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(12) # EUROPEAN PATENT APPLICATION

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(54) **Installation for casting ceramic sanitaryware articles.**

(57) An installation for casting ceramic sanitaryware articles, having a plurality of moulds arranged in a horizontal line on a support structure, in which each mould includes two side parts (2,3;40, 45) which when assembled define a casting cavity for casting a cistern tank for a water closet suite. In order to be able to open and close each mould by movement in a horizontal direction, one of the side parts (2; 40) has a vertical cavity surface for forming the back wall of the tank and the other side part (3; 45) is channel shaped in plan for forming the front and side walls of the tank, and the side parts are movable longitudinally along the support structure. One of the side parts has an integral base for forming the bottom wall of the tank. The moulds may have cores (4) for solid casting, or apertures (55) for drain casting.

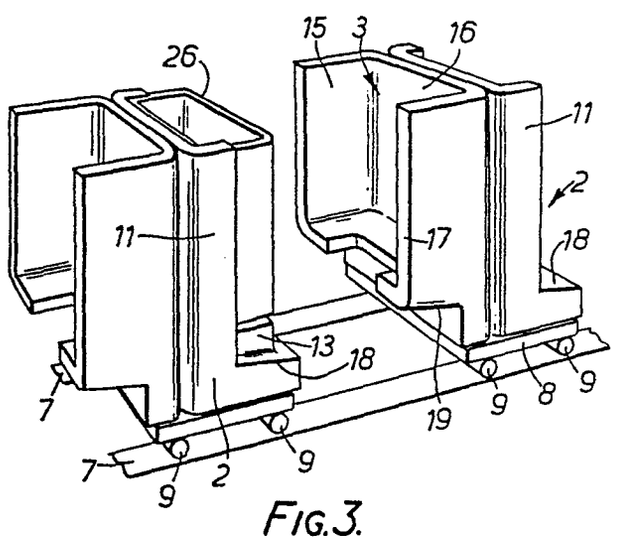

FIG.3.

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INSTALLATION FOR CASTING CERAMIC SANITARYWARE ARTICLES

This invention relates to an installation for casting from ceramic material in slip form articles of sanitaryware, in which a plurality of mould units are arranged in a generally horizontal line on a support structure. Casting in such installations is known as battery or bank casting.

It has been proposed to cast certain articles of sanitaryware in a line of moulds which are arranged on a support structure so as to permit movement of the mould parts in a direction longitudinally of the line; for example British patent specification No. 1,140,282 shows such an installation for casting wash hand basins.

Hitherto it has not been thought possible to cast cistern tanks for water closet suites in an installation of this kind because moulds for casting cistern tanks conventionally involve separation of the mould parts only in a vertical direction. Thus, normally, moulds for casting cistern tanks are made of two parts which, relative to the upright position of a cistern tank, comprise a container part which shapes the exterior of the side walls and bottom wall of the cistern tank, and a top part which closes the mould cavity, the two parts being separable at a horizontal parting plane by relative movement in a vertical direction. The cast piece is removed from the container part by movement in a vertical direction unless the mould is turned. The top part may have a core which projects down into the container part, for solid casting of a cistern tank, or the top part may simply be a closure member and the container

part may include a drain aperture for bank casting of a cistern tank.

Such moulds are unsuitable for use on a horizontal line of moulds because of the vertical separation of the mould parts and the vertical emptying. For the present invention, moulds for casting cistern tanks are adapted for use on a horizontal line by dividing the mould vertically into two side parts.

According to the present invention there is provided an installation for casting from ceramic material in slip form articles of sanitaryware, having a plurality of mould units arranged in a generally horizontal line on a support structure, in which each mould unit comprises two side mould parts which can be assembled to define a casting cavity for casting a cistern tank for a water closet suite, one side mould part having a substantially vertical cavity surface for forming the back wall of the cistern tank and the other side part being substantially channel-shaped in plan and having substantially vertical cavity surfaces for forming the side walls and front wall of the cistern tank, one of the side parts having an integral base for forming the bottom wall of the cistern tank, the side mould parts being adapted to be opened and closed by relative movement in a direction longitudinally of the line of mould units, each side mould part being connected in back-to-back relation to the adjacent side mould part of the next adjacent mould unit in the line.

Such an installation achieves the benefits of mass production with bank casting of up to fifty or more mould units in a line, which has hitherto not been possible for casting cistern tanks.

For solid casting of cistern tanks the base for forming the bottom wall of the cistern tank is preferably provided on the side mould part having the vertical cavity surface for forming the back wall of the tank, and there is also provided a core part which is adapted to be moved in a vertical direction into the side parts or so as to be spaced above them.

For drain casting of cistern tanks the base for forming the bottom wall of the cistern tank is preferably provided on the side mould part which is channel-shaped in plan, and either a separate mould cover part is provided or the other side mould part has an integral cover part.

The invention may be carried into practice in many ways but certain specific embodiments will now be described by way of example only with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of part of a line of mould units for solid casting of cistern tanks;

Figure 2 is a side view of the line of Figure 1;

Figure 3 is a further perspective view of the line of mould units of Figures 1 and 2 during emptying; and

Figure 4 is a perspective view of one of a line of mould units for drain casting a cistern tank.

Figures 1 to 3 show an embodiment for solid casting of cistern tanks in a line or bank of fifty or more mould units arranged in a horizontal line on a support structure in the form of two rails 7 extending longitudinally of the line.

Each mould unit 1 consists of three main mould parts: two side parts 2 and 3 and a core part 4. The side parts 2 and 3 are supported on carriers 8 fitted with rollers 9 so that they can be moved easily on the rails 7 in a longitudinal direction of the line. The side parts 2 each comprise an upstanding part 11 having a surface 12 which shapes the external surface of the back wall of the tank and a base part 13 which forms the bottom of the tank. The side parts 3 each comprise upstanding mould walls 15, 16 and 17 which form a channel shape as viewed in plan, the inside faces of which form the external surfaces of the side and front walls of the tank.

Each pair of side parts 2 and 3 of the same mould unit 1 can be brought together to define the casting cavity, the lower side edges 18 and 19 being inclined to the horizontal to allow the parts to be separated directly by movement in a horizontal direction without the mould parts

scraping against each other.

In the line of mould units, each side part 2 is connected rigidly in back-to-back relation with the side part 3 of the next adjacent mould unit in the line.

The core part 4 for each mould unit comprises a core 20 depending from a rim 21 which when the mould unit is assembled rests on the upper edges of the side parts 2 and 3 which lie in a common plane. The core part 4 is adapted to be lifted vertically above the line during emptying or lowered so that the core 20 is located between the side parts 2 and 3 in the assembled condition of each mould unit.

In operation, the mould units 1 of the entire line are assembled by closing up the side parts 2 and 3 and lowering the core parts 4. The line of mould units 1 is then clamped longitudinally by an overall clamping arrangement at each end of the line. The core parts 4 may be held by clamping or other hold-down means, which may be common to all the mould units, or the core parts 4 may be sufficiently heavy simply to rest on the side parts 2 and 3 without risk of the core moving when the mould unit is filled with slip under pressure.

The mould units1 are then filled with slip, the slip flowing from a slip supply tank under gravity into the casting cavity in each mould unit 1.

After a suitable casting time has elapsed, during which time moisture is absorbed by the plaster of the moulds, the moulds are opened.

The emptying procedure is as follows. The core part 4 of the first mould unit of the line is lifted by a suitable lifting means which is capable of traversing the entire line of mould units. The overall clamping of the side parts is then released and dealing with each mould unit in turn, the side parts are separated by moving side part 3 away from sidepart 2 on which the tank rests on the base part 13. The tank 26 (see Figure 3) is then removed using suitable tongs or similar tools and placed on a rack at one side. The emptied side part 2 is then pulled along the track which movement simultaneously pulls the side part 3

of the next mould unit to open that mould unit.

It will be appreciated that the particular design of the side parts 2 and 3 enables the cistern tanks to be cast in a line or bank casting installation and there are clear advantages in this.

Figure 4 shows a mould unit for drain casting of cistern tanks. Only one mould unit is shown but a plurality of such mould units will be provided in a line, each side mould part being joined in back-to-back relation with the adjacent side mould part of the next mould unit, as for the example of Figures 1 to 3.

The mould unit comprise a first side mould part 40 having a substantially vertical cavity surface 41 for forming the back wall of the tank and an integral top wall for closing the top of the tank casting cavity, and a second side mould part 45 which is substantially channel-shaped in plan having substantially vertical cavity surfaces 46, 47 and 48 for forming the side walls and the front wall of the tank and an integral base 49 for forming the bottom wall of the tank.

For casting, the mould units are assembled and the cavities filled with slip under pressure. After allowing the appropriate casting time to elapse, a lower aperture 5 provided in the base 49 of each mould is opened and the surplus slip from the inside of the tank will drain out leaving the green drain-cast tanks in the moulds. The mould units are then opened, in turn, by horizontal movement of the side parts along the line and each tank is removed from the respective mould part 45 and put to one side, this operation being repeated along the complete line of moulds.

CLAIMS

1. An installation for casting from ceramic material in slip form articles of sanitaryware, having a plurality of mould units arranged in a generally horizontal line on a support structure, characterised in that each mould unit comprises two side mould parts (2, 3; 40, 45) which can be assembled to define a casting cavity for casting a cistern tank for a water closet suite, one side mould part (2; 40) having a substantially vertical cavity surface (12, 41) for forming the back wall of the cistern tank and the other side part (3; 45) being substantially channel-shaped in plan and having substantially vertical cavity surfaces for forming the side walls and front wall of the cistern tank, one of the side parts having an integral base for forming the bottom wall of the cistern tank, the side mould parts being adapted to be opened and closed by relative movement in a direction longitudinally of the line of mould units, each side mould part being connected in back-to-back relation to the adjacent side mould part of the next adjacent mould unit in the line.

2. An installation as claimed in claim 1, characterised in that, in each mould unit, the base (13) for forming the bottom wall of the cistern tank is provided on the side mould part (12) having the vertical cavity surface for forming the back wall of the cistern tank.

3. An installation as claimed in claim 1 or claim 2, characterised in that each mould unit is provided with a core part (4) which is adapted to be moved in a vertical direction between a position in which the core (20) is located between the side parts and a position in which the core is spaced above the side parts.

4. An installation as claimed in claim 3, characterised in that each core part (4) includes an integral cover which closes the top of the mould cavity when the core is located between the side mould parts.

5. An installation as claimed in claim 1, characterised in that, in each mould unit, the base (49) for forming the bottom wall of the tank is provided integrally with the

side mould part (45) which is channel-shaped in plan.

6. An installation as claimed in claim 5, characterised in that a separate cover part is provided for each mould unit for closing the top of the mould cavity.

7. An installation as claimed in claim 5, characterised in that, in each mould unit, a cover part (42) for closing the top of the mould cavity is provided integrally on the side mould part (40) having the vertical cavity surface for forming the back wall of the tank.

8. An installation as claimed in any one of claims 5 to 7, characterised in that, in each mould unit, there is provided an aperture (55) in the mould base for draining excess slip from the mould cavity.

9. An installation as claimed in claim 3 or claim 4, characterised in that there is provided a lifting device mounted so as to be capable of traversing the entire line of mould units, for lifting the core part of each mould unit in turn.

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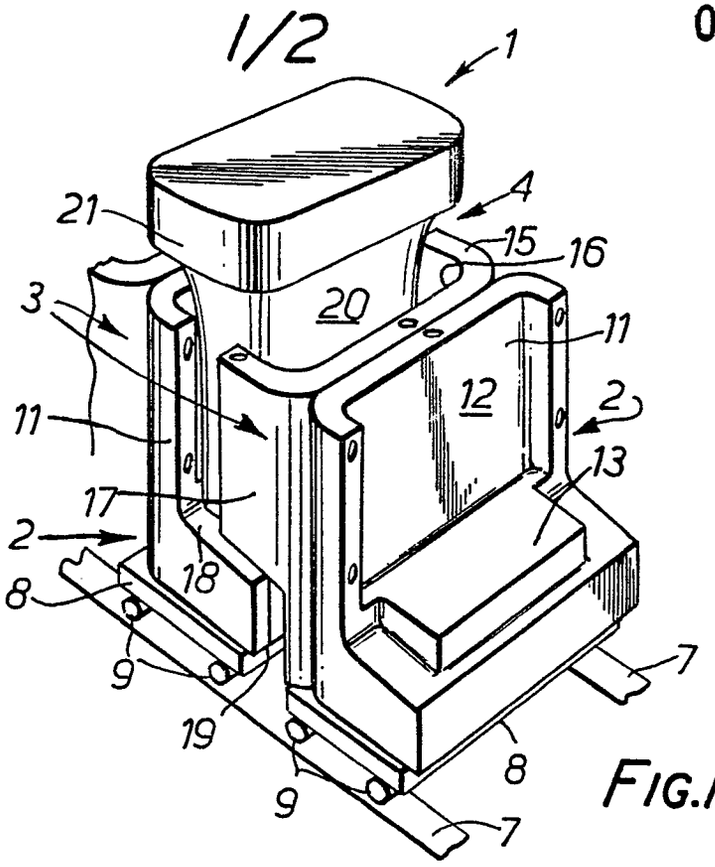

FIG.1.

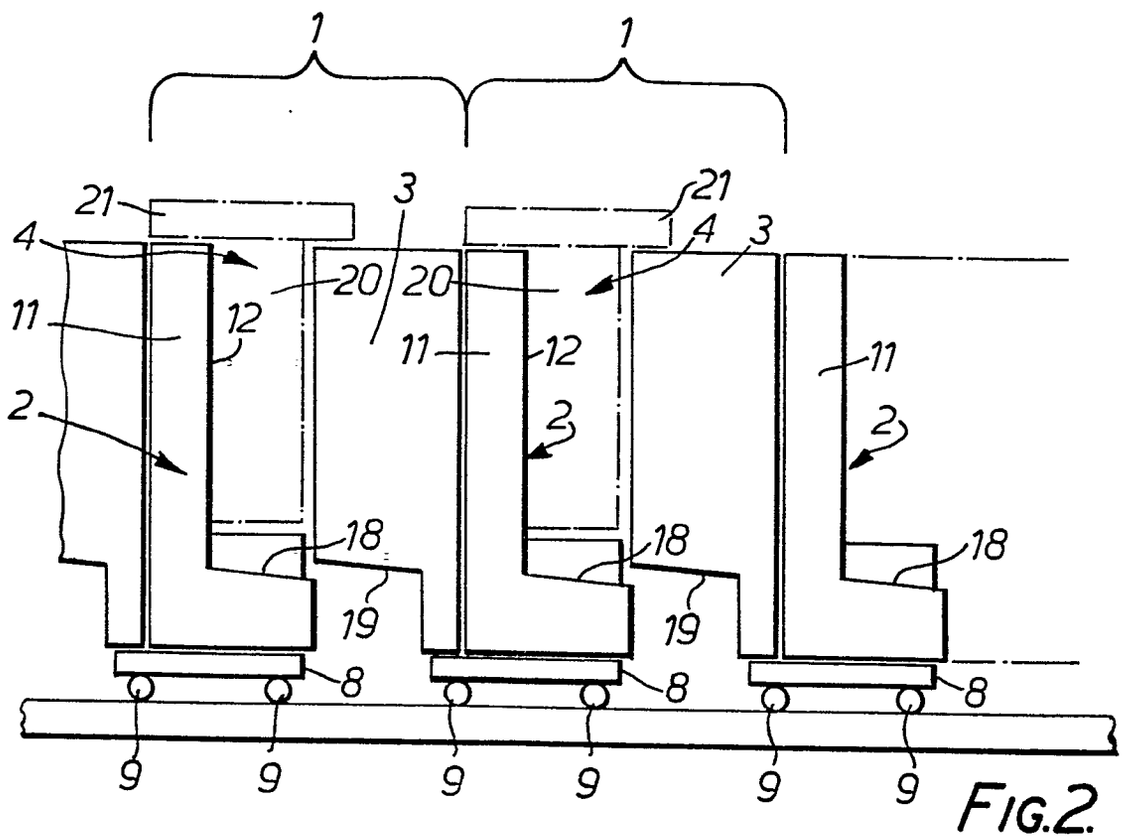

FIG.2.

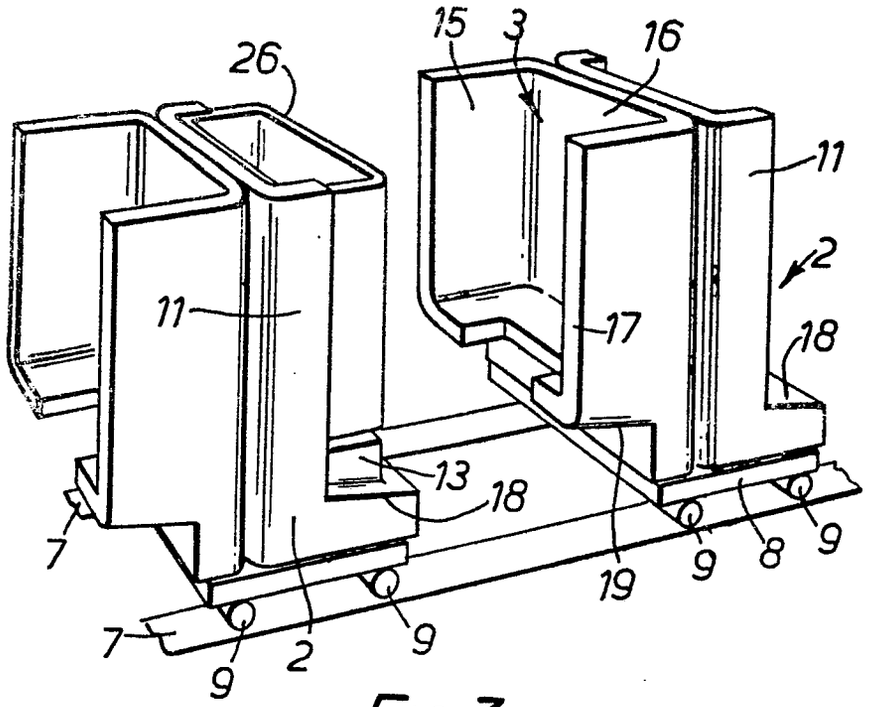
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FIG.3.

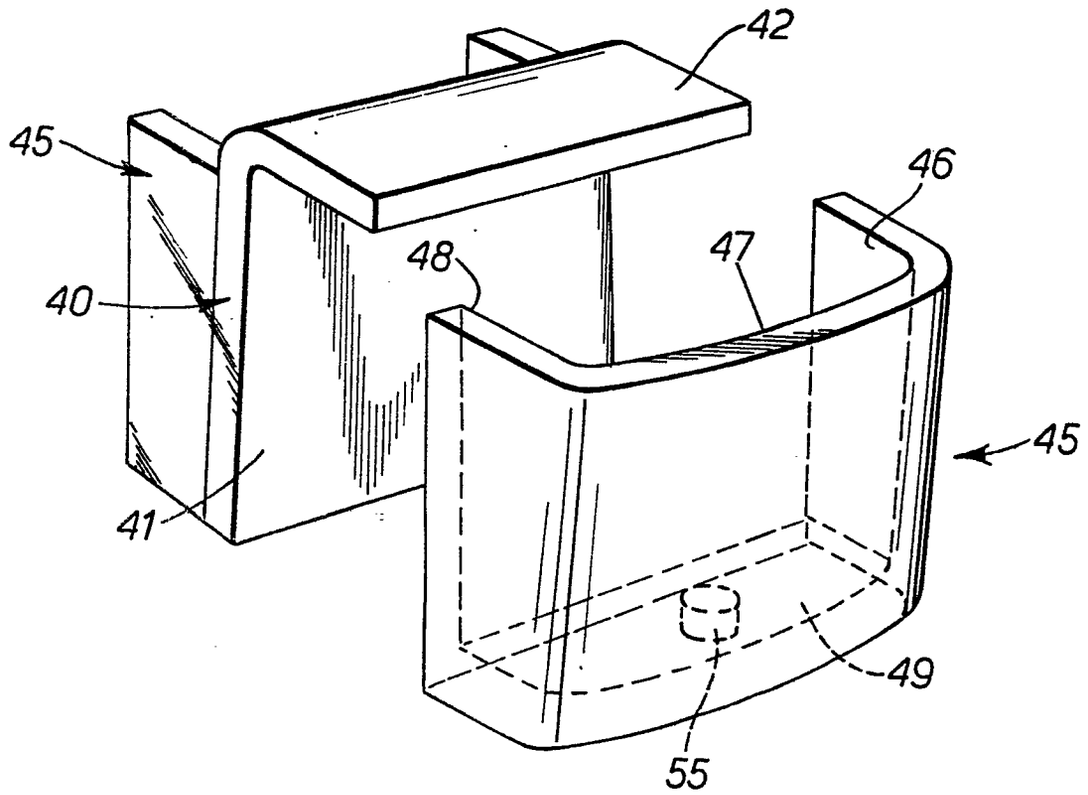
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FIG.4.

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Application number

EP 79 30 0593

European Patent Office

EUROPEAN SEARCH REPORT

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
X	DE - A - 2 444 551 (VILLEROY AND BOCH) * Page 4, lines 15-18,31-33; page 5, paragraph 1; page 6, paragraph 7; page 7, paragraph 1; figures 1,2 *	1,3,6, 9
D	GB - A - 1 140 282 (CERAMIC ENGINEERING LIMITED) * Page 2, lines 90-96,112-125; page 3, lines 5-13,60-64; page 4, lines 1,2; figures 1-4 *	1,8
	FR - A - 2 210 135 (IDEAL - STANDARD) * Page 3, lines 17-21,29-36; page 4, lines 1,2; figure 1 *	1,8
	US - A - 2 583 842 (HENDRICKSON) * Column 3, lines 33-60; figures 4,6 *	4,8

CLASSIFICATION OF THE APPLICATION (Int. Cl.²)

B 28 B 1/26

TECHNICAL FIELDS SEARCHED (Int.Cl.²)

B 28 B

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	26-06-1979	RUYMBEKE