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Wenger et al.

[11] **3,747,708**

[45] **July 24, 1973**

[54] **PORTABLE FOLDING RISER**

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[21] Appl. No.: **200,134**

[52] **U.S. Cl.** **182/152**, 52/9, 52/183, 182/178

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

[58] **Field of Search** 52/8, 9, 10, 143; 182/159, 162, 161, 178

[56] **References Cited**

UNITED STATES PATENTS

2,598,983	6/1952	Ellis	182/159
3,230,907	1/1966	Morford	52/143

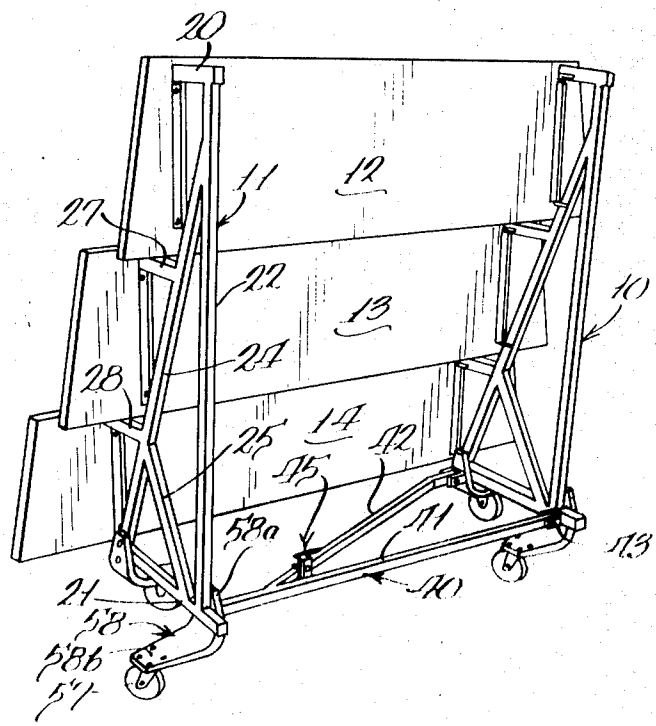
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[57] **ABSTRACT**

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.

15 Claims, 11 Drawing Figures



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SHEET 1 OF 3

Fig. 1.

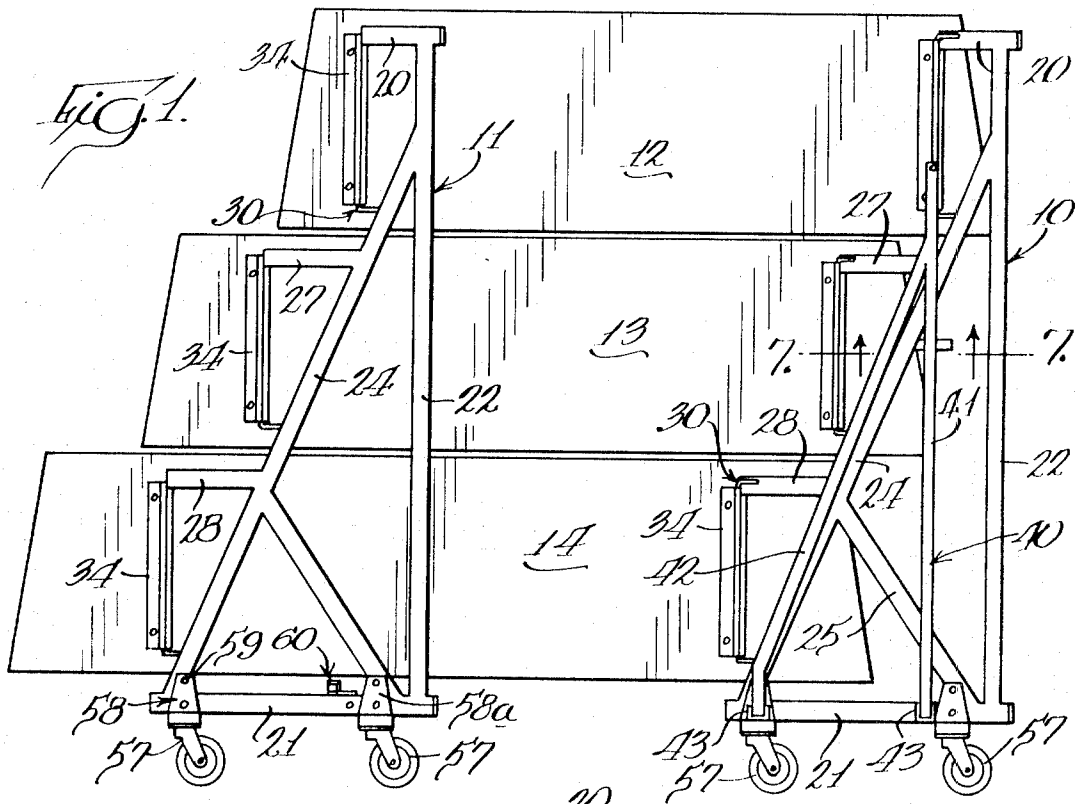


Fig. 2.

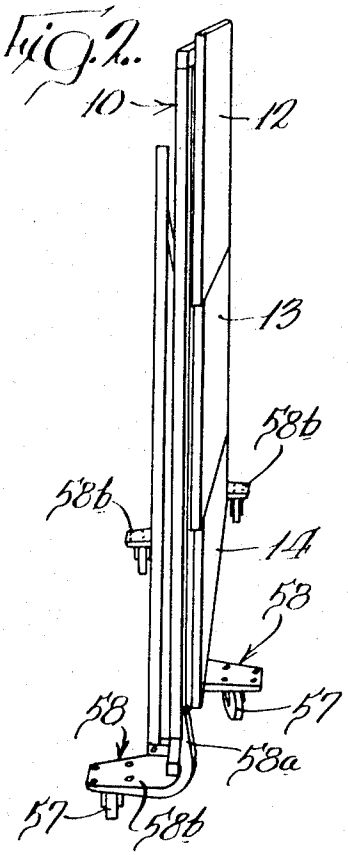
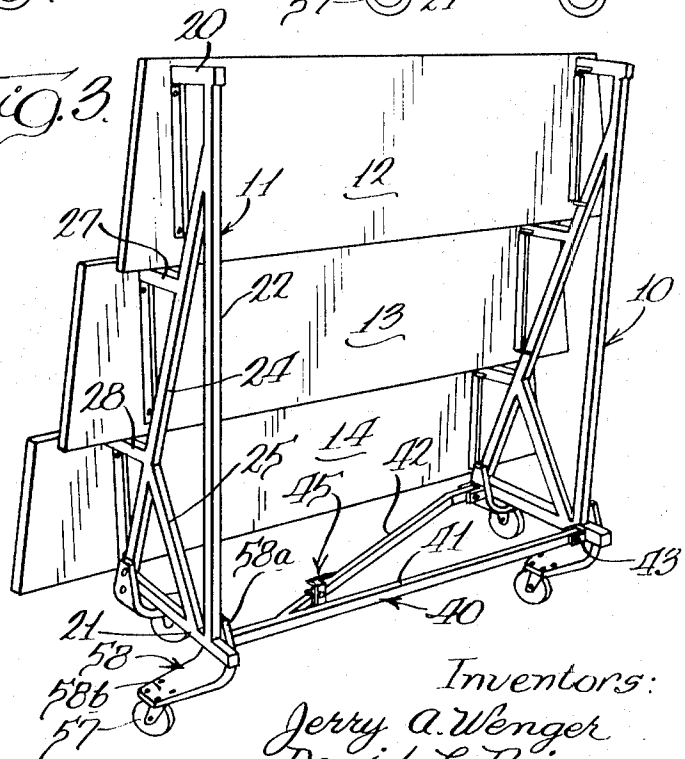


Fig. 3.



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Fig. 4.

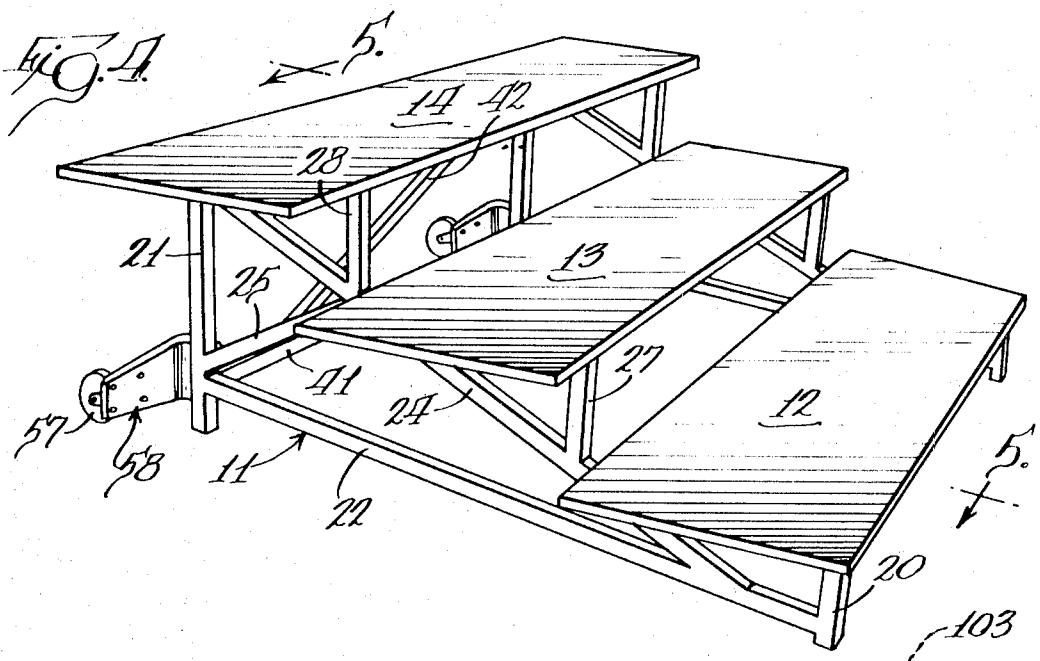


Fig. 5.

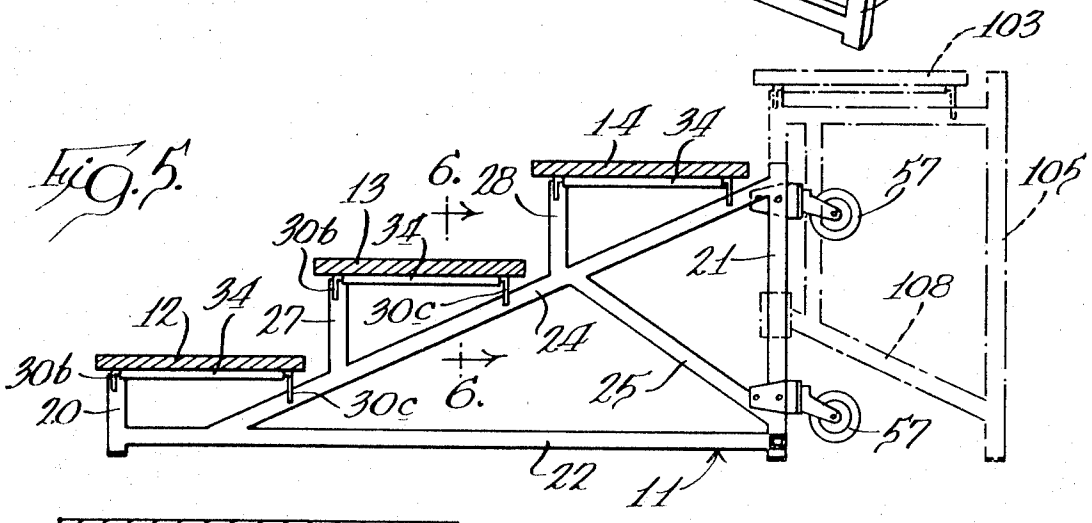


Fig. 6.

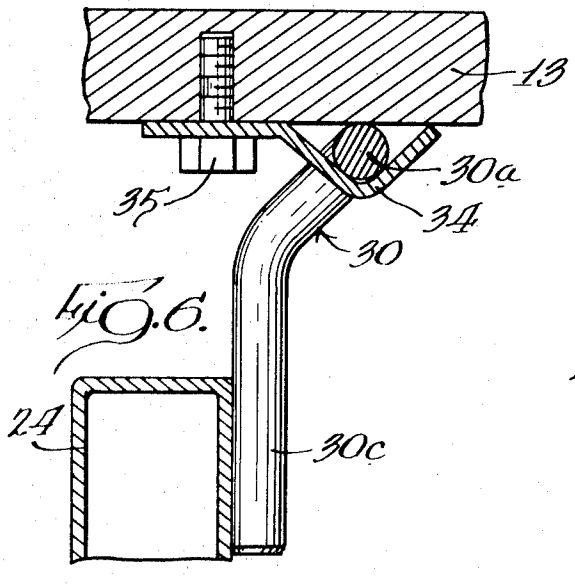
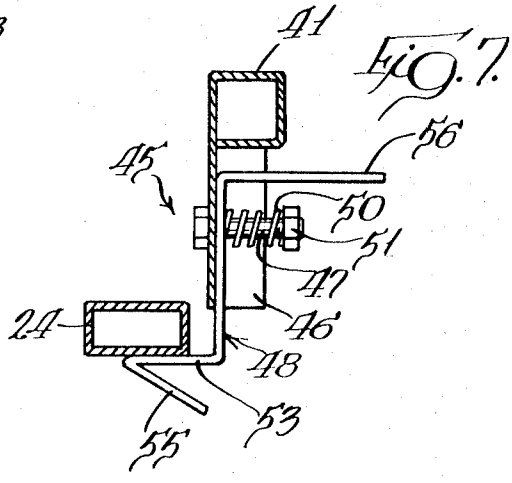


Fig. 7.



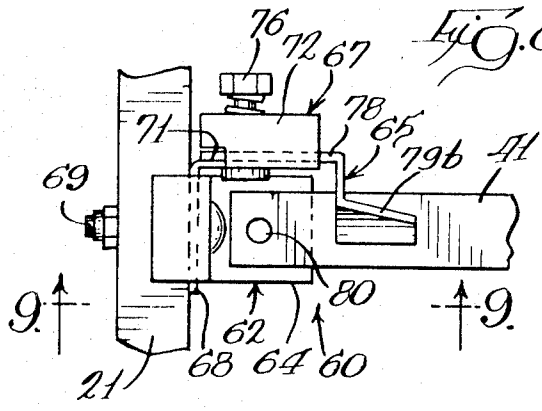


Fig. 8.

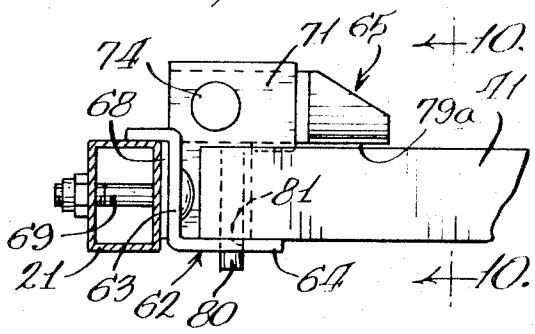


Fig. 9.

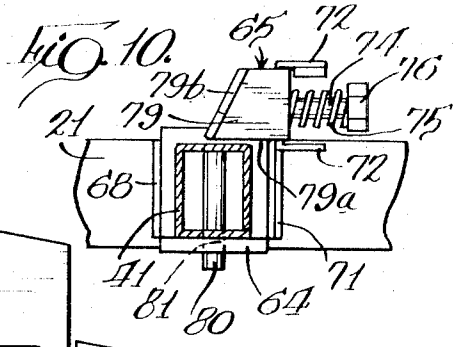


Fig. 10.

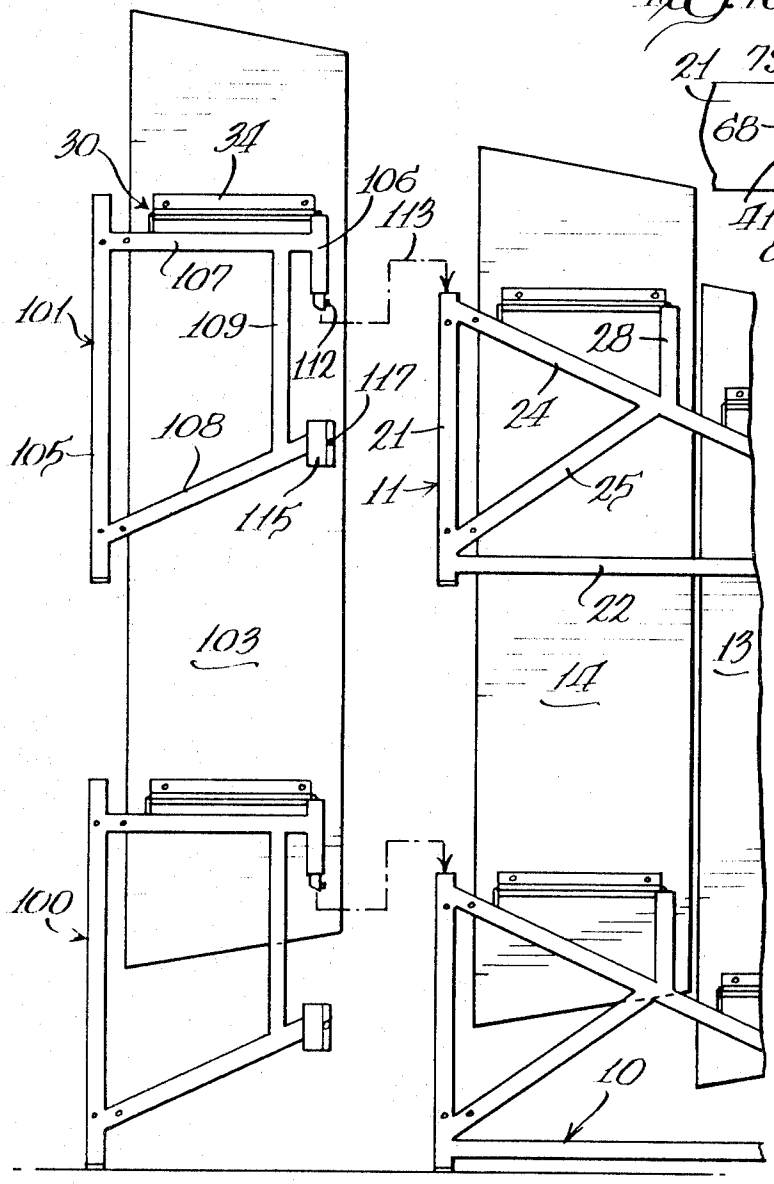


Fig. 11.

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.

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 collapse, and a collapsible brace of skeletal construction releasably connecting the support frames to prevent collapse.

An important feature of the present invention resides in construction of the brace in the form of a frame pivotable about an upright axis on one of the support frames and disposed in an upright plane parallel to the rear edge of the upper steps so that the brace not only properly spaces the support frames from each other, but also prevents pivotal movement of the support frames relative to the steps, thereby to maintain a rigid structure during use.

In the preferred construction illustrated, the brace has one end releasably secured to the other support frame by means releasably holding the brace against horizontal pivotal movement and by means releasably securing the brace against vertical movement.

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; and

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.

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 **30*c*** 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 of the 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 leg **21.**

In the collapsed condition of the riser 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** moved 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 adjacent 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 **58***a* secured to the support frame by bolts **59** and a laterally extending flange **58***b* 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 mechanism **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 of the 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 **79***a* for retaining the brace leg **41** in position and a camming edge **79***b* 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 member **41** 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.**

The additional riser is disclosed and claimed in the copending application of Harvey M. Urch, et al. Ser. No. 200,115, filed concurrently herewith, Nov. 18, 1971, and assigned to the assignee of this application.

We claim:

1. A folding riser, comprising,

a. a pair of support frames disposed in spaced upright planes and having free lower ends adapted to rest on a floor,

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 brace extending between the frames and engaging at least one frame at vertically spaced positions to prevent collapsing movement of the support frames relative to the steps,

e. means pivotally connecting the brace to one of the frames for collapse relative thereto, and

f. means detachably connecting the brace to the other frame.

2. A folding riser as defined in claim **1,** wherein the support frames are each skeletal and comprise an upright rear leg, an upright front leg, a rigid horizontal crossmember connecting lower ends of the legs, and an inclined brace connecting the rear leg and the crossmember.

3. A folding riser as defined in claim **1,** wherein the means pivotally connecting the steps and the support frames comprises a plurality of hinge pins rigidly positioned on each frame beneath each seat, and a hinge plate secured to the adjacent seat with a recess capturing the hinge pin between the plate and the seat.

4. A folding riser as defined in claim **1,** wherein the brace comprises a frame pivotable about an upright axis on one support frame and disposed in an upright plane parallel to the rear edge of the upper step.

5. A folding riser as defined in claim **1,** wherein the last recited means comprises a spring-biased latch on said other frame for releasably holding said brace in extended position, and cooperating cam means on the brace and the latch for forcing the latch open as the brace is moved to extended position.

6. A folding riser as defined in claim **1,** including a stop on said other frame abutting the brace in extended position and a pin securing the brace to the stop.

7. A folding riser as defined in claim **1,** including means for releasably holding the brace in collapsed position adjacent said one frame.

8. A folding riser as defined in claim **7,** wherein the last recited means comprises a spring-biased latch on the brace for releasably engaging said one frame, and cooperating cam means on said one frame and on the brace for forcing the latch open as the brace is moved to collapsed position.

9. A folding riser as defined in claim **6,** wherein the brace comprises a frame pivotable about an upright axis on said one support frame and disposed in an upright plane parallel to the rear edge of the upper step.

10. A portable folding riser, comprising,

a. a pair of support frames disposed in spaced parallel upright positions and having free lower ends engageable with a floor,

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 connecting the support frames in an upright plane parallel to the rear step,

e. means pivotably mounting one end of the brace about an upright axis on one of the support frames for movement to a collapsed position parallel to the frame,

f. means detachably connecting the other end of the brace to the other frame, and

g. a plurality of casters on the backs of the support frames for movably supporting the riser on edge when collapsed.

11. A portable folding riser as defined in claim **10,** wherein the means detachably connecting said other end of the brace to said other frame includes a yieldable latch on said other frame for releasably holding said brace against horizontal pivotal movement on said one frame in a collapsing direction, and means releasably securing the brace to said other frame against vertical movement.

12. A portable folding riser as defined in claim **10,** including means for releasably holding the brace in col-

lapsed position on said one frame including a yieldable latch on the brace releasably engaging said one frame.

13. A portable folding riser as defined in claim **10,** including means pivotally connecting the steps to the frames comprising a plurality of hinge pins rigidly positioned on each frame beneath each seat, and a hinge plate secured to the adjacent seat with a recess capturing the hinge pin between the plate and the seat.

14. A folding riser, comprising,

a. a pair of 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, said legs having free lower ends adapted to rest on a floor,

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 including a plurality of hinge pins rigidly positioned on each frame beneath each seat, and a hinge plate secured to the adjacent seat with a recess capturing the hinge pin between the plate and the seat, and

d. a collapsible brace releasably connecting the support frames to prevent pivotal collapse of the support frames relative to the seats.

15. A folding riser as defined in claim **14,** wherein the brace comprises a frame disposed in an upright plane parallel to the rear edge of the upper step, and pivotably mounted at vertically spaced positions on the rear leg of one support frame.

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