Aug. 21, 1951 R. E. CRANE ET AL 2,565,356

MOLD FOR CASTING VITREOUS WATER CLOSET BOWLS

Original Filed Nov. 9, 1944 2 Sheets-Sheet 1

Fig. 1

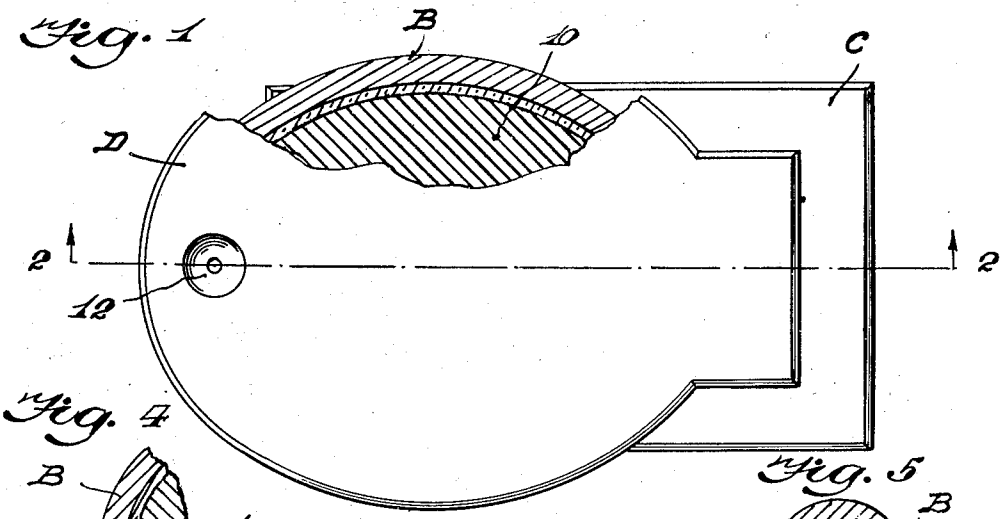


Fig. 4

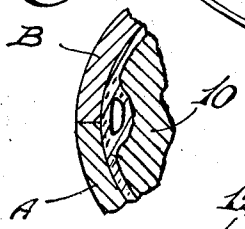


Fig. 5

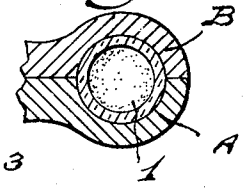


Fig. 2

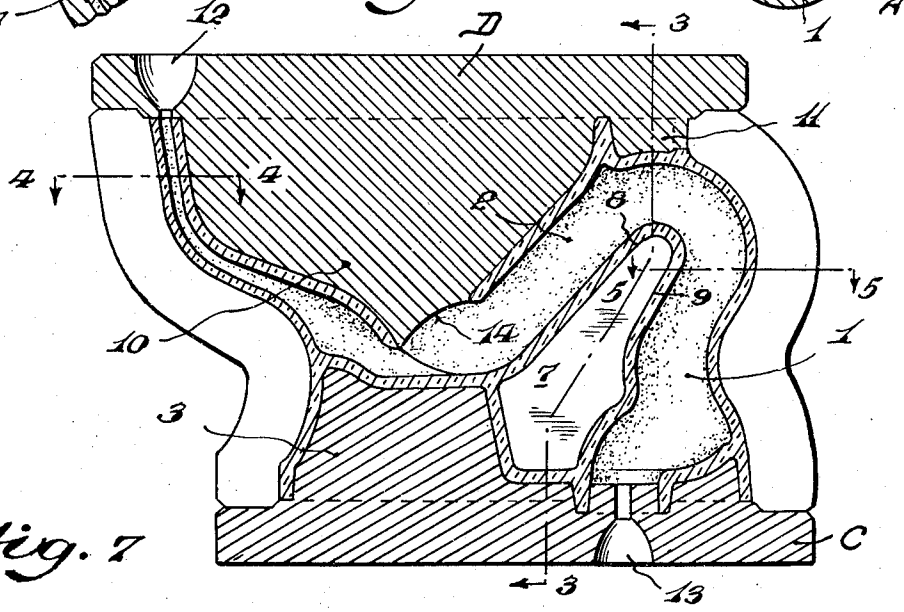


Fig. 7



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Fig. 3

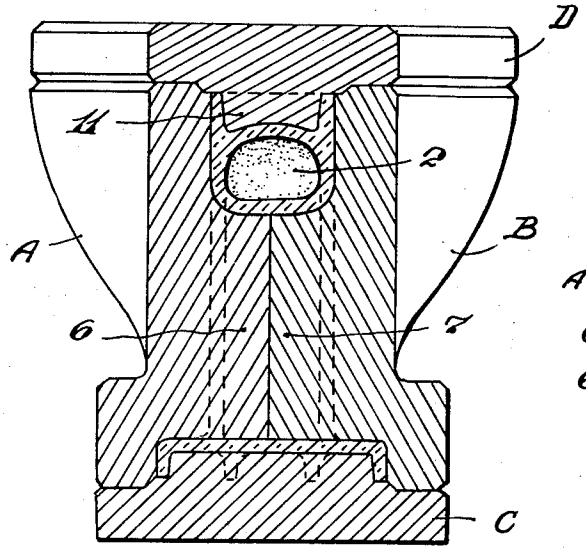


Fig. 6

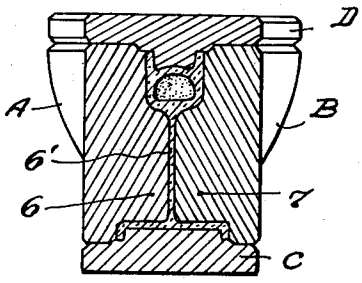


Fig. 9

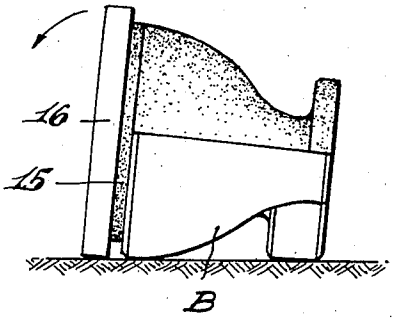


Fig. 8

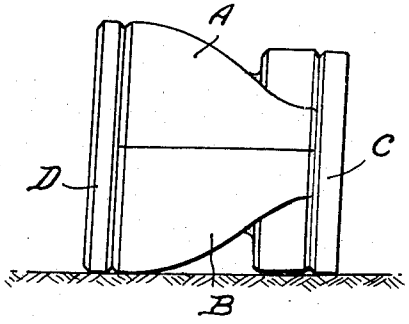


Fig. 10

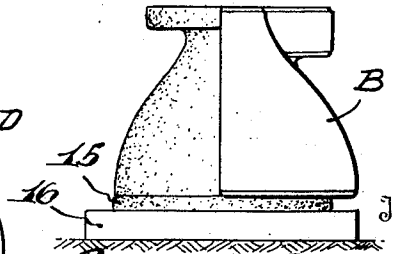
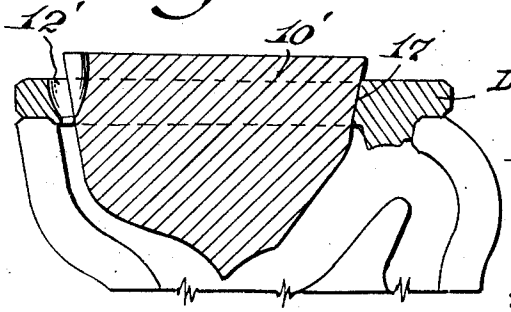


Fig. 11



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Patented Aug. 21, 1951

2,565,356

UNITED STATES PATENT OFFICE

2,565,356

MOLD FOR CASTING VITREOUS WATER CLOSET BOWLS

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Original application November 9, 1944, Serial No. 562,648. Divided and this application September 28, 1948, Serial No. 51,538

4 Claims. (Cl. 25—129)

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This invention relates to a mold for hollow vitreous castings, such as water closet bowls.

The prime object of the present invention is the production of a water closet bowl in a single casting, including the bowl proper, the trapway and the base on which the device stands and through which the outlet or discharge of the bowl takes place, without the use of separate cores or plugs heretofore thought necessary, particularly in connection with the forming of the trap-way.

Heretofore, water closet bowls have been built up of separately cast sections, assembled together in a green condition and then fired so as to unite the sections and harden the surfaces of the device.

It has long been recognized that the main body of a water closet bowl including the upright walls, bowl, trapway and base made in a single casting would be desirable. Applicants' invention produces this desirable single casting main body of a water closet bowl by means of a mold which will accomplish the desired results.

Objects of the present invention are to provide for forming such an article by a pouring of the molding material into a single mold so as to provide a new and improved product wherein joints are obviated and the upright walls of the bowl proper, the trapway, the base and other parts of the article are cast in a single piece; to enable the formation of the bowl and its associated trapway as a single integral casting free from joints; to reduce the parts of the mold to the minimum; and to simplify the assembly and the taking apart of the mold and otherwise simplifying and improving the production of vitreous water closet bowls.

With these and other objects in view, the present invention consists in certain constructions and combinations and operations as will be hereinafter more fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that changes in minor details of the mold and the procedure may be resorted to, within the scope of the claims, without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings:

Figure 1 is a plan view of a water closet bowl mold of the present invention, with parts broken away;

Figure 2 is a vertical longitudinal sectional view on the line 2—2 of Figure 1;

Figure 3 is a cross sectional view on the line 3—3 of Figure 2;

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Figure 4 is a fragmentary sectional view on the line 4—4 of Figure 2;

Figure 5 is a fragmentary sectional view on the line 5—5 of Figure 2;

Figure 6 is a view similar to Figure 3 but on a smaller scale and illustrating a modification;

Figure 7 is a fragmentary vertical sectional view of a top portion of the mold and the contained casting, the top of the mold being removed and a flushing rim fitted to the top edge of the casting;

Figure 8 is an elevation of the mold, on a smaller scale, turned over from the position of Figures 2 and 3 and resting on one of its side members;

Figure 9 is a view similar to Figure 8, the bottom mold member and the upper side mold member being removed, and showing a slab in place against the top of the flushing rim;

Figure 10 is an elevation of the casting on a smaller scale, turned over from the position of Figure 9 and resting on the flushing rim with one of the remaining side mold members in place preparatory to removal from the casting; and

Figure 11 is a detail fragmentary sectional view of a modification of the top member of the mold.

This application is a division of my copending application filed November 9, 1944, Serial No. 562,643 now abandoned.

According to the embodiment of the present invention as shown in the accompanying drawings, the mold includes four members which are opposite duplicate upright side members A and B, a base member C and a top member D. The inner face of each upright mold member A and B is configured to define a part of the wall of the bowl, and upright side portions of the downleg 1 of the trapway and the upleg 2 of the trapway. The base member C has its top face configured in accordance with the desired configuration of the bottom of the casting and includes an upstanding hump or elevation 3 constituting in effect a core whose top surface is intended to define a portion of the bottom of the bowl and its upright sides to define other portions of the casting.

As best shown in Figure 3 of the drawings, it will be seen that the upright side members of the mold are provided, respectively, with inwardly directed projecting portions or bosses 6 and 7 constituting in effect cores which, in Figure 3, abut at the middle of the mold and thus produce an opening transversely through the casting between the legs 1 and 2 of the trapway thereof.

In Figure 6 it will be seen that the inner faces

of the cores 6 and 7 may be spaced apart so as to receive liquid clay slip therebetween and thereby produce a wall 6' in the casting and closing the opening which would otherwise extend through the casting. This wall would, of course, constitute a brace or reinforcement for the walls of the trapway which it connects and other parts of the casting.

As shown in Figures 2 and 3, it will be seen that what will be termed the upper surfaces 8 of the cores 6 and 7 are intended to define the lower wall of the upleg 2, while each surface 9 of each core will cooperate with the other surface of the other boss to define the inner wall of the downleg 1 of the trapway. The cores 6 and 7 have a configuration such that they will readily slide out of the casting when the upright side members A and B of the mold are separated laterally when being removed from the casting.

The top member D of the mold, of course, rests upon the top edges of the upright side members A and B and is provided with a depending projection or boss 10, constituting in effect a core which may be integral with the top member or otherwise, extending downwardly within the space defined by the side members A and B and having its exterior surface configured to give the desired shape to the inner surface of the bottom of the bowl and the inner upright surfaces thereof.

The core 10 is spaced a suitable distance from the inner walls of the bowl portions of the side members A and B so as to receive therebetween the liquid clay slip employed to make the casting, as will be hereinafter explained. The top member D is also provided with a depending annular rib 11 spaced from and extending around the periphery of the part 10 for the purpose of defining a flushing inlet in the top of the casting. A pouring opening 12, of suitable size and configuration, is provided through the top of member D at one side of the core 10 and having its lower open end in communication with the space between the core 10 and the inner faces of the side members A and B to facilitate the pouring of liquid clay slip into the mold. For draining the liquid clay slip from the mold, the bottom member C is provided with a drain opening 13 communicating with the bottom of the downleg 1.

In employing the mold of the present invention for casting a water closet bowl, the upright side members A and B of the mold are placed upon the base C and secured together by the application of suitable clamps or other fastening means, not shown. The top member D is then put in place and supported upon the top edges of the members A and B with the core 10 within the bowl-defining wall portions of the members A and B. Liquid clay slip is then poured through the opening 12 in the top D until all of the spaces between the several portions of the mold have become filled with the casting material. As usual, the mold members are made of plaster of Paris or other suitable water absorbing material so that water will be absorbed thereby from that portion of the liquid clay slip in contact with and adjacent to the mold parts to the end that liquid clay slip will adhere to the mold parts and thus build up a hollow casting having the configuration of the interior of the mold. It will, of course, be understood that the liquid clay slip will entirely fill the space between the cooperating parts of the mold, and that only a portion thereof will adhere to the mold walls and become hardened sufficient to take on the desired configuration.

When a desired wall thickness has been deposited or collected upon the mold walls, which condition is determined by experience, the slip material which remains liquid is drawn off from the mold, thus leaving a hollow casting of a configuration defined by the mold walls.

It will be explained that preparatory to pouring the casting material into the mold, the drain opening 13 in the bottom member C of the mold is plugged and closed in any suitable manner, and such plug subsequently removed when it is desired to drain material from the interior of the mold. It will, of course, be understood that the mold may be tilted, inverted or otherwise manipulated to facilitate the draining of the liquid casting material from the mold.

A suitable length of time should lapse between the withdrawing of liquid casting material and the removal of the mold members from the casting in order to permit of sufficient moisture being absorbed from the casting to the walls of the mold until the casting has become hard enough to permit handling thereof without breakage. When the casting has hardened to the desired extent, the top member D should be removed upwardly, thus exposing the inside of the cast bowl and the upper edge thereof. Thereupon, as shown in Figure 7, any ordinary or preferred form of flushing rim 15 cast from liquefied slip should be placed in position on the top edge of the bowl and secured in place by means of the usual coating of sticking clay applied to either the edge of the bowl or the rim, or both.

When the rim has hardened sufficiently and a satisfactory adherence has taken place between the rim and the top edge of the casting, the mold is turned down so as to rest upon one of its side members, the mold being shown in this position in Figure 8 with the side member B resting upon some suitable support. The next step is to remove the bottom member C horizontally, the casting being supported within the side mold members A and B. After removing the bottom member C, the uppermost side member, A in the present instance, is removed upwardly, thus leaving the casting supported upon the mold side member B as shown in Figure 9. The next step is to apply a slab or bat 16 in an edgewise upright position against the top of the rim 15 as shown in Figure 9, and then the casting, together with the side mold member B and the slab 16 are turned to the position shown in Figure 10 so as to support the casting on the rim 15 which would in turn be supported upon the bat or slab 16. The mold side member B, which is now in an upright position, may be removed horizontally away from the casting. The casting is then permitted to stand until it has dried to a satisfactory condition, after which the casting is smoothed and finished to a condition such that it may be fired in a kiln.

From the foregoing description, it will be understood that the article of the present invention is formed by pouring clay slip into a single mold whereby the bowl proper together with its trapway and the base is an integral casting without any joints whatsoever. There is, of course, a joint between the top edge of the bowl proper and the flushing rim, but there are no joints in the bowl proper, the trapway and the base.

In Figure 2 of the drawings, the discharge opening 14 of the bowl leading into the trapway may be produced by supplying shellac to the

surface of the part 10 which is to define this opening, the shellac operating to prevent the accumulation of the casting material on this coated surface portion of the part 10. If desired, the shellac may be omitted and the casting material permitted to collect on the surface of the part 10 where the discharge opening should be, and thereafter the material may be removed by cutting before complete hardening of the material.

While, in Figure 2 of the drawings, the core portion 10 has been shown integral with the top member 9, we contemplate also making the core member as a separate part and secured to the top member in any suitable manner, and also to provide for the removal of the core member independently of the top member. An embodiment of such an arrangement has been shown in Figure 11, wherein the top member has been shown as provided with an opening 17, the walls of which incline inwardly and downwardly, and in this tapered opening is fitted a removable core member 10' having its lower portion configured in accordance with the desired shape for the inner walls of the bowl, and its upper portion tapered or conical so as to fit the opening 17. The top portion of the core projects above the upper surface of the top member D so as to facilitate the removal of the core independently of the top member D. The filling opening 12' is formed by registered notches or openings through the top member D and the peripheral edge portion of the tapered part of the core. Otherwise, the core is the same as that illustrated in Figure 1 and functions in the same manner.

We also contemplate making the core portion 3 of the base member C and other elevated portions separate and apart from the base member and secured thereto in any preferred or appropriate manner. It is not deemed necessary to illustrate such a construction in the drawings.

We claim:

1. A four part mold for casting the main body of a water closet bowl including the trapway, comprising a one piece base configured to the base of the bowl structure, opposite upright duplicate side members configured to define the opposite sides, the front and the back of the bowl supported on said base, a top having a depending integral core spaced from the walls of said side members and shaped to define the inner face of the bowl, and inwardly projecting similar bosses integrally formed with each of said side members, defining, when all of said parts are assembled, the bottom and inner walls of said trapway.

2. A four part mold for casting the main body of a water closet bowl including the trapway, comprising a one piece base configured to the base of the bowl structure, opposite upright duplicate side members configured to define opposite sides, the front and the back of the bowl supported on said base, a top having a depending integral core spaced from the walls of said side members and shaped to define the inner face of the bowl and the top wall of the trapway, and inwardly projecting similar bosses integrally formed with each of said side members, defining, when all of said parts are assembled, the bottom and inner walls of said trapway, the opposed faces of said bosses being spaced apart to provide space for casting material to provide a reinforcing wall between the inner walls of the upleg and downleg of the trapway.

3. A four part mold for casting the main body of a water closet bowl including the trapway, comprising a one piece base configured to the base of the bowl structure, opposite upright duplicate side members configured to define the opposite sides, the front and the back of the bowl supported on said base, a top having a depending integral core spaced from the walls of said side members and shaped to define the inner face of the bowl and the top wall of the trapway, and inwardly projecting similar bosses integrally formed with each of said side members, defining, when all of said parts are assembled, the bottom and inner walls of said trapway, the top member having a pouring opening communicating with the top of the space between the core and side members, and the base having a discharge opening communicating with the bottom of the trapway.

4. A four part mold for casting the main body of a water closet bowl including the trapway, comprising a one piece base configured to the base of the bowl structure, opposite upright duplicate side members configured to define the opposite sides, the front and the back of the bowl supported in said base, a top having a depending integral core spaced from the walls of said side members and shaped to define the inner face of the bowl and the top wall of the trapway, and inwardly projecting contacting bosses integrally formed with each of said side members, the inner peripheral edges of which defining, when assembled, the bottom and inner walls of said trapway.

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JAMES M. HENDRICKSON.

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