March 16, 1937. J. SCHMELLER, SR 2,073,758

COMPOSITE PLATE FOR STAIR TREADS AND THE LIKE

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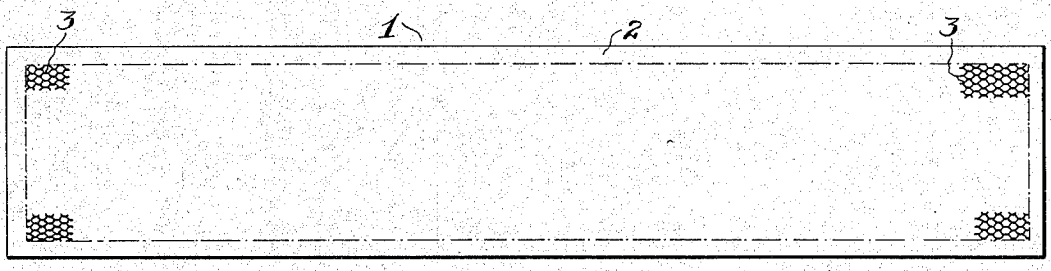


FIG. 1.



FIG. 2.

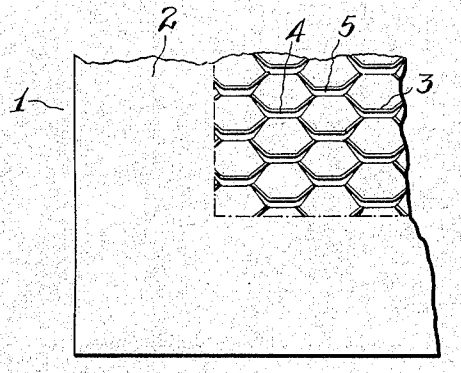


FIG. 3.

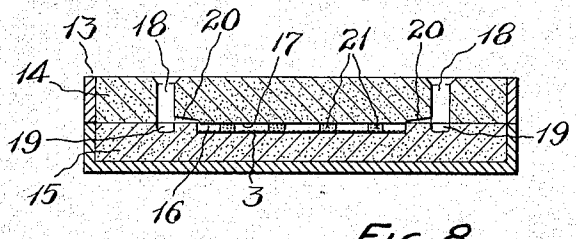


FIG. 8.

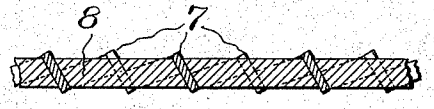


FIG. 6.

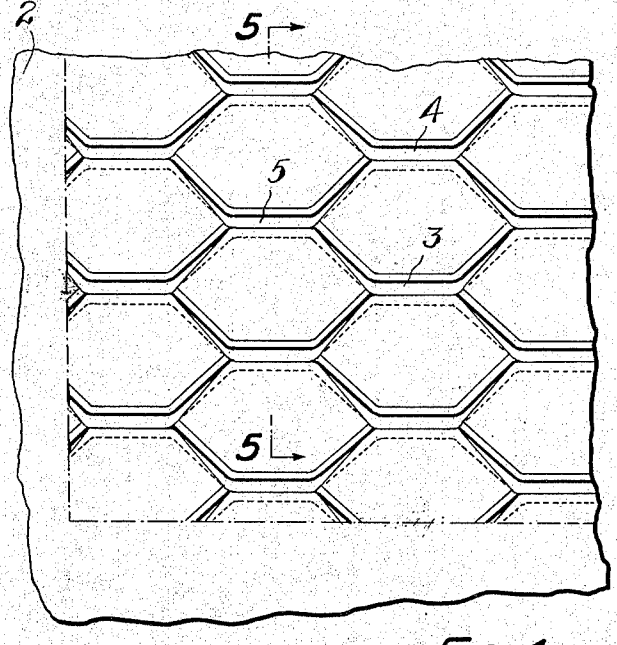


FIG. 4.

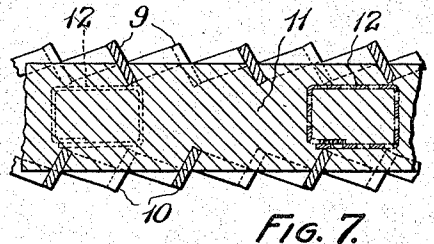


FIG. 7.

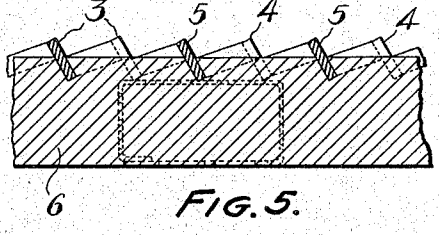


FIG. 5.

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COMPOSITE PLATE FOR STAIR TREADS AND THE LIKE

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Application July 31, 1935, Serial No. 34,064

6 Claims. (Cl. 94—5)

This invention as indicated relates to a composite plate useful for a wide variety of purposes, including stair treads, floor plates, street and sidewalk plates and covers, and like uses. More particularly, it comprises a plate made of relatively soft metal engaged about a flexible reinforcing and wear-resisting element formed of relatively harder metal. In the present invention it is preferred to use aluminum or aluminum alloy as the main body portion of the plate and to engage the same over a reinforcing and wear-resisting element preferably in the form of a sheet of expanded metal.

When aluminum or aluminum alloy or some similar metal of high crystallization shrinkage and high heat conductivity is used as the main body portion of the plate, if an inserted wear element is used which would not compensate for the high shrinkage and expansion characteristics of the metal, a satisfactory finished product free of cracks and warpage could not be provided. With the use of expanded metal, however, elasticity in all directions is provided for, and the full and free shrinkage and expansion of the body portion of the plate may take place without interfering with the firm engagement of the aluminum with the reinforcing and wear-resisting insert.

The insert is designed not only to strengthen the plate as such, but also to provide a tread surface which will be maintained as a non-slipping tread surface even though subjected to very heavy wear.

The principal object of the present invention is to provide an improved wear plate wherein metal having high thermal conductivity and a large factor of crystallization shrinkage may be utilized as a tread plate having a non-slipping insert whereby a satisfactory surface will be continuously maintained throughout a long period of use.

Another object of the invention is to provide a wear plate wherein an inner reinforcing and wear-resisting member is provided having angularly disposed portions adapted to project edgewise through the surface of the body portion of a plate and provide spaced points at which such insert will project to form a non-slipping surface.

Another object of the invention is to provide a simple method of forming a tread plate which will be free of danger of fracturing through temperature changes and which will provide a non-slipping surface through the association of a grid of expanded metal of one degree of hardness embedded in a body portion of metal of a lesser degree of hardness.

Another object of the invention is to provide a wear plate wherein the non-slipping elements are formed in edgewise angular position and embedded in the main body portion of the plate and are of such extent that they will wear down to approximately the same degree as the main body portion of the plate so that a non-slipping surface will be maintained and one having a satisfactory appearance because of the approximately uniform wear on the several elements thereof.

Other and further objects of the invention will appear in the course of the following description.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the product and method hereinafter fully described and particularly pointed out in the claims.

The annexed drawing and the following description set forth in detail certain means and modes of carrying out the invention, and products resulting therefrom, such disclosed means, modes and products, illustrating however, but several of various applications of the principle of the invention.

In said annexed drawing:

Figure 1 is a top plan view illustrating a tread plate embodying the principles of the invention;

Figure 2 is a side elevation of the structure shown in Figure 1;

Figure 3 is an enlarged fragmentary plan view, partly broken away, showing the structure illustrated in Figures 1 and 2;

Figure 4 is a still further enlarged view of the structure shown in Figures 1 to 3;

Figure 5 is an enlarged fragmentary sectional view of the structure shown in Figures 3 and 4, taken along the line 5—5, shown in Figure 4;

Figure 6 is an enlarged fragmentary sectional view of a modified form of construction wherein the embedded sheet projects from the top and bottom faces of the tread plate;

Figure 7 is an enlarged fragmentary sectional view showing a tread plate having two embedded sheets of expanded metal, one projecting through the top and the other through the bottom surface; and

Figure 8 is a diagrammatic view, partly in section, illustrating the method of molding the tread plate.

As is clearly shown in the drawing, the plate 1 comprises a main body portion 2 preferably of aluminum or aluminum alloy, and a grid portion 3 preferably formed of expanded metal produced

by slitting sheet steel and drawing the same. Through the use of an embedded sheet of expanded metal or similar steel grid, preferably deformable in all directions, a plate may be produced having a capacity to expand or contract without fracturing, and at the same time bring about the combination of effects which resides in the use of an aluminum plate with a steel insert to form a non-slipping surface and produce an article which will be of good appearance throughout its entire period of use even though subjected to very severe usage.

The sheet of expanded metal may be of the full size of the plate or may stop short of the margins thereof so as to provide a central area having the roughened non-slipping surface. The preferred form of structure would carry the area of non-slipping surface substantially over the entire extent of the plate, particularly where the structure was incorporated in a stair tread.

Through the use of expanded metal, as is clearly shown in Figure 5, two series of angularly disposed parallel wearing portions 4, 5 are provided, such portions being in different rows transversely and longitudinally, respectively. The intermediate portions of the expanded metal connect the parallel wearing portions to each other and yield whenever pressure is placed upon the structure.

In the form shown in Figure 5, the expanded metal grid is positioned so as to project slightly from the upper surface of the tread plate and has a relatively large body 6 of aluminum beneath the same.

In the form of construction shown in Figure 6, the grid 7 is of such size relatively to the body 8 of the tread plate as to have its wearing portions project from each side of the plate.

In Figure 7, two expanded metal grids 9, 10 are used, one adjacent the top surface and one adjacent the bottom surface of the plate 11, such grids being held in spaced relation by means of chaplets 12 during the process of forming the same.

The tread plate may be made in various ways and is preferably cast about the expanded metal or similar form of grid. It may be cast in sand molds, permanent molds, semi-permanent molds, or may be otherwise fabricated.

The preferred method of making the wear plate is in a sand mold and is illustrated in Figure 8, and preferably comprises a flask 13 having a cope portion 14 and drag portion 15 providing a molding cavity 16, the size of the plate to be formed, in the drag portion 15, and having a flat face 17 in the cope portion 14 of the mold, as well as a sprue passageway 18 communicating with peripheral runners 19 and entering the margins of the casting cavity for the plate through a series of thin gates 20 preferably equally spaced from each other which are readily frangible when the plate has been formed, and thus the auxiliary metal may be broken free of the plate without machining operations. The casting cavity may be formed either in the drag or the cope, but is preferably formed in the drag. The gates and peripheral runner are formed at the parting line, but may be formed in either the cope or drag, or partly in each.

As has been stated, the inserted web or grid 3 may be of less than the full extent of the plate to be cast and may be held in position preliminary to the pouring of the metal by means of a number of chaplets 21 placed above the grid. Thus after the plate is formed the grid will be held against the bottom of the drag to form the top of the plate through the action of the chaplets, and the body of the plate may have at its base an area of metal free of the inserted grid.

For certain uses the grid may be made of sufficient thickness so as to have the metal thereof extend completely through the body portion of the plate as shown in Figure 6, and thus a non-slipping surface would be provided no matter to what extent the article would be subjected to wear. It may also be formed as shown in Figure 7 where a separate grid is provided adjacent both the top and bottom surfaces of the tread plate.

For certain uses, however, it may be desirable to have a body of aluminum or other metal free of inserted metal completely around the marginal portions of the device, as well as forming a base pad free of inserted metal. In general, however, the amount of space free of the non-slipping grid will be kept at a minimum for the reason that the marginal areas of such plates might themselves present a hazard, particularly when used as a stair tread and subjected to the polishing action of severe use.

Other modes of applying the principle of my invention may be employed instead of those explained, change being made as regards the means and the steps herein disclosed and the forms of the product resulting therefrom, provided those stated by any one of the following claims or their equivalents be employed or embodied therein.

I therefore particularly point out and distinctly claim as my invention:

1. An article of the character described having in combination a flat elongated body member of relatively soft material, and a reinforcing grid embedded intermediate the top and bottom surfaces thereof, said grid having angular connecting elements providing an open mesh structure with the openings in staggered relation to each other in adjacent rows whereby said grid is freely expansible and contractible, and portions of said grid projecting from the upper surface of said body member to provide parallel series of spaced ribs to serve as wear-resisting elements.

2. An article of the character described having in combination a flat elongated body formed of metal of high crystallization shrinkage and high heat transfer characteristics, having embedded therein, and partially projecting from the upper surface of said body, a wear-resisting grid of relatively harder metal and provided with staggered inclined ribs and angular connecting elements and freely expansible or contractible.

3. An article of the character described having in combination a flat elongated body formed of metal of high crystallization shrinkage and high heat transfer characteristics, having embedded therein a wear-resisting grid of relatively harder metal and freely expansible or contractible, said inserted metal being formed of slitted and expanded sheet metal and having a series of angularly disposed webs throughout the structure, the upper edges of said webs projecting above the upper surface of said body.

4. An article of the character described having in combination a flat elongated body formed of metal of high crystallization shrinkage and high heat transfer characteristics, having embedded therein a wear-resisting grid of relatively harder metal and freely expansible or contractible, said inserted metal being formed of slitted and expanded sheet metal and having a plurality of series of angularly disposed webs throughout the structure, said respective series being in staggered relation to each other and the upper edges of said

webs projecting above the upper surface of said body.

5. An article of the character described having in combination a flat elongated body member formed of metal of high crystallization shrinkage and high heat transfer characteristics, having embedded intermediate the top and bottom surfaces thereof a wear-resisting grid of relatively harder metal and freely expansible or contractible, said grid being formed of slitted and expanded sheet metal and having a series of angularly disposed webs throughout the structure, the edges of said webs projecting outwardly from each of the top and bottom surfaces in alternate ribs of roughly crescent shape.

6. An article of the character described having in combination a flat elongated body member formed of metal of high crystallization shrinkage and high heat transfer characteristics, having embedded adjacent each of the top and bottom surfaces thereof a wear-resisting grid of relatively harder metal and freely expansible or contractible, said inserted metal being formed of slitted and expanded sheet metal and having a series of angularly disposed webs throughout the structure, the outer edges of said respective grids projecting above the respective top and bottom surfaces of said body in alternately spaced ribs of roughly crescent shape.

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