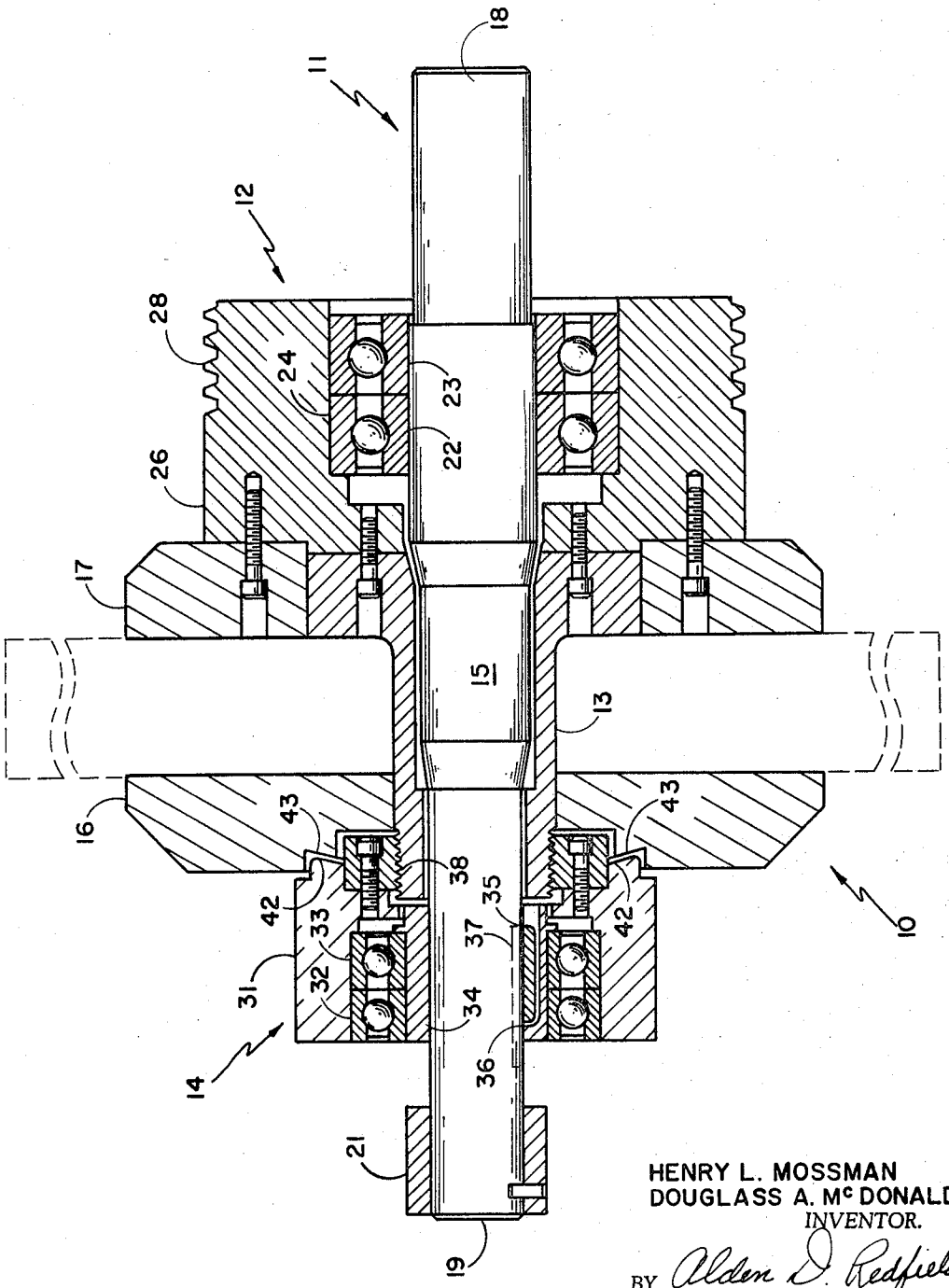
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DEAD SHAFT SPINDLE ASSEMBLY FOR REDUCED APERTURED GRINDING WHEELS

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DEAD SHAFT SPINDLE ASSEMBLY FOR REDUCED APERTURED GRINDING WHEELS

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ABSTRACT OF THE DISCLOSURE

This invention relates to a spindle assembly for grinders and in particular to a dead shaft spindle assembly for reduced apertured grinding wheels. A rotatable arbor mounted on a dead shaft is provided in a spindle assembly. A pair of spaced bearing assemblies couple the arbor to the dead shaft. One of the bearings is detachable from the arbor. The outside diameters of the bearings are larger than the outside diameter of the arbor. A pair of flanges each associated with one of the bearings are also mounted on the arbor between the bearings and in a spaced relationship. One of the bearing assemblies and its adjacent flange include cooperating spherical surfaces to compensate for non-parallel sides of grinding wheels. The above-described assembly is adapted to mount and secure a grinding wheel on the arbor between the flanges and the bearings.

It is well known that the greatest stress in grinding wheels occurs on the periphery of the mounting hole. The stress concentrated in this region limits the speed and load under which grinding wheels may be safely operated. To avoid stress concentrations about the peripheries of mounting holes, an attempt has been made to fabricate grinding wheels without a center aperture, i.e., without a center mounting hole. While this type of structure has increased the strength of the wheel, it created other problems, not the least of which relates to mounting such a wheel to a grinding machine. Grinding wheels without center holes require special complex mounting provisions and often entirely new machine mounting concepts.

Operational limitations due to stress concentration at mounting holes are particularly acute in snagging operations. Typically, snagging wheels of 16-, 20-, and 24-inch diameters have mounting holes ranging from 6 to 12 inches. Typically, existing machines contain spindle assemblies in which the grinding wheel bearings have a diameter smaller than the grinding wheel mounting hole. Accordingly, the bearings conveniently have diameters smaller than the diameters of the wheel mounting hole.

Under these conditions, the bearings may be conveniently contained within the wheel shaft—see Patent No. 1,519,921.

It has been observed that most of the strength of a grinding wheel without a hole can be retained by utilizing a grinding wheel having a reduced diameter hole, that is to say, a hole having a diameter substantially less than 6 to 12 inches, normally used heretofore. This type of construction immediately posed several problems:

(1) finding a spindle construction which can be adapted to existing machines; and
(2) finding a spindle construction which can utilize bearings equal in size or larger than bearings now in use, since the operational loads and speed of these reduced apertured wheels will be larger than the loads and speed in current use.

It is an object of the invention to provide a dead shaft spindle assembly for reduced apertured grinding wheels.

It is another object of the invention to provide a dead shaft spindle assembly for reduced apertured grinding wheels which can be used on existing grinding machinery.

It is yet another object of the invention to provide a dead shaft spindle assembly for a reduced apertured grinding wheel which:

(1) is adjustable to variations in grinding wheel thicknesses;
(2) is adjustable to variations in the parallelism between the sides of grinding wheels; and
(3) makes it possible to operate grinding wheels at higher speeds and loads than the existing industry standard.

In accordance with the invention, a dead shaft spindle assembly for a reduced apertured grinding wheel comprises a pair of bearing assemblies joined by a smaller diameter arbor, said arbor being dimensioned to fit within a grinding wheel aperture, one of said bearing assemblies being detachably secured to said arbor. A dead shaft passes through the bearing assemblies and arbor with adequate clearance. The dead shaft spindle assembly also includes means at each end of the arbor for securing a grinding wheel to said arbor.

The novel features that are considered characteristic of the invention are set forth in the appended claims; the invention itself, however, both as to its organization and method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment when read in conjunction with the accompanying drawings, in which:

The figure is a cross-sectional representation of a dead shaft spindle assembly embodying the principles of the present invention.

Referring to the figure, a dead shaft spindle assembly **10** includes a dead shaft assembly **11**, a first bearing assembly **12**, an arbor **13**, a second bearing assembly **14**, and a pair of disc flanges **16** and **17**.

The dead shaft assembly includes a pair of oppositely positioned trunnions **18** and **19**. Trunnion **18** is dimensioned to fit into an existing clamp of a grinding machine (type), whereas trunnion **19** includes a split sleeve **21** to enlarge that end of the dead shaft to the existing diameter of the grinding machine clamp.

The first bearing assembly includes a pair of ball bearings **22** and **23**. Each of the bearings **22** and **23** has the inner race secured to the trunnion **18** and its outer race secured to the inside surface **24** of a sleeve **26**. The outside surface **28** of the sleeve **26** is appropriately notched to form a sheave. In the alternative, it is quite obvious that the surface **28** can be contoured to take a belt or shaped for other suitable drive mechanisms.

As shown in the figure, one end of the arbor **13** is bolted into the sleeve **26** of the first bearing assembly **12**. There are suitable clearances between the arbor **13** and the dead shaft **15**.

The second bearing assembly has several features which are similar to the features of the first bearing assembly. There is a sleeve **31** in contact with the outer race of another pair of bearings **32** and **33**. In this case, however, the inner race is secured to a sleeve **34**. The sleeve **34** includes a keyway **36**. There is an oppositely disposed, complementary keyway **37** on the dead shaft. A key **35** is positioned in the keyway **36**. The second bearing assembly **14** may be removed from the dead shaft by merely disengaging it from the threads **38**, thus causing it to move to the left. See the figure. In the illustrated construction, the sleeve **21** needs to be removed prior to removing the second bearing assembly.

The dead shaft spindle assembly **10** also includes a pair of spaced disc flanges **16** and **17**. These flanges are designed to bear against the sides of a grinding wheel as

shown and upon the application of pressure, caused by threading the second bearing assembly **14** on the arbor **13** toward the right in the illustration, secure the grinding wheel to the arbor for rotation with the arbor.

Where the sides of a grinding wheel are not parallel, there is a tendency to set up bending stresses within the bearings, particularly the bearings in the second bearing assembly, which tend to reduce the efficiency and the useful life of these bearings. The bending stresses are created when one of the flanges cocks to compensate for the nonparallel sides. To overcome this difficulty, one flange and one bearing assembly include complementary surfaces **42** and **43** forming a spherical seat. In this manner, the flange **16** can be adjusted in relation to the bearing assembly so that they can compensate for nonparallel grinding wheel sides or eccentricities in the arbor. (Flange **17** is bolted to sheave **26** and drives the wheel.) In other words, the spherical seat formed by the spherical surfaces allow the flanges to be adjusted away from true vertical position, should it become necessary to do so.

The disclosed assembly provides a workable solution to the vexing problem of mounting reduced diameter grinding wheels to existing machinery without sacrificing grinding performance. This capability is particularly significant in view of the high cost of grinding machinery. To enable an expensive machine to accomplish another and heretofore unattainable function is, indeed, highly beneficial.

The various features and advantages of the invention are thought to be clear from the foregoing description. Various other features and advantages not specifically enumerated will undoubtedly occur to those versed in the art, as likewise will many variations and modifications of the preferred embodiment illustrated, all of which may be achieved without departing from the spirit and scope of the invention as defined by the following claims.

We claim:

1. A spindle assembly for mounting a grinding wheel comprising:

(a) a dead shaft as an axis of rotation;

(b) a one piece and tubular rotatable arbor mounted on said dead shaft;

(c) a first bearing assembly secured to said dead shaft and one end of said arbor for rotatably coupling the arbor to the dead shaft;

(d) a second bearing assembly complementary in function to said first bearing assembly detachably secured to said other end of the arbor and said dead shaft for rotatably mounting the other end of the arbor to the dead shaft, the ratio of the outside diameter of the bearing assemblies to said outside diameter of said arbor being greater than 1; and

(e) a pair of spaced flanges on said arbor, each flange including a bearing surface for bearing against one of said bearing assemblies for securing a grinding wheel to said arbor between said flanges and between said bearing assemblies.

2. An assembly as described in claim **1** in which at least one of said bearing assemblies and the adjacent flange have coacting spherical surfaces for properly positioning said flange against the grinding wheel.

3. A dead shaft spindle assembly for a reduced apertured grinding wheel comprising:

(a) a dead shaft;

(b) a pair of spaced bearing assemblies joined by a tubular arbor for rotatably mounting said arbor on said dead shaft, said arbor having an outside radial dimension smaller than the outside radial dimension of said bearing assemblies and one of said bearing assemblies being detachably secured to said arbor; and

(c) means substantially coaxial with said arbor and bearing assemblies for securing a reduced apertured grinding wheel to said arbor between said bearing assemblies.

4. A dead shaft spindle assembly as described in claim **3** wherein at least one of said securing means and one of said bearing assemblies have means for adjusting the axial relationship of one relative to the other.

5. A dead shaft spindle assembly as described in claim **4** in which said adjusting means are mated spherical surfaces.

6. A dead shaft spindle assembly as described in claim **3** in which said securing means and arbor are detachably secured to said first bearing assembly, whereby substitutions for these members may be made.

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