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Ring-spinning spindle

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The invention relates to a ring-spinning spindle with a spindle-bearing housing and with a radially movable bearing sleeve which is arranged in the latter, is centred via return means and is vibration-damped via
10 damping oil and in which a neck bearing and a foot bearing for the rotatable spindle part are fastened.

The classic and most predominantly used ring-spinning spindle, for example according to DE 26 37 715,
15 carries, at the upper end of its rigid bearing housing, a neck bearing which is designed as a rolling bearing and which supports the spindle shank. This bearing is arranged in the running plane of the drive band or drive belt and absorbs its one-sided bearing pressure,
20 so that the latter does not bring the spindle out of centre. Furthermore, an elastic bearing sleeve, at the lower end of which the foot bearing is seated, is fastened rigidly in the bearing housing. This bearing, mostly designed as a toe-type plain bearing, carries
25 the weight of the spindle shank and of the cop fastened on the latter.

The bearing sleeve is surrounded, in its lower region, by a damping sleeve which consists of spirally wound
30 sheet metal and which endeavours to hold the bearing sleeve in its coaxial mid-position or to press it back into this mid-position. The damping sleeve stands in an oil bath. The oil of the oil bath has the function both of oiling the foot bearing and of damping the
35 vibrations of the bearing sleeve in the event of an unsteady running of the spindle shank as a result of unbalances which arise, in that the damping oil is displaced out of the interspaces between the plies of

the damping sleeve. Furthermore, the oil mist from this oil bath also lubricates the neck bearing.

Since the oil of the oil bath also serves for
5 lubrication, during which it loses its lubricating capacity over time, it occasionally has to be changed. This oil change on all the many hundreds of spindles of a ring-spinning machine is a laborious activity and necessitates a lengthy standstill of the ring-spinning
10 machine, along with an undesirable production stoppage.

The publications DE 406 058 and DE 1 028 025 disclose ring-spinning spindles, the rotatable spindle upper part of which is mounted in an upper and a lower
15 rolling bearing. The damping and return of the rotatable spindle upper part take place, here, by means of elastic rings or by means of spring cages between the rolling bearings and the spindle-bearing housing. The publications do not contain any indication that the
20 rolling bearings have lifetime lubrication; on the contrary, the bearing housings according to DE 406 058 are provided with sealing devices which are to prevent the lubricating oil from escaping. The oil serves here solely for lubricating the bearings, not as damping
25 oil.

CH 458 157 also shows a textile spindle with a rotatable spindle upper part mounted on rolling bearings. The use of damping oil is not provided here
30 because of a lack of sealing.

A textile spindle with rolling bearings as neck and foot bearings is illustrated in DE 153 241. However, as is evident, the rolling bearings are not those with
35 lifetime lubrication.

The set object of the invention was, therefore, to achieve simplification here. It achieves this object by

means of the features mentioned in the characterizing clause of the main claim.

5 The use of lifetime-lubricated rolling bearings both as neck bearing and as foot bearing makes the lubricating function of the oil of the oil bath unnecessary. This affords the possibility of also using liquid damping means other than oil.

10 GB 723 988 discloses a spindle, in which both the neck bearing and the foot bearing are designed as rolling bearings and are seated in a common rigid bearing sleeve. This bearing sleeve is centred and vibration-damped via a bush consisting of synthetic rubber.
15 However, the common rigid bearing sleeve does not allow any independent centring and vibration-damping of the spindle shank at its two bearings.

The invention therefore provides two separate bearing
20 sleeves for the neck bearing and the foot bearing. Both bearing sleeves are also assigned in each case a separate centring means and a separate damping means. For this purpose, the invention provides the use of proven damping spirals and of damping oil. Since the
25 rolling bearings, lubricated for their lifetime, no longer have to be lubricated by the damping oil, the function of the latter is restricted to damping. Since, in this case, it is not subjected to any serious wear or any ageing, it does not need to be exchanged and
30 also constitutes a lifetime filling. It also affords the possibility of using another liquid damping means instead of the damping oil.

The ring spindle therefore no longer requires
35 maintenance in terms of lubrication.

It is necessary, however, to keep the damping oil away from the rolling bearings. The bearing sleeve is

therefore designed, according to the invention, so as to be liquid-tight.

5 In order to achieve an optimum return and damping action of the bearing sleeve, the part-regions of the bearing sleeve which contain the neck bearing and the foot bearing are separated by an elastic intermediate region and at the same time remain as far as possible decoupled from one another in terms of vibration and of
10 movement.

In a first embodiment, this decoupling may take place in an elastically configured region of the otherwise one-piece bearing sleeve, in that the latter is elastic
15 in this region, for example, owing to deep beads or owing to a reduced material thickness. In a preferred embodiment, however, the bearing sleeve consists of two separate bearing part-sleeves which are connected to one another by means of an elastic oil-tight diaphragm.

20 Exemplary embodiments of the invention are illustrated diagrammatically in the drawing. The figures show longitudinal sections through the ring spindle, Fig. 1 with damping means in the form of damping
25 spirals and damping oil on separate bearing sleeves;
Fig. 2, as Fig. 1, but on a one-piece bearing sleeve.

The ring-spinning spindle 1 has a tubular spindle-bearing housing 2 which is closed at the bottom and
30 which can be fastened in the spindle rail in a familiar way, not illustrated in any more detail here, by means of a fixed flange resting on the spindle rail and a nut screwable from below against the latter.

35 In this spindle-bearing housing 2, a spindle upper part 3 is mounted rotatably. The latter consists of a cop carrier 4, onto which the tube of the cop, not illustrated here, can be attached, of the wharve 5 and

of the spindle shank 6. A drive belt 7 or a drive band, by means of which the spindle upper part 3 is driven, runs over the circumference of the wharve 5.

5 The spindle shank 6 is mounted in two rolling bearings 8 and 9, of which the upper, the neck bearing 8, as it is known, is arranged in the plane of the drive belt 7 and absorbs the pressure force of the latter. The said neck bearing thus prevents this pressure force from
10 acting as a tilting moment on the spindle upper part 3 and impairing the centring of the latter with respect to the spinning ring. The other rolling bearing 9 is arranged near the lower end of the spindle shank 6.

15 The rolling bearings 8 and 9 may be designed as ball bearings or as roller bearings with a ball cage or roller cage and with or without an inner ring. They are provided with lifetime lubrication, so that they do not require any relubrication. The inner rings and outer
20 rings 10, 11 of the rolling bearings can be pressed onto the spindle shank 6 and be pressed or flanged into the bearing sleeve 12/13. They thus also fix the vertical position of the spindle upper part 3 in the spindle-bearing housing 2 and secure it against being
25 pulled out, for example when the cop is drawn off. If the rolling bearings 8 and 9 have no inner ring, as illustrated, a running groove for the balls or for the rollers is incorporated for this purpose on at least one of the rolling bearings.

30 The spindle upper part 3 is excited by the non-balanced overhung-mounted cop into wobbling movements which must be damped in order to achieve a steady running of the ring-spinning spindle. For this purpose, the outer
35 rings 10 and 11 of the rolling bearings 8 and 9 are fastened in rigid bearing part-sleeves 12 and 13 which are seated elastically, with a centring action, in the spindle-bearing housing 2.

The elastic seat is achieved in each case by means of a damping spiral 16 and 17 consisting of rolled-up sheet metal and arranged in the gap between the spindle-bearing housing 2 and the bearing part-sleeves 12, 13. Furthermore, this gap is filled with damping liquid medium, preferably with damping oil 18, up to near to the upper end of the upper damping spiral 16. This damping medium must be displaced in the event of a deformation of the damping spiral and thus contributes effectively to damping the wobbling movements.

In order to prevent damping means 18 from penetrating into the bearing part-sleeves 12, 13, these may be connected to one another, according to Figure 1, by means of an elastic tubular liquid-tight diaphragm 19. The diaphragm 19 is drawn with end cuffs over corrugated collars of the bearing part-sleeves 12, 13. Separate bearing sleeves afford the advantage that their damping movements do not influence one another and therefore a maximum damping action can be achieved.

According to Figure 2, the two rolling bearings 8, 9 may also be arranged in a one-piece bearing sleeve 20. In this case, this decoupling of the damping movements may be achieved by means of an especially thin-walled design of the connecting region between the regions of the bearing sleeve 20 which receives the outer rings 10, 11 and/or by means of deep beads or corrugation 21 in this region.

The gap between the spindle-bearing housing 2 and the (upper) bearing part-sleeve 12 or the one-piece bearing sleeve 20 is sealed off at the top by means of a sealing disc 22 which prevents the escape of damping means 18 and, in particular, the ingress of the latter into the bearing part-sleeves 12, 13 or the bearing sleeve 20. Small quantities of overflowing damping means 18 may accumulate in a collecting container 23 of the bearing sleeve 13 or 20 below the lower end of the

spindle shank, where it does not come into contact with the rotating spindle shank.

List of reference numerals

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| 1 | Ring-spinning spindle |
| 2 | Spindle-bearing housing |
| 3 | Spindle upper part |
| 4 | Cop carrier |
| 5 | Wharve |
| 6 | Spindle shank |
| 7 | Drive belt |
| 8 | Rolling bearing |
| 9 | Rolling bearing |
| 10 | Outer ring |
| 11 | Outer ring |
| 12 | Bearing part-sleeve |
| 13 | Bearing part-sleeve |
| | |
| 16 | Damping spiral |
| 17 | Damping spiral |
| 18 | Damping means |
| 19 | Diaphragm |
| 20 | Bearing sleeve |
| 21 | Beads, corrugation |
| 22 | Sealing disc |
| 23 | Collecting container |

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Patent Claims

- 5 1. Ring-spinning spindle with a spindle-bearing housing and with a radially movable bearing sleeve which is arranged in the latter, is centred via return means and is vibration-damped via damping oil and in which a neck bearing and a foot bearing for the
10 rotatable spindle upper part are fastened, the bearings being designed as rolling bearings, characterized in that the rolling bearings (8, 9) are provided with lifetime lubrication, and the bearing sleeve (12/13; 20) is designed to be liquid-tight in such a way that
15 it separates the space, containing the damping oil (18), between the spindle-bearing housing (2) and the bearing sleeve from the space, containing the rolling bearings, within the bearing sleeve.
- 20 2. Ring-spinning spindle according to Claim 1, characterized in that the bearing sleeve consists of two rigid bearing part-sleeves (12, 13) which are connected to one another, liquid-tight, via an elastic portion (19).
- 25 3. Ring-spinning spindle according to Claim 2, characterized in that the elastic portion connecting the bearing part-sleeves (12, 13) is formed by an elastic diaphragm (19).
- 30 4. Ring-spinning spindle according to Claim 1, characterized in that the bearing sleeve (20) is of one-piece design and has a middle elastic portion (21).
- 35 5. Ring-spinning spindle according to Claim 2, characterized in that the bearing sleeve (13; 20) has, below the lower end of the spindle shank (6), a collecting container (23) in which damping medium (18)

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which has overflowed into the bearing sleeves is collected.