Aug. 15, 1972 D. L. SENSENIG ET AL 3,684,630

CUSHION FLOOR

Filed March 9, 1970

Fig. I

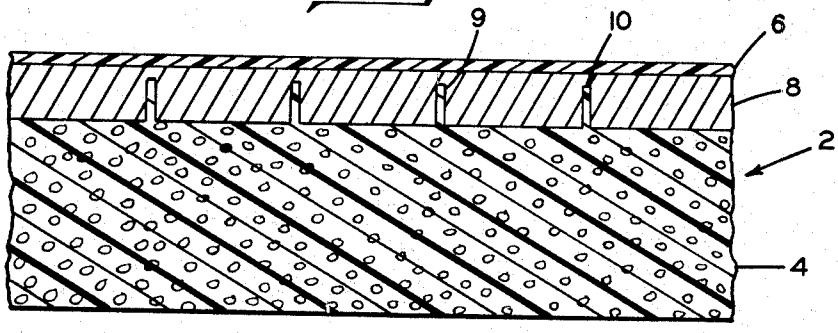
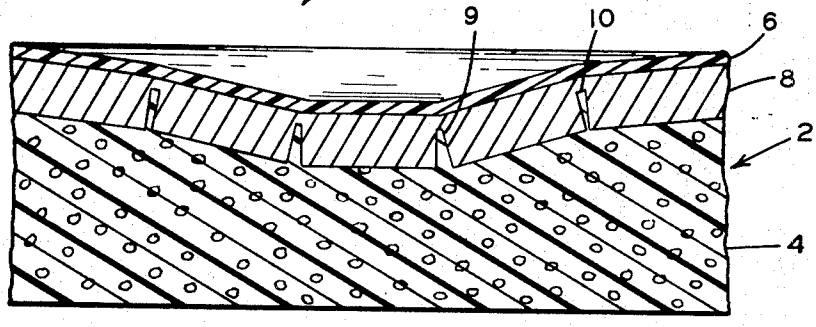


Fig. II



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CUSHION FLOOR

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ABSTRACT OF THE DISCLOSURE

The flooring structure is composed of three layers. The upper layer is a wear layer surface which may have a decorative design or configuration. The lower layer is a cushion or foam backing which is generally resilient. Between the upper and lower layers there is deposited a layer which is used to distribute the load applied on the upper layer to a wide surface area of the lower layer. The load distributing structure may be a plurality of interconnected plates, a thin unitary sheet structure or a sheet structure divided into a plurality of interconnected plates.

BACKGROUND OF THE INVENTION

Field of the invention

The invention herein is directed to a floor covering structure and, more particularly, to a cushion floor covering with a built-in load distributing means.

Description of the prior art

U.S. Pat. No. 2,569,709 discloses a flexible wood floor covering which is composed of a unitary sheet structure with a plurality of grooves converting the sheet structure into a plurality of interconnected plate elements. This structure is used to provide a covering on an irregularly contoured floor surface or to provide a floor surface which will not warp or bulge upon taking up moisture. This floor structure is not resilient in the sense that a load applied to the upper surface is distributed to a large area of the underlying surface.

U.S. Pat. No. 3,001,902 is directed to a tile structure which has a plurality of plate-like elements fastened to the back surface of the wear layer. Again, this floor is made flexible so that it may be applied to uneven surfaces. Likewise, here there is no indication of a load distribution feature.

Finally, U.S. Reissue Patent No. 26,239 discloses a floor structure which utilizes pads under the floor covering to provide a resiliency to the upper floor structure. The above structure is basically a resilient support for a conventional wood flooring laid over a concrete base. Here there is no teaching of a load distribution from a small upper surface area to a large underlying resilient surface area.

SUMMARY OF THE INVENTION

The invention deals with the construction of a backing layer for the wear surface of a floor covering so that there will be provided improved under-foot cushioning comfort along with very great resistance to damage to the upper floor surface. The feature of the construction which provides for the limited damage to the upper surface while still permitting a cushioning effect is the positioning of a load distributing structure between the upper wear layer surface and the underlying cushioning surface. The load distributing structure is generally a rigid material. This rigid material is normally cut, embossed or routed to make geometrical shapes or plates. The cut or routed areas do not cut completely through the rigid material, and there is provided a structure comparable to a plurality of rigid plates interconnected by resilient hinges. Of course, this structure could be made by merely placing a plurality of rigid plates on a continuous sheet, which functions as a resilient hinge between the individual plates.

This particular load distributing structure is placed between the upper wear layer structure and a relatively thick cushioning layer. A concentrated force applied to the upper surface of the wear layer is distributed by the rigid plate structure to a wide area of the underlying cushion material. With the interconnected plate structure, the plates will not bend appreciably, but there will be a bending between two plates at the groove area between the two plates. This feature thus helps to distribute the load over a large area of the underlying cushion material. It has been found that a load distributing structure along with a low compression modulus lower layer material will still permit the desired cushioning comfort and yet be extremely resistant to puncture plus recover immediately from long-term static load or other types of compression.

BRIEF DESCRIPTION OF THE DRAWING

FIG. I is a side view of an embodiment of the structure herein with the wear surface in a nonstressed state; and

FIG. II is a showing of the structure of FIG. I in a stressed condition.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. I, there is shown the three-layer structure of the invention herein. The floor structure **2** has three layers. The lower layer **4** is a conventional foam-type material such as that utilized in Patent No. 2,961,029. The upper layer **6** is a conventional wear layer surface such as that shown in the above-mentioned patent. This particular wear layer surface may be provided with a decorative design or a decorative surface configuration. The primary function of the upper layer is to provide a tough wear-resistant coating to the overall floor covering **2**. The layer **4** is meant to provide a resilient backing to the overall flooring **2** so that the flooring will provide an under-foot cushioning comfort due to the fact that it gives to some degree under the feet of a person walking thereacross. With floor structures having just the upper wear layer and the resilient undersurface, high heel, spiked shoe heels, chair legs, table legs, etc., tend to apply a very large force in a concentrated area. This force is transmitted by the wear layer to the resilient material directly under the wear layer. There is very little tendency for the surface wear layer to distribute the load over a wide area of the cushion material and thus diminish the depth to which the wear layer is depressed. The deeper the wear layer is depressed the greater is the tendency to rupture the wear layer and to crush the underlying cushion material. It is normal practice when tables and chairs are placed on this type of flooring to place load distributing plates or discs under the table or chair leg and on top of the wear layer. This thus tends to distribute the load of the table or chair over a larger area than would normally be utilized if the leg of the table or chair were permitted to rest directly on the wear layer.

The above load distribution feature of the unsightly appearing load distributing plates or discs is accomplished through the utilization of the load distribution layer **8** of the invention herein. This layer **8** is deposited between the wear layer **6** and the cushion layer **4** so that a concentrated force placed upon the wear layer **6** is distributed over a substantially large area of the cushion material **4**. Generally, a rigid material is utilized for the layer **8**, and this material has a thickness less than 0.050" and has an elastic modulus greater than 5×10^5 p.s.i./inch/inch.

The cushion layer has a low compression modulus of 2 to 20 p.s.i./inch/inch with a good short and long-term recovery. Since the rigidity of the rigid material is a function of its elastic modulus and thickness, variations of the above two factors may be used as long as they give the same resultant as the above structure.

In one preferred embodiment, the load distribution layer is made from a 30-mil steel plate which has a series of grooves **9** cut therein in a grid pattern to form 3" squares. The grooves do not extend completely through the steel; and, therefore, the steel plate-like structures are interconnected by hinge elements **10**. The cushion layer is a low modulus urethane foam of 6 p.s.i./inch/inch. The grooved rigid material is placed on the cushion layer with the opening of the grooves facing down. The wear layer is placed on the nongrooved side of the metal layer **8**. When the load is applied with the openings of the grooves face down, the plates themselves will not bend appreciably, but there will be bending at the grooves as shown in FIG. II. Since these hinge plates will not bend appreciably, loads will not be concentrated at one spot, but will be distributed over adjacent plates.

It is possible that the load distributing layer **8** could be made from a plurality of separate plastic plates which are individually adhered to a thin resilient material; and, therefore, this resilient material would form the hinges between the plates. Also, the plates could be individually embedded in the foam backing **6** and the foam function as the individual plate hinges. It is even conceivable that a single sheet structure could be used as the load distributing layer **8**. Certain plastic-type materials could well function in this manner and thereby provide a load distributing feature for a load placed on the wear layer while at the same time give a cushioning effect.

What is claimed is:

1. In a floor covering having a thick backing layer of resilient material, a thin upper layer of a wear resistant material, the improvement in the combination therewith comprising a means between these two layers for distributing a load applied to a small surface area of the upper layer to a large surface area of the resilient backing layer, said load distributing means is a plurality of rigid, plate-like elements connected together by a resilient hinge-like structure.

2. The floor covering of claim **1** wherein the lower layer has an elastic modulus in the range of 2 to 20 p.s.i./inch/inch while the load distributing means has an elastic modulus greater than 5×10^5 p.s.i./inch/inch with a thickness of less than 0.050".

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MORRIS SUSSMAN, Primary Examiner

U.S. Cl. X.R.

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