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(54) DEVICE FOR INTERRUPTING THE SUPPLY OF A BUNDLE OF FIBRES, METHOD FOR INTERRUPTING THE SUPPLY OF A BUNDLE OF FIBRES, AND MACHINE FOR SPINNING A CORE THREAD, COMPRISING SAID DEVICE

(57) A device (1) for the INTERRUPTING of the feed of a roving (12) when breakage of a filament (11) occurs during the process of spinning core yarn, characterised in that it comprises a wedge (2) arranged to be inserted, in its active position, between a pair of roving (12) feed rollers (6a, 6b), said wedge (2) enabling the INTERRUPTING of the feed of the roving (12) by acting on said rollers (6a, 6b); said device (1) featuring a mechanism (3, 4, 5, 7) to activate the displacement of the wedge (2) towards said active position when the breakage occurs. A procedure for the INTERRUPTING of the feed of a roving (12) when breakage of a filament (11) occurs during the process of spinning core yarn, comprising the stage of separating the roving (12) feed rollers (6a, 6b) by strictly mechanical means (2) to grasp the roving (12) and to halt its feed when a breakage of the filament (11) occurs.

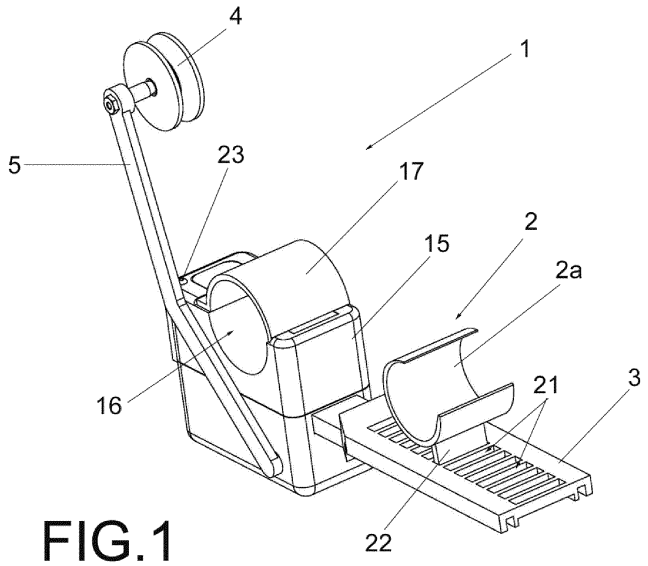


FIG.1

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Description

[0001] The present invention relates to a device and to a process for interrupting the feed of a roving in the event of the breakage of a continuous filament during the spinning process of core yarn. It likewise relates to a core yarn spinning machine incorporating said device.

Background of the invention

[0002] The manufacture of core yarn by means of the continuous spinning process is well known. Specifically, the manufacture of a core yarn combining one or two filaments with elastic properties on a single spool, covered with the fibres from a cotton roving or similar. The feed of the filament to the drafting device of the spinning machine is carried out under tension and at a predetermined tension draft ratio via a pulley acting as a guide for the filament.

[0003] For the manufacture of core yarn it is common to employ a continuous filament of elastomeric material, such as elastane or spandex fibre, as is the case of the Lycra ® brand. It is known that this continuous filament breaks easily, it being necessary in the event of a breakage to interrupt the feed of roving in time, to prevent the manufacture of a defective filament lacking the filament forming its core.

[0004] In the state of the art, there exist devices for interrupting the feed of the roving in the event of a breakage of the continuous filament. Many of these devices employ an electrical sensor which monitors the passage of the filament, detects the breakage and sends a signal to a device located at the roving feed intake. These electrical devices present the drawback that their maintenance requires the presence of specialised personnel and increases the cost of the spinning process.

[0005] Patent ES2442341T3 reveals a device for interrupting the feed of a roving which dispenses substantially with electronic means and employs mechanical means to interrupt the feed of the roving when the tension of the filament on the pulley acting as a guide for the filament ceases.

[0006] However, the device revealed in the aforementioned patent presents the drawback that it interrupts the feed by means of a mechanism which cuts the roving at the feed roller intake; therefore, in order to recommence the spinning process the operative must manually insert the roving into the feed roller intake. This manual insertion operation entails a high cost in labour, and decreases the efficiency of the spinning process.

Description of the invention

[0007] The aim of the present invention is to resolve the aforementioned drawbacks, developing a device for interrupting the feed of a roving which presents the advantages to be described below.

[0008] In accordance with this aim, according to a first aspect of the invention, the present invention provides a device for interrupting the feed of a roving in the event of the breakage of a filament during the process of spinning a core yarn, characterised in that it comprises a wedge arranged for its insertion, in an active position, between a pair of roving feed rollers, said wedge being able to interrupt the feed of the roving by its action on the rollers, said device comprising a mechanism for the activation of the displacement of the wedge to said active position when breakage of the filament occurs.

[0009] The device claimed presents the advantage that it comprises a wedge which acts on the roving feed rollers to grasp the roving and thus prevent the feed of the roving.

[0010] In the present invention, the means which interrupt the feed of the roving act on the roving feed rollers and not on the roving itself; for this reason, to recommence the spinning process it is not necessary to manipulate the roving (to insert said roving into the feed roller intake), but merely to release the means acting on the rollers. Consequently, a simple and highly efficient device is obtained.

[0011] In the device claimed, once the feed is interrupted, the free end of the roving is arranged at the outlet of the feed rollers and at the intake of the drafting rollers of the spinning machine, as it is the drafting rollers themselves which separate or cut the roving, the roving being grasped between the feed rollers due to the effect of the wedge. In fact, in the device claimed, the free end of the roving is arranged within a condenser element which captures the roving and automatically directs it to the drafting rollers when the feed is resumed.

[0012] In accordance with an embodiment of the device, said wedge is articulately attached to a supporting slide associated with a roller which acts as a guide for the filament of the core yarn, said slide being susceptible to displacement in order to move the wedge to its active position on cessation of the tension of the filament on the roller, when breakage of the filament occurs.

[0013] Preferably, said slide is displaceably assembled on a housing of the device in such a way that it is susceptible to accumulating elastic potential energy derived from the compression force applied to a spring, said slide being susceptible to displacement in order to move the wedge to its active position when cessation of the compression force and the tension of the filament on the roller occurs.

[0014] Advantageously, the roller which acts as a guide for the filament is joined to the extremity of a lever whose opposite extremity incorporates a means to activate the displacement of said slide when the tension of the filament on the roller ceases.

[0015] Also advantageously, the opposite extremity of said lever is associated with a retaining trigger for said supporting slide, said lever incorporating an element acting as a cam to activate the displacement of said slide when the tension of the filament on the roller ceases and said element releases the retaining trigger.

[0016] In accordance with an embodiment, the supporting slide of the wedge comprises a notch for the retaining trigger and a spring arranged in such a way that it is susceptible to be compressed on manually displacing the slide until the trigger becomes lodged in the aforementioned notch.

[0017] Preferably, said wedge is comprised of a body with a curved surface, configured to surround a portion of the wall of the lower roving feed roller, and a stem to articulately join said body to the wedge supporting slide.

[0018] Advantageously, in its active position, a portion of said body with a curved surface is inserted between the roving feed lower roller and upper roller, said portion of the body interrupting the rotation of the upper roller while the lower roller continues to rotate.

[0019] The upper feed roller is a roller assembled on the pressure arm of the spinning machine. This roller is pressuredly held against the lower roller, which is the drive roller. On inserting the wedge between the two rollers, the upper roller is elevated and ceases to make contact with the lower roller, and the roving is grasped.

[0020] In accordance with an embodiment, said supporting slide comprises a plurality of grooves to attach the stem of the wedge in a plurality of positions, each of said grooves determining a predetermined position of the wedge in accordance with the distance separating the bar holding the pressure arm from the feed rollers.

[0021] Preferably, said device comprises a casing provided with a housing and a clamp to secure said casing to a bar bearing a number of pressure arms of a core yarn spinning machine. Each of these pressure arms is configured so as to pressuredly hold the upper roving feed roller against the lower roller.

[0022] Also advantageously, said device comprises at least one sensor to detect the movement of the roving supporting slide when the tension of the filament ceases, and a lamp which has been foreseen on the exterior of the casing of the device for the generation of a light signal when said sensor detects the displacement of the slide.

[0023] This sensor is associated with a magnet installed on the wedge supporting slide. When the slide is displaced in order to activate the wedge, the magnet activates the sensor and the lamp (LED) is illuminated.

[0024] In accordance with a second aspect, the present invention provides a procedure for interrupting the feed of a roving when the breakage of a filament occurs during the process of spinning core yarn, comprising the stage of separating, by strictly mechanical means, the roving feed rollers to interrupt the feed of the roving and to grasp the same when breakage of the filament occurs.

[0025] Preferably, said stage is carried out by inserting a wedge between the feed rollers in order to separate said rollers and to grasp the roving.

[0026] By means of the procedure claimed, the interruption of the feed is carried out by acting upon the rollers in order to interrupt the feed. In this way, it is the drafting rollers themselves which separate or cut the roving when the feed is halted.

[0027] Advantageously, the procedure claimed comprises the stage of separating or cutting the roving prior to its intake into the drafting rollers.

[0028] Preferably, the procedure comprises the stage of capturing the free end of the roving, once separated or cut, within a condenser element, said free end being susceptible to be fed automatically into the drafting rollers when the means interrupting the feed cease to be active.

[0029] In accordance with a third aspect, the present invention provides a ring spinning machine for core yarn incorporating at each spinning position a device to interrupt the feed of the roving in the event of the breakage of the filament such as that claimed herein.

[0030] In the present invention, "continuous filament" should be understood to be a filament of textile fibre of an indefinite length, preferably a length of synthetic fibre obtained by extrusion, for example a filament of elastane or of polyester.

[0031] "Roving" or "bundle of roving fibres" should be understood to be a bundle of cut cotton, wool, or viscose fibres, or another similar natural or artificial cut fibre, intended for the coating of one or more continuous filaments in the spinning of core yarn.

[0032] "Core yarn" should be understood to be a yarn combining a core of one, two or as many as three continuous filaments with a bundle of roving fibres covering the filaments.

Brief description of the drawings

[0033] For a better understanding of that which is described herein, a set of drawings is attached which, schematically and by way of a non-limiting example only, represent a practical case of embodiment.

[0034] In said drawings:

Figure 1 is a perspective view of an embodiment of the device.

Figures 2 and 3 are two schematic longitudinal cross-sections of the device, showing the mechanism which activates the displacement of the wedge. Figure 2 shows the wedge and the slide supporting this in a resting position (filament in tension over the roller), and figure 3 shows the wedge and the slide supporting this in its active position (broken filament).

Figure 4 is a schematic representation of a core yarn spinning machine, incorporating a device attached to the arm-bearing bar. This representation shows the feed of the filament via the roller which acts as a guide for said filament at the extremity of the lever of the device; likewise the wedge in a resting position.

Figure 5 is a schematic representation of the core yarn spinning machine shown in figure 4. This representation shows the active position of the wedge when the filament is broken; likewise the position of the free extremity of the roving at the intake of the drafting rollers.

Figure 6 is a perspective view of a core yarn spinning machine incorporating a device at each spinning position. All the devices are attached to the bar supporting the pressure arms of the machine.

Description of a preferred embodiment

[0035] An embodiment of the device and the process claimed is described below, with reference to figures 1 to 6. Both the device and the process are applied to the manufacture of core yarn by means of a continuous ring spinning machine. Core yarn is comprised of a core of at least one continuous filament covered with a roving of fibres. The continuous filament may be, for example, a continuous filament of elastane by the Lycra ® brand. The roving may be, for example, a roving of cotton fibres.

[0036] Figure 1 shows a perspective view of an embodiment of a device 1 for interrupting the feed of a roving during the spinning process of core yarn. This device 1 is characterised in that it comprises a wedge 2 articulately joined to a supporting slide 3 associated with a roller 4 which acts as a guide for the filament of core yarn via an activating lever 5.

[0037] When breakage of the filament 11 of a spinning position occurs, the wedge 2 is activated and adopts an active position where it is inserted between a pair of feed rollers 6a, 6b of the roving 12 so as to halt the feed of said roving 12 (see figure 5).

[0038] The roller 4 which acts as a guide for the filament 11 is linked to the extremity of the activating lever 5 whose opposite extremity is associated with a retaining trigger 7 of the wedge 2 supporting slide 3 by means of an element 8 which acts as a cam to release said trigger 7 (see figures 2 and 3).

[0039] As may be seen in figures 2 and 3, the wedge 2 supporting slide 3 presents a notch 9 for the trigger 7 and a spring 10 which is arranged in such a way that it may be compressed by manually displacing the slide 3 until the trigger 7 becomes locked in the aforementioned notch 9 (see figure 2).

[0040] When the tension of the filament 11 on the roller 4 ceases, the lever 5 descends to a lower position and activates the displacement of the supporting slide 3, as the retaining trigger 7 is released from the interior of the notch 9 and the spring 10 recovers its resting position (see figure 3). As the supporting slide 3 recoils due to the action of the spring 10, the wedge 2 is moved to its active position, enabling it to act upon the feed rollers 6a, 6b to interrupt the feed of the roving 12 (see figure 5).

[0041] In the embodiment described, the wedge 2 presents a body 2a with a curved surface configured in order to surround a portion of the wall of the lower roving 12 feed roller 6a, and a stem 22 articulately joined to the supporting slide 3. In its active position (see figure 5), a portion of the body 2a with a curved surface is inserted between the roving 12 feed lower roller 6a and upper roller 6b. In this position, the upper roller 6b is elevated and ceases to make contact with the lower roller 6a, interrupting the feed of the roving 12 which, being grasped, is separated or cut prior to entering the drafting rollers 13a, 13b.

[0042] As may be seen in figure 5, the free extremity of the roving 12 is captured within a condenser element 14, precisely at the intake of the drafting rollers 13a, 13b; for this reason this extremity may be fed automatically in order to continue with the spinning process once the broken filament 11 has been repaired. To achieve this, the wedge 2 supporting slide 3 must be manually moved so that the wedge 2 frees the rollers 6a, 6b.

[0043] Figure 4 shows the device 1 with the supporting slide 3 in a forward position and the wedge 2 in a resting position to enable the feed of the roving 12. As may be seen in this figure 4, the tension of the filament 11 on the roller 4 maintains the lever 5 in an elevated position, enabling the supporting slide 3 to remain locked in a forward position, accumulating elastic potential energy derived from the compression force applied to the spring 10. As has been mentioned above, the potential energy accumulated by the spring 10 activates the recoil of the supporting slide 3 when the retaining trigger 7 is freed due to the occurrence of a breakage of the filament 11.

[0044] In the embodiment described, the device 1 comprises a casing 15 provided with a housing 16 and a clamp 17 to secure the casing 15 to a bar 18 of the spinning machine 19. Figure 6 shows a view of a spinning machine 19 including a device 1 at each spinning position. As may be seen in this figure 6, all the devices are attached to the bar 18 bearing the arms 20 which pressuredly hold the upper feed roller 6b and the upper drafting roller 13b against their respective drive rollers 6a, 13a.

[0045] The distance separating the bar 18 bearing the arms 20 from the feed rollers 6a, 6b may vary, depending on the type of machine 19. For this reason, the slide 3 supporting the wedge 2 features a plurality of grooves 21 to attach the stem 22 of the wedge 2 in a plurality of positions in accordance with the distance chosen.

[0046] In the embodiment described, each device 1 comprises a sensor (not portrayed) to detect the displacement of the supporting slide 3 when the tension of the filament 11 ceases, and with an LED lamp 23 foreseen on the exterior of the casing 15 of each device 1 to generate a light signal when the sensor detects the movement of the supporting slide 3 (see figure 6). In this way, the operatives receive a visual warning of filament 11 breakage. This sensor may also send a signal to collective warning lights (not portrayed) located at both extremities of the spinning machine.

[0047] As has been mentioned in the description of the invention, the procedure claimed enables the interrupting of the feed of the roving 12 when breakage of the filament 11 occurs, separating the roving 12 feed rollers 6a, 6b by strictly mechanical means, and grasping the roving 12 and interrupting the feed of the same. In this way, and in contradistinction to the state of the art, it is the drafting rollers 13a, 13b themselves which separate or cut the roving 12 when the feed is halted, so the free extremity

of the roving 12 may be captured within the condenser element 14 installed at the intake of the drafting rollers 13a, 13b in order to automatically recommence the spinning process.

[0048] While the foregoing description and representation has been with reference to a particular embodiment of the present invention, it will be evident that a person skilled in the art will be able to introduce multiple variations or modifications, or replace the details mentioned herein by other technically equivalent details without departing from the scope of protection defined by the appended claims. For example, although reference has been made in the present specification to a device 1 and process for interrupting the feed of a roving 12 of cotton fibres, the same device 1 is of use for the interrupting of the feed of any type of roving. Likewise, although reference has been made to the breakage of an elastane filament 11, the same device 1 is of use for the interrupting of the feed of a roving subsequent to the breakage of a filament of a type different from elastane, for example a polyester filament.

Claims

1. A device (1) for interrupting the feed of a roving (12) when breakage of a filament (11) occurs during the process of spinning core yarn,
characterised in that it comprises a wedge (2) arranged to be inserted, in its active position, between a pair of roving (12) feed rollers (6a, 6b), said wedge (2) enabling the interrupting of the feed of the roving (12) by acting on said rollers (6a, 6b), and said device (1) comprising a mechanism (3, 4, 5, 7) to activate the displacement of the wedge (2) towards said active position when the breakage occurs.

2. A device (1) as claimed in claim 1, wherein said wedge (2) is articulately joined to a supporting slide (3) associated with a roller (4) which acts as a guide for the filament (11) of the core yarn, said slide (3) being susceptible to displacement in order to move the wedge (2) to its active position on cessation of the tension of the filament (11) on the pulley (4), when breakage of the filament (11) occurs.

3. A device (1) as claimed in claim 2, wherein said supporting slide (3) is susceptible to accumulating elastic potential energy derived from the compression force applied to a spring (10), said slide (3) being susceptible to displacement in order to move the wedge (2) to its active position when cessation of the compression force and the tension of the filament (11) on the roller (4) occurs.

4. A device (1) as claimed in either of claims 2 to 3, wherein said pulley (4) which acts as a guide for the filament (11) is attached to the extremity of a lever (5) whose opposite extremity incorporates a means (7, 8) to activate the displacement of said slide (3) when the tension of the filament (11) on the roller (4) ceases.

5. A device (1) as claimed in claim 4, wherein the opposite extremity of said lever (5) is associated with a retaining trigger (7) for said supporting slide (3), said lever incorporating an element (8) acting as a cam to activate the displacement of said slide (3) when the tension of the filament (11) on the roller (4) ceases and said element (8) releases the retaining trigger (7).

6. A device (1) as claimed in claims 3 and 5, wherein the wedge (2) supporting slide (3) comprises a notch (9) for the retaining trigger (7) and a spring (10) which is arranged in such a way that it is susceptible to be compressed by manually displacing the slide (3) until the trigger (7) becomes locked in the aforementioned notch (9).

7. A device (1) as claimed in claim 1, wherein said wedge (2) has a body (2a) with a curved surface, configured to surround a portion of the wall of the lower roving (12) feed roller (6a), and a stem (22) to articulately join said body (2a) to the wedge (2) supporting slide (3).

8. A device (1) as claimed in claim 7, wherein, in its active position, a portion of said body (2a) with a curved surface is inserted between the roving (12) feed lower roller (6a) and upper roller (6b), said portion of the body (2a) interrupting the rotation of the upper roller (6b) while the lower roller (6a) continues to rotate.

9. A device (1) as claimed in claims 7 and 8, wherein said supporting slide (3) comprises a plurality of grooves (21) to attach the stem (22) of said wedge (2) in a plurality of positions, each of said grooves (21) determining a predetermined position of the wedge (2) in accordance with the distance separating the bar (18) bearing the pressure arms (20) from the feed rollers (6a, 6b).

10. A device (1) as claimed in claim 1, which comprises a casing (15) provided with a housing (16) and a clamp (17) to secure said casing (15) to a bar (18) on which a number of pressure arms (20) of the spinning machine (19) are assembled.

11. A device (1) as claimed in claim 2, which comprises at least one sensor to detect the displacement of the wedge (2) supporting slide (3) when the tension of the filament (11) ceases, and a lamp (23) foreseen on the exterior of the casing (15) to generate a light signal when said sensor detects the movement of

the supporting slide (3).

12. A device (1) as claimed in claim 11, wherein said sensor is configured in such a way that it may send a signal to a collective warning light located at one extremity of a spinning machine so that this warning light also generates a light signal.

13. A continuous core yarn spinning machine (19), **characterised in that** it comprises at each spinning position a device (1), as claimed in any of claims 1 to 12, to interrupt the feed of the roving (12) in the event of breakage of the filament (11).

14. A procedure for interrupting the feed of a roving (12) when the breakage of a filament (11) occurs during the process of spinning core yarn, comprising the stage of separating the roving (12) feed rollers (6a, 6b) by strictly mechanical means (2) to grasp the roving (12) and interrupt its feed when a breakage of the filament (11) occurs.

15. A procedure as claimed in claim 14, where stage (a) is executed by inserting a wedge (2) between the rollers (6a, 6b).

16. A procedure as claimed in claim 14, comprising the stage of separating or cutting the roving prior to its intake into the drafting rollers (13a, 13b) while the feed of the roving (12) is interrupted, the free extremity of the roving (12) being captured within a condenser element (14) of the machine (19).

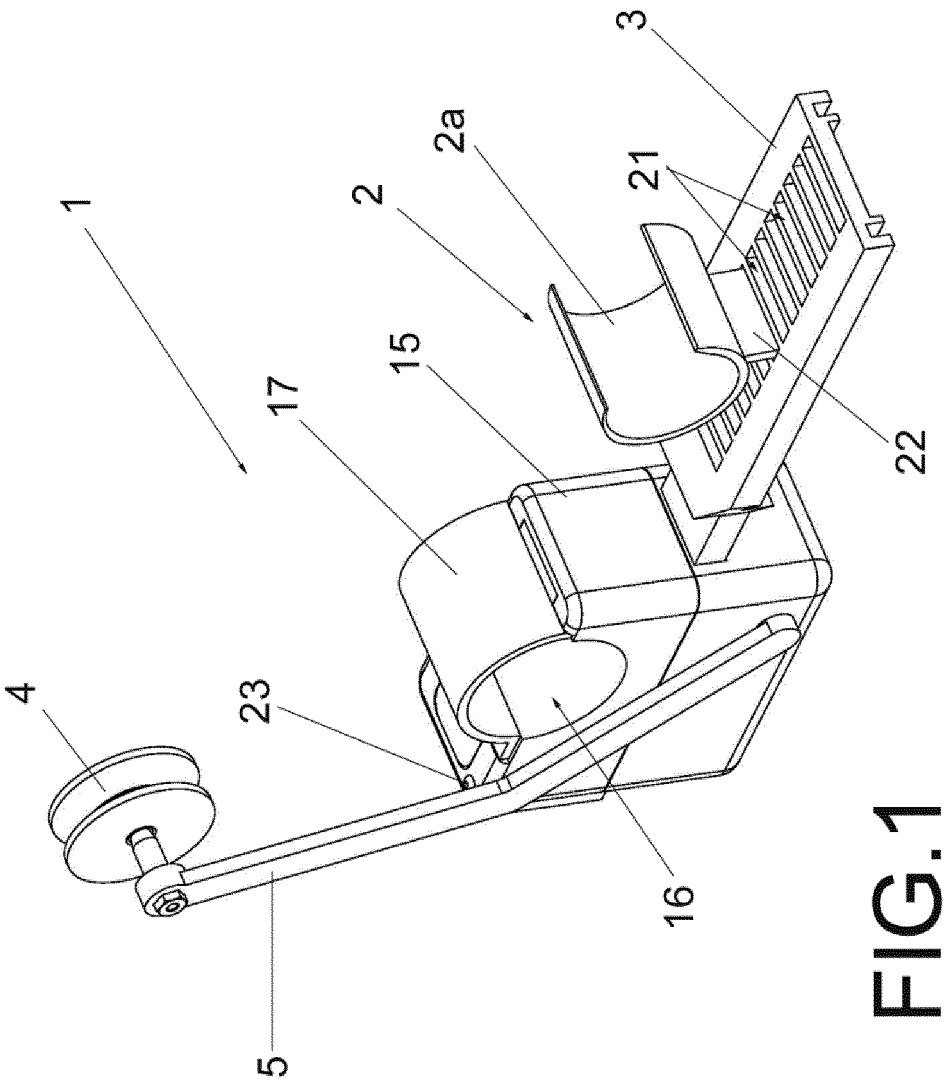


FIG.1

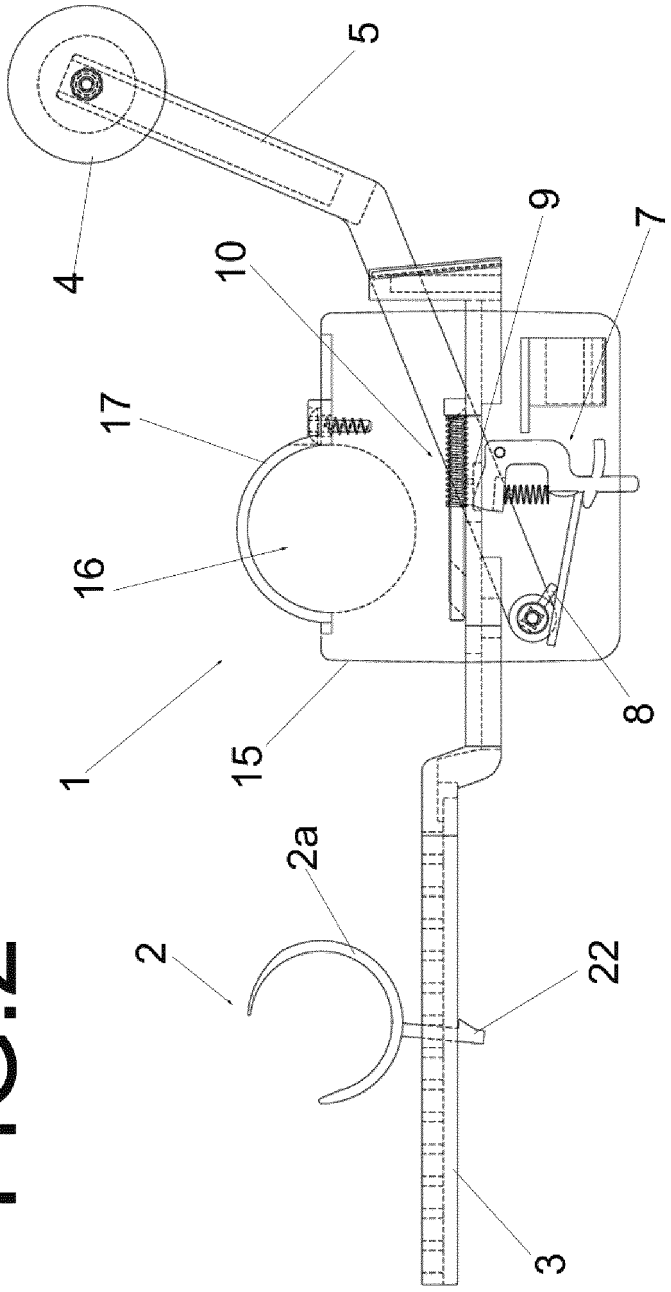


FIG.2

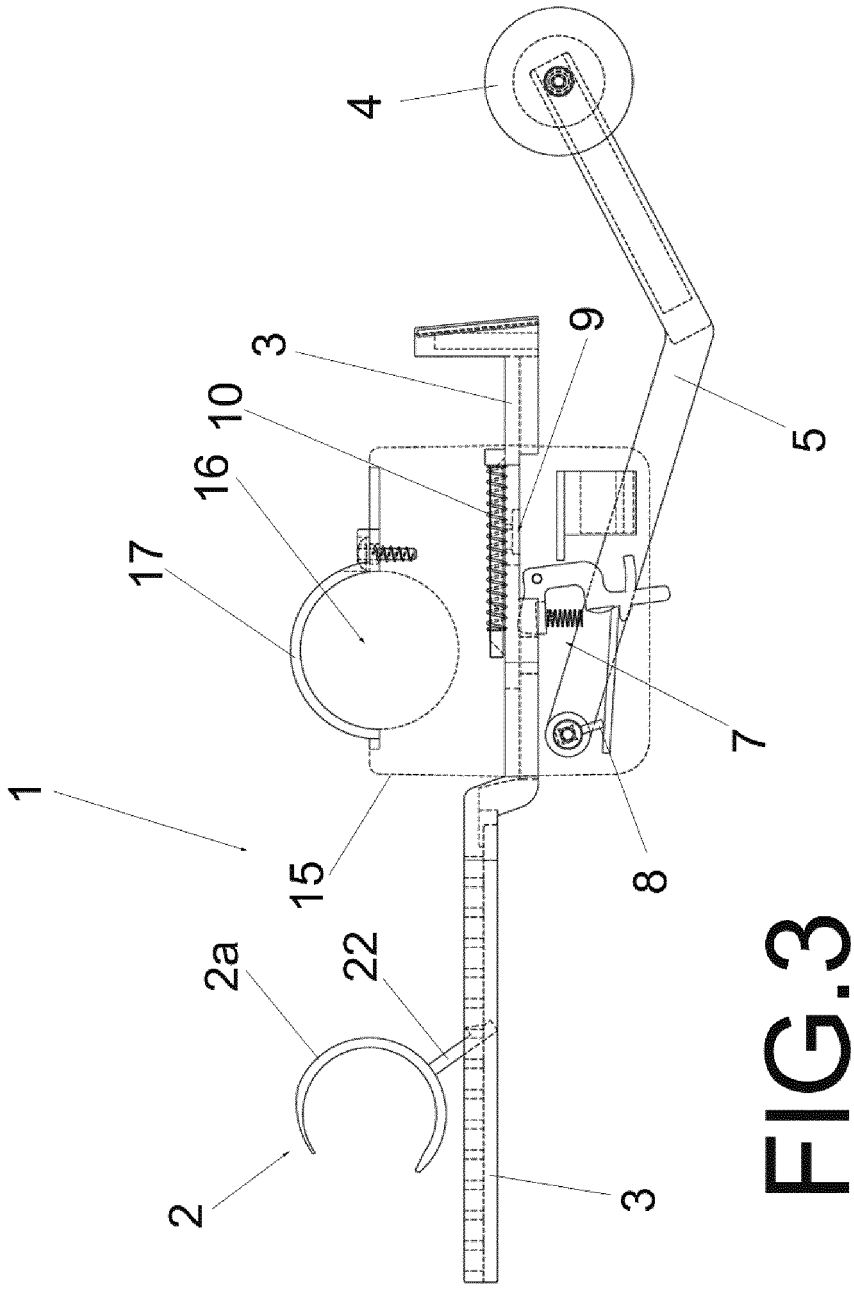


FIG.3

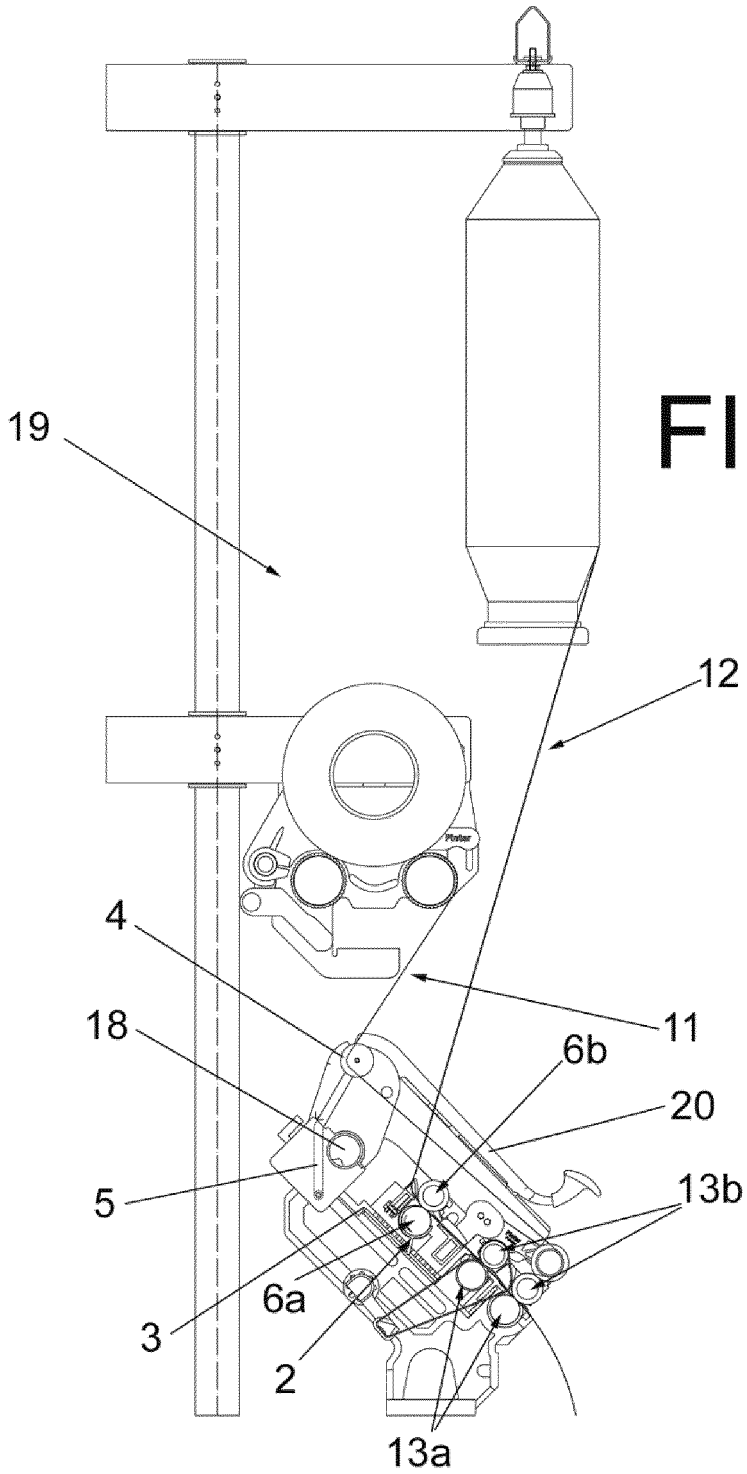
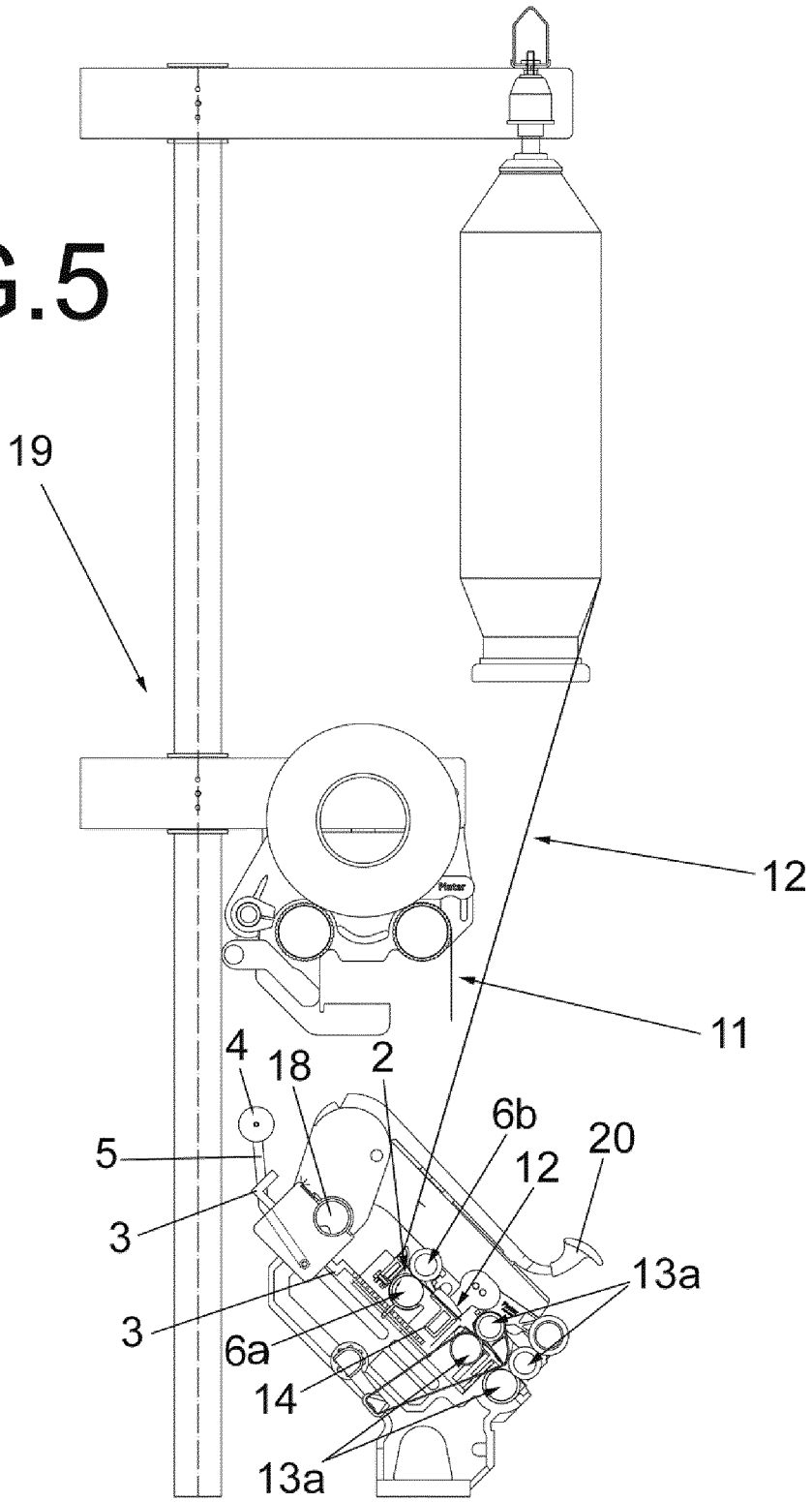


FIG.4

FIG.5



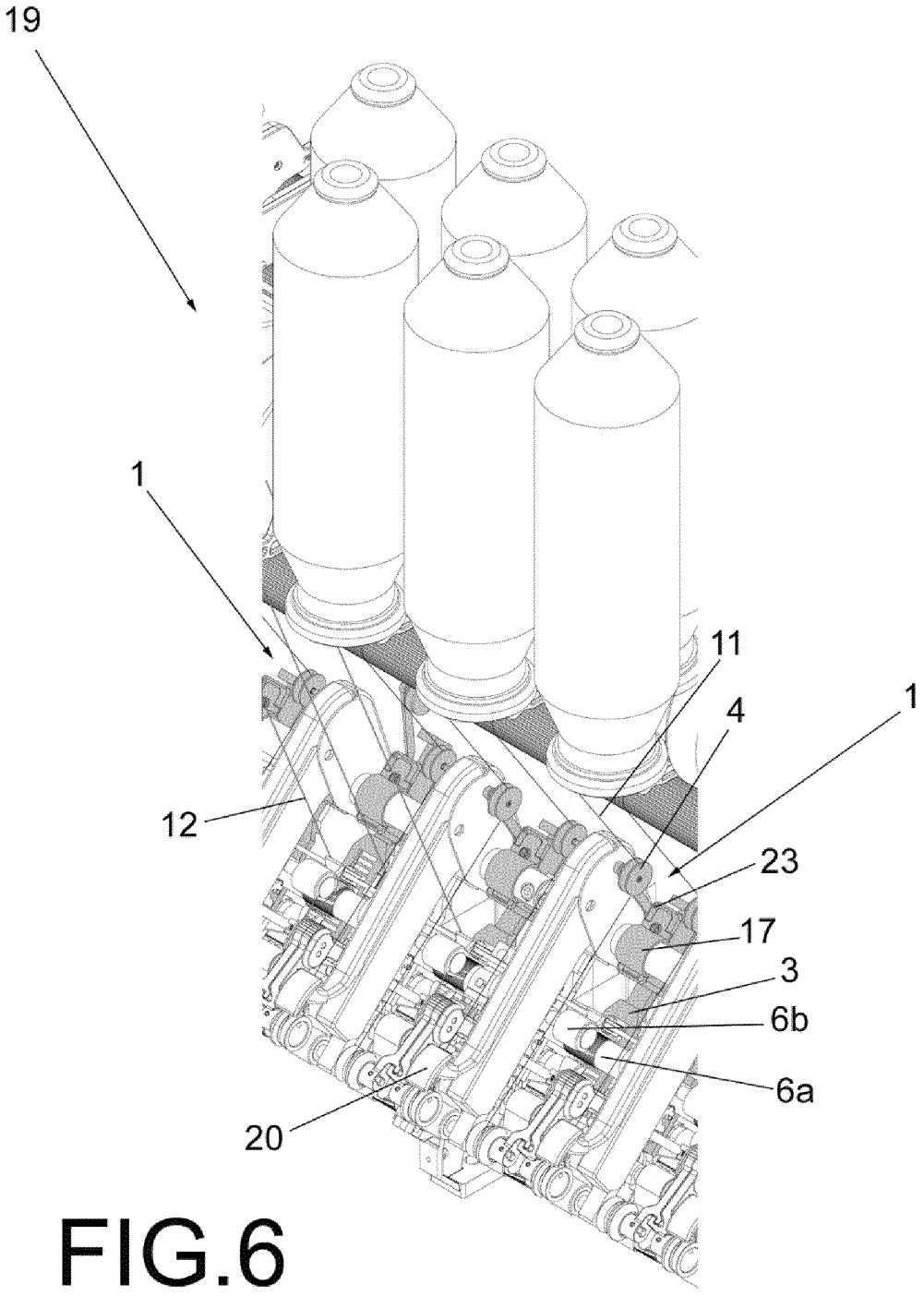


FIG.6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2014/070917

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
D02G, D01H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	FR 2507633 A1 (SKF KUGELLAGERFABRIKEN GMBH) 17/12/1982, page 3, lines 9 - 14; page 3, line 33 - page 4, line 3; page 5, line 27 - page 6, line 14; page 7, lines 2 - 10; page 7, line 28 - page 8, line 1; page 8, line 35 - page 9, line 6; page 9, line 21 - page 17, line 28; page 19, lines 21 - 27; page 21, lines 22 - 31; page 22, lines 4 - 9; page 24, lines 18 - 26; figures 1 a 3.	1,13-16 2-12
X Y	US 4951357 A (GRAU GERHARD ET AL.) 28/08/1990, column 1, lines 6 - 25; column 3, line 27 - column 5, line 38; figures 1 a 4.	1 2-12

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
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"P" document published prior to the international filing date but later than the priority date claimed
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Date of the actual completion of the international search	Date of mailing of the international search report
16/07/2015	**(17/07/2015)**
Name and mailing address of the ISA/ OFICINA ESPAÑOLA DE PATENTES Y MARCAS Paseo de la Castellana, 75 - 28071 Madrid (España) Facsimile No.: 91 349 53 04	Authorized officer A. Rodríguez Cogolludo Telephone No. 91 3498534

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2014/070917

C (continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of documents, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 148886 C (FELSING CONRAD) 27/03/1903, page 1, lines 1 - 10; lines 22 - 48; figures.	2-12
X	US 4644609 A (LATTNER MANFRED) 24/02/1987, column 1, lines 5 - 11; column 2, lines 15 - 50; column 3, line 33 - 47; lines 58 - 63; column 4, lines 10 - column 5, line 3; figures 1, 3.	1,7,9,13
A	US 2002139102 A1 (KAWABATA HIRAYUKI) 03/10/2002, paragraphs [0001], [0043] - [0045], [0048], [0052] - [0054], [0056], [0058] - [0060], [0096], [0107] - [0108]; figure 4.	1,7,8,13-16

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/ES2014/070917

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FR2507633 A1	17.12.1982	US4501114 A	26.02.1985
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