(No Model.) 2 Sheets—Sheet 1.

B. D. WHITNEY.

STEP BEARING.

No. 541,303. Patented June 18, 1895.

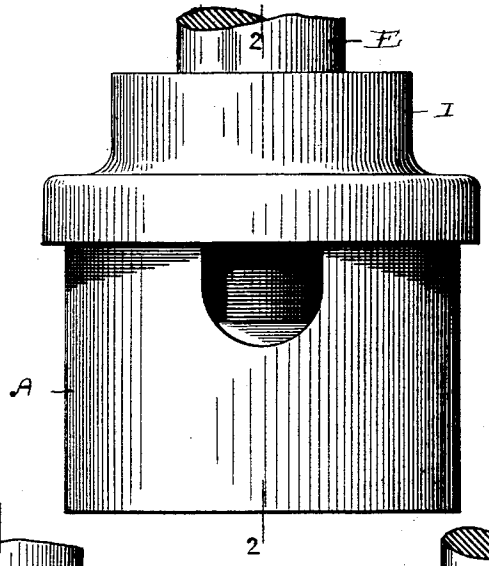

Fig. 1.

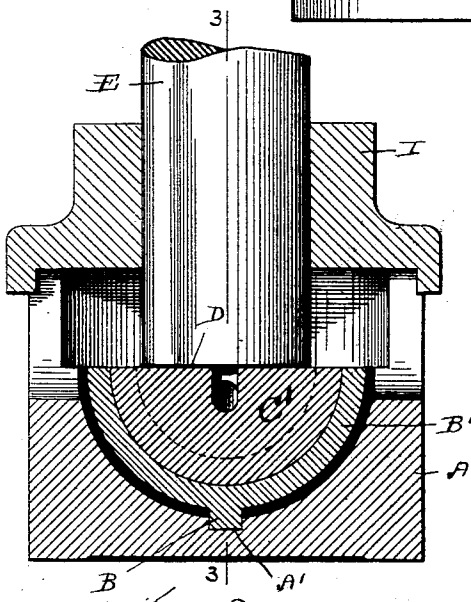

Fig. 2.

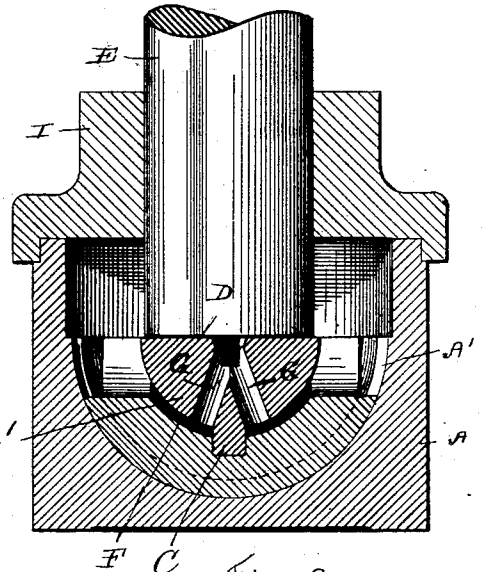

Fig. 3.

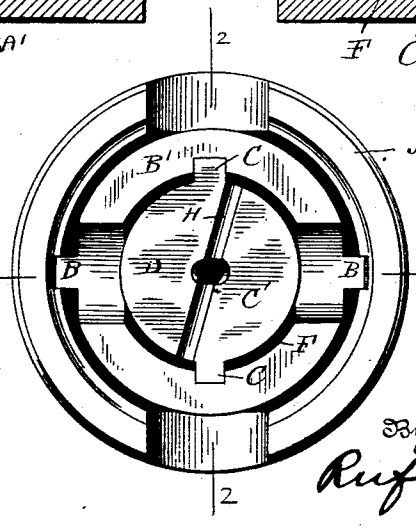

Fig. 4.

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Rufus B. Fowler.

(No Model.) 2 Sheets—Sheet 2.

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STEP BEARING.

No. 541,303. Patented June 18, 1895.

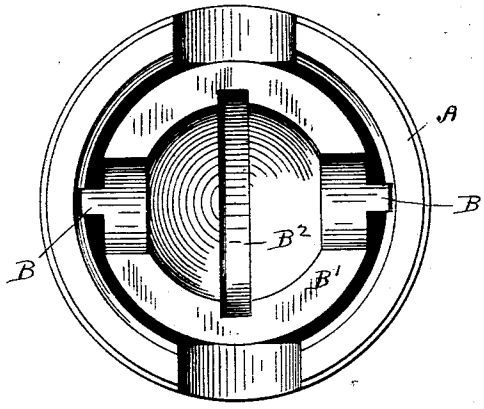

Fig. 5.

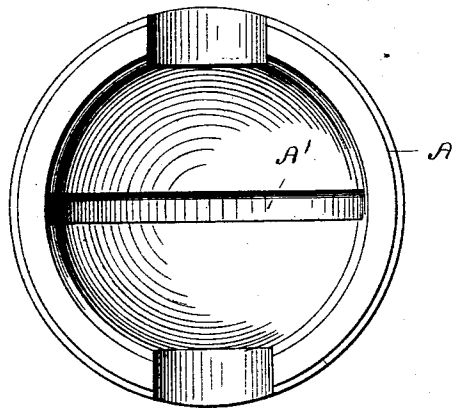

Fig. 6.

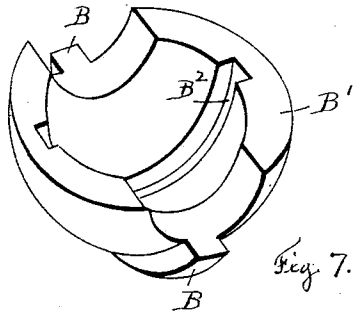

Fig. 7.

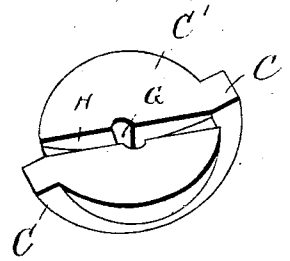

Fig. 8.

Witnesses
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Emma Kester.

Inventor
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UNITED STATES PATENT OFFICE.

BAXTER D. WHITNEY, OF WINCHENDON, MASSACHUSETTS.

STEP-BEARING.

SPECIFICATION forming part of Letters Patent No. 541,303, dated June 18, 1895.

Application filed October 25, 1892. Serial No. 449,991. (No model.)

To all whom it may concern:

Be it known that I, BAXTER D. WHITNEY, a citizen of the United States, residing at Winchendon, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Step-Bearings, of which the following is a specification, accompanied by drawings, forming a part of the same, in which—

Figure 1 represents a side elevation of a step-bearing embodying my invention. Fig. 2 is a vertical central sectional view on lines 2 2, Figs. 1 and 4. Fig. 3 is a vertical central sectional view on lines 3 3, Figs. 2 and 4. Fig. 4 is a top view of the step-bearing. Fig. 5 is a top view of the step-bearing with the central disk or block removed. Fig. 6 is a top view of the bed upon which the step-bearing is supported. Fig. 7 is a perspective view of the semispherical shell supported by the bed and forming the cradle for the shaft bearing-block, and Fig. 8 is a perspective view of the central disk or shaft bearing-block held in the cradle and against which the end of the shaft bears.

Similar letters and numerals refer to similar parts in the different figures.

The object of my invention is to provide an end, or step-bearing for rotating shafts, whether vertical, horizontal, or otherwise, which will yield to conform to the end of the shaft bearing upon it, whereby the endwise pressure of the shaft shall be uniformly distributed over the entire surface of the bearing in contact with the shaft, and I attain this object by means of the device hereinafter described and shown in the accompanying drawings, in which, A denotes the bed upon which my improved bearing is supported, represented in the present instance as a shell, or case, inclosing the bearing, and provided with an interior curved groove A′ to receive the curved rib B.

The rib B is formed upon the outside of the semi-spherical shell B′, which is provided upon its interior surface with a curved groove, B^2, placed at right angles with the rib B and receiving the curved rib C, formed upon the outer surface of the semi-spherical block C′, which is provided with the bearing surface D to receive the end of the shaft E. The two pieces, namely, the semi-spherical shell B′ which I term the cradle and the semi-spherical block C′ which I term the thrust block, are interposed between the base A and the end of the shaft with the weight of the shaft resting upon the plane surface D of the thrust block, the weight of the shaft and thrust block being received by the cradle and the downward pressure of the shaft, thrust block and cradle being received by the base A forming a solid support for the shaft E, or a support providing a solid and continuous mass of metal between the end of the shaft and the bearing surface of the shell A and in the line of the axis of the shaft; and one feature of my invention consists in making the thrust block and cradle capable of a rocking motion in planes at right angles to each other so they may be rocked by any variation in the alignment of the shaft in order to maintain an equal pressure of the end of the shaft upon the bearing surface D of the thrust block. I, therefore, make the thrust block C′ capable of rocking in one plane upon its curved rib C and the cradle B′ capable of rocking in a plane at right angles thereto upon its curved rib B; and it will be obvious that this result would be equally accomplished were the curved surfaces of the thrust block and cradle which are provided with the ribs B and C, semi-cylindrical instead of semi-spherical.

The ribs B and C are each arcs of circles whose radii equal the radii of their respective grooves A′ and B^2; the ribs fitting within said grooves and being capable of a rocking motion therein.

The ribs B and C are preferably concentric and with their centers lying in the plane of the bearing surface D and, also, within the planes of the sections 2, 2, and 3, 3, Fig. 4, so than an unequal pressure upon the surface D, upon each side of the plane 3, 3, will rock the rib C within the groove B^2 and thereby incline the bearing surface D until it conforms to that of the shaft and an equilibrium of pressure is restored. In like manner, an unequal pressure upon the surface D, upon each side of the plane 2, 2, will rock the rib B within the groove A′ until an equilibrium of pressure is restored.

Any variation of the alignment of the shaft E will be compensated for by the rocking of the thrust block C′, until its surface is brought

into a plane at right angles to the axis of the shaft, thereby restoring an equipoise over the bearing surfaces.

The pressure of the shaft, exerted in the line of its axis will be received by the bed A and ribs B, C, in their planes of intersection, causing the end-thrust of the shaft to be resisted by a solid mass of metal.

The thrust block C′ shown in Fig. 8 is represented as semi-spherical in form, but such form is not essential, as the operation of the bearing requires only a bearing surface D and a circular rocking surface, substantially like that formed by the rib C, which will allow the inclination of the bearing surface in the plane of the rib.

The shell B′ represented in Fig. 7, I prefer to make semi-spherical in form, but such form is not essential, as it can be made in any suitable form which will serve as a rocking cradle to receive and support the rocking thrust block C′.

When the cradle B′ is semi-spherical as shown in Fig. 7, the chamber F will serve as a cup for lubricating material, which can gain access to the bearing surface through the holes G, G, communicating with the groove H, extending diametrically across the surface D.

In the bearing shown in the accompanying drawings, the shaft E is held in position upon the bearing surface D by means of a collar I; but any variation in the alignment of the shaft, which causes an inclination of its axis, will not affect the pressure upon the bearing surface D, as the rocking thrust block C′ and cradle B′ will accommodate themselves to the changed alignment, as already described, the bearing surface D varying its inclination as the resultant of the rocking motions of the shaft bearing thrust block C′ and its supporting cradle B′.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination with a shaft and a bed arranged to receive the end thrust of said shaft, of two intervening blocks between said bed and the end of the shaft, one of said blocks having upon one side a plane bearing surface in contact with a corresponding plane surface upon the end of the shaft and at right angles to its axis and forming a thrust block, the other of said blocks being interposed between said thrust block and said bed, each of said blocks being capable of a rocking motion in planes at right angles to each other, whereby the bearing surface of said thrust block is tilted, or inclined, in order to maintain an equilibrium of pressure thereon, substantially as described.

2. The combination with a shaft, and a supporting bed by which the end thrust of said shaft is received, of a step-bearing interposed between said bed and said shaft, consisting of a block provided with a plane bearing surface resting against a corresponding plane surface upon the end of said shaft and at right angles to the axis of said shaft, said block having its opposite side provided with a rib in the form of a circular arc, upon which said block is capable of rocking, whereby the position of said block is made to correspond with any variation in the alignment of said shaft within the plane of said rib, substantially as described.

3. The combination with a shaft and a supporting bed by which the end-thrust of said shaft is received, of a step-bearing interposed between the end of said shaft and said bed and comprising a shell capable of rocking in one plane upon said bed and forming a cradle for a shaft bearing block, and a shaft bearing block capable of rocking in a plane at right angles to the rocking plane of said cradle and having a bearing surface bearing against the end of said shaft, whereby said bearing surface is tilted, or inclined, so as to maintain an equilibrium of pressure upon the entire bearing surface, substantially as described.

4. The combination with a supporting bed A, provided with a groove A′, of a cradle B′, having a groove B^2, a block C′ having a rib C, fitting said groove B^2, and provided with a bearing surface D, adapted to receive the end-thrust of the shaft, whereby said block C′ and said cradle B′ are capable of being rocked in planes at right angles to each other, in order to maintain an equilibrium of pressure upon the bearing surface D, substantially as described.

5. In a step bearing for a shaft, the combination of a shaft supporting block C′ held in a semi-spherical shell, a semi-spherical shell B′ supporting said block C′, there being an intervening space F between said shell and said block for lubricating material, said block having holes leading from said intervening space to its bearing surface, substantially as described.

6. A thrust bearing consisting of a thrust block provided with a curved or rocking surface on the side opposite to that which opposes the end of a shaft, a rocking cradle provided on one side with an internal groove suited to engage the curved, or rocking surface of said thrust block and provided upon its opposite side with a curved or rocking surface upon which said cradle is capable of rocking in a plane at right angles to the rocking motion of said thrust block, and a supporting bed provided with a groove suited to engage the curved, or rocking, surface of said cradle, substantially as described.

Dated this 22d day of October, 1892.

BAXTER D. WHITNEY.

Witnesses:

GEO. M. WHITNEY,

M. A. YOUNG.