B. D. GRAY.

MEANS FOR CENTERING RINGS ON ARBORS, &c.

APPLICATION FILED MAR. 6, 1917.

1,316,709.

Patented Sept. 23, 1919.

2 SHEETS—SHEET 1.

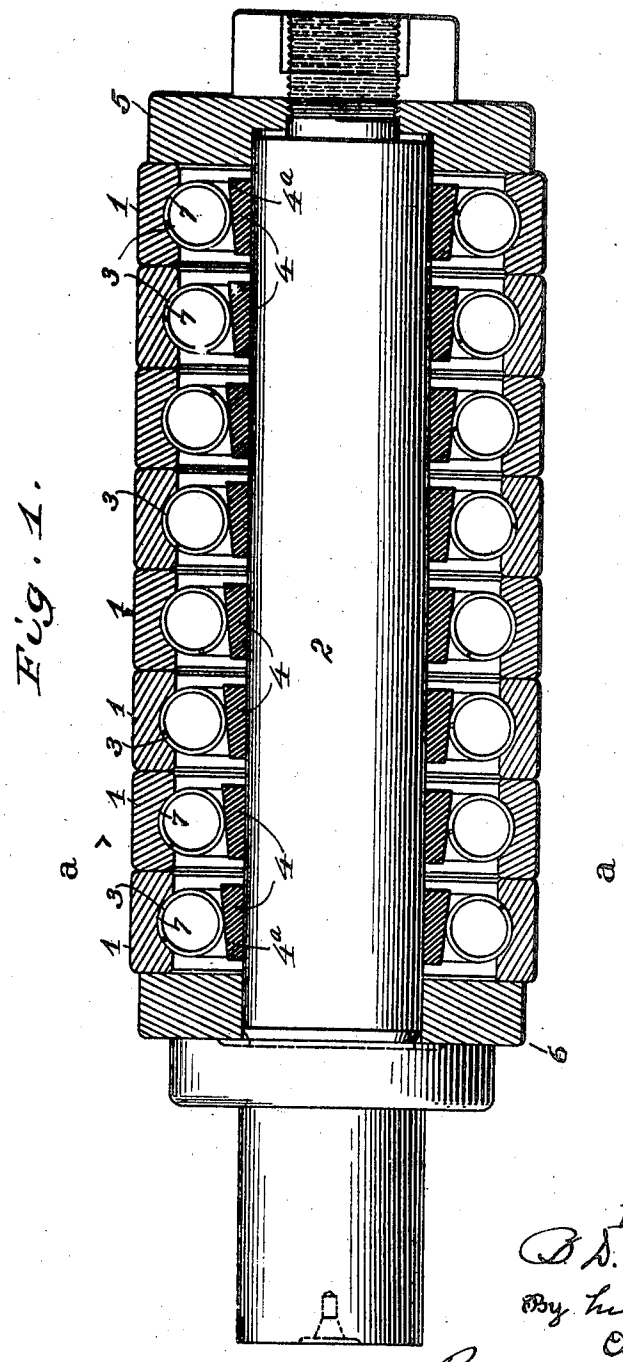


Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

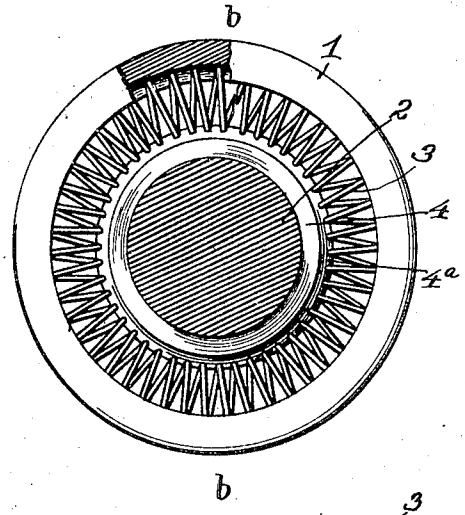


Fig. 3.

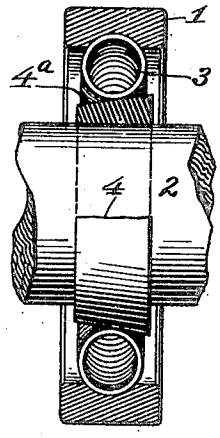
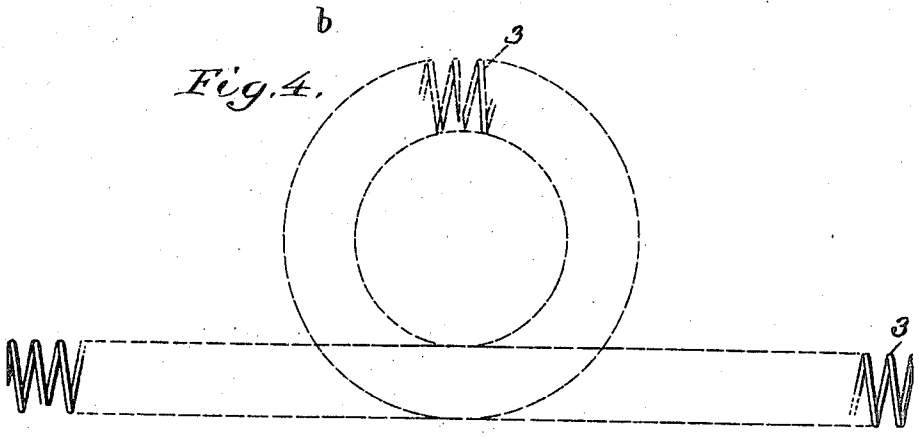


Fig. 4.



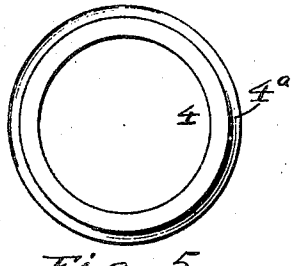


Fig. 5.



Fig. 6.

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UNITED STATES PATENT OFFICE.

BUDD D. GRAY, OF PHILADELPHIA, PENNSYLVANIA.

MEANS FOR CENTERING RINGS ON ARBORS, &c.

1,316,709. Specification of Letters Patent. Patented Sept. 23, 1919.

Application filed March 6, 1917. Serial No. 152,547.

To all whom it may concern:

Be it known that I, BUDD D. GRAY, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Means for Centering Rings on Arbors, &c., of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to means for centering rings and the like on rotary arbors, spindles, etc., for grinding, and it is specially designed for the centering of the outer rings of antifriction bearings, which rings are formed in their inner sides with grooves in which the antifriction balls of the bearings travel.

For the proper and effective operation of antifriction bearings it is necessary that the grooves in the rings be formed with extreme accuracy, and it is the practice to first form the groove in the rough and then subject the same to a finishing operation to give the groove its final and accurate finished form. In handling the ring in the finishing operation, it is held in a work-holder or chuck which grasps the same exteriorly, and thus held it is rotated about its central axis relatively to the grinding or finishing tool acting in the groove. It is important that the outer surface of the ring where it is held in the work-holder be truly concentric with the groove, otherwise the surface of the groove will not be presented at all points uniformly to the finishing tool; and in order that the outer surfaces of the rings will be thus ground it is necessary that they be assembled on the grinding arbor with their grooves truly concentric with the axis of rotation of the arbor so that when the latter is rotated and presents the outer surface of the rings to the action of the grinding tool, said surface will be ground accurately, concentric with the grooves.

My invention aims to center the rings on the arbor to the end that this result may be accomplished, and it consists of an expansible member adapted to seat within the ring, and an expanding member adapted to surround the arbor and being operable to actuate the expansible member and position the ring with the inner surface thereof in exact concentric relation with the central axis of the arbor.

In the more specific embodiment of my invention the expansible member is in the form of a length of spiral spring which will fit and seat circumferentially in the groove in the ring, and the expanding member is in the form of a sleeve having an internal bore ground to accurately fit around the arbor and having an external sloping surface adapted to extend within the spring, so that when the sleeve is shifted axially relatively to the spring and ring, the sloping surface acting on the spring will crowd the same outwardly and expand it uniformly at all points in its circumference, and in this manner will cause the ring to be positioned on the arbor with the groove therein in accurate concentric relation to the central axis of the arbor.

In the accompanying drawings:

Figure 1 is a sectional view taken axially through a number of rings and their centering devices, assembled in centered condition on a grinding arbor.

Fig. 2 is a transverse sectional elevation taken on the line *a*—*a* of Fig. 1, as viewed in the direction of the arrow, a portion of the ring being broken away to show how the expansible member engages therein.

Fig. 3 is a longitudinal sectional elevation on the line *b*—*b* of Fig. 2, the expanding member being partly broken away.

Fig. 4 is an elevation of a length of coiled spring constituting the expansible member, showing by dotted lines the same bent into circular form to enable it to be seated in the groove of the ring to be centered.

Fig. 5 is an end elevation of the tapered sleeve constituting the expanding member.

Fig. 6 is a side elevation of the same partly in section.

Referring to the drawings:

1, 1, etc., designates a series of rings assembled side by side on a rotary grinding arbor 2 and centered thereon by means of expansible members 3 extending circumferentially within the rings, and expanding members 4 surrounding the arbor and extending within the expansible members. The rings in their centered condition are firmly clamped in fixed relations on the arbor by means of a clamping nut 5 threaded on one end of the arbor and bearing against the outermost ring, and thus binding the rings against each other and a shoulder 6 at the inner end of the arbor against which the innermost ring seats.

The rings have each an internal groove

7 in which the antifriction balls of the antifriction bearing are adapted to travel, and the expansible member 3 is seated circumferentially in the groove, and is preferably, as here shown, in the form of a length of coiled spring bent around into circular form so as to extend circumferentially within the ring and fit in the groove therein. The expanding member 4 is preferably, and as here shown, in the form of a sleeve having a bore ground to a neat slip fit around the arbor, the outer surface of the sleeve being tapered or sloping as at 4^a so as to extend within the interior of the spring. With the parts thus assembled, when the sleeve is shifted axially on the arbor relatively to the encircling spring and surrounding ring, the sloping surface acting on the spring will crowd the same outwardly and expand it, thereby causing the ring to come to a centered position, with the groove therein in true concentric relation to the axial center of rotation of the spindle.

In the operation of the parts in centering the ring as thus described, the centering is effected from the groove in the ring as a basis, so that the rotation of the arbor, with the ring centered thereon will, in presenting the outer surface of the ring to the action of the grinding tool, result in the formation of said surface truly concentric with the axis of rotation and consequently truly concentric with the groove.

In the assemblage of the parts on the arbor as shown in Fig. 1, the two ends of a spring are brought together so as to form practically a circle and inserted into the groove in the ring where it remains; the ring and spring are then dropped over the arbor which is stood on end on a bench, and the tapered sleeve is slipped over the arbor and pressed into the spring. These operations are repeated with the remaining rings until the entire series is assembled on the arbor, whereupon the lower end of the latter is tapped against the bench, this action causing the conical sleeves to shift axially on the arbor downwardly and resulting in the expansion of the springs, and the final set of the rings in truly centered positions. The clamping nut is now screwed on the upper end of the arbor and brought up against the outermost ring and screwed tightly so as to bind the entire series of rings against each other and against the shoulder 6 at the inner end of the series; whereby the rings will be firmly held in their centered positions so that in the rotation of the arbor they will be presented solidly as a unit to the action of the grinding tool.

By centering the rings from the grooves as a basis the outer surfaces are ground to a concentric relation to the grooves so that in the finishing grinding operation on the grooves a minimum of stock will be removed, thereby saving time in the operation and reducing to a minimum the wear on the grinding wheel.

It will be observed that the springs and tapered sleeves serve only to effect the centering of the rings, and take no part in the retention of the rings in their centered position, this latter function being performed by the clamping nut 5 binding the rings against each other on the arbor as above described.

While I prefer to form the expansible members in the form of sections of springs bent into circular form with their ends disconnected from each other as shown in Fig. 2, this is not absolutely essential as the ends of the sections may be joined together to form a continuous spring ring, which would possess the necessary degree of flexibility and expansibility to enable them to be sufficiently expanded by the expanding members to effect the centering action.

In the foregoing description and accompanying drawings I have set forth my invention in the particular detailed form and construction which has been found in practice to answer to a satisfactory degree the ends to be attained. It will be understood that the parts may be variously changed and modified without departing from the spirit of my invention, and further it will be understood that the invention is not limited to any particular form or construction of the parts except in so far as such limitations are specified in the claims.

Having thus described my invention, what I claim is:

1. In combination with a supporting arbor, adapted to be surrounded by a ring provided with an internal circumferential groove, a section of coiled spring adapted to seat circumferentially in the groove in the ring with the ends of the spring disconnected, and a sleeve surrounding the arbor and provided with a tapered external surface engaging the spring, said sleeve being shiftable axially to expand the spring in the groove and thereby center the base of the groove relative to the axis of the arbor.

2. In combination with a supporting arbor, adapted to be surrounded by a ring provided with an internal circumferential groove, expansible means adapted to seat in the groove in the ring, and an expanding member sustained by the arbor and operable on the expansible means to expand the same and thereby center the base of the groove relative to the axis of the arbor.

3. In combination with a supporting arbor adapted to have a plurality of independent rings assembled thereon side by side and expansible means adapted to seat in each groove, and independent expanding members surrounding the arbor and coöperating with the respective expansible means, and

acting when shifted axially, to expand the expansible means and thereby center the rings independently of each other.

4. In combination with a supporting arbor adapted to have a plurality of independent rings assembled thereon side by side, means for centering the rings on the arbor, and independent means for clamping the rings endwise firmly against each other in centered positions.

5. Means for centering rings on arbors, spindles and the like, said means comprising a section of coiled spring adapted to be bent into circular form to seat circumferentially within the ring with its ends disconnected from each other, and a sleeve adapted to surround the arbor and tapered externally to fit within the spring, said sleeve being shiftable axially to expand the spring.

6. In combination with a supporting arbor adapted to have a plurality of rings assembled thereon, expansible members adapted to seat in the respective rings, and an expanding member extending in each expansible member and surrounding said arbor, said expanding members adapted, when the arbor is tapped at its end, to shift axially thereof and expand the expansible members and thereby center the rings, and means for clamping the rings firmly in their centered positions on the arbor.

In testimony whereof I have affixed my signature.

BUDD D. GRAY.