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(54) METHOD OF CRATING A FALL-SAFE, SYNTHETIC TURF-COVERED PLAY AREA

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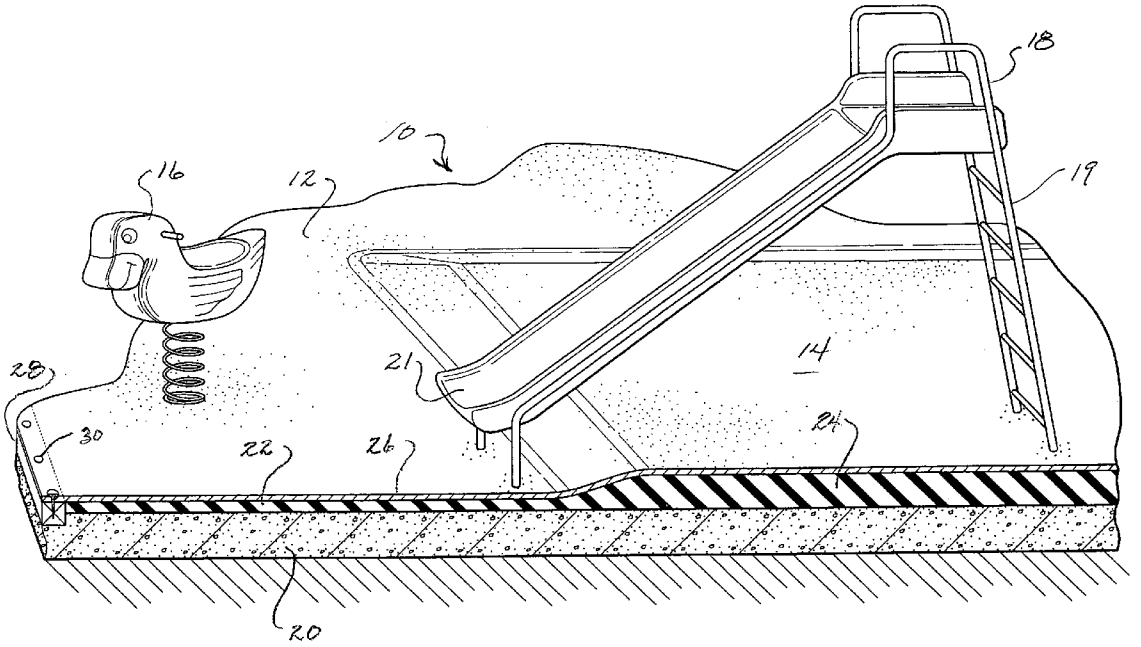
(57) **ABSTRACT**

A method of constructing a play area with an all-weather resilient surface, the thickness and degree of resilience of which is objectively related to the height of the play equipment to be erected on the surface of the play area. Thicker, more resilient surfaces underlie higher equipment or decks. Single and multiple thickness surfaces can be constructed using a mixture of shredded rubber in a urethane binder. The cured surface is covered with a synthetic turf.



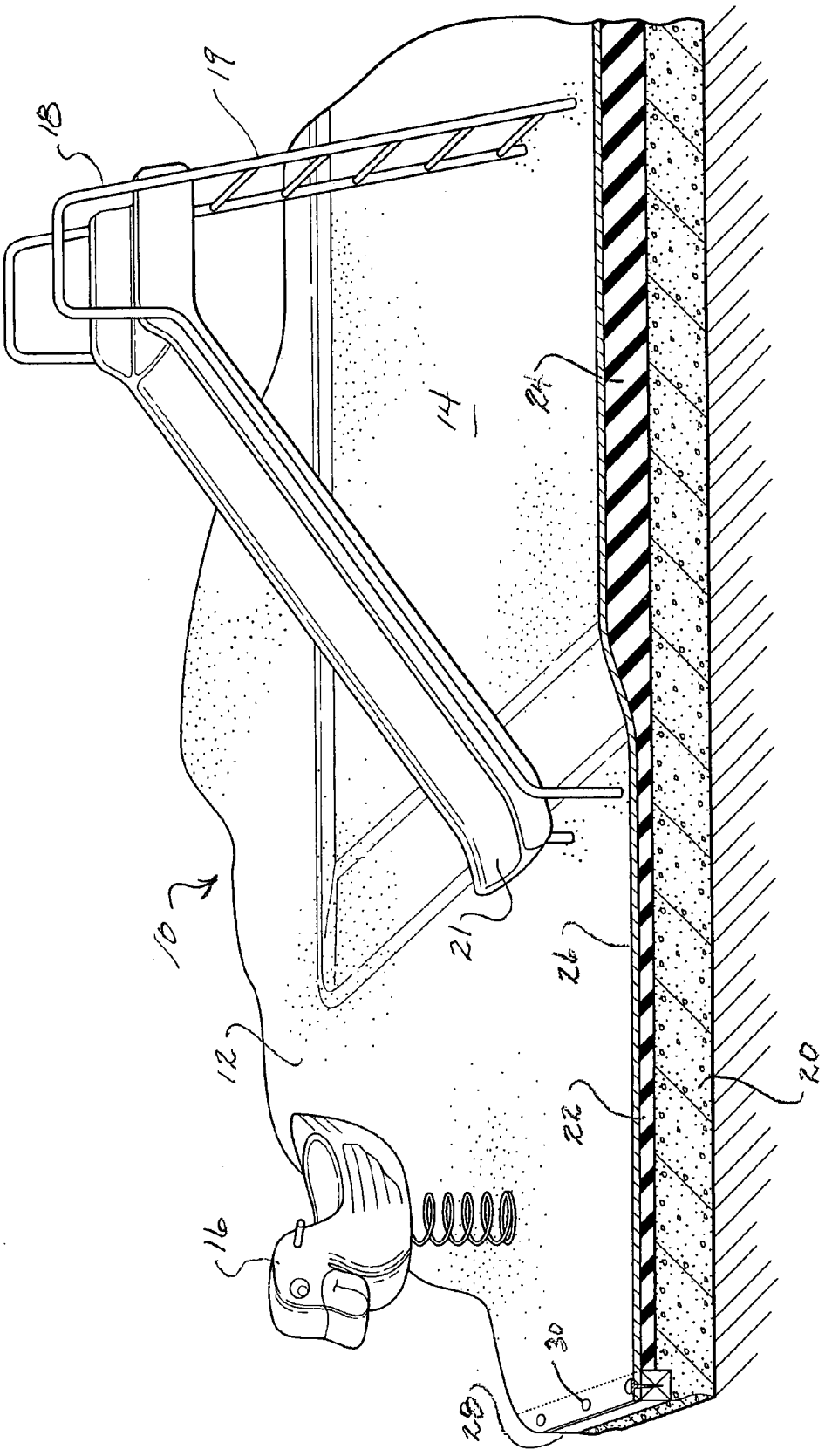



FIG - 1

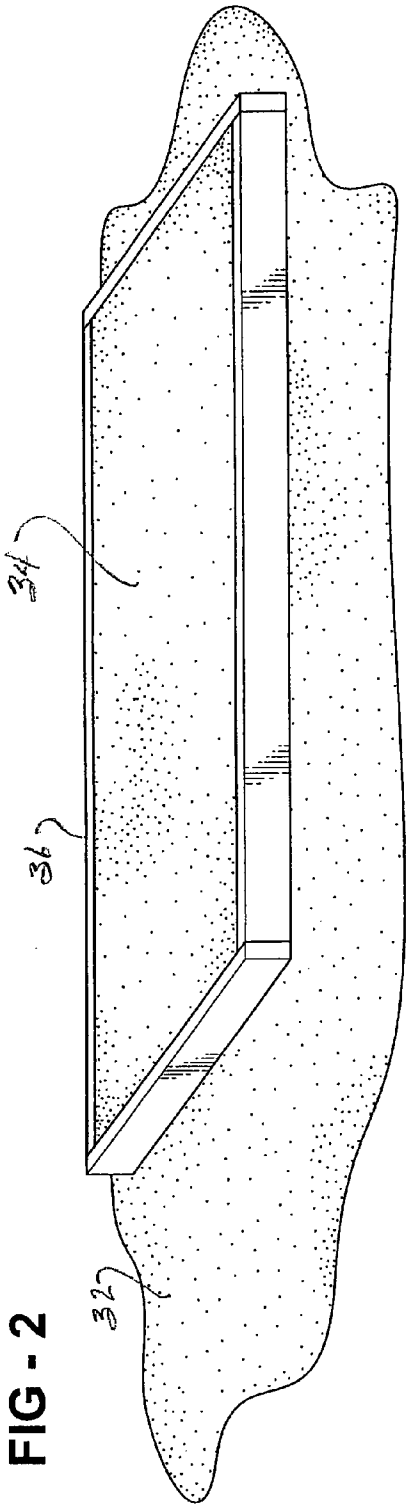



FIG - 2

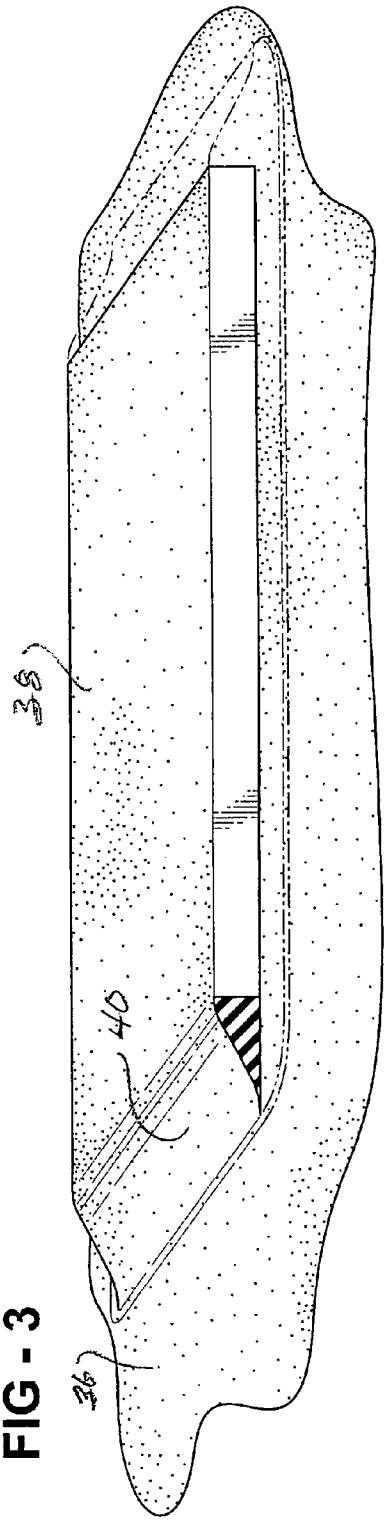



FIG - 3

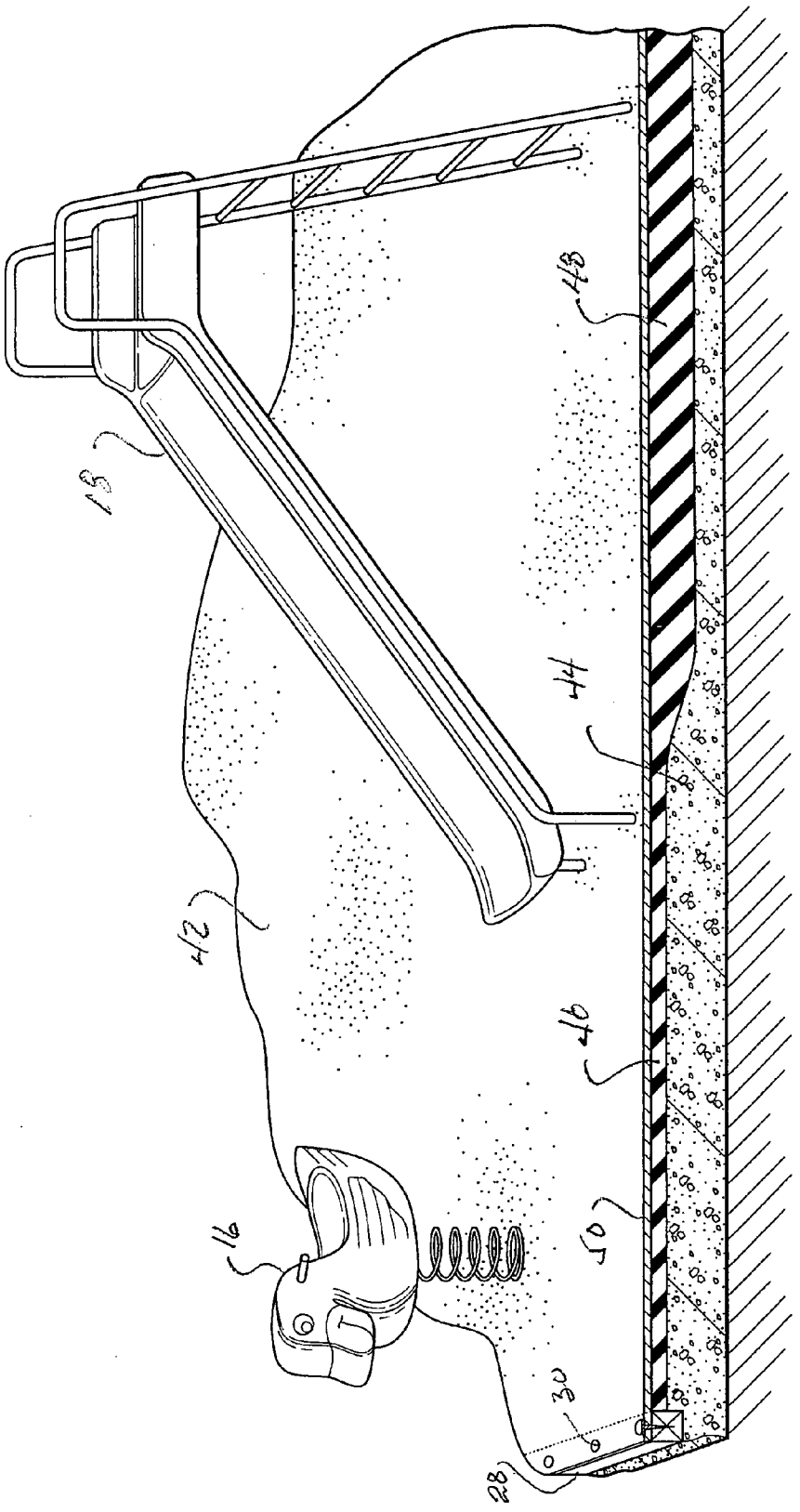



FIG - 4

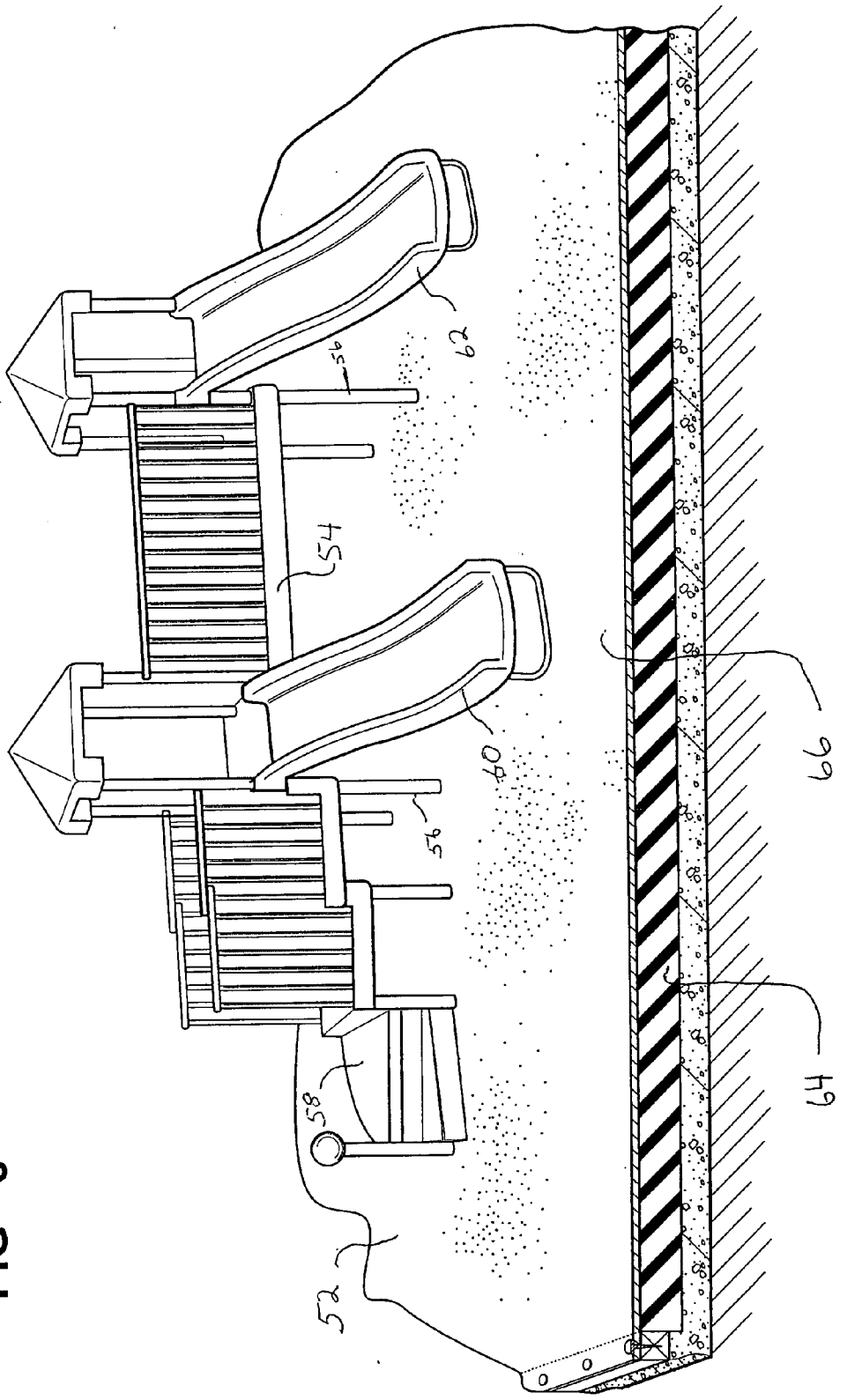



FIG - 5

# METHOD OF CRATING A FALL-SAFE, SYNTHETIC TURF-COVERED PLAY AREA

## FIELD OF THE INVENTION

**[0001]** This invention relates to play or playground areas and more particularly to a method of constructing a fall-safe, resilient, all-weather play area wherein the thickness and resulting resilience of the play area surface is related to the height of the equipment situated in the play area.

## BACKGROUND OF THE INVENTION

**[0002]** Play areas for children, commonly called "playgrounds", have traditionally been characterized by dirt or turf play area surfaces. More recently, it has become customary to spread shredded rubber on the play area surface; e.g., under swings, at the end of slides and around and beneath steps which permit children to climb onto elevated decks. The objective is to create a soft surface which cushions a fall onto the surface and, therefore, reduces the risk of injury.

**[0003]** A disadvantage of loosely spread particulate rubber is that it tends to get moved around; e.g., the area at the base of the slide contacted repeatedly by children's feet tends to wear thin until eventually there is little or no particulate rubber in the area. Similar circumstances exist immediately under swings, where repeated dragging of feet tends to move the particulate rubber away. The rubber can, of course, be redistributed by raking, but this requires regular maintenance which is not always provided in municipal or private play areas.

**[0004]** Another approach is described in a published patent application, U.S. 2003/0104157 published Jun. 5, 2003 wherein the inventors Brady and Sutcliffe proposed the use of highly engineered safety tiles with tongue-in-groove interlocking features which permit the tiles to be installed on a uniform subsurface. Because the tiles interlock, they tend to stay in place. The Brady/Sutcliffe tiles are expensive and unnatural in appearance.

## SUMMARY OF THE INVENTION

**[0005]** According to the present invention, a resilient play area surface is constructed on a pre-existing subsurface which can be bare ground, natural turf, asphalt concrete, or compacted gravel. The surface is constructed through simple steps similar to those used in the casting of concrete to create a seamless resilient play area surface which is engineered to provide a thickness and resulting degree of cushioning resilience which is objectively related to the height of decking or other equipment situated in the play area; i.e., the higher the equipment or decking, the thicker the surface. By virtue of this process, the thickness of the cast surface material is directly and objectively related to the resilience needed to reduce the risk of injury due to falls from the decking or maximum climbable height of other equipment situated in the play area.

**[0006]** In accordance with the invention, a mixture of flowable particulate rubber and a urethane binder is prepared. The height or heights of play equipment such as decks, slides, or other climbable equipment already situated or to be later erected within the play area is determined and from this the thickness of the resilient surface needed to meet an objective safety standard for falls from such height or heights is determined. Using any of a variety of techniques to ensure the proper thickness, the mixture is then spread onto the subsurface, typically within pre-determined boundaries, until the appropriate thickness or thicknesses are reached. The mixture is then allowed to at least partially cure and the partially or fully cured surface is then covered with a synthetic turf. A suitable synthetic turf is a woven polyethylene fabric which is needle-punched and adhesively bonded to a backing material and known in the trade as Astroturf®.

**[0007]** The preferred particulate rubber material is shredded tire casing and the preferred shape is strand-like, approximately ¼ to ½ inch in length by approximate 2-3 mm in thickness. Such material is available, packaged and shipped in 50 pound bags.

## BRIEF DESCRIPTION OF THE DRAWING

**[0008]** FIG. **1** is a perspective view, partly in section, of a playground area with two different types of equipment mounted on resilient surfaces of differing thickness wherein each thickness is related to the height of the play equipment;

**[0009]** FIG. **2** is a perspective view of an example of a two-height play area with a step boundary around the higher height area;

**[0010]** FIG. **3** is a perspective view of a multi-height play area with a smooth transition along the one edge;

**[0011]** FIG. **4** is a perspective drawing of a play area similar to the play area of FIG. **1**, but showing how a multi-thickness resilient surface can be achieved through strategic ground grading; and

**[0012]** FIG. **5** is a perspective view of a play area with single thickness resilient surface and a representative deck structure erected thereon.

## DETAILED DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENTS

**[0013]** Referring to FIG. **1**, there is shown a play area **10** characterized by a first level surface **12** and a second higher level surface **14**. Situated on the surface **12** is a spring-loaded riding animal **16**. Mounted substantially over the higher level surface **14** is a slide **18** having steps **19** which directly overlie the surface **14** and a slide end **21** which overlies the lower level surface **12**.

**[0014]** The surfaces **12** and **14** are installed on graded concrete base **20**. Poured, troweled or cast over the concrete surface **20** is a first thickness layer **22** of resilient material made by combining particulate rubber with a urethane binder. That same material is smoothly troweled or cast into the higher level surface **14** having a greater thickness **24** so that the resilience factor of the surface **14** immediately under the slide **18** is greater than that of the surface **12** surrounding the riding animal **16** and the end of the slide **21**. It will be appreciated that the fall height from the riding animal **16** and/or from the terminal end **21** of the slide **18** is significantly less than the fall height from the top of the ladder **19** or the upper reaches of the slide **18**. Accordingly, the resilience and cushioning effect of the surface **12** can objectively be less than that of the surface **14** while still providing a substantial safety factor as far as the risk of injury from fall is concerned. The lower level surface is bordered by wooden rails **28** and the entire play area is covered over with synthetic turf **26** which is tacked down by fasteners **20** at all edges.

**[0015]** Looking to FIG. **2**, a play area is shown to comprise a first lower level **32** and a raised upper level area **34** bounded by 2×4's, railroad ties or other bordering elements **36**. Again, higher play equipment is mounted in the area **34** whereas lower play equipment is mounted on the area **32**. The rectangular shape for area **34** is arbitrary as it may assume any of a variety of shapes as well as any size necessary to accommodate the type and amount of equipment desired in a given play area.

**[0016]** FIG. **3** shows another approach to a multi-level play area in which the lower less resilient surface **36** surrounds a higher, more resilient surface **38**. A transition area **40** is smoothly trowelled into the structure to allow children to move easily from one area to the other.

**[0017]** FIG. **4** illustrates a playground surface **42** with a flat upper level that provides different degrees of resilience by contouring the concrete base **44** so that the resulting cured rubber/resin material has a first level **46** around the riding animal **16** and the end of the slide **18** whereas the ladder and upper areas of the slide **18** overlie a thicker resilient area **48**. The two level underlayment **44** is created using two depths relative to a datum level representing the desired upper level for surface **42**. The thickness of layers **46** and **48** must, therefore, be known in advance; i.e., when the underlayment **44** is poured.

**[0018]** A layer of Astroturf **50** is installed over the rubber and urethane layers **46** and **48** in the same fashion as the Astroturf layer **26** is installed on the play area of FIG. **1**; i.e., a border or boundary element **28** is laid in place and the Astroturf is secured to it by means of tacks or nails **30**.

**[0019]** Referring now to FIG. **5**, a play area **52** is shown to have a deck structure **54** erected thereon with legs **56**. The deck structure **54** is reached by steps **58**, and accommodates slides **60** and **62**. Other conventional equipment well known to persons familiar with children's play areas may also be used with deck **54**. The thickness of the resilient material **64** around and under the deck **54** is chosen to provide a degree of resilience objectively related to the height of the deck **54**. Synthetic turf **66** is placed over the resilient layer **64**.

**[0020]** Turning now to the description of methodology associated with this invention, the resilient layers consist of shredded rubber mixed with 100% polyurethane binder with no solvents added and meeting all applicable U.S. material safety standards (MSDS). The shredded rubber comes from the sidewalls of tires and is typically ground to a length of approximate ⅜ of an inch by 2-3 mm in thickness. Such materials are commercially available in 50 pound bags.

**[0021]** The rubber and binder is mixed in any convenient vessel such as a cement mixer or tub and spread over the prepared underlayment when the temperature is within the range of 45 degrees to 90 degrees Fahrenheit. Each 50 pound bag of shredded rubber is mixed with about 7-8 pounds of polyurethane binder in an appropriate mixer vessel and conveyed by wheel barrow or the like to the construction area where it is dumped and poured or spread onto the underlayment of concrete asphalt or compacted stone. It can be troweled or spread like concrete using various types of equipment including long handled spreaders. The appropriate thickness can be achieved in a variety of ways including the use of dowels or other bordering elements of appropriate thickness or by installing a height-graded border structure such as that shown at **28** in FIGS. **1** and **4** and as shown at **36** in FIG. **2**.

**[0022]** Once the first layer is complete it must cure or at least partially cure for approximately **12** hours or overnight. A higher level can be built on top of the first after the first is completely cured. Alternatively, the higher level can be created first and the second level created around it without waiting for the first level to completely cure.

**[0023]** After the rubber/urethane layer is sufficiently cured, a layer of synthetic turf which is either 100% Nylon or 70% polyethylene and 30% Nylon is laid on top if it. A suitable material is the needle punched woven material described above which comes in rolls of 6, 10 or 12 feet in width by 30 feet in length. It can be slit and taped at the various uprights, slide legs, trees and other pre-existing articles. The entire perimeter can be attached to a 2×2 nailer board and tacked similar to the process used to lay carpeting.

**[0024]** The suggested correlation between equipment height or deck height and thickness is as follows:

| | |
|---|---|
| For a 4 foot deck or equipment height | Resilient material of 1 inch thickness |
| For a 5 foot deck or equipment height | Resilient material of 1½ inches thickness |
| For a 6 foot deck or equipment height | Resilient material of 2 inches thickness |
| For a 7 foot deck or equipment height | Resilient material of 2½ inches thickness |
| For a 8–10 foot deck or equipment height | Resilient material of 3 inches thickness |

**[0025]** The resulting structure is one having a natural appearance and a significantly higher degree of safety than bare ground or natural turf and a much lower degree of maintenance than ground or turf on which loose particulate rubber has been spread. The surface is essentially an all-weather surface which can be easily cleared of snow through the use of brooms and which is tolerant to ultraviolet light, rain and freeze/thaw cycles.

What is claimed is:

**1**. A method of constructing a resilient play area surface on a pre-existing subsurface comprising the steps of:

(a) preparing a flowable uncured mixture of particulate rubber and a urethane-based binder;

(b) determining the height or heights of climbable play equipment to be situated within the play area;

(c) determining the thickness of the flowable mixture when cured needed to meet an objective safety standard associated with the maximum of said heights;

(d) spreading the flowable mixture onto the subsurface until at least said thickness is reached;

(e) allowing the mixture to at least partially cure; and

(f) covering the at least partially cured mixture surface with a synthetic turf.

**2**. The method described in claim **1** wherein the particulate rubber consists of strands on the order of ¼ to ½ inch in length.

**3**. The method of claim **1** wherein the binder is at least partly polyurethane and is free of added solvents.

**4**. The method of claim **1** wherein the step of spreading the mixture is carried out at an ambient temperature of between 45 and 90 degrees Fahrenheit.

**5**. The method of claim **1** wherein the equipment is situated in the play area before the curable mixture is spread.

**6**. A method of constructing a resilient play area surface on a subsurface comprising the steps of:

(a) preparing a subsurface having at least two depths relative to a datum level;

(b) preparing a flowable uncured mixture of particulate rubber and urethane-based binder;

(c) spreading the flowable mixture onto the prepared subsurface up to the datum level so as to produce at least two different thicknesses of the spread material;

(d) allowing the mixture to at least partially cure; and

(e) covering the surface of the at least partially cured mixture with a synthetic turf.

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