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MILLING MACHINE

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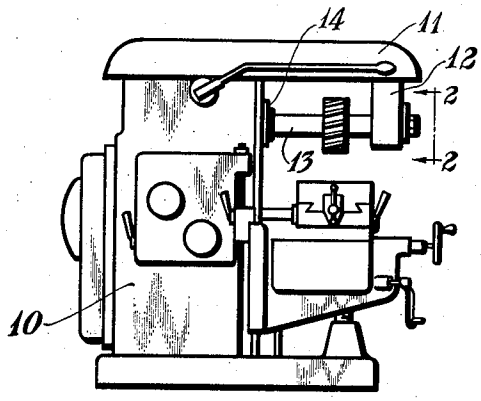


Fig. 1

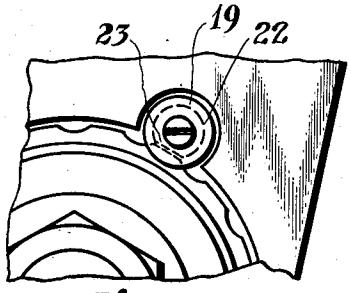


Fig. 4

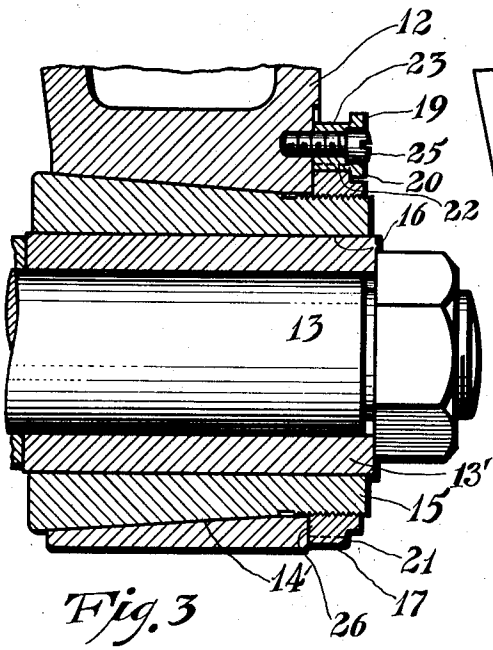


Fig. 3

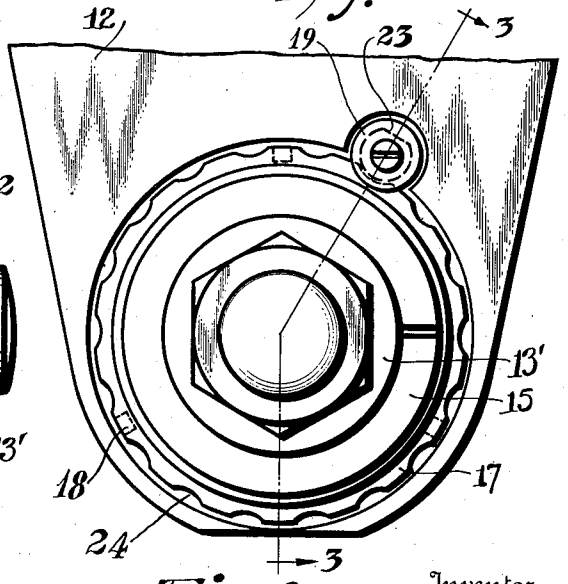


Fig. 2

Inventor

EDGAR D. VANCIL

HENRY J. DODS

By

A. K. Parsons

Attorney

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MILLING MACHINE

Edgar D. Vancil, Cincinnati, and Henry J. Dods, Montgomery, Ohio, assignors to The Cincinnati Milling Machine Company, Cincinnati, Ohio, a corporation of Ohio

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5 Claims. (Cl. 308—70)

This invention relates to milling machines and more particularly to improvements in bearing structures for the cutter arbors of the same.

One of the principal objects of the present invention is the provision of an improved outboard adjustable bearing for a cutter arbor that may be adjusted to determined size with greater precision and subsequently clamped to maintain that size during operation of the machine, thus obviating the present tendency of such bearings to creep and thereby reduce in size causing a binding on the arbor and overheating of the parts.

Another object of this invention is to provide improved locking means for adjustable tapered bushings for use with cutter arbor bearings.

A further object of this invention is to provide gauge means for adjustable tapered bushings of arbor bearings whereby greater precision may be attained in the adjustment of the same.

Other objects and advantages of the present invention should be readily apparent by reference to the following specification considered in conjunction with the accompanying drawing illustrative of one embodiment thereof, but it will be understood that any modifications may be made in the specific structure details hereinafter disclosed within the scope of the appended claims without departing from or exceeding the spirit of the invention.

Referring to the drawing in which like reference numerals indicate like parts:

Figure 1 is an elevation of a machine tool embodying the principles of this invention.

Figure 2 is a detail as viewed on the line 2—2 of Figure 1.

Figure 3 is a section on the line 3—3 of Figure 2.

Figure 4 is a detail showing the locking member in position to permit adjustment of the bushing.

In the drawing, reference numeral 10 indicates the column of a milling machine having supported thereon the over arm 11 which carries the outboard support or pendant 12 for journaling the outboard end of the tool or cutter arbor 13 adapted to be driven by the cutter spindle 14 journaled in the column.

Since cutter arbors and the spacers or bushings assembled for rotation therewith, one such bushing being indicated by the reference numeral 13', vary somewhat in outside diameter it has been found desirable to provide an outboard bearing which has a certain range of adjustment for securing a proper running fit between the parts. To this end the pendant 12 is provided with tapered bore 14' in which is mounted a tapered split bushing 15 having a bore 16 adapted to receive therein the projecting end of the cutter arbor 13. This bushing is longitudinally adjusted in the bore 14' to vary the inside diameter of the bore 16 and this adjustment may be accomplished by threading the smaller end of the bushing for the reception of an adjusting member 17. This member is in the form of a nut and for facilitating its rotation a plurality of small holes 18 may be formed in its periphery for the reception of a spanner wrench or the like.

In order to prevent creepage of the bushing after adjustment, such as might be caused for instance, by heating and expansion of the arbor under working conditions, provision has been made for locking the clamping member 17 in its adjusted position both with respect to either longitudinal or rotative movement. In the present embodiment the locking adjustment may take the form of a rotatable keeper or locking member such as 19 having an enlarged head 20 for engaging the peripheral shoulder 21 of the member 17 to prevent longitudinal movement thereof. The member 19 is also provided with a reduced body portion 22 having a flat surface 23 formed thereon. The periphery of the member 17 is provided with a plurality of arcuate shaped notches 24 equally spaced thereabout and each one representing a determined amount of reduction in size, such as .00026 of an inch, of the internal diameter of the tapered bushing. The operation here is such that when the parts are in the position shown in Figure 2 the circular portion of the body 22 neatly engages one of these arcuate shaped notches and thereby locks the member 17 against rotative movement. In order to effect adjustment, the set screw 25 by which the member 19 is attached to the pendant 12, is loosened permitting rotation of the member 19 until the flat surface 23 is tangent to the periphery of the adjusting member as shown in Figure 4. The member 17 is now rotated and by engagement with the surface 26, which is finished normal to the axis of the tapered bore draws the bushing 15 into its bore. After rotation of the nut 17 through sufficient angle to effect the desired adjustment, the member 19 is rotated to its locking position shown in Figure 2 and the set screw 25 tightened to lock the parts in adjusted position.

Attention is invited to the fact that the portion 22 of the member 19 is slightly less in length than the width of the periphery of the member 17 so that when the set screw 25 is tightened it not only locks the member 19 against rotation and thereby the member 17 but by engagement with the

shoulder 21 it also prevents lateral bodily movement of the member 17 and thereby longitudinal creepage of the bushing 15. In other words, the member 17 engages the face of the pendant thereby preventing movement in one direction and the head engages the shoulder 21 of member 17 preventing movement in the other direction. It is thus seen that a very efficient structure has been provided for the purposes intended having a small number of parts which are simple to adjust.

What is claimed is:

1. In a device of the class described including a pendant for supporting a tool arbor, the combination of a bearing member for the arbor adjustable axially thereof to vary its internal diameter, a rotatable nut threaded on said member and bearing against said pendant for effecting adjustment thereof, a locking member having a first portion for engaging the periphery of the nut to hold the same against rotation, and a second portion engageable with the end of the nut to prevent axial movement thereof.

2. In a milling machine having a pendant for supporting a cutter arbor, a tapered bore formed in the pendant, a tapered contractible bushing mounted in said bore for journalling the end of the arbor, a surface on the pendant perpendicular to the axis of the bore, a rotatable peripheral notched nut member threaded on the small end of said bushing and engaging said surface for drawing the bushing into the bore to reduce its internal diameter, a locking member spaced from the bushing having an enlarged head overlying the face of the nut member for retaining it against said surface, and a portion for interlocking with the notched periphery to retain the nut against rotation, said locking member being rotatable to present another portion to said periphery to permit rotation of the nut while still maintaining overlapping engagement with the face thereof.

3. A milling machine having a column, a tool arbor journaled therein and projecting therefrom, an overarm mounted on the column parallel to the arbor and having a pendant for journaling the free end of the arbor, including a tapered bore formed in the pendant, a tapered split bushing in the bore having a threaded reduced end projecting from a face of the pendant which is normal to the axis of the bore, a rotatable nut member having a notched periphery received on the reduced end and engaging said face for moving the bushing axially of the bore to reduce its internal diameter, a lock bushing adjacent the periphery of the member having an enlarged portion for retaining the member against the face of the pendant, a circumferential portion in the lock bushing interlocking with one of the notches for retaining the nut member against rotation, said lock bushing adapted to be rotated to present a flat to the member permitting rotation.

4. An arbor support bearing for a milling machine comprising a pendant having a tapered bore formed therein, a tapered split bushing mounted in the bore having a reduced threaded end projecting from a face of the pendant which is normal to the axis of the bore, a rotatable nut member having a notched periphery threaded on the reduced end and engaging said face for moving the bushing axially of the bore to reduce its internal diameter, a locking member spaced from the bushing having an enlarged head over-lying the face of the nut, said member being rotatable and axially movable, means to rotate the member into engagement with said notched periphery to prevent positively rotation of the nut member, and means to effect axial movement of the locking member to prevent positively any axial movement of the nut member and thereby prevent axial creepage of the bushing during operation of the machine.

5. In an outboard bearing for milling machine cutter arbors, the combination of a relatively fixed pendant support having a tapered bore therein, a longitudinally split bushing mounted in said bore, said bushing having in turn a substantially cylindrical bore for receiving an arbor, an adjusting member threaded on the end of the bushing and bearing against said support, means to rotate the member to cause axial movement of the bushing to vary thereby the size of the internal bore of the bushing, a locking member carried by the support, means on the periphery of the adjusting member cooperating with the locking member to determine the amount of change effected in the internal diameter of the bushing, means on the locking member effective upon partial rotation thereof to positively lock the adjusting member against rotation, and additional means on the locking member for holding the adjusting member and thereby the bushing in a predetermined longitudinal position.

EDGAR D. VANCIL.
HENRY J. DODS.