Patented May 26, 1931 1,806,589

# UNITED STATES PATENT OFFICE

HERMANN ESPIG AND WOLFGANG TEUBNER, OF BITTERFELD, GERMANY, ASSIGNORS TO I. G. FARBENINDUSTRIE AKTIENGESELLSCHAFT, OF FRANKFORT-ON-THE-MAIN, GERMANY

## SURFACE TREATMENT OF ARTICLES MADE OF SYNTHETIC CORUNDUM

No Drawing. Application filed June 12, 1930, Serial No. 460,788, and in Germany February 11, 1929.

The present invention relates to an improved surface treatment of articles made of synthetic corundum (crystallized alumina). An object of the invention is to provide said articles with a perfectly smooth surface by a simple treatment which does not involve the employment of mechanical smoothing processes, such as grinding or polishing.

In our earlier application Ser. No. 426,765 dated February 7, 1930, there is described a method of smoothing the surface of synthetic precious stones, particularly of such belonging to the classes of corundum and spinel, by treating the surface of the stones for a short period with fused anhydrous sodium tetraborate. Preferably the moderately preheated stones are dipped into a melt of sodium tetraborate having a temperature of about 750° to 800° C. and moved about therein for a period of, say, 5 minutes. The stones are then taken out of the melt and allowed to cool, whereupon any sodium tetraborate still adhering to the surface of the stones is removed by rinsing them in water.

We have now found that the same treatment may be applied to articles made of artificial corundum in general for the purpose of producing a perfectly smooth surface. Particular advantages arise from this treatment when applied to insulating bodies of spark plugs consisting either wholly or with respect to their head piece of artificial corundum, inasmuch as a smooth surface of the head portion, i. e., the portion of the body protruding into the combustion chamber of the motor, is less liable to give rise to precipitates of a conductive nature upon the surface of the body, from combustion gases containing metal compounds, such as anti-knocking ingredients. These preciptates, however, are obnoxious as they cause short circuits across the surface of the head piece.

We have further found that the general method of surface treatment, as described in the specification referred to, may be advantageously modified by admixing to the sodium tetraborate melt moderate amounts of diluting substances which are indifferent to corundum, such as sodium chloride. In this manner, it is possible to regulate more accurately the effect of the surface treatment by means of the borate melt, and simultaneously a lowering of the fusion point of the melt may be brought about. In any case, however, these diluents must be soluble either in water or in acids or caustic lyes so that they may be easily removed after the treatment is completed.

Finally we have found that it is not compulsory to employ sodium tetraborate as the active ingredient of the mixture. It is also possible to use potassium tetraborate instead of the sodium salt, or a mixture of boracic acid and sodium carbonate in proportions approximately corresponding to the stoichiometric ratio prevailing in the tetraborate, or finally even to employ an excess of boracic acid. However, the best results are obtained when pure sodium tetraborate is employed as the only active ingredient.

We claim:

1. A process which comprises treating the surface of an article consisting of synthetic corundum with a fused substance containing a substantial amount of boracic acid.

2. A process which comprises treating the surface of an article consisting of synthetic corundum with a fused substance containing a substantial amount of an alkali tetraborate.

3. A process which comprises treating the surface of an article consisting of synthetic corundum with a fused mixture consisting of an alkali tetraborate and a diluting agent.

4. A process which comprises treating the surface of an article consisting of synthetic corundum with a fused mixture consisting of a major quantity of sodium tetraborate and a minor quantity of sodium chloride.

In testimony whereof, we affix our signatures.

HERMANN ESPIG.
WOLFGANG TEUBNER.