Patented Feb. 9, 1932

1,844,064

UNITED STATES PATENT OFFICE

MINER L. HARTMANN, OF NIAGARA FALLS, NEW YORK, ASSIGNOR TO THE CARBORUNDUM COMPANY, OF NIAGARA FALLS, NEW YORK, A CORPORATION OF PENNSYLVANIA

ABRADING

No Drawing. Application filed July 9, 1924. Serial No. 724,978.

My invention relates to the art of grinding or abrading, and particularly to the treatment of grinding or abrading surfaces, the object being to greatly improve the grinding efficiency of said surfaces, to lengthen their life, and decrease the temperature of grinding.

My improvement is based upon the discovery that the action of such grinding or abrading surfaces can be greatly improved by providing them with a "high pressure lubricant". By this term I mean a lubricant which has greater adsorptive properties in relation to the surfaces with which it contacts in the grinding operation than are possessed by ordinary lubricants, such as waxes, greases, oils, fats and resins.

To my knowledge, the question of adsorption has not arisen in this grinding art, and my discovery is based upon the fact that when lubricants, which have adsorptive properties to a much higher degree than ordinary lubricants, are supplied to the abrading surface, a great increase in the efficiency results.

Among the materials which I have found to possess this property are fatty acids. In general, I believe that the desired effect will be obtained where the lubricants are of a character having high adsorptive properties and possessing residual chemical activities. These are usually present in what are now known in the art as "fixed oils", i. e. oils which cannot be distilled without decomposition.

As the result of long experimenting on this subject, I believe that the highly adsorptive properties of the special lubricants which I have found to be efficient in this connection cause them to maintain a film between the surfaces of the cutting or abrading particles of the abrasive wheel or article and the material being ground or abraded. For this reason, I have termed this class of lubricants "high pressure lubricants", meaning thereby that due to their adsorptive properties they will "wet" the surfaces and maintain this film to a much greater degree than will any ordinary lubricants.

As a specific example of my invention, I have dipped an ordinary silicon carbide grinding wheel in oleic acid. The wheel may be quickly removed from the dipping bath and the surplus acid removed in any desired way. Continued use of such a wheel has proven that its efficiency is greatly increased. Comparing an untreated silicon carbide wheel with a similar wheel so treated with oleic acid, and operating upon the same grade of steel under the same conditions, the efficiency per unit of time has been increased about 70 per cent. In other cases the efficiency has risen above this. Furthermore, after continued use, the wheel shows less wear and no apparent deterioration in its efficiency. This I again attribute to the high adsorptive properties of this fatty acid. In a similar test I coated such a wheel with paraffine and also with ordinary petroleum oil and found substantially no improvement in the efficiency of its operation. This I believe to be due to the extremely high pressures developed between the small areas of the cutting grains and the material being ground, which forces away ordinary lubricants owing to their low adsorbent characteristics.

In another case I took a grinding wheel made of bonded grains of fused crystalline aluminous abrasives which would remove about 2 grams of steel per minute. When treated with a small amount of oleic acid, I found it would remove about 6 grams per minute, this being an increase of about 200 per cent. The wear on the wheels is also very much less when they are so treated.

Also the action of the adsorbed high pressure lubricant is very apparent in the character of the abraded metal. In the case of the ordinary abrasive wheel, whether ordinary lubricants are used or not, the chips are short and many are of globular type and show partial fusion or oxidation, whereas with the treated wheel the shavings are of long thin thread-like type. The surface imparted to the material being ground is also of a much finer quality where the wheel has been so treated, and the temperature of operation is reduced.

Instead of using the adsorbent lubricant by itself, I may mix it with an ordinary lubricant. For example, I may blend a low melt-

ing point high pressure lubricant of my type with higher melting point oils, waxes, fats or resins, either by emulsifying or by solution. This will also aid in reducing the amount of my lubricant thrown off in the rotation of a grinding wheel. In all cases there should, of course, be a material or substantial proportion of my improved type of lubricant in the mixture. The presence of a material amount of the high pressure lubricant seems to wet the surfaces treated due to its adsorptive properties.

Instead of treating the wheel prior to using it in the grinding operations, and preferably removing the surplus, the material may be applied in other ways. For example, I may intermittently or continuously press a stick or block of lubricant containing my high pressure lubricant against the surface of a revolving abrasive wheel during grinding, thus raising the temperature to a point where the surface portion of the stick liquefies and becomes adsorbed in the surface portion of the wheel. I may also in some cases continuously supply a liquid high pressure lubricant or a lubricant containing a certain proportion of it to the surface of the wheel during the grinding operation.

The invention may not only be applied to abrasive wheels, but also to abrasive coated paper and cloth or to loose abrasives. In fact, it is generally applicable to any abrasive operation.

The advantages of my invention will be obvious to those skilled in the art, since the invention increases the cutting efficiency, decreases the temperature, reduces the wear on the abrasive, and improves the efficiency of the article being treated. By reason of the high adsorptive properties of a so-called high pressure lubricant of the type referred to herein, it will be retained within the pores of a rapidly revolving wheel and will spread over the abrasive particles rapidly enough to reform the surface film which has been ruptured before the full revolution of the wheel takes place even when the wheel is revolving at high speed.

While I have described only certain classes of materials as possessing this highly adsorptive property in connection with lubrication, I do not intend to limit myself to these specific classes in the broader claims, since I consider myself the first to discover the great value of "high pressure lubricants" having highly adsorptive properties in this connection.

I claim:

1. In the preparation of an abrading tool, the step consisting in treating the cutting face of a rigid abrasive tool having fixed abrasive particles with a lubricant comprising a free fatty organic acid.

2. In the preparation of an abrading tool, the step consisting in treating the cutting face of a rigid abrasive tool having fixed abrasive particles with a lubricant containing a substantial amount of a free uncombined fatty acid.

3. As an article of manufacture, a rigid abrasive tool having fixed abrasive particles therein, and having a free fatty organic acid applied to its working face.

In testimony whereof I have hereunto set my hand.

MINER L. HARTMANN.