said same roller apron support in a backward position with respect the pair of first drafting rollers to be able to act at each spinning position S1, S2 as back bottom drafting rollers over the existing back bottom rollers of said ring spinning machine,
- two pairs of first and second drafting aprons for drafting fibres at two spinning position S1 or S2, wherein each pair of first and second drafting aprons includes a first drafting apron configured for drafting a first roving when wrapped around one of said first drafting rollers (4) and said apron profile, and a second drafting apron configured for drafting a second roving when wrapped, adjacent to the first drafting apron, around one of said second drafting rollers and the same apron profile,
- a pair of third drafting aprons for said adjacent spinning positions S1, S2, wherein each one of the third drafting aprons is configured wider than each one of said first and second drafting aprons for drafting fibres of at least one roving, when wrapped around one of said first drafting rollers and said apron profile,
- wherein said pairs of first and second drafting aprons are interchangeable with said pair of third drafting aprons on the first and second drafting rollers removably coupled to the roller apron support.

[0039] Preferably, the drafting kit includes a raiser configured to be able to raise the working position of an existing front bottom drafting roller of said ring spinning machine for said existing front bottom drafting roller to be able to receive when in its raised working position at least a bundle of fibres coming from said first and/or second drafting rollers mounted on said removable roller apron support,

[0040] This claimed drafting kit permits an existing drafting frame to be easily adapted to different methods of production of yarns and drastically improves handling of components necessary for drafting fibres in a ring spinning machine. Indeed, this claimed drafting kit allows the existing drafting frame to dispense with fixed attachments for fibre condensers and easies the maintenance operations such as the one of replacing the bottom drafting aprons while the drafting frame is keeps running.

[0041] Preferably, the claimed drafting kit comprises a roller apron support including means for removably attaching at least one fibre condenser component, at least one apron guiding component and/or at least one apron tension component, between one of said first drafting rollers and one of said second drafting rollers. The aforesaid means may include a removable bar susceptible to be attached to a roller support arm of the removable apron support.

[0042] Optionally, the roller apron support may additionally comprise means for removable attaching at least one fibre condenser component behind one of said second drafting rollers.

[0043] In the present invention;

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.

[0044] Yarn different from Fancy yarn shall be understood to mean a yarn manufactured including pre-drafting and main drafting of at least a roving by means of single middle bottom drafting apron wrapped around a middle bottom drafting roller.

[0045] Pre-drafting shall be understood to mean a drafting that takes place in between the back and the middle rollers. Main drafting shall be understood to mean a drafting that takes place in between the middle and the front rollers. Pre-drafting is necessary for ensuring quality of a yarn when this yarn is manufactured at each spinning position with a single drafting apron wrapped around a bottom middle roller.

[0046] 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 drafting roller pair to other drafting roller pair of a drafting assembly.

Brief description of the drawings

[0047] The previous and other advantages and features will be more fully understood from the following detailed description of embodiments, with reference to the attached drawings, which must be considered in an illustrative and non-limiting manner, in which:

Figure 1 shows a perspective view of a removable apron support of a drafting kit of the present invention suitable for a first method of production of fancy yarn.

Figure 2 shows a plan view of the removable apron support of figure 1.

Figure 3 shows a perspective view of a removable apron support of a drafting kit of the present invention suitable for a second method of production of fancy yarn that dispenses with the use of pneumatic devices for compacting fibres.

Figure 4 shows a plan view of the removable apron support of figure 3.

Figure 5 shows a perspective view of a removable apron support of a drafting kit of the present invention suitable for pre-drafting and drafting fibres of at least one roving. This roller apron support includes a support arm that is extendable.

Figure 6 shows a plan view of the removable apron support of figure 5.

Figure 7 shows a perspective view of a drafting assembly for a ring spinning machine wherein removable apron supports according to figures 3 and 4 have been arranged on the existing drafting frame. For the sake of clarity a top arm of the drafting frame bearing the upper drafting rollers is not shown.

Figure 8 shows a side view of the drafting assembly of figure 7.

Figure 9 shows a side view of the drafting assembly of figure 7 wherein a roller apron support is shown in an upper position suitable for allowing replacement of the drafting aprons to switch to a different method of production of yarn.

Figure 10 shows a perspective view of a drafting assembly for a ring spinning machine wherein removable apron supports according to figures 5 and 6 have been arranged on the existing drafting frame. For the sake of clarity a top arm of the drafting frame bearing the upper drafting rollers is not shown.

Figure 11 shows a side view of the drafting assembly of figure 10.

Figure 12 shows a side view of the drafting assembly of figure 10 wherein a roller apron support is shown in an upper position suitable for allowing replacement of the drafting aprons.

Figure 13 shows a perspective view of a fibre joining component attachable to the apron profile of the claimed roller apron support.

Figures 14 and 15 show upper and lower perspective views of the roller apron support of figure 1 wherein the drafting aprons are not depicted.

Description of preferred embodiments

[0048] Following is a description of the drafting kit of the present invention and several embodiments of the claimed drafting assembly of the present invention with reference to drawings of figures 1 to 15.

[0049] Figures 1 to 6 show perspective and plan views of removable roller apron supports 2 of the drafting kit and drafting assembly 1 of the present invention suitable for different methods of production of yarn. All these removable apron supports 2 include a support arm 3 which is arranged centred on the roller apron support 2 between a pair of first drafting rollers 4 and a pair of second drafting rollers 5. An apron profile 6 is attached to the roller apron support 2 and is dimensioned to be able to extend between two adjacent spinning positions S1, S2 of the ring spinning machine.

[0050] As can be seen on figures 1 to 6, the pair of first drafting rollers 4 are coupled on the roller apron support 2 in a forward position whereas the pair of second drafting rollers 5 are coupled in a backward position with respect to said first drafting rollers 4. Both said first and second drafting rollers 4, 5 are mounted such as to be able to act at each spinning position S1, S2 as middle and back bottom drafting rollers over the existing middle and back bottom rollers 12, 13 of the ring spinning machine (See drawings of figures 7, 10).

[0051] The rear end 3a of the support arm 3 of the roller apron support 2 is configured so as to be able to rotate attached to a bar 8 of the drafting frame 7 of the ring spinning machine. In particular, this rear end 3a is configured such that it can be laterally displaced on the bar 8 of the drafting frame 7. In this manner, the roller apron support 2 may be easily positioned to match with the middle and back upper drafting rollers of a top arm (not represented) of the existing drafting frame or roller stand 7 of the ring spinning machine.

[0052] For a preferred embodiment, the claimed draft-

ing kit and drafting assembly 1 include a raiser 9 configured to be able to raise the working position of an existing front bottom drafting roller 14 for said existing bottom drafting roller 14 to be able to receive at least a bundle of fibres coming from said first and/or second drafting rollers 4, 5 mounted on the roller support apron 2.

[0053] Figures 1 to 4 represent roller apron supports 2 of drafting kits suitable for producing fancy yarn according to first and second methods of production that combine different bundles of fibres in a single spinning position S1, S2. These rollers apron supports 2 include a first drafting apron 10a configured for drafting a first roving (not shown) when wrapped around a first drafting roller 4 and the apron profile 6, and a second drafting apron 10b configured for drafting a second roving (not shown) when wrapped around a second drafting roller 5 and the same apron profile 6, adjacent the first drafting apron 10a. Those first and second drafting aprons 10a, 10b are controlled for the start and the stop thereof during spinning by controlling the operation of the existing middle and back 12, 13 bottom rollers of the drafting frame 7 so that feeding of roving is interrupted alternately to combine sections of different types of fibres in a single yarn.

[0054] According to a particular method of production of fancy yarn which dispenses with the use of pneumatic devices for compacting fibres coming at the outlet of the drafting aprons 10a, 10b, the claimed drafting assembly 1 includes, at each spinning position S1, S2 (see drawings of figures 3, 4 and 7 to 9);

- a fibre joining component 15 susceptible to be removably attached to the apron profile 6,
- an apron guiding component 19 removably attached to the roller apron support 2 so that it remains located between said first and second drafting rollers 4, 5 to guide the driving of one of those second drafting aprons 10b,
- a first fibre condenser component 20 removably attached to the roller apron support 2 so that it remains located between said first and second drafting rollers 4, 5 to receive a first roving (not shown),
- two second fibre condenser components 21 removably attached to the roller apron support 2 so that they remain located behind the second drafting rollers 5 to help joining fibres of first and second roving (not shown) when entering the drafting assembly 1, and
- an apron tension component 23.

[0055] As stated, the claimed drafting assembly 1 has the advantage that most of the components needed for the production of fancy yarn are removably attached to a roller apron support 2, which in turn is also pivotally attached to the drafting frame 7 of the ring spinning machine.

[0056] Figure 13 shows a perspective view of an embodiment of the fibre joining component 15 including a fibre joining channel 16 defining a support bed L dimensioned to receive and support in parallel two bundles of fibres (not shown) at the outlet of the adjacent drafting aprons 10a, 10b. A pair of securing clamps 17 are provided on the body of the fibre joining component 15. These clamps 17 are configured to be snap fitted into the edge of the apron profile 6. In fact, the surface of the edge 6a of the apron profile 6 of the roller apron support 2 is adapted with two notches to receive and removably secure these clamps 17 such that, in operation, the pair of clamps 17 have the advantage that act as a guide for the outer sides of the first and second drafting aprons 10a, 10b (see figures 8 and 9).

[0057] Figures 14 and 15 show upper and lower perspective views of a roller apron support 2 comprising an apron profile 6 whose body defines fittings 24 for receiving and guiding the first and second drafting aprons 10a, 10b. In the same figures 14 and 15, it can be observed said first and second drafting rollers 4, 5 are provided with first roller portions 4a, 5a of wider radius including recesses 25 for receiving and guiding in an optimum manner the first and second drafting aprons 10a, 10b.

[0058] Figures 5 and 6 show a roller apron support 2 of the claimed drafting kit suitable for producing a yarn different from Fancy yarn, that is to say for producing a yarn according to a method of production that includes pre-drafting and main drafting of at least a bundle of fibres at each spinning position S1, S2. This embodiment includes a single drafting apron 18 (the third drafting apron of the drafting kit) configured for main drafting a roving (not shown) when wrapped around a first drafting roller 4 and the apron profile 6. At each spinning position S1, S2, the single drafting apron 18 is controlled for the start and the stop by controlling the operation of the existing middle 13 bottom roller of the drafting frame 7 of the ring spinning machine.

[0059] As it is shown in figures 5, 6 and in figures 10 to 12, the roller apron support 2 may be, for example, a support arm 3 extendable for varying the distance between the first and second drafting rollers 4, 5 which are arranged over the existing middle and back drafting rollers of the drafting frame 7 of the ring spinning machine. In this manner, the claimed drafting kit adapts to the production of different types of yarn which require the distance between middle and back drafting rollers 12, 13 to be modified depending on the kind of fibres used to manufacture those yarns.

[0060] As stated in the description, the claimed drafting kit drastically improves handling of components necessary for drafting fibres in a ring spinning machine. As a matter of fact, by virtue of the presence of the claimed roller apron support 2 and preferably, of the raiser 9, first and second drafting rollers 4, 5 of the roller apron support 2 are able to act as middle and back bottom rollers over the existing drafting bottom rollers 12, 13 and the existing front bottom roller 14 is able to receive bundle of fibres coming from said first and/or second drafting rollers 4, 5 to produce yarns according to different methods of production.

[0061] If fancy yarn is to be produced, at each spinning position S1, S2 first and second drafting aprons 10a, 10b are interchanged with single drafting apron 18 on first and second drafting rollers 4, 5 attached to the roller apron support 2. To this end, the roller apron support 2 is rotated to an upper position to facilitate changing of single drafting apron 18 and placing of those drafting aprons 10a, 10b, while the existing bottom drafting rollers, 12, 13 keep running (see, figures 7, 9, 10, 12). As per the fibre joining component 15, the apron guiding component 19 and the first and second fibre condenser components 20, 21, these components may be attached to the roller apron support 2 either by means of bars 22 which are secured to the support arm 3 wherein the first and second drafting rollers 4, 5 are attached, or by means of clamps 17 which are secured to the edge 6a of the apron profile 6 as it is the case of the fibre joining component 15.

[0062] When producing fancy yarn, at each spinning position S1, S2, a first roving (not shown) is fed to a first drafting apron 10a and a second roving (not shown) is fed to a second adjacent drafting apron 10b. Operation of these first and second drafting aprons 10a, 10b is controlled by the middle and back existing bottom rollers 12, 13 acting on drafting aprons 10a, 10b which may be easily replaced in case of failure without the need for the existing bottom rollers 12, 13 to stop running. Besides, with the claimed drafting assembly, operation of drafting aprons 10a, 10b on the first and second drafting rollers 4, 5 takes place by applying a force torque to the existing bottom rollers 12, 13 lower than in the case of conventional drafting assemblies.

[0063] Conventional drafting frames does need the provision of an important number of attachments to support fibre condenser and guiding components in between the reduced space left by the existing drafting rollers of the drafting frame. The claimed drafting assembly allows most of these components 19, 20, 21 to be attached to a removable roller apron support 2 that is pivotally attached to the existing drafting frame 7.

[0064] A person skilled in the art could introduce changes and modifications in the embodiments described without departing from the scope of the invention as it is defined in the attached claims. For example, although it has been disclosed an embodiment of drafting assembly 1 wherein the working position of the existing front roller 14 of the drafting frame 7 is modified by means of a raiser 9, it would be possible to provide another embodiment of drafting assembly 1 wherein the working position of the existing middle and back bottom drafting rollers 12, 13 is modified to a lower position while the existing working position of the front bottom roller 14 remains unchanged. The claimed drafting kit would be suitable for both embodiments.

Claims

1. A drafting assembly (1) for a ring spinning machine, comprising a roller apron support (2) removably attached to the drafting frame (7) of the ring spinning machine, **characterised in that** it includes;

   - a first drafting roller (4) coupled to said removable roller apron support (2) in a forward position to be able to act at a spinning position S1, S2 as a middle bottom drafting roller over an existing middle bottom drafting roller (13) of said ring spinning machine,
   - a second drafting roller (5) coupled to said removable roller apron support (2) in a backward position with respect to said first drafting roller (4) to be able to act at the said spinning position as a back bottom drafting roller over an existing back bottom drafting roller (12) of said ring spinning machine, and
   - an apron profile (6) attached to said removable roller apron support (2) for at least one drafting apron (10a, 10b, 18) to be wrapped around said first drafting roller and/or said second drafting roller at a spinning position S1,S2,
   - wherein said drafting assembly includes a drafting frame (7) of the ring spinning machine configured to modify either the working position of an existing front bottom drafting roller (14) or the working position of the existing middle and back bottom drafting rollers (12, 13) for said first and second drafting rollers (4, 5) of the roller apron support (2) to be able to operate as middle and back bottom drafting rollers over the existing middle and back bottom drafting rollers (12, 13) of the ring spinning machine.

2. A drafting assembly (1) according to claim 1 and suitable for working two adjacent spinning positions S1, S2 with a single removable roller apron support (2), wherein it comprises;

   - a pair of first drafting rollers (4) for a pair of adjacent spinning positions S1, S2 of said ring spinning machine, said pair of first drafting rollers (4) being coupled to said roller apron support (2) in a forward position to be able to act on each spinning position S1, S2 as middle bottom drafting rollers over existing middle bottom rollers (13) of said ring spinning machine,
   - a pair of second drafting rollers (5) for said pair of adjacent spinning positions S1, S2 of said ring spinning machine, said pair of second drafting rollers (5) being coupled to said same roller apron support (2) in a backward position with respect the pair of first drafting rollers (4) to be able to act on each spinning position S1, S2 as back bottom drafting rollers over existing back

bottom rollers (12) of said ring spinning machine,
- wherein said apron profile (6) is dimensioned to extend between said adjacent spinning positions S1, S2, for at least one drafting apron (10a, 10b, 18) to be wrapped around one of said first drafting rollers (4) and/or one of said second drafting rollers (5) on each of said adjacent spinning positions S1, S2, and
- wherein said drafting assembly includes a drafting frame (7) of the ring spinning machine configured to modify either the working position of an existing front bottom drafting roller (14) or the working position of the existing middle and back bottom drafting rollers (12, 13) for said pair of first and second drafting rollers (4, 5) of the roller apron support (2) to be able to operate as middle and back bottom drafting rollers over the existing middle and back bottom drafting rollers (12, 13) of the ring spinning machine.

3. A drafting assembly (1) according to any of claims 1 to 2, wherein said drafting frame (7) is configured to modify the working position of an existing front bottom drafting roller (14) by means of a raiser (9) removably mounted on the drafting frame (7) of the ring spinning machine to raise the working position of an existing front bottom drafting roller (14) for said existing front bottom drafting roller (14) to be able to receive when in its raised working position at least one type of bundle of fibres coming from said first and/or second drafting rollers (4, 5) mounted on said removable roller apron support (2).

4. A drafting assembly (1) according to any of claims 1 to 3 and suitable for a method of production of fancy yarn, wherein it comprises;

- a first drafting apron (10a) wrapped around each one of said first drafting rollers (4) and said apron profile (6) and configured for drafting a first roving at a spinning position S1, S2, and
- a second drafting apron (10b) wrapped adjacent to the first drafting apron (10a) around each one of said second drafting rollers (5) and the said apron profile (6) and configured for drafting a second roving in the same ring spinning position S1, S2.

5. A drafting assembly (1) according to claim 4, wherein the body of said apron profile (6) defines at each spinning position S1, S2 a fitting (24) for receiving said first and second drafting aprons (10a, 10b).

6. A drafting assembly (1) according to any of claims 4 or 5, wherein each of said first and second drafting rollers (4, 5) comprises a first roller portion (4a) of wider radius provided with a recess (25) for receiving and guiding one of said first or second drafting aprons (10a,10b).

7. A drafting assembly (1) according to claim 1 to 3 and suitable for pre-drafting and drafting fibres of at least one roving, wherein it comprises ;

- a single drafting apron (18) at each spinning position S1, S2 wrapped around each one of said first drafting rollers (4) and the said apron profile (6) for drafting fibres coming from at least one roving.,

8. A drafting assembly (1) according to any of claims 1 to 6, wherein said removable roller apron support (2) comprises a support arm (3) wherein said first and second drafting rollers (4, 5) are attached, and wherein a rear end (3a) of said support arm (3) is pivotally attached to the drafting frame (7) of the ring spinning machine.

9. A drafting assembly (1) according to claim 7, wherein said support arm (3) is extendable for varying the distance between one of said first drafting rollers (4) and one of said second drafting rollers (5) attached to the support arm (3) of the roller apron support (2).

10. A drafting assembly (1) according to claims 1 to 5, wherein it comprises a fibre joining component (15) removably attached to the apron profile (6) of said roller apron support (2), said fibre joining component (15) including a fibre joining channel (16) defining a support bed (L) dimensioned to receive and support in parallel at least two bundles of fibres at the outlet of two adjacent drafting aprons (10a, 10b) in a spinning position S1, S2.

11. A drafting assembly (1) according to any of claims 1 to 4, wherein it comprises a first fibre condenser (20) component removably attached to the roller apron support (2) so that it remains located between one of said first drafting roller (4) and one of said second drafting roller (5) for receiving a first roving in a spinning position S1, S2.

12. A drafting assembly (1) according to claim 4 , wherein it comprises an apron guiding component (19) removably attached to the roller apron support (2) so that it remains located between one of said first drafting rollers (4) and one of said second drafting rollers (5) for guiding one of said second drafting aprons (10a) in a spinning position S1, S2.

13. A drafting assembly (1) according to any of claims 1 to 3 , wherein it comprises at least one second fibre condenser component (21) removably attached to the roller apron support (2) so that it remains located behind one of said second drafting rollers (5) in a spinning position S1 or S2.

14. Drafting kit for drafting fibres at two adjacent spinning positions of a ring spinning machine , comprising ;

- a removable roller apron support (2),
- a pair of first drafting rollers (4) for a pair of adjacent spinning positions S1, S2 of said ring spinning machine, said pair of first drafting rollers (4) being removably coupled to said apron support (3) in a forward position to be able to act at each spinning position S1, S2 as middle bottom drafting rollers over the existing middle bottom rollers (13) of said ring spinning machine,
- a pair of second drafting rollers (5) for said pair of adjacent spinning positions S1, S2 of said ring spinning machine, said pair of second drafting rollers (5) being removably coupled to said same roller apron support (2) in a backward position with respect the pair of first drafting rollers (4) to be able to act at each spinning position S1, S2 as back bottom drafting rollers over the existing back bottom rollers (12) of said ring spinning machine,
- two pairs of first and second drafting aprons (10a, 10b) for drafting fibres at two spinning position S1 or S2, wherein each pair of first and second drafting aprons (10a, 10b) includes a first drafting apron (10a) configured for drafting a first roving when wrapped around one of said first drafting rollers (4) and said apron profile (6), and a second drafting apron (10b) configured for drafting a second roving when wrapped, adjacent to the first drafting apron (10a), around one of said second drafting rollers (5) and the same apron profile (6),
- a pair of third drafting aprons (18) for said adjacent spinning positions S1, S2, wherein each one of the third drafting aprons (18) is configured wider than each one of said first and second drafting aprons (10a, 10b) for drafting fibres of at least one roving, when wrapped around one of said first drafting rollers (4) and said apron profile (6),
- wherein said pairs of first and second drafting aprons (10a, 10b) are interchangeable with said pair of third drafting aprons (18) on the first and second drafting rollers (4, 5) removably coupled to the roller apron support (2).

15. Drafting kit according to claim 14, wherein it includes a raiser (9) configured to be able to raise the working position of an existing front bottom drafting roller (14) of said ring spinning machine for said existing front bottom drafting roller (14) to be able to receive when in its raised working position at least a bundle of fibres coming from said first and/or second drafting rollers (4, 5) mounted on said removable roller apron support (2),

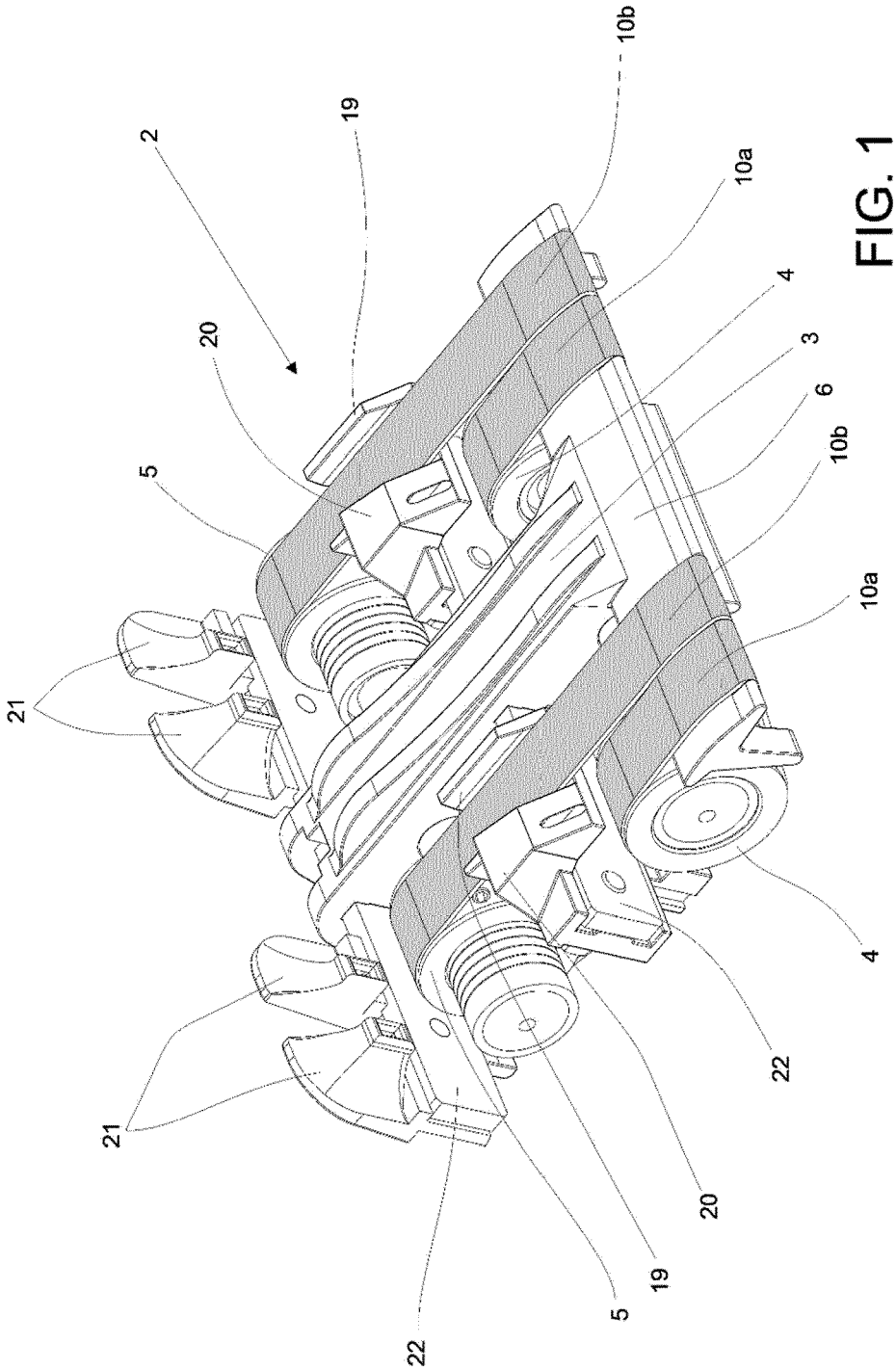


FIG. 1

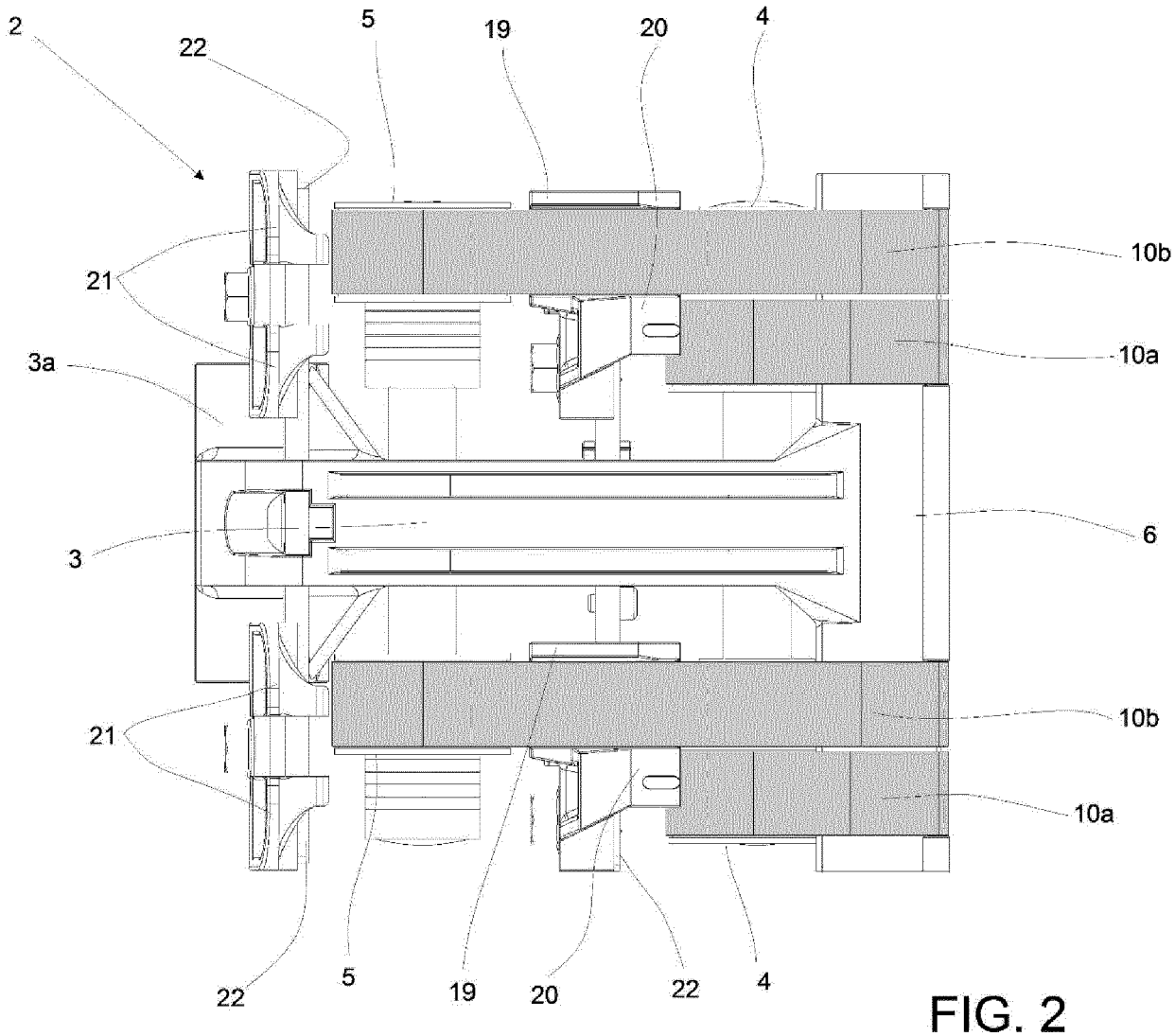


FIG. 2

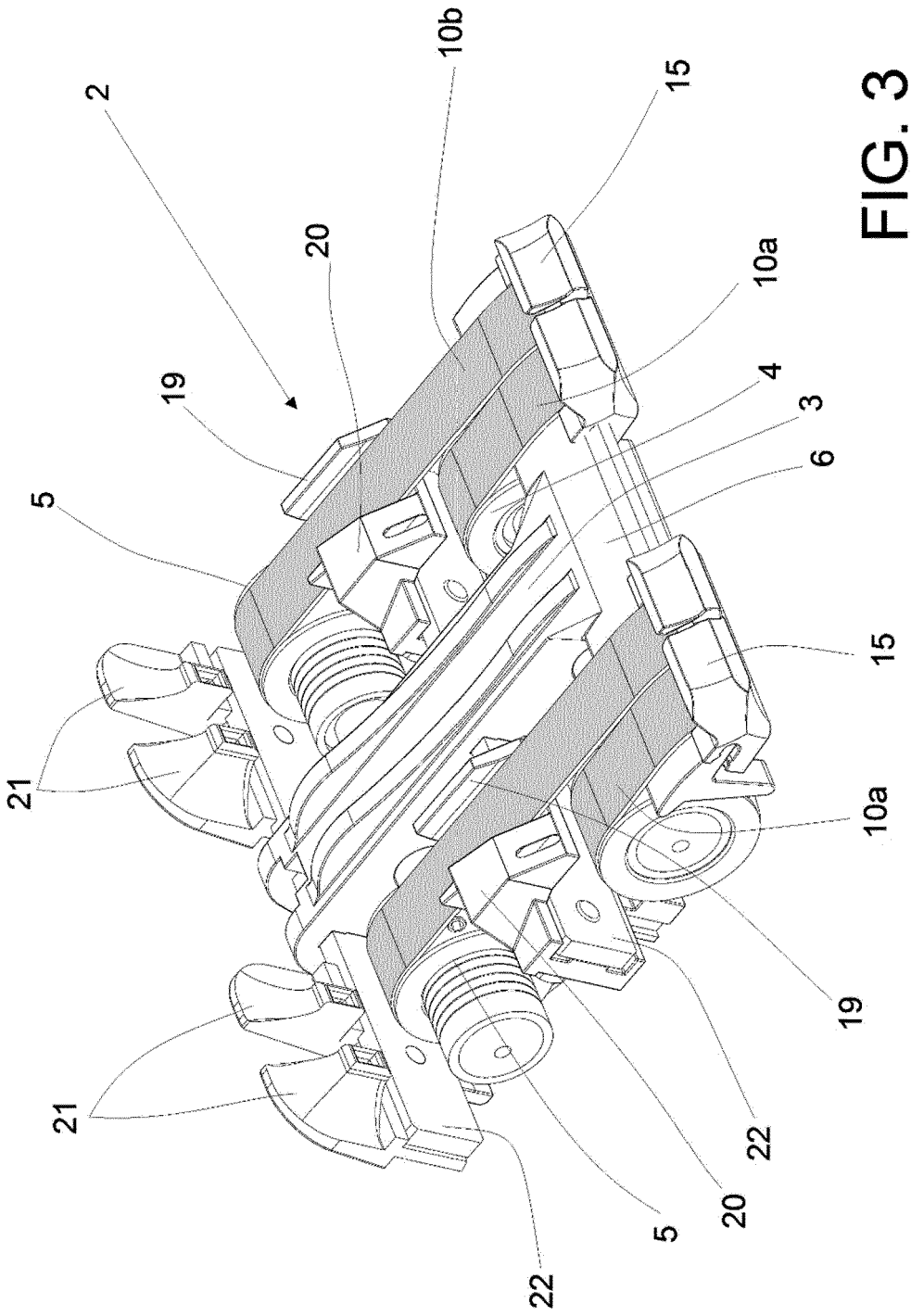
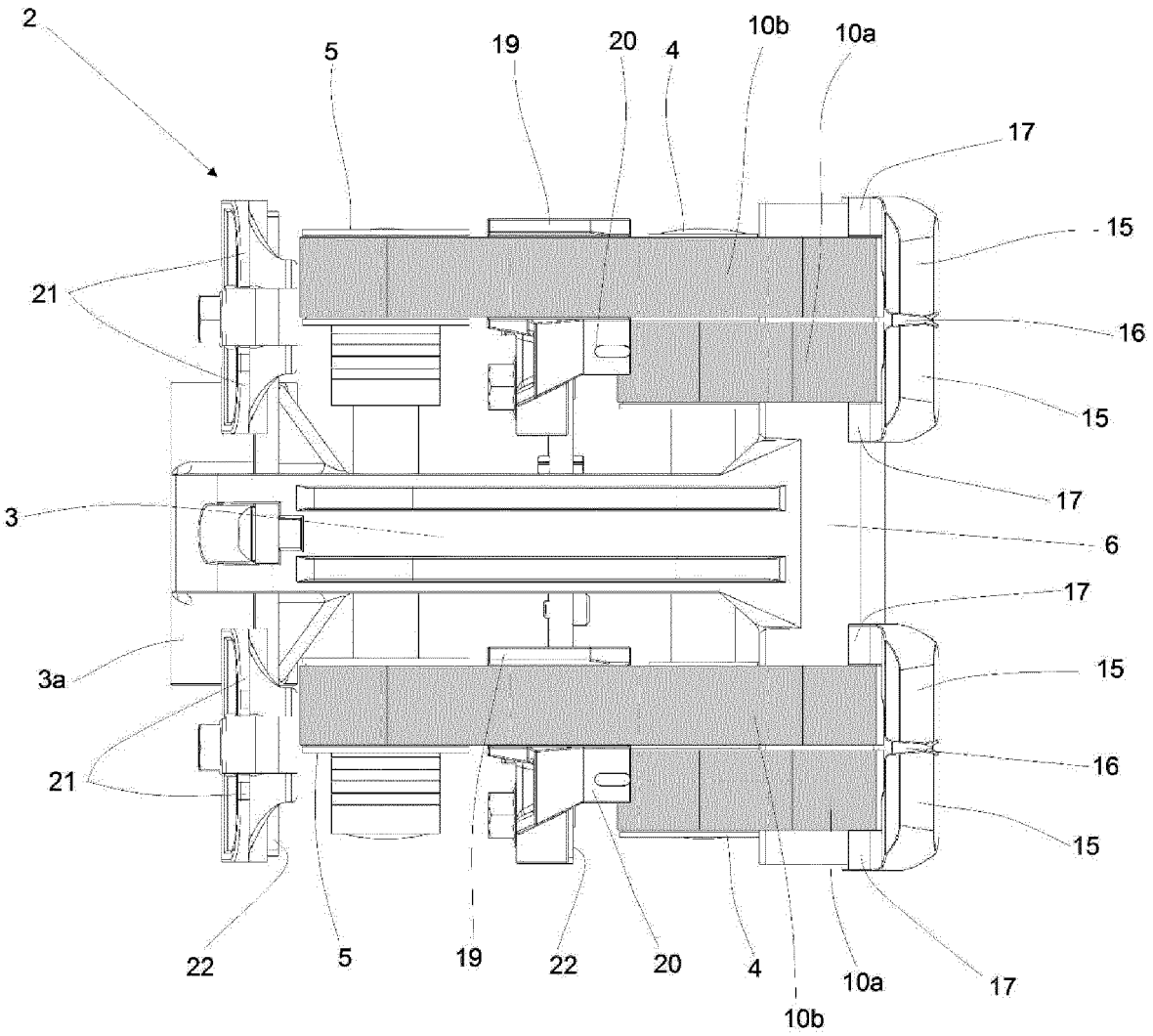


FIG. 3


2
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10b
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FIG. 4

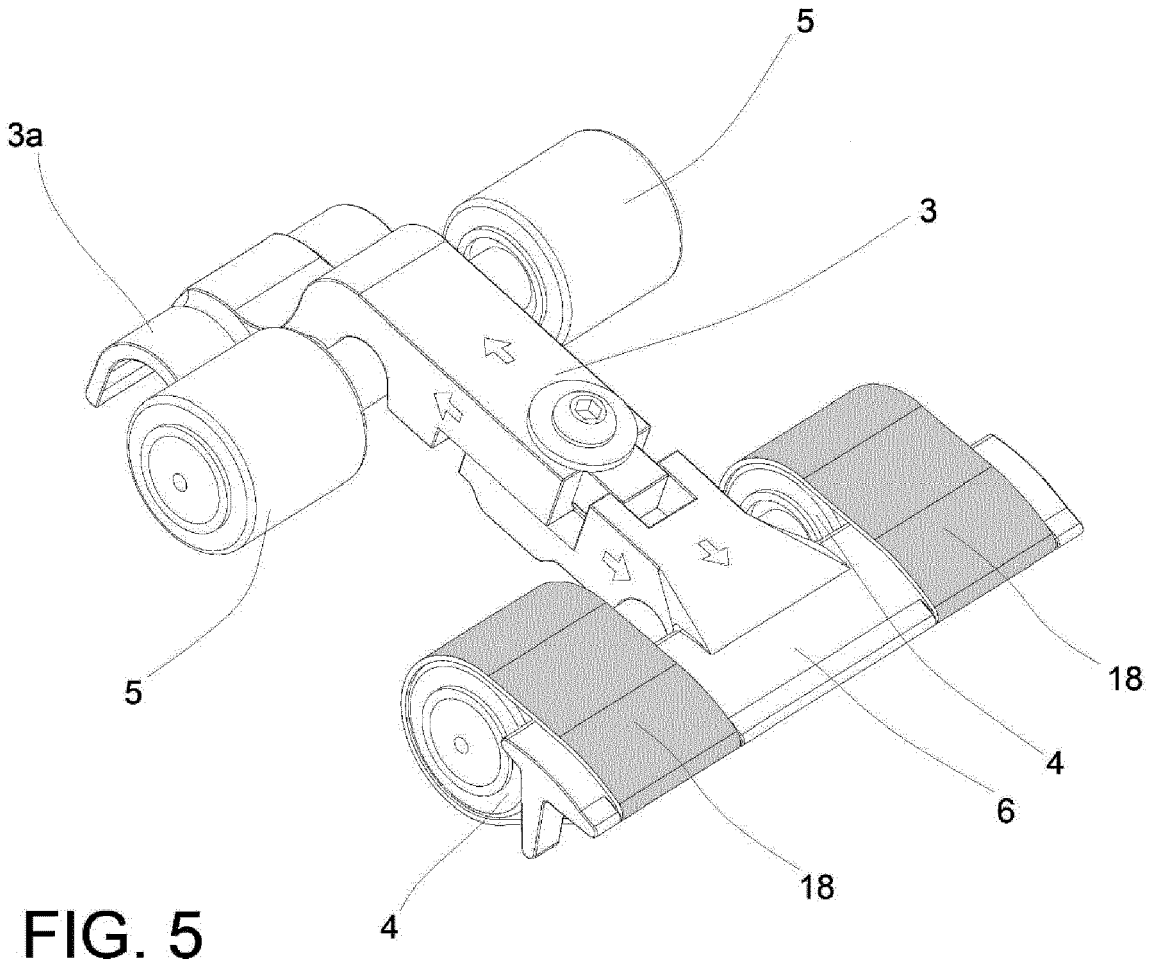

FIG. 5

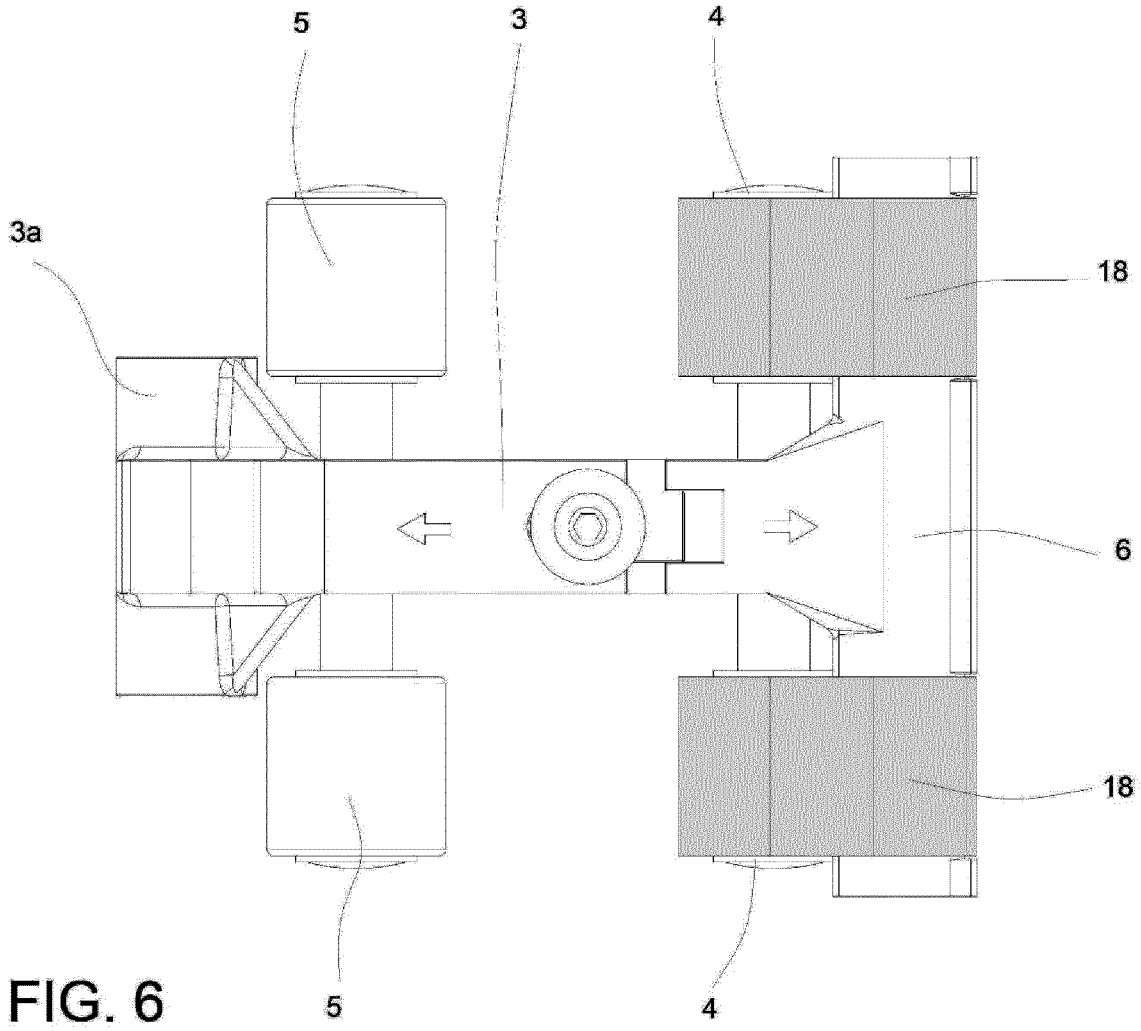

FIG. 6

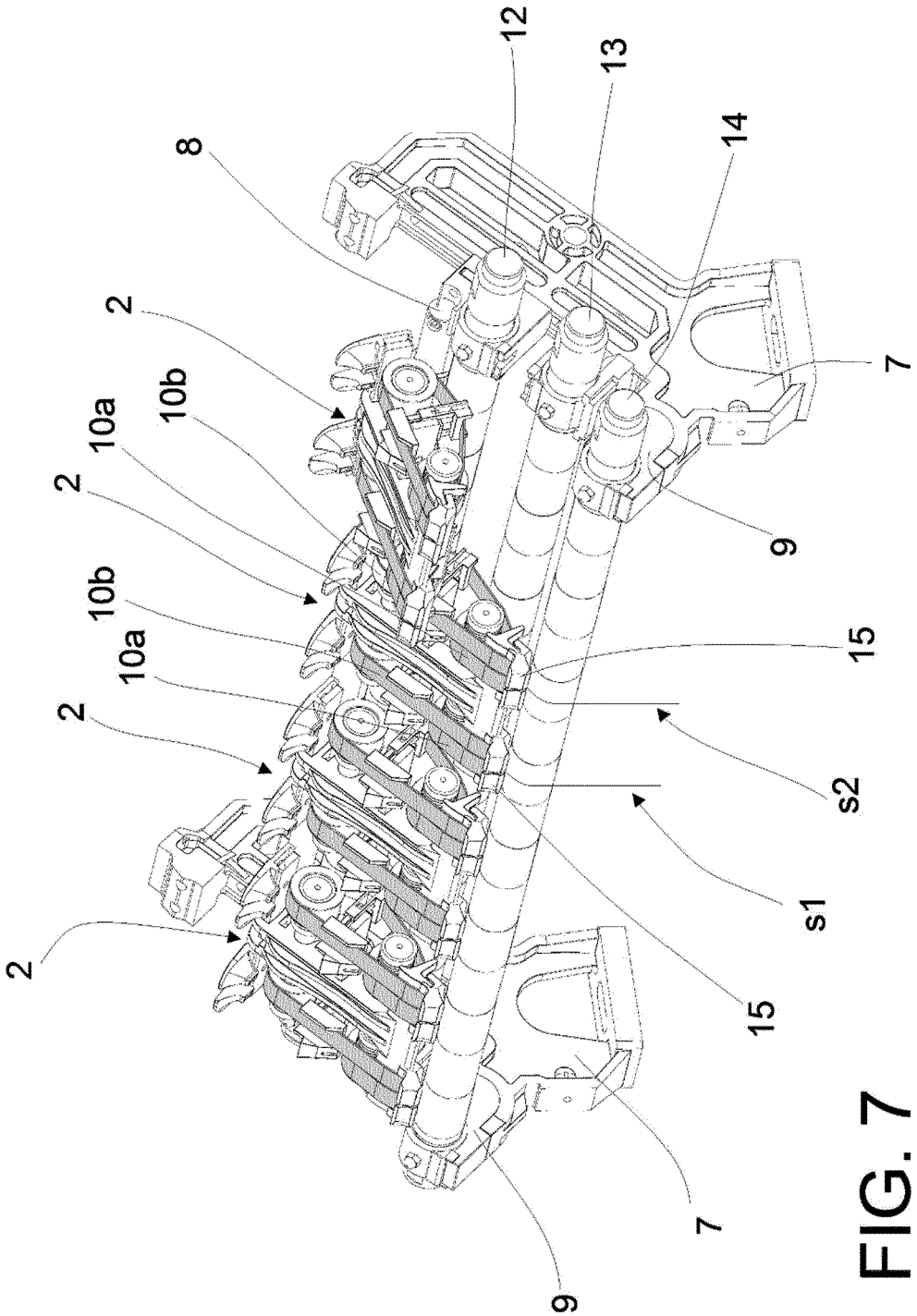

FIG. 7

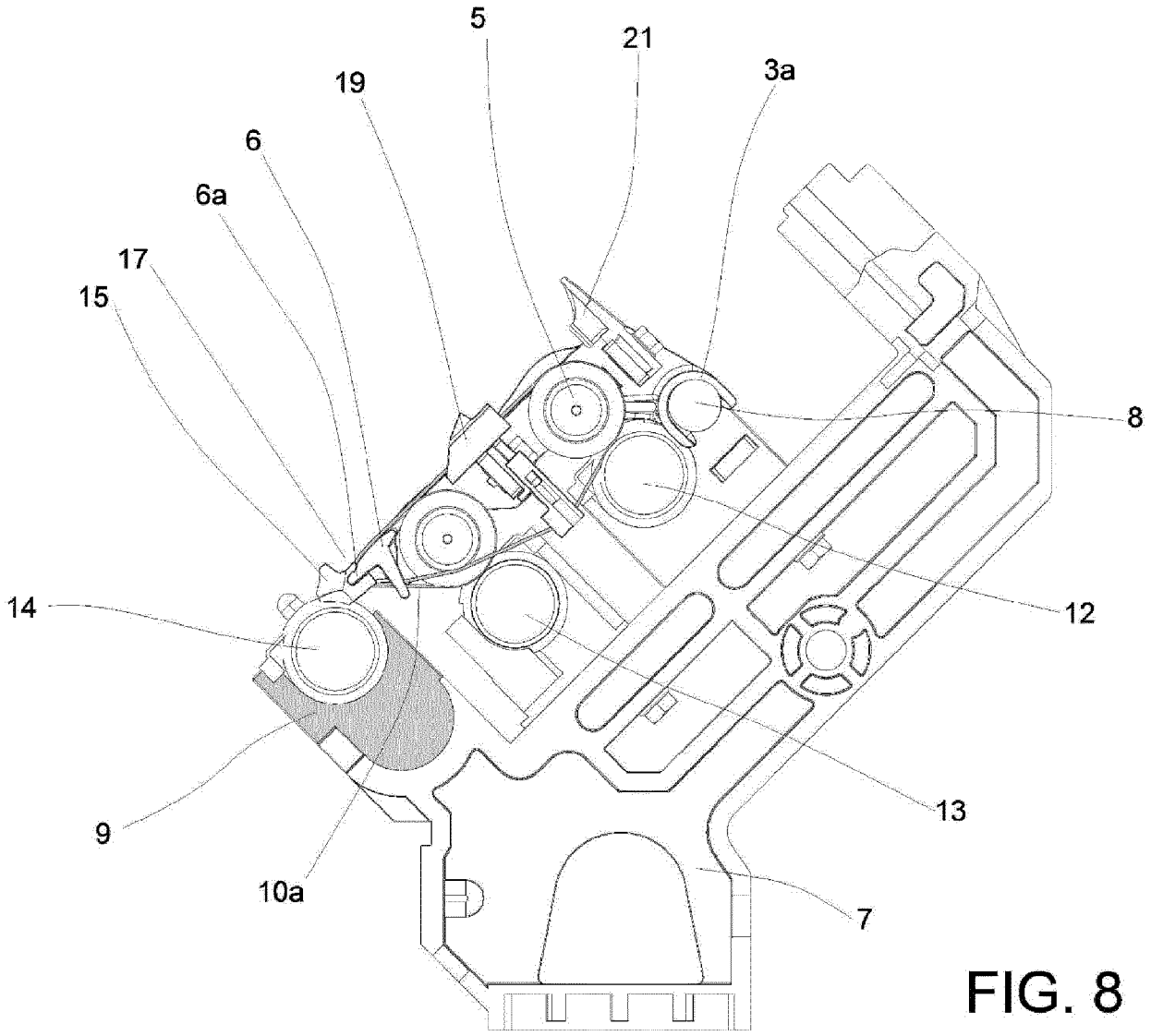

FIG. 8

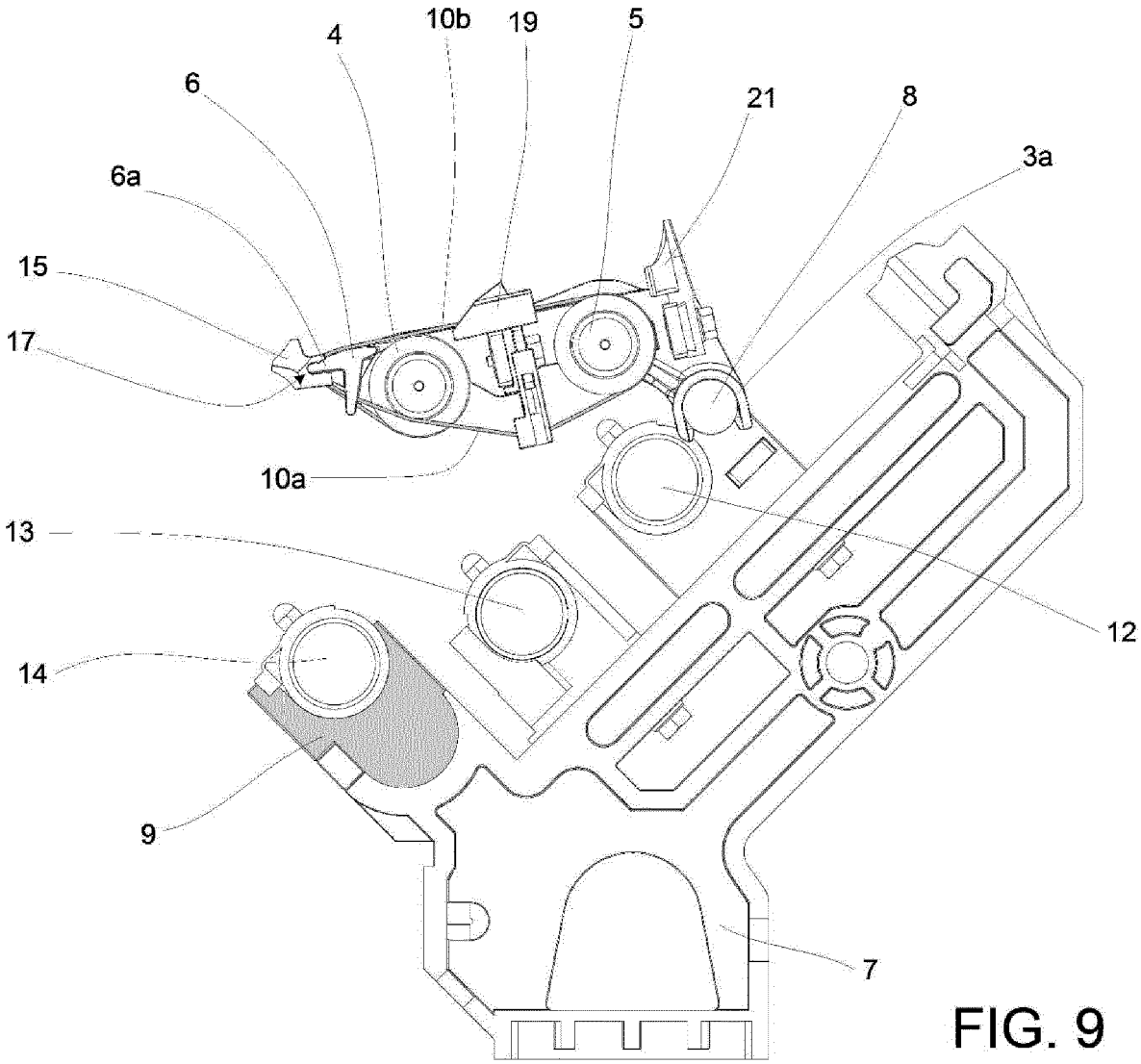

FIG. 9

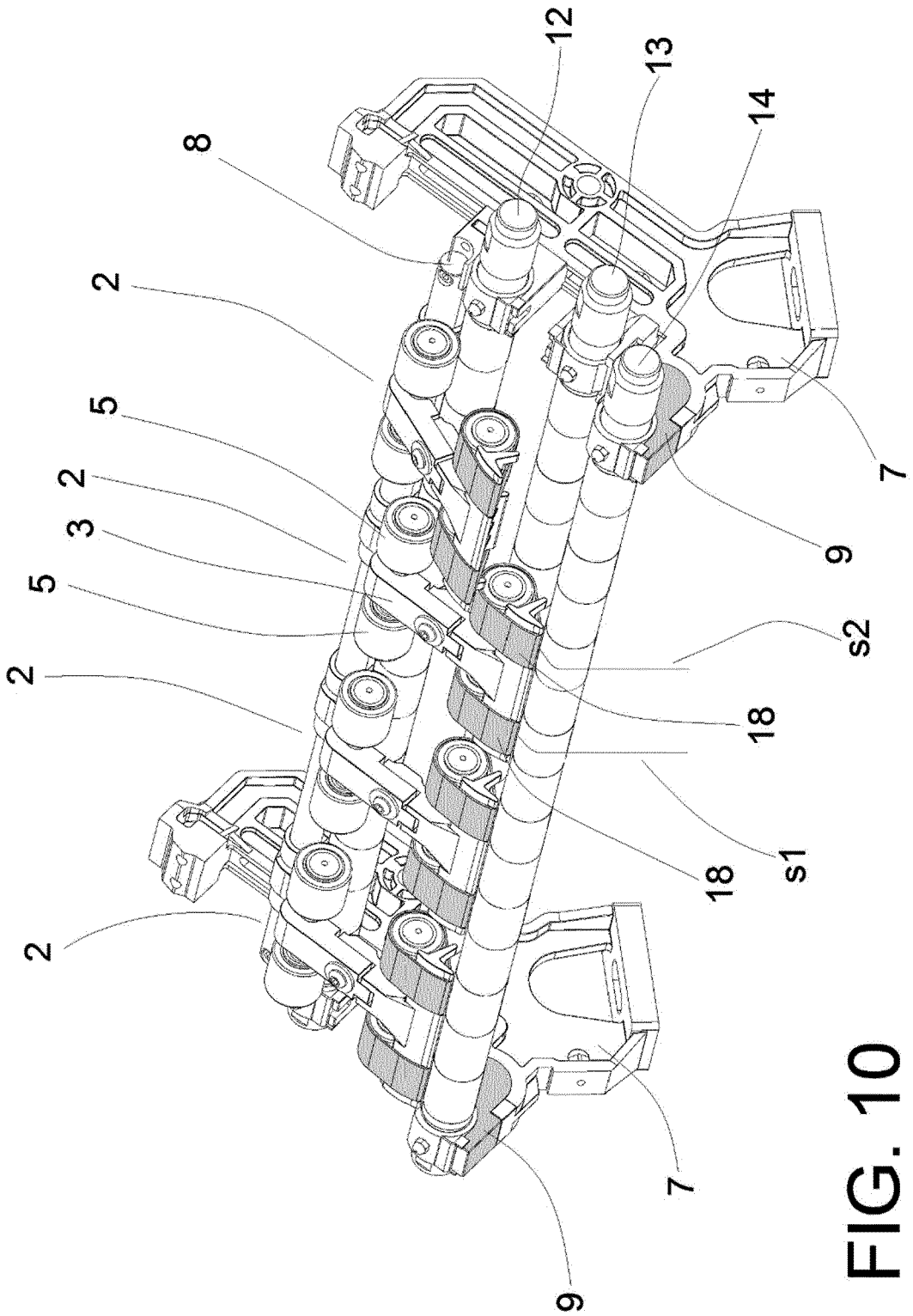

FIG. 10

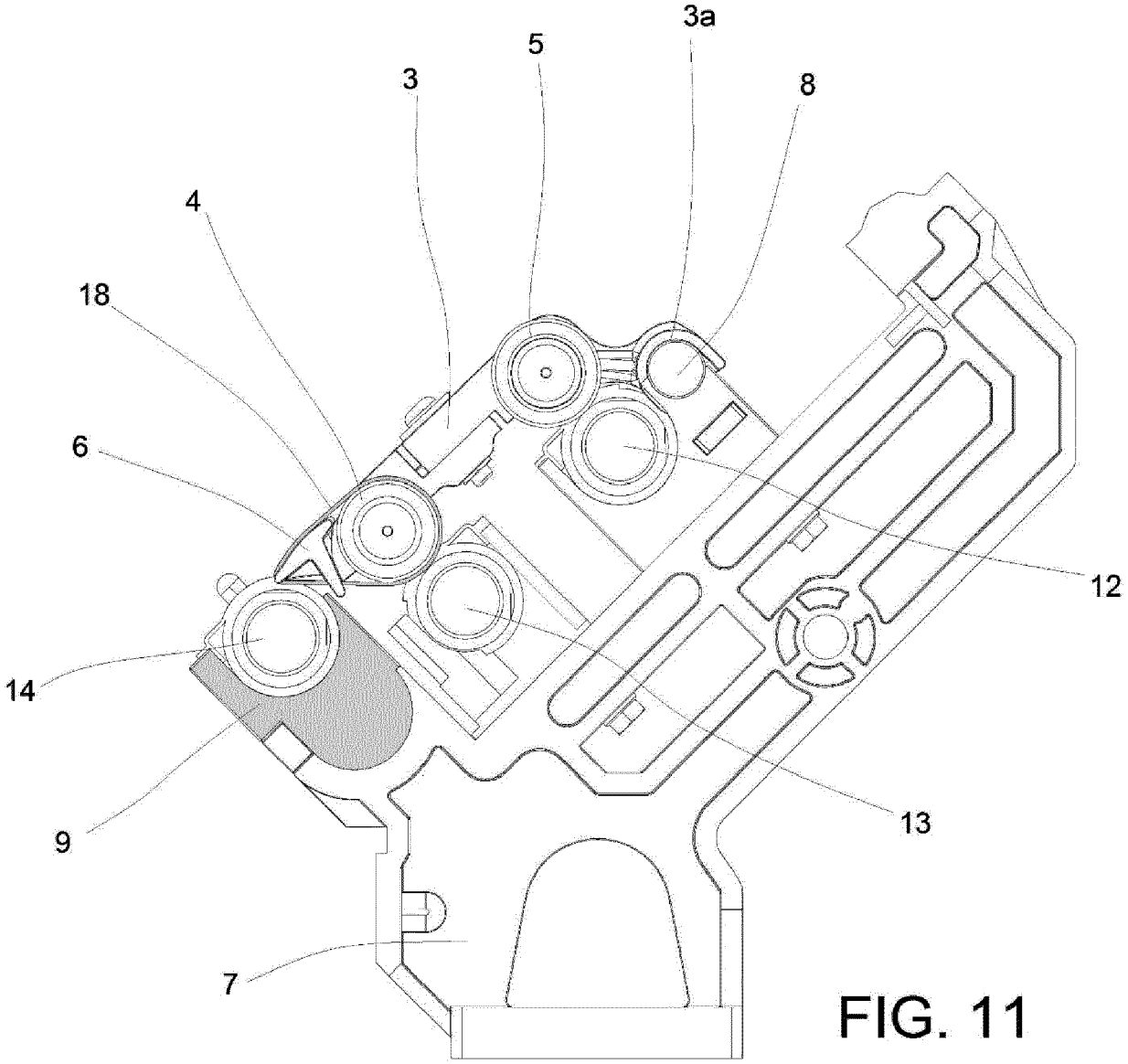

FIG. 11

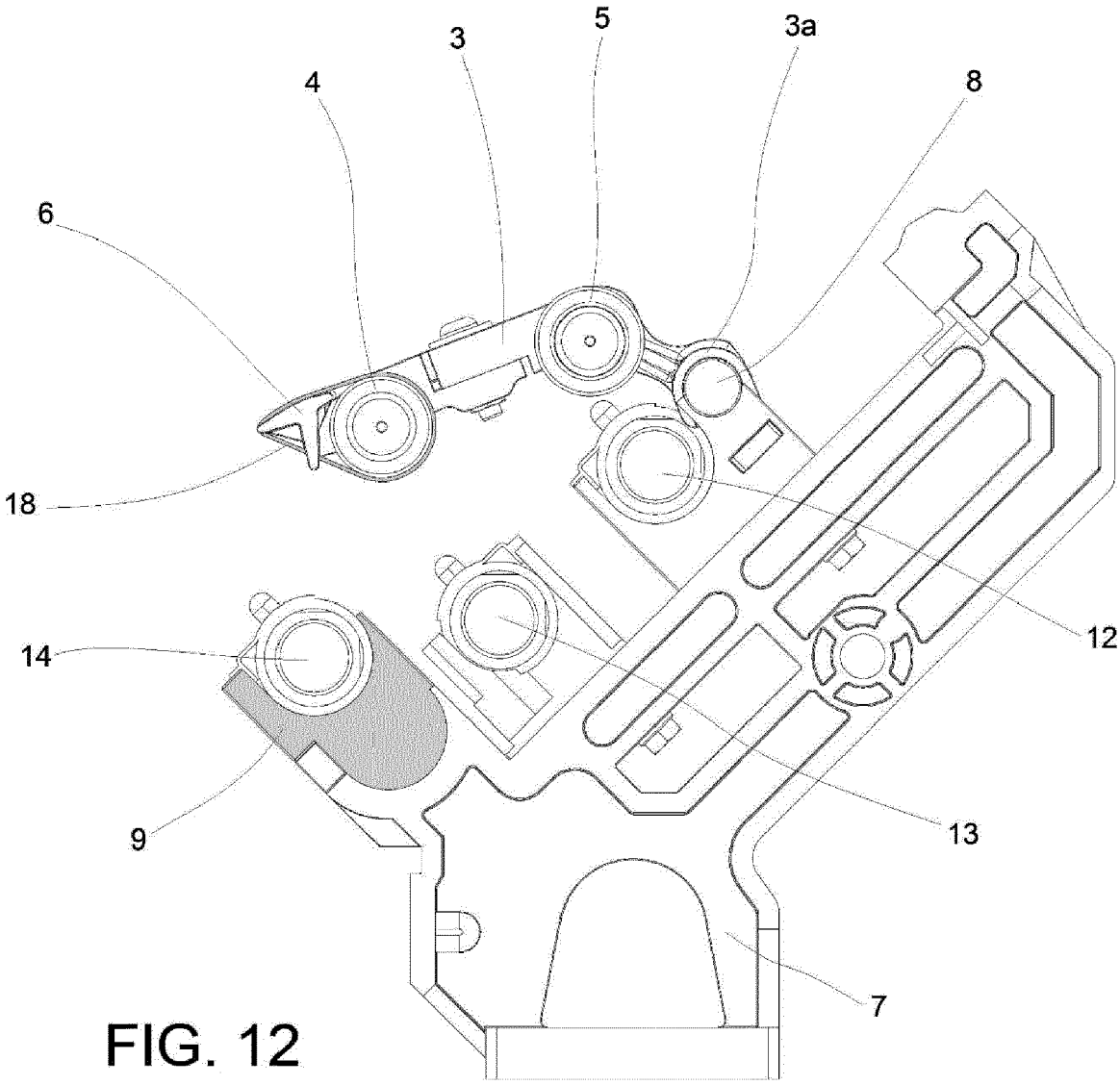

FIG. 12

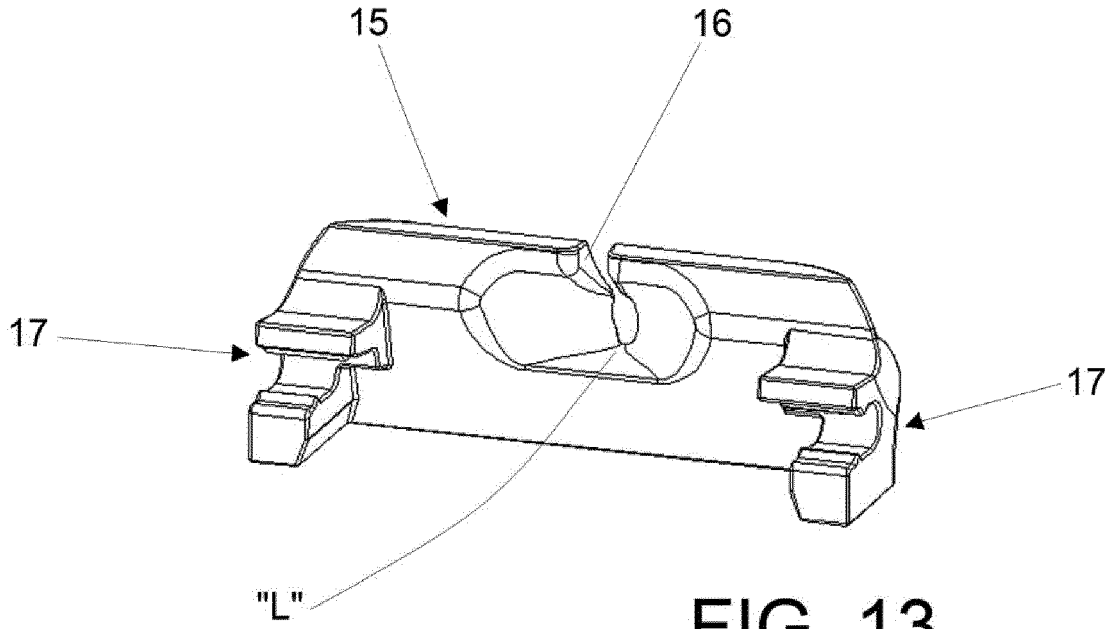

FIG. 13

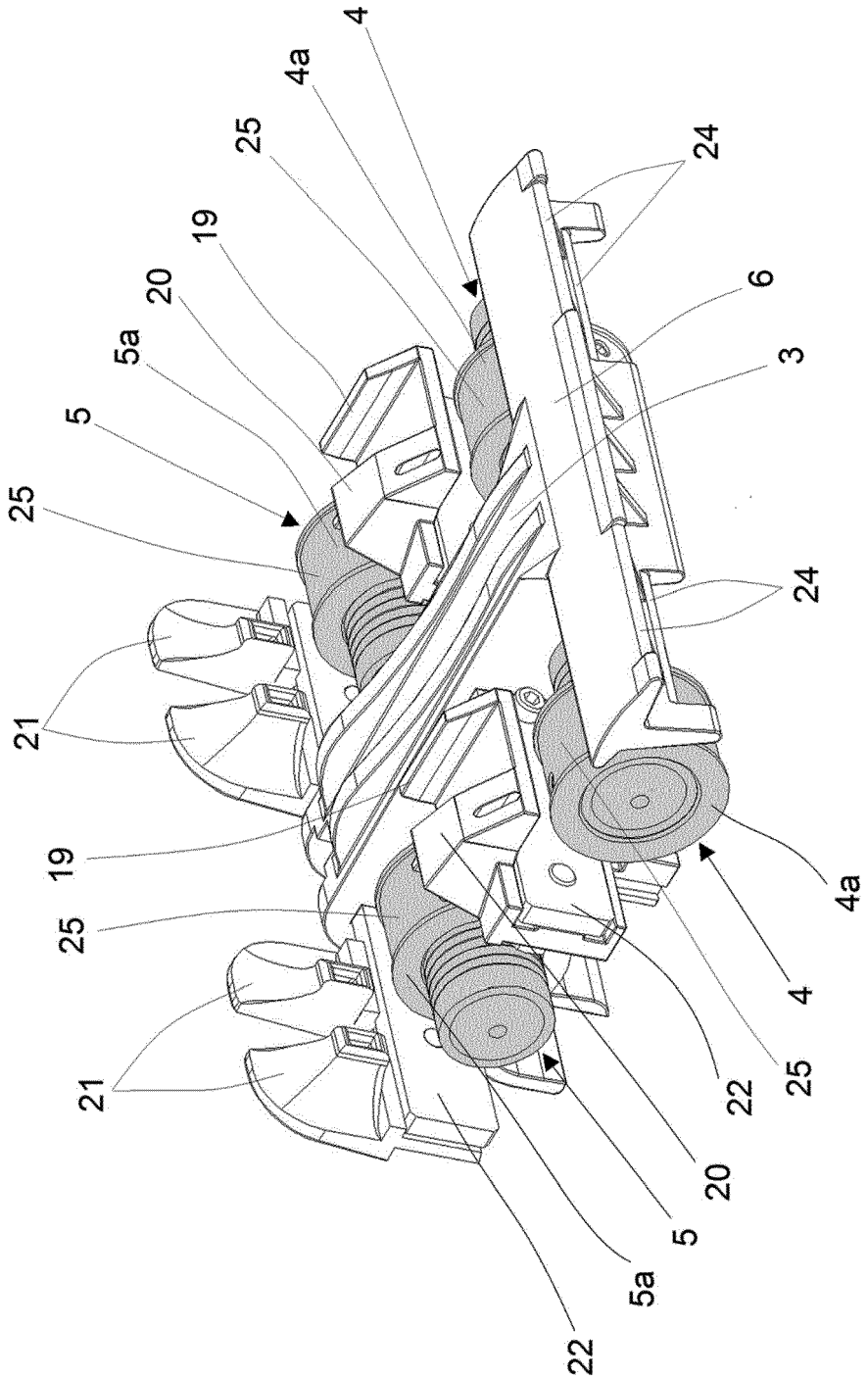

FIG. 14

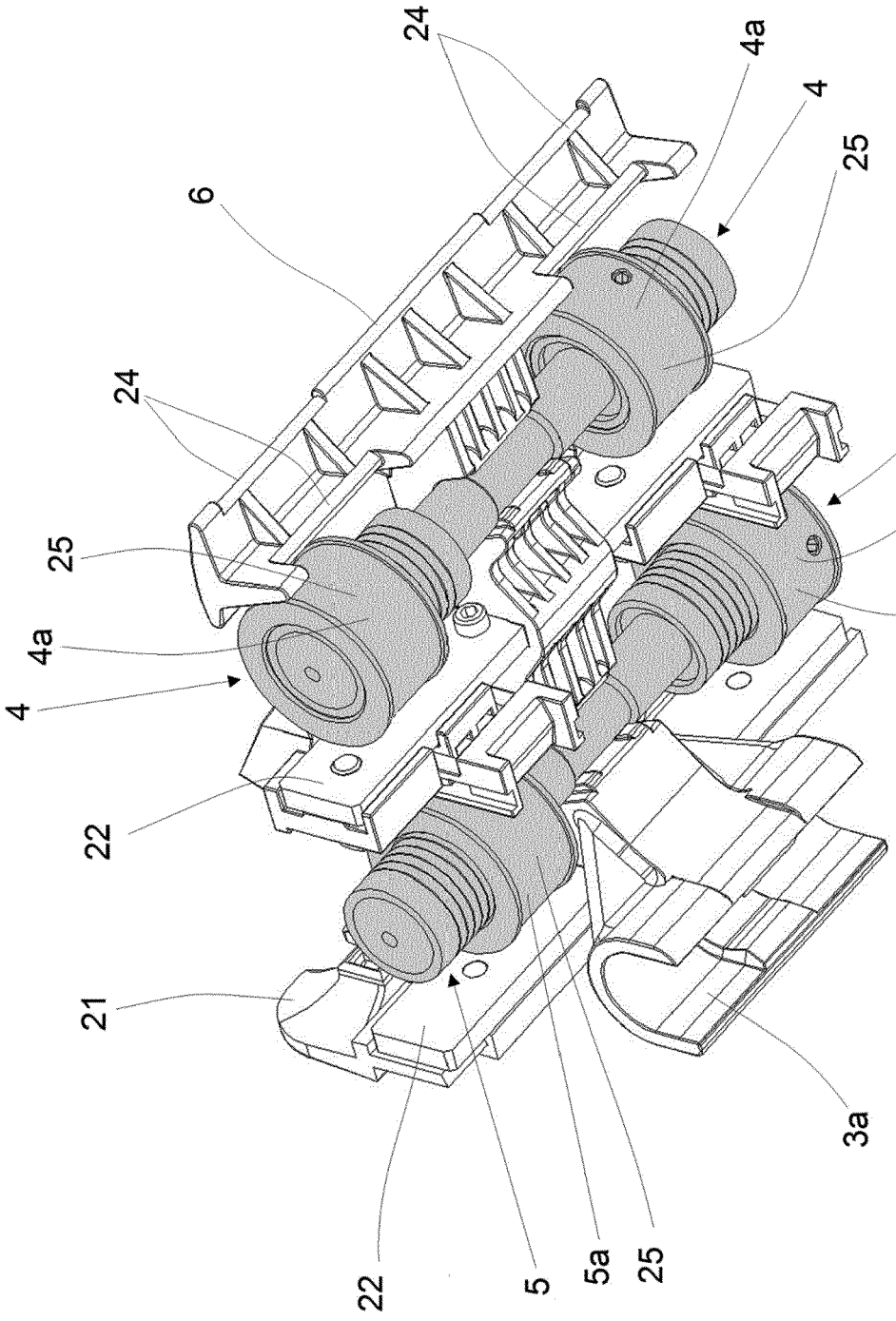

FIG. 15

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EUROPEAN SEARCH REPORT

Application Number
EP 18 38 2783

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	CN 203 440 532 U (QINGDAO HICORP GROUP CO LTD) 19 February 2014 (2014-02-19) * abstract; figures 1,2 *	1	INV. D01H5/44 D01H5/88
A	US 3 341 901 A (SHINZO KITAMURA) 19 September 1967 (1967-09-19) * figure 1 *	1	
A	DE 295 09 671 U1 (SKF TEXTILMASCH KOMPONENTEN [DE]) 24 August 1995 (1995-08-24) * page 1, paragraph 2 * * figure 2 *	14	
A	DE 893 770 C (SUEDD SPINDELWERKE ZINSER DIPL) 19 October 1953 (1953-10-19) * figures 1-2 *	3	
A	WO 2017/080594 A1 (PINTER CAIPO S A U [ES]) 18 May 2017 (2017-05-18) * page 6, line 22 - line 34 * * figures 4,5 *	14	

TECHNICAL FIELDS SEARCHED (IPC)

D01H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 April 2019	Humbert, Thomas

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 18 38 2783

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08-04-2019

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REFERENCES CITED IN THE DESCRIPTION

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