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3,574,107

ARTIFICIAL SKIING SURFACES

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Fig. 1

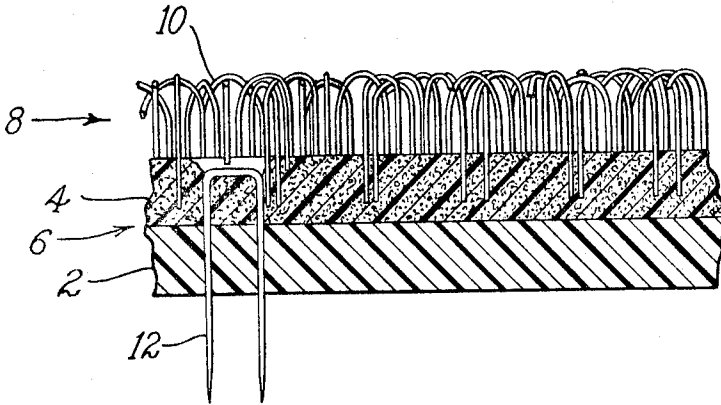


Fig. 2

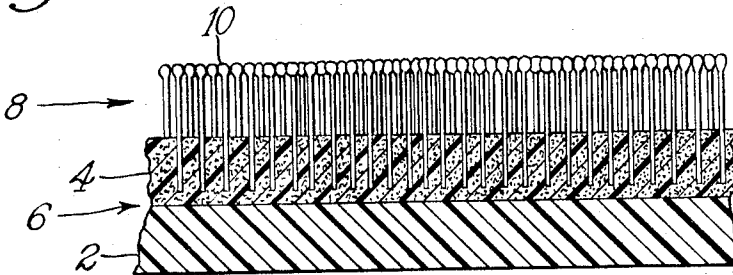
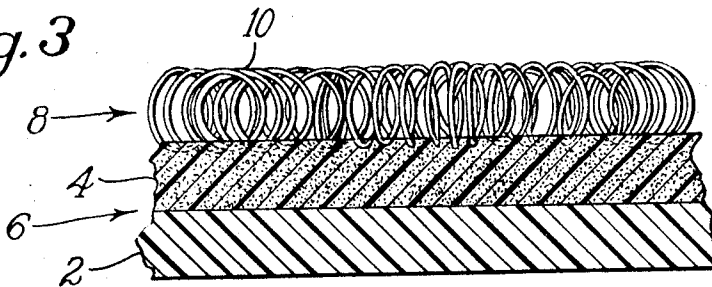


Fig. 3



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ARTIFICIAL SKIING SURFACES

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4 Claims

ABSTRACT OF THE DISCLOSURE

An artificial skiing surface comprising a plurality of layers of material, each layer having properties similar to corresponding layers of natural snow, including a bottom layer of relatively hard material corresponding to hard packed base snow, an upper layer of upstanding filaments corresponding to surface powder snow, and at least one layer between the bottom and upper layers of relatively sponge-like material corresponding to packed powder snow. The layers are bonded together to form a laminated artificial skiing surface providing for a skiing experience closely resembling that observed in natural snow.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to an artificial skiing surface and is directed more particularly to such a surface having a plurality of layers of different densities corresponding generally to the layers of natural snow generally found upon ski slopes.

Description of the prior art

The use of artificial skiing surfaces has become popular both in indoor applications, such as ski schools and the like, and outdoors in areas which are likely to suffer from an inadequate supply of natural snow or in which it is desired to extend the ski season beyond its normal limits. Accordingly, several surfaces have been devised which support a skier in a manner somewhat similar to natural snow.

A shortcoming encountered in the prior surfaces, however, is the lack of the "feel" of snow. Surfaces have been devised which have roughly the same coefficient of friction as natural snow so that skiing speeds on the artificial surface may approximate the speeds attained on natural snow. Surfaces also have been devised, particularly brush-like surfaces, which afford edging response or "cornering" characteristics similar to that encountered in natural snow. Despite these advances, however, the artificial surfaces to date have failed to approximate the feel of natural snow, particularly from the standpoint of ski penetration. There is a certain stiffness or inflexibility in the prior artificial surfaces which probably explains the resistance among skiers, and therefore among ski enterprise operators, to the artificial surfaces.

SUMMARY OF THE INVENTION

It is, therefore, an object of the present invention to provide an improved artificial skiing surface having not only the desired frictional and edging response characteristics, but in addition providing the feel of natural snow.

With the above and other objects in view, as will hereinafter appear, the present invention contemplates the provision of an artificial skiing surface made up of a number of layers corresponding generally to layers of snow found on a natural ski slope. The least dense of the layers is uppermost and corresponds generally to surface powder snow. The layers thereunder are of increasing density, with the layer of greatest density being the layer farthest removed from the uppermost layer and corre-

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sponding generally to hard-packed, or even frozen base snow.

It is to be understood that the present invention is by no means limited to the particular constructions herein disclosed and/or shown in the drawings, but also comprises any modifications or equivalents within the scope of the disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross-sectional view of one illustrative form of artificial skiing surface embodying the invention;

FIG. 2 is a cross-sectional view of an alternative illustrative form of artificial skiing surface embodying the invention; and

FIG. 3 is a cross-sectional view of another alternative illustrative form of artificial skiing surface embodying the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, it will be seen that the present invention comprises a laminated artificial skiing surface having at least three distinct layers, or laminae, of different degrees of flexibility or hardness. The lower layer, or lamina, 2 comprises relatively hard foam plastic, such as for example, foam urethane. This layer corresponds generally to the layer of hard-packed base snow or frozen granular base which constitutes the oldest snow on a ski slope.

The intermediate layer, or lamina, 4 may also be a foam plastic, such as for example, foam urethane, but is more flexible, and not as hard as the layer 2. It is desirable that the intermediate layer 4 be of a somewhat "spongy" nature. This layer corresponds generally to the intermediate layer of packed powder snow generally found on top of hard-packed powder snow on a natural ski slope. The layers 2 and 4 may be joined together, as at 6, by appropriate adhesive.

The upper layer, or lamina, 8 comprises plastic strands 10, which may be of PVC, embedded in the layer 4. It is preferable that the strands 10 be embedded in the intermediate layer 4 thereby to provide upstanding loops (FIGS. 1 and 3). The looped strands may comprise individual filaments embedded at each end as shown in FIG. 1, or the upper portions of embedded coils, as shown in FIG. 3, or a combination thereof. The upstanding loops comprising the layer 8 provide a desirably low coefficient of friction, but permit penetration of ski edges for edging or maneuvering. Alternatively, the filaments 10 may be embedded at one end only as shown in FIG. 2. In this construction it is preferable that the free filament ends be rounded to decrease friction and to eliminate a possible safety hazard in upstanding sharp edges. The upper layer 8 accordingly comprises a plurality of strands or filaments which, acting cumulatively and not individually, afford an uppermost layer which is the most flexible of the layers and is of the least hardness of all the layers. By "most flexible" it is meant that the upper layer offers the least resistance to penetration of all the layers of the lamination. The upper layer 8 corresponds generally to the upper layer of powder snow found on a natural snow ski slope.

The combination of the three layers affords an artificial skiing surface providing to the skier a "feel" corresponding to that experienced on a natural ski slope. It will be apparent that the invention need not be limited to precisely three layers, but may include any number of layers approximating the various layers of snow found on a natural ski slope.

It is desirable that the layer 4 be molded in relatively large sheet form with the strands or filaments 10 embedded therein. It has been found that molded foam urethane having a density of 8 to 14 pounds per cubic

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foot affords a suitable intermediate layer. The layer 2 is also preferably molded in large sheet form and the layers 2 and 4 joined together at 6 by adhesive. Urethane foam having a density of 20 to 40 pounds per cubic foot has been found suitable for the bottom layer.

For outdoor purposes, staples 12 (FIG. 1) may be used to secure the surface to the side of a mountain. It is preferable that the staple 12 be driven well into the layer 4 so that it will not protrude upwardly in such a manner as to interfere with skiing or constitute a safety hazard in the event of a fall. In outdoor applications, the surface is preferably cut in a geometrical pattern permitting air and sunlight to reach the mountainside. Of course, for indoor applications, the surface may be used without openings therethrough.

Since certain obvious changes may be made in the illustrated device without departing from the scope of the invention, it is intended that all matters contained herein be interpreted in an illustrative and not a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A laminated artificial skiing surface comprising a plurality of laminae of material corresponding substantially to layers of natural snow, said laminae comprising a bottom lamina of hard foam plastic having a density of 20 to 40 pounds per cubic foot and having a flexibility and hardness whereby to react to a force applied thereagainst as by a ski, in a manner substantially approximating that of hard packed base snow, a second lamina of flexible foam plastic upwardly of said bottom lamina having a density of 8 to 14 pounds per cubic foot and having a flexibility greater than and hardness less than the flexibility and hardness of said bottom lamina and being such as to react to a force applied thereagainst, as by a ski, in a

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manner substantially approximating that of packed powder snow, and a top lamina made up of a multiplicity of plastic strands attached in upstanding position to said second lamina and having a flexibility greater than and hardness less than the flexibility and hardness of any other of the laminae of said surface and being such as to react to a force applied thereagainst, as by a ski, in a manner substantially approximating that of surface powder snow.

2. The invention according to claim 1 in which each of said filaments is embedded at both ends in said second layer whereby to provide an upstanding loop.

3. The invention according to claim 1 in which said filaments comprise a coil embedded in said second layer and having loop portions upstanding from said second layer.

4. The invention according to claim 1 in which said filaments have projecting ends which are rounded.

References Cited

UNITED STATES PATENTS

2,558,759	7/1951	Johnson	272—56.5
3,047,292	7/1962	Acquaderni	272—56.5
3,091,998	6/1963	Wehr et al.	272—56.5X
3,142,855	8/1964	Gilchrist	161—64X
3,251,596	5/1966	Niizaki	161—62X
3,350,092	10/1967	Maki	272—56.5
3,414,928	12/1968	Lemelson	161—64X
3,422,732	1/1969	York	272—56.5X

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