C. L. GEBAUER.

METALLIC ARTICLE.

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1,395,269. Patented Nov. 1, 1921.

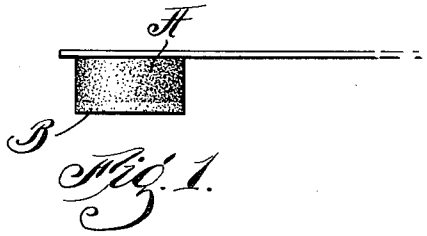


Fig. 1.

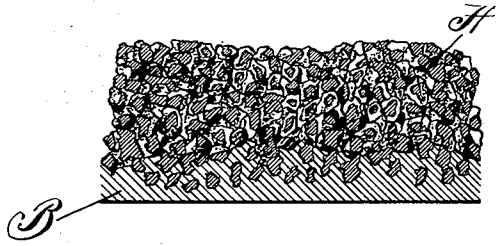


Fig. 2.

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UNITED STATES PATENT OFFICE.

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METALLIC ARTICLE.

1,395,269. Specification of Letters Patent. Patented Nov. 1, 1921.

Original application filed May 17, 1917, Serial No. 169,176. Divided and this application filed October 10, 1918. Serial No. 257,632.

To all whom it may concern:

Be it known that I, CHARLES L. GEBAUER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Metallic Articles, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to a composite metal body or article of manufacture of peculiar nature and internal condition, the present application being a division of my earlier application filed May 17, 1917, Serial No. 169,176. The objects of the invention are the provision of a composite metallic body or articles of manufacture which shall be of cheap and easy manufacture and wherein the different parts thereof shall be formed of such character of metal as to be peculiarly adapted to the different requirements of the use to which the whole is subjected; the provision of a composite metal body formed chiefly of an inexpensive refractory metal but having its surface portions so treated with a more noble metal as to afford protection to the whole; the provision of a new and improved construction for spark points or other devices which are subject to severe physical or chemical requirements; further objects and advantages will become apparent as the description proceeds.

While I do not limit myself to the use of any particular metal or of any combination or combinations of metals, I prefer to use and for practical purposes have used a combination of tungsten and platinum more frequently than any other, as for example in the construction of parts for electrical instruments such as spark points or arcing terminals. In the performance of my said invention, assuming the above named materials to be employed, the tungsten is utilized in the finely divided crystalline form just as it is derived from the reduction of tungstic oxid by hydrogen. This finely granular material is first compacted under great pressure, as by a hydraulic or other press, into the exact shapes and sizes required. The articles are then placed in a suitable heating device such as an electric furnace, in close surface contact with sheets or plates or layers of the other substance. Thus in the case of spark points, a disk of platinum foil of the appropriate size is laid on the top of each member, while for rods or bars the foil is wrapped around the same, or for irregular shapes a layer of finely divided platinum (or other metallic substance) can be sprinkled thereon. The furnace then being heated to the regular temperature, the more fusible metal is first melted and then absorbed by the less fusible article. A reducing or neutral atmosphere is maintained in the furnace during this operation so as to prevent any such oxidation of the metal as would impede close surface contact. The rate and amount of absorption can be regulated by the porosity of the articles, this being dependent upon the coarseness of the pulverization and the pressure employed in compacting. In the case of tungsten, molybdenum, and the like metals, which are reduced by hydrogen, the crystal size can be modified by proper regulation of temperature during the reduction as is well known. A sufficiently close compacting must be given in all cases to enable the articles to withstand reasonable handling prior to the sweating or staining operation.

In addition to the convenience gained by the ability to use each metal in the form in which it is most cheaply obtained commercially, there is the consideration that less of the more fusible substance is employed than when the two substances are mixed uniformly together, and this substance is located in large proportion at the place where it is most useful, namely adjacent to the surface of the resulting article.

A great many combinations of metals can be employed though preferably they should be so chosen as not to be mutually soluble under the conditions described. I can see that my invention will be most useful in cases where tungsten, molybdenum, and the like constitute the more refractory element, and platinum, silver or gold the more fusible element, but I do not confine myself thereto. Ordinarily the more fusible metal constitutes from 3 to 10 per cent. of the weight of the less fusible metal but these proportions are also susceptible to variation according to the particular use in view.

In the accompanying drawings, Figure 1 is an elevational view of a contact point embodying my invention, and Fig. 2 is a view of a portion of the working surface thereof. on an exaggerated scale.

In Fig. 2 I have attempted to illustrate

the structural nature of the working surface of a contact formed in accordance with my invention. The main body portion of the contact point consists of highly refractory material A, illustrated as very finely divided, as tungsten in the crystalline form, and the working surface is formed of a layer of more fusible material B, as of platinum, applied thereto and fused into the interstices between the tungsten particles in the above described manner, the tungsten particles having been previously closely compacted together under great pressure. This results in a composite contact point having a main body portion A of finely divided closely compacted particles and a working surface B of another material in the non-divided state, the latter material flowing into and completely filling the interstices between the finely divided particles near the surface of the main body portion. For convenience in illustration I have shown the more fusible metal B as only penetrating the main body to a comparatively short depth below the surface although in practice the impregnation probably goes much deeper. In fact, by properly proportioning the size and porosity of the absorbing particles or by continuing the sweating operation long enough the main body may become impregnated throughout. In all cases the impregnation is more complete near the surface than deeper down, and the composition of the contact varies in a graded manner from the surface inwardly, the variation taking place progressively from the layer B to the extent of the impregnation.

Having thus described my invention, what I claim is:—

1. A composite metallic body comprising a main body portion of finely divided, discrete particles of highly refractory material closely compacted together, and a layer of more fusible material introduced in a non-divided state into and completely filling the interstices between the particles of the more highly refractory body portion near the surface thereof.

2. A composite metallic body comprising a main body portion of finely divided, discrete particles of tungsten closely compacted together and a layer of a more fusible material introduced in a non-divided state into the interstices between the tungsten particles near the surface of the main body.

3. As an article of manufacture a contact point comprising a main body portion of finely divided, discrete particles of tungsten closely compacted together and a working surface of more fusible material introduced in a non-divided state into and completely filling the interstices between the tungsten particles near the surface of the main body.

4. As an article of manufacture a contact point comprising a main body portion of finely divided, discrete particles of tungsten closely compacted together, and a working surface of platinum introduced in a non-divided state into and completely filling the interstices between the tungsten particles near the surface of the main body.

In testimony whereof, I hereunto affix my signature.

CHARLES L. GEBAUER.