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(54) **WINDING MACHINE WITH IMPROVED MOTORIZED YARN END EXTENSION LEVER AND RELATIVE METHOD OF CONTROLLING THE POSITION OF THE YARN END EXTENSION LEVER**

WICKELMASCHINE MIT VERBESSERTEM MOTORISCHEM FADENENDVERLÄNGERUNGSHEBEL UND ZUGEHÖRIGES VERFAHREN ZUM STEuern DER POSITION DES FADENENDVERLÄNGERUNGSHEBELS

MACHINE D'ENROULEMENT DOTÉE D'UN LEVIER D'EXTENSION D'EXTRÉMITÉ DE FIL MOTORISÉ AMÉLIORÉ ET SON PROCÉDÉ DE RÉGLAGE DE LA POSITION DU LEVIER D'EXTENSION D'EXTRÉMITÉ DE FIL

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Description

FIELD OF APPLICATION

[0001] The present invention relates to a winding machine provided with an improved motorized yarn end extension lever and to the relative method of controlling the position of the yarn end extension lever.

PRIOR ART

[0002] In a textile plant, the automatic winding machine includes several winding units that allow the yarn to be unwound from several bobbins or from a reel to wind it into a new reel: during this process, defects are eliminated from the unwound yarn, before rewinding said yarn onto the reel.

[0003] It should be noted that the term "yarn" or "monofilament" or "continuous yarn" means a single filament or continuous strand (for example in the case of silk, artificial, or synthetic fibers), while the term "yarn" means the set of fibrils of variable length that are parallelized and joined by twisting. In the following, one or the other term will be used without distinction, it being understood that the applications of this invention are not limited to either type.

[0004] On board each winding unit there is a yarn quality control sensor, also called clearer, which verifies the "fitness" of the yarn being unwound; when a defect is detected, the yarn is cut and the winding is immediately interrupted; the cycle then starts with the aim of eliminating the portion of yarn containing the defect from the bobbin and capturing and then bringing the two ends of the yarn (one coming from the reel and the other from the bobbin) inside the joining device by means of two dedicated end gripping nozzles.

[0005] For a well-made join of the yarns it is essential that the two yarns are introduced in the right position inside the yarn-joiner device and also with the right tension before starting the joining cycle: in particular, the appearance, the resistance and the repeatability of the joining process are increasingly pressing demands from end customers.

[0006] At this point, with the ends inserted, well positioned and tensioned inside the yarn-joiner device, the joining cycle starts, joining the two ends recreating the yarn and one is then ready to start again with the reeling.

[0007] The restart after a joining cycle is also a critical step, because the yarn must return to its natural winding path without creating sudden changes in tension or twisting of the yarn which may be seen by the clearer (3) as defects and generate unjustified cuts, interruptions not due to winding and therefore loss of production.

[0008] It is known to use a lever, called the yarn end extension lever, to accompany the yarn end coming from the bobbin in the most suitable position inside the yarn-joiner for the correct realization of the join. Normally such yarn end extension lever takes the motion, through levers

and springs, from other mechanisms (bobbin nozzle) and repeats the movement of accompanying and releasing the yarn after joining always in the same way without the possibility of changing the final arrival position and with difficulty to control the return speed.

[0009] The types of yarn have changed in recent years and the expectations of end customers on the quality and repeatability of the join have increased: to achieve these improvements it is necessary to take care of every aspect both immediately before joining and immediately after during the re-winding step.

[0010] In particular, the known solutions described above are not able to adapt effectively to the different types of yarn, always guaranteeing high standards of repeatability and quality. A solution according to the preamble of claim 1 is disclosed by DE 10 2009 024037 A1.

DISCLOSURE OF THE INVENTION

[0011] The need to solve the drawbacks and limitations mentioned with reference to the prior art is therefore felt.

[0012] Such a need is met by a winding machine according to claim 1 and by a method according to claim 12.

DESCRIPTION OF THE DRAWINGS

[0013] Further features and advantages of this invention will become more apparent from the following detailed description of preferred, non-limiting embodiments thereof, wherein:

- Figure 1 shows a front view of a winding machine according to an embodiment of the present invention;
- Figures 2-3 show a side view and a partial top view, respectively, of the winding machine of Figure 1.

DETAILED DESCRIPTION

[0014] With reference to the above figures, reference numeral 4 globally denotes an overall view of a winding machine according to the present invention.

[0015] More in detail, the winding machine 4 comprises at least one winding unit 6, each having a bobbin 8 provided with a yarn 10 wound around a tube 12, and a reel 14 comprising said yarn 10 unwound from said bobbin 8 and in turn wound on a relative tube 12.

[0016] The winding unit 6 also comprises means for unwinding the yarn 10 from the bobbin 8 and winding the yarn 10 onto the reel 14 in a known manner.

[0017] The winding unit 6 comprises a yarn quality control device 16, called clearer, fitted with a quality sensor 18 operatively connected to yarn cutting means operable in the event of detection of a defect by said quality sensor 18. The cutting means of the yarn-joiner device 22 may be either on the clearer edge or separate.

[0018] The winding unit 6 also comprises a yarn-joiner device 22 configured to join together the yarn ends generated by the cutting of the yarn 10 by said cutting means 20, a first end 24 being connected to the yarn 10 on the bobbin side 8 and a second end 26 being connected to the yarn 10 on the spool side 14.

[0019] Advantageously, the winding unit 6 comprises a yarn end extension lever 28 configured to move from a rest position 28a in which it does not interfere with the winding path of the yarn to a gripping position 28b of the first end 24 in which it grips said first end 24 and to a release position 28c of the first end 24 in which it places the first end 24 at the yarn-joiner device 22.

[0020] In general, the movement of displacement of the yarn end extension lever 28 between the rest 28a, grip 28b and release 28c positions may be a rotary, translational and/or roto-translational movement.

[0021] According to a possible and non-limiting embodiment, the yarn end extension lever 28 rotates around a preferably vertical rotation axis X-X.

[0022] Advantageously, said yarn end extension lever 28 is provided with its own independent drive means 30 for its positioning between said rest 28a, grip 28b and release 28c positions.

[0023] The drive means 30 preferably comprise an electric motor. For example, said electric motor is a stepper type electric motor, or a brushless motor, or a DC electric motor or an electric linear motor.

[0024] It is also possible to provide, as drive means, pneumatically operated drive means.

[0025] Preferably, but not exclusively, the drive means 30 are keyed directly onto the yarn end extension lever 28, in direct transmission.

[0026] Preferably, the yarn end extension lever 28 is provided with a position sensor 32 for controlling its angular position.

[0027] For example, said position sensor 32 is of the inductive or Hall effect type.

[0028] Preferably, the yarn end extension lever 28 is provided with a control unit 34 operatively connected to said drive means 30 and to said position sensor 32, so as to control the position of the yarn end extension lever 28.

[0029] According to a further possible embodiment, the yarn end extension lever 28 and/or the drive means 30 are provided with an encoder for controlling the angular position of the lever 28 itself.

[0030] The drive means 30 are operatively connected to a programmable control unit 34 so as to vary said rest 28a, and/or grip 28b and/or release 28c positions.

[0031] According to a possible embodiment, said control unit 34 is programmable to set at least one intermediate working position of the yarn end extension lever 28, between said grip 28b and release 28c positions.

[0032] According to a possible embodiment, said control unit 34 is programmable to change the speed of rotation of the yarn end extension lever 28 to switch between said rest 28a, and/or grip 28b and/or release 28c positions.

[0033] It should be noted that the control unit 34 which controls the drive means also drives and interfaces with other devices of the winding unit 6 or may interface with further control units of the winding unit itself.

[0034] The operation of the winding unit according to the invention and therefore the method of controlling the position of the yarn end extension lever into the winding machine will now be described.

[0035] In particular, during normal spooling, the yarn 10 runs continuously, i.e. it is unwound from the bobbin 8 and wound onto the reel 14.

[0036] During normal operation, the yarn end extension lever 28 is usually in the rest position 28a in which it does not interfere with the sliding of the yarn 10.

[0037] In the event of sudden breakage of the yarn 10 or detection of defects by the clearer 16, the yarn is cut, the winding is stopped and the two end gripping openings 40, 42 intercept the first end 24 on the bobbin side and the second end 26 on the reel side, respectively.

[0038] Therefore, by means of the control unit 34, the rotation of the yarn end extension lever 28 is commanded between said rest 28a, grip 28b and release 28c positions of the first end 24.

[0039] In detail, the yarn end extension lever 28 moves to the gripping position 28b, rotating towards the yarn 10 so as to capture the first end 24 and bring it, to the release position 28c, at the yarn-joiner device 22.

[0040] The yarn end extension lever then returns to the rest position 28a.

[0041] According to the present invention, it is possible to provide for the step of modifying said grip 28b and release 28c of the first end 24 according to the operating conditions of the winding machine 4, so as to adjust the tension of the yarn 10 on the bobbin side 8 before the joining cycle by the yarn-joiner device 22 and specifically according to the type of yarn used.

[0042] For example, it is possible to adjust the yarn tension according to whether it is made up of lycra, cotton, polyesters, wool, mixed elastics, etc.

[0043] In fact, depending on the material, the tendency of the yarn to form kinks changes and therefore also the tension to which the yarn must be subjected to avoid the occurrence of such defects.

[0044] It is also possible to provide for the step of changing the speed of rotation of the yarn end extension lever 28 to switch between said rest 28a, and/or grip 28b and/or release 28c positions.

[0045] According to a further possible embodiment, the step is provided of defining/modifying the speed at which the yarn end extension lever 28 returns to its rest position 28a after joining has taken place while resuming winding, so as to control the yarn 10 on the bobbin side 8 and release it, preventing the formation of kinks.

[0046] It is also possible to provide for further working positions of the yarn end extension lever 28 to be reached while the yarn-joiner device 22 makes the join and in a synchronized manner therewith to improve said join both in terms of aesthetics and resistance.

[0047] Finally, it is possible to provide for the step of starting to move the yarn end extension lever 28 earlier than in conventional solutions and reduce the joining cycle time (position 28b), thus obtaining greater productivity of the single winding unit 6 and therefore of the winding machine 4.

[0048] As may be appreciated from what is described, the present invention overcomes the drawbacks of the prior art.

[0049] Advantageously, the described solution allows the operation of the yarn end extension device to be adapted as desired so as to make it effective and repetitive when the types of yarn used vary.

[0050] More in detail, the winding machine according to the invention allows defining and modifying the end-of-stroke of the yarn end extension lever in a dynamic and centralized manner, and therefore "adjusting" the tension of the section of the yarn coming from the spool side immediately before the joining cycle and specifically for each type of yarn (lycra, cotton, polyester, wool, mixed elastic, etc.).

[0051] Furthermore, the solution according to the invention makes it possible to define the speed with which the yarn end extension lever returns to its zero position (28-a) once the joining has taken place while the winding restarts: in fact, it is very important in this transitory step to control the yarn and not release it too quickly, otherwise "kinks" may form which may be seen as defects by the clearer which may cause subsequent stops of the winding since it would interpret these kinks as defects.

[0052] In fact, when the clearer sees a false defect (kink), the cycle is repeated and there is a reduction in the overall production of the winding machine.

[0053] By virtue of the present invention it is also possible to define further working positions to be reached while the end-joiner device makes the join and in a synchronized manner therewith to improve said join both in terms of aesthetics and resistance.

[0054] It is also possible to start to move the yarn end extension lever earlier than in conventional solutions and reduce the joining cycle time (position 28-b), thus obtaining greater productivity of the single unit and therefore of the winding machine.

[0055] Different end-joiner devices are available in a winding machine, typically one for each winding unit of the winding machine: the specific end-of-stroke of each end-joiner device (28-c) may be set either centrally or in a different way for each winding unit, without the need for mechanical adjustments of the yarn end extension lever to adapt it to the device itself.

[0056] In addition, it is also possible to obtain a reduction in the maintenance necessary for the change of processing batch.

[0057] The implementation of a device according to the present invention facilitates the production steps and reduces the manufacturing times.

[0058] Those skilled in the art, in order to satisfy contingent and specific needs, may make numerous mod-

ifications and variations to the solutions described above, said modifications and variations all being contained within the scope of the invention as defined in the following claims.

Claims

1. A winding machine (4) comprising a plurality of winding units (6):

- a bobbin (8) having a yarn (10) wound around a tube (12),
- a reel (14) comprising said yarn (10) unwound from said bobbin (8),
- means of unwinding the yarn (10) from the bobbin (8) and winding it onto the reel (14),
- a yarn quality control device (16) fitted with a quality sensor (18) operatively connected to yarn cutting means (10) operable in the event of detection of a defect by said quality sensor (18),
- a yarn-joiner device (22) configured to join together the yarn (10) ends generated by the cutting of the yarn (10) by said cutting means, a first end (24) being connected to the yarn (10) on the bobbin side (8) and a second end (26) being connected to the yarn (10) on the spool side (14),
- a yarn end extension lever (28) configured to move from a rest position (28a) in which it does not interfere with the winding path of the yarn (10) to a gripping position (28b) of the first end (24) in which it grips said first end (24) and to a release position (28c) of the first end (24) in which it places the first end (24) at the yarn-joiner device (22),
- wherein said yarn end extension lever (28) is provided with its own independent drive means (30) for its positioning between said rest (28a), grip (28b) and release (28c) positions,

characterized in that the drive means (30) are operatively connected to a programmable control unit (34) so as to vary said rest (28a), and/or grip (28b) and/or release (28c) positions.

2. The winding machine (4) according to claim 1, wherein the yarn end extension lever (28) is provided with a position sensor (32) for controlling its position.

3. The winding machine (4) according to claim 2, wherein the yarn end extension lever (28) is provided with a control unit (34) operatively connected to said drive means (30) and to said position sensor (32), so as to control the position of said yarn end extension lever (28).

4. The winding machine (4) according to claim 2 or 3,

wherein said position sensor (32) is of the inductive or Hall effect type.

5. The winding machine (4) according to claim 1, 2, 3 or 4, wherein the yarn end extension lever (28) and/or the drive means (30) are provided with an encoder for controlling the angular position of said yarn end extension lever (28). 5
6. The winding machine (4) according to any of the claims from 1 to 5, wherein said drive means (30) comprise an electric motor. 10
7. The winding machine (4) according to claim 6, wherein the electric motor (30) is a stepper type electric motor, or a brushless motor, or a DC electric motor or an electric linear motor. 15
8. The winding machine (4) according to any of the claims from 1 to 5, wherein said drive means (30) comprise pneumatically driven drive means. 20
9. The winding machine (4) according to any one of claims from 1 to 8, wherein said control unit (34) is programmable to set at least one intermediate working position of the yarn end extension lever (28), between said grip (28b) and release (28c) positions. 25
10. The winding machine (4) according to any one of claims from 1 to 9, wherein said control unit (34) is programmable to change the speed of rotation of the yarn end extension lever (28) to switch between said rest (28a), and/or grip (28b) and/or release (28c) positions. 30
11. The winding machine (4) according to any of the claims from 1 to 10, wherein the drive means (30) are keyed directly onto the yarn end extension lever (28), in direct transmission. 35
12. A method of controlling the position of a yarn end extension lever (28) in a winding machine (4) comprising the steps of: 40
 - providing a winding machine (4) according to claim 1, 45
 - commanding the movement of the yarn end extension lever (28) between said rest (28a), grip (28b) and release (28c) positions of the first end (24). 50
13. The method of controlling the position of a yarn end extension lever (28) in a winding machine (4) according to claim 12, comprising the step of modifying said grip (28b) and release (28c) of the first end (24) according to the operating conditions of the winding machine (4), so as to adjust the tension of the yarn (10) on the bobbin side (8) before the joining cycle 55

and specifically according to the type of yarn (10) used.

14. The method of controlling the position of a yarn end extension lever (28) in a winding machine (4) according to claim 12 or 13, comprising the step of changing the speed of rotation of the yarn end extension lever (28) to switch between said rest (28a), and/or grip (28b) and/or release (28c) positions.
15. The method of controlling the position of a yarn end extension lever (28) in a winding machine (4) according to claim 12, 13 or 14, comprising the step of defining and/or modifying the speed at which the yarn end extension lever (28) returns to its rest position (28a) after joining has taken place while resuming winding, so as to control the yarn (10) on the bobbin side (8) and release it, preventing the formation of kinks.
16. The method of controlling the position of a yarn end extension lever (28) in a winding machine (4) according to claim 12, 13, 14 or 15, comprising the step of defining further working positions of the yarn end extension lever (28) to be reached while the yarn-joiner device (22) makes the join and in a synchronised manner therewith to improve said join both in terms of aesthetics and resistance.

Patentansprüche

1. Wickelmaschine (4), umfassend eine Mehrzahl von Wickeleinheiten (6):
 - eine Spule (8) mit einem Garn (10), das um eine Hülse (12) gewickelt ist,
 - eine Rolle (14), die das von der Spule (8) abgewickelte Garn (10) umfasst,
 - Mittel zum Abwickeln des Garns (10) von der Spule (8) und Aufwickeln auf die Rolle (14),
 - eine Garnqualitätskontrollvorrichtung (16), die mit einem Qualitätssensor (18) ausgestattet ist, der operativ mit Garnschneidemitteln (10) verbunden ist, die im Falle einer Detektion eines Defekts durch den Qualitätssensor (18) operabel sind,
 - eine Garnverbindungs Vorrichtung (22), die konfiguriert ist, die Enden des Garns (10), die durch das Schneiden des Garns (10) durch die Schneidemittel erzeugt werden, miteinander zu verbinden, wobei ein erstes Ende (24) mit dem Garn (10) auf der Spulenseite (8) verbunden ist und ein zweites Ende (26) mit dem Garn (10) auf der Rollenseite (14) verbunden ist,
 - einen Garnendenverlängerungshebel (28), der konfiguriert ist, sich von einer Ruheposition (28a), in der er den Wickelweg des Garns (10)

nicht beeinträchtigt, zu einer Greifposition (28b) des ersten Endes (24), in der er das erste Ende (24) greift, und zu einer Freigabeposition (28c) des ersten Endes (24) zu bewegen, in der er das erste Ende (24) an der Garnverbindungs-
vorrichtung (22) platziert,

- wobei der Garnendenverlängerungshebel (28) mit seinen eigenen unabhängigen Antriebsmitteln (30) für seine Positionierung zwischen der Ruhe- (28a), der Greif- (28b) und der Freigabeposition (28c) versehen ist,

dadurch gekennzeichnet, dass die Antriebsmittel (30) operativ mit einer programmierbaren Steuer- bzw. Regeleinheit (34) verbunden sind, um die Ruhe- (28a) und/oder die Greif- (28b) und/oder die Freigabeposition (28c) zu variieren.

2. Wickelmaschine (4) nach Anspruch 1, wobei der Garnendenverlängerungshebel (28) mit einem Positionssensor (32) zum Steuern bzw. Regeln seiner Position versehen ist.
3. Wickelmaschine (4) nach Anspruch 2, wobei der Garnendenverlängerungshebel (28) mit einer Steuer- bzw. Regeleinheit (34) versehen ist, die operativ mit den Antriebsmitteln (30) und dem Positionssensor (32) verbunden ist, um die Position des Garnendenverlängerungshebels (28) zu steuern bzw. zu regeln.
4. Wickelmaschine (4) nach Anspruch 2 oder 3, wobei der Positionssensor (32) vom induktiven Typ oder Hall-Effekt-Typ ist.
5. Wickelmaschine (4) nach Anspruch 1, 2, 3 oder 4, wobei der Garnendenverlängerungshebel (28) und/oder die Antriebsmittel (30) mit einem Encoder zum Steuern bzw. Regeln der Winkelposition des Garnendenverlängerungshebels (28) versehen sind.
6. Wickelmaschine (4) nach einem der Ansprüche 1 bis 5, wobei die Antriebsmittel (30) einen Elektromotor umfassen.
7. Wickelmaschine (4) nach Anspruch 6, wobei der Elektromotor (30) ein Elektromotor vom Schritztyp ist oder ein bürstenloser Motor oder ein DC-Elektromotor bzw. Gleichstrommotor oder ein elektrischer Linearmotor ist.
8. Wickelmaschine (4) nach einem der Ansprüche 1 bis 5, wobei die Antriebsmittel (30) pneumatisch angetriebene Antriebsmittel umfassen.
9. Wickelmaschine (4) nach einem der Ansprüche 1 bis 8, wobei die Steuer- bzw. Regeleinheit (34) dahin-

gehend programmierbar ist, zumindest eine Zwischenarbeitsposition des Garnendenverlängerungshebels (28) zwischen der Greif- (28b) und der Freigabeposition (28c) festzulegen.

10. Wickelmaschine (4) nach einem der Ansprüche 1 bis 9, wobei die Steuer- bzw. Regeleinheit (34) dahingehend programmierbar ist, die Drehgeschwindigkeit des Garnendenverlängerungshebels (28) zu ändern, um zwischen der Ruhe- (28a) und/oder der Greif- (28b) und/oder der Freigabeposition (28c) zu wechseln.
11. Wickelmaschine (4) nach einem der Ansprüche 1 bis 10, wobei die Antriebsmittel (30) in direkter Übertragung direkt auf den Garnendenverlängerungshebel (28) aufgekeilt bzw. aufgezogen sind.
12. Verfahren zum Steuern bzw. Regeln der Position eines Garnendenverlängerungshebels (28) in einer Wickelmaschine (4), umfassend die Schritte:
 - Bereitstellen einer Wickelmaschine (4) nach Anspruch 1,
 - Befehlen bzw. Anordnen der Bewegung des Garnendenverlängerungshebels (28) zwischen der Ruhe- (28a), der Greif- (28b) und der Freigabeposition (28c) des ersten Endes (24).
13. Verfahren zum Steuern bzw. Regeln der Position eines Garnendenverlängerungshebels (28) in einer Wickelmaschine (4) nach Anspruch 12, umfassend den Schritt eines Modifizierens des Griffs (28b) und der Freigabe (28c) des ersten Endes (24) gemäß den Betriebsbedingungen der Wickelmaschine (4), um die Spannung des Garns (10) auf der Spulenseite (8) vor dem Verbindungszyklus und speziell bzw. gezielt gemäß dem Typ des verwendeten Garns (10) einzustellen.
14. Verfahren zum Steuern bzw. Regeln der Position eines Garnendenverlängerungshebels (28) in einer Wickelmaschine (4) nach Anspruch 12 oder 13, umfassend den Schritt eines Ändern der Drehgeschwindigkeit des Garnendenverlängerungshebels (28), um zwischen der Ruhe- (28a) und/oder der Greif- (28b) und/oder der Freigabeposition (28c) zu wechseln.
15. Verfahren zum Steuern bzw. Regeln der Position eines Garnendenverlängerungshebels (28) in einer Wickelmaschine (4) nach Anspruch 12, 13 oder 14, umfassend den Schritt eines Definierens und/oder Modifizierens der Geschwindigkeit, mit welcher der Garnendenverlängerungshebel (28) nach erfolgter Verbindung bei Wiederaufnahme des Wickelns in seine Ruheposition (28a) zurückkehrt, um das Garn (10) auf der Spulenseite (8) zu steuern bzw. zu

kontrollieren und freizugeben, wobei die Bildung von Knicken verhindert wird.

16. Verfahren zum Steuern bzw. Regeln der Position eines Garnendenverlängerungshebels (28) in einer Wickelmaschine (4) nach Anspruch 12, 13, 14 oder 15, umfassend den Schritt eines Definierens weiterer Arbeitspositionen des Garnendenverlängerungshebels (28), die erreicht werden sollen, während die Garnverbindungs Vorrichtung (22) die Verbindung herstellt, und auf synchronisierte Weise damit, um die Verbindung sowohl hinsichtlich Ästhetik als auch Widerstandsfähigkeit zu verbessern.

Revendications

1. Machine d'enroulement (4) comprenant une pluralité d'unités d'enroulement (6) :

- une bobine (8) avec un fil (10) enroulé autour d'un tube (12),
- une quenouille (14) comprenant ledit fil (10) déroulé de ladite bobine (8),
- des moyens pour dérouler le fil (10) de la bobine (8) et l'enrouler sur la quenouille (14),
- un dispositif de contrôle de la qualité du fil (16) équipé d'un capteur de qualité (18) fonctionnellement relié à des moyens de coupe de fil (10) pouvant fonctionner en cas de découverte d'un défaut par ledit capteur de qualité (18),
- un dispositif d'assemblage de fils (22) configuré pour attacher, l'une à l'autre, les extrémités du fil (10) créées en coupant le fil (10) par les moyens de coupe, une première extrémité (24) étant attachée au fil (10) du côté de la bobine (8) et une deuxième extrémité (26) étant attachée au fil (10) du côté de la quenouille (14),
- un levier d'extension d'extrémité de fil (28) configuré pour se déplacer d'une position de repos (28a) dans laquelle il n'interfère pas avec le trajet d'enroulement du fil (10), à une position de saisie (28b) de la première extrémité dans laquelle il saisit ladite première extrémité (24), et à une position (28c) de détachement de la première extrémité (24) dans laquelle il place la première extrémité (24) au dispositif d'assemblage de fils (22),
- dans laquelle le levier d'extension d'extrémité de fil (28) est pourvu de ses propres moyens d'entraînement indépendants (30) pour son positionnement entre lesdites positions de repos (28a), de saisie (28b) et de détachement (28c),

caractérisée en ce que les moyens d'entraînement (30) sont fonctionnellement reliés à une unité de commande (34) pouvant être programmée, de façon à varier lesdites positions de repos (28a), de saisie

(28b) et de détachement (28c).

2. Machine d'enroulement (4) selon la revendication 1, dans laquelle le levier d'extension d'extrémité de fil (28) est pourvu d'un capteur de position (32) pour la commande de sa position.
3. Machine d'enroulement (4) selon la revendication 2, dans laquelle le levier d'extension d'extrémité de fil (28) est pourvu d'une unité de commande (34) fonctionnellement reliée auxdits moyens d'entraînement (30) et audit capteur de position (32) afin de commander la position dudit levier d'extension d'extrémité de fil (28).
4. Machine d'enroulement (4) selon la revendication 2 ou 3, dans laquelle ledit capteur de position (32) est du type à induction ou à effet Hall.
5. Machine d'enroulement (4) selon la revendication 1, 2, 3 ou 4, dans laquelle le levier d'extension d'extrémité de fil (28) et/ou les moyens d'entraînement (30) sont pourvu d'un encodeur pour commander la position angulaire dudit levier d'extension d'extrémité de fil (28).
6. Machine d'enroulement (4) selon l'une des revendications 1 à 5, dans laquelle lesdits moyens d'entraînement (30) comprennent un moteur électrique.
7. Machine d'enroulement (4) selon la revendication 6, dans laquelle le moteur électrique (30) est un moteur électrique pas à pas ou un moteur sans balai ou un moteur électrique à courant continu ou un moteur électrique linéaire.
8. Machine d'enroulement (4) selon l'une des revendications 1 à 5, dans laquelle lesdits moyens d'entraînement (30) comprennent des moyens d'entraînement à entraînement pneumatique.
9. Machine d'enroulement (4) selon l'une des revendications 1 à 8, dans laquelle ladite unité de commande (34) est programmable pour fixer au moins une position de travail intermédiaire du levier d'extension d'extrémité de fil (28) entre lesdites positions de saisie (28b) et de détachement (28c).
10. Machine d'enroulement (4) selon l'une des revendications 1 à 9, dans laquelle ladite unité de commande (34) peut être programmée pour changer la vitesse de rotation du levier d'extension d'extrémité de fil (28) pour changer entre lesdites positions de repos (28a) et/ou de saisie (28b) et/ou de détachement (28c).
11. Machine d'enroulement (4) selon l'une des revendications 1 à 10, dans laquelle les moyens d'entraî-

nement (30) sont attachés directement au levier d'extension d'extrémité de fil (28), en transmission directe.

12. Procédé de réglage de la position d'un levier d'extension d'extrémité de fil (28) dans une machine d'enroulement (4), comprenant les étapes de :
 - mettre à disposition une machine d'enroulement (4) selon la revendication 1, 5
 - commander le mouvement du levier d'extension d'extrémité de fil (28) entre lesdites positions de repos (28a), de saisie (28b) et de détachement (28c) de la première extrémité (24). 10
13. Procédé de réglage de la position d'un levier d'extension d'extrémité de fil (28) dans une machine d'enroulement (4), selon la revendication 12, comprenant l'étape de modifier lesdites saisie (28b) et détachement (28c) de la première extrémité (24) 15

selon les conditions de fonctionnement de la machine d'enroulement (4) afin de régler la tension du fil (10) du côté de la bobine (8) avant le cycle d'attachement et notamment selon le type de fil (10) utilisé. 20
14. Procédé de réglage de la position d'un levier d'extension d'extrémité de fil (28) dans une machine d'enroulement (4), selon la revendication 12 ou 13, comprenant l'étape de changer la vitesse de rotation du levier d'extension d'extrémité de fil (28) 25

pour commuter entre lesdites positions de repos (28a), de saisie (28b) et de détachement (28c). 30
15. Procédé de réglage de la position d'un levier d'extension d'extrémité de fil (28) dans une machine d'enroulement (4), selon la revendication 12, 13 ou 14, comprenant l'étape de définir et/ou de modifier la vitesse à laquelle le levier d'extension d'extrémité de fil (28) retourne à sa position de repos (28a) après qu'un assemblage a eu lieu, tout en reprenant l'enroulement, afin de commander le fil (10) du côté de la bobine (8) et de le détacher, évitant la formation de nœuds. 35
16. Procédé de réglage de la position d'un levier d'extension d'extrémité de fil (28) dans une machine d'enroulement (4), selon la revendication 12, 13, 14 ou 15, comprenant l'étape de définir des positions de travail supplémentaires du levier d'extension d'extrémité de fil (28) à atteindre lorsque le dispositif d'assemblage de fils (22) réalise l'assemblage et de façon synchronisée avec cela pour améliorer ledit assemblage aussi bien en termes d'esthétique que de résistance. 40

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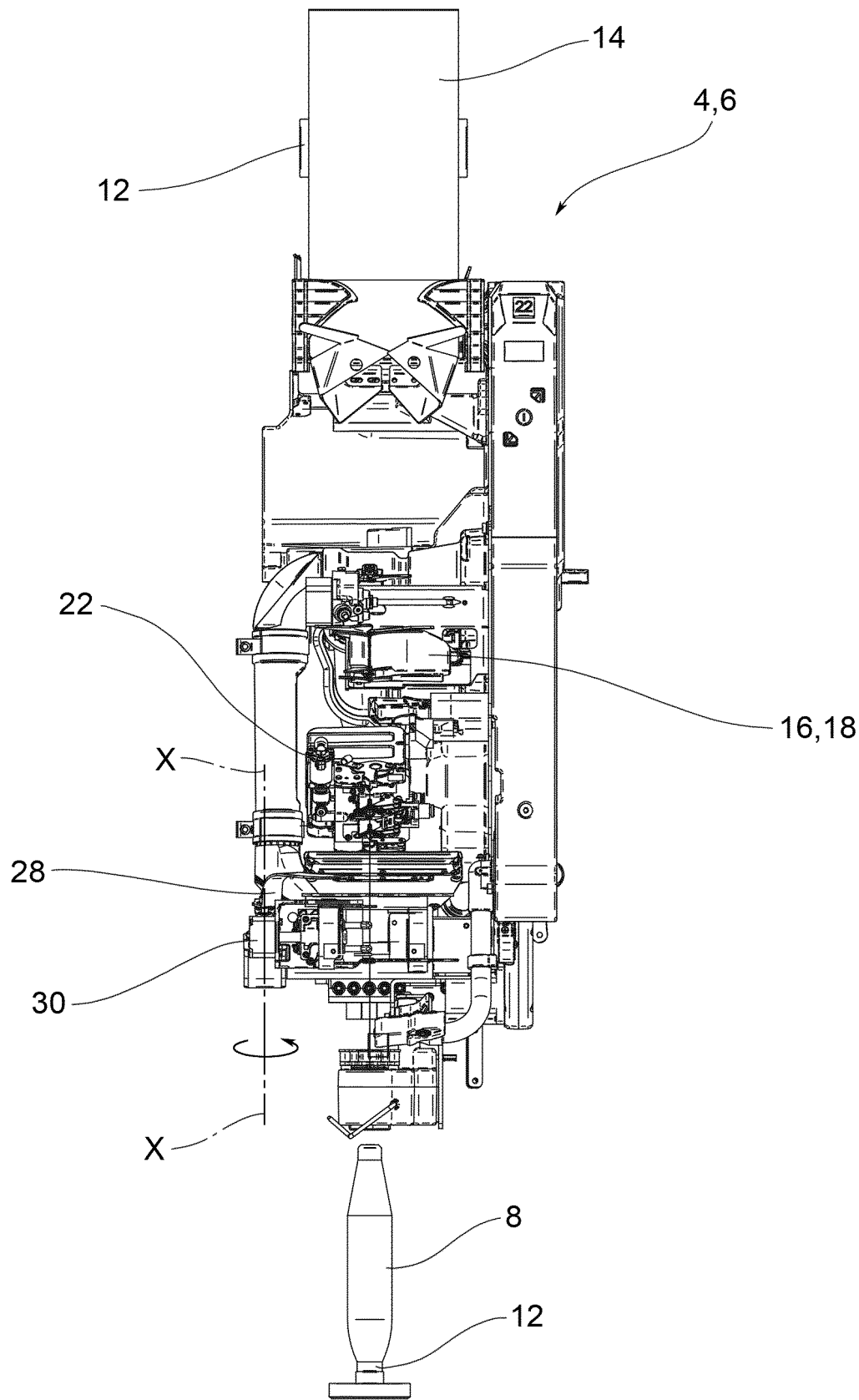


FIG.1

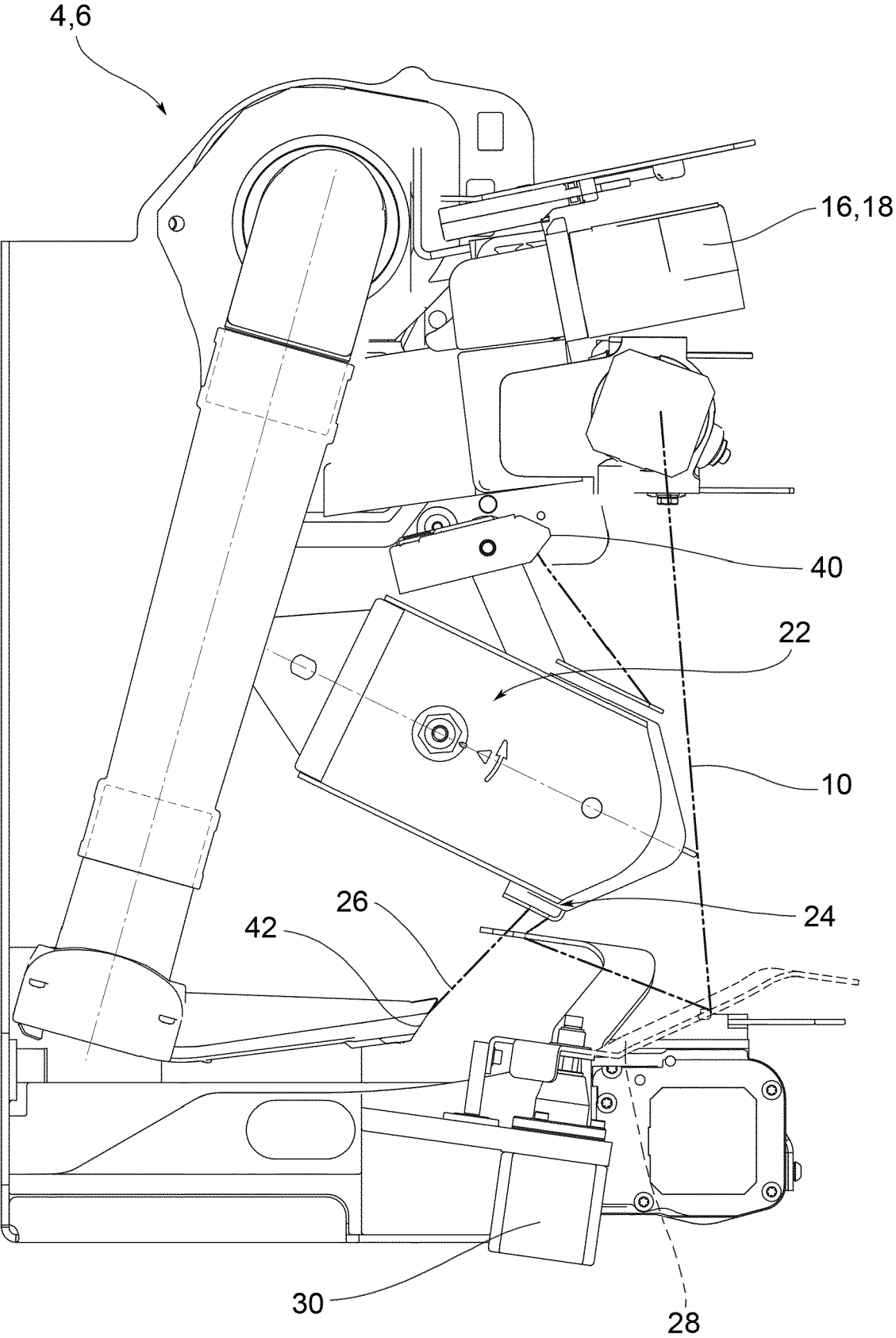


FIG.2

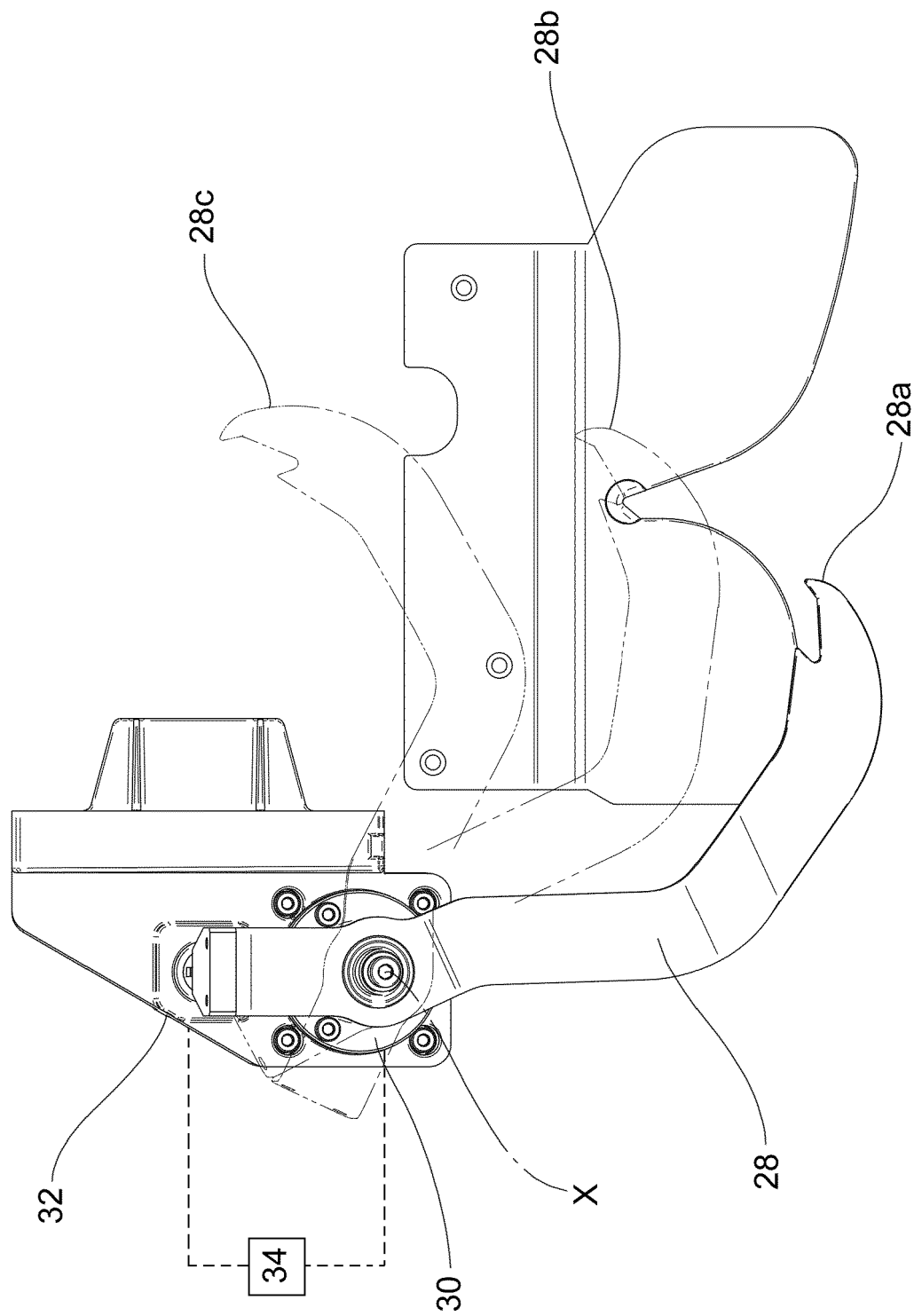


FIG.3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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