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UNIVERSAL WHEEL MOUNT FOR GRINDERS

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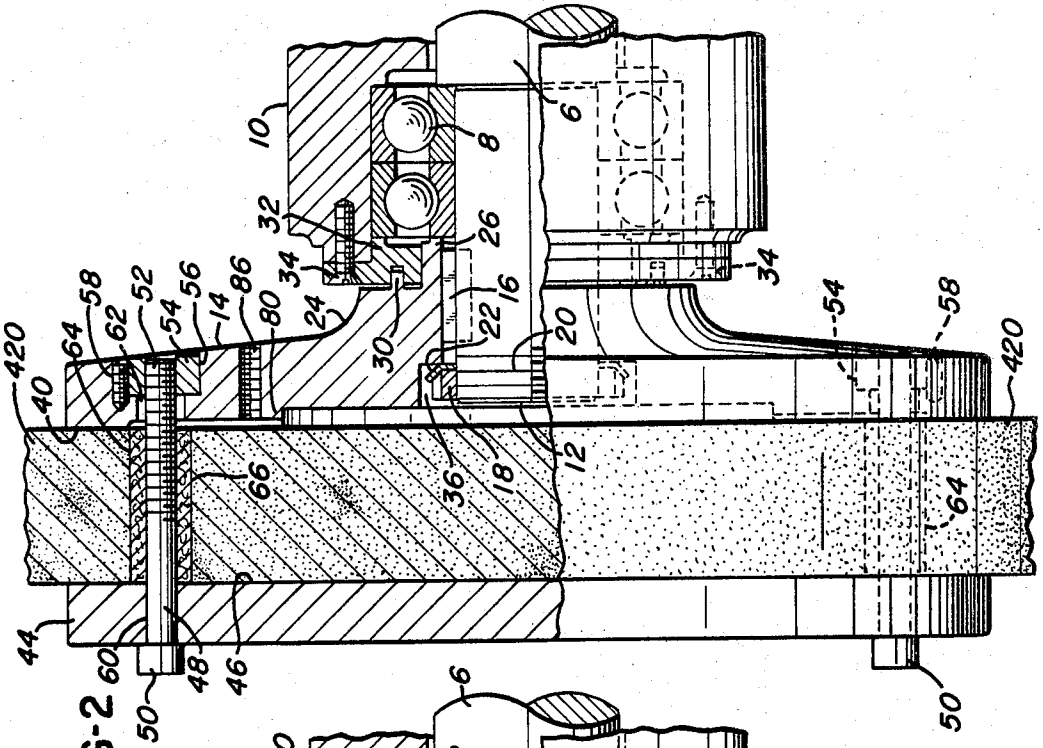

FIG-2

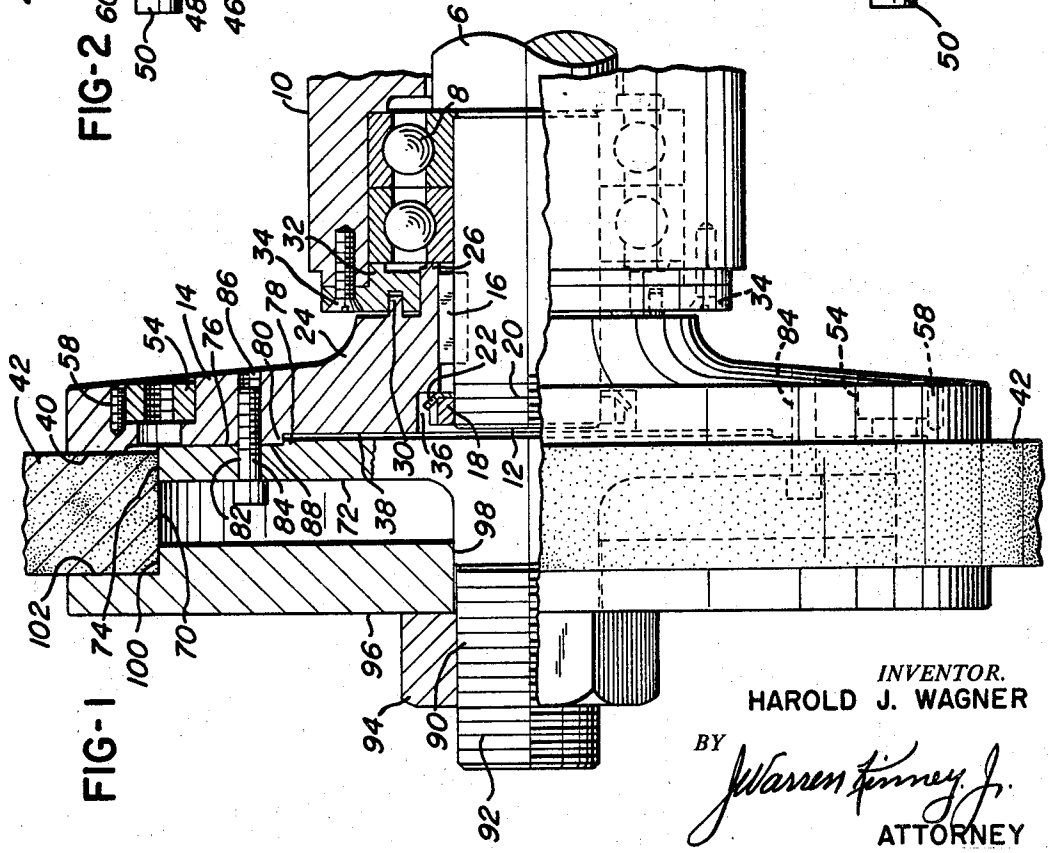

FIG-1

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UNIVERSAL WHEEL MOUNT FOR GRINDERS

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ABSTRACT OF THE DISCLOSURE

The rotable spindle of a grinding machine is provided with a universal nose or wheel mount whereby the spindle may be adapted to accommodate alternatively, an arbor-type grinding wheel, or an arborless type grinding wheel, with ease and dispatch, and without removing from the spindle a drive disc which safely supports and drives either type of wheel. The substitution of wheels involves simply the substitution of an arborless clamp disc for an adapter disc assembly carrying an arbor.

This invention relates to grinders and in particular to a universial nose or wheel mount for high speed grinders.

An object of the invention is to provide means for interchangeably mounting different types of grinding wheels relative to the grinder spindle for broadening the service capabilities of the grinder by adapting same for use with the so-called conventional arbor type wheels as well as with the recently developed super high speed arborless type wheels.

One type of grinding wheel applicable to the spindle is the arbor type wheel, and another is the arborless type wheel. The wheels of both types are quite large, approximating in diametral measurement about 30 inches or more. When wheels of this size are rotated at high surface speed, the danger of fragmentation or bursting is a matter of concern.

Arbor type wheels are commercially available as regular arbor wheels and reinforced arbor wheels. The regular arbor wheels are considerably less expensive than the reinforced arbor type wheel and the arborless type wheel, however, they will tend to burst more readily when rapidly rotated. Accordingly, wheels of the regular arbor type should not be rotated at more than 9,500 s.f.p.m. (surface feet per minute), the reinforced arbor type wheels are suitable for operation at speeds up to 12,500 s.f.p.m. An arbor type wheel of the same diameter and width, however, may safely be rotated in excess of 16,000 s.f.p.m.

Depending upon the nature of the work to be performed, and other factors, a grinder spindle may be equipped with either of the three types of wheels above mentioned, and may be driven at different speeds of rotation within the safety limits aforesaid.

An object of the present invention is to provide highly desirable means for alternatively mounting upon a grinder spindle, large wheels of the arbor and the arborless types, to broaden the service capabilities of the grinder.

Another object of the invention is to provide such means for the interchange of grinding wheels upon the spindle, whereby the interchange may be effected with maximum facility, safety, and dispatch.

A further object is to provide means of the character and for the purpose stated, which is simple and inexpensive, though extremely durable and effective as to application and performance, with safety of operation assured.

The foregoing and other objects are attained by the means described herein and as illustrated upon the accompanying drawing, in which:

FIG. 1 is a side elevational view, partly in vertical section, showing a grinder spindle equipped with the means of the present invention, supporting an arbor type grinding wheel.

FIG. 2 is a view similar to FIG. 1, showing the means of the invention supporting an arborless type grinding wheel upon the same spindle.

A heavy-duty grinder usually comprises a heavy frame upon which is supported a grinding wheel drive spindle journaled in anti-friction bearings, and driven at selective speeds of rotation by means including an electric motor. The spindle may rotate about an axis which is either horizontal or vertical, or in some cases inclined to the vertical, depending upon the nature of the work to be performed by the grinder. In the structure herein illustrated by way of example, the spindle **6** is supported by anti-friction bearing means **8**, for rotation upon a horizontal axis. As will be apparent, the drawing views show only one end of the spindle, the opposite end being supported by bearing means which may be similar to bearing **8**. A portion of the grinder frame is indicated by reference numeral **10**.

Spindle **6** includes a terminal end **12** upon which is fixedly secured a primary drive disc or plate **14** to be rotated with the spindle as the spindle is driven by means of a suitable motor, not illustrated. For the purpose, disc **14** may be keyed to the spindle as at **16**, and secured against displacement from the end of the spindle by means of a nut **18** engaging threads **20** formed on the spindle end. A lock washer for the nut is indicated at **22**. From the foregoing, it will be understood that primary disc **14** is securely though releasably fixed to the spindle for rotation therewith.

The hub **24** of primary disc **14** has at its inner end an annular abutment **26** to bear against the inner race of one of the bearings **8**. Radially outwardly of abutment **26** is located an annulus **30**, to form a lubricant seal with the bearing retainer **32** which is fixed to frame part **10** by means of several screws **34**. Disc **14** at the opposite end of hub **24**, may be provided with a central recess **36** to accommodate the spindle end **12**, washer **22** and nut **18**.

Drive disc **14** has a forward substantially planar face **38** which is normal to the axis of the drive spindle. The forward outer marginal portion of face **38** is projected forwardly to provide an annular contact area **40** to abut one side of grinding wheel **42**, or alternatively, one side of grinding wheel **420**, when the wheel is clamped against the contact area. In the case of the arborless type grinding wheel **420**, clamping of the wheel may be effected by means of a clamp disc **44** having a flat rear face or clamping area **46** drawn tightly against the outer side face of the wheel by means of bolts or equivalent fasteners **48**.

Each bolt **48** may have a head **50** to abut clamp disc **44**, and a threaded shank **52** to engage the internal threads of a nut **54** disposed at the rear of drive disc **14**. The nut may be embedded in a recess **56** at the rear of the drive disc, and means such as a lock screw **58** may be employed to anchor the nut against displacement and rotation of the nut relative to recess **56**. The clamp bolts **48** pass through holes **60** and **62** formed in clamp disc **44** and drive disc **14**, respectively, and are received also in the longitudinal bores of a series of cushion sleeves or bushings **64** carried by the grinding wheel. The sleeves or bushings are formed of fiber or other suitable material, and may be pressed into transverse openings **66** formed in the grinding wheel.

The wheel **420** may carry any number of sleeves or bushings **64**, equally spaced apart on a circle concentric with the periphery of the wheel. An equal number of bolt holes **60** and nuts **54** will of course be provided in discs

44 and 14, to register with the sleeve bores and the bolts employed to clamp the grinding wheel between the discs.

It should be noted that the arborless wheel 420 is not provided with a central spindle bore, nor is it necessary to aperture the clamp disc 44 to accommodate the driving spindle. Disc 44 may be in the form of a plain flat circular plate, usually of steel or other suitable metal, having a diametral dimension equal to the diameter of drive disc 14.

The grinding wheel of FIG. 2 may be demounted by simply removing the bolts or fasteners 48 to release the wheel and clamp disc 44. Nuts 54 will remain in place upon the drive disc, as in FIG. 1. After removal of the arborless grinding wheel of FIG. 2, an arbor type of wheel may be substituted therefor in accordance with the disclosure of FIG. 1.

The arbor type of grinding wheel 42, FIG. 1, may be of approximately the same diameter and thickness as wheel 420, if desired; however, wheel 42 is provided with a central opening or bore 70 larger in diameter than the diameter of the drive spindle. To center the wheel 42 relative to the drive spindle, there is provided an adapter in the form of a disc 72 which is axially aligned with spindle 6, said adapter disc being of a diameter approximately equal to the diameter of the grinding wheel opening 70. The adapter disc fits snugly within opening 70, with its peripheral edge 74 supporting the wheel.

The adapter disc 72 may carry on its rear face 76 an annular shoulder 78, to engage snugly a complementary annular shoulder 80 formed on the forward face of drive disc 14. Both shoulders are concentric to the axis of the drive spindle, wherefore the adapter disc and the wheel 42 supported thereby will rotate in exact concentricity with the drive spindle. The adapter disc may be provided with a plurality of equally spaced holes 82 to accommodate mounting screws 84 threadedly engaging tapped holes 86 in drive disc 14. Screws 84 are removable for demounting the adapter and wheel 42. When applied to the drive disc, the adapter disc flatly abuts an annular contact area 88 formed on the drive disc radially outwardly of locating shoulder 80.

At its exact center, adapter disc 72 carries an outwardly extended screw-threaded stud 90, the threads 92 of which are receptive of a clamp nut 94. Nut 94 may be tightened against a clamp disc 96 which is centrally apertured at 98 to receive stud 90. Clamp disc 96 preferably is of the same diameter as drive disc 14, and has an annular ledge or shoulder 100 to enter partially the opening 70 of grinding wheel 42, for supporting the wheel as effectively as does the peripheral edge 74 of adapter disc 72. Clamp disc 96 has an annular marginal contact area or face 102, to embrace a side of the grinding wheel and clamp it tightly against the contact area 40 of the drive disc. The contact area or face 102 is contiguous to, and located radially outwardly of, the wheel-supporting shoulder or ledge 100.

When interchange of grinding wheels is to be effected, the wheel of FIG. 1 may be readily demounted by removing the nut 94 and clamp disc 96, removing wheel 42, then removing the screws 84, and displacing adapter 72 from the driving disc 14.

While in the preferred embodiment of the invention the clamp nuts 54 are shown attached to the drive disc, these elements if desired may be common nuts applied to the bolts 48 in ordinary manner, and not necessarily recessed in the body of the drive disc.

The foregoing and other modifications and changes in structural details may be restored to, within the scope of the appended claims, without departing from the spirit of the invention.

What is claimed is:

1. A grinder comprising a grinding wheel, a rotatable spindle having an outer end, a drive disc mounted on the outer end of the spindle and driven thereby, the drive disc having rows of apertures with threaded means in the apertures, the rows of apertures being on circles of different diameters, the outer face of said disc having a shoulder concentric with the axis of said spindle and within the innermost circle of said apertures, a clamping means clamping the grinding wheel to the drive disc, fastening means engaging the clamping means and a selected row of the apertures, whereby different forms of clamping means may be used to clamp different forms of grinding wheels to the drive disc.

2. A grinder as set forth in claim 1 wherein the clamping means comprises an adapter disc secured to the drive disc by the fastening means engaging the selected row of aperture, the adapter disc having a hub, the grinding wheel being of the arbor type, a clamp disc engaging the hub and means on the hub holding the clamp disc thereon, cooperative means on the adapter disc and the clamp disc engaging the grinding wheel to support the wheel and hold the wheel in engagement with the drive disc.

3. A grinder as set forth in claim 2 wherein the cooperative means on the adapter disc and the clamp disc comprise aligned and opposed shoulders on said adapter and clamp discs.

4. A grinder as set forth in claim 1 wherein the clamping means comprises a disc having a circular row of apertures therein aligned with one of the rows of apertures in the drive disc, the grinding wheel being of the arborless type and having a circular row of apertures therein aligned with one of the rows of apertures in the drive disc, and the fastening means comprises bolts passing through the aligned apertures in the clamping means and the grinding wheel and engaging threaded means in the apertures in the drive disc.

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