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

(11) **EP 2 803 612 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
19.11.2014 Bulletin 2014/47

(51) Int Cl.:
B65H 54/70 *(2006.01)*

(21) Application number: **14157317.0**

(22) Date of filing: **28.02.2014**

(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

(30) Priority: **16.05.2013 IT PD20130135**

(71) Applicant: **Savio Macchine Tessili S.p.A.**
33170 Pordenone (IT)

(72) Inventors:
- **Badiali, Roberto**
  I-33170 PORDENONE (IT)
- **Ceolin, Mauro**
  I-33170 PORDENONE (IT)
- **Colomberotto, Giorgio**
  I-33170 PORDENONE (IT)

(74) Representative: **Mitola, Marco**
Jacobacci & Partners S.p.A.
Via Berchet 9
35131 Padova (IT)

(54) Method of winding and winder

(57) A winding method comprises the steps of - preparing a winder comprising a plurality of winder units (30), wherein at least one of said winder units (30) is fitted with a suction device (19) suitable for creating a high vacuum suction, and wherein said winder unit (30)is fitted with two suction intakes (9,10) suitable for catching the interrupted ends of yarn (2) and/or the starting end of a new feed bobbin (1), fluidically connecting the suction device (19) to mobile suction intakes (9,10),suitable for performing interruption and joining operations of a yarn (2) and for starting a new feed bobbin (1). When a new feed bobbin (1) needs to be started and/or the yarn (2) breaks, the intakes (9,10) move towards the feed bobbin (1) and the package (12) respectively so as to each catch a respective yarn end, and bring it to a yarn-joiner (6) to restore the continuity of the yarn (2), when the yarn (2) moves during unravelling of the yarn (2) from a feed bobbin (1) and its winding onto a package (12), at least one of said suction intakes (9,10) moves next to the yarn (2) so as to aspirate the dust and/or yarn waste raised during winding.

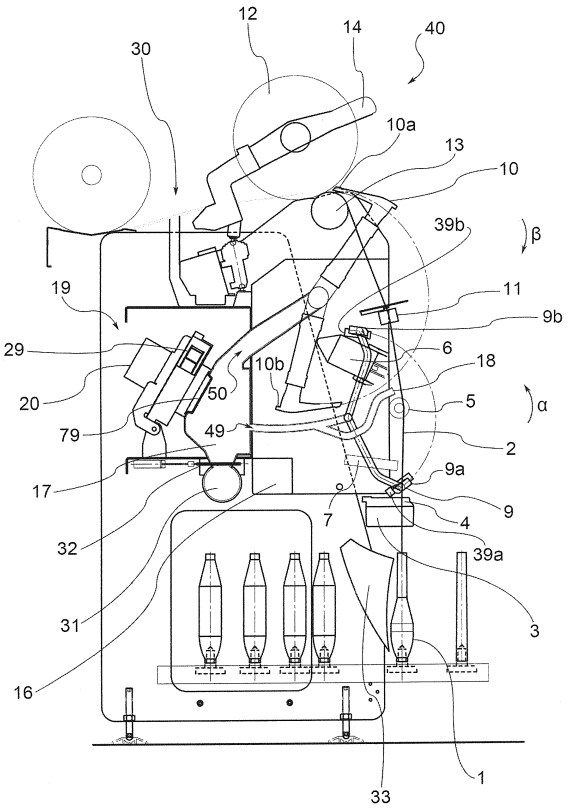

Fig.1

EP 2 803 612 A1

Description

Field of application

[0001] The present invention relates to a method of winding and a winder and in particular a winder fitted with a specific suction device serving the winding stations of said winder.

State of the art

[0002] In industrial practice the ring spinning method producing spools of yarn followed by a winding step in which the yarn is unwound from the spool, purified of its defects, joined and rewound onto a package, is widespread. The winding is performed in the winders positioned downstream of the spinning machines.

[0003] To make both the technical difficulties tackled and resolved by the present invention and its characteristics and advantages compared to the prior art evident the winding method performed in a conventional winder will be described below.

[0004] The winders are composed of a plurality of winding units aligned along the front of the machine and provided with communal control and service equipment.

[0005] As is known, the winding process consists of unwinding a yarn from a feed bobbin and in collecting it onto a package, in identifying and removing any defective sections of yarn, by means of a yarn cleaner, and in joining the interrupted ends by means of a yarn- joiner device.

[0006] In the path as far as the winder, the yarn cleaner identifies the yarn defects and orders the cutting thereof.

[0007] As seen, along the path of the yarn is a yarn-joiner, to which appropriate suction intakes, placed in suction mode by at least one suction device, at the moment of yarn interruptions resulting from the yarn running out, natural breakage or intervention of the yarn-cleaner, bring the interrupted yarn ends to be joined. The intakes thus recover the interrupted skein ends and consign them to the yarn-joiner for the joining thereof, that is to restore the continuity of the yarn.

[0008] In addition, during the winding around the working spool a balloon rotating at high speed is formed and a substantial quantity of dust, fibre and hairy residues of the yarn is released. A suction intake may be placed in the vicinity of the unravelling spool to remove and discharge such impurities.

[0009] As may be guessed, the winding units forming the winder require a significant suction service, one essential high vacuum service to catch the skein ends to be joined, and one low vacuum service used to reduce the quantity of dust in the winding environment when dusty materials are used.

[0010] The high vacuum suction service is needed to start the new feed bobbin and for each joining operation of the skein ends, and requires the suction thereof with mobile intakes and/or with a fixed intake; such suction operations, lasting to the order of 3 seconds each time, have a variable frequency depending on the quality of the yarn and the gauge assigned to the yarn-cleaner, and are characterised by suction heads to the order of 600-650 nm C.A. to make catching of the skein ends and discharge of the yarn waste cycles efficient and safe.

Presentation of the invention

[0011] In the conventional winders the high vacuum suction service is centralised, or, as for the winders described in the patent EP1950162B1 is supplied by single suction devices on the single winder heads; in all these cases the winder heads are connected and disconnected from the high vacuum suction service by means of the interposition of valves, for example solenoid valves, which are opened only for the duration of the suction required at the moment of its intervention on the skein ends, thus withdrawing the suction needed for the necessary time.

[0012] As regards the dust removal service, it is current practice for the conventional winders to be fitted with travelling fans which are used to keep the machine clean; these move back and forth along runways positioned over the machine, removing with appropriately directed jets of air, the dust deposited on the various members of the winder heads and on the machine structures, then aspirating the dust thus removed and lastly accumulating it in a filter on board the travelling fan. The filter on board the travelling fan is then cleaned at predefined intervals with special devices known of in the art. Over recent years, fixed dust suction devices, normally applied to the back of the winder on the lower part, have become increasingly widespread. These fixed devices are composed of several low vacuum suction units, placed as said on the back of the winder on the lower part, which serves sections of machine, feeding with low vacuum suction fixed suction intakes of the dust placed in the area of the unravelling spools so as not to obstruct the winding operations.

[0013] These devices are described for example in the applicant's patent EP1950162B1, which discloses a winding machine with single suction devices which provide the high vacuum suction essential for performing the joining cycle of the winder heads, while the low vacuum suction is an optional centralised device or divided between aspirators which serve sections with several winder heads, which are used to reduce the quantity of dust in the environment when particularly dusty materials are used.

[0014] Another patent application by the applicant EP2322458A1 describes instead a winder wherein the single aspirator per head is used alternately to provide high vacuum suction to the intakes used for the joining cycle, and to supply air to the fixed intakes situated near the unravelling spool. To realise such devices the winder head must have ducts which join the high suction intakes to the single aspirator - when said single aspirator functions at high vacuum suction - and the low suction intakes

when said single aspirator functions at low vacuum suction, as well as appropriate shut-off members which exclude the connection to the low vacuum suction intakes when the high vacuum suction intakes are functioning and vice versa. Said connections, together with the shut-off members and commands thereof constitute a significant additional cost which does not have an economic return for a machine - in the majority of cases - which is not fitted with the dust removal device.

[0015] The problem thus arises of equipping the winder so that it can also be fitted for dust removal at no additional cost, so as to obtain a winder which is at the same time efficient and reliable over time, thanks to the periodic dust removal, without o such account being excessively expensive.

[0016] Such requirement is achieved by a method according to claim 1, and by a winder according to claim 10.

Description of the drawings

[0017] Further characteristics and advantages of the present invention will be more clearly comprehensible from the description given below of its preferred and non-limiting embodiments, wherein:

figure 1 shows a side view, in partial cross-section , of a winder according to the present invention, in a suction configuration of the skein ends for the respective joining thereof;

figure 2 shows a side view, in partial cross-section, of a winder according to the present invention, in a dust removal configuration;

figures 3a-3b show details of the winder of the present invention, in a suction configuration of the skein ends, according to figure 1;

figures 3a-3b show details of the winder of the present invention, in a dust removal configuration, according to figure 2;

Detailed description

[0018] The elements or parts of elements common to the embodiments described below will be indicated using the same reference numerals.

[0019] With reference to the aforementioned figures, reference numeral 40 globally denotes a winder comprising a plurality of winder units 30.

[0020] As mentioned, the processing on the winding unit 30 consists of unwinding a yarn 2 from a feed bobbin 1 and collecting it on a package 12, in removing the sections of defective yarn 2, and in joining the interrupted skein ends.

[0021] In the path as far as the package 12, a yarn cleaner 11 identifies the yarn defects 2 and orders the cutting thereof.

[0022] When the yarn runs out, natural breakage occurs or cutting of the yarn 2 is ordered, the yarn cleaner 11 signals to a control unit 16 of the winding station the absence of yarn in the upper part of the winder unit 30.

[0023] A sensor 4 in turn signals to a control unit 16 the possible absence of the yarn 2 in the lower part of the winder unit 30. The control unit 16 comprises among its functions, the control programme for the reattachment and changing procedure of the feed bobbin 1.

[0024] The package 12 is placed in rotation at a controlled speed by a roller 13 of a support unit 13'; said support group 13' also supports a package-holder arm 14, to roll in the yarn 2, unravelling it at high speed from the feed bobbin 1 kept still on a positioning peg 15.

[0025] The support unit 13' comprises as seen a support roller 13 of the package 12 provided with grooves for alternately shifting the yarn to the right and to the left while depositing on the package 12; According to further embodiments the support unit 13' comprises a support roller 13 of the package 12, while the shifting of the yarn to the left and to the right is performed by known devices suitable for shifting the yarn to the right and to the left, not shown in the drawings.

[0026] The yarn 2 passes through the unravelling unit 3, the yarn sensor 4 and a yarn-tensioner 5. Along the path of the yarn 2 is a yarn-joiner 6 which has the function of joining to each other the separate skein ends, in the known manner.

[0027] In particular, the interrupted skein ends are brought to the yarn joiner 6 by suction intakes 9, 10 at the moment of yarn 2 interruptions resulting from the yarn running out, natural breakage or intervention of the yarn-cleaner 11.

[0028] According to a possible embodiment, a suction intake 33 may be positioned in the vicinity of the feed bobbin 1 as it unravels to remove and discharge the impurities raised during unravelling of the yarn 2 from the feed bobbin 1. The presence of said suction intake 33 is entirely optional in the winder according to the present invention.

[0029] In order to provide the required suction, the suction intakes 9, 10 are fluidically connected to a suction device 19, as described further below.

[0030] In particular, the intake 9, generally driven by a stepped motor, performs a rotation α which leads the suction nozzle of said intake to first catch the interrupted skein end from an unravelling unit 3, after it has been cut by a scissor 7, and after the rotation α, to deliver the skein end of the feed bobbin 1 to the yarn-joiner 6.

[0031] Figure 1 shows the winder head 30, with the intakes 9 and 10 used for the high vacuum suction service shown in the skein end suction positions 9A and 10A and in the skein end insertion positions in the yarn joiner 6 in figures 9B and 10B. The intakes 9 and 10 are arranged along the path of the yarn and, once the function of proffering the skein ends to the yarn-joiner and aspirating the yarn waste have been performed, are available for use for the other services, as specified further below, conditional to not interfering with the yarn in movement. The intakes 9 and 10 are kept in a vacuum by means of the suction device 19, preferably controlled by the control

unit 16.

[0032] According to one embodiment, the intake 9, is provided with a cover 9' pivoted on said intake 9, kept closed by a spring 9", see figures 3a-4a, and which is opened by special cams, for example fixed, 39a and 39b positioned respectively in a suction position of the skein end on the feed bobbin side and delivery position of the skein end to the yarn-joiner 6.

[0033] In position 9A the intake 9 laterally faces the interrupted skein end of the yarn 2 on the feed bobbin side, with the cover 9' kept open by the cam 39a. Once the skein end has been aspirated the intake 9 rises disengaging from the cam 39a, and the cover 9', operated by the spring 9", closes to retain the aspirated skein end along the transport path of the yarn to the yarn-joiner 6.

[0034] The intake 10, also generally driven by a stepped motor, performs a rotation β which leads the suction nozzle of said intake to first catch the interrupted skein end from the package side and, after the rotation β, to deliver the skein end of the feed bobbin 12 to the yarn-joiner 6.

[0035] Usually the intake 10 does not need covers; it frontally aspirates the interrupted yarn 2 all along the periphery of the package 12, and is kept fed with yarn, see fig. 3b, during its rotation β downwards, by the package 12 which is made to turn slowly from the cylinder 13 in the unravelling direction.

[0036] The yarn-joiner 6, after receiving and cutting the two skein ends to measure performs the join while the yarn waste is aspirated away by the intakes 9 and 10; in the case of intervention by the yarn cleaner 11 as a result of a defect, the yarn waste coming from the package 12 which is eliminated contains the yarn defect 2. The yarn-joiner 6 then releases the joined yarn to return to its winding configuration from the feed bobbin 1 to the package 12.

[0037] At the beginning of each new feed bobbin 1, the new skein end is inserted by known means into the unravelling unit 3, and from here is withdrawn by the feed bobbin side intake 9. A further fixed intake 18 of a small size may be placed next to the yarn tensioner 5, generally placed between the yarn cleaner 11 and the yarn tensioner 5. At each interruption of the yarn the fixed intake 18 catches the lower skein end on the feed bobbin side and keeps it taut between the yarn tensioner 5 and the unravelling unit 3. From this position the feed bobbin side intake 9 is able to pick it up and bring it to the yarn joiner 6 for the joining of the yarn and for the continuation of the winding.

[0038] Advantageously said intakes 9, 10, when not used to recuperate the skein ends, are used to provide the dust removal service.

[0039] For example, figure 2 shows the winder head 30, with the intakes 9 and 10 next to the yarn 2, in the positions 9C and 10C suitable for performing the dust removal service. After aspirating the yarn waste and after joining the yarn 2 the intakes 9 and 10, are made to advance and positioned next to the yarn 2 in movement when the yarn resumes its normal winding; in such position, just a few millimetres from the path of the yarn, the intakes 9 and 10 are able, suitably provided with low vacuum suction air, to perform the suction of the dust which develops along the path of the yarn.

[0040] As can be seen in figure 2 in the position 9C and 10C the intakes 9 and 10 are in fact in communication with the suction device 19 since the cover 9' of the intake 9 in position 9C, see fig.4a, is still kept open by the cam 39a, and the intake 10, in the position 10C, see fig.4b, as already said is always open not having a closure cover. In said positions in fact the air aspirated by the aspirator 19 flows inside the intakes 9 and 10 aspirating the dust generated by the unwinding of the feed bobbin 1 which tends to rise dragged by the air adhering to the yarn 2 in movement. In particular, the intake 9 mainly aspirates the dust formed by the unwinding balloon 2B of the yarn 2 from the feed bobbin 1 and by the transit of the yarn through the units 3 and 4 and the package side intake 10 mainly aspirates the dust formed by the contact of the yarn with the yarn tensioner 5. As may be seen in figures 4a and 4b, the dust 2P which encompasses the yarn 2 is dragged upwards by it, enters the sphere of action of the air aspirated by the intakes 9 and 10 and is then captured and aspirated keeping the path of the yarn clean.

[0041] The low vacuum suction air may even be set to zero in the case of yarns with little dust, in which case the single aspirator remains inactivated, and may be set at a predetermined level in the case of yarns requiring, on account of their dustiness, supplementary cleaning compared to that provided by the travelling fans.

[0042] As mentioned above, the winder 40, is provided with a suction device 19 connectable to the intakes 9,10, so as to permit the suction of skein ends and/or of dust.

[0043] According to a possible embodiment, the suction device 19 comprises a fan or air-lock positioned remotely in relation to the winder unit 30 and/or to the winder 40: such suction device 19 thus provides a vacuum suction such as to permit suction through the intakes 9, 10 of one or more winder units 30.

[0044] According to a further embodiment, at least one winder unit 30 comprises, on board said unit, a suction device 19 suitable to supply said unit 30.

[0045] Preferably, each winder unit 30 of the winder 40 comprises a respective suction device 19.

[0046] Preferably, each suction device 19 is able to provide both a high vacuum suction service, so as to permit the catching of the skein ends, and a low vacuum suction service, so as to aspirate the dust which rises during the winding operations.

[0047] The suction device 19 is fitted with at least one suction fan 29 suitable for generating the vacuum required, provided with a motor 20; the single suction device 19 is also preferably fitted with a filter thereof.

[0048] According to one embodiment, the motor 20 is a motor with a variable rotation speed so as be varied as desired, according to the specific requirements and char-

acteristics of the yarn used, the degree of suction required both for the skein ends and for the dust. The motor 20 may be fitted with deviator devices, such as blades and/or valves which, for the same rotation speed, are able to alter the degree of vacuum suction generated,

[0049] According to one embodiment, the suction device 19 is positioned rearwards of the suction intakes 9, 10, that is opposite the skein ends intercepted by said intakes.

[0050] The suction device 19 is in fluidic communication with a collection chamber 17 which the inner outlets 49, 50 of the suction ducts 9, 10 respectively flow into.

[0051] Advantageously, the suction device 19 is fluidically connected to the intakes 9, 10.

[0052] The intakes 9, 10 are thus supplied with vacuum suction whenever the suction device 19 is started both for the joining cycle and for the dust removal.

[0053] According to one embodiment, in order to modify the degree of vacuum suction provided to the intakes 9,10, the motor 20 is commanded by the control unit 16 so as to change the rotation speed thereof.

[0054] It is also possible to provide for the use of throttle valves 59 which for the same vacuum provided by the suction device 19 and/or by the suction fan 29, are able to modify the flow to the intakes 9, 10.

[0055] According to a possible embodiment, said throttle valves 59 are able to totally and selectively occlude said each one of the intakes 9, 10. This way, for the same suction provided by the suction device 19 and/or by the suction fan 29, it is possible to occlude one of the two intakes 9, 10 so as to increase the flow of air through the other intake remaining open 10, 9.

[0056] The filter has the function of withholding upstream the yarn waste and dust aspirated during the joining cycles, which accumulate in the collection chamber 17, while the filtered air is discharged into the environment.

[0057] Preferably, the intake 18, if provided, is connected directly to the inner outlet 49 which also flows into said collection chamber 17.

[0058] The suction device 19 comprises a suction wall 79 which partially delimits an inner side wall of said collection chamber 17.

[0059] Preferably, said suction wall 79 is positioned adjacent to an inner outlet 49, 50 of the suction ducts 9, 10 so as to be lapped by the suction flow coming from said inner outlet 49, 50.

[0060] According to a possible embodiment, the collection chamber 17 is connected to a duct 31 which deals with supplying a centralised high vacuum suction service for cleaning the filter, by means of an interposed valve 32, for example a gate valve.

[0061] According to a further embodiment, the winder 40 may be fitted with at least one travelling fan device (not shown); in particular, it is possible to activate or deactivate the travelling fan device during the winding steps, so as to act in conjunction or not with the suction intakes 9, 10, for the purpose of aspirating/removing dust depending on its effective diffusion in the winder environment and the hairiness of the yarn to be wound.

[0062] In other words, depending on the type of winding, the type of yarn, the environment and the functioning conditions, the travelling fan device may be used in place of but also so as to supplement the suction provided by the intakes 9, 10.

[0063] As may be seen from the description, the winder according to the invention makes it possible to overcome the drawbacks presented of the prior art.

[0064] In fact, the present invention relates to new suction arrangement at the service of the winder which introduces a substantial improvement, which consists of making use of members, normally present on the winder heads, making them also capable of the dust removal function. This way, a standard winder which performs the normal winding functions is provided but which in case of need can also perform the dust removal function without the need for additional members and expense. Thanks to the invention the same intakes used for the high vacuum suction, respectively for the package side skein end and for the feed bobbin skein end , may also be used for dust removal when needed, supplying them with low vacuum suction without the need for fixed intakes dedicated to the low vacuum suction.

[0065] The solution according to the present invention discloses instead a basic machine in which the single winder head aspirators are used mainly for the high vacuum suction, for the functions relative to the joining cycle and to the start of a new feed bobbin, but which is also predisposed for dust removal without the need to add any centralised part or changeover devices, making use only of the intakes positioned near the yarn path, for example making the single aspirators rotate at low speed.

[0066] One advantage of the proposed solution consists of the considerable simplification of the single suction system for the winder head, by eliminating the valve means commanded by the control unit to open and close the high vacuum suction and low vacuum suction ducts creating the alternating of the high vacuum suction to the intakes catching the skein ends and the low vacuum suction to the dedicated intake, as happens with the prior solutions.

[0067] In addition, as seen, the fixed low vacuum suction intakes for dust removal are no longer needed.

[0068] Another advantage of the present invention is to make available a winder which is able to process both yarns with a low degree of dust and with a high degree of dust, without having to be physically equipped with devices which are only used in limited circumstances, that is to say specific dust removal devices. In fact the dust removal function may be activated or not depending on the yarn or on the desired energy saving. The client may thus balance energy savings with dust removal requirements according to quality and economic considerations, thanks to the winder according to the present invention which offers 4 different energy saving possibilities and namely: travelling fan off and suction intakes 9,

10 off, travelling fan off and suction intakes 9, 10 on, travelling fan on and suction intakes 9, 10 off, travelling fan on and suction intakes 9, 10 on.

Claims

1. Winding method comprising the steps of:

   - preparing a winder comprising a plurality of winder units (30), wherein at least one of said winder units (30) is fitted with a suction device (19) suitable for creating a high vacuum suction, and wherein said winder unit (30)is fitted with two suction intakes (9,10) suitable for catching the interrupted ends of yarn (2) and/or the starting end of a new feed bobbin (1),
   - fluidically connecting the suction device (19) to mobile suction intakes (9,10) suitable for operating during the interruption and joining operations of a yarn (2) and for starting a new feed bobbin (1), **characterised in that**
   - when a new feed bobbin (1) needs to be started and/or the yarn (2) breaks, the intakes (9,10) move towards the feed bobbin (1) and the package (12) respectively so as to each catch a respective yarn end, and bring it to a yarn-joiner (6) to restore the continuity of the yarn (2),
   - when the yarn (2) moves during unravelling of the yarn (2) from a feed bobbin (1) and its winding onto a package (12), at least one of said suction intakes (9,10) moves next to the yarn (2) so as to aspirate the dust and/or yarn waste raised during winding.

2. Winding method according to claim 1, wherein, when the yarn (2) moves during unravelling, at least one suction intake (9) moves next to the feed bobbin (1) so as to aspirate the dust and/or yarn waste raised during winding of the yarn (2) from the feed bobbin (1).

3. Winding method according to claim 1 or 2, wherein, when the yarn (2) moves during unravelling, at least one suction intake (9,10) moves next to the yarn tensioner (5), so as to aspirate the dust forming from the contact of the yarn (2) with the yarn tensioner (5).

4. Winding method according to any of the previous claims, wherein, when the yarn (2) moves during unravelling, both suction intakes (9, 10) move next to the yarn (2) so as to aspirate the dust and/or yarn waste raised during winding.

5. Winding method according to any of the previous claims, wherein the suction device (19) provides a variable degree of suction/vacuum pressure, so as to increase the high vacuum during catching of the yarn ends, when the yarn (2) is not moving, and decrease the high vacuum suction during the suction step of the dust and/or yarn waste, when the yarn (2) is moving.

6. Winding method according to any of the previous claims, comprising the step of occluding at least partially one of said suction intakes (9, 10) during the suction step of the yarn ends and /or yarn waste, so as to increase the flow on the non-occluded intake (10, 9).

7. Winding method according to any of the previous claims, wherein said suction device (19) is fitted with at least one suction fan (29), positioned on the winder unit (30) and suitable for generating the high vacuum required.

8. Winding method according to any of the previous claims, comprising the step of varying the degree of high vacuum suction generated by the suction device (19) by modifying the speed of rotation of a suction fan (29) of the suction device (19) and/or by throttling said suction intakes (9, 10).

9. Winding method according to any of the previous claims, comprising the steps of:

   - supplying the winder(40) with at least one travelling fan device,
   - activating or deactivating the travelling fan device during the winding steps, so as to co-operate or not with the suction intakes (9,10), for the purpose of aspirating/removing dust depending on its effective diffusion in the winder environment and the hairiness of the yarn to be wound.

10. Winder (40) comprising,

    - a plurality of winder units (30), wherein at least one of said winder units (30) is fitted with a suction device (19) suitable for creating a high vacuum suction, and wherein said winder unit (30)is fitted with two suction intakes (9,10) suitable for catching the interrupted ends of yarn and/or the starting end of a new feed bobbin (1),
    - wherein the suction intakes (9,10) are fluidically connected to the suction device (19) and are mobile so as to operate during the interruption and joining operations of a yarn (2) and the starting of a new feed bobbin (1), **characterised by** the fact that
    - the winder (40) comprises a control unit (16) programmed to move and actuate the suction intakes (9,10) and/or the suction device (19) so that
    - when a new feed bobbin (1) needs to be started and/or the yarn (2) breaks, the intakes (9,10)

move towards the feed bobbin (1) and the package (12) respectively, each intake (9,10) thanks to the connection with the suction device (19) catches a respective yarn end (2) and brings it to a yarn-joiner (6) to restore the continuity of the yarn (2),

- when the yarn (2) moves during unravelling of the yarn (2) from a feed bobbin (1) and its winding onto a package (12), at least one of said suction intakes (9,10) moves next to the yarn (2)and, thanks to the connection with the suction device (19), aspirates the dust and/or yarn waste raised during winding.

11. Winder (40) according to claim 10, wherein said control unit (16) is programmed so that, when the yarn (2) moves during unravelling, at least one suction intake (9,10) moves next to the feed bobbin (1) so as to directly aspirate the dust and/or yarn waste raised during winding of the yarn (2) from the feed bobbin (1).

12. Winder (40) according to claim 10 or 11, wherein said control unit (16) is programmed so that, when the yarn (2) moves during unravelling, at least one suction intake (9,10) moves next to the yarn tensioner (5), so as to aspirate the dust forming from the contact of the yarn (2) with the yarn tensioner (5).

13. Winder (40) according to any of the claims from 10 to 12, wherein said control unit (16) is programmed so as to bring both suction intakes (9,10) next to the yarn (2) and to aspirate the dust and/or yarn waste, when the yarn (2) moves during unravelling.

14. Winder (40) according to any of the claims from 10 to 13, wherein said control unit (16) is programmed so that the suction device (19) provides a variable degree of suction/high vacuum pressure, so as to increase the high vacuum during catching of the yarn ends, when the yarn (2) is not moving and decrease the high vacuum suction during the suction step of the dust and/or yarn waste, when the yarn (2) is moving.

15. Winder (40) according to any of the claims from 10 to 14, wherein said suction device (19) is fitted with at least one suction fan (29), positioned on the winder unit (30) and suitable for generating the vacuum required.

16. Winder (40) according to any of the claims from 10 to 15, comprising throttle valves (59) which for the same vacuum provided by the suction device (19), are able to modify the flow to the intakes (9, 10).

17. Winder (40) according to claim 16, wherein said throttle valves (59) are suitable for selectively and totally occluding one of the intakes (9, 10) so as to increase, for the same suction provided by the suction device (19), the flow of air through the other intake remaining open (10, 9).

18. Winder (40) according to any of the claims from 10 to 17, wherein the suction device (19) is positioned rearwards of the suction intakes (9, 10), that is opposite the ends of yarn intercepted by said intakes(9, 10).

19. Winder (40) according to any of the claims from 10 to 18, wherein the suction device (19) is in fluidic communication with a collection chamber (17) which the inner outlets (49, 50) of the suction ducts (9, 10) flow into respectively.

20. Winder (40) according to any of the claims from 10 to 19, comprising at least one travelling fan device,

- wherein said control unit (16) is programmed so as to activate or deactivate the travelling fan device and/or suction intakes (9,10), during the winding steps, so as to calibrate the aspiration/removal of dust depending on its effective diffusion in the winder environment and the hairiness of the yarn to be wound.

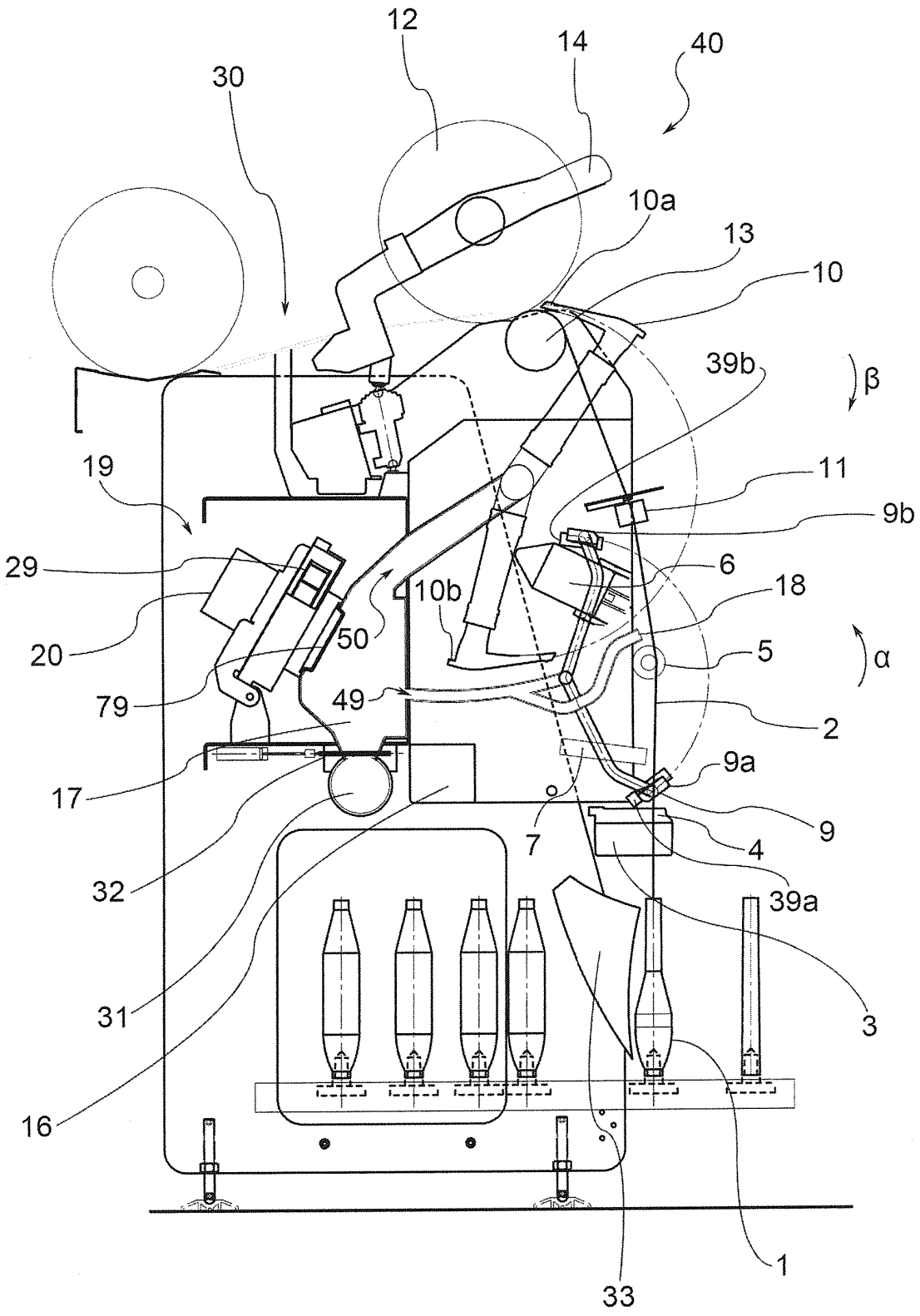
12
14
40
30
10a
13
10
39b
β
19
11
9b
29
6
18
10b
20
50
5
α
79
49
2
9a
17
9
7
4
32
39a
31
3
16
1
33

Fig.1

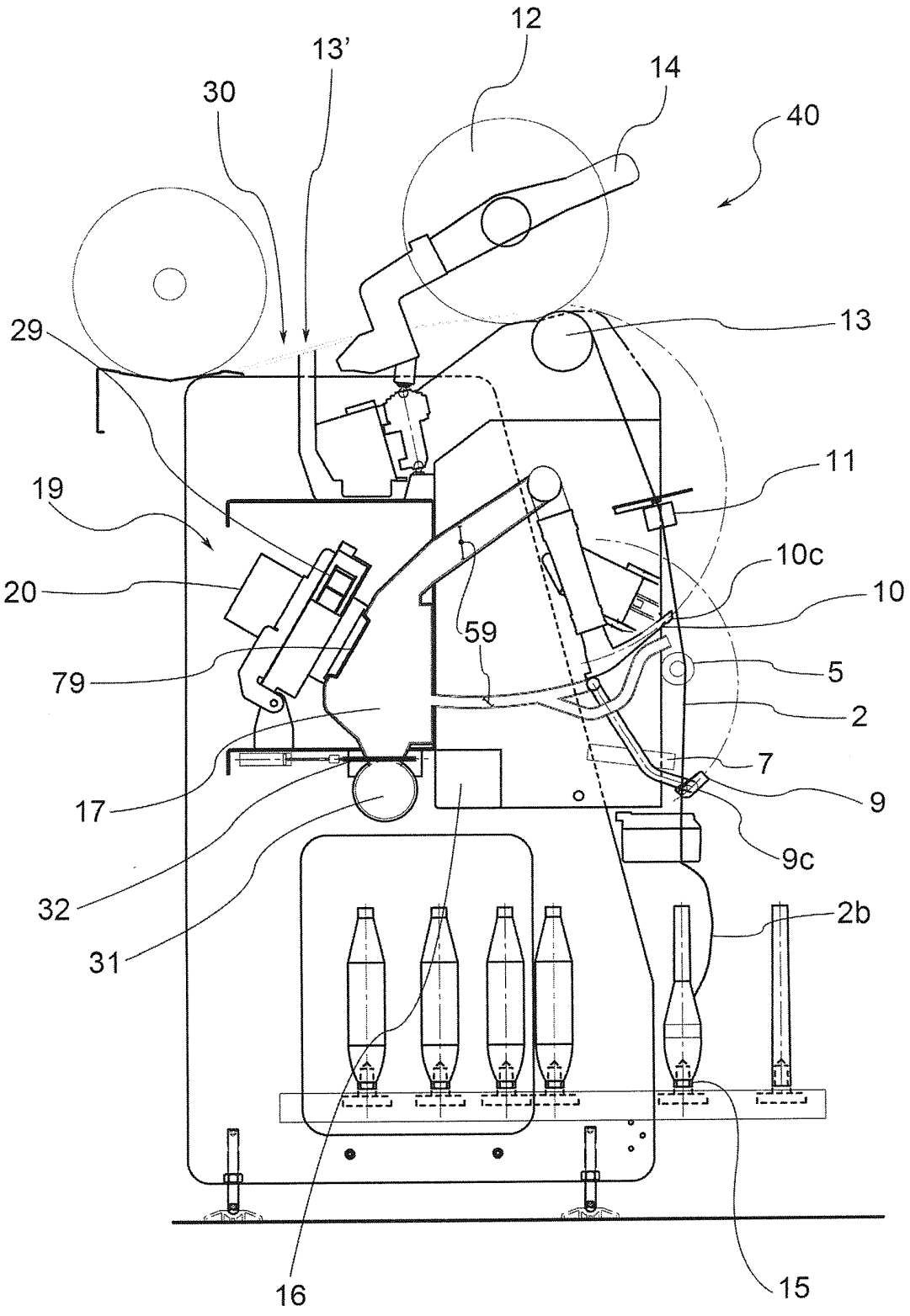

Fig. 2

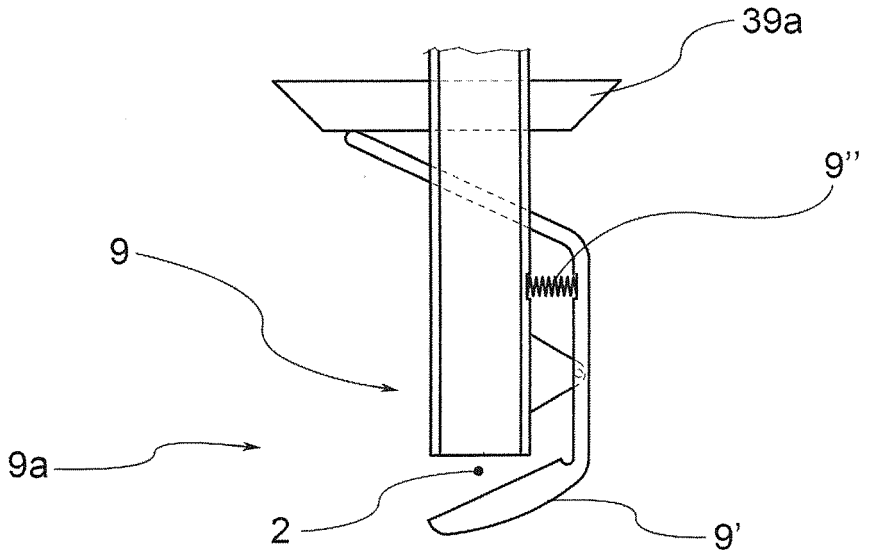

Fig.3a

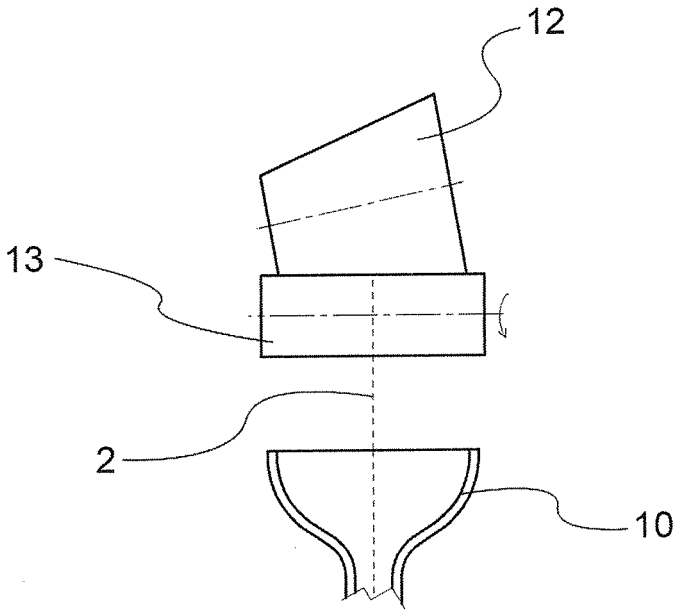

Fig.3b

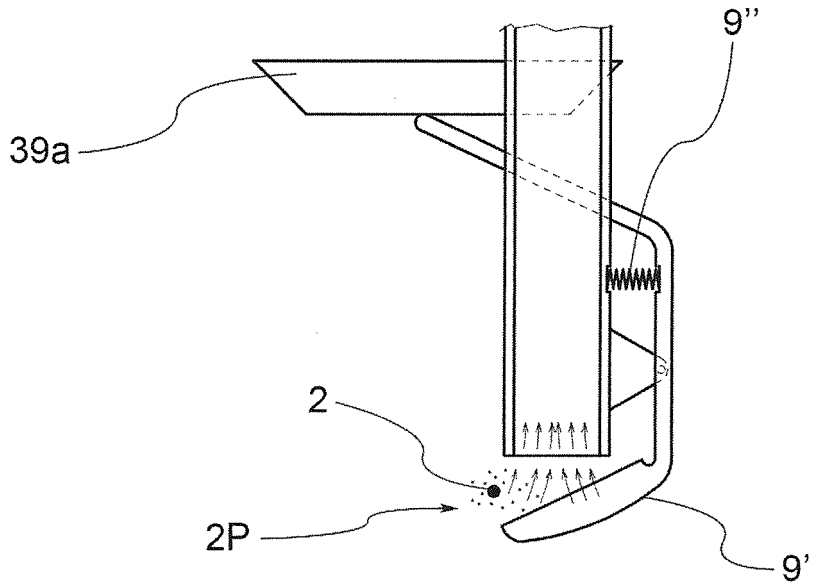

Fig. 4a

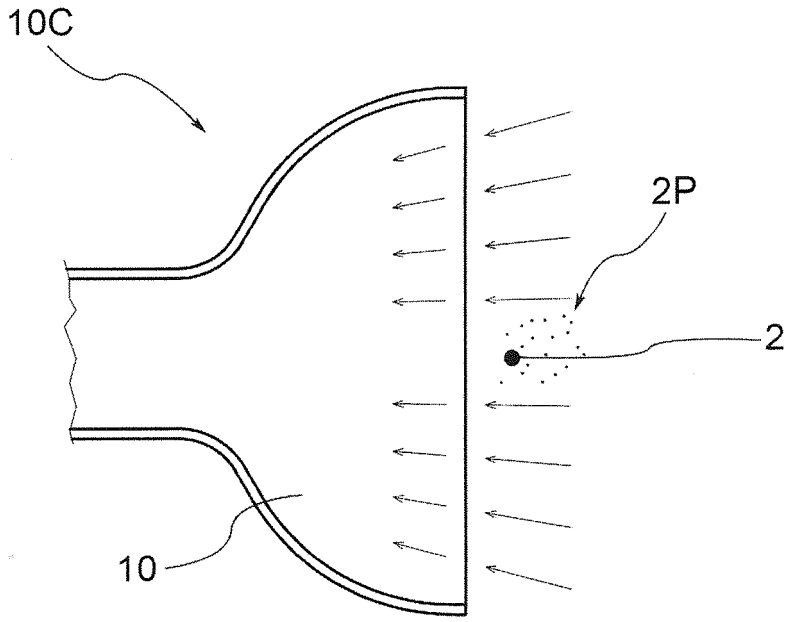

Fig. 4b

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 14 15 7317

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,D	EP 1 950 162 A2 (SAVIO MACCHINE TESSILI SPA [IT]) 30 July 2008 (2008-07-30) * the whole document *	1-20	INV. B65H54/70
A,D	EP 2 322 458 A1 (SAVIO MACCHINE TESSILI SPA [IT]) 18 May 2011 (2011-05-18) * the whole document *	1-20	
A	DE 38 12 643 A1 (MURATA MACHINERY LTD [JP]) 3 November 1988 (1988-11-03) * column 3, lines 24-66; figure 9 * * column 7, lines 28-66; figure 14 *	1,10	

TECHNICAL FIELDS SEARCHED (IPC)

B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	26 March 2014	Pussemier, Bart

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 14 15 7317

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

26-03-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1950162 A2	30-07-2008	CN 101235565 A	06-08-2008
		EP 1950162 A2	30-07-2008
EP 2322458 A1	18-05-2011	CN 102060215 A	18-05-2011
		EP 2322458 A1	18-05-2011
DE 3812643 A1	03-11-1988	DE 3812643 A1	03-11-1988
		IT 1219923 B	24-05-1990
		US 4917326 A	17-04-1990

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 1950162 B1 **[0011] [0013]**
- EP 2322458 A1 **[0014]**