United States Patent

Takanashi

[15] **3,685,298**

[45] **Aug. 22, 1972**

[54] **DRAINER**

[72] Inventor: **Michinobu Takanashi,** No. 5, 9-banchi, 2-chome, Sakae-cho, Higashi, Mirayamashi, Tokyo, Japan

[22] Filed: **Nov. 23, 1970**

[21] Appl. No.: **92,085**

[30] **Foreign Application Priority Data**

Nov. 27, 1969 Japan 44/112,110

[52] **U.S. Cl.**.....**61/11,** 61/13

[51] **Int. Cl.** **E02b 11/00**

[58] **Field of Search** 61/11, 13, 53, 4, 5; 52/738, 52/739, 740, 729

[56] **References Cited**

UNITED STATES PATENTS

3,086,627 4/1963 Bernard.....52/738

1,998,017 4/1935 Jaekle.....61/53

FOREIGN PATENTS OR APPLICATIONS

255,221 1964 Australia.....52/729

Primary Examiner—Jacob Shapiro

Attorney—Holman & Stern

[57] **ABSTRACT**

A subsoil drainer for draining seepage water, in which an elongated member has at least three radially projecting continuous ribs and continuous integral cross pieces on at least two of the radially projecting ribs. The drainer may be installed in subsoil singly or bunched together with like members to provide a quick and unblocked drainage of seepage water especially in reclaimed land.

6 Claims, 6 Drawing Figures

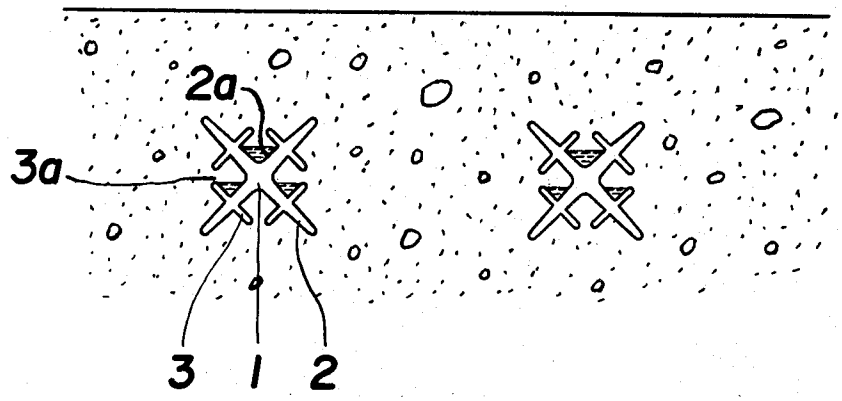


FIG. 1

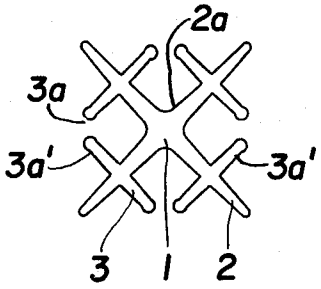


FIG. 4

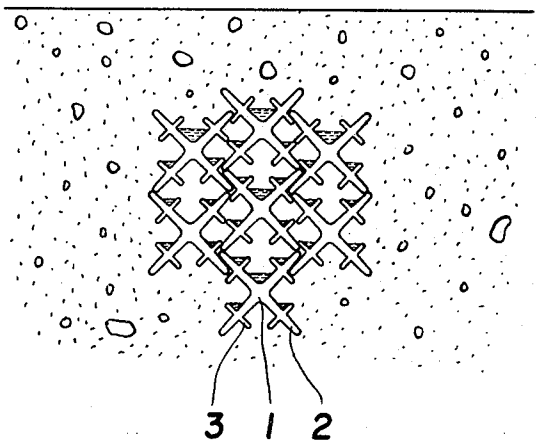


FIG. 2

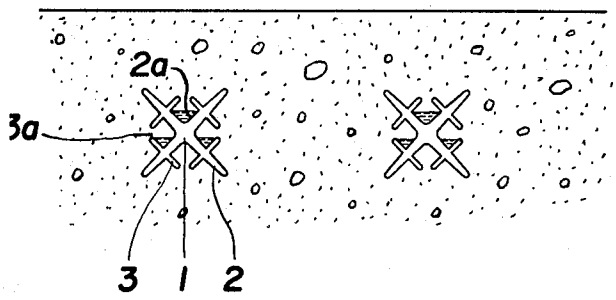


FIG. 5

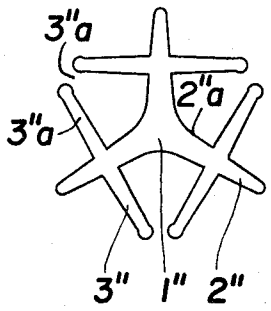


FIG. 3

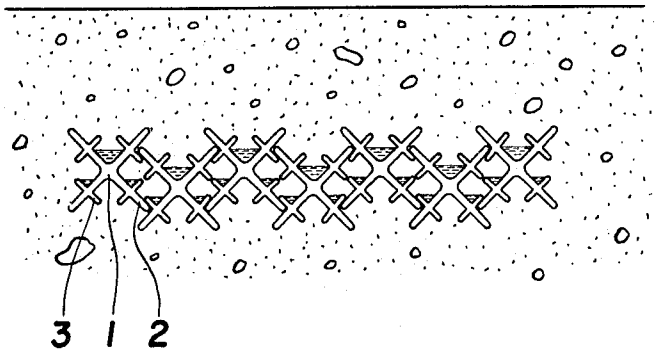
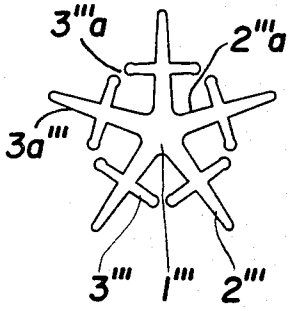


FIG. 6



INVENTOR.
Michinobu Takanashi
BY Holman & Stern

ATTORNEYS

DRAINER

BACKGROUND OF THE INVENTION

This invention relates to the drainage of soil and more particularly to a drainage means for installation in subsoil to provide for a fast and unblocked drainage of seepage water.

Perforated pipes are usually embedded under reclaimed ground to drain underground water but such pipes are not entirely satisfactory since the holes and joints are likely to be clogged.

SUMMARY OF THE INVENTION

Generally, the present invention is directed to a drainer for sub-soil use for draining seepage liquids including an elongated body member having at least three radially projecting continuous ribs, at least two of the ribs being provided with a crosspiece which extends continuously of the length of the rib and is located inwardly of the outer ends of the rib to provide a clearance between adjacent crosspieces which leads to a channel or drain opening between adjacent ribs.

BRIEF DESCRIPTION OF THE DRAWINGS

The drawings show embodiments of the present invention.

FIG. **1** is a view in end elevation of the drainer of the invention,

FIG. **2** is a diagrammatic view illustrating the use of the drainer shown in FIG. **1** alone is sub-soil,

FIG. **3** is a view similar to FIG. **2** illustrating the use of a plurality of the drainers shown in FIG. **1** arranged to provide a horizontal row in the sub-soil,

FIG. **4** is a view similar to FIGS. **2** and **3** illustrating the use of the drainer in FIG. **1** to provide a bundle of drainers installed in the sub-soil,

FIG. **5** is a view in end elevation showing a second embodiment, and

FIG. **6** is a view in end elevation showing a third embodiment.

DETAILED DESCRIPTION OF THE INVENTION

The present invention provides a drainer which overcomes the objections to the perforated pipes previously mentioned and FIG. **1** illustrates one embodiment of the present drainer which is constituted by an elongated horizontal body **1** made of a synthetic resin such as a flexible polyethylene or acrylonitrile-polyethylene copolymer or a material possessing similar characteristics with four ribs **2** projecting radially therefrom, each rib being provided with a cross piece **3** having a portion **3***a* projecting radially from each surface of the rib **2**, there being a clearance **3***a* between adjacent crosspieces **3** which leads to a channel or drain opening **2***a* between adjacent ribs **2**.

Now, in the use of the drainer body **1** installed alone as in FIG. **2**, it will be appreciated that water penetrating into the ground because of rain or snow enters the channels **2***a* between the ribs **2** via **2** and the clearance **3***a* between adjacent crosspieces **3** and is led to a drainage. Further, sand and stones may flow in together with water. However, sand and stones larger than the clearance **3***a* are stopped from entering channel **2***a*.

Even though those items smaller than the clearance **3***a* enter the channel **2***a*, they may be discharged by the

water flowing in. A large quantity of water flows in through all the channels **2***a* in the lengthwise direction of the body **1**. Further, the projecting end of a bottom rib **2** bites into the ground and can be positively positioned.

FIG. **3** shows the drainers as connected in parallelism with respect to the ground surface. They function similarly as in the case of using them singly. Where the drainers are in contact with each other, as they are flexible, they are flexed by the pressure of the earth and the edges of the ribs and are not in sealing contact with each other, but form clearances therebetween the drainers therefore act in the same manner as when they are respectively alone and can drain a large quantity of water.

FIG. **4** shows the drainers installed in a bundled or bunched formation. In the same manners as explained with reference to FIG. **3**, water enters the channels through all the clearances and a large quantity of water can be quickly drained. The drainers in any arrangement can be advantageously installed with a slope for drainage.

FIG. **5** shows another embodiment having three ribs **2''**. FIG. **6** shows a further embodiment having five ribs **2'''**. If the one in FIG. **1** and these are combined and used bundled, the clearances **3'''***a* and channels **2'''***a* are formed and therefore water can be drained effectively and quickly.

In the present invention, as underground water is drained by using the same or different drainers, alone or combined as described above, the arrangement is such that channels in the lengthwise direction of the drainer become paths or drain openings for water coming in and are not clogged as is true of perforated pipes. Moreover, the drainers can be mass-produced by extrusion-molding and are therefore inexpensive.

Further, due to its flexibility, long drainers can be conveyed as wound and can be made seamless and therefore the conveying and working costs can be saved very much.

Further, the projecting end of a bottom rib **2** is likely to bite into the earth. Therefore, there are remarkable effects in that, in a reclaimed ground, not only underground water can to some extent be drained but also a landslide can be prevented.

What I claim is:

1. An elongated drainer for sub-soil use for draining seepage liquids, comprising an elongated body having at least three radially projecting continuous ribs, each rib being provided with a crosspiece which extends continuously throughout the length of the rib inwardly of the outer end of the rib, each crosspiece having a portion extending substantially perpendicularly from each face of the rib, and there being a clearance between adjacent crosspieces which leads to a channel provided between adjacent ribs providing a flow path for the liquid lengthwise of the elongated body.

2. The drainer as claimed in claim **1** in which said body, ribs and crosspieces pieces are of a synthetic resin.

3. The drainer as claimed in claim **2** in which said body, ribs and crosspieces are of extruded flexible polyethylene.

4. The drainer as claimed in claim **2** in which said body, ribs and crosspieces are of extruded flexible acrylonitrile-polyethylene.

5. A sub-soil seepage drainer-assembly, comprising a plurality of drainers as claimed in claim **1**, arranged in a bundled longitudinal assembly.

6. A sub-soil seepage drainer assembly comprising a plurality of drainers as claimed in claim **1**, arranged in longitudinally adjacent abutting relation.

* * * * *