CERAMICS

Scientists Aid Ceramic Industry In Using Native Clays

Abundance of Good Kaolin in Tennessee Valley; Cheap Current Makes Electric Kilns Possible

SCIENTIFIC research in Federal ceramic laboratories is on the trail of a discovery which will greatly extend the uses of American clays in the chinaware that graces the nation's tabletops.

At the National Bureau of Standards in Washington and in laboratories of the Tennessee Valley Authority near Knoxville the last two years have shown intensive exploration of the possibility of using native American clays for the production of fine translucent whiteware, much of which is still made, in part, from a superior clay imported from England.

Whether English clays are really superior to American kaolin or whether the latter can be refined to a form which competes with the imported variety is now a debatable topic. The fact in itself is a tribute for the research, for previously the subject was not even open to argument among pottery manufacturers.

Just Mud to Layman

Kaolin, one should hasten to explain, is simply the potters' and chemists' technical name for a particular kind of pure and white clay which the layman would probably call—and rightly—just mud.

It is a long way geologically and in the evolution of the potters' art from the mud of kaolin to the prized "company" china on the family dinner table. Geologically kaolin consists of decomposed granite. The best kind has crumbled to dust and has then been purified by weathering. Deposits of kaolin in England are especially good for making the finer types of tableware, and many an American-made dish, teacup or saucer still contains some of the soil of good old Cornwall.

But America too has its decomposed granites and the resulting clay. North Carolina primary kaolins at a convenient and nearby source have been the main materials used in the TVA tests. Major previous handicaps to the exploitation of these North Carolina clays for fine china have been three: (1) It was believed that there was not sufficient material available for large-scale operations; (2) the kaolins of Carolina varied from one small deposit to another, and (3) the refined North Carolina kaolin previously marketed was low in its plasticity and strength and extremely difficult to work.

100 Year Supply Available

Already exploration has disclosed that point one—the supposed lack of large amount of material—is false. A reserve of refinable material is available which would last the American whiteware industries for generations to come.

Improved methods of refining American clays, involving the use of TVA's large potential supplies of cheap electricity, are making headway in clearing the two final objections—lack of uniformity and the difficulties as to strength and workability in the refined product.

One whole school of thought in the ceramic field refuses to admit that American clays are any less refined than those of England and that the previous lack of development of American kaolins has been due to the dominance of the whiteware industry by the English-born and trained manufacturers who first brought the industry to this country about 1875. A tendency to stick to English methods and English clays, by this viewpoint, has been natural.

Industry for South

TVA's report on its attempt to substitute American kaolins for the imported variety has just been summarized at the recent meeting in New York of the American Ceramic Society. Admittedly certain technical problems have not yet been cleaned up to a point where the whole American industry can jump into production on a large scale, but a new ceramic industry for the South, at least, seems fairly sure.

For courage in experiment TVA wins the prize. They tackled one of the toughest of all ceramic problems; production of pure white, translucent and fragile china that would rival the best of foreign table whiteware.

On a laboratory scale this goal has been achieved and novel refining meth-

MASTER MOLD

It makes the famed willowware pattern by the Ford glazing method. The body material of the plate is pressed against this form and takes the surface which will be the face of the plate after glazing has applied the characteristic blue color in shades from pure white to deep blue.

ELECTRICITY BRINGS BEAUTY

Experiments in the ceramics laboratory of Tennessee Valley Authority have discovered ways to use native American clays in producing the finest types of flawless table whiteware. Shown above is the difference in translucence which heating in an electric kiln can bring.

ods have been introduced which may soon turn the American manufacturers from their older time-tried ways to new methods and a wider use of American materials. These improved refining methods can bring, potentially, a greater mechanization to the industry.

Ceramic scientists have long reasoned that this delayed mechanization of the ceramics industry has, in part, been due to the variations in the clays and other materials which eventually become table whiteware. It is argued that if the automobile industry has to use materials with such variation as those supplied to the ceramic industry, it, too, would have reached a less advanced stage of development.

Hand in hand with ways to utilize clays has been research to improve and develop electric heating in ceramic kilns. Here again TVA with its electricity is naturally interested, but frankly admits that the work is still in a preliminary stage of development. A few electrically heated kilns are in use in the United States and many in Europe.

New Ceramic Advance

With the same thought in mind the National Bureau of Standards has just about completed the construction of a giant "tunnel" kiln heated by electricity which will be the first of its kind in an American laboratory. Such tunnel kilns make for continuous firing of the pottery or ceramics for they are fed in one end, gradually approach the maturing temperatures of some 2,400 degrees Fahrenheit, and then cool off and come out at the other end of the tunnel.

Such experiment indicates clearly that the American ceramic industry is not a backward business resting on its venerable laurels and content with old-fashioned methods.

Design by Photography

As another example of progress witness the new photographic process of Walter D. Ford of Columbus, Ohio, which can transfer any given drawing, or even a portrait, into a design for chinaware at a fraction of the present cost. In effect the Ford process adapts the accomplishments of the newspaper or magazine halftone engraving to produce the color gradation in a chinaware design.

The trick of the Ford process is to make photographically a master raised, negative plaster mold of the chosen design containing all the little depressions and little raised portions, which will form the face of the plate. The plastic body materials are pressed against this master mold by a profile tool which forms the bottom of the plate in a projection stage called jiggering.

After drying, the plates are heated in the kiln in a step which makes them hard and creates what the potter calls bisque. The decorative glaze is then applied either by dipping or spraying and the plate is again fired to fuse the glaze. In the Ford process, where there are depressions, the colors come out deep and intense. On the high spots of the bisque the white background shows through. At the in-between elevations of the bisque one obtains the color shades between these two extremes. The similarities to halftone printing are evident.

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