

C. J. & F. G. MARIUS.

PROCESS OR METHOD OF CASTING ABRADING, GRINDING, CUTTING, AND POLISHING SUBSTANCES
IN A METALLIC MATRIX.

APPLICATION FILED NOV. 27, 1905.

918,069.

Patented Apr. 13, 1909.

2 SHEETS—SHEET 1.

FIG. 1.

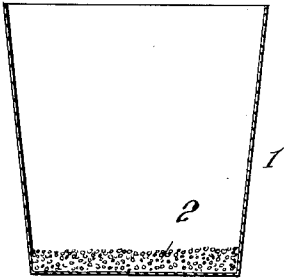


FIG. 2.

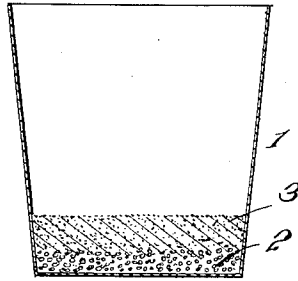


FIG. 3.

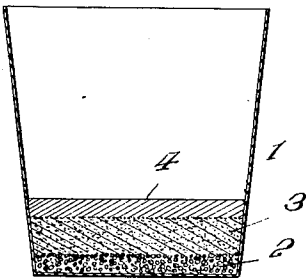


FIG. 4.

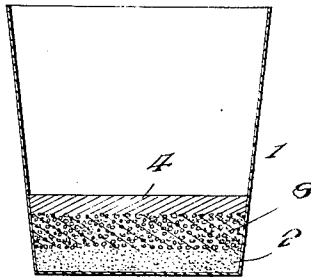


FIG. 5.

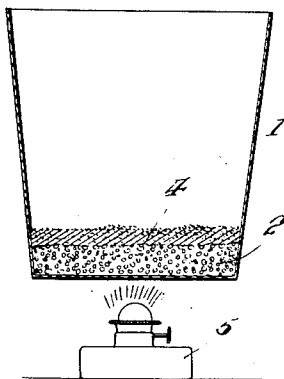
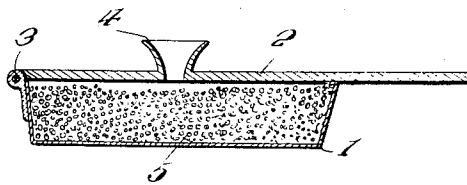


FIG. 13.



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2 SHEETS—SHEET 2.

FIG. 6.

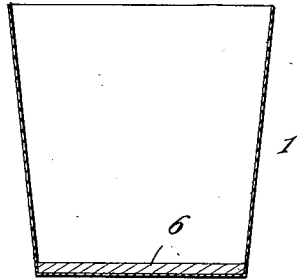


FIG. 7.

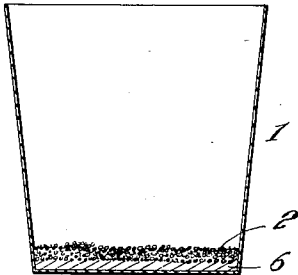


FIG. 8.

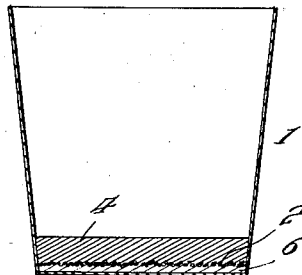


FIG. 9.

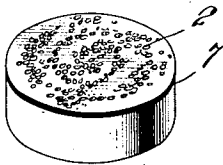


FIG. 10.

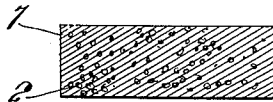


FIG. 11.

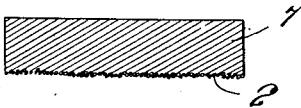


FIG. 12.



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CASTERAN J. MARIUS AND FRANCES G. MARIUS, OF WEST HOBOKEN, NEW JERSEY.

PROCESS OR METHOD OF CASTING ABRADING, GRINDING, CUTTING, AND POLISHING SUBSTANCES IN A METALLIC MATRIX.

No. 918,069.

Specification of Letters Patent.

Patented April 13, 1909.

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To all whom it may concern:

Be it known that we, CASTERAN J. MARIUS and FRANCES G. MARIUS, citizens of the United States of America, and residents of West Hoboken, in the county of Hudson, State of New Jersey, have invented a certain new and useful Improved Process or Method of Casting Abrading, Grinding, Cutting, and Polishing Substances in a Metallic Matrix, of which the following is a specification.

Our invention relates to an improved process or method of casting abrading, grinding, cutting or polishing substances in a metallic matrix, adapted to hold the same in a firm setting, for the purposes of the various uses to which the same may be applied, as for instance, cutting, abrading or polishing tools, or for the purposes of anti-slipping devices, as the same may be set in a sidewalk or other suitable place to prevent the slipping of the foot on a concrete metal or glass pavement, or the combination of these, and also for the new article of manufacture produced as the result of the casting.

We are aware that it is not new with us to mix grinding or abrading materials with a suitable metal or other substance adapted to hold the same in a matrix.

Our method relates to a particular manner of accomplishing this result in order that the abrading materials may be uniformly distributed throughout the metallic matrix with approximately predetermined relation one to the other.

The difficulties which have been encountered heretofore in casting a metallic matrix embracing abrading materials has been that when the molten metal is mixed with the abrading material in a molten condition, the abrading material being lighter will be disturbed in its position by the inflow of the molten metal. This is particularly the case, where the abrading material is finely divided, the result being that when the cast is set, the abrading material is found either as having risen to the surface of the molten metal, or as having been crowded together in one particular part; at all events, as having been removed from its original position in the mold. In other words, by the processes

heretofore employed, it has been impossible with certainty to determine where the abrading material would be found after the cast was made.

The purpose of our present invention is to provide means by which the abrading material will be held firmly in position, during the period in which molten metal which is to form the matrix is flowing about the same, and while the cast is being formed.

When we refer here to abrading materials, we mean such materials as diamond dust, corundum, carborundum, emery and equivalent materials.

We have diagrammatically illustrated our invention in the accompanying drawings, designating the parts by numerals, referring to like parts by like numerals.

The drawings, Figure 1 to Fig. 13, inclusive, all illustrate vertical sections in diagrammatic form, with the exception of Fig. 9, which is a perspective view of a disk or button adapted to be used in connection with a concrete pavement or vault light, to prevent the foot from slipping in passing over such pavement or grating.

We will now proceed to describe our method or process, referring to the drawings as occasion may require. As heretofore stated, the fundamental principle involved in our process is that of holding in a fixed position the abrading material during the period that the molten metal is embracing the same. This may be accomplished in several ways without departing from the spirit of our invention. We will describe these processes in their several steps and stages.

Referring to Fig. 1, (1) represents a mold or retort adapted to receive and form the casting desired to be made. (2) represents an abrading material, such for instance, as carborundum, suitably divided into particles according to the size or mesh required for the purposes for which the ultimate product is intended to be used. A stratum of such particles of carborundum is laid at the base of the mold (1). The second step is that of adding finely divided metal, such for instance, as steel, having a weight greater than that of the carborundum and

being more finely divided. This is poured over the strata of carborundum, as shown in Fig. 2, and indicated as (3), which is shown by etched lines. The fact that the steel particles in this case are of smaller mesh than the carborundum particles will permit the steel particles to sift down between the interstices lying within the carborundum strata, until the same are practically filled. I apply enough of these steel particles to fill the interstices of the carborundum strata and to overlay it in order to hold the same firmly in position. We then pour on to these two strata molten metal, such for instance, as zinc or other compound or composite metal. We have indicated this in Fig. 3 at (4). The result will be that the molten metal will flow through the interstices of the two strata last described and entirely embrace all of the particles, the weight of the metal strata (3) being sufficient to hold the carborundum or other molten material in position during the period of casting. When the metal is set, the carborundum will be in approximately the same position as when it was introduced into the mold and the product will exhibit the carborundum inclosed in a metallic matrix.

The second form of the application of our process is illustrated in Fig. 4. In this figure, we make a strata of carborundum or other suitable abrading material of a predetermined size or mesh, as indicated at (2). We overlay this strata with a second strata of metal, as for instance, steel or other heavy metal, the mesh being substantially the same or greater than that of the carborundum strata (2). This will result in the steel strata lying on top of the carborundum strata without passing into the interstices of the same, as described in the last operation. (4) indicates the metal poured on top of the steel strata in a molten condition. This metal, it will be appreciated, will pass through both metal and carborundum strata and fill the interstices thereof, thus forming a metallic matrix as heretofore described.

In Fig. 5, we illustrate still another form of the same general principle, wherein we form a strata of carborundum particles and overlying the same is a strata of finely divided metal, suitable itself to become the metallic matrix, as for instance, zinc or lead, or composite metal. The latter stratum is more finely divided than the carborundum stratum, and, therefore, passes through the interstices of the carborundum strata and fills the same, and as indicated in Fig. 5, at (4) overlies the same. We then apply heat to the retort or mold in which the two strata are contained, sufficient to melt or fuse the metal. When the same is fully melted, we

permit the mass to cool and set, thus forming in like manner a metallic matrix embracing the abrading material.

In the operation of the last described method, it is desirable that the act of heating and cooling be accomplished suddenly in order that the abrading material may not have time within which to change its position, the fact of the matrix metal being mixed with the abrading material in advance decreasing the liability of disturbance by reason of the limited flow of the matrix metal, the weight of the matrix metal operating to hold the abrading material in position until the matrix metal is melted, when the setting of such metal should be accomplished immediately, at all events, before the position of the particles of abrading material would be materially disturbed. We may also accomplish the same result by finely dividing metal particles, such as steel, and coating the same with an adhesive substance, (preferably such as is not affected by heat) and then mixing with the coated steel particles, a finely divided carborundum or other suitable abrading material. The result of this will be that the steel particles will become coated with the carborundum particles, but throughout the whole mass, when thus mixed will be interstices suitable for the passage of molten metal, which is adapted to form a metallic matrix. We have found that by this method a very uniform casting can be made, the carborundum particles clinging to the steel particles and when they are all mixed together causing a separation between the steel particles. Of course, it would be understood, that the adhesive material may be applied either to the metal particles or to the carborundum particles. We have illustrated this process in diagrammatic magnified form in Fig. 12, wherein (2) represents the carborundum or equivalent material and (3) the steel particles, or vice versa, as heretofore stated.

We illustrate another form in Figs. 6, 7 and 8. In this form, we apply to the bottom of the retort or mold an adhesive material, such as a cement, a wax, a plastic or a glue indicated as (6). This adhesive material may be of a substance not affected by heat, such for instance, as plaster of paris or an equivalent material. We then throw into the retort a quantity of the abrading material, such as carborundum, causing the same to contact with the adhesive substance as at (6) and adhere to the same. When the adhesive material is dried or set, holding or embracing the carborundum in a firm or fixed position at the base of the mold, we throw out of the mold all of that portion of the carborundum, which has not adhered to the base of the mold, and pour into the mold molten

metal, such as heretofore described, and permit the same to set. The metal, it will be readily appreciated, will embrace the particles of carborundum or other similar material and hold the same in a metallic matrix. The retaining agent can then be removed.

In Fig. 13, we have illustrated another form in which we may apply mechanical means for holding the carborundum in position in the process of molding, which consists of a mold (1) having a lid (2), hinged at (3) and a receiving port (4). We have illustrated the carborundum or other equivalent material (5) as contained within this mold, and completely filling the same, the lid being closed, the carborundum is held mechanically and firmly in position. The molten metal is poured into the port (4) until all the interstices lying between the particles of carborundum are filled. The product is illustrated in Figs. 9, 10 and 11, wherein (2) is the abrading material and (7) the matrix. The carborundum is found in the metallic matrix in approximately the same position as it was found in the original mold, but embraced and inclosed by a metallic matrix, i. e., the carborundum or other particles bear to each other substantially the same relation as they did in the mold, and we have a product wherein the abrading material is approximately uniformly distributed throughout the metallic matrix, or in substantially a predetermined position. Of course, the position of the carborundum particles may be varied from time to time as occasion may require. They may be cast all along one surface of the metallic matrix or placed in any other position that may be suitable or convenient by regulating the strata or form in which the same is placed in the mold in association with the binding or holding agent.

Referring to the metal employed by us to form the metallic matrix, this may be and preferably is, of a malleable quality, as we find that such metal has certain advantages. We do not intend, however, to limit ourselves to malleable metal for we may employ other metal. We may also employ crushed steel as an abrading material and may combine the same with copper or other metals.

What we claim as new and desire to secure by Letters Patent is:

1. The method or process of casting abrading material in a metallic matrix to form an abrading mixture, which consists in mechanically holding the abrading material in a fixed position in a mold or retort, and intermixing the same with the metal which is to form the metallic matrix by causing the latter to flow in a molten condition in the interstices between the abrading material and so holding the abrading material until the metal has set.

2. The method or process of casting abrading material in a metallic matrix to form an abrading mixture, which consists in mechanically holding the abrading material in a fixed position in a mold or retort and intermixing the same with a metallic binding material by fusing or fluxing the latter in the interstices between the abrading material.

3. The method or process of casting abrading material in a metallic matrix, which consists in placing abrading material divided into suitable particles in a retort or mold, then overlaying this strata of abrading material with divided particles of metal having sufficient weight to hold the abrading material in position during the operation of casting, then causing a metal adapted to form a metallic matrix to flow in a molten condition into and through the interstices of the two strata above described and fill the same.

4. The method or process of casting abrading material in a metallic matrix, which consists in dividing into suitable particles the abrading material and a metal having sufficient weight to hold the abrading material in position during the process of casting, then intermingling the divided particles in a suitable mold, then causing a metal suitable to form a metallic matrix to flow in a molten condition into the interstices between the particles of abrading material and the particles of metal.

5. The method or process of casting abrading material in a metallic matrix, which consists in mixing divided particles of the abrading material with divided particles of a metal heavier than the abrading material and then causing the metal which is to form the metallic matrix to flow into the interstices between said divided particles of abrading material and the divided particles of metal.

6. The method or process of casting abrading material in a metallic matrix which consists in first placing the abrading material divided into suitable particles into a mold then pouring on this strata of abrading material a metal more finely divided than the abrading material and heavier than it and permitting the same to sift down into the interstices between the particles of abrading material, and then causing a metal suitable to form the metallic matrix to flow in a molten condition into the interstices between the divided particles of metal and abrading material.

7. The method or process of casting abrading material in a metallic matrix, which consists in first placing the abrading material divided into suitable particles into a mold, then pouring on this strata of abrading material, a metal more finely divided than the abrading material and heavier than it and

permitting the same to sift down into the interstices between the particles of abrading material and then causing a metal suitable to form the metallic matrix, divided still
5 finer than the last two mentioned to flow or sift between the interstices of the abrading material and metal and then applying heat.

8. The process of casting abrading material in a metallic matrix, which consists in
10 dividing into suitable particles the abrading material, placing a stratum of said particles in a suitable receptacle and while mechanically holding the particles of abrading ma-

terial in position in fixed contact with each other in the receptacle, and intermixing the
15 same with a metallic binding material by pouring metal in a molten condition into the interstices between the abrading particles.

Signed by us at West Hoboken, in the county of Hudson, State of N. J., this 14th
20 day of November, 1905.

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FRANCES G. MARIUS.

Witnesses:

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LEVI R. MYERSON.