May 10, 1932. E. B. WYATT 1,857,340

ABRASIVE ARTICLE

Filed Jan. 5, 1929

Fig. 1.

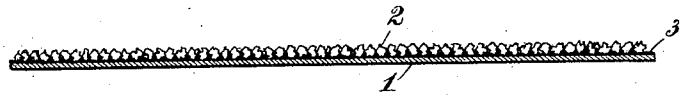


Fig. 2.

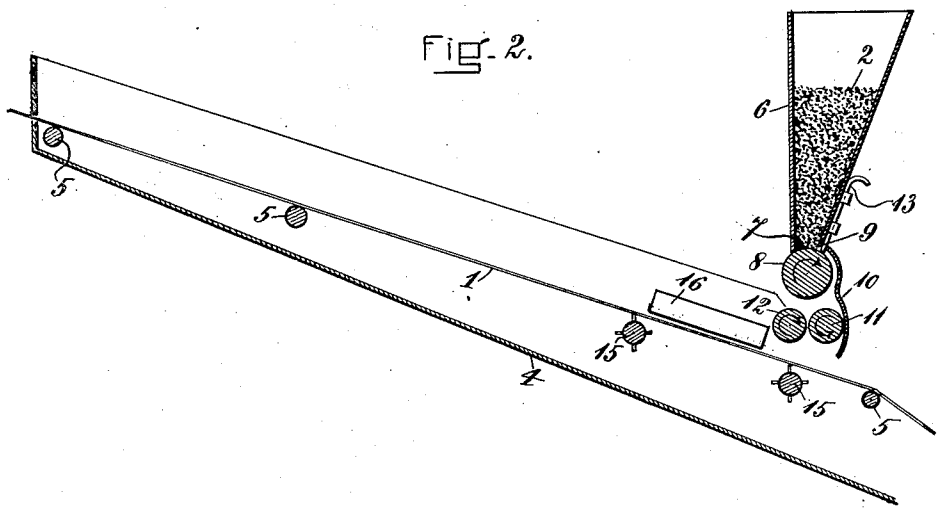
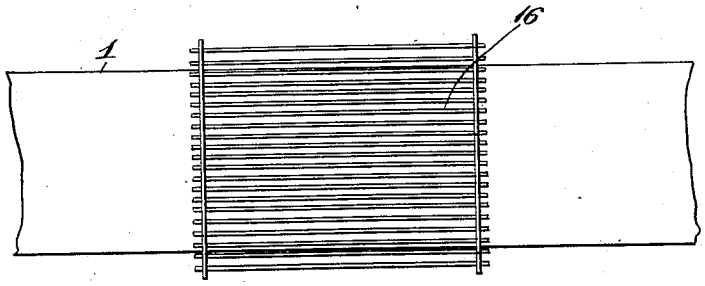


Fig. 3.



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UNITED STATES PATENT OFFICE

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ABRASIVE ARTICLE

Application filed January 5, 1929. Serial No. 330,666.

The invention relates to an improvement in abrasive articles such as abrasive papers and abrasive cloths in which abrasive material is bonded to a base sheet by means of an adhesive binder, the exposed outer surface of the abrasive material so bonded forming the cutting face for the abrasive article.

One difficulty with abrasive articles of the kind just mentioned is that the exposed portion or cutting face presented by the abrasive material does not possess sufficient roughness to have the highest degree of efficiency.

The object of the invention is to overcome the difficulty just referred to by improving, in the sense of making more effective as a cutting agent, the cutting face of the abrasive article as presented by the abrasive material.

It will first be explained that the abrasive grain or particle now commonly employed in the making of abrasive articles, is a grain possessing irregularity in form with sharp cutting edges or points. Owing to the irregularity in the form of the abrasive grain or particle a certain sectional portion of the grain will be larger in size and accordingly heavier than the remaining portion thereof and it is that section of the grain having the lesser body which presents the better cutting edge or point. This peculiarity of the grain itself is referred to at this time because it is availed of, at least in part, in the present invention.

The improved abrasive article constituting my invention consists in one in which the abrasive material is bonded by a suitable binder to a base sheet or backing, usually of cloth or paper, and in which the abrasive grains forming the abrasive material lie or are so positioned that those portions or sections of the grains possessing the larger body will lie nearest the base sheet or backing, while those portions or sections of the grains possessing the lesser body and the better cutting edge or points, are directed away from the base sheet or backing. The disposition of the grains is also such that they will occupy positions unimpacted with relation to one another, impacting of the grains causing the cutting surface presented by them to be smoothed out or leveled which impairs its cutting efficiency as when the abrasive grains, having been applied to a base sheet or backing with unset binder thereon, are passed through or beneath press rolls.

The improvement can better be understood in the light of the way in which the abrasive article is made and in the light also of the drawings, where—

Figure 1 is a cross section of the improved abrasive article.

Fig. 2 shows diagrammatically in cross section certain apparatus used in making the article, and

Fig. 3 is a plan of a portion of the apparatus.

Referring to the drawings:—

1 is the base sheet or backing, 2 the abrasive material consisting of abrasive grains or particles, and 3 the binder by which the abrasive grains are bonded to the base sheet.

In the making of the article the base sheet or backing, to which the binder material has been applied, is passed through or over a troughlike receptacle 4, idler rolls 5 assisting in the support of the sheet and the sheet being propelled by any suitable mechanism (not shown). Located above the sheet is a hopper 6 containing the abrasive grains or particles to be applied to the sheet. The hopper is provided at the bottom with a mouth 7 normally closed by a roll 8 excepting for an opening 9 left at the bottom of the hopper adjacent the top side of the roll and through which opening the abrasive material will escape to pass through the opening out over the roll 8 as the roll is turned. The material thus escaping to pass over the roll 8 is directed by a guard 10 to fall by gravity onto a roll 11 arranged beneath the roll 8, and from the roll 11 the abrasive material is directed to fall

by gravity onto the sheet or backing passing beneath the hopper and the respective rolls. The roll 11 may have co-operating with it a roll 12 for assisting in the directing of the abrasive material onto the sheet, but this second roll is not necessary. All the rolls may be rotated by any suitable mechanism (not shown). In practice only so much of the abrasive material is applied to the sheet or backing as will remain upon it and become bonded to it. Accordingly, taking into consideration the rate of speed at which the sheet is moving beneath the hopper, only a determinate amount of the abrasive material is allowed to escape through the opening 9 left at the bottom of the hopper, for which reason the opening 9 is provided with a gate 13 located on the hopper.

Arranged beneath the sheet in position to engage the under side thereof are rotary beaters 15. One of these beaters is preferably placed directly beneath the point where the abrasive material is being deposited upon the sheet and the other one of the beaters is located a little forward of the first beater. The beaters are rotated by any suitable mechanism (not shown) at a very high rate of speed during the time when the abrasive material is being deposited upon the sheet whereupon the following effect will be obtained: The violent vibration of the sheet by the beaters has but little effect on the positioning of the abrasive grains immediately next to the backing sheet for these grains will be wetted by the cementing material and will adhere to it. Other of the abrasive grains will be batted into the air and drop back or settle by gravity on the sheet in a manner fairly describable as "free fall", in which the shape and weight of the particle will determine the position it takes on the backing. In other words, the larger or heavier portions or sections of the grains will face the sheet or backing, while the smaller portions or sections, or those which present the better cutting portions or edges, will be directed away from the sheet or backing. The grains or particles thus falling will become bonded to the sheet or backing as the cementing material will have wetted the first layer of particles whereupon more particles will be held to the sheet as they fall by gravity onto it in the natural travel of the backing. In this way a coating is achieved which may be described as an oriented coating or one in which the grains are placed in positions most effective for cutting operations. The application of the grains or particles, falling gently as they do by gravity after being thrown into the air, leaves them relatively isolated and unimpacted with relation to one another. That is, the deposited abrasive material is left as it falls and is not subjected to any rolling action or pressure which will cause impaction thereof or levelling and consequent impairment of the cutting surface presented by it.

The cementing or bonding material by which the abrasive is secured to the sheet is very sensitive to atmospheric changes and in order to assist in maintaining the character of the coating so that the grains or particles thrown into the air and falling back onto the sheet will become wetted and adhere to the sheet there is preferably arranged over the sheet above the point where the beaters are in engagement therewith a fixed grid 16 which operates to keep air currents away from the cementing material and also from the falling grains themselves in order that both the bonding material and the grains will be as little influenced by disturbing air currents as possible. The grid also assists in directing the abrasive grains thrown into the air in a direction where they will fall back onto the sheet instead of falling off the sheet.

In some operations the application of the abrasive grains or mineral to the coated backing may be so lean and scant that only one layer of the abrasive will be applied to the backing. In such case there will be practically no batting of the mineral into the air as described above for the reason that substantially all of the applied abrasive will adhere to the backing. In such case, however, the applied mineral will be given a firmer seating in the bond on account of the beater dispersing the poorly bonded particles to places where they will be securely held.

In practice the surface of the deposited abrasive material is subjected to a binder coating 17 which co-operating with the binder applied to the sheet or backing, assists in holding in place the abrasive grains or particles which form the outer portion or true cutting face of the deposited material.

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

1. The method of making an abrasive article having a backing, a facing of abrasive material and a binder bonding the abrasive material to the backing, which comprises applying the abrasive material in determinate quantity to the running backing coated with binder material and at the place of application and during the time of such application rapidly vibrating the backing by an application of force to the rear side thereof whereby a portion of the deposited material will be thrown into the air above the backing and afterward settle back onto the backing.

2. The method of making an abrasive article having a backing, a facing of abrasive material and a binder bonding the abrasive material to the backing, which comprises applying the abrasive material in determinate quantity to the running backing coated with binder material and at the place of

application and during the time of such application rapidly vibrating the backing by an application of force to the rear side thereof whereby a portion of the deposited material will be thrown into the air above the backing and afterward settle back onto the backing, the area immediately adjacent and above the backing into which the abrasive material is projected being kept free from disturbing air currents.

ERNEST B. WYATT.