

June 28, 1966

L. D. KLEIN

3,257,761

STAIR STRUCTURE

Original Filed April 23, 1963

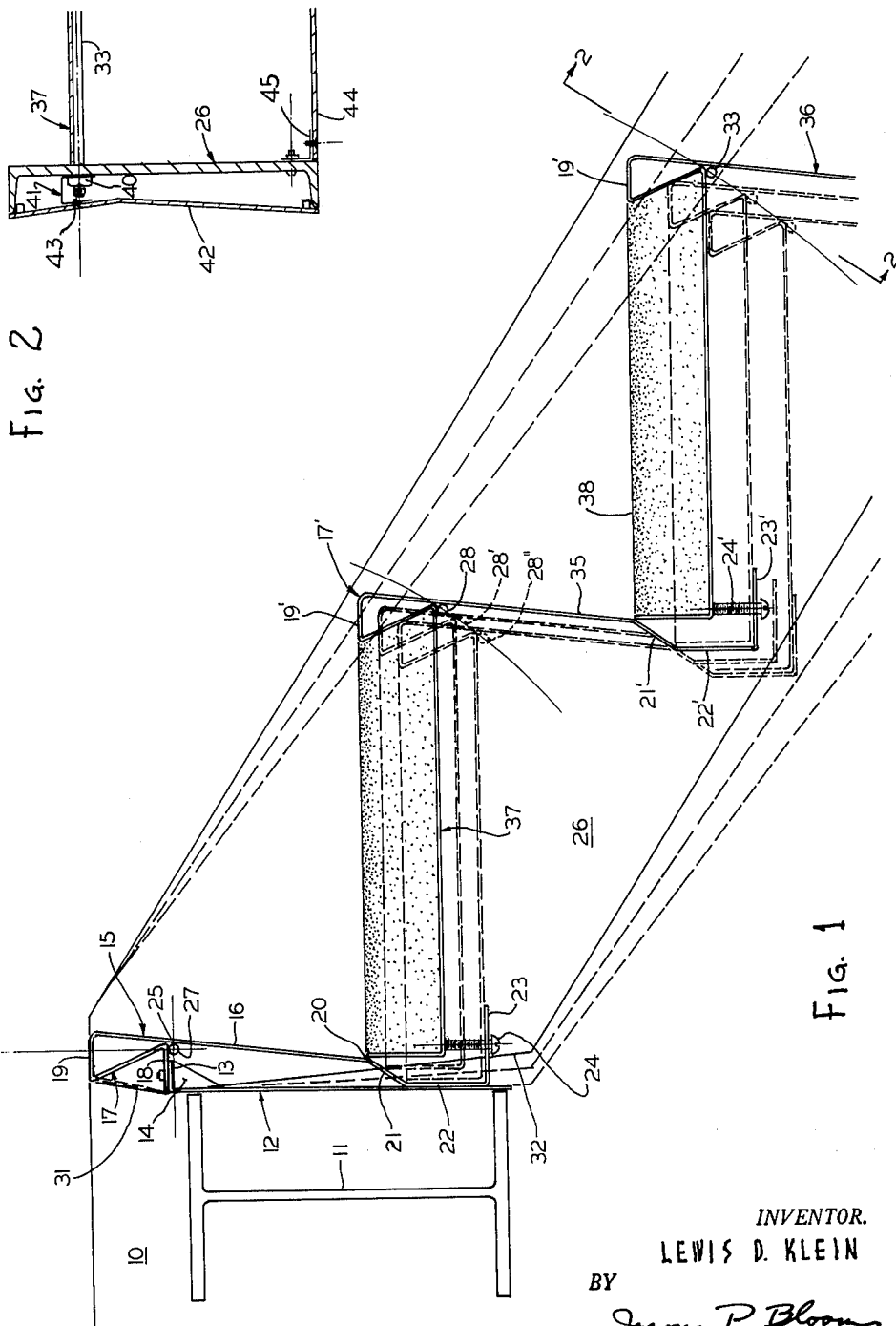


Fig. 2

Fig. 1

INVENTOR.
LEWIS D. KLEIN
BY
Jerome P. Bloom

1

3,257,761

STAIR STRUCTURE

Lewis D. Klein, 3699 Briar Place, Dayton, Ohio
Continuation of application Ser. No. 275,062, Apr. 23, 1963. This application June 7, 1965, Ser. No. 465,247
4 Claims. (Cl. 52—126)

This is a continuation of my application Serial No. 275,062, filed April 23, 1963 now abandoned for stair structure.

This invention relates to an improved stair structure the elements of which are so designed to facilitate their installation in a minimum of time and with a minimum of effort. More particularly, a preferred embodiment provides a single package of elements which can be used per se to produce any one of a variety of modular stair structures, each of which requires a different stringer inclination, tread depth and riser height. The invention thereby obviates the need for a distributor to maintain a large and costly inventory of a great variety of tread and riser elements as normally required.

A primary object of the invention is to provide an improved stair structure which is economically fabricated, more efficient and satisfactory in use and readily adaptable to a wide variety of applications.

A further object of the invention is to provide a single package of structural elements which per se can be used to produce any one of a variety of stair structures, each of which requires a different stringer inclination, tread depth and riser height.

Another object of the invention is to provide improvements in stair structures which facilitate their installation in a minimum of time and with a minimum of effort.

An additional object of the invention is to provide a stair structure including improved tread and riser elements which so mount to facilitate a simultaneous adjustment of their tread depth and riser height.

Another object of the invention is to provide an improved association of stair elements enabling their application to form a number of different stair structures having a variable tread depth and riser height.

A further object of the invention is to provide improved tread and riser units for stair structures.

An additional object of the invention is to provide stair structures possessing the advantageous structural features, the inherent meritorious characteristics and the means and mode of application herein described.

With the above and other incidental objects in view as will more fully appear in the specification, the invention intended to be protected by Letters Patent consists of the features of construction, the parts and combinations thereof, and the mode of operation as hereinafter described or illustrated in the accompanying drawings, or their equivalents.

Referring to the accompanying drawing wherein is shown one but obviously not necessarily the only form of embodiment of the invention,

FIG. 1 is a partly diagrammatic view in side elevation of a stair structure in accordance with the illustrated embodiment of the invention, one of the side stringer plates being removed to show the tread and riser units, alternately adjusted positions of the stringer plates and associated parts being indicated by broken lines; and

FIG. 2 is a sectional view taken on line 2—2 of FIG. 1. Like parts are indicated by similar characters of reference throughout the several views.

As shown in the drawings, the entire assembly of the invention is suspended from a terminal portion of the floor 10 which includes the underlying support member 11. Fixed to the outer face of member 11 is a vertically oriented plate 12. The upper extremity of plate 12,

2

which terminates short of the floor line, is bent to form a right angled plate projection 13. The projection 13 is braced by stiffening members 14 and thereby fixed generally parallel to the floor line.

A formed plate element 15 provides a riser panel 16 which constitutes the uppermost element of the illustrated stair structure. Plate 15 has an upper portion which is bent to form a rearwardly projected nose 17 at the top of the panel 16 and terminate in a rearwardly directed mounting flange 18. The nose 17 is triangular in cross-section, its uppermost portion 19 being formed to provide a continuation of a floor line at an angle of slightly less than 90° to the panel 16. As disclosed, the flange 18 is spaced below and generally parallel to the nose portion 19.

On fixing the mounting flange 18 over the projection 13 of the mounting plate 12, the nose 17 forms a continuation of the floor 10 and defines the top of a stair structure. Panel 16 is thereby oriented to depend at an inclination to the floor line and the plate 12. The inclination of the panel 16 to the plate 12 is uniform until such uniformity is interrupted at a line 20 adjacent and spaced from its dependent extremity and the plate 12.

At the line 20, the panel 16 is bent rearwardly to provide it with a sharply diverted section 21, the terminal portion of which abuts the plate 12. A further bend in the panel 16 at this point provides a following section 22 arranged, in the mounting of the plate 15, to coextensively abut the lower end of the plate 12. The dependent extremity of the panel 16 is then bent to form a shelf 23 projecting forwardly at right angles to the panel section 22. Threadedly engaged through and projecting vertically of the shelf 23 is a screw 24 the purpose of which shall be further described.

Welded to transversely bridge the back of the riser panel 16 and to project therefrom adjacent the flange 18 is a pivot rod 25, such rod being fastened to the panel 16 prior to assembly of the stairs.

In the embodiment illustrated, the projected extremities of rod 25 each are adapted to pivotally mount a stringer plate 26. Each of the plates 26 is a channel member which includes an aperture 27 in one end and, at each of equidistant intervals, spaced longitudinally thereof, a similar aperture 28. The apertures 27 in the plates 26 accommodate the projected extremities of the rod 25.

The plates 26 are thereby adapted to pivotally mount for suspension at a selected angle of inclination to the floor 10. It should be noted that the upper ends of the angularly inclined plates 26 include divergent surfaces 31 and 32 which accommodate their angular adjustment in a manner believed obvious. Further, on pivoting of a plate 26 to vary its inclination the apertures 28 thereof follow arcuate paths, selective positions in said path identified by numerals 28' and 28'' being shown in FIG. 1. Thus, dependent on the inclination of plates 26 the vertical and transverse spacing of the apertures 28 will vary in a manner believed obvious. In other words on pivoting of a plate 26, the distances between adjacent apertures 28, in a relative horizontal and vertical sense, will change. The broken lines shown in FIG. 1 indicate alternate positions of adjustment which the stair structure, and particularly the tread and riser units may initially assume under rocking movement of the stringer plates about the pivot 25. These positions correspond to the indicated aperture positions 28' and 28''.

Suitable means may be employed on the projected extremities of rod 25 for clamping the plates 26, at the appropriate time, in a fixed relation to the lateral extremities of the plate 15 and at a desired angle of inclination to the floor 10.

With the stringer plates 26 pivotally suspended on

3

rod 25 and laterally aligned, their apertures 28 at the spaced intervals will transversely align. Irrespective of the inclination of the stringer plates and the tread depth and riser height to be achieved in the end product, each pair of the aforementioned transversely aligned apertures at each of the spaced intervals accommodates the extremities of a rod 33. Thus, at equidistantly spaced intervals, intermediate their longitudinal extremities, the plates 26 are bridged by rods 33 which are parallel to each other and to the rod 25.

As in the case of the rod 25, each one of the rods 33 is fixed to the back of a riser panel. This panel is designated as 35 and constitutes a part of a formed plate 36. The portion 35 of each plate 36 has a configuration which is identical with the configuration of the panel 16 of the formed plate 15. Accordingly, as may be observed in the drawings, the lower end of each panel portion 35 includes a recess formed in its forward wall which is defined by angularly diverted sections 21', 22' and 23'. As in the case of the section 23 of the riser panel 16, the section 23' of each of the plates 36 provides a forwardly projected shelf which mounts a vertically adjustable screw 24'. Formed at the top of each panel portion 35 and projected to its rear is a nose 17' having a shape similar to the nose 17. However, in this case, rather than the nose 17' terminating in a flange such as 18, the plate 36 has an extended terminal portion the extremity of which bends upwardly to form a tray 37, together with the nose 17'. Each tray 37 nests material to form a tread 38 the upper surface of which is generally coplanar with the uppermost surface 19' of the nose 17'.

Thus, each of the formed plates 36 provides both a tread and a riser panel, the riser panel depending at slightly less than a 90° angle to the tread surface.

Accordingly, through the medium of their pivot rods 33 which are adapted to project through apertures in the stringer plates, the formed plates 36 are enabled to pivotally mount between the stringer plates 26 for relative adjustment prior to being clamped in a fixed position.

As the formed plates 36 are caused to respectively mount to and between the stringer plates 26, in following relation to the plate 15, it will be noticed that the tray portion 37 of each plate 36 is oriented to overlap the projected shelf at the bottom of the preceding riser panel and seat in free bearing relation to the screw thereon. The terminal portion of each tray element will selectively nest in the recess formed in the bottom of the associated riser panel to its rear and to a degree dependent on the inclination of plates 26. Dependent on the degree of nesting one achieves a particular tread depth. Dependent on the relative vertical displacement of the rods 33, which is dependent on the inclination of plates 26 to the floor 10, one may achieve both a selective tread depth and riser height. A riser height is determined by the relative elevation of the tray 37 which mounts thereon. The tread depth and riser height may be simply and simultaneously adjusted, prior to the rods 33 being clamped, further by vertical adjustment of the screws 24 and 24'. Such adjustment causes the adjusted plate elements 36 to pivot with their rods 33 relative the stringer plates to move their tread and riser portions through arcs and simultaneously adjust their tread depth in relation to a preceding riser panel and their riser panel height in relation to a following tread. Adequate clearance exists between each tray 37 and the riser panel 35 associated with the next higher unit to permit adjustment of the units by the screws 24'. This clearance is maintained as the elevation of each tray effects a corresponding motion of its riser portion away from the next lower tray. The parts are shown with the screws 24 and 24' in positions of substantially maximum elevational adjustment. Thus, and referring particularly to the screw 24 and fixed panel 16, it is not contemplated that the tray should be raised by the screw 24 above the full line position shown.

When all adjustments of the stringer plates 26 and the

4

formed plates 15 and 36 are effected, suitable means such as nuts 40 may be provided on the extremities of the rod 25 and rods 33 to clamp the stringer plates 26 to cause them to rigidly confine the formed plates 15 and 36 in a fixed position therebetween.

Referring to FIG. 2 of the drawings, mounted to each of the projected extremities of each of the rods which bridge the plates 26 is one leg of a U-shaped anchor clip 41 which is fixed thereto by the associated nut 40. The outer sides of the channel shaped stringer plates are bridged by cover plates 42, the length thereof, which are tray shaped in cross-section to nest therein. The other legs of the clips 41 include threaded apertures which are adapted to align with threaded openings in the plates 42. Screws 43 which engage through these threaded openings on alignment thereof with the threaded apertures in the clips 41 are adapted to clamp the cover plates 42 in place.

The undersides of the stringer plates are bridged by a soffit plate 44. Plate 44 is suitably secured through the medium of clips 45 in a manner believed obvious from FIG. 2 of the drawings.

Thus, using the invention stair elements, any one of a great variety of stair structures may be achieved having different stringer inclination, tread depth and riser height. The stringer plates 26 may be selectively inclined from and seated to floor surfaces on being pivotally hung on the ends of the suspension rod 25, following which the rods 33 may be inserted to bridge the plates 26 and thereby assume selected vertically displaced and relatively offset positions to mount the tread and riser plates 36 in a desired relation between the stringer plates. In addition to the variability in tread depth and riser height enabled by stringer plates 26, there may be selective and simultaneous adjustment of tread depth and riser height in a very simple fashion, as provided by the invention, due to the free bearing relation of the tray portions of the plate elements 36 to the adjusting screws on the shelf portions of the preceding riser panels to which they mount.

While a particular embodiment has been illustrated in the drawings, it should be obvious to those versed in the art that the invention contemplates the use of the improved tread and riser units and the novel relation therebetween in other forms of embodiment. For example, in the present instance these units have been illustrated in reference to a pair of relatively free stringer elements. However, they can just as easily be adapted for use between any pair of wall structures in a manner believed obvious.

The assembly as provided by the invention is easy and quick to install. A sturdy structure results which will meet any modular architectural requirement. It is obvious that the versatile nature of the included elements enable a distributor of construction materials to limit his inventory.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific features shown, but that the means and construction herein disclosed comprise but one of several modes of putting the invention into effect, and the invention is therefore claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described my invention, I claim:

1. A stair structure comprising, a mounting bracket,

5

a pair of stringer plates, means for pivotally interconnecting said pair of stringer plates to said bracket, said plates being adapted thereby to assume a selective inclination to said mounting bracket and position in generally parallel spaced relation, rod means bridging and slip fitting with said stringer plates at selected positions in pivotal relation thereto, each of said rod means having a tread and riser member fixed to pivot therewith on and between said stringer plates, said members arranging in successively stepped relation to said bracket, each of said members and said bracket including a riser portion the lower end of which provides a projected shelf, means mounting the tread portion of each member in adjustable relation to the shelf on the preceding riser portion and means establishing the tread and riser members in a fixed relation between said stringer plates.

2. A stair assembly comprising, a bracket means for connection to a portion of a floor structure, a pair of stringer plates, means for adjustably mounting said plates to said bracket means at a selective inclination to said floor structure, tread and riser units having an integrally connected form and each including laterally projected rod means, means for pivotally mounting said rod means to said stringer plates, said rod means disposing said tread riser units in successively stepped relation spaced longitudinally of said plates, the riser portion of each said tread and riser unit providing means supporting the tread portion of the most adjacent of said units in free bearing relation thereto, the mounting of said tread and riser portions adapting them for adjustment to suit the selective inclination of said stringer plates and means for clamping said rod means in a fixed relation to said plates.

3. A stair assembly as in claim 2 characterized by the

6

riser portion of each said tread and riser unit including a projected shelf mounting vertically adjustable bearing means for the supported tread.

4. A package stair structure comprising a pair of stringer plates, means for pivotally suspending said plates in spaced parallel relation from an edge of a floor structure to cause said plates to assume a selective inclination thereto, rod means, means for pivotally mounting said rod means to said plates to dispose them in relatively parallel, longitudinally spaced, and in a selective vertical and horizontal offset relation, tread and riser elements fixed to each of said rod means to pivot therewith and dispose thereon intermediate said stringer plates, portions of adjacent of said elements having means providing a relatively free bearing relation therebetween and forming steps thereby, said portions of said elements providing for said relative free bearing relation including means for selective pivotal adjustment of said elements to vary the exposure thereof and thereby achieve a desired tread depth and riser height.

References Cited by the Examiner

FOREIGN PATENTS

230,043	4/1959	Australia.
1,160,400	3/1958	France.
831,450	2/1952	Germany.
348,229	5/1931	Great Britain.
361,649	11/1931	Great Britain.
658,120	10/1951	Great Britain.

FRANK L. ABBOTT, *Primary Examiner.*

M. O. WARNECKE, *Assistant Examiner.*