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(54) **AN OPEN END SPINNING MACHINE WITH IMPROVED FIXING OF THE BEARINGS SUPPORTING THE SPINNING ROTOR**

OPEN-END-SPINNMASCHINE MIT VERBESSERTER BEFESTIGUNG DER LAGER ZUR STÜTZUNG DES SPINNROTORS

MACHINE DE FILAGE À BOUT LIBRE À FIXATION AMÉLIORÉE DES PALIERS SUPPORTANT LE ROTOR DE FILAGE

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GB-A- 2 317 425 JP-U- S5 335 219
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Description

TECHNICAL FIELD

[0001] The present invention relates to an open end (OE) spinning machine with improved fixing of bearings supporting the spinning rotor.

BACKGROUND ART

[0002] On today's OE spinning machines with direct bearing, the bearing/mounting system is fixed in the housing of the machine by a single screw on one side of the system while, on the other side, the bearing system/house has a sliding or transition fit, since bearing system needs to be easily/by hand removable.

[0003] So the housing of known solutions is split and it builds with fixing area a kind of clamping bush.

[0004] The single screw, placed on one side only, creates through the clamping a different pressure on one side of the bearing rows. This can also have an impact on the bearing clearance.

[0005] Second side of bearing is pressed or moved in body.

[0006] Therefore, due to the transition fit, the bearing mounting system of known solutions is not clearly defined: in other words it can be free or fix.

[0007] Free mounting has negative impact to lifetime of the bearing and fix mounting has negative impact to handling and lifetime too; moreover a fix mounting is not easy to be dis-assembled.

[0008] Therefore, both conditions of prior art solutions have a negative impact on the life-time and the speed level of the bearing. Above solutions are known from US 3972171 A, US 3874751 A, JP S5335219 U, DE 3605273 A1, GB 2317425 A.

SUMMARY OF THE INVENTION

[0009] The purpose of the present invention is that of providing an open end spinning machine which overcomes the drawbacks mentioned with reference to the prior art.

[0010] Such aim is reached by an open end spinning machine according to claim 1.

[0011] Other embodiments of the open end spinning machine according to the invention are described in the subsequent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] 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:

- figures 1a-1b show perspective views of an open end spinning machine according to an embodiment

of the present invention;

- figure 2 shows a perspective view schematically showing components of a workstation of the open end spinning machine of figure 1;
- figures 3-4 show perspective views, with different details, of a spinning rotor with relative bearings of the spinning machine of figure 1;
- figure 5 shows a complete spinning rotor, composed of rotor cup 18, the rotor shaft with is directly the inner ring of the bearings/bearing rows 36,40, and the resilient mounting 54.

[0013] The elements or parts of elements common to the embodiments described below will be indicated using the same reference numerals.

DETAILED DESCRIPTION

[0014] With reference to the aforementioned figures, reference numeral 4 globally denotes an open-end spinning machine.

[0015] The open-end spinning machine 4 comprises at least one workstation 8 or unit; each workstation or unit 8 comprises an open-end spinning device 12 and a winding device 13. As known, in each open-end spinning device 12 a fiber sliver 14 is drawn up from a respective spinning can (not shown) and is spun into a yarn 15. The yarn is subsequently wound on the winding device 13 to form a package (or cross-wound cone), not shown in the drawings.

[0016] In each workstation, an opening roller 17 is provided, which opens the fiber sliver 14 to form individual fibers. The individual fibers are then fed to a spinning rotor 18, which turns them into a yarn 15.

[0017] Each package is frictionally driven for rotation by a winding drum 19. The winding drums 19 are arranged on a winding shaft 20.

[0018] The workstations each have a yarn take-up roller 22 arranged on a take-up drive shaft 23.

[0019] A yarn traversing device 24, which comprises a yarn guide 25, is provided in each workstation 8. The yarn guide 25 is controlled for longitudinal reciprocating motion through a yarn guide rod 26.

[0020] Additionally, the spinning machine may be equipped with several other devices (not described herein), for example a system for changing automatically the finished yarn packages. The workstations may each be equipped with a piecing device. The spinning machine may be also equipped with a system for automated piecing.

[0021] As explained above, the working station 8 is provided with an opening roller 17 configured to open a fiber sliver 14 to form individual fibers and a spinning rotor 18 for turning the individual fibers into a yarn 15.

[0022] In particular, the spinning rotor 18 is housed within a casing 28 and is rotatably supported, around a rotating axis X-X, by at least one bearing 36,40, in particular a first bearing 36 and a second bearing 40, or two

different rows of bearings 36,40.

[0023] The rotor bearings 36,40 may comprise ball bearings, roller bearings and/or needle bearings and/or sliding bush bearing.

[0024] The definition of bearing should be considered in a general and non-limiting sense.

[0025] For example, the bearings may comprise a unique cage supporting two or more rows of balls/roller elements, or different, spaced apart, cages supporting rows of balls/roller bearings.

[0026] Advantageously, the casing 28 comprises a first clamp 42 and a second clamp 44 divided in correspondence of a mean plane M and supporting said bearings 36,40.

[0027] Said clamps 42,44 are connected each other by means of removable fixing means 48 acting on the first clamp 42 and pressing it against an external fixed lateral surface 68 of the bearings 36,40.

[0028] The first and second clamps 42,44 may touch in correspondence of respective abutments 52, diametrically opposite with respect to a vertical plane V, perpendicular to the mean plane M and passing through the rotating axis X-X.

[0029] Said clamps 42,44 are preferably displaced symmetrically with respect to said vertical plane V.

[0030] According to a possible embodiment, said removable fixing means 48 comprises elastic means 54 in order to ensure a resilient pressing and mounting of the at least one bearing 36,40 inserted between the clamps 42,44.

[0031] According to an embodiment, said elastic means 54 comprise elastic bushes 55, each elastic bush 55 being clamped around the external fixed lateral surface 68 of a corresponding bearing 36,40.

[0032] Preferably, the removable fixing means 48 comprises a presser 56 which urges the first clamp 42 against the second clamp 44.

[0033] For example, said presser 56 comprises a self-fixing eccentric pin 60, rotatable in order to set the clamping force between clamps 42,44.

[0034] Preferably said self-fixing eccentric pin 60 is displaced along a transversal axis Y-Y, perpendicular to the rotating axis X-X; moreover, said self-fixing eccentric pin 60 is preferably displaced above first clamp 42, in order to push first clamp 42 against second clamp 44.

[0035] Preferably, said self-fixing eccentric pin 60 is displaced between a first and a second rotor bearing 36,40, along the rotating axis X-X.

[0036] According to a possible embodiment, the self-fixing eccentric pin 60 is connected to an operating lever in order to set and fix the angular orientation of the pin itself and the pressing force between clamps 42,44.

[0037] Each clamp 42,44 is counter-shaped with respect to an external fixed lateral surface 68 of the corresponding bearing 36,40.

[0038] Preferably, the first clamp 42 surrounds at least 60% of said external fixed lateral surface 68 of each rotor bearing 36,40.

[0039] More preferably, the first clamp 42 surrounds at least 80% of the external fixed lateral surface 68 of each rotor bearing 36,40.

[0040] According to an embodiment, said first clamp 42 is connected to the removable fixing means 48 while the second clamp 44 is fixed to the casing 28.

[0041] Above description relates to a single workstation 8, but present invention applies to an open-end spinning machine 4 comprising a plurality of workstations 8 arranged side by side in at least one row, each workstation comprising a spinning rotor 18 with relative clamps 42,44, bearings 36,40 and removable fixing means 48 as previously above.

[0042] As it can be inferred from the description, the open end spinning machine according to the invention overcomes the drawbacks mentioned with reference to the cited prior art.

[0043] In particular, the present invention fixes the rotor bearing/mounting system in the rotor housing evenly: the rows of the bearings are fixed and pressed with the same pressure to have an equal situation of forces.

[0044] The solution is built as two saucer-type or "half-moon" parts, wherein one part/half-shell is integrated or applied into the rotor housing and the other part/half-shell is separate, slight flexible in movement to ensure the clamping with a further device.

[0045] The geometries of the two "half-moon" parts ensure, that the force generated by the clamping is "guide" equal to the areas of the ball rows.

[0046] The present invention ensures precise clamping by a fixing geometry which is preferred build as saucer-type/"half-moon" parts. Such a geometry ensures a guidance of the fixing/clamping force symmetrically/equal in to the areas of the bearing grooves (balls or other rolling elements).

[0047] Therefore, the fixing of the clamping force ensures a safe and stable position of the rolling elements during spinning.

[0048] Moreover, the interposition of elastic means between the clamps and the external fixed lateral surface of the bearings allows to dampen vibrations of the spinning rotor.

[0049] Moreover, the elastic means allow to avoid peaks of mechanical stresses on the bearings of the rotor shaft during different working conditions (and also in case of shock against the rotor itself).

[0050] Moreover, the present invention allows, when clamping is realized, an easy exchange of the rotor shaft /bearing system: in fact the bearing system, including the resilient mounting, can be easily removed without special tools, for example by using eccentric pin operated by the lever.

[0051] The main difference between prior art and the new solution is that the old rotor housing has a free end-part, far from the rotor axis, what creates not stable loading position to the bearing.

[0052] The new solution of rotor housing is more symmetrical from the view of rotor axis, so the distribution of

loaded forces is better and even.

[0053] Moreover, both sides of the resilient mounting are fixed by defined forces which are easily set-able by the user.

[0054] The clamp is more than 80% of rounds by half-noon shape.

[0055] Moreover, the releasing of clamping force of the rotor bearing can be made by self-fixing eccentric pin. Moreover, said self-fixing eccentric pin can be handled without tool (hand only) for a quicker maintenance of the rotor bearing.

Claims

1. An open-end spinning machine (4) comprising at least one workstation (8) provided with

- an opening roller (17) configured to open a fiber sliver (14) to form individual fibers,
- a spinning rotor (18) for turning the individual fibers into a yarn (15),
- wherein the spinning rotor (18) is housed within a casing (28) and is rotatably supported, around a rotating axis (X-X), by at least one bearing (36,40), **characterised in that**
- the casing (28) comprises a first and a second clamp (42,44) divided in correspondence of a mean plane (M) and supporting said at least one bearing (36,40),
- said clamps (42,44) are connected to each other by means of removable fixing means (48) acting on the first clamp (42) and pressing it against an external fixed lateral surface (68) of the at least one bearing (36,40),
- wherein said removable fixing means (48) comprise elastic means (54) in order to ensure a resilient pressing and mounting of the at least one bearing (36,40) inserted between the clamps (42,44).

2. An open-end spinning machine (4) according to claim 1, wherein said elastic means (54) comprise elastic bushes (55), each elastic bush (55) being clamped around the external fixed lateral surface (68) of a corresponding bearing (36,40).

3. An open-end spinning machine (4) according to claim 1 or 2, wherein the removable fixing means (48) comprises a presser (56) which urges the first clamp (42) against the second clamp (44).

4. An open-end spinning machine (4) according to claim 3, wherein said presser (56) comprises a self-fixing eccentric pin (60), rotatable in order to set the clamping force between first and second clamp (42,44).

5. An open-end spinning machine (4) according to claim 4, wherein said self-fixing eccentric pin (60) is displaced along a transversal axis (Y-Y), perpendicular to the rotating axis (X-X).

6. An open-end spinning machine (4) according to any one of claims from 4 to 5, wherein said self-fixing eccentric pin (60) is displaced between a first and a second rotor bearing (36,40), along the rotating axis (X-X).

7. An open-end spinning machine (4) according to any one of claims from 4 to 6, wherein the self-fixing eccentric pin (60) is connected to an operating lever in order to set and fix the angular orientation of the self-fixing eccentric pin (60) and the pressing force between first and second clamp (42,44).

8. An open-end spinning machine (4) according to any one of claims from 4 to 7, wherein said self-fixing eccentric pin (60) is displaced above first clamp (42), in order to push the first clamp (42) against the second clamp (44).

9. An open-end spinning machine (4) according to any one of claims from 1 to 8, wherein the first and second clamp (42,44) are counter-shaped with respect to the external fixed lateral surface (68) of the corresponding at least one bearing (36,40).

10. An open-end spinning machine (4) according to any one of previous claims, wherein the first clamp (42) surrounds at least 60% of the external fixed lateral surface (68) of each rotor bearing (36,40).

11. An open-end spinning machine (4) according to any one of previous claims, wherein the first clamp (42) surrounds at least 80% of the external fixed lateral surface (68) of each rotor bearing (36,40).

12. An open-end spinning machine (4) according to any one of previous claims, wherein said second clamp (44) is fixed to the casing (28).

13. An open-end spinning machine (4) according to any one of previous claims, wherein the first clamp (42) is connected to the removable fixing means (48).

14. An open-end spinning machine (4) according to any one of previous claims, wherein said first and second clamp (42,44) are displaced symmetrically with respect to a vertical plane (V) perpendicular to the mean plane M and passing through the rotating axis (X-X).

15. An open-end spinning machine (4) according to any one of previous claims, wherein the at least one bearing (36,40) comprise ball bearings, roller bearings

and/or needle bearings.

16. An open-end spinning machine (4) according to any one of previous claims, comprising a plurality of workstations (8) arranged side by side in at least one row, each workstation (8) comprising a spinning rotor (18) with relative first and second clamps (42,44), at least one bearing (36,40) and removable fixing means (48) according to any one of previous claims.

Patentansprüche

1. Open-End- bzw. Offenend-Spinnmaschine (4), umfassend zumindest eine Arbeitsstation (8), versehen mit

- einer Öffnungs- bzw. Auflösewalze (17), die konfiguriert ist, ein Faserband (14) zu einzelnen Fasern zu öffnen bzw. aufzulösen,
- einem Spinnrotor (18) zum Drehen der einzelnen Fasern zu einem Garn (15),
- wobei der Spinnrotor (18) in einem Gehäuse (28) untergebracht ist und durch zumindest ein Lager (36, 40) drehbar um eine Drehachse (X-X) gelagert ist,

dadurch gekennzeichnet, dass

- das Gehäuse (28) eine erste und eine zweite Klemme (42, 44) umfasst, die entsprechend einer mittleren Ebene (M) geteilt sind und das zumindest eine Lager (36, 40) tragen bzw. stützen,
 - die Klemmen (42, 44) miteinander mittels entfernbaren bzw. lösbarer Befestigungsmittel (48) verbunden sind, die auf die erste Klemme (42) einwirken und sie gegen eine äußere feste bzw. fixierte Seitenfläche (68) des zumindest einen Lagers (36, 40) pressen,
 - wobei die entfernbaren Befestigungsmittel (48) elastische Mittel (54) umfassen, um ein rückstellfähiges Pressen und Montieren des zumindest einen Lagers (36, 40) sicherzustellen, das zwischen die Klemmen (42, 44) eingesetzt ist.
2. Open-End-Spinnmaschine (4) nach Anspruch 1, wobei die elastischen Mittel (54) elastische Buchsen (55) umfassen, wobei jede elastische Buchse (55) um die äußere feste Seitenfläche (68) eines entsprechenden Lagers (36, 40) geklemmt ist.
3. Open-End-Spinnmaschine (4) nach Anspruch 1 oder 2, wobei die entfernbaren Befestigungsmittel (48) eine Presseinrichtung (56) umfassen, welche die erste Klammer (42) gegen die zweite Klammer (44) drängt.
4. Open-End-Spinnmaschine (4) nach Anspruch 3, wo-

bei die Presseinrichtung (56) einen selbstfixierenden Exzenterstift (60) umfasst, der drehbar ist, um die Klemmkraft zwischen der ersten und der zweiten Klemme (42, 44) einzustellen.

5. Open-End-Spinnmaschine (4) nach Anspruch 4, wobei der selbstfixierende Exzenterstift (60) entlang einer Querachse (Y-Y) senkrecht zu der Rotationsachse (X-X) verlagert wird.
6. Open-End-Spinnmaschine (4) nach einem der Ansprüche 4 bis 5, wobei der selbstfixierende Exzenterstift (60) zwischen einem ersten und einem zweiten Rotorlager (36, 40) entlang der Rotationsachse (X-X) verlagert wird.
7. Open-End-Spinnmaschine (4) nach einem der Ansprüche 4 bis 6, wobei der selbstfixierende Exzenterstift (60) mit einem Betätigungshebel verbunden ist, um die Winkelausrichtung des selbstfixierenden Exzenterstifts (60) und die Presskraft zwischen der ersten und der zweiten Klemme (42, 44) einzustellen und zu fixieren.
8. Open-End-Spinnmaschine (4) nach einem der Ansprüche 4 bis 7, wobei der selbstfixierende Exzenterstift (60) über die erste Klammer (42) verlagert wird, um die erste Klammer (42) gegen die zweite Klemme (44) zu drücken.
9. Open-End-Spinnmaschine (4) nach einem der Ansprüche 1 bis 8, wobei die erste und die zweite Klemme (42, 44) in Bezug auf die äußere feste Seitenfläche (68) des entsprechenden zumindest einen Lagers (36, 40) entgegengesetzt geformt sind bzw. gegengeformt sind.
10. Open-End-Spinnmaschine (4) nach einem der vorhergehenden Ansprüche, wobei die erste Klammer (42) zumindest 60% der äußeren festen Seitenfläche (68) jedes Rotorlagers (36, 40) umgibt.
11. Open-End-Spinnmaschine (4) nach einem der vorhergehenden Ansprüche, wobei die erste Klammer (42) zumindest 80% der äußeren festen Seitenfläche (68) jedes Rotorlagers (36, 40) umgibt.
12. Open-End-Spinnmaschine (4) nach einem der vorhergehenden Ansprüche, wobei die zweite Klemme (44) an dem Gehäuse (28) befestigt ist.
13. Open-End-Spinnmaschine (4) nach einem der vorhergehenden Ansprüche, wobei die erste Klemme (42) mit den entfernbaren Befestigungsmitteln (48) verbunden ist.
14. Open-End-Spinnmaschine (4) nach einem der vorhergehenden Ansprüche, wobei die erste und die

zweite Klemme (42, 44) symmetrisch in Bezug auf eine vertikale Ebene (V) verlagert sind, die senkrecht zu der Mittelebene M ist und durch die Rotationsachse (X-X) verläuft.

15. Open-End-Spinnmaschine (4) nach einem der vorhergehenden Ansprüche, wobei das zumindest eine Lager (36, 40) Kugellager, Wälzlager und/oder Nadelager umfasst.
16. Open-End-Spinnmaschine (4) nach einem der vorhergehenden Ansprüche, umfassend eine Mehrzahl von Arbeitsstationen (8), die Seite an Seite in zumindest einer Reihe angeordnet sind, wobei jede Arbeitsstation (8) einen Spinnrotor (18) mit relativer erster und zweiter Klemme (42, 44), zumindest ein Lager (36, 40) und entfernbare Befestigungsmittel (48) nach einem der vorhergehenden Ansprüche umfasst.

Revendications

1. Machine de filage à bout libre (4) comprenant au moins un poste de travail (8) équipée
- d'un rouleau ouvreuse (17) configuré pour ouvrir un ruban de fibre (14) pour former des fibres individuelles,
 - d'un rotor de filage (18) pour transformer les fibres individuelles en un fil (15),
 - dans laquelle le rotor de filage (18) est logé au sein d'un boîtier (28) et est supporté en rotation, autour d'un axe de rotation (X-X), par au moins un palier (36, 40),

caractérisée en ce que

- le boîtier (28) comprend un premier et un second collier de serrage (42, 44) divisés en correspondance d'un plan moyen (M) et supportant ledit au moins un palier (36, 40),
 - lesdits colliers de serrage (42, 44) sont raccordés l'un à l'autre grâce à des moyens de fixation (48) amovibles agissant sur le premier collier de serrage (42) et l'appuyant contre une surface latérale fixe externe (68) de l'au moins un palier (36, 40),
 - dans laquelle lesdits moyens de fixation amovibles (48) comprennent des moyens élastiques (54) afin de garantir un appui résilient et un montage de l'au moins un palier (36, 40) inséré entre les colliers de serrage (42, 44).
2. Machine de filage à bout libre (4) selon la revendication 1, dans laquelle lesdits moyens élastiques (54) comprennent des douilles élastiques (55), chaque douille élastique (55) étant serrée autour de la

surface latérale fixe externe (68) d'un palier (36, 40) correspondant.

3. Machine de filage à bout libre (4) selon la revendication 1 ou 2, dans laquelle les moyens de fixation amovibles (48) comprennent une presse (56) qui pousse le premier collier de serrage (42) contre le second collier de serrage (44).
4. Machine de filage à bout libre (4) selon la revendication 3, dans laquelle ladite presse (56) comprend une goupille excentrique d'auto-fixation (60), pouvant entrer en rotation afin de régler la force de serrage entre les premier et second colliers de serrage (42, 44).
5. Machine de filage à bout libre (4) selon la revendication 4, dans laquelle ladite goupille excentrique d'auto-fixation (60) est déplacée selon un axe transversal (Y-Y), perpendiculaire à l'axe de rotation (X-X).
6. Machine de filage à bout libre (4) selon l'une quelconque des revendications 4 et 5, dans laquelle ladite goupille excentrique d'auto-fixation (60) est déplacée entre un premier et un second palier de rotor (36, 40), suivant l'axe de rotation (X-X).
7. Machine de filage à bout libre (4) selon l'une quelconque des revendications 4 à 6, dans laquelle la goupille excentrique d'auto-fixation (60) est raccordée à un levier de fonctionnement afin de régler et fixer l'orientation angulaire de la goupille excentrique d'auto-fixation (60) et la force d'appui entre les premier et second colliers de serrage (42, 44).
8. Machine de filage à bout libre (4) selon l'une quelconque des revendications 4 à 7, dans laquelle ladite goupille excentrique d'auto-fixation (60) est déplacée au-dessus du premier collier de serrage (42), afin de pousser le premier collier de serrage (42) contre le second collier de serrage (44).
9. Machine de filage à bout libre (4) selon l'une quelconque des revendications 1 à 8, dans laquelle les premier et second colliers de serrage (42, 44) sont de forme complémentaire par rapport à la surface latérale fixe externe (68) de l'au moins un palier (36, 40) correspondant.
10. Machine de filage à bout libre (4) selon l'une quelconque des revendications précédentes, dans laquelle le premier collier de serrage (42) entoure au moins 60 % de la surface latérale fixe externe (68) de chaque palier de rotor (36, 40).
11. Machine de filage à bout libre (4) selon l'une quelconque des revendications précédentes, dans la-

quelle le premier collier de serrage (42) entoure au moins 80 % de la surface latérale fixe externe (68) de chaque palier de rotor (36, 40).

12. Machine de filage à bout libre (4) selon l'une quelconque des revendications précédentes, dans laquelle ledit second collier de serrage (44) est fixé au boîtier (28). 5
13. Machine de filage à bout libre (4) selon l'une quelconque des revendications précédentes, dans laquelle le premier collier de serrage (42) est raccordé aux moyens de fixation amovibles (48). 10
14. Machine de filage à bout libre (4) selon l'une quelconque des revendications précédentes, dans laquelle lesdits premier et second colliers de serrage (42, 44) sont déplacés symétriquement par rapport à un plan vertical (V) perpendiculaire au plan moyen M et passant à travers l'axe de rotation (X-X). 15
20
15. Machine de filage à bout libre (4) selon l'une quelconque des revendications précédentes, dans laquelle l'au moins un palier (36, 40) comprend des roulements à billes, des roulements à rouleaux et/ou des roulement à aiguilles. 25
16. Machine de filage à bout libre (4) selon l'une quelconque des revendications précédentes, comprenant une pluralité de postes de travail (8) agencés côte à côte en au moins une rangée, chaque poste de travail (8) comprenant un rotor de filage (18) avec des premier et second colliers de serrage (42, 44) relatifs, au moins un palier (36, 40) et des moyens de fixation amovibles (48) selon l'une quelconque des revendications précédentes. 30
35

40

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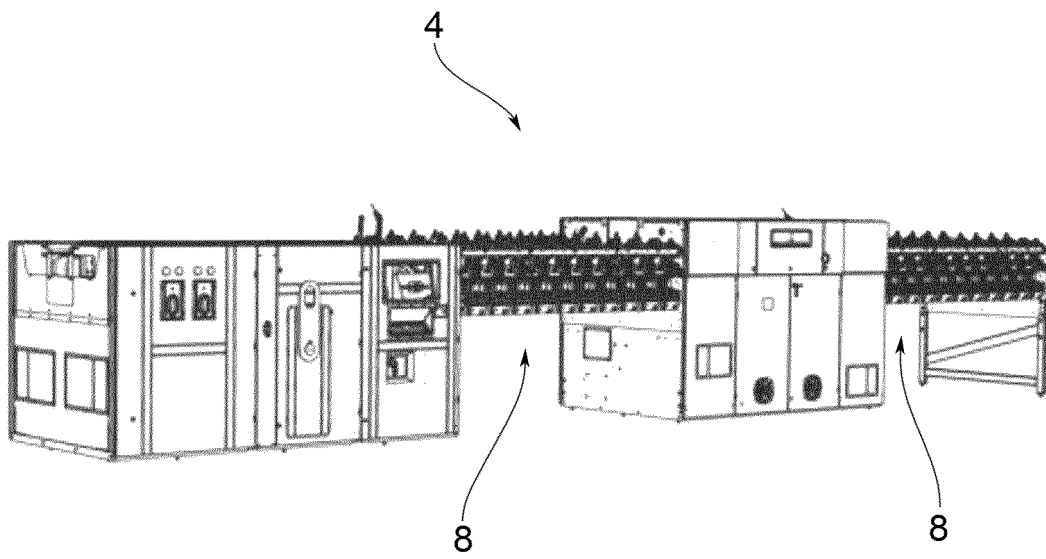


FIG.1a

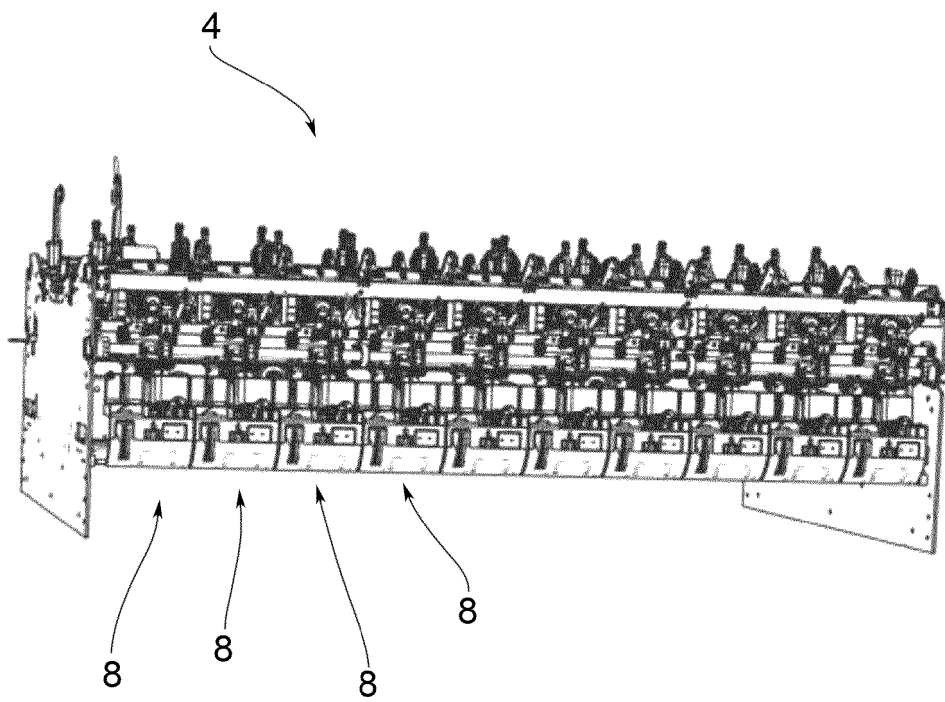


FIG.1b

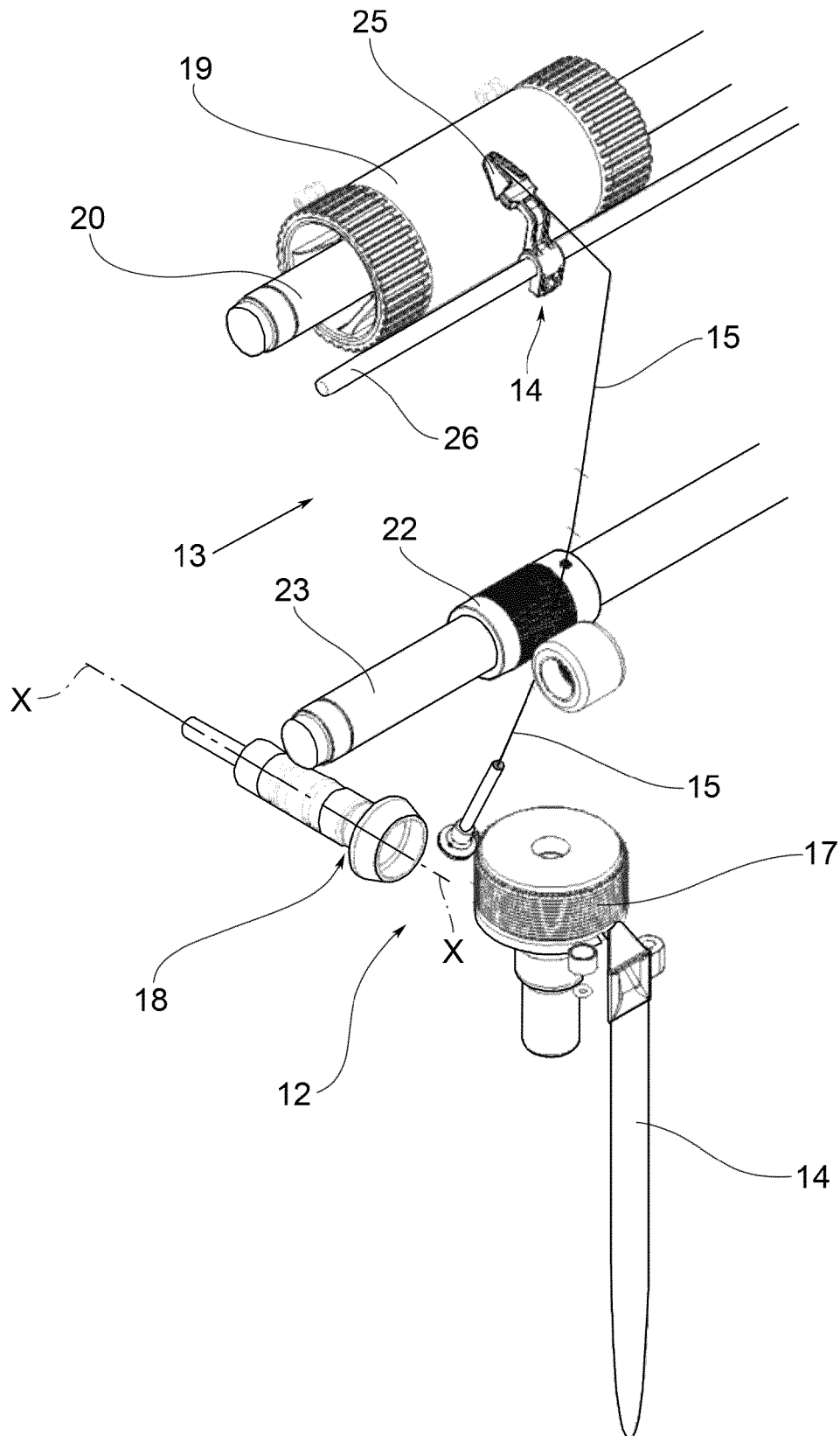


FIG.2

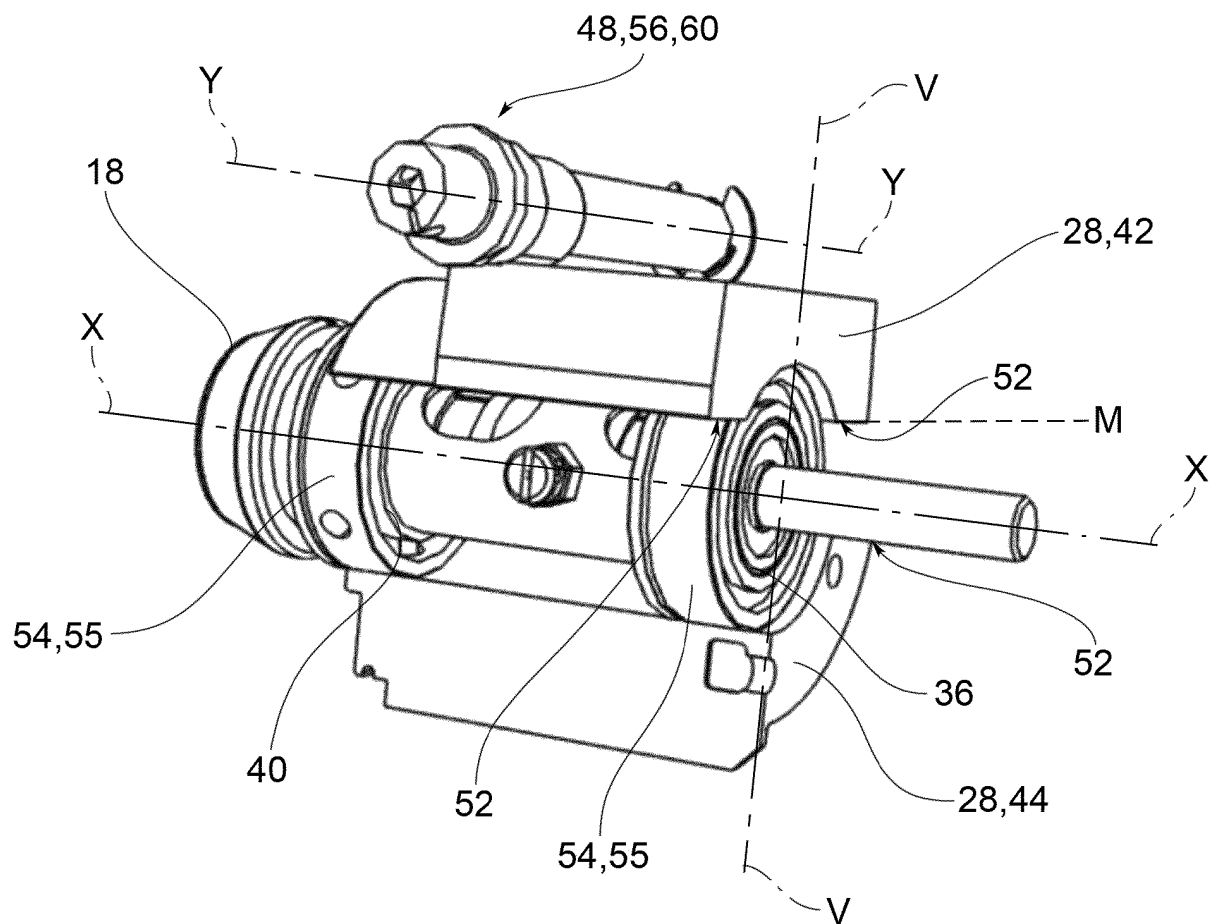


FIG. 3

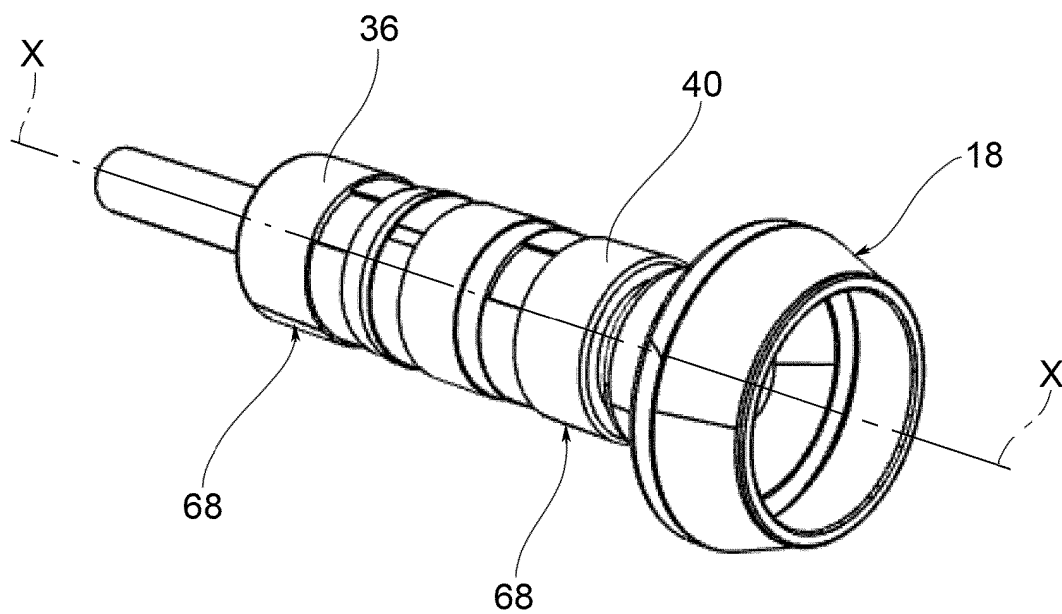


FIG. 4

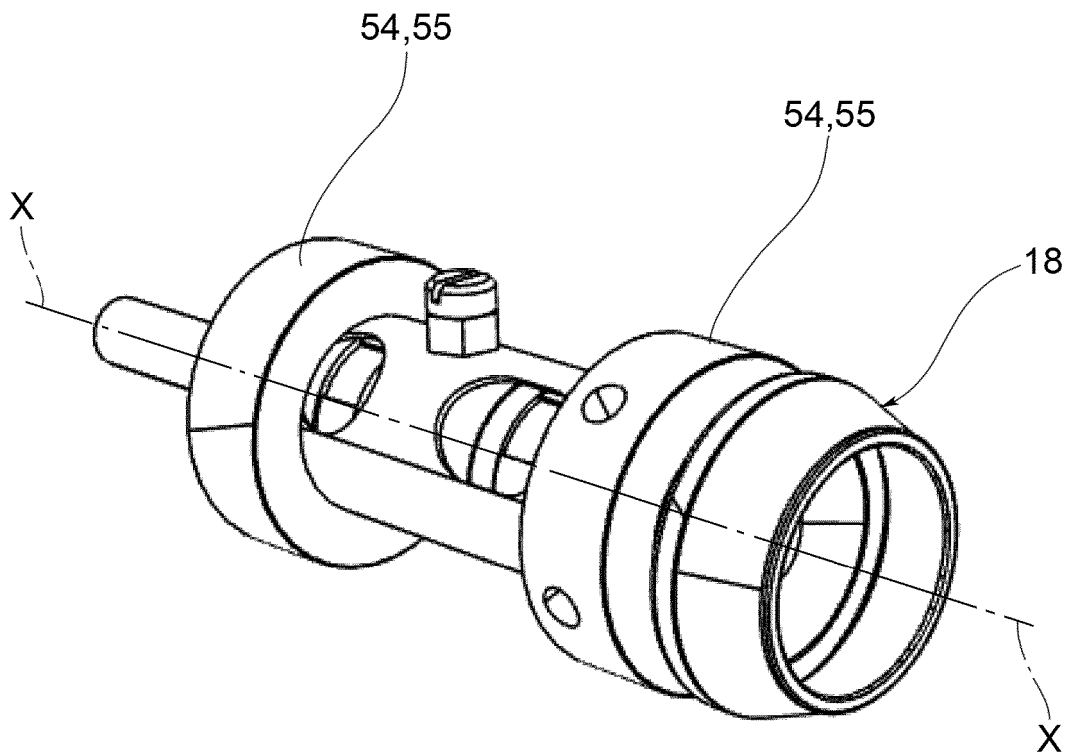


FIG.5

REFERENCES CITED IN THE DESCRIPTION

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