

- [54] **METHOD OF ERECTING STAIRS**
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[58] Field of Search **52/182, 188, 191, 184, 52/185, 190, 741**

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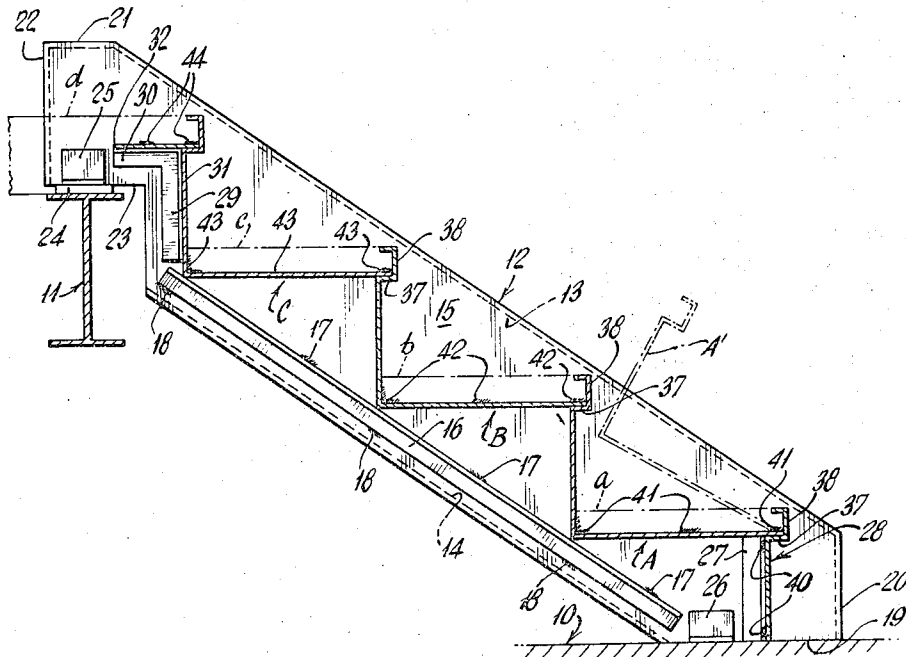
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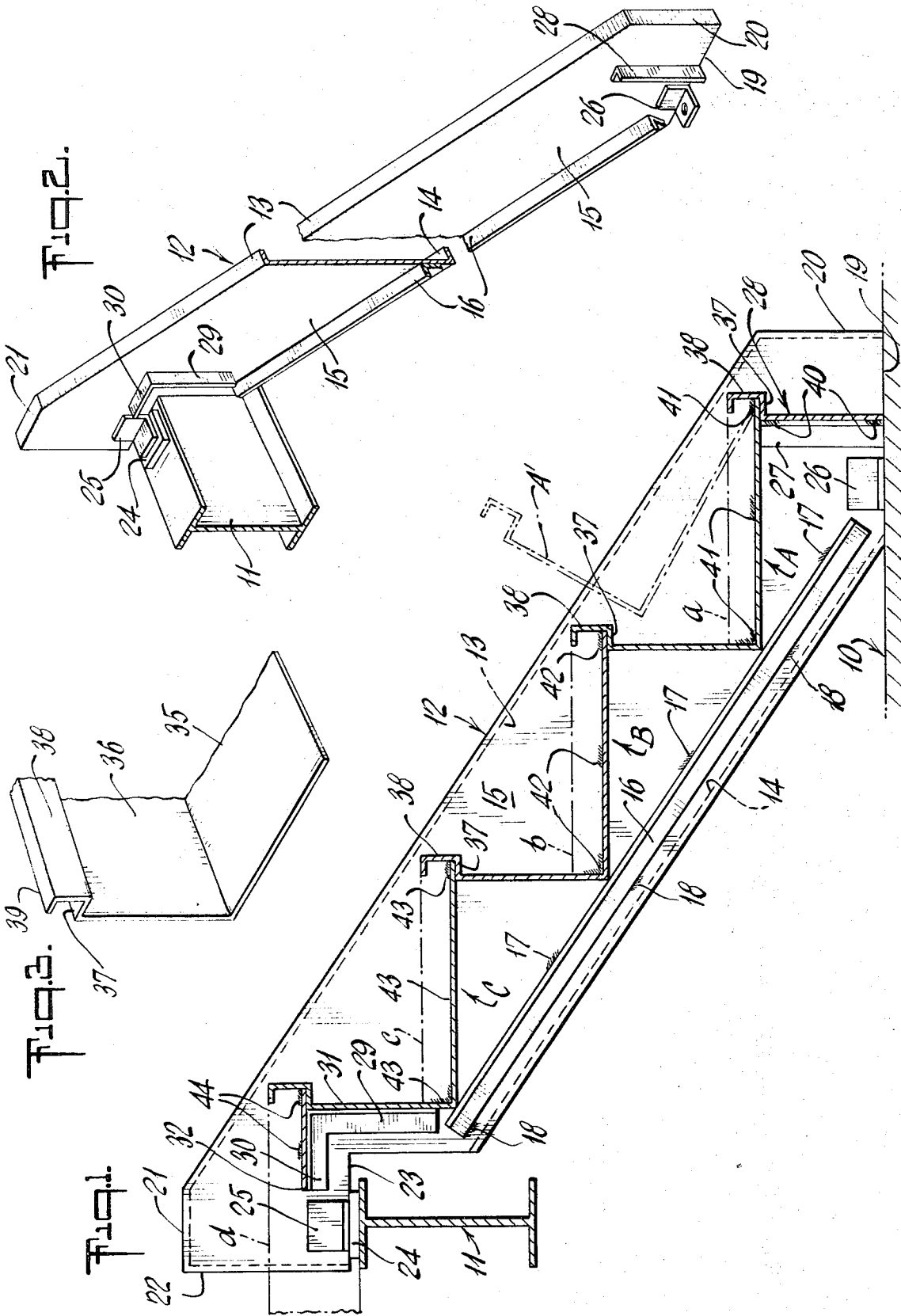
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[57] **ABSTRACT**

The invention contemplates a metal-stair construction wherein a succession of interrelated tread and riser elements derive support from an elongate lower flange of a course-defining stringer; once thus supported, the individual tread and riser elements are secured at their ends to the primary face or panel of the flange-bearing stringer. In the form disclosed, a suitably formed retaining lip along the upper forward edge of each tread provides a means for applying hardenable tread material to the horizontal volume above the tread element and bounded by adjacent vertical walls of the lip, riser and stringer.

7 Claims, 3 Drawing Figures





METHOD OF ERECTING STAIRS

This invention relates to a metal stair construction and to a method of erecting the same.

Past constructions of prefabricated sheet-metal stairs or stair subassemblies have required stringers in which separate vertical and horizontal brackets or angle members have had to be precision-mounted to side stringers, to provide separate horizontal and vertical reference support for each of the several riser and tread elements involved in the stair flight. Thus supported and referenced, each tread and riser element has had to be secured to its reference support. Such construction and technique is unduly complex, expensive in terms of fabrication and erection time, and consumes more materials than necessary.

It is, accordingly, an object of the invention to provide an improved stair construction avoiding or substantially reducing the above-noted deficiencies of past constructions.

It is a specific object to meet the above objects with a simpler construction lending itself to a substantial saving in shop fabrication and erection time, without sacrifice of quality or strength in the finished product.

It is another object to meet the above objects with a saving in materials cost.

Other objects and various further features of novelty and invention will be pointed out or will occur to those skilled in the art from a reading of the following specification in conjunction with the accompanying drawings. In said drawings, which show, for illustrative purposes only, a preferred form of the invention:

FIG. 1 is a longitudinal sectional view taken in a vertical plane which includes the inclined longitudinal course alignment of a flight of stairs embodying the invention;

FIG. 2 is a fragmentary view in perspective showing a prefabricated stringer of the invention, in the course of erection at its intended site; and

FIG. 3 is a fragmentary view in perspective of adjacent tread and riser elements constituting a unit subassembly in the construction.

Referring to the drawings, the invention is shown in application to erection of a flight of stairs along an inclined course extending from a lower-floor level 10, to an upper level at which a transverse beam 11 provides the basic supporting reference. An elongate side plate or stringer 12 is formed with upper and lower longitudinal stiffening flanges 13-14 which define between them a vertical-plane panel 15 against which tread and riser elements are to be fitted and secured. The lower panel edge may be otherwise bent to define a tread and riser supporting flange, but in the form shown a separate elongate angle member or girder 16 is secured to panel 15 to define the lower limit of the stair-course alignment; as best seen in FIG. 1, it is preferred to precision-weld girder 16 in place, as part of the prefabrication of the stringer subassembly; in this connection, interlaced upper and lower welds 17-18 are distributed along the length of the girder 16.

The stringer subassembly 12 is appropriately truncated with horizontal and vertical edges 19-20 at its lower end and with horizontal and vertical edges 21-22-23 at its upper end. The edge 23 is part of a notched cut-out, whereby edge 23 may be cleanly supported by the horizontal top surface of beam 11, using one or

more shims 24 as may be necessary to obtain precisely the desired sloping alignment of the stringer; and if desired, anchoring brackets 25-26 carried by panel 15 may assist in securely locating the upper and lower ends of the stringer. The stringer subassembly further includes a short angle member 27 secured at the foot end of panel 15 to provide a vertical reference for the lowermost riser 28. In similar fashion, angle members 29-30 secured at the upper end of panel 15 provide vertical and horizontal reference for the uppermost riser and tread elements 31-32, respectively. Preferably, all brackets and angle members are suitably welded to panel 15, the same being part of subassembly prefabrication, as will be understood. The stringer subassembly 12 will also be understood to be one of a pair having opposite or image flange, bracket, etc., formations of the character described, and mounted in spaced array in accordance with the desired width of the stairway.

The basic tread and riser unit is shown in FIG. 3 to comprise a single integral structure bent from sheet metal such as structural steel, the same material being also preferably used in the stringer already described. Each such unit comprises a tread element 35, an adjoining next-above riser element 36, an outward horizontal support flange 37, and a tread-retaining lip 38 bent upward from flange 37 and preferably formed with a back-turned horizontal flange 39 to provide enhanced wear resistance at the exposed outer edge of the tread. It is intended that the outer corner or edge of the intersection between tread and riser elements 35-36 shall derive primary support from abutment with the flange 16 of both stringer subassemblies 12.

In erecting a stair of the character indicated, the stringer subassemblies are first located and secured at their upper and lower mounting means 25-26, welding being preferred as with the case of upper support 11, where bracket 25, shim 24 and beam 11 are welded as appropriate; all riser and tread elements will have been supplied, to specified length. Next, the lowermost riser 28 is installed, the same being either prefabricated specially or shorn at the site, by appropriate operation on or near the base elevation of a riser element 36 of the riser-tread unit of FIG. 3; weldments 40 secure this first riser 28 in place. Thereafter, a first complete tread and riser unit (of FIG. 3), identified A in FIG. 1, is merely lowered into place, as suggested by the dashed outline A' in FIG. 1, wherein the free edge of tread element 35 is fulcrumed at the inside-corner between flange 37 and lip 38 of riser 28. The first unit A comes to rest on flange 37 of riser 28 and upon the two side rails or flanges 16 of the stringer subassemblies. The next unit B (of FIG. 3 formation) is then similarly laid in place, resting upon rails 16 and upon the upper flange 37 of unit A. The operation is repeated for successive tread-riser units until the intended flight is completed, here involving only the addition of unit C, and a scrap of flat sheet at 32 to define the uppermost tread element; the latter scrap will be understood to be available from the shearing operation by which the lowermost riser 28 was formed.

Having thus placed all tread and riser elements in position, final welding can proceed, from the bottom up. Thus, weldments at 41 secure the tread and riser elements of unit A to the stringer panels 15; and weldments 42-43-44 similarly secure corresponding parts of successive tread and riser elements. Preferably, all weldments 41-42-43-44 are performed within the in-

cluded volume above the tread element and below the horizontal plane which includes the adjacent lip flange 39.

The final fabrication step is to fill each of these included volumes with tread material, such as a hardenable material, exemplified by concrete, texturized elastomer, plastic or the like. These filled levels are designated *a-b-c-d*, as appropriate.

It will be seen that the described invention meets all stated objects, and presents a clean appearance, in that all welds can be blind. For example, the welds 41-42-43-44 are buried by hardenable material. Also, as viewed from below, the rails or girders 16 are clean and uninterrupted, presenting none of the snags and rough edges that have characterized past constructions.

While the invention has been described for the preferred form shown, it will be understood that modifications may be made without departure from the invention.

What I claim is:

1. The method of erecting stairs along a sloping course between supporting members at each of two levels to be stair-connected, which comprises selecting a pair of stringers adapted to span said course and to be supported by said members, each stringer having a primary panel with an elongate stair-supporting flange along a lower edge, erecting said stringers on said supporting member and in desired spaced relation, with said flange oriented along the lower limit and alignment of said course, selecting duplicate stair tread and riser elements of length to match said spacing, each tread and riser element being additionally selected for an up-standing tread-retaining flange-lip formation along the upper edge of the riser portion thereof, assembling tread and riser elements to the flanges of said stringers such that the intersection edge between each tread element and the next-above riser element is abutted to and supported by both flanges, with ends of said tread and riser elements adjacent the respective panels of said stringers, the tread portion of each element being so supported by the riser portion of the next lower element that the flange-lip formation projects upwardly of the elevation of the tread portions, thereby defining a fillable tread volume beneath a horizontal plane at the upper edge of said flange-lip formation, welding end portions of said tread and riser elements to the immediately adjacent regions of said panels, such welding for each element being limited to regions within said volume, and applying a hardenable tread material into each said volume.

2. The method of erecting stairs along a sloping course between supporting members at each of two levels to be stair-connected, which comprises selecting a pair of stringers adapted to span said course and to be supported by said members, each stringer having a primary panel with an elongate stair-supporting flange along a lower edge, such stringer selection additionally involving a vertical-reference flange at the lower end of

each panel, erecting said stringers on said supporting member and in desired spaced relation, with said flange oriented along the lower limit and alignment of said course, selecting stair tread and riser elements of length to match said spacing, assembling tread and riser elements to the flanges of said stringers such that the intersection edge between each tread element and the next-above riser element is abutted to and supported by both flanges, with ends of said tread and riser elements adjacent the respective panels of said stringers, and securing end portions of said tread and riser elements to the immediately adjacent regions of said panels, the lowermost riser element being first secured to said vertical-reference flange, and the next tread element being supported by said first riser element and by said stair-supporting flanges when secured to said panels.

3. The method of claim 2, wherein stair and tread elements above said lowermost riser element are selected as duplicate units, each unit comprising a tread element integrally formed with the next-above riser element, each unit tread element being supported by the next-lower riser element and by said stair-supporting flanges when secured to said panels.

4. The method of claim 3, wherein said units each are additionally selected for a tread-retaining flange-lip formation along the upper edge of the riser element thereof, each unit tread element being so supported by the next-lower riser element that the retaining lip formation projects upwardly of the tread-element elevation, and applying a hardenable tread material into the upwardly open volume defined by each tread element and the horizontal intercept of the upper edge of the associated retaining lip with the adjacent panels and next-above riser.

5. The method of claim 2, wherein the stringer selection additionally involves a vertical-reference flange at the upper end of each panel, the uppermost riser element being abutted to said upper vertical-reference flange and to said stair-supporting flanges when secured to said panels.

6. The method of claim 2, wherein the stringer selection additionally involves a tread-supporting horizontal-reference flange at the upper end of each panel, the tread-supporting flange and the tread-supporting region of the uppermost riser element being horizontally aligned when said uppermost riser element is secured to said panels.

7. The method of claim 2, wherein the stringer selection additionally involves horizontal and vertical reference flanges at the upper end of each panel; the uppermost riser element being abutted to said upper vertical-reference flange and to said stair-supporting flanges, and the tread-supporting region of the uppermost riser element being horizontally aligned with said horizontal flange, when the uppermost riser element is secured to said panels.

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