(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 745 732 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
24.01.2007 Bulletin 2007/04

(51) Int Cl.:
A47K 3/40 *(2006.01)*

(21) Application number: **06253809.5**

(22) Date of filing: **20.07.2006**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: **23.07.2005 GB 0515210**

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(54) Manufacture of sanitary ware

(57) An article of sanitary ware such as a shower tray 1 having a composite construction, includes an outer skin 20 of plastics material forming an upper surface of the tray, a backing layer 21 of resin concrete applied to the underside of the skin, and a partial back skin 22 covering less than 90% of the underside of the backing layer. The remainder of the underside is uncovered to allow removal of air from the resin concrete during manufacture. A number of inserts are cast into the backing layer to form sockets into which support elements may be inserted to support the article above a surface on which it is installed. The sockets are bolted to a carrier tool in sealing contact with the partial back skin which is held between the sockets and the tool. The manufacturing process can be carried out without using release agents or high pressure moulding.

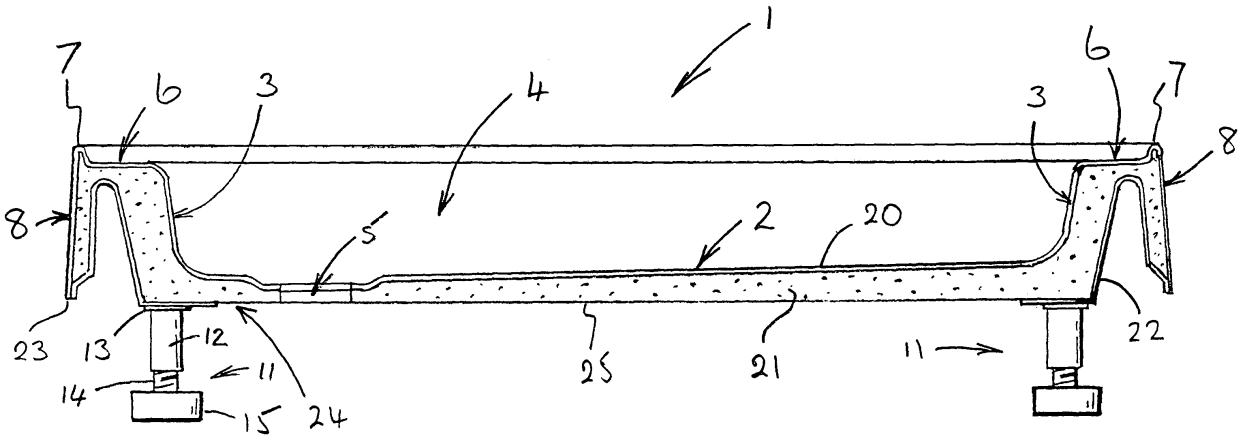

Fig 3

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Description

TECHNICAL FIELD OF THE INVENTION

[0001] This invention relates to the manufacture of articles of sanitary ware which have a composite construction. Although the invention is particularly applicable to shower trays it may also be applicable to other items which are manufactured in a similar manner, such as, sinks, baths and the like.

BACKGROUND

[0002] In many situations shower trays are installed directly on a floor with the waste pipes and traps running beneath the floor surface, but in other cases it may be required, out of necessity or convenience, to raise the tray off the floor to enable the waste traps and pipes to run in the gap which is thus formed between the tray and the floor. Support legs are often provided on the underside of the tray for this purpose.

[0003] In recent years shower trays of composite construction have become commonplace. A vacuum formed or gel coated plastics skin provides an attractive, comfortable and hygienic upper surface whilst a GRP or filled resin backing provides strength and rigidity. In the case of backing materials which are formed of a mixture of a polymer resin and an inorganic granular filler (generally called resin concrete) the tray is normally manufactured with the skin inverted. The resin concrete is poured into the skin and the tray is vibrated to remove air bubbles. When the resin has set, the tray is trimmed and drilled to receive the waste fittings.

[0004] Various ways of attaching the legs have been used. Timber backing boards are often bonded to the rear of the tray and brackets screwed to the board to carry the legs. However, this arrangement is cumbersome, and trays having such an arrangement can only be used as raised trays, i.e. they cannot be mounted directly on a floor surface. A neater arrangement is to cast threaded metal sockets into the resin concrete layer to receive screw-threaded bars and feet, but whilst this arrangement could be used for both raised trays and direct surface mounting with the legs removed, in practice the cost of providing the metal sockets and legs is not competitive with trays intended for surface mounting. The manufacturing process is also time-consuming and unpleasant for workers. The metal sockets are bolted to a waxed former which is pressed into the resin to hold the sockets in position as the resin cures. When the resin has set the bolts are removed to release the sockets from the former, which is then removed leaving the sockets embedded in the resin concrete. The trays must be thoroughly cleaned to remove all wax residues before they reach the customer, and the formers must also be cleaned periodically to prevent a buildup of wax.

[0005] A recent form of shower tray which is currently on the market has recesses cast into the resin concrete backing to receive inexpensive push-in plastic legs. Since the cost is greatly reduced compared with metal inserts/legs the trays can be sold as dual purpose items, giving the user the option of using the legs or discarding them as required. However, wax, or an alternative release agent, must still be used to ensure that the mould that forms the sockets can be released from the cast material, and this must again be completely removed prior to shipping.

[0006] Another form of shower tray which has recently appeared on the market has upper and lower plastic skins which completely encapsulate an inner core of resin concrete. Sockets are formed by the lower skin to receive inexpensive plastic legs so that the second skin acts to locate the sockets while the resin concrete sets. This avoids the use of wax or other release materials, and therefore removes the need to clean the trays prior to shipping. The trays can again be offered as dual purpose, surface mounting or raised units at the option of the user. However, such trays have manufacturing drawbacks. In order to prevent the formation of voids in the resin concrete core which could significantly weaken the tray, it must be moulded in a press. The lower skin is provided with a system of interconnected channels or recesses to aid distribution of the resin concrete, and an array of small bleed holes are provided in the lower skin to allow air to escape. This places design constrains the shape of the tray. Furthermore, although the bleed holes are smaller than the particles of the resin concrete filler, small quantities of resin tend to leak through the bleed holes, marring the appearance of the rear skin.

[0007] The present invention seeks to provide a new and inventive form of composite sanitary item which is comfortable to handle, which can be moulded without using release agents or presses, and which incorporates accurately aligned sockets for support legs which can, if desired, be provided as an inexpensive use-or-discard option.

SUMMARY OF THE INVENTION

[0008] The present invention proposes an article of sanitary ware having a composite construction, which includes:

- an outer skin of plastics material forming an upper surface of the article in use;
- a backing layer of settable material applied to the underside of the outer skin;
- a partial back skin covering less than 90% of the underside of the backing layer leaving the remainder of said underside uncovered by said partial back skin for removal of air from the settable material during vibration thereof; and
- a plurality of inserts which are cast into the backing layer to form sockets into which support elements may be inserted to support the article above a surface on which it is installed.

[0009] The article is comfortable to handle, and can be moulded without using release agents or presses.

[0010] To completely avoid the formation of voids in the backing layer the partial back skin preferably covers less than 50% of the underside of the backing layer. The partial back skin preferably covers a peripheral area of the backing layer and has an aperture occupying a central region of the backing layer.

[0011] The invention also provides a method of manufacturing an article of sanitary ware having a composite construction, which includes:

- providing an outer skin of plastics material to form an upper surface of the article in use;
- placing a quantity of settable material on the outer skin to form a backing layer;
- placing a partial back skin against said settable material to cover less than 90% of the underside of the backing layer leaving the remainder of said underside uncovered by said partial back skin;
- pressing a plurality of inserts into the body of settable material to form sockets into which support elements may be inserted to support the article above a surface on which it is installed; and
- vibrating the settable material, before it sets, to remove air from the settable material through said uncovered area.

[0012] The partial back skin and the inserts may be releasably secured to a carrier tool. The tool may thus be used to accurately hold the inserts while the backing layer sets. The inserts are preferably aligned with holes in the partial back skin through which fastening elements are inserted to clamp the partial back skin between the support elements and the carrier tool. The inserts preferably make sealing contact with an area of the partial back skin surrounding the respective holes. They may have an internal formation for engagement with the respective fastening element.

[0013] Within the scope of the invention, the inserts may also be formed as an integral part of the partial back skin.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The following description and the accompanying drawings referred to therein are included by way of non-limiting example in order to illustrate how the invention may be put into practice. In the drawings:

Figure 1 is a top view of a shower tray in accordance with the invention;

Figure 2 is a bottom view of the shower tray;

Figure 3 is a cross section through the shower tray taken on the line III-III of Figure 1;

Figure 4 is a similar cross-section to Figure 3, but showing the shower tray in the process of manufacture;

Figure 5 is a sectional detail of part of the shower tray, taken at the position of line V-V of Figure 2, shown at a later stage in the manufacturing process than Figure 2;

Figure 6 is a similar view to Figure 5 but showing the completed tray in the position which it occupies when installed;
and

Figure 7 is a similar view to Figure 6, but showing a modified form of the shower tray.

DETAILED DESCRIPTION OF THE DRAWINGS

[0015] **Fig.s 1 to 3** show a composite sanitary item in the form of a shower tray 1. The tray has a floor 2 which is surrounded by four upstanding walls 3 to define a well 4 for receiving water emitted by a shower head. The floor 2 may be profiled in known manner to reduce the risk of slipping, e.g. by providing shallow raised areas (not shown). The floor 2 has a slight downward slope towards a drain hole 5, provided in one corner of the floor 2, for connection of a waste fitting (not shown) to which a trap and waste pipe may be connected in known manner.

[0016] The walls 3 of the well are connected to a continuous outwardly-extending top wall 6, the outer periphery of which may be provided with a shallow upstand 7 to reduce the risk of leakage at the junction with the walls of a shower enclosure. The outer periphery of the top wall 6 is also connected to a depending skirt 8, which may have a slight outward slope.

[0017] The underside of the shower tray is provided with sockets 10 into which supports 11 may be inserted, if required, to raise the tray above a surface on which the tray is installed. Although four such sockets are shown, one in each corner of the tray, it will be appreciated that the arrangement and number of the sockets may vary, e.g. depending on the shape of the tray, to provide additional support, or to provide the installer with a choice of positions for the supports 11.

[0018] The supports 11 are moulded of plastics and are therefore relatively inexpensive, although they could be formed of other materials if desired. Each support 11 comprises an outer leg portion 12 which is a push-fit in the sockets 10 and which is provided with an outwardly-projecting flange 13 to provide a positive limit to the insertion of the leg into the respective socket and ensure that the leg remains vertical. The support also has an inner leg portion 14 which is screw-threaded into the outer portion 12 allowing the length of the leg to be adjusted for levelling the tray and adjusting its height during installation. The inner leg portion is secured to a foot 15 on which the support stands. Again, it will be appreciated

that the particular shape and configuration of the supports 11 may vary from that shown, depending on materials used etc.

[0019] The shower tray includes an outer skin 20, which, in use, provides the upper working surface of the shower tray, a backing layer 21 covering the underside of the skin 20, and a partial back skin 22 which covers a peripheral area of the bottom surface of the backing layer 21.

[0020] The outer skin 20 is preformed, e.g. by vacuum moulding, from an acrylic capped ABS sheet or similar scratch and impact resistant material. The backing layer 21 provides strength and rigidity and is formed of a resin concrete having a polymer resin mixed with a granular filler comprising particles of an inorganic material such as limestone, calcium carbonate or the like. The partial back skin 22 may again be vacuum formed of ABS or another suitable plastics material, approximately conforming to the opposing area of the outer skin 20. The outer peripheral edge of the back skin 22 is shaped to contact the peripheral edge of the outer skin 20, together forming the lower margin 23 of the skirt 8. The inner edge of the back skin 22 defines a large central aperture 24, substantially covering the floor 2 of the shower tray, which substantially coincides with an exposed planar bottom area 25 of the resin concrete layer 21 which occupies a major part of the underside of the backing layer.

[0021] A process for manufacturing the shower tray, which does not require the use of high pressure moulding presses or release agents, will now be described. Referring firstly to **Fig. 4,** the preformed outer skin 20 is mounted upside down on a vibratory table 30, which may be shaped to conform to and support the opposing surface of the skin 20, as shown. It will be noted that the area 31 where the drain hole 5 will eventually be formed has not been removed at this stage.

[0022] The partial back skin 22 is also mounted upside down on the underside of a carrier tool 34. The tool 34 has a central opening 35 to coincide with the aperture 24 of the back skin 22. Any suitable means may be used to secure the partial back skin to the tool 34. In a preferred means, which is used in this example, the skin is held to the tool by four socket inserts 36 which also form sockets for receiving the supports 11 in the completed shower tray. One of the inserts 36 is shown in more detail in **Fig. 5.** The inserts 36 are preferably moulded of plastics, although they could be formed of metal or other suitable materials. The inserts are generally cup-shaped with a cylindrical wall 37 and an end wall 38. The open end of the inserts have an outwardly-projecting annular flange 39, whilst the end wall 38 carries an internally-screw-threaded boss 40, projecting within the cylindrical wall 37. The inside of the cylindrical wall 37 may be provided with axial ribs 41 to grip the supports 11. The inserts are secured to the carrier tool 34 by clamping bolts 42, which are screwed into the threaded bosses 40. The bolts 42 pass through clearance holes 43 in the partial back skin 22, such that the skin is rigidly clamped between the flanges 39 and the tool 34. The inserts need not necessarily be secured to the carrier tool using bolts. For example, another kind of fasting element could be used which engages the insert by means of a bayonet connection, a self-tapping thread, or a push-fit interference connection with boss 40.

[0023] Referring back to **Fig. 4,** the opposing faces of the skins 20 and 22 may be coated with a resin primer in known manner to ensure good adhesion with the resin concrete backing layer. After addition of a suitable setting catalyst, a measured quantity of resin concrete mix 32 is poured into the outer skin, distributed in a generally even layer across the area of the skin with a slightly greater depth at the periphery. The carrier tool 34 is then lowered to introduce the partial back skin 22 and inserts 36 into the resin concrete mix 32. Since the flanges 39 are clamped against the partial back skin 22 by the bolts 42 there is no leakage of resin in the region of the inserts. Before the mix sets the table 30 is vibrated causing the resin concrete to settle within the outer skin 20. Air bubbles in the mix may be expelled through the aperture 24. It is not necessary to apply clamping pressure between the tool 34 and the table 30 during this process and the weight of the tool 34 will normally be sufficient.

[0024] The carrier tool firmly and accurately holds the inserts in place while the resin concrete sets. When the resin has cured sufficiently the bolts 42 are removed to release the carrier tool 34 from the inserts 36, and hence from the back skin 22. The tool can then be lifted away from the back skin 22, leaving a layer of set resin concrete 21 sandwiched between the partial back skin 22 and the outer skin 20. The shower tray can then be trimmed to remove any surplus resin at the margin 23 of skirt 8, and the drain hole 5 is drilled through the outer skin 20 and resin concrete backing layer 21. As shown in **Fig. 6,** the inserts 36 are held captive within the set resin concrete layer 21, forming sockets 44 into which the supports 11 may be inserted.

[0025] Since the carrier tool 34 does not come into direct contact with the resin the use of wax or other release agents is not necessary. The shower tray is of neat appearance, and the two skins completely cover the rough resin concrete surface at the periphery of the tray which is most commonly handled. The sockets provided by the inserts 36 are accurately aligned, yet the manufacturing process can be carried out using simple low pressure moulding.

[0026] **Fig. 7** shows an alternative way of providing sockets for the supports 11. In this case the sockets are formed by cylindrical recesses 50 which are formed in the partial back skin 22 during vacuum moulding. Releasable clips or similar means may be used to hold the back skin to the carrier tool 34 instead of using bolts. In other respects, the shower tray and its method of manufacture is as described above.

[0027] It will be appreciated that the features disclosed herein may be present in any feasible combination. Whilst the above description lays emphasis on those ar-

eas which, in combination, are believed to be new, protection is claimed for any inventive combination of the features disclosed herein.

Claims

1. An article of sanitary ware having a composite construction, which includes:

- an outer skin (20) of plastics material forming an upper surface of the article in use; and
- a backing layer (21) of settable material applied to the underside of the outer skin;

characterised by

- a partial back skin (22) covering less than 90% of the underside of the backing layer leaving the remainder (25) of said underside uncovered by said partial back skin for removal of air from the settable material during vibration thereof; and
- a plurality of inserts (36) which are cast into the backing layer to form sockets (10) into which support elements (11) may be inserted to support the article above a surface on which it is installed.

2. An article of sanitary ware according to Claim 1 in which the partial back skin covers less than 50% of the underside of the backing layer.

3. An article of sanitary ware according to Claim 1 or 2 in which the partial back skin covers a peripheral area of the backing layer and has an aperture occupying a central region of the backing layer.

4. An article of sanitary ware according to any preceding claim in which the article includes a drain hole which passes through the outer skin and the backing layer in the area which is uncovered by said partial back skin.

5. An article of sanitary ware according to any preceding claim in which the inserts are aligned with holes in the partial back skin through which support elements may be inserted into the sockets to support the article above a surface on which it is installed.

6. An article of sanitary ware according to Claim 5 in which the inserts make sealing contact with an area of the partial back skin surrounding the respective holes.

7. An article of sanitary ware according to Claim 6 in which h the inserts have outwardly projecting flanges which make sealing contact with an area of the partial back skin surrounding the respective holes.

8. An article of sanitary ware according to any preceding claim in which the inserts are generally cup-shaped.

9. An article of sanitary ware according to any preceding claim in which the inserts have an internal formation for engagement with a fastening element for securing the insert to a carrier tool during moulding.

10. An article of sanitary ware according to Claim 9 in which the internal formations comprise internally screw-threaded bosses and the fastening elements comprise bolts.

11. An article of sanitary ware according to any preceding claim in which the inserts have internal axial ribs.

12. An article of sanitary ware according to any of Claims 1 to 4 or 8 in which the inserts are formed as an integral part of the partial back skin.

13. An article of sanitary ware according to any preceding claim in which the outer skin is of substantially uniform thickness.

14. An article of sanitary ware according to any preceding claim in which the settable material comprises a mixture of a polymer resin and an inorganic filler.

15. An article of sanitary ware according to any preceding claim in which the partial back skin is of substantially uniform thickness.

16. An article of sanitary ware according to any preceding claim in which the article includes a floor which is surrounded by walls to define a well, and said walls are connected to an outwardly-extending top wall having a peripheral depending skirt.

17. A method of manufacturing an article of sanitary ware having a composite construction, which includes:

- providing an outer skin (20) of plastics material to form an upper surface of the article in use; and
- placing a quantity of settable material on the outer skin to form a backing layer (21);

characterised by

- placing a partial back skin (22) against said settable material to cover less than 90% of the underside of the backing layer leaving the remainder (25) of said underside uncovered by said partial back skin;
- pressing a plurality of inserts (36) into the body of settable material to form sockets (10) into which support elements (11) may be inserted to

support the article above a surface on which it is installed; and
- vibrating the settable material, before it sets, to remove air from the settable material through said uncovered area.

18. An article of sanitary ware according to Claim 17 in which the partial back skin covers a minor part of the underside of the backing layer.

19. An article of sanitary ware according to Claim 17 or 18 in which the partial back skin covers a peripheral area of the backing layer and has a single aperture occupying a central region of the backing layer.

20. An article of sanitary ware according to Claim 17, 18 or 19 which includes cutting a drain hole through the outer skin and the backing layer in the area which is uncovered by said partial back skin.

21. An article of sanitary ware according to any of Claims 17 to 20 in which the outer skin is supported by a vibratory table.

22. An article of sanitary ware according to any of Claims 17 to 21 in which the partial back skin and the inserts are releasably secured to a carrier tool.

23. An article of sanitary ware according to Claim 22 in which said inserts are aligned with holes in the partial back skin through which fastening elements are inserted to clamp the partial back skin between the support elements and the carrier tool.

24. An article of sanitary ware according to Claim 23 in which the inserts make sealing contact with an area of the partial back skin surrounding the respective holes.

25. An article of sanitary ware according to Claim 24 in which the inserts have outwardly projecting flanges which make sealing contact with an area of the partial back skin surrounding the respective holes.

26. An article of sanitary ware according to Claim 23, 24 or 25 in which the inserts have an internal formation for engagement with the respective fastening element.

27. An article of sanitary ware according to Claim 26 in which the internal formations comprise internal bosses for receiving and engaging the fastening elements.

28. An article of sanitary ware according to any of Claims 17 to 27 in which the inserts are generally cup-shaped.

29. An article of sanitary ware according to any of Claims 17 to 28 in which the inserts have internal axial ribs.

30. An article of sanitary ware according to any of Claims 17 to 22 or 28 in which the inserts are formed as an integral part of the partial back skin.

31. An article of sanitary ware according to any of Claims 17 to 30 in which the outer skin is of substantially uniform thickness.

32. An article of sanitary ware according to any of Claims 17 to 31 in which the settable material comprises a mixture of a polymer resin and an inorganic filler.

33. An article of sanitary ware according to any of Claims 17 to 32 in which the partial back skin is of substantially uniform thickness.

34. An article of sanitary ware according to any of Claims 17 to 33 in which the article includes a floor which is surrounded by walls to define a well, and said walls are connected to an outwardly-extending top wall having a peripheral depending skirt.

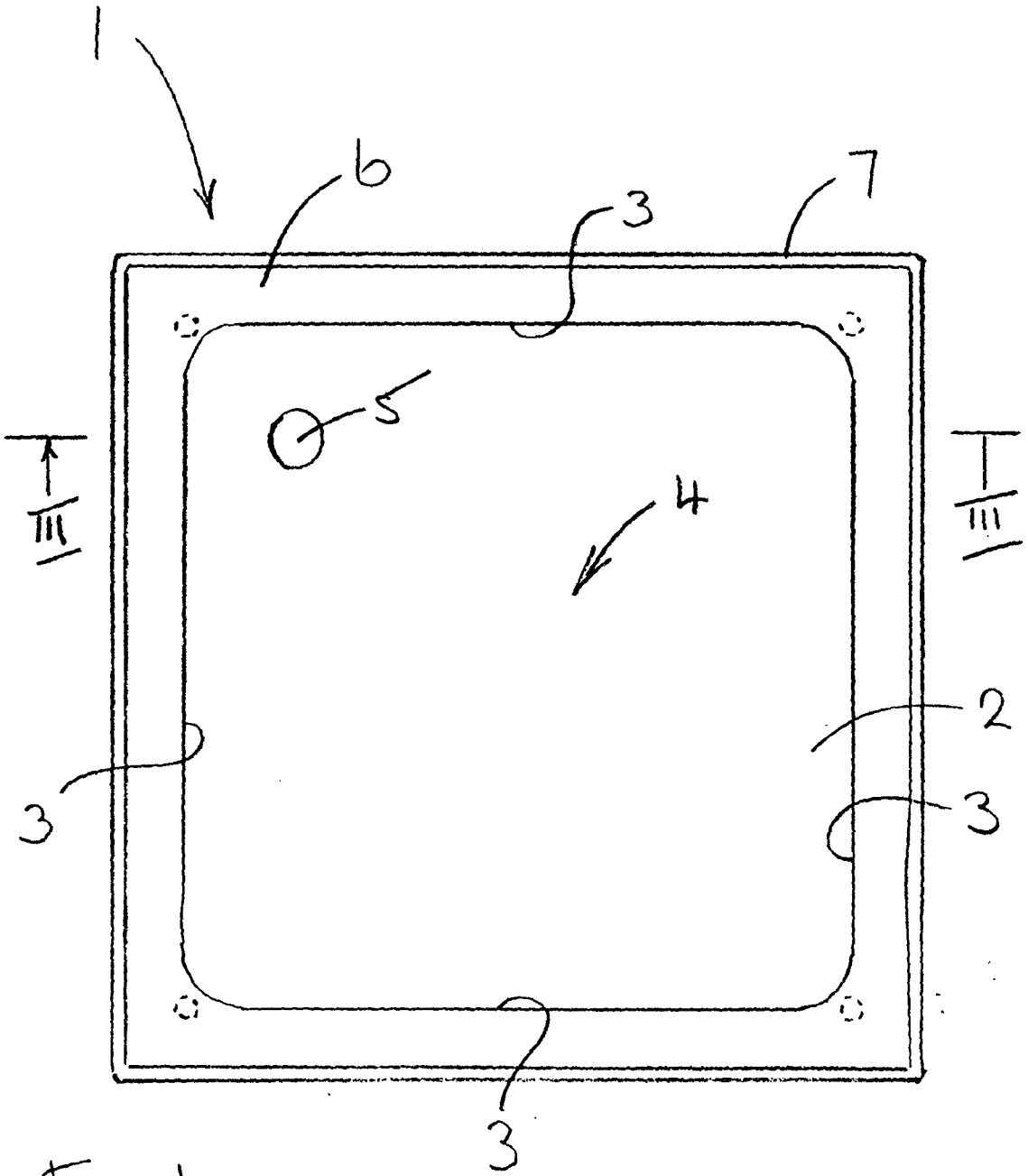

Fig 1

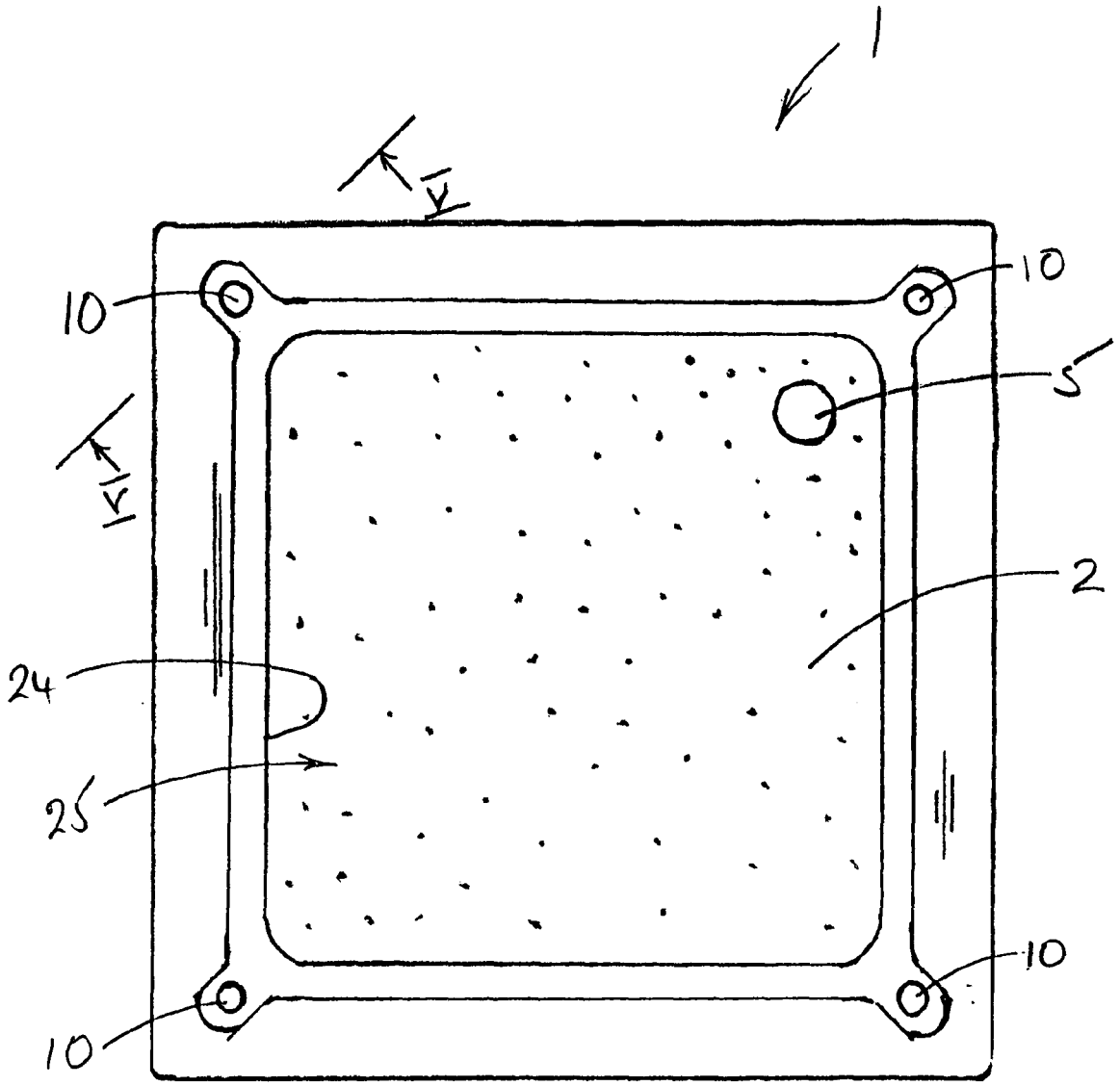

Fig 2

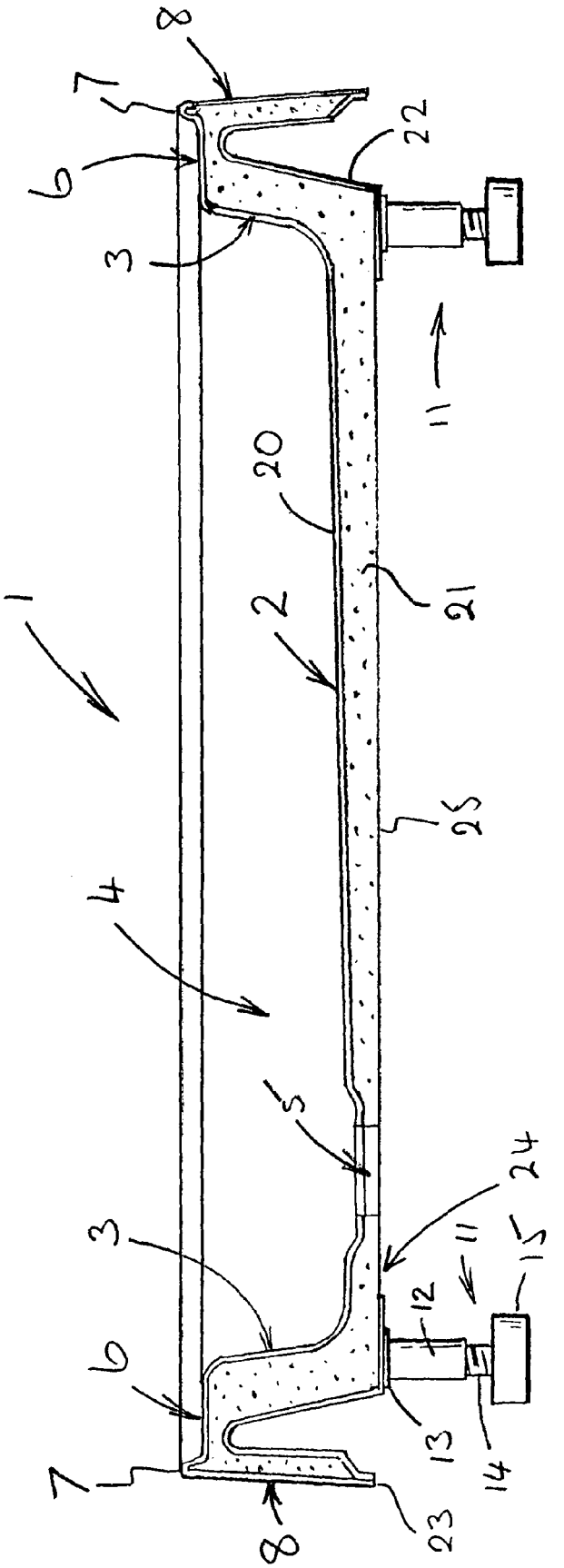

Fig 3

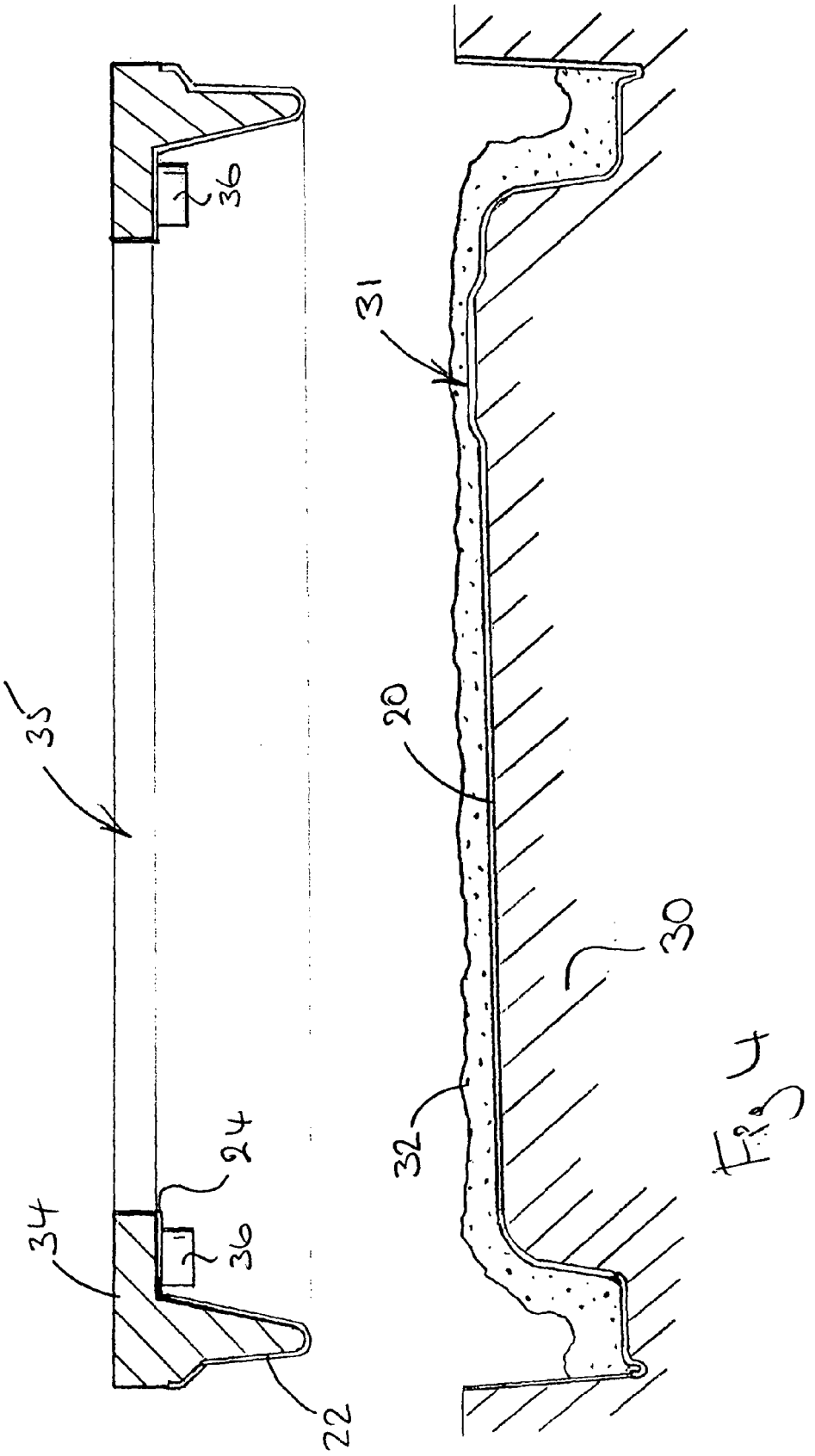

FIG 4

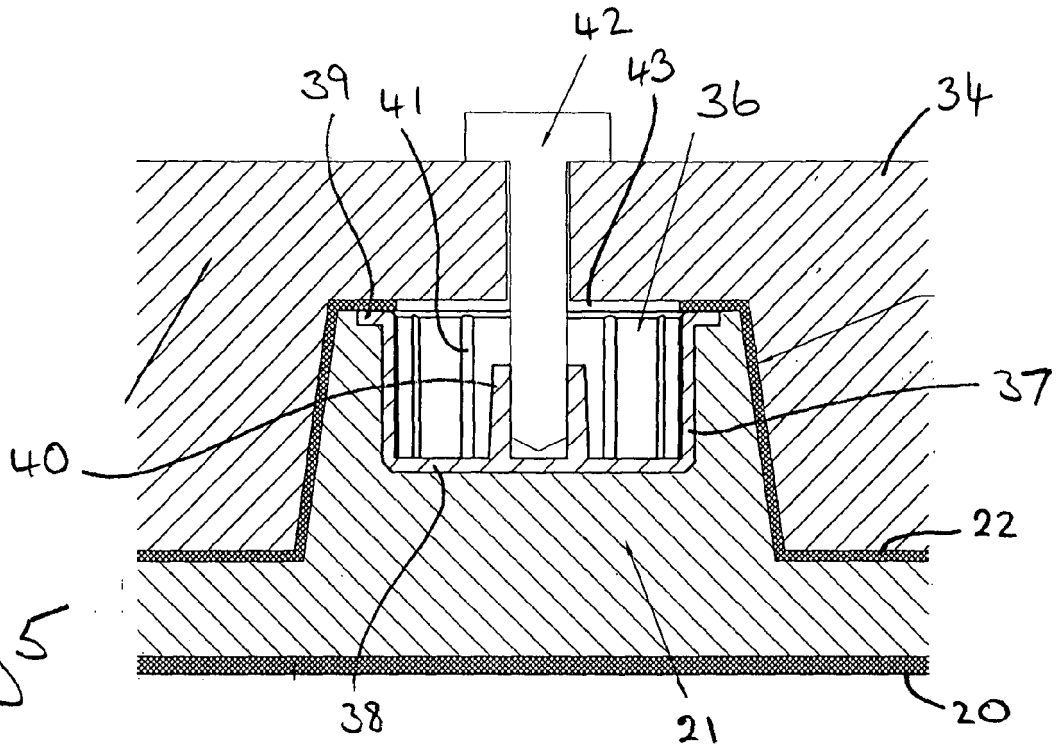

Fig 5

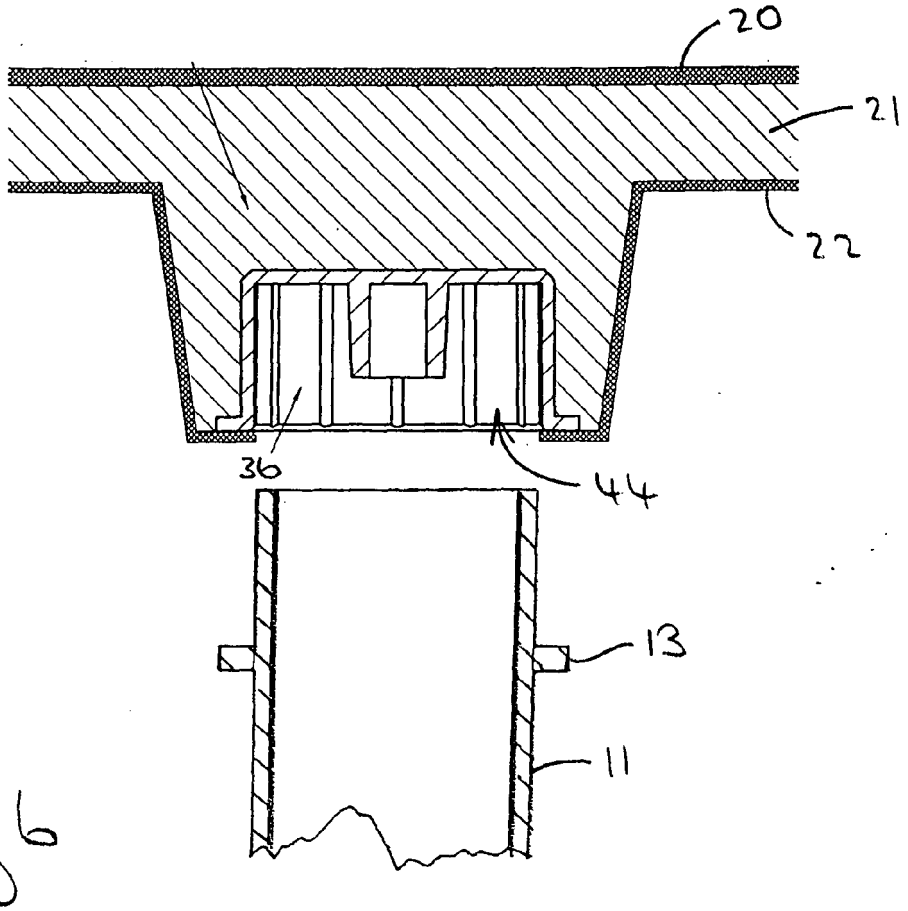

Fig 6

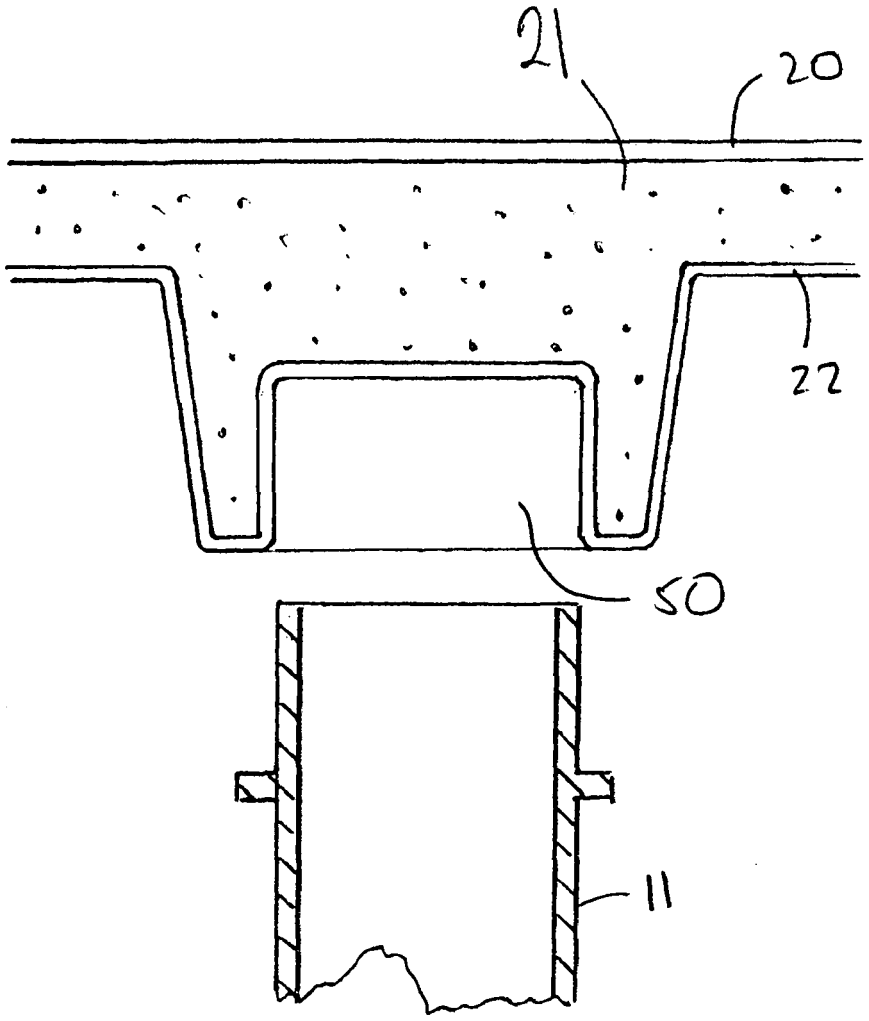

Fig 7