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TECHNICAL ABSTRACT

A SELF-LUBRICATING BEARING

The invention relates to bearing structures particularly suited for use in environments requiring self-lubricating bearings having an extended operational life.

The bearing structure is characterized by a bearing retainer 16 formed of a permanently magnetized porous material filled with an interstitial magnetic lubricant, whereby the pores serve as lubricant reservoirs from which the lubricant continuously is delivered to a film 22 disposed between contiguous bearing surfaces of a ball 20, an internal race 12 and an external race 14. A further embodiment includes a journal shaft formed of a similar material for similar reasons.

The invention resides in employing a permanently magnetized, porous body filled with an interstitial magnetic lubricant from which the lubricant is delivered to a film interposed between contiguous bearing surfaces.

Inventor: Ann F. Whitaker

Employer: NASA - MSFC

~~Initial Evaluator: Keith Demorest/EH14~~

Application Serial No.: 522,557

Date Filed: November 11, 1974

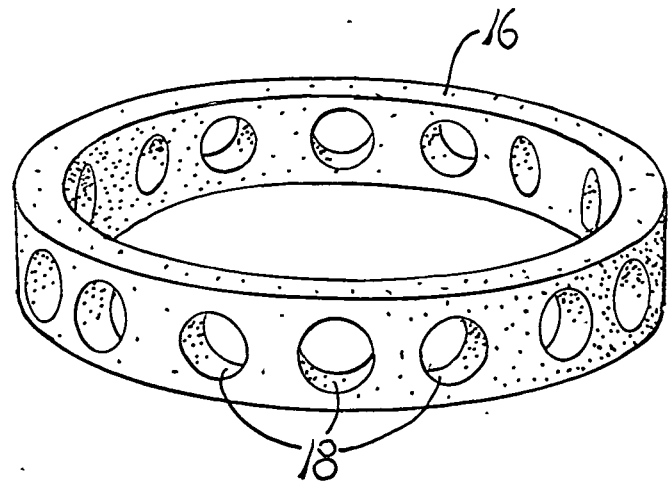
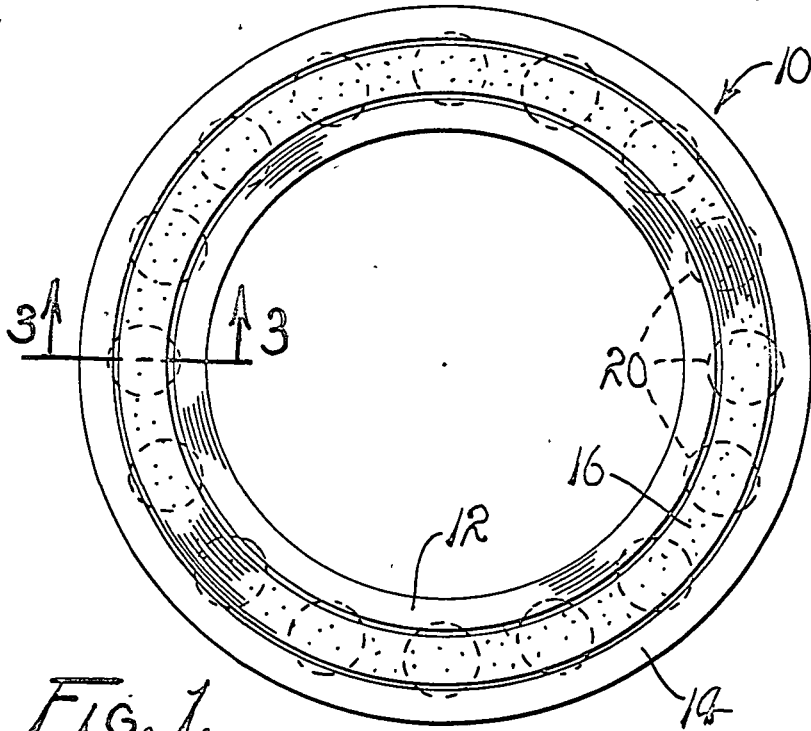


FIG. 1.

FIG. 2.

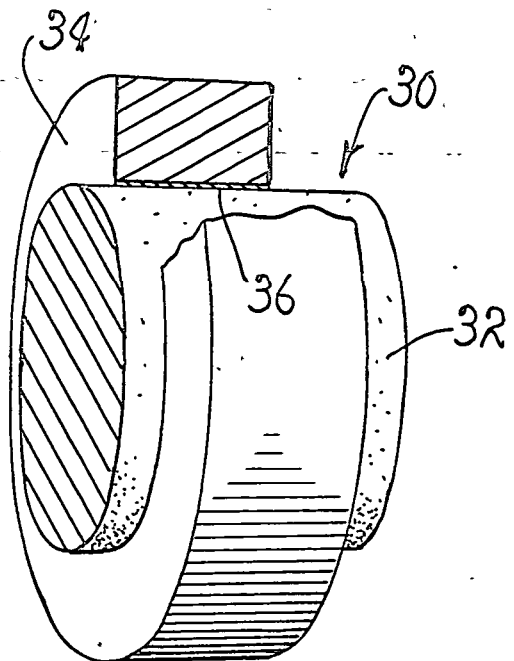
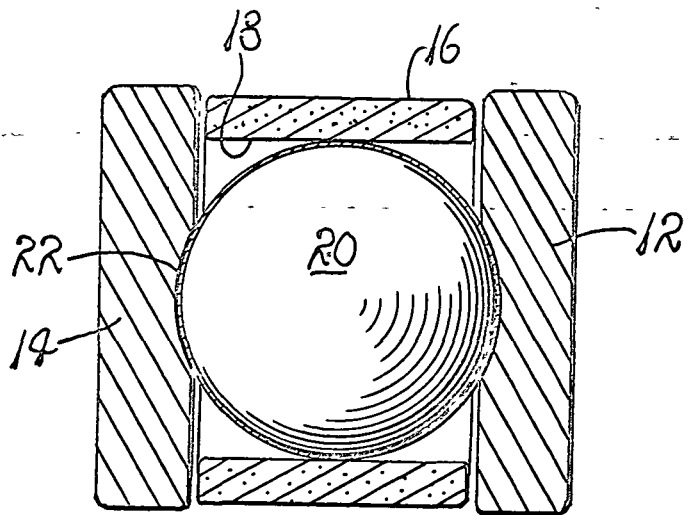


FIG. 3.

FIG. 4.

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APPLICATION FOR LETTERS PATENT

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN THAT Ann F. Whitaker, a citizen of the United States of America, residing in Huntsville, County of Madison, State of Alabama, has invented certain new and useful improvements in A SELF-LUBRICATING BEARING of which the following is a specification:

2 A SELF-LUBRICATING BEARING

3 ABSTRACT OF THE DISCLOSURE

4 An improved bearing structure including a permanently  
5 magnetized porous body filled with an interstitial magnetic  
6 lubricant for extending the operational life of self-lubricating  
7 bearings. The bearing structure is characterized by a permanently  
8 magnetized retainer formed of a porous material and filled with  
9 an interstitial magnetic lubricant, whereby the pores serve as  
10 lubricant reservoirs from which the lubricant continuously is  
11 delivered to a film disposed between contiguous bearing surfaces.  
12

13  
14 ORIGIN OF THE INVENTION

15 The invention described herein was made by an employee  
16 of the United States Government and may be manufactured and used  
17 by or for the Government for governmental purposes without the  
18 payment of any royalties thereon or therefor.  
19

20  
21 BACKGROUND OF THE INVENTION

22 The invention generally relates to bearings and more  
23 particularly to an improved, self-lubricating bearing having an  
24 extended operational life.  
25

26  
27 Bearing systems presently are lubricated by one of  
28 several techniques, including that of packing with selected  
29 greases, employing self-lubricating retainers formed of phenolic  
30 materials, and utilizing dry film lubricants. Unfortunately,  
31 bearings thus lubricated often fail because of a collection of  
32 debris or through a loss or drying of the lubricant.

1           It is, therefore, the general purpose of the instant  
2 invention to provide an improved, self-lubricating bearing  
3 having an extended operational life span, and unimpaired overall  
4 efficiency.

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7                   OBJECTS AND SUMMARY OF THE INVENTION

8           It is, therefore, an object of the instant invention to  
9 provide an improved self-lubricating bearing which overcomes the  
10 aforementioned difficulties and disadvantages.

11  
12           It is another object to provide a bearing having an  
13 extended operational life span.

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15           It is another object to provide in a self-lubricating  
16 bearing means for continuously introducing a lubricant between  
17 contiguous surfaces.

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19           It is another object to provide in a self-lubricating  
20 bearing a porous body filled with an interstitial lubricant.

21  
22           It is another object to provide in a self-lubricating  
23 bearing a permanently magnetized porous body filled with an  
24 interstitial magnetic lubricant.

25  
26           It is another object to provide in a self-lubricating  
27 bearing a permanently magnetized bearing retainer formed of a  
28 porous material and filled with an interstitial magnetic  
29 lubricant.

30  
31           It is another object to provide in a self-lubricating  
32 bearing, of a type including a curved surface and an annular

1 array of discrete bearings seated on the surface, the improvement  
2 comprising a bearing retainer including a permanently magnetized  
3 body formed of a porous material and filled with an interstitial  
4 magnetic lubricant.

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7 These and other objects and advantages are achieved  
8 through the use of an interstitial magnetic lubricant, such as  
9 oil or low viscosity grease, confined within reservoirs defined by  
10 the pores of a permanently magnetized porous body, as will  
11 hereinafter become more readily apparent by reference to the  
12 following description and claims in light of the accompanying  
13 drawings.

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16 BRIEF DESCRIPTION OF THE DRAWINGS

17 Fig. 1 is a top plan view of an embodiment of the  
18 instant invention comprising a self-lubricating bearing which  
19 includes a permanently magnetized bearing retainer formed from  
20 a porous material and filled with an interstitial magnetic  
21 lubricant.

22  
23 Fig. 2 is a perspective view of the bearing retainer  
24 shown in Fig. 1.

25  
26 Fig. 3 is a cross-sectional view taken generally along  
27 line 3-3 of Fig. 1.

28  
29 Fig. 4 is a fragmented partially sectioned view of a  
30 further embodiment comprising a journal bearing having a  
31 permanently magnetized journal formed of a porous material and  
32 filled with an interstitial magnetic lubricant.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

1  
2 Referring now with more particularity to the drawings  
3 wherein like reference characters designate like or corresponding  
4 parts throughout the several views, there is shown in Fig. 1 a  
5 bearing structure, generally designated 10, which embodies the  
6 principles of the instant invention.  
7

8 The structure 10, as shown in Fig. 1, includes an  
9 annular inner race 12, an annular outer race 14 concentrically  
10 related to the inner race and a bearing retainer 16, also of an  
11 annular configuration interposed between the races. The retainer  
12 16, in practice, includes a plurality of bearing receiving open-  
13 ings, designated 18, within which there is seated a plurality of  
14 balls 20.  
15

16 The bearing retainer 16, as shown, is fabricated from a  
17 suitable, ferromagnetic material, such as a porous steel, which  
18 becomes permanently magnetized when subjected to a magnetic field  
19 beyond its saturation level. The fabrication techniques employed  
20 in fabricating the retainer 16, such as casting, sintering, and  
21 machining and the like, are techniques which are well understood  
22 by those familiar with the fabrication of bearings and similar  
23 structures. It is to be understood that the fabricated retainer  
24 16 is permanently magnetized by being subjected to a magnetic  
25 field of a suitable density and thereafter included within the  
26 bearing structure 10 during its assembly.  
27

28 Once the bearing structure 10 has been assembled, the  
29 pores are filled with a magnetic lubricant. Such lubricant  
30 includes those magnetic fluids which comprise a carrier fluid  
31 such as water, hydrocarbons, fluorocarbons, and magnetic  
32 particles such as ferrite, chromium dioxides, and magnetite.



1 Since magnetic lubricants are well known, a more detailed  
2 description thereof is omitted in the interest of brevity.  
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4

5 It should, of course, be readily apparent that once  
6 the magnetic lubricant is introduced into the pores of the  
7 bearing retainer 16, the pores act as a myriad of reservoirs  
8 and the lubricant becomes an interstitial magnetic lubricant  
9 which is introduced between the contiguous surfaces of the balls  
10 20 and the inner and outer races 12 and 14. Thus, a film of  
11 friction-reducing lubricants, designated 22, continuously is  
12 provided.  
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#### 15 FURTHER EMBODIMENT

16 Turning now to Fig. 4, there is illustrated a self-  
17 lubricating bearing structure 30, which comprises a further  
18 embodiment of the instant invention.  
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21 As shown, the bearing structure 30 includes a journal  
22 shaft 32 and an annular journal bearing 34 concentrically  
23 related to the shaft 32. The journal shaft 32 is fabricated  
24 from a material having characteristics similar to the  
25 characteristics of the material utilized in the fabrication of  
26 the bearing retainer 16. It will, of course, be appreciated  
27 that the load-bearing characteristics of the journal shaft 32  
28 may be reduced due to the porous nature of the material from  
29 which the shaft is fabricated.  
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1           In any event, it is to be understood that a magnetic  
2 lubricant, similar to the fluid hereinbefore described in  
3 connection with the description of the bearing structure 10,  
4 is introduced into the pores of the shaft 32. This lubricant  
5 serves to develop a film, designated 36, between the contiguous  
6 surfaces of the journal bearing 34 and the journal shaft.  
7  
8

9                                 OPERATION

10           It is believed that in view of the foregoing  
11 description, the operation of the device will readily be  
12 understood and it will be briefly reviewed at this point.  
13  
14

15           When employing the bearing structure, designated 10,  
16 the interstitial magnetic lubricant is retained in the  
17 reservoirs defined by the pores within the bearing retainer 16  
18 by the magnetic flux emanating from the retainer. Due to the  
19 effects of surface tension, the reservoirs serve to deliver,  
20 continuously, lubricant to the film of lubricant 22 disposed  
21 between the contiguous surfaces of the balls 20 and the inner  
22 and outer races, designated 12 and 14, respectively, for thus  
23 reducing friction.  
24  
25

26           When employing the journal bearing structure,  
27 designated 30, the interstitial magnetic lubricant is retained  
28 in reservoirs defined by the pores provided within the journal  
29 shaft 32, by the field of flux emanating from the shaft. However,  
30 this lubricant serves to deliver lubricant to the film 36 dis-  
31 posed between the adjacent surfaces of the journal bearing 34 and  
32 the shaft for thus reducing friction.

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In view of the foregoing, it should readily be apparent that the self-lubricating bearing structures, which embody the principles of the instant invention, provide a practical solution to the perplexing problem of extending the operational life span of bearing structures.

Although the invention has been herein shown and described in what are conceived to be the most practical and preferred embodiments, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the illustrative details disclosed.

This is the end of the patent specification. There are no claims attached.