Dec. 4, 1962 R. ALBERTI 3,066,580

SKI SURFACE AND PROCESS OF FORMING SAME

Filed May 25, 1959

FIG. 1.

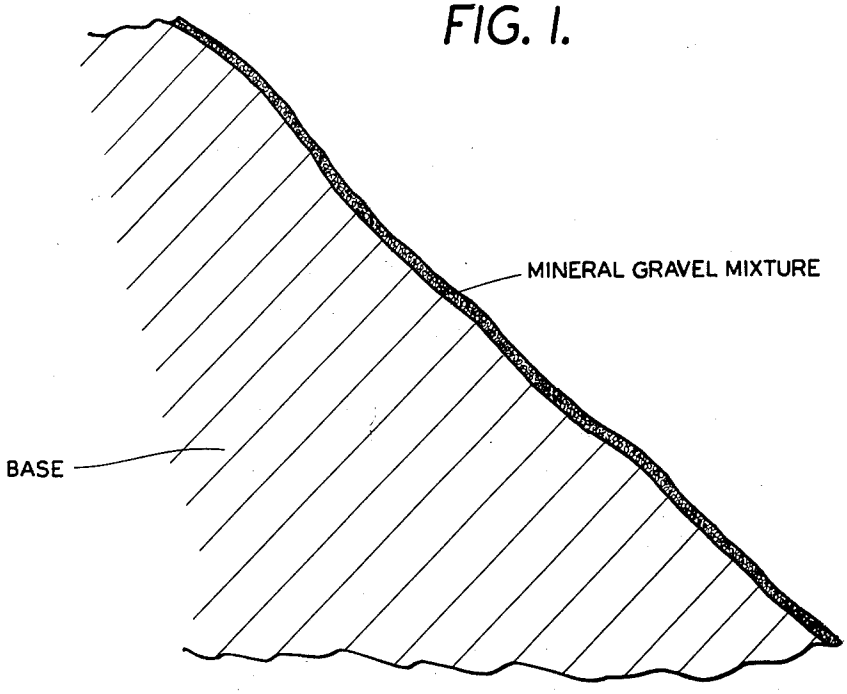
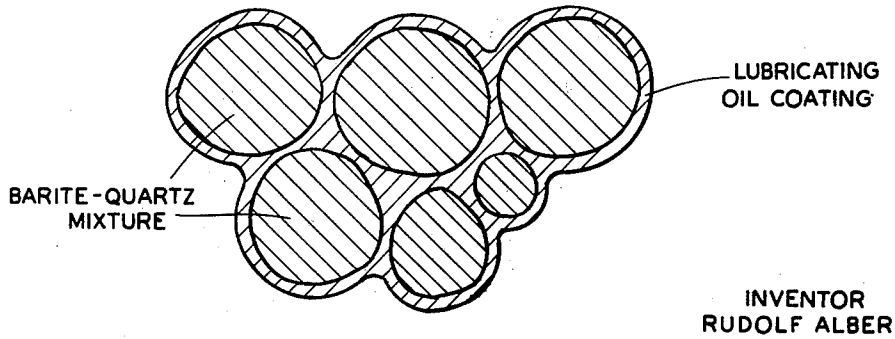


FIG. 2.



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SKI SURFACE AND PROCESS OF FORMING SAME

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This invention relates to a snow-like material for summer skiing which has excellent gliding properties and great durability and which is of low cost and is easy to manufacture and apply. Synthetic snows are known. They have been formed of various materials, such as, loose fibers, tree needles etc., which were impregnated with a soap or a solid fat. Another type of artificial snow employed as covering for man-made slopes consisted of soda ash and finely dispersed fillers, such as, sawdust or wood pulp. Artificial snow has also been made of granular materials, particularly, a mixture of a thermoplastic resin with powdered wax which was sprayed onto a special textile covering provided on the ground.

None of these proposals has found practical acceptance to any degree because these materials were either too expensive to manufacture, to apply and to maintain or they wore out too fast under the action of the weather and during actual use.

It is therefore an object of this invention to provide a snow-like material for summer skiing which will stand up better under various weather conditions and will have improved wear properties. It is another object of the invention to provide for a snow-like material which is less expensive both in manufacture, application and maintenance.

In a more general way, this invention has the object to provide for a snow-like material having an increased life span irrespective of weather conditions and amount of use.

These and further objects of the invention will be apparent from the following description.

I have found that a snow-like material which will accomplish the above listed and other objects can be formed of a substantially dust-free mineral gravel, the particles of which are covered with a thin coating of lubricating oil. Employing skis that have a sufficiently hard base, for instance, a base covered either with thin sheet steel or with another material of sufficiently high abrasion resistance it is possible to practice on thus covered slopes all types of skiing, including downhill skiing and slalom and to make turns substantially in the same manner as on natural snow.

Preferably, a gravel mixture is employed of generally non-uniform (hetero-dispersed) particle size distribution. This permits close compacting which is important for the rain resistance of the slope cover and also will avoid the formation of undesirable slalom troughs and heaves in case frequent turns are made at the same spot.

The base of the artificial snow of this invention can either be a natural mineral gravel, for instance, river gravel, or a gravel obtained by processing minerals. Natural quartz gravel, such as is obtained from river beds, has the advantage that the individual particles are particularly well rounded. However, sedimentation gravel, such as is obtained from the processing of minerals, because of the preceding wet preparation in crushers, drum screens and settling machines is usually sufficiently smooth at the edges. Excellent results have been accomplished with a gravel, so-called sedimentation quartz, which, in addition to quartz (SiO_2), contains, for instance, about 22% heavy spar (barite, $BaSO_4$), a mineral which is considerably less hard than quartz. Heavy spar has better gliding properties than pure quartz compounds, and is therefore beneficial both for the glide of the skier and for the abrasion to which the ski is being subjected. It is in general, however, possible to employ al kinds of gravel, from pure barite (heavy spar) to pure quartz. The selection of the desired type depends on local conditions and the available deposits. It is only necessary that the gravel be essentially free of dust since the presence of dust would interfere with the glide.

The particle size of the gravel of my invention can be varied within a broad range. It should in general not be too small. A substantial plurality of the particles should, for instance, be between 0.02 and 0.6" diameter. The amount of the portion with a particle size (according to sieve opening) below 0.02" should ordinarily not be in excess of 25 weight percent of the total amount. Mixtures have successfully been used where at least 50 weight percent had a particle size between 0.04 and 0.2".

For the treatment of the gravel it is possible to employ low grade used oil, such as, used engine oil, including automotive engine oil. The oil is added to the gravel in a mixer in the ratio of a few pounds to each ton of gravel. The mixture may be effected in a rotary concrete mixer into which the gravel is introduced together with at least about 6, preferably about 10 to 25 lbs. used automobile engine oil per ton of gravel, and the mixing is continued until the particles are covered with a uniform coating of oil. This coating is hardly noticeable on the individual particles but is sufficient, as practical experience has proven, to provide a good glide. The slope is then covered with the coated gravel of the invention to a thickness of, for instance, 4 to 8 inches.

The type of lubricating oil may be varied substantially. It is, for instance, possible, under certain conditions, to use silicone oil in the place of the conventional hydrocarbon base automotive engine oil. The viscosity of the oil must, however, be sufficient to permit good adhesion to the gravel particles, which condition is met in case of the conventional automotive oils (both summer and winter type). The amount of oil must be sufficient to provide the particles with a coating adequate for a safe glide of the skis. The amount of oil actually required in case of various types of gravel depends, of course, on the grain size of the gravel and can easily be determined experimentally.

The accompanying drawing illustrates the invention in a schematic manner.

FIG. 1 of the drawing shows a base forming the ski slope covered with the mineral gravel mixture of the invention.

FIG. 2, on an enlarged scale, shows individual particles of the preferred embodiment of a barite-quartz mixture and the coating of lubricating oil which surrounds the individual particles.

A particular advantage of the snow-like material of my invention over the prior art products resides in its unusual resistance to weather action. Even long periods of rain do not interfere with the usefulness of the slope, since, after the rain has stopped, the material will dry up in a short time and will provide as good a glide as before. The thin oil coating on the individual particles remains intact even after months of exposure. Accordingly, the glide provided thereby likewise remains unchanged. Should the gliding properties however go down, a simple respraying with oil is sufficient to restore the material.

The skis used on the snow of the invention—in addition to the conventional ski edging—must either have a particularly hard synthetic covering on their base, not only on the edges, or, and preferably, be provided on their entire base with a covering of sheet steel. It is also advisable to make the skis of even width throughout

their length excepting, of course, the tip of the ski. This will make it easier to apply the steel covering to the running surface in-between the steel edges. In order to preserve the flexibility of the ski to the same extent as it is present in conventional wooden skis with steel edges, the running surface between the steel edges is formed by separate successive lengths of steel which are applied by screws. If the steel portions have the same width along the entire ski, the application and also the storing of the parts will be easier.

An embodiment of a ski used, in combination with the snow material described would be as follows: a ski is formed of even width along its entire length, for instance 3.2" wide. It is provided at both edges with the conventional steel edging, which may have a thickness of about 5/64". Along the axially central portion of the ski, between the steel edges, there is provided a covering of sheet steel which may have a thickness inferior to that of the steel edges, for instance, a thickness of about 1/16". The several steel portions may have a length of, for instance, 16 to 20 inches. They are individually attached and individually exchangeable. A suitable material for the steel covering is a tempered steel, such as is used for leaf-springs. The edging can be made of the same material. With this type of ski, it is possible to do the same skiing on the lubricated gravel of the invention as on natural snow.

An example of the composition and manufacture of the snow-like material of my invention is as follows:

A mixture was prepared in the ratio of 1:1 of two sedimentation gravels (*a*) and (*b*) made from a barite preparation. The particle distribution of the several fractions was as follows (expressed by sieve openings);

(*a*)	> 1.0 mm. 14.9%	(*b*)	< 5.0 mm. 43.3%
	0.5–1.0 mm. 43.3%		3.0–5.0 mm. 24.7%
	0.2–0.5 mm. 20.8%		1.3–3.0 mm. 28.1%
	< 0.2 mm. 21.0%		>1.3 mm. 3.9%

The gravels contained about 22% $BaSO_4$, the balance being quartz. Even the finer grained gravel (a) did not contain any dust, that is, particles below 30 microns (0.03 mm.).

The oil employed was used automobile engine oil in an amount of about 22 lbs. per 1-ton gravel mixture. The mixing was effected in individual batches in the rotary drum of a concrete mixer, for a time of 5 minutes per batch.

The viscosity of the used oil was as follows:

at
16° C. ---------- 175–200 cp.
and at
73° C. ---------- 11– 12 cp.

With this type of lubricated gravel mixture, a suitable width of slope was covered to a thickness of about 6 inches.

While I have described specific examples of my invention I do not wish to be limited otherwise than by the scope of the appended claims:

What I claim and intend to secure by Letters Patent is:

1. A ski surface comprising a substantially dust-free mineral gravel mixture disposed upon a base, said mixture comprising individual particles which are covered with a substantially uniform coating of lubricating oil, said particles being of a size distribution, between 0.02 and 0.6" and said lubricating oil coating having a thickness sufficient to impart gliding properties to the gravel mixture so as to permit skiing thereon.

2. A ski surface comprising a substantially dust-free quartz-barite gravel mixture disposed upon a base, said mixture comprising individual particles which are covered with a substantially uniform coating of lubricating oil, said particles being of a size distribution, between 0.02 and 0.6" and said lubricating oil coating having a thickness sufficient to impart gliding properties to the gravel mixture so as to permit skiing thereon.

3. In the process of forming a ski surface the step of mixing a substantially dust-free mineral gravel mixture of a particle size distribution generally between 0.02 and 0.6" and lubricating oil together until the particles are covered with a substantially uniform coating of the lubricating oil followed by the step of applying the coated gravel particles on a slope to form a skiing surface.

4. In the process of forming a ski surface the step of mixing a substantially dust-free quartz-barite gravel mixture of a particle size distribution generally between 0.02 and 0.6" and lubricating oil together until the particles are covered with a substantially uniform coating of the lubricating oil followed by the step of applying the coated gravel particles on a slope to form a skiing surface.

References Cited in the file of this patent

UNITED STATES PATENTS

727,511	Warren	May 5, 1903
935,572	Amies	Sept. 28, 1909
1,356,794	Smith	Oct. 26, 1920
1,730,245	Sadtler	Oct. 1, 1929
1,884,471	Wittenberg	Oct. 25, 1932
2,091,610	Patnode	Aug. 31, 1937
2,143,545	Currier	Jan. 10, 1939
2,179,664	MacBride	Nov. 14, 1939
2,446,591	Hoerle	Aug. 10, 1948
2,558,759	Johnson	July 3, 1951
2,664,362	Higgs et al.	Dec. 29, 1953

FOREIGN PATENTS

508,128	Great Britain	June 27, 1939

OTHER REFERENCES

Engineering Record, vol. 65, No. 17, Apr. 27, 1912, page 464.