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MANUFACTURE OF CERAMIC WARE

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It is an object of the present invention to manufacture ceramic wares by a process in which the temperature of the first firing or the biscuit firing is reduced as compared with that normal in the industry.

Another object of the invention is to extend the benefit accruing from the use of certain fluxes in making glazed porous bodied tiles and glazed porous bodied electric fittings, as described in my United States Letters Patent No. 1,666,828, to goods of other classes, such as ordinary earthenware or faïence whether

(1) These goods are glowed sufficiently to drive off combined water and subsequently glazed and reburnt in the glost kiln, or

(2) The maturing of the body material and of the glaze is effected by one burning process, or

(3) The goods are burnt without subsequent glazing.

A further object of my invention is to provide a flux adapted to lower the temperature at which body compositions mature and at the same time of such a low degree of solubility in water that it can be used in those processes of making goods in which a soluble flux is liable to waste, wash out or segregate, for instance in the processes involving the use of filter presses or "slip kilns."

With these objects in view I add to the body material a flux distinct from that contained in the constituents of the normal body and of low solubility in water, so much as to be practically "insoluble" a term which I use to indicate that when these fluxes are added to the normal body materials they do not substantially waste, wash out, or segregate when the mixed constituents are subjected to filter press, or slip kiln treatment. In other words, the constituent composition of the body materials which are to be moulded or otherwise fashioned, does not substantially differ from that of the mixture as first made. In every case, by the use of the fluxes referred to it is possible to employ burning temperatures lower than those normally used for biscuit firing, and great economies in fuel consumption, in handling, and in the process of manufacture generally, are effected.

In carrying out my invention, the body is modified in the required direction by using as a constituent of its sodium-calcium silicate

$$\left.\begin{matrix}0.6\ Na_2O\\0.4\ CaO\end{matrix}\right\}\ 2.5\ SiO_2$$

together with small proportions of alumina, and enough of a materal containing boric oxide to maintain the insolubility referred to, the said material being usually added in the form of borocalcite or boracite. When complex borates are used, the addition of alumina counteracts the tendency of the borate to dissolve. In some cases lead compounds may be used if they are insoluble and hygienically inert; for example, lead bi-silicate.

The proportion of insoluble flux to be added for the purpose of causing the body to mature at temperatures approximating to those at which the glaze matures, varies between 2 and 8 per cent of the weight of the body but may be more or less.

The following examples illustrate the invention:—

(1) In making glazed pottery, the body material consisting of 20 parts by weight of ball clay, 20 parts of china clay, 44 parts of flint, and 16 parts of stone is mixed with approximately 2 per cent of a flux comprising a mixture of sodium calcium silicate, with, or without, say 0.4 per cent of borocalcite or boracite. With such a composition, the body material matures at a temperature below that corresponding with Seger cone O1A (1080° C.), a temperature that is considerably lower than that which would be necessary if the specified extraneous flux had not been added.

It will be realized that the exact proportion of the added extraneous fluxing materials will depend upon the firing temperature desired, obviously a little less flux being required for higher temperatures and correspondingly larger amounts for lower firing temperatures, the general effect of the addition of the flux being the reduction of the temperature necessary to ensure satisfactory maturing of the normal body constituents, so as to cause them to correspond with the maturing temperature of the glazes employed.

(2) In making an unglazed ware of type

more vitreous than the product of Example (1), 25 parts by weight of ball clay, 25 parts of china clay, 15 parts of flint and 35 parts of felspar are mixed with approximately 5 per cent of insoluble sodium calcium silicate and approximately 1 per cent of borocalcite or boracite, the mixture being fired as biscuit only at, say, a temperature corresponding with Seger cone 2a (1120° C.).

The same proviso as to proportions corresponding with desired maturing temperatures applies in this example as in the Example (1).

Having thus fully described the nature of the said invention and the best means I know of carrying the same into practical effect, I claim:—

1. A body material for making ceramic ware which consists of normal body material, sodium-calcium silicate and combined boric oxide, so that the body matures at temperatures approximating to those normally employed for maturing glazes.

2. A body material for making ceramic ware, composed of the normal body plus sodium-calcium silicate and borocalcite so that the body matures at temperatures approximating to those normally employed for maturing glazes.

3. A process for the manufacture of ceramic ware which consists in mixing normal body material with sodium-calcium silicate and a material containing boric oxide, forming the body from the material and firing the formed body at a temperature at which the flux acts, so that the body matures at temperatures approximating to those normally employed for maturing glazes.

4. A process for the manufacture of ceramic ware, which consists in mixing normal body material with sodium-calcium silicate and borocalcite, forming the body from the material and firing the formed body at a temperature at which the flux acts, so that the body matures at temperatures approximating to those normally employed for maturing glazes.

In testimony whereof I have signed my name to this specification.

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