Patented Apr. 8, 1930

1,753,581

UNITED STATES PATENT OFFICE

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BEARING AND METHOD OF MAKING SAME

No Drawing. Application filed July 3, 1926. Serial No. 120,541.

This invention relates to bearings of granular structure, and particularly to self-lubricating bearings, and to a method of making same.

An object of the invention is the provision of a bearing of this class which is provided with a metallic bearing surface. A further object of the invention is the provision of such a bearing with a metallic bearing surface of a porous nature adapted to permit the seepage of oil therethrough from the interior bearing structure during use, whereby an automatic lubricating of the bearing surface is effected. Another object of the invention is the provision of a simple and efficient method of making bearings of this character. Another object of the invention is to so treat the porous structure of the bearing that after impregnation of the same with oil a more efficient retaining of the oil within the bearing will be effected than would otherwise be the case. Other objects and advantages of the invention will be apparent from the following detailed description thereof.

In the preferred and practical operation of my method in the manufacture of bearings, I employ a mixture of substantially 82% copper powder, 9% tin powder, 3% lead powder, and 6% graphite powder, although the particular composition employed is not material to the essential features of the invention and may, therefore, be changed or varied materially. These ingredients, which are preferably but not necessarily of powder form and of a fineness to enable them to pass through a screen of about 150 mesh, are thoroughly mixed together and then subjected in a mold to an initial shaping pressure of about twenty tons per square inch. This initial shaping gives the molded material the general but not the exact shape and size desired for the finished article. The molded article is then subjected to a baking action in a temperature of about 750° C. by which it is strengthened and rendered somewhat malleable and distinctly metallic. The temperature should not be sufficiently high, however, to effect a general fusing together of the ingredients forming the article.

After the baking operation the article is electroplated, copper or brass plating being preferably used, and after the electroplating it is immersed in a lubricating oil, of which it will absorb a very appreciable quantity. The plated and impregnated piece is then subjected in a die to a pressure of about twenty tons per square inch, which compacts both the internal structure of the article and the plating, causing the plating to more closely and intimately adhere to the granular body of the article and giving the article its finished form. While it is preferable to electroplate the article after baking, these operations may be reversed if desired. Therefore, where "baking and electroplating" is called for by the claims, either operation may be first.

The mold for the original forming of the piece should be slightly smaller than the outside diameter of the re-shaping die, so as to permit an easy insertion of the same into the die, and should be somewhat longer than the finished article to permit a compressing of the material of the article into its final or finished form. If the bearing is of hollow cylindrical or sleeve form its internal diameter should be slightly greater than the core or plug portion of the die fitting therein, thus facilitating an easy mounting of the article in the die preparatory to re-shaping.

After the re-shaping operation, the article is forcefully ejected from the die while it is in close contact with the sides of the die and its core member, so that the frictional coaction of the electroplated surface or surfaces of the article with the respective portions of the die will cause a burnishing and polishing of the plating surface, thereby removing any slight irregularities or roughness from the surface thereof and at the same time giving the article a finished and pleasing appearance.

The compressing of the internal granular structure of the article after the oil impregnating operation seems to partially seal or close the cells or pores containing the oil and thereby more effectually retain the oil in the article than is possible without such compressing. At the same time the compressing of the metallic coating or plating in-

creases the density thereof and renders it less porous to the passage of oil therethrough. It will, therefore, be apparent that while the metallic coating itself will materially facilitate the retention of oil within the body of the article over what would be possible if the plating were omitted, the compressing of the plating as well as the compressing of the granular structure of the article materially facilitates or enhances the oil retaining feature.

The electroplating of the bearing or wear surface of the granular bearing member and the compressing of such plating gives a hard glossy wearing surface which at the same time is sufficiently porous to allow a slight seepage of oil from the body of the bearing through the plated surface. In this way, there is sustained a good lubricating effect. In addition to the bearing being provided with a metallic wear surface that is lubricated from within the bearing body, it also enables the granular body structure of the bearing to be composed of less expensive materials than where the granular body itself is to form the bearing surface. For instance, instead of using the more expensive compound enumerated above, a graphite and iron mixture may be used, a suitable mixture for such purpose being 90% powdered iron with 10% powdered graphite. Such a composition would be sufficiently porous for the absorption of oil while a brass or bronze electroplating would answer all the requirements of an efficient bearing surface.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A bearing having a granular porous body portion and an electroplated bearing surface tending to seal the pores.

2. A bearing having a granular porous body portion and a compressed electroplated bearing surface tending to seal the pores.

3. A bearing having a granular body portion composed of grains only partially fused together and a metallic bearing surface intimately cohering therewith.

4. A bearing having an oil impregnated granular body structure and a porous metallic coating for said structure.

5. A bearing having an oil impregnated granular body structure and an electroplated bearing surface through which the oil may seep.

6. A bearing having an oil impregnated granular body structure and a compressed electroplated bearing surface sufficiently porous to permit a slow seepage of oil therethrough.

7. A bearing having a granular body structure composed of grains only partially fused together and an electroplated coating entirely enclosing the body structure.

8. A bearing having a granular body structure composed of grains only partially fused together and a compressed electroplated coating entirely enclosing the body structure.

9. The method of providing the porous granular body of a bearing member with a metallic coating, consisting in electroplating the body and then subjecting it to a compressing pressure which compacts both the internal structure of the body and the coating.

10. The method of providing the granular body of a bearing member with a metallic coating, consisting in electroplating the body and subjecting the plated body in a die to a compressing pressure which compacts both the internal structure of the body and the coating, and causing the body to have a frictional ejecting coaction with the die walls to burnish the coating.

11. The method of making a bearing, consisting in shaping loose granular materials under pressure to form a granular body, baking to a temperature to cause incipient fusion between the particles composing it, and electroplating the body to form a metallic bearing surface.

12. The method of making a bearing consisting in shaping loose granular materials under pressure to form a granular body, baking to a temperature to cause incipient fusion between the particles composing it, and electroplating the body to form a metallic bearing surface, and subjecting the electroplated article to a compressing and shaping pressure.

13. The method of making a granular bearing from loose granular materials consisting in shaping under pressure the materials forming the bearing, baking the shaped article to a temperature to cause incipient fusion between the particles composing it, electroplating the baked article, impregnating the article with oil, and then subjecting the article to a compressing force.

14. The method of making a granular bearing from loose granular materials consisting in shaping under pressure the materials forming the article, baking the shaped article to a temperature to cause incipient fusion between the particles composing it, electroplating the bearing surface of the article, and impregnating the article with oil.

15. The method of making a granular bearing from loose granular materials consisting in giving a preliminary shape to bodies formed from the granular materials, baking the shaped article to a temperature to cause incipient fusion between the particles composing it, electroplating the baked article, impregnating the article with oil, and then compressing the article to give the same a finished form and to render the granular body and electroplating of greater density.

16. The method of treating porous granular bearings to render them self-lubricating and to tend to retain the lubricant therein, consisting in electroplating the bearing, then

impregnating the bearing with oil and then subjecting the bearing to a compressing pressure to increase the density of both the body structure and electroplating of the bearing whereby the oil is partially sealed or imprisoned therein.

In testimony whereof I have hereunto signed my name to this specification.

RALPH L. SEABURY.