Oct. 12, 1948. L. H. METZGER ET AL 2,451,295

ABRASIVE WHEEL

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FIG. 1

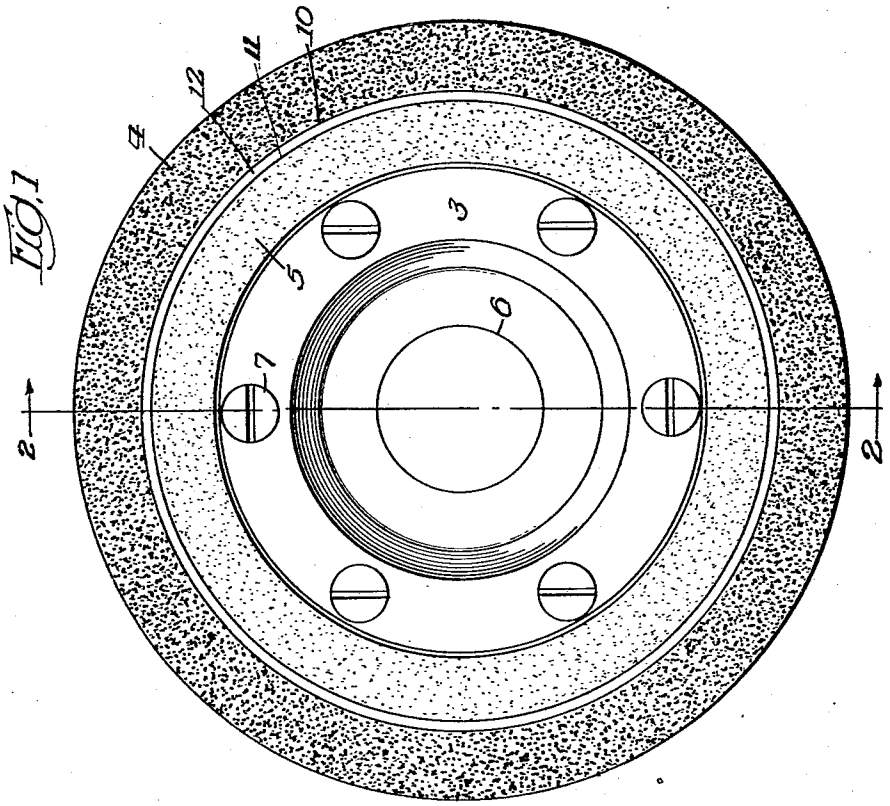
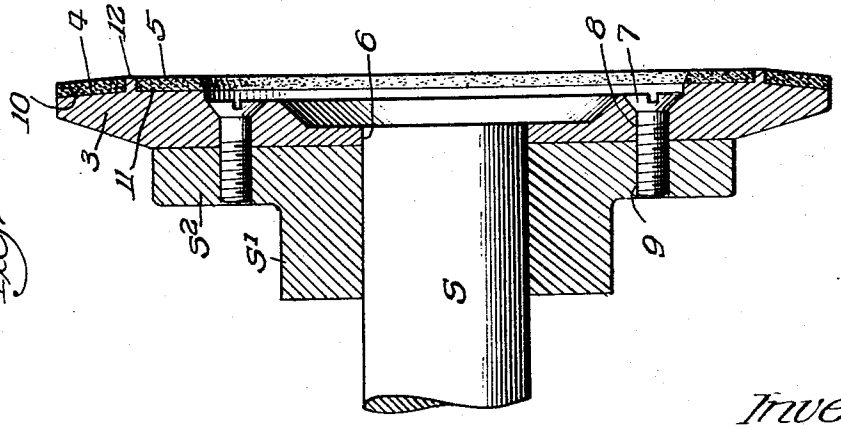


FIG. 2



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ABRASIVE WHEEL

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1 Claim. (Cl. 51—209)

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The present invention relates generally to diamond abrasive wheels. More particularly the invention relates to that type of abrasive wheel which is primarily adapted to grind the tips of cutting tools, embodies means whereby it may be attached to one end of a power driven shaft and in addition embodies on one side thereof an annular band consisting of diamond particles and a matrix for the particles.

In grinding a cutting tool of the variety that embodies a tip of tungsten carbide or like material it has heretofore been standard practice first to rough grind the tip by a silicon carbide abrasive wheel, then to grind the tip to a finished dimension by an abrasive wheel having diamonds of coarse mesh and finally to provide the tip with a final or so-called mirror finish by way of an abrasive wheel having diamonds of fine mesh. In carrying out this practice it is necessary either to mount two of the abrasive wheels on the ends of one power driven shaft and to mount the third wheel on the end of a second power driven shaft or to mount one of the wheels on one end of a power driven shaft and then successively to mount the other wheels on the other end of the shaft. If two power driven shafts are employed the equipment for grinding the tip of the cutting tool is expensive and time is consumed in moving the tool from one of the wheels on one of the shafts to the wheel on the second shaft. If but a single power driven shaft is utilized time is consumed in removing one of the abrasive wheels from the shaft and attaching the third wheel and hence the labor that is involved is essentially costly.

One object of the invention is to simplify the labor and reduce the cost of grinding the tips of cutting tools as heretofore practiced. This object is attained by providing an abrasive wheel having on the outer side thereof an outer annular band with diamond particles of coarse mesh and a concentric inner annular band with diamond particles of a fine mesh. By employing a single wheel having bands with diamonds of different mesh a single power driven shaft only need be employed and it is unnecessary to move or relocate the tool in connection with grinding the tip to a finished dimension and providing the tip with a final or mirror finish.

Another object of the invention is to provide a diamond abrasive wheel of the last mentioned character in which the cutting faces of the two diamond carrying bands are arranged so that they are not in the same plane and hence in connection with use of the inner band to provide a final or mirror finish on the tip of the tool being

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ground there is substantially no likelihood of the tip being inadvertently brought into contact with the outer annular band having diamond particles of coarse mesh.

A further object of the invention is to provide an abrasive wheel of the type and character last mentioned in which the inner annular band with diamond particles of fine mesh is spaced from the outer annular band with diamond particles of coarse mesh in order further to eliminate the possibility of the tool tip being moved into contact with the outer band while it is being given its final or mirror polish by the inner band.

A still further object of the invention is to provide a diamond abrasive wheel which is generally of new and improved construction, serves the purpose of two wheels and is characterized by high efficiency and comparatively low cost.

Other objects of the invention and the various advantages and characteristics of the present diamond abrasive wheel will be apparent from a consideration of the following detailed description.

The invention consists in the several novel features which are hereinafter set forth and are more particularly defined by the claim at the conclusion hereof.

In the drawing which accompanies and forms a part of this specification or disclosure and in which like letters and numerals of reference denote corresponding parts throughout the several views:

Figure 1 is an outer side view of a diamond abrasive wheel embodying the invention; and

Figure 2 is a section taken on the line 2—2 of Figure 1 and illustrating in detail the arrangement and design of the outer and inner annular diamond carrying bands.

The abrasive wheel which is shown in the drawing constitutes the preferred form or embodiment of the invention. It is adapted for use in grinding tips of cutting tools and is shown in the drawing as being mounted on one end of a horizontally extending power driven shaft *s*. As its component parts the wheel comprises a circular or disc-like rigid body **3**, an outer annular band **4** and an inner annular band **5**.

The body **3** is formed of any suitable material such, for example, as bronze or brass and has in the center thereof a circular hole **6** in which said one end of the shaft *s* fits. The shaft is provided inwards of said one end with a fixed collar s^1 having at its outer end an annular outwardly extending flange s^2. The inner side of the body is flat and fits flatly against the flange s^2 of the col-

lar s^1. The body is secured in fixed relation with the shaft by way of an annular series of screws 7. The latter extend through holes 8 in the intermediate portion of the body and fit within internally threaded sockets 9 in the flange.

The outer annular band 4 is fixedly mounted in an annular groove 10 in the outer margin of the front or outer side of the wheel body 3 and consists of diamond particles of coarse mesh and a matrix. If desired the diamond particles in the band 4 may have a mesh of approximately 100. The matrix of the outer annular band is preferably an alloy but it may be resin or any other type of bonding material. The outer band 4 is adapted to be used to grind the tips of cutting tools to a finished dimension after they have been rough ground by a silicon carbide or other abrasive wheel on the other end of the shaft *s*. In utilizing the band for tip grinding purposes the tip of the cutting tool to be ground is placed against the outer side surface of the band 4 while the wheel is being rotated in response to drive of the shaft *s*. The outer side face of the outer annular band 4 is frusto-conical and extends at an angle of approximately 7° with respect to a plane at right angles to the axis of the wheel. The band 4 is of uniform thickness throughout. The surface of the wheel 3 that defines the bottom of the groove 10 is in parallel relation with the outer side face of the band 4, as shown in Figure 2.

The inner annular band 5 is positioned in concentric relation with the outer annular band 4 and is fixedly mounted in an annular groove 11 in the front or outer side of the body 3 of the wheel. It consists of diamond particles of fine mesh together with a matrix and is adapted to be used to provide a final or mirror finish to the tips of cutting tools after they have been ground to a finished dimension by way of the outer annular band 4. If desired the diamond particles in the band 5 may have a mesh of approximately 400. The matrix of the band 5 is preferably the same as that of the outer band 4. The groove 11 is disposed inwards of the groove 10 and is separated from the latter by a circular rib 12. In utilizing the inner band 5 the tips of the cutting tools to be ground are placed against the outer side surface of said band while the wheel is being rotated in response to drive of the shaft *s*. The outer side face of the inner annular band 5 is flat and extends at truly right angles to the axis of the wheel body 3. As shown in Figure 2, the inner edge of the outer annular band 4 and the outer side face of the inner band are coplanar. The band 5 is of uniform thickness throughout and is fixedly retained within the groove as a result of the matrix thereof being bonded to the portion of the wheel body that defines the annular groove 11. The fine mesh diamond particles are provided in the inner annular band 5 inasmuch as such particles will produce the desired final or mirror finish without the necessity of being rotated at a surface speed as great as that of the coarse mesh diamond particles.

In utilizing the wheel for grinding the tip of a cutting tool the tip of the tool, after being rough ground by way of a silicon carbide grinding wheel at the other end of the shaft *s*, is placed against the outer side face of the outer annular band 4 while the wheel is being driven by the shaft. The tip of the tool is held in place against the outer band until it is ground to a finished dimension. After the tip of the tool is ground by the outer band 4 it is placed against the outer side face of the inner band 5 in order to provide it with a final or mirror finish. By reason of the fact that the outer side face of the outer band is not in the same plane as the outer side face of the inner band and the two bands are separated by the circular rib 12 there is no likelihood of the tip of the tool being ground by the inner band being brought into engagement with the outer band.

The herein described abrasive wheel serves the purpose of two wheels by reason of the fact that it includes the outer band having diamonds of coarse mesh and the inner band having diamonds of fine mesh. It is highly efficient and may be produced at a low cost.

The invention is not to be restricted to the details set forth since these may be modified within the scope of the appended claim without departing from the spirit and scope of the invention.

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

As a new article of manufacture, an abrasive wheel adapted to grind the tips of cutting tools and comprising a rigid disc-like body adapted for connection to a power driven shaft, an outer annular band mounted fixedly on one side face of the body and having diamond particles of certain mesh, and an inner annular band mounted fixedly on said one side face of the body and having diamond particles of different mesh, the outer side face of one of the two bands being frusto-conical and disposed at an acute angle to the outer side face of the other band, and the outer edge of the outer side face of the inner band being spaced inwards a small distance from the inner edge of the outer side face of the outer band.

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