

[54] ARTIFICIAL GRASS SPORTS FIELD

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[58] Field of Search 161/62, 66, 38, 67, 160, 161, 161/39, 21; 272/56.5 SS; 273/25, 55 R, 176 J; 94/7

[56]

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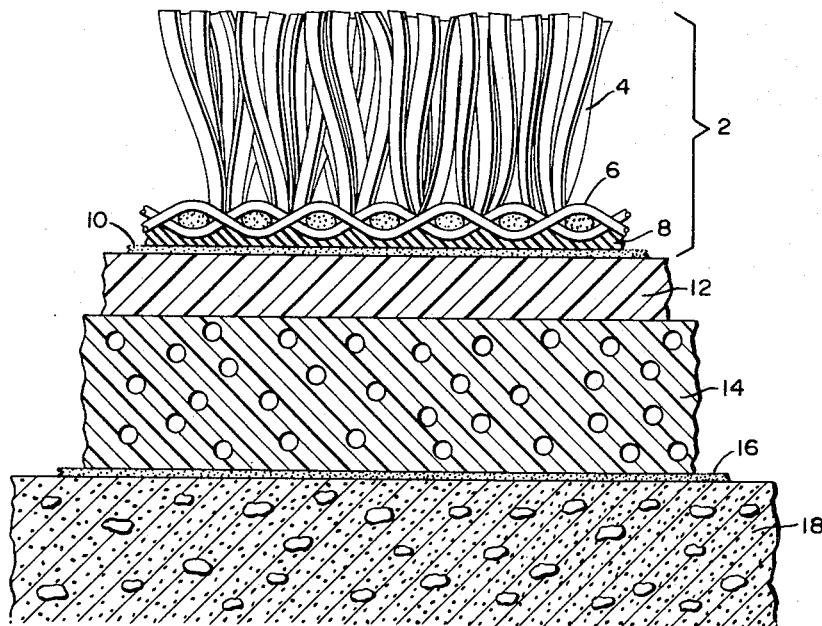
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[57]

ABSTRACT

The invention is a composite sports field in which the top surface is artificial grass, the next layer (down) is a layer of shock dissipating material, the next layer is a shock-absorbing material, and the bottom layer is a foundation which preferably is an asphalt composition suitably crowned to effect proper drainage.

7 Claims, 2 Drawing Figures



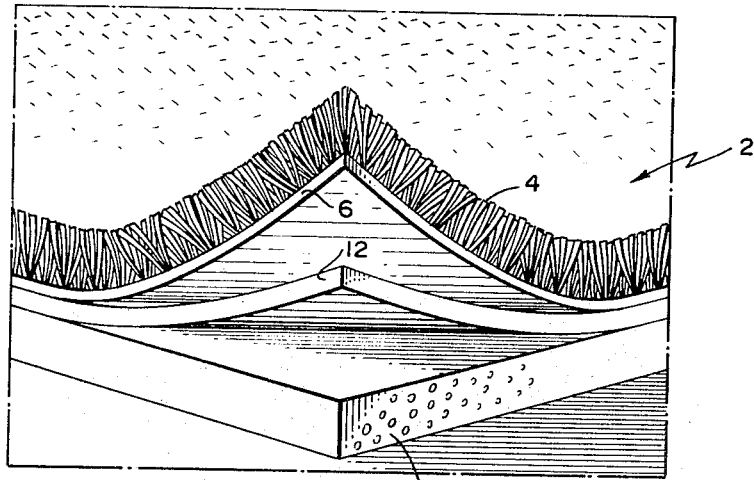


FIG. 1

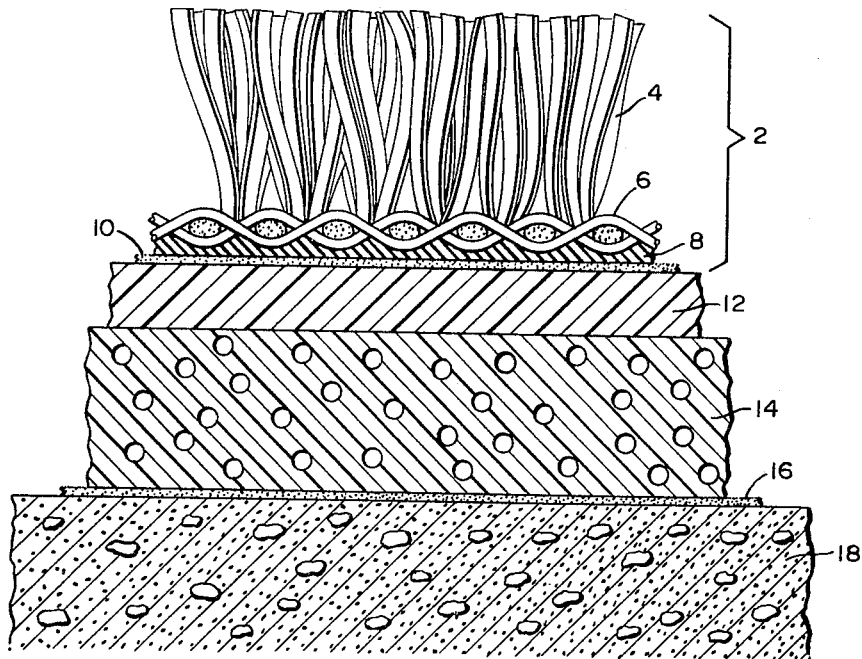


FIG. 2

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ARTIFICIAL GRASS SPORTS FIELD

BACKGROUND OF THE INVENTION

During recent years, considerable development has occurred in playing fields for sports which use an artificial turf as a top surface. The artificial turf is sold by several companies, these materials being sold, for example, under the trademarks POLY-TURF, TARTAN, etc. However, difficulty has been experienced in providing such a playing surface that would have a proper "feel" to, for example, football players, and which would also provide a much desired shock-absorbing and shock-dissipating quality. Other problems in connection with such artificial fields, particularly football fields, is the need of such fields which are rugged and tough, have long life, and require a minimum of maintenance.

These problems, combined with the necessity of providing the proper "feel" which enables the players to feel reasonably secure on the playing field, and shock-absorption and dissipation characteristics in order to minimize injury to the players of contact sports such as football, soccer, etc. have hitherto not been solved.

Accordingly, it is one object of this invention to provide an artificial composite playing field having means therein which absorbs shocks.

Another object of the invention is to provide a field of the above kind, but in addition has means for dissipating shock and impact throughout a relatively wide area.

Yet another object of the invention is to provide an artificial playing field of the above kinds in which the surface of the playing field is crowned to provide proper drainage.

Other objects will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, ingredients and combinations of ingredients, features of construction, composition and arrangement of parts which will be exemplified in the construction and products hereinafter described, and the scope of which will be indicated in the following claims.

Of course, it is to be realized that while the invention is primarily directed to playing fields for sports, the characteristics of this invention may find great adaptability in surface coverings used for other purposes.

In the accompanying drawings, in which one embodiment of the invention is shown:

FIG. 1 is an illustration of a portion of one embodiment of the invention, with the layers thereof separated in order to illustrate clearly the basic three layers comprising the invention; and

FIG. 2 is a cross-section of a portion of the FIG. 1 embodiment, enlarged in respect to the FIG. 1 illustration, to illustrate more clearly the details of the invention.

Throughout the drawings, similar reference characters indicate corresponding parts, and dimensions of certain of the parts as shown in the drawings may have been relatively modified and/or exaggerated both as to actuality and in respect to each other, for the purposes of clarity of illustration and understanding the invention.

Referring now to FIG. 1 for a description of the invention, the embodiment as shown illustrates a portion of a playing field of this invention, with a corner thereof separated as shown. The first or top layer is an artificial grass material illustrated generally by numeral 2 and comprises a layer of carpet like material having grass-like filaments 4 and a backing material 6, with the filaments being locked into backing 6 by a suitable adhesive, such as latex. Such latex materials are commonly used in the carpet industry. Filaments 4 may have cross-sectional shapes of several kinds, such as rectangular, square, oval or round. However, it is preferred that they be rectangular in cross-section, and about the size of natural grass. The material from which the strands 4 is made may be, for example, polypropylene. If desired, other suitable strong, tough, resilient thermoplastic materials may be used. Such materials may be members of the polyamide family such as nylon, or may be polyethylene terephthalate, for example.

The thermoplastic resins may be solution dyed before the filaments 4 are extruded, both for color and to prevent debasement by ultraviolet light. Such dyeing materials are well known in the art and their application will therefore not be further detailed here. Where nylon is used, the fibers may be further stabilized by the inclusion of ultraviolet light absorbers which are compatible therewith. Such absorbers are also well known for such purposes and their use in artificial grass will not be further detailed here.

The fibers 4 may be tufted, knitted or woven into the backing material 6, and the latter may also be made, for example, from suitable thermoplastic resins such as the polyesters, polypropylene, nylon fibers, or combinations thereof. When tufting is used, a common practice is to have each tuft bundle comprise six flat monofilaments, each monofilament initiating a blade of natural grass.

The above description of the artificial grass surface covering 2 has been given for general information only, since such carpets or surface coverings are presently being made and sold on the market by several companies. The particular construction of the artificial grass covering 2 is not a part of this invention, and therefore no further details will be given.

Referring particularly to FIG. 2, the next layer of the invention comprises a layer of adhesive 10 which fastens layer 2 to a layer 12 of shock dispersing material. An example of a suitable shock dispersing material is that sold by American Biltrite Rubber Company, Inc., Boston Woven Hose Division, Cambridge, Massachusetts, under the Trademark UNI-TURF. UNI-TURF material is a polyvinylchloride resin having a typical composition such as

	Parts by Weight
Polyvinylchloride resin	227
Diocetyl phthalate plasticizer	195
Stabilizer	16
Filler	77
U.V. Absorber	0.2
Fungicide	0.5
Coloring	0.75

The UNI-TURF material is laid down in sheets with the edges abutting and then these edges are bonded together using a suitable adhesive such as an epoxy resin. The function of this is to make sure that a uniform surface without any breaks or cracks therein is immediately underneath the artificial grass layer 2. In this manner, if, for example, a football player falls on the field adjacent a place where the edges of layer 12 abut, then the energy of the impact will be transmitted through the bonded edges to the sheets adjacent the place of impact.

The adhesive 10 may be any suitable one, such as, for example, polyvinylchloride dissolved in a solvent, the composition having 25 to 40 per cent solids.

The next underlying layer is a shock absorption layer 14 which preferably is a foamed, closed-cell polyvinyl material. It is critical and a key point of this invention that the layer 12 and the layer 14 are not bonded together, and that the layer 12 "floats" or "rides" on the closed-cell polyvinyl foam layer 14. By not bonding these layers together, they can "slide" on each other to a limited extent, and the inter-surface friction acts as a damping factor aiding in energy absorption and dissipation. Shock absorption layer 14 may be generally stated to be a suitably expanded polyvinyl chloride or elastomer or combinations thereof, which will recover in not less than 1 hour 95 percent of its original gauge.

Such materials are well known, and the parameters should be approximately as follows:

25% Compression Resistance, PSI	5-7
50% Compression Set 24 Hour Recovery—Percent Loss	12 (max.)
Shrinkage	3% (Average)
Water Absorption (pounds per cubic foot)	0.1 (max.)
Cold Crack, tested by $\frac{1}{4}$ -inch mandrel	-10°F.

A typical such product is Ensolite material, a product of Uniroyal, Inc. Expanded Products Department, Mishawaka, Indiana, and being a blend of polyvinyl chloride and acrylic nitrile, the blend having the following physical characteristics:

Density	6.0-6.5 pounds per cubic foot
Flammability in seconds	5, self extinguishing
Thermal conductivity	0.26 BTU/in/hr/ft ²
Tensile Strength	100 (min.) pounds per square inch
Elongation	125%

Finally, the layer 14 is fastened by a suitable adhesive 16 such as the aforementioned epoxy resin to a base layer 18 which preferably is concrete, but may be an asphalt layer. Of course, if desired, chemically treated foundation earth may be prepared, but because of impacts on the field and consequently settling of the earth, any such field may eventually develop low spots in it which will collect water. Therefore, an earth foundation is not preferred. Lying beneath the cement layer will be either the ground or possibly the ground and a layer thereon of crushed stone. These are not shown in the drawings because this invention is the combination of the layers 2, 10, 12, 16 and 18 to provide the required amount of shock dissipation and absorption, the "feel" of the playing surface, and the correct drainage.

In view of the fact that layer 14 will be laid down as separate sheets with abutting edges, it is preferred that these edges also be bonded with a suitable adhesive.

The thicknesses of the several layers may lie within the following ranges, although other thicknesses can be used if desired: The thickness of the concrete or asphalt base 18 will be that necessary to maintain a smooth, uniform, crowned, non-collapsing foundation on the ground, depending upon the soil conditions, etc. Therefore, the concrete surface may range in most instances, for example, from 5 to 6 inches. The thickness of the closed cell shock-absorbing layer 14 should lie within the range of 0.25 to 1 inch. The thickness of the shock-dispersing or dissipating layer 12 should lie within the range of 0.125 to 2.50 inches. The total thickness of artificial grass layer 2 will be that which is commercially being sold under the aforesaid Trademark POLY-TURF depending on the intended use for the particular playing field. Such use will determine the density of the grass fibers 4 per square foot, that is, the number of upstanding ribbons per square foot, and their height, the denier of the threads or strands 6 making up the backing material, the thickness of the adhesive 8 which is applied to the back thereof. The height of the grass may vary, for example, from 0.250 to 1.5 inches. A typical football field having the following thickness parameters has been used successfully:

Layer 4	1/8 inch
Layer 12	3/16 inch
Layer 14	1/2 inch

Layer 18

6 inches

Other suitable uses for the material of this invention are in track surfaces for runners, golf tees and greens, football fields, soccer fields, lacross fields, and, in fact, any playing field.

In view of the above it will be seen that the several objects of the invention are achieved and other advantageous results attained.

It is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

As many changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings, shall be interpreted as illustrative and not in a limiting sense, and it is also intended that the appended claims shall cover all such equivalent variations as come within the true spirit and scope of the invention.

Having described the invention, what is claimed is:

1. A sports field comprising a plurality of layers assembled one on top of the other, the layers in descending order being a first layer comprising artificial grass filaments attached to a backing layer;
- a second layer comprising a sheet of resilient shock-dispersing material, the top side of the second layer being bonded to the underside of the first layer;
- a third layer comprising a sheet of resilient, shock-absorbing material;
- a fourth layer comprising a relatively thick bed of durable material, the top side of the fourth layer being bonded to the underside of the third layer; and
- the underside of the second and the top side of the third layers not being attached to each other, whereby said under and top sides can move relatively to each other to provide frictional damping therebetween.
2. The sports field of claim 1 in which the second layer is a polyvinyl chloride artificial resin.
3. The sports field of claim 2 in which a second layer is a continuous sheet comprising a plurality of individual sheets whose abutting edges are bonded together.
4. The sports field of claim 1 in which the third layer is a foamed, closed-cell polyvinyl resin.
5. The sports field of claim 4 in which the third layer is a continuous sheet comprising a plurality of individual sheets whose abutting edges are bonded together.
6. The sports field of claim 1 in which the second layer is a polyvinyl chloride resin, and the third layer is a foamed, closed-cell polyvinyl resin.
7. The sports field of claim 6 in which the fourth layer is selected from the group consisting of concrete and asphalt.

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