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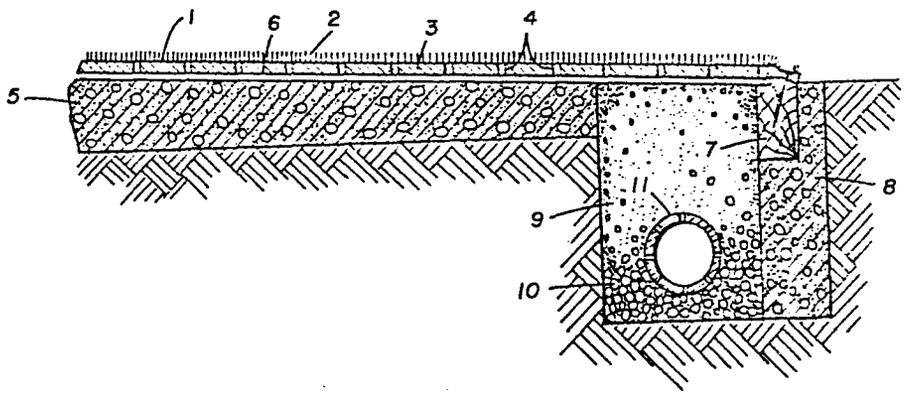
(54) Rapid draining artificial turf playing field.

(57) A rapid drying playing field of water-permeable artificial turf adhered to a perforated closed-cell, polymeric foam pad which is loose laid on a sloped impervious base to form an interface there-between. Rain water permeates the artificial turf and pad and flows in the interface under the floating turf and pad.



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RAPID DRAINING ARTIFICIAL TURF PLAYING FIELD

This invention pertains to a rapid draining playing field of artificial turf.

A variety of designs for playing fields have been proposed to extend recreation time into periods of rain and to provide a quality playing surface immediately after periods of rain. In cases where a flat field is required, for instance baseball outfields, water has been removed mechanically by blowers or vacuum cleaners. Alternatively a wide variety of constructions have been proposed to assist in water removal from flat playing surfaces. U.S. Patent 2,837,984 discloses a quick drying tennis court comprising layers of granular limestone over a clay base. U.S. Patent 1,763,782 discloses a playing field of fibrous mats inserted in a drained cement basin. U.S. Patent 1,906,494 discloses a playing surface comprising a layer of felt, a layer of pervious concrete and a bedding of course stone or broken stone.

Grass-like artificial turf systems have been proposed as an alternative to high maintenance surfaces such as golf putting greens which, although not necessarily flat, have been required to be highly permeable. See, for instance, U.S. Patents 2,515,847; 3,740,303; and 4,007,307; and Canadian Patent 886,152 which disclose artificial turf over permeable layers of sand, gravel, stone, rubber, plastic chips and the like. While such playing fields appear to provide some degree of permeability, they do not appear to have a base with sufficient stability to maintain a smooth playing surface even with only occasional traffic of maintenance vehicles. Accordingly, in recent years flat playing fields have been designed with both advantageous permeability and a strong,

stable base by overlying artificial turf on a base of permeable concrete. Permeable concrete bases were proposed as early as 1930 in U.S. Patent 1,906,494 which relates to playing surfaces comprising a layer of felt, a layer of pervious concrete and a bedding of course stone or broken stone. Permeable asphaltic concrete has also been utilized as a base for athletic fields of artificial turf. See, for instance, U.S. Patent 4,515,839.

In other cases sloped surfaces of about a 1 to 2 percent grade have been provided to assist rain water runoff from playing fields which may be utilized for such sports as American football and association football (soccer). Sloped playing fields may be provided with interceptors as disclosed in U.S. Patent 3,611,729 which discloses vertical slots extending through the top layer of a natural turf field and in U.S. Patent 3,625,011 which discloses covered trenches for installation in an artificial turf field. In such cases fields of artificial turf comprise an impervious layer requiring slopes, for instance of about a 1 to 2 percent grade on American football fields to provide water runoff. In some cases the impervious layer of artificial turf has been provided because the turf itself comprises artificial blades of grass tufted into a backing which is covered with an impervious layer of polymer to assist in retaining the tufts of artificial turf in the backing. In other cases the impervious layer has been provided because a pervious layer of artificial turf was glued to a polymeric shock-absorbing pad and/or such polymeric shock-absorbing pad was glued to the sloped subbase. Although the use of sloped playing fields of artificial turf do allow water to run off, the water

tends to run off through the blades of artificial turf which provides considerable resistance to hydraulic flow. Such fields are generally crowned in the center with slopes, for instance, of about 1 percent toward the sidelines. The center portions of such sloped fields, for instance near the crowned center, generally stay somewhat dry. However, because of the resistance to water flow provided by the blades of artificial turf, water level builds up toward the sidelines with water flow often rising over the tops of the blades of artificial turf creating an undesirable level of water especially near the sidelines.

By this invention applicants have provided a rapid draining playing field of artificial turf for use on sloped fields having a non-permeable base. This invention allows for rapid draining of such playing fields without heretofore undesirably high levels of water near the sidelines of such an artificial turf playing field. This has been achieved by utilizing a perforated, closed cell, polymeric shock-absorbing pad having a substantially flat lower surface. Rain water passes through permeable artificial turf and the perforations in the polymeric shock-absorbing pad. The shock-absorbing pad is loose laid on a sloped, non-permeable base which allows for water which permeates the pad to float the layers of artificial turf and pad as it flows in the interface between loose laid pad and the sloped subbase.

SUMMARY OF THE INVENTION

This invention provides an artificial turf playing field comprising a laminate of an upper layer of water permeable artificial turf adhered to a lower layer of a perforated, closed-cell, polymeric foam, shock-absorbing pad having a substantially flat lower surface. The pad is loose laid on a sloped, non-permeable base to form an interface therebetween. The

laminate of artificial turf and shock-absorbing pad has a specific gravity less than water whereby rain water falling on a playing field can permeate the laminate causing the laminate to float on a layer of water flowing in the interface.

BRIEF DESCRIPTION OF THE DRAWINGS

The figure schematically illustrates an aspect of this invention where a laminate of artificial turf and a polymeric pad is loose laid over a sloped non-permeable base to provide an interface for water flow under the laminate to a drain at the margin of the playing field.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

By this invention applicants have provided an artificial turf playing field where a laminate of artificial turf and shock-absorbing pad are loose laid on a sloped non-permeable base to form an interface through which water can flow under the floating artificial turf pad to provide a rapid draining playing field. With reference to Figure 1 which illustrates one embodiment of the invention, there is shown a laminate 1 of an upper layer of water permeable artificial turf 2 adhered to a lower layer of a closed-celled, polymeric foam, shock-absorbing pad 3. The pad has a plurality of perforations 4 and a substantially flat lower surface. The laminate is loose laid on a sloped, non-permeable subbase 5 forming an interface 6 therebetween. Rain water falling on the playing field can permeate the layer of artificial turf 2 and flow through the pad through the perforations 4 to the interface 6. The laminate has a specific gravity less than water allowing the laminate to float on water flowing in the interface 6 along the surface of the sloped, non-permeable base to a drain 9 which can, for instance, comprise a trench filled with an aggregate 10. A perforated conduit 11 can serve to remove water accumulated in the trench.

The margin of the playing field can be secured in any desirable way for instance by nailing the laminate to a board 7 affixed to a concrete anchor 8.

Although portions of the artificial turf playing field will float on a layer of water running off the sloped subbase, the playing field will remain stable because the playing field is anchored at its margins and because the center of the playing field at the crown of the sloped surfaces will not accumulate sufficient water to float the field at the center. In this regard a slope of as little as about one percent is sufficient to provide rapid drainage of water through the interface between the artificial turf/pad laminate and the non-permeable base. It is critical that the laminate of the layer of permeable artificial turf and closed-cell, polymeric foam, shock-absorbing pad have a specific gravity of less than water in order for the laminate to float on water draining from the field. It is further critical that the polymeric pad be closed cell to avoid absorption of water into the pad which would increase the bulk density of the laminate such that flotation will not occur. In a preferred aspect of the invention the pad will have a thickness greater than the head of water required to float the laminate so that the water level at the floating pad is below the level of artificial turf.

Artificial turf is well known to those skilled in the art and any artificial turf which is permeable to water may be used in the practice of this invention. In a preferred aspect of this invention the permeable artificial turf will comprise a knitted artificial turf which is inherently water permeable. When such knitted artificial turf comprises nylon blades of artificial turf knitted onto a polyester backing the artificial turf may tend to elongate or shrink depending on ambient conditions. Accordingly it is desirable that such artificial turf be adhered to the polymeric pad.

A polymeric pad used both in the playing field of this invention comprises a polymeric foam of an interpolymer of polyvinyl chloride and nitrile rubber having closed cells. Such pads can have a thickness ranging from about 1/4 to 1 inch (6.3 - 25.4 mm). To provide adequate drainage of water through the laminate the pad should have a plurality of perforations. Useful perforations can have diameters as small as 1/8 inch (3 mm) or as large as 1/2 inch (12.7 mm) or larger. The perforations can be spaced as close as 2 inches (5 cm) or less or as far apart as 6 to 8 inches (15-20 cm) or more.

In one preferred embodiment a polymeric pad that was demonstrated to be useful had a thickness of about 5/8 inch (16 mm) with 3/8 inch (9.5 mm) perforations on 3 inch (7.6 cm) centers. Such pad had a specific gravity of about 0.12, and correspondingly had a basis weight of 0.39 lb/ft^2 (19 Pa). Glued to the pad was a layer of artificial turf comprising nylon blades knitted to a polyester backing. The artificial turf had a basis weight of 0.48 lb/ft^2 (23 Pa). The glue was applied at a basis weight of about 0.1 lb/ft^2 (5 Pa). The combined basis weight of the laminate was 0.97 lb/ft^2 (47 Pa). When floating the water level rose to a height of about 3/16 inch (4.7 mm) on the 5/8 inch (16 mm) thick pad, well below the level of the artificial turf.

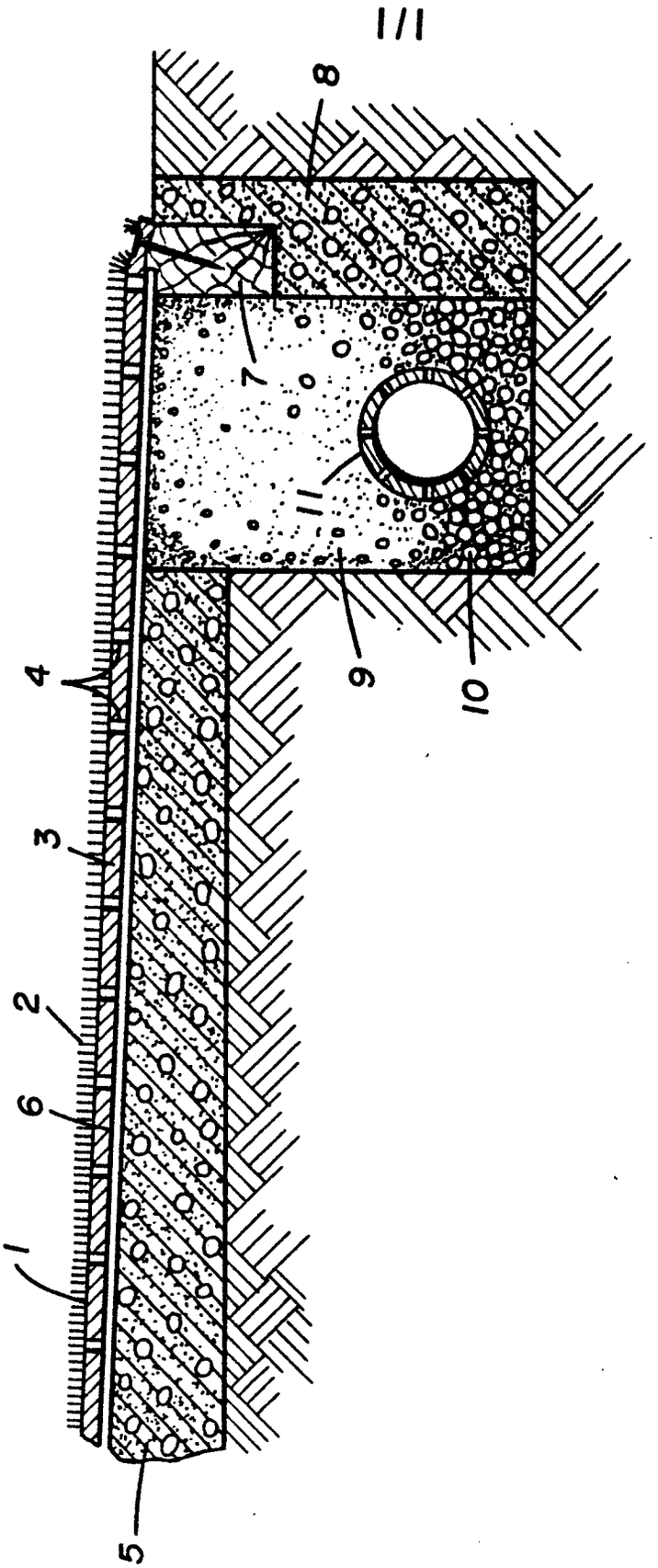
While specific embodiments of the invention have been described, it should be apparent to those skilled in the art that various modifications thereof may be made without departing from the true spirit and scope of the invention. Accordingly it is intended that the scope of the following claims cover all such modifications which fall within the full inventive concept.

Claims:

1. An artificial turf playing field comprising a laminate of an upper layer of water permeable artificial turf adhered to a perforated lower layer of a closed cell, polymeric foam, shock absorbing pad having a substantially flat lower surface; said pad being loose laid on a sloped non-permeable base to form an interface therebetween; wherein said laminate has a specific gravity less than water, whereby rain water falling on said playing field can permeate said laminate, causing said laminate to float on a layer of water flowing in said interface.

2. The playing field of claim 1 wherein said pad has a thickness greater than the head of water required to float said laminate.

3. The playing field of claim 2 wherein a major portion of said base has a slope of at least about one percent.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