

Jan. 30, 1934.

J. McKEE

1,944,898

ABRASIVE ARTICLE

Filed Dec. 31, 1929

Fig. 1.

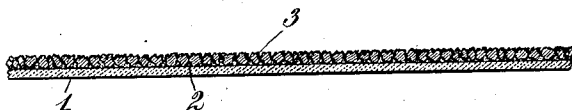


Fig. 2.



Fig. 3.

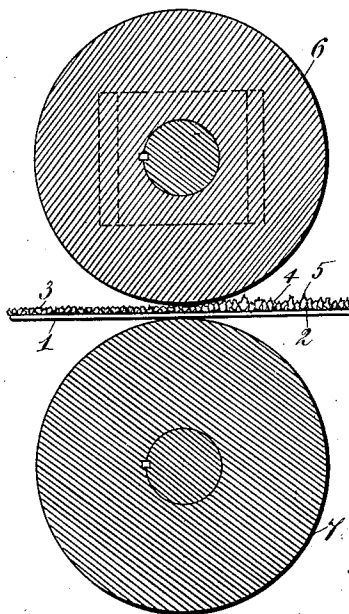
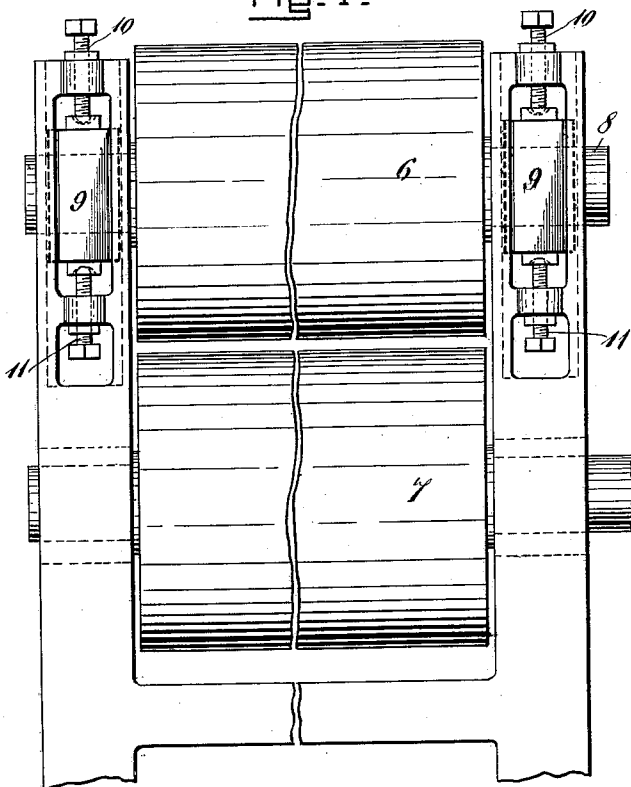


Fig. 4.



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1,944,898

ABRASIVE ARTICLE

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Application December 31, 1929

Serial No. 417,727

3 Claims. (Cl. 51—278)

The invention relates to an improvement in abrasive articles of the type in which the abrasive material is fixed to a base sheet or disk usually of paper or cloth. Abrasive articles of this type are used for a great many purposes, and the abrasive sheet or disk is commonly borne by some device or carrier to which the sheet or disk is secured. The abrasive material is fixed to the sheet or disk by some cementing material usually glue. The common practice is to apply the cementing material or glue to the surface of the base sheet or disk and afterward the abrasive material is deposited or run (usually by gravity) onto the cement or glue and then allowed to set or dry when the abrasive material becomes securely fixed to the sheet or disk.

While many improvements have in the past been made to abrasive articles of this type including improvement in the base sheet or disk body, improvements in cementing material used or its manner of application, and improvements in the abrasive material itself and the manner of its application or deposit, the essential character of the resulting article, sheet or disk, has remained the same, coarse or fine depending upon the relative fineness or coarseness of the abrasive material used. While the terms "coarse" and "fine" are relative terms, they are used herein in the sense that they are usually understood in the trade and by those skilled in the art.

The present-day coarse abrasives or fine abrasives each have their own particular advantages, but they have also their disadvantages. The coarse abrasive as distinguished from the fine has the advantage of cutting more rapidly than the fine and of lasting longer, being less susceptible to wear. With the coarse also there is less tendency for dust from the work to fill in and lodge between the interstices or openings between particles of abrasive matter with a consequent tendency to destroy the operative efficiency of the entire abrasive surface. This is because in the coarse there is more space between the particles of abrasive material than in the fine, so affording less opportunity for dust to lodge and accumulate. There is, however, one outstanding disadvantage in the use of coarse abrasive, viz: its tendency to scratch the work, so practically excluding its use in connection with fine work. On the other hand fine abrasive has the paramount advantage that it will not scratch, but opposed to this advantage are the disadvantages of slow cutting aggravated by the fact that the abrasive surface will become quickly clogged

with dust. The life of the finer abrasive is short, it being relatively quickly worn out as compared with the coarse.

The object of the present invention is to obviate the difficulties above referred to and combine in one abrasive sheet or disk all of the advantages above pointed out and which include rapidity of cut, freedom from dust, long life, and especially non-scratching.

An example of the improved abrasive article embodying all these characteristics together with the manner in which it is obtained is shown in the drawing where—

Figure 1 is a cross section showing in enlarged diagrammatic detail the improved abrasive article as embodied in an abrasive sheet.

Fig. 2 is a cross section in enlarged diagrammatic detail of the same abrasive sheet shown in Fig. 1 at a certain stage of its formation and preliminary to the abrasive surface of the sheet being treated to obtain the form shown in Fig. 1.

Fig. 3 shows in cross section a set of press rolls used in the method of treatment, and

Fig. 4 is a front elevation of the same rolls showing especially the means for adjusting and setting in adjusted position the upper one of the rolls.

Referring to the drawing:—

The improved abrasive article shown in Fig. 1 comprises the body portion or backing 1, the cementing material or glue 2 and the applied abrasive material 3. This abrasive material is of a type which would be characterized in the trade as coarse abrasive. It is also an abrasive material characterized not only by extreme hardness to withstand wear, but a material also essentially fragile and which will become readily fractured as by a blow and when fractured will present sharp cutting points. Silicon carbide is an example of such kind of abrasive material, and is of a type commonly employed in the making of abrasive articles. Other kinds of abrasive mineral grains commonly employed exhibit the same characteristics of hardness and fragility. The abrasive article shown in Fig. 1 is further characterized by the fact that the cutting points presented by its surface or face do not rise above a determinate level and lie substantially in the same plane, and though the particles forming these points would be characterized in the trade as coarse particles or coarse abrasive with an appreciable space between the points in contrast to but little space, as with fine abrasive, yet coupled with this is the fact that these points all lie in substantially the same plane and, while

coarse, they present to the touch a smoothness more or less characteristic of the finer abrasives.

The essential character of the new abrasive article shown in Fig. 1 can be better appreciated in the light of the ordinary abrasive article when employing the same kind of coarse abrasive material. Such ordinary abrasive article is shown in Fig. 2 where it will be noted that the applied abrasive material instead of presenting a surface or face in which the cutting points all occupy substantially the same plane, have many projecting points 5 outstanding from the mean surface 4 of the abrasive. It is these outstanding or projecting points that cause "scratching" when the coarse abrasive material is used. Returning to Fig. 1 it will be observed that all outstanding or projecting points have been eliminated, and this by fracturing or breaking so as to bring all the points down to a mean level or plane, at the same time retaining the cutting points, or even increasing the number of cutting points by the fracturing or breaking down of the outstanding points or particles.

The improved abrasive article is made as shown in Fig. 1 by passing the abrasive article as shown in Fig. 2 between press rolls set at a determinate distance from one another by which the outstanding particles to be broken down are fractured by the operation of the rolls. 6 and 7 represent these rolls arranged in the ordinary manner of press rolls and the top one of these rolls is adjustably mounted so that it may be set to operate a determinate spaced distance from the bottom one of the rolls. To this end the upper roll is mounted upon a shaft 8 turning within boxes 9 arranged between adjusting screws 10 and 11, respectively, the adjustment and setting of which sets the roll in a determinate position as aforesaid. Power is applied for operating the rolls by application of power in any suitable manner to the bottom one of the rolls. The rolls are made of a material tougher than the abrasive material to be broken down by them. In practice the rolls are made of manganese steel, 45 bronze or steel, and preferably manganese steel. Rolls of considerable weight are employed for the reason that the rolls must possess such mass that they will not become distorted during the breaking down of the abrasive particles. It is preferred, also, that the rolls, and especially the top roll, shall be of sufficient weight to break down the mineral particles by its own weight without the necessity of applied pressure. On this account a roll of some three or four hundred pounds weight is used in practice. A roll of this weight has been found sufficient to effect the fracture of the particles for the reason that the roll will at any one time be resting upon relatively few of the particles of the abrasive material, or, in other words, those of the particles which are outstanding above the

level to be obtained, and this level is in practice a level slightly above the mean level of the entire cutting surface or face presented by the abrasive material, so that when the outstanding particles have become fractured they will lie substantially within the mean surface presented by the other particles. Experience will demonstrate the proper spaced positioning of the rolls to effect the best results. The fact that the pressure is applied to the upstanding abrasive particles for fracturing them after the cementing thereof to the backing sheet by the setting of the cementing material will prevent the particles from being leveled by the shifting of their position; nor will the bond or setting of the particles be disturbed; nor will they be driven into the backing sheet and produce a pebbly effect on the back thereof.

The improved abrasive article possesses, in accordance with the objects of the invention first pointed out, the advantage of being a fast-cutting article. Dust will not accumulate upon its abrading surface owing to the space separating its abrasive particles. The article possesses good wearing quality just as coarse abrasive articles possess such quality, and the article will not scratch, the surface obtained by it being homogeneous throughout and free from defacing lines or "scratches". The abrasive article thus improved pertains to all abrasive articles of the type specified including the so-called "open coat" abrasive article well known to those skilled in the art and to which it is especially applicable.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States:—

1. In the manufacture of abrasive coated articles, the step consisting of breaking off substantially all of the abrasive particles that project beyond the level of the majority of the particles after the adhesive has set.

2. In the manufacture of abrasive coated articles, the steps comprising attaching a coating of abrasive particles to a flexible backing by means of an adhesive, causing said adhesive to set, and then breaking off those abrasive particles that project beyond the level of the majority of the abrasive particles of the coating.

3. In the manufacture of abrasive coated articles, the steps comprising attaching a coating of abrasive particles to a flexible backing by means of an adhesive, and after said adhesive has become firm, passing said coated article between rolls positioned sufficiently close to break off the abrasive particles that extend beyond the level of the majority of the abrasive particles and positioned sufficiently far apart to permit the majority of the particles to pass therebetween without becoming fractured.

JOSEPH McKEE.