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

(11) **EP 3 705 432 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
07.06.2023 Bulletin 2023/23

(21) Application number: **20160871.8**

(22) Date of filing: **04.03.2020**

(51) International Patent Classification (IPC):
B65H 75/24 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
B65H 75/247

(54) ANNULAR DEVICE WITH IMPROVED PERFORMANCE FOR SHAFTS OF WINDING MACHINES

RINGFÖRMIGE VORRICHTUNG MIT VERBESSERTER LEISTUNG FÜR WELLEN VON WICKELMASCHINEN

DISPOSITIF ANNULAIRE À PERFORMANCE AMÉLIORÉE POUR ARBRES DE MACHINES D'ENROULEMENT

(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

(30) Priority: **05.03.2019 IT 201900003153**

(43) Date of publication of application:
09.09.2020 Bulletin 2020/37

(73) Proprietor: **M.E.C. Mechanical Engineering Consulting Srl**
20010 Bareggio (MI) (IT)

(72) Inventor: **PETTINATI, Andrea**
I-20099 Sesto San Giovanni (MI) (IT)

(74) Representative: **Lampis, Marco et al**
Dragotti & Associati Srl
Via Nino Bixio, 7
20129 Milano (IT)

(56) References cited:
JP-A- H0 213 545
JP-A- 2001 106 397
JP-A- 2017 114 597

EP 3 705 432 B1

Description

[0001] The present invention relates to an innovative device for locking and winding coils of tape in multiple winding machines. The invention also relates to a shaft with a plurality of such devices.

[0002] In the technical sector of multiple winding machines, shafts with a plurality of adjacently arranged annular devices, which allow the rapid insertion and locking of the cores of the coils to be wound, are well known.

[0003] These devices comprise two concentric rings between which engagement elements are inserted, said engagement elements protruding from the outermost ring so as to engage with the cores which are fitted onto the shaft.

[0004] The outer ring can be rotated on the inner ring between an operating position and a rest position for locking or allowing radial movement of the engagement elements such as to engage or release the inner surface of the cores inserted on them.

[0005] When the outer ring is in the angular rest position, the cores of the coils can slide along the shaft so that they may be inserted on or removed from them. In the operating position, the cores of the coils are instead locked by the engagement elements so as to rotate together with the shaft.

[0006] In known devices, the engagement elements are usually unable to retract fully within the outer ring because the rotation of the outer ring from and into the rest position is necessarily achieved by means of minimum engagement of these elements against the inside of the core fitted onto the shaft. For example, the resulting movement produced by the start of the shaft rotation is indispensable for automatically bringing all the devices on the shaft from the rest position into the working position.

[0007] JP2017-114597 discloses a device in which a sequence of balls is arranged between an innermost ring and an intermediate ring and the intermediate ring carries inclined planes on which other balls rest, these other balls slide on the inclined planes by the engagement with the outermost ring. The sequence of balls creates a ball bearing which serves to facilitate the rotation of the entire device on the shaft.

[0008] When the opposite movement towards the rest position is subsequently required, the rotation movement of the outer ring on the inner ring must continue until the rest position is fully reached in order to avoid excessive sticking due to non-rotated or only partially rotated rings. This again results in the need for the engagement elements even in the full rest position to protrude slightly to ensure that the rotation of the outer ring continues as far as this position.

[0009] The projection of the engagement elements from the ring also in the rest position, even if it is attempted to keep it as small as possible (for example even only equal to about a tenth of a millimetre), entails various drawbacks. For example, the engagement elements rub against the inner surface of the cores during the insertion and removal of the cores on the shaft, and this causes both undesirable scoring of this surface and the generation of dust (especially in the case of cardboard cores) which is not only damaging for the mechanisms of the winding machines, but is also unacceptable in the case of winding machines used for food products. This latter condition especially may prevent the use, in the food industry, of automatic unloading and loading winding machines and/or cardboard cores.

[0010] In the case of cores made of plastic material, the projection of the engagement elements during the insertion and the removal of the cores on the shaft also causes jumping and jamming of the cores which is detrimental for the loading and unloading operations, above all in the case of automatic loading and unloading systems.

[0011] A further drawback of the known systems is that it is often necessary to manufacture at least the outer ring or both rings using steel.

[0012] All this makes the device expensive, relatively heavy and difficult to machine.

[0013] The working life of the known devices may however be relatively limited and fairly frequent maintenance may be required to prevent the number of jamming situations from increasing excessively over time.

[0014] A further drawback of the prior art is the relative complexity of the device, which requires a relatively large number of parts which are not simple to machine and are relatively complicated to assemble. In fact, it is usually envisaged that the inner ring is provided with a side shoulder which protrudes radially outwards and on which there rests a corresponding side face of the outer ring which is axially inserted on the inner ring while at the same time all the engagement elements must be housed between the rings. A round rim is then fixed on the opposite face of the inner ring and locked in place with a plurality of screws distributed circumferentially along the rim. All this results in various ring machining operations and a not insignificant amount of wasted material (for example, due to the turning of the inner ring in order to form as one piece the shoulder which protrudes radially from the finished part).

[0015] As an alternative to the fixing screws with their seats, it has also been proposed locking the rim with a large elastic metal ring, but this involves further machining of the rings. The general object of the present invention is to overcome the drawbacks of the prior art by providing an improved annular device for winding machines.

[0016] In view of this object, the idea which has occurred is to provide, according to the invention, an annular locking device for the winding of coils as claimed in claim 1.

[0017] The device is intended to be arranged alongside a plurality of same annular devices in order to form a winding shaft in a winding machine, and it comprises a concentric inner ring and outer ring, and engagement elements which emerge through slots on the peripheral

surface of the outer ring, the outer ring being rotatable with respect to the inner ring between a first angular rest position, in which the engagement elements may be retracted into the outer ring by a first amount, and a second angular operating position, in which the engagement elements may be retracted by an amount less than in the first angular rest position. At least one circumferential interspace containing a series of balls for relative sliding of the two rings is present between the inner ring and the outer ring. Again according to the invention, a shaft assembly for winding coils on coil cores in a multiple winding machine is also provided, said assembly comprising a shaft on which a plurality of annular devices realized according to claim 1 are inserted, being arranged coaxially side-by-side along the shaft so as to accommodate on them cores of coils to be wound.

[0018] In order to explain more clearly the innovative principles of the present invention and its advantages compared to the prior art, a description of examples of embodiments applying these principles will be given below, with the aid of the accompanying drawings.

[0019] In the drawings:

- Figure 1 shows a schematic perspective view of an annular device according to the invention;
- Figure 2 shows a schematic plan view, partially sectioned, of the device of Figure 1;
- Figure 3 shows a schematic view sectioned along line III-III of Figure 2;
- Figure 4 shows a schematic view sectioned along line IV-IV of Figure 2;
- Figure 5 shows a schematic perspective view of a variant of an annular device according to the invention;
- Figure 6 shows a schematic, partially sectioned, plan view of the device of Figure 5;
- Figure 7 shows a schematic view sectioned along line VII-VII of Figure 6;
- Figure 8 shows a schematic view sectioned along line VIII-VIII of Figure 6.

[0020] With reference to the drawings, Figure 1 shows an annular locking device, denoted generally by 10, intended to be mounted on a winding shaft 17 of a known winding machine (not shown here or described in detail since it is well known per se and may be easily imagined by the person skilled in the art). Several annular devices 10 are intended to be mounted side-by-side on the shaft 17 using systems known in the sector and therefore not shown since they may be easily imagined by the person skilled in the art, in order to accommodate one or more cores inserted onto the devices 10 so as to be controllably locked to the shaft 17 of the winding machine. A shaft assembly for a winding machine, formed by a plurality of devices according to the invention mounted on a rotation shaft, is thus provided (by way of example, a second device according to the invention is shown in broken lines in Figure 1).

[0021] The device 10 comprises an inner ring 11 and an outer ring 12 coaxial with each other. Engagement elements 13 emerge from the peripheral cylindrical surface 15 of the outer ring through shaped seats or slots 14 arranged at - preferably equidistant - intervals around the circumference of the ring.

[0022] As will become clear below, the engagement elements 13 are movable radially with respect to the rings depending on the relative angular position of the two rings, which can be rotated relative to each other between a first angular rest position and a second angular locking position. In the first angular rest position, the engagement elements 13 are radially retracted or elastically retractable, while in the second angular position the engagement elements 13 are retractable or retracted by an amount less than in the first angular rest position. In this way, in the first position, the cores of the coils to be wound may be slid axially along the shaft, while in the second position they are constrained to rotate together with the annular devices, as known to the person skilled in the art.

[0023] Advantageously, in the rest position, the engagement elements are completely retracted and do not protrude from the surface 15 of the outer ring.

[0024] The seats 14 narrow towards the exterior of the device so as to allow the engagement elements 13 to move radially in the seats but without being able to come out completely from the device through these seats.

[0025] As will be become clearer below, in the embodiment shown in Figure 1 the engagement elements are preferably balls, advantageously arranged in adjacent pairs or in any case on two circumferences of the cylindrical surface 15 which are axially spaced so as to define between them a central annular strip, as is clear in the drawings.

[0026] As can be seen more clearly in the cross-section of Figure 2, the device 10 has the inner ring 11 with a peripheral surface which forms for each engagement element 13 a sliding surface 19 with a variation in height in the support of the corresponding engagement element 13 with respect to the outer ring so that at one end 20 of the sliding surface (corresponding to the angular rest position) the element 13 can retract more than at the opposite end 21.

[0027] For example, the sliding surface 19 can be formed by a tear-shaped groove 19, i.e. with side walls which converge from the end 20 to the end 21 on the surface of the inner ring, so as to form a channel with decreasing width and to move correspondingly closer together the two points making contact on the surface of the ball during sliding along the groove 19 and thus lift the ball. It can however also be imagined that each ball may slide in a channel having a constant width but with a depth of the channel which varies from one end to the other.

[0028] Advantageously, a stop allows relative rotation of rings 11 and 12 only through a small angle, corresponding to sliding of the engagement elements 13 between the first and second ends of the sliding surface 19.

[0029] For example, the stop may be formed by a locking element 22 which protrudes from one ring so as to be inserted and to slide in a circumferential recess 23 of suitable length formed on the facing peripheral surface of the other ring.

[0030] Advantageously the locking element 22 may be in the form of a ball, which is received inside a seat 24 so as to slide along the circumferential recess 23 upon rotation of the rings. To allow the mutual assembly and disassembly of the two rings 11 and 12, the seat 24 may be extended to form a passage from the lateral periphery of the outer and/or inner ring towards the circumferential recess 23, so as to allow the passage of the locking element 22 during a relative movement of the two rings in their axial direction. For example, as shown in Figure 1, the passage 24 may be a half-channel with a circular cross-section formed on the inner face of the outer ring 12 so as to intersect the circumferential slot 23 formed on the outer surface of the inner ring 11. For the assembly of the two rings, it is sufficient to insert the locking element 22 into the recess 23 and slide the two rings one on top of the other after arranging them in a relative angular position about the common axis so that the locking element 22 may simultaneously slide along the passage 24.

[0031] Figure 3 shows clearly how the surface 19 makes the engagement elements 13 protrude more or less when the rings are rotated relative to each other. This figure also clearly shows how the locking element 22 inside the recess 23 limits the degree of rotation.

[0032] As can be seen again in Figures 1 and 2 and in the cross-section of Figure 4, an annular interspace 25 is formed between the two inner and outer rings and receives a circumferential series of sliding balls 26 around the whole circumference of the inner ring, which thus form a circumferential row of balls 26. The annular interspace is advantageously formed by a circumferential groove in the inner face of the outer ring and by a corresponding circumferential facing groove in the outer face of the inner ring so as to form the two halves of an interspace with a generally circular cross-section inside which the balls 26 are received so as to form a substantially continuous circumferential sequence (i.e. with only a small play between the balls to allow rotation thereof inside the groove).

[0033] As is clear from the cross-sections in Figures 3 and 4, the diameters of the facing surfaces of the two rings and the diameters of the balls 26 are such as to maintain a small space between the rings in a radial direction so that they do not touch each other during their relative rotation, but slide on the balls. The fact that the balls 26 are free to roll and slide in the continuous circumferential interspace allows the rings to rotate without the need for any further element.

[0034] Advantageously the sliding balls 26 may be introduced into the interspace between the rings through a radial hole 27 which is formed in one of the rings and which leads into the interspace. For example, advantageously, the hole 27 is formed in the outer ring. Once the balls are introduced into the interspace, the hole 27 can be closed with a suitable plug 28.

[0035] The device according to the invention can be easily made with few parts. For example, it is possible to keep the two rings assembled together simply by means of the action of the sliding balls arranged in the interspace between the rings. In particular, the two halves of the interspace formed as grooves in the rings are sufficiently deep to prevent an axial displacement of the rings with respect to each other, as is clear for example from Figure 2. No additional components are therefore necessary.

[0036] For assembly, it is sufficient to arrange the engagement elements 13 in the ends 20 of the surfaces 19, so that they are retracted as far as possible. The dimensioning of the engagement elements and the rings will be such as to allow the relative sliding of the two rings on each other (making use also of the radial play between the rings), as may now be easily imagined by the person skilled in the art. During the relative sliding assembly of the rings, the locking element 22 may also be inserted in its seat, as already described above.

[0037] After this first assembly step, the interspace 25 may be substantially filled with sliding balls 26 through the hole 27 and the hole can then be plugged.

[0038] The assembly is thus completed, since the presence of the sliding balls 26 prevents the device from being disassembled. However, in the case where this disassembly is required, it is sufficient to remove the plug from the hole 27 and empty the balls 26 from the circumferential interspace.

[0039] The double circumference of engagement elements 13 gives stability to the coupling between the two rings, preventing a significant inclination between the axes of revolution of the two rings, said axes thus always coinciding.

[0040] The device according to the invention has the outer ring which can roll on the inner ring with minimum effort, owing to the balls 26. This ensures, for example, that the small friction produced between a core fitted onto the shaft with the devices of the invention is sufficient to allow the rotation of the device between the rest position and operating position, without the need in the rest position for the engagement elements to protrude from the outer face of the outer ring. These engagement elements may therefore be fully retracted within the seats 14 when the device is in the rest position, as can be clearly seen for example in Figure 2.

[0041] Figure 5 shows schematically a variant of a device according to the invention. For the sake of clarity, this variant has parts which are similar to those of the previous embodiment denoted by the same numerals increased by 100.

[0042] Therefore the embodiment of Figure 5 is formed by an annular locking device, generally denoted by 110, which is intended to be mounted on a winding shaft 17 of a known winding machine (not shown here or described in detail since it is well known per se and may be easily imagined by the person skilled in the art).

[0043] As with the device 10, several devices 110 are intended to be mounted alongside each other on the shaft 17 so as to receive one or more coil cores in the winding machine.

[0044] The device 110 comprises an inner ring 111 and an outer ring 112 coaxial with each other. Engagement elements 113 emerge from the peripheral cylindrical surface 115 of the outer ring through shaped seats or slots 114 arranged at intervals, which are preferably equidistant, around the circumference of the ring.

[0045] As is also clear in Figure 7, the engagement elements 113 are movable radially with respect to the rings depending on the relative angular position of the two rings owing to variable-depth sliding surfaces 119. Each surface 119 has an end 120 (corresponding to the angular rest position of the device) which is less distant from the axis of the ring and an opposite end 121 (corresponding to the angular operating position of the device) which is more distant from the axis of the ring than the first end 120.

[0046] The engagement elements 113 are therefore movable so as to protrude more or less from the respective seats 114 depending on the relative angular position of the two rings, as already described above for the engagement elements 13.

[0047] The seats 114 narrow towards the exterior of the device so as to prevent the engagement elements 113 from coming out completely from their seats.

[0048] In the embodiment shown in Figure 5, the engagement elements are cylindrical elements with their axis parallel to the axis of the rings.

[0049] If desired, these cylindrical elements may also have rounded bases (advantageously semispherical), as shown in the drawings, and the seats will in this case be correspondingly shaped. In this way the cylinders have no sharp edges in the axial direction with respect to the device and possible damage to the cores is avoided. The cylindrical elements which are rounded on the bases may also advantageously be free to tilt slightly in order to adapt better to the cores.

[0050] Using cylindrical elements, it was found to be advantageous to position these cylindrical elements centrally in relation to the rings and to use two rows of sliding balls of the rings, arranged on the two sides of the cylindrical elements as shown clearly in Figure 6. Therefore, as can again be clearly seen in Figures 5 and 6 and in the cross-section of Figure 8, between the two inner and outer rings two annular interspaces 125 are formed close to the two edges of the ring, each annular interspace receiving a circumferential series of sliding balls 126 around the entire circumference of the inner ring.

[0051] Each interspace 125 may be formed in the same way as already described above for the interspace 25, as may now be easily imagined by the person skilled in the art.

[0052] The balls 126 can be inserted into the respective interspaces 125 through a corresponding hole 127 which is then closed with a suitable plug 126, as already described above for the balls 26.

[0053] In the same way as for the previous embodiment, a stop is used to limit the rotation of one ring with respect to the other one between the two rest and operating positions of the device.

[0054] Advantageously, also in order to reduce the axial thickness of the device, the stop may also be arranged between the two rows of balls 126 in a free space between the surfaces 119 for actuating the movement of the cylindrical elements 113.

[0055] For example, the stop may be formed with a locking element 122 which protrudes from one ring so as to be inserted and slide in a circumferential recess 123 of suitable length formed on the facing peripheral surface of the other ring.

[0056] Advantageously the locking element 122 may be a pin which may, for example, protrude inside the outer ring in the radial direction so as to be inserted in the recess 123 formed in the outermost surface of the inner ring.

[0057] To enable the assembly and disassembly of the two rings with respect to each other, it may be envisaged that the pin 122 is inserted from the outer surface 115 of the outer ring through a special hole 124 inside which it is locked (for example by mean of screwing, gluing, etc.). The locking element 122 may also be a ball which is inserted through hole 124 (subsequently plugged) and has a suitable size so as to remain partially inside the hole 124 and partially inside the recess 123.

[0058] The assembly of the device 110 is substantially similar to that of the device 10. Once the engagement elements 113 have been positioned, the two rings are inserted axially one inside the other and the balls 126 are inserted through the respective holes 127 which are then plugged. The rotation stop element 122 is inserted into the hole 124 so as to enter into the recess 123.

[0059] The device is thus rapidly assembled. If it is to be disassembled, it is sufficient to remove the balls 126 and the stop 122 and the rings may be once again extracted from each other. It is clear at this point how the objects of the invention have been achieved.

[0060] The core sliding, supporting and locking operations are facilitated and more reliable than in the known solutions. The cores are kept intact and, if the engagement elements are designed so as to be completely retracted in the rest position, there is for example no production of dust. The device according to the invention is therefore suitable also for the use of cardboard cores for alimentary purposes and also in the case of automatic systems for insertion and extraction of the cores onto/from the shaft of the winding machine. Owing to the sliding balls, the relative rotation of the two rings is facilitated and even only the slightest friction between the outer ring and the core is sufficient to produce the rotation of the device around the rest position, even with the engagement elements completely retracted.

[0061] Owing to the innovative structure of the device, manufacture thereof is simple, with few machining oper-

ations and no wastage of material. In addition, it may be made, for example, of aluminium and is therefore lighter. The outer rings may be easily made from a cylindrical tube with an inner wall in which a part of the interspace for receiving the sliding balls is formed. The inner rings may be easily made from a cylindrical tube with an outer wall in which a part of the interspace for receiving the sliding balls and sliding surfaces of the engagement elements upon rotation of the rings are rotated between said two rest and operating positions is formed.

[0062] The radial thickness of the device may also be kept very small and this facilitates, for example, the manufacture of devices suitable for mounting cores with a small diameter or in any case with a small difference in diameter with respect to the rotating shaft. Obviously, the description given above of embodiments applying the innovative principles of the present invention is provided by way of example of these innovative principles and must not therefore be regarded as limiting the scope of the invention, which is defined by the appended claims.

[0063] The engagement elements may be arranged centrally and two series of sliding balls may be used on the sides or in the opposite arrangement.

[0064] For example, two rows of sliding balls, as described for device 110 but with spherical engagement elements, as described for the device 10, and also in a single circumferential line in the centre of the two rows of sliding balls, may be used. The opposite arrangement is also possible, if the desired width of the rings allows it. The engagement elements and the surfaces for their movement between the two rest and operating positions may have a shape different from that shown and may, for example, be made according to other types known in the sector.

[0065] The shaft assembly formed by a rotation shaft and a plurality of devices according to the invention may also include further known mechanisms, such as for example known pneumatic systems for locking the devices on the shaft.

Claims

1. An annular locking device (10, 110) for winding coils, intended to be arranged alongside a plurality of same annular devices so as to form a winding shaft in a winding machine, comprising a concentric inner ring (11, 111) and outer ring (12, 112) and engagement elements (13, 113) which emerge through slots (14, 114) on the peripheral surface of the outer ring, the outer ring being rotatable with respect to the inner ring between a first angular rest position, in which the engagement elements (13, 113) may be retracted into the outer ring by a first amount, and a second angular operating position, in which the engagement elements (13, 113) may be retracted by an amount less than in the first angular rest position, at least one circumferential interspace (25, 125) containing a series of balls (26, 126) for relative sliding of the two rings is present between the inner ring (11, 111) and the outer ring (12, 112) **characterized in that** the outer ring is a cylindrical tube with an inner wall in which a part of the interspace for receiving the sliding balls is formed and the inner ring is a cylindrical tube with an outer wall in which a part of the interspace for receiving the sliding balls and surfaces for sliding of the engagement elements upon rotation of the rings between the said two rest and operating positions are formed.

2. Annular device according to Claim 1, **characterized in that** in the first rest position the engagement elements (13, 113) can be completely retracted into the outer ring in order not to protrude from the peripheral surface of the outer ring.

3. Annular device according to Claim 1, **characterized in that** the engagement elements (13) are formed by balls.

4. Annular device according to Claim 1, **characterized in that** the engagement elements (113) are cylinders with rounded bases and an axis parallel to the axis of the rings.

5. Annular device according to Claim 1, **characterized in that** the engagement elements are arranged along two circumferences of the rings with in the middle the circumferential interspace (25) containing the series of balls for relative sliding of the two rings.

6. Annular device according to Claim 1, **characterized in that** the circumferential interspaces (125) containing the series of balls for sliding are two in number with engagement elements in the middle.

7. Annular device according to Claim 1, **characterized in that** the series of balls is introduced into the interspace through a radial hole in one of the rings.

8. Annular device according to Claim 1, **characterized in that** the series of balls inside the interspace prevents the axial disengagement of the rings from each other.

9. Annular device according to Claim 1, **characterized in that** between the inner ring (11, 11) and the outer ring (12, 112) there is a stop for a limited relative rotation of the rings.

10. Annular device according to Claim 9, **characterized in that** the stop comprises a recess (23, 123) extending circumferentially in one of the two rings and an element sliding in said recess and connected to the other ring.

11. A shaft assembly for winding coils on coil cores in a winding machine, comprising a shaft (17) on which a plurality of annular devices (10, 110) realized according to any of the preceding claims are inserted, being arranged coaxially side-by-side along the shaft so as to accommodate on them cores of coils to be wound.

Patentansprüche

1. Ringförmige Verriegelungsvorrichtung (10, 110) zum Aufwickeln von Spulen, die dazu bestimmt ist, neben mehreren gleichen ringförmigen Vorrichtungen angeordnet zu werden, um eine Wickelwelle in einer Wickelmaschine zu bilden, welche umfasst, einen konzentrischen Innenring (11, 111) und einen Außenring (12, 112) und Eingriffselemente (13, 113), die durch Schlitze (14, 114) an der Umfangsfläche des Außenrings austreten, wobei der Außenring relativ zu dem Innenring zwischen einer ersten, Winkel-versetzten Ruheposition, bei der die Eingriffselemente (13, 113) um einen ersten Betrag in den Außenring zurückgezogen werden können, und einer zweiten, Winkel-versetzten Betriebsposition, bei der die Eingriffselemente (13, 113) um einen geringeren Betrag als bei der ersten Winkel-versetzten Ruheposition zurückgezogen werden können, drehbar ist, worin mindestens ein umlaufender Zwischenraum (25, 125), der eine Reihe von Kugeln (26, 126) zum relativen Gleiten der beiden Ringe aufweist, zwischen dem Innenring (11, 111) und dem Außenring (12, 112) vorgesehen ist, **dadurch gekennzeichnet, dass** der Außenring ein zylindrisches Rohr mit einer Innenwand ist, bei der ein Teil des Zwischenraums zur Aufnahme der Gleitkugeln ausgebildet ist, und der Innenring ein zylindrisches Rohr mit einer Außenwand ist, bei der ein Teil des Zwischenraums zur Aufnahme der Gleitkugeln und Oberflächen zum Gleiten der Eingriffselemente bei Drehung der Ringe zwischen den beiden Ruhe- und Betriebspositionen ausgebildet sind.

2. Ringförmige Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Eingriffselemente (13, 113) in der ersten Ruhestellung vollständig in den Außenring zurückgezogen werden können, so dass sie nicht über die Umfangsfläche des Außenrings vorstehen.

3. Ringförmige Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Eingriffselemente (13) durch Kugeln ausgebildet sind.

4. Ringförmige Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Eingriffselemente (113) Zylinder mit abgerundeten Böden und einer Achse parallel zur Achse der Ringe sind.

5. Ringförmige Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Eingriffselemente entlang zweier Umfänge der Ringe angeordnet sind, wobei in der Mitte der umlaufende Zwischenraums (25) die Reihe von Kugeln zum relativen Gleiten der beiden Ringe enthält.

6. Ringförmige Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** zwei Umfangszwischenräume (125), die die Reihe von Kugeln zum Gleiten enthalten, vorgesehen sind, wobei sich die Eingriffselemente in der Mitte befinden.

7. Ringförmige Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Reihe von Kugeln in den Zwischenraum durch ein radiales Loch in einem der Ringe eingeführt wird.

8. Ringförmige Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Reihe von Kugeln innerhalb des Zwischenraums das axiale Lösen der Ringe voneinander verhindert.

9. Ringförmige Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** zwischen dem Innenring (11, 11) und dem Außenring (12, 112) ein Anschlag für eine eingeschränkte relative Drehung der Ringe vorhanden ist.

10. Ringförmige Vorrichtung nach Anspruch 9, **dadurch gekennzeichnet, dass** der Anschlag eine sich in einem der beiden Ringe in Umfangsrichtung erstreckende Vertiefung (23, 123) und ein in dieser Vertiefung gleitendes und mit dem anderen Ring verbundenes Element umfasst.

11. Wellenanordnung zum Aufwickeln von Spulen auf Spulenkerne in einer Wickelmaschine, welche umfasst, eine Welle (17), auf der mehrere ringförmige Vorrichtungen (10, 110) nach einem der vorhergehenden Ansprüche eingesetzt sind, die koaxial nebeneinander entlang der Welle angeordnet sind, um auf ihnen Kerne von zu wickelnden Spulen aufzunehmen.

Revendications

1. Dispositif de verrouillage annulaire (10, 110) avec bobines d'enroulement, prévues pour être agencées le long d'une pluralité de dispositifs annulaires similaires afin de former un arbre d'enroulement dans une machine d'enroulement, comprenant une bague interne concentrique (11, 111) et une bague externe (12, 112) et des éléments de mise en prise (13, 113) qui sortent par les fentes (14, 114) sur la surface périphérique de la bague externe, la bague externe pouvant tourner par rapport à la bague interne entre

une première position de repos angulaire, dans laquelle les éléments de mise en prise (13, 113) peuvent être rétractés dans la bague externe selon une première quantité et une seconde position de fonctionnement angulaire, dans laquelle les éléments de mise en prise (13, 113) peuvent être rétractés selon une quantité inférieure à celle dans la première position de repos angulaire, au moins un espace intermédiaire circonférentiel (25, 125) contenant une série de billes (26, 126) pour le coulissement relatif des deux bagues est présent entre la bague interne (11, 111) et la bague externe (12, 112), **caractérisé en ce que** la bague externe est un tube cylindrique avec une paroi interne dans laquelle une partie de l'espace intermédiaire pour recevoir les billes de coulissement est formée et la bague interne est un tube cylindrique avec une paroi externe dans laquelle une partie de l'espace intermédiaire pour recevoir les billes de coulissement et les surfaces pour le coulissement des éléments de mise en prise suite à la rotation des bagues entre lesdites deux positions de repos et de fonctionnement sont formées.

2. Dispositif annulaire selon la revendication 1, **caractérisé en ce que** dans la première position de repos, les éléments de mise en prise (13, 113) peuvent être complètement rétractés dans la bague externe afin de ne pas faire saillie de la surface périphérique de la bague externe.

3. Dispositif annulaire selon la revendication 1, **caractérisé en ce que** les éléments de mise en prise (13) sont formés par les billes.

4. Dispositif annulaire selon la revendication 1, **caractérisé en ce que** les éléments de mise en prise (113) sont des cylindres avec des bases rondes et un axe parallèle à l'axe des bagues.

5. Dispositif annulaire selon la revendication 1, **caractérisé en ce que** les éléments de mise en prise sont agencés le long des deux circonférences des bagues avec, dans le centre, l'espace intermédiaire circonférentiel (25) contenant les séries de billes pour le coulissement relatif des deux bagues.

6. Dispositif annulaire selon la revendication 1, **caractérisé en ce que** les espaces intermédiaires circonférentiels (125) contenant la série de billes pour le coulissement sont au nombre de deux avec les éléments de mise en prise dans le centre.

7. Dispositif annulaire selon la revendication 1, **caractérisé en ce que** la série de billes est introduite dans l'espace intermédiaire par un trou radial dans l'une des bagues.

8. Dispositif annulaire selon la revendication 1, **caractérisé en ce que** la série de billes à l'intérieur de l'espace intermédiaire empêche le dégagement axial des bagues l'une par rapport à l'autre.

9. Dispositif annulaire selon la revendication 1, **caractérisé en ce qu'**entre la bague interne (11, 11) et la bague externe (12, 112), il y a une butée pour une rotation relative limitée des bagues.

10. Dispositif annulaire selon la revendication 9, **caractérisé en ce que** la butée comprend un évidement (23, 123) s'étendant de manière circonférentielle dans l'une des deux bagues et un élément coulissant dans ledit évidement et raccordé à l'autre bague.

11. Ensemble d'arbre pour enrouler des bobines sur des âmes de bobine dans une machine d'enroulement, comprenant un arbre (17) sur lequel une pluralité de dispositifs annulaires (10, 110) réalisés selon l'une quelconque des revendications précédentes, sont insérés, agencés de manière coaxiale côte à côte le long de l'arbre pour accueillir sur ce dernier, les âmes de bobines à enrouler.

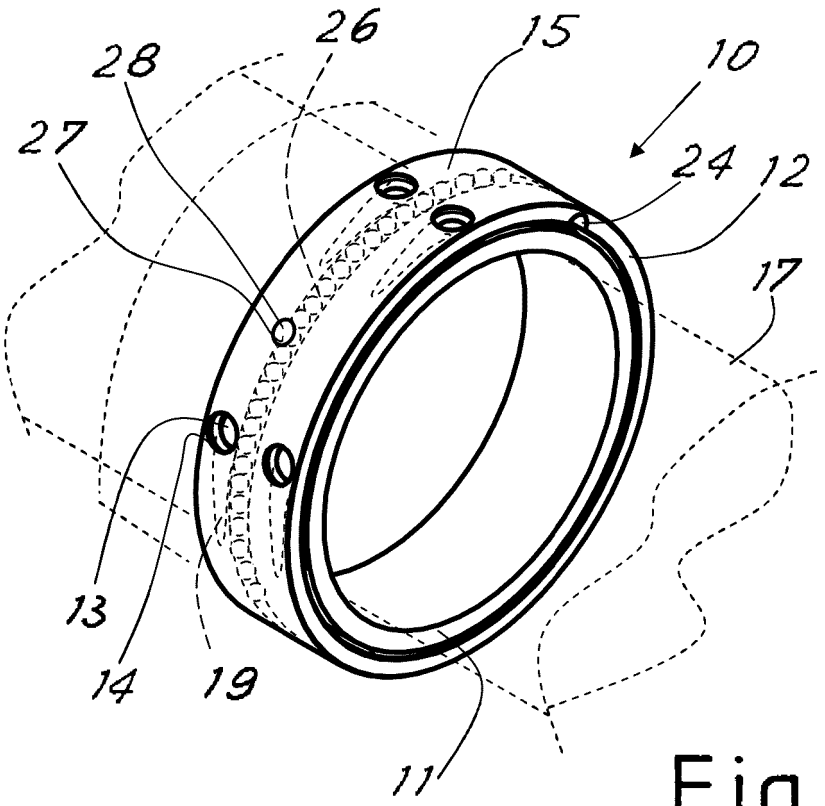
26
15
28
10
27
24
12
17
13
14
19
11

Fig.1

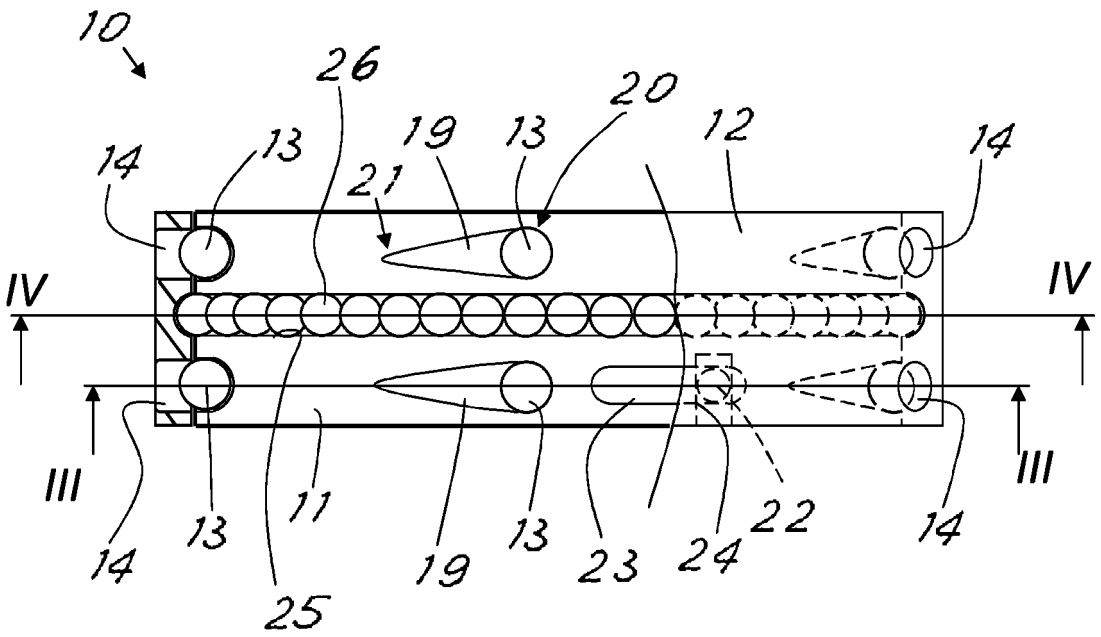
10
26
20
19
13
12
14
13
21
14
IV
IV
III
III
14
13
11
19
13
23
24
22
14
25

Fig.2

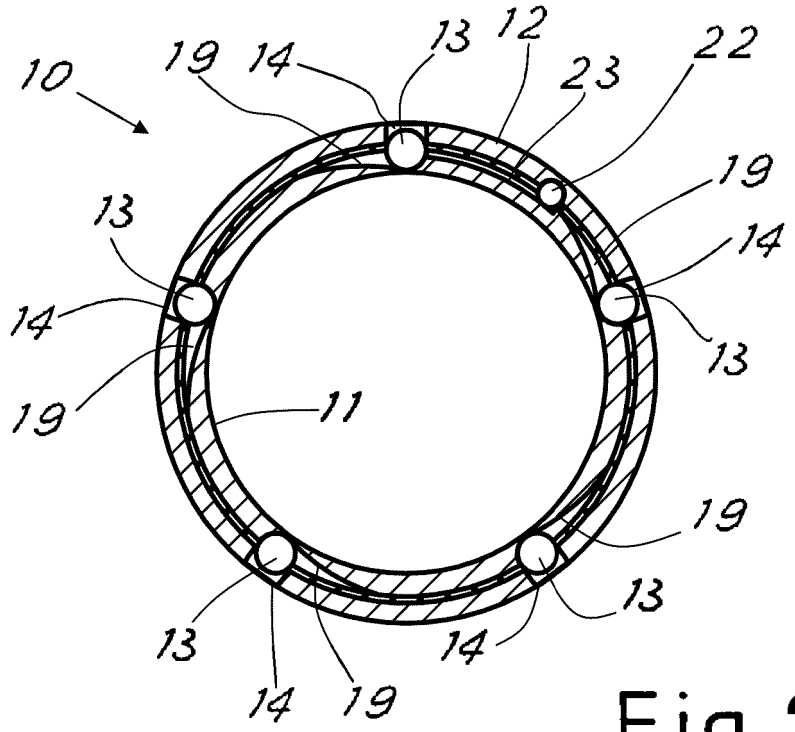
10
19
14
13
12
23
22
19
14
13
13
14
19
11
19
13
13
14
14
19

Fig.3

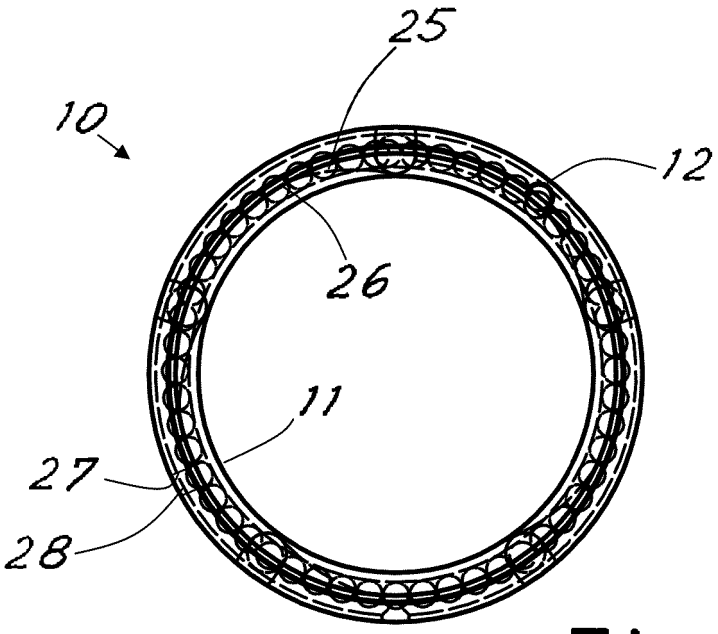
25
10
12
26
11
27
28

Fig.4

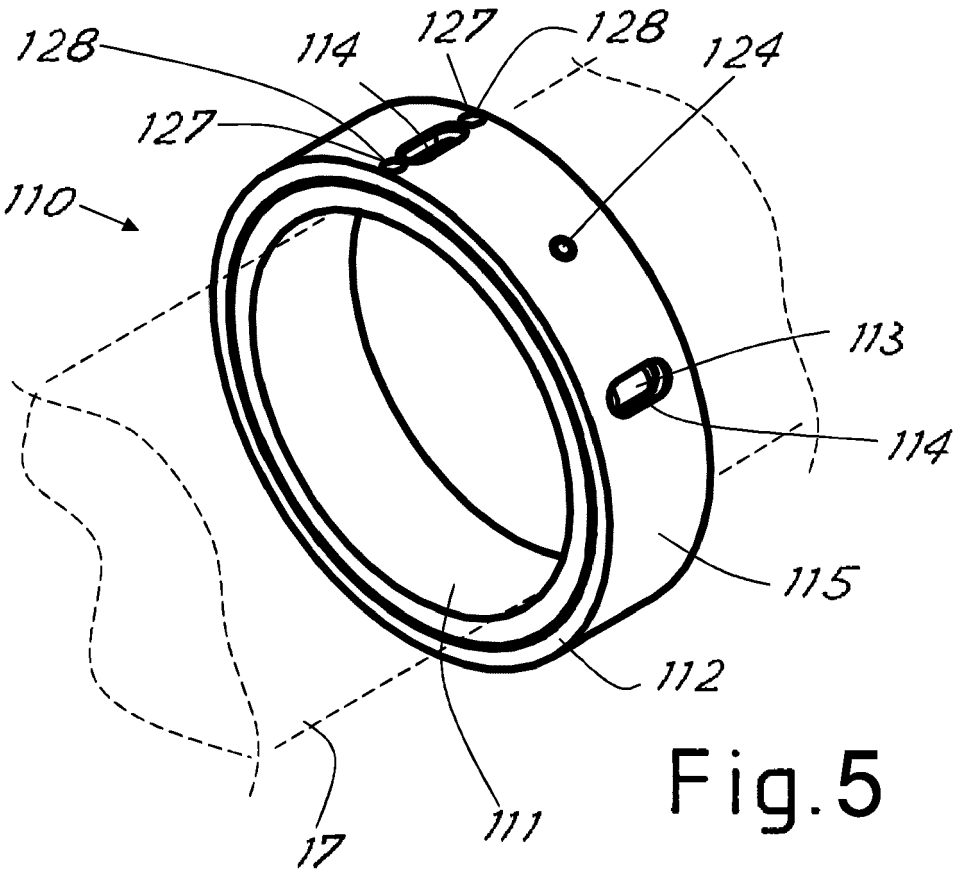
128
114
127
128
124
127
110
113
114
115
112
17
111

Fig.5

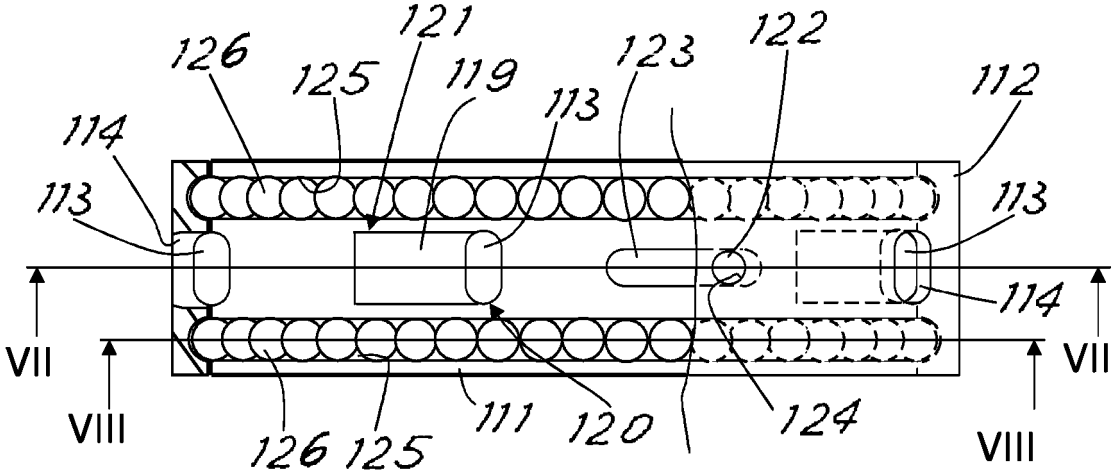
121
126
125
119
123
122
112
114
113
113
113
114
VII
VII
VIII
VIII
126
125
111
120
124

Fig.6

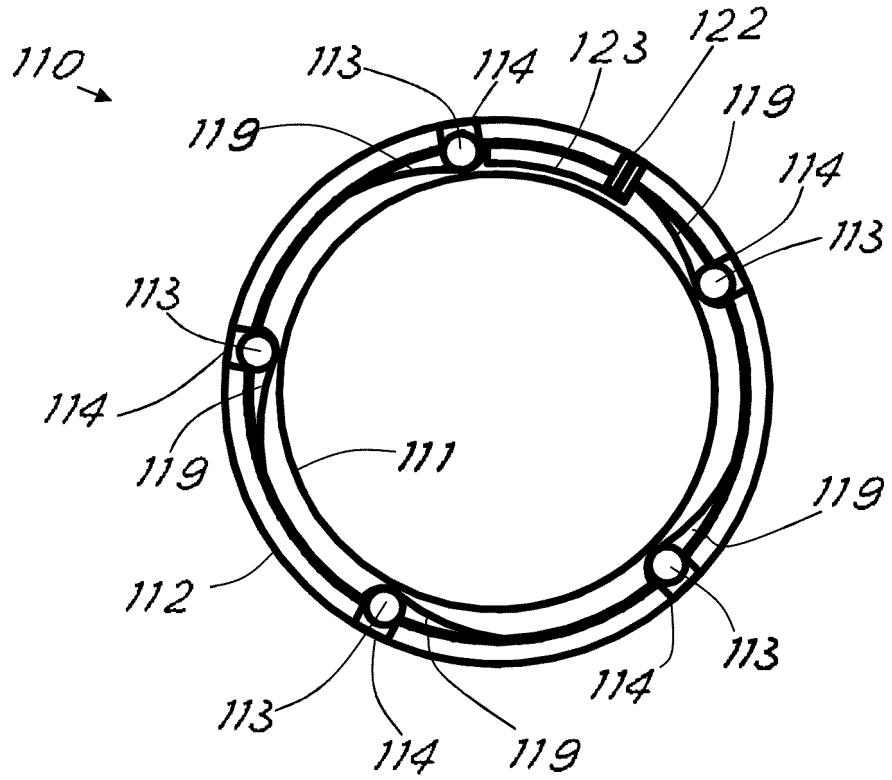
110
113
114
123
122
119
119
114
113
113
114
119
111
119
112
113
114
113
114
119

Fig.7

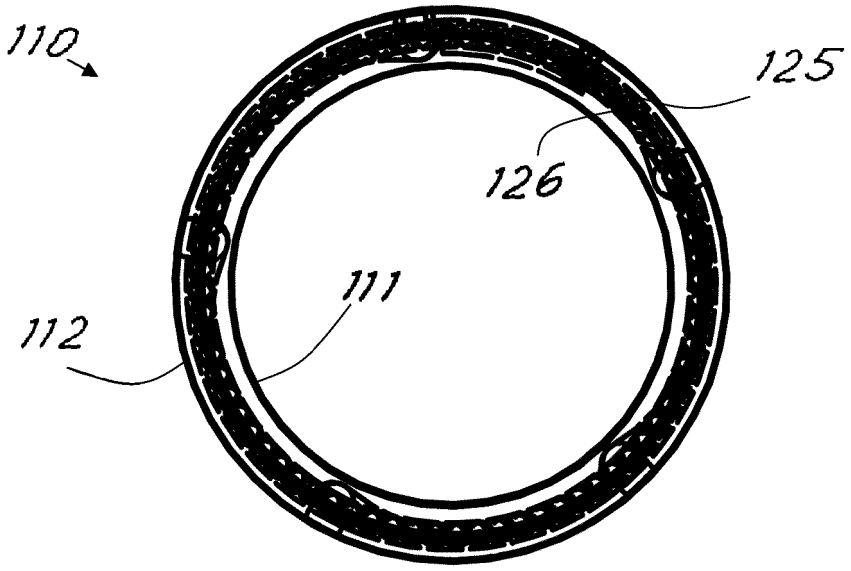
110
125
126
111
112

Fig.8

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

- JP 2017114597 A **[0007]**