United States Patent [19]

Paine et al.

[11] **3,747,706**

[45] **July 24, 1973**

[54] **PORTABLE FOLDING RISER**

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[22] Filed: **Nov. 18, 1971**

[21] Appl. No.: **200,115**

[52] **U.S. Cl.** **182/113,** 182/152, 182/178, 52/9

[51] **Int. Cl.** **E04h 3/12**

[58] **Field of Search** 182/152, 159, 113; 52/8, 9, 143

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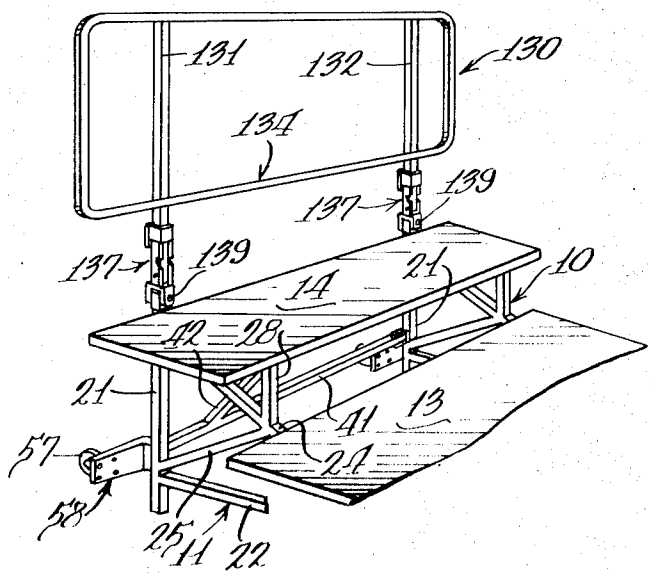
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[57] **ABSTRACT**

A portable folding riser for supporting a choir or the like including a pair of skeletal floor-engaging support frames disposed in spaced parallel upright positions, a plurality of ascending steps having opposite ends pivotally connected to the support frames for collapsing movement of the steps and frames about parallel front-to-rear axes to storage positions with the steps lying in a common plane and the frames lying in a common plane closely parallel to the steps, a brace extending between the support frames to prevent collapsing of the frames relative to the steps, and a plurality of casters on the backs of the support frames for movably supporting the riser on edge when collapsed. An additional tier may be optionally attached to the riser and includes a pair of collapsible frames supporting an additional step at a level above the highest step on the first recited frame. A safety rail is provided with the uppermost step.

10 Claims, 15 Drawing Figures



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Fig. 1.

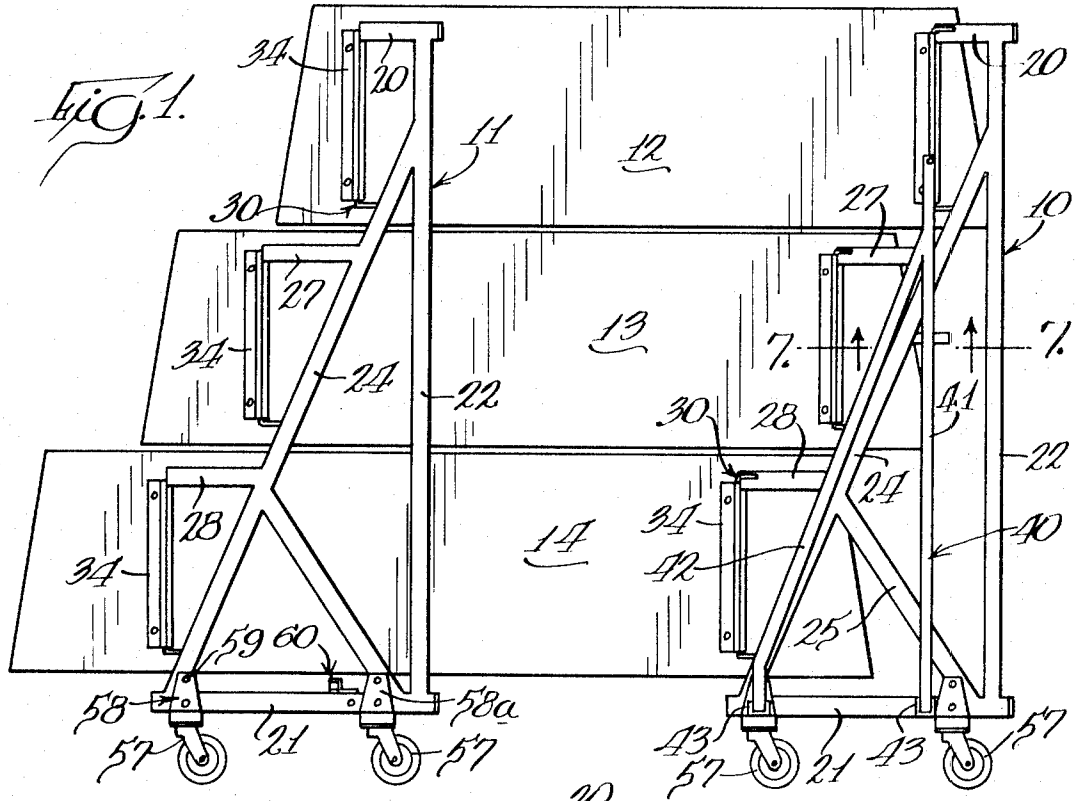


Fig. 2.

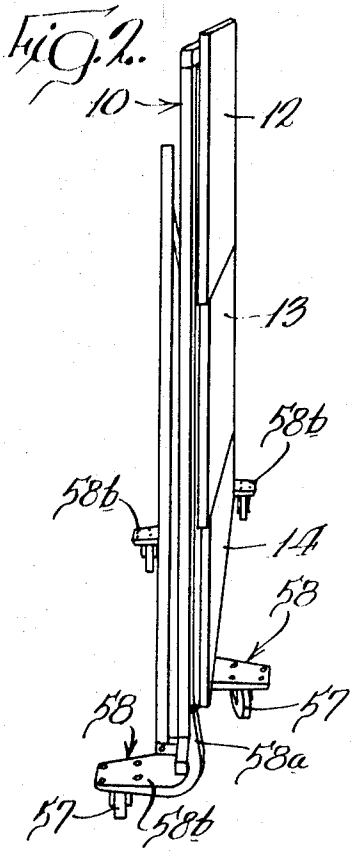
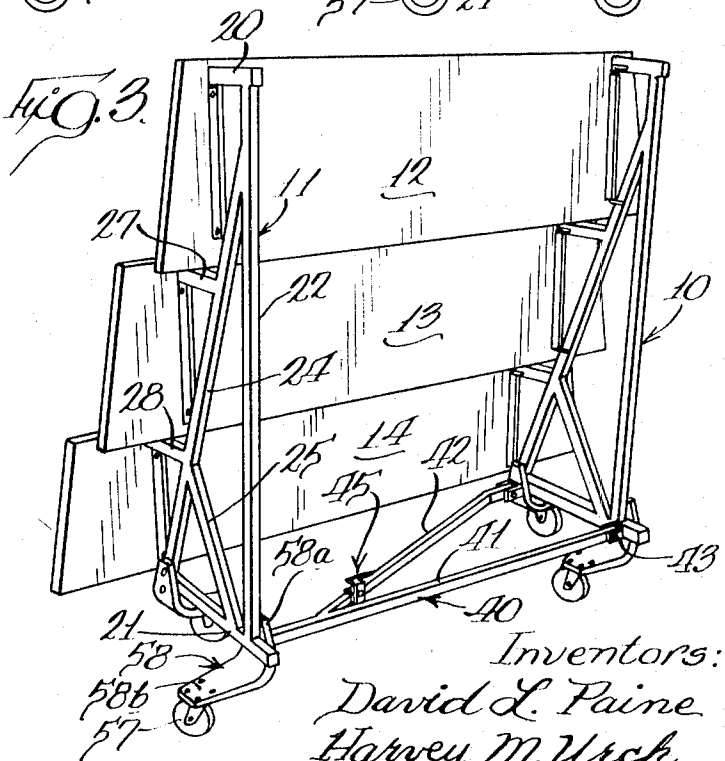


Fig. 3.



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Attys

Fig. 4.

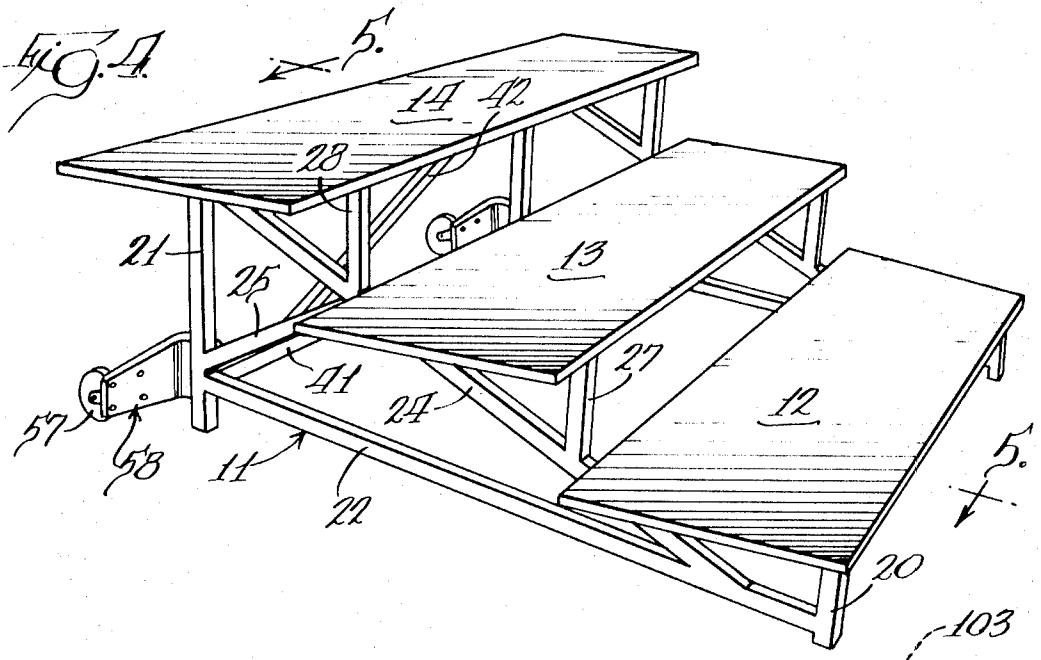


Fig. 5.

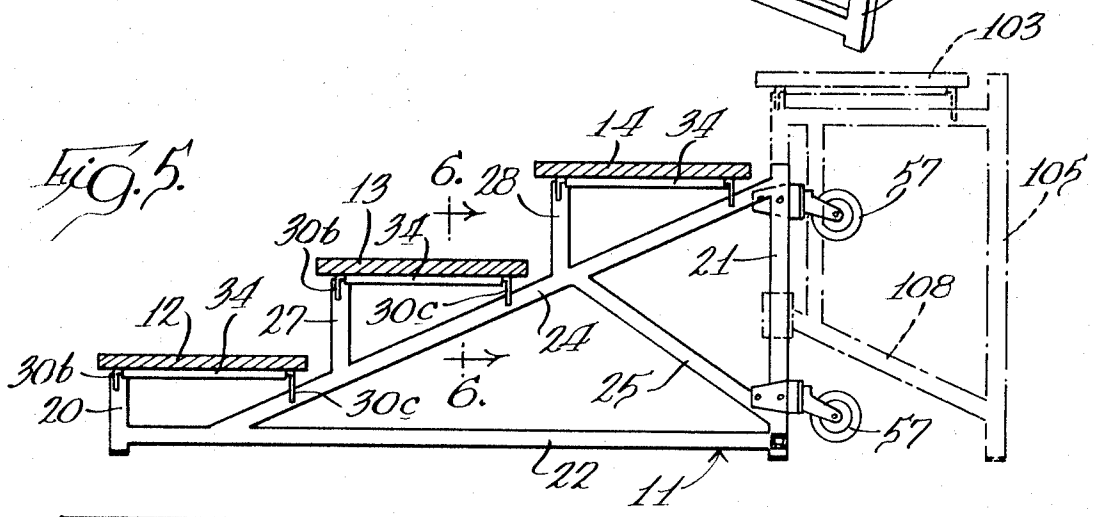


Fig. 6.

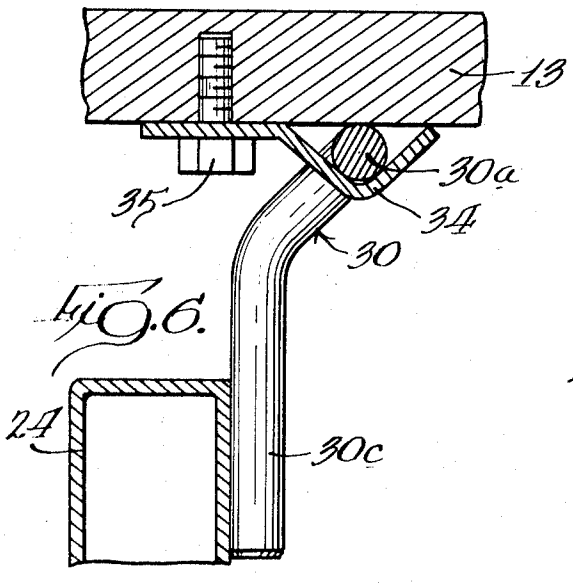


Fig. 7.

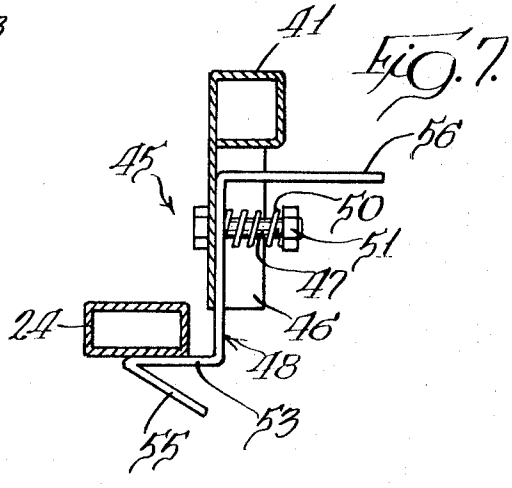


Fig. 8.

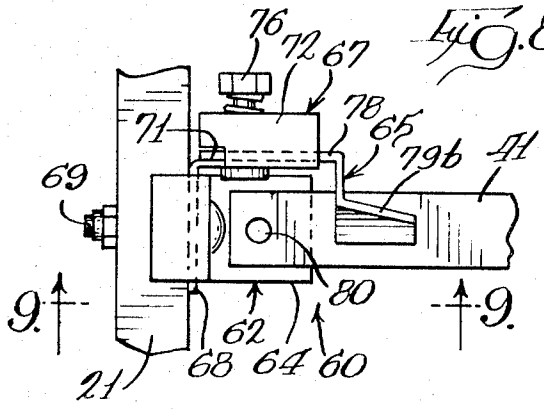


Fig. 9.

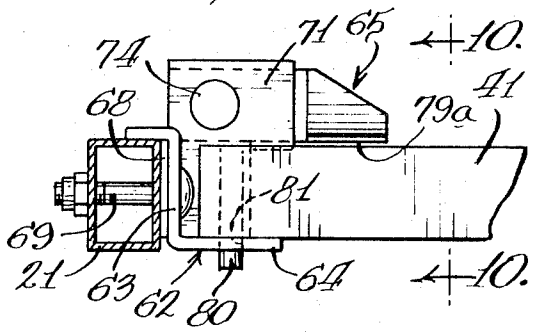
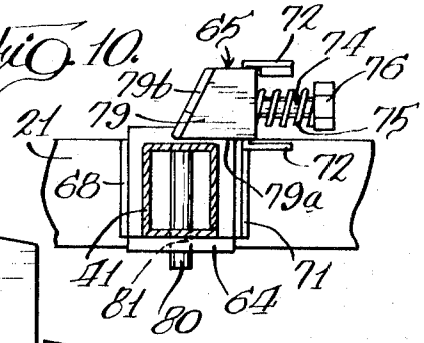


Fig. 10.



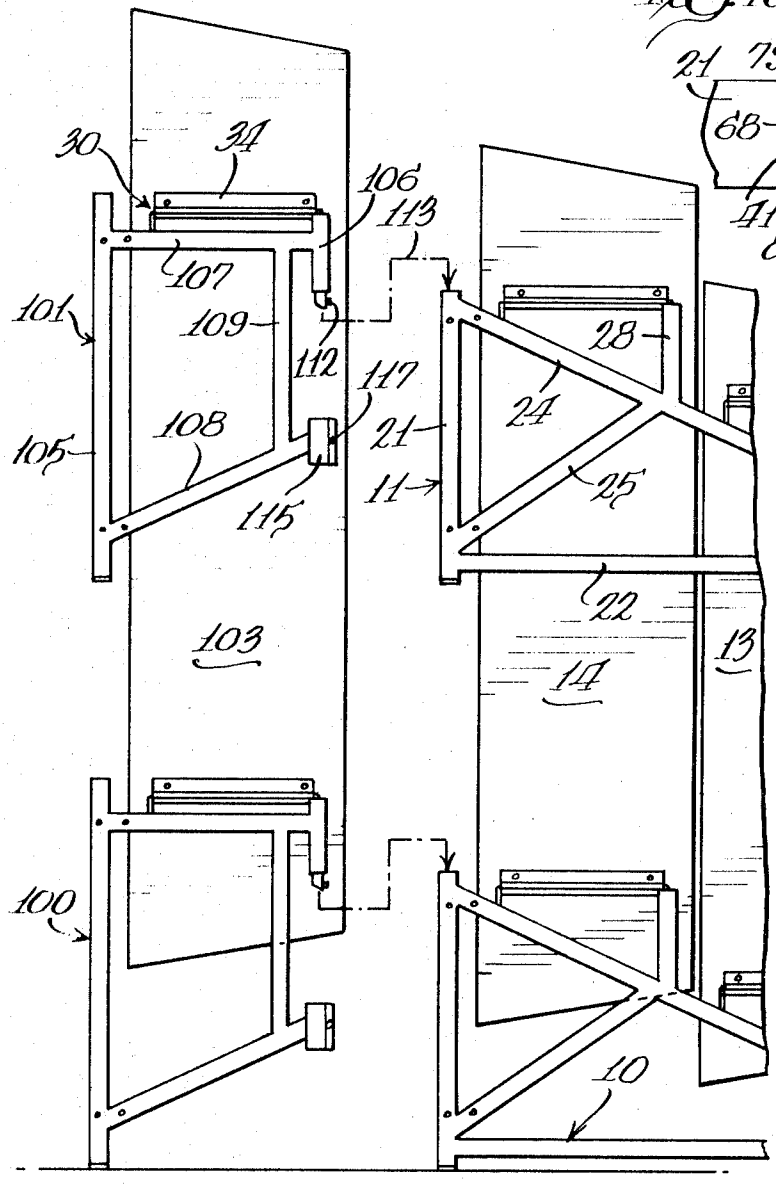


Fig. 11.

Fig. 12.

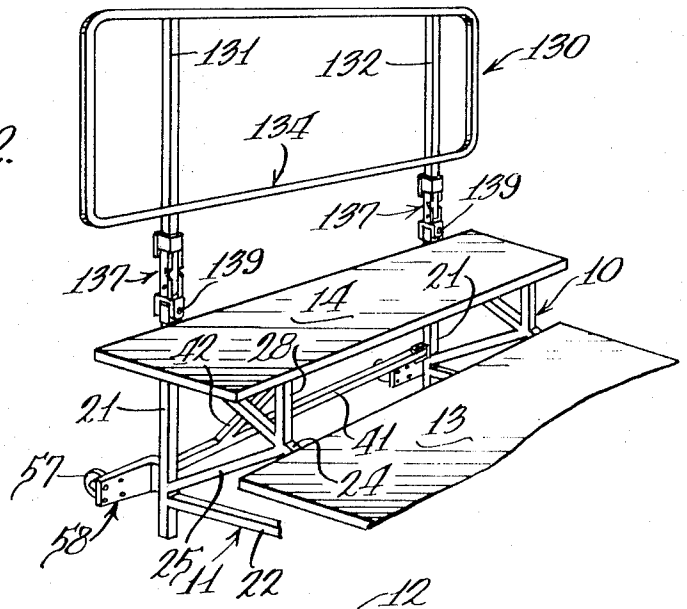


Fig. 13.

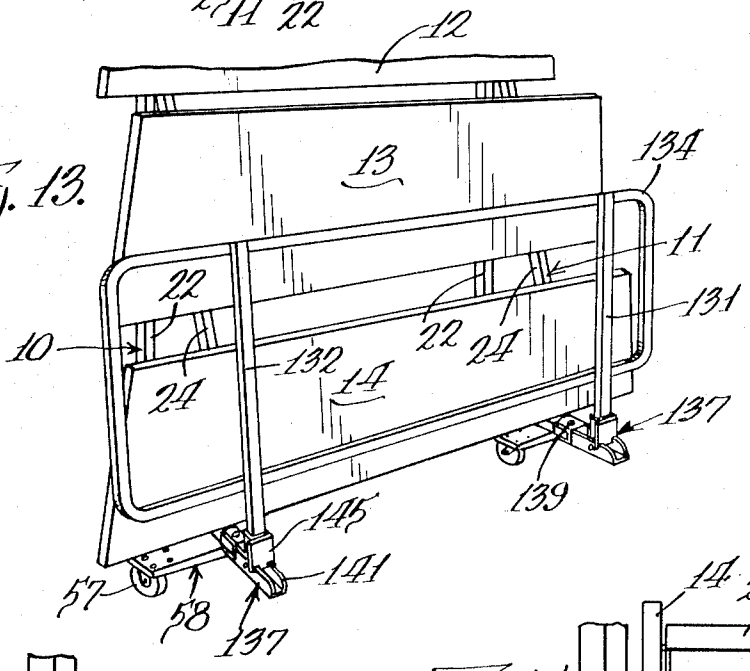


Fig. 14.

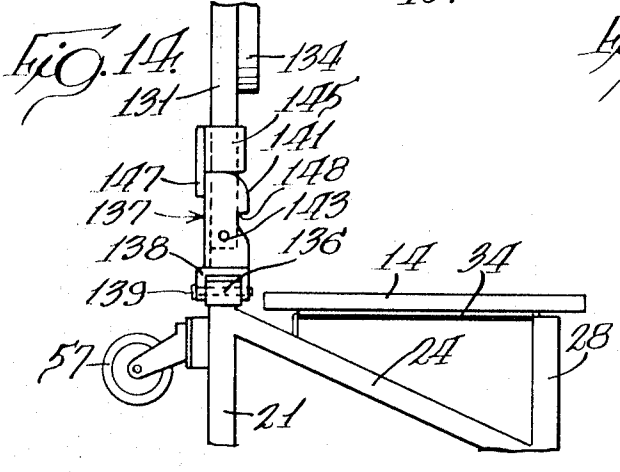
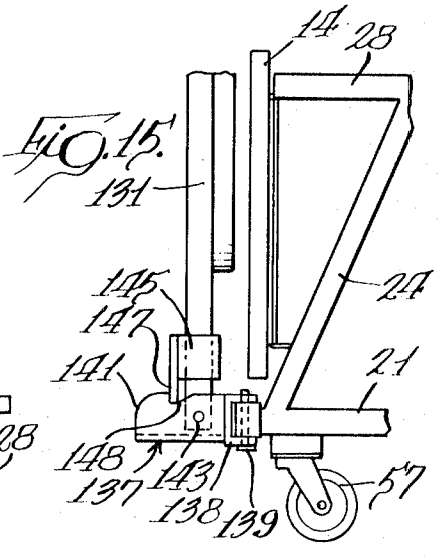


Fig. 15.



PORTABLE FOLDING RISER

BACKGROUND OF THE INVENTION

The present invention relates to a portable folding riser for a choir or the like with a plurality of ascending steps supported on a pair of spaced upright frames which are collapsible to positions wherein the steps lie in a common plane and the support frames lie in a common plane closely parallel to the steps, so that the assembly may be tipped on edge for compact storage against a wall or the like. In the past, there has been some prior work in connection with such structures. For example, U. S. Pat. No. 2,859,488 relates to a folding stand generally of the type described. However, in some instances prior stands have not been entirely portable, and to some extent portability has been restricted by cumbersome construction involving unnecessary complexity and undue weight. The copending application of Jerry A. Wenger et al, Ser. No. 200,134, filed concurrently herewith, Nov. 18, 1971 relates to a skeletal lightweight riser which is readily portable, but the invention of Wenger et al does not encompass an attachable additional step or a guard rail for the uppermost step.

SUMMARY OF THE PRESENT INVENTION

According to the present invention, an improved lightweight readily portable folding riser is constructed with a pair of floor-engaging support frames of skeletal construction, a plurality of steps having opposite ends supported on the frames at ascending levels from front to rear, means pivotally connecting the steps to the frame for callapse, and a collapsible brace construction releasably connecting the support frames to prevent collapse, together with an additional attachable riser tier including a pair of support frames each having a rear floor-engaging leg and a forward projection attachable to the rear of one of the basic riser support frames, and a step pivotably supported on the top of the last mentioned support frames at a level above the highest step on the basic riser.

Another feature of the present invention resides in the provision of a detachably mountable guard rail for the uppermost step in the riser to prevent personnel falling from the highest level.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a bottom elevational view of a riser incorporating the principles of the present invention, illustrated in collapsed condition and tipped on edge for support by casters which facilitate portability;

FIG. 2 is an end perspective view of the collapsed riser illustrated in FIG. 1, taken from the right end of FIG. 1;

FIG. 3 is a bottom perspective view of the riser illustrated in FIG. 1, shown with the steps, support frames and brace in extended condition preparatory for use but still on edge on the casters for convenient movement;

FIG. 4 is a perspective view of the riser in extended condition and with the legs of the support frames on the floor for use of the riser in the intended manner where a plurality of people may be supported on ascending steps in a front-to-rear direction;

FIG. 5 is a transverse sectional view taken at about the line 5—5 of FIG. 4, and also illustrates in broken line an additional attachable riser tier which may be used with the basic riser;

FIG. 6 is an enlarged fragmentary sectional view taken at about the line 6—6 of FIG. 5;

FIG. 7 is a fragmentary enlarged transverse sectional view taken at about the line 7—7 of FIG. 1, illustrating means for retaining a brace in collapsed storage position closely adjacent to one of the support frames;

FIG. 8 is an enlarged fragmentary plan view of means provided for maintaining the brace in its extended position;

FIG. 9 is a front elevational view partly in section along the line 9—9 of FIG. 8;

FIG. 10 is a side elevational view, partly in section along the line 10—10 of FIG. 9;

FIG. 11 is a bottom view of the additional riser tier adjacent to the basic riser and illustrating the manner in which the two may be connected.

FIG. 12 is a fragmentary perspective view of an erected riser with a guard rail embodying the principles of the present invention;

FIG. 13 is a fragmentary perspective view of a tilted riser with the guard rail folded;

FIG. 14 is an enlarged fragmentary elevational view of the guard rail mounting; and

FIG. 15 is a fragmentary view, like FIG. 14, showing the guard rail folded.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

Referring now to the drawings in more detail, a riser embodying the principles of the present invention includes a pair of support frames **10** and **11**, and a plurality of steps **12**, **13** and **14** supported on the frames **10** and **11** in positions which provide ascending levels when the riser is in extended condition for use in the intended manner with the support frames on the floor as illustrated in FIGS. **4** and **5**.

The support frames **10** and **11** are similar in construction for the most part, and similar reference numbers are used in designating the similar components of the two frames. Each frame includes a relatively short front leg **20**, a relatively tall rear leg **21**, and a crosspiece **22** rigidly connecting the front and rear legs. The frame structure is stabilized by an inclined brace member **24** extending from the top of the rear leg **21** to the crosspiece **22** near the front of the frame. A brace **25** extends from a midportion of the brace **24** to a lower portion of the rear leg **21**. In order to provide support for the steps, the inclined brace member **24** includes an intermediate upright leg **27** for the intermediate step **13** and a rear upright leg **28** for the rear step **14**.

Each frame includes a separate support for pivotal connection with each of the steps, and each of the supports comprises a fixed hinge pin **30** extending in a front-to-rear direction parallel to the steps adjacent the bottom surface thereof. The hinge pins **30** are all similar, and each includes a long horizontally disposed intermediate portion **30*a*** (FIGS. **5** and **6**), a downwardly turned forward end portion **30*b*** and a rearward downwardly turned end portion **30*c***. The hinge pin for the front step **12** has its forward end portion **30*b*** welded or otherwise secured to the upright front leg **20** of the support frame, and has its rear end portion **30*c*** welded or otherwise secured to the inclined brace **24** of the support frame. The forward end portion **30*b*** of the hinge pin for the intermediate step **13** is welded or otherwise

secured to the upright post 27 on the brace 24, and the rearward end 30c of the pin for the intermediate step is welded or otherwise secured to the inclined brace 24. The forward end portion of the hinge pin for the upper step 14 is welded or otherwise secured to the upright post 28 on the inclined brace 24, and the rearward end of the pin for the step 14 is welded or otherwise secured to the inclined brace 24.

It will be understood from the foregoing description that the hinge pins comprise rigid supports on which opposite ends of the steps are supported in order to bear the weight of people on the riser. The hinge pins also facilitate pivotal connection ofthe steps to the support frames, and to that end, each of the steps has a hinge plate as at 34 secured to the bottom of the step as by screws 35 and formed with a recess receiving the hinge pin 30 and capturing the latter between the hinge plate and the step so that the step and the hinge pin are relatively pivotably movable.

In operation of the riser as thus far described, it will be understood that the hinge pins 30 and the hinge plates 34 pivotally mount the steps 12, 13 and 14 on the support frames 10 and 11 so that the frames and the steps are movable between the collapsed condition illustrated in FIGS. 1 and 2 and the extended condition illustrated in FIGS. 3, 4 and 5. In the collapsed condition illustrated in FIGS. 1 and 2, the steps 12, 13 and 14 lie in a common plane, and the support frames 10 and 11 lie in a common plane closely adjacent to and parallel to the plane containing the steps. In the extended condition of the riser as illustrated in FIGS. 3, 4 and 5, the support frames are disposed in parallel upright planes adjacent opposite ends of the steps and the steps are supported on the frames at ascending levels from front to rear.

In order to maintain the riser in extended condition against collapse while in use, the parallel support frames 10 and 11 are secured against relative movement by means of a brace 40 in the form of a skeletal triangular frame including a horizontally disposed leg 41 and an inclined leg 42. The spaced ends of the legs 41 and 42 are pivotally mounted on U-shaped pivot brackets as at 43 on the upright leg 21 of support frame 10 so that the brace 40 is adapted to pivot on the support frame about an axis parallel to the frame by 21.

In the collapsed condition of the rieser as illustrated in FIG. 1, the brace 40 is adapted to be compactly stored in a plane closely adjacent the support frame 10 and retained in such retracted position by means of a latch device 45 illustrated in FIG. 7. Preferably, the latch device includes an angle-shaped bracket as at 46 welded or otherwise secured to the brace leg 41 and carrying a fixed bolt 47 on which a latch member 48 is loosely mounted. The latch member is yieldably retained in the position illustrated in FIG. 7 by means of a coiled compression spring 50 surrounding the bolt 47 and bearing between the latch member 48 and a head or nut 51 on the bolt 47. The latch member 48 includes an angularly disposed latch portion 53 adapted to catch behind the inclined brace leg 24 on the support frame 10. Additionally, the terminus of the latch portion 53 includes an angularly disposed end portion 55 which functions in cooperation with the brace leg 24 as the brace 40 is moved toward storage position to perform a camming function which laterally deflects the latch member 48 against the yieldable force of the spring 50 so that the latch portion 53 is cammed to one side of the brace leg 24 as the latch portion 53 moves behind the member 24. When it is desired to extend the riser, the latch member 48 may be manually retracted by means of a manually accessible extension 56 in order to release the brace 40.

In order to facilitate handling of the riser in collapsed condition as illustrated in FIGS. 1 and 2, the support frames 10 and 11 are provided with swivel casters as at 57, two mounted on each support frame adjacnet the rear leg 21. Each caster 57 includes a rotatable wheel in a yoke which is swivelly mounted on a support bracket 58 secured to the support frame. As seen in FIGS. 2 and 3, each support bracket 58 includes an upright portion 58a secured to the support frame by bolts 59 and a laterally extending flange 58b secured to the caster. The support brackets are secured respectively to opposite sides of the support frame and extend laterally in opposite directions so that the casters are laterally displaced, as viewed in FIG. 2, in order that the collapsed riser will stand by itself.

In order to maintain the riser in extended condition, the free end of the brace 40 is latched in the extended position illustrated in FIG. 3 by means of a latch mechanism 60, illustrated in FIGS. 8, 9 and 10, carried on the rear leg 21 of the support frame 11. The latch mechansim 60 includes an angle-shaped bracket 62 including a flange 63 secured to the rear leg 21 of the support frame 11 and an outwardly turned flange 64 against which the end of the brace leg 41 abuts. As will be understood on reference to the front elevational view of FIG. 8, the flanges 63 and 64 are disposed in vertical planes, and the end of the brace leg 41 abuts the flange 64. In order to retain the brace leg 41 against horizontal pivotal movement about the upright pivot axis ofthe brace on the support frame 10, a yieldable latch member 65 is utilized.

The latch member 65 is yieldably mounted on a latch support bracket 67 which includes a flange 68 clamped between the flange 63 and the support frame leg 21. The flange 63 and the flange 68 are secured to the leg 21 by means of an appropriate bolt as at 69. A horizontal flange 71 extends laterally from the flange 68 and is formed with upwardly turned tabs as at 72, between which a fixed bolt 74 is mounted. Latch member 65 is loosely mounted on the bolt 75 between the tabs 72 and yieldably maintained in the position illustrated by a coiled compression spring 75 bearing between the latch member 65 and a head or nut 76 on the bolt 74. The latch member 65 includes a flange 78 mounted on the bolt 74 and also includes a latching flange 79 including a latching surface 79a for retaining the brace leg 41 in position and a camming edge 79b adapted to be engaged by the brace leg 41 during movement of the latter toward the position illustrated in FIGS. 8, 9 and 10 for purposes of laterally displacing the latch member 65 to permit the member41 to pass the latch and move to the position shown.

The end of the brace leg 41 includes a welded pin as at 80 adapted to register with an aperture as at 81 in the flange 64 for purposes of retaining the member 41 against movement vertically relative to the flange 64.

Referring to FIGS. 5 and 11, an additional tier may be attached to the basic riser described above if it is desired to provide an additional step. As seen best in FIG. 11, the additional tier includes a pair of support frames as at 100 and 101, for supporting a step 103. Frames 100 and 101 are attachable respectively to the frames

10 and 11 in a manner to support the step 103 at a level above the step 14. The support frames 100 and 101 are similar and the components thereof may be designated by similar reference numbers. Each frame includes an upright rear leg 105 and a relatively short front leg 106. The legs 105 and 106 are rigidly connected by a crossmember 107. An additional crossmember 108 extends forwardly from the bottom of the rear leg 105, and the crossmembers 107 and 108 are rigidly connected by an intermediate leg 109. A hinge pin 30 (similar to those previously described) has its front angularly turned end rigidly secured as by welding to the front leg 106 and its rear angularly turned end rigidly secured to the crossmember 107 as by welding. The main intermediate portion of the hinge pin 30 is captured by a hinge plate 34 (similar to those previously described) secured to the seat 103 so that the frames 100 and 101 are pivotally relative to the seat 103.

In order to provide for connection of the frames 100 and 101 to the main riser, the lower end of the front leg 106 of each frame is formed with a reduced terminus as at 112 adapted to fit telescopically into the hollow rectangular upper end of the leg 21, as represented by the broken line 113. Additionally, the forward end of the crossmember 108 is formed with a U-shaped bracket 115 adapted to embrace an intermediate portion of the leg 21. In order to secure the bracket 115 to the leg 21, a bolt of suitable proportions is inserted in an aperture 117 on the bracket 115 to retain the assembly in place. The bolt may be retained in the aperture 117 with a self-locking nut.

In operation, it will be understood that the support frames 100 and 101 of the additional step 103 may be secured to the support frames 10 and 11 of the main riser structure in the manner described above, so that the frames 100 and 101 are pivotally movable with the main frames 10 and 11 between the collapsed and extended positions. In FIG. 5, the additional tier is illustrated in the extended position where the step 103 is disposed at a level above the step 14. On viewing the illustration in FIG. 5, it will be understood that if the additional tier is added to the main riser structure, the casters 57 should be removed from the frames 10 and 11 and mounted in similar positions on frames 100 and 101 in order to facilitate manipulation of the riser in collapsed condition. While the illustration in FIG. 11 has omitted the brace 40 for purposes of simplifying the drawing, it should be understood that the riser with the additional step 103 would also utilize the brace 40 extending between the frames 10 and 11.

Referring now to FIGS. 12 through 15, there is illustrated a guard rail structure 130 adapted to be attached to the supporting frame of the basic three-step riser or to the supporting frame of the attachable fourth step riser tier for purposes of providing security against personnel falling from the back of the uppermost riser, whether that be the third step or the fourth step. As illustrated in FIGS. 12 through 15, the guard rail structure 130 is attached to a basic three-step riser, such as that illustrated in FIGS. 1 through 10. The guard rail includes a pair of upright posts as at 131 and 132 and a transversely-extending rail or panel as at 134. As shown herein, the rail or panel 134 is in the form of a single elongate tubular member bent into a rectangular configuration and disposed in a plane parallel to the upright posts 131 and 132. The rail 134 may be secured to the posts 131 and 132 in any suitable manner.

The guard rail is mounted on the basic riser in a manner which permits the riser to be folded for storage in the manner illustrated in FIGS. 1 and 2, while at the same time, permitting the guard rail to be folded to a fourth plane parallel to the plane of the steps, the plane of the upright supporting frames, and the plane of the connecting brace, as will be understood on reference to FIGS. 13 and 15. In order to appropriately mount the guard rail 130 for such purposes, the rearwardly disposed upright post 21 of each of the supporting frames 10 and 11 is provided with a cap of appropriate bearing material as at 136. A mounting bracket 137 is pivotally mounted on the cap 136 and the leg 21 for relative movement about a front-to-rear pivot axis parallel to the hinge axes connecting the steps to the supporting frames. To this end, the lower portion of the bracket 137 is formed in the shape of an inverted U as at 138 embracing the cap 136 and mounted by means of a pivot pin 139. With this arrangement, it will be understood that the upright supporting frames 10 and 11 are free to pivot to the collapsed positions in FIGS. 1 and 2, even though the guard rail is mounted on the frames.

In order to appropriately support the guard rail 130 for folding movement from the upright position illustrated in FIGS. 12 and 14 to the folded position illustrated in FIGS. 13 and 15, each of the mounting brackets 137 is formed with an upper portion in the shape of a forwardly-opening U 141 which receives the lower end of the upright post for pivotal movement about a horizontal transversely extending axis provided by mounting pin 143. It will be understood that the bracket portion 141 facilitates movement of the upright posts from the upright position illustrated in FIGS. 12 and 14 to the folded position illustrated in FIGS. 13 and 15.

In order to retain the posts 131 and 132 in the upright positions, a latching collar 145 is slidably mounted on the lower end of each upright post and includes a downwardly extending projection as at 147 adapted to overlap the back of the bracket 137 when the post is upright. On viewing the structure as illustrated in FIGS. 12 and 14, it will be understood that the overlapping projection 147 in contact with the back of the bracket 137 adjacent the upper portion 141 will prevent pivotal movement of the upright posts in a forward direction about the axis 143. In order to fold the guard rail, the collar is slidable upwardly from the position of FIGS. 12 and 14, to clear the bracket 137, whereupon the post may be pivoted.

In order to latch the guard rail in the folded position illustrated in FIGS. 13 and 15, the forward edges of the upper portion 141 of the bracket 137 are provided with forwardly opening notches, as at 148, adapted to receive the projection 147 on the slidable collar 145, when the posts are folded to positions parallel with the upper step 14. On viewing the structure in the position illustrated in FIGS. 13 and 15, it will be noted that the projection 147 is disposed in the notches 148, retaining the guard rail in the folded position, even when the riser is tilted onto the casters 57.

In FIGS. 13 and 15, it will be understood that, while the guard rail 130 is illustrated in folded position relative to the riser, and the riser is turned onto the casters 57, the rieser frames 10 and 11 are not illustrated in collapsed positions. While the guard rail is illustrated in FIGS. 12 to 15 as mounted on a three-step riser, it will be understood that the guard rail may, if desired, be

mounted on the rear upright post of the vertical frames of the fourth attachable riser tier.

We claim:

1. A folding riser, comprising,
a. a pair of floor-engaging support frames disposed in spaced upright planes and each including an upright rear leg, an upright front leg, and a cross member rigidly connecting the legs,
b. a plurality of steps having opposite ends supported on the frames at ascending levels from front to rear,
c. means pivotally connecting the steps to the frames for collapsing movement of the frames about axes parallel to the steps to positions parallel to the steps,
d. a collapsible brace releasably connecting the support frames to prevent pivotal collapse of the support frames relative to the seats,
e. an additional attachable riser tier including a pair of support frames, each having a rear floor-engaging leg and a front leg attachable to the top of the rear leg of one of the first recited support frames, and a step connected to the top of the last recited support frames at a level above the highest step on the first recited frames and
f. means pivotally connecting the step of the attachable riser tier to the support frames therefor about axes parallel to the steps for collapse of the attachable riser tier frames with the first recited frames.

2. A riser, comprising,
a. a pair of floor-engaging support frames disposed in spaced parallel upright positions,
b. a plurality of steps having opposite ends supported on the frames at ascending levels from front to rear,
c. a brace connecting the support frames, and
d. a collapsible guard behind the uppermost step including a pair of upright posts, a transverse rail secured to the posts, means pivotally mounting one post on each supporting frame adjacent the uppermost step for movement between an upright position relative to the uppermost step and a folded position parallel to the uppermost step, and a collar slidable on the post and engageable with the mounting bracket to latch the post in upright position.

3. A riser, comprising,
a. a pair of floor-engaging support frames disposed in spaced parallel upright positions,
b. a plurality of steps having opposite ends supported on the frames at ascending levels from front to rear,
c. a brace connecting the support frames, and
d. a collapsible guard behind the uppermost step including a pair of upright posts, a transverse rail secured to the posts, a U-shaped mounting bracket on each supporting frame adjacent the uppermost step, means pivotally mounting one post on each bracket for movement between an upright position relative to the uppermost step and a folded position parallel to the uppermost step, and means for latching each post in upright position.

4. A riser, comprising,
a. a pair of floor-engaging support frames disposed in spaced parallel upright positions,
b. a plurality of steps having opposite ends supported on the frames at ascending levels from front to rear,
c. a brace connecting the support frames, and
d. a collapsible guard behind the uppermost step including a pair of upright posts, a transverse rail secured to the posts, a U-shaped mounting bracket on each supporting frame adjacent the uppermost step, means pivotally mounting one post on each bracket for movement between an upright position relative to the uppermost step and a folded position parallel to the uppermost step, and a collar slidable on the post and engageable with the mounting bracket to latch the post in upright position and in folded position.

5. A folding riser, comprising,
a. a pair of floor-engaging support frames disposed in spaced upright planes and each including an upright rear leg, an upright front leg, and a crossmember rigidly connecting the legs,
b. a plurality of steps having opposite ends supported on the frames at ascending levels from front to rear,
c. means pivotally connecting the steps to the frames for collapse,
d. a collapsible brace releasably connecting the support frames to prevent collapse of the support frames relative to the seats,
e. a mounting bracket detachably mounted on the top of each rear leg,
f. an upright post pivotally mounted on each mounting bracket for movement between an upright position and a folded position parallel to the uppermost step,
g. a transverse guard rail secured to the posts, and
h. means for latching each post in upright and folded positions.

6. A portable folding riser, comprising,
a. a pair of floor-engaging support frames disposed in spaced parallel upright positions,
b. a plurality of horizontal supports on each support frame at increasing heights from front to rear,
c. a plurality of ascending steps having opposite ends pivotally connected to the supports for collapsing movement of the steps and frames about parallel front-to-rear axes to positions with the steps lying in a common plane and the frames lying in a common plane closely parallel to the steps,
d. a brace releasably holding the support frames in upright positions,
e. a mounting bracket pivotally mounted on each support frame adjacent the uppermost step for relative movement about a front-to-rear axis,
f. an upright post pivotally mounted on each mounting bracket about a transverse axis for movement from an upright position to folded position parallel to the uppermost step, and
g. a transverse guard rail secured to each post.

7. A riser as defined in claim 6, including means for latching the posts in upright positions.

8. A riser as defined in claim 6, including means for latching the posts in folded positions.

9. A riser as defined in claim 6, including a slidable collar on each post engageable with the adjacent mounting bracket for latching the post in upright and folded positions

10. A riser as defined in claim 9, wherein each mounting bracket is of forwardly-open U-shape and includes a forwardly-facing notch, and each collar includes a projection overlapping the mounting bracket when the post is upright and receivable in the notch when the post is folded.

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