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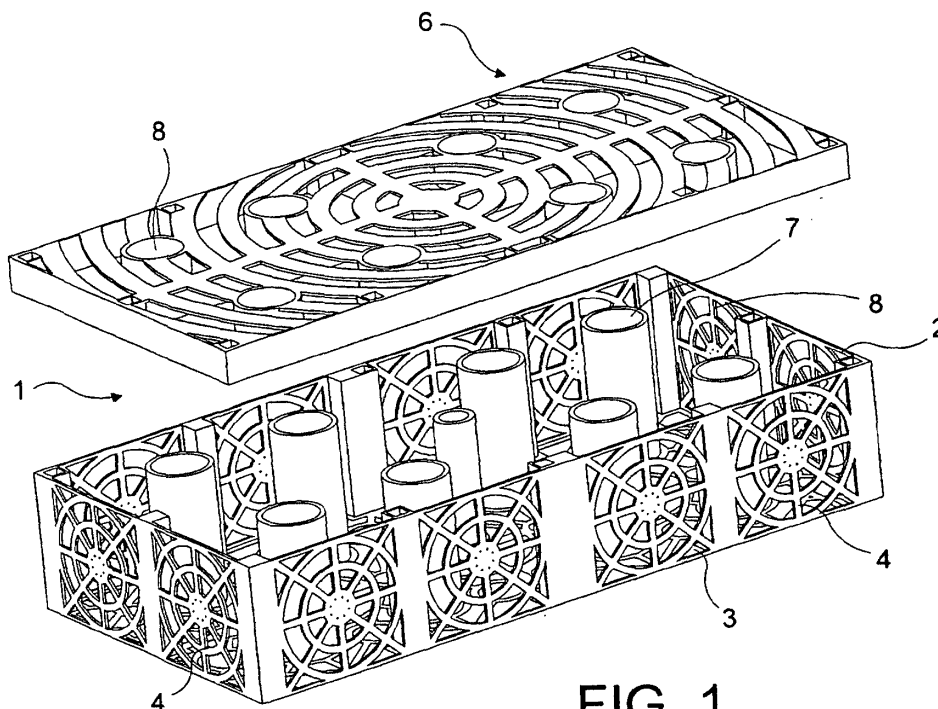
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(54) **Apparatus and system for through flow of a fluid**

(57) Apparatus 1, providing through flow of fluid, comprising a base unit 2 to receive a fluid, having a base 3 and boundary walls 4 rising therefrom to define an open top 5 opposite the base 3, and a substantially planar closure 6 for the open top 5, which closure 6 is adapt-

ed for passage of fluid therethrough, there being respective means 7, 8 of the base unit 2 and closure 6 for interengagement of the base unit and closure whereby when the interengagement means 7, 8 are interengaged, a closed unit 9 is obtained.



**FIG. 1**

## Description

**[0001]** The invention relates to apparatus for providing through flow of a fluid, and to a system utilising such apparatus.

**[0002]** Modern building techniques are such that earth or the ground is either compacted so that run-off of surplus water is not possible, or the earth or ground is in any event rendered impermeable by the use of concrete, metallised surfaces such as road-ways, and the like.

**[0003]** Rainwater, or melt water, cannot then drain off, causing flooding, particularly in a flash storm situation. Moreover, water which can be contaminated with say oil or petrol spillage at a refuelling location such as a garage in parking lots or loading bays, cannot readily be handled.

**[0004]** It is accordingly an object of the invention to seek to mitigate these disadvantages.

**[0005]** According to a first aspect of the invention there is provided apparatus for providing through flow of a fluid, comprising a base unit which is adapted to receive a fluid, having a base, and boundary walls rising therefrom, to define an open top, and a substantially planar closure for the open top, which closure is adapted for passage of fluid therethrough, there being respective means of the base unit and closure for interengagement of the base unit and closure whereby when the interengagement means are interengaged, a closed unit is obtained.

**[0006]** The closure may comprise a grid which supports the respective interengagement means of the closure. This provides for ease of construction for example by moulding, particularly the said means may comprise a plurality of spaced members depending from the grid and laid out in a desired array.

**[0007]** The respective interengagement means of the base unit may comprise spaced upright members rising from the base and may be laid out in an array corresponding with the desired array of the closure. This provides for ease of assembly of a base unit and closure.

**[0008]** The members of the closure may be female members and the members of the base unit may be male members. This provides for positive interconnection.

**[0009]** The closure may be reversible so that the members can define spaces, and there may be a plurality of inserts which can be inserted into the spaces to provide a generally planar surface.

**[0010]** This provides a particularly suitable closed unit used as a paving construction.

**[0011]** Each insert may have a part complementary in shape to a part of a respective member of the closure, and substantially the same height thereas whereby to form a substantially planar surface. This again provides for a suitable paving construction.

**[0012]** The female members may be tubular to provide fluid access to/from the base unit. Thus the female

members provide drainage into the base unit with the apparatus is used to collect water.

**[0013]** Each insert may be selected from a group of materials which may comprise plastic, rubber, reclaimed rubber and concrete. This provides for relative ease of construction, for example by moulding. Moreover, a surface of an insert remote from the interior of the apparatus may be moulded with a desired surface pattern or finish. This can provide for an aesthetic and/or functional aspect such as grip.

**[0014]** The apparatus may comprise a storm water infiltration module, which module may comprise part of a paving system round a dwelling, swimming pool or under a path, road, drive, parking space, loading bay, filling station apron or the like.

**[0015]** Alternatively, the apparatus may comprise a crop-drying floor, suitably the crop being grain.

**[0016]** According to a second aspect of the invention there is provided a system utilising a plurality of apparatus as hereinbefore defined.

**[0017]** Respective closure units of adjacent base units may be offset or overlapped whereby to tie the system together.

**[0018]** Apparatus and a system embodying the invention are hereinafter described, by way of example, with reference to the accompanying drawings.

Fig. 1 is an exploded perspective view of a first embodiment of apparatus for through flow of a fluid, according to the invention;

Figs. 2 and 3 are respective exploded views of a second embodiment of apparatus according to the invention, respectively exploded and assembled; and

Fig. 4 is a perspective assembled view of a system embodying apparatus according to the invention.

**[0019]** Referring to the drawings, in which like parts are referred to by like numerals there is shown apparatus 1, 10 providing through flow of fluid, comprising a base unit 2 to receive a fluid, having a base 3 and boundary walls 4 rising therefrom to define an open top 5, opposite the base 3 and a substantially planar closure 6 for the open top 5, which closure 6 is adapted for passage of fluid therethrough, there being respective means 7, 8 of the base unit 2 and closure 6 for interengagement of the base unit and closure whereby when the interengagement means 7, 8 are interengaged, a closed unit 9 is obtained.

**[0020]** It will be understood that reference to a 'closed' unit refers to the assembly of base unit 2 and closure 6, the base, boundary walls 4 and closure 6 being, in the embodiments, perforated, or having through passages defined therein for passage therethrough of water when the apparatus 9 comprises a module of a storm water infiltration system or of heated air when the apparatus

is a module of a crop drying floor.

[0021] In the embodiments, both the base unit 2 and closure 6 are formed as by moulding, for example injection moulding of plastic to provide a rigid structure.

[0022] The "perforations" in the base 3, boundary walls 4 and closure 6 are formed during the moulding process.

[0023] The interengagement means 7 of the base unit 2 comprise an array of integral formed male members, suitably tubular columns, the disposition of the array being similar to that of the interengagement means 8 of the closure 6, which are integrally formed female members or tubes depending from a grid forming a body of the closure 6.

[0024] To assemble the base unit 2 and closure 6, the respective male 7, 8 and female members are interengaged, after offering up the closure 6 to the base unit 2.

[0025] As shown in Figs. 2, 3, in the embodiment 10 the closure 6 can be reversed so that the female interconnection means 8 are upstanding from the grid, the male columns 7 on assembly entering the bases thereof. The female tubes 8 then define spaces 11 in which inserts 12 can be inserted, there being complementary parts 13 of the inserts 12 which mate with a part of the external surface of an adjacent tube 8 to form a complete paved surface provided by the inserts, which may be formed of any suitable material such as rubber, reclaimed rubber, plastic, brick, concrete or the like. The upper, in use, surface of the inserts 12 may have a suitable surface configuration 14 or finish to provide an aesthetic and/or functional, e.g. gripping, effect.

[0026] The inserts 12 can be replaced singly, when damaged, and moreover form essentially a false floor in combination with a module formed from an assembled base unit and closure.

[0027] Fig. 4 shows a system built up from a series of modules, which are tied together by offset or overlapping closures 6.

[0028] In all the embodiments, there is provided a relatively shallow apparatus (in Fig. 1 the base unit could be 200mm deep and the closure 50mm) which can be placed in a suitable excavation so that the upper in use surface of the closure 6, or inserts 12, is flush with surrounding ground or structures for example providing a walkway around a dwelling drainage. In this case a void may be left open or filled with say gravel.

[0029] It will be understood that modifications are possible. Thus the columns 7 of the base unit 3 could be separate items which could be screwed into position on the base. The base units 3 can be stacked, and, in Fig. 4, the closure 6 or inserts 12 could be of varied structures to provide for varied desired surface finishes.

[0030] Also, a module 1, 10, 6/12 can be encased in a geotextile material, which may be water permeable or impermeable. It is also to be understood that apparatus described herein with reference to the drawings may comprise:-

1. A crop-drying floor where the modules are laid to form a false floor with some sort of cover put over them. The crop such as grain is placed on to this floor and then hot/cold air is blown under the floor. This air then forces itself up through the cover and filtrates through the crop, which has the effect of drying it.

2. The module could be laid under a driveway or path and used to clear the surface laid above from ice or snow in the winter. This could be done with the use of hot air, which in turn would be blown into the void created by the module thus heating up the area below the path or driveway that would in turn heat up the surface above it. This could provide a valuable service for the elderly or disabled during the winter months.

3. The module could be laid around houses as a multipurpose conduit in which electrical ducting and mains water piping could be run through. This would allow for maintenance points to be put in as well as segregating the majority of houses important connections into one place.

4. Using a shape other than a rectangle as the bases of the cell (e.g. a cross or a tube).

## Claims

1. Apparatus for providing through flow of a fluid, comprising a base unit which is adapted to receive a fluid, having a base, and boundary walls rising therefrom to define an open top, **characterised by** a substantially planar closure (6) for the open top, by the closure (6) being adapted for passage of fluid therethrough, and by there being respective means (7, 8) of the base unit (2) and closure (6) for interengagement of the base unit (2) and closure (6), whereby when the interengagement means (7, 8) are interengaged, a closed unit is obtained.
2. Apparatus according to claim 1, **characterised by** the closure (6) being perforated.
3. Apparatus according to claim 1 or claim 2, **characterised by** the closure (6) comprising a grid which supports the respective interengagement means of the closure.
4. Apparatus according to claim 3, **characterised by** the said means (7, 8) comprising a plurality of spaced members (8) depending from the grid (6) and laid out in a desired array.
5. Apparatus according to claim 4, **characterised by** the respective interengagement means (7) of the base unit (2) comprising spaced upright members rising from the base and laid out in an array corresponding with the desired array of the closure (6).

6. Apparatus according to claim 5, **characterised by** the members (8) of the closure (6) being female members and by the members (7) of the base unit (2) being male members. 5
7. Apparatus according to any of claims 4 to 6, **characterised by** the closure (6) being reversible so that the members (6) define spaces (11), and there being a plurality of inserts (12) which can be inserted into the spaces (11) to provide a generally planar surface. 10
8. Apparatus according to claim 7, **characterised by** each insert (12) having a part complementary in shape to a part of a respective member of the closure, and substantially of the same height thereof whereby to form a substantially planar surface. 15
9. Apparatus according to Claim 8, **characterised by** the female members (8) being tubular to provide fluid access to/from the base unit. 20
10. Apparatus according to any of claims 7 to 9, **characterised by** each insert (11) being selected from a group of materials comprising plastic, rubber, reclaimed rubber and concrete. 25
11. Apparatus according to claim 10, **characterised by** the inserts (11) being made by moulding. 30
12. Apparatus according to claim 11, **characterised by** the surface of an insert (11) remote from the interior of the apparatus being moulded with a desired surface pattern or finish (14). 35
13. Apparatus according to any preceding claim, **characterised by** comprising a storm water infiltration module.
14. Apparatus according to claim 13, **characterised by** the module comprising part of a paving system round a dwelling, swimming pool or under a path, road or drive. 40
15. Apparatus according to any of claims 1 to 12, **characterised by** comprising a crop-drying floor, suitably for grain. 45
16. A system, **characterised by** utilising a plurality of apparatus according to any preceding claim. 50
17. A system according to claim 16, **characterised by** the respective closure units (6) of adjacent base units being offset or overlapped whereby to tie the system together. 55

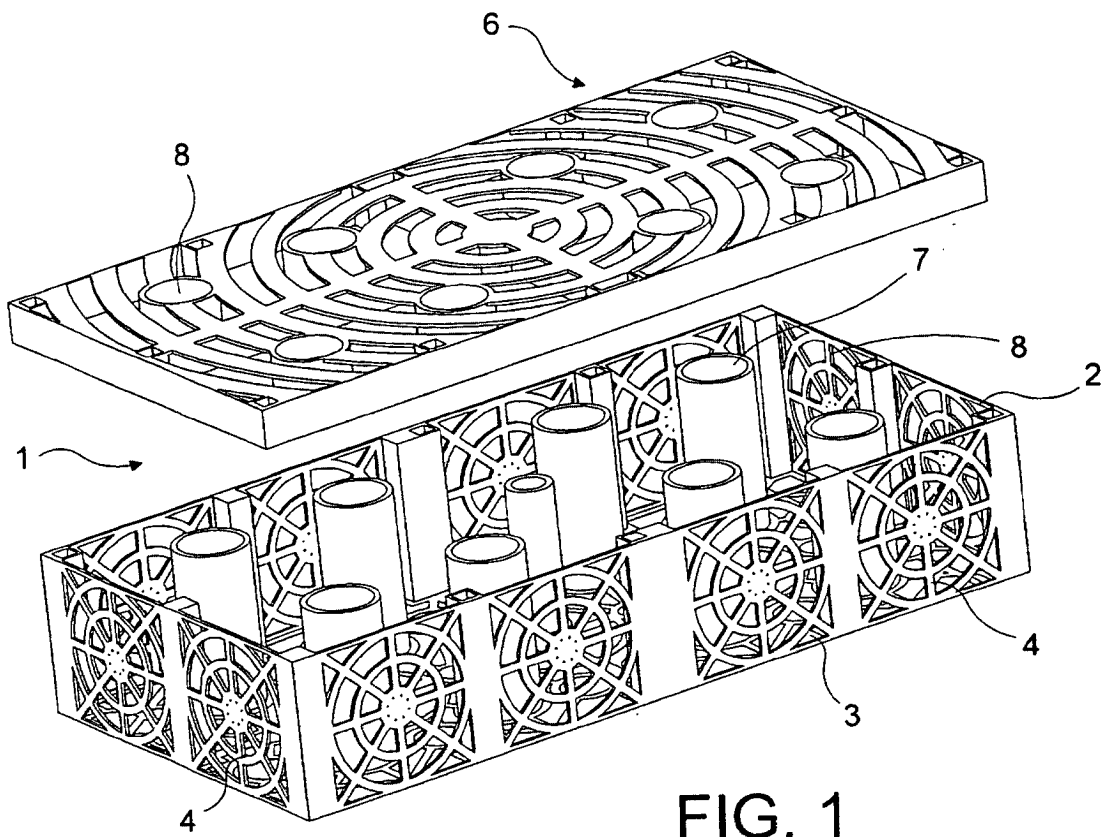
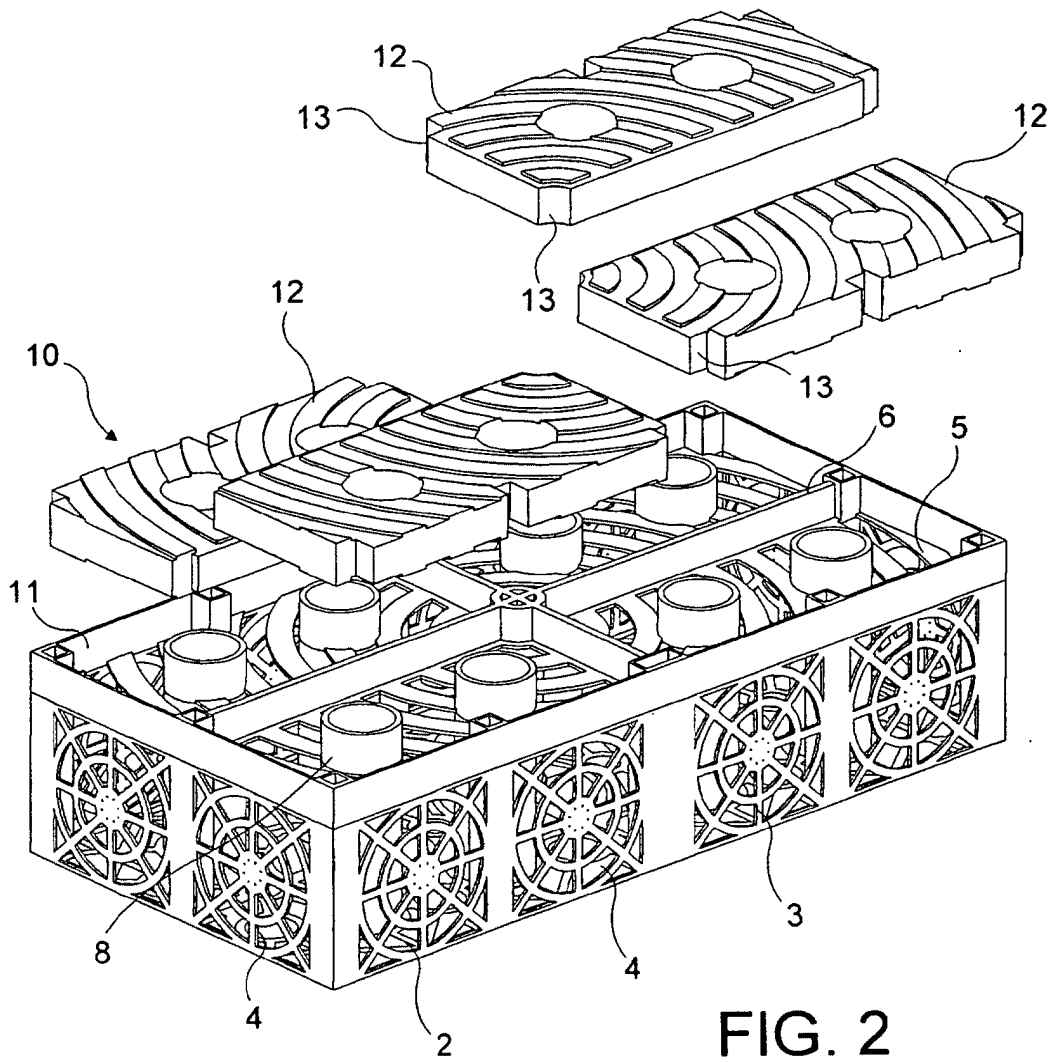


FIG. 1



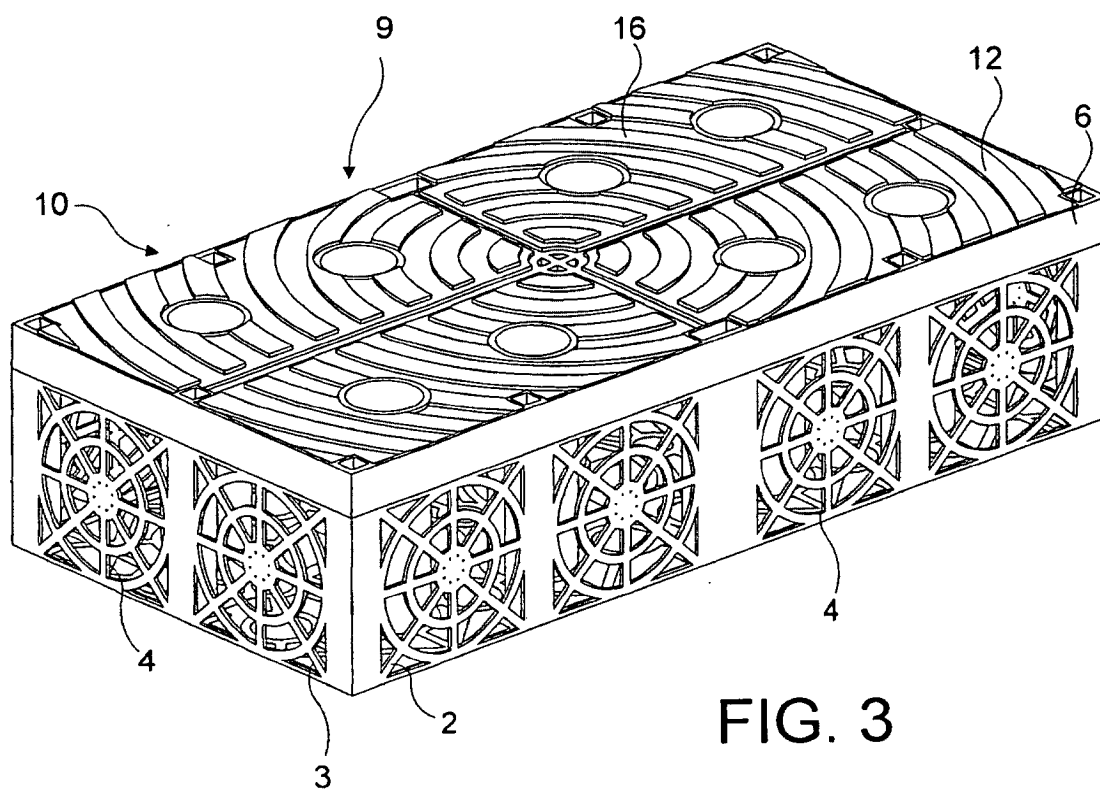


FIG. 3

