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

(11) EP 1 338 687 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
27.08.2003 Bulletin 2003/35

(51) Int Cl.[7]: **D02G 3/34**, D01H 4/08

(21) Application number: **03466001.9**

(22) Date of filing: **12.02.2003**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT SE SI SK TR
Designated Extension States:
AL LT LV MK RO

(30) Priority: **14.02.2002 CZ 20020555**
17.01.2003 CZ 20030148

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(54) Multi-component fancy yarn and method and device for its production

(57) The multi-component fancy rotor yarn (3) comprises a continuous component (31), in particular an elastic continuous component, and a component (32) spun in the rotor of a rotor spinning machine from singled-out fibres. The thickness of the multi-component fancy rotor yarn (3) as well as the mutual position of the continuous component (31) and the spun component (32), both considered in cross section of the multi-component yarn (3), vary along its length thus producing multi-component yarn (3) comprising thick and thin sections and other varying effects due to the variable position of the continuous component (31) and of the spun component (32) in the cross section of the multi-component yarn (3). The continuous component (31) can consist of two or more linear textile formations.

The invention also relates to the method of and device for the production of such multi-component fancy rotor yarn.

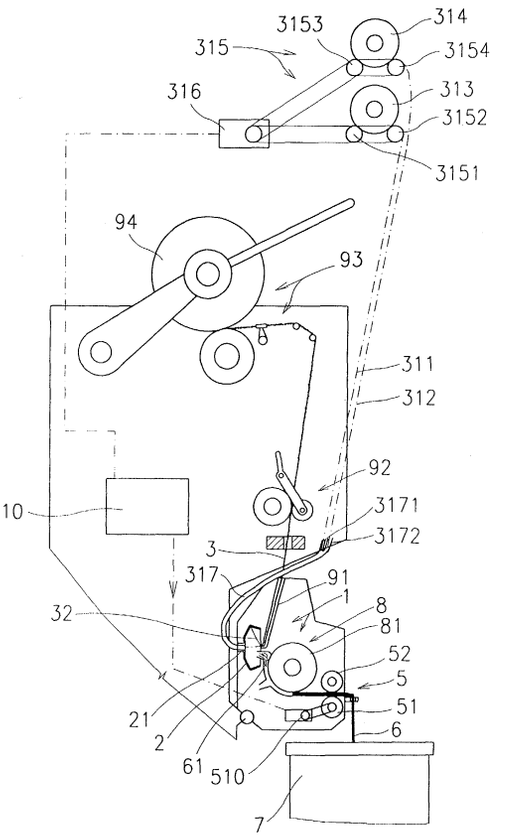

Fig. 2

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Description

Technical field

[0001] The invention relates to a multi-component fancy rotor yarn comprising a continuous component and a component spun in the rotor of a rotor spinning machine from singled-out fibres, the multi-component yarn being of varying thickness throughout its length.

[0002] The invention also relates to the method of production of such a multi-component fancy rotor yarn on a rotor spinning machine into the rotor of which there are fed a continuous component of a multi-component yarn and singled-out fibres from one sliver from which the spun component is spun out and in the rotor combined with the continuous component into the multi-component fancy rotor yarn.

[0003] The invention further relates to a rotor spinning machine for producing the multi-component fancy rotor yarn, the rotor spinning machine comprising a plurality of operating stations situated next to each other out of which each contains a device for feeding the sliver into a singling-out device, a device for feeding singled-out fibres into the rotor, and a device for feeding the continuous component into the rotor.

Background art

[0004] US 4,218,868 has disclosed the production of the fancy rotor yarn of varying thickness on a rotor spinning machine in which the alternating yarn deflection between the draw-off rollers and the outlet from the delivery tube from the rotor changes the yarn length between the collecting surface of the rotor where yarn is being formed and the draw-off rollers and thus changes the yarn delivery speed and, consequently, the thickness of the yarn on which thick and thin sections are formed in this way.

[0005] The drawback of this solution consists in particular in the yarn handling in front of the draw-off rollers since it involves serious danger of yarn rupture instead of the modification of its delivery speed.

[0006] US 4,361,067 has disclosed the production of yarn with sharply demarcated reinforced sections. Singled-out fibres coming from the combing roller are fed into the rotor through a transport channel by means of sucked air. In the rotor, singled-out fibres are deposited on its collective surface and are in a well-known manner twisted into yarn which is drawn from the rotor at a constant speed by draw-off rollers. To achieve the yarn reinforcement, in the transport channel leading the fibres into the rotor, a part of the fibres is retained and then suddenly released thus supplying the rotor with increased number of fibres and increasing the thickness of the yarn. The following retaining of the fed fibres again reduces the yarn thickness. The retaining of the fibre is actuated for instance by a programme-controlled means such as a spring-biased pin adapted to reciprocate, or by a suitable selected programme-controlled swinging means, etc.

[0007] The drawback of the device consists in its constructional complexity and in the fact that the retaining means interferes into the stream of singled-out fibres fed into the rotor. The retained and then released fibres, that is to say, are not set in parallel at their entry into the rotor which is one of the basic conditions of the rotor spinning. Consequently, this solution, not known to have come into practical application, would lead to irregularities not only in the yarn appearance but also in the yarn strength, and to interruptions of the front yarn due to the supply of unparallel fibres.

[0008] DE 41 24 571 describes a method of production of fancy yarn comprising thick and thin sections on rotor spinning machines in which the sliver is led into a singling-out device in which it is singled-out to separate fibres which are through a transport channel fed into the rotating rotor where they are collected on its collecting groove, twisted into yarn which is from the rotor drawn by a pair of draw-off rollers and wound on a bobbin. Entering into the transport channel or into the rotor is a nozzle adapted for interrupted supply of pressure air so as to increase or to reduce the number of singled-out fibres led into the rotor for spinning.

[0009] CZ 239510 discloses a rotor spinning device whose sliver feed device comprises two separate feed rollers situated on a common support shaft and a divided feed table. One feed roller is fixed on the support shaft and serves to feed the basic fibre component while the other serves to supply the fancy component of the fibre and is adapted both to slide and to rotate on the support shaft. Said other feed roller is fitted with an activating means actuated according to the programmed selection of the feed of the fibre fancy component.

[0010] In addition to the constructional complexity, a drawback consists in the displacing arrangement of the second feed roller in the area of the fibre or roving feed since it involves the deposition of dust, broken-away fibre particles and impurities coming from the sliver or roving with the ensuing faults of the device.

[0011] Industrial application on the rotor spinning machines has been achieved by a device for the production of the fancy thread containing thick and thin sections such as that of the company AMSLER TEX AG. In this device, the roller feeding the sliver into the singling-out device is coupled with a drive operating at variable speed. Sudden short-interval changes in the sliver feed speed supply variable quantity of sliver to the singling-out device which then produces variable amount of singled-out fibres supplied to the rotor which in its turn results in varying thickness of the yarn being spun.

[0012] Also known in the rotor spinning machines is the production of multi-component yarns comprising a continuous component, in particular an elastic component, and a component spun in the rotor from singled-out fibres.

[0013] CS 218925 B1, CS 221970 B1, and CS

222553 B1 disclose a multi-component yarn comprising a spun component consisting of the rotor yarn made from staple fibres which is in the sense of its windings wound around by one or more continuous components. The lead angle of the continuous components can be different, or the continuous components can be wound around in an irregular helix. The spun component acts as a core of the multi-component yarn and has a constant cross section.

[0014] The invention aims at increasing the range of multi-component fancy rotor yarns, proposing a method of production, and creating a device, for the production of such yarns.

Principle of the invention

[0015] The goal of the invention has been achieved by a multi-component fancy rotor yarn comprising a continuous component according to the invention whose principle consists in that along the length of the multi-component yarn the amount of the component spun in the rotor from singled-out, and the position of the continuous component, both considered in cross section of the multi-component yarn, undergo changes. The multi-component yarn comprising a continuous component and at the same time marked by varying thickness of the spun component and by varying mutual position of the continuous component and of the spun component in the cross-section of the multi-component yarn is a new generation in the range of well-known fancy multi-component rotor yarns since the properties of the continuous component have a marked influence on the properties of the resulting multi-component yarn; in particular, in the case of an elastic continuous component, the appearance of the resulting multi-component fancy rotor yarn changes with the tension of the multi-component yarn. This means, for instance, that a change in the tension of the elastic continuous component of the multi-component yarn induces changes in thickness and size, and especially in the position, of the neps in the resulting multi-component yarn. In reinforced sections, the continuous component is laid under smaller tension which renders these reinforced sections less elastic and thus supports the behaviour stability of the yarn in the fabric.

[0016] The principle of the method of production of the multi-component fancy rotor yarn comprising a continuous component, according to the invention, consists in that during the spinning process, the amount of singled-out fibres supplied to the rotor undergoes sudden changes resulting in sudden and substantial changes in the thickness of the spun component and thus producing, while being combined in the rotor with the continuous component, further effects on the multi-component yarn consisting in particular in the changes of the mutual position of the continuous component and of the spun component in the cross section of the multi-component yarn. This leads to the production of the multi-component fancy rotor yarn comprising thick and thin sections and other variable effects due to the varying position of the continuous component and of the spun component in the cross section of the multi-component fancy yarn.

[0017] The suddenly varying change in the thickness of the multi-component yarn due to the changes in the mass of the component spun in the rotor from singled-out fibres results in the variation of their mutual relations while being combined with the continuous component and, consequently, in the change of their mutual position, in the winding of one component by the other and vice versa. This produces on the multi-component yarn further effects which can be obtained with no else up to now known method of production of multi-component fancy rotor yarns. This method of production of the multi-component yarn substantially increases the stability of the sections reinforced due to the irregular distribution of the mass of the continuous component in the resulting yarn. In the thickened sections, the elastic continuous component is laid with smaller preload and they thus contain a mass amount of the continuous component superior to that of its linear proportion in the yarn..

[0018] Further fancy effects on the multi-component yarn, in particular on that with an elastic continuous component, can be obtained by changing the tension of the continuous component while being supplied to the rotor.

[0019] If the change in the tension of the continuous component is applied separately, without combination with a suddenly variable change in the amount of singled-out fibres fed into the rotor, the effect will be a multi-component fancy yarn with less sharp variations between the fancy effects.

[0020] The principle of the rotor spinning machine for producing the multi-component fancy rotor yarn comprising a continuous component and a component spun in the rotor from singled-out fibres consists in that the sliver feed device is coupled with a drive with quickly variable feed speed during the spinning. This drive is preferably coupled with a control unit with which the drive of the feed device of the continuous component for controlling the feed speed of the continuous component during the spinning is coupled.

Description of the drawings

[0021] Examples of embodiment of the rotor spinning machine for carrying out the method according to the invention and for the production of the multi-component fancy rotor yarn comprising a continuous component, in particular an elastic component, and a component spun in the rotor from singled-out fibres on rotor spinning machines are schematically shown in the enclosed drawings showing the elements of the operating unit of the rotor spinning machine important for the production of the multi-component fancy rotor yarn comprising a continuous component consisting of one linear textile formation in Fig. 1, and in Fig. 2 for the production of the multi-component fancy rotor yarn in which the continu-

ous component consists of two linear textile formations.

Specific description

[0022] The method according to the invention will be described on the example of embodiment of a rotor spinning machine for the spinning of the multi-component fancy rotor yarn from which the enclosed drawings show only the parts related to the method according to the invention.

[0023] The rotor spinning machine comprises a plurality of substantially identical operating units arranged next to each other and comprising each a spinning unit for spinning multi-component yarn from singled-out fibres and from a continuous component.

[0024] The spinning unit **1** comprises a rotor **2** mounted on a hollow shaft **21** seated in the spinning unit **1** in a well-known manner by means of a not shown rolling-contact bearing. The cavity of the hollow shaft **21** serves to feed the continuous component **31** of a multi-component yarn **3** into the spinning rotor **2** carried out by a well-known feed device **4** of the continuous component. The spinning unit **1** also contains a feed device **5** for a sliver **6** seated in a container **7** situated under the spinning unit **1**. The feed device **5** for the sliver **6** is followed by a well-known singling-out device **8** from which singled-out fibres are fed in a well-known manner into the rotor **2** to be spun.

[0025] The feed device **5** for the sliver **6** contains a driven feed roller **51** cooperating with a pressure member **52** pressed onto it and made for instance as a pressure feed roller as is the case in the illustrated embodiment, or as a well-known not illustrated feed table, or as another not illustrated member. The fed sliver **6** is clamped between the circumferential surface of the feed roller **51** and that of the pressure member **52**. The feed roller **51** is coupled with an individual or with a central drive **510** adapted for rapid changes in the rotation speed, for instance with an alternating current motor with a converter, a servomotor, a clutch with variable torque, a gear box with variable transmission ratio, etc., and is thus able to supply to a combing roller **81** of the singling-out device **8** an almost precipitously varying amount of the sliver **6**. In view of the constant rotation speed of the combing roller **81**, the rotor **2** receives varying amount of singled-out fibres **61**. In the spinning rotor **2**, the continuous component **31** combines with a component **32** produced in the spinning rotor **2** from the singled-out fibres **61** thus forming the spun multi-component yarn **3** which is led from the rotor **2** in a well-known manner through a yarn delivery tube **91**, is drawn off by a yarn draw-off device **92**, and during the spinning process is on the operating unit wound by means of a winding device **93** onto a bobbin **94**.

[0026] In the example of embodiment shown in Fig. 1, the feed roller **51** of the feed device **5** of the sliver **6** is on each operating unit coupled with the individual drive **510** which is, in particular in the interest of the variability of its speed, coupled with a control unit **10.** In case of a central drive for the feed roller **51**, the speed variations of the feed rollers **51** take place on all the operating units simultaneously.

[0027] During the production of the multi-component yarn **3**, the spinning rotor **2** receives in a well-known manner both the continuous component **31**, supplied at a constant tension, and singled-out fibres coming from the singling-out device **8** and in the rotor deposited in a well-known manner on its collecting surface, gathered in the collecting groove into a fibre band, twisted while being drawn off and thus creating the spun component **32**. The two components, i.e., the continuous component **31** and the spun component **32** combine in the rotor **2** into the multi-component yarn **3** which is in a well-known manner drawn off and wound onto the bobbin **94**.

[0028] The singling-out device **8** receives the sliver **6** by means of the feed device **5** whose feed roller **51** is adapted for precipitous speed variation resulting in precipitous variations of the amount of the sliver **6** supplied to the singling-out device **8** so that the singling-out device produces a quantity of singled-out fibres **61** precipitously varying in time led into the rotor **2**. The precipitous change in the amount of singled-out fibres **61** led into the rotor **2** involves precipitous change in the thickness of the spun component **32** in which thick and thin sections are formed depending on the amount of singled-out fibres **61** supplied. In process of combining the spun component **32** with the continuous component **31**, each of them is wound around the other one. In view of the varying thickness of the spun component **32**, the two components **31**, **32** wind around each other irregularly and alternately so that for instance the spun component **32** winds around the continuous component **31** whereupon the continuous component **31** winds around the spun component **32**. In addition to the alternating thick and thin sections due to the varying thickness of the spun component **32**, this gives rise to additional effects due to the irregularity in the winding of the winding of the components **31**, **32** and of their mutual alternating in the winding. The multi-component yarn **3** with thick and thin sections and with other additional fancy effects is in the drawing shown only schematically.

[0029] In case of an elastic continuous component **31**, another variable influencing the resulting appearance of the spun multi-component yarn **3** and adding it further fancy effects can be introduced into the spun multi-component yarn. This additional variable consists in the tension of the supplied elastic continuous component **31** whose variations in the phase of its introduction into the rotor **2** still more increase the irregularity of the mutual winding of the continuous component **31** and of the spun component **32** around each other and thus give additional effects to the resulting multi-component yarn **3**.

[0030] Other fancy variants on the fancy multi-component yarn **3** according to the invention can be achieved by providing for regularity in the changes of the sliver feed speed or in the tension of the continuous

component **31**, or in the variability of such changes and their mutual variations.

[0031] In the example of embodiment shown in Fig. 2, the continuous component **31** of the multi-component yarn consists of two linear textile formations **311** and **312** which are wound off from bobbins **313**, **314.** The bobbins **313**, **314** with the winding of linear textile formation **311**, **312** are mounted on the winding-off device **315** consisting of two pairs of kinematically mutually coupled rollers **3151**, **3152**, and **3153**, **3154** out of which one of each pair is coupled with a drive **316** of the winding-off device **315** which is in its turn connected with the control unit **10**. The two linear textile formations **311**, **312** are led through a transport tube **317** through the hollow shaft **21** into the rotor **2**. In the shown embodiment, the transport tube **317** is made as a shaped tube which is on its inlet end divided into two inlet sections **3171**, **3172** having inserted therein respectively one linear textile formation **311**, **312**. As linear textile formations can be combined elastic yarns or threads, various kinds of yarns, structured fibres, etc.

[0032] The winding-off device **315** can be made also in another suitable way, for instance by a pair of kinematically coupled rollers on which the bobbins with the winding of linear textile formations are seated along the machine length next to each other.

[0033] The continuous component **31** can consist also of a larger number of linear textile formations, limited, however by the actual possibility of being seated near each operating unit of the rotor spinning machine and by the actual possibility of their transport into the rotor **2**, in particular by the diameter of the cavity of the hollow shaft **21** and by the ensuing inner diameter of the transport tube **317** which is required to permit all the linear textile formations to pass into the rotor **2**.

[0034] The transport tube **317** can be made with one inlet section for all linear textile formations or with a number of inlet sections corresponding to the number of the transported linear textile formations. In another not shown embodiment, the transport tube **317** can be made as a transport tube independent for each supplied linear textile formation, and these transport tubes join into their common direct section passing through the cavity of the hollow shaft into the rotor.

[0035] The operating unit of the rotor spinning machine is fitted with not illustrated means for monitoring the presence of each of the linear textile formations supplied to the spinning rotor **2** and means for monitoring the presence of the spun component **32** or, as the case may be, of the linear textile formations in the multi-component yarn **3**, said means being coupled with device for interrupting the spinning process on the operating unit in case of the absence of any of the components of the multi-component fancy rotor yarn.

Claims

1. Multi-component fancy rotor yarn comprising a continuous component and a component spun in the rotor of a rotor spinning machine from singled-out fibres, **characterized by** that along the length of the multi-component yarn (3) the amount of the component (32) spun in the rotor (2) from singled-out fibres, as well as the mutual position of the continuous component (31) and the spun component (32), both considered in cross section of the multi-component yarn (3), undergo changes.

2. Multi-component fancy rotor yarn as claimed in Claim 1, **characterized by** that the continuous component (31) consists of at least two linear textile formations.

3. Multi-component fancy rotor yarn as claimed in Claim 2, **characterized by** that at least one linear textile formation is elastic.

4. Method of production of the multi-component fancy rotor yarn comprising a continuous component, in particular an elastic continuous component, and a component spun in the rotor from singled-out fibres on a rotor spinning machine into whose rotor there are supplied both the continuous component of the multi-component yarn and singled-out fibres from a sliver out of which the spun component to be combined in the rotor with the continuous component into the multi-component fancy rotor yarn is produced, **characterized by** that the amount of singled-out fibres (61) supplied to the rotor (2) undergoes changes resulting in changes in the thickness of the spun component (32) and thus producing, while being combined in the rotor (2) with the continuous component (31), further effects on the multi-component rotor yarn (3) consisting in particular in the changes of the mutual position of the continuous component (31) and of the spun component (32) in the cross section of the multi-component yarn (3) with the resulting effect of producing multi-component fancy rotor yarn (3) comprising thick and thin sections and other variable effects due to the varying position of the continuous component (31) and of the spun component (32) in the cross section of the multi-component fancy yarn (3).

5. A method as claimed in Claim 4, **characterized by** that the tension of the supplied continuous component (31) is haphazardly or periodically changed during the spinning process, thus producing further effects on the resulting multi-component yarn (3).

6. A rotor spinning machine for the production of the multi-component fancy rotor yarn comprising a continuous component, in particular an elastic continu-

ous component, and a component spun from singled-out fibres, the rotor spinning machine comprising a plurality of operating units situated next to each other, each of which comprises a feed device for supplying fibres to a singling-out device for feeding singled-out fibres into the rotor and a device for feeding the continuous component into the rotor, **characterized by** that the device (5) of the sliver (6) is coupled with a drive (510) with precipitously variable speed.

7. A rotor spinning machine as claimed in Claim 6, **characterized by** that the drive (510) with precipitously variable speed is coupled with a control unit (10) with which there is coupled the drive of the feed device (4) of the continuous component (31) for controlling the feed speed of the continuous component (31) during the spinning process.

8. A rotor spinning machine for the production of a multi-component fancy rotor yarn consisting of at least two linear textile formations out of which at least one can be elastic, the rotor spinning machine comprising a plurality of operating units situated next to each other each of which is fitted with a feed device for supplying the sliver into the singling-out device, a feed device for supplying singled-out fibres into the rotor, and means for supplying into the rotor at least two linear textile formations constituting the continuous component, **characterized by** that the feed device (5) of the sliver (6) is coupled with the drive (510) with variable speed and that the means for supplying at least two linear textile formations of the continuous component (31) of the multi-component yarn (3) into the spinning rotor (2) comprise for each linear textile formation of the continuous component (31) an independent positively driven winding-off device.

9. A rotor spinning machine for the production of a multi-component fancy rotor yarn consisting of at least two linear textile formations out of which at least one can be elastic, the rotor spinning machine comprising a plurality of operating units situated next to each other each of which is fitted with a feed device for supplying the sliver into the singling-out device, a feed device for supplying singled-out fibres into the rotor, and means for supplying into the rotor at least two linear textile formations constituting the continuous component, **characterized by** that the feed device (5) of the sliver (6) is coupled with the drive (510) with variable speed and that the means for supplying at least two linear textile formations of the continuous component (31) of the multi-component yarn (3) into the spinning rotor (2) comprise a positively driven winding-off device common for at least two linear textile formations of the continuous component (31).

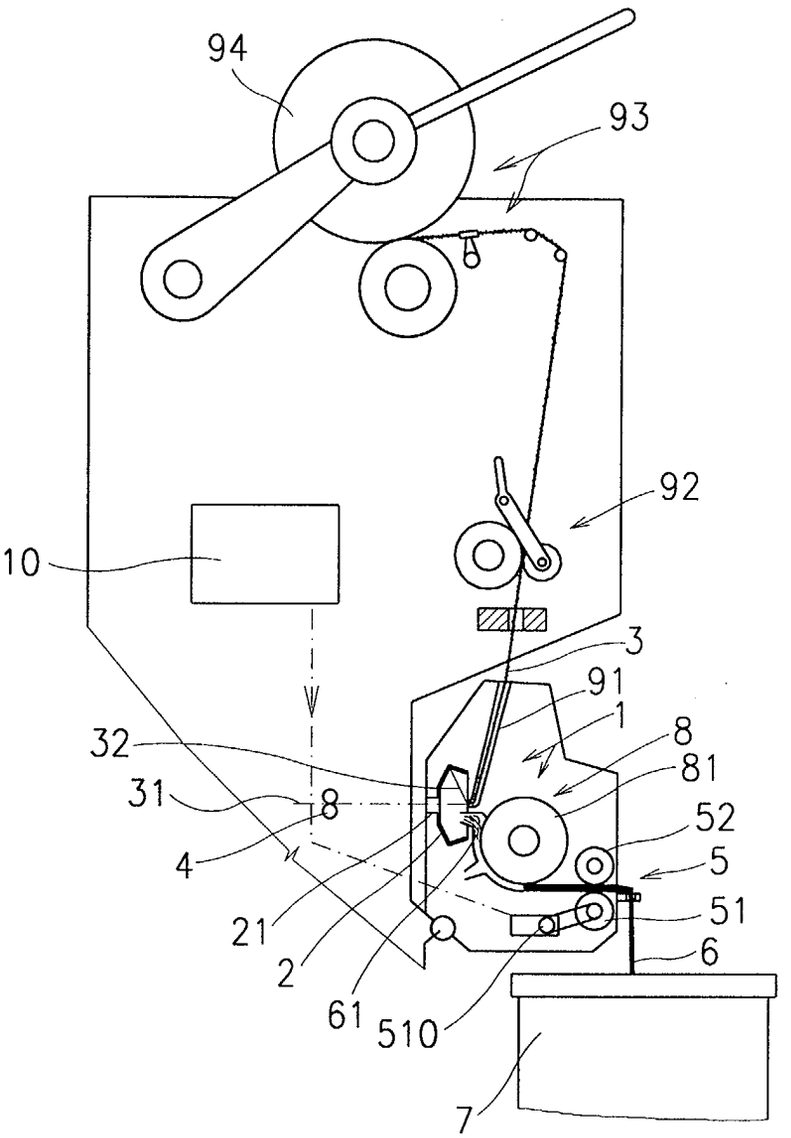

Fig. 1

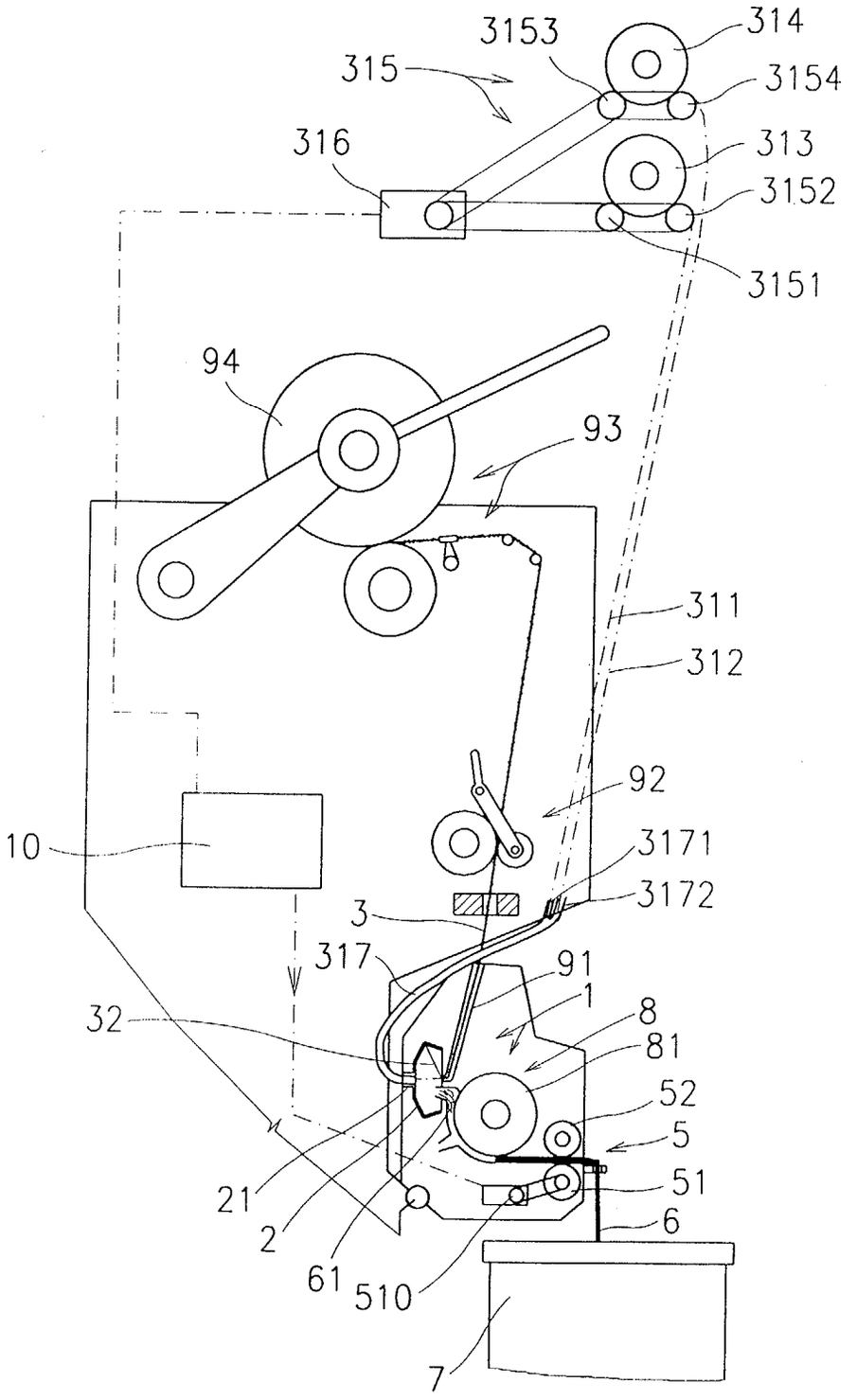
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Fig. 2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 46 6001

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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

D02G
D01H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20 June 2003	D'Souza, J

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