July 30, 1935. E. VAN DER PYL 2,009,595

ANTISLIPPING TREAD UNIT

Filed June 27, 1932

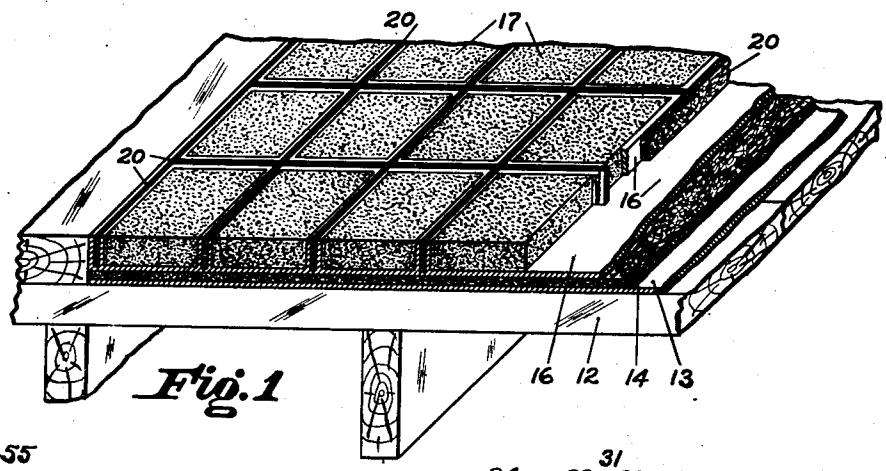


Fig. 1

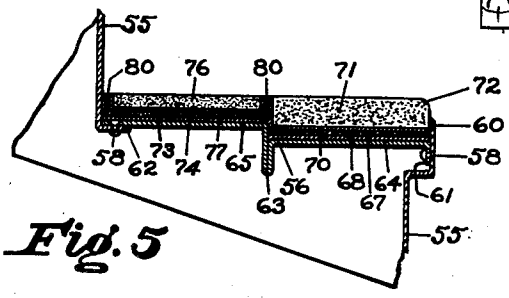


Fig. 5

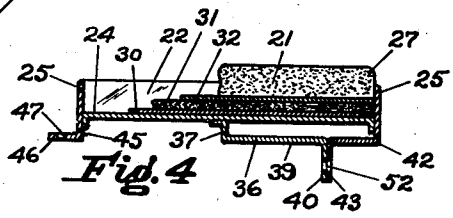


Fig. 4

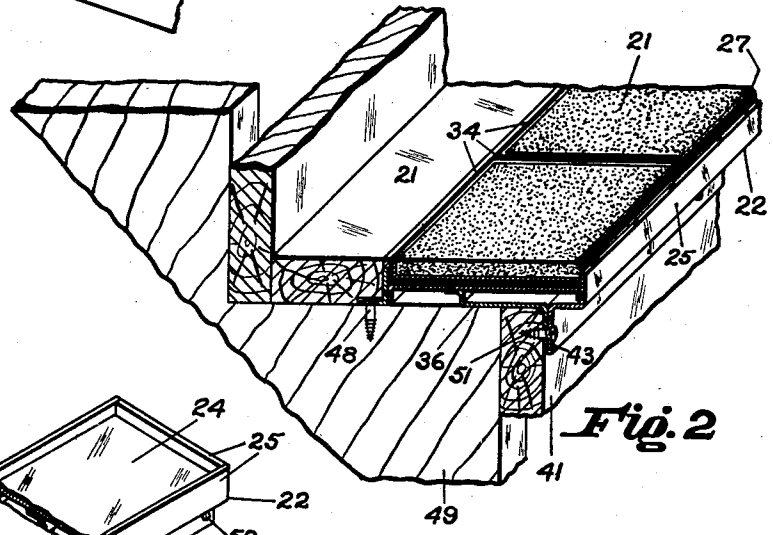


Fig. 2

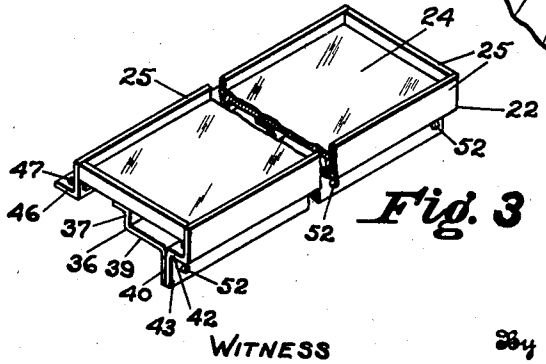


Fig. 3

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ANTISLIPPING TREAD UNIT

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4 Claims. (Cl. 94—5)

My invention relates to tile treads, and more particularly to a tread unit comprising anti-slipping tiles and a support therefor.

Heretofore, it has been the usual practice to form an anti-slip flooring or stair tread of tiles composed of ceramic bonded abrasive grains and imbed said tiles in a cement or concrete foundation, as disclosed in the patent to Dodge No. 1,377,960. Although this type of construction has proved highly satisfactory in many installations, it has several disadvantages. For example, it is often found to be difficult to lay new tiles or to replace old ones in accordance with this previous method without heavy expenditures of both time and labor. Owing to the porous and absorptive nature of such anti-slip tile treads, when imbedded within their cement supports, the tiles may absorb sufficient water therefrom to cause the cement to set unevenly and crumble away from the tiles, thus causing said tiles to become loosened from their cement support within a short time. In such a construction, the tiles will not properly support traffic and will soon break due to their uneven support and brittle structure.

In repairing old stairs or floorings, such as those constructed of wood, the use of cement would usually involve a complete tearing down and removal of the old construction, as well as its foundation, necessitating an entire new replacement due to the excessive weight of this type of cement construction. Furthermore, due to the brittleness of the tiles, it is especially desirable to provide a type of construction wherein individual tiles may be quickly and easily replaced.

It has also been proposed to construct a safety tread unit by imbedding a plurality of anti-slipping tiles in a plastic layer of asphalt which may be heated and flowed onto a suitable foundation, such as a floor or stair tread. This type of construction has been found unsatisfactory, especially when subjected to heavy traffic, due to the fact that the asphalt would gradually harden and offer an uneven support for the individual tiles whereupon, due to their brittle structure, they would be easily broken and tear loose from the asphalt supporting base.

It has also been proposed to secure a row of tiles on a wooden stair by means of a flange and a wedge block engaging opposite edges of the tile; but such a tile has been held either rigidly by the clamping members, or adequate cushioned movement has not been permitted. Furthermore, such constructions have not involved replaceable units capable of being manufactured and stored in the factory and then mounted as a unit on the structure of a stair, either on the old stair or as a replacement therefor.

It has also been proposed to imbed these tiles in an asphalt mastic carried in a pan and to form replaceable units thereof, but the asphalt has softened under the heat of the sun and permitted the tiles to become disarranged and unevenly supported so that they broke easily under the shocks of traffic. The asphalt hardens in position and fails to provide a cushion for the tiles; and particularly after it has softened a few times under the heat of the sun's rays, it does not support the tiles so that their upper faces lie in the same plane, but presents edges of the tile to traffic, causing pedestrians to catch their feet thereon and stumble and fall. Since the main purpose of such a construction was to provide a smooth anti-slip footing, obviously this type of tread does not meet the purposes for which it was intended.

Tiles rigidly imbedded in a cement or asphalt foundation receive and resist all of the shocks of traffic, and consequently are hard to walk upon; whereas a cushioned tread is highly desirable, since it is not only easy to walk upon, but also is much more serviceable since it moves slightly with each impact thereon and is evenly supported and is not easily broken.

It is accordingly the principal object of my invention to provide an anti-slip tile tread having tiles resiliently supported by means of a deformable cushioning member whereby any pressure exerted upon one of said tiles will be equally distributed substantially throughout its entire supporting surface.

It is a further object of my invention to provide an anti-slip tread comprising a ceramic bonded tile tread which may be quickly and resiliently secured to any substantial support in such a manner that undue stresses and strains subjected thereto will not tend to crack the tile but will be equally distributed therethrough, and its entire surface will present an anti-slip surface to all traffic contacting therewith.

It is a still further object of my invention to provide an article of manufacture which may be quickly and firmly secured to a worn-out flooring or stairway for the purpose of repairing it and providing a plane, unbroken slip-resistant supporting surface, generally serviceable as a stair tread.

Further objects will be readily apparent from the following disclosure.

Referring to the drawing, illustrating various embodiments of my invention, wherein like reference numerals indicate like parts:

Fig. 1 is an isometric view, broken away, to illustrate the application of my tread units to a flooring;

Fig. 2 is a fragmentary isometric view, showing the application of my tread units to a wooden stair;

Fig. 3 is an isometric view of the metal pan utilized to support the treads when used on a wood stair construction;

Fig. 4 is a sectional view, showing the application of a tread to a metal pan; and

Fig. 5 is a cross-sectional view of a steel stair, showing the application of treads thereto.

In accordance with my invention, I propose to utilize blocks of bonded abrasive grains wherein the abrasive comprises a material such as crystalline alumina or silicon carbide. The abrasive grains may be bonded together by any well-known method, but I preferably employ a vitrifiable ceramic material which, when fired in a suitable ceramic kiln, will become vitrified or fused into a hard porcelainic or glassy bond which unites the abrasive grains into an integral body. Tiles of this general type may be constructed in accordance with the disclosures presented in the patent to Dodge No. 1,377,960 and in the patent to Beecher No. 1,377,967 of May 10, 1921.

These tiles often become warped to a slight extent during the firing operation. As a consequence, I have found it especially advantageous to secure the tiles to a suitable cushioning deformable backing material which will support them uniformly irrespective of the tile surface contacting therewith, and tends to absorb the shocks of traffic imparted to said tiles, thereby serving to prevent breakage of their brittle structures. In mounting the tiles, I first cement a layer of deformable backing material upon a suitable support, such as a floor or stair tread, and then cement the tiles upon the top surface of said backing material.

In stair tread replacements, and particularly in repair work on worn wooden stair treads, I have found it convenient to resiliently secure the tiles within a metal pan, said pan and tiles forming a replacement unit which may be quickly and easily secured in place of a worn wooden stair tread by screws or nails, and thus provide an anti-slip wear-resisting tread unit which may be quickly mounted in position without necessitating a complete stairway replacement which has often been necessary when mounting anti-slip treads in a cement foundation.

As illustrated in the accompanying drawing, I provide slip-resisting tiles of ceramic bonded abrasive grain which may be of any convenient size and shape to handle and assemble. In the present instance, these tiles are rectangular in shape and are so spaced as to form a substantially uninterrupted anti-slip wear-resisting plane tread surface when assembled. Owing to the brittle structure of the tiles, I support them upon a deformable cushioning material, whereby any stresses or strains applied to one portion of a tile will be equally distributed over its entire supporting surface. This backing material further serves to absorb sudden shocks and jars due to heavy traffic passing over the tiles. Such a cushioning material may comprise leather, felt, linoleum or like material as well as various types of paper. My preferred material for this purpose comprises an asphalt paper approximately $\frac{3}{32}$ of an inch thick which serves to resiliently support each of the tiles over its entire contacting surface and to thereby distribute any sudden pressures or shocks throughout each tile. To secure these tiles in a substantially fixed positon to resiliently support traffic, the backing material is securely cemented to any suitable support and the tiles are then cemented in position on said resilient backing material. In this way, the tiles are secured to the base support. Various cementitious mediums may be employed to hold the tiles and deformable backing material in position, but in the present instance, I preferably utilize an emulsified asphaltic cement which has a tacky finish and may be laid on the desired surfaces with a brush or other convenient means. This type of tread mounting may be employed for various tread constructions such as wooden or cement floors and wooden or steel or even stone stairs.

As shown in Fig. 1, my preferred arrangement for mounting the tiles upon a floor consists in first coating the floor **12** with a resinous bituminous cementitious medium **13** which may comprise a thick emulsified asphaltic sticky medium laid onto the floor with a brush at room temperature. Various other cements may be utilized, but an emulsified asphaltic cement has been found entirely satisfactory and easy to use. A thick layer of a resilient deformable cushioning material **14**, which in the present instance comprises a soft asphalt impregnated paper about $\frac{3}{32}$ of an inch in thickness, is pressed into the cement **13** and thereby firmly secured to the floor **12** which may be of wood, metal, concrete or other material. After the deformable backing material **14** has been firmly pressed into position, a layer of similar cement **16** is flowed or brushed on the upper surface of the cushioning material **14** and tiles **17** are preferably mounted therein in tessellated formation. The interstices between the adjacent tiles may be filled with strips **20** of the same resilient backing material cemented to the end faces of the adjacent tiles with cement **16**.

It is apparent that various resilient deformable cushioning materials and various cements may be employed, but the essential features of my invention reside in the fact that the individual tiles must be cushioned and secured in position so that they may be evenly supported to prevent breakage of their brittle structures as well as to provide a slip-resistant tread surface which is easy to walk upon and resiliently supports the shocks of pedestrian traffic. Invariably, tiles become warped slightly in the firing operation during their manufacture. As a consequence, if such tiles were to be mounted upon a plane surface, they would quickly become broken in use due to the fact that their lower faces would not be evenly engaged to support their frail structures sufficiently to bear the shocks of traffic. Even when such tiles have been mounted in various cementitious mediums, there has been a tendency for the cement to shrink during hardening and provide an uneven tile support. In previous tile installations, many of the tiles had to be discarded or thrown away, since they were slightly warped. To overcome these various difficulties inherent in prior constructions, I have provided a construction wherein the tiles may be resiliently supported so that even tiles having a warped surface may be utilized to withstand the shocks of traffic without becoming broken. In addition to these features, my tile mounting facilitates an easy re-

placement of individual tiles if, by any chance, they should become broken due to abnormal shocks or blows. In case of breakage, it is simply necessary to pry loose the broken tile and apply a coating of cement to the resilient backing material, whereupon a duplicate tile may be pressed into position immediately ready for service.

As illustrated in Figs. 2, 3 and 4 of the drawing, when employing my anti-slip tile treads for either a new or a replacement of worn wooden stair treads, I preferably mount tiles 21 in a light weight reinforced metal pan which may be shipped as a unit and quickly and easily mounted in the position normally occupied by the wooden nose tread on a stairway. To facilitate such a mounting, I have provided a light weight metal pan 22 having a plate or tread supporting surface 24 which may be bounded by a short upstanding metal lip or flange 25 adapted to secure the tiles against any possibility of slippage when cemented within the pan. The tiles mounted in the metal pan are preferably rectangular in shape and of such dimensions as to fit loosely between the forward and rear upstanding metal lips of the pan. The forward edge of each tile 21 has a rounded nose 27 so that pedestrians may always maintain a secure footing thereon.

The tiles are mounted within the pan 22 similar to the way in which they are applied to a floor as disclosed in Fig. 1. My preferred method of tile mounting consists in first coating the surface 24 with a resinous, bituminous cementitious medium 30 which in the present instance comprises any reliable grade of asphaltic cement having a glassy finish. This cementitious medium 30 may be flowed onto the surface 24 with a brush or by any convenient method. A thick layer of a deformable cushioning material 31 is cut to fit within the pan and pressed into the cement 30 to cause it to adhere firmly to the surface 24 of the pan. This deformable material may comprise various suitable materials but, as in the application of my tiles to a flooring, it preferably comprises a soft, resilient, deformable asphalt impregnated paper about $\frac{3}{32}$ of an inch in thickness. After the paper has been cemented in position, its upper surface is coated with a layer of similar cement 32 into which the tiles 21 are pressed so that they will firmly adhere to the paper. As in the case of mounting my tiles on a flooring, I preferably cement strips 34 of the backing material in the interstices between the end faces of the tiles and the metal lip 25, as well as between adjacent tile end faces, thus permitting slight movement of the tiles when the backing material is deformed to absorb the sudden shocks of traffic.

The upstanding lip 25 extends sufficiently above the bottom of the tiles to prevent side movement thereof, but it is low enough so that it does not interfere with pedestrian traffic or contact with the heel of a shoe. To reinforce the metal pan and provide a firm support therefor, I have provided a metal reinforcing bracket 36 having an upstanding leg 37 which may be riveted or welded to the under side of plate 24 to prevent deflection or bending thereof so that said plate may offer a firm, substantial tile support. The bracket 36 is further provided with a supporting surface 39 and a downwardly projecting portion 40 which serve to engage a stair riser 41 and position the tread unit. A flanged member 42 having a depending portion 43 is secured by rivets or by spot welding to the downwardly projecting portion 40 of bracket 36 and also to the plate 24 at the forward portion of the pan, thereby providing ample support for the nosing of the tile treads. The rear portion of the pan is supported by an angle bracket 45 affixed to the pan in any convenient way, as by rivets or welds, and said bracket is provided with a foot 46 having holes 47 therein adapted to receive nails or screws 48 to quickly and firmly secure the rearward portion of the tread unit in position on the side pieces 49 which support the treads. The front of the tread unit is secured to the stair riser 41 by means of nails or screws 51 passing through holes 52 in the depending members 40 and 43.

An anti-slip stair tread of this type is especially advantageous, since it provides a self-contained tread unit which may be easily transported and quickly installed by an unskilled workman as a wooden stair tread replacement or as a new tread nosing on a standard type of wood stair construction. The metal pan is of light weight and of such dimensions that the tread surface of the anti-slip tiles is supported to lie in the plane of the rear portion of the wood tread which is positioned as in any standard wood stair tread construction. Treads of this type provide a rapid tread replacement unit which, although quickly installed, form a permanent repair. Due to the resilient backing material, these treads are easier to walk upon and only break when subjected to heavy abnormal shocks and blows. Unlike other tile tread constructions, if one of these tiles should become broken due to abnormal conditions, it is easily replaced.

It is often desirable to mount anti-slip tile treads upon a metal stairway. Fig. 5 suggests one means for providing such a construction wherein metal risers 55 are secured to a metal tread supporting member 56 by means of rivets 58. The risers are each provided with a short lip 60 which is comparable to the lip or flange 25 of the metal pan 22 used in the wood tread replacement construction and which lip extends above the metal tread support 56 sufficiently to hold the nose tiles in position without interfering or engaging with traffic. In view of the fact that the heaviest stresses and shocks of pedestrian traffic occur on the noses of stairs, I have preferably designed the tread support 56 to support heavy anti-slip abrasive nose treads and a lightweight rear tread which may or may not be an anti-slip tread, as desired. The tread support 56 which is preferably composed of a light-weight sheet metal, such as steel or iron, is provided with a short depending portion 61 at its forward end, through which the rivets 58 are secured to the riser 55. The rear of the tread support 56 is fastened to a short horizontal foot 62 on the riser 55 by means of rivets 58. The tread support is further provided with a depending web 63 which serves as a reinforcement therefor, and in the present instance comprises a fold in the member 56 which runs longitudinally thereof for the entire length of the tread support. The metal is folded in such a way that the support 56 provides two tile supporting surfaces 64 and 65 which do not lie in the same plane but are parallel to each other. Since the nose treads on all stairways have to bear the heaviest traffic and the most wear, I have so shaped my tread support 56 that the surface 64 lies in a plane below that of the surface 65, whereby I may mount a thick nose tile tread and a thin rear tile tread with their top surfaces in the same horizontal plane.

My anti-slip tile treads are secured to surfaces 64 and 65 in a similar manner as that utilized for mounting tiles on floors, as disclosed in Fig. 1.

My preferred arrangement of tile mounting consists in first coating the surface 64 with a resinous cementitious adhesive medium 67, which in the present case may comprise any reliable grade of asphaltic cement having a tacky finish. This cementitious medium 67 may be put on the surface 64 with a brush or in any other convenient way. A thick layer of resilient deformable material 68 is cut to the size of surface 64 and pressed into adhesive contact therewith. This deformable material which forms a resilient backing for the nose tiles may comprise any suitable materials such as linoleum, rubber, felt or paper, but as in the application of my tiles to a flooring, I preferably utilize a soft resilient deformable asphalt impregnated paper about $\frac{3}{32}$ of an inch in thickness. After the paper has been firmly cemented in position, its upper surface is coated with a similar layer of adhesive cement 70, into which anti-slip nose tiles 71 are pressed so that they will firmly adhere to the resilient backing material 68 which serves to evenly support said nose tiles and acts to absorb the shocks and jars of traffic. To facilitate easy walking, the noses 72 of the tiles 71 are rounded, in accordance with usual stair construction.

The rear tread supporting surface 65 is similarly coated with a layer of adhesive cement 73, into which is pressed a thick layer of similar backing material 74 to which is secured a tile 76 by means of a similar layer of cement 77. This rear tile 76 is thinner than the nose tile 71, since it does not have to withstand as heavy traffic shocks, but it is so mounted and the tread supporting surface 65 is so positioned with relation to surface 64, that the tops of the tile treads 71 and 76 lie in the same horizontal plane. The interstices between adjacent treads and between the rear tread and the riser 55 may be filled with strips 80 of backing material suitably cemented in position. This type of construction provides a shock-absorbing slip-resistant stair tread for pedestrial traffic and serves to minimize tile breakage.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. An anti-slip stair tread unit comprising a reinforced metal pan shaped to fit in the tread portion normally occupied by a wooden stair and having low upturned peripheral edges, a deformable cushioning material secured to the bottom of said pan by a plastic cementitious medium, a plurality of bonded abrasive anti-slipping tiles mounted within said pan which project above the front pan edge to provide an anti-slip stair nosing, said tiles being resiliently supported by the cushioning material and firmly secured thereto by an adhesive cementitious medium, whereby all shocks and blows of traffic on the tread will be absorbed by the cushioning material and breakage of the tiles will be prevented, and means remote from the stair nosing to secure the pan to a stair.

2. An anti-slip tread unit including a tread supporting pan having a low upturned nose flange, a downwardly projecting reinforcing flange on the bottom of the pan for securing it to a stair riser, a rear flange for securing the rear of the pan to a stair structure, a resilient shock-absorbing deformable body cemented within said pan to the bottom thereof, a plurality of anti-slipping tiles cemented to and supported by said deformable body but projecting above the nose flange of the pan, the top faces of said tiles being flat and lying substantially within the same plane and the outer edges thereof forming slip-resistant tread nosings.

3. An anti-slip stair tread unit comprising a reinforced metallic supporting pan having low upturned peripheral edges, a deformable cushioning material cemented within the pan, a plastic cementitious medium adhering to the top surface of the cushioning material, a plurality of bonded abrasive tiles imbedded in the cementitious medium in spaced relation to each other, a cushioning material secured within the spaces between adjacent tiles, said tiles providing a substantially plane slip-resistant tread surface projecting above the front upturned pan edge and an anti-slip tread nosing adjacent thereto, the tiles and pan being so shaped that the tiles substantially fill the pan and any material lateral tile movement therein is prevented but a cushioned movement thereof is provided to absorb the impacts of traffic, and means remote from the stair nosing to secure the tread unit in position on a stairway.

4. A safety stair tread unit comprising a metal supporting pan having low upturned edges, a layer of deformable cushioning material secured within the pan by a plastic cement, a plurality of anti-slipping tiles secured in spaced relation to the top surface of the cushioning material by a plastic cement, said tiles providing a substantially plane slip-resistant tread surface which projects above the front upturned pan edge and an anti-slip tread nosing adjacent thereto, a deformable cushioning material secured to and within the spaces between the adjacent tiles by a plastic cement, said plastic cements being non-meltable under ordinary climatic conditions and the cushioning material being sufficiently deformable to permit each of the tiles to evenly and resiliently adjust itself to the shocks of traffic, and means remote from the tiles to fasten the tread unit in position on a stairway.

EDWARD VAN DER PYL.