

[54] **SANITARY FIXTURE**  
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*Attorney, Agent, or Firm*—Donald D. Mon

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 [58] **Field of Search** ..... 4/69, 1, 6, 2-5, 4/68, 70, 71, 72, 73-75, 99, 110, 10, 187, 191, 173

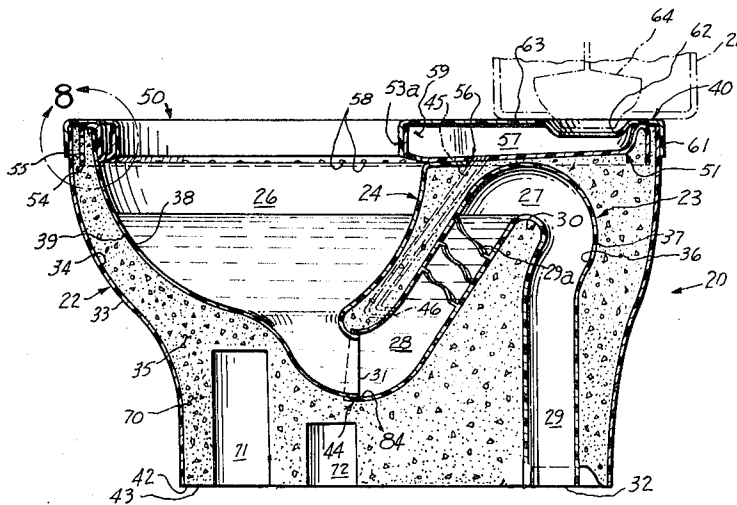
[57] **ABSTRACT**

A sanitary fixture made of composite construction, including a plurality of shell sections which are assembled to form part of the exposed boundary of the fixture and to form an internal cavity which is substantially filled with a settable core material. The settable core material is adherent to the shell sections and structurally interconnects them. This structure enables a commode or a urinal, for example, to be made with die-forming and filling techniques, and eliminates the breakage inherent in cast ceramic constructions. It enlarges design capabilities while enabling optimum fixture constructions inexpensively to be built.

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**20 Claims, 11 Drawing Figures**



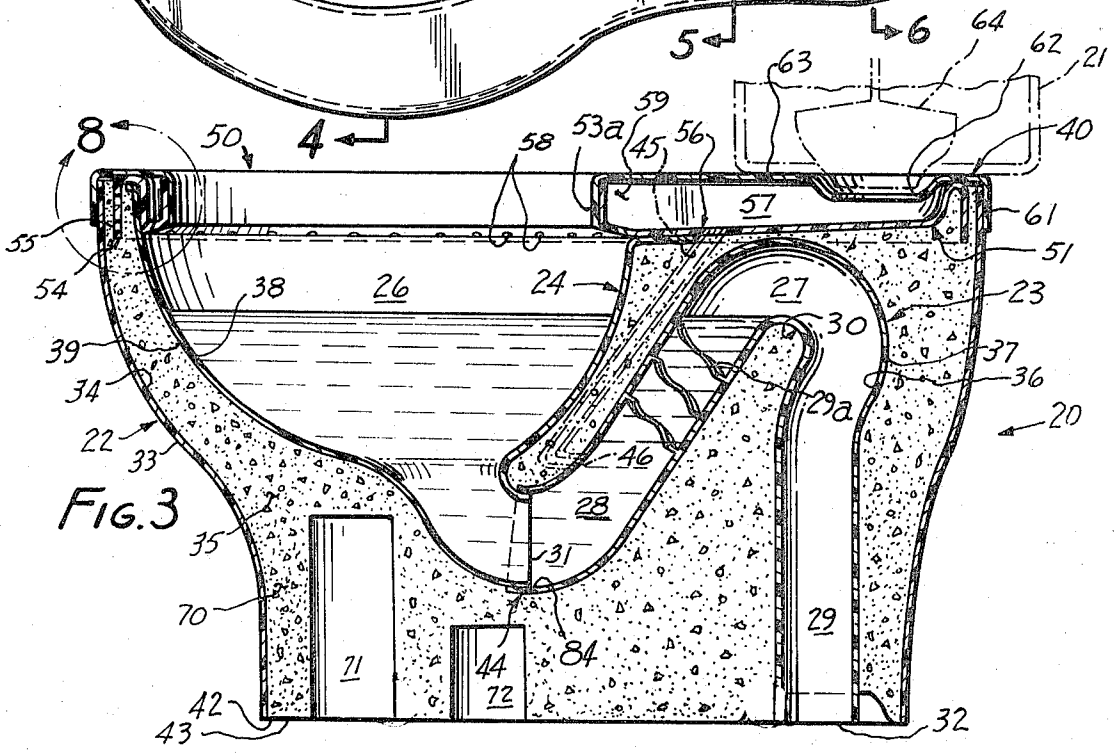
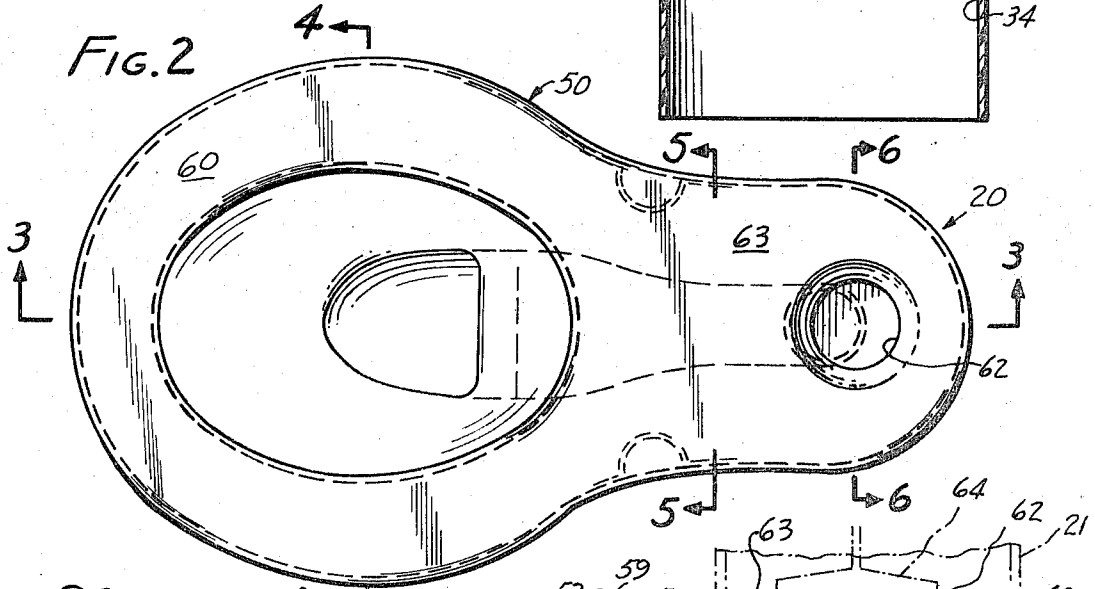
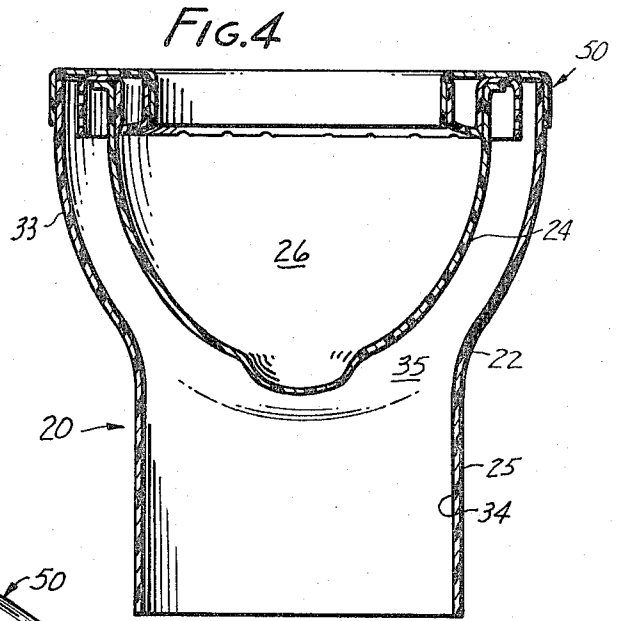
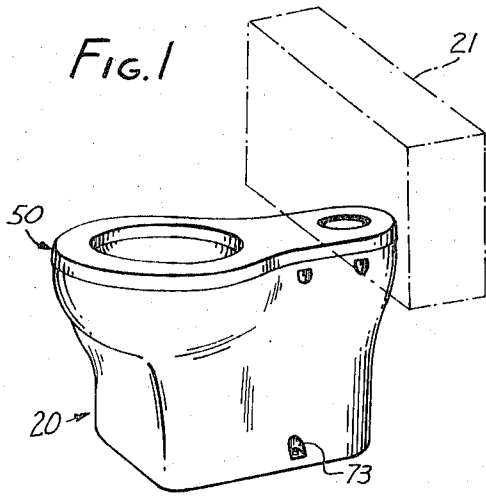


FIG. 5

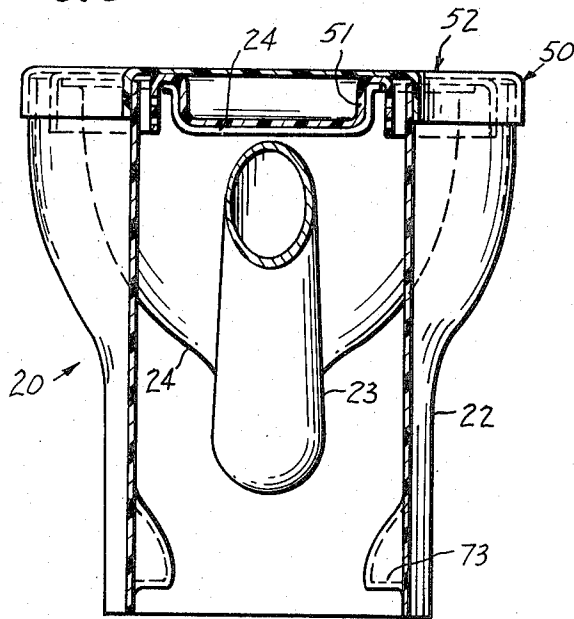


FIG. 6

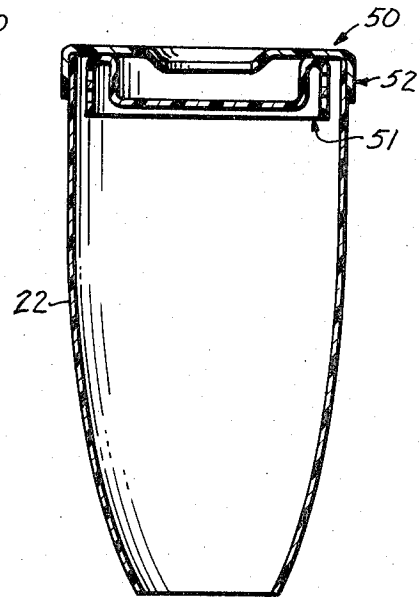


FIG. 8

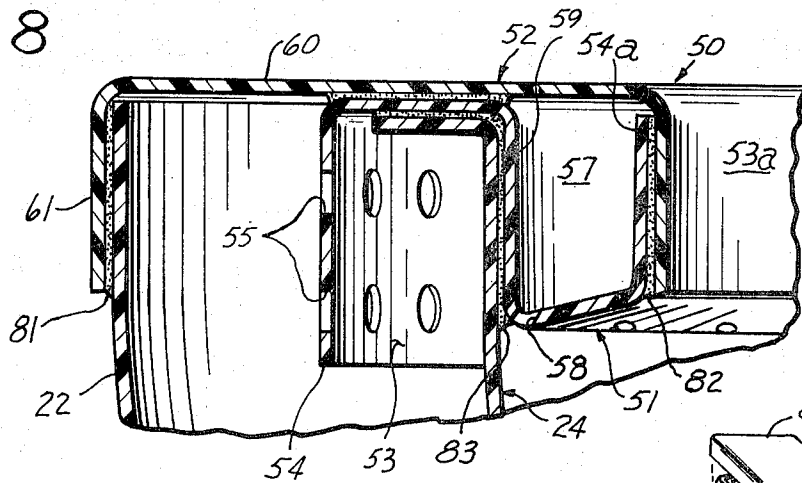


FIG. 10

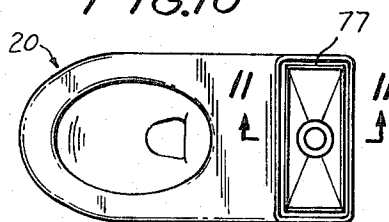


FIG. 9

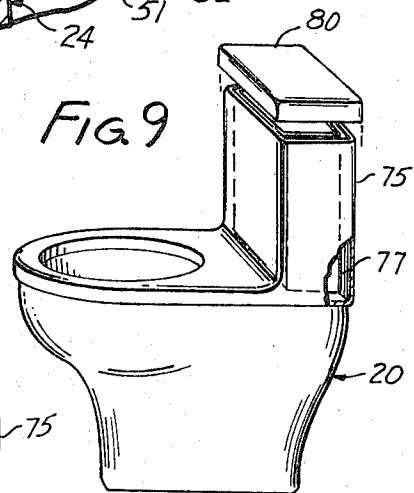


FIG. 11

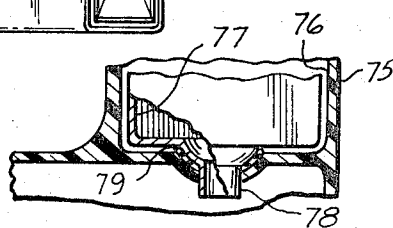
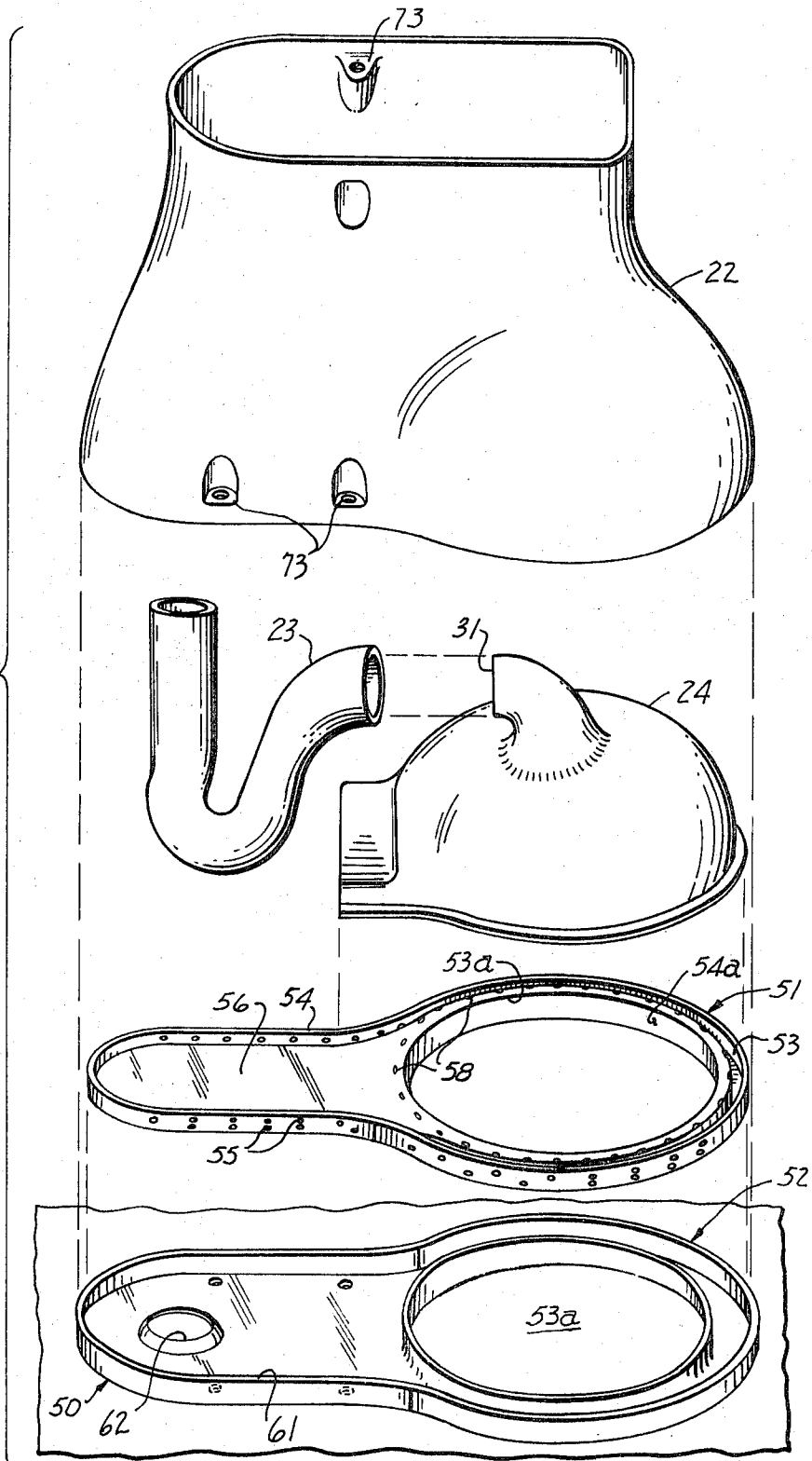


FIG. 7



## SANITARY FIXTURE

This invention relates to sanitary fixtures such as commodes and urinals.

Common techniques for manufacturing ceramic sanitary features limit the designer's freedom to design optimum constructions. This is primarily caused by the limitations inherent in successful firing of large clay pieces. Most commercial manufacture involves the formation of a number of sub-assemblies, which are joined together by "slip" material, and are fired so as to cure the clay, join the sub-assemblies, and provide a smooth surface finish. The thickness of the various parts, and the dimensions and configurations of the finished product, are seriously limited by the firing techniques.

In addition, conventional techniques suffer because the last step provides the surface finish, and an otherwise entirely satisfactory fixture can be scrapped by a blemish in its finish. In addition, because these fixtures are made of fired clay and are heavy, they suffer from a high rate of breakage in handling and shipping.

It has long been an objective in the art to manufacture sanitary fixtures of formable materials, such as die-formed or cast materials, because these materials would be less susceptible to breakage and to surface blemishing than ceramics. However, the widely varying wall thicknesses of the product, and the physical strength required for it, have prevented this objective from being realized. The need for a cast "plastic" fixture therefore remains unfilled.

This invention enables a sanitary fixture to be built utilizing die-forming techniques (the term "die-forming" including injection molding, sheet-forming, and the like) and cavity-filling techniques, to produce a fixture which is not susceptible to the damage rates of the known ceramic constructions and with equal or better strength. Also, the device can have a superior surface finish secured independently of its assembly process, and internal and external configurations which are optimal for their respective purposes, rather than those which are merely as close as possible to optimal in view of the limitations imposed by conventional ceramic techniques.

A sanitary fixture according to this invention comprises a plurality of shell sections having respective outer surfaces which form parts of the exposed boundary of the fixture, and inner surfaces which form parts of the boundary of an internal cavity. The shell sections are assembled to form this internal cavity. A core member is cast in the cavity. It is adherent to the said inner surfaces and structurally interconnects the shell sections. The shell sections are generally sheet-like in structure, and the core member is made of a material which is initially sufficiently fluid to flow into the cavity, and settable therein to form a hard structure.

According to a preferred but optional feature of the invention, a rim member covers an upper end of the assembled shells around the bowl and includes a rinse channel for discharging water into a bowl formed by the shell sections.

The above and other features of this invention will be fully understood from the following detailed description and the accompanying drawings in which:

FIG. 1 is a perspective drawing of a sanitary fixture according to the invention;

FIG. 2 is a top view of FIG. 1;

FIGS. 3, 4, 5 and 6 are cross-sections taken at lines 3-3, 4-4, 5-5 and 6-6, respectively, of FIG. 2;

FIG. 7 is an exploded view of the shell sections forming part of the construction of FIG. 2 and showing its means of assembly;

FIG. 8 is an enlarged fragmentary cross-section taken at region 8 in FIG. 3;

FIG. 9 is a perspective view of an alternate embodiment of the invention;

FIG. 10 is a top view of FIG. 9 with the lid removed; and

FIG. 11 is a cross-section taken at line 11-11 of FIG. 10.

FIG. 1 shows a sanitary fixture 20, in this case a commode, although it could instead be a urinal or any other sanitary fixture by appropriately reshaping the respective parts. The illustrated fixtures are adapted to be mounted to the floor. Floor mounting is not a restriction on this invention. Similar constructions may readily be adapted for wall mounting, and urinal constructions could also be adapted for either floor or wall mounting. A water tank 21 is schematically shown in FIG. 1.

With reference to FIGS. 2 and 7, a plurality of shell sections 22, 23 and 24 is provided. Shell section 22 forms part of an outer wall 25 of the fixture, while shell section 24 forms an inner bowl 26.

Shell section 23 forms a trap 27 having an inlet portion 28, an outlet portion 29, and a bight 30, the trap forming an inverted "U" between an outlet 31 in the bottom of the bowl and an outlet end 32 of the trap. The inlet portion 29 may be provided with spirally-oriented vortex ribs 29a which project into the passage formed by the trap to give the water a spinning motion, whereby to aerate it and to break up masses which are carried by the water.

As can best be seen in FIG. 4, shell section 22 includes an outer surface 33 which defines part of the exposed boundary of the fixture, in this case, the outer wall. It also includes an inner surface 34 which forms part of the boundary of a cavity 35 formed between the shell sections. Similarly, shell section 23 has an outer surface 36 and an inner surface 37. Again, the outer surface 36 forms part of the exposed boundary, and the inner surface partly defines the cavity. Similarly, shell section 24 has an outer surface 38 and an inner surface 39 with the same characteristics. The term "exposed boundary" means the surfaces of the fixture which can be seen by the eye or contacted by fluids passing through the fixture. The inner surfaces defining the cavities are not "exposed" in this sense.

The assembled shell sections 22, 23 and 24 form a structure having an upper end 40 and a lower end 42. An aperture 43 is formed giving access to the cavity. In this case, the aperture is the open lower end. It will be understood that access might be through an aperture formed in one of the shell members which could later be plugged, should no open end be provided. Such details will be evident to persons skilled in the art.

The shell sections 23 and 24 are joined by a telescopic joint 44 which is the only fitting between these two parts. Should a jet siphon be desired, which is a means for filling the trap more quickly, a supplementary flow channel 45 is provided which has a nozzle 46 that is directed upwardly into the inlet portion 28 of the trap.

A rim member 50 is placed atop the upper end of the sanitary fixture. It is preferably made in two parts, the first of which is a base element 51 and the other of

which is a cover element 52. The base element includes an opening 53 which surrounds and overhangs the upper end of the bowl and a peripheral flange 54 which may have perforations 55 for purposes yet to be described. The peripheral flange terminates between the shell sections 22 and 24. It has a flat bottom 56 which forms the base of a rinse channel 57.

A plurality of perforations 58 extends around opening 53 for the purpose of discharging water into the bowl from the rinse channel. An inner flange 59 rises from the flat bottom further to define the rinse channel. The cover element includes a smooth upper surface 60 and a peripheral flange 61, which surrounds and embraces the upper end of shell section 22. It also overlays base element 51. As can best be seen in FIG. 8, it similarly embraces the peripheral flange 54 of the base element, thereby completing the enclosure of the rinse channel. Inlet conduit means 62 is formed in a flat portion 63 of the cover element to receive water from tank 21. A ball 64 is schematically shown in the tank in FIG. 3. The ball is lifted to discharge water from the tank.

Cavity 35 is filled with a core material 70. The core material was initially sufficiently fluid to be placed (inserted) in the cavity so as to contact the inner surfaces of the shell sections and to adhere thereto so as to bind them together and structurally to support and permanently structurally to interconnect them. When the core material is relatively heavy, voids 71, 72 may be formed therein in places where the structural integrity of the device will not be impaired, so as to reduce the quantity used, and the total weight of the fixture.

Attachment pads 73 may be formed where desired in the fixture, as well as means (not shown) for attachment of a seat.

The shell sections can be formed by any appropriate method. The term "die-forming" is used herein to connote any plastic-forming technique which can produce the relatively thin shell sections. The term includes casting and molding, as well as forming by means of pressing sheets between platens or vacuum-forming them, and the bending of previously-formed tubing. Another technique is to form the shell sections from fiberglass-reinforced sheeting. It is also possible, and within the meaning of the term "die-forming", to produce them by dip-coating a form and stripping the section from the form. The preferred technique is to form the shell sections by injection molding. The trap may be bent from previously-formed tubing. The shell sections will ordinarily be about 3/16 inches thick. The term "sheet-like" has been used to describe the shell sections as being of substantially uniform thickness throughout. There may, of course, be substantial variation from exact uniformity of thickness, but the term is intended to distinguish this construction from heavy-walled, monolithic constructions, such as common clay shapes used for fixtures.

The material of the core may be any suitable cementitious or plastic material so long as it is once fluid (viscous) and later settable to a hard composition able structurally to interconnect and support the shell sections. Examples are ordinary water-curing concretes and cements, various lightweight cements such as pozzolans, castable plastics, and even structural foam materials. Foam materials could be foamed in place in the cavity.

The supplemental flow channel 45 is optional, and is therefore shown in dotted lines. When it is not desired as part of the base element, it will be eliminated, and the region otherwise occupied by it will be filled with core material.

In FIG. 1, the tank is shown as a separate means. With this invention, however, an improvement in appearance will result if a tank shroud 75 (see FIG. 9) is formed as an extension of the cover element. This may readily be cast or otherwise formed as part of the cover element, and forms a receptacle 76 to receive a separate tank 77 (FIG. 11), which tank may have stub pipe 78 extending below the same, passing through a seal 79 in the cover plate. A lid 80 completes this installation.

The assembly of this device should be evident from the foregoing and is best illustrated in FIGS. 7 and 8. The cover element is laid upside down on a table, and a layer 82 of adhesive is applied to it. Thereafter, the base element is pressed into it so that it is continuously joined and sealed at the adhesive layer 82. Next, adhesive layer 83 is applied, and shell 24 is joined and sealed to the base element. Thereafter, shell section 23 is joined by adhesive layer 84 (see FIG. 3) to trap 27, and thereafter, shell section 22 is fitted to the cover element and joined thereto by adhesive layer 81. Now, the shell sections are entirely assembled, and cavity 35 is formed. The adhesive layers extend over the entire surfaces on which they are shown in FIGS. 3 and 8 so as to form a reliable structural joint and fluid seal.

Thereafter, with aperture 43 elevated, i.e., the lower end of the fixture, the core material is poured into the cavity. Such removable cores as may be desired will be in place before the cement is poured to form voids in the core. At this time, the cement will enter perforations, such as perforations 55, in the flange of the base element so as to hold it more firmly as part of the fixture. The core material is allowed to harden, and the device is completed. If desired, flanges, perforated or otherwise, may variously be formed on the shell sections, the better to hold them to the core material.

It will be noted that all joints in the fixture are susceptible to being tapered and made relatively invisible. The joint between sections 23 and 24 can be located back out of sight of an observer.

Another important feature of this invention is that the cross-sectional area of the trap can be made substantially uniform throughout the length of the trap, which is an objective not heretofore attainable in ceramic constructions because of the limitations of the ceramic casting processes. Accordingly, with this invention, the trap can be filled by much less liquid than is ordinarily required in the flushing of toilets. This constitutes an important means for saving water. When the supplementary flow channel 45 is used, the trap will be more rapidly filled from the rinse channel, and the flushing cycle will be accelerated.

This invention thereby provides a sanitary fixture which can be made with die-forming and pouring techniques to produce a less expensive, functionally superior, sanitary fixture compared to common ceramic devices. The materials of construction when installed are, in general, less expensive than ceramics and can be selected for their best properties, i.e., finish and wear resistance for the outside and structural strength on the inside. The method of assembly is simple and straight-

forward and readily adapted to mass production techniques.

This invention is not to be limited by the embodiments shown in the drawings and described in the description, which are given by way of illustration and not of limitation, but only in accordance with the scope of the appended claims.

I claim:

1. A sanitary fixture comprising: a plurality of shell sections having respective outer surfaces forming parts of the exposed boundary of the fixture and inner surfaces forming part of the boundary of an internal cavity, the shell sections being assembled to form said internal cavity; and a core member in the cavity adherent to the said inner surfaces and structurally permanently interconnecting the shell sections, the shell sections being generally sheetlike in structure, the core member being made of a material which was sufficiently fluid to flow in said cavity, and settable to form a hard structure.

2. A sanitary fixture according to claim 1 in which the shell sections form an outer wall, an inner bowl, and a trap.

3. A sanitary fixture according to claim 1 in which the assembled shell sections present an upper end and a lower end, the fixture having an aperture through which the material for forming the core can be inserted into the cavity.

4. A sanitary fixture according to claim 3 in which the shell sections form an outer wall, an inner bowl, and a trap.

5. A sanitary fixture according to claim 4 in which a rim member covers the said upper end of the assembled shells around said inner bowl.

6. A sanitary fixture according to claim 5 in which the rim member includes a rinse channel extending around an upper region of the inner bowl, perforations being formed in said rim member to discharge water from the rinse channel into said bowl.

7. A sanitary fixture according to claim 2 in which the trap is an inverted U, having an upwardly-directed inlet portion, a downwardly-directed outlet portion, and a bight connecting the two said portions, and in which there is provided a supplementary flow passage discharging upwardly into the inlet portion.

8. A sanitary fixture according to claim 2 in which a rim member covers an upper end of the assembled shells around said inner bowl, and in which the rim member includes a rinse channel extending around an upper region of the inner bowl, perforations being formed in said rim member to discharge water from the

rinse channel into said bowl.

9. A sanitary fixture according to claim 8 in which the rim member includes inlet conduit means to receive water.

10. A sanitary fixture according to claim 9 in which said rim member includes a base element which substantially covers the said upper end, and projects over the periphery of the inner bowl, at least portions thereof being adherent to said core, and a cover element which fits over the base element to enclose the rinse channel, said cover element being attached to a shell section and to the base element.

11. A sanitary fixture according to claim 10 in which the said inlet conduit means is formed in the cover element.

12. A sanitary fixture according to claim 11 in which a tank shroud is mounted to said cover element to receive a water tank to be connected to said inlet conduit means.

13. A sanitary fixture according to claim 3 in which the shell sections are die-formed structures.

14. A sanitary fixture according to claim 13 in which the core member material is a water-curing cement.

15. A sanitary fixture according to claim 14 in which voids are cast in the said core member to lighten the same.

16. A sanitary fixture according to claim 13 in which the shell sections are of substantially uniform thickness.

17. A sanitary fixture according to claim 2 in which the inner bowl is formed by a dish-shaped shell section having an outlet adjacent to its bottom, the trap comprises a tubing bent to form an inlet portion, and outlet portion, and a bight connecting the two portions, said trap member being connected to the said outlet, in which an outer peripheral wall of the fixture is formed by a single continuous shell section, and in which the rim member closes the spacing between the shell sections which form the bowl and which form the outer peripheral wall.

18. A sanitary fixture according to claim 17 in which the rim member is contacted by and adhered to by the core member material.

19. A sanitary fixture according to claim 7 in which spirally oriented vortex ribs are formed in said inlet portion to impart a spinning motion to water flowing through the inlet portion.

20. A sanitary fixture according to claim 12 in which a separate water tank is contained in said tank shroud.

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