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Trible

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[54] **SELF-LEVELING STRIPS**

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[52] **U.S. Cl.**.....**182/115,** 182/1

[51] **Int. Cl.**.....**E06c 1/18**

[58] **Field of Search**.....182/115, 152, 1, 116

[56] **References Cited**

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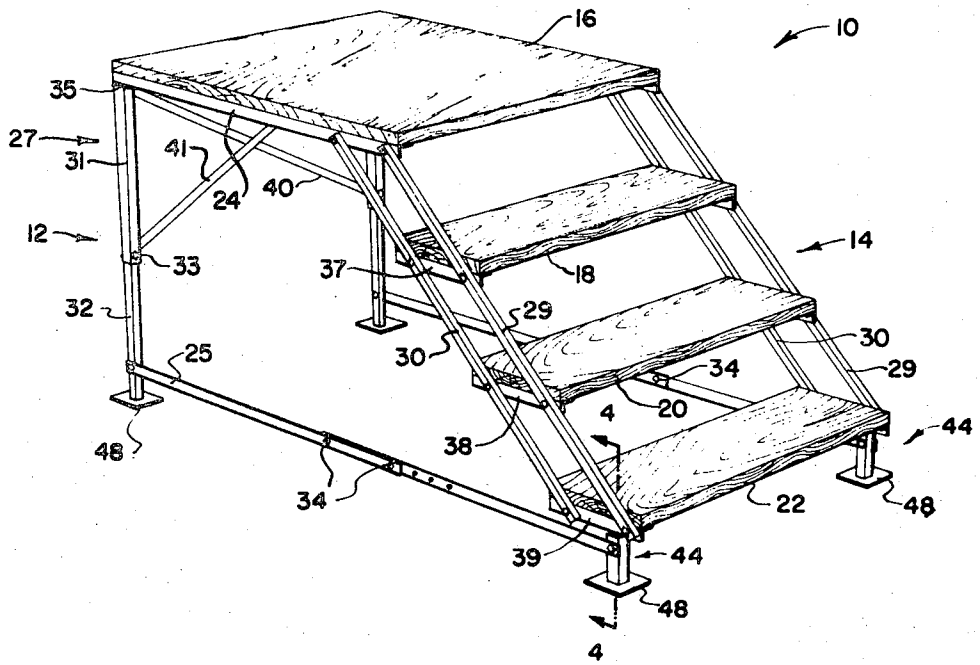
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[57] **ABSTRACT**

An adjustable height self-leveling set of steps and landing, including a pair of trapezoidal shaped side frames having legs at each corner thereof. The four members making up the side frames are pivotally connected with the exception of one rigid joint between two of the members to prevent the side frame from collapsing. Each corner will self-level by shifting the shape of the side frame while the steps and landing remain substantially horizontal.

10 Claims, 4 Drawing Figures



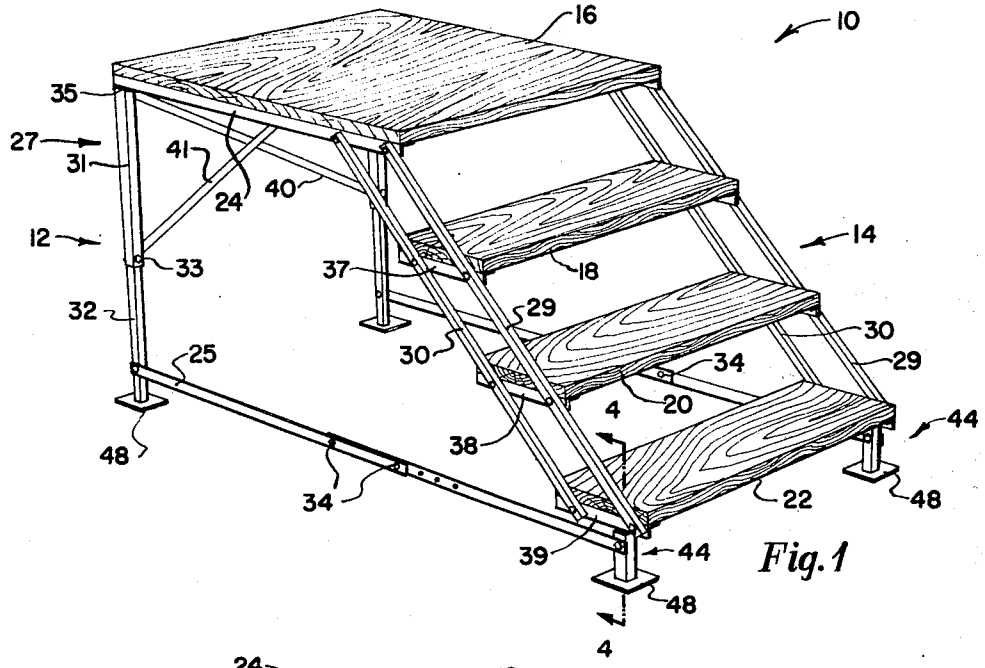


Fig. 1

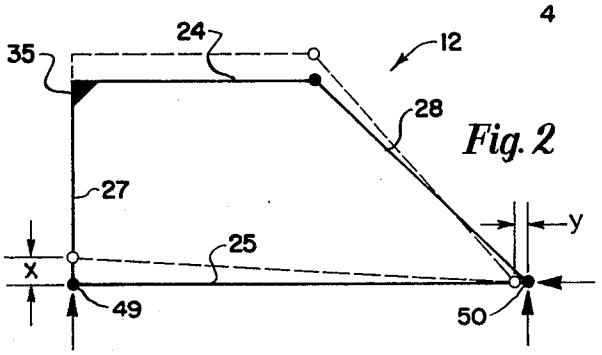


Fig. 2

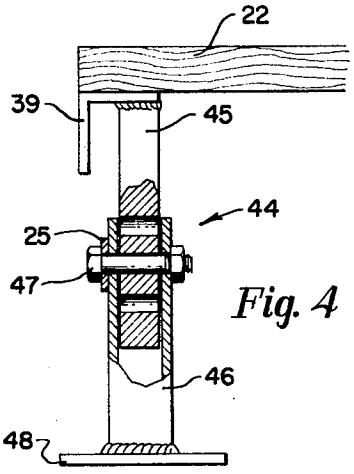


Fig. 4

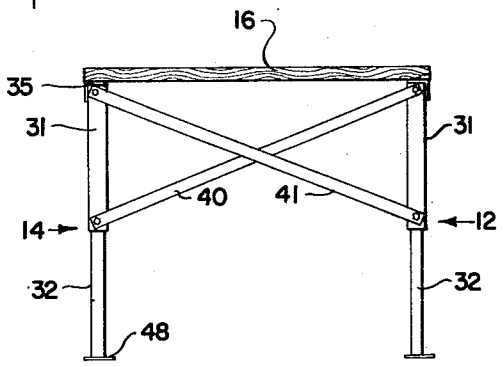


Fig. 3

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SELF-LEVELING STRIPS

The invention more specifically is a combined step and landing structure in a frame with legs at each corner which will self-level on an uneven surface without being anchored to the ground or shimmed. The portable step structure also has a telescoping feature allowing the height of the landing to vary to accommodate all heights of mobile homes.

BACKGROUND OF THE INVENTION

The type of steps used for mobile homes prior to the present invention have either been premolded concrete or rigid steel frame structures. In either of these types it is necessary to shim the corners so that they will not wobble on the uneven bearing surfaces. If the steel frame steps were not shimmed, or the shims work loose, the overall structure would have a tendency to walk or move around as the weight load varied across the steps.

The present invention alleviates any need for leveling the steps or anchoring them to the ground since the frame structure levels itself. As a person climbs the steps, each side frame will vary its shape so that the corresponding legs will come in contact with the uneven ground. When the weight is removed, the side frames will hold their shape retaining the legs in contact with the ground. The step structure also has an adjustable height feature allowing the steps to be used with different height door sills in mobile homes while the distance between the step treads is proportionately changed due to the parallelogram structure supporting the treads.

It is therefore the principal object of the present invention to provide a portable step and landing structure with four legs which self-levels without any separate adjustment.

Another object of the present invention is to provide an adjustable height step and landing to fit all heights and types of mobile homes.

A further object is to provide a strong light-weight step structure which breaks down to a compact size for shipping.

A preferred embodiment of the invention will now be described in detail with reference to the accompanying drawings in which:

FIG. 1 is a perspective elevational view of the step structure of the present invention;

FIG. 2 is a diagrammatic view of one of the side frames showing in dotted line the change in shape of the frame on an uneven surface;

FIG. 3 is a rear elevational view; and

FIG. 4 is a partial view to an enlarged scale taken along line 4—4.

Referring now to the drawings and more specifically to FIG. 1, the step structure is generally identified by reference numeral 10. The structure includes side frames 12 and 14 on each side, supporting a landing 16, and a plurality of steps 18, 20 and 22 therebetween. Each side frame 12 and 14 has a basic trapezoidal shape as illustrated in simplified form in FIG. 2; with two horizontal members 24 and 25 joining a vertical member 27 and a canted member 28. The canted member 28 actually comprises two closely spaced parallel members 29 and 30, as seen in FIG. 1. The frame members 24, 27, 29 and 30 are of a box shape in cross section, since they carry bending and compressions loads. Member 25, a strictly tension member, is a thin strip in section. Member 27 includes two sections, 31 and 32, lower section 32 telescoping within the larger section 31. Removable bolt 33 allows the lower section 32 to be extended and engaged in any one of a plurality of holes, not seen in the drawing, in member 32. Member 25 includes two sections held together by bolts 34 which can be removed to shorten the length of member 25. All of the members of the side frame 12 are pivotally connected by bolts, with the exception of the welded joint 35 between members 27 and 24. Pivotally connected to upper horizontal member 24 are members 29 and 30. Also pivotally attached to members 29 and 30, in equal spaced parallel relation, are angle iron members 37, 38 and 39 which support their respective step treads 18, 20 and 22. Cross braces 40 and 41 prevent any lateral movement between the side frames 12 and 14.

Welded in the center of angle iron 39 is a stub leg 44, as shown in detail in FIG. 4. Leg 44 includes an upper section 45 telescoping into a larger lower section 46. The length of leg 44 can be varied by removal of bolt 47 which also pivotally retains member 25. Welded to the lower end of legs 44 and vertical members 27 are bearing pads 48.

OPERATION

When the step structure 10 is set in place, usually on a concrete pad, the surface is generally not level. Rather than wobble back and forth, as most structures would do, the four pads 48, one located at each corner, will level themselves in contact with the bearing surface. This leveling is accomplished by varying the shape of the side frames 12 and 14. As for example in FIG. 2, if the rear corner 49 was resting on a high spot, a distance X above a level plane, the side frame would distort to the dotted line shape. Due to the rigid joint 35 between members 27 and 24, the new position of member 24 would be raised, but essentially parallel to its previous solid line position. The canted member 28 increases its angle with the horizontal members as its lower end 50 moves to the left due to the shortening effect on member 25. Since the remaining three corners of the side frame are pivotally connected, their angular relationship can readily change. The adjustment between the two side frames 12 and 14 is handled in the couple provided by the landing 16 and treads 18, 20 and 22. Stated in another way, one side frame 12 could be held rigid while the opposite frame could be twisted the necessary increment of adjustment.

Having described the invention with sufficient clarity to enable those familiar with the art to construct and use it, I claim:

1. A self-leveling adjustable height step structure comprising:

a plurality of step treads and a landing;

a pair of parallel spaced trapezoidal shaped side frames supporting the ends of the treads and landing, each frame having upper and lower parallel spaced horizontal members joined at their ends by two non-parallel members, the first non-parallel member being vertically spaced normal to the horizontal members and the second non-parallel member being a tread supporting member canted

with respect to the horizontal members, all of the members being pivotally connected together with the exception of one rigid joint allowing the trapezoid to change its shape as the lower ends of the non-parallel members adjust to the uneven bearing surface the step structure is placed on.

2. A step structure as set forth in claim 1, wherein the canted tread supporting member of each frame includes two closely spaced parallel structural members, each pivotally connected at separate points to each tread member and to the upper horizontal member, whereby the step treads always remain parallel to the landing regardless of the angle of the canted member to the horizontal members of the frame.

3. A step structure as set forth in claim 1, wherein the canted non-parallel member includes two closely spaced parallel structural members, each pivotally connected at separate points on each tread member and the upper horizontal member, whereby the step treads always remain parallel to the landing regardless of the angle of the canted member to the horizontal members of the frame, and cross brace means connecting the rear vertical members of each frame to prevent any lateral tilting of the side frames.

4. A step structure as set forth in claim 1, wherein the rear vertical members and the lower horizontal member include telescoping means whereby the lengths of said members can be varied to change the height of the step structure and angle of the canted member.

5. A step structure as set forth in claim 1, wherein the rear vertical members and the lower horizontal member includes telescoping means whereby the lengths of said members can be varied to change the height of the step structure, and an adjustable height stub leg attached to the lower end of the canted member whereby the height to the first tread member can be varied to correspond with the height to the remaining treads.

6. A step structure as set forth in claim 1, wherein the rear vertical members and the lower horizontal member include telescoping means whereby the lengths of said members can be varied to change the height of the step structure, and the canted tread supporting member of each frame includes two closely spaced parallel structural members, each pivotally connected at separate points on each tread member and the upper horizontal member, whereby the step treads always remain parallel to the landing regardless of the angle of the canted member to the horizontal members of the frame.

7. A step structure as set forth in claim 1, wherein the canted member of each frame includes means for adjustably supporting the treads and maintaining the treads substantially parallel to the upper horizontal member regardless of the angle between the canted member and the horizontal members.

8. A step structure as set forth in claim 1, wherein the canted member of each frame includes means for adjustably supporting the treads and maintaining the treads substantially parallel to the horizontal members regardless of the angle between the canted member and the horizontal members, and cross brace means connecting the rear vertical members of each frame to prevent any lateral tilting of the side frames.

9. A step structure as set forth in claim 1, wherein the rear vertical members and the lower parallel member include telescoping means whereby the lengths of said members can be varied to change the height of the step structure, and the canted member of each frame includes means for adjustably supporting the treads and maintaining the treads substantially parallel to the horizontal members regardless of the angle between the canted member and the horizontal members.

10. A step structure as set forth in claim 1, wherein the rigid joint is between the first non-parallel member and the upper horizontal member.

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