Feb. 17, 1925. 1,527,098

A. WHITE

GRINDING MACHINE BEARING

Filed June 28, 1922 3 Sheets-Sheet 1

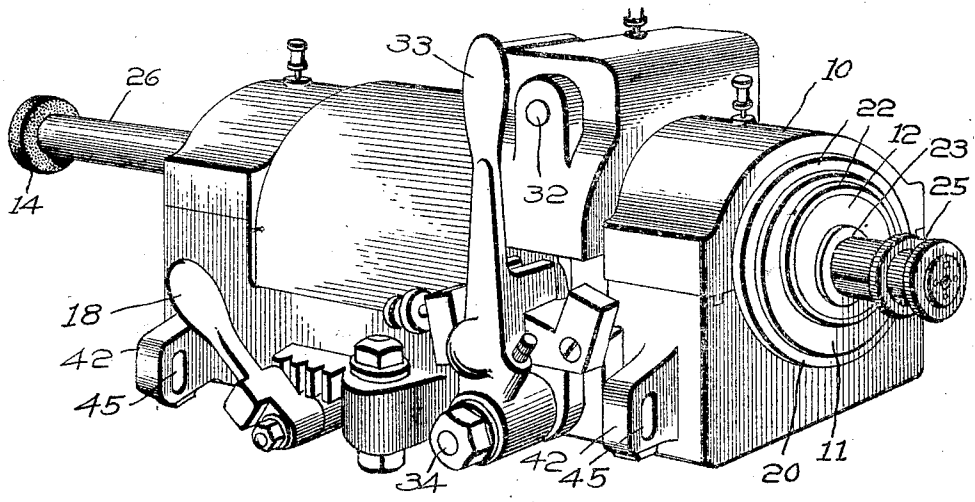


Fig. 1

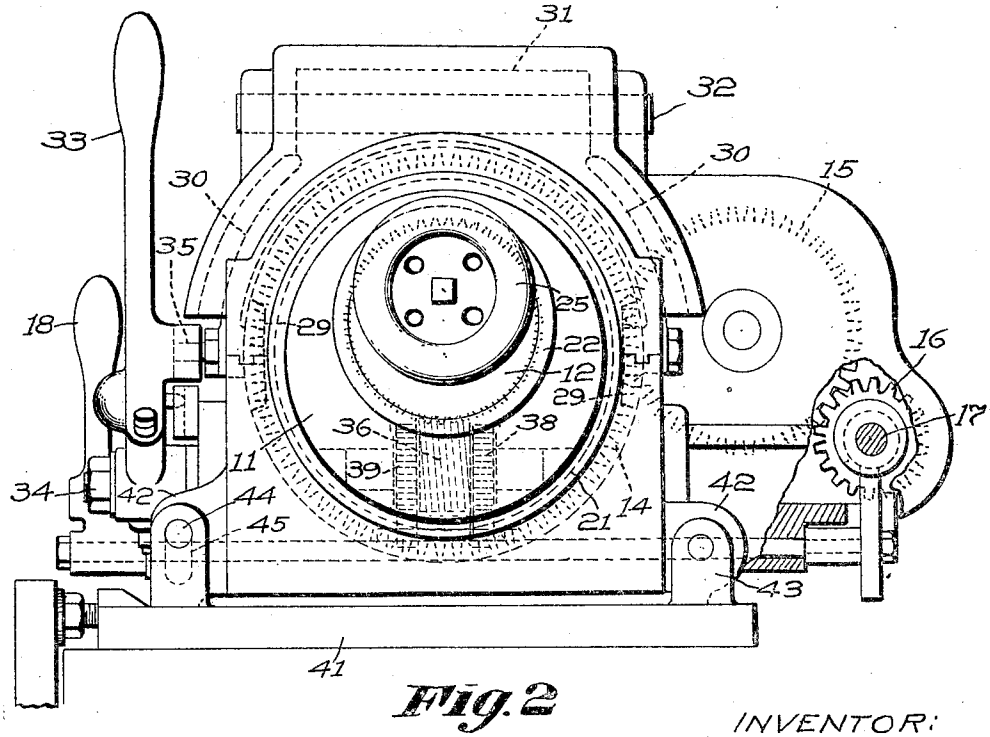


Fig. 2

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Fig. 3

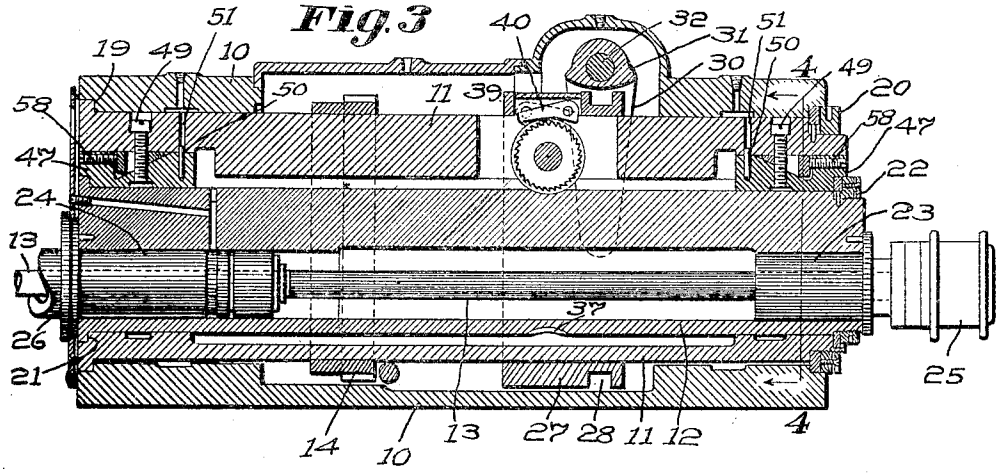


Fig. 4

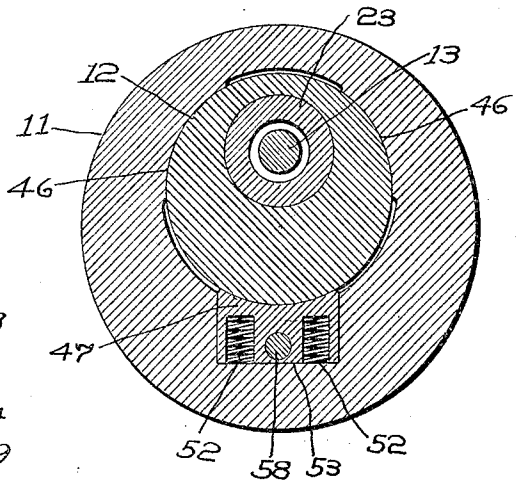
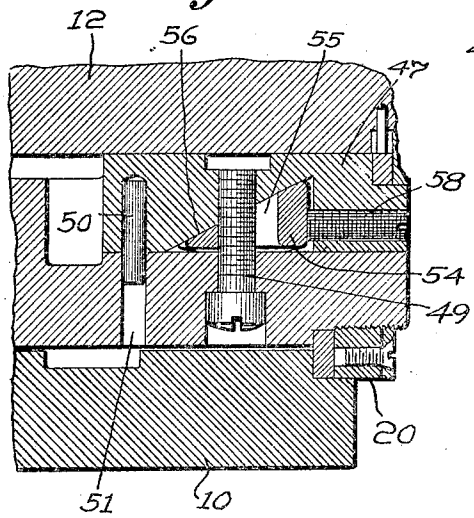


Fig 5



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Fig. 6

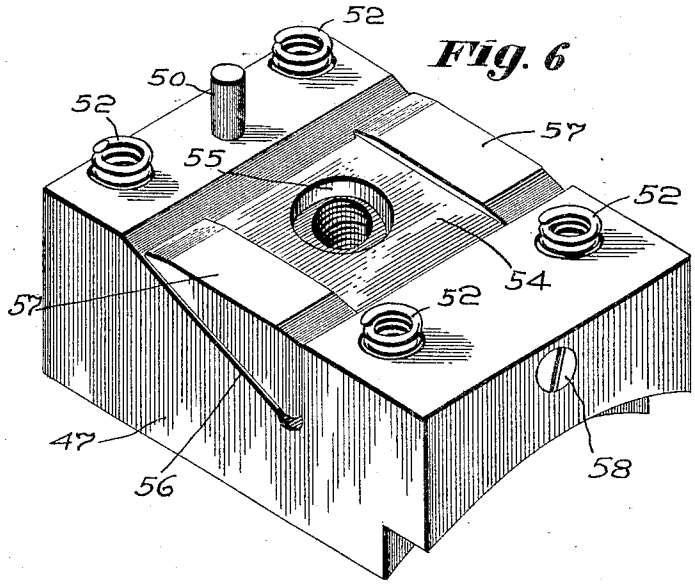
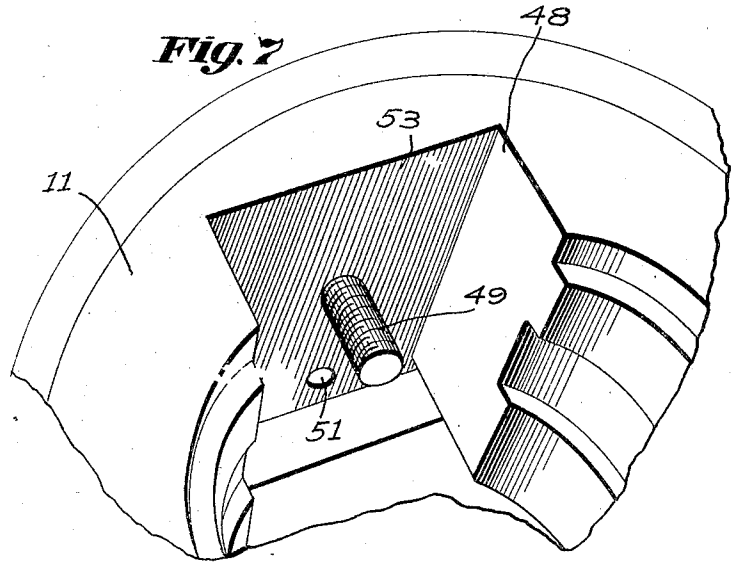


Fig. 7



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Patented Feb. 17, 1925. 1,527,098

UNITED STATES PATENT OFFICE.

ALPHONZO WHITE, OF WINCHENDON, MASSACHUSETTS, ASSIGNOR TO BAXTER D. WHITNEY & SON, INC., OF WINCHENDON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

GRINDING-MACHINE BEARING.

Application filed June 28, 1922. Serial No. 571,341.

To all whom it may concern:

Be it known that I, ALPHONZO WHITE, a citizen of the United States, residing at Winchendon, county of Worcester, and State of Massachusetts, have invented an Improvement in Grinding-Machine Bearings, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to a shaft bearing for frictionally holding its shaft in any position of angular adjustment, and more particularly to a bearing for frictionally holding an eccentric shaft of an internal grinding machine firmly in different positions of angular adjustment.

A special type of grinding machine designed to grind out the cylinders of internal combustion engines and for similar work has come into extensive use. This type of grinder commonly consists of a casing having a hollow shaft rotatably mounted within the casing, and an eccentric shaft which is mounted eccentrically within the first shaft for rotative adjustment therein, while a shaft for operating the grinding wheel or cutter is rotatably mounted eccentrically within the eccentric shaft. The arrangement is such that the cutter driving shaft travels bodily in the path of a circle, upon rotation of the outer hollow shaft, and moves the grinding wheel or cutter in an orbital path within the bore of the cylinder to be ground. The size of the circle in which the driving shaft travels may be increased or decreased by rotating the eccentric shaft within the outer shaft to move the driving shaft either toward or from the axis of said circle.

It is important that play between the relatively moving parts of the grinder be prevented as far as practical, and it is also important that the eccentric shaft be supported within the outer shaft so that accidental rotation of the former within the latter will be prevented.

An important feature of the present invention, therefore, resides in a combined bearing and friction clamping means for supporting the eccentric shaft for rotative adjustment within the hollow shaft so that play betweeen the parts will be eliminated, and accidental rotation of the eccentric shaft within the hollow shaft will be prevented.

A more specific feature of the invention resides in a bearing having bearing surfaces disposed angularly around the shaft to be supported and having one bearing surface adjustable towards the others to vary the frictional engagement between the shaft and bearing.

Other features of the invention and novel combinations of parts in addition to the above will be hereinafter described in connection with the accompanying drawings which illustrate one good practical form thereof.

In the drawings:

Fig. 1 is a perspective view of an internal grinding machine having the invention applied thereto;

Fig. 2 is an enlarged end view of Fig. 1;

Fig. 3 is a vertical longitudinal sectional view of Fig. 1;

Fig. 4 is an enlarged sectional view taken on line 4—4 of Fig. 3;

Fig. 5 is an enlarged fragmentary view of parts shown in Fig. 3;

Fig. 6 is an enlarged perspective view of the adjustable part of the novel bearing; and

Fig. 7 is a perspective view of a portion of the machine which receives the bearing part of Fig. 6.

The bearing of the present invention is well adapted for various purposes where a shaft is to be supported for a limited amount of rotation and where all play between the shaft and its bearing is to be eliminated.

In the drawings a grinding machine of the type above mentioned is shown as having the invention applied thereto. This machine is provided with a casing 10 in which is mounted a hollow shaft 11. Within the shaft 11 is mounted an eccentric shaft 12 and within the latter shaft a small shaft 13 is mounted eccentrically to drive the grinding wheel or cutter 14. The arrangement is such that as the outer shaft 11 is rotated within the casing, it will cause the driving shaft 13 to travel in the path of a circle, so that the cutter 14 at one end of the shaft will travel in an orbital path within the cylinder to be ground out.

It is important that the circle in which the shaft 13 travels bodily may be increased

or decreased in size to grind different sized cylinders and also to advance the cutter towards the surface to be ground. This is accomplished by rotating the eccentric shaft 12 within the outer shaft 11 so that the driving shaft 13 will be moved towards or from the axis of the circle about which the shaft 13 travels.

It is desirable that a continuous rotative movement be imparted to the outer shaft 11 throughout the grinding operation, and to this end a gear 14 surrounding the shaft and secured thereto is driven by a second gear 15 meshing with a pinion 16 operated by the driving shaft 17. To provide means for rotating the shaft 11 at different speeds several gears, not shown, may be provided between the shaft 17 and gear 14 to drive the latter, and these gears may be shifted by the hand-operated lever 18.

The outer shaft 11 is conveniently prevented from moving longitudinally within the casing 10 in one direction by a shoulder 19 and is prevented from moving in the opposite direction by a collar 20 having threaded engagement with the opposite end of the shaft. The eccentric shaft 12 may be prevented from moving longitudinally within the outer shaft by a shoulder 21 at one end thereof and by a collar 22 having threaded engagement with the shaft 12 at the other end thereof. The small driving shaft 13 is journalled within sleeves 23 and 24 that fit tightly within a bore of the inner eccentric shaft 12, and the shaft 13 may be rotated at a high speed by a pulley 25. The sleeve 24 preferably extends outwardly from the casing 10 as at 26 to form a housing for the shaft 13 and to support this shaft adjacent the cutter 14.

As stated, the driving shaft 13 may be adjusted toward or from the axis of the circle about which it travels by rotating the eccentric shaft 12 within the outer shaft 11, and to this end a sleeve 27 is mounted upon the shaft 11 for sliding movement longitudinally of the shaft and this sleeve has an annular groove 28 adapted to receive shoes 29 secured to each arm 30 of the yoke 31. The yoke 31 is pivotally mounted upon a shaft 32 in the upper part of the casing 10 and rocking movement may be imparted to the yoke by a hand-operated lever 33 pivoted upon the casing 10 at 34 and connected to one arm of the yoke by a pin 35. The lever 33 serves to rock the yoke 31 and the yoke imparts sliding movement to the sleeve 27. Movement is imparted from the sleeve 27 to the eccentric shaft 12 by a worm 36 that meshes with the teeth 37 formed around the shaft 12 and the worm may be rotated in one direction by a rachet wheel 38 and in the opposite direction by a ratchet wheel 39. Pawls 40 carried by the ring 27 and cooperating with the respective ratchet wheels 38 and 39 serve to rotate the worm 36 in one direction or the other depending upon the rocking movement imparted to the lever 33.

The casing 10 may be mounted upon a base-plate 41 for limited adjustment relative to the base-plate, and to this end the casing is provided with the lugs 42 pivotally secured to the lugs 43 at one side of the casing, while at the opposite side of the casing the lugs 42 are adjustably connected to the base-plate by bolts 44 extending through the elongated slots 45 of the lugs extending upwardly from the base-plate 41.

The construction so far described is well known and in itself forms no part of the present invention. The novel bearing, which is well adapted for use upon the type of grinder shown, will now be described.

The outer shaft 11 preferably is provided with spaced, fixed bearing surfaces 46, see Fig. 4, two of these surfaces being shown in the present invention, and a third bearing surface 47 spaced from the fixed bearing surfaces 46 is mounted for adjustment towards and from the fixed bearing surfaces. As a result of this bearing construction, a three point contact with the shaft 12 is provided and adjustment of the bearing may be varied as desired by moving the bearing surface or block 47 relatively to the fixed bearing surfaces 46.

In the present case, the block 47 is mounted in a correspondingly shaped slot 48 formed adjacent the inner face of the shaft 11 and the block 47 may be retained in position within the slot 48 by a bolt 49 having threaded engagement with the block 47 and by a pin 50 that enters a hole 51 within the shaft 11. It may be desirable yieldingly to force the block 47 inwardly towards the eccentric shaft 12 into frictional engagement therewith, and to this end coiled springs 52 may be provided mounted within sockets extending inwardly from the outer face of the block 47 and the springs are adapted to abut against the wall 53 of the slot 48. In most cases it will be desirable to provide adjustable means in addition to the springs for positively moving the block 47 toward the eccentric shaft 12 and for limiting the movement of the block outwardly from this shaft, and to this end a wedge 54 is provided having an aperture 55 considerably larger than the bolt 49 to allow for adjustment of the wedge, and the beveled face of the wedge 54 engages the correspondingly beveled face 56 of the block 47 while the opposite face of the wedge is provided with faces 57 that engage the wall 53 of the slot 48. A screw 58 serves to force the wedge 54 inwardly to move the block 47 toward the shaft 12 and to maintain this block in spaced relation to the wall 53 of the outer shaft. The screw 49 serves to retain the

parts in place and when the eccentric shaft 12 is to be removed from or inserted in the outer shaft 11 the screw 49 may be tightened to pull the block 47 back out of engagement with the shaft 12 against which it is normally forced by the springs 52.

In the construction shown, bearings of the type just described are provided adjacent each end of the eccentric shaft 12, and the bearing block 47 of each of these bearings may be adjusted to engage the shaft 12 with any desired amount of friction, so that all play between the shaft 12 and the outer shaft 11 may be eliminated. In a grinding machine of the type described, it is important that the eccentric shaft 12 be prevented from accidental rotation within the outer shaft 11 as this might change the adjustment of the cutter 14 during a grinding operation.

The construction of the present invention constitutes frictional clamping means that permits the eccentric shaft 12 to be rotated to the desired position of adjustment while maintaining upon the shaft sufficient pressure to hold the same firmly in any desired position of adjustment.

What is claimed is:

1. In a grinding machine, in combination, a casing, a hollow shaft rotatably mounted in the casing and having a slot formed in its inner wall, a second shaft eccentrically mounted in the hollow shaft for rotation therein, a block mounted in said slot and having a surface frictionally engaging said second shaft, means for forcing the block radially against the second shaft with frictional clamping effect to hold the shaft at any desired position of angular adjustment within the hollow shaft, and a grinding wheel shaft supported eccentrically within the second shaft for adjustment relative to the work by angular adjustment of the second shaft within the hollow shaft.

2. In a grinding machine, in combination, a casing, a hollow shaft rotatably mounted in the casing and having a slot formed in its inner wall, a second shaft eccentrically mounted in the hollow shaft for rotation therein, a block mounted in said slot and having a surface frictionally engaging said second shaft, a wedge mounted between the block and bottom of said slot for forcing the block radially against the second shaft with frictional clamping effect to hold the shaft at any desired position of angular adjustment within the hollow shaft, means for securing the wedge in different positions of adjustment, and a grinding wheel shaft supported eccentrically within the second shaft for adjustment relative to the work by angular adjustment of the second shaft within the hollow shaft.

3. In combination with a grinding machine, consisting of a casing having a hollow shaft rotatably mounted therein, a second shaft eccentrically mounted in the hollow shaft and rotatable therein, and a grinding wheel shaft rotatably supported eccentrically within said second shaft; a bearing provided with means for frictionally holding said second shaft in different positions of angular adjustment within the hollow shaft, comprising two fixed bearing surfaces angularly spaced and an adjustable bearing surface spaced from the fixed bearing surfaces, and an adjustable wedge for forcing the adjustable bearing surface toward the fixed bearing surfaces to exert a friction clamping pressure upon said second shaft.

4. In combination with a grinding machine, consisting of a casing having a hollow shaft rotatably mounted therein, a second shaft eccentrically mounted in the hollow shaft and rotatable therein, and a grinding wheel shaft rotatably supported eccentrically within said second shaft; a bearing provided with means for frictionally holding said second shaft in different positions of angular adjustment within the hollow shaft, comprising two fixed bearing surfaces angularly spaced and an adjustable bearing surface spaced from the fixed bearing surfaces, and means for forcing the adjustable bearing surface inward transversely of the shaft toward the fixed bearing surfaces to vary the frictional holding action of said surfaces.

5. In combination with a grinding machine, consisting of a casing having a hollow shaft rotatably mounted therein, a second shaft eccentrically mounted in the hollow shaft, and a grinding wheel shaft rotatably supported eccentrically within said second shaft for adjustment relative to the work by angular adjustment of the second shaft within the hollow shaft; a bearing provided with means for frictionally holding said second shaft in different positions of angular adjustment within the hollow shaft, including an adjustable bearing surface, and means for forcing said bearing surface radially against the second shaft with frictional clamping effect.

6. In combination with a grinding machine, consisting of a casing having a hollow shaft rotatably mounted therein, a second shaft eccentrically mounted in the hollow shaft, and a grinding wheel shaft rotatably supported eccentrically within said second shaft for adjustment relative to the work by angular adjustment of the second shaft within the hollow shaft; bearings adjacent the opposite ends of said second shaft and provided with means for frictionally holding the shaft in different positions of angular adjustment within the hollow shaft, including adjustable bearing surfaces, and means for forcing said bear-

ing surfaces in a transverse direction against the second shaft with frictional clamping effect.

7. In combination with a grinding machine, consisting of a casing having a hollow shaft rotatably mounted therein, a second shaft eccentrically mounted in the hollow shaft, and a grinding wheel shaft rotatably supported eccentrically within said second shaft for adjustment relative to the work by angular adjustment of the second shaft within the hollow shaft; a bearing provided with means for frictionally holding said second shaft in different positions of angular adjustment within the hollow shaft, consisting of two fixed bearing surfaces angularly disposed at intervals around the second shaft, a movable bearing surface opposite to the fixed bearing surfaces, and spring means for yieldingly forcing said movable bearing surface in a transverse direction against the second shaft with friction clamping effect.

8. In a grinding machine, in combination, a casing, a hollow shaft rotatably mounted in the casing, a second shaft eccentrically mounted in the hollow shaft for rotation therein, a grinding wheel shaft supported eccentrically within the second shaft for adjustment relative to the work by angular adjustment of the second shaft within the hollow shaft, and means for clamping the second shaft by radially acting pressure means disposed near the ends of the second shaft and constructed to maintain said second shaft in any position of angular adjustment and also to hold it and the shaft it carries from vibration during the grinding operation.

In testimony whereof I have signed my name to this specification.

ALPHONZO WHITE.