

PATENT SPECIFICATION (11)

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- (21) Application No. 22170/76 (22) Filed 27 May 1976 (19)
 (31) Convention Application No. 638 167 (32) Filed 5 Dec. 1975 in
 (33) United States of America (US)
 (44) Complete Specification published 7 Dec. 1977
 (51) INT. CL.² E04H 3/24 3/28
 (52) Index at acceptance
 A6M 15F



(54) ELEVATIONALLY ADJUSTABLE FOLDING STAGE

(71) I, KERMIT H. WILSON, a citizen of the United States of America, residing at 7001 Antrim Road, Edina, Minnesota, U.S.A., do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to folding stages and more particularly to simplified elevationally-adjustable folding stages.

Folding stages have become very popular and widely used in multi-purpose rooms or areas wherein differing use requirements dictate rapid setup and take-down capability of the stage. One example of a prior art folding mobile stage is found in U.S. Patent No. 3,351,029 issued to R. C. Bue.

It has been recognised that even greater versatility of use could be achieved if a simple and convenient elevational adjustment could be provided for portable folding stages, and the present invention provides folding stages having these desirable features.

Accordingly, the invention provides a folding stage comprising first and second stage surface members; first and second main support leg means interconnected to form a base frame for supporting the stage in its folded position, said first and second stage surface members being hingedly mounted on said base frame for pivotal movement of said members from a storage position in which they are positioned substantially vertically above the base frame, said members being adjacent each other, to an operable position in which said members are horizontally positioned and together provide a stage surface; first and second outer legs means attached respectively to said first and second stage surface members at positions remote from the hinged mounting, and adjustable as to length; and auxiliary support leg means mounted respectively on said first and second stage surface members adjacent the ends thereof that are hingedly mounted on said base frame, said auxiliary leg means each being able to be moved from an inoperable position to an

operable position in which it extends from the stage surface member a distance greater than does the respective main support leg means. In a preferred embodiment, the feet of the auxiliary legs have a curved configuration to facilitate in a rocking or pivoting motion thereabout so as to make easier and more convenient the transition of the stage from its folded position into its operative, extended height position.

In the drawings, Figure 1 is a view in side elevation, portions thereof broken away for clarity, of an elevationally adjustable folding stage according to the present invention, one half thereof being indicated in raised position for illustrative purposes;

Figure 2 is a view in side elevation of the folding stage of Figure 1 in a storage position;

Figure 3 is an enlarged fragmentary detail in top plan of a portion of Figure 1, portions thereof removed for purposes of clarity;

Figure 4 is an enlarged view in side elevation of a portion of the elevationally adjustable folding stage of Figure 1; and

Figure 5 is a diagrammatic view in side elevation illustrating the folding and elevationally adjustment according to the present invention.

Although the elevationally adjustable feature of the present invention could be used with many type of folding stages, in the presently preferred embodiment the invention is used in conjunction with the prior art type of folding stage disclosed in U.S. Patent No. 3,351,029; and the preferred embodiment as illustrated herein shows the elevationally adjustable feature of the present invention applied to that type of folding stage.

The stage of Figure 1 comprises a pair of stage surface members 10 and 11. In Figure 1, the stage is shown in its open or operable position in which the stage surface members 10 and 11 are positioned adjacent each other to form a continuous stage surface. Stage member 11 is supported at its outer end by an outer leg assembly generally indicated by reference numeral 13. Similarly, stage surface member 10 has a corres-

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5 ponding outer leg assembly 12, which is
 shown in its extended position as explained
 hereinafter. At their ends which are ad-
 10 jacent to each other, stage surface members
 10 and 11 are supported by main support
 leg assemblies 14 and 15 respectively. These
 main support leg assemblies are intercon-
 nected by means of a brace 16, so that the main
 15 support leg assemblies 14 and 15 and brace
 16 together form a base frame. Member
 10 is pivotally connected to the base frame
 by means of links 21 and 22, while member
 11 is pivotally connected to the base by
 20 means of links 23 and 24. Only one side
 of the structure is shown in Figure 1, but it
 will be appreciated that links 21-24 have
 corresponding parts on the other side of the
 structure which co-operate to hingeably
 mount the stage surface members to the base
 frame.

As shown in Figure 2, stage member 11
 has a plurality of support or reinforcing rails,
 including angle irons 31 and 32 along each
 25 side, angle iron 33 along one end, angle
 iron 34, which is placed slightly away from
 the other end, and angle iron 35 across the
 center. Together, these angle irons form a
 framework for supporting and reinforcing
 30 the actual stage surface member itself, and
 provide a means for attaching the legs and
 various components.

Also as shown in Figure 2, outer leg
 assembly 13 has a pair of individual legs
 13a and 13b, one on either side which are
 35 pivotally mounted to reinforcing member 33
 by means of suitable pivotal mounts 41a and
 41b. In the preferred embodiment, these
 pivots may be a pair of tabs welded to mem-
 ber 33, with a pivot bolt passing through the
 40 tabs and the upper end of the leg. At the
 lower end of legs 13a and 13b, there is a
 cross member 13c. A pair of cross brace
 wires 13d and 13e may be provided for
 additional rigidity.

45 A cross member 43 extends between sup-
 port legs 15a and 15b which are positioned
 on either side of the table. Sliding collars
 44a and 44b fit coaxially around legs 15a
 and 15b and are attached to cross member
 50 43. Caster wheels 45a and 45b are attached
 to cross member 43.

As better shown in Figure 4, a pair of
 links 23 and 24 are pivotally connected to a
 bracket 25 which is attached to frame re-
 55 inforcing member 34. The other ends of
 links 23 and 24 are pivotally connected to
 brace 16. A similar construction is used
 for connecting member 10 to brace 16 by
 means of links 21 and 22. Portions of the
 60 stage member reinforcing rail have been
 broken away from the members 11 to more
 clearly show the details of connection. An-
 other pair of links 46 and 47 connect from
 the sliding collars on the main support legs

to brackets which in turn are mounted to
 frame reinforcing member 34.

An outer leg control link 51a connects
 from main support leg 15a to outer leg 13a.
 As seen in Figure 2, the equivalent control
 link 51b is found on the other side of the
 70 stage surface member. Also, as seen in
 Figure 1, a corresponding control link 52, is
 provided for stage surface member 10. This
 link likewise has left and right portions but
 only one side is visible in Figure 1.

Briefly, the folding stage may be folded up
 by swinging the outer portions of both stage
 surface members 10 and 11 upward to where
 they meet in a vertical plane above the base
 frame. The upward pivoting movement is
 80 made possible by pivoting links 21-24, and
 at the same time links 46 and 47 cause the
 sliding collars 44a and b to slide downward
 bringing the wheels 45a and 45b into contact
 with the ground and lifting main support
 85 legs 14 and 15 slightly off the surface. Also
 during the folding motion, control links 51
 and 52 fold outer leg assemblies 12 and 13
 inward against the undersurface of stage sur-
 face members 10 and 11. The resulting
 90 folded position, as indicated in Figure 2 in
 the solid line portion of Figure 5, represents
 a compact storage arrangement that permits
 the stage to be wheeled away to a storage
 area.

According to the present invention, ele-
 vational adjustment is accomplished primar-
 ily by means of auxiliary support legs. As
 seen in Figure 2, a pair of leg structures 60a
 and 60b are provided on stage surface mem-
 100 ber 11. The following detailed description
 is given with respect to leg 60a, but it will be
 appreciated that the same description applies
 with respect to leg 60b.

In the preferred embodiment, auxiliary
 105 support leg 60a has a generally L-shaped
 tubular section 61. A bracket 62 is welded
 to one end of tubular member 61, and
 bracket 62 is pivotally connected to cross
 brace reinforcement member 35 by means of
 110 a pivot bolt 63. Another tubular section
 64 is provided generally parallel to a portion
 of tubular member 61, and a brace 65 may
 be welded therebetween to hold them in
 position. A tab welded to one end of tubu-
 115 lar member 64 is pivotally connected by
 means of a pivot bolt 66, to an angle bracket
 67 (Figure 3) which is bolted or welded or
 otherwise attached to cross brace angle
 bracket 34.

A U-shaped foot member 68 is made of
 a tubular member having a small enough
 diameter to fit inside the open ends of tubu-
 120 lar members 61 and 64. This foot member
 68 is held in place by pins 69 passing
 125 through holes provided therein. Additional
 holes may be provided in the straight por-
 tions of foot member 68, so that different
 adjustment heights are possible by pulling

member 68 further out and reapplying the pins 69 in the other holes.

A tab 70 is welded to a portion of tubular member 64 in such a position as to fit between mating tabs 71 provided along the bottom of cross brace 43. Tabs 70 and 71 serve to positively locate and laterally stabilize the auxiliary legs when they are in their down position.

- 10 Means are provided for adjusting the length of the outer leg assemblies. As shown in Figure 1, in the preferred embodiment outer leg 13 is tubular in configuration, and has a telescoping inner portion 17a. Similarly, portions 18a fits telescopically inside outer leg 12 of the other portion of the stage. The telescopic inner portions of the legs are held in position by means of pins or bolts 19, and a plurality of holes are provided in the telescopic inner portions so that different adjustment heights are possible. The lowest adjustment height position corresponds to the length of the main support legs 14 and 15, while additional adjustment height positions correspond to different adjustment heights of the foot portions 68 of the auxiliary support legs.

- As shown in Figure 1, stage surface member 10 has a pair of auxiliary support legs designated by reference numeral 80 (only one of which is visible in the side view of Figure 1) and these correspond to auxiliary support legs 60a and 60b, previously described, of stage surface member 11.

- For illustrative purposes, Figure 1 is divided showing the left hand portion of the stage set in an end elevated position, with the right-hand portion set in its lowest position. In its lowest position, the stage rests on main support legs 14 and 15 and the outer leg assemblies when set to their lowest height; and the auxiliary support legs are folded up. In its elevated position or positions, the stage rests upon auxiliary support legs 60a and 80a and corresponding legs 60b (Fig. 2) and one not shown, and the outer leg assemblies in their extended position or positions.

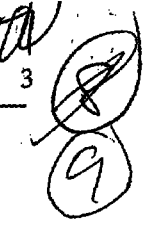
- The operation of the invention in adjusting the stage from a low position to a higher position will now be described with primary reference to Figure 5. In Figure 5, the solid line portion indicates the stage folded up in its storage position, with stage surface members 10 and 11 adjacent each other in a vertical position over the base frame. After wheeling the stage to the desired location in the room, the auxiliary support legs including 60a, 60b and 80a (two per side) are pivoted outward to a position wherein they are perpendicular to their respective stage surfaces. The adjustable U-shaped telescoping foot portion of each of the auxiliary support legs can at this time be adjusted to the desired height and the pins reinserted to

hold them in that position. The two stage surface members 10 and 11 are then manually pivoted outward and downward, one at a time, to the intermediate position indicated by the dotted lines in Figure 5. In this position, the foot portion of the auxiliary support legs just contacts the floor at points 88 and 89, thereby stopping the pivoting of the stage momentarily. In this position, the outer leg assemblies 12 and 13 can be adjusted by removing the pins 19 and pulling the telescoping inner portions out to a position corresponding to the height previously set on the auxiliary support legs. The pins are then reinserted in the outer leg assemblies.

To finish erecting the stage, the person opening the stage selects either side, and simply pushes downward on the end of the stage surface member. Either side can be used, but for purposes of explanation, assume that the operator selects to push downward on the left-hand side, on the end of stage surface member 10, as indicated by arrow 90 in Figure 5. The force thus applied causes stage surface member 10 to pivot about the auxiliary support leg 80, and downward to the operational position indicated by the broken lines in Figure 5. As the left end of stage member 10 is brought down into position, its right end, which is connected to the main support legs and the base frame, is lifted upward, lifting the main support legs off the floor. At the same time, stage surface member 11 is pivoted to its horizontal position and pulled to the left a distance indicated by arrow 91. It should be pointed out that the pivoting motion has the effect of lightening the half of the stage which is being slid into position, thereby minimizing any danger of marring the floor.

It is thus apparent that the auxiliary support legs, in addition to providing the extra height required for elevational adjustment also serve in a unique manner as a rocking point or pivot when erecting the stage to its higher position. For this purpose, in the preferred embodiment the foot portions 68 (Fig. 4) of the auxiliary support legs is configured with a curved portion. This curved portion facilitates the rocking or pivoting movement, making it easier and smoother for the operator to apply the downward force at 90 while at the same time minimizing any marking or scuffing of the floor. By the same token, the curved foot serves as a skid, allowing the auxiliary support leg on the other side to slide laterally across the floor a short distance inot position as indicated by arrow 91, further minimizing any marking of the floor.

It will also be apparent that other shapes and configurations could be used for the auxiliary support legs, while still achieving the primary function of the present inven-



tion. For example, a caster wheel could be used at the foot of the auxiliary support leg to provide the pivoting or rocking motion, as well as a rolling motion when the other side is pulled into place. However, in stages intended for carrying very heavy loads while in use, the structure shown in the drawings would be preferred. Alternatively, a flat platform foot portion pivotally connected to the bottom of the auxiliary support legs could be used.

It should be further appreciated that the rocking or pivoting action described above for final setup of the stage to its elevated position is much more convenient, and requires much less effort than would be the case if workmen were required to lift and hold the stage while another workman was required to telescopically adjust the legs. Further, the relatively great leverage provided from the end of the stage to the pivot point at the foot of the auxiliary support leg further ease the setup operation.

Resetting the stage to a folded or a lower position is accomplished by a reverse operation of the steps set forth above.

Thus it will be seen that the present invention provides an improved elevationally adjustable foldable stage, having a simplified construction and providing simplified and convenient one-man operation in setting up the stage to higher elevations.

WHAT I CLAIM IS:—

1. A folding stage comprising first and second stage surface members; first and second main support leg means interconnected to form a base frame for supporting the stage in its folded position, said first and second stage surface members being hingedly mounted on said base frame for pivotal movement of said members from a storage position in which they are positioned substantially vertically above the base frame, said members being adjacent each other, to an operable position in which said members are horizontally positioned and together provide a stage surface; first and second outer leg means attached respectively to said first and second stage surface members at positions remote from the hinged mounting, and adjustable as to length; and auxiliary support leg means mounted respectively on said first and second stage surface members adjacent the ends thereof that are hingedly mounted on said base frame, said auxiliary leg means each being able to be moved from an inoperable position to an operable position in which it extends from the stage surface member a distance greater than does the respective main support leg means.

2. A folding stage according to Claim 1, wherein each of said auxiliary support leg means comprises a pair of auxiliary legs.

3. A folding stage according to Claim 1 or 2, wherein each of said main support leg means comprises a pair of main support legs.

4. A folding stage according to Claim 2 or 3, wherein said auxiliary support legs each have a curved foot portion for permitting a pivoting or rocking motion thereabout during setup of the stage.

5. A folding stage according to Claim 2, 3 or 4, wherein said auxiliary support leg means are pivotally connected respectively to the underside of said first and second stage surface members and are foldable laterally to said inoperable position in which they are generally parallel to their respective stage surface members.

6. A folding stage according to Claim 5, wherein locating tabs are positioned on said auxiliary support legs and said base frame and aligned for abutment when said auxiliary support legs are in their operable position, so as laterally to locate and stabilize the auxiliary support legs when the stage is in its operable position.

7. A folding stage according to any of Claims 2—6, wherein said auxiliary support leg means are telescopically adjustable in length so as to provide further elevational adjustment for said stage.

8. A folding stage according to any of Claims 2—7, wherein said auxiliary support legs comprise generally U-shaped members whose upper portions are pivotally connected to the underside of the respective stage surface member so that the auxiliary support legs can be folded thereagainst, and said U-shaped members each have a curved foot portion for contacting the floor surface when the stage is in its horizontally extended position, and for facilitating pivoting or rocking movement thereabout during setup of the stage.

9. A folding, height-adjustable stage comprising:

(a) first and second main support leg means interconnected to form a base frame;

(b) first and second stage surface members;

(c) hinge means hingeably connecting said first and second stage surface members to said base frame for movement from a storage position wherein said stage surface members are generally vertically disposed above said base frame, to an operable position in which said stage surface members are generally horizontally disposed to define a continuous stage surface;

(d) first and second outer leg means connected to said first and second stage surface members, respectively, at positions remote from said base frame

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tion. For example, a caster wheel could be used at the foot of the auxiliary support leg to provide the pivoting or rocking motion, as well as a rolling motion when the other side is pulled into place. However, in stages intended for carrying very heavy loads while in use, the structure shown in the drawings would be preferred. Alternatively, a flat platform foot portion pivotally connected to the bottom of the auxiliary support legs could be used.

It should be further appreciated that the rocking or pivoting action described above for final setup of the stage to its elevated position is much more convenient, and requires much less effort than would be the case if workmen were required to lift and hold the stage while another workman was required to telescopically adjust the legs. Further, the relatively great leverage provided from the end of the stage to the pivot point at the foot of the auxiliary support leg further ease the setup operation.

Resetting the stage to a folded or a lower position is accomplished by a reverse operation of the steps set forth above.

Thus it will be seen that the present invention provides an improved elevationally adjustable foldable stage, having a simplified construction and providing simplified and convenient one-man operation in setting up the stage to higher elevations.

WHAT I CLAIM IS:—

1. A folding stage comprising first and second stage surface members; first and second main support leg means interconnected to form a base frame for supporting the stage in its folded position, said first and second stage surface members being hingedly mounted on said base frame for pivotal movement of said members from a storage position in which they are positioned substantially vertically above the base frame, said members being adjacent each other, to an operable position in which said members are horizontally positioned and together provide a stage surface; first and second outer leg means attached respectively to said first and second stage surface members at positions remote from the hinged mounting, and adjustable as to length; and auxiliary support leg means mounted respectively on said first and second stage surface members adjacent the ends thereof that are hingedly mounted on said base frame, said auxiliary leg means each being able to be moved from an inoperable position to an operable position in which it extends from the stage surface member a distance greater than does the respective main support leg means.

2. A folding stage according to Claim 1, wherein each of said auxiliary support leg means comprises a pair of auxiliary legs.

3. A folding stage according to Claim 1 or 2, wherein each of said main support leg means comprises a pair of main support legs.

4. A folding stage according to Claim 2 or 3, wherein said auxiliary support legs each have a curved foot portion for permitting a pivoting or rocking motion thereabout during setup of the stage.

5. A folding stage according to Claim 2, 3 or 4, wherein said auxiliary support leg means are pivotally connected respectively to the underside of said first and second stage surface members and are foldable laterally to said inoperable position in which they are generally parallel to their respective stage surface members.

6. A folding stage according to Claim 5, wherein locating tabs are positioned on said auxiliary support legs and said base frame and aligned for abutment when said auxiliary support legs are in their operable position, so as laterally to locate and stabilize the auxiliary support legs when the stage is in its operable position.

7. A folding stage according to any of Claims 2—6, wherein said auxiliary support leg means are telescopically adjustable in length so as to provide further elevational adjustment for said stage.

8. A folding stage according to any of Claims 2—7, wherein said auxiliary support legs comprise generally U-shaped members whose upper portions are pivotally connected to the underside of the respective stage surface member so that the auxiliary support legs can be folded thereagainst, and said U-shaped members each have a curved foot portion for contacting the floor surface when the stage is in its horizontally extended position, and for facilitating pivoting or rocking movement thereabout during setup of the stage.

9. A folding, height-adjustable stage comprising:

- (a) first and second main support leg means interconnected to form a base frame;
- (b) first and second stage surface members;
- (c) hinge means hingebly connecting said first and second stage surface members to said base frame for movement from a storage position wherein said stage surface members are generally vertically disposed above said base frame, to an operable position in which said stage surface members are generally horizontally disposed to define a continuous stage surface;
- (d) first and second outer leg means connected to said first and second stage surface members, respectively, at positions remote from said base frame



for supporting said stage surface members when in their operable position;

(e) means for adjusting the length of said first and second outer leg means;

(f) first and second auxiliary support leg means mounted respectively on said first and second stage surface members at positions adjacent said hinge means; and

(g) means for adjusting said auxiliary support leg means from a storage position to an operable position in which said support leg means extend outward from said stage surface members farther than do said main support legs, whereby said stage may be elevated by lengthening said outer leg means, adjusting said auxiliary support leg means to their operable position, and pivoting said stage surface members to their operable position thereby lifting the base frame and main support leg means off the floor.

10. A folding stage according to claim 9, wherein said first and second auxiliary support leg means each comprise a pair of legs pivotally connected to the underside of their respective stage surface members for lateral folding to their folded position.

11. A folding stage according to claim 10, including locating tabs positioned on said auxiliary legs and base frame and aligned with one another for abutment when the auxiliary leg means are in their operable position, so as laterally to locate and stabilize the auxiliary support legs.

12. A folding stage according to claim 9, 10 or 11, wherein said auxiliary support leg means have curved foot portions for contact with the floor surface, for facilitating rocking or pivoting motion of the stage thereabout during stage set-up.

13. A folding stage according to claim 9, wherein said first and second auxiliary support legs means comprise a plurality of legs, each leg comprising a U-shaped member having upper parts connected to said stage surface member and having a lower curved portion for contact with the floor surface when it is in its operable position.

14. A folding stage according to claim 13, wherein said lower curved portion is telescopically adjustable with respect to said upper portions of said U-shaped leg member for providing further height adjustment for said stage.

15. A folding stage according to claim 14, wherein said U-shaped auxiliary support leg members are pivotally connected to their respective stage surface members for lateral fold-up to said storage position beneath said stage surface member, and further including locating tabs positioned on said main support legs and said base frame and aligned for abutment laterally to locate said auxiliary support legs when in their operable position.

16. A folding stage according to claim 9, wherein said means for adjusting said auxiliary leg means includes inner and outer tubular members telescopically adjustable for adjusting the length of said auxiliary leg means.

17. A folding stage according to any of the preceding Claims, substantially as described herein and substantially as shown in the accompanying drawings.

18. A folding stage substantially as described herein and substantially as shown in the accompanying drawings.

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