Dec. 7, 1954 C. J. RYLAND 2,696,027

STAIR CONSTRUCTION

Filed Nov. 17, 1950

Fig 1

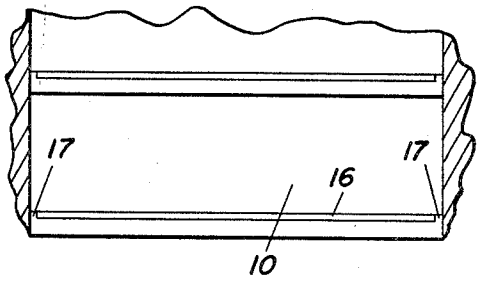


Fig 2

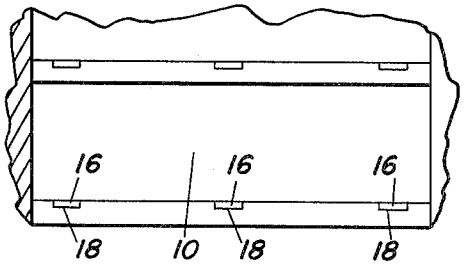


Fig 4

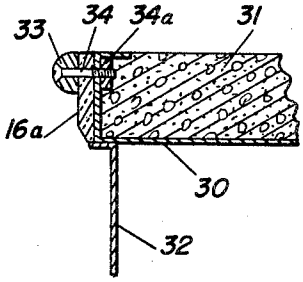


Fig 3

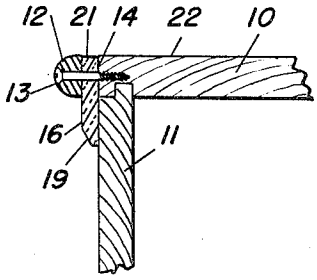


Fig 5

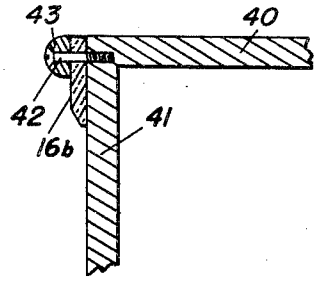
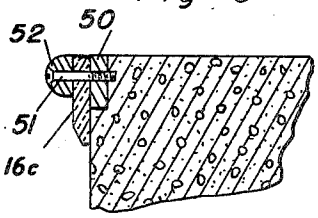


Fig 6



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STAIR CONSTRUCTION

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7 Claims. (Cl. 20—10)

This invention relates to a new and improved stair construction. It is common knowledge that yearly many accidents occur by persons falling down poorly or dimly lighted stairways. Occasionally, portions of the stair treads and/or risers are painted white to more clearly delineate them, and, moreover, some attempts have heretofore been made to paint stair portions with phosphorescent or fluorescent materials which fluoresce light in darkness or semi-darkness. A common disadvantage attendant with the employment of any of these methods of marking stairs is that, after the stairs have been subjected to considerable use, the markings tend to scuff and wear off and thereby become practically worthless in so far as making the stairs safer for use.

The present invention, which will be described hereinafter in more detail, contemplates the employment, in novel fashion, of strips of material selected from a class of materials of the type characterized by their ability to pipe light from a light absorption surface to a light diffusion surface. More particularly, it has been determined that materials, such as polymethylmethacrylate and polyethylmethacrylate, for example, possess to a high degree light piping characteristics. Materials of this latter type are more commonly known by their commercial or trade names, as for example, "Lucite" and/or "Plexiglas." These materials have an extremely high index of refraction which accounts principally for their ability to pipe light from one area to another. A strip of one of these materials will absorb light through any of its surfaces which are highly polished and a large proportion of the light so absorbed will be piped to roughened areas of the material whereat the light is diffused. In other words, it is characteristic of strips of such material to pipe light from a smooth polished surface to a roughened surface where the light so piped is dispersed or diffused in the form of an illuminating glow. As will appear more fully hereinafter, the light piping characteristics of such materials have especial utility in stair constructions of the type herein illustrated and to be described hereinafter in some specific detail.

For purposes of clarity and brevity, materials such as polymethylmethacrylate and/or polyethylmethacrylate and/or similar materials which have a pronounced ability to pipe light from one area to another will sometimes hereinafter be referred to as "light piping materials."

A stair construction embodying the present invention, comprises, generally, in combination with a stair tread, a strip of light piping material secured adjacent the outer edge of the stair tread and in such manner that the light diffusion surface of the strip is disposed substantially flush and coplanar with the top surface of the tread and so that the light absorption area of the strip is disposed beneath the top surface of the stair tread. Thus, light will enter the strip of material beneath the stair tread and be piped upwardly to the light diffusion surface whereat it will diffuse and illuminate the stair along the outer edge of the tread. Preferably a stair nose is provided along the outside edge of the strip of light piping material and the tread to protect the strip along its outer portions.

A principal object, therefore, of the present invention is to provide a stair construction of the type hereinabove briefly mentioned which incorporates a strip of light piping material adapted to diffuse light along and adjacent each tread of a stairway.

Another object of the present invention is to provide

a novel stair construction of the type alluded to in the foregoing paragraphs which employs and utilizes to full advantage the inherent property characteristics of light piping material such as polymethylmethacrylate or polyethylmethacrylate and/or similar materials.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings in which similar characters of reference represent corresponding parts in each of the several views.

In the drawings:

Fig. 1 is a fragmentary top plan view of a stair construction embodying the present invention.

Fig. 2 is a fragmentary top plan view of a modified stair construction embodying the present invention.

Fig. 3 illustrates how the present invention may be employed in association with a conventional wooden stair construction.

Fig. 4 illustrates how the present invention may be employed in association with a conventional prefabricated metal and concrete stair construction.

Fig. 5 illustrates how the present invention may be employed in association with a conventional cast iron stair construction.

Fig. 6 illustrates how the present invention may be employed in association with a conventional solid concrete stair construction.

As heretofore indicated, Fig. 3 illustrates how the present invention may be employed in association with a conventional wooden stairway construction. More particularly, the stair construction illustrated in Fig. 3 comprises a stair tread **10** which is supported at its outer edge by a riser **11**. A conventional nose-strip **12** is secured by screws or nails or the like, such as indicated at **13**, to the outer edge **14** of the stair tread.

In the embodiment of the invention illustrated in Fig. 3 a strip of light piping material **16** possessing the property characteristics hereinabove defined is disposed between nose **12** and outer edge **14** of the tread. The light piping material **16** may either comprise a single elongated strip extending substantially the full length of the stair tread (as indicated in Fig. 1) or it may comprise a plurality of shorter strips interposed at spaced intervals between the stair nose and the outer edge of the tread in accordance with the arrangement illustrated in Fig. 2. It is readily understandable that the construction in either case is substantially the same—the only difference being in the particular formations of the nose strips employed in each respective arrangement. More specifically, if a single elongate strip of light piping material is employed, the stair nose is preferably formed with two inwardly extending end-flanges **17** to establish a protective housing around said strip. On the other hand, if the arrangement of Fig. 2 is followed, the stair nose strips are preferably formed with a plurality of cut-outs **18** to individually receive in nested relationship an associated short length of material **16**.

Each strip of material **16** is substantially rectangular in cross-section, and the lower portion of each strip depends well below the bottom edge of its associated nose strip. The bottom outside edge of each strip is preferably bevelled, such as indicated at **19**, to provide a more efficient light absorption area or surface.

As heretofore explained, a strip of light piping material of the type hereinabove mentioned tends to absorb light through its highly polished surfaces and to diffuse light through its roughened surfaces. In the present construction, all exposed surfaces of each strip **16** are highly polished except the very top edge or surface **21** thereof which is roughened in order to provide a light diffusion area disposed along and substantially flush with the top surface **22** of the tread. It is obvious that the location and positioning of strip **16** is such that only its top edge **21** is likely to receive any hard wear by being walked upon or scuffed and that the polished surfaces of the strip are positioned and located out of the way of actual traffic. Moreover, in view of the fact that top edge **21** of the strip is roughened initially to establish a suitable light diffusion surface, the scuffing which it may receive through heavy and prolonged traffic thereover will in no way affect its efficiency as an illuminating means. In short, unlike con-

ventional paints or other conventional phosphorescent or luminescent materials which have a tendency to rub off under wear of traffic, the present strips of light piping material will not suffer any noticeable adverse effect through prolonged hard use.

Fig. 4 is illustrative of a more or less conventional type of metal and concrete stair construction comprising a prefabricated metal member **30** with a concrete fill **31** providing the actual stair tread. Metal risers of the type indicated at **32** are also conventional in this type of stair construction. Fig. 4 also illustrates how the present invention may be employed in association and in combination with stair constructions of this latter type. More particularly, a strip of light piping material **16***a* may be disposed between the outer edge of the metal tread member and a nose strip **33** which serves to clamp the light piping material firmly in position. The nose strip can be secured by screw bolts **34** to the metal tread member by providing a suitable female threaded anchoring band or plate **34***a* on the inner face of said metal tread member. In actual construction, the band **34** may be spot-welded to the inner face of the metal tread member at desired intervals (in alignment with suitably formed bolt holes in the tread member) prior to the time that concrete tread is poured. Thereafter, the light piping strip and nose-strip may be installed by threading the screw bolts into the anchoring band from the outside.

Fig. 5 is illustrative of the more or less conventional cast iron stairway construction which consists of an integral piece of cast iron defining a tread portion **40** and a riser **41**. The outer edge of the tread member **40** may be tapped to receive bolts such as screw bolt **42** which, of course, is adapted to secure nose strip **43** and light piping strip **16***b* into position substantially in the same manner as described with respect to the construction shown in Figs. 3 and 4.

Fig. 6 shows how the present invention including light piping strip **16***a* is adapted for use in association with substantially solid concrete stairs. In this type of construction a metal anchoring strip **50** is preferably embedded in the cement at the time that the cement is poured into the forms. The anchoring strip **50** is tapped to threadedly receive screw bolts, such as indicated at **51**, which in turn are provided to secure the nose strip **52** and light piping strip **16***c* adjacent the outer edge of the stair tread.

From the foregoing illustrations and examples on how the present invention may be employed in combination with more or less conventional type stair constructions, it is seen that each adaptation of the invention to the various types of stair construction follows generally the same principles of construction, assembly and installation. More particularly, in each case the strip (or a plurality of strips as the case may be) of light piping material is disposed between the outer edge of a stair tread and a nose strip secured thereto, and in such manner that the roughened light diffusion surface of the light piping strip extends along the outer edge of the tread substantially coplanar with the top surface of said tread. The exposed polished surfaces of the strip of light piping material located below the top surface of the tread will absorb light from any source of illumination in the area and diffuse it along the outer edge of a tread. In dimly lighted stairways, for example, light reflected from the ceilings and walls of the building will be absorbed through the exposed polished surfaces of the material and be transmitted to the top roughened edge of the strip of material for diffusion and increased illumination along the outer edge of the tread. From the foregoing, it is believed obvious that the present invention may be employed to excellent advantage in association with any number of types of stair constructions and in any number of places such as theatres, arenas, apartment buildings and the like.

Although the present invention has been described in some detail by way of illustration and example for purposes of clarity of understanding, it is understood that certain changes and modifications may be made within the spirit of the invention and scope of the appended claims.

I claim:

1. A stair construction comprising in combination with a stair tread and supporting riser, a strip of material selected from a class of materials of the type having a pronounced ability to pipe light from a light absorption polished surface to a light diffusing roughened surface thereof, said strip secured adjacent the outer edge of said stair tread exteriorly of the riser and with the light diffusion roughened surface of said strip disposed substantially coplanar with the top surface of said tread and with the light absorption polished surface of said strip disposed below the top surface of said tread.

2. A stair construction comprising in combination with a stair tread and supporting riser, a stair nose secured adjacent the outer edge of said tread, a strip of material selected from a class of materials of the type having a pronounced ability to pipe light from a light absorption polished surface to a light diffusion roughened surface thereof, said strip disposed between said stair nose and the outer edge of said tread exteriorly of the riser and with the light diffusion roughened surface of said strip disposed substantially coplanar with the top surface of said tread, and with the exposed light absorption polished surface of said material being disposed below the top surface of said tread.

3. A stair construction comprising in combination with a stair tread and supporting riser, a stair nose secured to the outer edge of said tread, a strip of material selected from a class of materials having a pronounced ability to pipe light from a highly polished surface to a roughened surface for light diffusion disposed exteriorly of the riser between said stair nose and the outer edge of said tread, the top edge of said material being roughened and disposed substantially coplanar with the top surface of said tread, a portion of said strip depending below said stair nose, exposed surfaces of said depending portion of said strip being highly polished to absorb and pipe light to the roughened top edge of said strip.

4. A stair construction comprising in combination with a stair tread and supporting riser, a stair nose secured to said tread along the outer edge thereof, a strip of material selected from a class of materials having a pronounced ability to pipe light from a highly polished surface to a roughened surface for light diffusion, said strip being substantially rectangular in cross-section and disposed exteriorly of the riser between said stair nose and the outer edge of said tread, the top edge of said strip being roughened and disposed substantially flush with the top surface of said tread to establish a light diffusion surface proximate the outer edge of said tread, a portion of said strip depending below said stair nose with its inner surface abutting flush against said riser, the exposed surfaces of said depending portion of said strip being highly polished to absorb and pipe light to said roughened top edge of said strip.

5. A stair construction according to claim 4 and wherein said strip extends substantially the entire length of said tread.

6. A stair construction according to claim 4 and wherein a plurality of similarly formed strips of material are provided at spaced intervals along the top edge of said tread between said tread and said stair nose.

7. A stair construction according to claim 4 and wherein the bottom outer edge of the depending portion of said strip is bevelled to form an inclined polished light absorption surface.

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