

Title of the invention

Rolling-bearing-mounted roller

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Description**Field of the invention**

10 The invention relates to a rolling-bearing-mounted roller suitable, in particular, for a tensioning device, and also to a process for producing a rolling-bearing-mounted roller.

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Background of the invention

A bearing for a tensioning device is known, for example, from DE 297 11 143 U1. This bearing has an outer ring which is connected to a bearing outer part.
20 The bearing outer part forms a tensioning roller for a tensioning device, for example for a chain drive or belt drive. An open end face of the bearing can be closed off by means of a cover cap which has a plurality of snap-in elements distributed over the
25 circumference. Opposing snap-in elements which interact with the snap-in elements are present on the bearing outer part. The bearing outer part may also be embodied as a gearwheel.

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Object of the invention

The invention is based on the object of specifying a rolling-bearing-mounted roller which can be produced efficiently, is particularly suitable for guiding a
35 belt and is distinguished by the fact that it requires a small axial construction space.

Summary of the invention

According to the invention, this object is achieved by means of a rolling-bearing-mounted roller having the features of Claim 1 and also by means of a process for
5 producing a rolling-bearing-mounted roller having the features of Claim 19. In the text which follows, refinements and advantages of the invention explained in conjunction with the device correspondingly also
10 apply to the process, and vice versa.

The rolling-bearing-mounted roller comprises an inner ring, which does not rotate in one preferred application, a number of rolling bodies, in particular
15 balls, and also an outer ring to which a plastic bearing outer part is connected by means of plastic injection moulding. A cover embodied as a cover disc is situated on at least one end face of the bearing outer part, preferably on both end faces. The cover is fitted
20 on an anti-rotation contour of the bearing outer part and protrudes beyond the bearing outer part in the radial direction. The cover disc is preferably produced from metal, in particular from stainless steel. If two cover discs are connected to the bearing outer part,
25 they preferably have identical dimensions.

In order to prevent the cover disc from lifting off from the bearing outer part in the axial direction, continuous deformation of anti-rotation elements of the
30 bearing outer part after the cover disc has been fitted on is advantageous. In a preferred refinement, the anti-rotation elements, which at the same time are provided for transmitting at least small axial forces, are deformed by means of ultrasonic welding. By way of
35 example, individual pins, which each engage in an opening in the cover disc, are provided as anti-rotation elements. The openings, which are distributed over the circumference, are preferably each situated in a recessed area of the cover disc, and therefore the

cover disc can be connected to the bearing outer part without the need for connecting elements which protrude beyond the end face of the rolling-bearing-mounted roller.

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A suitable material for producing the bearing outer part is, for example, polyamide. Particularly advantageous mechanical properties can be obtained using fibre-reinforced plastics, with the fibre content preferably being between 10% and 30%, in particular being 20%. The fibres used to reinforce the plastic, for example PA 66, are preferably carbon fibres.

15 In a particularly advantageous refinement, there is an overlap between the cover disc and the inner ring of the rolling bearing in the radial direction, and therefore a seal of the rolling bearing is formed at this point. The seal is preferably of identical configuration on both end faces of the rolling bearing.

20 In the area radially within the seals, the inner ring preferably has an asymmetrical cross section, in which case the inner ring protrudes axially in precisely one direction beyond the cover disc arranged on the relevant end face. The inner ring preferably has a

25 conical opening on the opposite end face.

The rolling bearing of the roller is preferably embodied as a single-row bearing, in particular as a four-point bearing. In a preferred refinement, the

30 maximum tilting play of the bearing is no more than 0.012 mrad, in particular no more than 0.008 mrad. This reliably avoids sliding of the cover disc on the inner ring even if a narrow gap seal is formed between these parts. This applies both to embodiments in which the

35 bearing outer part has toothing, and also to embodiments in which the bearing outer part has a smooth circumferential surface.

In the text which follows, two exemplary embodiments of the invention are explained in more detail with reference to a drawing, in which:

5 **Brief description of the drawing**

- Figure 1 shows a first exemplary embodiment of a
 rolling-bearing-mounted roller in cross
 section,
- 10 Figure 2 shows a detail of the roller according
 to Figure 1,
- Figure 3 shows the roller according to Figure 1
15 in a perspective view, and
- Figures 4 to 6 show a second exemplary embodiment of a
 rolling-bearing-mounted roller in views
 similar to those in Figures 1 to 3.

20 **Detailed description of the drawing**

Figures 1 to 3 show a rolling-bearing-mounted roller 1
which is embodied as a toothed belt tensioning roller
25 or deflection roller. A rolling bearing 2 of the roller
1 is composed of an inner ring 3, an outer ring 4, and
also a number of balls 6, which are guided in a cage 5,
as rolling bodies. The single-row rolling bearing 2 is
a four-point bearing with a maximum tilting play of
30 approximately 0.007 mrad. A bearing outer part 7
composed of plastic, specifically PA 66 CF 20, is
integrally formed on the outer ring 4 of the rolling
bearing 2 by means of plastic injection moulding and,
in the present case, has toothing 8 in order to
35 interact with a toothed belt (not illustrated). The
toothed belt is secured in the axial direction by means
of two cover discs 9, 10, which are each fastened to an
end face 11, 12 of the bearing outer part and protrude
beyond the bearing outer part 7 in the radial

direction. The terms "axial" and "radial" relate to the axis of rotation, denoted by A, of the roller 1.

The cover discs 9, 10 produced as sheet-metal parts
5 formed in a non-cutting manner have a plurality of oval openings 13 which are uniformly distributed over the circumference and are each situated in a recessed area 14. A pin 15 which is in the form of an anti-rotation element and is integrally formed on the bearing outer
10 part 7 protrudes through each opening 13, with all of the pins 15 together forming an anti-rotation contour 16. After the cover discs 9, 10 have been fitted on the bearing outer part 7 during the assembly of the rolling-bearing-mounted roller 1, the pins 15 are
15 deformed by means of ultrasonic welding, and this results in a positive connection between the cover discs 9, 10 and the bearing outer part 7. As is clear, in particular, from Figure 2, each pin 15 has an elongate cross section matched to the contour of the
20 opening 13, and this provides, during welding, a relatively long force-transmitting edge region in comparison with a fastening pin having a circular cross section, in which edge region the pin 15 engages behind the cover disc 9, 10.

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An overlap 17, 18, which performs a sealing function, is formed between each cover disc 9, 10 and the outer ring 4. The cover discs 9, 10 therefore have a dual function, specifically firstly to guide the toothed
30 belt and secondly to seal the rolling bearing 2. A circular opening 19 in the cover disc 9 can be seen in Figure 3 and is suitable for making the angular position of the outer ring 4 visible. The first end face 11 of the roller 1, which can be seen in Figure 3,
35 is also referred to as the front end face. On this end face 11, the inner ring 3 does not protrude beyond the cover disc 9 in the axial direction. In contrast to this, the inner ring 3 has, on the opposite end face

12, an annular projection 20 which protrudes beyond the cover disc 10 in the axial direction.

5 The exemplary embodiment according to Figures 4 to 6 differs from the exemplary embodiment explained above in that the bearing outer part 7 has a smooth circumferential surface 21 instead of toothing. The roller 1 according to Figures 4 to 6 is therefore suitable for guiding a smooth belt. For the rest, the
10 description regarding Figures 1 to 3 also applies to the exemplary embodiment according to Figures 4 to 6.

Reference symbols

	1	Roller
5	2	Rolling bearing
	3	Inner ring
	4	Outer ring
	5	Cage
	6	Rolling body
10	7	Bearing outer part
	8	Toothing
	9	Cover disc
	10	Cover disc
	11	End face
15	12	End face
	13	Opening
	14	Area
	15	Pin, anti-rotation element
	16	Anti-rotation contour
20	17	Overlap
	18	Overlap
	19	Opening
	20	Projection
	21	Circumferential surface
25		
	A	Axis of rotation

Claims

- 5 1. Rolling-bearing-mounted roller (1) comprising a
rolling bearing (2) which has an inner ring (3),
an outer ring (4) and a number of rolling bodies
10 (6), wherein the outer ring (4) is encapsulated
with a plastic bearing outer part (7) by injection
moulding, and comprising at least one cover (9,
10) connected to the bearing outer part (7),
characterized in that the cover is embodied as a
cover disc (9, 10) which is fitted on an anti-
rotation contour (16) of the bearing outer part
15 (7) and protrudes beyond the bearing outer part
(7) in the radial direction.
2. Roller (1) according to Claim 1, characterized in
that the cover disc (9, 10) is produced from
20 metal.
3. Roller (1) according to Claim 1 or 2,
characterized in that a cover disc (9, 10) is
arranged on each of the two end faces (11, 12) of
25 the bearing outer part (7).
4. Roller (1) according to one of Claims 1 to 3,
characterized in that the cover disc (9, 10) is
connected to the bearing outer part (7) by means
30 of deformation of the latter.
5. Roller (1) according to Claim 4, characterized in
that the cover disc (9, 10) is connected to the
bearing outer part (7) by means of ultrasonic
35 welding.
6. Roller (1) according to one of Claims 1 to 5,
characterized in that the anti-rotation contour

(16) is embodied in the form of individual pins (15).

- 5 7. Roller (1) according to Claim 6, characterized in that each pin (15) engages in an opening (13) in the cover disc (9, 10).
- 10 8. Roller (1) according to Claim 7, characterized in that the opening (13, 19) is situated in a recessed area (14) of the cover disc (9, 10).
- 15 9. Roller (1) according to one of Claims 1 to 8, characterized in that the cover disc (9, 10) overlaps with the inner ring (3) in the radial direction.
- 20 10. Roller (1) according to one of Claims 1 to 9, characterized in that the inner ring (3) is embodied asymmetrically, wherein it protrudes axially beyond the cover disc (10) in one direction.
- 25 11. Roller (1) according to one of Claims 1 to 10, characterized in that the rolling bearing (2) is embodied as a single-row bearing.
- 30 12. Roller (1) according to one of Claims 1 to 11, characterized in that balls (6) are provided as rolling bodies.
- 35 13. Roller (1) according to Claim 12, characterized in that the rolling bearing (2) is embodied as a four-point bearing.
14. Roller (1) according to Claim 13, characterized in that the rolling bearing (2) has a maximum tilting play of 0.012 mrad.

15. Roller (1) according to one of Claims 1 to 14, characterized in that the bearing outer part (7) has toothing (8).
- 5 16. Roller (1) according to one of Claims 1 to 14, characterized in that the bearing outer part (7) has a smooth circumferential surface (21).
- 10 17. Roller (1) according to one of Claims 1 to 16, characterized in that the bearing outer part (7) comprises polyamide.
- 15 18. Roller (1) according to one of Claims 1 to 17, characterized in that the bearing outer part (7) is produced from fibre-reinforced plastic.
19. Process for producing a rolling-bearing-mounted roller (1), comprising the following steps:
- 20 • providing a rolling bearing (2) which comprises an inner ring (3), a number of rolling bodies (6), and also an outer ring (4) and a bearing outer part (7) connected thereto by means of a plastic injection moulding process,
 - 25 • placing two cover discs (9, 10) on the end faces (11, 12) of the bearing outer part (7), wherein the cover discs (9, 10) protrude beyond the bearing outer part (7) in the radial direction and anti-rotation elements
 - 30 (15) integrally connected to the bearing outer part (7) engage in openings (13) in the cover discs (9, 10),
 - 35 • fastening the anti-rotation elements (15) on the cover disc (9, 10) by means of ultrasonic welding.