Feb. 23, 1971 A. L. REHFELD 3,564,790

COLLAPSIBLY PORTABLE STEP AND SUPPORT APPARATUS

Filed Nov. 3, 1969 2 Sheets-Sheet 1

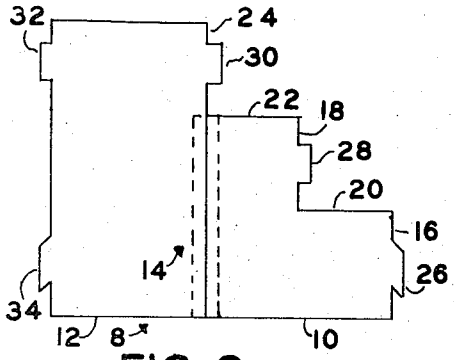


FIG. 2

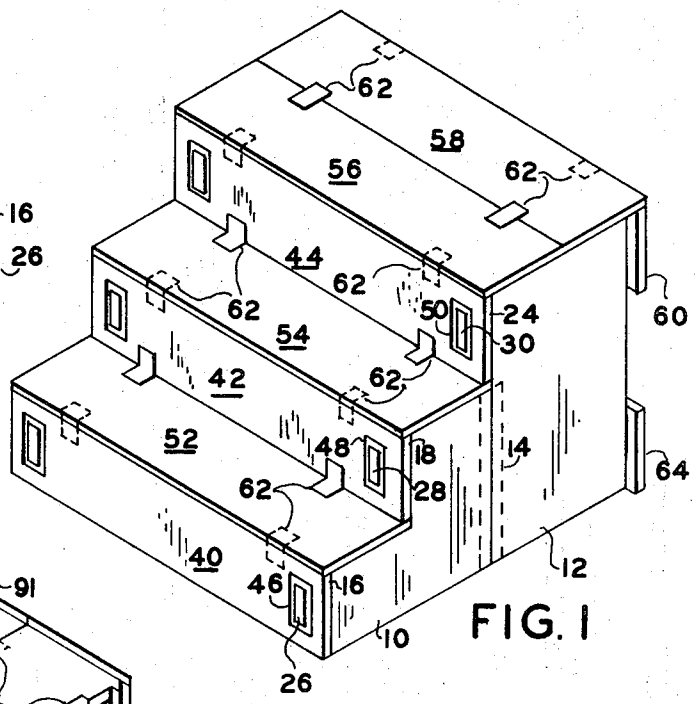


FIG. 1

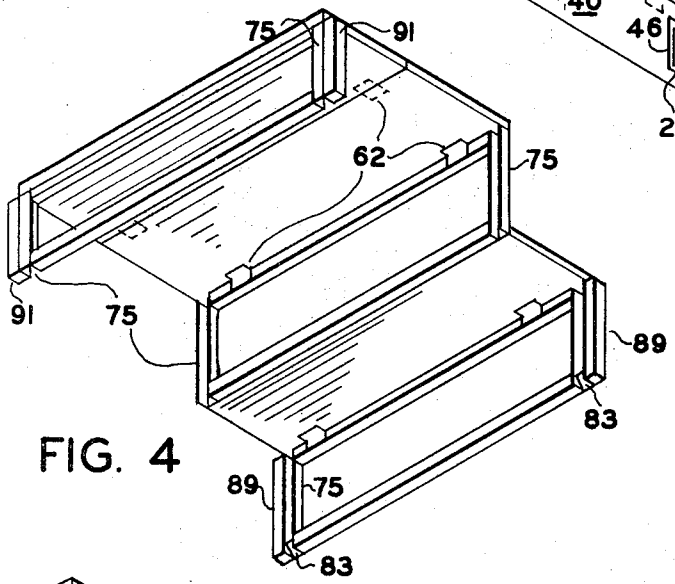


FIG. 4

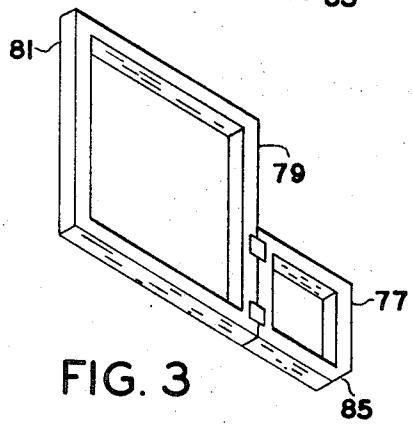


FIG. 3

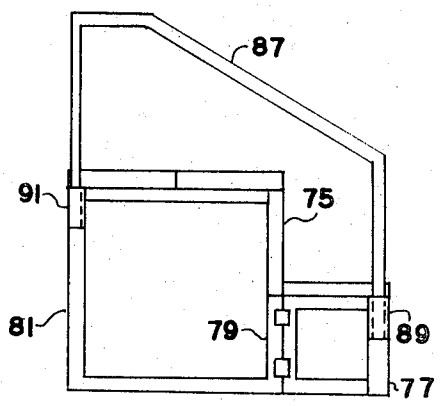


FIG. 5

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COLLAPSIBLY PORTABLE STEP AND SUPPORT APPARATUS

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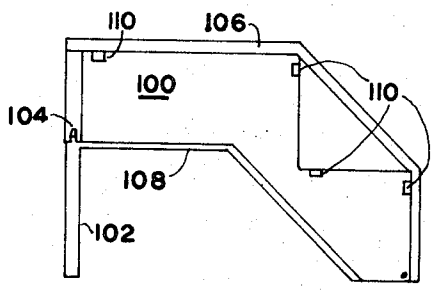


FIG 6

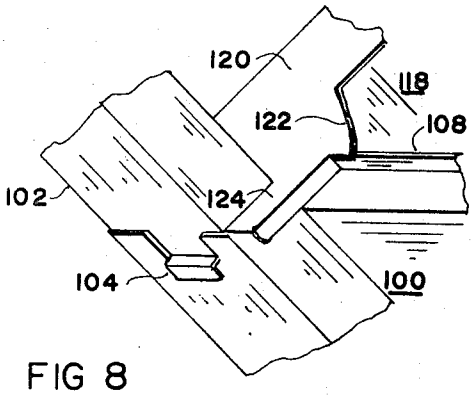


FIG 8

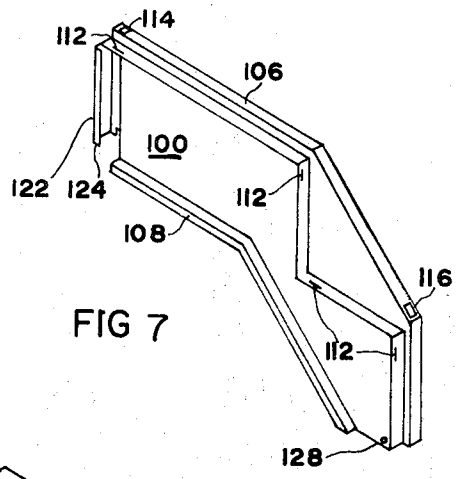


FIG 7

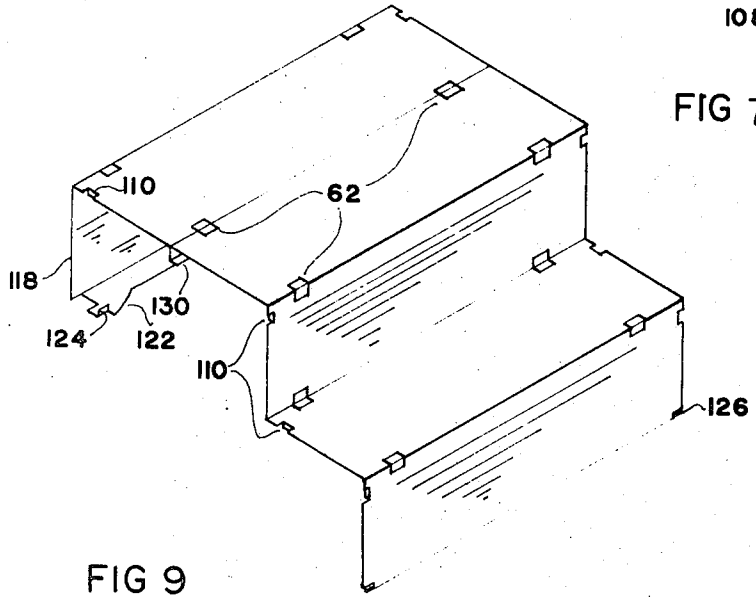


FIG 9

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United States Patent Office 3,564,790 Patented Feb. 23, 1971

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COLLAPSIBLY PORTABLE STEP AND SUPPORT APPARATUS

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Continuation-in-part of application Ser. No. 787,494, Dec. 27, 1968. This application Nov. 3, 1969, Ser. No. 873,567

Int. Cl. E04f *11/06, 11/18*

U.S. Cl. 52—183 14 Claims

ABSTRACT OF THE DISCLOSURE

Collapsible steps which when assembled form a very rigid support due to a tongue and receiver interlocking technique used to attach the parts. Several embodiments are shown. In all of them, tongue and receiver locking means combinations are uniquely constructed adjacent the base of the steps such that the weight of the steps keeps the pieces in place and together. Further, a locking means in the form of a rail provides additional support to keep the pieces in place.

This invention is a continuation-in-part of a continuation-in-part application No. 787,494 filed Dec. 27, 1968 now abandoned having a parent application No. 640,244 filed May 22, 1967 now abandoned.

This invention is generally related to support means and more specifically related to support means which readily collapse for portability yet when assembled provide a rigid structure.

While the prior art is replete with collapsible steps such as shown in a Sigmund Patent 1,125,194 and a Paysen Patent 1,818,428, none of the suports shown in these patents are as simply or as rigidly constructed as the present invention. The simplicity and rigidty is obtained by the placement and design of my interlocking tongue and receiver combinations. I have found that the steps shown can easily be assembled in 1½ minutes with disassembly taking even less time.

It is therefore an object of my invention to provide improved portable support means.

Further objects and advantages of my invention will become apparent from a reading of the specification and appended claims along with the drawings wherein:

FIG. 1 is an isometric view of one embodiment of the steps in an assembled condition;

FIG. 2 is an elevation view of a detached end member of FIG. 1;

FIG. 3 is an isometric view of a side member of a second embodiment;

FIG. 4 is an isometric view of the underside of a set of risers and treads used with side members as in FIG. 3 to form a step;

FIG. 5 is an end view of an assembled step using the parts of FIGS. 3 and 4;

FIG. 6 is a side view of a third embodiment of the steps in an assembled condition but without a rail;

FIG. 7 is an inside isometric view of one of the side supports for the steps and riser portions of the third embodiment;

FIG. 8 is an enlarged view of the locking mechanism between the rear portion of one of the side supports, the back portion of the set of risers and treads and one of the legs looking from underneath the steps; and

FIG. 9 is an isometric view of the tread, riser and back portions of the third embodiment.

Referring first to FIG. 2, it will be noted that there is a side or end member generally designated as **8** having

two sections or members **10** and **12** which are pivotally or hingeably connected together by hinge means **14** (indicated by dashed lines). The hinge is of course on the side opposite that shown. This method of presentation is used to eliminate undue multiplicity of drawings.

The member **10** has two riser portions **16** and **18** which are juxtaposed the vertical parts of the first and second step respectively. The first and second steps also coact with support portions **20** and **22** on member **10**. A third riser portion **24** is shown as a part of member **12**. Tongue means **26**, **28** and **30** are attached respectively to riser portions **16**, **18** and **24**. While tongue means **28** and **30** merely extend in an outwardly direction from the riser portions, tongue means **26** extends outwardly and downwardly to form a wedge portion which interlocks with an opening to be later described, in a riser member so that the weight of the steps acting against the base upon which the steps are standing serves to prevent movement of the member containing the opening.

On the upper back portion of member **12** there is a tongue means **32** similar to tongue **30** while on the lower back portion there is a tongue means **34** similar in construction to tongue **26**. As will be noted, member **10** comprises about half the area of member **12** and is the conjugate of the same portion of the other side or end member (not shown) of the steps. Therefore the two sides will fit together to form a combination the total thickness of which is the thickness of two members **12** and one member **10** while having substantially the area of member **12**.

In FIG. 1, the same numbers as used in FIG. 2 are used to describe the same portions of the side shown. In addition there is shown riser members **40**, **42** and **44** juxtaposed the riser portions **16**, **18** and **24** of side **8**. These risers respectively have openings or receiving means **46**, **48** and **50** for interlocking with tongue means **26**, **28** and **30** respectively. The opening **46** is wedge shaped in generally the same manner as the tongue means **26**. The other side or end member (not shown) also has tongue means etc., which are similar to those shown in FIG. 2 and which interact with openings shown in the risers. However, these tongues and openings are not numbered. Support members **52** and **54** are juxtaposed the support portions **20** and **22** of member **10**. In this embodiment, two support members **56** and **58** are used to cover the top portion of the step and are juxtaposed the support portion of member **12**. A further member **60** interacts with the tongue **32** and is juxtaposed the upper back portion of side **8**. Each of the members **40–44** and **52–60** are hingeably connected together through the pivotal connection of adjacent members by a plurality of hinge means each designated as **62**. As previously mentioned, the hinge means shown as dashed lines are on the opposite sides of the members shown for pivoting these members in the opposite direction to that of the solidly shown hinge means. A lower member or base member **64** interacts with the tongue means **34** to keep the lower back portion of the side members such as **8** in position and further rigidizing the steps.

As previously indicated, FIG. 4 is an underside view of treads or support members and risers to be used with two side supports or members such as shown in FIG. 3 to form the completed step of FIG. 5. Since most of the concept of this two step embodiment is obvious from the previous discussion, only a simple explanation will be given for these figures.

As will be noted the embodiment of FIG. 4 is most easily made from metal. Channel members, receiving means or grooves **75** engage or coact with surfaces **77**, **79** and **81** to prevent sideways movement of the support. A hook, prong or other engaging means **83** on the first or front riser interlocks with an opening **85** in a front portion of

the side supports of FIG. 3 to prevent vertical movement of the apparatus of FIG. 4 with respect to that of FIG. 3 when assembled. The interaction of **83** and **85** is similar to the coaction of **26** and **46** of FIG. 1.

An additional safety interlock means in the form of a guard rail is used in conjunction with conduits, receiving means or coacting means **89** and **91**. The rail **87** prevents movement of the rear riser with respect to the first riser which is held in place by prong **83**. This rail eliminates any need for a further locking means such as **34** and **64**.

In FIG. 6 a side support **100** is shown with a leg **102** inserted in a back portion thereof. A tab **104** on an exterior surface of side support **100** is utilized as part of a mechanism to hold a rail in place and prevent it from wobbling. It will be further noticed that the side support has an outwardly extending U-shaped stiffening rail **106** along the upper surface thereof and extending down to the front portion. A further L-shaped stiffening rail is also found along the lower portion of the side support. Tabs or tongues **110** also appear at various places on the steps. Two of the tabs shown are adjacent the rail **106**. These tabs are attached to the riser and tread portions of the steps. They are inserted through holes, slots or receiving means designated with the same numbers as in FIG. 6. However no thickness is indicated in the drawings for the pieces of FIGS. 7 and 9. It is believed that such a showing would not add to the understanding of the invention and would complicate the clarity of the drawing. It will be further noted that there is an opening or receiving means **114** through which a hand rail similar rail **87** of FIG. 5 is inserted. Opening **114** and tab **104** coact to keep the hand rail in a solid position. A further opening or receiving means **116** is shown at the front portion of side support **100** through which the hand rail is fitted. The extension of the stiffening rail **106** at the front encloses and prevents sideways movement of the hand rail.

FIG. 8 as previously explained is an expanded view of the under portion of FIG. 6. Again, the same designations are used as are used in FIGS. 6 and 7. In addition, a back portion **118** is shown having a lip or strengthening portion **120**. A first tab **122** coacts with stiffening rail **108** and is utilized to hold the back portion in place vertically while a second tab **124** coacts with strengthening rail **108** to prevent sideways movement of the back portion. Tab **124** further coacts with leg **102** to prevent movement in a back and forth direction orthogonal to the aforementioned vertical and sideways movements.

A U-shaped channel portion **122** is formed to receive the leg **102** of FIG. 6. A lip **124** on the channel **122** helps enclose the leg **102** on a fourth side to prevent any substantial movement of the leg.

In FIG. 9 a plurality of tread and riser portions are shown similar in construction to those illustrated in FIG. 4 with a difference being in the interlocking mechanism for attaching the risers and steps to the side support. Specifically, the treads and risers of FIG. 9 utilize tabs or tongues **110** to coact with the receiving means **112** of FIG. 7 for structural rigidity. In addition, a pin **126** which extends from a lower portion of the first riser cooperates with a receiver means or hole **128** in the side supports as shown in FIG. 7. A stiffening means **130** is used to strengthen the top pair of treads. Other numerical designations in this figure are as shown in the previous figures. Further, the structure shown is hinged to collapse in a manner similar to that of FIG. 4.

As will be realized, the steps shown in FIGS. 6–9 are different from the previously described steps only in the fact that the tongues are situated on the risers and treads rather than on the side supports. However, the end result is still substantially the same and operates in substantially the same fashion to provide an easily collapsible set of steps which are simple to assemble in a very rigid support form.

While the metal steps added by the first and second continuation-in-parts may appear different at first glance, it will be determined that they still employ the tongue and receiving means concept to prevent sideways movement along with the portability concept of the wooden or first embodiment. The main difference being in the type of safety interlock used to prevent accidental collapse of the steps.

Where only a portable support is desired, as opposed to steps, the section **10** and its associated supports and risers can be removed to leave a still rigid support. If desired, an additional tongue and lower riser means can be added to the front of the section **12** similar to **34** and **64** in the back.

As will be noted by those skilled in the art, each of the members forming the riser, support and back portions are approximately the same size so that a minimum volume of space is involved when this plurality of hinged members is collapsed for storage. Further as previously indicated the wedge action of tongues **26** and **34** will interact with the base upon which the steps are setting to prevent members **40** and **64** from accidently disengaging themselves from the side portions.

While a few embodiments of the invention have been shown and described, I do not wish to be limited to these embodiments or to the relative dimensions shown since the invention covers broadly the idea of a tongue and receiver interaction to provide rigid yet easily collapsible steps or support means.

I claim:

1. Stepped support means of the type which may be easily taken apart and collapsed for portability and storage comprising, in combination:

first and second side members each having riser, support and back portions, the riser and back portions having outwardly extending tongues as a part of an interlocking mechanism; and

a plurality of hingeably connected riser, support and back members, said plurality of said hingeable connected members containing openings therein interlockingly engaging the tongues of the riser and back portions of said side members to form step and support means and said riser and support members in an operable supporting position being offset vertically and horizontally respectively.

2. Apparatus as defined in claim **1** where the hingeably connected members are pivotally attached to one another in opposite directions so that when the members are collapsed, the riser members are intermediate the support members.

3. Apparatus as defined in claim **2** wherein said side members comprise hingeable connected sections, one section being approximately one-half the area of the other section and including two riser and support portions whereby said side members may be fitted together with the smaller sections juxtaposed to form a combination for storage which is substantially the size and thickness of three of the larger sections.

4. Apparatus as defined in claim **1** wherein said tongues extend outwardly from the riser portions substantially the thickness of said riser members and are substantially greater in height than in width and wherein the tongue on the base riser portion forms a wedge to keep said riser and side members from accidently separating.

5. Apparatus as claimed in claim **4** wherein said side members each contain a wedge tongue in the base portion of the back and an additional member interlocks with said wedge tongues to rigidly attach the back base portions of said side members together.

6. Stepped support means of the type which may be easily taken apart and collapsed for portability and storage comprising, in combination;

first and second side members each having riser, support and back portions, the riser and back portions having tongues as part of an interlocking mechanism; and

a plurality of hingeably connected riser, support and back members, said plurality of hingeably connected members containing tongue engaging end portions interlockingly engaging the tongues of the riser and back portions of said side members to form step and support means and at least two of said riser members and two of said support members when attached to said side members being offset vertically and horizontally respectively.

7. Apparatus as defined in claim **6** for use as steps wherein the tongues of said riser portions are substantially greater in height than in width and wherein the tongue on the base riser portion of the side member and the base riser member wedgeably interlock to keep said riser and side members from accidently separating.

8. Apparatus as defined in claim **6** wherein the tongues of said riser portions of said side members have sides which are substantially greater in height than the tongues are in width and wherein the tongue engaging end portions of said risers substantially enclose the sides of said tongues.

9. Apparatus as defined in claim **6** wherein a first front riser member includes additional interlocking means in the form of a prong for engaging an opening in a first front one of said riser portions of each of said side members.

10. Apparatus as defined in claim **6** comprising in addition:

receiving means on at least one side of a first front riser member and a corresponding side of said back member; and

locking means engaging said receiving means for preventing movement of said first front riser member and said back member with respect to each other thereby preventing accidental collapse of the step support apparatus.

11. Apparatus as claimed in claim **10** wherein said locking means comprises a support railing.

12. Stepped support means of the type which may be easily taken apart and collapsed for portability and storage comprising, in combination:

first and second side members each having riser, support and back portions, the riser and back portions having one part of a two part tongue means and tongue engaging means interlocking mechanism; and

a plurality of hingeably connected riser, support, and back members, completely detachable from said first and second side members, said plurality of said hingeably connected members including the other part of said two part interlocking mechanism for interlocking with the corresponding part on said side members to form stepped support means and said riser and support members in an operable supporting position being offset vertically and horizontally respectively.

13. The apparatus of claim **12** wherein the support portions also include one part of said two part interlocking mechanism.

14. Apparatus as defined in claim **12** comprising in addition:

a support railing interlocking with at least one of said side members; and

a pin in the first riser member coacting with a hole in each side member.

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JOHN E. MURTAGH, Primary Examiner

U.S. Cl. X.R.

108—92; 251—57