(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 3 643 819 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
29.04.2020 Bulletin 2020/18

(51) Int Cl.:
D01H 15/00 *(2006.01)*

(21) Application number: **19189586.1**

(22) Date of filing: **01.08.2019**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **11.09.2018 IN 201841034136**

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(54) YARN PICKING ARRANGEMENT FOR A RING SPINNING MACHINE AND A METHOD THEREOF

(57) The present invention relates to a yarn picking arrangement (100) for an automatic yarn piecing unit (10) in a ring spinning machine (20), the arrangement comprising a suction jet assembly comprising a hose (102) having a first end and a second end. The first end connected to a suction air source and the second end has a circumferential housing (104). A driving means (106) coupled to the suction jet assembly capable of moving the suction jet assembly vertically up and down such that the circumferential housing is capable of surrounding a cop (108) at the outer portion at the top of the cop. The suction air source during operation generates a suction which pulls the broken yarn end (112) anywhere in the chase length from bottom to top of the cop into the housing to enable automatic piecing operation in the ring spinning machine.

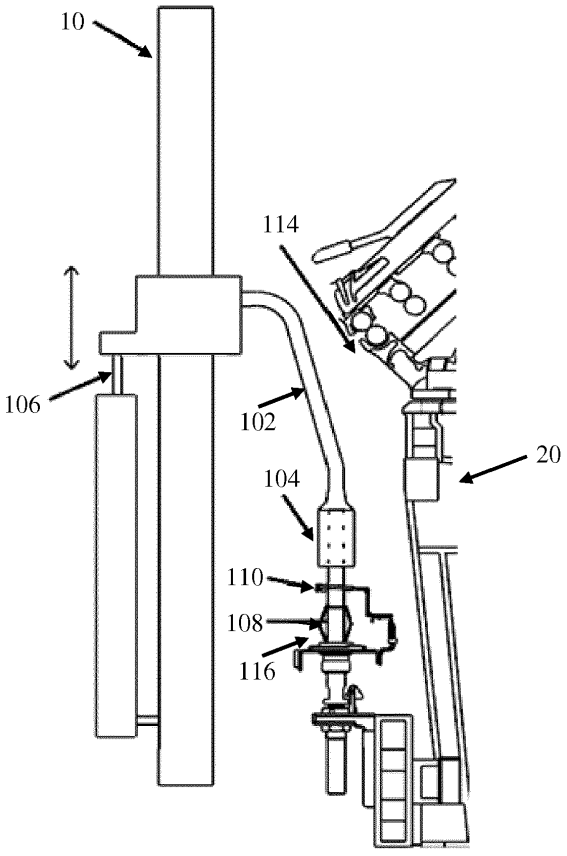

Figure 3

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to textile machines, particularly, the invention relates to yarn picking arrangement for an automatic yarn piecing unit in ring spinning machines. More particularly, the invention relates to broken yarn picking arrangement to detach the broken yarn end from the spinning cop to enable automatic piecing operation in textile ring spinning machines.

BACKGROUND OF THE INVENTION

[0002] In textile spinning mills, ring spinning machines are very crucial machines. The said ring spinning machines produces the resultant form of cotton in spinning line, so called yarn. During ring spinning, yarn breakage occurs frequently which is a major setback. Yarn breakage has to be continuously monitored and broken yarn has to be pieced then and there by the manual labours. The yarn breakage occurs due to various parameters of yarn and machine and it is unavoidable. In long spinning frame sites, manual labours continuously monitors yarn breakages and perform manual piecing of broken yarns round the clock walking along the aisle of the ring frames. This has to be done for a machine frame normally consisting of more than 1600 spindles and about 75 metres long. Then, yarn spinning sequence has to be restarted then and there after piecing in order to avoid wastage of yarn.

[0003] To overcome above problems, automatic piecing units are developed. The automatic piecing unit is in the form of a movable vehicle with wheels/rails. The said piecing vehicle stops at respective spindle positions which require piecing attention. The piecing unit in general moves longitudinally over the machine frame aisles. Before initiating piecing operation, the piecing vehicle stops in front of the spindle position of ring spinning machine. Then the broken yarn end which is available in the spinning cop has to be found and detached from the cop and lifted above to enable piecing operation. The said detaching of yarn from spinning cop automatically is a major challenge textile spinning industry is facing in general.

[0004] In the known piecing arrangements as shown in figure 1, the automatic piecing unit (1) moves longitudinally along the aisle of the ring spinning machine. The ring spinning machine is capable of winding yarn onto a bobbin mounted to spinning spindle, so called cop (3). When yarn breakage occurs in the spinning sequence, the broken yarn thread becomes tangled in the spinning cop (3). To enable yarn piecing, the tangled yarn end has to be detached from the cop (3). For broken yarn picking from the cop, auto piecing units are provided with yarn picking suction arrangements. The cylindrical suction nozzle (5) with horn type mouth extends from the piecing unit and is positioned usually at a predetermined distance above the top of the spinning cop (3). The distance maintained in known arrangements is approximately 15 mm upwards from the top of the spinning cop (3). In this type of arrangement, broken yarn end from bottom of the chase length of the cop (3) is not able to be picked. Even if the broken yarn is present somewhere at the top portion of the chase length, the height difference of the suction mouth (5) from the cop (3) does not provides required suction to effectively pick the broken yarn from the cop (3). Thus, the existing arrangement is not reliable in picking the broken yarn end from the cop.

[0005] There exists a need to develop an improved broken yarn picking from the cop which reliably picks the yarn without fail, to which the present invention provides a solution.

OBJECTIVE OF THE INVENTION

[0006] These objectives are provided to introduce a selection of concepts in a simplified form that are further described below in the detailed description. This objective are not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used as an aid in determining the scope of the claimed subject matter.

[0007] An important object of the invention aims at providing a solution for the shortcomings of the automatic piecing unit.

[0008] Another object of the invention is to provide an arrangement for picking broken yarn end from the spinning cop to enable automatic piecing in ring spinning machines.

[0009] Yet another object of the present invention is to provide an arrangement for broken yarn picking anywhere in the chase length of the cop in textile ring spinning machines.

[0010] Further object of the present invention is to provide an arrangement for detaching broken yarn end from the spinning cop of the textile ring spinning machines.

[0011] It is yet another object of the present invention to provide a method for picking broken yarn end from the cop in textile ring spinning machines.

[0012] Object of the present invention is not limited to the above-mentioned problem. Other technical problems that are not mentioned will become apparent to those skilled in the art from the following description.

SUMMARY OF THE INVENTION

[0013] According to an aspect of the invention, yarn picking arrangement for an automatic yarn piecing unit in ring spinning machines, comprising of a suction jet assembly comprising a hose having a first end and a second end. The first end connected to a suction air source, and the second end has a circumferential housing. A driving means coupled to the suction jet assembly capable of moving the suction jet assembly vertically up and down such that the circumferential housing is capa-

ble of surrounding the cop at the outer portion at the top of the cop. The suction air source generates a suction pull which pulls the broken yarn end present anywhere in the chase length from bottom to top of the cop into the housing.

[0014] According to another aspect of the invention, a method for picking a yarn by a yarn picking arrangement, comprises the steps of moving a suction jet assembly from drafting zone to cop zone such that a circumferential housing of the suction jet assembly surrounds a cop at the outer portion at the top of the cop. In the next step, tangled broken yarn end is picked by a suction pull into the housing, wherein the broken yarn end is picked on the cop anywhere in the chase length from bottom to top. In the further step, suction jet assembly is moved from cop zone to drafting zone to enable automatic piecing operation in a textile ring spinning machine.

[0015] Other aspects and advantages of the invention will become apparent from the following description, taken in conjunction with the accompanying drawing, illustrating by way of example the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] For a more detailed understanding of this invention, reference is made to the accompanying drawings in which:

Figure 1 shows side view of the yarn picking arrangement of the piecing unit according to the known art;

Figure 2 shows side view of the yarn picking arrangement of the piecing unit, according to an embodiment of the present invention;

Figure 3 shows side view of the yarn picking arrangement of the piecing unit at cop zone for picking the broken yarn end from the cop, according to an embodiment of the present invention; and

Figure 4 shows side view of the yarn picking arrangement of the piecing unit at drafting zone for subsequent piecing operation according to an embodiment of the present invention.

[0017] The 3 over 3 drafting arrangement is shown herein in figures only for illustrative purpose. The drafting arrangement also includes 4 over 4 drafting and compact spinning drafting arrangement, etc.

[0018] Persons skilled in the art will appreciate that elements in the figures are illustrated for simplicity and clarity and may have not been drawn to scale. For example, the dimensions of some of the elements in the figure may be exaggerated relative to other elements to help to improve understanding of various exemplary embodiments of the present disclosure.

[0019] Throughout the drawings, it should be noted that like reference numbers are used to depict the same or similar elements, and features.

DETAILED DESCRIPTION OF THE INVENTION

[0020] The following description with reference to the accompanying drawings is provided to assist in a comprehensive understanding of exemplary embodiments of the invention as defined by the claims and their equivalents. It includes various specific details to assist in that understanding but these are to be regarded as merely exemplary. Accordingly, those of ordinary skill in the art will recognize that various changes and modifications of the embodiments described herein can be made without departing from the scope and spirit of the invention. In addition, descriptions of well-known functions and constructions are omitted for clarity and conciseness.

[0021] Automatic piecing unit is provided for textile ring spinning machines. The automatic piecing unit moves longitudinally along the aisle of the ring spinning machine. The ring spinning machine is capable of winding yarn onto a bobbin mounted to spinning spindle, so called cop. When yarn breakage occurs in the spinning sequence, the broken yarn thread is tangled in the spinning cop. To enable yarn piecing, the tangled yarn end has to be picked from the cop. Thus, automatic piecing unit assists in yarn piecing operation during yarn breakage incidents in ring spinning machines. The proper picking of the broken yarn end from the spinning cop is necessary for the successful piecing of the broken yarn ends. To enable the picking of the broken yarn end, the present invention is provided with a yarn picking arrangement in the automatic piecing unit.

[0022] Figure 2 shows side view of the yarn picking arrangement in the piecing unit, according to an embodiment of the present invention. Accordingly, a yarn picking arrangement (100) for an automatic yarn piecing unit (10) to detach the broken yarn end (112) from a spinning cop (108) to enable automatic piecing operation in a textile ring spinning machine (20), the arrangement (100) comprising of a suction jet assembly comprises a hose (102) having a first end and a second end. The first end of the hose (102) is connected to a suction air source (not shown in figure), and the second end has a circumferential housing (104). Further a driving means (106) is coupled with the suction jet assembly for moving the suction jet assembly vertically up and down. The driving means (106) can be a pneumatic driving unit, or a hydraulic driving unit having piston and cylinder arrangement with actuators. The drive means can also comprise of screw rod, cylinder and all types of actuating means.

[0023] Further, the arrangement (100) includes a control apparatus functionally connected with driving means (106) comprising a control unit coupled with a plurality of sensors and stoppers for precisely controlling the movement of moving suction jet assembly so as to move the circumferential housing (104) vertically up and down such that the circumferential housing (104) is capable to stop anywhere around the cop (108) at the outer portion

from top to bottom. Such that the suction air source generates a suction pull which pulls the broken yarn end (112) anywhere in the chase length from bottom to top of the cop (108) into the housing (104) to enable automatic piecing operation in a textile ring spinning machine (20).

[0024] In the process of yarn picking, suction jet assembly of the yarn picking arrangement (100) is moved from drafting zone (114) to cop zone (116) such that a circumferential housing (104) of the suction jet assembly surrounds a cop (108). The internal diameter of the hose (102) and/or the housing (104) of the suction jet assembly is such that substantially greater than the external diameter of the cop (108). The corresponding figure 3 shows side view of the yarn picking arrangement of the piecing unit at cop zone (116) surrounding the cop (108) for picking the broken yarn end from the cop, according to an embodiment of the present invention.

[0025] In the next step, suction air source generates a suction pull which pulls the broken yarn end (112) anywhere in the chase length from bottom to top of the cop (108) into the housing (104). In the further step, suction jet assembly is moved from cop zone (116) to drafting zone (114) to enable automatic piecing operation in a textile ring spinning machine (20). Figure 4 shows side view of the yarn picking arrangement of the piecing unit at drafting zone after successful picking of the broken yarn end from the cop and for subsequent piecing operation according to an embodiment of the present invention.

[0026] According to an example embodiment the suction jet assembly comprising circumferential housing (104) surrounds the cop (108) at the outer portion while moving vertically from top to bottom. During which the suction jet assembly reaches a position adjacent to the Balloon Control ring (110) travelling around 100 mm downwards. The moving suction jet assembly covers substantially at least 85 mm of the cop (108) height from the top and surrounds the cop (108) before reaching position adjacent to Balloon Control ring (110). The inner diameter of the suction jet assembly is designed such that it is capable of surrounding the cop (108) for picking the broken yarn (112) effectively. The movable suction jet assembly picks the tangled broken yarn (112) from the cop (108) successfully anywhere in the chase length even at the bottom of the chase length. The distance between the Balloon Control ring (110) and the suction jet assembly while yarn picking is around 25 mm only for the bottom most ring rail position compared to that of the known arrangement which is around 125 mm.

[0027] According to an embodiment of the present invention, before yarn picking, the movable suction jet assembly mounted in the piecing unit can be moved forward through suitable drive means. Subsequently, the downward movement of the suction jet assembly for surrounding the cop is effected by pneumatic or hydraulic drive means mounted in the auto piecing unit.

[0028] Thus, the above described automatic piecing unit for ring spinning machine frame provides a reliable solution for picking the broken yarn end from the cop. The suction jet which is movable vertically throughout the chase length of the cop is able to pick the broken yarn from the cop anywhere from bottom to top based on the broken yarn position.

[0029] For exemplary the embodiment of this invention employs yarn picking arrangement for an automatic yarn piecing unit. Various modifications to these embodiments are apparent to those skilled in the art from the description and drawings herein. Therefore, the description is not intended to be limited to the embodiment shown along with the accompanying drawings but is to be provided broadest scope consistent with the principles and novel and inventive features describe/disclosed or suggested herein. Any modifications, equivalent substitutions, improvements etc. within the spirit and principle of the present invention shall all be included in the scope of protection of the present invention.

Claims

1. A yarn picking arrangement for an automatic yarn piecing unit to detach the broken yarn end from a spinning cop to enable automatic piecing operation in a textile ring spinning machine, the arrangement comprising of:

   a suction jet assembly comprising a hose having a first end and a second end, the first end connected to a suction air source, and the second end has a circumferential housing;
   a driving means coupled to the suction jet assembly capable of moving the suction jet assembly vertically up and down such that the circumferential housing is capable of surrounding the cop at the outer portion at the top of the cop; and the suction air source generates a suction pull which pulls the broken yarn end present anywhere in the chase length from bottom to top of the cop into the housing.

2. The yarn picking arrangement as claimed in claim 1, wherein the driving means is a pneumatic driving unit, or hydraulic driving unit or electric or screw rod type.

3. The yarn picking arrangement as claimed in claim 1, wherein a control apparatus is provided for precisely controlling the movement of moving suction jet assembly vertically up and down, said control apparatus comprises a control unit coupled with a plurality of sensors and stoppers.

4. The yarn picking arrangement as claimed in claim 1, wherein the internal diameter of the suction jet assembly is substantially greater than the external

diameter of the cop.

5. The yarn picking arrangement as claimed in claim 1, wherein the suction jet assembly moves from drafting zone to cop zone and reaches a position adjacent to a Balloon Control ring and surrounds the cop at the top portion.

6. The yarn picking arrangement as claimed in claim 5, wherein the suction jet reaches a position adjacent to the Balloon Control ring travelling around 100 mm downwards.

7. The yarn picking arrangement as claimed in claim 6, wherein the moving suction jet covers substantially at least 85 mm of the cop height from the top of the cop and surrounds the cop.

8. The yarn picking arrangement as claimed in claim 5, wherein the distance between the Balloon Control ring and the suction jet assembly is preferably 25 mm for the bottom most ring rail position.

9. The yarn picking arrangement as claimed in claim 1, wherein the suction jet assembly is capable to move downwards fully surrounding the cop for the entire chase length.

10. The yarn picking arrangement as claimed in claim 1, wherein the suction jet assembly can pick broken yarn from the cop at the bottom of the chase length.

11. A method for picking a yarn by a yarn picking arrangement, the method comprising the steps of:

moving a suction jet assembly from drafting zone to cop zone such that a circumferential housing of the suction jet assembly surrounds a cop at the outer portion at the top of the cop;
picking tangled broken yarn end by a suction pull into the housing, said broken yarn end is picked on the cop anywhere in the chase length from bottom to top; and
moving said suction jet assembly from cop zone to drafting zone to enable automatic piecing operation in a textile ring spinning machine.

12. The method of yarn picking as claimed in claim 11, wherein the suction jet assembly while moving from drafting zone to cop zone reaches a position adjacent to a Balloon Control ring and surrounds the cop at the top portion.

13. The method of yarn picking as claimed in claim 12, wherein the suction jet reaches a position adjacent to the Balloon Control ring travelling around 100 mm downwards.

14. The method of yarn picking as claimed in claim 13, wherein the moving suction jet covers substantially at least 85 mm of the cop height from the top of the cop and surrounds the cop.

15. The method of yarn picking as claimed in claim 12, wherein the distance between the Balloon Control ring and the suction jet assembly is preferably 25 mm for the bottom most ring rail position.

16. The method of yarn picking as claimed in claim 11, wherein the suction jet assembly is capable to move downwards fully surrounding the cop for the entire chase length.

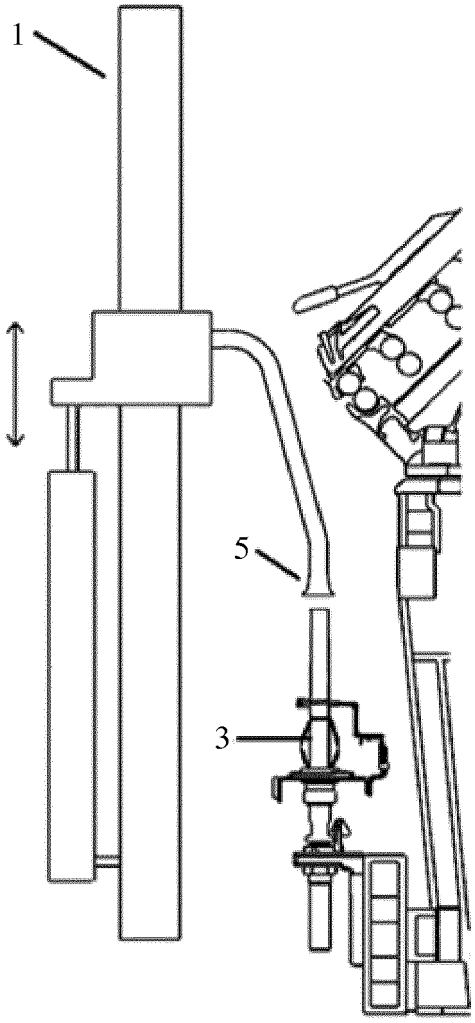

Figure 1

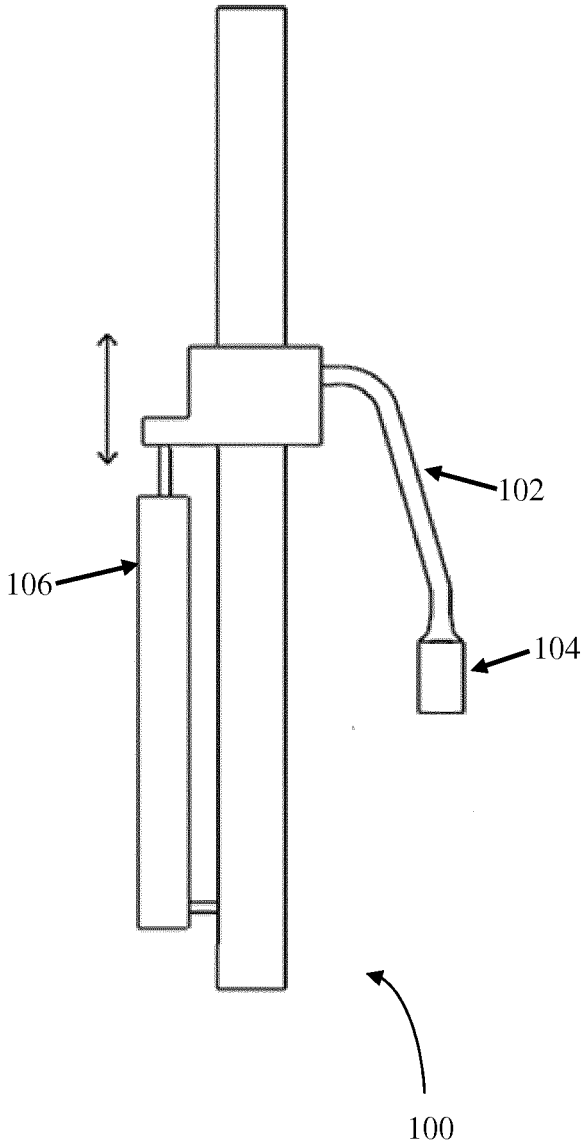

Figure 2

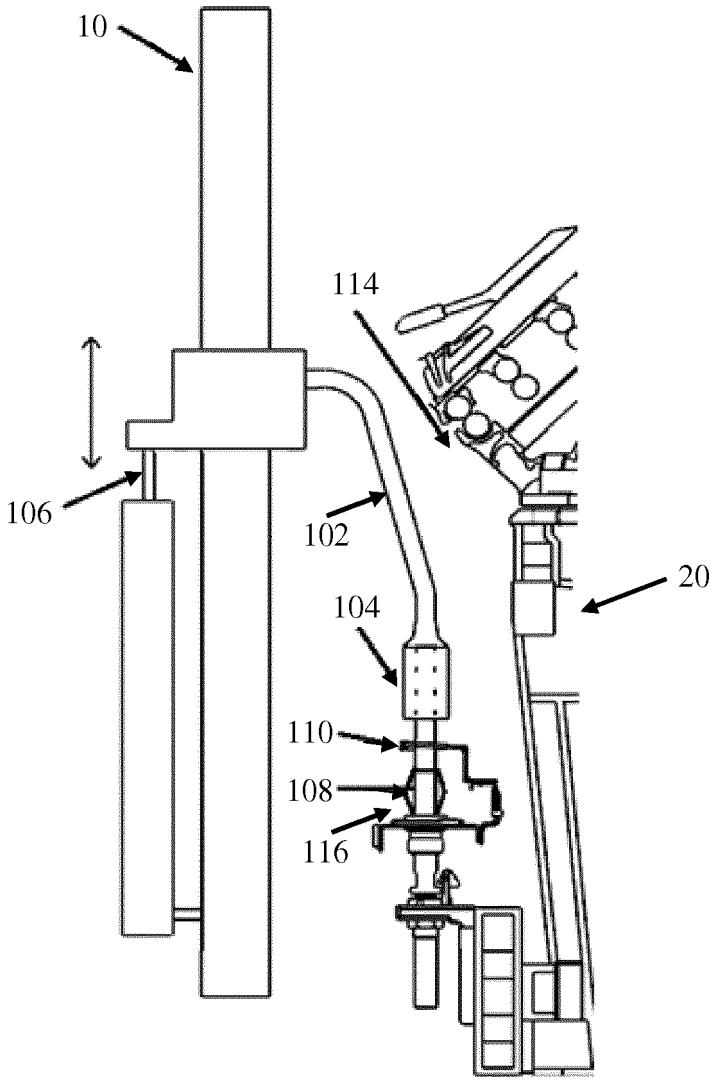

Figure 3

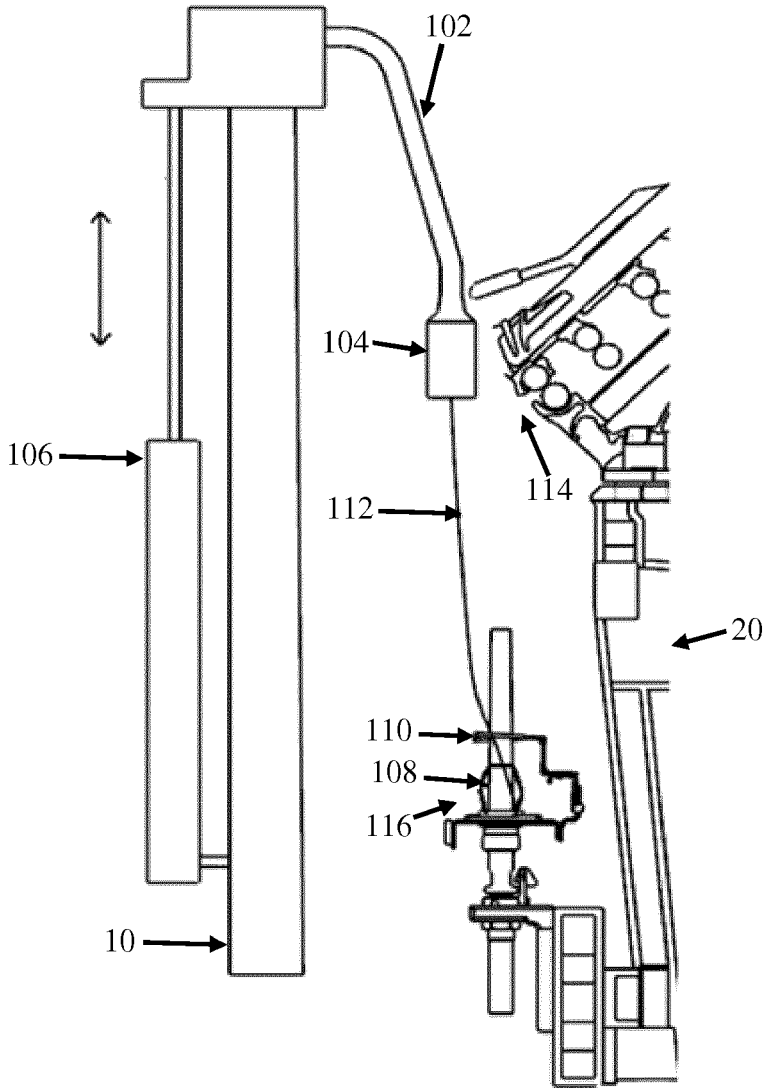

Figure 4

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EUROPEAN SEARCH REPORT

Application Number
EP 19 18 9586

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	19 March 2020	Pollet, Didier

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 19 18 9586

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