No. 677,434. Patented July 2, 1901.

H. BRINKMANN.

THRUST BEARING.

(Application filed Apr. 12, 1901.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.

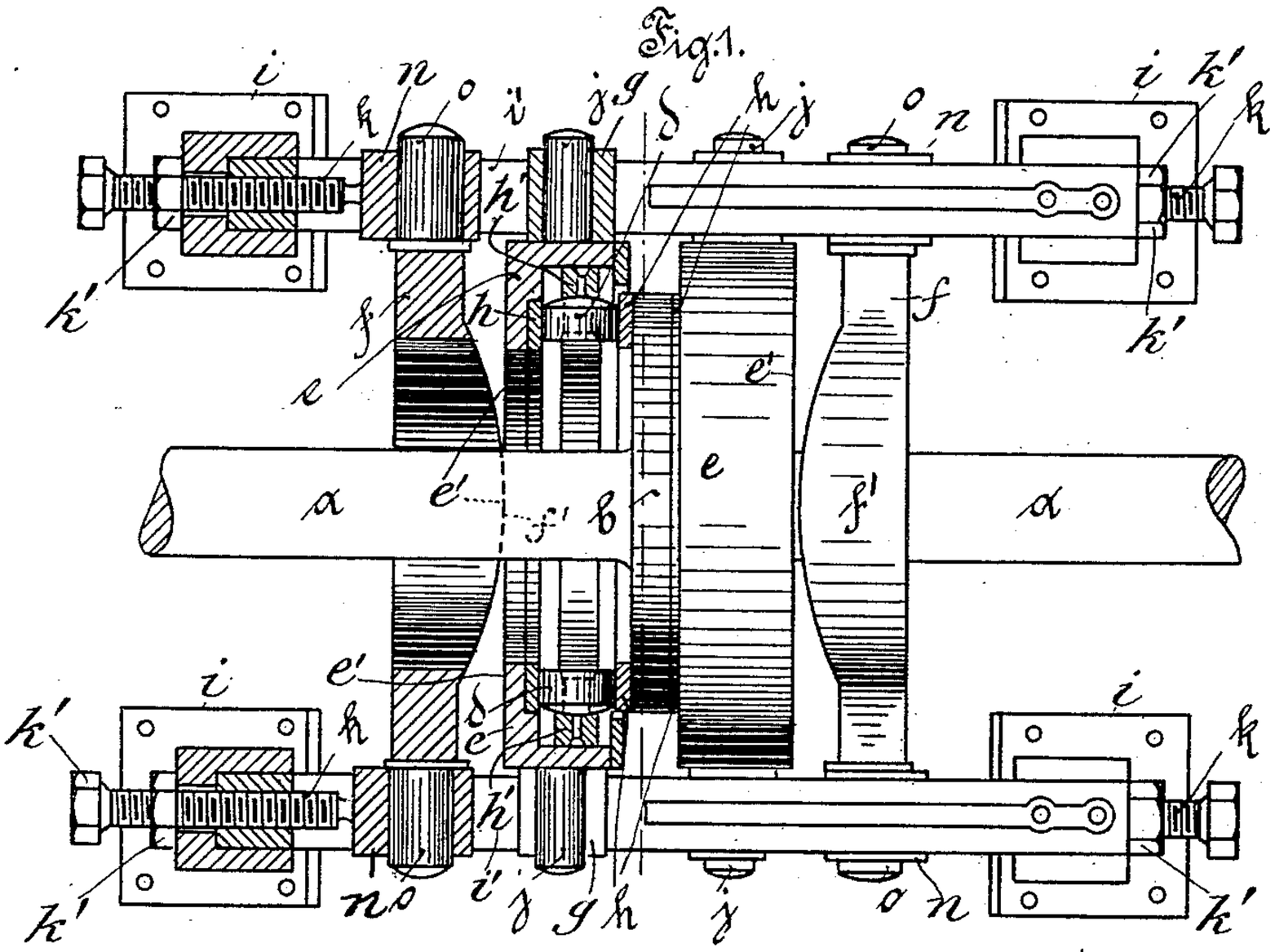

Fig. 3.

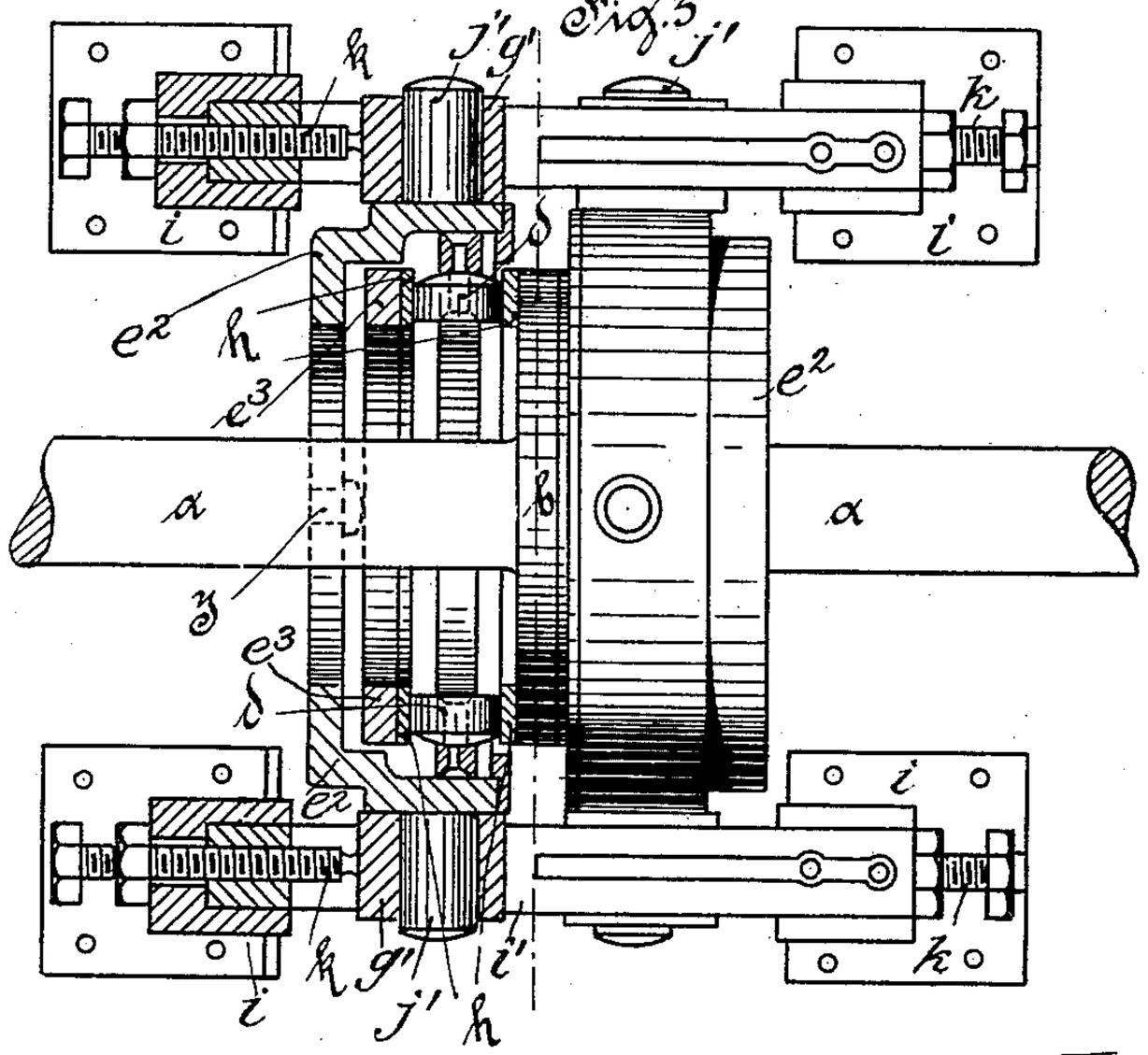

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Fig. 2.

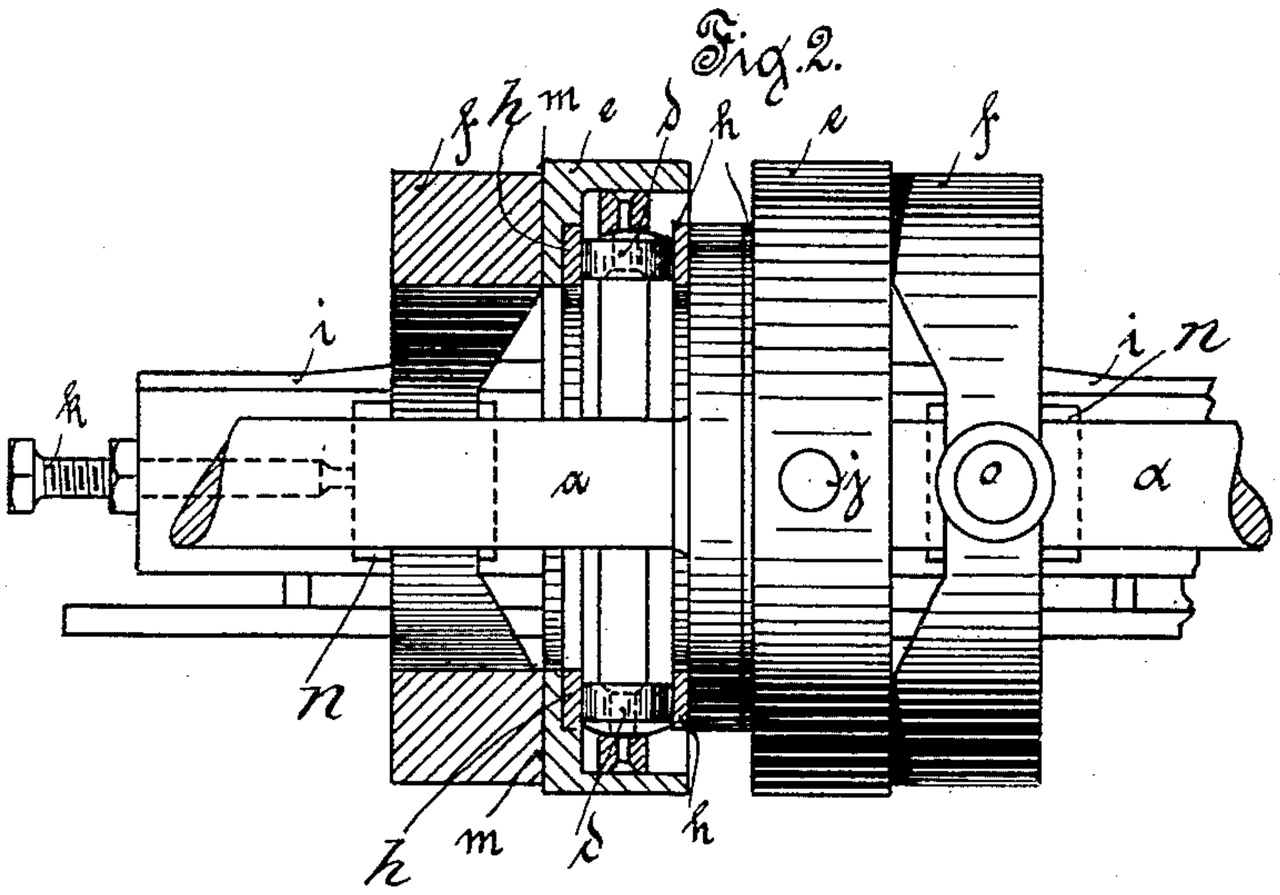

Fig. 4.

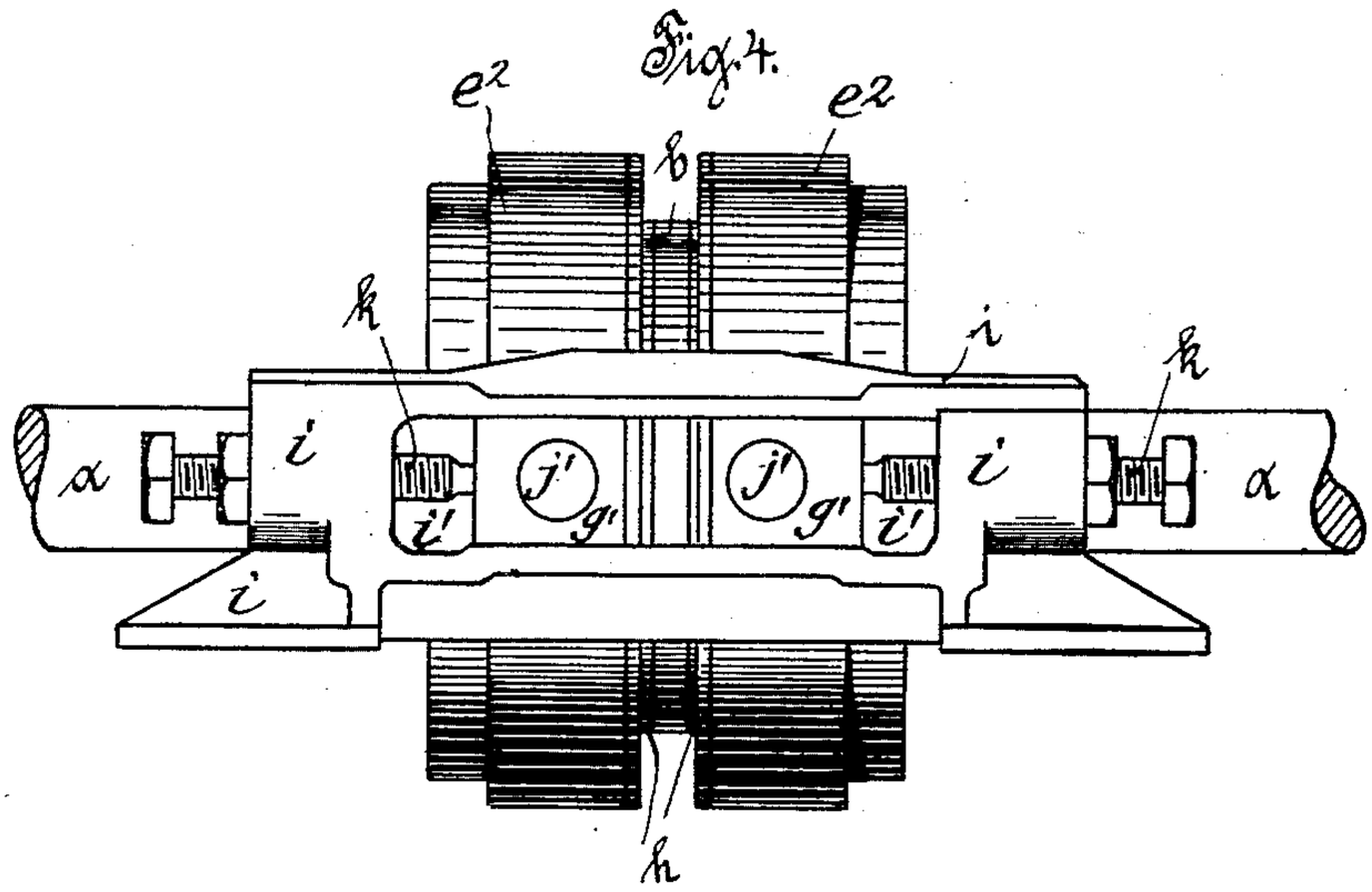

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Fig. 5.

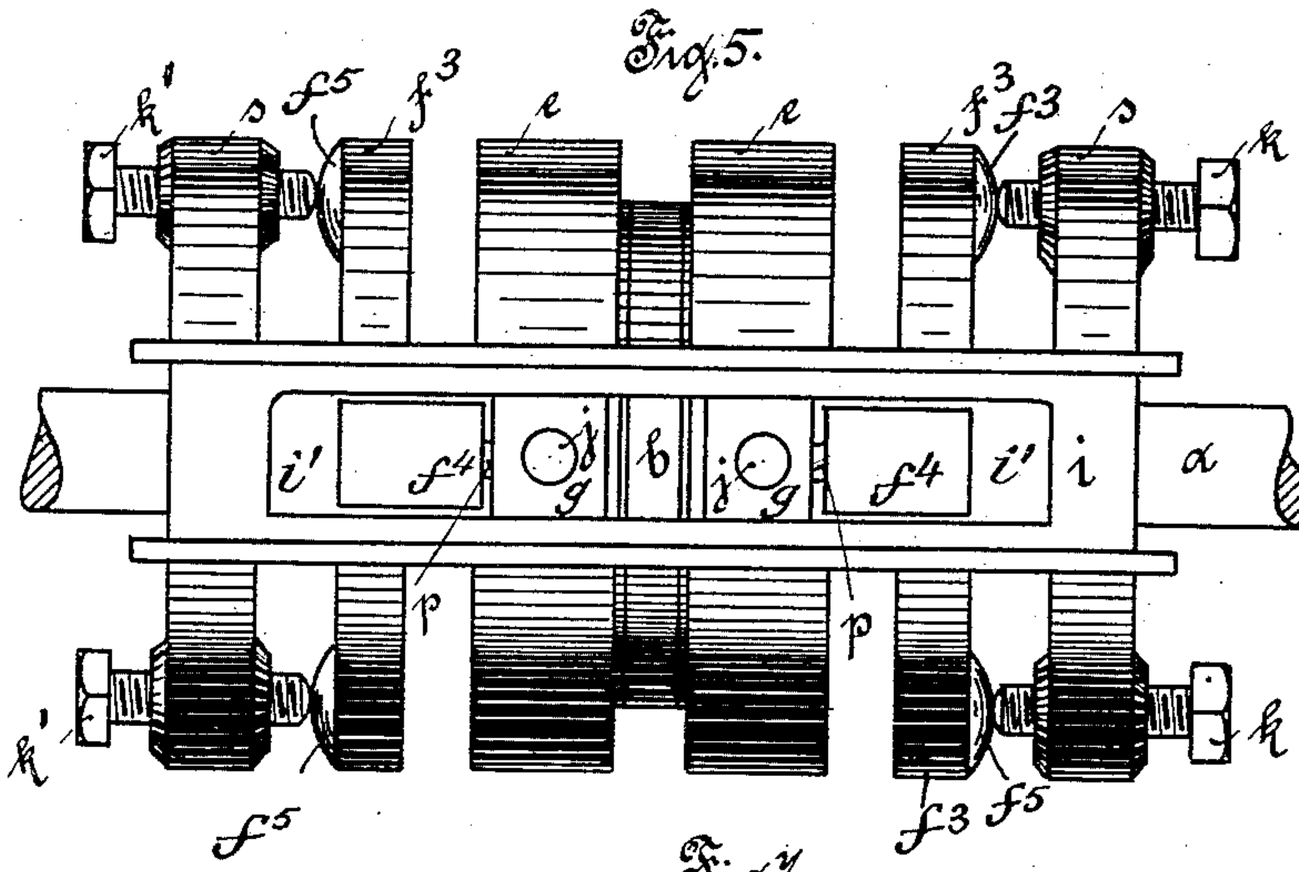

Fig. 6.

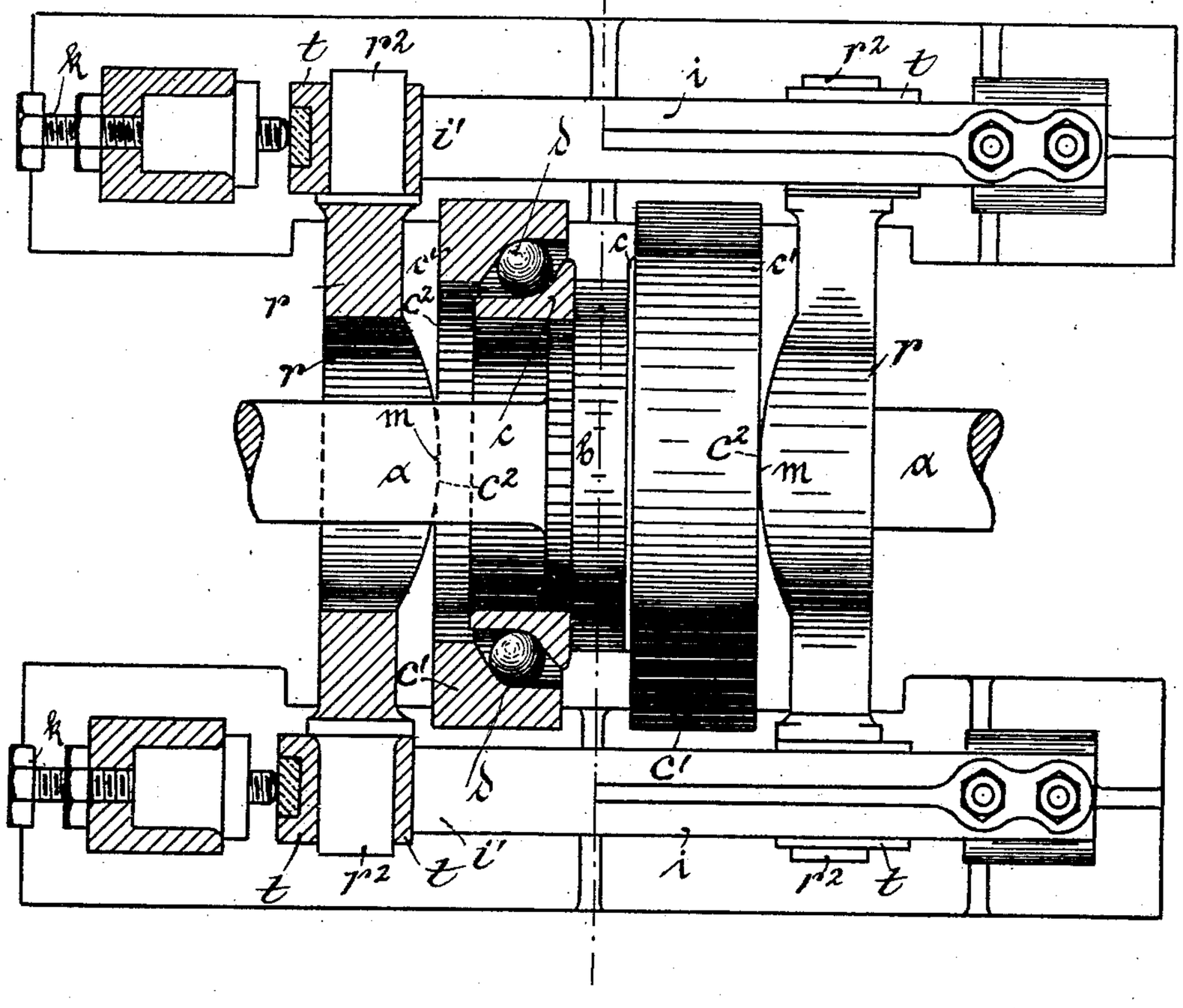

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Fig. 6.

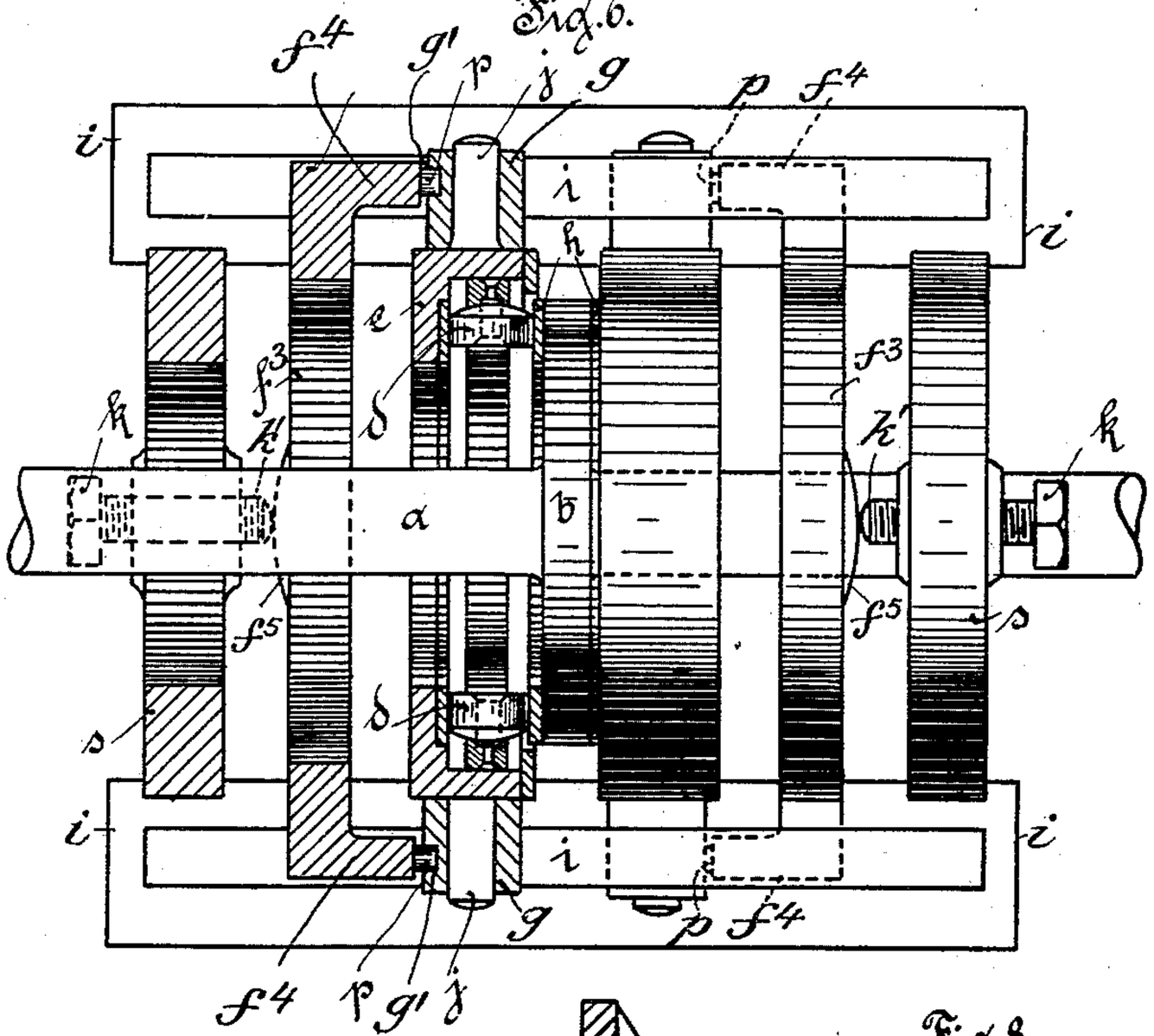
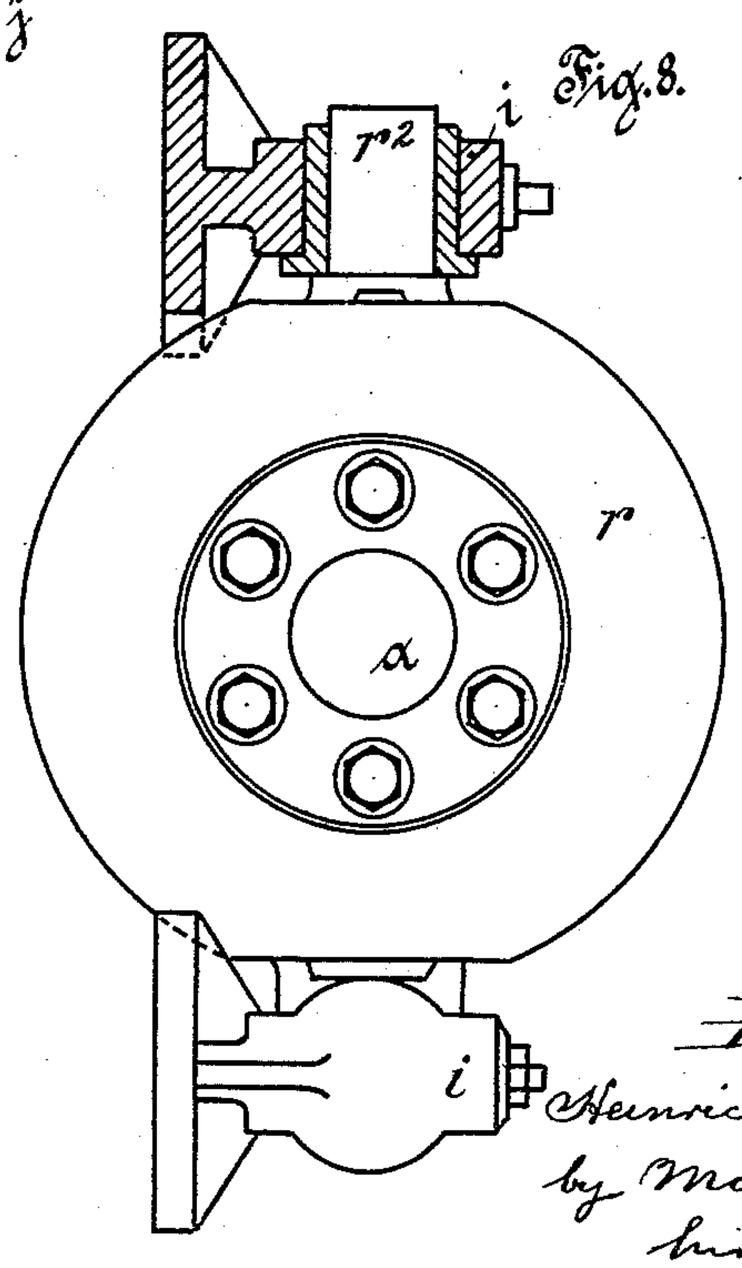


Fig. 8.



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UNITED STATES PATENT OFFICE.

HEINRICH BRINKMANN, OF MUNICH, GERMANY.

THRUST-BEARING.

SPECIFICATION forming part of Letters Patent No. 677,434, dated July 2, 1901.

Application filed April 12, 1901. Serial No. 55,484. (No model.)

To all whom it may concern:

Be it known that I, HEINRICH BRINKMANN, a citizen of the Empire of Germany, residing at Munich, in the Empire of Germany, have invented certain new and useful Improvements in Thrust-Bearings; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to thrust-bearings for the propeller-shafts of vessels, or for other revolving shafts that are subjected to pressure in an axial direction.

The object of my invention is to provide improved means for permitting the bearings to move, as it were, on a universal joint in order to compensate for any unequal wear in the bearing-surfaces and also to compensate for any slight lateral vibration or movement of the shaft.

With this object in view a thrust-bearing embodying my invention consists in a shaft provided with a disk secured transversely thereto, in combination with a head or heads containing bearings arranged to engage the disk and journaled in boxes and means for adjusting such boxes axially of the shaft.

My invention also involves the combination, with the above, of means for permitting the head or heads to swing about an axis perpendicular to the journals of the head; and my invention further comprises such details of construction and arrangements, either separately or in combination, as will be hereinafter particularly described and then pointed out in the claims.

In the accompanying drawings, representing mechanism embodying my invention in my preferred form of construction and arrangement, Figure 1 represents a plan view, certain parts being shown in section. Fig. 2 is an elevation of the mechanism shown in Fig. 1, certain parts being shown in section. Fig. 3 shows in plan a modification of the mechanism set forth in Fig. 1, certain parts being shown in section. Fig. 4 represents an elevation of the mechanism shown in Fig. 3. Fig. 5 shows in elevation another modification of my invention. Fig. 6 is a plan view of the modification shown in Fig. 5, certain parts being shown in section. Fig. 7 represents in plan view another modification, certain parts being shown in section. Fig. 8 is an elevation of the modification shown in Fig. 7, certain parts being shown in section.

Referring now particularly to Figs. 1 and 2, the reference-letter *a* indicates a shaft on which is secured transversely a disk *b*, having on each of its opposite faces a bearing ring or washer *h*. A bearing-head *e* has journals *j j* secured thereto at the extremities of a diameter and contains a series of antifriction devices, such as rollers *d*, pivotally secured thereto. A pair of stationary frames *i* are arranged parallel with each other, and each contains a longitudinal slot *i'*. In each of these slots is arranged to slide a journal-box *g*, that serves to support, respectively, the journals *j j* of the head *e*. The said frames and head are so located that the series of rollers *d* engage the disk *b* at its friction-ring *h*. A ring *f* has journals *o o* secured thereto at the ends of a diameter, which journals engage, respectively, the boxes *n n*, that are arranged to slide in the said slots *i' i'* of the frames *i i*. The said ring *f* has a cylindrical face *f'*, which ring is so located that the said cylindrical face engages the face *e'* of the head *e* on a line that is transverse to the axis of the journals *o* and also transverse to the axis of the shaft *a*. The movement of the said boxes *n n* in the slots *i' i'* is limited by a pair of adjusting-screws *k k*, which preferably have jam-nuts *k'* to secure them when properly adjusted. The head *e* may also have an antifriction-ring *h'*, arranged to engage the rollers *d*. The opposite face of the disk *b* has a bearing arrangement that is a duplicate of the parts hereinbefore described, but which are arranged in a reverse order from these described parts. The function of these duplicate parts is to receive the thrust of the shaft in the opposite direction from that which is received by the above-described parts. The operation of this mechanism is as follows: If there is an unequal wear in the ring *h* or the ring *h'* either above or below the shaft, the head *e* will automatically oscillate on the journal *j*, thus causing pressure between the rollers and the ring to be distributed among the series and not confined to a few of them, as would be the case were this head not so adjustable. The said journaled ring *f* can so oscillate and assist in compensating for the said wear of the ring *h* above or below the axis; but should there be an unequal wear of the ring *h* at either

side of the axis of the shaft the head *e* will automatically oscillate on a vertical axis in virtue of the bearing of the cylindrical face of the ring *f* on the side *e'* of the head *e* in a vertical line. During said oscillation the boxes *g* of the journal *j* will slide longitudinally in the slots *i'*, as will be readily understood. The operation of the bearing parts on the opposite side of the disk *b* will be identical with that just described. The adjusting-screws *k* permit the head *e* to be moved to and from the bearing-disk *b*, as desired. It will also be readily understood that any lateral movement or vibration of the shaft *a* will cause a corresponding distortion of the bearing-disk *b*, which will be automatically compensated for by the double oscillation of the head *e*, as above described.

Referring now particularly to Figs. 3 and 4, the head e^2 is mounted by journals *j'* in boxes *g'*, that slide in slots *i'* in the frame *i*, similar to the arrangement of the above-described box *e*. The box e^2 contains a series of antifriction devices, such as rollers *d;* but these rollers do not bear on the box *e*, as in the former case. A ring e^3 is mounted in the box e^2 and serves as a bearing for the said rollers *d*. A pair of pins J J are secured to the head e^2 at diametrically opposite points in a vertical line and contact with the rear face of the said ring e^3. The opposite face of the disk *b* in this modification also has a duplication of the parts just described, but which are arranged in a reverse order. In the operation of this modification the head e^2 oscillates on the journals *j' j'*, as in the form shown in Fig. 1; but in order to compensate for wear on the bearing-ring *h* on either side of the shaft *a* said ring e^3 oscillates about a vertical axis in virtue of its being supported on its rear face by the vertically-alined pins J. This modification has the adjusting-screws *k*, that serve the same function as in the form shown in Fig. 1.

In Figs. 5 and 6 is shown another modification, in which the bearing-disk *b* has the bearing-head *e*, containing the antifriction-rollers *d*, as hereinbefore described and shown with reference to Figs. 1 and 2. This head *e* also has the journals *j j*, engaging boxes *g g*, that slide in slots *i'* in frames *i*, similar to those shown in Fig. 1. A ring f^3 has diametrically opposite extensions f^4, to which are secured, respectively, pins *p p*, engaging apertures *g'* in the said boxes *g*. The rear face of this ring f^3 has at places that are ninety degrees distant from the said extensions f^4 projections f^5, that engage, respectively, adjusting-screws *k' k'*, mounted in a ring *s*, that is secured to the said frames. The opposing face of the disk *b* in this modification has a duplication of the bearing parts just described, but which are arranged in reverse order. In the operation of this modification the swinging head *e* performs the same function as in the form shown in Fig. 1—that is, it compensates for wear in the friction-ring *h* either above or below the axis *a*. When there is any wear in the friction-ring on either side of the axis, the ring f^3, swinging about a vertical axis by reason of its vertically-alined supports f^5 f^5, permits the box *e* to compensate for this wear.

Another modification of my invention is set forth in Figs. 7 and 8, in which the disk *b* has secured to its opposite faces rings or cones *c c*, in proximity to which are arranged, respectively, bearing-cups *c' c'*, which cups and cones form a raceway in which is located a series of balls *d*. A pair of rings *r*, each having a cylindrical face *m*, are arranged to contact with the rear face c^2 of the cups *c c* on a vertical line. The rings *r* have journals r^2 secured thereto at the extremities of a horizontal diameter, which journals engage boxes *t*, arranged to slide in the slots *i'* in the frames *i*. In the operation of this last modification the support of the cups *c' c'* by their cylindrical faces permits the oscillation of the same about a vertical axis, and thus automatically compensates for wear on either the cups or cones on either side of the shaft *a*. Any wear of the cups or cones either above or below the shaft is automatically compensated for by reason of the oscillation of the rings *r* about their horizontal axes on the journals r^2. Adjusting-screws *k* in this modification permit of movement of the parts in an axial direction, as will be readily understood from the foregoing.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a thrust-bearing, the combination with a shaft having a disk secured transversely thereto, of a head containing bearings arranged to engage said disk, a pair of journals secured to said head, a box engaging each of said journals, and means for adjusting said boxes axially of the shaft.

2. In a thrust-bearing, the combination with a shaft having a disk secured transversely thereto, of a head containing bearings arranged to engage a face of said disk, a pair of journals secured to said head, a box engaging each of said journals, means for adjusting said boxes axially of the shaft, a second head containing bearings arranged to engage the opposite face of said disk, a pair of journals secured to said second head, a box engaging each of said latter journals, and means for adjusting said latter boxes axially of the shaft.

3. In a thrust-bearing, the combination with a shaft having a disk secured transversely thereto, of a head containing bearings arranged to engage said disk, a pair of journals secured to said head, a box engaging each of said journals, means for adjusting said boxes axially of the shaft, and means for permitting said head to swing about an axis perpendicular to said journals.

4. In a thrust-bearing, the combination with a shaft having a disk secured transversely

thereto, of a head containing bearings arranged to engage a face of said disk, a pair of journals secured to said head, a box engaging each of said journals, means for adjusting said boxes axially of the shaft, means for permitting said head to swing about an axis perpendicular to said journals, a second head containing bearings arranged to engage the opposite face of said disk, a pair of journals secured to said second head, a box engaging each of said latter journals, means for adjusting said latter boxes axially to the shaft, and means for permitting said second head to swing about an axis perpendicular to said journals.

5. In a thrust-bearing, the combination with a shaft having a disk secured transversely thereto, of a head containing bearings arranged to engage said disk, a pair of journals secured to said head, a box engaging each of said journals, said boxes being arranged to move in a plane parallel with the axis of said shaft, a ring having projecting portions on one face so arranged as to engage said head on a line that is perpendicular to said shaft and also perpendicular to the axis of said head, a pair of journals secured to said ring, and a second pair of boxes engaging said journals on the ring, said latter boxes being arranged to move in a plane parallel with the axis of said shaft.

6. In a thrust-bearing, the combination with a shaft having a disk secured transversely thereto, of a head containing bearings arranged to engage said disk, a pair of journals secured to said head at the extremities of a diameter, a box engaging each of said journals, a pair of slotted frames, said boxes being arranged to slide in the said slots in the frames, said frames being so arranged that said boxes move in a plane parallel with the axis of said shaft, and means for permitting said head to swing about an axis that is perpendicular to said plane.

7. In a thrust-bearing, the combination with a shaft having a disk secured transversely thereto, of a head containing bearings arranged to engage said disk, means for supporting said head so that it can swing on an axis that is transverse to the said shaft, said supporting means being arranged to move in a plane parallel with said shaft, a ring having projecting portions on one face so arranged as to engage said head on a line that is perpendicular to the axis of said shaft and also perpendicular to the axis of the said head, and means for supporting said ring.

8. In a thrust-bearing, the combination with a shaft having a disk secured transversely thereto, of a head containing bearings arranged to engage said disk, means for supporting said head so that it can swing on an axis that is transverse to the said shaft, said supporting means being arranged to move in a plane parallel with said shaft, a ring having projecting portions on one face so arranged as to engage said head on a line that is perpendicular to the axis of said shaft and also perpendicular to the axis of the said head, means for supporting said ring, and means for adjusting said supporting means.

9. In a thrust-bearing, the combination with a shaft having a disk secured transversely thereto, of a head containing bearings arranged to engage said disk, means for supporting said head so that it can swing on an axis that is transverse to the said shaft, said supporting means being arranged to move in a plane parallel with said shaft, a ring having projecting portions on one face so arranged as to engage said head on a line that is perpendicular to the axis of said shaft and also perpendicular to the axis of the said head, said ring being supported so as to swing on an axis that is parallel with the axis of the said head and that intersects the axis of the said shaft.

10. In a thrust-bearing, the combination with a shaft having a disk secured transversely thereto, of a head containing bearings arranged to engage said disk, a pair of journals secured to said head at the extremities of a diameter, a box engaging each of said journals a pair of slotted frames, said boxes being arranged to slide in the slots in said frames, said frames being so arranged that said boxes move in a plane parallel with the axis of said shaft, a ring having projecting portions on one face so arranged as to engage said head on a line that is perpendicular to the said shaft and also perpendicular to the axis of said head, a pair of journals secured to said ring, and a second pair of boxes also sliding in the said slots in said frames, said second boxes engaging said journals on said ring.

11. In a thrust-bearing, the combination with a shaft having a disk secured transversely thereto, of a head containing bearings arranged to engage said disk, a pair of journals secured to said head at the extremities of a diameter, a box engaging each of said journals, a pair of slotted frames, said boxes being arranged to slide in the slots in said frames, said frames being so arranged that said boxes move in a plane parallel with the axis of said shaft, a ring having projecting portions on one face so arranged as to engage said head on a line that is perpendicular to the said shaft and also perpendicular to the axis of said head, a pair of journals secured to said ring, a second pair of boxes also sliding in the said slots in said frames, said second boxes engaging said journals on said ring, and means for adjusting the position of said second boxes.

In testimony whereof I affix my signature in presence of two witnesses.

HEINRICH BRINKMANN.

Witnesses:

RUDOLPH W. HIEBL,

WALLY SEITZ.