DESCRIPTION

TITLE OF THE INVENTION

SINTERED BEARING AND METHOD FOR MANUFACTURING SAME

TECHNICAL FIELD

[0001]

The present disclosure relates to a sintered bearing, a method for manufacturing the sintered bearing, a sintered bearing device, a rotary device, and a sintered body.

BACKGROUND ART

[0002]

Sintered bearings produced by the powder metallurgy technique are known as bearings that support rotary shafts. An oil-impregnated sintered bearing, which is an example of the sintered bearings, is a sliding bearing that attains a self-lubricating property by impregnating pores of a sintered body with a lubricant oil. The oil-impregnated sintered bearing is widely used in the fields of home electric appliances, OA equipment, automobiles, etc., due to the advantage that it can be used for a long time period without oiling.

[0003]

Examples of the known oil-impregnated sintered bearing include a sliding bearing that has a steel back metal and an iron-based sintered alloy layer which is joined to the steel back metal concurrently with sintering and contains 10 to 30 parts by weight of copper with the balance of iron (see Patent Document 1); and an iron-based sintered bearing that has an entire composition of a sintered alloy containing, in mass ratio, 2.0 to 9.0% of Cu, 1.5 to 3.7% of C, and the balance of Fe and inevitable impurities (see Patent Document 2).

RELATED ART DOCUMENTS

PATENT DOCUMENTS

[0004]

PATENT DOCUMENT 1: Japanese Unexamined Patent Application Publication No. 11-117940

PATENT DOCUMENT 2: Japanese Unexamined Patent Application Publication No. 2010-77474

SUMMARY OF THE INVENTION

CLAIMS

1. A sintered bearing having a ratio of change in porosity of 55% or less on an inner bore surface thereof after a rotary shaft is rotated for three hours while being supported by the sintered bearing.

2. A sintered bearing comprising a metal structure that includes a metal base and a hard phase dispersed in the metal base and being harder than the metal base.

3. The sintered bearing according to claim 2, wherein a difference in hardness between the metal base and the hard phase is 290 to 650 HV.

4. The sintered bearing according to claim 2 or 3, wherein an average diameter of the hard phase is 5 to 100 μm.

5. The sintered bearing according to any one of claims 2 to 4, wherein the metal base is an iron base including a pearlite phase and a ferrite phase.

6. The sintered bearing according to any one of claims 2 to 5, wherein the hard phase contains a hard material, and the hard material includes at least one selected form the group consisting of molybdenum silicide, molybdenum carbide, chromium carbide, vanadium carbide, and tungsten carbide.

7. The sintered bearing according to any one of claims 2 to 6, wherein a content of the hard phase is 6.0 to 19% by mass based on a mass of a sintered body.

8. The sintered bearing according to any one of claims 2 to 7, wherein an area ratio of the hard phase to a cross section of a sintered body is 5 to 20%.

9. The sintered bearing according to any one of claims 2 to 8, wherein when a total amount of a sintered body except for the hard phase is assumed to be 100% by mass, a composition of the sintered body contains 1.0 to 13% by mass of copper, 0.5 to 5.5% by mass of carbon, and the balance of iron and inevitable impurities.

10. The sintered bearing according to any one of claims 1 to 9, wherein the sintered

bearing comprises a lubricant oil.

11. The sintered bearing according to any one of claims 1 to 10, wherein the sintered bearing is for high circumferential velocity and/or high specific bearing load.

12. A method for producing the sintered bearing according to any one of claims 1 to 11, the method comprising:

preparing a mixed powder containing a metal powder and a hard material powder;

compression-molding the mixed powder to obtain a compact; and

heating the compact to obtain a sintered body.

13. A sintered bearing device comprising the sintered bearing according to any one of claims 1 to 11, and a housing that supports the sintered bearing.

14. A rotary device comprising a rotary shaft and the sintered bearing according to any one of claims 1 to 11 that supports the rotary shaft.

15. A sintered bearing device comprising a sintered bearing and a housing that supports the sintered bearing, wherein the sintered bearing has a ratio of change in porosity of 55% or less on an inner bore surface thereof after a rotary shaft is rotated for three hours while being supported by the sintered bearing.

16. A rotary device comprising a rotary shaft, and a sintered bearing that supports the rotary shaft, wherein the sintered bearing has a ratio of change in porosity of 55% or less on an inner bore surface thereof after the rotary shaft is rotated for three hours.

17. A sintered body used for obtaining the sintered bearing according to any one of claims 1 to 11.

DESCRIPTION

TITLE OF THE INVENTION

SINTERED BEARING, SINTERED BEARING DEVICE, AND ROTARY DEVICE

TECHNICAL FIELD

[0001]

The present disclosure relates to a sintered bearing, a method for manufacturing the sintered bearing, a sintered bearing device, a rotary device, and a sintered body.

BACKGROUND ART

[0002]

Sintered bearings produced by the powder metallurgy technique are known as bearings that support rotary shafts. An oil-impregnated sintered bearing, which is an example of the sintered bearings, is a sliding bearing that attains a self-lubricating property by impregnating pores of a sintered body with a lubricant oil. The oil-impregnated sintered bearing is widely used in the fields of home electric appliances, OA equipment, automobiles, etc., due to the advantage that it can be used for a long time period without oiling.

[0003]

Examples of the known oil-impregnated sintered bearing include a sliding bearing that has a steel back metal and an iron-based sintered alloy layer which is joined to the steel back metal concurrently with sintering and contains 10 to 30 parts by weight of copper with the balance of iron (see Patent Document 1); and an iron-based sintered bearing that has an entire composition of a sintered alloy containing, in mass ratio, 2.0 to 9.0% of Cu, 1.5 to 3.7% of C, and the balance of Fe and inevitable impurities (see Patent Document 2).

RELATED ART DOCUMENTS

PATENT DOCUMENTS

[0004]

PATENT DOCUMENT 1: Japanese Unexamined Patent Application Publication No. 11-117940

PATENT DOCUMENT 2: Japanese Unexamined Patent Application Publication No. 2010-77474

SUMMARY OF THE INVENTION

CLAIMS

1. A sintered bearing having a ratio of change in porosity of at least 5% but not more than 53% on an inner bore surface thereof after a rotary shaft is rotated for three hours while being supported by the sintered bearing, wherein

when a porosity of the inner bore surface before the rotary shaft is rotated is referred to as a porosity I (%), and a porosity of the inner bore surface after the rotary shaft is rotated for three hours is referred to as a porosity II (%), the ratio of change is determined by the following formula,

Ratio of Change in Porosity (%) =

(Porosity I - Porosity II) / Porosity I × 100

and the sintered bearing includes a metal structure that includes a metal base and a hard phase dispersed in the metal base and being harder than the metal base.

2. The sintered bearing according to claim 1, wherein a difference in hardness between the metal base and the hard phase is 290 to 650 HV.

3. The sintered bearing according to claim 1 or 2, wherein an average diameter of the hard phase is 5 to 100 μm.

4. The sintered bearing according to any one of claims 1 to 3, wherein an area ratio of the hard phase to a cross section of a sintered body is 5 to 20%.

5. The sintered bearing according to any one of claims 1 to 4, wherein a content of the hard phase is 6.0 to 19% by mass based on a mass of a sintered body.

6. A sintered bearing device comprising a sintered bearing and a housing that supports the sintered bearing, wherein

the sintered bearing has a ratio of change in porosity of at least 5% but not more than 53% on an inner bore surface thereof after a rotary shaft is

rotated for three hours while being supported by the sintered bearing,

when a porosity of the inner bore surface before the rotary shaft is rotated is referred to as a porosity I (%), and a porosity of the inner bore surface after the rotary shaft is rotated for three hours is referred to as a porosity II (%), the ratio of change is determined by the following formula,

$$\text{Ratio of Change in Porosity (\%)} = (\text{Porosity I} - \text{Porosity II}) / \text{Porosity I} \times 100$$

and the sintered bearing includes a metal structure that includes a metal base and a hard phase dispersed in the metal base and being harder than the metal base.

7. A rotary device comprising a rotary shaft and a sintered bearing that supports the rotary shaft, wherein

the sintered bearing has a ratio of change in porosity of at least 5% but not more than 53% on an inner bore surface thereof after the rotary shaft is rotated for three hours,

when a porosity of the inner bore surface before the rotary shaft is rotated is referred to as a porosity I (%), and a porosity of the inner bore surface after the rotary shaft is rotated for three hours is referred to as a porosity II (%), the ratio of change is determined by the following formula,

$$\text{Ratio of Change in Porosity (\%)} = (\text{Porosity I} - \text{Porosity II}) / \text{Porosity I} \times 100$$

and the sintered bearing includes a metal structure that includes a metal base and a hard phase dispersed in the metal base and being harder than the metal base.