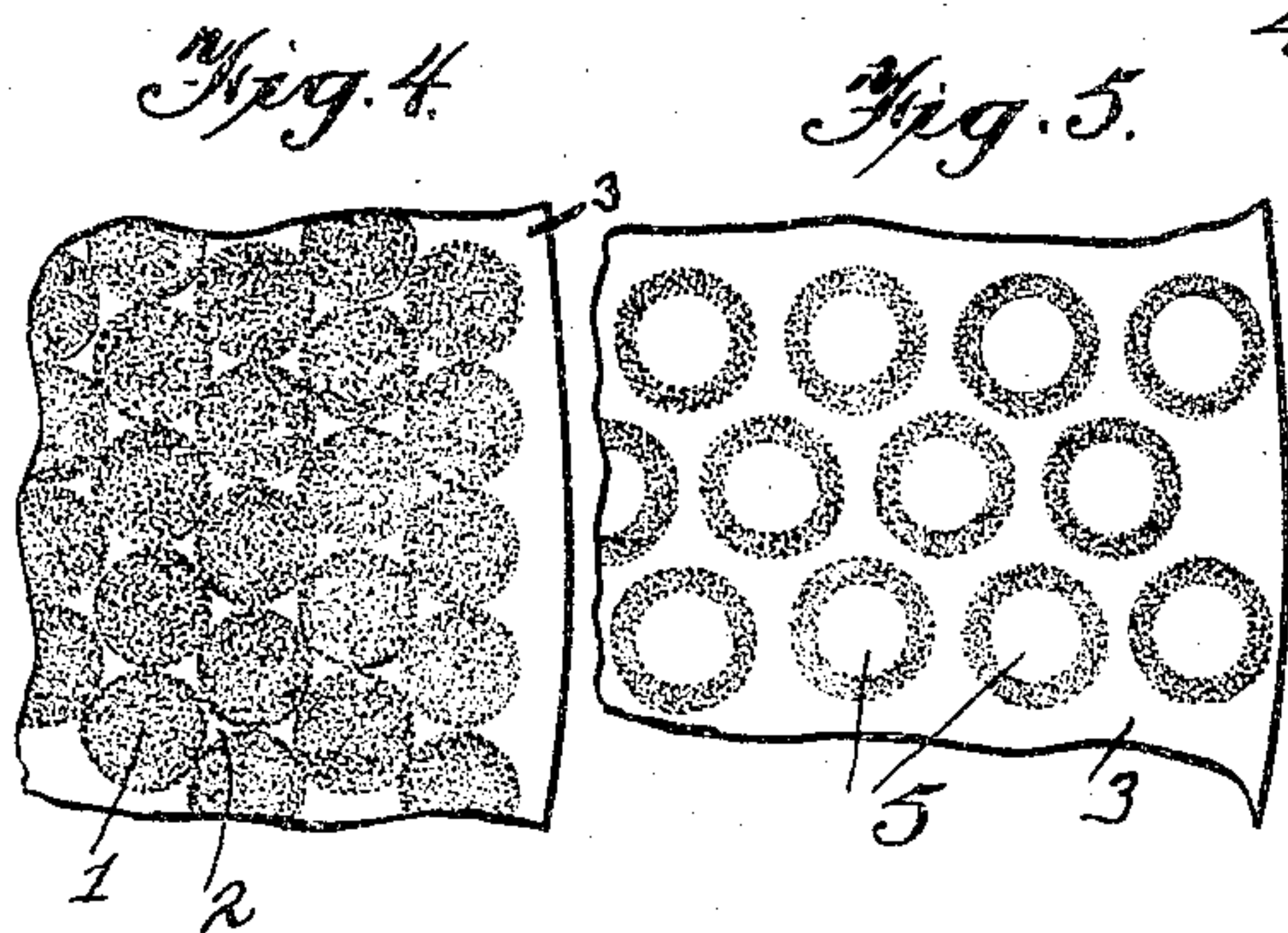
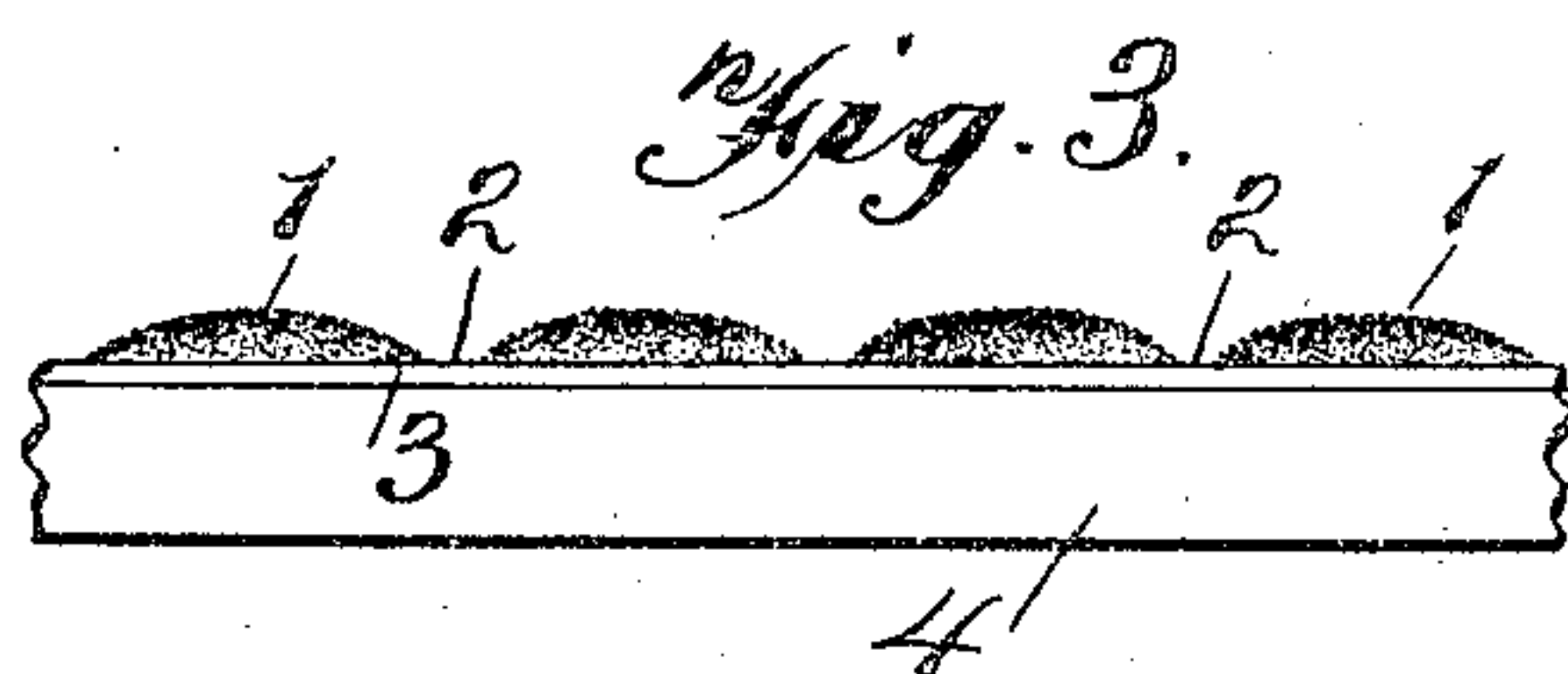
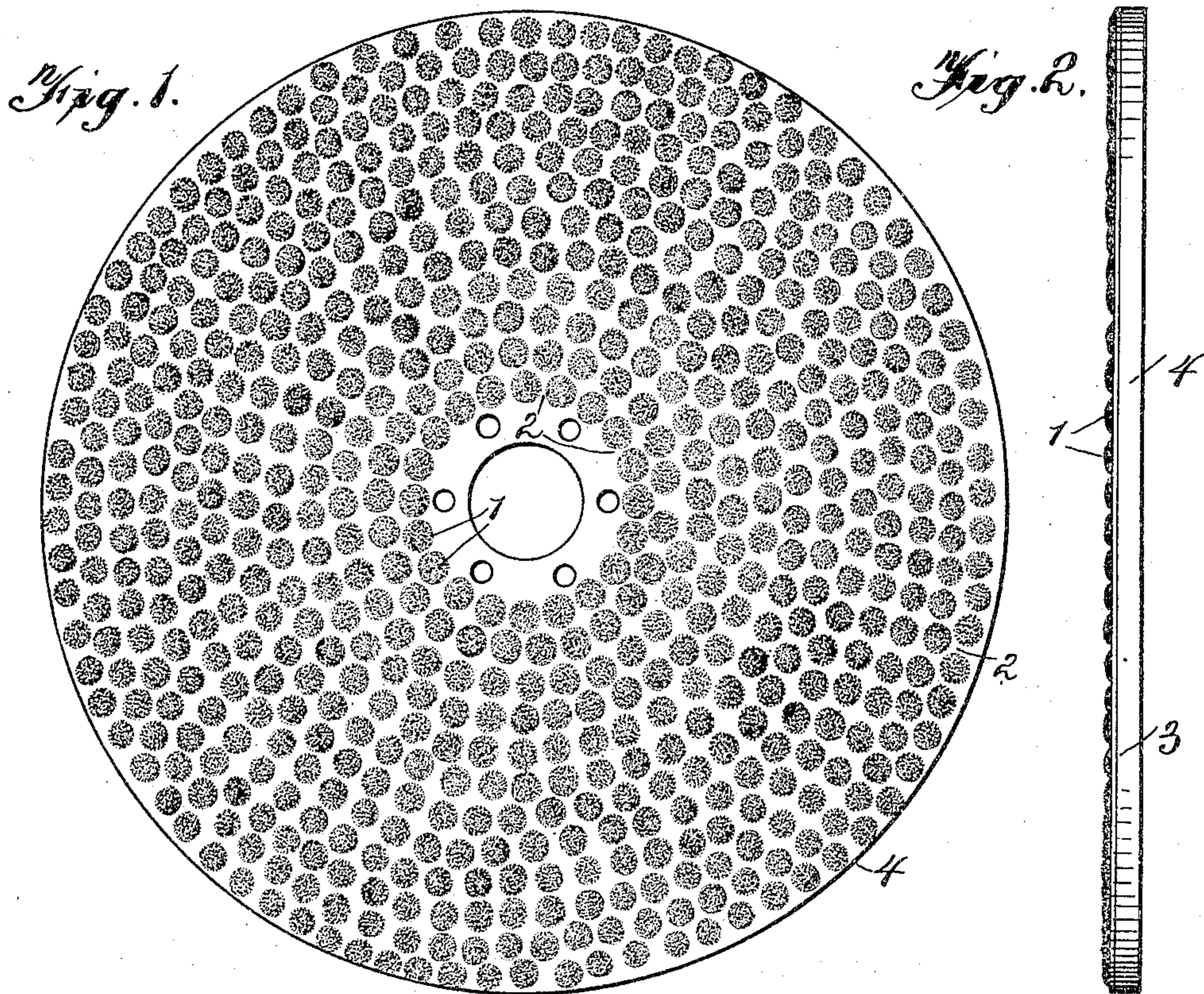


No. 794,495.

PATENTED JULY 11, 1905.

G. GORTON.
ABRADING SURFACE.

APPLICATION FILED APR. 30, 1902. RENEWED DEC. 13, 1904.



Witnesses

Geo. C. Peck.
E. R. Peck

By

George Gorton.

Hubert E. Peck
Attorney

UNITED STATES PATENT OFFICE.

GEORGE GORTON, OF RACINE, WISCONSIN.

ABRADING-SURFACE.

SPECIFICATION forming part of Letters Patent No. 794,495, dated July 11, 1905.

Application filed April 30, 1902. Renewed December 13, 1904. Serial No. 236,758.

To all whom it may concern:

Be it known that I, GEORGE GORTON, a citizen of the United States, residing at Racine, Racine county, Wisconsin, have invented certain new and useful Improvements in Abrading-Surfaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain improvements in grinding or polishing surfaces, and more particularly to improvements in abrading surfaces, sheets, or disks.

An object of the invention is to provide an abrading-surface of such formation and construction as to reduce to a minimum "gumming" of the surface while at work, and thereby increase to the maximum the effective working life of the surface and the cutting or abrading speed of such surface.

Another object of the invention is to provide an abrading-sheet—for instance, abrading cloth or paper—having the abrading material on its face so divided up by intervening clearance-spaces formed by uncovered portions of the cloth or paper backing sheet or carrier that said abrading-surface, in effect, will be made up of comparatively small projecting portions of abrading material, each approximately surrounded by blank or clearance spaces, or so that each narrow or small abrading portion, spot, or projection will, in the direction of movement of the sheet when at work, have a clearance-space behind it, whereby the grit and fine particles of metal are quickly released from the contacting surfaces of the work and the abrading portions or projections and without rubbing, except for a very slight distance between the work and any one or more of the abrading-surface projections or portions, thereby leaving the abrading material free to enter into intimate unobstructed cutting or grinding contact with the work.

With these and other objects in view my invention consists in certain novel features in construction and in arrangements of parts, as more fully and particularly specified and set forth hereinafter.

Referring to the accompanying drawings, which show constructions merely as examples among other arrangements within the spirit and scope of my invention, Figure 1 is an elevation of a grinding or abrading disk constructed in accordance with my invention. Fig. 2 is an edge view of a flat metal disk or plate having such an abrading-disk cemented thereon. Fig. 3 is a detail edge view of part of the abrading-sheet to show more clearly the tapered, convexed, or rounded-off form of each spot or projection of abrading material. Figs. 4 and 5 are plan views of portions of disks, showing modified arrangements of abrading-surfaces.

In certain types of grinding or polishing machines the grinding-heads are composed of flat steel or other strong plates or disks 4, each usually circular in form and mounted on a central axis and having a flat face covered by an abrading-sheet. This head is rapidly rotated, and the work to be ground is held against the rapidly-rotating abrading-surface. Usually circular disks of cloth, paper, or other fabric, each coated on one side with the abrading material, are provided. Each sheet usually completely covers the flat face of the metal disk and is glued or cemented thereto. When an abrading-surface is worn out, its sheet is removed from the metal plate or disk and a fresh sheet is applied thereto. Where abrading-sheets are employed having their faces completely coated and covered by the grit or abrading material, so that an unbroken abrading-surface is produced, serious disadvantages are encountered in practical use. Such abrading-surfaces soon become clogged and gummed by the fine grit and minute particles worn from the abrading-surface and from the metal-work being held to the abrading-surface and ground. These fine particles must rub completely across the face of the work before they can possibly find release. The particles form a coating or film between the face of the work and the grinding or abrading surface, and hence prevent the necessary free and intimate cutting or grinding contact between the abrading material and the work, to the detriment of rapid and accurate grinding as well as to the detriment of the grinding-surface itself,

which soon becomes worn and clogged or gummed. This objection to a continuous or unbroken layer or coating of abrading material has in the past been recognized in the art, and various attempts have been made to correct the difficulty; but these previous attempts to solve the problem have not been altogether satisfactory in practical use and in the practical manufacture of such abrading-sheets. The objection remained of permitting the grit and fine refuse to rub between almost concentric circular lines of abrading material and the work and completely or almost completely across the work. I overcome these objections by forming the abrading-sheet with a multiplicity of closely-arranged blank or clearance spaces surrounding or surrounded by projecting portions or spots of abrading material, which are small or narrow and so arranged as to cover or evenly cut or grind the entire surface of the work exposed thereto and yet so that there will always be a multiplicity of clearance-spaces opposite the work for the grit and refuse, or so that each projection or approximately radial line or narrow portion of abrading material moving across the work will have a clearance-space approximately around or behind the same, whereby the grit will not have to rub completely or for any material distance across the work under or against the abrading material. I have attained these results by forming the abrading-surface of a multiplicity of small spots or projections 1 of abrading material, about as shown in Figs. 1 and 4. These spots are closely arranged, so as to evenly cover the surface of the work operated on, yet so as to leave the clearance, blank, or uncovered spaces 2 of the backing sheet or carrier 3 between the grinding-spots 1. Each spot or projection 1 is preferably isolated from adjacent projections and completely surrounded by the blank, uncovered, or clearance space, as shown in Fig. 1; but I do not wish to so limit my invention, for, as shown in Fig. 4, the spots or projections can be arranged more closely together and still leave the surrounding non-working clearance spaces or depressions. The arrangement of Fig. 4 can be followed where the finer grades of grit are employed, as it permits the employment of more material over a given surface, and less clearance-space is required for the reception of waste material removed when the disk is in operation than where a coarser grade of grit is employed.

Usually the abrading-sheets are composed of the preferably flexible backing or carrier 3, of paper, cloth, fabric, or equivalent material. The abrading-surface is composed of any suitable grit of any desired size of grain for the particular work intended. For instance, emery, corundum, flint, carborundum, garnet, or other suitable material can

be employed in granulated or grit form. The backing-sheets are preferably cut to the circular or other shape desired before the abrading material is applied thereto, as it is very difficult to practically cut the sheets with the hard abrading material thereon.

In the process of forming the abrading-surface each sheet has spots of glue or other liquid or plastic cement applied to one face thereof. The glue is usually not applied as a mere film or coating, but in considerable quantity or body—that is, where the abrading-surface is made up of spots, as in Fig. 1. The granulated abrading material is then deposited on the surface of the sheet and is taken up by the glue, so that when the glue has set and hardened the abrading-material projections will be formed on the face of the usually flexible sheet. The bulk or quantity of abrading material applied to each sheet can be varied by varying the consistency of the glue or cement employed.

It is usually desirable that abrading sheets or disks used in machines of the character stated be provided with an excessive bulk of abrading material—that is, that each working projection or portion project as far as possible from the face of the backing-sheet. By forming the sheets with the clearance-spaces dividing the abrading-surface into working portions or faces I am enabled to accomplish this desirable result and provide each sheet with the maximum bulk of abrading material without detracting from the working or effective life and durability of the abrading-surface.

Each spot, projection, or working face or portion 1 of the sheet is preferably convex or rounded or tapered, about as shown clearly in Fig. 3, and material advantages in operation are thereby attained.

The spots or working projections 1 are usually arranged in circular rows or lines concentric with the axis on which the disk rotates, and the circular rows gradually increase in diameter from the small center circle at the center of the abrading-surface to the largest row forming the surrounding outer edge of the abrading-surface, so that the entire abrading-surface is made up of the multiplicity of small closely-arranged spots or working projections, each preferably circular in form, although each spot can be of any form or outline, and the spots can be variously arranged on the sheet to form the clearance-spaces and to properly and evenly grind or cut the surface of the work presented thereto. Where the spots 1 are arranged in the concentric circular rows, the spots of one row break joints with those of adjacent rows to prevent cutting grooves in the face of the work and to evenly reduce the face of the work.

If desired, the working projections or spots

can be annular or ring-like in form, (see 5, Fig. 5,) forming clearance-spaces between the spots as well as within each spot.

I prefer to employ the approximately isolated round spots or projections somewhere about from five-sixteenths to seven-sixteenths of an inch in diameter; but I do not wish to limit myself to such forms or dimensions. The object is to avoid a completely-covered or unbroken abrading-surface and also to avoid an abrading-surface having only a continuous unbroken clearance-line made up of convolutions all approximately concentric with the axis on which the disk rotates, for with such a formation the abrading-faces as they move across the work are all approximately concentric with the axis of rotation, and hence the grit and refuse must practically rub completely across the face of the work and between the same and the almost concentric abrading-faces.

By reason of the peculiar divided formation of my abrading-surface I provide almost instant relief for the grit worn from each abrading face or division and for the minute metal particles cut by such face or division. For instance, the refuse can drop behind each projection as the disk revolves and prevent collection thereof between the metal-work and the abrading projections. The grit does not have to rub across more than one abrading face or edge before it finds relief, and as it leaves the work the grit and refuse can fly from the disk, not having been rubbed or ground into the abrading-face.

Abrading-sheets constructed substantially as described are very durable, as it is almost impossible to knock off the separate projections or spots of abrading material. By reason of the bulk of material which can be in-

cluded in each spot—that is, the length thereof from the face of the sheet—the sheets can be employed for a long time and can stand extensive wear and use, and also the effect of a solid emery or carborundum wheel is attained without the disadvantages thereof for the purposes intended.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An abrasive or grinding disk having a spotted abrading-surface and consisting of a sheet provided with adherent abrasive material partially covering and arranged in uniformly-disposed areas over a face of said sheet and forming the multiplicity of closely and irregularly arranged intervening clearance-spaces.

2. An abrading-disk having its abrading-surface formed by a multiplicity of small closely - arranged projections of adherent abrading material forming the intervening clearance-spaces, substantially as described.

3. An abrading-sheet having its working surface divided into convexed or rounded abrading projections or portions by blank or uncovered clearance-spaces, substantially as described.

4. A backing having an abrading-surface formed by approximately convexed portions of abrading-material grit cemented to the backing and forming clearance portions distributed throughout the abrading-surface, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE GORTON.

Witnesses:

C. R. CARPENTER,
M. M. MORRIS.