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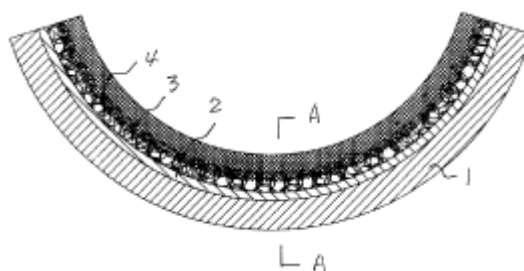
CLAIMS: 1 page SPECIFICATION: 3 pages
DRAWINGS: 1 page

[54] Title:

Support Bearing for Ball Mill and Manufacturing
Method Thereof

[57] Abstract

Disclosed in the present invention is a support bearing for a ball mill, including an arc-shaped steel tile base (1). A steel base (2) is attached to a friction surface and two axial end surfaces of the arc-shaped steel tile base (1). There is a spiral metal wire and copper alloy powder layer (3) on the steel base (2). The spiral metal wire and copper alloy powder layer (3) is filled with a plastic alloy layer (4). A manufacturing method includes: manufacturing an arc-shaped steel tile base 1 by using a cast steel billet; laying a spiral metal wire and spraying copper alloy powder on a steel base 2, and performing sintering; compositing a plastic alloy layer 4 on a spiral metal wire and copper alloy powder layer 3 to obtain a steel-backed metal-plastic composite bearing bush, where the plastic alloy layer 4 is a mixture of



1. A support bearing for a ball mill, comprising an arc-shaped steel tile base (1), characterized in that a steel base (2) is attached to a friction surface and two axial end surfaces of the arc-shaped steel tile base (1), there is a spiral metal wire and copper alloy powder layer (3) on the steel base (2), and the spiral metal wire and copper alloy powder layer (3) is filled with a plastic alloy layer (4).

2. The support bearing for a ball mill according to claim 1, wherein the plastic alloy layer (4) is a mixture of polytetrafluoroethylene, polyimide, and molybdenum disulfide, molybdenum disulfide and polyimide respectively account for 3%-5% and 10%-30% of a total weight, and polytetrafluoroethylene accounts for the remaining part.

3. A manufacturing method of a support bearing for a ball mill, characterized in comprising the following steps:

a: manufacturing an arc-shaped steel tile base (1) by using a cast steel billet;

b: laying a spiral metal wire and spraying copper alloy powder on a steel base (2), and performing sintering; and

c: compositing a plastic alloy layer (4) on a spiral metal wire and copper alloy powder layer (3) to obtain a steel-backed metal-plastic composite bearing bush, wherein the plastic alloy layer (4) is a mixture of polytetrafluoroethylene, polyimide, and molybdenum disulfide, molybdenum disulfide and polyimide respectively account for 3%-5% and 10%-30% of a total weight, and polytetrafluoroethylene accounts for the remaining part; and manufacturing the steel-backed metal-plastic composite bearing bush into a shape matching a friction surface and two axial end surfaces of the arc-shaped steel tile base (1), and separately connecting the steel base to the friction surface and the two axial end surfaces of the arc-shaped steel tile base (1).

4. The manufacturing method of a support bearing for a ball mill according to claim 3, wherein step d comprises: roughening a back surface of the steel base (2), and bonding the steel base (2) to the friction surface and the two axial end surfaces of the arc-shaped steel tile base (1).

Support Bearing for Ball Mill and Manufacturing Method Thereof

Technical Field

The present invention relates to a composite sliding bearing, particularly, to a support bearing applicable to a horizontal ball mill and a manufacturing method thereof. The support bearing has a high bearing capability, a simple structure, and low costs.

Background

A composite sliding bearing is usually obtained by compositing plastic alloy (a friction surface layer) on a steel tile base, and has a good self-lubricating effect, a simple structure, and low costs. However, due to high requirements for bearing capabilities of support bearings at both ends of steel ball coal mills (single-inlet/single-outlet and double-inlet/double-outlet) used in the power station auxiliary equipment industry and both ends of ball mills in the cement industry, even if there are a plurality of types of composite sliding bearings currently, the strength of friction surfaces thereof fails to meet the requirements of the support bearings for ball mills.

Existing support bearings for ball mills use Babbitt alloy tiles. First, a cast steel billet is machined into an arc-shaped steel tile base whose inner surface and end surfaces meet a designed size, where the inner surface of the arc-shaped steel tile base is a friction surface, and an outer surface thereof is spherical to facilitate centering and ensure that the bearing does not bear a biased load. Then, dovetail grooves are machined on the inner surface of the arc-shaped steel tile base along a circumferential direction and an axial direction, a layer of Babbitt alloy is cast onto the friction surface and the two end surfaces after surface processing, and subsequent machining such as oil hole machining and oil chamber machining is performed to obtain a slide bearing product. The existing support bearings for ball mills mainly have the following drawbacks:

1. Operating speeds of the support bearings for ball mills are low, resulting in a thin hydrodynamic lubricating oil film. In addition, unstable loads and impact loads occur during operation. In this case, hydrodynamic lubrication conditions of the support bearings for ball mills are insufficient, typically existing between hydrodynamic lubrication and boundary lubrication (with contact friction). Under such an operating condition, the Babbitt alloy tiles with limited temperature resistance (usually $\leq 200^{\circ}\text{C}$) are prone to adhesive wear and even bearing bush burning.

2. To ensure strong bonding between the Babbitt alloy layer and the steel tile base, the dovetail grooves need to be machined on the steel tile base prior to casting. To optimize a

contact state between the Babbitt alloy tile and a journal, machining such as scraping needs to be performed on the Babbitt alloy tile during assembly. To prevent scoring when the support bearing is started, a high-pressure oil jacking apparatus needs to be mounted. Consequently, an oil chamber and associated piping required for the high-pressure oil jacking apparatus need to be machined on the bearing bush, leading to complex machining processes.

3. The required high-pressure oil jacking apparatus increases the structural complexity of the entire ball mill device, while the oil chamber and associated piping required for the high-pressure oil jacking apparatus further complicate the structure of the bearing bush.

Summary

The present invention is provided to solve technical problems in the prior art such as low strength, complex structure and machining process, and high costs, and provides a support bearing for a ball mill. The support bearing has a small friction coefficient, a low wear rate, low costs, a long service life, a simple structure, and a simple machining process.

Technical solutions of the present invention are as follows: Provided is a support bearing for a ball mill, comprising an arc-shaped steel tile base 1. A steel base 2 is attached to a friction surface and two axial end surfaces of the arc-shaped steel tile base 1. There is a spiral metal wire and copper alloy powder layer 3 on the steel base 2. The spiral metal wire and copper alloy powder layer 3 is filled with a plastic alloy layer 4.

The plastic alloy layer 4 is a mixture of polytetrafluoroethylene, polyimide, and molybdenum disulfide, molybdenum disulfide and polyimide respectively account for 3%-5% and 10%-30% of a total weight, and polytetrafluoroethylene accounts for the remaining part.

Provided is a manufacturing method of a support bearing for a ball mill, characterized in comprising the following steps:

- a: manufacturing an arc-shaped steel tile base 1 by using a cast steel billet;
- b: laying a spiral metal wire and spraying copper alloy powder on a steel base 2, and performing sintering;
- c: compositing a plastic alloy layer 4 on a spiral metal wire and copper alloy powder layer 3 to obtain a steel-backed metal-plastic composite bearing bush, wherein the plastic alloy layer 4 is a mixture of polytetrafluoroethylene, polyimide, and molybdenum disulfide, molybdenum disulfide and polyimide respectively account for 3%-5% and 10%-30% of a total weight, and polytetrafluoroethylene accounts for the remaining part; and
- d: manufacturing the steel-backed metal-plastic composite bearing bush into a shape

matching a friction surface and two axial end surfaces of the arc-shaped steel tile base 1, and separately connecting the steel base to the friction surface and the two axial end surfaces of the arc-shaped steel tile base 1.

Step d comprises: roughening a back surface of the steel base 2, and bonding the steel base 2 to the friction surface and the two axial end surfaces of the arc-shaped steel tile base 1.

Compared with the prior art, a friction surface layer of the present invention has a low friction coefficient, a small elastic modulus, good running-in performance, and a large binding force between the friction surface layer and both of a steel backing layer and the steel tile base. Therefore, the following advantages are achieved:

1. Adhesive and shaft damage are avoided even under contact friction, thereby significantly prolonging a service life of the bearing.

2. A high-pressure oil jacking apparatus and associated hydraulic facility, oil chamber, and piping thereof may be omitted, thereby simplifying a structure of the entire device.

3. Processes such as tile scraping and oil chamber and dovetail groove machining are no longer required, thereby simplifying a manufacturing process and reducing production costs.

Brief Description of the Drawings

FIG. 1 is a schematic diagram of a structure according to an embodiment of the present invention; and

FIG. 2 is a view along A-A of FIG. 1.

Detailed Description

The following describes specific implementations of the present invention with reference to accompanying drawings.

a: An inner surface same as that in the prior art is manufactured as a friction surface by using a cast steel billet, where an outer surface is a spherical arc-shaped steel tile base 1, which facilitates centering and ensures that the bearing does not bear a biased load.

b: A spiral metal wire (copper wire) is laid on a steel base 2 and copper alloy powder is sprayed on the steel base, and sintering is performed, where a sintering temperature is the same as that in the prior art; and a spiral metal wire and copper alloy powder layer 3 obtained after sintering is composited on the steel base 2 to obtain a steel-backed metal-plastic composite bearing bush.

c: compositing a plastic alloy layer 4 on a spiral metal wire and copper alloy powder

layer 3 to obtain a steel-backed metal-plastic composite bearing bush, wherein the plastic alloy layer 4 is a mixture of polytetrafluoroethylene, polyimide, and molybdenum disulfide, molybdenum disulfide and polyimide respectively account for 3%-5% and 10%-30% of a total weight, and polytetrafluoroethylene accounts for the remaining part; and

The steel-backed metal-plastic composite bearing bush is pressed into a shape matching the friction surface of the arc-shaped steel tile base 1, the steel-backed metal-plastic composite bearing bush is water-cut into two parts matching axial end surfaces in shape, and the steel-backed metal-plastic composite bearing bush is separately connected to the friction surface and the two axial end surfaces of the arc-shaped steel tile base 1. A back surface of the steel base 2 may be roughened, and the steel base 2 is bonded to the friction surface and the two axial end surfaces of the arc-shaped steel tile base 1. Alternatively, the steel-backed metal-plastic composite bearing bush matching the friction surface of the arc-shaped steel tile base 1 may be bonded to the friction surface of the arc-shaped steel tile base 1, and the steel-backed metal-plastic composite bearing bush matching the axial end surface is fastened on each of the two axial end surfaces of the arc-shaped steel tile base 1 by using screws. Bonding between the steel base 2 and the friction surface of the arc-shaped steel tile base 1 may be that the gummed steel base 2 may be adhered to the friction surface of the arc-shaped steel tile base 1 by using a press machine.

e: Finish machining is performed on the friction surface layer. In this way, the support bearing for a ball mill shown in FIG. 1 and FIG. 2 is obtained. The support bearing has the arc-shaped steel tile base 1. The steel base 2 is attached to the friction surface and the two axial end surfaces of the arc-shaped steel tile base 1. There is the spiral metal wire and copper alloy powder layer 3 on the steel base 2. The spiral metal wire and copper alloy powder layer 3 is filled with the plastic alloy layer 4. The plastic alloy layer 4 is a mixture of polytetrafluoroethylene, polyimide, and molybdenum disulfide, molybdenum disulfide and polyimide respectively account for 3%-5% and 10%-30% of a total weight, and polytetrafluoroethylene accounts for the remaining part.

If area/areas of the friction surface or the two end surfaces is/are extremely large, a plurality of steel-backed metal-plastic composite bearing bushes may be separately manufactured for splicing.

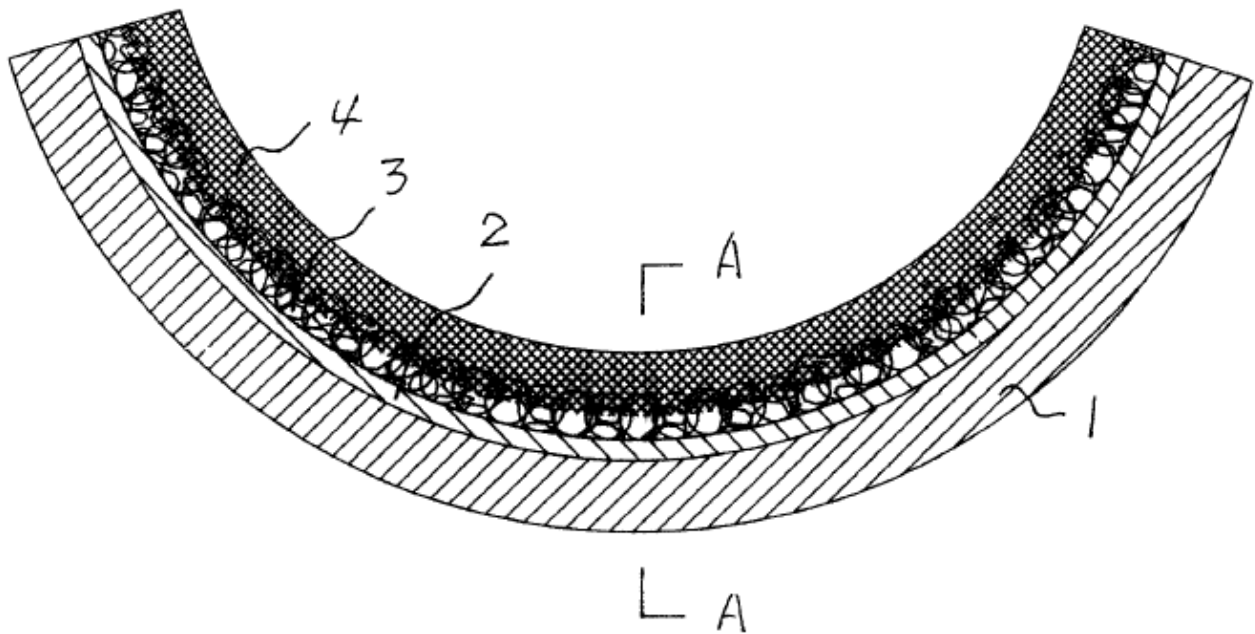


FIG. 1

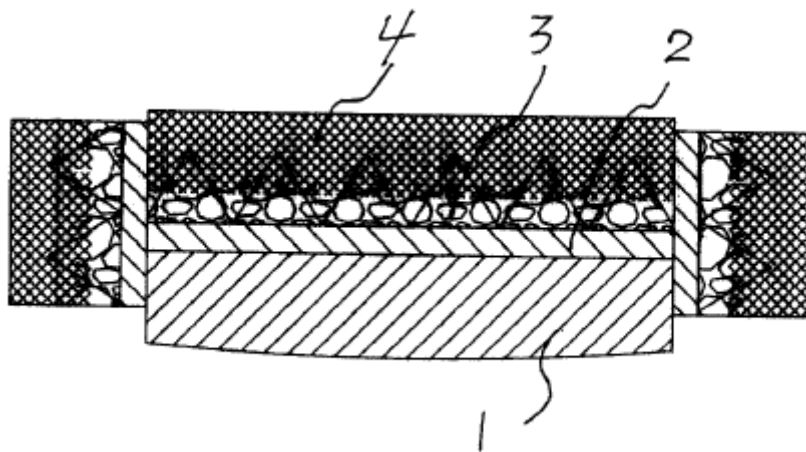


FIG. 2

TRANSLATION CERTIFICATION

Date: 2025/03/10

To whom it may concern:

This is to certify that the attached translation is an accurate representation of the documents received by this office. The translation was completed from:

- Chinese (PRC)

To:

- English (USA)

The documents are designated as:

- 'CN1904401A.pdf'

Cheli Rojas, Project Coordinator in this company, attests to the following:

"To the best of my knowledge, the aforementioned documents are a true, full and accurate translation of the specified documents."



Signature of **Cheli Rojas**, Project Coordinator

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