

ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE PRODUCTION OF BORON FREE ENAMELS, GLAZES AND THE LIKE

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My invention relates to the manufacture of enamels, glazes and the like which are entirely free of boric acid or other boron compounds. More particularly, the invention relates to the manufacture of enamels, glazes and the like which contain an alkali-earth alkali double carbonate, preferably calcium-sodium double carbonate instead of the hitherto used boron compounds.

Heretofore enamel coatings which were applied to steel sheet or cast iron bases were made from mixtures of feldspar, quartz, soda, borax, saltpeter, kryolith, fluor spar and the like with an addition of colored or white pigments. A more or less great amount of fluxes was necessary to fire the enamels at a temperature of 700 to 850° C. The most common and mostly used fluxes are boric acid or its compounds, preferably borax. By adding boric acid or its compounds to the enamel batch it is possible to produce an enamel with a low fusion point and to adapt the extension of the enamel fluxes to the respective metallic bases. This addition of boric acid or boron compounds renders the enamel also more valuable with respect to its physical properties, such as increased thermal resistance, brightness of surface, impact strength and the like.

In spite of numerous investigations it was heretofore nearly impossible to produce commercially utilizable boron free enamels with properties equal to those of boron containing enamels as no other flux possesses the qualities of boron compounds.

According to my invention a way is shown for the manufacture of enamels without the addition of boric acid or boron compounds. The new enamels have at least the same good properties as the boron containing enamels, if not even better qualities.

According to my invention an alkali-earth alkali double carbonate, preferably calcium-sodium double carbonate, in quantities of 10 to 50, preferably 30 to 40%, is added to the enamel composition.

It is known that alkali carbonates and earth alkali carbonates form double salts. Thus, for instance, soda and calcium carbonate yield to the carbonate (Na₂Ca—(CO₃)₂) which melts at 813° C., about 50° C. below the fusion point of pure soda. The potassium-calcium double carbonate is melting at an even lower temperature. I have

found that an addition of such double carbonates to enamels exerts a strongly liquefying effect on these enamels.

This action was surprising although it was a well known fact that small quantities of earth alkali compounds such as calcium carbonate were used besides soda in the production of enamel compositions. It is, however, also a well known fact that in using greater quantities of earth alkali carbonate, for instance, over 5%, the enamels tend to become brittle and extraordinarily viscous. It is further known that the use of earth alkali oxides in quantities of more than 5% will make the enamel brittle.

According to my invention it is necessary to introduce the already formed double salt of alkali carbonate and earth alkali carbonate into the enamel compositions in order to obtain the desired flux effect. If the single compounds are added to the enamel batch, no double salt will be formed and all well known disadvantages will occur.

In carrying out my invention, a mixture of the following composition

	Per cent	calculated chemical composition
		Per cent
Feldspar -----	10.0	53.0
Quartz -----	35.0	2.3
Sodium calcium double carbonate....	42.0	13.9
Sodium carbonate....	5.0	8.4
Sodium saltpeter....	1.5	20.4
Sodium fluosilicate....	6.5	1.1

is melted at 900° C to 1000° C and granulated. The shot is ground to a dross with 2 to 10% colored or white pigment together with 5 to 10% clay and 40% water. After applying the dross to a suitable base it will be fired for 2 to 4 minutes at a temperature of 810 to 815° C.

The thus manufactured enamels have a good elasticity, a high thermal resistance, high gloss and a perfectly uniform smooth surface.

Boric acid or other boron compounds may also be substituted with advantage in the manufacture of glazes, under-glazes, glasses or the like. If alkali earth alkali double carbonates are used as fluxes, the same good properties in the products will be obtained.

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