K. GAULDIE.

BEARING.

APPLICATION FILED JUNE 10, 1920.

1,421,208.

Patented June 27, 1922.

3 SHEETS—SHEET 1.

FIG. 1.

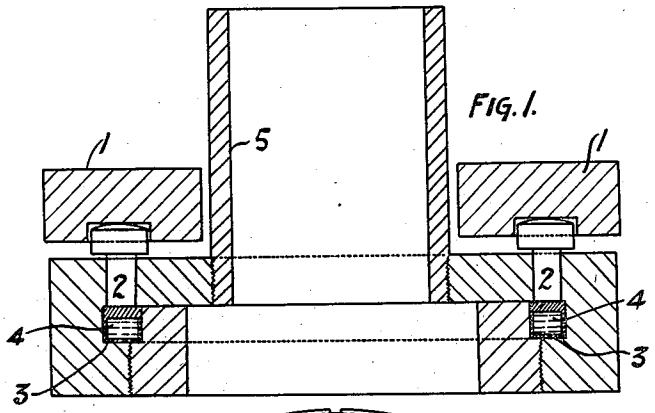


FIG. 2

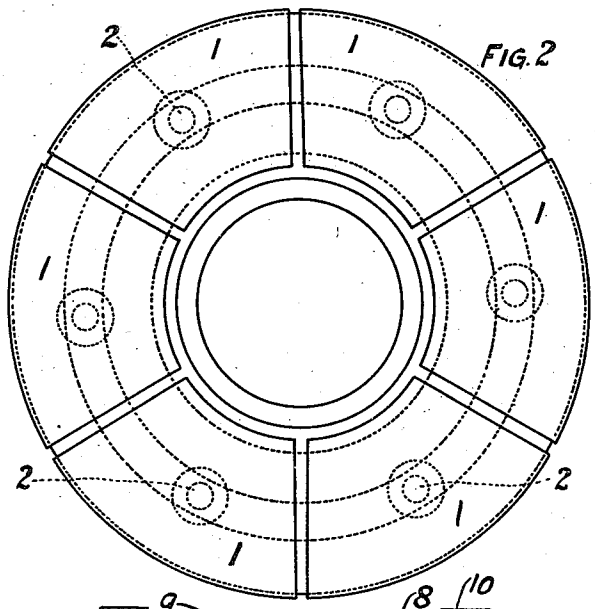
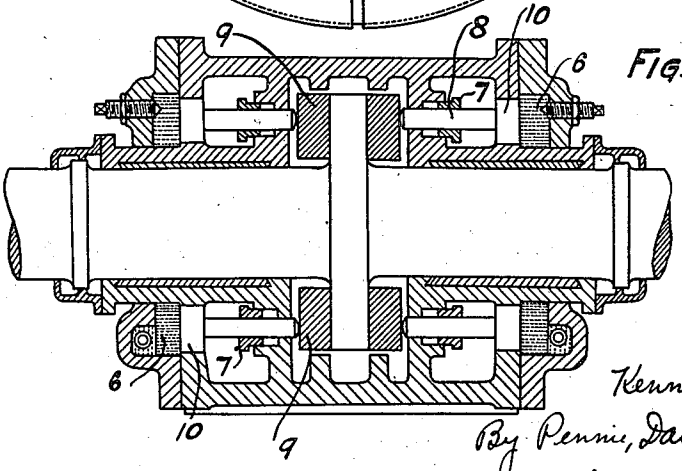


FIG. 3.



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3 SHEETS—SHEET 2.

FIG. 6.

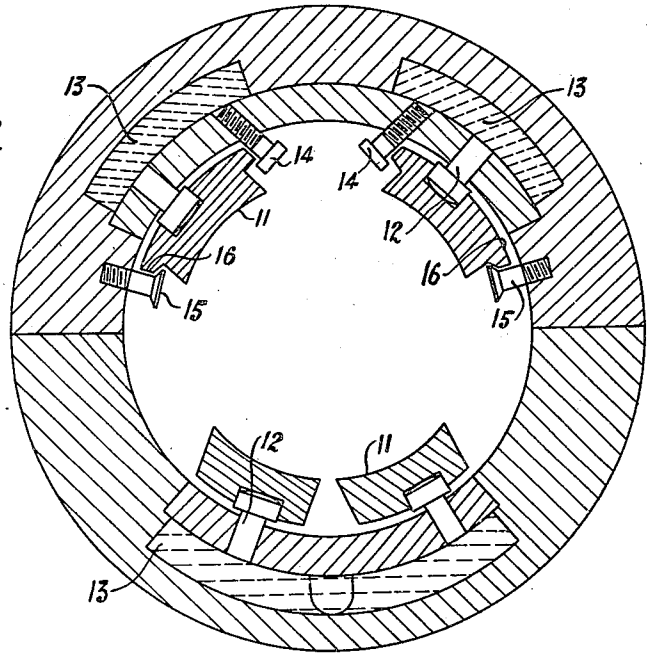
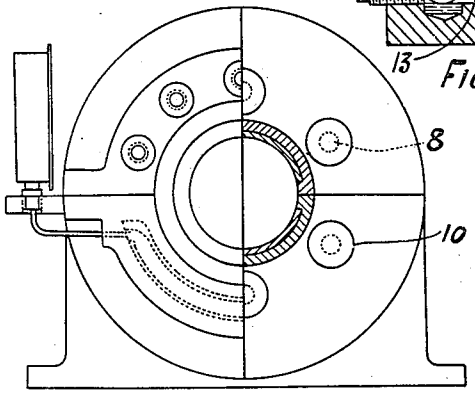


FIG. 4.



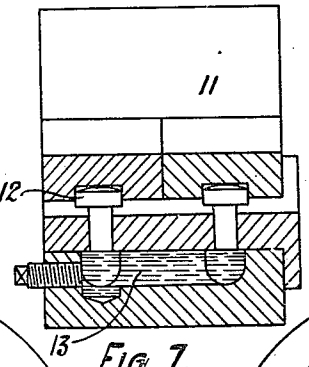
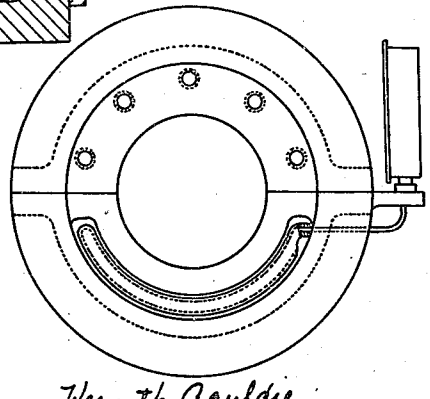


FIG. 7.

FIG. 5.



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3 SHEETS—SHEET 3.

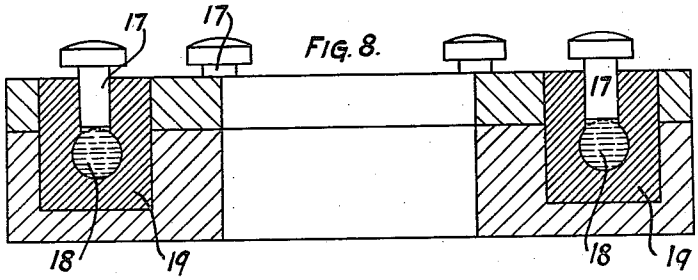


FIG. 8.

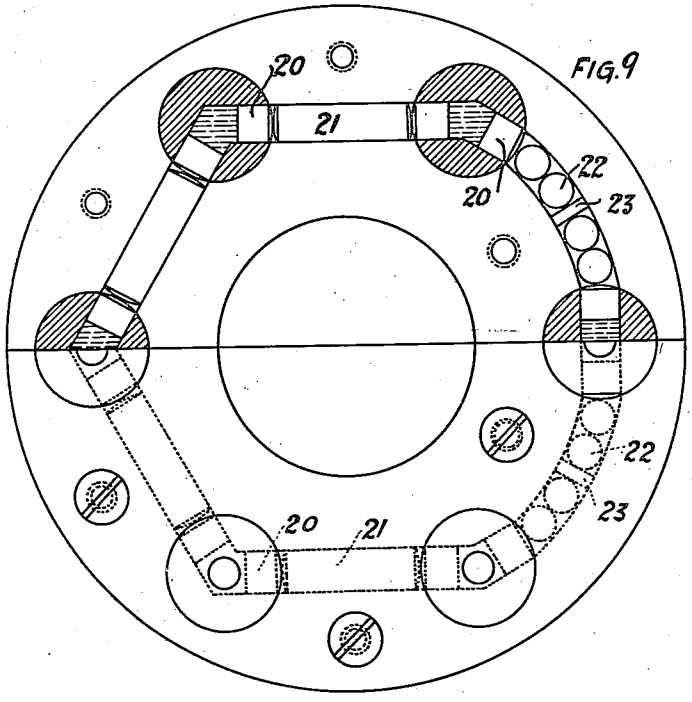


FIG. 9.

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UNITED STATES PATENT OFFICE.

KENNETH GAULDIE, OF GLASGOW, SCOTLAND.

BEARING.

1,421,208. Specification of Letters Patent. Patented June 27, 1922.

Application filed June 10, 1920. Serial No. 387,810.

To all whom it may concern:

Be it known that I, KENNETH GAULDIE, a subject of the King of the United Kingdom of Great Britain and Ireland, and residing at Glasgow, Scotland, have invented a certain new and useful Improvement in Bearings, of which the following is a specification.

In the construction of the segmented or pivoted-bearing surface type of bearing, now largely used for carrying axial loads, one of the main problems of design is to ensure that the load is equally borne by the segments comprised in the bearing, for which purpose the segmental bearing surfaces may be supported on a deformable seating.

The characteristic of the present invention resides in the feature that the segmental bearing surfaces are supported indirectly on the deformable seating through the medium of pistons. It is preferable that the surface of the seating on which the pistons rest or at least that portion of the surface close to the edges of the pistons should be of solid material or possess sufficient of the properties of a solid to prevent its extrusion under moderate pressure through a small chink or orifice, in order to obviate the necessity for piston packings, the efficacy of which is always doubtful when absolute tightness is required. Confined masses of deformable solids like lead or india-rubber, or liquids confined in a receptacle by a diaphragm on which the pistons rest, are examples of deformable seatings having a solid surface on which the pistons may press without danger of the extrusion past the pistons of the material of the seating under any pressure likely to be encountered in practice.

The particular advantage to be derived from this arrangement depends on the nature of the deformable substance employed to constitute the seating. Certain substances, such as pure rubber, which are otherwise applicable cannot withstand indefinitely the solvent or deteriorating action of lubricating oil. The invention permits the isolation of the seating from the oil in the bearing by means of stuffing boxes surrounding piston rods on the ends of which the segmental bearing surfaces are supported and through which the force on the segmental bearing surfaces is transmitted to the pistons resting on the deformable seating. Certain other comparatively easily deformable substances, such as lead or other soft metal or alloy, are stable under the influence of oil but are unsuitable for the direct seating of the segmental bearing surfaces on account of their rigidity. However, by supporting the segmental bearing surfaces on small pistons in contact with a confined mass of such material, the intensity of the pressure within this material can be raised to a very high value, sufficiently high to cause such material to yield comparatively readily to any serious difference of pressure on the segmental bearing surface supporting pistons. When the deformable substance is a liquid or for any other reason it is confined by means of a flexible diaphragm, the function of the pistons is to distribute the pressure of the segmental bearing surface over a reasonable area of diaphragm.

The invention is illustrated in Figs. 1 and 2 of the accompanying drawings in its application to a suspension bearing. In this bearing the pads 1 are supported on the rounded ends of small pistons 2, which rest on the surface of a confined mass of lead or similar deformable substance. It may be desirable when the deformable substance is of fairly rigid constitution such as lead, to combine it with a less rigid material such as rubber. For instance, a thick layer of the more rigid substance 3 may surround a core 4 of the less rigid substance, the composite mass being of much less rigidity than a mass composed wholly of lead. Or, for the same purpose, a layer of lead or similar material may lie above a layer of the less rigid substance. The deformable substance is confined within an enclosed annular groove 25.

The central tubular part 5 forms with the casing in which the bearing is set an oil reservoir in which the bearing surfaces are completely immersed.

In the bearing shown in Figs. 3, 4 and 5 the deformable seating 6 is isolated from the

lubricant in the bearing by means of stuffing boxes 7 surrounding the piston rods 8 on which the pads 9 are supported and through which the pressure on the pads is transmitted to the pistons 10 resting on the deformable seating, of rubber or similar easily deformable substance.

A journal bearing according to the invention is illustrated in Figs. 6 and 7. In this construction the segmental bearing surfaces 11 supporting the journal are borne on pistons 12 which each rest on the surface of a confined deformable seating 13. To minimize the effect of compression, the seating is confined to intercommunicating grooves of small volume. The bearing illustrated is divided into three sections, a bottom section carrying the weight of the rotating body and two top sections which with the bottom section centre the shaft. Each section has its own separate deformable seating. This separation is necessary, as otherwise the seating would be displaced from the position of maximum pressure and the shaft would get out of centre. Displacing screws 14 entering the deformable seatings are provided for the adjustment and centering of the shaft. The heads of screws 15 engaging loosely with projections 16 on the segmental bearing surfaces facilitate assembly by holding all the loose parts in position even although inverted.

Figs. 8 and 9 illustrate a modification, the object of which is to increase the sensitiveness of the load-distributing material when of lead or similar material which yields by flowing. A confined mass of such a substance when subjected to a pressure difference is capable of sustaining a moderate shear indefinitely and consequently the further apart are the points where unequal pressures are applied the greater must be the pressure difference to overcome the shearing resistance of the intervening material. According to this modification the pistons 17, Fig. 8, supporting the thrust-segmental bearing surfaces (not shown) are borne on small masses 18, of the deformable material confined in containers 19 in the sides of which small pistons 20 are fitted. These pistons are in rigid communication with one-another, either directly, through distance pieces 21 sliding in grooves, or by balls 22, with fitting pieces 23, also sliding in grooves, or similar rigid connection, if necessary. The slight movements incidental to load adjustment are thus transmitted through rigid parts which move with little friction and the effect of shear in the seatings is thus reduced to a minimum and the pressure difference required to cause a movement of the segmental bearing surface-supporting pistons becomes approximately that merely required to deform the small masses of the confined material.

I claim:—

1. In a bearing, in combination, segmental bearing surfaces, a confined seating including a body of rubber to which the force exerted on the segmental bearing surfaces is transferred for equalization, and pistons interposed between said pads and said seating.

2. In a bearing, in combination, segmental bearing surfaces, a confined deformable seating to which the force exerted on said segmental bearing surfaces is transferred for equalization, pistons interposed between said segmental bearing surfaces and said seating, piston rods, and stuffing boxes surrounding said rods.

3. In a bearing, in combination, segmental bearing surfaces, a confined deformable mass to which the forces exerted on said surfaces are transferred for equalization, independent pistons on one end of which said bearing surfaces are pivoted and which at the opposite end rest on the surface of said deformable mass and guides for said pistons restricting the movement of said pistons as a whole to the direction normal to the surface of said deformable mass.

4. In a bearing, in combination, segmental bearing surfaces, a confined deformable mass to which the forces exerted on said surfaces are transferred for equalization, independent pistons on one end of which said bearing surfaces are pivoted and which at the opposite end rest on the surface of said deformable mass and guides for said pistons restricting the movement of said pistons as a whole to the direction normal to the surface of said deformable mass, said mass being at least as to that part on the surface of which the pistons rest of a material possessing the properties of a solid.

5. In a bearing, in combination, segmental bearing surfaces, a confined deformable mass including a body of rubber to which the forces exerted on said surfaces are transferred for equalization, independent pistons on one end of which said bearing surfaces are pivoted and which at the opposite end rest on the surface of said deformable mass and guides for said pistons restricting the movement of said pistons as a whole to the direction normal to the surface of the deformable mass.

6. In a bearing, the combination of a plurality of bearing surfaces, pistons supporting said bearing surfaces, a deformable mass supporting said pistons and confined within an enclosed channel, said deformable mass comprising sections of rubber and interposed rigid members.

7. In a bearing, the combination of a plurality of bearing surfaces, pistons supporting said bearing surfaces, and a confined deformable seating comprising rubber and lead supporting the pistons and equalizing the pressures exerted thereupon.

8. In a bearing, the combination of a plurality of bearing surfaces, pistons supporting said bearing surfaces, and a confined deformable mass comprising a plurality of materials of varying rigidity supporting the pistons and equalizing the pressures exerted thereupon.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

KENNETH GAULDIE.

Witnesses:

KATE FOTHERINGHAM,

ANNE R. WATT.