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Downs

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[54] **SKI WITH CUT-RESISTANT SURFACE COVERING**

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[52] **U.S. Cl.**.....**280/11.13 L**, 156/334, 156/335, 161/156, 161/190

[51] **Int. Cl.**.....**A63c 5/12**

[58] **Field of Search** ...280/11.13; 161/190, 156, 159; 156/334, 335

[56] **References Cited**

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2,537,982	1/1951	Finn	260/32.2
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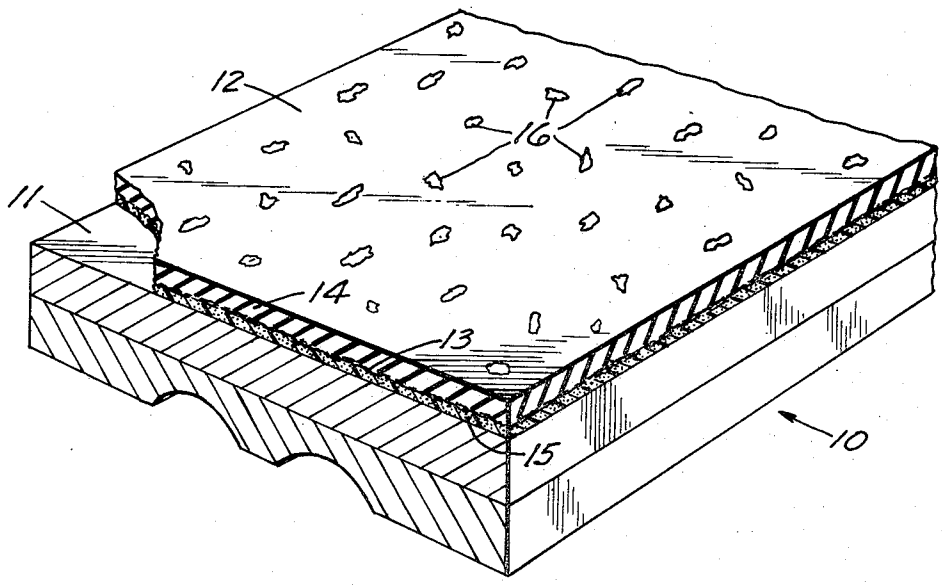
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[57] **ABSTRACT**

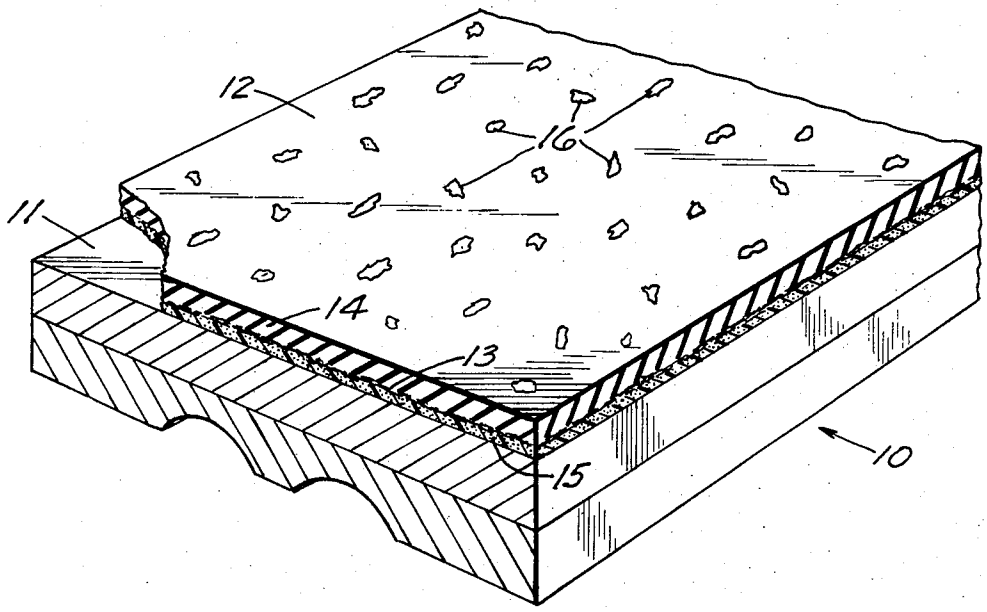
Skis and similar structures are provided with a cut-resistant decorative surface layer of urethane resin on a fibrous support. The protective surface layer may be removed and replaced as needed. The ski is protected against marring and scratching and is stabilized against chatter.

6 Claims, 1 Drawing Figure



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SKI WITH CUT-RESISTANT SURFACE COVERING

This invention relates primarily to an improvement in skis and similar sports equipment, although in a broader aspect it relates generally to a wide variety of substrates, e.g., of metal, wood or other material, provided with a protective decorative surfacing.

Skis used by novices are subject to considerable abrasion and marring which soon impairs the appearance of the ski. More experienced skiers, with better control of the skis, may be able to reduce the extent of such damage but frequently are bothered by chattering or excessive vibration of the skis during use. Attempts have been made to solve these problems, for example by use of high quality protective surface finishes, laminated structures, and perhaps in other ways. However, no one prior to the present invention, so far as is known to me, has provided a structure with the advantageous combination of properties here supplied.

In my novel structure the exposed decorative and marresistant surface covering is a relatively thick, e.g., about 20–35 mil, smooth-surfaced layer of pigmented urethane resin. Pigments of any desired color or combination of colors may be used. A particularly pleasing effect is obtained by combining small quantities of shiny metallic flecks with dark colored pigments to provide a sparkly appearance. In another form the coating is applied in two layers, the outer one of which contains dispersed pigmented elastomeric particles and has an attractive suede-like essentially glare-free appearance. The urethane resin is sufficiently hard and tough to resist gouging or tearing yet is also elastic and rubbery to an extent sufficient to withstand forces which might otherwise cause shattering, and the coating is found to contribute greatly to a vibration dampening effect. A typical pigmented resin may have a Shore A–2 hardness value within the range of 85 to 98 when tested in a thickness of at least about ½ inch.

The exposed surface covering is formed on a porous fibrous base which contributes dimensional stability and increased tensile strength. Thin open woven fabrics are useful but tend to produce a roughened exposed surface, and non-woven fibrous webs are therefore ordinarily preferred. An example is the spunbonded nonwoven polyester fabric available under the trade name "Reemay," a duPont product available in weight ranges of about 1.5 to about 2.5 oz./sq.yd. Spunbonded nylon fabrics are equally useful. The web is first coated and saturated with a polymeric adhesive cement composition which forms a firm bond with the urethane resin and also subsequently with the surface of the ski or other substrate to which the covering is applied.

Adhesive bonding between web and ski is sufficient to assure retention of the covering under all normal use conditions. The presence of the fibrous web imparts sufficient tensile strength to permit removal of the covering when desired, e.g., by hand stripping and particularly at moderately elevated temperatures. Removal of badly worn or marred coverings and replacement with new material is facilitated, so that the appearance of the skiis is easily maintained.

The following specific examples, in which all proportions are in parts by weight unless otherwise indicated, will serve further to illustrate but not to limit the invention.

EXAMPLE 1

A thin non-woven fibrous web of polyethylene terephthalate polyester fibers having a nominal weight of 2 oz./sq.yd. is supported on a silicone treated paper liner and saturated with a solution of a self-toughening adhesive as described in U.S. Pat. No. 2,537,982, applied to a total weight, after drying, of 3.0 gm./24 sq.in. The formula of the adhesive is

butadiene-acrylonitrile rubbery polymer	100
zinc oxide	10
oil soluble heat-reactive phenol-aldehyde resin	50
Vinsol ester gum	50
salicylic acid	15
methylethyl ketone (volatile solvent)	525

Over the dried coated web is then applied a thick coating of a pigmented self-curing urethane resin mixture and the coating is permitted to cure at room temperature. The urethane coating has a thickness of 30 mils. The urethane resin mixture is prepared from the following components, all proportions being in parts by weight:

Part A	100 parts
polypropylene ether triol (mw 440,eq.wt. 137)	220
polypropylene ether triol (mw 740,eq.wt. 240)	180
calcium octoate	0.8
phenyl mercuric acetate	1.2
pigment (optional)	5
Part B	100 parts
polypropylene ether glycol (mw 2000)	712
PbO paste (80% PbO in polypropylene ether glycol)	3
silica powder ("Cab-O-Sil")	32
methylene bis o-chloroaniline	43.2
calcium octoate	2.4
phenyl mercuric acetate	4.8
antioxidant (2,6-di-t-butyl-4-methylphenol)	3.2
Part C	100 parts
toluene diisocyanate	260
polypropylene ether triol (mw 740)	140
Part D	30 parts
toluene diisocyanate	60.7
polypropylene ether diol (mw 400)	30.6
polypropylene ether triol (mw 440)	8.7

Parts A and B are mixed together, and parts C and D are separately mixed together. The two mixtures are combined and well mixed just prior to coating. Curing is complete in about 24 hours at room temperature. The undisturbed exposed surface is quite smooth, but increased smoothness may be obtained by inverting the freshly coated web onto a smooth silicone-treated removable paper liner or other suitable smooth-surfaced removable carrier for curing.

The clean upper surface of a metal ski is optionally first lightly coated with a priming coat of the nitrile rubber - phenolic resin adhesive cement composition which has been further diluted with the volatile solvent to a concentration of not more than about 10 percent. The coating is allowed to dry. The cement-coated fibrous surface of the strip is then activated with the solvent and the strip is smoothly pressed onto the prepared surface. Overlapping edges are trimmed away and the solvent is permitted to evaporate. A strong bond is obtained between the strip and the substrate. No edge lifting, blistering or removal of the strip is experienced during subsequent storage and use of the ski. Equally firm bonds may be more rapidly obtained by application of the solvent-free strip under heat and pressure.

EXAMPLE 2

The cement-coated fibrous web is coated with a first layer of a self-curing urethane resin composition, e.g., as used in Example 1, and is then further spray coated over said first layer with "Nextel" 3101 suede coating composition, containing pigmented elastomeric urethane resin particles in a self-curing urethane resin composition. The coating is permitted to cure. The web is bonded to the upper surfaces of a pair of skis by the method described in Example 1 to provide an attractive appearing surface which is highly resistance to abrasion and marring, and which provides for reduced chatter of the skis during use.

In this example the fibrous web weighs 1.2 grams, the dry adhesive cement coating weighs 2.4 grams, and the two-layer urethane resin coating weighs 10.6 grams, per 24 sq.in. In a modification the fibrous web weighs 0.6 gram, the adhesive cement weighs 2.7 grams, and the urethane coating weighs 13.5 grams, per 24 sq.in.

EXAMPLE 3

A self-curing pigmented urethane resin composition, e.g., as described in Example 1, is coated on the smooth flat surface of a temporary carrier at a thickness of about 30 mils. While the composition is still fluid it is covered with a nonwoven spunbonded web of tensilized nylon. The fluid wets and partially penetrates the fibrous web. A layer of neoprene-phenolic contact adhesive composition is spread uniformly over the exposed surface of the web and is permitted to dry while the urethane composition is hardening. The upper surface of a metal ski is covered with a thin coating of the same contact adhesive which is allowed to dry, and a strip of the adhesive-coated web is pressed onto the coated surface promptly thereafter. Trimming of the edges and removal of the temporary carrier completes the construction. There is provided a tough and resilient, well bonded protective surfacing which gives both an attractive appearance and improved performance to the ski.

The release surface may be a silicone-treated paper. Another suitable material is Warren Paper Co. Type T/K Patent AV C1S polymer-coated paper having a smooth glossy polymeric release surface. The nylon web consists of spunbonded 1½ inch staple fibers of 2.3 denier nylon 6 monofilament having a weight of 8½ lbs./320 sq.yds., pre-treated with 3½ lbs./320 sq.yds. of polyacrylate ester applied in the form of "Rhoplex B-15" acrylate latex. The neoprene-phenolic contact adhesive is a blend of essentially polychloroprene, phenolic resin, and magnesia in a volatile organic liquid solvent, e.g., as described in U.S. Pat. No. 2,918,442.

The appended drawing illustrates in perspective an article of manufacture in the form of a portion of a ski **10** having bonded to its upper surface **11** a decorative protective covering **12** comprising a thin open fibrous base **13**, a tough resilient urethane resin outer layer **14**, and a polymeric adhesive cement layer **15** at least partially impregnating the base **13** and bonding the entire structure together. At least the outer surface layer of the urethane resin layer **14** is provided with decorative inclusions **16**.

What is claimed is as follows:

1. In a snow ski having a smooth running surface adapted to travel over snow and a smooth upper surface for supporting a skier, the improvement comprising a reinforcing, protective, decorative layer substantially covering and adherently bonded to said smooth upper surface, said layer being comprised of:

a. an open fibrous base,

b. polymeric adhesive cement impregnating said base and bonding the same to said upper surface, and

c. a tough resilient decorative urethane surface layer coextensive with and adherently bonded to the adhesive impregnated layer, said urethane resin layer being about 20 to 40 mils in thickness and having a Shore A–2 hardness of from about 85 to 98, whereby said ski is provided with a cut-resistant renewed decorative surface and a lessened tendency to chatter or vibrate excessively in use.

2. The manufacture of claim **1** wherein said fibrous base is a nonwoven spunbonded web of polyester filaments.

3. The manufacture of claim **1** wherein said fibrous base is a nonwoven spunbonded web of nylon filaments.

4. The manufacture of claim **1** wherein said adhesive cement consists essentially of butadiene-acrylonitrile rubbery polymer and phenol-aldehyde tackifier resin.

5. The manufacture of claim **1** wherein said adhesive cement consists essentially of neoprene-phenolic contact adhesive.

6. The manufacture of claim **1** wherein said urethane resin layer contains pigmented elastomeric particles.

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