July 8, 1958 C. STELMACHOWSKI 2,841,929

TRUING DEVICE FOR PERIPHERAL TYPE GRINDING WHEELS

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Fig. 1

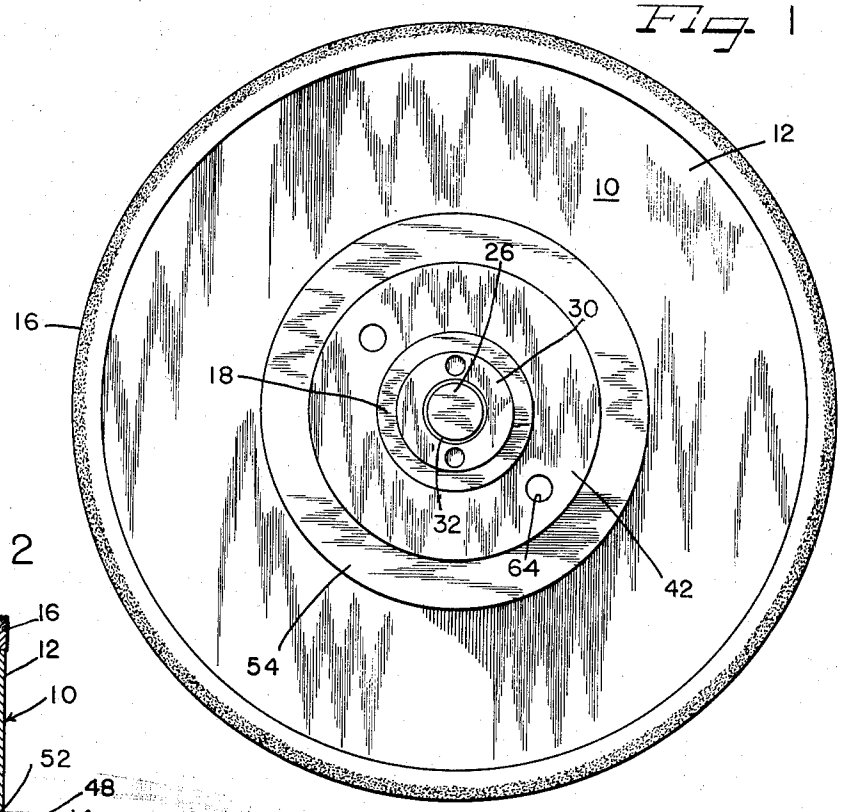


Fig. 2

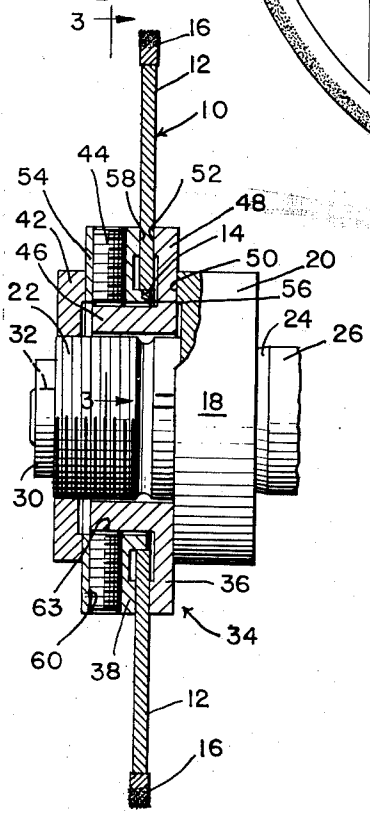
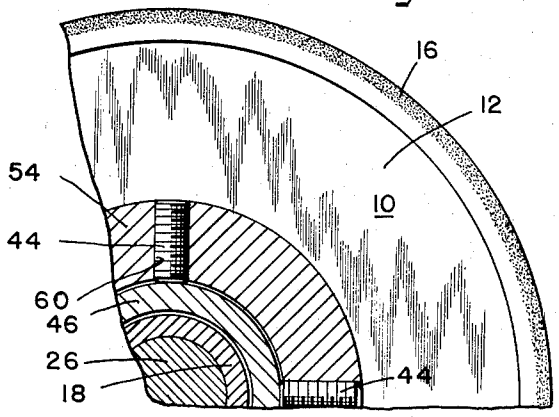


Fig. 3



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TRUING DEVICE FOR PERIPHERAL TYPE GRINDING WHEELS

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The improved truing device comprising the present invention has been designed for use primarily in connection with the truing of peripheral type diamond grinding wheels. The invention is, however, capable of other uses and the same may, if desired, with or without modification, be employed for truing and/or balancing shaft or spindle-mounted abrasive or other rotary tools which differ widely in their construction and design, as well as in the use to which they may be put. Irrespective, however, of the specific application of the present truing device, the essential features thereof are at all times preserved.

In the operation of peripheral type diamond grinding wheels, only extremely small eccentric tolerances are permitted between the axis of the central drive shaft or spindle and the axis of the wheel, both from the standpoint of accurate control of the desired work contour and of vibrational effects in the grinding wheel itself during free rotation thereof. Thus, where there is any discrepancy or lack of coincidence between the axis of the peripheral ring-like diamond matrix of the wheel and the axis of the central mounting opening in the wheel, the latter cannot be mounted for proper operation on the central drive shaft or spindle, or on the adaptor associated with such spindle, and, at least for certain types of precision work, the wheel must be discarded. Similarly, where there is a comparatively wide tolerance between the diameter of the spindle or adaptor and the cylindrical mounting opening in the grinding wheel, it is difficult to mount the wheel on the spindle in a condition of either trueness or balance, or both, and much time is consumed in an effort to obtain such trueness and balance.

According to the present invention, the above noted limitations that are attendant upon the use of peripheral diamond grinding wheel mountings are obviated and, toward this end, the invention contemplates the provision of a novel mounting for such grinding wheels whereby the wheels may be operatively mounted on the drive shaft or spindle and adjusted thereon through very fine limits of adjustment and thereby brought to a precise position of trueness and condition of balance.

The provision of a grinding wheel mounting of the character briefly outlined above being among the principal objects of the invention, it is another object thereof to provide a novel form of adjusting means for varying the radial position of the wheel on its drive spindle or adaptor so that the eccentricity of the former may be brought within tolerable limits with a minimum of effort on the part of the operator and whereby the adjusting means is conveniently accessible to the operator from the front of the machine with which the spindle is associated so that the adjustment may be made both at the time of initial installation of the wheel and at any time thereafter.

A similar and related object of the invention is to provide such a mounting wherein the adjustments may be made with the grinding wheel operatively installed on the spindle without requiring disassembly of parts, removal

and reapplication of the wheel from and to the spindle, or rearrangement of the various parts of the mounting.

It is another object of the invention to provide such a mounting and truing device which utilizes plural independent adjusting means which bear, each to the other, an interdependent adjusting function as well as an interdependent locking function whereby when one of the adjusting means is moved to its final adjusted position, frictional forces are applied to that adjusting means, as well as to all the others thereof tending to hold the various adjusting means in their final positions of adjustment.

Yet another object of the invention is to provide a combined grinding wheel mounting and truing device which is of simpler construction than other devices of the same general character and intended for the same general purpose, particularly with respect to the small number of parts which are required for the entire assembly, thereby resulting in economy of manufacture.

Other objects and advantages of the invention, not at this time enumerated, will become more readily apparent as the following description ensues.

In the accompanying single sheet of drawings forming a part of this specification, a preferred embodiment of the invention has been shown.

In these drawings:

Fig. 1 is a front elevational view, partly in section, of a peripheral type grinding wheel showing the same operatively mounted on a central adaptor by means of the present truing device;

Fig. 2 is a side elevational view, partly in section, of the structure shown in Fig. 1; and

Fig. 3 is a quarter sectional view taken substantially along the line 3—3 of Fig. 2.

Referring now to the drawings in detail, a conventional peripheral type diamond grinding wheel is designated in its entirety at 10 and includes the usual wheel body or annulus 12 having a central mounting or arbor opening 14 formed therein. A peripheral matrix assembly 16 consisting of crushed or fragmented diamonds is carried at the outer circular edge of the wheel body 12. The grinding wheel 10 is shown as being mounted on a conventional adaptor 18 having a rearwardly disposed clamping head 20 and a forwardly extending threaded shank portion 22 by means of the truing and mounting device of the present invention and which will presently be described in detail.

The adaptor 18 is carried at the outer tapered end 24 of a drive shaft or spindle 26 associated with a conventional grinding machine (not shown) and which may be of any suitable type. A clamping nut 30 which is countersunk in the adaptor 18 and threaded as at 32 on the reduced end of the spindle 26 serves to secure the adaptor on the spindle for rotation in unison therewith.

The mounting device of the present invention is designated in its entirety at 34 and is comprised of but three annual parts including a rear clamping ring 36, a front clamping ring 38 and a clamping or pull-up nut 42. The device further includes a series of adjusting screws or centering devices 44 of which there are preferably four in number although a greater or lesser number of such screws may be employed if desired, the various screws being spaced approximately 90° apart.

Referring now to Fig. 2, the rear clamping ring 36 is of L-shape design in radial cross section and is formed with a relatively thick hub portion 46 from the rear end of which there extends radially outwardly a clamping flange 48 the rear face of which bears against a forwardly facing rib 50 formed on the adaptor head 20. The flange 48 is formed at its peripheral regions with a forwardly extending clamping rib 52 adapted to bear against the rear side of the wheel body 12. The front

clamping ring 38 is likewise L-shape in radial cross section and includes a radial portion 54 and an axially extending flange or hub portion 56 which fits within the central arbor opening 14 of the wheel body 12 with a tight fit. The radial portion 54 of the front ring 38 is formed with a rearwardly facing clamping rib 58 which, in the assembled device, opposes the clamping rib 52 with the two ribs engaging the opposite sides of the wheel body 12 therebetween in clamping relationship. The clamping ring 38 is loosely and telescopically received over the hub portion 46 of the clamping ring 36 and is slidable therealong under the influence of the clamping nut 42 which bears against the forward face of the ring 38 and is utilized to draw the various parts together.

The radial portion 54 of the front clamping ring 38 is formed with a series of four radially disposed or extending threaded bores 60, one for each adjusting screw 44. The various screws are threadedly received within the respective bores 60 and each is formed at its outer end with a slot 62 designed to accommodate application to the screw of a conventional adjusting tool such as a screw driver or the like, and at its inner end with a flat broad hub-engaging surface 63 adapted to bear against the outer cylindrical surface of the hub portion 46 of the rear clamping ring 36.

The clamping nut 42 is preferably of the circular type and is formed with a pair of diametrically opposed spaced holes 64 therein designed for cooperation with a suitable tool such as a spanner wrench or the like by means of which the nut may be tightened on the threaded shank portion 22 of the adaptor 18.

In the operation of the above described mounting and truing device, the various annular parts extending from left to right as viewed in Fig. 2 and including the rear clamping ring 36, the grinding wheel body 12, the front clamping ring 38 and the clamping nut 42 are inserted on the spindle adaptor 18 in the order named and the clamping nut 42 is drawn up on the threaded portion 22 of the adaptor so as to loosely engage the front face of the clamping ring 38. It is then necessary only to manipulate the various adjusting screws 44, turning them one at a time or simultaneously in pairs in one direction or the other and, since the clamping ring 38 is only loosely engaged by the clamping nut 42, the radial position of the ring 38 may thus be adjusted and the grinding wheel 10 which is fixedly supported on the ring 38 may be brought to a precise adjustment wherein an indicating instrument or gauge will indicate that the diamond matrix 16 of the wheel is true with respect to the axis of the spindle. Truing of the grinding wheel in this manner will ordinarily compensate to a large degree for any unbalanced forces which might otherwise arise in the rotating wheel and the latter will be in perfect balance, as well as being true on the driving spindle 26.

During adjusting operations as described above, turning of any one of the adjusting screws 44 in a direction to advance the screw into the bore 60 in which it is threadedly received will bring the flat inner end 63 of the screw into engagement with the cylindrical surface of the hub portion 46 of the rear clamping ring 36 and continued turning movement of the screw will exert a radial thrust on the ring 38 as a whole and shift the radial position of the latter in the direction of extent of the axis of the screw. Experience will dictate the particular order of adjustment of the various adjusting screws 44 as well as the extent to which each element shall be turned to effect the desired adjustment. The adjustment of the last screw 44 in the series will effect a four-way binding of the various screws against the cylindrical surface of the hub portion 46 of the clamping ring 36. Since the diameter of the flat inner end 63 of the adjusting screw 44 is comparatively large, an appreciable extent of line contact will be obtained between the hub and screw and, upon tightening of the screw against the hub, comparatively large frictional forces are involved so that all of the adjusting screws 44 will be frictionally locked against subsequent loosening. After the necessary adjustments of the various adjusting screws have been made, the clamping screw 42 may be tightened on the threaded portion 22 of the adaptor and against the front face of the clamping ring 38 and the machine set into operation.

In compliance with title 35, U. S. Code, section 22, a preferred embodiment of the invention has been shown in the drawings and described herein, but it should be understood that the invention is not to be limited to the specific disclosure made inasmuch as various changes in the details of construction are contemplated without departing from the spirit of the invention. The ensuing claims therefore should be construed as broadly as the prior art will permit.

Having thus described the invention what I claim as new and desire to secure by Letters Patent is:

1. In a device for operatively mounting a peripheral type grinding wheel or the like having a wheel body provided with an arbor opening therein on a machine spindle between a shoulder normal to and rotating with the spindle and a clamping nut, in combination, a rear clamping ring including a radially extending clamping flange from which there projects forwardly a cylindrical hub portion presenting a cylindrical outer surface, a front clamping ring including a radially extending clamping flange and a rearwardly extending circular flange, said latter flange extending into and fitting tightly within the arbor opening of the grinding wheel body and serving to fixedly secure the latter to the front clamping ring, said hub portion of the rear clamping ring extending forwardly and projecting into the front clamping ring whereby said front clamping ring is loosely and telescopically slidable on the hub portion of the rear clamping ring, said clamping rings being disposed on the spindle between said shoulder and nut with the shoulder bearing against the front ring and the nut bearing against the rear ring, and an adjusting screw threadedly received within the radial clamping flange of the front clamping ring and projecting radially therethrough at at least three circumferentially spaced regions therearound and effectively bearing at its inner end against the outer surface of said cylindrical hub portion of the rear clamping ring.

2. In a device for operatively mounting a peripheral type grinding wheel or the like on a machine spindle, the combination set forth in claim 1 wherein each of said adjusting screws is provided with a flat relatively large diameter circular inner end surface for increasing the frictional characteristics of the adjusting screw.

3. In a device for operatively mounting a peripheral type grinding wheel or the like on a machine spindle, the combination set forth in claim 1 wherein said clamping screws are four in number and are spaced 90° apart.

4. In a device for operatively mounting a peripheral type grinding wheel or the like having a wheel body provided with an arbor opening thereon on the front end of a machine spindle between a clamping shoulder normal to and rotating with the spindle and a clamping nut at the extreme forward end of the spindle, in combination, a pair of cooperating clamping rings surrounding the spindle and interposed between said shoulder and nut, each of said rings being L-shaped in radial cross section and provided with an axial hub portion and a radial clamping flange, one of said rings being loosely and telescopically slidable on the hub portion of the other ring with said hub portions facing in opposite directions, the hub portion of said latter ring projecting into the arbor opening of the wheel body with a tight fit whereby said wheel body is interposed between said radial clamping flanges in clamping relation, and an adjusting screw extending into and radially through the radial clamping flange of said latter ring at at least three circumferentially

spaced regions around the ring and having its inner end bearing against the hub portion of the other ring.

5. In a device for operatively mounting a peripheral type grinding wheel or the like on the front end of a machine spindle, the combination set forth in claim 4 wherein said adjusting screws are four in number and are spaced 90° apart.

6. In a device for operatively mounting a peripheral type grinding wheel or the like on the front end of a machine spindle, the combination set forth in claim 5 wherein each of said adjusting screws is provided with a flat relatively large diameter circular inner end surface

for enhancing the frictional characteristics of the screw against said hub portion of said other ring.

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