May 8, 1945. H. KOPLIN ET AL 2,375,306

CENTERLESS GRINDER

Filed Nov. 6, 1942 3 Sheets-Sheet 1

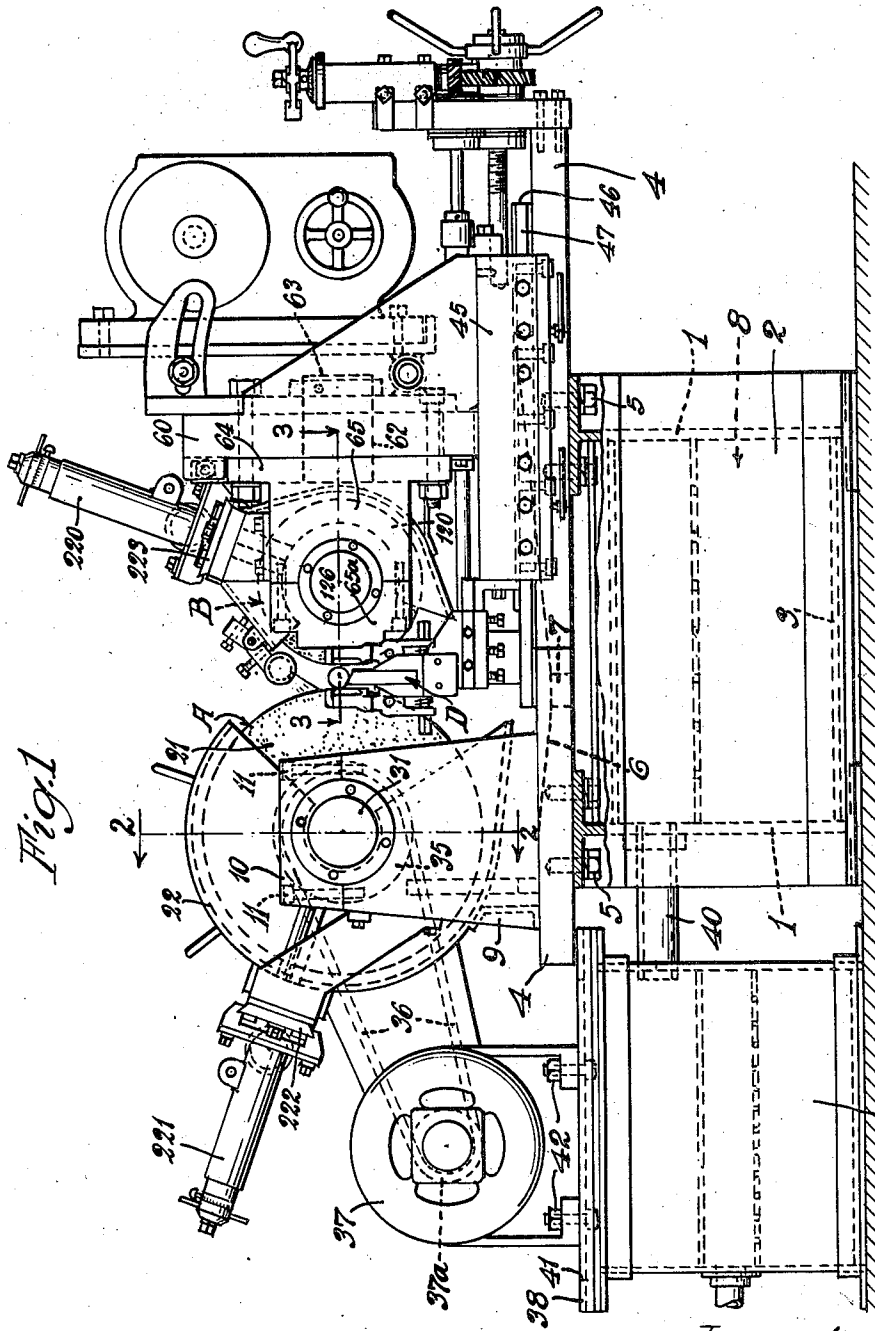


Fig. 1

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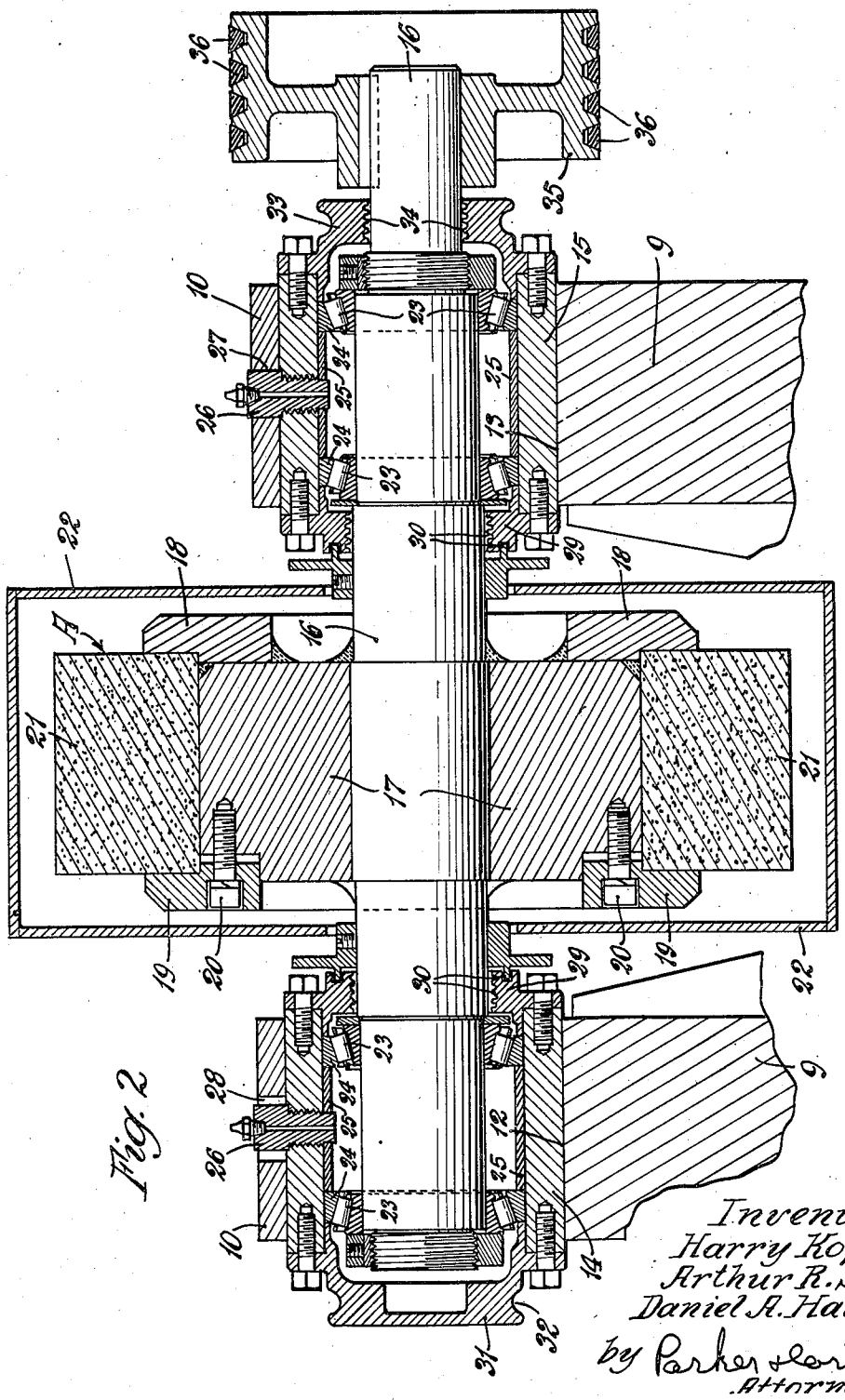


Fig. 2

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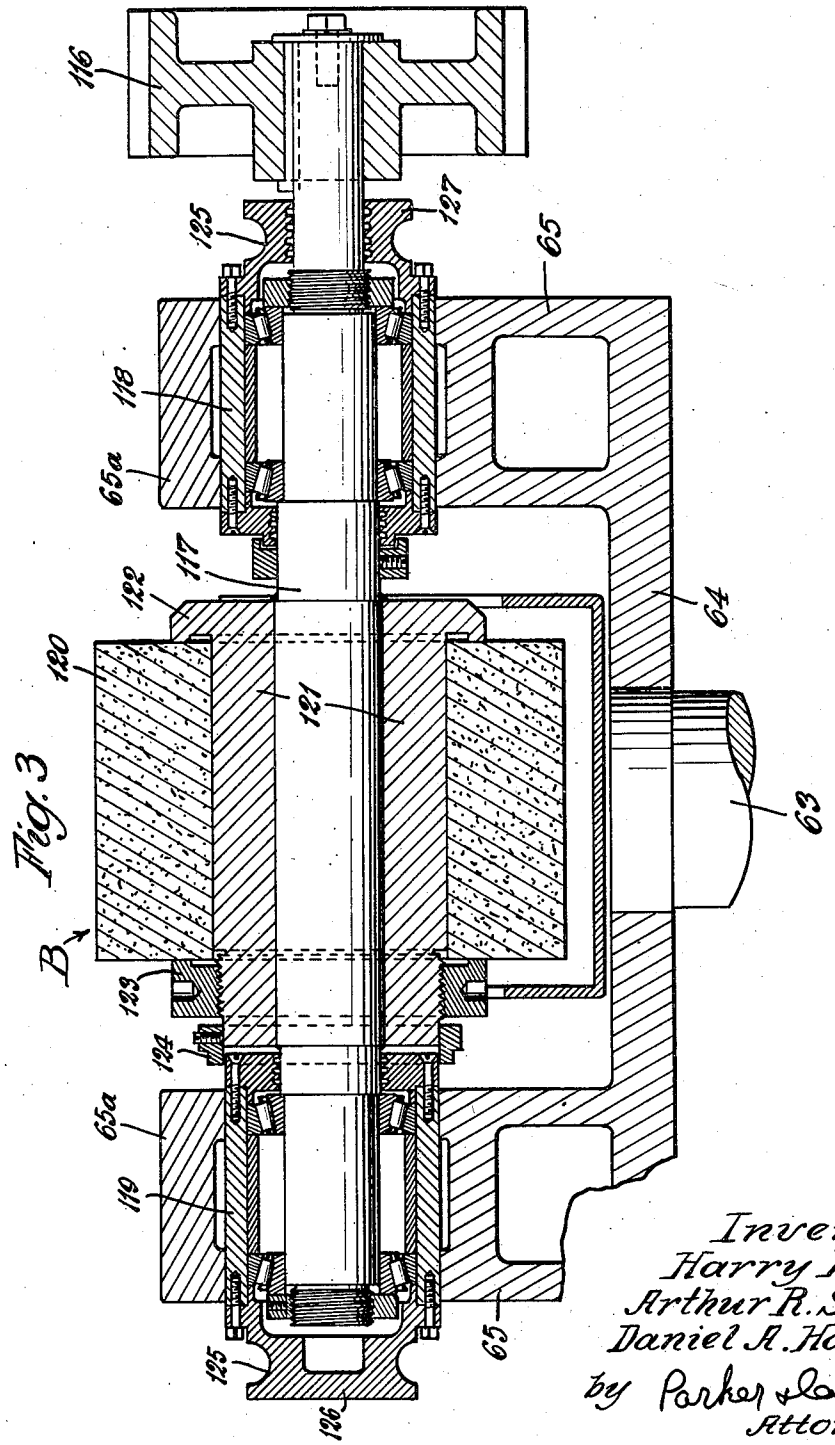


Fig. 3

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CENTERLESS GRINDER

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Application November 6, 1942, Serial No. 464,725

3 Claims. (Cl. 51—168)

Our invention relates to an improvement in centerless grinders.

One purpose is the provision of readily removable bearing means for the spindle of the grinding wheels or rolls.

Another purpose is the provision of improved means for ready removal of both grinding and feed wheels without disturbing the alignment or adjustment of the bearings.

Other purposes will appear from time to time in the course of the specification and claims.

The invention is illustrated more or less diagrammatically in the accompanying drawings, wherein:

Figure 1 is an end elevation, with parts broken away and parts in section;

Figure 2 is a section on an enlarged scale on the line 2—2 of Figure 1; and

Figure 3 is a section on an enlarged scale on the line 3—3 of Figure 1.

Like parts are indicated by like symbols throughout the specification and drawings.

The structure described falls in the category of a centerless grinder in which a grinding wheel or roll, generally indicated as A, is rotated about a generally horizontal axis, generally parallel with the direction of feed of the material. Opposed to but spaced away from the grinding roll or wheel A is a feed roll or wheel B, the axis of which is generally parallel with the axis of the wheel or roll A. The work is delivered by any suitable gauging and delivery assembly, and passes along a work guide or support structure generally indicated as D. In the operation of the device. the work, as it passes along the work guide or support D, is confined between the grinding wheel or roll A and the feed wheel or roll B, and is free to rotate as it is ground, being mounted on no spindle or arbor. A slight inclination of the axis of the feed roll causes the work to move forwardly between the rolls or wheels.

The grinding structure

Referring in greater detail to the structure, there is provided a base structure, which may form or include a coolant tank. This base structure may include side frame or wall elements 1, shown as I-beams, and end walls or frame structures 2, and a closed bottom 3. The base or tank is made of sufficient strength to serve as a support for the above mentioned grind and feed wheels and their supports and adjusting means.

Mounted on the I-beams 1 is a transversely extending base element 4, secured for example by bolts or screws 5. The top of the member 4 may be concaved at its center, as at 6, the concave portion communicating with a generally central drain aperture 7, through which coolant may drain into the interior of the base, indicated at 8.

Referring to the position of the parts in Fig. 1, at the left end of the base element 4 are located two upwardly extending pedestals or supports 9, shown in larger scale in Fig. 2. Removably secured at the top of each said supports is a bearing enclosing block 10, normally held in position for example by screws 11. The top of each support 9 and the under side of each block 10 are formed with surfaces 12, 13 which conform to the exterior of bearing sleeves 14, 15. It will be understood that when the screws 11 are released and the blocks or tops 10 are removed, then the below described grinding wheel structure, including the sleeves 14, 15, can be removed as a unit without disturbing the alignment of the below described bearings, and another unit may be inserted, thus permitting one complete grinding unit to be removed for adjustment or repair with an immediate replacement, and thus a minimum loss of time in the operation of the machine.

16 generally indicates a shaft on which is welded or mounted a wheel or disc 17, provided with flanges 18, 19, of which one flange, indicated as 19 in Fig. 2, is shown as removable and held removably in position for example by screws 20. Confined between the flanges 18 and 19 and the periphery of the wheel 17 is the grinding ring or wheel proper, of any suitable abrasive material, indicated at 21. 22 is any suitable surrounding housing guard open at one side to permit contact with the work.

Each of the bearing sleeves 14, 15 receives one end of the shaft 16, any suitable bearing means, for example roller bearings, being indicated as at 23, the details of the bearing rolls and their races being not of themselves new. The outer races 24, however, are shown as spaced apart by sleeves 25, which are positioned in relation to the bearing sleeves 14 by oiling fittings 26, which are shown as screw threaded into the sleeves 14, 15, with ends extending into appropriate apertures in the rings 25. The oiling fittings extend also through apertures in the members 10, the aperture 27 at one side of Fig. 2 providing a snug fit, the aperture 28 at the other side providing a loose fit to permit variation of adjustment or in size of parts.

The inner ends of the sleeves 14, 15 are closed by any suitable closure plates or rings 29, which may be provided with any suitable labyrinth or

other oil sealing means **30**. The outer end of the sleeve **14** is closed, and a closure plate **31** provided, with a groove or channel **32** to receive a rope or lifting device. A similar plate **33** is provided for the outer end of the sleeve **15**, apertured as at **34** to permit the extension of the end of the shaft **16**, upon which is mounted any suitable drive pulley **35**, herein shown as a multi-grooved pulley adapted to receive a plurality of V belts **36**.

It will be understood that no adjustment is provided for or necessary for the grinding unit. Its axis is fixed in relation to the base, and as the wheel wears down, the wear is compensated for by the below described adjusting means for the feed roller or wheel.

Any suitable motor **37** may be employed, which drives, by means of a pulley **37***a*, the pulley **35** through the above mentioned belts **36**. The motor **37** is shown as mounted on a base **38**, which is located upon the top of a second coolant tank **39**, which will later by described and which is connected with the coolant space **8** in the base, for example by the passage element **40**. It will be noted that the motor **37** may be adjusted toward and away from the grinding wheel, for example by the slots **41**, which receive any suitable securing bolts or screws **42**.

The feed wheel structure

The feed wheel structure is mounted for bodily movement on a movable support **45**, shown in some detail in Fig. 1. The member **45** is slidable on the fixed support **46**. At each side of the member **46** guiding flanges **47** are shown, which may, if desired, be unitary with the member **46** and which are spaced somewhat above the top of that part of the member **4** upon which the grinding assembly is mounted. This will be clear for example in Fig. 1. If desired, the portion **46** and the guiding flanges **47** may be made unitary with the base **4**.

Mounted on or integral with the member **45** is the upwardly extending frame member or support **60**. The member **60** is apertured generally centrally, as at **62**, to receive a trunnion **63**, fixed to the plate **64**, which is formed with forwardly extending bearing supports **65**. The trunnion **63** and the plate **64** may be moved as a unit in relation to the upstanding plate **60** on the slide **45**.

Considering the feed roll proper and is bearing means, any suitable driving element, not shown, passes about a pulley or sprocket **116** on the outer end of the guide roll or guide wheel shaft **117**. At each end of the shaft **117** are bearing units, much like those shown in Fig. 2 in connection with the grinder wheel, which units include sleeves **118** and **119**, which are supported in blocks or forwardly extending supports **65** of the plate **64**. Each such support **65** has an outer removable member **65***a*. The feed roll or wheel **120** extends about a hub **121**, which may be integral with or fixed to the shaft **117**, and which is shown in Fig. 3 as provided with a fixed positioning flange **122** and a screw threaded positioning ring **123**, screw threaded on the enlargement **121**. The feed wheel may be of an abrasive, or of rubber, or of any other suitable material, the surface of which is effective to act on the work.

The sleeves **118**, **119** are smaller in exterior diameter than the interior diameter of the wheel **120**, and are also smaller than the interior diameter of the nut **123** and the sealing ring **124**. Supporting channels **125** are provided at the end plates **126**, **127**, so that the entire unit can be bodily removed, just like the grinding unit shown in Fig. 2. When the unit has been removed, a removal of the sealing ring **124** and the nut or fixing flange **123** permits the ring **120** to be slid endwise from the shaft. It will be observed, as in the case of the grinding unit, that no disturbance of the alignment of the bearings is necessary, and the unit may be quickly removed from the machine, and a substitute unit put in position without any substantial loss of operating time.

Any suitable means may be employed for truing the surfaces of the grind wheel and the feed wheel. In Fig. 1 is diagrammatically illustrated a dresser assembly **220** for the feed wheel, the details of which do not of themselves form part of the present invention. A similar diamond dresser **221** is provided for the grind wheel. The dresser assemblies are slidably mounted upon suitable bases **222**, **223**, supported upon the pedestals **9** and **65**, respectively.

It will be realized that, whereas we have described and illustrated a practical and operative device, nevertheless many changes may be made in the size, shape, number and disposition of parts without departing from the spirit of the invention. It is therefore wished that the drawings and description be taken as in a broad sense illustrative or diagrammatic, rather than as a limitation to the precise showing.

The use and operation of the invention are as follows:

We provide opposed feed and grind rolls, the axes of which are shown as horizontal and generally parallel and in substantially the same horizontal plane. The axis of the work on the support D is slightly higher than the axes of the rolls. The axis of rotation of the grind roll is preferably horizontal and normally fixed and parallel with the path of movement of the material into the grinding zone.

It is highly important that grinders of the type herein shown, when used on critical work, such as war work, be serviced with a minimum loss of time. This is particularly the case where a number of these units are employed in series, the work passing from unit to unit. We, therefore, have provided means for ready removal of the grind wheel and its associated bearings as a unit, and the feed wheel and its associated bearings as a unit. All that is necessary is to remove the top members **10** of the grind wheel assembly shown in Fig. 2 and lift the grind wheel and its bearing sleeves bodily off the machine and replace it with another complete unit. Similarly, as shown in Fig. 3, the feed wheel assembly may be removed as a unit, including the feed wheel shaft and bearings. The result is a minimum loss of time of the unit and of the other units associated therewith.

The grind wheel **21** may be removed from its shaft by removing the flange **19**, without in any way disturbing the bearings for the shaft. Similarly, in the feed wheel unit shown in Fig. 3, when the sealing ring **124** and the nut **123** are moved, the feed ring **120** may be slipped off the shaft without disturbing the bearing adjustment.

We claim:

1. In a rotary grinder and bearing assembly therefor, a rotating shaft, a plurality of supports for said shaft spaced apart along said shaft, a plurality of bearing assemblies for said shaft, each said bearing assembly including an outer shell into which said shaft penetrates, and bearing means interposed between the penetrating portion of said shaft and the inner surface of said outer

shell, and means for removably securing each said assembly to one of said supports, said shaft and the associated bearing assemblies being unitarily removable from said supports without affecting the adjustment or alignment of said bearing assemblies in relation to said shaft, a hub on said shaft intermediate said bearing assemblies, a grinding ring on said hub, and means for removably securing it to said hub.

2. In a rotary grinder and bearing assembly therefor, a rotating shaft, a plurality of supports for said shaft spaced apart along said shaft, a plurality of bearing assemblies for said shaft, each said bearing assembly including an outer shell into which said shaft penetrates, and bearing means interposed between the penetrating portion of said shaft and the inner surface of said outer shell, and means for removably securing each said assembly to one of said supports, said shaft and the associated bearing assemblies being unitarily removable from said supports without affecting the adjustment or alignment of said bearing assemblies in relation to said shaft, a hub on said shaft intermediate said bearing assemblies, a grinding ring on said hub, and means for removably securing it to said hub, the interior diameter of the grinding ring exceeding the diameter of said bearing assemblies, whereby the ring may be removed from the hub while the bearing assemblies are in their normal relationship with the shaft.

3. In a rotary grinder and bearing assembly therefor, a rotating shaft, a plurality of supports for said shaft spaced apart along said shaft, a plurality of bearing assemblies for said shaft, each said bearing assembly including an outer shell into which said shaft penetrates, and bearing means interposed between the penetrating portion of said shaft and the inner surface of said outer shell, and means for removably securing each said assembly to one of said supports, said shaft and the associated bearing assemblies being unitarily removable from said supports without affecting the adjustment or alignment of said bearing assemblies in relation to said shaft, a hub on said shaft intermediate said bearing assemblies, a grinding ring on said hub, and means for removably securing it to said hub, including opposed flange elements on said hub, at least one of said flange elements constituting a flange ring axially removable from said hub, the interior diameter of said ring exceeding the exterior diameter of the adjacent bearing assembly.

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