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ABRASIVE ARTICLE AND METHOD OF MAKING THE SAME.

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To all whom it may concern:

Be it known that I, MINER L. HARTMANN, a citizen of the United States, residing at Niagara Falls, in the county of Niagara and State of New York, have invented a new and useful Improvement in Abrasive Articles and Methods of Making the Same, of which the following is a full, clear, and exact description.

The present invention relates to abrasive articles. In the art of grinding, material is removed by applying an article having an abrasive grinding surface to the desired object. In its usual form the grinding medium consists of the peripheral surface of a rapidly revolving abrasive wheel. Abrasive wheels are made up of hard particles of crystalline mineral material, such as silicon carbide, emery, fused alumina and aluminous materials commonly known in the trade as aloxite, alundum, and the like, held together by a bonding agent, such as fused silicates, glue, shellac, rubber, etc.

In this specification, such abrasive appliances will be referred to as grinding wheels. Grinding wheels consist essentially of numerous cutting points, held in place by the surrounding abrasive particles (in the sub-surface) and the bonding medium. The extruding cutting points, as they come in contact with the material being ground, cut small chips or "turnings", but in this process there is also much ineffectual friction between the surface being ground and the non-cutting portion of the wheel surface. This causes frictional heat, sometimes to such an extent that water or air blasts must be used for cooling, to prevent damage to the article being abraded.

To avoid this deleterious effect, various greases, resins and waxes have been used as fillers within the pores of the grinding wheel. The action of these materials depends upon their melting under the heat created by the friction, and thereby becoming liquids at the surface of the grinding wheel and functioning as lubricants. The same effect may be and is attained by smearing the surface of the wheel or the object being ground with a heavy viscous lubricating oil.

There are several serious defects to "filled" abrasive wheels as above described. The filler may be unevenly distributed during the process of impregnation, and the dynamic balance of the wheel seriously affected. This may subsequently lead to the breaking of the wheel while in rotation, with inherent dangers. The "filled" wheel in action frequently "throws" the melted grease, wax or rosin, making unhealthful working conditions. The odors invariably rising from the decomposition and burning of these organic filler materials during the grinding operation is one of the most serious defects.

I have discovered that all of these defects may be overcome by the use of a solid, infusible lubricating material incorporated within the pores of the grinding wheel. In addition, the grinding efficiency is increased and the energy used in the grinding operation is decreased because the ineffectual frictional losses are decreased. The actual weight of the solid lubricating agent which need be applied in the wheels is small in comparison to the quantity usually employed in "filled wheels" and consequently the effect upon the balance of the grinding wheel is negligible. Since the solid lubricating agent is infusible at the temperatures attained by friction in grinding operations, there is no smoke nor odor, nor is melted material thrown from the wheel as in the case of the grease, waxes and resins.

In carrying out my invention, I may use, for example, finely comminuted graphite. It is well known that graphite is an excellent lubricant and that its superior lubricating action is inherent in the graphite itself and not in the vehicle or carrier with which it is commonly used. In order to impregnate grinding wheels with graphite, I prefer to use a suspension of finely divided graphite in water, together with a small portion of an agglutinate, such as dextrine, which acts as a temporary binder for the graphite after the subsequent removal of the water. The grinding wheel is immersed in this suspension, preferably under reduced pressure, in order to facilitate the penetration of the graphite suspension to all of the pore spaces in the wheel. After this treatment, the wheel is removed and dried and is then ready for use as an abrasive grinding wheel.

The invention is, however, not restricted to the use of graphite, since other solid in-

fusible materials having lubricating qualities may be used, such, for example, as finely divided talc, mica, clay, zinc stearate, and the like. Also the lubricant may be incorporated in the abrasive articles in other ways, such, for example, as dusting on a powdered lubricant. The invention is therefore not limited to its described embodiment, but may be otherwise embodied within the scope of the following claims.

I claim:

1. An abrasive article having voids containing a finely divided solid lubricating material which is infusible under the heat normally created by the abrasive action and a binder for the lubricant, substantially as described.

2. An abrasive article having voids containing graphite and a binder for the graphite, substantially as described.

3. The method of lubricating an abrasive article, which consists in impregnating it will a solid lubricant, which does not melt under the heat normally created by the abrasive action, and a binder for the lubricant, substantially as described.

4. The method of treating formed abrasive articles having voids, which consists in impregnating the article with a liquid carrier holding a solid lubricant which does not melt under the heat normally created by the abrasive action, and thereafter removing the liquid, leaving the solid lubricant in the voids, substantially as described.

5. The method of treating formed abrasive wheels, comprising dipping the wheels in water with comminuted graphite held in suspension therein, and then drying the wheels, substantially as described.

6. The method of treating formed abrasive wheels, comprising dipping the wheels in water with comminuted graphite held in suspension therein while under reduced pressure, and then drying the wheels, substantially as described.

7. The method of treating formed abrasive wheels, comprising dipping the wheels in water with comminuted graphite and an agglutinate held in suspension therein, and then drying the wheels, substantially as described.

In testimony whereof I have hereunto set my hand.

MINER L. HARTMANN.