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(54) **PERMEABLE CAPSULE**

**Publication Classification**

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(52) **U.S. Cl.** ..... **210/165**

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(57) **ABSTRACT**

(22) Filed: **Mar. 24, 2010**

This invention designed a Permeable Capsule to make the traditional pavements such as asphalt, concrete, stone pavers to become permeable to stormwater. Permeable Capsule reduces water pollution and replenishes groundwater in paved areas. Permeable Capsule allows traditional asphalt, concrete, as well as block-pavers (existing or new) surfaces to become permeable.

**Cross Section of a Round Permeable Capsule**

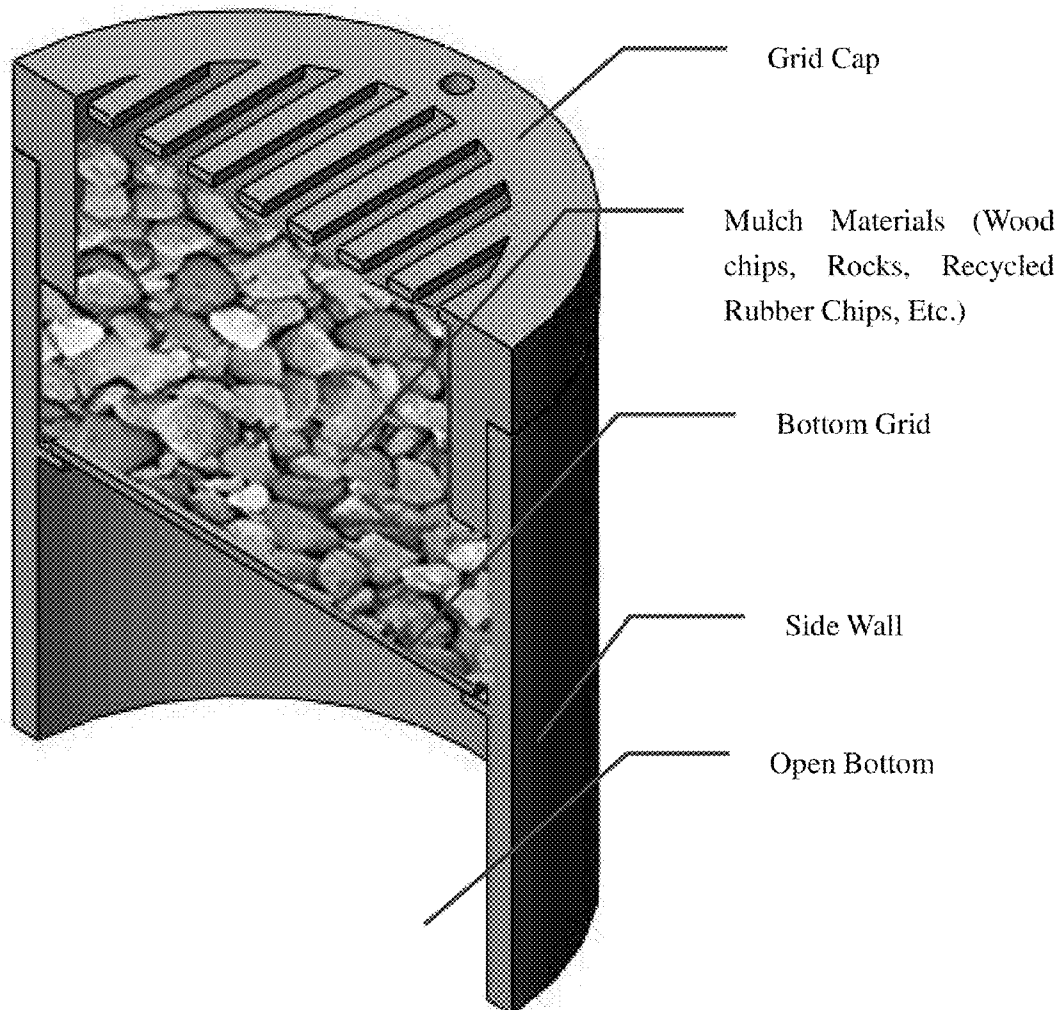


Figure 1A: Structure and Parts of a Round Permeable Capsule

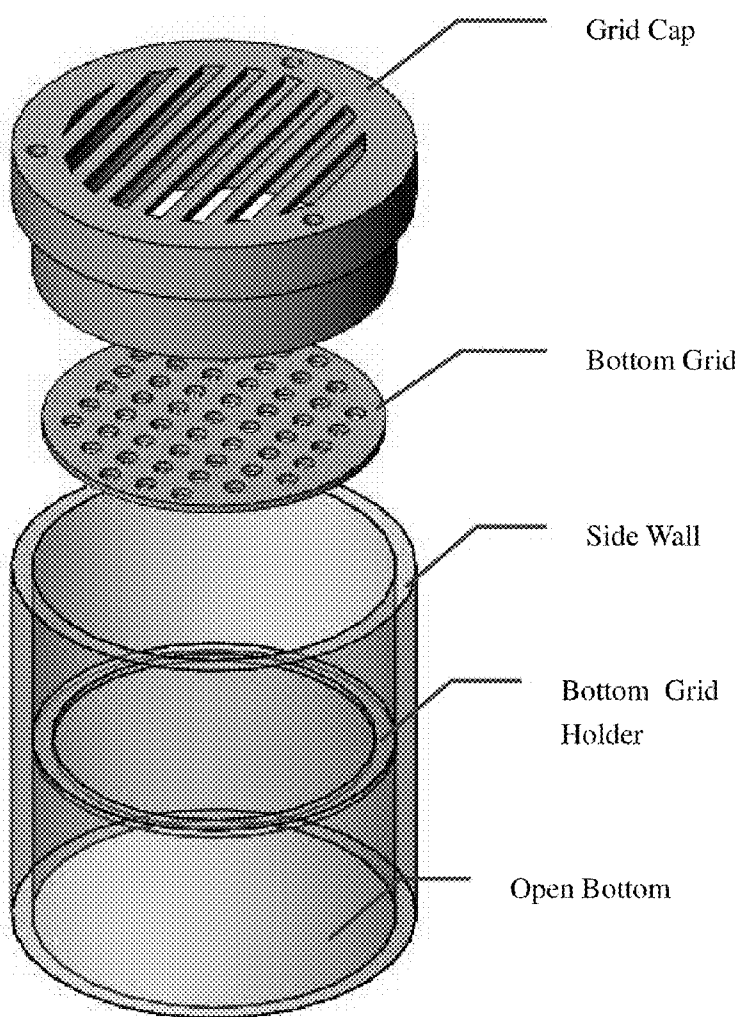


Figure 1B: Assembled Round Permeable Capsule

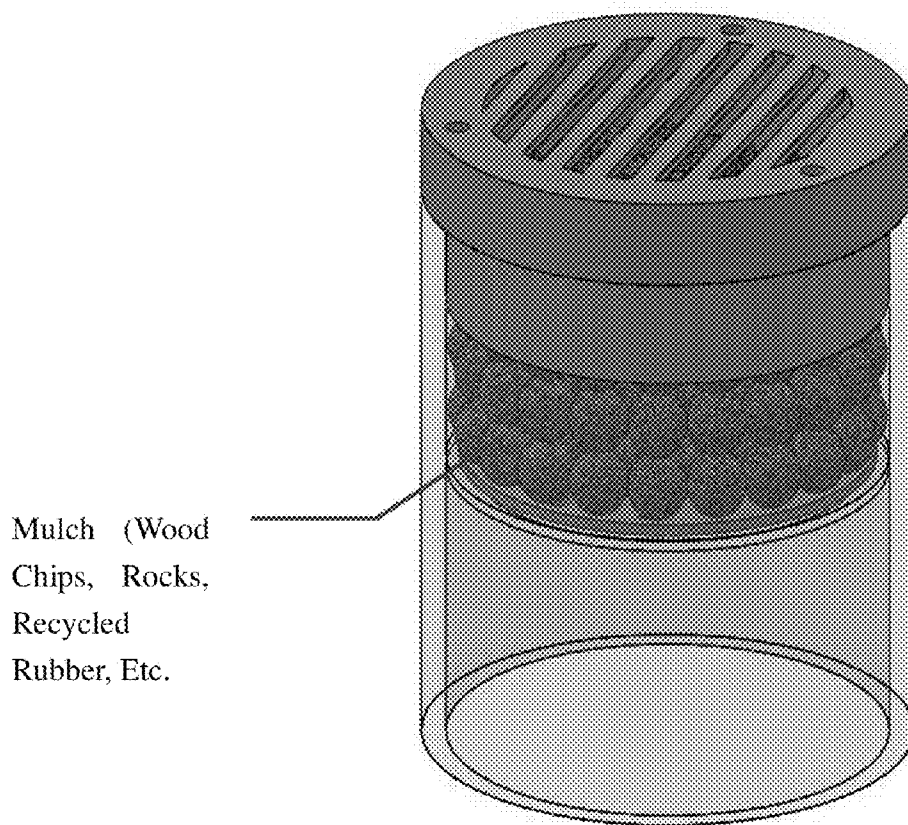


Figure 2A: Structure and Parts of a Rectangular Permeable Capsule

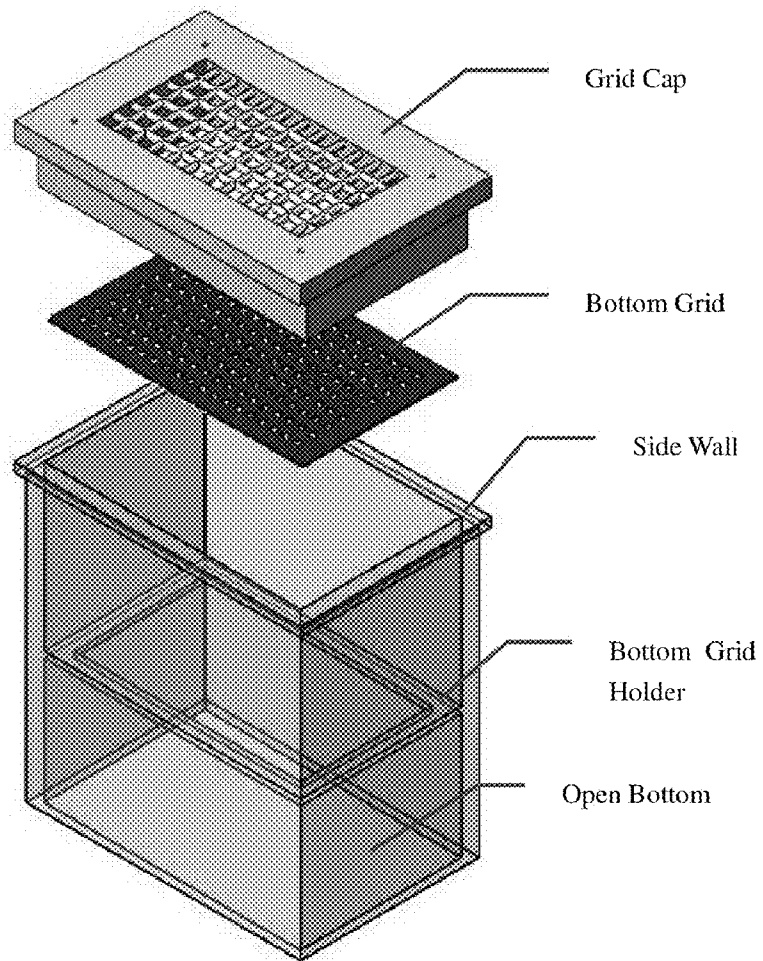


Figure 2B: Assemble Rectangular Permeable Capsule

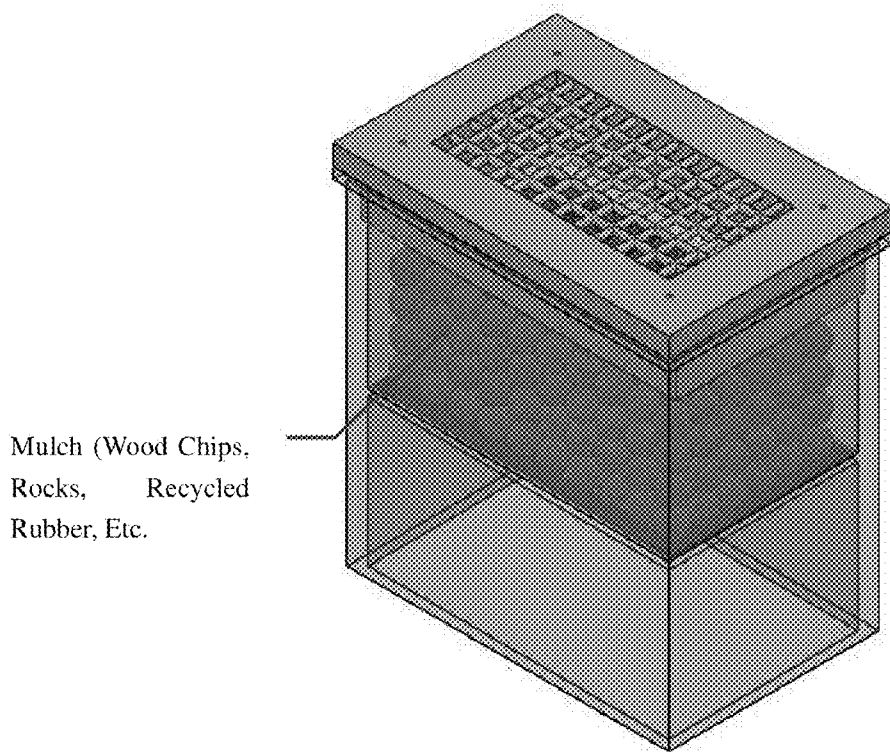


Figure 3: Cross Section of a Round Permeable Capsule

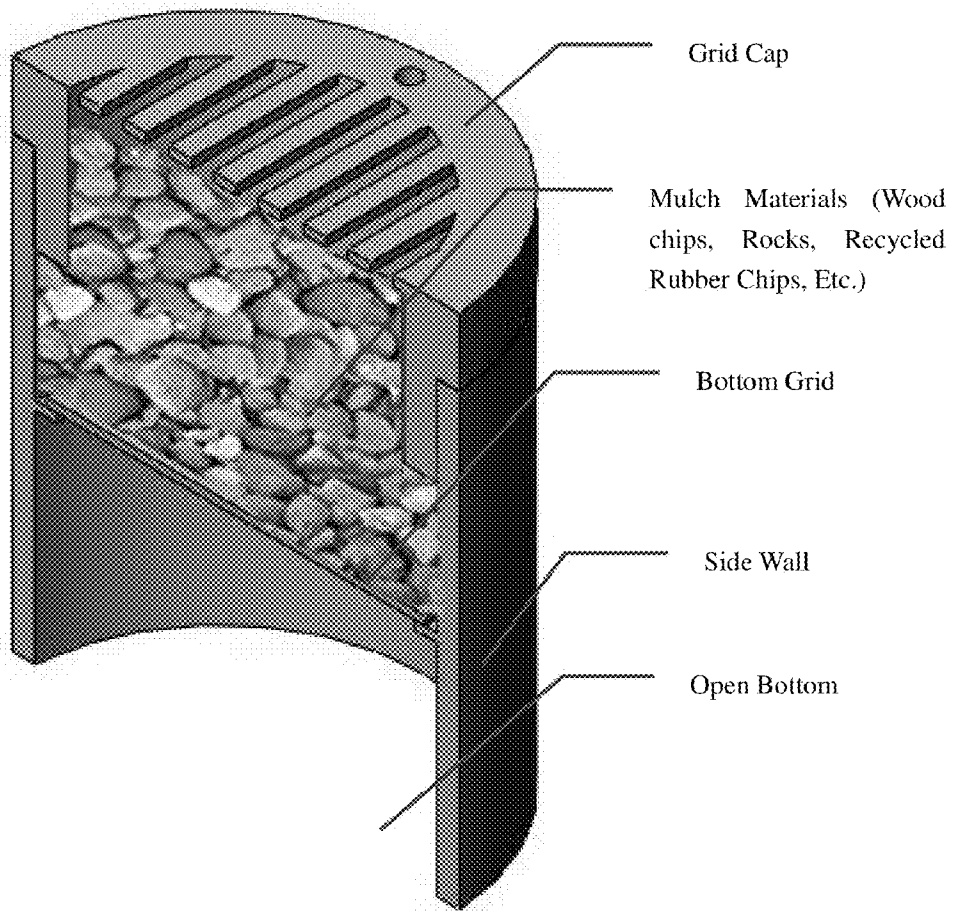


Figure 4: Cross Section of a Rectangular Permeable Capsule

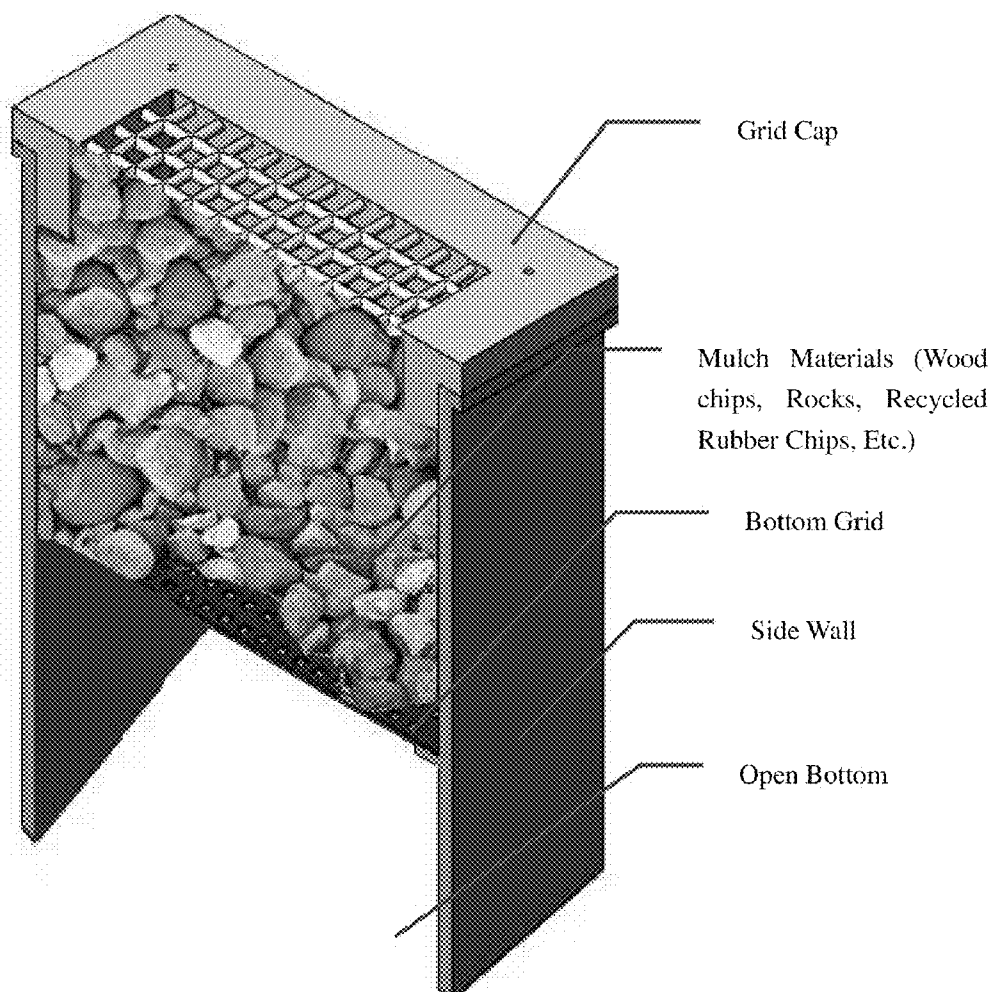
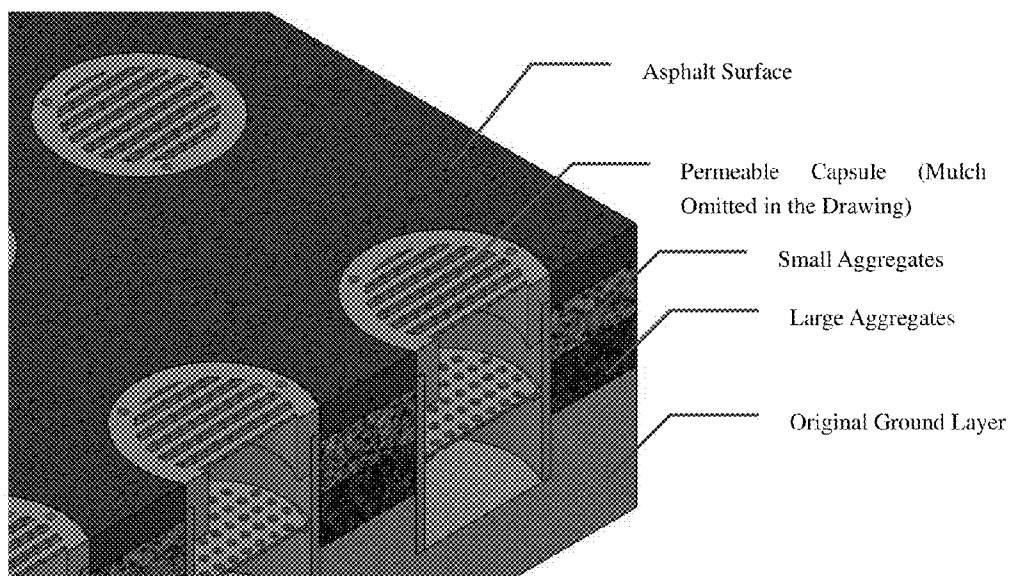
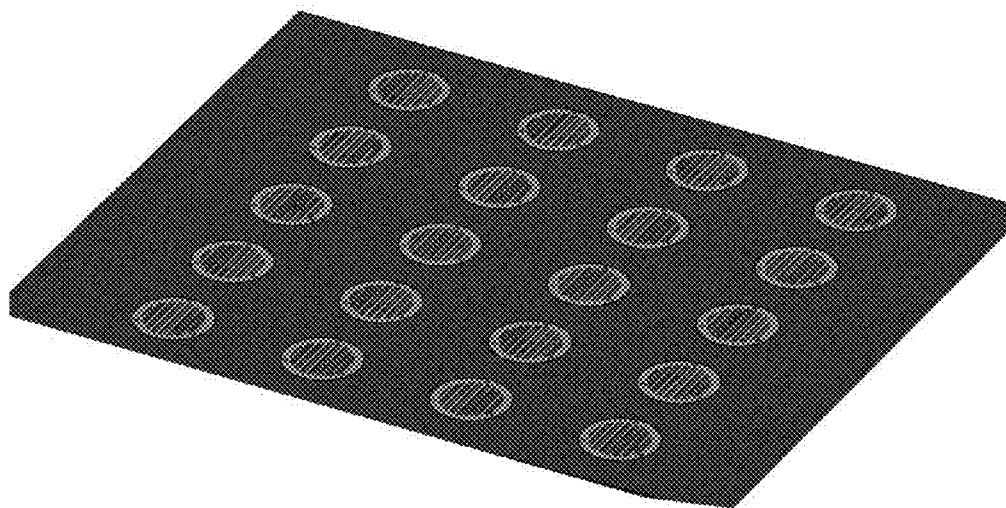


Figure 5: An Example of Round Permeable Capsules Installed on an Asphalt Paved Surface.



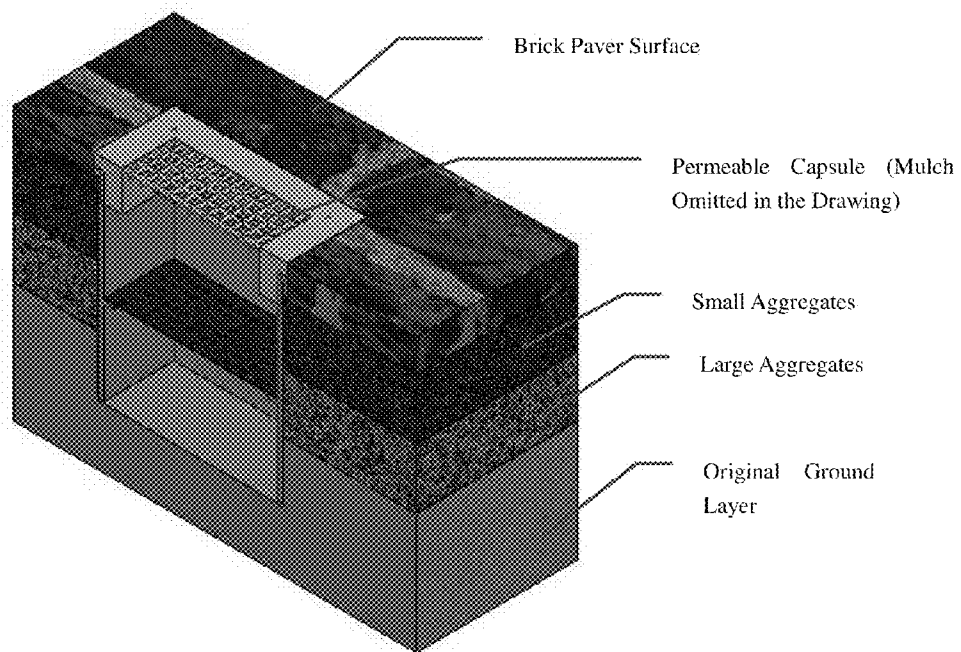
A: Installation Cross Section



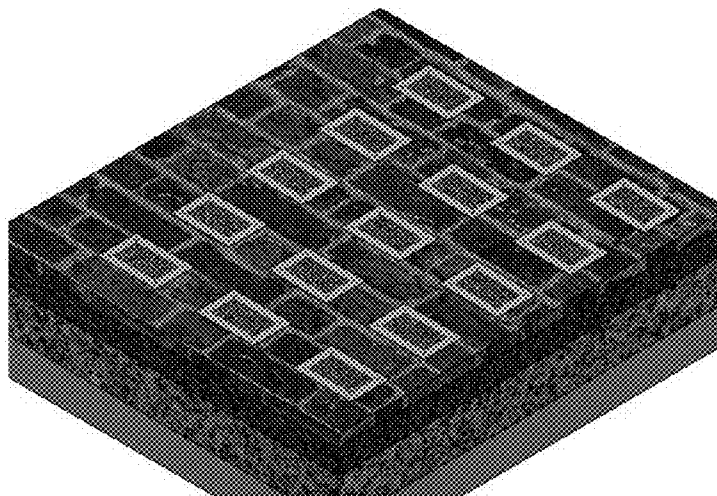
B: An Example of Permeable Capsules' Surface Layout



Figure 6: An Example of a Rectangular Permeable Capsules Installed on an Brick Paver Paved Surface.



A: Installation Cross Section



B: An Example of Permeable Capsules' Surface Layout

**PERMEABLE CAPSULE**

**BACKGROUND OF THE INVENTION**

[0001] Traditional pavements for roads, parking lots, walkways are impervious. In most cases, stormwater runs off the pavements to rivers or lakes through stormwater sewer systems. The runoff stormwater bypasses the ecological process of soil infiltration and groundwater recharge and brings pollutants to rivers and lakes directly. People have developed permeable asphalt, permeable concrete, and permeable pavers systems to address this issue. Permeable asphalt and concrete paving are based on the idea of building porous paved layers such that stormwater can percolate through to the soil below. Permeable pavers use open joints to allow stormwater to drain through to the soil below. All three permeable pavements have their advantages and disadvantages. The author of this invention presents a new permeable solution to paved surfaces of asphalt, concrete, and pavers: Permeable Capsule. Permeable Capsule can be used for new pavements or used onto existing pavements' conversions to permeable.

**SUMMARY OF THE INVENTION**

[0002] This invention designed Permeable Capsule to be used with traditional impervious pavements such as asphalt, concrete, and pavers. Permeable Capsules are installed (or embedded) on the pavements in a certain pattern. Stormwater flows into nearby Permeable Capsules and thus infiltrates into the soils below the pavements. A Permeable Capsule consists of open ended Side Wall (round, rectangle, or any other shapes that is strong enough to carry the traffic weights), Cap Grid, mulches (or similar materials that prevent the water evaporation from the soils), and Bottom Grid Cap Grid on top of Permeable Capsule levels with the surface the pavements. The bottom of the Permeable Capsule goes below the pavements. Permeable Capsules that are spread through out the pavements collect stormwater on paved surface and channel stormwater to soils under the pavements.

**BRIEF DESCRIPTION OF THE DRAWINGS OF THE INVENTION**

- [0003] FIG. 1A shows the structure and parts of a round Permeable Capsule.
- [0004] FIG. 1B shows an assembled round Permeable Capsule.
- [0005] FIG. 2A shows the structure and parts of a rectangular Permeable Capsule.
- [0006] FIG. 2B shows an assembled rectangular Permeable Capsule.
- [0007] FIG. 3 shows the cross section of a round Permeable Capsule.
- [0008] FIG. 4 shows the cross section of a rectangular Permeable Capsule.
- [0009] FIG. 5 is an example of installation of a round Permeable Capsule on an Asphalt surface.
- [0010] FIG. 6 is an example of installation of a rectangular Permeable Capsule on brick paver paved surface.

**DETAILED DESCRIPTION OF THE INVENTION**

**1. The Physical Structure**

- [0011] The invented Permeable Capsule consists of units (or modules) as follows:
- [0012] (a) Grid Cap (FIG. 1 and FIG. 2)
- [0013] Grid Cap allows stormwater to flow into Permeable Capsule and blocks out the big-size trashes. Grid caps are made of plastics or plastic-wood composite materials.
- [0014] (b) Bottom Grid (FIG. 1 and FIG. 2) is located below the Grid Cap. Water can flow freely through the Bottom Grid. Bottom Grids are made of plastics or plastic wood composite materials.
- [0015] (c) Side Wall (FIG. 1 and FIG. 2) is open at the top and bottom. Side Wall can take any shapes such as round in FIG. 1 and rectangular in FIG. 2.
- [0016] (d) The mulch space is the space that is under the Grid Cap and above the Bottom Grid and within the Side Wall. The mulch space is filled with permeable materials such as wood mulch, rocks, rubber mulch, etc.

**2. Operation of the Invented Permeable Capsule**

- [0017] Permeable Capsules are to be used on paved surfaces of highways, parking lots, and walkways. Permeable Capsules make these paved surfaces to become permeable. Here is how Permeable Capsule operates:
- [0018] (a) The surfaces of Grid Caps (FIGS. 1 and 2) are at the same level with paved surface (or a little lower, say 1 mm). Many Permeable Capsules are installed on the paved surface.
- [0019] (b) When stormwater flows to the Grid Caps, it flows into Permeable Capsules.
- [0020] (c) The water goes through the mulches, Bottom Grid, and bottom section of the Side Wall. The mulches seal water vapors below and prevent water losses from underground.
- [0021] (d) Stormwater infiltrates into the soils.
- [0022] (e) The height of Permeable Capsules can be adjusted to reach different levels of the pavements.

**CROSS-REFERENCES FOR THE INVENTION OF PERMEABLE CAPSULE**

[0023] There are no other patents that are close or similar to this invention from the US Patent search by this inventor.

- 1. This invention designed permeable capsule to be used on asphalt, concrete, and block pavers paved surface to allow stormwater to infiltrate into the grounds under such paved surfaces.
- 2. According to claim 1, Permeable Capsule consists of Grid Cap, Mulches, Bottom Grid, and Side Wall.
- 3. According to claim 2, Permeable Capsule can take various shapes and heights according to the needs. FIGS. 1 and 2 are two examples of round and rectangular forms of Permeable Capsules.
- 4. According to claim 2, Grid Cap filters out large objects such as leaves, papers, etc. and allows stormwater to flow into Permeable Capsule. Grid Cap can be made of materials such as plastics, wood-plastics composites, metals, and etc.
- 5. According to claim 2, the mulches that are under Grid Cap and on top of Bottom Grid allow stormwater to flow through. The mulches can be any of these materials as follows: wood chips (mulch), recycled rubber tire chips, rocks, and etc.

6. According to claims 2 and 5, the Bottom Grid holds mulches and allows stormwater to flow through. Bottom Grid can be made of materials such as plastics, wood-plastics composites, metals, and etc.

7. According to claims 2, 5, and 6, Bottom Grid can be mounted on the Side Wall or onto Grid Cap.

8. According to claims 2, 5, 6, and 7, Bottom Grid may not be used and to let mulches to sit on to the ground soil directly.

9. According to claim 2, the bottom of Permeable Capsule is open and allows stormwater to go to and infiltrate through the soils.

10. According to claim 2, Side Wall can be made of plastics, wood-plastic composites, metals, concrete, and etc.

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