L. HERRMANN.

BALL BEARING.

APPLICATION FILED MAR. 20, 1908.

901,169. **Patented Oct. 13, 1908.**

2 SHEETS—SHEET 1.

Fig. 1.

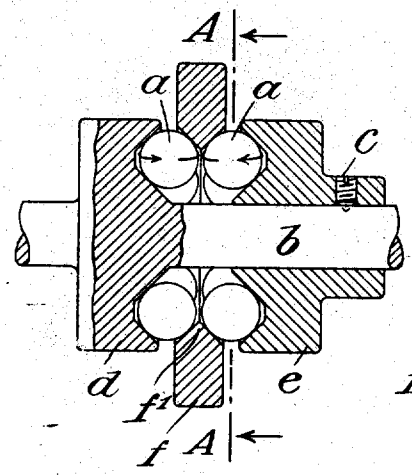


Fig. 2.

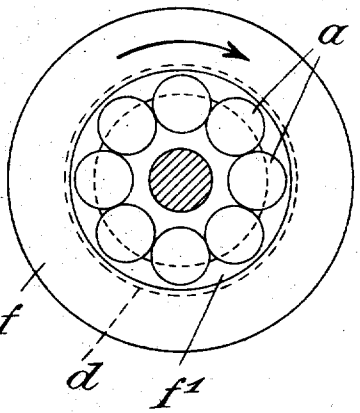
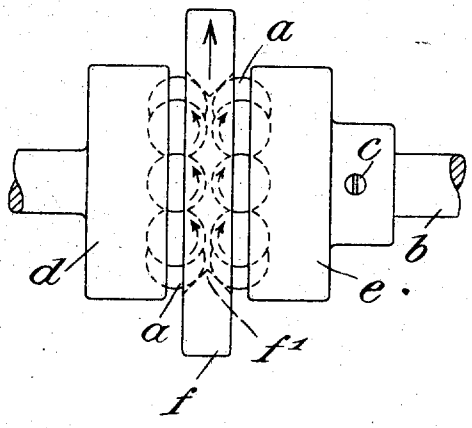


Fig. 3.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 4.

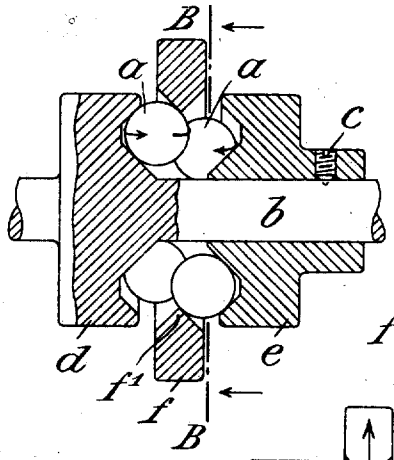


Fig. 5.

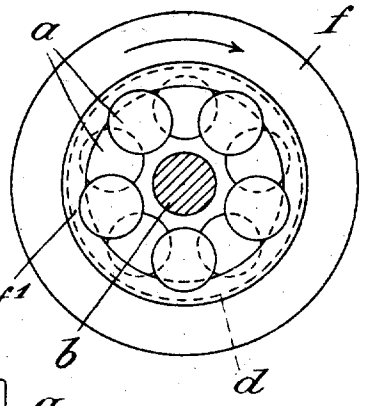


Fig. 6.

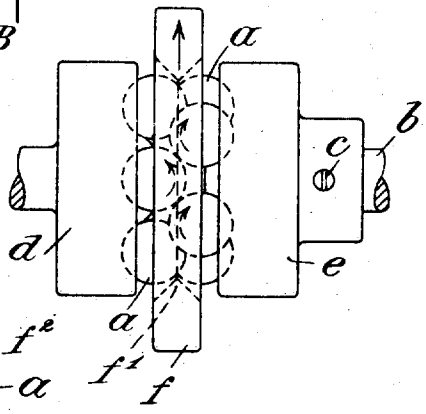
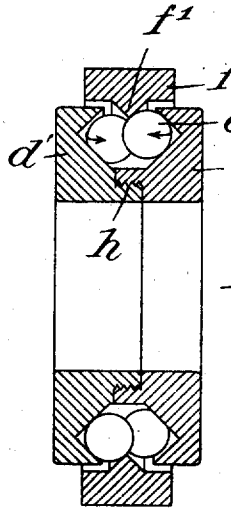


Fig. 7.



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LUDWIG HERRMANN, OF NUREMBERG, GERMANY.

BALL-BEARING.

No. 901,169. Specification of Letters Patent. Patented Oct. 13, 1908.

Application filed March 20, 1908. Serial No. 422,268.

To all whom it may concern:

Be it known that I, LUDWIG HERRMANN, German subject, residing at No. 46 Galgenhofstrasse, Nuremberg, Germany, have invented new and useful Improvements in Ball-Bearings, of which the following is a specification.

The subject of my invention is a ball-bearing in which the one main bearing-part presents a ridge or knife-edge resting in a saddle constituted by two adjacent, or mutually engaging, rows of balls, in such manner that the balls, forced against the walls of the race presented by the other main bearing-part, turn on axes located at right-angles and radially to, the main axis.

The new bearing enables easier running, with less wear and tear of the parts.

Various forms of construction of my invention are illustrated in the accompanying drawings, in which

Figure 1 is a vertical section of a bearing with adjacent, but not mutually engaging, rows of balls. Fig. 2 is a section on the line A—A of Fig. 1, seen in the direction of the arrow (Fig. 1). Fig. 3 is a plan of Fig. 1. Fig. 4 is a vertical section of a modification, in which the ball-rows mutually engage. Fig. 5 is a section on the line B—B of Fig. 4, seen in the direction of the arrow (Fig. 4). Fig. 6 is a plan of Fig. 4. Fig. 7 is a vertical section of a further modification with mutually engaging rows of balls.

Referring more particularly to Figs. 1–3, the bearing consists of the two parts *d*, *e*, containing the balls *a*, the part *d* being here shown integral with the shaft *b*, while the part *e* is secured to the latter by a screw *c*. The outer ring *f* of the bearing presents a wedge-shaped ridge f^1, which fits into the saddle constituted by the two adjacent rows of balls *a*, so that the latter are forced against the walls of the race presented by the bearing-parts *d*, *e*. Provided the angles of the grooves in the parts *d*, *e*, and the dimensions of the different parts of the bearing, are suitably selected, the balls *a*, when the ring *f* rotates, will not, as ordinarily in ball-bearings, be caused to turn on axes lying parallel with the main axis, but on axes which are directed at right-angles and radially to the main axis. Thus each separate row of balls moves in its race-groove like the ball in the race of a ball thrust-bearing, the load on the balls in the direction of the axis being caused by the ridged ring *f*.

A particular advantage of the new ball-bearing is that the individual balls of the two ball-rows *a a* can be staggered relatively to each other, that is to say, the balls of the one row may engage the balls of the other row. In such case at the mutual points of contact of the balls there is no sliding, but only rolling friction, since the balls, turning in counter-directions, mutually roll upon each other. The bearing shown in Figs. 4–6 works solely with rolling friction in this manner. In this modification the bearing consists, like that illustrated in Figs. 1–3, of two parts *d*, *e*, connected by means of the shaft *b* and screw *c*, and presenting race-grooves on the opposing faces to receive the balls *a*. The latter are staggered relatively to each other, so that there are two rows of balls formed, the individual balls of which two rows mutually contact, owing to the balls of one row lying in the spaces between the balls of the other row. Thus any given ball contacts with two balls of the adjacent row. As in the first described construction, the ring *f* does not present a race-groove to receive the balls as customarily, but has a wedge-shaped ridge f^1 which rests in the saddle constituted by the double row of balls *a*. The ridge f^1 thus tends to force the two ball-rows apart, so that they are pressed in the direction of the axis into the race-grooves in the parts *d*, *e*, the balls turning, as before, on axes which are directed at right-angles to the main axis, and thus radially outward.

The modification shown in Fig. 7 differs from that just described only in so far that the two parts of the composite inner ring d^1, e^1 are screwed together at *h*.

Having thus described my invention, I declare that what I claim as new is:—

1. A ball bearing comprising three parts, two of which are each provided with a race wall and race, two rows of balls located in said race and forming a saddle between the rows of balls, each row of balls being separated from the other, a bearing part having a knife edge entering said saddle between the two rows of balls and engaging the same, each race wall of the two first mentioned parts providing two bearing surfaces for its row of balls, the knife edge of the last mentioned bearing part providing bearing surfaces for both rows of balls near the inner edge of said knife edge, the said two bearing surfaces in each of the race walls and the bearing surfaces on the knife edge being disposed relatively to the

axis of the main bearing in such manner that the said balls turn on axes lying at right angles to the main axis of the bearing.

2. A ball bearing comprising three parts, two of which are each provided with a race wall and race, a row of balls arranged in each race, an outer bearing part having a knife edge engaging both rows of balls, each ball race providing two bearing surfaces for its row of balls, the knife edge of said outer bearing part providing a bearing surface for both rows of balls near the inner edge of said knife edge, the said bearing surfaces in each race wall and on the knife edge being disposed relatively to the main axis of the bearing in such manner that the balls turn on axes lying at right angles to the main axis of the bearing.

In witness whereof I have hereunto signed my name this 6th day of March 1908, in the presence of two subscribing witnesses.

LUDWIG HERRMANN.

Witnesses:
OSCAR BOCK,
WILHELM HERRMANN.