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[58] **Field of Search**..... 182/194, 93, 219;
52/182, 188, 731

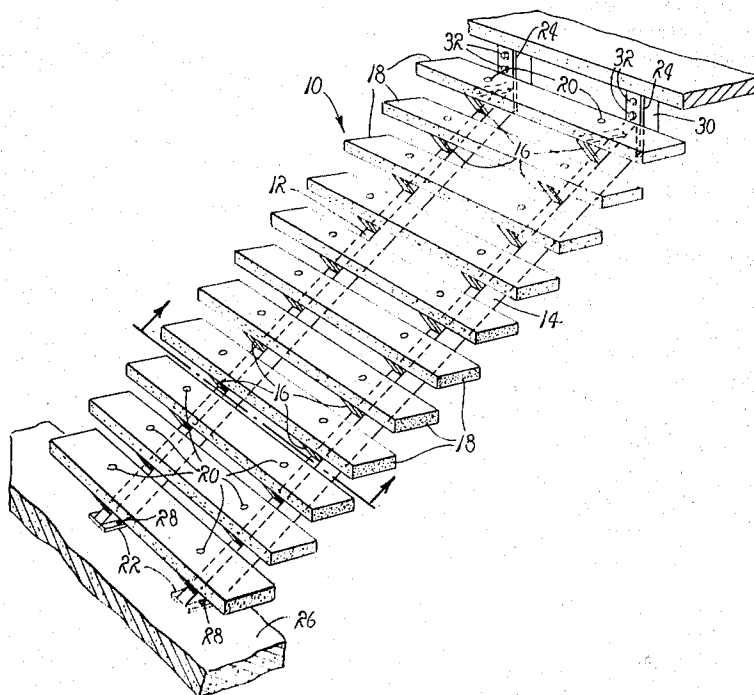
UNITED STATES PATENTS

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[57] **ABSTRACT**

An improved, readily assembled prefabricated stairway having both a pleasing appearance and desired load-bearing capabilities. The stairway is characterized by a pair of parallel stringers arranged in substantial parallelism, each of the stringers including a tubular span of a pentagonal cross-sectional configuration, formed of a plurality of contiguous components of an elongated and substantially planar configuration having angularly related planes of symmetry defining therebetween a pair of included angles of 90° and an included angle of greater than 90° , and a plurality of stairway treads, each being coupled to the stringers at a pair of single points located adjacent to the opposite ends thereof.

1 Claim, 6 Drawing Figures



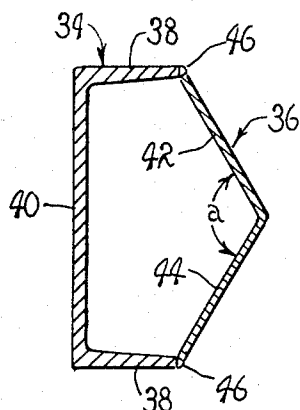


FIG. 5.

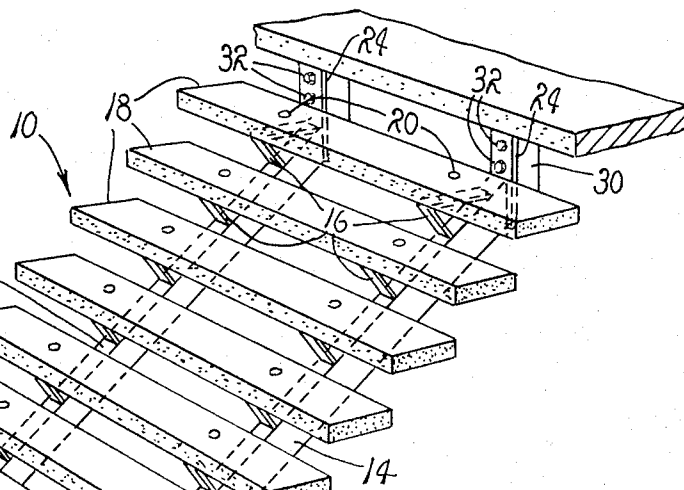


FIG. 1.

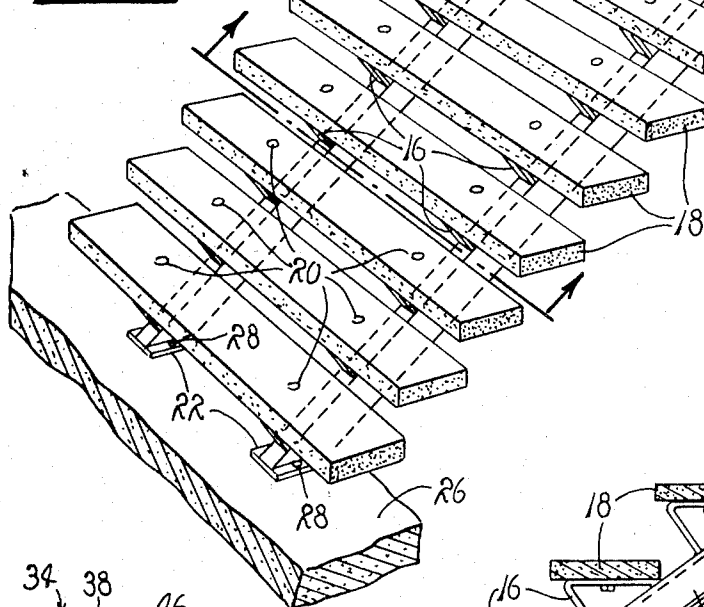


FIG. 2.

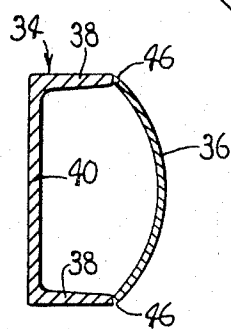


FIG. 6.

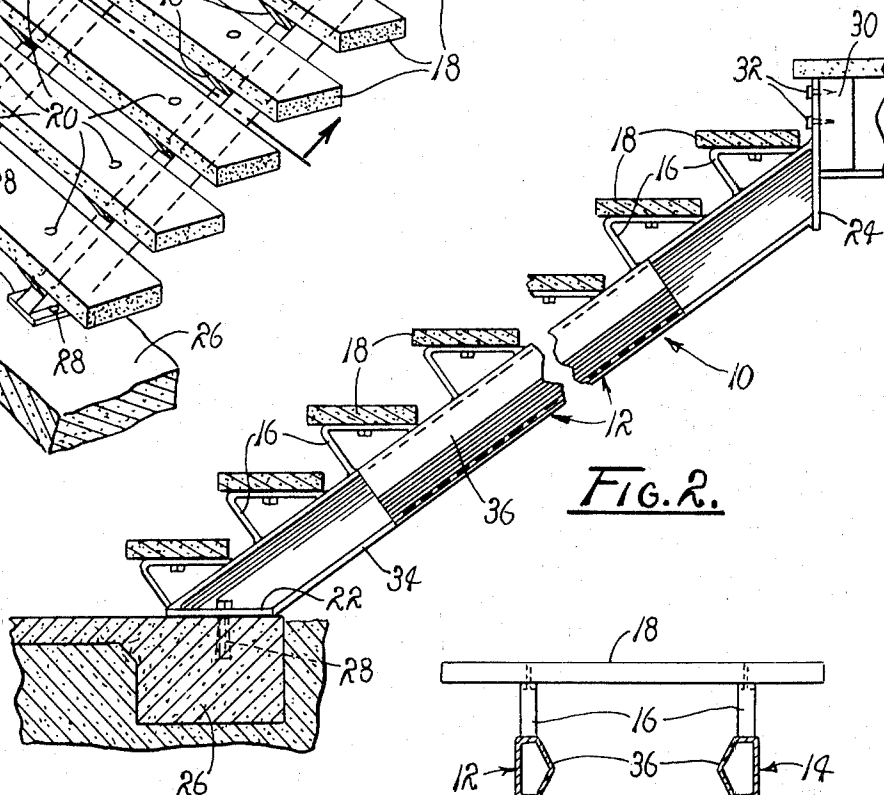


FIG. 3.

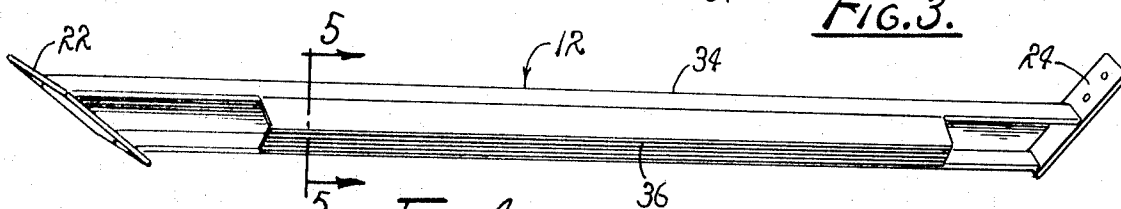


FIG. 4.

STAIRWAY

BACKGROUND OF THE INVENTION

The invention relates to stairways and more particularly to a prefabricated stairway for use in the building industry.

The prior art is replete with disclosures of stairways, ladders and the like utilized in the building industry. Historically, ladders and stairways have been fabricated from wood, metal and ceramic stock as well as various combinations thereof. Quite often, stairways are prefabricated, before erection, and delivered in completed form to a point of use. In other instances, the stairway components are delivered to a point of use and thereafter assembled. Where a stairway is of a substantial length, for spanning a substantial rise and run distance, the stringers incorporated therein frequently are incapable of withstanding substantial side-loading. As an innate consequence, such stairways tend to experience undesired "sway" in lateral directions when employed in a normal manner. In order to overcome this inadequacy, it has been common practice to utilize cross-bracing extended between the stringers and/or anchor at least one of the stringers to a support such as a vertical wall of a building or the like for imparting rigidity in lateral directions. This and similar techniques, of course, result in increased complexity, weight and expense of fabrication, and accordingly are in many instances undesirable and often impractical. Attempts also have been made to reduce lateral sway by increasing the number of points at which the treads of the stairway are affixed to the stringers. While this technique may appear to be quite satisfactory, in many instances, ease in fabrication is reduced with an attendant increase in fabrication costs. For example, where treads and stringers are fabricated at one point and assembled at another, problems in achieving alignment of the various openings provided for receiving anchor studs and the like are encountered. Thus, the time required in assembling the stairways having treads coupled at multiple points with each of the stringers is substantially increased. As a consequence, fabrication costs of such stairways often render their use undesirable.

In view of the foregoing, it should readily be apparent that there currently exists a need for an improved, prefabricated stairway having desired esthetic qualities and good lateral and vertical load-bearing capabilities, while being economic to fabricate and install.

OBJECTS AND SUMMARY OF THE INVENTION

It is therefore an object of the instant invention to provide an improved stairway.

It is another object to provide an improved, prefabricated stairway having good side-loading capabilities.

It is another object to provide in an improved stairway a pair of elongated stringers including a plurality of contiguous components defining a tubular body having a pentagonal cross-sectional configuration.

It is another object to provide an improved stairway having a pair of stringers, each including a tubular span formed of a plurality of contiguous components, and a plurality of transverse stairway treads, each being united with the pair of stringers through a pair of single-point coupling pins.

These and other objects and advantages are achieved through the use of a pair of stringers, each having five

contiguous, elongated components of a planar configuration defining a tubular body having a pentagonal cross-sectional configuration, said contiguous components defining therebetween a pair of included right-angles and a third included angle greater than a right-angle, whereby load-bearing characteristics of the stringers are enhanced.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of an improved stairway including a pair of improved stringers and treads coupled thereto through single-point couplings, which embodies the principles of the instant invention.

FIG. 2 is a fragmented, partially sectioned, side elevation of the stairway shown in FIG. 1.

FIG. 3 is a cross-sectional view, taken generally along line 3—3 of FIG. 1.

FIG. 4 is a perspective view of one of the stringers shown in FIGS. 1 and 2.

FIG. 5 is a cross-sectional view, taken generally along line 5—5 of FIG. 4.

FIG. 6 is a cross-sectional view, similar to FIG. 5, illustrating a modified form of the stringers shown in FIGS. 1 through 5.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in FIG. 1 an improved stairway 10 which embodies the principles of the instant invention.

The stairway 10 includes a pair of substantially parallel stringers 12 and 14, of structural steel, which, in turn, are provided with a plurality of tread brackets 16. To these brackets there is affixed a plurality of horizontally extended stairway treads 18, disposed in vertically spaced, substantially parallel planes. As a practical matter, the treads 18 are affixed to a pair of laterally spaced brackets 16 through a pair of single-point coupling pins 20 which, in practice, are tapered anchor pins, FIG. 3.

As shown in FIG. 1, one anchor pin 20 is employed in coupling each tread 18 to one of the brackets 16 so that each tread 18 is secured to a pair of brackets 16 employing a single pair of the pins 20. By employing a single-point coupling pin 20, in coupling each end portion of the treads 18 to one of the brackets 16, production costs are substantially reduced as an attendant consequence of a saving in the time and materials required to complete fabrication of the stairway 10.

Since the stringers 12 and 14 are of a similar design and perform similar functions, a detailed description of the stringer 12 is believed adequate for providing a complete understanding of the instant invention.

As shown in FIG. 2, the stringer 12 is provided with a horizontally extended base plate 22, welded or otherwise suitably affixed to the base end of the stringer 12. At the opposite end of the stringer 12 there is provided a vertically extended header plate 24, also suitably affixed to the stringer. The base plate 22 is, in practice, affixed to a concrete footing 26 by means of a plurality of anchor studs 28, only one of which is shown, projected from the footing and extended through appropriately formed openings provided in the base plate 22. The header plate 24, in turn, is coupled with a suitable header 30. As shown, the header 30 is a wooden header

and the plate 24 is affixed thereto through a plurality of wood-screws 32. Of course, the particular manner in which the stringer 12 is mounted can be varied as desired.

The stringers 12 and 14 are fabricated employing structural members 34, FIG. 5, commonly referred to as "channel members" and a so-called bent plate or web 36. For the sake of description, the channel member 34 is of a laterally projected, U-shaped, cross-sectional configuration and includes a pair of laterally extended components 38, and an orthogonally related web component 40. The web component 40 functions as a "backbone" for imparting vertical stability, while the parallel components 38 serve to impart lateral stability to the channel member 34. Even though the web component of a channel member often serves to impart sufficient stability, in a vertical direction, channel members frequently lack sufficient lateral stability since channel members are not designed for primary loading in a lateral direction.

As is well known by those familiar with the fabrication of structural members, the parallel components 38 have a thickened portion near the base thereof tapering to a reduced thickness near their outermost edge. Consequently, the parallel components 38 are not of a perfectly planar configuration. However, for purposes of understanding the instant invention, it is to be understood that the channel member employed includes a pair of parallel components 38 having planes of symmetry normally related to the plane of symmetry of the vertical component 40. Thus, it is to be understood that the parallel components 38, in effect, are substantially planar members having a transverse plane of symmetry defining included right-angles with the plane of symmetry of the vertical component 40. Thus for the purpose of describing the instant invention, it is to be understood that notwithstanding the particular configuration for each of the parallel components 38, the components are considered to define an included right-angle, due to the relationship of their planes of symmetry, as the components 38 extend along the opposite side edges of the web component 40, as best illustrated in FIG. 5.

The bent-plate web 36 includes two angularly related, elongated components 42 and 44 spanning the space between the distal edges of the components 38. This plate is welded or otherwise suitably secured to the distal edges of the components 38 at seams or lines of juncture 46. Preferably, the web 36 is formed in a brake from planar sheet stock. However, where so desired, the components 42 and 44 are welded into an integrated unit assuming the configuration of the bent-plate or web 36.

In practice, the planes of symmetry of components 42 and 44 collectively define an included angle α , normally greater than 90° . However, as should readily be apparent, the magnitude of the angle α is dictated by the magnitude of the loads which are, in operation, laterally applied to the stringer 12. While the components 42 and 44 are illustrated as being disposed in planes extending outwardly from the distal edges of the plates 38, it should readily be apparent that the components 42 and 44, where desired, are disposed in planes which extend inwardly from the distal edges of the parallel components. Furthermore, the bent-plate or web 36 may, where so desired, assume a hemispheric cross-sectional configuration, FIG. 6. It will be appreciated

that where the web 36 assumes an arcuate configuration, as shown in FIG. 6, the stringer suffers an attendant reduction in lateral load-bearing capability.

Preferably, the web 36 is employed along the mid-portion of the span of the stringers 12 and 14 since lateral deflection near the adjacent ends of the stringers normally is minimal. Hence, the end portions of the stringers normally do not conform to a tubular configuration. Thus, dip-priming and the like is enhanced during fabrication, prior to assembly, of the stairway 10.

Thus, it is to be understood that the stringers 12 and 14 preferably include five substantially planar components arranged in a contiguous relation, along the center spans thereof, united along adjacent lines of juncture to form a truss-beam having a pentagonal cross-sectional configuration.

In practice, the stairway 10, which embodies the principles of the instant invention, is fabricated by bending a web 36, from sheet-stock, to provide adjacent components 42 and 44 extended in a pair of intersecting planes. This web spans the distance between the distal edges of the pair of parallel components 38 laterally projected from a vertical web component 40 of a selected channel member 34. The web 36 is joined along lines of juncture 46 by welding, and the like, so as to provide one of the stringers 12 and 14. Thus, each of the stringers includes a center span of a tubular configuration formed of a plurality of contiguous components. Each of these components preferably is of an elongated, and substantially planar configuration. Once thus assembled, the stringers 12 and 14 are provided with a plurality of tread brackets 16 arranged in equidistances along the length of the stringers and welded thereto in a coplanar relationship. The brackets 16 are provided with a vertical rise dictated by the rise of the stairway 10 and a suitable run. While the tread brackets 16 preferably are welded to the stringers 12 and 14, other techniques can be employed equally as well.

Upon the tread brackets 16 there are affixed the treads 18 employing pairs of single-point coupling pins 20. Due to the fact that only a single pin is utilized with each of the brackets 16, alignment of prepared openings is enhanced for thus expediting assembly. Thus, the stairway 10 rapidly is assembled preparatory to being disposed in an operative position and anchored to the footing 26 and the header 30. Due to the truss-beam configuration imparted to each of the stringers 12 and 14, by the web 36, lateral deflection of the stairway 10 is substantially precluded, without cross-bracing, shoring, anchoring and the like.

In view of the foregoing, it should readily be apparent that the stairway 10 of the instant invention provides a practical solution to the problem of providing stairways having a capability of withstanding substantial side loads for avoiding sway and the like.

Although the invention has been herein shown and described in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the illustrative details disclosed.

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

1. An improved stairway comprising:

A. a pair of elongated stringers arranged in substantial parallelism, each of said stringers comprising a first pair of elongated, load-bearing components of

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a substantially planar configuration arranged in substantial parallelism, and a web of a substantially planar configuration extended between said first pair of components and normally related thereto inter-connecting said first pair of components into an integral structural member, and means for imparting stability to said structural member including an integral bent web plate comprising a second pair of angularly related components extended into an abutting relationship with adjacent edge portions of the first pair of components and welded

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thereto;

B. a plurality of stairway treads extended between the stringers of said pair of stringers; and

C. means for mounting said treads on said stringers, including a plurality of tread brackets projected from the stringers for supporting said stairway treads in substantially parallel planes, and means for affixing said treads to said plurality of tread brackets.

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