Nov. 16, 1943. R. A. MOORE 2,334,642

ABRASIVE TOOL

Filed Aug. 3, 1942

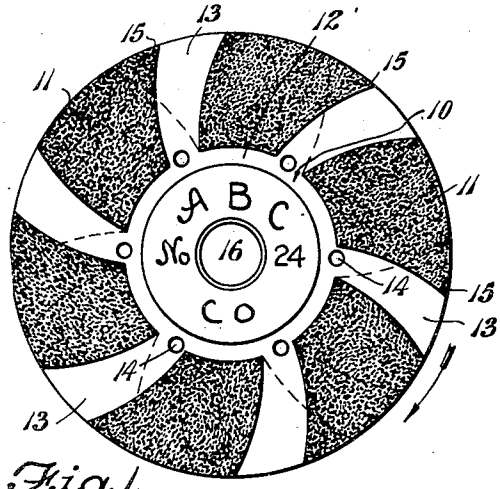


Fig. 1.

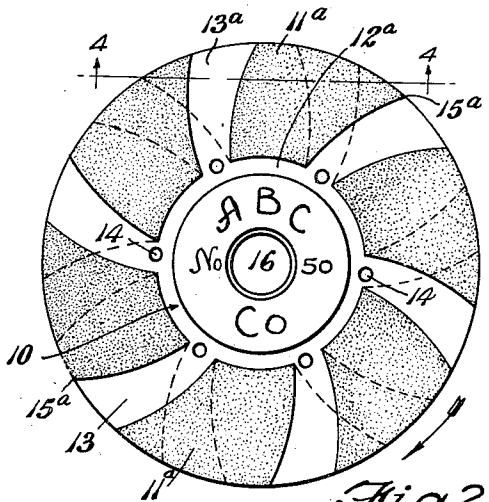


Fig. 2.

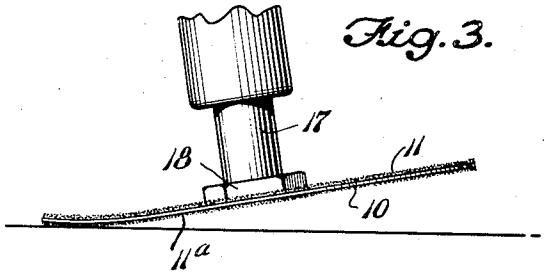


Fig. 3.

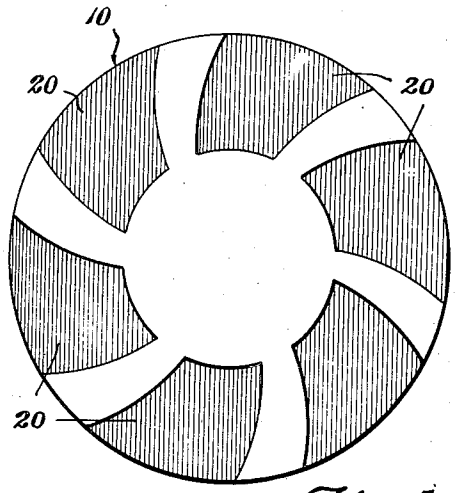


Fig. 5.

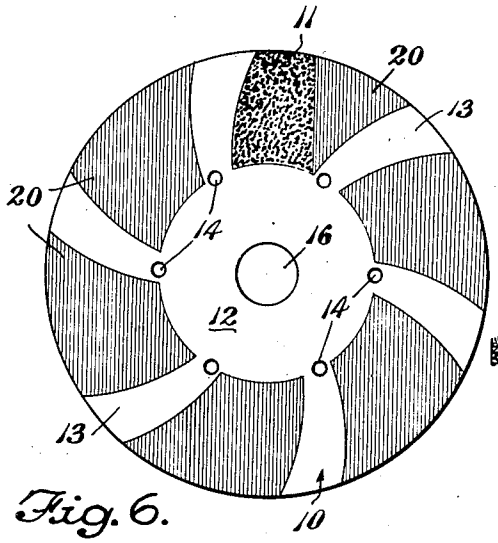


Fig. 6.

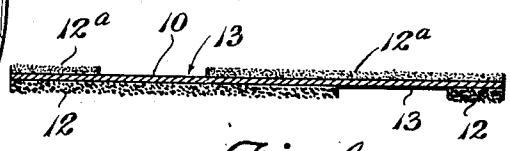


Fig. 4.

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Patented Nov. 16, 1943 2,334,642

UNITED STATES PATENT OFFICE

2,334,642

ABRASIVE TOOL

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Application August 3, 1942, Serial No. 453,335

5 Claims. (Cl. 51—195)

The invention relates to abrasive tools, especially grinding disks, and to an improved method of manufacturing the same.

One of the objects of the invention is to provide a composite abrasive disk having grinding surfaces on both sides thereof.

Another object is to provide an abrasive tool having one or more grinding surfaces each including intercommunicating openings, grooves, channels, depressions and the like, thereby providing air-ways for cooling the tool and passages through which waste material may pass, thus preventing clogging of the grinding surface or surfaces.

A further object of the invention is to provide a grinding tool having abrasive material so arranged thereon as to insure a shearing cut upon the material worked upon.

A still further object of the invention is to provide a simple and economical method of forming an abrasive tool, whereby marked saving in time and materials is insured.

The invention will be more readily understood by reference to the accompanying drawing and the following detailed description. A specific embodiment of the invention is set forth by way of illustration.

In the drawing:

Fig. 1 is a plan view of one surface of an abrasive disk embodying the invention;

Fig. 2 is a similar view showing the opposite surface of the disk;

Fig. 3 is a diagrammatic view illustrating the tool in operation;

Fig. 4 is a section on the line 4—4 of Fig. 2, and

Figs. 5 and 6 are views illustrating successive steps in the process of making the abrasive tool.

Referring in detail to the drawing, the reference numeral 10 denotes a base sheet which may be of cardboard, fibreboard, leatherboard or other suitable thin, relatively inexpensive and preferably somewhat flexible material. Each of the opposite surfaces of the disk is provided with spaced abrasive areas formed by causing particles of carborundum or other hard, gritty material to adhere to such surfaces. As shown in Fig. 1 the abrasive areas 11 on one surface are formed of particles of different size than the particles making up the areas 11*a* on the opposite face, as shown in Fig. 2. The central portions 12 and 12*a* on opposite surfaces of the disk remain uncoated, and upon these uncoated portions may be provided suitable indicia, as the name of the company, the trade-mark, and the size or grade of the particles making up the abrasive surface. Obviously, any suitable designation may be provided on the uncoated surfaces. Radiating from the central uncoated portions 12 and 12*a* are a plurality of curved channels 13, 13*a* which extend from the central portion to the periphery of the disk. It will be noted that the channels 13 and 13*a* are arranged in pairs each radiating from a corresponding position on opposite faces of the disk but curved in opposite directions. A plurality of openings 14, 14 corresponding in number to the pairs of channels are provided, each being located substantially at the point where the pairs of channels radiate from the central depressed portions 12 and 12*a*. Thus the channels on opposite faces are interconnected and the radial channels all communicate with the central depressed portion, thereby forming a series of communicating channels and air-ways for cooling the disk and insuring cleaning of the disk of dust, debris and the like during operation of the tool.

In addition to providing channels for cooling and cleaning purposes, the curved channels 13 and 13*a* are so shaped as to provide sharp points or cutting edges 15, 15*a* at the extremities of the abrasive coated areas 11 and 11*a*. Thus when the disk is rotated in the direction of the arrow as indicated in either Fig. 1 or Fig. 2 there is insured a shear cut which has been found very effective in abrading operations.

At the center of the disk there is provided an opening 16 to permit attachment to a rotatable shaft 17 by means of suitable fastening means 18. The fastening means are preferably countersunk so as to prevent contact of such fastening means with the surface to be abraded when the disk is placed flat upon the said surface.

In operation the abrading tool may be applied to the surface either inclined, as indicated in Fig. 3, or flatwise. A very effective result is obtained where the tool is applied in the inclined position, owing to the flexibility of the base material to which the abrasive particles are applied. Owing to this flexibility curvature of the disk results when one edge is pressed on the surface to be abraded and this insures a firm but yielding application of the abrasive materials. The disk is self-cleaning and self-cooling owing to the presence of the intercommunicating channels and openings, it being observed that each channel has an inlet and an outlet so that no clogging either of dirt or air results. Even when the disk is applied flatwise to a surface to be abraded the intercommunicating channels are still effective and both air and waste material are enabled to

pass freely through the openings 14 to the opposite side of the disk. The waste material will of course be thrown out by centrifugal force assisted by air currents. If desired other openings passing through the disk may be located within the channels 13, 13a and in the central uncoated portion or channel 12.

The disks may be cheaply and efficiently manufactured. Steps in the manufacture are illustrated in Figs. 5 and 6. According to the preferred method glue or suitable adhesive material is first applied to one surface of the base sheet 10 in spaced areas indicated at 20 in Figs. 5 and 6. These spaced areas correspond with the abrasive areas on the finished disk. When the adhesive has been applied abrasive particles may then be sprinkled upon the disk and will adhere only to the areas upon which the adhesive is located, the uncoated portions which correspond with the central depression 12 and radiating channels 13 will not retain the particles, which fall off or may be brushed off after the adhesive has dried. This method of coating is vary rapid since the adhesive may be applied to a large number of disks and the abrasive applied to all the disks by a blowing operation.

It will be obvious that various types of patterns may be employed in producing the improved abrasive tool. It may be desirable to form a number of patterns upon a single sheet before cutting the sheet into individual elements. Where such pattern is employed the glued areas for a number of tools may all be coated with abrasive material in spaced areas before the final individual unit is stamped or cut from the composite sheet. After one surface of the tool has been coated with abrasive material and the adhesive suitably dried the other surface may be coated in a similar manner. Where a number of units are to be stamped out of a single sheet both surfaces may be coated before the stamping operation.

While the invention has been described with particular reference to a disk it will be obvious that the method in its broadest aspects is applicable also to the formation of abrasive belts, sandpaper and the like having spaced abrasive areas, shearing cuts and intercommunicating channels or openings to provide cooling and cleaning passages or air-ways.

The invention has been described in detail for the purpose of illustration, but it will be obvious that numerous modifications and variations may be resorted to without departing from the spirit of the invention.

I claim:

1. An abrasive disk adapted for use as a rotary tool, comprising a base sheet having a working face comprising a smooth circular central area, and an outer portion comprising a plurality of spaced abrasive areas formed of abrasive particles adhesively secured to the base sheet, each abrasive area extending continuously from the central area to the periphery of the disk, said abrasive areas being separated by curved radial channels extending from the central area to the periphery, the channels being bounded by curves intersecting the periphery of the disk at an acute angle, considered in the direction of rotation of the tool, whereby the abrasive areas are provided with sharp cutting edges, and whereby air is forced through the channels by rotation of the disk to cool the tool during operation.

2. An abrasive disk as set forth in claim 1, in which the base sheet is similarly coated on opposite sides thereof, to provide optionally usable working faces, there being central uncoated areas on each face, and the curved channels extending from each central area to the periphery, the channels on opposite faces being oppositely curved.

3. An abrasive disk as set forth in claim 1, wherein openings extending through the disk are provided at the juncture of each channel with the central area.

4. An abrasive disk as set forth in claim 1, having similarly coated areas on opposite faces separated by curved channels, the channels on opposite faces radiating from corresponding positions but being oppositely curved.

5. An abrasive disk as set forth in claim 1, having similarly coated areas on opposite faces separated by curved channels, the channels on opposite faces radiating from corresponding portions but being oppositely curved, and openings extending through the disk at the juncture of each channel with its central area, each opening communicating with a pair of channels, one on each face of the disk.

ROBERT A. MOORE.