

PATENT SPECIFICATION

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(54) DRAINAGE PLATE

(71) We, CARL FREUDENBERG, a German Company (a Kommanditgesellschaft the present personally responsible partners of which are HELMUT FABRICIUS, HANS ERICH FREUDENBERG, OTTO SCHILDHAUER, HERMAN FREUDENBERG, DITER FREUDENBERG and REINHART FREUDENBERG) of 6940 Weinheim Bergstrasse, Hohnerweg 2, West Germany, do hereby declare the invention, for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a drainage plate which can be of particular utility in building construction and hydraulic engineering.

German Offenlegungsschrift No. 1 809 047 discloses water-permeable, coarse-pored, compact drainage elements consisting of foam-like plastic particles bonded to one another by an organic bonding agent, so that an externally rigid, substantially inelastic structure is obtained. The use of such drainage elements is essentially restricted to fields of application in which there are no great tensile or bending stresses. The homogeneous structure of these drainage elements has proved to be unsuitable for certain applications because they tend to become clogged inside with slime or to silt up relatively quickly under unfavourable conditions. The slight suction effect of a drain or drainage channel equipped with such drainage elements is greatly impaired in this way. If unfavourable conditions exist, the elements may quickly fail completely.

It would then be desirable to provide a drainage plate which overcomes these difficulties and which is usable universally both in building construction and in hydraulic engineering.

According to the invention, a drainage plate comprises particles of a cross-linked close-cell polyolefin foam, in which the particles are

fused together and in which there is a progressive increase in the average diameter of the particles from one face of the plate to the other. In use, the face having the larger particles should be the under face.

As a result of having the particles fused to one another, rather than being bonded by a bonding agent, various advantages are obtained. The plate is of increasing resilience and thus conforms more readily to ground movements, whereas a bonding agent usually provides an unresilient plate that may break. A bonding agent may lead to contamination of the ground water as well as detracting from the outer appearance of the finished articles.

The particles used in the invention are preferably of a cross-linked closed cell polyethylene foam. Each particle is foamed so that it consists of a plurality of closed cell pores which generally are each 0.1 to 2 mm, and preferably 0.6 to 1.2 mm, in diameter. It is easily possible to fuse such particles to give drainage plates of the invention having resilience and good bearing strength. Preferably, the average diameter of the particles on one face of the plate (the upper face in use) is between 3 and 15 mm, while on the other face (the under face in use) it is between 10 and 40 mm.

The external shape or form of the drainage plate according to the invention may be varied within extremely wide limits depending upon its intended use. For example, whereas a simple, compact rectangular profile is preferred for the drainage of roof gardens, for reasons of working procedure it is frequently more suitable for draining land to give the plate the form of a continuous band or strip which can be unwound from a drum if necessary and laid directly in the ground. Generally the thickness of the plate is considerably less (e.g. 0.5 to 10 cm, preferably 1 to 5 cm) than either its width or length

(generally at least 10 cm and often at least 20 cm).

Generally the plate is flat but it is sometimes preferable for the face having the larger particles, the under face in use, to have parallel-arranged grooves, the profile of which is preferably similar to that of a sine curve. The following Example shows how a drainage plate according to the invention can be made.

Example

A closed cell, foamed, cross-linked polyethylene band is milled to produce particles of diameters ranging from 3 to 40 mm. The particles are distributed in several uniformly thick layers on a wire screen, in such a way that there is a gradation in particle size through the layers. The screens are used to transport the particles through a jet dryer which can have 40 to 100 jets arranged laterally to the working direction of the screens. Hot air of about 145°C streams out of these jets at about 2.8 m/s and is sucked through the transportation screens. The individual particles on the screens are thus warmed and their surfaces become sticky.

As a screen nears the end of the jet dryer another wire screen covers the particle layer. The distance between the two screens decreases as the structure nears the end of the jet dryer thus reducing the thickness of the layer and fusing the particles together to form the drainage plate.

A plurality of pressure rollers are arranged at the end of the screen so that grooves can be made in the plate.

A particular advantage of such a plate is that the increasingly coarser structure of the drainage plate, in the downward direction, substantially excludes any clogging. Moreover, due to the extremely large cross-

section of the drainage channels formed by the grooves on the underside, excellent removal of water is ensured.

Depending on the design of profile and the choice of material, the drainage plate according to the invention has varying mechanical strength and also excellent stability of shape. In particular it is rated as being extremely advantageous that, even following ground subsidence, damage which would have resulted in serious impairment of the intended draining action has hardly ever been observed.

WHAT WE CLAIM IS:—

1. A drainage plate comprising particles of a cross-linked closed cell polyolefin foam, in which the particles are fused together and in which there is a progressive increase in the average diameter of the particles from one face of the plate to the other.
2. A drainage plate according to claim 1 in which the particles are of a cross-linked closed cell polyethylene foam.
3. A drainage plate according to claim 1 or claim 2 in which the average diameter of the particles is between 3 and 15 mm on one face of the plate and between 10 and 40 mm on the other face.
4. A drainage plate according to any preceding claim in which the face having the larger particles has parallel-arranged grooves, the profile of which are similar to that of a sine curve.
5. A drainage plate substantially as herein described with reference to the Example.

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