

April 25, 1944.

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2,347,244

ABRASIVE ELEMENT

Filed Dec. 7, 1942

2 Sheets-Sheet 1

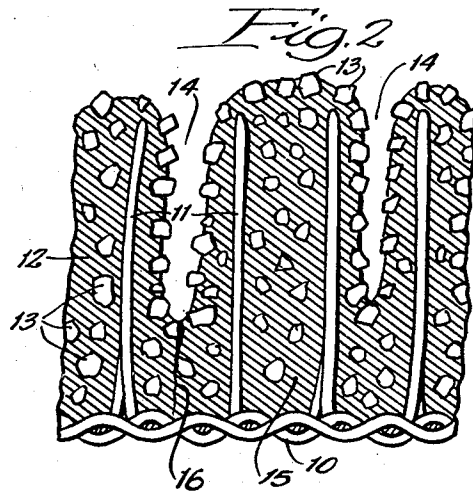
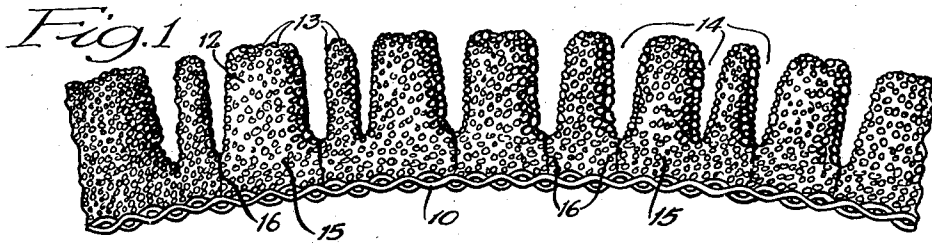
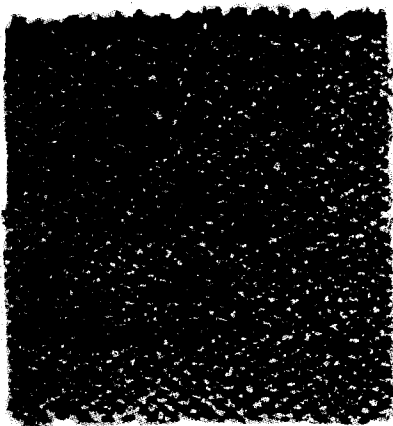


Fig. 3



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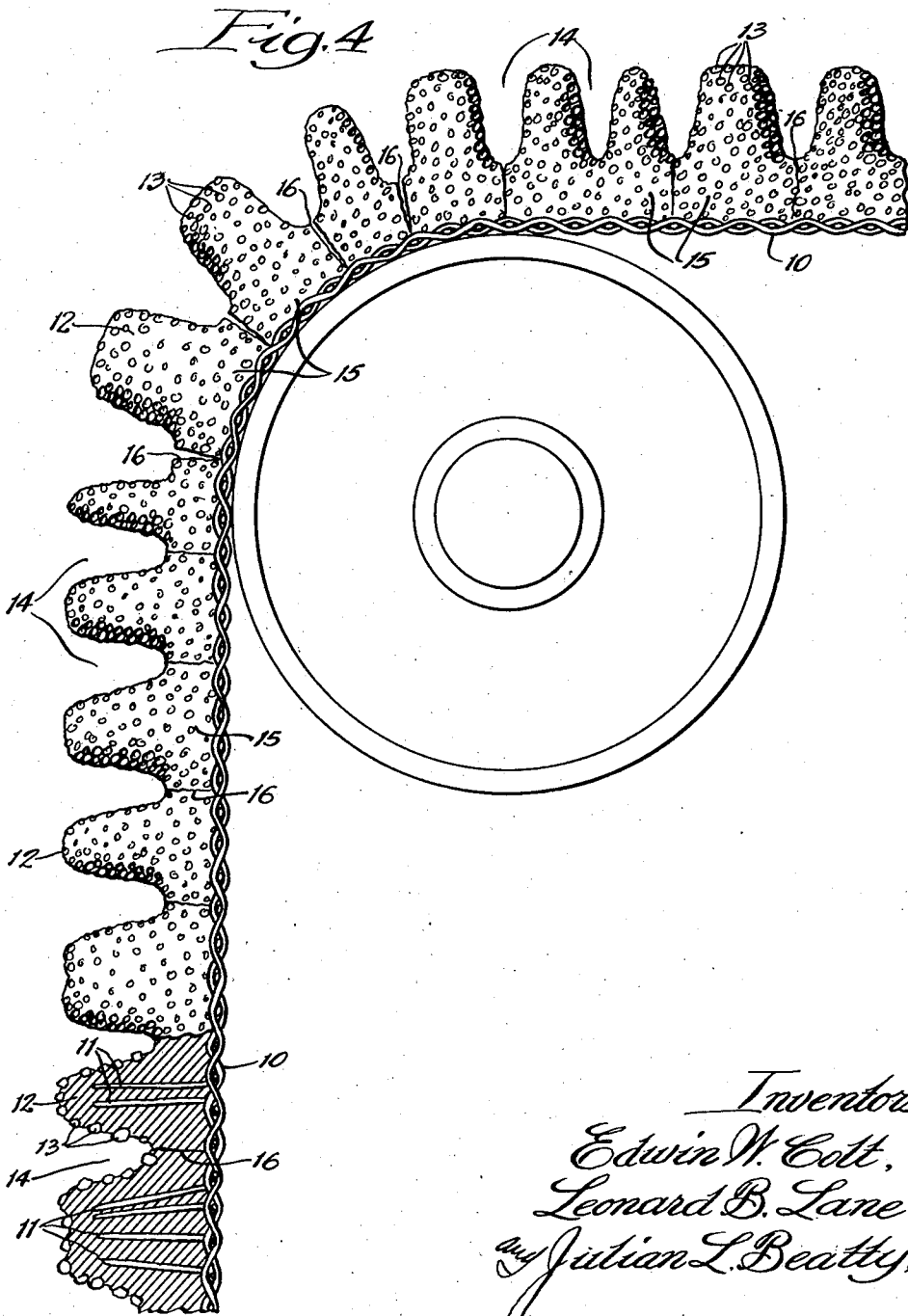
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ABRASIVE ELEMENT

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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ABRASIVE ELEMENT

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8 Claims. (Cl. 51—294)

This invention relates to an abrasive material in sheet form, and more particularly an abrasive material made from pile fabrics and similar fabrics coated with abrading agents. This application is a continuation in part of our co-pending application, Serial No. 399,102, filed June 21, 1941.

In the manufacture of sandpaper and similar abrasive materials it is found that the bonding capacity of the paper or fabric base for the abrasive coating is definitely limited by the character of the base material. The amount of abrasive coating which can be retentively held by the base under the severe action to which the abrasive material is subjected in use is correspondingly limited.

The regular surface of the familiar base materials also results in a fairly uniform distribution of the abrasive coating over the entire surface of the base in manufacture, with the result that the surface of the sandpaper or emery cloth is similarly regular and broken only by rather shallow depressions which readily fill with abraded material in use. This quickly cuts down the abrasive character of the material and reduces its cutting capacity.

Attempts to apply heavier coatings of abrasive materials yields a stiff and unwieldy material, and because of the limited bonding capacity of the underlying base, any flexing of the sandpaper quickly cracks and breaks off the abrasive coating.

One of the objects of the present invention is to provide an abrasive material in sheet form, in which the underlying base is composed of a pile fabric or similar material. Another object is to provide an abrasive material in which the base can be loaded with three or more times the conventional abrasive coating without impairing the flexibility or durability of the material. Another object is to provide an abrasive material in which the exposed working area of the abrasive material is several times the area of the base to which the abrasive coating is applied. Another object of the invention is to provide an abrasive material in which the bonding capacity of the base material is greatly increased, and in which the abrasive coating is firmly anchored to the base material.

A further object of the invention is to provide an abrasive material in which the working surface is irregular and broken by deep depressions, thus reducing the tendency of the material to fill and also rendering the material substantially self-cleaning.

Other objects and advantages of the invention will appear from the following description of a preferred form of the invention.

A preferred form of the invention is illustrated in the accompanying drawings, in which:

Figure 1 is a side view in elevation of an abrasive material embodying this invention, the sheet being arched to bring out features of its construction hereinafter more fully described;

Figure 2 is a greatly enlarged detail of a section of the material shown in Figure 1, showing in greater detail the relationship of the abrasive coating to the base material;

Figure 3 is a photograph, full size, of the surface of an abrasive material embodying this invention, showing the irregularity of surface and the increased area of abrasive material accessible to the work to which it is applied;

Figure 4 is a side view in elevation of a strip of the material shown in Figure 1 in use as a sanding belt, with a portion thereof shown in section.

In the illustrations, the numeral 10 designates the ground warp or base material, which in the embodiment shown is a strip of pile fabric. The individual filaments or fibers extending upwardly from the base are indicated by the numeral 11.

Any suitable type of pile fabric may be used. Common materials of this type are velours, velvets, chenilles, carpetings, and other forms of tufted and napped materials. The chief characteristic of suitable pile cloth is the presence of filaments protruding from one surface of the fabric, these filaments being firmly attached to the backing or base. The type of pile fabric used will depend upon the type of abrasive material sought. If the pile is closely spaced, the surface of the finished material will be less irregular than where the pile is more widely separated. Where the pile is more widely separated increased areas of abrasive surface are exposed to the work and the cutting capacity of the material increased.

It will be understood that while a pile fabric such as velour is stated by way of example, a great many varieties of such fabric formed of a variety of materials may be used. Any type of filament such as vegetable, animal or synthetic fiber may be employed. The base of the fabric will vary according to the use required. If the fabric is to be used as a belt, it may be necessary to strengthen the base so as to adapt it for this purpose. Similarly, if the abrasive strip is to be used on a wheel, the base will have to have the desired characteristics as to strength, stretch, etc. If the material is to be used as a disk then

the characteristics of the base may likewise be modified and the weave thereof changed from that employed where the fabric is used as a belt or for some other use.

An essential characteristic of the invention is that the base material 10, and the filaments 11, are coated substantially over their entire respective surfaces with the abrasive material, which may be applied in the conventional manner as an adhesive coating 12 of any of the types familiar to the art, followed by application of abrasive particles 13, or as a mixture of an adhesive vehicle 12 and abrasive particles 13 scattered throughout it. Nevertheless, the coating material must not form a solid plate over the base, to present a fairly even surface, but must leave deep, irregular depressions 14 between clusters of the coated filaments, thus forming the deeply rutted surface shown in Figure 3.

Thus, as clearly shown in Figure 2, the abrasive coating adheres to the base material 10 and clusters of the pile filaments 11, and renders the exposed area of abrasive coating substantially greater than the area of the base material itself. The spaces 14 between the coated clusters of pile filaments form deep and irregular pockets which do not easily fill with abraded material and, in the continued use of the abrasive material, because of its flexible character, readily unload the accumulating abraded material.

Not only does this invention permit the firm bonding of the abrasive coating to the base material, because of the filament clusters which anchor the coating to the base, but the resultant structure has greater flexibility. When ordinary abrasive cloth materials are flexed, the adhesive coating cracks and tends to peel from the backing. In the material of this invention, as clearly shown in Figure 4, the coating breaks into segments 15 of abrasive-bearing adhesive, which remain anchored to the base by means of the filaments. These segments are separated by the cracks 16 in the abrasive coating. Thus the abrasive material can be readily run as a belt without the danger of the abrasive coating peeling from the base, as it does in conventional abrasive fabrics.

In addition, this structure increases the capacity of the base for the abrasive coating several times. While this invention lends itself to the use of any of the familiar abrasive materials, such as aluminum oxide, garnet, silicon carbide, and similar substances, an example of the increased capacity of the base for adhesive coating is hereby given using aluminum oxide, although comparable results have been achieved with other materials. The following table gives the weights in aluminum oxide abrasive of four different grades which will be borne by a ream (480 sheets) of 9" x 11" sheets of abrasive material of this invention as compared with standard metal working cloth:

Grade No.	Weight of abrasive coating per ream	
	This invention	Standard metal working cloth
	Pounds	Pounds
60.....	125	35
80.....	125	26
150.....	125	15
400.....	50	5

It will thus be seen that an abrasive material made according to this invention will permit the use of a coating of from more than three times to ten times the weight of coating on conventional base materials. Because of the characteristics of the pile fabric base this load will be firmly anchored to the base material, will form a comparatively flexible structure, and will expose far more of the abrasive material as a working surface than the area of the base itself. Because of the irregularity of the surface presented to the work, as shown in Figure 3, the cutting capacity of the material is greatly increased.

Any method of applying the abrasive coating to the base fabric may be employed, provided care is taken that the filaments of the pile fabric are not matted down to the base, to insure the formation of the irregular surface shown in Figure 3.

It is desirable that after the coating has dried the sheet is run across a breaker bar or other flexing device as in well-known practice, to crack the hardened coating into segments separated by cracks 16 as indicated in Figure 1. If the material is first flexed in the direction of its length, and then transversely, the material becomes very flexible, and because of the anchoring of the coating to the base by means of the filaments 11, without any danger of the coating material breaking off the base.

While in the foregoing specification we have set forth certain details illustrative of the structure disclosed, it will be understood that those skilled in the art may depart rather widely from such details without departing from the principles of the invention.

We claim:

1. In an abrasive device of the character set forth, a strip of pile fabric having an interwoven base and pile filaments extending upwardly therefrom to a substantially uniform height, a coating of adhesive about said filaments throughout their length and attached directly to the top of said base, and abrasive particles carried by said adhesive upon said filaments and upon said base.

2. In an abrasive device of the character set forth, a strip of pile fabric having an interwoven base and pile filaments extending upwardly from said base, a coating of adhesive about said filaments and attached directly to said base, and abrasive particles secured by said adhesive to said filaments throughout their length, and abrasive particles secured by said adhesive to said base.

3. In an abrasive device of the character set forth, a strip of fabric providing an interwoven base and pile filaments extending upwardly from said base, a layer of adhesive upon said filaments and the top of said base, and abrasive particles secured directly by said adhesive to said filaments and base, providing an abrasive armor for each filament, protecting the filament throughout its length.

4. An abrasive material comprising a base of pile fabric and an irregular covering of abrasive coating applied thereto, said abrasive coating being secured directly to and completely covering the base fabric and clusters of the pile filaments rising therefrom.

5. An abrasive material comprising a base of pile fabric and an irregular covering of abrasive coating adhesively attached directly to said base and to the pile filaments of the fabric.

6. An abrasive material comprising a fabric base, pile filaments secured to said base and projecting upwardly therefrom and a heavy and irregular coating of abrasive material adhesively attached directly to said base and to said pile filaments, said coating presenting a deeply rutted abrasive surface.

7. An abrasive material comprising a fabric base, pile filaments secured to said base and projecting upwardly therefrom, and an abrasive coating attached directly to said base and forming irregular mounds above said base and about clusters of pile filaments.

8. In an abrasive device of the character set forth, a strip of pile fabric having an interwoven base and spaced pile filaments extending upwardly therefrom, segments of adhesive material secured to the base, said filaments extending into said segments of adhesive material to secure said segments to said base during flexing of said fabric, and abrasive carried by said segments of adhesive.

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