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3,241,999

SLIP RESISTANT FABRIC

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Fig. 1

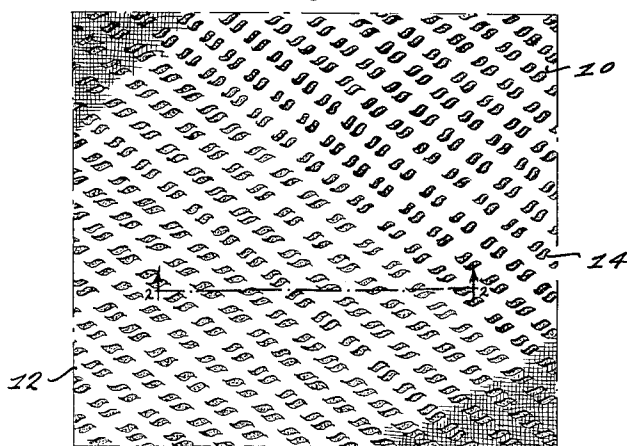


Fig. 2



Fig. 3

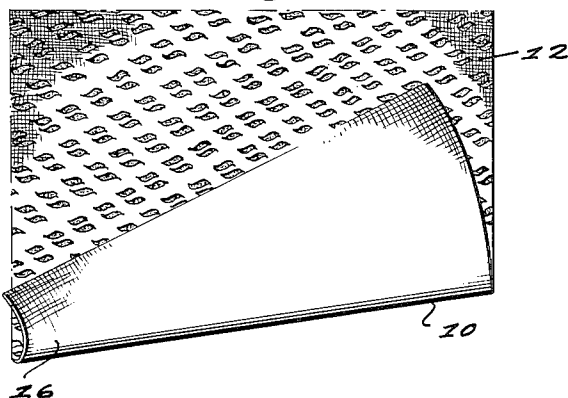
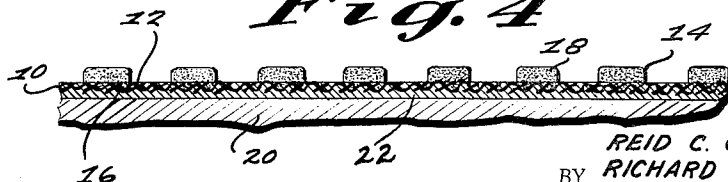


Fig. 4



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SLIP RESISTANT FABRIC

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2 Claims. (Cl. 117—38)

The present invention relates to a slip resistant textile fabric, and more particularly to a resin treated textile fabric which is slip resistant under both wet and dry conditions.

The fabric of the present invention is further characterized in that it has secured to one side thereof raised, spaced, resinous deposits containing 20–40% sand particles that provide excellent slip resistance without discomfort.

The fabric of the present invention is particularly well suited for use as a covering for surfaces that are likely to become wet and slippery, such as diving boards, walkways around swimming pools, and boat decks.

There are a number of prior art coverings for substrates, but each has disadvantages and limitations such as the following.

One of the prior art products comprises fabric having on the top surface thereof a heavily embossed continuous resin coating, and on the bottom surface thereof an adhesive which may be activated with a solvent. The primary disadvantages of this product are that it becomes slippery when wet, collects dirt, and tends to become disengaged from a diving board after some use, and is comparatively expensive.

Cocoa matting has also been tacked down to diving boards, but it tends to rot, mildew, collect dirt and debris between the diving board and the mat bottom, causing scratching and wearing of the board, and does not have the desired degree of wet slip resistance.

Through experimentation, we have found that prior fabric having on one side thereof conventional, raised, spaced, resinous deposits, such as the fabric disclosed in Hogg, British Patent No. 708,055, has slip resistance when dry, but becomes slippery when wet, and is therefore unsuitable for such things as diving board covering.

According to the present invention, the above disadvantages and limitations of the prior art have been overcome and additional advantages have been provided as follows.

It has been found that a flexible sheet material, such as fabric, which has secured to one side thereof a multiplicity of spaced, raised, resinous deposits covering about 20%–50% of the area of said side, said resinous deposits comprising a heat hardened vinyl resin and approximately 20%–40% by weight of sand particles, is slip resistant under both wet and dry conditions and scuff resistant, and is therefore admirably suited for covering surfaces such as diving boards. Moreover, fabrics having printed, discontinuous, resinous deposits thereon are less expensive to produce than fabrics with continuous coatings.

The invention will be described more particularly in connection with the accompanying drawings, forming a part of this application, in which:

FIG. 1 is a plan view of a plastic figured textile fabric embodying the present invention;

FIG. 2 is a cross sectional view of the fabric taken along lines 2–2 of FIG. 1;

FIG. 3 is a plan view with one end turned up to show

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the reverse side of a plastic figured textile fabric embodying the present invention; and

FIG. 4 is an enlarged cross sectional view showing the fabric of the present invention secured to a wood substrate by means of a resin.

Referring now to the drawings, the base sheet 10 may comprise any flexible sheet material, and preferably conventional woven glass fabric or woven mildew resistant cotton fabric. Glass fabric provides the advantage of non-rotting. The sheet 10 has a top surface 12 to which resinous deposits 14 are secured and a bottom surface 16. The raised, heat hardened, spaced (discrete), vinyl resin deposits 14 are secured to the top surface 12 of the base sheet 10, and cover approximately 20–50% of the area of the top surface. The resinous deposits may take any desired shape, such as dots, lumps, squares, etc., so long as they extend slightly above the surface of the fabric, e.g., about $\frac{1}{32}$ – $\frac{1}{8}$ ". The base of the resinous deposits may be about $\frac{1}{32}$ – $\frac{9}{32}$ " in diameter, if the deposits are circular, or about $\frac{1}{32}$ – $\frac{9}{32}$ " in length if the deposits are non-circular.

The resinous deposits 14 are impregnated with sand particles 18, which are essential to render the sheet resistant to slipping under wet conditions. The sheet is also slip resistant under dry conditions. The resinous deposits also provide wear resistance, and as the resinous deposits are worn down during normal wear additional sand particles become exposed at the surface of the resin deposits, inasmuch as the resin deposits are sand impregnated, so that the sheet retains its slip resistant properties during wear. The resinous deposits should contain about 20–40% of sand, based on the weight of the resinous deposits. If too much sand is utilized in the resinous deposits, the resin loses its plastic strength, and if too little sand is utilized, the sheet loses its wet slip resistant properties. The size range of the sand particles 18 should be such that they are small enough to pass a U.S. Standard Screen #40 (dry screen analysis), and large enough not to pass a U.S. Standard Screen #50 (dry screen analysis). When the sand particles are too large, they tend to remain behind in a circular printing screen rather than being uniformly and homogeneously printed onto the fabric with the other components of the resinous composition. When the sand particles are too small, the wet slip resistance property of the fabric is lost. The term "sand" as used herein, may be defined as grains or particles of disintegrated siliceous rock or stone, and accordingly includes pumice.

The vinyl resin utilized in the composition for forming the resin deposits 14 should be a vinyl type resin, e.g., it may be homopolymer of vinyl chloride or polyvinyl chloride copolymerized with polyvinyl acetate.

In selecting the particular vinyl resin, it is preferred to utilize one which will form a thixotropic composition; otherwise the resin printing process will be slowed down too much to have practical commercial value. For example, when the homopolymer of vinyl chloride is utilized, it should have a particle size range of 0.05–1.0 micron, a predominant particle size range of 0.2–0.8 micron, and a predominant particle size of 0.25 micron. That particular vinyl chloride resin may comprise all of the resin component in the composition for forming the resinous deposits 14, or it may comprise 75%–100% of the total resin component and homopolymer of vinyl chloride having a particle size range of 0.2–2.0 microns, a predominant particle size range of 0.25–1.2 microns

and a predominant particle size of 0.45 micron may comprise 0-25% of the total resin component.

Inasmuch as plasticizer also has an effect on whether a resinous composition is thixotropic, the plasticizer utilized in the resinous composition should be judiciously selected. Two plasticizers which are capable of forming thixotropic compositions with the above vinyl resin systems are di(2-ethylhexyl) adipate and di(2-ethylhexyl) sebacate.

The ratio of plasticizer to resin should be about 0.4-1:1 parts by weight, and preferably about 0.7:1.

The resinous composition for forming the resinous deposits may advantageously comprise 1.0 parts of homopolymer of vinyl chloride resin, 0.4-1 part of plasticizer, and 0.35-1.33 parts of sand particles small enough to pass a U.S. Standard Screen #40 and large enough not to pass a U.S. Standard Screen #50, dry screen analysis.

The resinous composition may additionally comprise small amounts of stabilizer, such as diglycidal ether of diphenyl propane, or strontium complex salt, or epoxy resin; lubricant, such as motor oil or stearic acid; pigment colorant; and fungicide, such as N(trichloromethylthio) phthalimide.

A specific example of a resinous composition which is suitable for use in forming the resinous deposits 14 is set out below. All parts are by weight, and the components may be added and blended in the order listed, at room temperature.

Example 1: Parts by Weight

Homopolymer of vinyl chloride having a particle size range of 0.05-1.0 micron, a predominant particle size range of 0.2-0.8 micron, and a predominant particle size of 0.25 micron	85
Homopolymer of vinyl chloride having a particle size range of 0.2-2.0 micron, a predominant particle size range of 0.25-1.2 microns, and a predominant particle size of 0.45 micron	15
Di(2-ethylhexyl) adipate	62
Epoxidized soybean oil	4
Diglycidal ether of diphenyl propane	3
Titanium dioxide	0.5
Dye pigment (phthalocyanine green)	2.0
Sand particles which pass #40 screen and do not pass #50 screen	74
N(trichloromethylthio) phthalimide	0.5
Total	246

The above resinous composition may be applied to the flexible sheet material as spaced, discrete deposits in any convenient manner. For greater efficiency, it is preferred to utilize the means described in U.S. Patent No. 2,893,315, and to train the flexible sheet material in linear movement at a rate of 5-30 yards per minute past and in contact with an arcuate surface portion of a hollow cylindrical screen roll having perforations therein corresponding to the shape of resinous deposits desired, said screen roll containing the resinous composition and being equipped interiorly with a doctor blade for doctoring the resinous deposit onto the flexible sheet, through the perforations. The screen roll rotates in the same direction as the flexible sheet travels, and a pressure roll is utilized to hold the flexible sheet against the screen roll.

Following application of the resinous deposits to the flexible sheet, the resinous deposits are heated to cure or solidify the resin deposits and to secure the resinous deposits to the sheet. This heating may be accomplished in any desired manner, and advantageously by passing the resinous deposits under infra-red lamps. Curing may also be accomplished by passing the resinated fabric through an oven heated to 375°-550° F. for 60 to 30 seconds.

Flexible sheet material to which has been applied res-

inous deposits 14 as above, may be secured to a number of solid substrates or surfaces, such as wood, aluminum, concrete and "Fiberglas." FIG. 4 illustrates the flexible sheet material 10, having thereon resinous deposits 14, secured to a wood substrate 20 by means of an adhesive resin 22. When securing the flexible sheet material to a substrate, the substrate should be clean and dry, and conventional adhesive comprising 98-99% polyester resin and 1-2% benzoyl peroxide hardener or catalyst may be utilized in securing the flexible sheet material to the substrate. A first coating of adhesive 22 should be applied to the substrate 20 and allowed to dry thoroughly. A second coating of the adhesive 22 should then be applied over the first coating, and the bottom surface 16 of the flexible sheet 10 placed thereon, resinous deposits 14 upward, while the adhesive is still wet. The second coating of adhesive coats the bottom surface 16 of the flexible sheet 10, the fibers forming the flexible sheet 10, and surrounds the base of the resinous deposits 14, but does not cover the upper surface of the resinous deposits 14. Care should be taken that the amount of adhesive 22 utilized in the second coating is not so great that it covers the top surface of the resinous deposits 14, otherwise the slip resistant property under wet conditions will be lost.

Among the advantages of flexible sheet material produced and anchored to the substrate as above, are the following. The surface is slip resistant under both wet and dry conditions, and is not uncomfortable to bare feet. The flexible sheet material 10 is firmly bonded to the substrate 20 and dirt, debris, etc., cannot work their way under the flexible sheet material and thereby cause difficult to remove soiling and excessive wear. The resin anchored fabric is easily washable with a hose.

This invention is not limited other than as defined in the appended claims.

What is claimed is:

1. A flexible sheet material which is slip resistant under wet and dry conditions, comprising a base sheet having on the top surface thereof a multiplicity of spaced, raised, resinous slip resistant and scuff resistant deposits that cover approximately 20% to 50% of the top surface area of the base sheet, said resinous deposits comprising 1.0 part by weight of homopolymer of vinyl chloride having a particle size range of 0.05-1.0 micron, a predominant particle size range of 0.2-0.8 micron, and a predominant particle size of 0.25 micron, 0.4-1.0 part by weight of a plasticizer selected from the group consisting of di(2-ethylhexyl) adipate and di(2-ethylhexyl) sebacate and 0.35-1.33 parts by weight of sand particles impregnated throughout said deposits.

2. A flexible sheet material which is slip resistant under wet and dry conditions, comprising a base sheet having on the top surface thereof a multiplicity of spaced, raised, resinous slip resistant and scuff resistant deposits that cover approximately 20% to 50% of the top surface area of the base sheet, said resinous deposits comprising 0.4-1.0 part by weight of a plasticizer selected from the group consisting of di(2-ethylhexyl) adipate and di(2-ethylhexyl) sebacate, 1.0 part by weight of resin comprising 75%-100% of homopolymer of vinyl chloride having a particle size range of 0.05-1.0 micron, a predominant particle size range of 0.2-0.8 micron, and a predominant particle size of 0.25 micron and 0%-25% of homopolymer vinyl chloride having a particle size range of 0.2-2.0 microns, a predominant particle size range of 0.25-1.2 microns and a predominant particle of 0.45 micron, and 0.35-1.33 parts by weight of sand particles impregnated throughout said deposits.

References Cited by the Examiner

UNITED STATES PATENTS

1,330,973 2/1920 Batholomew ----- 94-5

(Other references on following page)

5

UNITED STATES PATENTS

2,015,658	10/1935	Bezzenberger	117—13
2,221,038	11/1940	Austin	94—5
2,308,650	1/1943	Desagnat	52—388
2,421,171	5/1947	Tautvetter	52—180
2,680,319	6/1954	Dratler	161—39
2,772,181	11/1956	Rogers	117—25
2,887,867	5/1959	Burchenal	52—309

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2,984,052	5/1961	Mueller	117—25
2,995,179	8/1961	Scolamiero	117—25

FOREIGN PATENTS

638,429	3/1962	Canada.
CHARLES E. O'CONNELL, <i>Primary Examiner.</i>		
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