

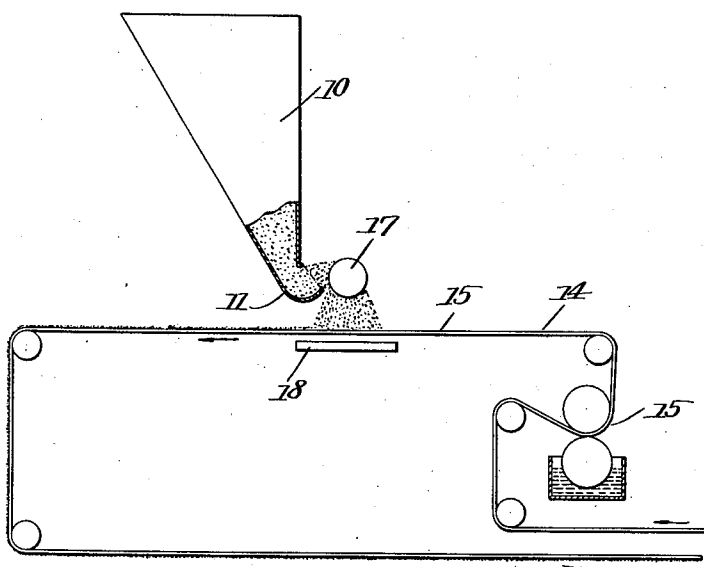
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E. C. SCHACHT

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MANUFACTURE OF ABRASIVE ARTICLES

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Inventor

Elmer C. Schacht,

By *Sutherland Bryant & Cushman*
Attorneys

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MANUFACTURE OF ABRASIVE ARTICLES

Elmer C. Schacht, Troy N. Y., assignor, by mesne assignments, to Behr-Manning Corporation, a corporation of Massachusetts

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The present invention relates to the manufacture of abrasive articles and is primarily concerned with the production of flexible abrasive material, of which sand paper is one example. The process of the present invention consists briefly in employing an electrical field as the sole means of propelling the particles of abrasive to the backing or carrier whereby at a single step the backing will be coated with a uniformly dispersed layer of abrasive, oriented and stratified to produce an article having an abrasive surface of maximum efficiency.

The process is distinguished from prior methods wherein electrically charged particles have been projected upon the backing after a preliminary agitation in the presence of the electric field, since not only must such particles be floated in order to acquire a charge, but a separate projecting means such as a blower has been considered necessary.

As stated, the present invention utilizes a single step to propel and efficiently control the positions of the particles upon the backing. In other words, reliance is solely placed upon the use of the electrical force.

By reason of the invention, there is produced (a) a uniform dispersion of the particles to form a level and continuous sand distribution upon the carrier presenting a maximum number of cutting points, (b) an orientation of the particles such that the longest axes and sharpest edges are positioned to produce maximum cutting effect, and (c) a stratification or classification whereby the coarser fractions or particles are disposed in the top plane where they can produce a maximum abrading effect.

A further object of the invention is to produce an abrasive article of a flexible character, such as sand paper, wherein the particles are propelled first substantially laterally only under control of an electrostatic field and then downwardly under control of the electrostatic field.

Heretofore with various methods, the abrasive particles have been applied downwardly without such control to the top surface of the adhesively coated backing or carrier, and this has required that an amount of abrasive in excess of what is required to form a satisfactory coating, be fed to the carrier and this excess subsequently removed. When this excess of abrasive particles is used, the efficiency of the abrasive coating produced is reduced because the excess abrasive particles are afforded an opportunity to position themselves or be accommodated in the voids between the permanently secured particles which

have these two effects: (a) where fine or small sized excess particles fill up the voids between the permanently secured particles, then the necessary clearance between the cutting edges is reduced which has the final effect of reducing the cutting capacity of the coating and promoting rapid "filling" or "loading" with attendant burning and short life. In a measure it has the same effect as reducing the size of cutting particles since a smaller fraction of their total effective edges will now come into use; (b) where nominal size or over-grade excess particles become secured in the voids between the permanently secured particles there is produced in effect a superimposed layer of poorly secured particles since only a corner or edge of the larger grains can imbed itself between the permanently secured particles leaving the major portion of the grain in question to extend above the true abrading surface. This superimposed or secondary coating is objectionable because (1) it is a waste of grain; (2) it requires more sizing glue in the secondary step of sandpaper manufacture in order to hold on this superimposed coating with the result that the majority of the real abrasive surface is oversized, that is, overglued which greatly decreases its abrading efficiency; (3) in the finished article, these top particles above the level of the vast majority of particles on the true abrasive surface, are in themselves insufficient in number to really accomplish any removal of stock but in bringing sufficient pressure on the coating to cause the article being sanded to engage the real abrasive level, the higher or superimposed particles are either broken off or if sufficiently well imbedded, remain on the coating to scratch and injure the finish of the piece being sanded.

In the usual method of coating in which an excess of abrasive is employed, a means is positively provided which insures the creation of the superimposed coating while in the applicant's method, a positive control is provided to prevent the excess particles from filling up the voids between the permanently secured particles.

The invention is applicable for the manufacture of both "open coated," and "closed coated" sand paper, and is particularly useful where the sand particles are not of exactly uniform size and shape.

In the drawing the figure is a diagrammatic view of the invention.

The numeral 10 indicates a hopper in which the sand or other abrasive particles will be disposed. The hopper is provided with an upturned mouth.

The backing or carrier 14 may consist of paper.

cloth, or a lamina of these two materials, and in fact any flexible backing as now used in the art. The backing is fed from a roll over suitable guide rollers to an adhesive applying device which will apply to the surface of the web a coating of adhesive 15.

The abrasive particles which are fed from the hopper are those customarily employed and constitute a mixture of "over grade," "below grade," and "control grade," in which the "control grade" predominates.

It will be observed that reliance is only had upon the electrical field as the means for propelling the abrasive particles to the backing and controlling their position upon the surface thereof.

No recourse is had to any accelerating means such as a blower nor are the particles preliminarily agitated in the field before they are propelled. As heretofore stated, where the particles are preliminarily floated or agitated in the field, it has been found essential that some additional positive projection means such as air be employed which I find prevents any control of the dispersion and destroys any possibility of orientation or stratification of the particles upon the adhesive surface of the backing.

In the drawing, I have illustrated the hopper 10 as being provided with an upturned mouth 11 and the abrasive particles are attracted therefrom laterally in one direction i. e., substantially laterally only to the field of the electrode 17, whereupon they are directed downwardly by reason of the field created between the electrode 17 and terminal 18, which is disposed below the web, and the electrode 17 as shown.

In this construction, as with that illustrated in Figure 1, the particles are propelled to the backing, oriented and stratified thereon solely by means of the electrical field of the oppositely polarized terminals 17 and 18.

The electrode 17 which is preferably negatively charged from a source of high potential, may take the form of an elongated bar or cylinder extending substantially across the transverse dimension of the web so that the entire surface of the web will be coated with the abrasive particles. Referring particularly to Figure 2, the electrode 17 will preferably be fixed but this electrode may be rotated, if desired.

I may transpose the method and construction in such manner that the movement of the particles to the web will be in a horizontal direction or in planes at an angle to both the vertical and horizontal without departing from the spirit of the invention.

No change is necessary other than that of transposing the web 14 to assume a vertical position in proximity to the roller 17, which, in the lateral propulsion, can be continuously rotated if desired.

It will, therefore, be seen that I have completely eliminated the necessity for preliminarily floating or agitating the particles in an electric field as well as the necessity for providing some positive means such as a blower for projecting such electrically charged particles upon the adhesive surface of a backing. Moreover, by propelling and controlling the positions of the particles upon the carrier in a single step as described, the control of the abrasive coating is positively assured.

The value of an effective control will be appreciated since reliance is had only upon a single factor, namely the electrical field, the strength

of which may be varied, as occasion arises, and likewise, the spacing of the electrode 17 from the web may be changed to suit conditions as well as the strength of the field. By eliminating the necessity for a preliminary floating or agitation of the particles, or of using some additional positive projecting means, the control obtained is not interfered with in the slightest and the particles are attracted to the web 14 and their positions controlled thereon by reason of the single and complete effect of the electrical field, the intensity of which may be controlled and varied.

A further and important feature of the invention resides in the fact that the abrasive particles may be fed continuously to the electrostatic field, by means of the charged bar or conveyor 17.

The invention, it will be observed, assures a complete control of the disposition of the particles upon the web and enables the production of a sand paper which possesses (a) a level and uniform distribution of the sand particles, (b) an oriented disposition wherein the longest axes and sharpest edges of the particles are arranged to produce maximum cutting effect, and (c) a stratification or classification whereby the coarser particles or fractions of the abrasive mixture are positioned in the top plane of the completed article to exert the optimum abrading effect.

The construction and method illustrated possesses the very valuable advantage in that material is conserved and that an abrasive coating is produced which has a level top surface with all cutting points in the same plane and no undesirable superimposed particles. This feature is of particular importance since it is to be observed that by attracting the particles upwardly, there is avoided any tendency of a secondary surface to be built up over the permanently secured abrasive coating.

The invention achieves a final coated product having a maximum coating efficiency wherein the control of the particles and their propulsion to the carrier and disposition thereon is accomplished solely by the electrical means.

I claim:

1. An apparatus of the class described comprising a hopper for abrasive grit having an upwardly opening mouth, a negatively charged rotatable electrode disposed in such proximity to said mouth that grit is attracted laterally in one direction, means for moving a strip of backing material horizontally longitudinally beneath said mouth and electrode, means for applying an adhesive coat thereto and presenting the same upwardly, and a terminal immediately below said first electrode and said mouth and cooperating with the electrode for creating a field and directing the laterally projected grit downwardly into contact with the moving adhesive face of said strip.

2. An apparatus of the class described, comprising a delivering means for abrasive grains, a charged electrode disposed in such proximity to said grain-delivering means that grit is attracted first substantially laterally only therefrom to said electrode, means for moving a strip of backing material horizontally longitudinally beneath said grain-delivering means and said electrode, means for applying an adhesive coat thereto and presenting the same upwardly, and a terminal immediately below said first electrode and cooperating with the said electrode to create a field and then direct the laterally projected

grit downwardly into contact with the moving adhesive face of said strip.

3. A process of coating abrasive grits in oriented relationship onto an adhesively coated backing, comprising delivering grits from a grit storage means to an electrostatic field, passing an adhesively coated backing through an electrostatic field, first directing said grit substantially

laterally only by means of the electrostatic field and then directing said grit along a vertical path by means of the electrostatic field to embed the grits into an adhesive coating superimposed upon the reinforcing backing, moving said coated backing from the electrostatic field and drying the adhesive.

ELMER C. SCHACHT.