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STAIR STRUCTURE

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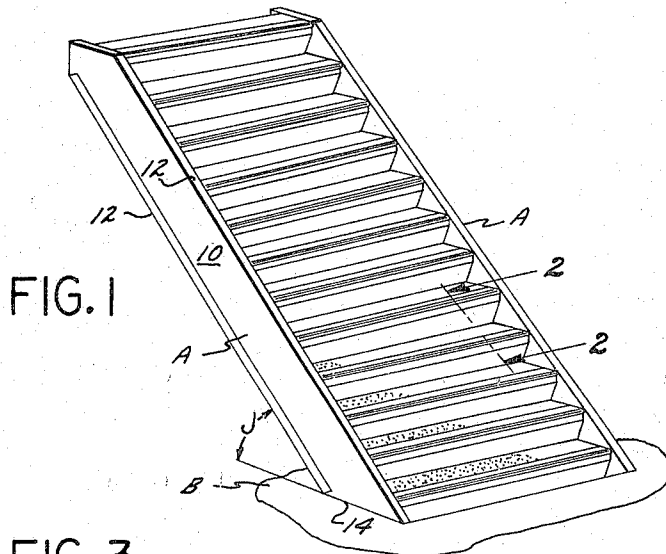
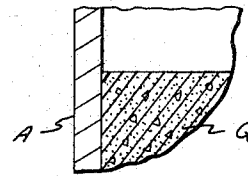
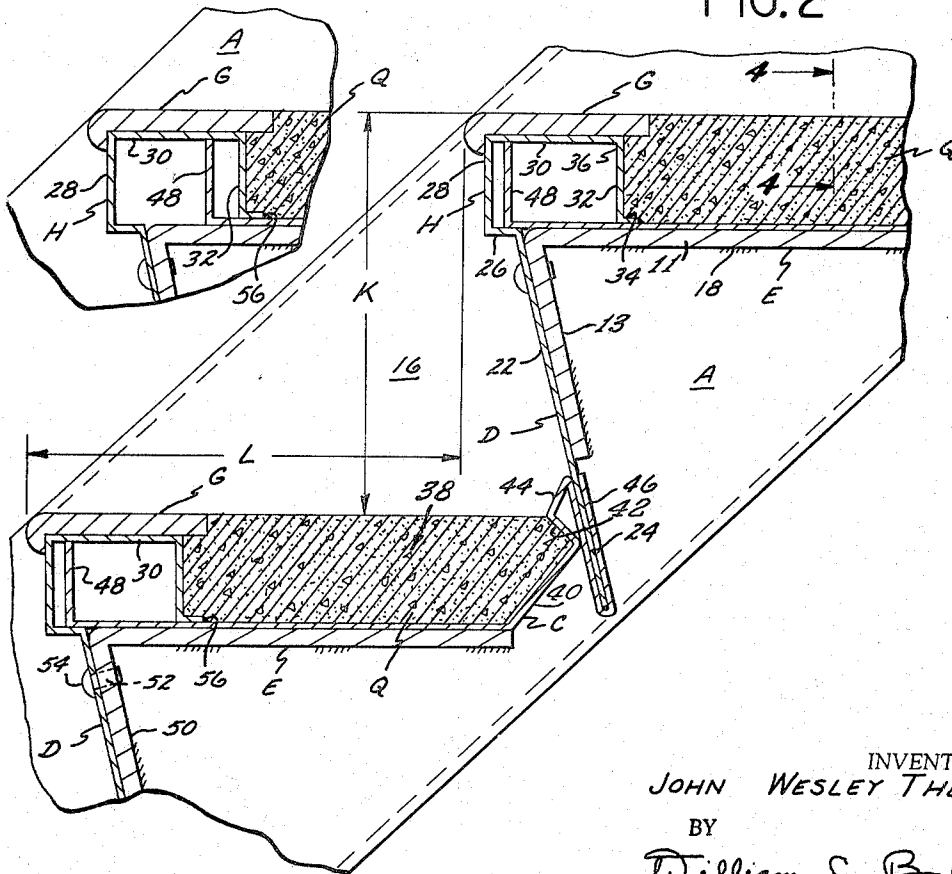


FIG. 3

FIG. 2



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STAIR STRUCTURE

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The present invention relates generally to the construction field, and more particularly to a stair structure fabricated from a number of prefabricated components that are vertically and horizontally adjustable relative to one another.

In the construction of buildings, it has been found desirable to fabricate stair structures from prefabricated components. However, in the past such a mode of construction was only possible if the components were to be used with stringers which were disposed at a particular pitch. Normally, the pitch at which stringers are positioned varies from job to job, and accordingly the assembly of stair structures from standard prefabricated components has not been practised extensively in the past.

A primary object of the present invention is to provide a stair structure that can be assembled from standard prefabricated components, with the pitch of the stair structure being adjustable within predetermined limits.

Another object of the invention is to supply a stair structure of relatively simple design which is easy to assemble in assured uniformity from one installation to the next, and one in which the components can be roll-formed to close tolerance for economy of production.

A further object of the invention is to provide a stair structure in which the components thereof may be delivered out of stock, with the only cutting required being that of providing stringers and treads of the proper length and width for a particular installation.

Still another object of the invention is to provide a stair structure in which the pans and risers thereof are separate components, and can accordingly be formed from sheet material of different gauges.

Another object of the invention is to provide a stair structure that is assembled by working from the bottom to the top, and all fastening is accomplished from the upper side of the structure.

These and other objects and advantages of the invention will become apparent from the following description thereof, and from the accompanying drawings illustrating the same, in which:

FIGURE 1 is a perspective view of the stair structure of the present invention after assembly of the prefabricated components thereof;

FIGURE 2 is a fragmentary vertical, cross-sectional view of a portion of the stair structure, taken on the line 2-2 of FIGURE 1;

FIGURE 3 is a portion of the same view shown in FIGURE 2, but illustrating the manner in which one of the stair pans can be horizontally adjusted relative to one of the risers; and

FIGURE 4 is a fragmentary vertical, cross-sectional view of the invention, taken on the line 4-4 of FIGURE 2.

With continuing reference to the drawing for the general arrangement of the invention, it will be seen to include two parallel, laterally spaced stringers A that may be disposed at a desired angulation relative to the floor surface B. The stringers A support a number of pans C and risers D therebetween, which are horizontally and

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vertically adjustable relative to one another, as will later be explained in detail.

A plurality of vertically spaced pairs of inverted L-shaped supports E on which the pans C rest and against which the risers D abut are supported by the two facing sides of a pair of stringers A. Nosings G are supported on the upper surfaces of engageable portions H of the risers D. Each of the supports E includes a first horizontal leg 11 and a second leg 13, which latter leg extends downwardly from the forward end of said first leg, as can best be seen in FIGURE 2.

The stringers A are preferably formed from channel iron, and each includes a web 10 having two flanges 12 projecting outwardly from the longitudinal edges thereof. The length of the stringers A for a particular installation is known, as well as the angulation at which the stringers will be positioned. Accordingly, when the stringers A are cut, this cutting is done in a manner to assure that the lower edges 14 of the stringers will be at the angle J relative to the lower flange 12, which is the angle the stringers will occupy relative to the surface B. The lower stringer edges 14 are horizontally disposed and rest on the surface B, and with the stringers at the angle J they will occupy in a building (not shown). As previously mentioned, a number of pairs of vertically spaced inverted L-shaped supports E are affixed to the surfaces 16 of stringers A, preferably by welding at the beads 18, as shown in FIGURE 2.

The more acute the angle J relative to floor surface B, the greater the horizontal spacing may be between adjacent pairs of supports E (FIGURE 2), as well as the distance L shown in the same figure. When the angle J is increased relative to the floor surface B, the vertical spacing of adjacent pairs of supports E is increased, together with the distance K. This horizontal and vertical spacing between adjacent pairs of supports E that may occur as the angle J is varied, is compensated for in the risers D and pans C which may be vertically and horizontally adjusted relative to one another. The length of the pans C and risers D must, of course, be sufficient to span the distance between the two stringers A.

In detail, each riser D is formed from a rolled sheet material, and includes a downwardly extending rectangular section 22. The upper end of section 22 develops into a short, forwardly extending leg 26, from which a forward wall 28 extends upwardly and then develops into a rearwardly extending horizontal top 30. The rear edge of top 30 develops into a second wall 32 which terminates in a transverse flange 34. Walls 28 and 32, together with top 30, cooperatively define a first engageable portion 36, the function of which will hereinafter be explained.

Each pan C includes a horizontal rectangular section 38, the rear edge of which develops into an upwardly extending leg 40, as can be seen in FIGURE 2. The leg 40 develops into an upwardly and forwardly extending extension 42 from which a lip 44 projects upwardly and rearwardly. The rear portion of lip 44 supports a narrow U-shaped member 46. The forward end of section 38 develops into an upwardly extending flange 48.

After the stringers A have been disposed in the position shown in FIGURE 1, one of the pans C is placed on the lowermost pair of supports E, and one of the risers D is so positioned (FIGURE 2) that the first engageable portion 36 thereof envelopes the flange 48. As will be noted

in FIGURE 2, the riser D is in abutting contact with the forward surfaces of second legs 13. The pan C resting on the lowermost pair of supports E can be horizontally adjusted relative to the riser D, with the limit of this horizontal adjustment being determined by the flange 48 which contacts either the forward wall 28 of the first engageable portion 36 or the rear wall 32 thereof. The rear vertical edge surfaces of the section 22 of the lowermost riser D, as well as the balance of the risers, are in abutting contact with the forward surfaces of the legs 13, as shown in FIGURE 2. Aligned openings 52 are formed in the vertical edge portions of the section 22 and second legs 13, and these aligned openings are engaged by rivets 54, or other suitable fastening means to hold the risers D in abutting contact with the supports E in the manner described.

The next riser D is positioned on the pair of supports E directly above the lowermost pair thereof, with the section 22 of the second riser being slidably inserted within the confines of the U-shaped member 46. From the construction shown in FIGURE 2, it will be seen that the sections 22 are vertically movable relative to the U-shaped members 46 and permits the risers D to be vertically adjustable relative to the pans C. After assembly of pans C and risers D on supports E, the engageable portion 36 of the lowermost riser D may be tack-welded by beads 56 to the lowermost pan C, as shown in FIGURE 2.

The nosings G (FIGURE 2) are supported on the tops 30. The assembly of the pans C and risers D on the supports E proceeds upwardly in the manner described, with the nosings G being sequentially placed on the tops 30 of first engageable portions 36 as the work progresses.

FIGURE 3 illustrates the manner by which the flange 48 may be moved within the confines of the engageable portion 36 prior to tack-welding the flange 34 to section 38 by bead 56. Thus, the horizontal spacing between supports E may be varied, and the pans C and risers D adjusted relative to one another to compensate for this variation. Variations in the vertical spacing of the supports E is, of course, taken care of by vertically moving the sections 22 relative to the U-shaped members 46.

Installation of the stair structure of the present invention is relatively simple. After determination of the height and pitch of the stair structure, two channels or other structural shapes are taken from stock and cut to provide the two stringers A. The supports E are then welded or otherwise affixed to stringers A to provide the desired vertical and horizontal spacing between the nosings G when they are supported from the stair structure in the manner shown in FIGURE 2. Thereafter, the stringers A are supported on the floor B and extends upwardly therefrom at the desired pitch angle J.

Starting at the bottom of the stringers A, the risers D and pans C are sequentially assembled therein and supported from the supports E (FIGURE 2). The risers D are vertically adjustable to the spacing of the supports E, for the section 22 of each riser is slidably adjustable in the U-shaped member 46 of the pan C situated therebelow. Horizontal adjustment of the pans C relative to the risers D is possible inasmuch as the flanges 48 are horizontally movable within the portions 36, as illustrated in FIGURES 2 and 3. As assembly of the stair structure progresses, rivets 54 or other fastening means, are extended through the side portions of the risers D to engage the second legs 13 of the supports E. After the risers D and pans C are installed in the manner described, the nosings G may be sequentially positioned between the stringers A to rest on the tops 30 of the engageable portions 36, with the nosings being affixed thereto by conventional means. After the stairs have been assembled in the manner described, the pans C are filled with bodies of poured concrete Q, or other suitable material, until the upper surface of this material is flush with the upper surface of the nosings G.

Although the present invention is fully capable of

achieving the objects and providing the advantages hereinbefore mentioned, it is to be understood that it is merely illustrative of the presently preferred embodiment thereof and I do not mean to be limited to the details of construction herein shown and described, other than as defined in the appended claims.

I claim:

1. In combination with two laterally spaced, parallel stringers disposed at a desired angle relative to a floor surface and including a plurality of pairs of inverted, L-shaped laterally aligned supports affixed to the adjacent surfaces thereof, a stair structure, with each of said supports having a first horizontally disposed leg and a second leg which extends downwardly from the forward end thereof, which stair structure comprises:

(a) a plurality of elongate pans, each of which is of such length as to span the distance between said stringers, with each of said pans including a rectangular section that rests on, and is supported by, one of said first legs, a flange projecting upwardly from a forward edge of said section, and a U-shaped member supported from the rear portion of said section;

(b) a plurality of risers, each of which is of such length as to span the distance between said stringers, with each of said risers including a rectangular section that abuts against one of said second legs when said section is slidably inserted in one of said U-shaped members, and an engageable portion on the upper end of said section that is engaged by one of said flanges;

(c) means for affixing said risers to said second legs; and

(d) a plurality of bodies of non-metallic material having flat horizontal upper surfaces, which bodies are supported by said pans to define treads.

2. A stair structure as defined in claim 1 wherein said U-shaped members are disposed above said rectangular sections of said pans and are angularly disposed relative thereto.

3. A stair structure as defined in claim 1 wherein each of said pans further includes:

(e) a leg extending upwardly from the rear edge of said section thereof;

(f) an extension projecting upwardly and forwardly from the upper edge of said leg; and

(g) a lip extending upwardly and rearwardly from said extension and supporting said U-shaped member.

4. A stair structure as defined in claim 1 wherein each of said engageable portions includes:

(e) a leg that extends forwardly from the upper edge of said section thereof;

(f) a forward wall that extends upwardly from the forward edge of said leg;

(g) a horizontal top that extends rearwardly from the upper edge of said forward wall;

(h) a rear wall that depends from the rear edge of said top; and

(i) a flange that extends from the lower edge of said rear wall to abut against the upper surface of one of said rectangular sections of said pans.

5. A stair structure as defined in claim 1 which further includes:

(e) a plurality of tack welds which affix each of said engageable portions to the rectangular section of that one of said pans most adjacent thereto.

6. A stair structure as defined in claim 1 wherein said pans are formed from rolled metallic sheet material.

7. A stair structure as defined in claim 1 wherein said risers are formed from rolled metallic sheet material.

8. A stair structure as defined in claim 1 wherein said bodies of non-metallic material are concrete.

9. A stair structure as defined in claim 1 wherein said bodies of non-metallic material are concrete that is

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poured to define said treads after assembly of said stair structure.

10. A stair structure as defined in claim 1 which further includes:

(e) a plurality of transversely disposed nosings that 5
extend between said stringers and are supported on said engageable portions.

11. A stair structure as defined in claim 10 wherein 10
said bodies are of such depth that said horizontal surfaces thereof are flush with the upper surfaces of said nosings.

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