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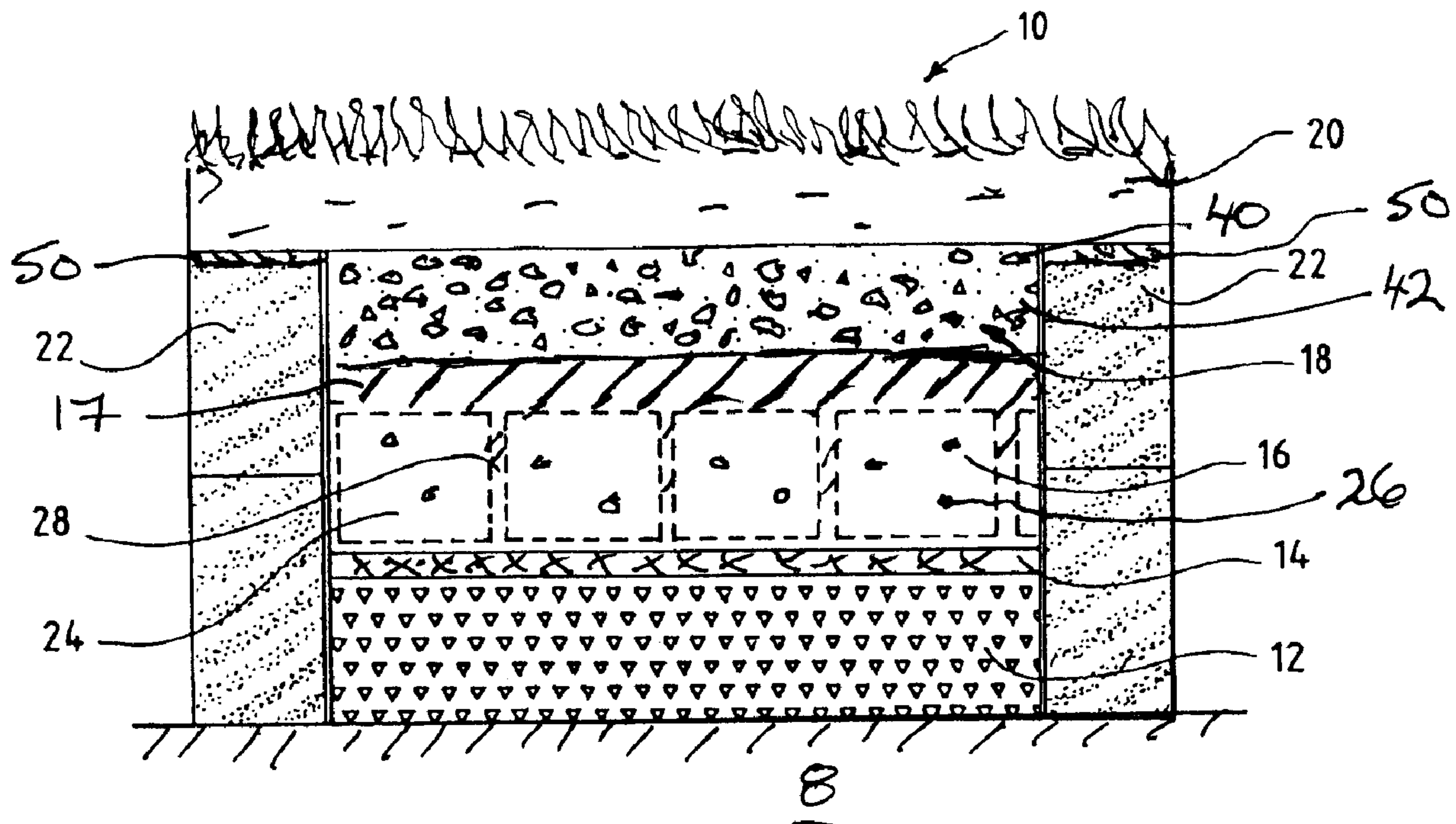
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(54) Titre : SURFACE DE TERRAIN DE JEUX ELASTOMERIQUE ET METHODE D'INSTALLATION

(54) Title: ELASTOMERIC PLAYGROUND SURFACE AND METHOD OF INSTALLING SAME



(57) Abrégé/Abstract:

A playground play surface that is safe and suitable for use by children consists of a base layer, a fluid permeable base covering layer, a bag layer, a ground particle layer, and a top cover layer. The bag layer consists of a plurality of bags each filled with loose or shredded rubber, and which are aligned side by side forming a single layer of rows and columns. The ground particle layer consists of ground or shredded rubber or tire particles which are secured into a cohesive layer by a binder. A retaining border defines the playground play surface and contains the layers.



ABSTRACT

A playground play surface that is safe and suitable for use by children consists of a base layer, a fluid permeable base covering layer, a bag layer, a ground particle layer, and a top cover layer. The bag layer consists of a plurality of bags each filled with loose or shredded rubber, and which are aligned side by side forming a single layer of rows and columns. The ground particle layer consists of ground or shredded rubber or tire particles which are secured into a cohesive layer by a binder. A retaining border defines the playground play surface and contains the layers.

ELASTOMERIC PLAYGROUND SURFACE AND METHOD OF INSTALLING SAME

SCOPE OF THE INVENTION

The present invention relates to playground surfaces and more particularly to an elastomeric playground surface that is provided with one or more impact absorbing elastomeric layers, at least one of which incorporates shredded rubber tires for enhanced absorption properties.

BACKGROUND OF THE INVENTION

Over the years, playgrounds have evolved from natural grass surfaces to man engineered or manufactured surfaces formed as sand, gravel, wood mulch, wood chips, elastic chips, and/or rubber. Examples of such playgrounds are found in U.S. Pat. No. 6,287,049 to Keinholz entitled "Layered Foundation For Play Surface"; U.S. Pat. No. 6,071,039 to Ogura, et al., entitled "Structure of Surface Portions of Grounds"; and U.S. Pat. No. 5,525,416 to Katz, et al., entitled "Play Area Surface Treatment."

In an effort to provide still enhanced impact absorbing properties, various individuals have proposed forming playground play surfaces using elastomeric materials formed from shredded rubber tires or crumb rubber. The applicant has appreciated, however, that in areas where extreme climate changes occur and temperatures fall below freezing, water may tend to penetrate the interstices between the crumb rubber particles. Upon freezing, the crumb rubber surfaces may be highly susceptible to lifting and/or splitting as a result of ice expansion and frost heave.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a synthetic playground play surface that provides enhanced resilience and a more robust construction better suited for extreme climate changes.

Another object of the invention is to provide a playground play surface which incorporates a ground or crumb rubber impact absorption layer, and which includes a top layer and/or adhesive layer which is configured to substantially seal or restrict the flow of water into the interstices between crumb rubber particles.

The present invention is an impact absorption playground surface that is safe and suitable for use by children. The playground play surface consists of a base layer, a covering layer, a bag layer, a ground particle layer of crumb rubber, and a top cover layer. The bag layer consists of a plurality of bags each filled with loose resilient material such as shredded rubber. In one possible construction, the ground particle layer consists of a number of elastically deformable particles which are bound to each other by a binder such as a polymer or rubber binder. The binder is most preferably provided within the granular particle layer so as to at least infill any interstices between the particles to reduce water flow therethrough. More preferably, an adhesive layer is provided between the bag layer and the granular particle layer. The adhesive layer acts to glue the bag layer together and/or retain the granular layer in position thereon against frost movement. Suitable adhesives would include water resistant adhesives including polyurethane adhesives and the like.

In one preferred possible construction, the top cover layer may consist of a roll of extruded PVC, foam, fabric or even artificial turf or synthetic carpet. Preferably, the top cover layer is formed from a substantially continuous roll or sheet of material so as to minimize the number of seams and water percolation therethrough and into the granular particle layer. Alternately, the top cover layer could be adapted for formation *in situ* and could, for example, be

formed from settable elastomeric compounds or a granulized rubber crumb mixture bound with a rubber or polymer binder. Although not essential, cover layer is most preferably substantially fluid impermeable.

The bag layer may consist of bags of fragmented, ground, or crumb elastomeric material, or alternately other resilient materials and/or impact absorbing materials such as sand, gravel or the like, as well as mixtures thereof. The bags may be formed as either square or elongated tubes arranged in a cross row orientation. More preferably, in a simplified construction, the bags are aligned side by side forming a single layer of rows and columns, and which are positioned in abutting contact with each other.

Optionally, a retaining border defines the playground play surface and may assist in containing the layers.

Accordingly, in one aspect the present invention resides in a play surface for installation on the ground, comprising:

a first layer of coarse drainage material;

a second layer of water permeable material is placed on the first layer;

a third layer of substantially closed bags having flexible walls, the bags filled with multiple fragments of elastically deformable material, the bags placed adjacent to each other to restrict lateral movement;

a fourth layer placed on the third layer, the fourth layer comprising the multiple fragments of elastically deformable material; and

a top cover layer placed on the fourth layer, the cover layer being selected from the group consisting of an extruded PVC roll, a roll of synthetic grass, a roll of synthetic carpet and a substantially fluid impermeable settable elastomeric compound;

whereby, the first layer, the second layer, the third layer, the fourth layer, and the top cover layer co-act to form an impact absorbing play surface.

In another aspect, the present invention resides in a method for installing a play surface, comprising the steps of:

- (a) installing a first layer of course drainage material;
- (b) installing a second layer of water permeable material on the first layer;
- (c) installing a third bag layer, the bags being at least partially filled with multiple fragments of resiliently compressible elastomeric material and being placed on the second layer adjacent to each other so as to restrict lateral movement;
- (d) applying an adhesive layer to a top portion of the bag layer;
- (e) installing a fourth layer comprising multiple fragments of resiliently deformable elastomeric material in a binder on the adhesive layer; and
- (f) installing a top cover layer of on the fourth layer, the top cover layer selected from a roll of extruded PVC, a roll of synthetic grass fabric, a roll of synthetic carpet and a settable elastomeric composition.

In yet a further aspect, the present invention resides in a playground play surface that is safe and suitable for use by children, and which includes a base layer, a fluid permeable base covering layer, a bag layer, a ground particle layer, and a top cover layer. The bag layer consists of a plurality of bags each filled with loose or shredded rubber, and which are aligned side by side forming a single layer of rows and columns. The ground particle layer consists of ground or shredded rubber, and preferably tire particles which are secured into a cohesive layer by a binder. A retaining border defines the playground play surface and contains the layers.

BRIEF DESCRIPTION OF THE DRAWINGS

Reference may now be had to the following detailed description taken together with the accompanying drawings in which:

FIG. 1 is a cross-sectional side view of a playground surface in accordance with a preferred embodiment of the invention;

FIG. 2 is a partial perspective view of a bag layer for use in the playground surface of Figure 1;

FIG. 3 is a cross-sectional side view of a playground surface of Figure 1 showing the installation of a settable top cover layer in accordance with a further embodiment of the invention; and

FIG. 4 is a top plan view of the top cover layer of the playground play surface in accordance with an alternate embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference is first made to FIG. 1 which shows a synthetic playground surface 10 adapted for installation on a ground surface 8 in accordance with the present invention. The playground surface 10 is formed as a multilayer construction and includes a base layer 12, a base covering layer 14, a bag layer 16, a binder layer 17, a ground particle layer 18, and a top covering layer 20. With the exception of the top layer 20, the layers are all contained within a retaining border 22 extending around the entire circumference of the playground surface 10. The overall surface area of the playground play surface 10 may be as large or as small as the designated playground area allows or, alternatively, is designed to accommodate. Also, the playground surface 10 may be installed either at grade, completely above, completely below, or partially above and partially below the ground level.

The base layer 12 is the first layer of the playground play surface 10 and is installed directly on the ground 8. The base layer 12 consists of coarse drainage material such as a gravel or stone material. In the preferred embodiment, the gravel or stone is a washed stone, size 7. Alternatively, the gravel or stone may be any size suitable for providing a base layer with sufficient strength and drainage. In the event the playground play surface 10 is installed above the surface of the ground 8, the preferred minimum depth of the base layer 12 is approximately 10 cm. In the event the playground play surface 10 is partially or completely subgrade, the preferred minimum depth of the base layer 12 is at least about 10 cm. If, however, the playground surface 10 is to be installed in a location where soil drainage is not a problem, the base layer 12 may be omitted in its entirety.

The base layer 12 is directly overlain with the base covering layer 14 as a second layer of the playground play surface 10. In the preferred embodiment, the covering layer 14 is a geo-textile fabric. The geo-textile fabric is a water permeable mesh or mat made out of rot and/or water resistant material such as spun polypropylene used to suppress weeds or to control erosion while allowing the free exchange of water and air. The purpose of the geo-textile fabric is therefore to maintain good separation between the base layer 12 and the bag layer 16 and prevent the downward migration of debris into the gravel. In addition, as the geo-textile fabric of the layer 14 is highly suited for drainage, the covering layer 14 facilitates the drainage of any water that may exist or form as condensation within the playground surface 10 between the base layer 12 and the bag layer 16.

The bag layer 16 is the third layer of the playground play surface 10. The bag layer 16 consists of a plurality of either square or elongated bags 24, each aligned side by side and forming a substantially contiguous single layer of rows and columns as illustrated in FIG. 2. The bags 24 are each positioned adjacent to one another, so as to minimize any gaps therebetween. In the preferred embodiment, the bags 24 are 50 to 100 cm; 20 to 50 cm in width; and 5 to 10 cm in height in size, providing a volume of 15 to 40 kg per bag. The bags 24 are made of a durable polypropylene or geo-textile fabric and provide gussets for additional strength. The total number

of bags 24 in the bag layer 16 is directly proportionate to the overall surface area of the playground surface 10.

Each bag 24 is filled with multiple fragments of particulate and more preferably loose resilient material 26. Preferably, the multiple fragments of resilient material 26 is elastically deformable loose granular or shredded rubber obtained from recycled rubber and/or ground or shredded rubber tires. Other materials, such as gravel, sand or other compressible particles could, however, also be used. The size of the loose or shredded rubber particles are approximately .5 to 2 cm in length by .5 to 2 cm in width by .5 to 2 cm in height. The bags 24 are the specific size and volume fill by density to assure uniformity of the surface of the bag layer 16. Preferably, the volume of multiple fragments of resilient material is substantially twelve pounds per square foot.

Most preferably, the shredded rubber particles 26 used in each bag 24 of the bag layer 16 are sized, and substantially wire and contaminate free, cleaned and ready for installation.

The ground particle layer 18 is provided as a fourth layer of the playground surface 10. The ground particle layer 18 consists of multiple fragments 40 of resiliently deformable elastomeric material (i.e., ground or shredded rubber) and, most preferably, is the same material as the particles 26 used in the bags 24. In the preferred embodiment, the loose particles layer 18 is substantially 2.5 cm thick. Although not essential, the fragments 40 are most preferably bound with a binder 42. Suitable binders used in the ground particle layer 18 would include polymer binders and polyurethane binders. Although not essential, most preferably, the binder 42 is present in a sufficient amount so as to provide the ground particle layer 18 with substantially fluid impermeable properties.

The layer of adhesive 17 is provided between the ground particle layer 18 and the bag layer 16. The adhesive is used to secure the ground particle layer 18 against movement relevant to the bags 24, with each of the individual bags 24 acting to anchor an overlying part of the layer 18. Suitable adhesives for use in the adhesive layer 17 would include, without restriction, synthetic and natural adhesives, and most preferably a polymer binder. Optionally, the adhesive

layer 17 is provided in sufficient amounts to infill any edge spaces 28 which may exist between adjacent bags.

Although the use of an adhesive layer 17 is preferred, it is to be appreciated, however, that the binder 42 used in the particle layer 18 could alternately be pre-applied to the bag layer 16, as for example by spraying prior to the placement of the particle layer 18 in installation of the playground surface 10.

The top cover layer 20 is provided as a fifth and uppermost layer of the playground play surface 10. The top cover layer 20 consists, depending upon the surface area of the playground play surface 10, of either an extruded roll of polyvinyl chloride (PVC) or alternately synthetic grass or carpeting. Most preferably, the top cover layer 20 is formed from a substantially fluid impermeable material so as to minimize the percolation of water and snow melt into the interior 10 of the playground surface 10. In this regard, the applicant has appreciated that cover layers 20 formed from continuous rolls of preformed materials between about 5 and 10 metres in width are most preferably used. Roll material of this advantageously minimizes the presence of end seams which could otherwise facilitate transmission of water.

Where seams between edges of the top cover layer 20 are present, in a preferred embodiment a suitable glue such as a urethane based or cyanoacrylic adhesive is used to secure the edge portions of the cover layer 20 directly to the ground particle layer 18. A separate glue 50, preferably a rubber, cyanoacrylic adhesive or other urethane glue, may be used for the attachment of the exterior edge portions of the top cover layer 20 to the entire perimeter of the retaining border 22 as illustrated in FIG. 1.

In an alternate embodiment, as shown in Figure 3, the top cover layer 20 may be formed *in situ* as a settable elastomeric compound. Most preferably, *in situ* form cover layers 20 are provided with a seamless upper surface 52 of granulized rubber crumb 54 bound with a polymer binder 56. The unset crumb 54/binder 56 mixture is poured in place within the retaining binder

22 in liquid form over the ground particle layer 18, and which thereafter sets as a substantially continuous top layer.

The top cover layer 20 of the playground surface 10 may, as illustrated in FIG. 4, be displayed with visual indicia or colored inlay designs 60.

Although not essential, the retaining border 22 defines the exterior perimeter of the playground surface 10 and retains the layer within a defined area. The retaining border 22 may be formed of stone, poured or precast concrete or recycled timber or plastic.

To create the playground play surface 10, the retaining border 22 is installed to establish the exterior perimeter of the playground play surface 10 and define a surface area of the playground. Within the area defined by the retaining border 22, the base layer 12 is the first layer installed. The gravel or stone material is filled over the entire surface area inside the retaining border 22. The gravel or stone material of the layer 12 is raked to evenly disburse the gravel or stone material, and then compacted into a levelled, uniform surface.

Next, the base covering layer 14 of the geo-textile fabric is installed over the entire base layer 12 inside the retaining border 22. After placement of the covering layer 14, the bag layer 16 of bags 24 are installed over the entire covering layer 14 inside the retaining border 22. The bags 24 are then compacted into a levelled, uniform base and surface. The size and density of the bags 24 assures uniformity of the layer 16 assisting in physical compaction. Vibration compactors are then employed to compact the bags 24 and provide the bag layer 16 with a uniform level surface. The placement of plywood sheathing on top of the bags 24, and thereafter using the vibrating compactor on top of the sheathing has been found to facilitate the compacting process and sets the bag layer 16 into its a level uniform surface.

Following the compaction of the bag layer 16, the adhesive layer 17 is thereafter rolled, brushed or, more preferably sprayed over the top surface of the bag layer 16.

Immediately following the placement of the adhesive layer 17, the particle layer 18 is then formed by admixing the elastomeric fragments 40 and the binder 42. Prior to the setting of the fragments 40/binder 42 mixture, the mixture is thereafter spread over the adhesive layer 17 and bag layer 16 inside the retaining border 22. Preferably the mixture is evenly distributed into any gaps between each adjacent bag 24 to form a level, uniform particle layer 18 surface. In an alternate construction the granular particle layer may be provided as a preformed roll, or a series of preformed mats which are positioned directly on the adhesive layer, prior to its setting.

Next, the top cover layer 20 is installed over the entire particle layer 18 and the retaining border 22. Although not essential, if desired, the cover layer 20 could be adhered directly to the ground particle layer 18 by use of a further adhesive. Alternately, the cover layer 20 could be installed prior to final setting of the particle layer 18, with the result that the binder 42 acts to secure not only the fragments 40, but also affix the top cover layer 20 in place.

As a result, a multiple layer playground surface 10 is provided which creates a safe playground play surface that is suitable for use by children, and which enables the highest play element impact attenuation for children.

Thus, there has been provided a unique playground surface 10 as described herein. While the invention has been described in conjunction with a specific embodiment, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art in light of the foregoing description. Accordingly, it is intended to embrace all such alternatives, modifications and variations as falling within the scope of the appended claims.

I claim:

1. A multilayer impact absorbing playground play surface, comprising:

a first layer of coarse drainage material;

a second layer of water permeable material is placed on the first layer;

a third layer of substantially closed bags having flexible walls, the bags at least partially filled with multiple fragments of elastically deformable material, the bags disposed immediately adjacent to each other to restrict lateral movement;

a fourth layer placed on the third layer, the fourth layer comprising a plurality of elastically deformable particles and a binder substantially adhering said plurality of elastically deformable particles to each other; and

a top cover layer placed on the fourth layer, the cover layer comprising an *in situ* formed layer comprising granulized rubber crumb particle bound with a polymer binder.

2. A play surface for installation on the ground, comprising:

a first layer of coarse drainage material;

a second layer of water permeable material is placed on the first layer;

a third layer of substantially closed bags having flexible walls, the bags filled with multiple fragments of elastically deformable material, the bags placed adjacent to each other to restrict lateral movement;

a fourth layer placed on the third layer, the fourth layer comprising the multiple fragments of elastically deformable material; and

a top cover layer placed on the fourth layer, the cover layer being selected from the group consisting of an extruded PVC roll, a roll of synthetic grass, a roll of synthetic carpet and a substantially fluid impermeable settable elastomeric compound;

whereby, the first layer, the second layer, the third layer, the fourth layer, and the top cover layer co-act to form an impact absorbing play surface.

3. The play surface of claim 2 and further comprising a retaining border, the retaining border defining the boundary of the play surface and containing the first layer, the second layer, the third layer, and the fourth layer.
4. The play surface of claim 3 wherein the top cover layer is attached to the retaining border by glue.
5. The play surface of claim 1 wherein the first layer of coarse drainage material is placed on top of the ground.
6. The play surface of any one of claims 1 to 5 wherein the adhesive layer comprises a polyurethane binder.
7. The play surface of any one of claims 1 to 5 wherein the coarse drainage material comprises gravel or stone.
8. The play surface of any one of claims 1 to 6 wherein the water permeable material comprises geo-textile fabric material.
9. The play surface of any one of claims 1 to 8 wherein each of the bags is filled with shredded or ground tire particles.
10. The play surface of claim 2 wherein the multiple fragments of the fourth layer comprise ground or shredded rubber.
11. The play surface of claim 1 wherein the top cover layer comprises a settable rubberized compound.

12. The play surface of claim 1 wherein the top cover layer comprises a substantially fluid impermeable layer of synthetic grass.

13. A method for installing a play surface, comprising the steps of:

- (a) installing a first layer of course drainage material;
- (b) installing a second layer of water permeable material on the first layer;
- (c) installing a third bag layer, the bags being at least partially filled with multiple fragments of resiliently compressible elastomeric material and being placed on the second layer adjacent to each other so as to restrict lateral movement;
- (d) applying an adhesive layer to a top portion of the bag layer;
- (e) installing a fourth layer comprising multiple fragments of resiliently deformable elastomeric material in a binder on the adhesive layer; and
- (f) installing a top cover layer on the fourth layer, the top cover layer being selected from a roll of extruded PVC, a roll of synthetic grass fabric, a roll of synthetic carpet and a settable elastomeric compound.

14. The method of claim 13 and further comprising the step of installing a retaining border defining the boundary of the play surface and containing the first layer, the second layer, the third layer, and the fourth layer.

15. The method of claim 13 or claim 14 and further comprising the step of compacting each layer into a levelled, uniform surface.

16. The play surface of claim 1 or claim 2 further including a polymer binder layer to assist in binding adjacent ones of said bags to each other.

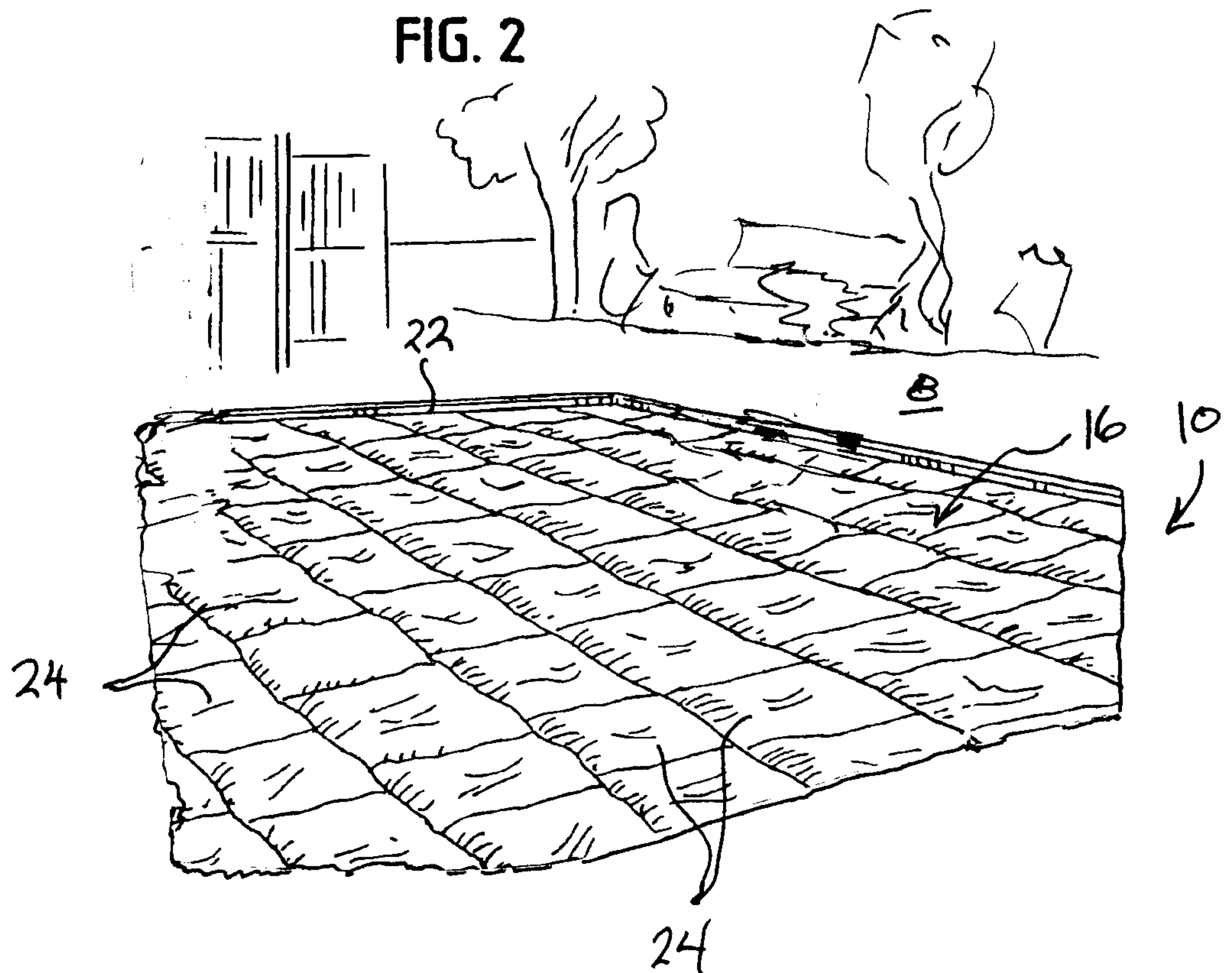
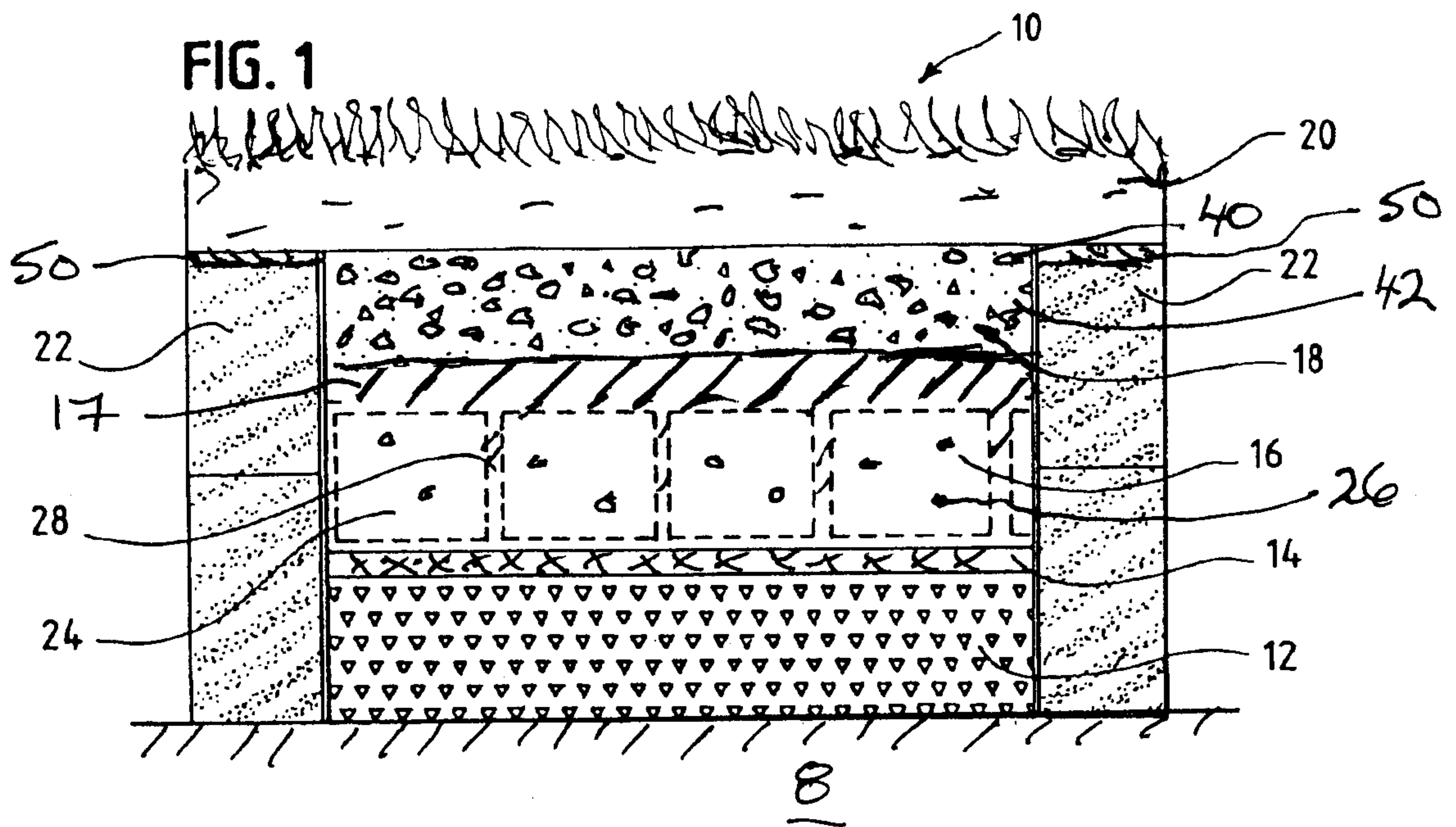


FIG. 3

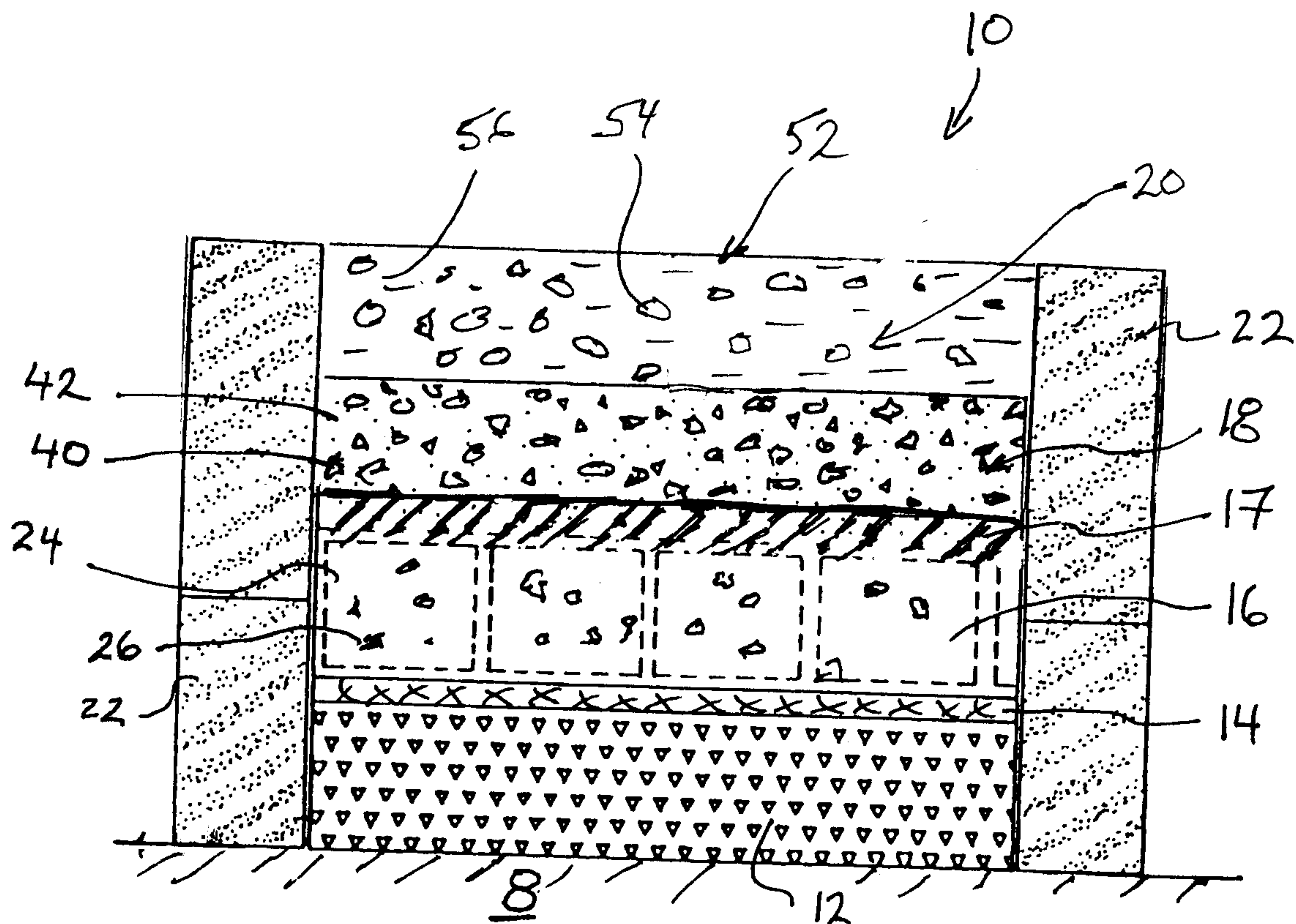


FIG. 4

