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FLOOR COVERING

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This invention relates to a floor covering of the hard-surfaced flexible type and method of making the same, and has particularly, though not exclusively, to do with a resilient floor covering of the general character described and claimed in our Patent No. 1,971,036, dated August 21, 1934, with respect to which the present invention is in certain aspects an improvement.

The present invention, in common with that of the said patent, includes the printing on a permeable or porous medium in the nature of a partially completed wearing layer with a coloring material, preferably in a drying-oil binder, but, differing from the invention of said patent as disclosed therein, the present invention involves the printing upon the permeable medium with a binder pigmented with two wholly different types of pigment, one of which types, namely, the coloring pigment, is herein termed "penetrating pigment" and the other type, the non-coloring and smoothing pigment, is herein termed "surface pigment", as hereinafter described, with resultant advantages in product and process. The advantages in the product include a materially smoother, harder, and hence more wear-resistant surface which is of particular advantage in the manufacture of a less expensive product having a relatively thinner wearing layer (say .010" to .012"), though also is of advantage in a product having a thicker wearing layer, even up to as thick as .030". In addition, it is possible, particularly in the thinner and less expensive products hereof, successfully to put on by the printing machine more coloring material and in less time than would be otherwise feasible. The product also exhibits more accurate lines and better definition of the design elements than has heretofore been practical or possible,—all of which are conducive to a more serviceable and more attractive product. Various process and manufacturing advantages are also secured by this invention in that the coloring medium may be more rapidly and more accurately printed on and so that it will be substantially free from flooding, despite the relatively large amount of colored binder printed thereon as compared with the thickness of the material printed. It is of particular advantage that the printing of the material of this invention may be more rapidly successfully printed for each print machine represents a very substantial item of cost (costing upwards of $100,000). Also, from more rapid printing various other advantages follow, for example, better control on the print machine, and in reducing the drying time and hence the cost thereof because of resultant saving in space, stock in process, etc.

In the commercial practice of the invention of said patent, the coloring materials employed have included dyes and pigments and when pigments have been employed they have ordinarily been first mixed with additional or filling binder and applied by printing to the partially completed wearing layer by the application thereto of the colored binder made up principally of drying oil and ordinary relatively fine coloring pigments the size of which was such as to permit them to pass and penetrate (though materially slower than dyes and with a tendency to flood) down through the interstices and into the body of the partially completed porous wearing layer in order to fill the same and provide a firm, hard, wear-resistant surface.

The floor covering of this invention embodies a wearing layer of substantial thickness made preferably from the novel plastic composition of said patent including a wood powder and primary binder with mineral pigment, which layer is frictioned in layer form (.015" to .030" thick) in situ as it is applied to a base or backing of woven or felted sheet material,—all as more fully described in our said patent. The thickness of the wearing layer structure in the case of the present invention, however, may be practically and commercially reduced to a thickness of .010" or even slightly less and still be properly and rapidly printed without spreading out or running, commonly termed bleeding or flooding, to provide the product having the above described advantages. Heretofore it has been particularly difficult if not impossible practically to print with a pigmented colored binder and without flooding a thin layer of say .010" thick. We have found in practice that we can rapidly print with an ordinary commercial print machine and apply to the porous foundation layer a relatively large amount of pigmented drying oil binder material without flooding by providing a colored binder material including a drying oil (together with any resinous materials desired) pigmented with relatively fine homogeneously dispersed coloring pigment, for example, what are known commercially as flushed pigments or finely ground wet pigments, plus a relatively large quantity of substantially colorless pigment, of the class known and described in technical literature as "mineral whites", which are practically transparent in oil owing to their low refractive power. The latter class of pigments is relatively coarse, of the order of 5 to 150 microns, as compared with the dis-

persed penetrating and coloring pigments which are ordinarily of the order of 1 to 3 microns, though ranging down to as small as .2 micron in the case of carbon black.

A typical pigmented colored binder material suitable for printing the product as herein described is as follows (all parts being by weight):

100 parts of binder material (for example, oil or oils such as linseed or China-wood, resins, etc.)

25–125 parts of surface pigment, i. e. mineral whites, (for example, barytes, whiting, asbestine or talc)

2–25 parts of pentrating pigment, i. e. dispersed pigment (flushed pigments or finely ground wet pigments).

The above example has been found in practice to be entirely satisfactory, and preferably thinning material is omitted, but, if desired, a small amount of thinner may be added, particularly if a relatively large amount of resin be included. Ordinarily in practice, and for most colors which it is desired to employ in the design, the aggregate amount of pigment is roughly equal to the amount of binder but, as will be seen from the above example, the amount of pigment may be substantially reduced so that, for example, its amount is but one-half of the amount of binder.

The printing of the intermediate product is preferably done by printing on a flat bed print machine with the same type of print blocks as are commercially used for printing felt base rugs. Despite the fact that the holes or openings in the porous base product may be of the order of 10 to 50 microns, paradoxically, the mineral whites or colorless pigments, for the most part, tend to remain at or near the surface of the printed product (though do not prevent the penetration by the penetrating pigment) and hence are herein termed "surface pigments" whereas the dispersed pigments readily pass through and from the agglomerated mineral white pigment and well down into the body of the porous layer through at least a major portion of its vertical depth to present the design therein. Upon the hardening of the printed binder material it thereupon converts the printed layer into a highly desirable smooth wearing surface as herein described and in which the surface pigments fill and smooth the surface and provide a smooth wear-resistant layer hardened and densified by the large proportion of mineral white pigments at and near the surface thereof, which pigments however do not appreciably affect the color or appearance or penetration by the penetrating pigments which color and decorate said wearing layer at its exposed surface and through the major portion of its vertical depth. Thus, the surface pigments serve in a dual capacity, first during the actual printing as a control phase of pigment to prevent flooding and later function to provide a smooth and wear-resistant surface, whereas the penetrating pigments serve as a coloring phase to pass down into the body of the sheet and there remain despite subsequent wear, to provide an attractive design.

The function of the surface pigments therefore is purely or substantially mechanical as distinguished from the optical or coloring effect of the pentrating pigment.

Having described our invention, what we wish to claim and secure by Letters Patent is:

1. A hard-surfaced flexible floor covering comprising a base with a wearing layer formed from a porous material adhesively united thereto, a substantial quantity of translucent substantially colorless surface pigment held at and near the exposed surface of said layer by a hardened binder material, and a quantity of colored relatively fine penetrating pigment also held by said binder material and extending from the exposed surface of said wearing layer down through at least a major portion of the vertical depth of said wearing layer and presenting a printed colored design therein and on the wearing surface thereof, and with the color of said design substantially unaffected by said surface pigment.

2. A hard-surfaced flexible floor covering comprising a base with a wearing layer formed from a porous material adhesively united thereto, a quantity of relatively large-size translucent substantially colorless surface pigment held at and near the exposed surface of said layer by a hardened binder material, and a quantity of colored relatively fine penetrating pigment also held by said binder material and extending from the exposed surface of said wearing layer down through at least a major portion of the vertical depth of said wearing layer and presenting a printed colored design therein and on the wearing surface thereof, and with the color of said design substantially unaffected by said surface pigment.

3. A hard-surfaced flexible floor covering comprising a base with a wearing layer formed from a porous material adhesively united thereto, a substantial quantity of translucent substantially colorless surface pigment substantially all of which is held at and near the exposed surface of said layer by a hardened binder material, and a substantial amount of colored relatively fine penetrating pigment also held by said binder material and extending from the exposed surface of said wearing layer down through at least a major portion of the vertical depth of said wearing layer and presenting a printed colored design therein and on the wearing surface thereof, and with the color of said design substantially unaffected by said surface pigment.

4. A hard-surfaced flexible floor covering comprising a base with a wearing layer formed from a porous material adhesively united thereto, a substantial quantity of relatively large-size translucent substantially colorless surface pigment substantially all of which is held at and near the exposed surface of said layer by a hardened binder material, and a substantial amount of colored relatively fine penetrating pigment also held by said binder material and extending from the exposed surface of said wearing layer down through at least a major portion of the vertical depth of said wearing layer and presenting a printed colored design therein and on the wearing surface thereof, and with the color of said design substantially unaffected by said surface pigment.

5. A hard-surfaced flexible floor covering comprising a base with a wearing layer formed from a plastic porous material adhesively united thereto, a substantial quantity of translucent substantially colorless surface pigment held at and near the exposed surface of said layer by a hardened binder material, and a quantity of colored relatively fine penetrating pigment also held by said binder material and extending from the exposed surface of said wearing layer down through at least a major portion of the vertical depth of said wearing layer and presenting a printed colored design therein and on the wearing surface

thereof, and with the color of said design substantially unaffected by said surface pigment.

6. A hard-surfaced flexible floor covering comprising a base with a wearing layer formed from a porous material adhesively united thereto, a quantity of relatively large-size translucent substantially colorless surface pigment held at and near the exposed surface of said layer by a hardened drying oil binder material, and a quantity of colored relatively fine penetrating pigment also held by said binder material and extending from the exposed surface of said wearing layer down through at least a major portion of the vertical depth of said wearing layer and presenting a printed colored design therein and on the wearing surface thereof, and with the color of said design substantially unaffected by said surface pigment.

7. A hard-surfaced flexible floor covering comprising a base with a wearing layer formed from a plastic porous material adhesively united thereto, a substantial quantity of translucent substantially colorless surface pigment held at and near the exposed surface of said layer by a hardened drying oil binder material, and a substantial amount of colored relatively fine penetrating pigment also held by said binder material and extending from the exposed surface of said wearing layer down through at least a major portion of the vertical depth of said wearing layer and presenting a printed colored design therein and on the wearing surface thereof, and with the color of said design substantially unaffected by said surface pigment.

8. A hard-surfaced flexible floor covering comprising a base with a wearing layer formed from a plastic porous material adhesively united thereto, a substantial quantity of relatively large-size translucent substantially colorless surface pigment substantially all of which is held at and near the exposed surface of said layer by a hardened drying oil binder material, and a substantial amount of colored relatively fine penetrating pigment also held by said binder material and extending from the exposed surface of said wearing layer down through at least a major portion of the vertical depth of said wearing layer and presenting a printed colored design therein and on the wearing surface thereof, and with the color of said design substantially unaffected by said surface pigment.

9. The method of making a hard-surfaced flexible floor covering material which consists in frictioning to a flexible base a wearing layer of substantial thickness of plastic material and thereby adhesively uniting the same thereto, drying the intermediate product thus formed, and then printing upon the exposed surface of said material with a liquid hardenable binder material including therein a substantial quantity of translucent, substantially colorless, surface pigment and a quantity of colored, relatively fine, penetrating pigment to provide a printed, colored design extending down through at least a major portion of the vertical depth of said wearing layer and with the colored design substantially unaffected by said surface pigment on the wearing surface thereof.

10. The method of making a hard-surfaced flexible floor covering material which consists in frictioning to a flexible base a wearing layer of substantial thickness of plastic material and thereby adhesively uniting the same thereto, drying the intermediate product thus formed, and then printing upon the exposed surface of said material with a drying oil binder material including therein a substantial quantity of translucent, substantially colorless, surface pigment and a quantity of colored, relatively fine, penetrating pigment to provide a printed, colored design extending down through at least a major portion of the vertical depth of said wearing layer and with the colored design substantially unaffected by said surface pigment on the wearing surface thereof.

11. The method of making a hard-surfaced flexible floor covering material which consists in frictioning to a flexible base a wearing layer of substantial thickness of plastic material and thereby adhesively uniting the same thereto, drying the intermediate product thus formed, and then printing upon the exposed surface of said material with a liquid drying oil binder material including therein a substantial quantity of translucent, substantially colorless, relatively large-size surface pigment and a quantity of colored, relatively fine, penetrating pigment to provide a printed, colored design extending down through at least a major portion of the vertical depth of said wearing layer and with the colored design substantially unaffected by said surface pigment on the wearing surface thereof.

12. The method of making a hard-surfaced, flexible floor covering material which consists of frictioning to a flexible base, a wearing layer of substantial thickness of plastic material and thereby adhesively uniting the same thereto, drying the intermediate product thus formed, and then printing upon the exposed surface of said material with a liquid hardenable binder material including therein a substantial quantity of relatively coarse translucent substantially colorless surface pigment and also including a quantity of colored, relatively fine penetrating pigment, to provide in the finished material a printed colored design visible at the surface thereof, and extending down through at least a major portion of the vertical depth of said wearing layer and with the relatively coarse surface pigment substantially at the wearing surface thereof.

13. The method of making a hard-surfaced, flexible floor covering material which consists of frictioning to a flexible base, a wearing layer of substantial thickness of plastic material and thereby adhesively uniting the same thereto, drying the intermediate product thus formed, and then printing upon the exposed surface of said material with a liquid drying oil binder material including therein a substantial quantity of relatively coarse translucent substantially colorless surface pigment and also including a quantity of colored, relatively fine penetrating pigment, to provide in the finished material a printed colored design visible at the surface thereof, and extending down through at least a major portion of the vertical depth of said wearing layer and with the relatively coarse surface pigment substantially at the wearing surface thereof.

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