ABSTRACT

The invention relates to a funnel unit for a spinning device which is suitable for high funnel speeds, vibration-optimised and simple to maintain. The funnel unit comprises a funnel (4) and a shaft (6) connected rotationally fixedly to the funnel (4) or constructed in one piece with the funnel (4), by which means the funnel (4) is rotatably cantilever-mounted and can be driven or braked by means of an electric drive (7) whose rotor (8) is fixed to the shaft (6) and whose stator (10) is surrounded by a drive housing (9). A bearing unit (12) is disposed in a bearing housing (11) connected to the drive housing (9) and is arranged on the shaft (6) between the rotor (8) and the funnel (4) so that the funnel (4) and the rotor (8) are rotatably cantilever-mounted. According to the invention, the funnel unit comprises a casing (13) which can be connected to the funnel bearing plate (3), which surrounds the bearing housing (11) concentrically radially at a distance and is connected in a decoupled fashion to the bearing housing (11) by means of at least radially and axially acting, spacing damping members (14a, 14b) such that at least the funnel (4), the shaft (6), the rotor (8), the drive housing (9), the stator (10) and the bearing housing (11) are decoupled from the casing (13) and the funnel bearing plate (3).

(Fig. 1)

CLAIMS

1. A funnel unit for a spinning device comprising a drivable spindle (2) having a winding zone (1), which funnel unit can be arranged on a funnel bearing plate (3) of the spinning device and comprises
   - a funnel (4) designed to concentrically overlap the winding zone (1) and enabling a thread to be guided,
   - a shaft (6) connected rotationally fixedly to the funnel (4) or constructed in one piece with the funnel (4), and having a thread guide hole (5) for supplying the thread to the funnel (4), by which means the funnel (4) is rotatably cantilever-mounted and is drivable or brakable,
   - an electric drive (7) comprising a rotor (8) fixed to the shaft (6), especially by means of gluing, for driving or braking the funnel (4) and a stator (10) surrounded by a drive housing (9), and
   - a bearing unit (12) which is disposed in a bearing housing (11) connected to the drive housing (9) and is arranged on the shaft (6) between the rotor (8) and the funnel (4) so that the funnel (4) and the rotor (8) are rotatably cantilever-mounted,

   characterised in that a casing (13), especially cylindrical, which can be connected at least indirectly to the funnel bearing plate (3), surrounds at least the bearing housing (11) concentrically radially at a distance and is connected in a decoupled fashion to the bearing housing (11) by means of at least radially and axially acting, spacing damping members (14a, 14b) such that at least the funnel (4), the shaft (6), the rotor (8), the drive housing (9), the stator (10) and the bearing housing (11) are decoupled from the casing (13) and the funnel bearing plate (3).

2. The bearing unit according to claim 1, characterised in that the bearing unit (12) is constructed as a double-row roller bearing whose inner ring is formed by the shaft (6) which has two outer grooves (15) for guiding the roller bodies.

3. The funnel unit according to claim 1 or claim 2, characterised in that the bearing unit (12) is constructed as a double-row roller bearing whose outer ring is formed by a bearing sleeve (16) surrounded by the bearing housing (11) and especially detachably connected thereto, which has two inner grooves (17) for guiding the roller bodies.

4. The funnel unit according to claim 3, characterised in that
   - the outside diameter (D_{16}) of the bearing sleeve (16) is greater than the maximum outside diameter (D_8) of the rotor (8) so that the rotor (8) can be guided through the bearing housing (11) and
   - the connection between the bearing sleeve (16) and the bearing housing (11) is configured as axially detachable so that the funnel (4), the shaft (6), the rotor (8) and the bearing unit (12) can be separated as a common funnel component (21) from the remaining funnel unit by axial displacement in the direction (25) of the funnel (4).

5. The funnel unit according to any one of claims 2 to 4, characterised in that the damping members are embodied as two damping members (14a, 14b) which surround the bearing housing (11) substantially at the axial height of the two rows of roller bearings (23a, 23b) in a ring shape.

6. The funnel unit according to any one of claims 1 to 5, characterised in that the casing (13) extends longitudinally over the funnel (4) and concentrically surrounds the funnel (4) substantially at its total length (L_4).

7. The funnel unit according to any one of claims 1 to 6, characterised in that the casing (13) comprises a cylindrical outer surface (18) and an inner surface (20) adapted at least in part to the shape of the outer surface (19) of the funnel (4).

8. A funnel component (21) for a funnel unit according to claim 4, comprising
   - a funnel (4) designed to concentrically overlap the winding zone (1) and enabling a thread to be guided,
   - a shaft (6) connected rotationally fixedly to the funnel (4) or constructed in one piece with the funnel (4), and having a thread guide hole (5) for supplying the thread to the funnel (4), by which means the funnel (4) is rotatably cantilever-mounted and is drivable or brakable,
   - a rotor (8) fixed to the shaft (6), especially by means of gluing, which is surrounded and driven by a stator (10) of an electric drive (7), and
   - a bearing unit (12) arranged on the shaft (6) between the rotor (8) and the funnel (4) for rotatable cantilever mounting of the funnel (4) and the rotor (8),

characterised in that the bearing unit (12) is constructed as a double-row roller bearing whose outer ring is formed by a bearing sleeve (16) having two inner grooves (17) for guidance of the roller bodies and the outside diameter (D_{16}) of the bearing sleeve (16) is greater than the maximum outside diameter (D_8) of the rotor (8).

9. The funnel component (21) according to claim 8, characterised in that the inner ring of the bearing unit (12) constructed as a double-row roller bearing is formed by the shaft (6) which has two outer grooves (15) for guidance of the roller bodies.

10. The funnel unit according to any one of claims 1 to 7, characterised in that the funnel (4) together with drive and bearing unit (6, 8, 9, 10, 11) is connected to the casing (13) by means of damping members (14a, 14b) and is thus elastically mounted thereto.

Dated this 15 day of February 2006

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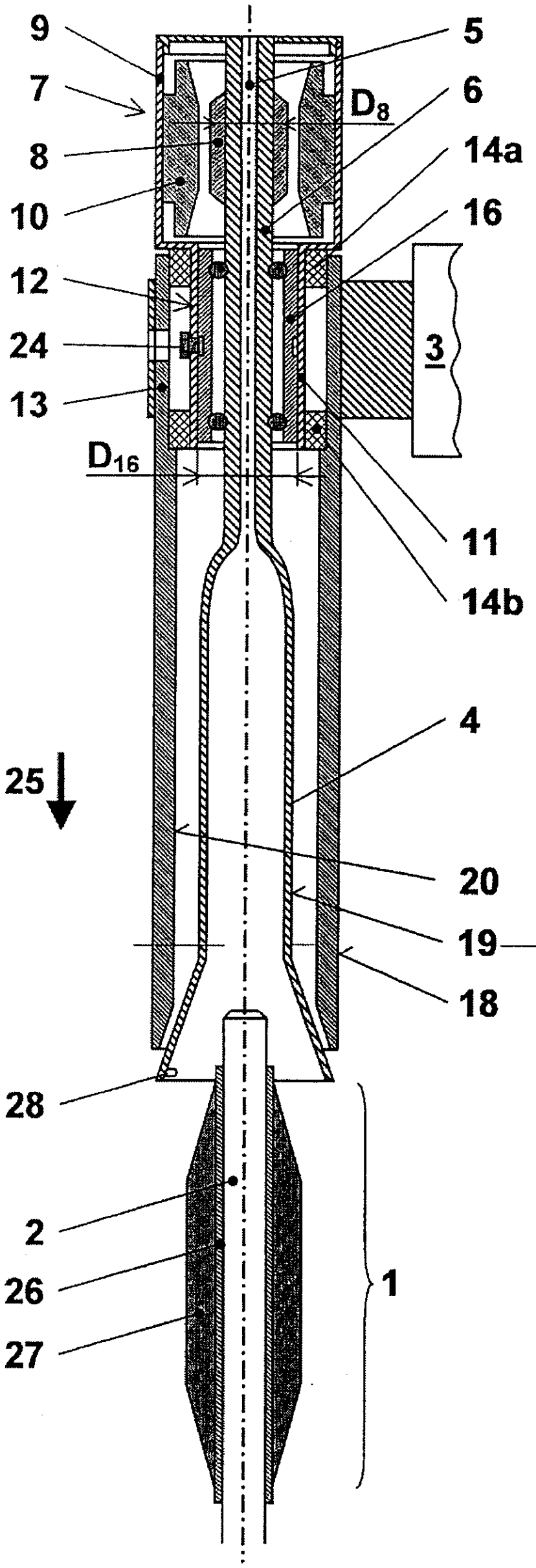

FIG. 1

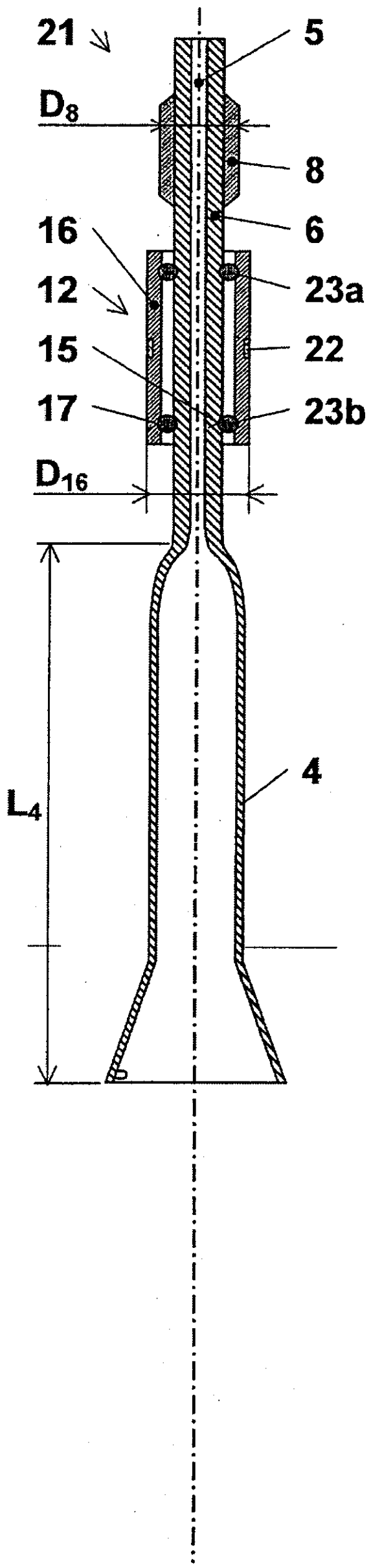

FIG. 2

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FORM 2

THE PATENTS ACT, 1970
(39 of 1970)

COMPLETE SPECIFICATION

(See Section 10; rule 13)

TITLE

FUNNEL UNIT FOR A SPINNING DEVICE

APPLICANT

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The following specification particularly describes
the nature of this invention and the manner
in which it is to be performed

FUNNEL UNIT FOR A SPINNING DEVICE

The invention relates to a funnel unit for a spinning device comprising a rotatably cantilever-mounted and drivable or brakable funnel according to the preamble of claim 1. Such a funnel unit is known, for example, from DE 34 00 327 A1.

The term spinning in the sense of the invention is also to be understood as twisting where, instead of a thread being wound, a thread is delivered from a bobbin and the thread can be formed both of a spun yarn and of a ply yarn.

Funnel units comprising a funnel driven by an electric motor, constructed to overlap concentrically over the winding zone of a spindle, and allowing a thread to be guided are known for spinning devices in a wide range of embodiments from the prior art, where different funnel geometries have proved suitable depending on the method used and material. The term funnel is thus to be understood within the scope of the invention not only as a funnel shape but also as a bell shape, a cylinder shape, a truncated cone shape, any other shape suitable for carrying out a funnel spinning method, a bell spinning method, a loop spinning method or a similar spinning, twisting or rewinding method or also so-called spinning or twisting fliers or ballooning limiters. The funnel is generally suspended and overlaps the usually vertical driven spindles from above.

The mounting and drive of the funnel presents a particular challenge in view of the high funnel speeds of modern spinning methods, with funnel speeds higher than 40,000 revolutions per minute being strived for. Generically the funnel has an elongated shape to allow complete overlap of the winding zone of the funnel.

As a result of the thread guide on the inner or outer surface of the funnel and the risk of asymmetrical fibre deposits inside the funnel, the vibration-free mounting of the elongated, rapidly-rotating funnel is thus particularly problematical, especially as losses caused by friction resistances at the bearings and excessive noise loadings are to be restricted to a minimum in order to keep the total energy requirement of the method as well as the manufacturing and maintenance costs of the device as low as possible. Rocking of the rotating parts as a result of excessive vibrations should be prevented in any case since contact between the rotating and stationary parts can result in considerable damage.

A possible bearing and drive arrangement which pursues the aim of a low-vibration and low-resistance mounting provides for direct mounting of the funnel in the form of a bearing surrounding the funnel. In this case, the drive mostly also encloses the funnel. Such an arrangement has the advantage that as a result of short lever arms, the risk of vibrations at the funnel as a result of an imbalances is relatively low. However, since the mounting is arranged around the funnel which generally has a relatively large diameter for overlapping the spindle, the choice of a suitable bearing proves to be extremely difficult. Mountings surrounding the funnel require a relatively large amount of space in the horizontal direction. As a result, the maximum number of funnels which can be positioned adjacent to one another on a funnel bearing plate is restricted. Guidance of the thread on the outer surface of the funnel is eliminated. Also it is not possible to slide a small-diameter shielding element over the funnel, for example, a shielding sleeve to shield the spindle and the wound-on thread.

Conventional roller bearings surrounding the funnel at its funnel outer surface, such as are disclosed in CH 681 630 A5 and EP 0 458 154 A1, for example, necessarily having a large bearing diameter, are unsuitable for the desired high funnel speeds primarily because of the inadequate speed endurance strength, too-high frictional resistances, too-high noise pollution and too-large space requirement. The use of an air bearing, such as is especially known from DE 30 47 275 C2, surrounding the cylindrical upper portion of the funnel, certainly results in a reduction in the drive energy and allows the funnel to be driven at the desired high speeds of more than 40,000 revolutions per minute but this type of air bearing is expensive to manufacture and operate since the expenditure on maintenance among other things is high as a result of the fibre-containing ambient air and requires each individual spinning station to be provided with compressed air, whereby the total energy consumption increases. Furthermore, the horizontal space requirement for an air bearing surrounding the funnel is large. As another solution for a funnel mounting, DE 44 22 420 A1 proposes the use of at least one magnetic bearing which is actively regulated by means of a sensor. As a result, the funnel is magnetically mounted so that it is freely suspended. A magnetic bearing certainly fulfils the requirement of speed endurance strength with very low bearing frictional resistance at the same time but active magnetic bearings have an extremely complex structure compared with roller bearings, they are very expensive to manufacture, must be supplied with current and require cost-intensive electronic control. However, since textile machines are mainly used in countries with low wages and only a

few highly qualified maintenance staff are available, solutions having such complex structures and which can only be maintained regularly by specialist staff, are difficult to implement and market in practice.

In another possible and known bearing and drive arrangement, both the mounting and also the drive of the funnel are achieved by means of a hollow shaft which is coaxially adjacent to the funnel at its upper end and by which means the thread is guided to the funnel. The funnel is cantilever-mounted and freely accessible so that a thread can be guided not only on the inner surface of the funnel but also on its outer surface. Since the mounting and the drive are accomplished via the hollow shaft which has a substantially smaller diameter than the funnel overlapping the spindle, relatively high funnel speeds can be achieved by means of roller bearings. However, the elongated funnel forms a large lever arm for the bearing so that even the slightest imbalances at the funnel which can be caused by impurities or thread tensions for example, result in considerable vibrations which limit the maximum attainable funnel speed and drastically increase the wear. In any case, any contact between rotating and fixed parts, especially the rotor and the stator of the electric drive should be avoided since this can result in destruction of the components.

DE 34 00 327 A1 describes a so-called bell spinning device comprising a drivable or brakable bell where the thread is looped around the outside and supplied to the spindle. The bell is mounted on a shaft adjacent to the upper end of its shank by means of two single-row roller bearings which are pushed over the shaft and their bearing inner rings are fixedly connected thereto, so that this is rotatable in a fixed position on the frame of the bell spinning device. The shaft has a longitudinal channel with an outlet opening located underneath the bearing at the upper end of the shank of the bell for guiding the thread onto the outer surface of the bell. The bell is driven by means of an electric motor whose rotor is fixed at the end of the shaft facing away from the funnel so that the complete mounting of the bell, the shaft and the rotor takes place between rotor and funnel. The stator of the drive is connected to the frame of the textile machine. The bell is surrounded by a stationary hinged casing with a small air gap. Another casing which is constructed in one embodiment in one piece with the casing of the bell surrounds the spindle. The two casings can necessarily be opened for working on the bobbin, such as mending a thread breakage or for replacing full bobbins by empty bobbins by especially constructing these as hinged. As a result of the arrangement of bearings on the shaft,

the bearing diameter is smaller than that of a bearing surrounding the funnel so that higher speeds of the bell can be achieved. However, since the shaft cannot go below a certain minimum diameter to allow vibration-free secure mounting of the cantilever-mounted elongated bell, the still relatively large diameter of the roller body raceways of the single-row roller bearings which have been pushed on, for the desired speeds, and the distance between the two single-row bearings further presents an obstacle for achieving the desired bell speed. Furthermore, the wear as a result is relatively high and in order to avoid this, the requirements for the product accuracy increase in the extreme, which in turn results in very expensive manufacturing processes. Rapid and uncomplicated dismantling of the bell and the bearing especially for maintenance purposes is not possible since both single-row bearings must necessarily be mounted braced against one another and expensive dismantling of the bearing is required. Each bearing forms its own lubricating compartment so that both bearings should be lubricated separately. Furthermore, the rotor must be removed from the shaft to remove the funnel. Solutions for effective vibration damping of the entire arrangement are not described.

WO 2004/076727 A1 discloses a device for loop spinning or twisting comprising a bell-shaped balloon limiter with a tapering cylindrical part which forms a shaft. The shaft is rotatably mounted via a bearing block by means of two rows of bearings. An electric asynchronous motor is located between the two rows of bearings. The bearing block and the motor are arranged in one housing which is affixed to a bearing plate. This type of bearing-drive combination is extremely complex to implement in practice since the bearing and the drive are necessarily combined and both bearings should be braced with respect to one another by means of the fixed drive housing. In a structure of this type, the drive must necessarily be dismantled to the maintenance of the roller bearings which needs to be carried out regularly. This considerably increases the maintenance expenditure. Each bearing forms its own lubricating space so that both bearings can be lubricated separately. Effective means for indispensable vibration damping are not described.

It is thus the object of the invention to provide a funnel unit with drivable or brakable funnel by which means higher funnel speeds can be achieved with at the same time a relatively simple and compact structure, low wear, simple maintenance and the lowest possible energy consumption.

This object is solved by implementing the characterising features of the independent claims. Features which further develop the invention in an alternative or advantageous manner can be deduced from the dependent claims.

The invention is based on the finding that by means of a compact arrangement of the bearings inside a bearing housing located between rotor and funnel and by means of common vibrational decoupling of the rotating parts, the fixed drive element and the bearing housing from the casing of the funnel unit, the funnel bearing plate and the remaining stationary parts as a result of a substantially more favourable vibration behaviour, higher funnel speeds can be achieved at the same time as lower wear, low energy consumption and simple dismantling of the funnel unit.

The invention can in principle be applied to both spinning and knitting machines forming the basis of the object described above. If spinning machines and spinning processes are described hereinafter, these can always involve twisting machines and twisting processes. It is known to the person skilled in the art that such processes can in principle be implemented for example using ply yarns, false ply yarns, core yarn or core ply twist, fancy yarn or fancy ply twist and other process variants and can be carried out depending on the process both in the material flow direction described and in the opposite direction, which is why winding the thread within the scope of the invention should also be understood as delivering the thread.

Various terms are used in the literature for funnel spinning or similar methods, for example, bell spinning, spinning using balloon limiters, cap spinning, flyer spinning and other names. However the invention is not restricted only to funnel spinning but generally relates to spinning, twisting or rewinding devices in which a rotatable, substantially rotationally symmetrical thread guiding or balloon-limiting element, capable of guiding the thread, can comprise a thread winding or thread delivery area, hereinafter called winding zone, of a likewise rotatable spindle for spinning, twisting or rewinding.

The funnel unit according to the invention for a spinning device comprising a drivable spindle having a winding zone can be arranged or is already arranged on a funnel bearing plate of the spinning device. The funnel unit has a rotatably mounted and drivable funnel designed to concentrically overlap the winding zone and enabling a thread to be guided preferably inwards or optionally outwards, where in addition to a

funnel shape, the funnel can also have any other suitable shape. The funnel is rotatably cantilever-mounted and is drivable or brakable by means of a rotatably mounted shaft which has an axial thread guide hole for supplying the thread to the funnel and is connected coaxially rotationally fixedly to the funnel. The shaft and the funnel can either by formed by two interconnected parts consisting of different respectively suitable materials or they can be constructed in one piece. The funnel is driven or braked by means of an electric drive whose rotor is fixed to the shaft, especially by means of gluing or shrinkage and whose stator is surrounded by a drive housing. The electric drive is constructed for example as an asynchronous motor or a synchronous motor. A bearing unit is arranged in a bearing housing connected to the drive housing and on the shaft between the rotor of the drive and the funnel so that the funnel and the rotor are rotatably cantilever-mounted. The bearing unit is to be understood in general as an element for at least radial and preferably also axial mounting of the shaft. The bearing housing which for example can have the shape of a closed, especially cylindrical housing or a prong-like holder, generally represents the holder of the bearing unit. In a further development of the invention, the bearing unit is constructed as a double-row roller bearing with two rows of roller bodies whose inner ring is formed by the shaft which has two outer grooves for guiding the roller bodies. Since the roller bodies run directly in the grooves of the shaft, the diameter of the two roller body tracks is substantially smaller compared with roller bearings pushed onto the shaft whereby a high speed endurance strength of the bearing is achieved with a low frictional resistance. In a further refinement of the invention, the outer ring of the double-row roller bearing is constructed as an especially cylindrically elongated bearing sleeve which has two inner grooves for guidance of the roller bodies. The bearing sleeve is surrounded by the bearing housing and is in particular detachably connected thereto. By separating the connection between the bearing sleeve and the bearing housing, it is possible to separate the funnel and the shaft including the entire bearing unit from the remaining funnel unit. This can even be accomplished without removing the rotor from the shaft provided that the outside of the bearing sleeve, as in a further development of the invention, is greater than the maximum outside diameter of the rotor and the rotor can be guided axially through the bearing housing so that the funnel, the shaft, the rotor and the bearing unit as a common funnel component can be separated from the remaining funnel unit by axial displacement in the direction of the funnel. This has the considerable advantage that maintenance or replacement of the complete bearing can be accomplished within the shortest time without a fairly large amount of work. Also, one

funnel component can be exchanged for another funnel component, for example, for refitting a spinning machine to a different spinning method, within a short time. Since the double-row roller bearing forms a closed unit, both roller bearings can share a common externally sealed lubrication compartment which substantially facilitates maintenance. The funnel component is separated from the remaining funnel unit for example by means of a screw directly radially towards the shaft which is accessible from outside and engages in a recess formed in the bearing sleeve, which avoids any displacement or twisting of the funnel component with respect to the remaining funnel unit when the screw is tightened. A plastic ring firmly surrounding the bearing sleeve, in which the screw can engage is used as a receptacle for example.

According to the invention, the funnel unit comprises a casing, especially cylindrical, which can be connected at least indirectly or is connected to the funnel bearing plate which surrounds at least the bearing housing concentrically radially at a distance. The casing is connected in a decoupled fashion to the bearing housing by means of at least radially and axially acting, spacing damping members such that at least the funnel, the shaft, the rotor, the drive housing, the stator and the bearing housing are decoupled from the remaining part of the device, particularly the casing and the funnel bearing plate, so that vibrations are not or are only partly transmitted. This has the consequence that the vibration behaviour of the funnel unit is considerably improved, higher funnel speeds are achieved, the energy consumption is improved and the process safety is increased. The damping members for example are constructed as two damping members which surround the bearing housing substantially at the axial height of the two rows of roller bodies in a ring fashion. Vibration-damping rubber-metal elements or other elastic damping parts, for example, rubber, plastic or foam rings are suitable as damping members. Instead of a ring, it is also possible to use a plurality of individual elements distributed around the bearing housing. Since the rotating elements which are especially formed by the funnel, the shaft, the rotor and parts of the bearing unit and the fixed parts interacting directly with the rotating parts, especially the stator of the drive and the bearing housing connected to the latter, form an intercoupled light vibration unit which is as small as possible, relative vibrations between the rotating and said fixed parts are avoided so that that radial movement of the rotor inside the stator caused by unwanted vibrations is avoided, where possible, even any contact between rotor and stator which perturbs the drive is avoided. The interface between this vibration unit and the stationary bearing unit decoupled therefrom is formed by the damping members

arranged between the bearing sleeve and the casing connected to the funnel bearing plate. The casing is either used as an interface between the damping members and the funnel bearing plate or in a further development of the invention, indirectly or directly fulfils a further function, preferably a shielding function whereby the casing extends longitudinally over the funnel and substantially concentrically surrounds the funnel over its entire length. The casing, for example, has a cylindrical outer surface and an inner surface at least partly matched to the shape of the outer surface of the funnel. The cylindrical outer surface can serve as a receptacle for a cylindrical shielding element which can be displaced towards the spindle to shield the spindle on the casing. The casing can be configured as one-piece or multi-piece and can be hinged, for example, in the area surrounding the funnel.

The device according to the invention is explained in detail hereinafter merely as an example with reference to specific exemplary embodiments shown schematically in the drawings, where further advantages of the invention are discussed. In detail:

Fig. 1 shows an embodiment of the funnel unit according to the invention comprising damping members and dismountable funnel component and

Fig. 2 shows a funnel component of the funnel unit from Fig 1 composed of a funnel, a shaft, a rotor and a bearing unit.

Since Fig. 2 shows a section from Fig. 1 for better illustration, both figures will be explained jointly in the following. Figure 1 is a purely schematic diagram showing a possible embodiment of the funnel unit according to the invention for a spinning device comprising an individually drivable spindle 2 for receiving a thread on a winding zone 1 whereas Fig. 2 is a schematic diagram showing a funnel component 21 separated from the remaining funnel unit. The spindle 2 and the funnel unit execute an axial movement with respect to one another in a known fashion. The winding zone 1 of the spindle 2 is, for example, formed by that casing surface of the spindle 2 which, as is shown in Fig. 1, is at least partly surrounded by the ready-wound thread 27. In the example shown, the thread is wound in the form of a cop onto a tube 26 placed onto the spindle 2. The funnel unit comprises a funnel 4 having a cylindrical basic shape and a conically expanded end. Alternatively, it is especially possible to configure the entire funnel 4 as cylindrical or conical or to give the funnel 4 any other suitable shape for implementing the spinning method. The funnel 4 is connected rotationally fixedly to a shaft 6. Located

in the shaft 6 is a through central thread-guiding hole 5 through which the thread enters into the funnel 4 and is there guided on the inner surface of the rotating funnel 4 to a thread guide 28, constructed as an eye for example, to the lower edge of the conically expanded end of the funnel 4. In an alternative not described here in detail, the thread can, for example, be guided outwards through an opening at a suitable point or form a loop over the lower edge of the funnel. As a result of the funnel 4 lapping concentrically over the spindle 2, the thread is therefore wound in a known fashion. In the exemplary embodiment shown the funnel 4 and the shaft 6 are represented as a common part. However it is possible to construct the shaft 6 and the funnel 4 as two-part, in each using suitable materials. The shaft 6 is mounted radially and axially rotatably by means of a bearing unit 12 and is driven by means of a drive 7 embodied as an electric motor, whose rotor 8 sits rotationally fixedly on the shaft 6. The connection between the shaft 6 and the rotor 8 can be made by gluing for example. The bearing unit 12 is composed of two rows of roller bearings 23a and 23b, a cylindrical bearing sleeve 16 comprising two inner grooves 17 and two outer grooves 15 ground directly onto the shaft 6, in which the two rows of roller bearings 23a and 23b each run. The shaft 6 thus functions as an inner ring and the bearing sleeve 16 as an outer ring since the bearing tracks are ground directly into the shaft 6 or the bearing sleeve 16. Since the guidance of the roller bodies takes place directly on the shaft 6, the bearing diameter is as small as possible so that high bearing speeds are possible. As a result of the arrangement of the bearing unit 12 described between the section of the shaft 6 on which the rotor 8 sits and the section bordering the funnel 4, the funnel 4 and the rotor 8 are cantilever-mounted. The bearing sleeve 16 is enclosed by a likewise sleeve-shaped bearing housing 11 in a clearance or transition fit. In order to prevent any axial displacement of the bearing sleeve 16 and therefore the shaft 6 with respect to the bearing housing 11, a detachable connection is provided, preferably a locking screw 24 in the bearing housing 11 pointing towards the shaft 6, which engages in a ring 22 of suitable material, e.g. POM which is fixed in a central annular groove in the bearing sleeve 16 such that this is not deformed. The stator 10 of the drive 7 is located in a drive housing 9 by which means the stator 10 is connected to the bearing housing 11. In the exemplary embodiment shown the drive housing 9 and the bearing housing 11 are one-piece. Naturally, a multi-part construction is also possible.

The bearing unit 12 is surrounded by two radially, axially and circumferentially acting damping members 14a and 14b

which connect the drive housing 9 including the stator 10, the bearing housing 11 and the bearing sleeve 16 in a decoupled manner to a cylindrical casing 13 which concentrically surrounds at least the bearing housing 11 radially at a distance. The damping members 14a and 14 b are formed for example of rubber-elastic damping rings and are located substantially at the axial height of the two rows of roller bearings 23a, 23b. In the exemplary embodiment shown the casing 13 has a cylindrical outer surface 18, surrounds the funnel 4 concentrically substantially over its entire length L_4 with a small air gap and ends near the lower edge of the funnel 4. The inner surface 20 of the casing 13 is at least partly matched to the shape of the outer surface 19 of the funnel 4. As a result of the funnel 4 being encapsulated by the casing 13, the air resistance moment at the funnel 4 is reduced, resulting in a lower energy requirement. In the area of the locking screw 24 a hole is provided in the casing 13 so that the locking screws can be loosened from outside. In an upper section close to the bearing unit 12 the casing 13 is connected to the funnel bearing plate 3 of the spinning device and thus fulfils an interface function between the funnel bearing plate 3 and the damping members 14a and 14b and also a shielding function for the funnel 4. However, it is alternatively possible that the casing 13 merely surrounds the bearing housing 11 in a sleeve fashion, is connected to the same via the damping members 14a and 14b in a decoupled fashion, does not surround the funnel 4 and fulfils no shielding function for the funnel 4. In this case, the casing 13 is constructed as a short housing which is indirectly or directly in communication with the funnel bearing plate.

As a result of the vibrational decoupling of the bearing unit 12 and the drive 7 from the casing 13 and the funnel bearing plate 3 by means of the damping members 14a and 14b, the vibration behaviour of the funnel unit is improved considerably so that high funnel speeds, low vibrations and a lower energy requirements are achieved.

The outside diameter D_{16} of the bearing sleeve 16 is larger than the maximum outside diameter D_8 of the rotor 8, whereby the rotor 8 can be guided axially through the bearing housing 11. By means of the connection between the bearing sleeve 16 and the bearing housing 11 which can be detached axially by loosening the locking screw 24, the funnel 4, the shaft 6, the rotor 8 and the bearing unit 12 can be simply separated from the remaining funnel unit as a common funnel component 21 by axial displacement in the direction 25 of the funnel 4. This is particularly advantageous for implementing the regular maintenance of the bearing unit 12 or the drive 7, for cleaning the funnel 4 or for

exchanging the entire funnel component 21, for example on rearranging the spinning method, since the entire funnel component 21 can be removed by loosening the one locking screw 24. Unnecessary stoppage times of the spinning device are thus avoided so that further maintenance-related costs can be saved in addition to the considerable increases in productivity resulting from the higher funnel speeds which can be achieved.

The funnel unit is characterised in that the funnel 4 together with driver and bearing unit 6, 8, 9, 10, 11 consisting of shaft 6, rotor 8, housing 9, stator 10 and bearing housing 11 is connected to the casing 13 via damping members 14a, 14b and thus is elastically mounted therein.

Reference list

1	Winding zone
2	Spindle
3	Funnel bearing plate
4	Funnel
5	Thread guide hole
6	Shaft
7	Drive
8	Rotor
9	Drive housing
10	Stator
11	Bearing housing
12	Bearing unit
13	Casing
14a, 14b	Damping members
15	Outer grooves (on the shaft 6)
16	Bearing sleeve
17	Inner grooves (of the bearing sleeve 16)
18	Outer surface of the casing 13
19	Outer surface of the funnel 4
20	Inner surface of the casing 13
21	Common funnel component
22	Ring
23a,23b	Series of roll bodies
24	Locking screw
25	Direction
26	Sleeve
27	Wound-on thread
28	Thread guide
L_4	Length of funnel 4
D_8	Maximum outside diameter of rotor 8
D_{16}	Outside diameter of bearing sleeve 16