United States Patent

Mulitz

[15] **3,672,106**

[45] **June 27, 1972**

[54] STAIR STRUCTURE

[72] Inventor: **Thomas C. Mulitz**, Silver Spring, Md.

[73] Assignee: **Pico Safe Stairs Co.**, Hyattsville, Md.

[22] Filed: **Aug. 13, 1970**

[21] Appl. No.: **63,491**

[52] **U.S. Cl.** **52/188**, 52/189

[51] **Int. Cl.** **E04f 11/12**

[58] **Field of Search** 52/188, 189, 179

[56] **References Cited**

UNITED STATES PATENTS

750,156	1/1904	Bois	52/188
1,063,216	6/1913	Rendle	52/188
1,134,992	4/1915	Brooks	52/188
1,353,377	9/1920	Bois	52/188
1,655,769	1/1928	Lerner	52/188
2,886,269	5/1959	Carlson	248/70
3,043,409	7/1962	Kremer	52/633

FOREIGN PATENTS OR APPLICATIONS

230,043	1959	Australia	52/182

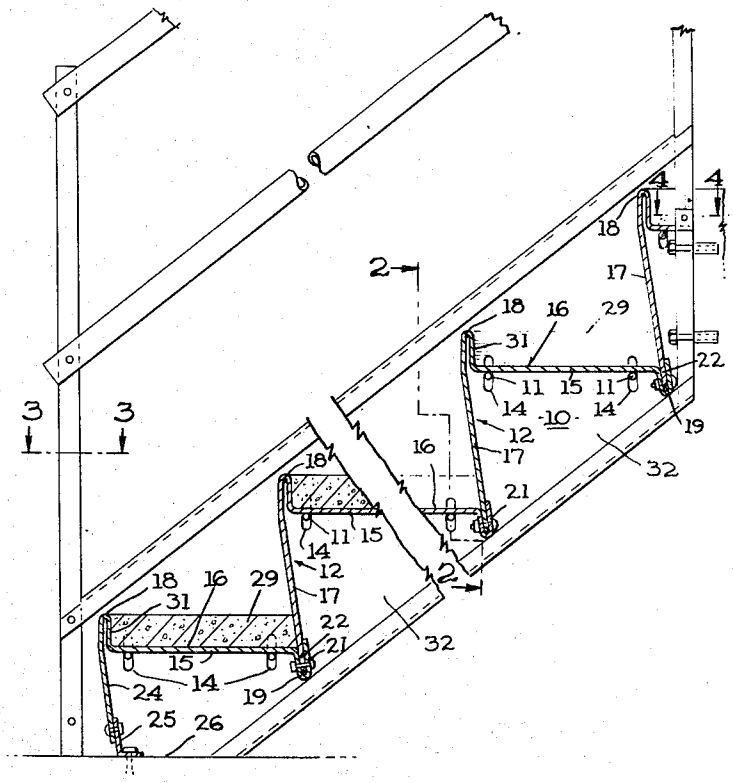
Primary Examiner—John E. Murtagh

Attorney—Karl W. Flocks

[57] **ABSTRACT**

A stair structure fabricated from riser-tread units each having an inverted U-shaped nosing forming a trough or pan at the tread portion, in combination with the sides of supporting channels and the lower portion of the next higher riser, into which concrete or similar material is poured. The rear of the tread portion forms a U-shaped groove extending below the bottom of the pan surface for receiving the lower edge portion of the next higher riser portion therein.

6 Claims, 9 Drawing Figures



PATENTED JUN 27 1972

3,672,106

SHEET 1 OF 2

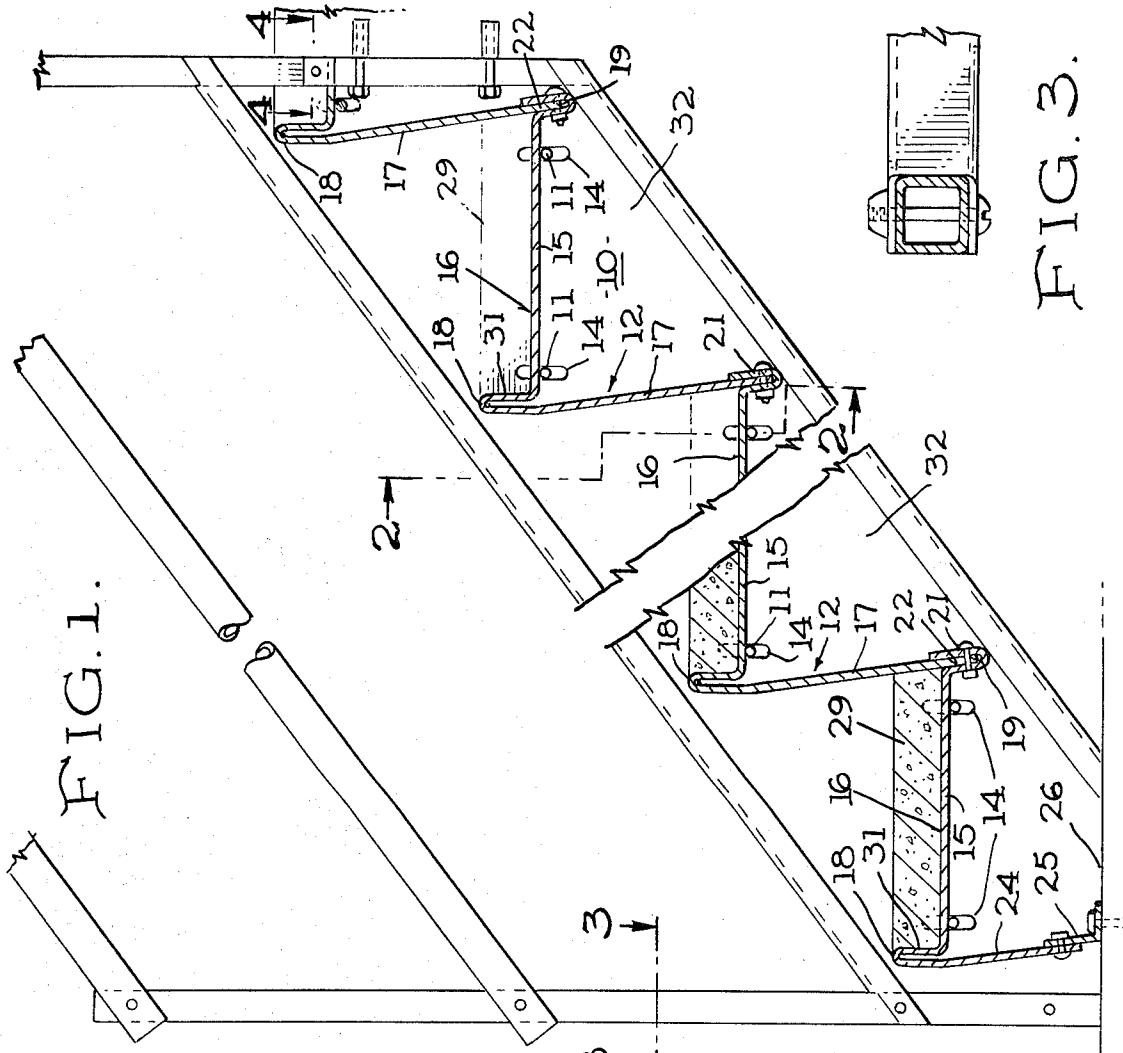


FIG. 1.

FIG. 3.

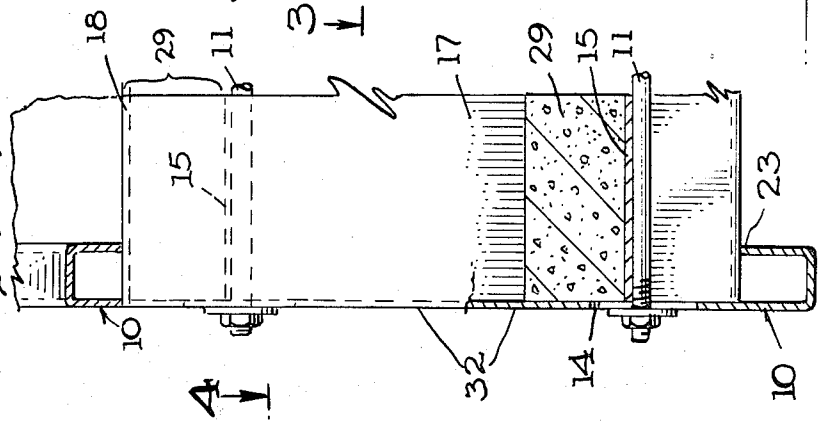


FIG. 2.

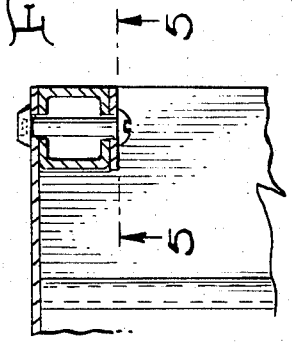


FIG. 4

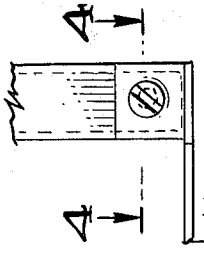


FIG. 5.

INVENTOR

THOMAS C. MULITZ

BY KARL W. FLOCKS

ATTORNEY

FIG. 7.

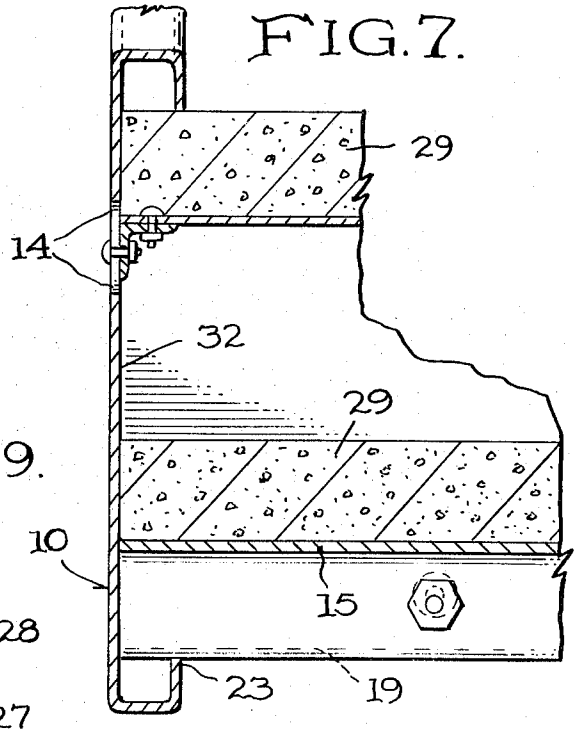


FIG. 8.

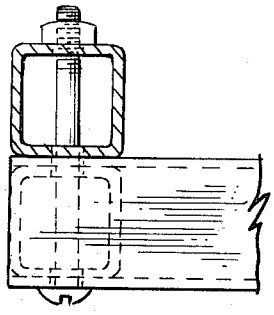


FIG. 9.

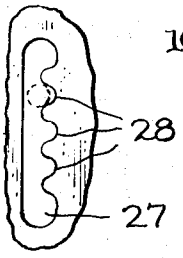


FIG. 6.

INVENTOR

THOMAS C. MULITZ

BY KARL W. FLOCKS

ATTORNEY

STAIR STRUCTURE

BACKGROUND OF THE INVENTION

The present invention relates to stair structures and more particularly to structures of that type in which forms made of sheet material, each comprising an integral tread and riser portion are assembled to make the stair structure.

In order to provide stairways of adjustable height to fit the structure into which it is being installed it has been found convenient to construct these stairways of prefabricated units which may be used in the number depending on the size of the stairway unit needed. These prefabricated units are shaped to receive concrete or other suitable material in a trough or pan portion formed in the tread portion of the stairway.

The weight of the filler materials and of the users of the stairways requires the greatest strength obtainable from these structures without the use of excessive supporting pieces which add to the construction expenses. The strength of the stair units must not be lessened by the omission of such supporting pieces below the requirements of safety and good building practices.

The present invention has solved the problem of retaining structural strength while using sheet material in a simple and economical manner.

SUMMARY OF THE INVENTION

It is an object of the present invention to produce a stairway formed from sheet material units utilizing the curvatures of those units to produce maximum structural strength.

It is also an object of the present invention to produce such stairways in the simplest and most economical manner while retaining this structural strength in their construction.

Accordingly the present invention is a stairway formed of interfitting sheet material units of integral riser and tread portions connected by an inverted U-shaped nosing and a depending U-shaped groove at the rear of the tread portion adapted to receive the lower edge portion of the riser portion of the next higher units, said riser-tread units connected to channels, forming stringers, and a trough for receiving concrete-like material formed by said nosing, the lower portion of the next units riser and the channels on both sides of the riser tread units.

The riser-tread units can be attached to the channels and supported by rods passing through the channels or by brackets bolted to the channels and the attachment to the channels may be adjustable through use of notched slotways in the channels.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a longitudinal sectional view of one embodiment of a stairway of the present invention;

FIG. 2 is an enlarged sectional view on line 2—2 of FIG. 1;

FIG. 3 is an enlarged sectional view on line 3—3 of FIG. 1;

FIG. 4 is an enlarged sectional view on line 4—4 of FIG. 1 and a sectional view on line 4—4 of FIG. 5

FIG. 5 is a sectional view on line 5—5 of FIG. 4;

FIG. 6 is a longitudinal sectional view of another embodiment of the stairway of the present invention;

FIG. 7 is an enlarged sectional view on line 7—7 of FIG. 6;

FIG. 8 is an enlarged sectional view on line 8—8 of FIG. 6; and

FIG. 9 is an enlarged view of a modified form of a slotway in the channels depicted in FIGS. 1 and 6.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring first to FIG. 1 and to the detailed illustrations in FIGS. 2-5, there are shown stringers consisting of channels 10 to which are bolted or otherwise fastened support rods 11. These support rods 11 extending through the walls of channel 10 form the immediate supporting means for stair forms 12. Referring to FIGS. 6–8 the same stair forms 12 are supported by angle arms or brackets 13 which are bolted to channels 10 through slots 14 therein, with the horizontal surface of the angle arms or brackets 13 bolted to the pans surface 15 of tread portion 16 of stair forms 12.

Each stair form 12 comprises a riser portion 17 and a tread portion 16 integral therewith. At the juncture of the riser and tread portions there is provided a nosing 18 of substantially inverted U-shape. This nosing rises appreciably above the level of the pan surface 15 of tread portion 16. At the rear edge portion of pan surface 15 of the tread portion 16 there is located groove 19 formed by a depending U-shaped member 21.

Groove 19 of U-shaped member 21 opens upwardly at an angle adapted to receive the lower edge portion 22 of the riser portion 17 of stair form 12 located next above the stair form having this U-shaped member.

As viewed from the front of the stairway, the riser portion 17 below the substantially inverted U-shaped nosing 18 is angled backward into the stair unit and therefore enters groove 19 at an acute angle with pan surface 15 and with lower edge portion 22 substantially parallel to the walls of groove 19. Also the bottom surface of U-shaped member 21 depends to a sufficient degree so as to rest and be supported adjacent its end by an upwardly extending edge 23 of channel 10.

The lower most stair form 12, as shown in FIGS. 1 and 6 has a shortened riser portion 24 which is bolted by means of bracket 25 to the horizontal surface 26 upon which the stairway unit is resting. All of the stair forms 12 may be adjusted in order to produce the best interfitting of these forms, by means of support rods 11 or angle arms or brackets 13 with the bolts attached thereto moving vertically in slot 14. Further support of the bolts or support rods 11 passing through a slot may be had through the use of the modified form of the slot shown in FIG. 9 wherein slot 27 has a plurality of grooves 28 for receiving the bolts or support rods 11 at any of a number of different vertical positions.

When stair forms 12 are assembled on channels 10 and the stairway is in the position required in the building construction, concrete 29 or some similar plastic material is poured into the trough formed by pan surface 15, the rear wall 31 of nosing 18, the lower portion of riser portion 17 of the next above stairform 12, and the side walls 32 of channels 10 on either side of stair form 12. This concrete 29 or similar material is poured flush with the uppermost part of nosing 18.

The U-shaped channel portions at either end of pan surface 15, formed by nosing 18 at the forward end of stair form 12 and depending U-shaped member 21 at the rear of pan surface 15, contribute substantially to the strengthening of the riser portion 17 since such U-shaped channels resist a bending or sagging action transversely of the stair form 12. Such sagging under excessive weight and continued use over a period of time is even more of a problem with supporting angle arms only at the sides adjacent the channels as in the embodiment of FIG. 6. Rod supports 11 help somewhat to alleviate such sagging but the U-shaped channels further increase the resistance to such sagging. Also the U-shaped depending member 21 obtaining additional support on channel edge 23 further increases the strength of the overall structure.

Variations in the manner of attaching the stair forms of the present invention to the supporting channels may be made within the spirit of the invention and scope of the claims as may variations also be made in the stair forms within the spirit of the invention by retaining the basic shape which strengthens the individual stair forms and also strengthens the overall assembly of the stair forms in the finished stairway.

It will be obvious to those skilled in the art that various changes may be made without departing from the scope of the invention and the invention is not to be considered limited to what is shown in the drawings and described in the specification.

What is claimed is:

1. A stair structure comprising

a pair of stringers including parallel spaced channels having elongated slots therethrough;

a plurality of interfitting stair forms supported between said channels;

and adjustable means to support said stair forms connected to said channels;

each of said stair forms including

tread and riser portions integrally connected at the forward end of said tread portion with the upper end of said riser portion,

said tread portion including a pan surface extending transversely between said channels for supporting concrete-like material therein,

a nosing forming the connection between said pan surface and the upper end of said riser portion and having an inverted U-shape rising above said pan surface,

said tread portion also including a depending U-shaped channel member at the opposite end of said pan surface from said nosing integral with said pan surface and having at least a portion depending below said pan surface with the lower end of said riser portion resting in a groove in said U-shaped channel member of said stair form next below,

said means to support said stair forms including at least a pair of supporting rods passing under said tread portions of said stair forms spaced under said pan surface, and out through said slots in both of said spaced channels.

2. The stair structure of claim 1, further characterized by

said riser portion angled inward from below said nosing so as to meet said pan surface therebelow at an acute angle.

3. The stair structure of claim 1, further characterized by

said depending U-shaped channel member having its bottom resting on upward turned edges of said parallel spaced channels.

4. A stair structure comprising

a pair of stringers including parallel spaced channels having elongated slots therethrough;

a plurality of interfitting stair forms supported between said channels;

and adjustable means to support said stair forms connected to said channels;

each of said stair forms including

tread and riser portions integrally connected at the forward end of said tread portion with the upper end of said riser portion,

said tread portion including a pan surface extending transversely between said channels for supporting concrete-like material therein,

a nosing forming the connection between said pan surface and the upper end of said riser portion and having an inverted U-shape rising above said pan surface,

said tread portion also including a depending U-shaped channel member at the opposite end of said pan surface from said nosing integral with said pan surface and having at least a portion depending below said pan surface with the lower end of said riser portion resting in a groove in said U-shaped channel member of said stair form next below,

said means to support said stair forms including support under said tread portions of said stair forms having connections spaced back from said forward end of said tread portions extending out through said slots in both of said spaced channels to allow vertical movement of said connections associated with adjusting movement of said tread portions.

5. The stair structure of claim 4, further characterized by

said parallel spaced channels having notched slots therethrough with said notches vertically arranged.

6. The stair structure of claim 5, further characterized by

said means to support said stair forms being supporting rods passing under said tread portion of said stair forms and fixed in selected ones of said notches.

* * * * *