Jan. 23, 1940. H. P. KIRCHNER ET AL 2,187,743

GRANULAR COATED ARTICLE

Original Filed April 5, 1934

Fig. 2.

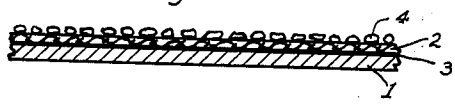


Fig. 1.

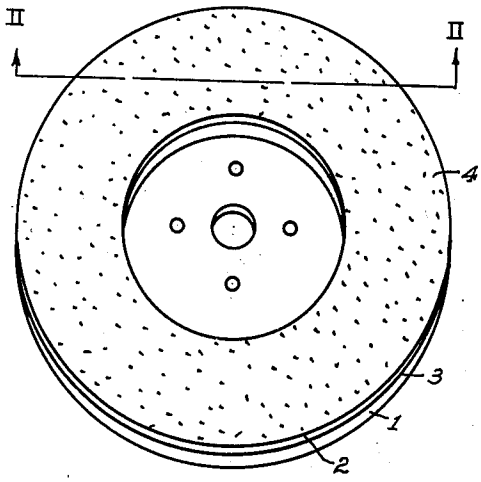
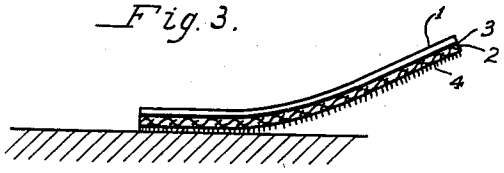


Fig. 3.



INVENTORS
HENRY P. KIRCHNER
CHARLES E. WOODDELL

BY R. C. Benner

ATTORNEY.

Patented Jan. 23, 1940 2,187,743

UNITED STATES PATENT OFFICE

2,187,743

GRANULAR COATED ARTICLE

Henry P. Kirchner and Charles E. Wooddell, Niagara Falls, N. Y., assignors to The Carborundum Company, Niagara Falls, N. Y., a corporation of Delaware

Continuation of application Serial No. 719,173, April 5, 1934. This application April 28, 1938, Serial No. 204,760

3 Claims. (Cl. 51—195)

This invention relates to granular coated articles and more especially to granular coated discs.

This application is a continuation of our copending application Serial No. 719,173, filed April 5, 1934.

Abrasive coated discs have heretofore ordinarily been made by forming the backing of a combination of cloth and fibre, such as vulcanized fibre, and attaching thereto abrasive granules by means of an adhesive such as glue or the like. Discs made with fibre and cloth backings are soon cracked, twisted, or torn, and otherwise prematurely rendered unfit for use. Furthermore, the use of fibre and cloth backings gives the product a warped appearance and prevents it from being applied uniformly and efficiently to the surface to be ground or polished.

It is an object of the present invention to provide a new and improved granular coated article that will overcome these and other disadvantages, and to provide a method of making the same in an efficient and economical manner.

Fig. 1 is a plan view of a circular abrading disc;

Fig. 2 is a section thereof on the line 2—2 of Fig. 1; and

Fig. 3 is a diagrammatic representation of a cut-off part of a disc in use illustrating the manner of use.

According to one modification of our invention, fabric such as paper or cloth 2 is attached to a metal backing 1, such as steel, brass, copper, aluminum or the like, by means of an adhesive 3. The metal to be used is first roughened on one side or, if desired, on both sides, by sand-blasting, chemical etching or knurling, to provide a suitable surface for receiving and holding the adhesive. The roughened surface is thereafter washed with a solvent or similar material that acts to cleanse it and the fabric is then attached either to one or both surfaces of the metals, as may be desired, by means of an adhesive that will adhere to both metal and to paper or cloth. We prefer to use, as an adhesive for this purpose, a partially vulcanized latex in solution, such as "Vultex", although sulphonated rubbers of the "Vulcalock" type, soluble rubbers and resin cements can also be used. The fabric is then given a coating of adhesive such as glue, to which is applied, by any method known in the art, a coating of granular material 4 such as silicon carbide, emery, etc.

According to another modification of our invention, one surface of the fabric 2 is first coated with abrasive granules 4 and the uncoated side is attached, by means of an adhesive 3, to the previously roughened surface of the metal backing 1. The application of the abrasive granules to the fabric before mounting the fabric on the metal is preferred in the manufacture of depressed center discs, although it is to be understood that the time and method of applying the granular coating to the backing is a matter of choice and convenience and does not appreciably affect the quality of the article produced.

As an example of one modification, one surface of a sheet of spring steel approximately .032" thick is sand-blasted to roughen it. Immediately thereafter, it is cleansed with benzol, and a thin film of a solution of vulcanized latex, such as "Vultex", is applied thereto. The uncoated side of the fabric that has been coated on one side with aluminous abrasive material, is pressed firmly and evenly into intimate contact with the latex coated surface of the metal backing by means of a soft rubber roller, or the like, and held in this position until the latex has thoroughly dried. The metal sheet with the granular coated fabric adhesively attached to one face thereof is then ready to be cut into the granular coated article covered by this invention.

In the manufacture of the granular coated articles of this invention, variations in the above procedure may be made when it is found expedient to do so. For example, in the case of depressed center discs the operation of stamping the discs out of the metal sheet, depressing the centers thereof and punching supporting holes therein is either performed before the metal sheet has been roughened and cleansed, or it is done after the granular coating has been applied to the metal backing.

The product of the present invention overcomes the numerous disadvantages now experienced with the granular coated articles heretofore used, in that the backing here provided is flexible, resilient and strong, as well as having the property of preventing warpage in the finished article.

As illustrated diagrammatically in Fig. 3, when these discs are used they are applied to the work at an angle and under pressure so that they contact the work points over an appreciable area at and near the periphery. The part of the disc which is in contact with the work is necessarily bent out of the plane of the rest of the disc and as the disc rotates this bent portion again assumes a plane position normal to the axis of rotation of the disc. As a result of this method of application, the outer portion of the disc is

being continually flexed and distorted out of the plane surface where it is applied to the work piece and then caused to return to its original plane surface by the resilience of the disc. In order to obtain the requisite pressure of the abrasive grains against the material being abraded, it is necessary that the discs have an appreciable amount of stiffness or resistance to flexure. At the same time, the discs must have the capability of withstanding repeated flexing and distortion which follows from their use in the manner described.

Because of the repeated flexing of the composite article, the adhesive used to attach the abrasive coated fabric to the metal backing must be carefully selected. If ordinary glue is used for this purpose, the glue cracks because it does not have the required flexibility to withstand the repeated flexing. As was indicated, we use a flexible cement for this purpose including specially proportioned rubber compositions, flexible resins such as special alkyd resins formed by condensing a polyhydric alcohol with sebacic or adipic acid, or resins which are normally somewhat stiff but flexibilized by the inclusion of suitable plasticizers according to methods well known in the art.

Heretofore, it has been necessary to use supporting pads with the discs to supply the requisite support to fibre and cloth backed discs, and to add resiliency thereto, in order that the discs might be subjected to pressure and flexing without being cracked. Regardless of the provision of supporting pads, the efficiency of the discs has been low because the very nature of the work for which they are intended requires continual flexing and bending of the discs, and when the fibre and cloth backed discs are repeatedly flexed and bent, they crack and are rendered inoperable prior to the wearing away of the abrasive thereon. Without supporting pads, these discs are practically useless.

On the other hand, the product of the present invention is one that has a high degree of flexibility, permitting it to be flexed and even bent back upon itself innumerable times without cracking or otherwise being injured in any way. It has exceptional strength, and this, coupled with its capability of yielding to pressure while resisting bending to the extent necessary to exert the required pressure on the work, permits it to act as a supporting pad of itself without the necessity of any additional or auxiliary supporting means. It can not be torn easily, and thus the article is capable of maintaining the sustaining lots or holes by means of which the discs are attached to the drive shaft.

This improved disc is especially advantageous where it is used to clean out channels or corners, as for example, in the finishing or polishing of automobile bodies. This is due to the fact that when the abrasive on the outside edge, which contacts with the surface, wears off, the outside edge of the disc maintains its stiffness. Such is not the case with fibre and cloth backed discs as the wearing away of the abrasive on the edges causes the discs, even when supported by the usual supporting pad, to bend over freely and renders them incapable of working down into the corners or channels, or the like.

Articles of the present invention are not affected by atmospheric conditions and moisture encountered during the manufacture and use of the abrasive articles does not have any deleterious effect thereupon.

The provision of a granular coated article which does not warp is a substantial improvement in the art inasmuch as difficulty has heretofore been experienced with warpage in discs. Fibre and cloth backed discs usually warp on two opposite sides and when used, this warpage causes intermittent deflection of the disc from the surface to be ground at a rate of two deflections per revolution of the disc. In consequence thereof, this deflection causes uneven grinding of the surface to be finished, and uneven wearing of the disc. Discs that do not warp have a greater area of contact than those that do warp. In addition, the inherent elasticity of the discs made according to this invention gives a more constant work pressure.

From the standpoint of cost of manufacture, metal backings for abrasive discs are a material advance in the art. To secure the equivalent strength and weight in a fabric or cloth backing of a very thin sheet of metal, the fabric must be very heavy, and a heavy sheet of fabric is decidedly more expensive than a thin sheet of metal. They are further of advantage because the discs may be accurately stamped or cut out from the metal that has been coated with paper or cloth and granular material without cracking the adhesive.

It is not intended that the scope of our invention shall be limited but shall be commensurate with the spirit of the appended claims.

We claim:

1. A granular coated article comprising a flexible disc of continuous sheet spring metal having an abrasive coated fabric attached thereto by a flexible resin cement, said disc having sufficient flexibility to permit it to be flattened over an appreciable area at and near the periphery when applied to a workpiece at an angle under pressure and sufficient resilience to cause it to return to a plane surface when the pressure is removed, and said cement having sufficient flexibility to permit the disc to be repeatedly flexed without impairing the attachment of the fabric to the metal.

2. A granular coated article comprising a flexible disc of continuous sheet spring metal having an abrasive coated fabric attached thereto by a flexible cement, said disc having sufficient flexibility to permit it to be flattened over an appreciable area at and near the periphery when applied to a workpiece at an angle under pressure and sufficient resilience to cause it to return to a plane surface when the pressure is removed, and said cement having sufficient flexibility to permit the disc to be repeatedly flexed without impairing the attachment of the fabric to the metal.

3. A granular coated article comprising a flexible disc of continuous sheet spring metal having an abrasive coated fabric attached thereto by a flexible rubber cement, said disc having sufficient flexibility to permit it to be flattened over an appreciable area at and near the periphery when applied to a workpiece at an angle under pressure and sufficient resilience to cause it to return to a plane surface when the pressure is removed, and said cement having sufficient flexibility to permit the disc to be repeatedly flexed without impairing the attachment of the fabric to the metal.

HENRY P. KIRCHNER.
CHARLES E. WOODDELL.