March 16, 1971 A. P. WEBER ET AL 3,570,846

SURFACING MEANS FOR SNOWLESS SKI SLOPES AND METHOD OF PRODUCING THE SAME

Filed Aug. 21, 1968

Fig. 1.

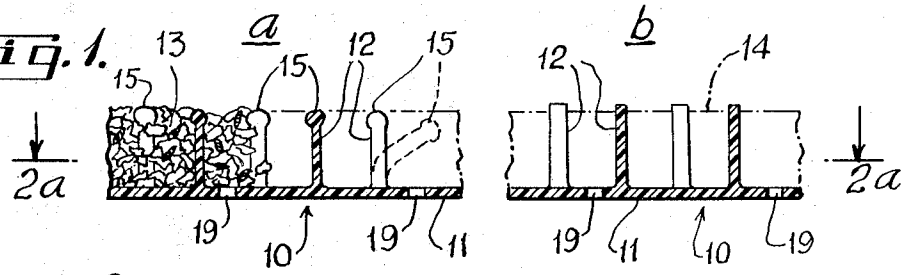


Fig. 2.

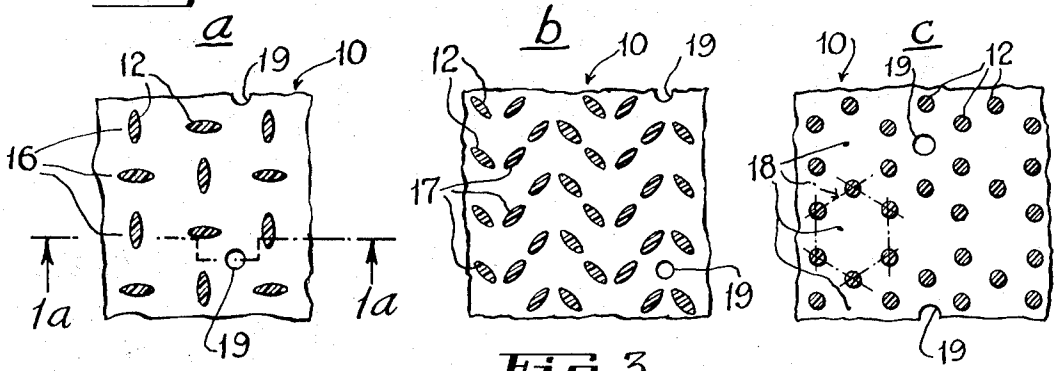


Fig. 3.

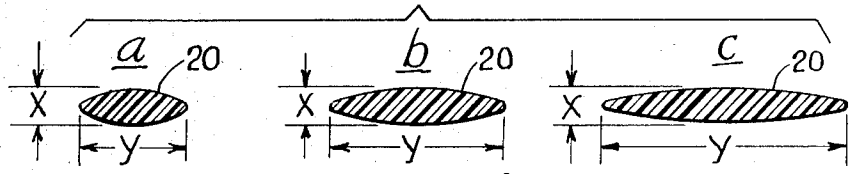


Fig. 4.

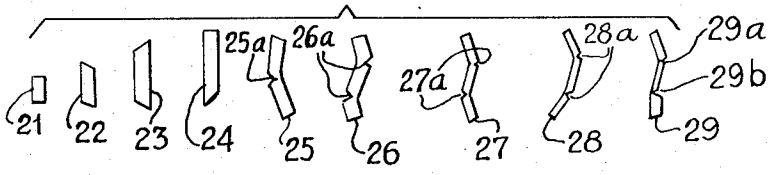


Fig. 6.

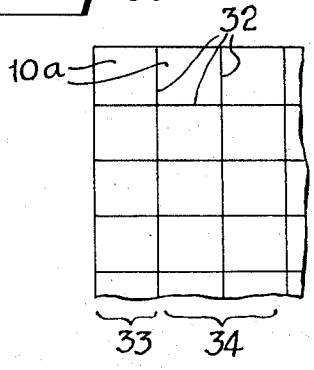


Fig. 7.

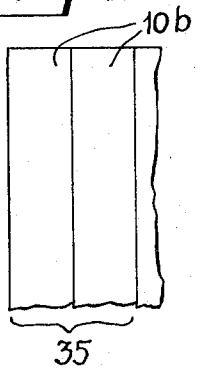
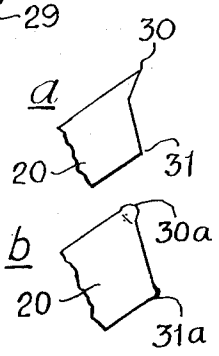


Fig. 5.



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SURFACING MEANS FOR SNOWLESS SKI SLOPES AND METHOD OF PRODUCING THE SAME

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ABSTRACT OF THE DISCLOSURE

Surfacing means for snowless ski slopes and the like comprising a flexible support member in sheet form having protruding from one upper surface thereof a plurality of spaced and essentially perpendicular flexible rods forming an open brush-like surface, a bed of random shaped, generally elongated, flexible plastic particles substantially filling the spaces between said rods with portions of said particles extending above said rods, said rods and particles being substantially free of sharp edges, and means on said rods interfitting with said bed of particles restricting inadvertent displacement of said particles. Novelty is considered to reside both in the combination and in the flexible support member and artificial snow consisting of such plastic particles as separate articles of commerce.

BACKGROUND OF THE INVENTION

The rapidly developing interest in skiing and the substantial investments in ski resorts and facilities has created a substantial economic problem due to the relatively short period of the year in which natural snow or even artificially-generated snow can be relied upon to provide adequate surfaces on ski slopes, trails, and the like. Various attempts have been made to extend the skiing season by such various means as enclosing portions of ski slopes and trails to provide an air conditioned environment preventing the melting of snow, and substituting on the slopes and trails a surface material which may be effective for skiing without the presence of snow.

The first approach above mentioned has not proved satisfactory due to the inherent expense involved as well as the lack of interest by skiers in the enclosed environment. The substitution of a surfacing material for snow on slopes and trails has met with only limited success because thus far such materials have had one or more of the following drawbacks: they have lacked the appearance of snow, they have not sufficiently simulated the properties of snow with respect to the normal movements of skis thereover, they have not been sufficiently durable to provide a practical surfacing of ski slopes and trails. In the meantime, countless ski resort areas would welcome a practical means for extending the skiing season and hopefully make it possible to provide year-round ski facilities.

THE INVENTION

The surfacing means for snowless ski slopes and the like in accordance with the present invention is considered to provide a practical means for solving the problems above mentioned and converting any suitably inclined surface to a surface suitable not only for skiing but for other typical winter activities such as tobogganing and sledding. Basically the invention consists of an improved type of artificial snow together with a flexible support in sheet form which will maintain a substantial amount of the artificial snow in position for extended periods of use, and in which displaced artificial snow can readily be returned to its original position or replaced by additional artificial snow in providing easy maintenance of the surface.

The artificial snow consists of random cut particles of flexible plastic filaments having a maximum cross section dimension of about ⅛ inch and characterized as being essentially free of sharp corners and feather edges which have been found to interfere with the frictional properties particularly desired in the movement of skis thereover. The artificial snow thus substantially free of sharp corners and feather edges can be prepared from various types of plastic filaments wherein the rounding of corners and feather edges can be accomplished by such methods as mechanical tumbling, exposure to solvent action, and the like. A more practical approach, however, is considered to be the formation of the particles from filaments of thermoplastic material such as polypropylene and medium to high density polyethylene and then subjecting the cut particles to momentary localized application of heat which will soften and round the sharp corners and feather edges without otherwise altering the irregular shape and contour of the particles. Such localized heating can be effected in various ways as by spreading the particles on a supporting surface and passing an open flame thereover or by dropping the particles through a zone of open flame or controlled radiant heating.

By providing particles of widely varying size and shape including a substantial number of elongated particles with one or more partial cuts intermediate their ends to thereby provide a longitudinal distortion of the particle, a random mixture of the particles provides packing and resilient properties which very closely simulate the properties of natural snow with respect to movement of skis thereover. Furthermore, because of the substantial elimination of sharp corners and feather edges, artificial snow has frictional characteristics on inclined surfaces of the type found on ski slopes which experienced skiers indicate to be very similar to that of natural snow.

The flexible support member which is important for maintaining a minimum useful amount of the artificial snow on a ski slope or trail comprises a flexible backing member having protruding from the upper surface thereof a plurality of spaced and essentially perpendicular flexible rods having generally uniform height within the range of about ⅜ inch to ¾ inch forming an open brush-like surface with upper ends of said rods having balled enlargements which will expose smoothly rounded surfaces as the rods are flexed in any direction from the perpendicular as skis or other sliding bodies move thereover.

The enlargements provide the further important function of retaining the compacted particles of artificial snow in position. In other words, with the rods and snow particles both being flexible, the snow particles can be forced down between the rods into spaces having a larger cross sectional dimension than the cross sectional space in alignment with the balled rod tips. This interlocking of the artificial snow with the support is sufficient to retard displacement of the snow particles by normal wind and rain action and even normal sliding movement of skis thereover. On the other hand, the execution of turns and other maneuvers in which the ski edges must grip the surface, may cause some displacement of artificial snow from the support. In areas repeatedly exposed to such maneuvers, it will be necessary to sweep back the artificial snow or to add fresh artificial snow just as it is now frequently necessary to reinforce natural ski slopes and trails with fresh or artificially generated snow.

The flexible rods on said support are suitably fashioned from a thermoplastic material such as low to medium density polyethylene in which event the balled tips can easily be formed at the rod ends by momentary localized heating which will soften the thermoplastic material and cause a slight shortening of the rods as the material flows

and expands to form a ball tip. The rods can be secured to a flexible backing member by various means including weaving, cementing and the like; but a practical approach is the integral molding of the backing member and rods from thermoplastic material. This has the advantage of permitting squares or elongated strips of the flexible support to be heat sealed along abutting edges in building up the width and length of an area desired for covering a particular ski slope or trail. Such assemblage of the unit squares or strips can readily be accomplished at the site with portable heat sealing equipment, but it is considered more practical to form preassemblages at the point of manufacture in which a plurality of squares or strips are secured together as conveniently handleable rolls, and such rolls then spread on the particular slope or trail and joined together in appropriate side-by-side or end-to-end relation. In covering irregular or rolling terrain, it will of course be apparent that the backing maaterial can be cut and spliced in any desired manner to follow the contour of such rolling terrain.

The new artificial snow, and the flexible support therefor, provide practical ski surfaces capable of substantially year-round use. In fact, even at times when natural snow may be available, the surfacing of artificial snow and support can be left in place as providing a desirable base for the natural snow.

As far as the skier is concerned, the new surfacing means for ski slopes can provide an excellent substitute for natural snow. By employing a white plastic for the flexible support and rods, and colorless plastic (which takes on a degree of whiteness at the points of cutting) as the artificial snow, a slope surfaced with this material has an appearance very similar to natural snow. The surface reacts quite similarly to natural snow in all of the conventional ski maneuvers; and even falling on the new surface is not unlike falling on a hard snow base since the flexible rods and artificial snow have appreciable resilience and are essentially free of any sharp edges which might cause injury.

Details of the present invention will be more readily understood from a consideration of the following description taken together with the accompanying drawing in which the support and filler components thereof are illustrated in the several views with details identified by suitable reference characters in which:

FIG. 1*a* is a fragmentary sectional view of the support and filler assemblage, being a section substantially on the broken line 1*a*—1*a* in FIG. 2*a*.

FIG. 1*b* is a fragmentary view similar to FIG. 1*a* showing the support member in an intermediate stage of production.

FIGS. 2*a, b* and *c* are fragmentary plan views of the support without filler indicating typical arrangements of the projecting members thereof.

FIGS. 3*a, b* and *c* are enlarged cross-sectional views of typical filaments employed in preparing the filler.

FIG. 4 illustrates a view of typical shapes of chopped filament which may be present in the filler.

FIGS. 5*a* and *b* are enlarged showings of typical edge portions of chopped filament before and after heat treatment.

FIG. 6 is a fragmentary view of a plurality of unit support members in assembled relation as on a ski slope indicating such units as of essentially uniform square contour.

FIG. 7 is a view similar to FIG. 6 wherein the individual units comprise elongated strips secured together along longitudinal edges.

As shown in FIG. 1 of the drawing, the support component **10** in accordance with the present invention comprises a mat or backing **11** having a plurality of flexible rods or bristles **12** disposed substantially perpendicularly to the upper surface thereof and spaced apart to provide distances or areas therebetween which are substantially greater than the cross sections of said rods or bristles but

less than the height thereof. This relatively wide spacing of the rods or bristles accommodates in the areas a random lay of filler material **13** which will be more fully hereinafter described but should be generally thought of as a mixture of random sizes and shapes of chopped or cut plastic filaments.

The rods or bristles **12** and the backing **11** can be fashioned in various ways probably the most practical from a production standpoint being the molding of the backing **11** with the rods or bristles **12** being integral protruding portions of the backing material. Various thermoplastic materials can be employed in such molding operations to provide flexibility in both the backing **11** and the rods or bristles **12**. A preferred thermoplastic material is low to medium density polyethylene suitably compounded with titanium dioxide or other white filler so that the support unit **10** is white in color to aid in the simulating of snow.

When the support unit is thus molded from thermoplastic material such as polyethylene, the rods or bristles **12** are initially formed with flat ends as shown in FIG. 1*b* protruding slightly above the ultimate height desired in the rods or bristles **12** as indicated by the dot and dash line **14**. After molding, the ends of the rods or bristles **12** are exposed to a controlled application of heat which will soften the ends only thereof, permitting the material to flow and expand to form rounded or balled tips **15** as shown in FIG. 1*a*.

The rounding of the bristle or rod ends **15** is considered to be an important feature of the present invention for a number of reasons. Of primary importance is the elimination of sharp edges of plastic material which would tend to increase friction between the rod or bristle members and a ski or other member sliding over the assemblage. Even as the rods or bristles **12** may be substantially flexed as shown in dotted lines in FIG. 1*a*, the portions thereof exposed will be the rounded or balled tip **15**. Furthermore, the slight enlargement of the upper ends of the bristles or rods **12** by reason of the balled tips **15** acts to support the filler material which is disposed between the rods or bristles **12** against accidental displacement as by wind action or the like.

The rods or bristles **12** can vary in height from about ⅜ inch to ¾ inch with the most practical height being about ½ to ⅝ inch. The filler material **13** should be worked between the rods or bristles **12** to substantially fill the spaces therebetween, with some of the filler material protruding slightly above the tips **15**. This provides a surface which is yieldable to both vertical and angular pressure which may be exerted by a ski, sled runner, toboggan or the like and which will resiliently return to substantially its original configuration when the pressure has been released. Angular pressure as exerted by a ski when turning and the like may cause displacement of some filler material with a buildup thereof on adjacent surfaces. This creates no problem and actually enhances the simulation of natural snow conditions; and the thus-displaced filler material can be periodically brushed back into position or repalced by new filler material in properly maintaining the surface for further use.

While it has been indicated that integral molding of the backing member **11** and rods or bristles **12** is a preferred method of production, it will be understood that any manufacturing procedure, which will dispose flexible spaced rods or bristles **12** substantially perpendicular to a backing member **11**, can be used, including without limitation weaving, cementing of rods to the backing, or combinations thereof. In each instance, however, it is important that the rod or bristle ends **15** have the rounded or balled contour above described.

The rods or bristles **12** can be in truly random arrangement on the backing **11** or in varied patterned arrangements. Furthermore, the rods or bristles **12** can have varied cross sections including round, triangular, square, or elongated cross sections or combinations thereof in a single assemblage. In FIGS. 1*a* and 2*a*, the rods or bristles

12 have been shown as of essentially elliptical or biconvex contour with the long axis of the ellipse being alternately arranged in successive rows 16 and in alternating positions in such rows. This type of arrangement has the advantage of enhancing local yieldability of the filler material supported between the rods or bristles 12 since a given pressure against the flat side of the elliptical shaft causes a greater deflection than the same pressure applied to the narrow edge of the shaft. Furthermore, the alternate arrangement of the rods or bristles of elliptical contour tends to create irregular passages between the rods or bristles and varied size spaces or areas to better accommodate the irregular filler material 13.

FIG. 2*b* shows rods or bristles 12 arranged in interfitting zig-zag rows 17 providing substantial space to accommodate filler while at the same time minimizing the chance of filler movement along the rows. In this figure, rods or bristles 12 have again been shown as having essentially elliptical or biconvex contour, but it is understood that the cross section of the bristles can be of any desired form while maintaining the essentially zig-zag positioning of the bristles.

In FIG. 2*c* the rods or bristles 12, here shown as having a round cross section, are arranged in interfitting hexagonal patterns 18 which tend to approach a random arrangement with substantial variation in the size and shape of filler receiving spaces or areas.

It is to be understood that the various arrangements of the rods or bristles 12 as shown in FIGS. 2*a, b* and *c* are presented merely as typical illustrations and not by way of limitation. Any arrangement of rods or bristles 12 can be employed which will effectively support the filler material against excessive movement, particularly when subjected to angular pressure.

The backing member 11, particularly when formed of molded plastic material, is preferably provided with a plurality of spaced apertures 19 which are primarily for drainage purposes. The provision of such drainage apertures serves both to prevent undue displacement of filler material due to water action and to preserve the texture of the ground on which the backing 11 may be resting.

The filler material 13 as earlier mentioned comprises a random mixture of chopped or cut fibrous material. In preparing the filler, extruded plastic rods or filaments are subjected to the action of rotating knives or other chopping or cutting means. The rods or filaments may have varied cross sections such as round, triangular, square, or elongated with dimensions to provide substantial flexibility in at least one direction. Various thermoplastic materials can be employed, and very satisfactory results have been obtained with medium or high density polyethylene and with polypropylene filaments. The filament cross sections which have been found particularly effective are the flattened elliptical or biconvex filaments 20 shown in FIG. 3 with the ratio of length Y to thickness X ranging from about 3 to 1 as in FIG. 3*a* to about 7 to 1 as in FIG. 3*c*, and with the most advantageous contour having a 5 to 1 ratio as in FIG. 3*b*. To better visualize the filament size the dimension X is preferably of the order of .025 inch with the dimension Y then ranging from .075 inch to .175 inch.

The flattened elliptical cross section for the filament 20 permits a combined sliding and rolling action between contacting particles enhancing both the packing of filler particles between the rods or bristles 12 and the resilience of the resulting assemblage.

In FIG. 4 an attempt is made to illustrate a few of the typical configurations of chopped filament particles which make up a mass of filler material. To characterize these filament particles, it will be noted that 21 is a short filament with essentially square cut ends, 22 is another short filament with angular cut ends, 23 is a longer filament with ends cut at different angles, and 24 is a still longer filament with one square and one angular end. Typical more complex filament particles include 25 having a partial cut 25*a* at one side thereof, 26 having partial cuts 26*a* at opposed sides thereof, 27 having cuts 27*a* at opposed surfaces thereof, 28 having a plurality of cuts 28*a* in the same surface thereof, and 29 having cuts 29*a* and 29*b* in both side and surface permitting a twisting of the filament. The irregular contours and longitudinal distortion provided by the variations 25 to 29 enhance the interlocking of the particles and the stability of the compacted filler 13. It will, of course, be understood that the illustrations in FIG. 4 are merely intended to permit a better visualizing of the type of cutting and nicking of the filament which is accomplished in the random cutting of filaments with rotating knives or other cutting means. In actual size, the chopped filament pieces should be predominantly in the ⅛ to ¾ inch range although finer particles and occasionally larger particles can be utilized in admixture therewith without impairing the characteristics and performance of the support and filler assemblage.

The filaments used in making the filler material 13 are preferably clear polyethylene or polypropylene since the chopped filament then takes on a sparkle and reflective quality closely simulating that of snow. It will be understood, of course, that for special purposes the filler material could be produced from filaments colored in any desired manner; and in such instance it would probably be desirable to fashion a support 10 from similarly colored material.

In chopping the filaments 20 to form fragments of the type shown at 21 to 29, numerous feather edges 30 and sharp corners 31 are formed as shown in FIG. 5*a*. These feather edges and sharp corners can undesirably increase the friction between the compacted filler and skis or other sliding bodies, and it is desirable to heat treat the filler fragments to soften and round such feather edges and sharp corners as seen at 30*a* and 31*a* in FIG. 5*b*. This can be accomplished by spreading a quantity of filler fragments on a flat surface and passing a blowtorch or the like over the particles. In larger quantity the same result can be accomplished by dropping the particles past a flame or bank of flames which will soften and round such feather edges and corners without otherwise altering the characteristics of the particles.

The description thus far has been concerned with the structural details of incremental portions of the support and the filler. In actual use, however, the surface provided in accordance with the present invention is intended to be applied to large inclined areas such as open ski slopes or even ski trails. Even a small practice slope would involve an area of at least 2,000 to 3,000 square feet and an all-purpose slope or trail would involve many times this area. It should be understood, therefore, that the support 10 will be fashioned in practical size units depending upon the mode of manufacture and assembled in multiples of such units to cover the desired area.

When molding the support 10 by one shot injection molding techniques, the individual production units may be squares measuring 12 inches to 24 inches on a side, or even seomewhat larger depending upon the size of available molding equipment. In FIG. 6 there is shown a portion of a surface covered with a plurality of square support units 10*a* joined together along all abutting edges 32 by heat sealing, taping, or other conventional means. As a practical matter, the squares 10*a* can be secured together at the point of manufacture in single-width strips 33 or multiple-width strips 34 having a length to form a conveniently handled roll. Thus, for example, the preassembled support might be supplied to the ski slope in a roll 12 to 15 feet wide and 100 feet or more in length, thereby minimizing the joining and sealing that would haev to be accomplished at the point of installation.

If the support 10 is fashioned in a continuous molding operation or by weaving or other techniques as above mentioned the supports would be initially formed as long strips 10*b* which would then be assembled in edge-

to-edge relation in covering a desired area. Here again a plurality of strips could be secured together as a preassemblage **35** and supplied as such to the ski slope.

In making an installation on a ski slope or trail, the weight of the support and filler assemblage and the flexibility of the support permit it to closely follow the ground contour with little or no supplemental support. It is preferable, however, along edges and in areas which may be subjected to angular stress such as turning areas, to provide anchorage of the support member to the ground. Any conventional fastening or anchoring means can be used for this purpose; and by way of illustration suitable headed spikes can be passed through the drain holes **19** and into the ground at points where anchorage is desired.

If the support members or subassemblages as above described are being obtained from the same supplier it will be understood that the supplier can furnish sheets or rolls of the support already packed with filler, at least through out the major portion of the area. On the other hand, the filler is readily applied at the site after the support sections have been laid and joined to cover a particular slope or trail. Furthermore, it is quite likely that the support and the artificial snow filler may be furnished by different suppliers and constitutes separate articles of commerce.

Various changes and modifications in the surfacing means for ski slopes and methods for producing the same as herein disclosed may occur to those skilled in the art, and to the extent that such changes and modifications are embraced by the appended claims, it is to be understood that they constitute part of the present invention.

We claim:

1. Surfacing means for snowless ski slopes and the like comprising a flexible support member in sheet form having protruding from one upper surface thereof a plurality of spaced and essentially perpendicular flexible rods, said flexible rods being spaced apart by distances generally greater than the cross sectional dimension thereof and less than the height thereof forming an open area brush-like surface, a bed of random shaped, generally elongated, flexible plastic particles substantially filling the areas between said rods with portions of said particles extending above said rods, said rods and particles being substantially free of sharp edges, the height of each of said rods being several times the transverse dimension thereof, and smoothly rounded balled enlargements at the ends of said rods providing means interfitting with said bed of particles restraining said particles against displacement.

2. Surfacing means as defined in claim **1**, wherein said rods are of essentially uniform height and project from said support about ⅜ inch to about ¾ inch.

3. Surfacing means as defined in claim **1**, wherein said rods are of elongated elliptical to biconvex cross section with the angular orientation of said elongated cross section differing from place to place throughout said support.

4. Surfacing means as defined in claim **1**, wherein said plastic particles are randomly chopped plastic filaments having a maximum cross-sectional dimension of about ⅛ inch, and the length of said chopped particles is predominantly within the range of ⅛ inch to ¾ inch.

5. Surfacing means as defined in claim **4**, wherein said particles are formed from filaments having an elongated elliptical to biconvex cross section with the long dimension of said cross section being about 3 to 7 times the short dimension.

6. Surfacing means as defined in claim **1**, wherein said plastic particles are randomly chopped plastic filaments having a maximum cross-sectional dimension of about ⅛ inch, the length of said chopped particles is predominantly within the range of ⅛ inch to ¾ inch, and a substantial number of said particles having at least one partial cut intermediate the ends thereof providing longitudinal distortion of said particles, thereby enhancing interlocking within a randomly deposited bed of said particles.

7. Surfacing means as defined in claim **1**, wherein the flexible support and rods are white and the flexible plastic particles forming said bed are colorless thermoplastic, whereby the assemblage of particles with said support has an appearance closely resembling that of snow.

8. Surfacing means as defined in claim **1**, wherein the rods on said support are formed from low to medium density polyethylene.

9. Surfacing means as defined in claim **1**, wherein the support and rods are integrally molded from low to medium density polyethylene.

10. Surfacing means as defined in claim **1**, wherein said plastic particles are selected from the group consisting of particles of medium to high density polyethylene, particles of polypropylene, and mixtures of such particles.

11. Surfacing means as defined in claim **1**, wherein said flexible support has a plurality of holes at spaced intervals throughout its surface facilitating both drainage through and anchoring in position of said support.

12. Surfacing means as defined in claim **1**, wherein said flexible support is in the form of unit squares adapted to be joined together in edge to edge relation when applied to ski slopes and the like.

13. Surfacing means as defined in claim **12**, wherein a plurality of said squares are joined together forming a subassemblage adapted to cover a substantial area of ski slope.

14. Surfacing means as defined in claim **1**, wherein said fiexible support is in the form of elongated strips adapted to be joined together in edge to edge relation when applied to a ski slope.

15. Surfacing means as defined in claim **1** wherein the transverse dimensions of said plastic particles are generally less than the spacing of the balled enlargements on said rod ends, whereby said fiexible support member and said plastic particles can be separately supplied and assembled at the ski slope site.

16. Surfacing means as defined in claim **1** wherein said perpendicular rods comprise thermoplastic material, and said smoothly rounded balled enlargements have contours characteristic of having been formed by applying to the ends of rods, having essentially uniform cross section throughout their lengths, localized heat sufficient to soften the rod ends.

17. Surfacing means as defined in claim **1** wherein said particles comprise randomly cut thermoplastic filaments, a substantial number of said particles having at least one partial cut therethrough intermediate the ends thereof providing longitudinal distortion of said particles, and cut edges of said particles having smoothly rounded contours characteristically assumed by momentary exposure of said particles to localized heat sufficient to soften and round said edges.

18. Surfacing means for snowless ski slopes and the like comprising a flexible support member in sheet form having protruding from one upper surface thereof a plurality of spaced and essentially perpendicular flexible rods forming an open area brush-like surface, said rods being of elongated ellipical to biconvex cross section with the angular orientation of said cross section differing from place to place throughout said support, a bed of random shaped, generally elongated, flexible plastic particles substantially filling the areas between said rods with portions of said particles extending above said rods, said rods and particles being substantially free of sharp edges, and means on said rods interfitting with said bed of particles restraining said particles against displacement.

19. Surfacing means as defined in claim **18** wherein said rods are formed of thermoplastic material and said last-named means comprises smoothly rounded balled enlargements at the ends of said rods having contours characteristic of having been formed by applying to the

ends of rods of essentially uniform cross section throughout their lengths, localized heat sufficient to soften the rod ends.

20. Surfacing means as defined in claim **18** wherein said particles are formed from filaments having an elongated elliptical to biconvex cross section with the long dimension of said cross section being about three to seven times the short dimension.

21. Surfacing means for snowless ski slopes and the like comprising a flexible support member in sheet form having protruding from one upper surface thereof a plurality of spaced and essentially perpendicular flexible rods forming an open area brush-like surface, a bed of random shaped, generally elongated, flexible plastic particles substantially filling the areas between said rods with portions of said particles extending above said rods, said rods and particles being substantially free of sharp edges, means on said rods interfitting with said bed of particles restraining said particles against displacement, said plastic particles being randomly chopped filaments having a maximum cross sectional dimension of about ⅛ inch, the length of said chopped particles being predominately within the range of ⅛ inch to ¾ inch, and a substantial number of said particles having at least one partial cut intermediate the ends thereof providing longitudinal distortion of said particles, thereby enhancing interlocking within a randomly disposed bed of said particles.

22. Surfacing means as defined in claim **21** wherein said plastic particles comprise thermoplastic material and cut edges of said particles have smoothly rounded contours characteristically assumed by momentary exposure of said particles to localized heat sufficient to soften and round said edges.

23. Surfacing means as defined in claim **21** wherein said particles are formed from filaments having an elongated elliptical to biconvex cross section with the long dimension of said cross section being about three to seven times the short dimension.

References Cited

UNITED STATES PATENTS

2,254,482	9/1941	Heller	272—56.5
2,742,288	4/1956	Brunel	272—56.5
3,066,382	12/1962	Zweigle et al.	161—168
3,091,998	6/1963	Wehr et al.	272—56.5X
3,233,893	2/1966	Meyer	272—56.5
3,350,092	10/1967	Maki	272—56.5

FOREIGN PATENTS

619,975	5/1961	Canada	272—56.5
1,418,836	10/1965	France	94—3(S)

OTHER REFERENCES

"Recreation," July, 1938, pages 222 and 223. Article entitled "Skiing in the Straw," published by National Recreation Association, 315 Fourth Ave., New York, N.Y.

ANTON O. OECHSLE, Primary Examiner

A. W. KRAMER, Assistant Examiner

U.S. Cl. X.R.

94—3; 106—36; 161—168; 264—15