

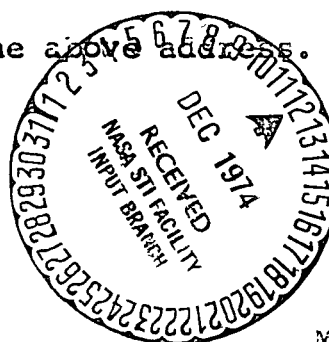
NASA CASE #1
PRINT FIG.

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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.

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~~Initial Evaluator: Keith Demorest/EH14~~

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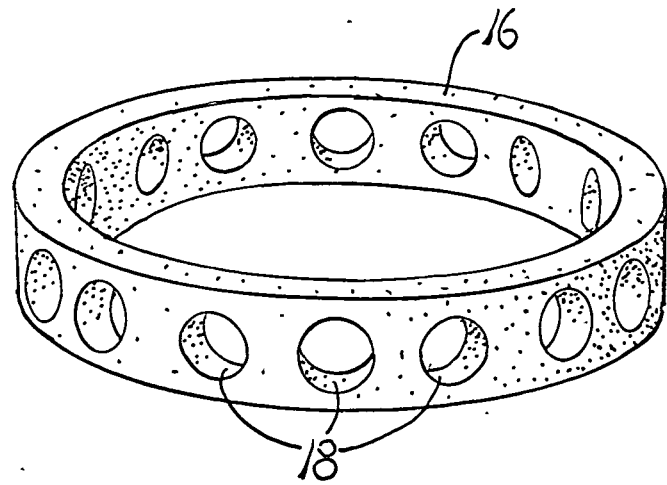
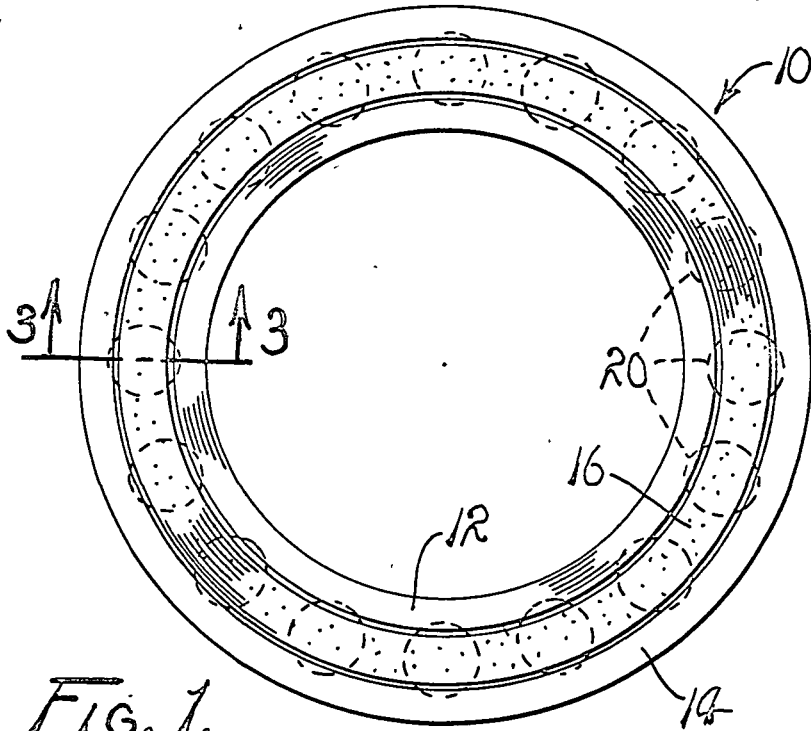


FIG. 1.

FIG. 2.

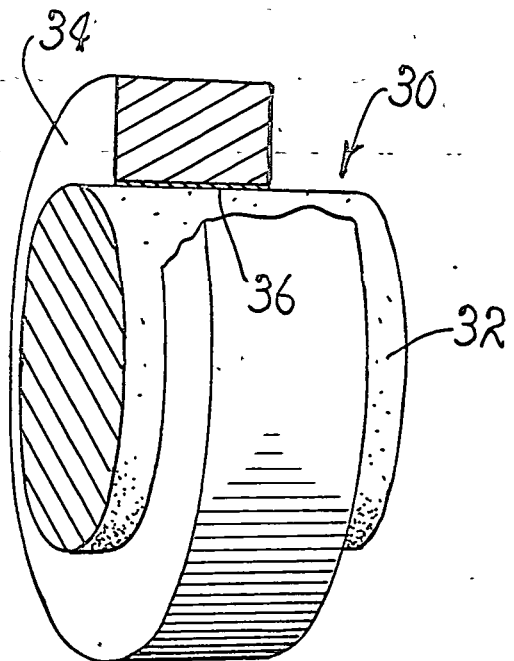
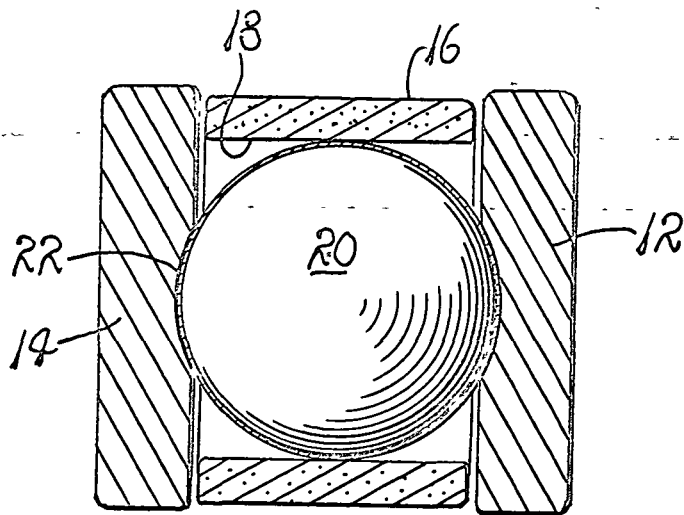


FIG. 3.

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.

5
6
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.

14
15 It is another object to provide in a self-lubricating
16 bearing means for continuously introducing a lubricant between
17 contiguous surfaces.

18
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.

5
6
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.

14
15
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.
3
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.
13
14

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.
19
20

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.
30
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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.

1 In view of the foregoing, it should readily be
2 apparent that the self-lubricating bearing structures, which
3 embody the principles of the instant invention, provide a
4 practical solution to the perplexing problem of extending the
5 operational life span of bearing structures.
6
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8 Although the invention has been herein shown and
9 described in what are conceived to be the most practical and
10 preferred embodiments, it is recognized that departures may be
11 made therefrom within the scope of the invention, which is not
12 to be limited to the illustrative details disclosed.
13

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