

A Ball Bearing Assembly

This invention relates to a ball bearing assembly.

A ball bearing assembly as described in GB-PS-542 669 comprises two spaced apart rows of balls, each in O-configuration and each having an inner race formed on a shaft and an outer race, the outer races being spaced by a sleeve. It is indeed a compact and easily installable ball bearing assembly with the balls in O-configuration, because a spacer sleeve split into two half-sleeves is inserted between the outer races. However, this specific construction brings about some significant disadvantages. To start with, the bisection complicates manufacture, the reason being that a precise two-piece spacer sleeve can be manufactured only from two one-piece sleeves. Having regard to the fact that each bearing assembly consists of specially matched components, there is a very high risk of mistaking the half-sleeves as far as their dimensions are concerned. More particularly, they may be of different dimensions, and there may be a squint between their end faces and between their outer and separation surfaces. This can cause the outer races to be twisted, and thus the bearings' functions to be impeded. Usually the outer races are force-fitted into a sleeve or the casing. This being so, there is the risk, if a two-piece spacer sleeve is used, that the half-sleeves in the course of such force-fitting will be axially displaced one against the other. The result is that the outer races, which are small in

relation to the external diameter, will be tilted, with the risk of thus hampering the bearing's function. Subsequent adjustment is impossible because this state cannot be detected from the outside.

Accordingly, the present invention aims to reduce such disadvantages. In particular, the invention aims to provide a simple and easily installable ball bearing assembly which will reduce any out-of-balance force.

With this aim in view, the invention is directed to a ball bearing assembly including two rows of balls in O-configuration, the inner paths of the two rows of balls being formed on a shaft and a spacer sleeve being disposed between outer races of the rows of balls, in which :

- (a) the spacer sleeve is a one-piece component;
- (b) the spacer sleeve is provided with an axially-extending slit of a width allowing the shaft to pass through the slit; and
- (c) the centre of gravity of the sleeve coincides with the centre of rotation of the shaft.

In one embodiment, the spacer sleeve is a one-piece component so that its manufacture with high precision is comparatively simple and the aforesaid risk of mistakes is eliminated. The spacer sleeve is provided with an axially-extending slit to facilitate its installation, the width of the slit being substantially equal to the diameter of the shaft. This is to ensure that the sleeve is easily fittable - in a radial direction - after the outer races with the balls have been mounted on the shaft. However,

the slit could cause, if the spacer sleeve is a concentric one, an imbalance, especially under the frequently occurring operation conditions of rotating outer races. In order to avoid this, the centre of the sleeve's internal bore is displaced, in relation to the centre of the sleeve's external diameter, in a direction away from the slit. Thus, as a countermeasure against the missing material in the slit region, the sleeve has increased wall thickness in the areas adjoining the slit. The thickness of the sleeve wall decreases with increasing distance from the slit. The displacement of the centre of the bore from the centre of the external diameter can mathematically be ascertained and optimized so that the sleeve's centre of gravity coincides with the bearing's axis of rotation, thus avoiding the occurrence of any imbalance. It is especially the length of the spacer sleeve which can be produced very accurately. This permits insertion - without being axially tilted - of the outer races into the casing, even if they have to be forced thereinto. Thus, the ball bearing assembly can be of high precision and can be used, therefore, to meet even very high requirements of operational quality and at high speeds.

It is also important in this connection that the bearing assembly can easily be tested prior to its ultimate installation. In the event of the test producing unsatisfactory results, any faulty component can be replaced without loss of perfect ones. It can subsequently be secured in the casing by, for example, glueing or

pressing it in.

The invention will now be explained in more detail with reference to one illustrative embodiment thereof shown by way of example in the accompanying drawing, in which :

Figure 1 is an axial cross-sectional view of a ball bearing assembly according to the invention; and

Figure 2 is a transverse cross-sectional view of the bearing assembly in the region of a spacer sleeve.

The ball bearing assembly comprises, as shown in Figure 1, a shaft 1 which is formed with the inner paths 2 for two rows 3 of balls, and outer races 4 and a spacer sleeve 5. All these components are arranged, for the purpose of obtaining a constructional unit, in a casing 6.

The spacer sleeve 5 is a one-piece component provided, as clearly shown in Figure 2, with an axially-extending slit 7. Its width corresponds substantially to the diameter of the shaft 1, thus rendering it possible to insert the sleeve 5 without difficulty and in a radial direction into the free space between the outer races 4 after the latter and the ball rows 3 have been assembled on the shaft 1. In order to prevent, after the sleeve 5 has been inserted, the occurrence of any eccentric mass distribution, the centre 8 of the sleeve's 5 bore diameter is displaced in relation to the centre 9 of the sleeve's 5 external diameter in a direction away from the slit 7. The consequence is different wall thicknesses of the sleeve, by means of which the missing mass resulting from the slit 7 is balanced out. This ensures a smooth and reliable

operation of the bearing arrangement even at high rotational speeds.

The embodiment of the invention shown in the Figures provides a ball bearing assembly of high precision which, even at high rotational speeds of the outer races, generates only small, or even avoids, out-of-balance forces.



- 6 -

Claims

1. A ball bearing assembly including two rows of balls in O-configuration, the inner paths of the two rows of balls being formed on a shaft and a spacer sleeve being disposed between outer races of the rows of balls, in which :

- (a) the spacer sleeve is a one-piece component;
- (b) the spacer sleeve is provided with an axially-extending slit of a width allowing the shaft to pass through the slit; and
- (c) the centre of gravity of the sleeve coincides with the centre of rotation of the shaft.

2. A ball bearing assembly according to claim 1, wherein the centre of the bore of the sleeve is displaced, in relation to the centre of the external diameter of the sleeve, in a direction away from the slit.

3. A ball bearing assembly according to claim 1 or claim 2, wherein the width of the slit is substantially equal to the diameter of the shaft.

4. A ball bearing assembly substantially as described herein with reference to Figures 1 and 2 of the accompanying drawing.

---