Feb. 5, 1952 C. L. GARRISON 2,584,862

METHOD OF FORMING GRINDING WHEELS

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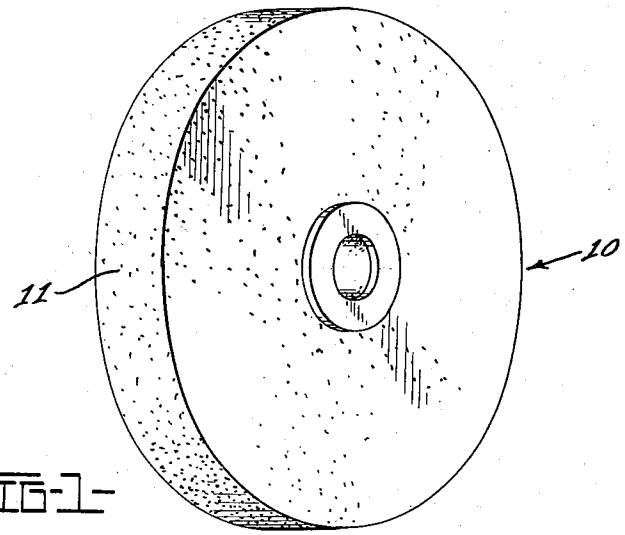


FIG-1-

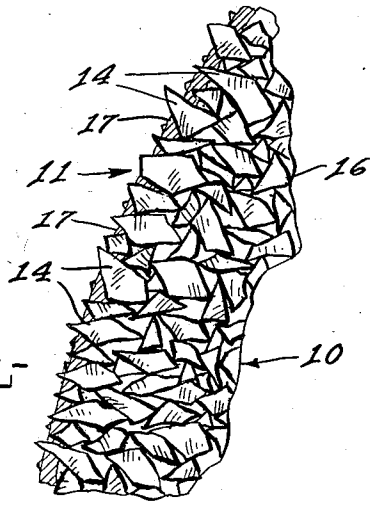


FIG-2-

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METHOD OF FORMING GRINDING WHEELS

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1 Claim. (Cl. 51—295)

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This invention relates to grinding or abrasive wheels and more particularly to a method of means of supporting the abrasive grains in the grinding zone whereby the grinding properties of the wheel are improved.

In the manufacture of grinding wheels by conventional methods, the grains or particles of abrasive are placed in a suitable mold in conjunction with a bonding agent such as a fusible ceramic material or a liquid cementitious material which "sets" on exposure to air or heat, the molded product being subjected to a temperature sufficient to cause a bonding of the abrasive grains or particles into an agglomerate mass. The grains or particles of abrasive project from the surface of the wheel and provide the cutting media for grinding tools or other objects. It has been found that in the use of the grinding wheel of this character, and especially in grinding a tool that is of very hard material, the contact or engagement of the tool with the rotating grinding wheel often results in the outermost particles of abrasive becoming dislodged from the wheel mass, thus seriously imparing the grinding efficiency of the wheel.

The present invention embraces a means and method of treating or processing a grinding wheel or the grinding zone of a wheel whereby the tendency of the grains of abrasive to be broken or dislodged from the wheel during grinding operations is substantially reduced.

An object of the invention resides in applying a material to a grinding or abrasive wheel whereby the projecting grains or particles of abrasive are provided with additional support to minimize the tendency of the particles to be dislodged from the wheel.

Another object of the invention resides in the provision of a grinding wheel in which the interstices existent between the adjacent particles of abrasive at the exterior surface of the wheel are filled with a comparatively soft material providing additional support for the grains of abrasive and preventing the accumulation of abraded particles of hard material upon the wheel surface.

Another object of the invention resides in the provision of a grinding wheel having its working surface or grinding zone filled or impregnated with a comparatively soft metal or alloy.

Further objects and advantages are within the scope of this invention such as relate to the arrangement, operation and function of the related elements of the structure, to various de-

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tails of construction and to combinations of parts, elements per se, and to economies of manufacture and numerous other features as will be apparent from a consideration of the specification and drawing of a form of the invention, which may be preferred, in which:

Figure 1 is an elevational view of a grinding wheel, and

Figure 2 is a greatly enlarged fragmentary detail sectional view of a portion of the grinding wheel illustrating the grinding zone or surface embodying a form of the present invention.

While I have illustrated a form of my invention as used with a grinding wheel it is to be understood that the invention may be used with other types or forms of abrasive devices as for example abrasive discs, abrasive drums and the like wherever the invention may be found to have utility.

Referring to the drawings, the numeral 10 indicates a grinding wheel of the type in which the peripheral arcuate surface 11 is utilized as the grinding zone. In the formation of a grinding wheel of this character, the particles or grains 14 of abrasive such as crystalline alumina, silicon carbide or the like are coated with a suitable bonding liquid 16 or other bonding agent or medium, the particles moulded to suitable shape and subjected to heat to set the bond. As shown in Figure 2, the grains or particles 14 of abrasive material project outwardly from the wheel and provide the cutting means or instrumentalities for grinding or abrading tools or other objects.

The grains or particles 14 are cemented or held together by the bonding agent but are usually insufficiently supported by such agent. This condition obtains for the reason that contact of an object being ground with the grinding wheel surface causes a fracture or rupture of the bond, thus depriving the abrasive grains of adequate support. Thus when a tool or object to be ground is moved into engagement with the projecting grains of abrasive on the wheel surface, the grains become dislodged from the bonding medium or are broken because of lack of suitable support hence impairing the grinding efficiency of the wheel. As illustrated in Figure 2, I provide the peripheral or grinding zone of the wheel 10 with an abrasive grain supporting means or reinforcing medium 17. I have found that a superficial coating or filler of a comparatively soft metal alloy functions very satisfactorily as a supporting means for the abrasive grains. A supporting material

which I have found to be very inexpensive and satisfactory is Babbitt metal, that is a composition embodying copper, antimony and tin which may be readily applied to the grinding wheel while the latter is rotating by engaging a bar of Babbitt metal in forcible contact with the rotating wheel.

The abrasive grain supporting or filler material may be applied to the grinding wheel by immersing the wheel in molten metal composition or alloy having as its principal constituents copper, tin and antimony.

I have found that by filling the interstices between adjacent grains at the surface or grinding zone of a grinding wheel, that the grinding efficiency is greatly improved by reason of the presence of the soft filler. I attribute the beneficial grinding results to an apparent two-fold purpose or function of the soft metal filler viz., it affords not only a supplemental support or reinforcement for the surface grains of abrasive, but also substantially eliminates the accumulation of particles of hard metal abraded from the tool or other object being ground. While I have found that a soft metal of the character of Babbitt metal when used as a filler attains very satisfactory results, it is to be understood that other comparatively soft materials or metals may be utilized without departing from the spirit of the invention. After the filled grinding zone has been used and the filler material worn away, the material may be replaced by again bringing a bar of soft metal into contact with the surface of the moving grinding wheel or immersing the wheel in a bath of molten metal.

A grinding wheel of the character described herein is of a somewhat porous nature by reason of the character of the bond or cementitious material securing the abrasive particles together which provides minute interstices adjacent the grains of abrasive throughout the wheel. By immersing the wheel in molten metal or by injecting molten metal under pressure into the wheel, I have found that adequate support for the abrasive particles may be obtained.

It is apparent that, within the scope of the invention modifications and different arrangements may be made other than is herein disclosed, and the present disclosure is illustrative merely, the invention comprehending all variations thereof.

What I claim is:

A method of reinforcing the surface particles of abrasive in a grinding wheel which consists in forcing a bar of Babbitt metal into engagement with the abrasive or grinding surface of said grinding wheel when the latter is in motion to remove metal from said bar and deposit a layer thereof upon said abrasive or grinding surface, whereby the surface particles of abrasive become partially surrounded with the Babbitt metal.

CLIFFORD L. GARRISON.

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