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(54) Title: SHOWER BASE

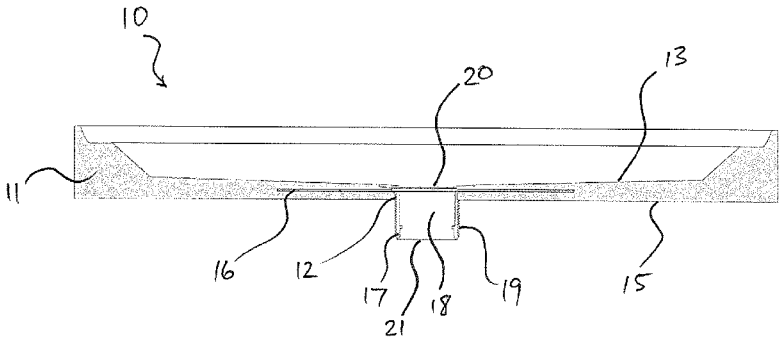


Figure 1B

(57) Abstract: A shower base comprising: a body having a drain aperture extending therethrough; and a reinforcing element at least partially surrounding the drain aperture and extending radially therefrom, the reinforcing element enclosed within the body.

SHOWER BASE

TECHNICAL FIELD

The present technology relates to bathroom showers and in particular, a shower base.

BACKGROUND

Bathroom showers typically comprise a faucet for dispensing water and which is arranged in or proximal to an at least partially enclosed cubicle. The cubicle typically comprises a base connected to one or more walls and a door. The base defines a floor surface on which a user stands when operating the faucet, the floor surface arranged to collect water dispensed by the faucet and to direct waste water through a drainage aperture arranged therein. The floor surface typically slopes towards the drainage aperture to assist with the collection and drainage of the waste water from the shower cubicle.

Shower bases may be formed from a range of different materials, including sheet metal, enamel, ceramic or a polymer. Polymer shower bases are popular due to their hardwearing properties and relatively low cost. In particular, resin-based polymers are popular as these can provide a comparable durability and surface finish to a ceramic base at a substantially reduced weight and cost.

Polymer shower bases are often manufactured by casting liquid polymer material in a mould. Due to the sloping geometry of the floor surface, the casting of such shower bases forms a shell which gradually decreases in thickness towards the drainage aperture. The thin wall section of the shell formed around the drainage aperture is typically the weakest point in the shower base and is known to crack during use of the shower base, which can result in the shower base leaking and requiring replacement.

To address this issue, it is known to form or affix a collar around the drainage aperture on an underside of the shower base. This often involves

gravity casting a shower base body in an open mould to form a flat base surface having the drainage aperture therethrough, and subsequently casting an additional collar around the drainage aperture. After the base body and collar have cured (solidified), the collar becomes an integral part of the base. The collar therefore thickens the region surrounding the drainage aperture to attempt to reduce the likelihood of this region cracking under load.

However, this approach suffers from a number of drawbacks. For example, the extra thickness of material provided by the collar means that the underside of the shower base is not flat, which can prove problematic when installing the shower base. The non-flat base often requires an installer to cut into a floor which the shower base is being installed on to create space for the collar to extend into. This can be time consuming and substantially increase installation costs. Furthermore, it is relatively common for shower bases having the collar feature to crack proximal to the waste outlet, and therefore this solution is not particularly durable or reliable.

The present invention seeks to ameliorate one or more of the abovementioned disadvantages or at least seeks to provide a new shower base.

SUMMARY

Broadly the present specification discloses a composite shower base with a floor body and a drain reinforcing element disposed in the floor body such that the underside of the floor body is flat.

Broadly, the present specification discloses a shower base having a floor body and a reinforcing element for a drain region of the body, the reinforcing element furthermore being disposed flush with and/or substantially within the floor body.

Broadly the present specification discloses a shower base having a floor body and a drain reinforcing element, the drain reinforcing element being integrated into the floor body.

Broadly the present specification discloses a shower base having a floor body and a drain reinforcing element interengaged with the floor body.

According to one aspect of the technology there is provided a shower base comprising a body having a drain aperture extending therethrough and a reinforcing element at least partially surrounding the drain aperture and extending radially therefrom, the reinforcing element at least substantially disposed within the body.

In one embodiment the shower base further includes a drain aperture extending therethrough; and the reinforcing element is configured to at least partially surround the drain aperture and extend radially therefrom, the reinforcing element substantially disposed within the body.

In one embodiment the floor body has a floor surface arranged in a top portion thereof, and a base surface arranged in an opposed bottom portion thereof, and the drain aperture connects therebetween, and wherein the reinforcing element is disposed in the floor body between the floor surface and the base surface.

In one embodiment the base surface is substantially planar and flat.

In one embodiment there is also provided a drain outlet arranged in the drain aperture and affixed to the body, and wherein the reinforcing element further comprises an engaging portion for engaging the drain outlet.

In one embodiment the drain outlet comprises a conduit for conveying water through the drain aperture, the conduit having two opposed ends, and wherein the engaging portion is adapted to retain the reinforcing element in a spaced apart position from both of the ends.

In one embodiment the reinforcing element further comprises a plurality of apertures extending therethrough, and wherein the body extends through each of the plurality of apertures.

In one embodiment the plurality of apertures are arranged in an annular array.

In one embodiment the plurality of apertures are arranged to form one or more mesh portions.

In one embodiment the reinforcing element further comprises one or more finger portions extending radially from the drain aperture.

In one embodiment the reinforcing element is a planar disc.

In accordance with one aspect there is provided a method of manufacturing a shower base, the method comprising the steps of: securing at least a portion of a drain reinforcing element in a mould cavity; introducing settable material into the cavity, such that the settable material covers the reinforcing element; at least partially curing the settable material to form the body; and removing the body from the mould, whereby the body has the reinforcing element secured thereto.

In one embodiment there is also included the step of securing the drain outlet in a cavity in a mould and connecting the engaging portion to the drain outlet.

Throughout this specification and the claims that follow, the word "comprising" and its grammatical variants such as "comprised" and the like is intended to be inclusively construed, so as to enable the inclusion of other features which may be described herein.

The discussion of any prior art is not intended to be construed as an admission that that information has formed the common general knowledge in the art.

BRIEF DESCRIPTION OF THE DRAWINGS

To enable a clearer understanding of the invention, preferred embodiments of the technology will hereinafter be described, by way of example only, with reference to the accompanying drawings in which:

Figures 1A and 1B are perspective and cross-section views of a shower base having a reinforcing element and drain outlet secured thereto;

Figures 2A and 2B are plan and side elevation views of the reinforcing element and the drain outlet shown in Figures 1A and 1B;

Figure 3 is a plan view of the reinforcing element shown in the previous figures without the drain outlet for clarity;

Figures 4A and 4B are perspective and cross-section views of an alternative shower base having the reinforcing element and the drain outlet shown in Figures 1A to 2B secured thereto; and

Figures 5A and 5B are top and side views of the reinforcing element and the drain outlet shown in Figures 4A and 4B.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The present disclosure relates to a shower base comprising a body having a drain aperture extending therethrough and a reinforcing element at least partially surrounding the drain aperture and extending radially therefrom, the reinforcing element enclosed within the body.

The disclosed shower base has a reinforcing element disposed at least partially within the base body to facilitate the provision of a rigid structure within a region surrounding the drainage aperture, in order to strengthen this region. This arrangement may be achieved by positioning the reinforcing element in a mould for the base during a casting process, or a moulding process such as for example injection moulding, and then forming the base body over at least a portion of the reinforcing element (around and/or in between portions thereof), such that the element is co-moulded

and therefore integral with what could then be termed a composite shower base body. In some approaches the whole reinforcing body is surrounded by the floor body. This co-moulding approach has been found to be substantially more durable than prior art approaches, such as adding a collar to the underside of the shower base as described above. Furthermore, the absence of the collar means that the underside of the disclosed shower base is substantially flat and planar, which is more convenient to install and therefore reduces installation time and costs.

It is to be understood that there are several ways that the reinforcing element can be integrated or interengaged with the base body, and those several ways are in terms of manufacturing method and manufacturing position. In one way of integration or interengagement, an underside of the reinforcing element can be left to be exposed by the moulding or casting process; what is advantageous to at least preferred embodiments is that a base surface of the body is flat and planar. Thus, the reinforcing element can be integrated by a settable and flowable material flowing around and through the reinforcing element. Some embodiments of the reinforcing element may comprise fingers radially extending from a central hub.

It is also contemplated that the reinforcing element can be interengaged with the base body by being adhered to an underside of the base body, wherein the renforcing element can be mounted on bosses, or posts, or corrugations, or other recesses, and adhered to the underside of the body.

The reinforcing element may be adapted to engage with a drain outlet (also known as a 'drain waste') arranged in the drainage aperture. The engagement in some embodiments locates the reinforcing element in a predetermined position relative to the drainage aperture and retains the reinforcing element in that position and/or orientation. This is particularly useful if the shower base is cast or moulded, as the reinforcing element can be retained in a position to facilitate that the reinforcing element is disposed within the cast/moulded body. This may involve retaining the reinforcing element in a spaced-apart position relative to a floor surface of the shower base to allow settable material to pass under, around and/or through the

reinforcing element so as to form a smooth floor surface under the base body. To assist with the fabrication of the smooth floor surface, the reinforcing element may have a plurality of apertures or slots extending therethrough to allow the settable material to pass through the reinforcing element. When the settable material is cured to form the shower base body, the apertures or slots also firmly engage the reinforcing element with the shower base, further enhancing the structure of the base.

The reinforcing element in some embodiments has one or more portions arranged extending radially away from the drainage aperture, the geometry of these portions being configurable according to loading requirements. For example, the reinforcing element may be configured as a star or web pattern to provide ribs extending away from the drainage aperture. Alternatively, the reinforcing element may be a disc surrounding the drainage aperture.

In some embodiments, the reinforcing element is formed from a different material to the shower base body, as the properties of the reinforcing element material are typically different to those of the shower base material and therefore provide an increase in durability, such as enhanced tensile or compressive strength. For example, where the base is formed from a resin-base polymer, the reinforcing element may be formed from ABS plastic, which has been found to increase the tensile strength of the region of the shower base in which the reinforcing element is arranged.

Figures 1A and 1B are perspective and cross-section views of a shower base 10. The shower base 10 includes a body 11 (sometimes in this specification referred to as a base body or a floor body) having a drainage aperture 12 extending therethrough. An upper portion of the body 11 defines a floor surface 13 for supporting a user (not shown) during use of the shower base 10, the floor surface 13 generally sloping towards the drainage aperture 12 to assist the drainage of water therethrough. A lower portion of the body 11 defines a base surface 15 extending between a peripheral region of the body 11 and the drainage aperture 12. The base surface 15 is in some embodiments, (apart from the drainage aperture and conduit) a flat, planar

surface. There are some portions where it may be appropriate to have corrugations or recesses in the base surface 15, but not necessarily near the drain region and no protrusions unless these are intended to be received in cooperating bosses in a cooperating floor region for mounting the shower base body 11. A reinforcing element 16 is arranged at least partially around a periphery of the drainage aperture 12 and extends substantially radially therefrom. As best shown in Figure 1B, in that embodiment the reinforcing element 16 is substantially disposed within the body 11 between the floor surface 13 and the base surface 15.

In the embodiment shown in Figures 1A and 1B, a drain outlet 17 (known as a 'drain waste') is arranged in the drainage aperture 12. The drain outlet 17 includes an aperture and a conduit 18 for facilitating the flow of water through the drainage aperture 12 and away from the floor surface 13. The conduit 18 includes in this embodiment a screw thread 19 arranged around a peripheral region thereof for threadedly engaging a waste water pipe (not shown). The conduit 18 has two opposed ends 20, 21, being a water inlet 20 and a water outlet 21. At the inlet end 20 there is a rim portion 22 extending away from the conduit 18, the rim portion 22 arranged to be flush with the floor surface 13.

Manufacturing the shower base 10 for the embodiment shown can involve a casting process, whereby the body 11 is cast from a settable material, such as a resin-based polymer. This process involves securing the drain outlet 17 in a cavity in a mould tool (not shown), securing the reinforcing element 16 to the drain outlet 17, introducing the settable material into the cavity to cover the reinforcing element 16 and at least a portion of the drain outlet 17, at least partially curing the settable material to form the body 11, and removing the body 11 from the mould, such that the outlet 17 and reinforcing element 16 are secured to the body.

In Figures 2A and 2B the reinforcing element 16 and drain outlet 17 are shown in isolation. The reinforcing element 15 typically has one or more engaging portions 25 for engaging the drain outlet 17. The engaging portion 25 is adapted to retain the reinforcing element 15 to the drain outlet 17 in a

specific spatial relationship. For example, the engaging portion 25 may threadedly engage the screw thread 19 thereby allowing the reinforcing element 16 to be selectively positioned along the conduit 18. Alternatively, the engaging portion 25 may not be threaded but may comprise snap-fit features which interlock with cooperating features on the drain outlet 17. The engaging portion 25 typically allows the reinforcing element 16 to be secured in a spaced apart position relative to both ends 20, 21 of the conduit 18. This is particularly useful with regard to the inlet end 20 and rim 22, as spacing the reinforcing element 16 away from these features provides space for settable material to enter during a casting or moulding process, in order to form the floor surface 13 and base surface 15. This arrangement of the reinforcing element 16 relative to the drain outlet 17 therefore substantially ensures the reinforcing element 16 does not interfere with the fabrication of a smooth floor surface 13.

In Figure 3, the reinforcing element 16 is shown in isolation. The reinforcing element comprises a body 26 having one or more first apertures 27 extending therethrough, each first aperture 27 dimensioned to surround the drainage aperture 12. The element 16 further comprises a plurality of second apertures 28 for allowing substantially liquid material to flow through. The second apertures 28 are adapted to allow the settable material for forming the body 11 to flow through during a casting or moulding process, thereby securing the reinforcing element 10 to the body 11 when the material cures. Whilst the body 26 is shown as a disc including a complete drainage aperture 12 it will be appreciated that the shape and configuration of the body 26 may be adapted according to design requirements for the reinforcing element 16, and therefore may only partially surround the drainage aperture 12, forming a 'horse-shoe' or 'U-shaped' body (not shown). Similarly, whilst the second apertures 28 are shown as circular holes, these may be adapted to form different shaped openings, such as slots (not shown).

The second apertures 28 are arranged in an annular array around the body 26. However the dimensions and arrangement of the second apertures 28

may be adapted according to design requirements. For example, if the material for forming the body 11 has low viscosity and/or the shower base 10 is intended to only support small loads, the reinforcing element 16 may be configured to have considerably more second apertures 28 than shown in Figure 3, and each aperture 28 being a smaller diameter, as this would provide sufficient reinforcement for the body 11 and allow the material to pass through the reinforcing element 16 more easily. Similarly, a plurality of second apertures 28 may be grouped together to form one or more mesh portions (not shown) in the reinforcing element.

The reinforcing element 16 is shown configured as flat, planar disc of around 3 mm thickness, as this is convenient to produce and fit within the body 11 between the floor surface 13 and the base surface 15. However, the shape and configuration of the reinforcing element 16 may also be adapted according to design requirements. For example, the reinforcing element 16 may be substantially larger than the disc shown in Figure 3 in order to provide structural support for a larger area of the body 11.

It may be that the reinforcing element is corrugated, formed in a plurality of laminates, or other suitable arrangements.

Figures 4A to 4B show an alternative shower base 30 whereby the drainage aperture 12 is arranged proximal to a side-wall 31 of an alternative body 32. The arrangement of the reinforcing element 16 relative to the drainage aperture 12 and drain outlet 17 is therefore such that an alternative first aperture 27 is disposed adjacent an edge of the reinforcing element 16. The alternative first aperture 27 has a periphery which extends around the drainage aperture 12 and drain outlet 17. This alternative configuration ensures that the reinforcing element 16 (in the form of a disc) remains disposed within the body 11 and does not extend beyond the side-wall 31.

Figures 5A and 5B show the reinforcing element 16 and drain outlet 17 in the configuration shown in Figures 4A and 4B in isolation. As best shown in Figure 5B, an alternative first aperture 27 also has an engaging portion 25

associated therewith to engage and selectively position the reinforcing element 16 relative to the conduit 18.

It will be apparent that obvious variations or modifications may be made which are in accordance with the spirit of the invention and which are intended to be part of the invention.

EXAMPLES

Specimens

A force-displacement experiment has been conducted on a prior art shower base 50 (Specimen 1), the shower base 10 (Specimen 3) and a variant thereof 100 (Specimen 2).

Figure 6 shows a cross-section view of the prior art shower base 50. The prior art shower base 50 comprises a body 51 defining a drainage aperture 52 therethrough in the form of a drain conduit. A collar 53 is integrally formed with the body 51 and is disposed so as to receive the drainage aperture 52. The body 51 and collar 53 are formed by casting a resin-polymer.

The shower base 10 includes the body 11 and reinforcing element 16 as previously described. The body 11 has substantially the same dimensions as the body 51 and is formed from the same resin-polymer as the prior art shower base 50. The reinforcing element 16 is 3mm thick and formed from ABS.

The variant of the shower base 100 (not shown) includes the body 11 and an alternative reinforcing element 160 (not shown). The alternative reinforcing element 160 is substantially identical to the reinforcing element 16 except it does not have the second apertures 28 and instead, is perforated with very small holes such that the majority of the element 160 is a mesh. The reinforcing element 160 is 3mm thick and formed from polypropylene.

Method

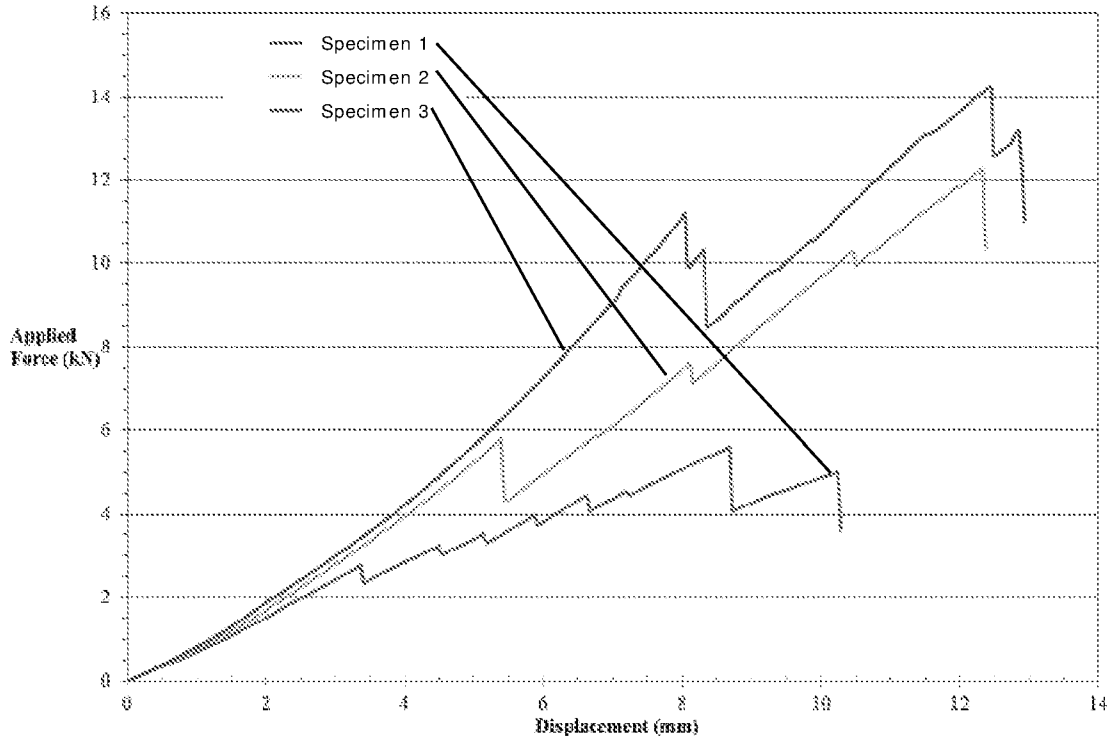
Each of the specimens 50, 100, 10 were tested by placing on a rigid floor surface and arranging a 150 x 150 mm bearing plate against a top surface thereof, proximally above the respective drainage aperture. The bearing plate was advanced toward the top surface at a constant rate of 2 mm per minute until the specimen 50, 100, 10 could no longer support any force. The applied force and corresponding displacement was recorded using strain gauges and a data acquisition system.

During the application of force to each specimen 50, 100, 10, each specimen 50, 100, 10 developed an initial crack. As the applied force increased, the crack propagated away from the bearing plate towards a peripheral region of the specimen 50, 100, 10 until the specimen 50, 100, 10 could no longer support any force, i.e. the bearing plate penetrated through the specimen 50, 100, 10.

Results: Data

Specimen	Force at initial crack (kN)	Displacement at initial crack (mm)	Peak Force (kN)	Displacement at Peak Force (mm)
1	2.77	3.37	5.60	8.68
2	5.78	5.39	12.25	12.33
3	11.19	8.04	14.22	12.41

Results: Graph of Load v Displacement



INDUSTRIAL APPLICABILITY

The invention can be utilised in the construction of buildings and in particular, for plumbing applications.

CLAIMS:

1. A shower base comprising a floor body and a reinforcing element for a drain region of the floor body, the reinforcing element being substantially within the floor body.

2. The shower base in accordance with claim 1 wherein the drain reinforcing element is disposed in the floor body such that the underside of the floor body is flat.

3. The shower base in accordance with claim 1 or 2 wherein the reinforcing element is interengaged with the floor body.

4. The shower base in accordance with any one of claims 1 to 3 further including a drain aperture extending therethrough; and

   the reinforcing element is configured to at least partially surround the drain aperture and extend radially therefrom, the reinforcing element substantially disposed within the body.

5. The shower base in accordance with any one of claims 1 to 4, wherein the floor body has a floor surface arranged in a top portion thereof, and a base surface arranged in an opposed bottom portion thereof, and the drain aperture connects therebetween, and wherein the reinforcing element is disposed in the floor body between the floor surface and the base surface.

6. The shower base according to claim 5, wherein the base surface is substantially planar and flat.

7. The shower base in accordance with any one of claims 1 to 6, further comprising a drain outlet arranged in the drain aperture and affixed to the body, and wherein the reinforcing element further comprises an engaging portion for engaging the drain outlet.

8. The shower base in accordance with claim 7, wherein the drain outlet comprises a conduit for conveying water through the drain aperture,

the conduit having two opposed ends, and wherein the engaging portion is adapted to retain the reinforcing element in a spaced apart position from both of the ends.

9. The shower base in accordance with any one of claims 1 to 8, wherein the reinforcing element further comprises a plurality of apertures extending therethrough, and wherein the body extends through each of the plurality of apertures.

10. The shower base according to claim 9, wherein the plurality of apertures are arranged in an annular array.

11. The shower base according to claim 9 or 10, wherein the plurality of apertures are arranged to form one or more mesh portions.

12. The shower base in accordance with any one of claims 1 to 11, wherein the reinforcing element further comprises one or more finger portions extending radially from the drain aperture.

13. The shower base according to any one of claims 1 to 12, wherein the reinforcing element is a planar disc.

14. A method of manufacturing a shower base, the method comprising the steps of:

securing at least a portion of a drain reinforcing element in a mould cavity;

introducing settable material into the cavity, such that the settable material covers the reinforcing element;

at least partially curing the settable material to form the body; and

removing the body from the mould, whereby the body has the reinforcing element secured thereto.

15. The method in accordance with claim 14 including the step of securing the drain outlet in a cavity in a mould and connecting the engaging portion to the drain outlet.

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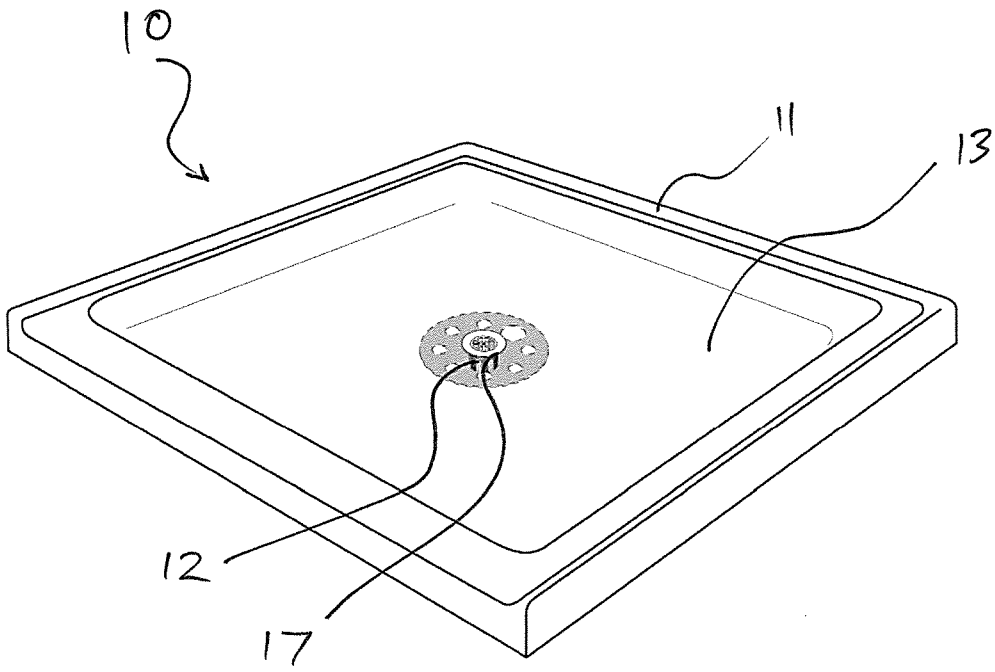

Figure 1A

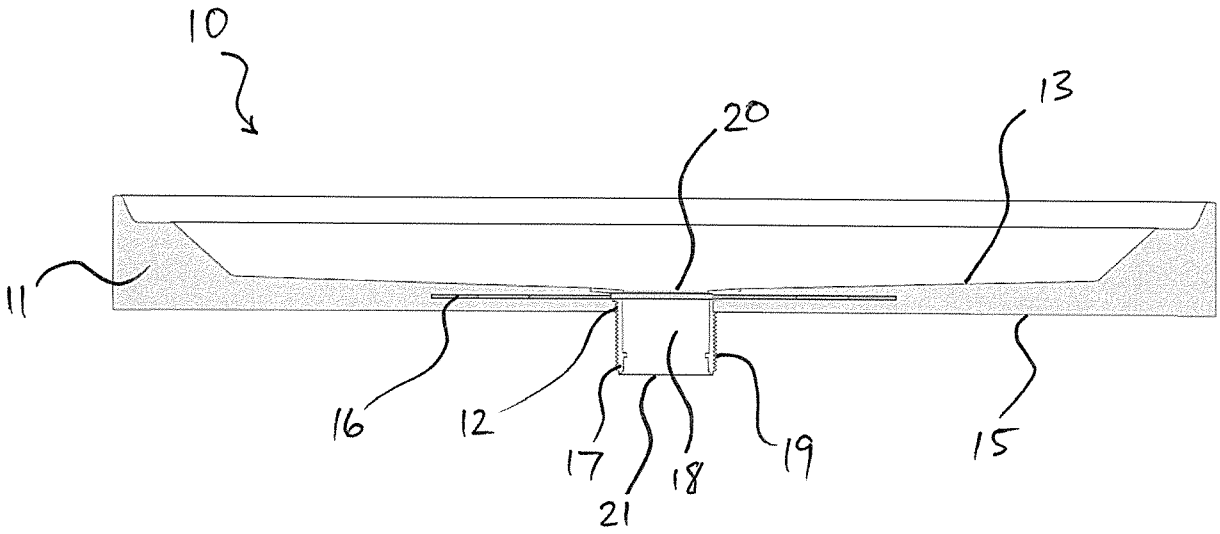

Figure 1B

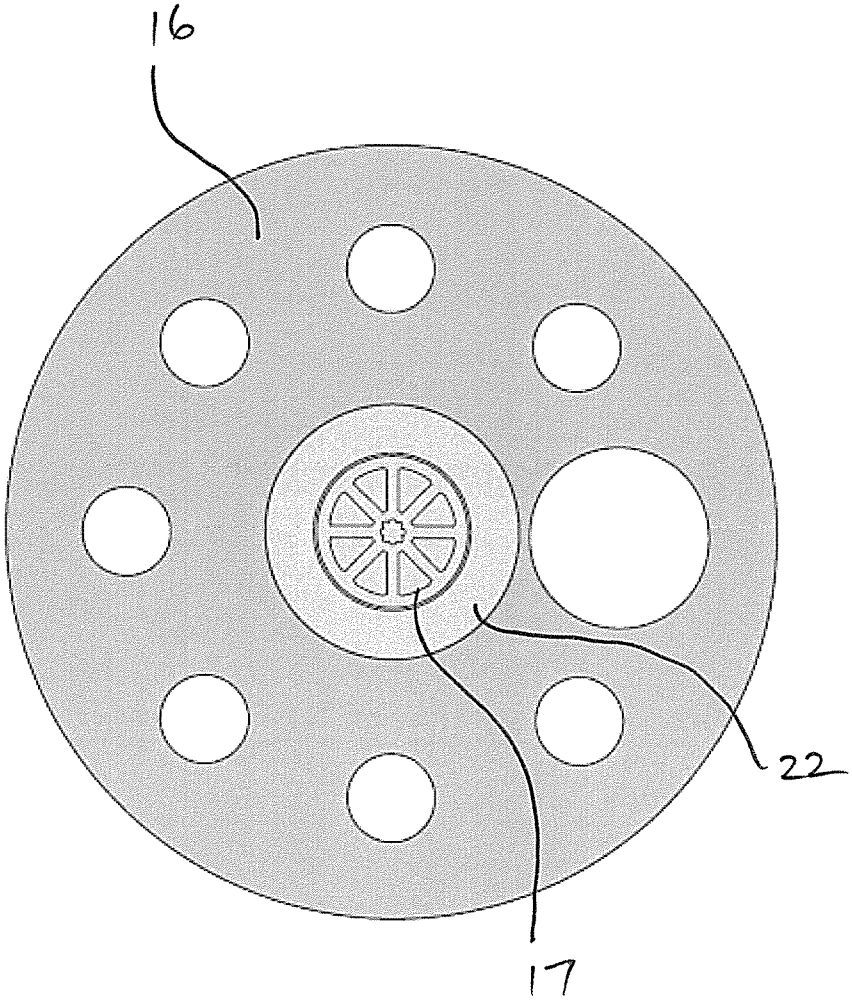

Figure 2A

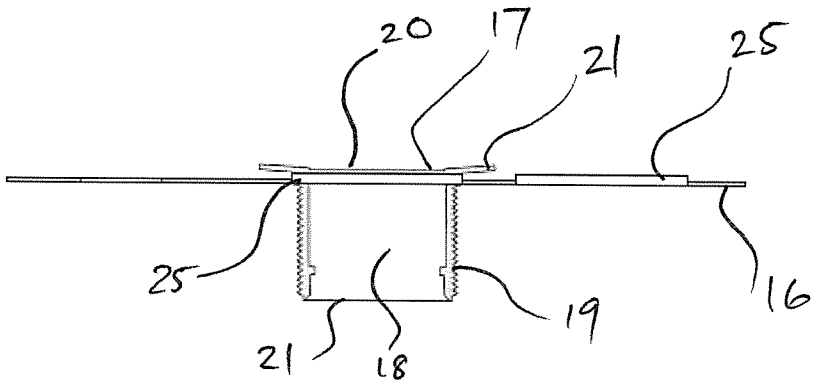

Figure 2B

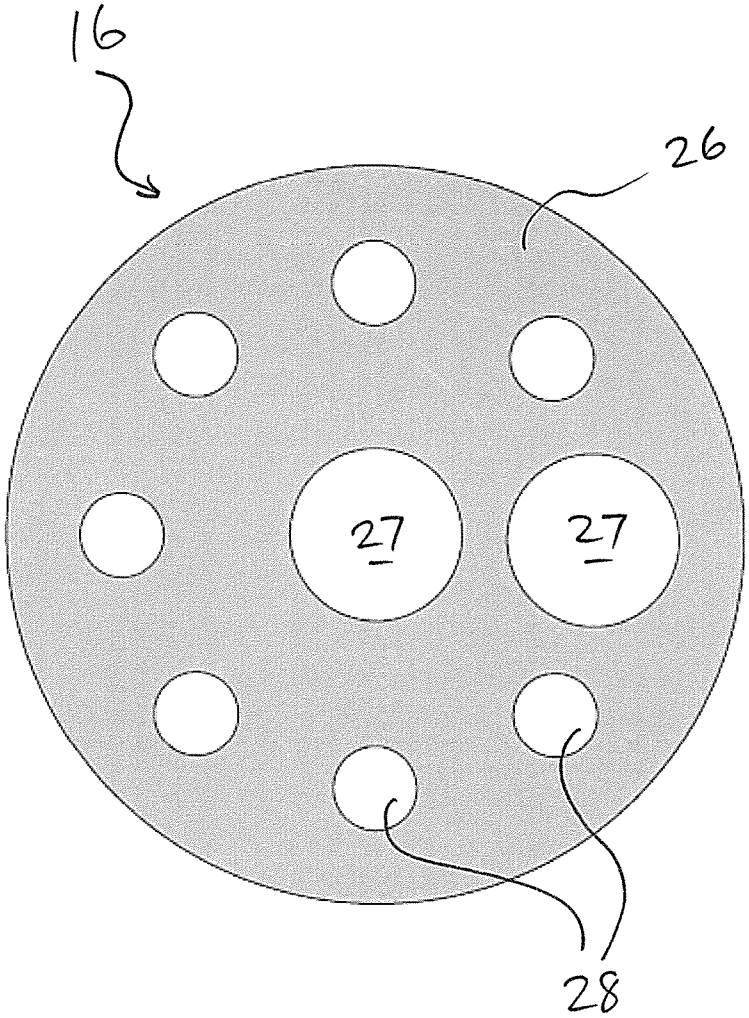

Figure 3

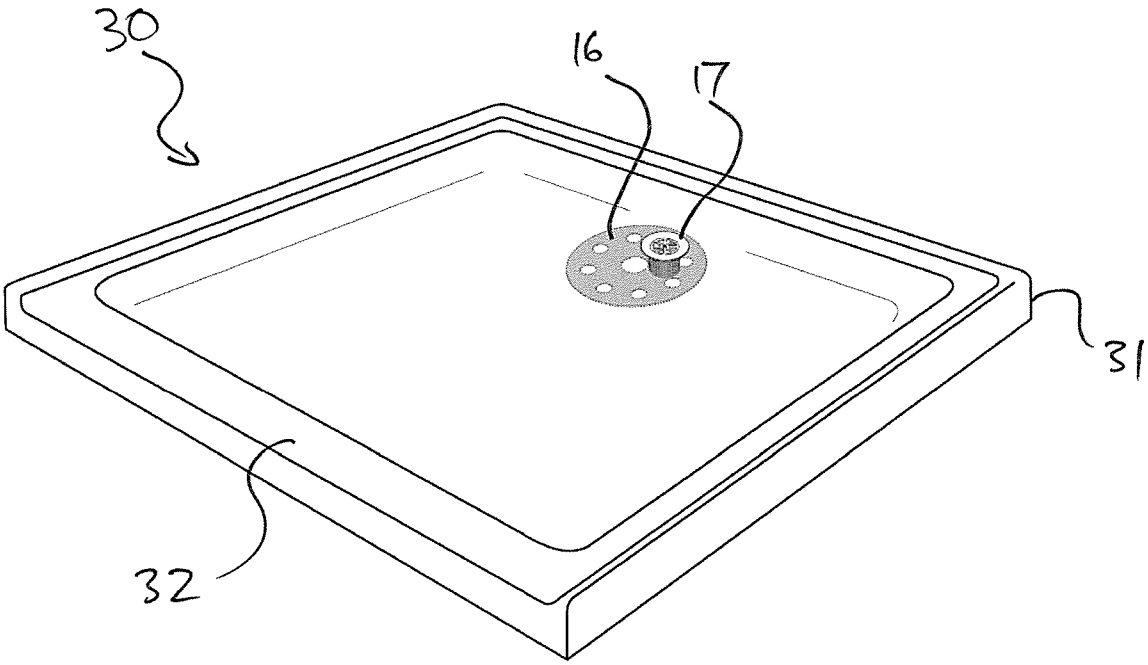

Figure 4A

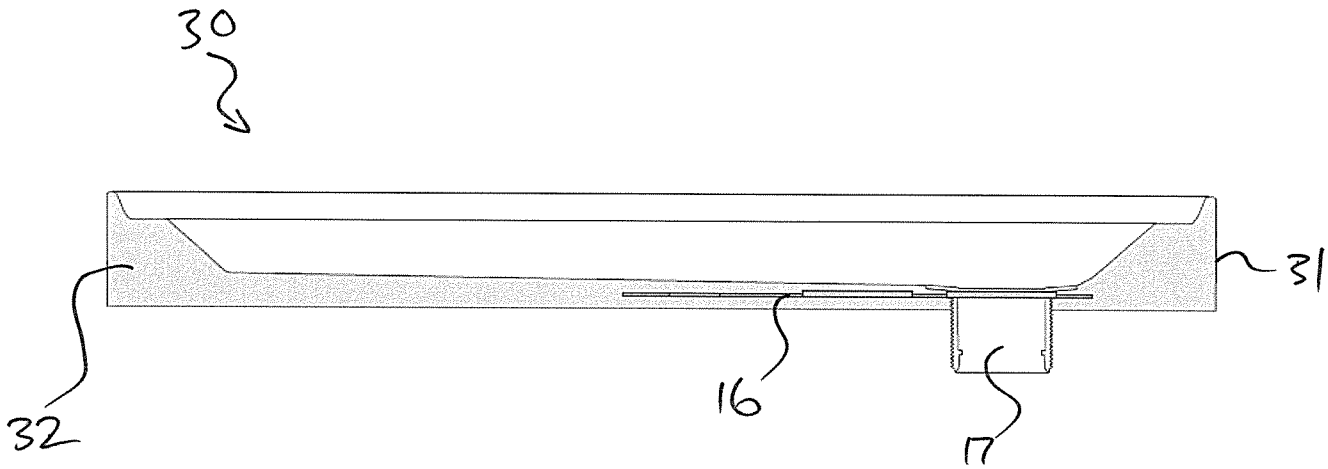

Figure 4B

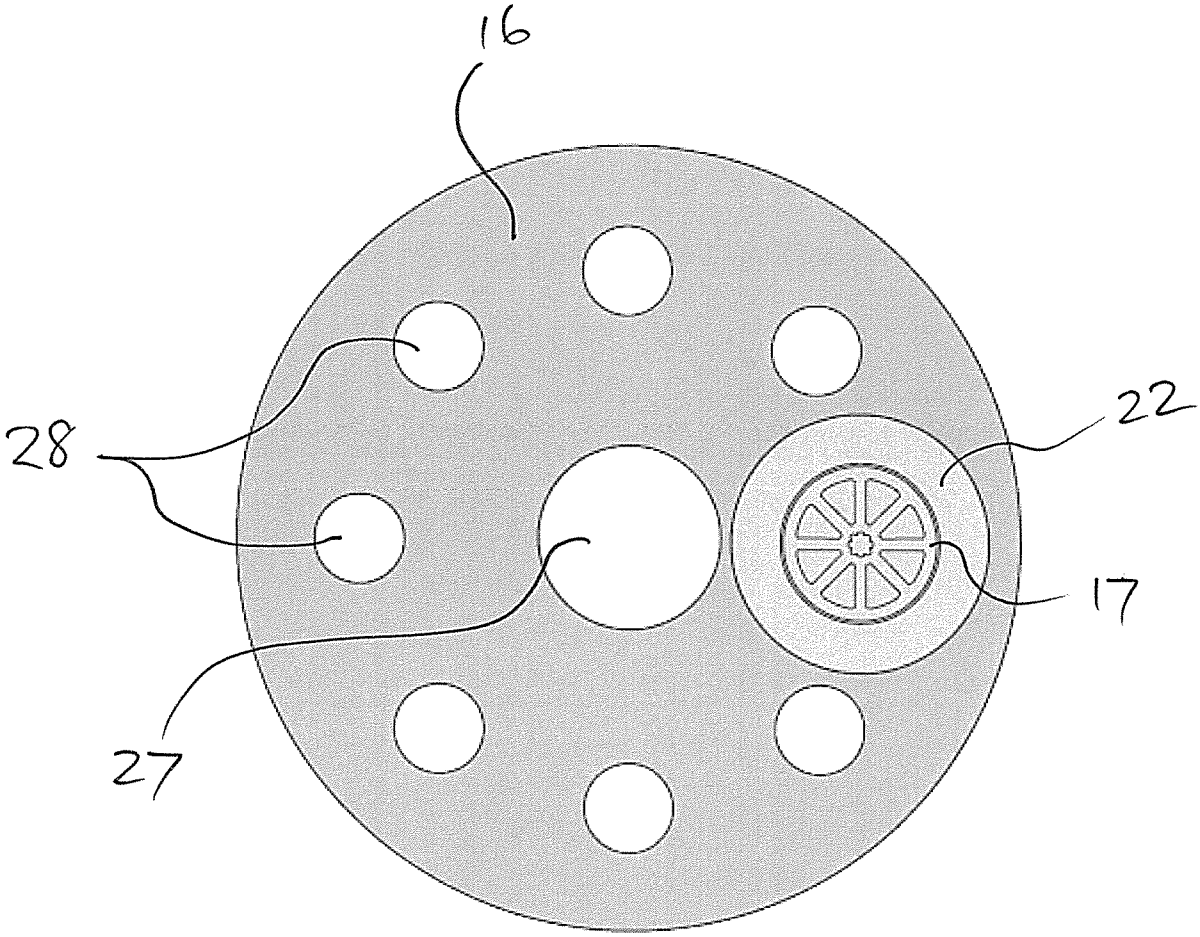

Figure 5A

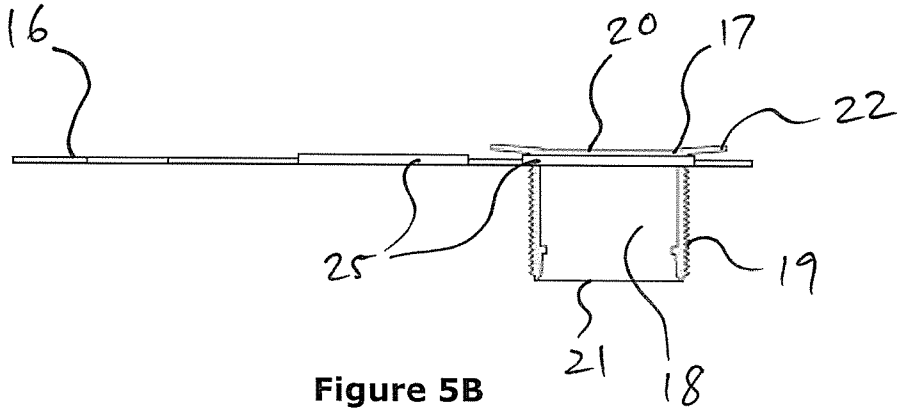

Figure 5B

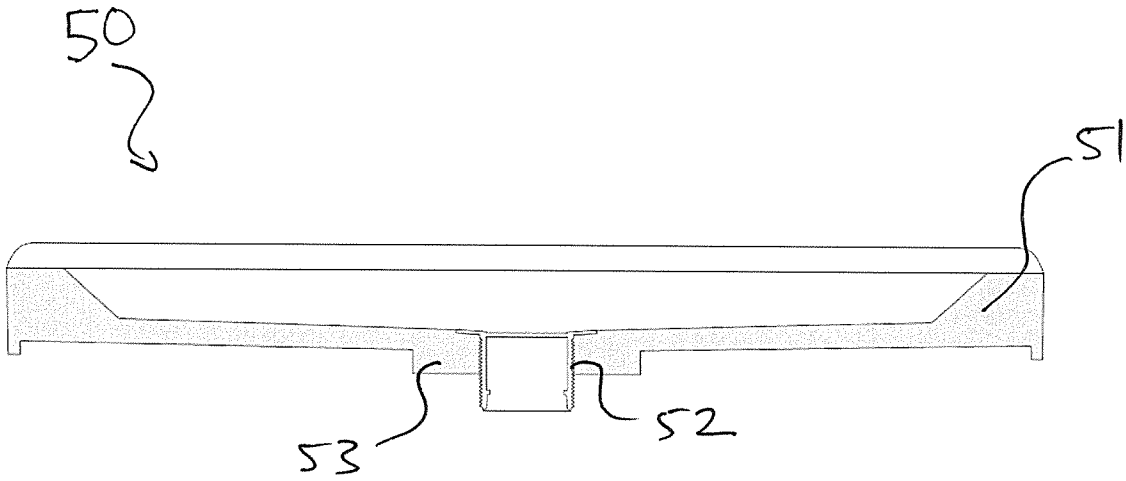

Figure 6

(Prior Art)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2016/050976

A. CLASSIFICATION OF SUBJECT MATTER

A47K 3/40 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPIAP, EPODOC:

IPC/CPC: A47K3/40/LOW, E03F5/0408/LOW & Keywords: REINFORC+, STRENGTH+, PLANAR+, FLAT+, DIS[C,K]+, FRACTUR+, CRACK+, FAIL+, PREVENT+, STOP+, DRAIN+, OUTLET+, CONDUIT+, MAT+, MESH+, APERTUR+, FLOOR+, BASE?, TRAY+ and similar terms.

ESPACENET, AUSPAT: Inventor & Applicant Name(s): "QUINTANA ALBERT", "RIVETT ROSS", "GEMINI INDUSTRIES PTY LTD"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	

[X] Further documents are listed in the continuation of Box C

[X] See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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Date of the actual completion of the international search	Date of mailing of the international search report
12 December 2016	12 December 2016
Name and mailing address of the ISA/AU	**Authorised officer**
AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA Email address: pct@ipaustralia.gov.au	SuMei Van AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. 0262256111

INTERNATIONAL SEARCH REPORT C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		International application No. **PCT/AU2016/050976**
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2008/0222795 A1 (COOK) 18 September 2008 Abstract; Fig. 1-4B, 7-9, 18; Paragraphs [0063]-[0067], [0096]-[0097]	1-15
X	US 6643863 B1 (GERBER) 11 November 2003 Abstract; Fig. 3-5, 7; Col. 3 lines 13 – col. 4 lines 65	1-15
X	EP 2415377 A1 (SPA-JET LIMITED) 08 February 2012 Abstract; Fig. 1-2; Paragraphs [0002], [0024]	1-13

INTERNATIONAL SEARCH REPORT Information on patent family members	International application No. **PCT/AU2016/050976**

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