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[54] **ABRASIVE GRINDING WHEEL CONSTRUCTION**

[75] Inventors: **Kenneth A. Darrow**, Sprakers; **Louis E. Hibbs, Jr.**, Schenectady, both of N.Y.

[73] Assignee: **General Electric Company**, Schenectady, N.Y.

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[51] **Int. Cl.** **B24d 5/02**

[58] **Field of Search** ..... 51/206 R, 207, 209 R, 51/168, 307

[56] **References Cited**

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Primary Examiner—Donald G. Kelly
Assistant Examiner—Howard N. Goldberg
Attorney—John F. Ahern, Frank L. Neuhauser et al.

[57] **ABSTRACT**

Abrasive grinding wheel construction is described in which the wheel disc (exclusive of the abrasive rim) and hub are made as a single member to eliminate eccentricity a) during molding of the abrasive rim thereto and b) upon mounting the completed wheel.

3 Claims, 2 Drawing Figures

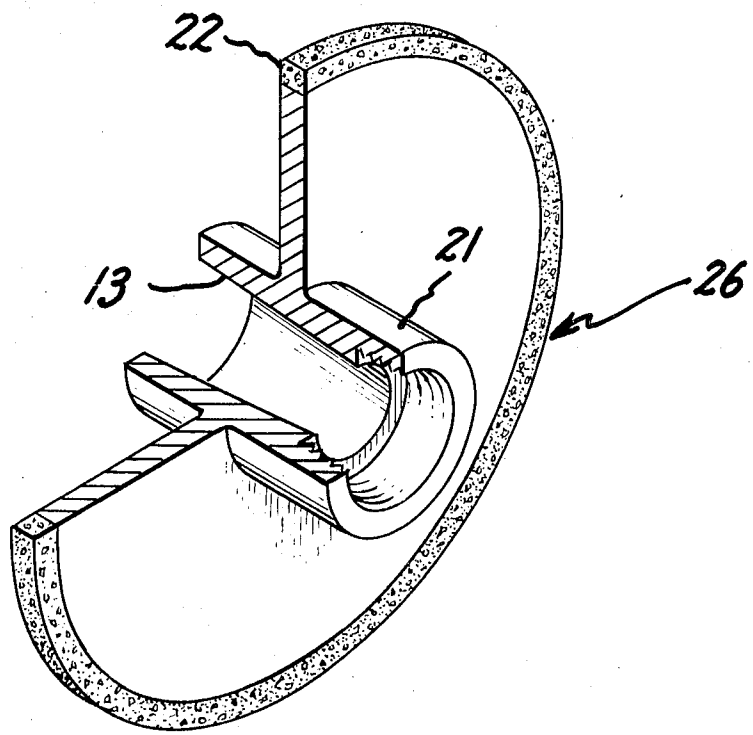


Fig. 1.

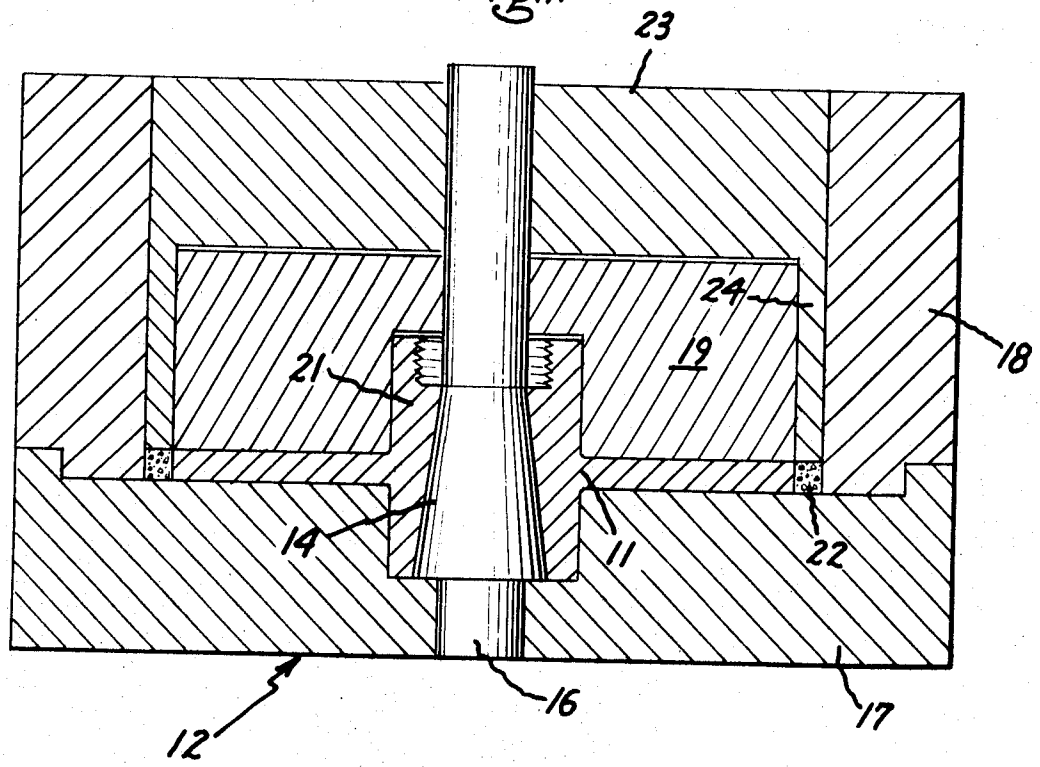
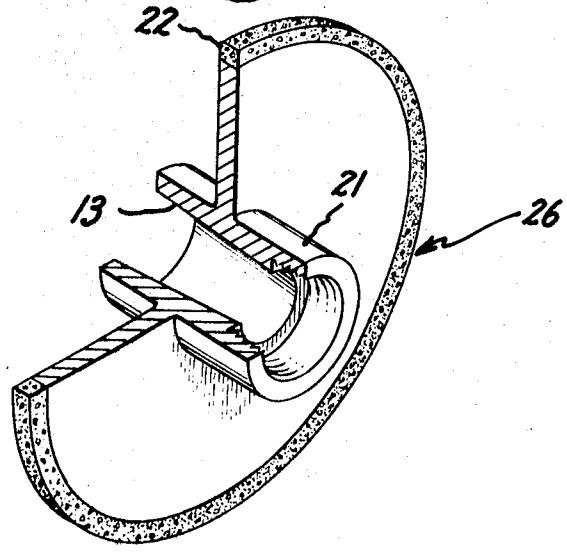


Fig. 2.



ABRASIVE GRINDING WHEEL CONSTRUCTION

BACKGROUND OF THE INVENTION

Abrasive grinding wheels as marketed, particularly those employing expensive grit materials, such as diamond and cubic boron nitride, consist of a metal wheel disc to which is affixed a relatively thin rim of a mixture of abrasive grit, filler and bonding matrix. The user mounts the wheel disc on a hub by means of a center bore extending through the wheel disc and the hub and wheel assembly are affixed to the drive mechanism for rotating the wheel. The wheel must then be trued to correct for any eccentricity resulting from imperfect centering of the wheel relative to the center of the drive shaft.

Lack of concentricity of the abrasive rim relative to the center bore and between the center bore and the hub can easily amount to several percent of the total abrasive rim thickness.

Trueing of the wheel consists of removing abrasive from portions of the rim eccentric to the center of the mounting shaft whereby the outer edge of the wheel is concentric therewith. Thus, after the trueing operation some arc length of the abrasive rim will be thinner than the rest of the rim and this thinner portion limits the life of the wheel, because when the abrasive rim has been worn through in this region there will still be several percent of the total rim thickness on the balance of the wheel periphery that can never be used. Therefore, the aforementioned lack of concentricity has a double effect in increasing the cost of grinding wheels to the user.

It would, therefore, be most advantageous to provide a method of abrasive grinding wheel manufacture and an abrasive grinding wheel construction wherein the initial trueing and requisite dressing (exposing grit by controllably removing binder) operations of the wheel by the user will be minimized or eliminated together with the loss of expensive abrasive grit due to the lack of concentricity between hub and center bore and between center bore and abrasive rim.

SUMMARY OF THE INVENTION

The present invention is directed to assuring the concentricity of the abrasive rim relative to the center of the hub. In the abrasive grinding wheel construction of this invention, the wheel disc (exclusive of the abrasive rim) and the hub are made as one single unit. The bore in the hub consists of a tapered portion and a threaded portion and the perimeter of the disc being concentric with the center line of the bore.

In molding the wheel this single unit is placed in the mold over a male tapered pin that automatically centers the wheel disc in the mold to within a few ten thousandths of an inch. This automatic centering action eliminates eccentricities in the rim thickness relative to the center-line of the bore. Once the abrasive rim has been applied to the outer periphery of the wheel disc in the molding operation the wheel is usually ready for mounting on a tapered arbor. In some instances, a small amount of initial trueing will be necessary.

BRIEF DESCRIPTION OF THE DRAWING

The practice of this invention and the product resulting therefrom will be apparent from the following detailed description and the annexed drawing in which:

FIG. 1 is a view showing a device for molding the abrasive grinding wheel construction of this invention (most of the elements thereof being shown in cross section) and

FIG. 2 is a three-dimensional view partially in section showing abrasive grinding wheel construction according to this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the preparation of an abrasive grinding wheel according to this invention a preformed unitary wheel disc/hub unit **11** of relatively soft material (e.g., die-cast aluminum) is placed in the disassembled mold **12** in the position shown in FIG. **1**. Tapered bore **13** of unit **11** is placed over the tapered portion **14** of pin **16** mounted in base **17** of mold **12**. Outer confining wall **18** supported on and interengaged with base **17** defines the outer edge of the abrasive rim to be formed in the mold and assures the concentricity of this outer dimension relative to the axis of symmetry thereof, the center line of pin **16**.

After integral wheel disc/hub unit **11** has been placed over pin **16**, guide element **19** is introduced over pin **16** and over hub portion **21**. The abrasive grit, filler and bonding material composition is deposited uniformly in the annular space between elements **18** and **19** to an appropriate depth (about twice the thickness shown for the completed abrasive rim **22**), after which compressing element **23** is introduced for applying pressure to the abrasive composition to consolidate the deposit into the abrasive rim for the completed wheel by means of annular punch **24**. The mold and its contents are subjected to the proper curing temperature for the abrasive composition, while pressure continues to be applied via punch **24** by means not shown.

After the requisite exposure to temperature and pressure suitable for the particular bonding medium, the mold is disassembled to enable removal of the completed abrasive wheel **26**.

If the molding operation has been properly conducted, trueing of wheel **26** usually will not be necessary. This perfection of manufacture is particularly desirable in the case of diamond or cubic boron nitride abrasive grinding wheels, because trueing with a diamond tool leaves most of the abrasive particles sheared off flat and devoid of good cutting edges.

After the wheel is molded and mounted on a tapered arbor, it can be checked for trueness. If trueing is required, it should be minor in extent and if trueing is not required all that need be done is to "open" the wheel as by sand blasting the edge thereof for a very short period of time. Such treatment will remove the excess binder present between the abrasive particles without destroying their bond in the wheel rim.

If abrasive wheel **26** is removed from the grinder arbor and later replaced, the tapered fit insures placement of the wheel in its original position, thereby eliminating the need for repeated trueing and dressing.

It may be seen, therefore, that the wheel construction of the instant invention will have a longer useful life and yield extra grinding capacity (as much as 10 percent) for a net savings to the consumer.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. An abrasive wheel comprising a hub portion formed integral with a disc portion, the hub and disc

being a continuous piece of a single material, said piece being bounded to an annular rim comprising abrasive grit and binder material, said hub portion having a tapered bore for mounting said wheel and the central axis of said tapered bore being substantially co-incident with the axis of symmetry of said outer rim.

2. The abrasive wheel of claim 1 wherein the abrasive grit is diamond and the integral hub and disc construction is a casting.

3. The abrasive wheel of claim 1 wherein the abrasive grit is cubic boron nitride and the integral hub and disc construction is a casting.

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