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J. R. THOMPSON

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CERAMIC PROCESS

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Fig. 1.

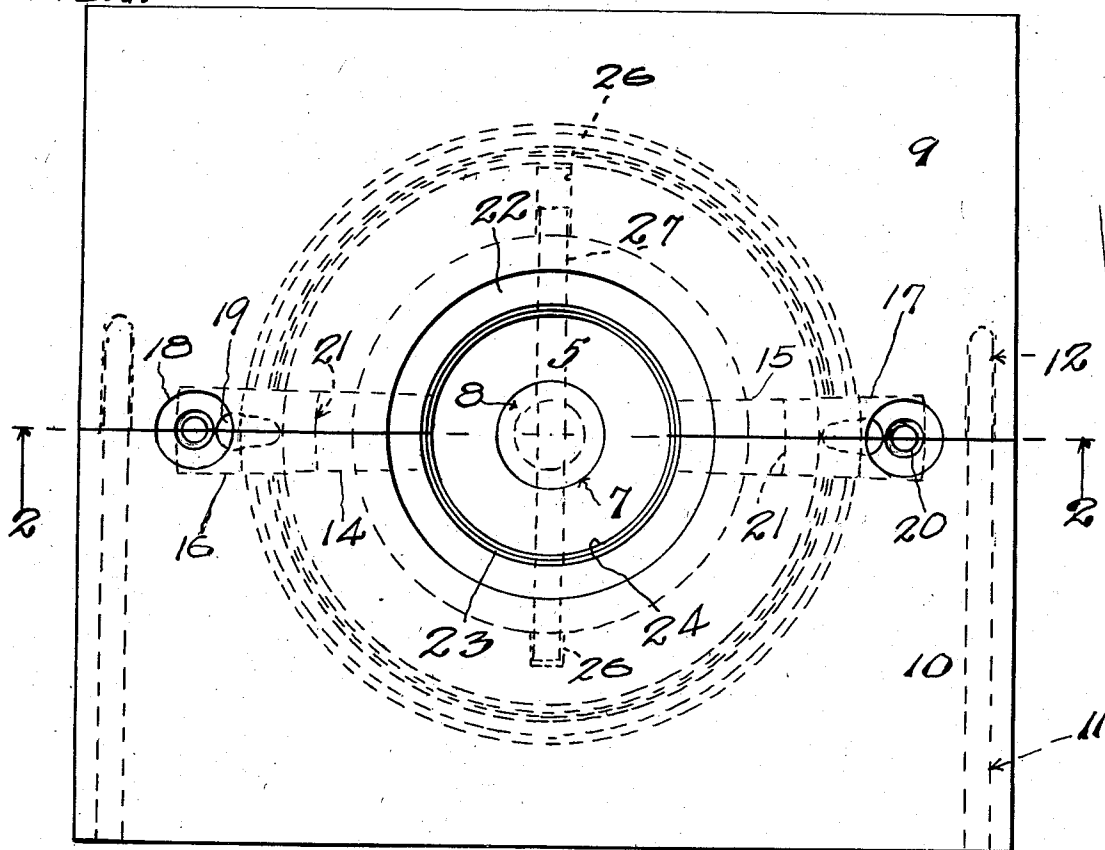


Fig. 2.

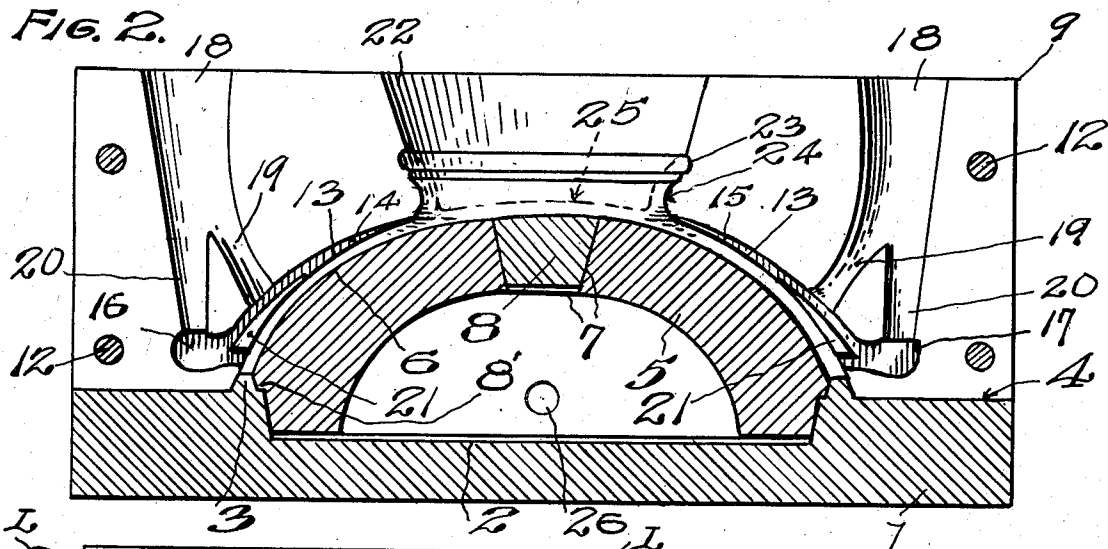
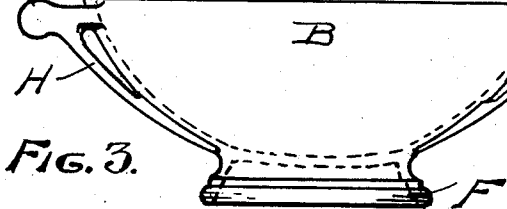


Fig. 3.



Inventor
JOSEPH R. THOMPSON

Chas. K. Davies & Son
Attorney

UNITED STATES PATENT OFFICE

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CERAMIC PROCESS

Joseph R. Thompson, East Liverpool, Ohio, assignor to The Hall China Company, East Liverpool, Ohio, a corporation of Ohio

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2 Claims. (Cl. 25—156)

The present invention relates to an improved ceramic process or method of producing vitreous or semi-vitreous chinaware, especially, chinaware of the bowl type in which the bowl is fashioned with exterior handles and a foot or hollow supporting base both of which members are cast integral with the bowl.

In carrying out the process of my invention I employ in one and the same mold, the step of casting the bowl with its integral handles from slip which is poured into a matrix formed between the base or core and the removable cope of the mold; and also the open-casting step of fashioning the integral foot or hollow supporting base of the bowl from slip as the mold is rotated.

As is well known in the ceramic art the slip employed is a homogeneous creamy wet mixture of finely divided clay and other ingredients, and the mold into which the slip is poured is made up of plaster of Paris or other porous and absorbent material which will absorb the moisture from the slip or clay mixture. After the deposited material has set the separable cope-portion or upper portion of the mold is removed to permit the green bowl to season preparatory to subsequent steps in finishing, glazing, decorating, and otherwise completing the bowl for commercial purposes.

In carrying out my invention the bowl or other hollow vessel is fashioned in inverted position, and the integral handles and hollow supporting base are united with and form part of the body of the bowl while the clay is in the best possible condition for such purpose.

The mold as a whole is divided horizontally, and the cope or removable portion of the mold is divided vertically in order that the cope may be removed to uncover the green bowl, and an enclosing casing and other accessories (not herein shown) are or may be employed in mounting the mold upon a rotary head or jigger spindle for use as a rotary former in the open-casting step in usual manner.

The invention consists in certain related steps in the manner of using the mold as will hereinafter be more fully set forth and claimed. In the accompanying drawing I have illustrated one complete example of a mold in which the steps of my improved process may be performed. It will be understood however that changes and alterations may be made in the exemplifying drawing within the scope of my appended claims without departing from the principles of the invention.

Figure 1 is a top plan view of a mold showing the necessary parts for a disclosure of my process.

Figure 2 is a vertical sectional view at line 2—2 of Figure 1 with the parts in position to mold an inverted bowl.

Figure 3 is a side view of an upright bowl of the type produced in the mold, showing exterior handles and a hollow supporting base for the bowl.

For convenience of illustration and description in setting forth my process I have disclosed a mold for casting a circular bowl having a hollow circular base and exterior, diametrically opposed handles or ribs with end lugs, but it will be understood that the process may be adapted for the production of other concavo-convex vessels or hollow-ware having a hollow supporting base and exterior arms or ribs and lugs integral with the vessel.

In order that the steps of the process and structure of the mold may more readily be understood I have shown in Figure 3 a bowl having the body B and a hollow supporting base in the nature of an annular flange F which is cast integral with the body B of the bowl. The two exterior diametrically arranged handles H are also cast integral with the bowl, and these handles terminate in integral lugs L extending laterally of the bowl. Spaces indicated as S, S, are provided between the handles and the bowl body, and dotted lines are employed to indicate the interior shape of the bowl and also the interior shape of the hollow supporting base F of the bowl.

In Figure 1 where the outline of the bowl with its handles and end lugs are indicated by dotted lines, and in Figure 2 where the mold as a whole is shown as horizontally divided and the cope or upper removable section of the mold is shown as vertically divided, it is believed the disclosure is adequate for a clear understanding of the process of the invention. In Figure 2 it will be seen that the mold is supported upon a rectangular base 1 of suitable material and preferably in one piece, and upon the upper face of the base is provided a circular recess 2 of suitable depth. A centering ring or continuous rib 3 is fashioned on the upper face 4 of the base 1, and a dome-shaped core 5 with tapering lower edge is mounted in the recess of the base. The upper or outer face 6 of the core is fashioned to desired shape so that the body of the bowl, in inverted position, may be built upon the core, and of course

the interior of the bowl will conform to the shape of the outer face 6 of the core.

A central hole 7, that may be used for venting the interior of the hollow dome-shaped core, is closed with a tapered plug 8 while the molding or casting operations are progressing, and the dome-shaped core is fashioned with an exterior annular shoulder 8' above its tapered edge to assist in properly centering the core and in holding it in proper position.

It will be noted that the recessed base 1, and the dome-shaped hollow core 5 are each a unitary or one piece structure, and they form the drag portion of the mold. The cope or upper portion of the mold, however, is composed of two separable sections 9 and 10 that are vertically divided and rest on the face 4 of the base member 1 of the mold. These sections 9 and 10 are rigidly held together in suitable manner, as by the use of holes 11 and dowel pins 12 to provide a rigid structure, and this separable cope member is clamped in suitable manner on the face 4 of the base so that when the clamp is released the cope may be removed by separating its two members 9 and 10.

Each of the cope-sections 9 and 10 is fashioned with a semi-circular cavity and together these cavities form a circular face 13, or concave, that is spaced from the convex molding face 6 of the core to provide the matrix in which the slip is poured or deposited in the formation of the body B of the bowl.

Each of the sections 9 and 10 is fashioned with half grooves 14 and 15 in the molding face 13 and each pair of half-grooves provides a radially extending groove that is instrumental in forming or molding a handle H on the exterior of the bowl. These radially extending grooves terminate in lateral recesses 16 and 17, also formed in halves in the abutting faces of the cope-sections 9 and 10, and these lateral recesses are instrumental in forming the free ends of the handles or lugs L, L, of the handles.

The clay slip is introduced to the matrix preferably through two pouring passages 18, 18, each of which passages is formed by two complementary vertically extending recesses or grooves in the abutting faces of the cope-section, and a suitable nozzle, or a funnel may be employed for discharging the slip into each passage. As indicated, the large passages terminate in forked sprue-holes 19 and 20, the sprue holes 19 opening into the matrix through the grooves 13 and 14, and the sprue-holes 20 opening into the recesses 16 and 17, for proper distribution of the fluid clay. These pouring passages and ducts or holes are formed one-half in each of the abutting faces of the cope-sections 9 and 10, and abutting half-lugs 21, 21, are also provided in these faces and located in the adjoining handle-grooves of the sections. These abutting half-lugs 21, 21 form two cross bridges in the handle grooves, and these bridges are instrumental in the formation of the spaces S, S, between the body B of the bowl and the handles H of the bowl.

In the top center of the removable and separable two-piece cope or upper mold-section is fashioned a mold cavity 22 which is shown with an annular groove 23 and a neck portion 24, the neck portion opening as shown into the main portion or matrix of the mold. This mold cavity with its annular groove and neck is instrumental in the formation of the hollow supporting base F of the bowl, and the numeral 25 in Figure 2 shows the dotted line formation of the hollow base.

As before stated, the body of the bowl or other hollow ceramic vessel, with its handles and lugs integral therewith, is fashioned within the matrix by pouring the fluid clay or slip through the passages 18, 18, and the sprue-holes 19 and 20, and it will be apparent that the lug-recesses 16 and 17 and that portion of the matrix directly over the centering ring 3, first, are filled with the plastic material. As the matrix is gradually filled with the slip, air vented from the matrix through the central mold cavity 22, permits the formation of solid walls, handles, and lugs, of the inverted bowl. As the lowermost portion of the matrix becomes filled with the fluid clay, the body of the bowl is gradually built up, as are also the handles built up in their grooves 13 and 14, and the body-wall of the bowl is imposed on the molding surface 6 of the core 5.

By pouring the slip at opposite sides of the center of the mold the fluent material is uniformly distributed throughout the matrix, and it will be apparent that by varying the width of the matrix between the two mold faces 6 and 13, the thickness of the walls of the bowl may be controlled as desired. In its inverted position, the body of the bowl is built up to a desired height by this step of casting the bowl on a core in the closed portion of the mold, and this desired height may be up to the junction of the neck 24 with the matrix, leaving open that portion which subsequently becomes the bottom of the bowl.

This unfinished bottom portion indicated by dotted lines 25 in Figure 2 and the hollow supporting base F of the bowl in Figure 3 are fashioned by the step of open casting during which the slip is poured into the open casting cavity 22 at the top center of the mold while the latter is revolving on a rotary head or jigger-spindle in well known manner. This open casting step is performed immediately as a continuous operation in the method of manufacturing the bowl, the two steps utilizing the same supply of slip, and therefore the hollow foot or annular supporting base F is fashioned as an integral and intact portion of the bowl. The pouring of the slip into the casting cavity 22 is controlled so that the bottom 25 of the bowl and the flange F or hollow annular supporting base are built up to a desired thickness and as an integral portion of the bowl. As the slip is poured into the casting cavity 22, which forms a rotary former for the hollow supporting base, the material is thrown by centrifugal force into the annular groove 23 and against the annular surface of the neck 24 to form the hollow base integral with the bottom of the bowl. The wall of the supporting base follows the general outline of the casting cavity, the inside of the cavity of course forming the outside of the supporting base.

The moisture from the slip, both with respect to the body of the bowl and the supporting base of the bowl, penetrates into the porous absorbent mold members, leaving the green body-wall of the bowl adhering to the core 5 and the supporting base-wall F adhering to the molding face of the casting cavity 22, and of course the escape or removal of the moisture from the cast piece due either to capillary attraction or to centrifugal action dries the cast article to a certain degree.

The green bowl is permitted to stand in its mold for a period of time sufficient for the plastic material to set and attain the proper condition to permit removal of the mold. The separable cope-sections 9 and 10 are first removed from

their enclosing positions exterior of the inverted bowl. The core 5, with the cast bowl mounted thereon may then be lifted from the base 1 and the green bowl is permitted to season for a suitable period of time before firing.

To facilitate handling of the core, it may be provided with diametrically arranged interior sockets 26, 26, into which the opposite ends of a stick or rod, (indicated as 27 by dotted lines in Figure 1) are inserted in order that after the mold has been reversed from position of Figure 2 the core may be removed from the cast bowl.

As the slip dries it shrinks upon and adheres to the mold face 6 of the core, and, due to suction, or to atmospheric pressure, the interior surface of the bowl remains in close contact with the molding face 6 of the core. To release these parts one from the other without marring the cast bowl, a gentle tapping on the smaller end of the tapered plug 8 breaks this close contact thereby permitting admission of air between the bowl and the core.

From the above disclosure it will be apparent that I have provided an improved method including a continuous succession of essential steps whereby a concavo-convex ceramic vessel with its exterior handles and its exterior hollow supporting base or foot may be cast in a single piece within a single mold and by a single operation of the mold. Inasmuch as the handles and foot are cast or molded integrally with the body of the bowl all appearance of a joint or union between these parts is of course eliminated and the "finish" of the bowl is enhanced as to its appearance. Thus the concavo-convex ceramic vessels such as casseroles, cups, sauce boats, sugar bowls,

creamers, and similar chinaware made according to my invention have a smooth exterior as well as a smooth interior surface. By my method of molding and casting, the production of ceramic articles having handles and feet or supporting bases of this type, is greatly enhanced, and the cost of production is reduced materially due to a more efficient use of time, labor, and material. The mold parts may readily be adjusted to vary the thickness of the walls of the vessel, and no surplus material is employed or enters into the structure of the vessel, only the designed quantity of slip being used to insure the desired form, shape, and size of the various integral parts.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The uninterrupted slip-casting method of forming an inverted bowl having integral exterior handles and an exterior integral hollow supporting base, which consists in forming the bowl and handles in the matrix of a closed stationary mold having an open central mold-cavity forming an upper extension of the matrix, then rotating the mold and slip-casting the bowl-base by centrifugal force in the mold cavity.

2. The uninterrupted method of forming an inverted bowl having integral exterior handles and an exterior integral hollow supporting base, which consists in slip-casting the bowl and handles in the matrix of a closed stationary mold and venting the mold through an open central mold cavity forming an upper extension of the matrix, then rotating the mold and slip-casting the bowl-base by centrifugal force in the mold-cavity.

JOSEPH R. THOMPSON.