June 21, 1960 C. F. GROVER ET AL 2,941,616

STAIRWAY TYPE SCAFFOLD

Filed Feb. 15, 1957

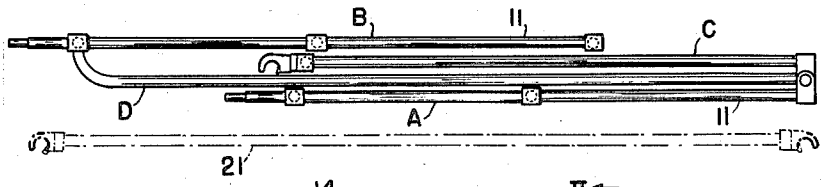

Fig. 4

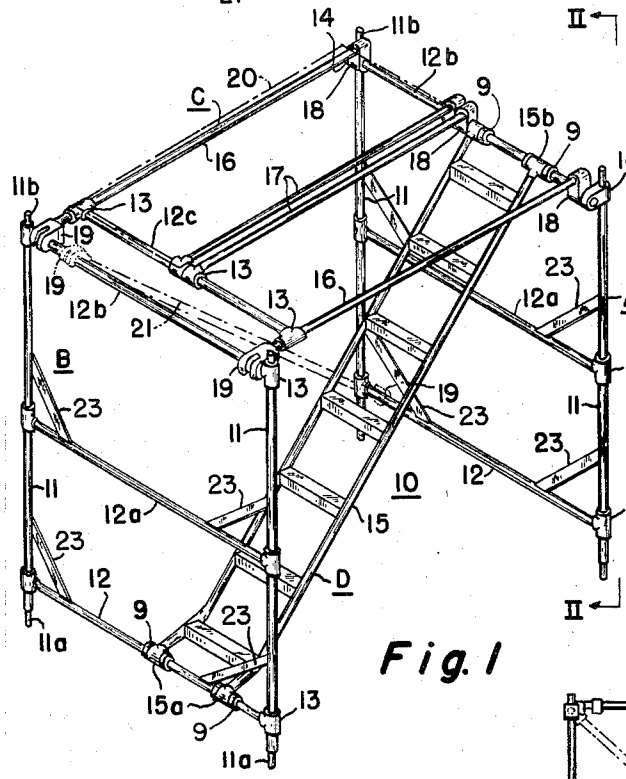

Fig. 1

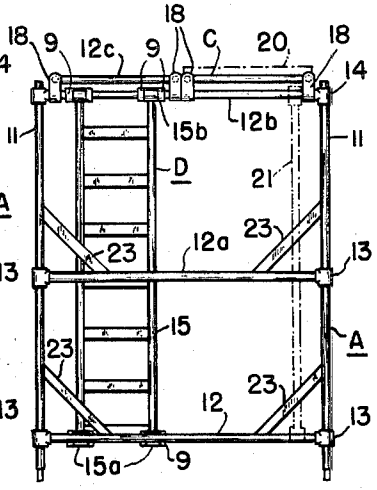

Fig. 2

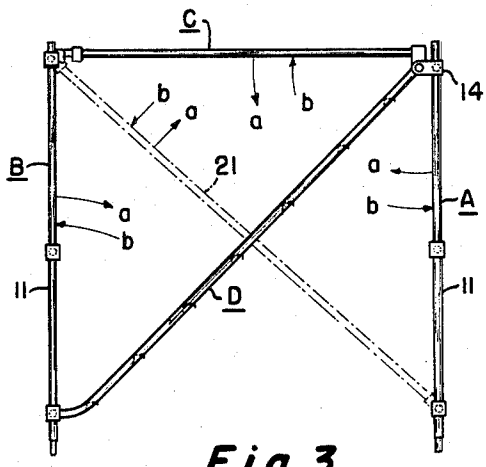

Fig. 3

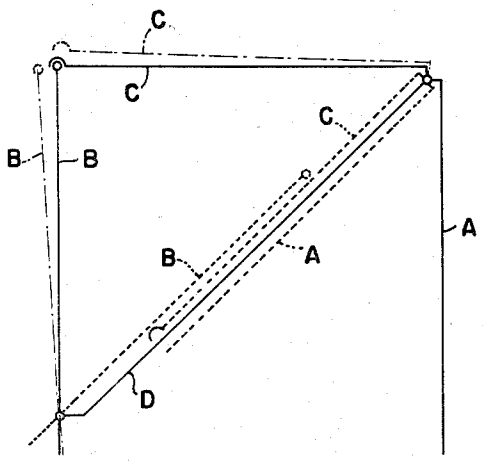

Fig. 5

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STAIRWAY TYPE SCAFFOLD

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17 Claims. (Cl. 182—115)

This invention relates to a collapsible scaffold erection unit and particularly, to a stairway type or one in which the stairway extends somewhat diagonally between end portions.

A phase of our invention pertains to a stairway type of scaffold which may be more easily erected, assembled or expanded and disassembled or collapsed.

Scaffolds employing stairways have before been available. However, they have all been too complicated in their construction, particularly from the standpoint of facilitating their installation or assembly and collapse. We have found that there is a need for an improved type of scaffold of this type.

It has thus been an object of our invention to devise a so-called stairway type of scaffold that will meet safety and strength requirements and, at the same time, provide a better method of erection and collapse;

Another object of our invention has been to devise a stairway type of scaffold unit that has an improved type of swing assembly and that may be built up by tiers into a column of suitable height;

A further object of our invention has been to devise a collapsible scaffold construction whose parts or sections may be swung, pivoted or folded about and upon a stairway part thereof to erect and collapse the parts as a unit;

These and other objects of our invention will appear to those skilled in the art from the disclosure, including the claims.

In the drawings, Figure 1 is a perspective view in elevation illustrating scaffold equipment of our invention in the form of a unit or construction that may be quickly erected and collapsed; in this figure, the construction is in its erected position;

Figure 2 is an end view taken in the direction of the line II—II of Figure 1 and on the same scale as Figure 1;

Figure 3 is a side view in elevation of the structure of Figures 1 and 2, somewhat diagrammatically indicating by direction arrows *a* how it is collapsed and by direction arrows *b* how it is erected, the movement in both cases being on or about a stairway or diagonal section;

Figure 4 is a side view in elevation on the slightly enlarged scale with respect to Figures 1 to 3, showing a device or unit of our construction laid down in its collapsed or folded position ready for storing or carrying;

Figure 5 is a diagrammatic view illustrating steps in the procedure of collapsing or folding the construction of Figure 3.

Referring particularly to Figures 1 and 2 of the drawings, we have shown a scaffold unit, device or construction **10** of our invention in an erected position. This unit **10** is made up of what may be termed three movable or swing sections A, B and C and a diagonal or oblique-positioned stairway or swing-axis section D. End support frames or sections A and B are in a horizontally-longitudinally opposed and spaced-apart relationship with each other. Top platform or floor section C is at substantially right angles to and extends across between the sections A and B when the unit or construction is in its erected position. Ladder or stairway frame or section D serves to not only provide steps, a cross-tie and a support for the construction, but to also provide a diagonal or vertically-sloped pivot or swing plane about which the construction is swung, pivoted or folded in erecting and collapsing it.

The end wall sections A and B are of similar construction; thus their portions or elements have been given like reference numerals. In this connection, a pair of upright end posts, column or corner members **11** is provided for each section A and B. Transverse, vertically spaced-apart, and horizontally-extending rails, transverse or cross-connecting members **12** and **12***b* define a rectangular and substantially closed frame area with the pair of posts **11**. An additional intermediate rail, transverse or cross member **12***a* is provided to reinforce and strengthen the structure. If desired (as shown in Figure 2), corner brace pieces or members **23** of strap-like construction may be brazed or welded between post members **11** and cross members **12**, **12***a* and **12***b*.

It will be noted that the members **11**, **12**, **12***a* and **12***b* of the end support sections A and B, as well as the members **12***c*, **16** and **17** of the platform or roof section C, are secured in position into rigid constructions by means of T's **13**. In this connection, the top or floor section C has a pair of adjacent, centrally-extending, longitudinal members **17** that are secured at their ends to the upper transverse member **12***b* of end section A and to opposed transverse member **12***c* of the roof or platform section C. The member **12***c* is secured at its opposite ends by T's **13** to a pair of longitudinally-extending outer side members **16**. Thus, the floor section or frame C is defined by end or transverse members **12***b* and **12***c* and by side or longitudinal members **16**, and is reinforced by intermediate or central member pair **17**.

The upper transverse member **12***b* of end section A is a swing support member or arm, in that it is mounted in an inwardly-offset relationship with the post members **11** of the end section A, in a secure relationship with respect thereto, to swingably support the upper end portion of stairway section D and the back end portion of platform section C. End mounting assemblies **14** have collar portions that extend at right angles with respect to each other to rigidly secure the member **12***b* on the section A. Welding or brazing is used throughout the construction. The swing support member **12***b* of section A acts as a shaft or support for movement of the floor section C, since the ends of section C are secured to upwardly-offset, journal collars or sleeve trunnions **18** that are rotatably-pivotally mounted on the member **12***b*.

Forward end portions (left of Figure 1) of the floor frame or section C are provided with a pair of releasable clamping ends or detachable connecting means **19** that are adapted to yieldably or resiliently snap over the forward cross member **12***b* and be releasably retained in such a position during the use of the section C as a floor. However, the construction is such that when the unit is to be collapsed, the clamps **19** may be easily unlocked or unlatched by moving them upwardly to release the floor frame C (see arrow *b* of Figure 3) and permit it to be swung downwardly upon the stairway section D (see arrow *a* of Figure 3).

Side rails **15** of the ladder section or frame D are, at their lower end portions, provided with collars, sleeves or trunnions **15***a* that are rotatably or swingably mounted on the lower front transverse member **12**. In a like manner, upper end portions of the side rails **15** of the stairway or ladder section have swing pivot collars, sleeves or trunnions **15***b* that pivotally mount the section D on

the transverse member 12*b*. Thus, the section or frame D is pivotally positioned between an upper end portion of one end section A and a lower end portion of the other end section B. Removable cross brace members **21** of needed quantity, usually not more than one or two, may be employed (as shown in Figure 1) to project diagonally between a bottom rail or transverse member **12** of one end section A to a top rail or cross member **12***b* of the other end section B. The brace members **21** will usually (as shown in Figure 1) be positioned to extend oppositely or at substantially right angles to the stairway section D. Each tie or brace member **21** may, as shown, have end clamps or detachable connectors **19** of the same type or construction and operation as those of the floor section C. Copending Grover and Stoyer application No. 632,916, filed January 7, 1957, and entitled "High Clearance Scaffold," now Patent No. 2,917,129 shows details of a suitable clamp of this type.

Our construction is collapsed (see arrows *a* of Figure 3 and the positions of Figure 5) by first raising or lifting the front clamp ends **19** of the floor section C off the front cross member **12***b* (of section B) and lifting off the clamp ends **19** of diagonal brace members **21**. As shown in Figure 5, the end section B is swung outwardly to clear the floor C, in order that the floor section C may be swung downwardly on swing member **12***b* (of section A) upon the stairway section D. The end section B may then be swung downwardly upon section D and the end section A may be swung upwardly upon the same stairway section D. The result is shown in Figure 4, wherein the sections lie in a substantially parallel, collapsed relationship with each other. It will be noted that if brace members **21** are used, these are preliminarily lifted off before attempting to collapse the end sections A and B. In Figure 3, the erecting procedure is the reverse of the collapsing procedure and is illustrated by arrows *b*.

It is important in providing the above type of swing action, to offset the lower end of the stairway section D inwardly of front end section B, to mount the swing support member **12***b* (at the back end of Figure 1) inwardly of back end section A, and to position the swing mounting of the floor section C in an upwardly-offset or above swing mounting on the rear member **12***b*.

In Figures 1 and 2, we have illustrated a plywood platform **20** (see the dot and dash lines) secured by suitable means, such as J-bolts (not shown), to the left half of the floor section C (which is defined by members **16**, **17**, **12***b* and **12***c*) beyond or to one side of the overhead clearance area needed for the stairway or ladder section D.

In employing our invention, we preferably utilize hollow members for the side rails **15** of the stairway section D and for the frame members of the end and floor sections A, B and C, to provide lightness as well as strength, and to further provide for ease of handling, as well as pivoting of the parts in the desired manner. In this connection, any suitable material or metal may be employed, such as non-conductors, reinforced plastics, magnesium, steel, aluminum, and its alloys, although the latter is now preferred. The trunnion or swivel means **15***a*, **15***b* and **18** of the various members may, as shown, be retained in a suitable lateral or transverse positioning on their respective transverse swing support members **12** and **12***b*, by fixed rings or sleeves **9**, or if desired, by cross pins (not shown).

In Figure 1, we have shown bottom end portions of the post members **11** as having pintles or pins **11***a*, so that the bottom portion of an upper unit may be mounted in a sliding or telescopic engagement within upper collar or open tubular end portions **11***b* of a lower unit. In this manner, vertical tiers may be used to build up a suitable height of column. The bottom section will customarily have its pintles mounted within caster or floor stand assemblies that are adjustable as to their respective vertical heights.

As shown in Figure 1, the stairway section D extends

diagonally from the lower transverse member **12** of front end section (or relatively rigid rectangular upright support) B in an inwardly offset relation therewith and upwardly to the inwardly-offset upper transverse member **12***b* of the back end section (or relatively rigid rectangular upright support) A.

It will be noted, as before mentioned, that the floor section C has floor covering means **20**, such as plywood, mounted to cover a side half or area that lies adjacent the longitudinal opening for the stairway section D. We prefer to leave the area immediately above the stairway section open, but a floor and trap door arrangement may be used, if desired.

The floor section C is swingably mounted at one end portion on the swing support member **12***b* of end section A that lies immediately adjacent the upper ends of the end section A and the stairway section D. The other end portion of the floor section C detachably engages the swing support member **12***b* (of end section B) that is remote to the lower end of the stairway section D.

What we claim is:

1. In a scaffold assembly wherein a pair of end support sections are connected at their tops by a top section, the top of one end section and the bottom of the other end section are connected by a diagonal support section having a pair of transversely spaced-apart diagonally-extending support members, and the end and the top and the support sections constitute a unit that may be collapsed and erected, an improved collapsible construction comprising, a pair of upper cross-members each forming an upper portion of one of the pair of end sections and defining a pair of upper positioning axes, members of the top section pivotally mounted at one end about one axis of said upper positioning axes whereby the top section may be folded downwardly to lie along the diagonal support section, upwardly-extending members of one end section being pivotally mounted at their upper ends about said one axis of said pair of positioning axes whereby said end section may be folded about said axis to lie along the diagonal support section, a third cross-member forming a lower portion of the other end section and defining a lower positioning axis, means pivotally mounting the support members of the diagonal support section at their lower ends on said lower positioning axis whereby said other end section having the third cross-member may be folded downwardly to lie along the diagonal support section, means connecting the support members of the diagonal support section at their upper ends to the cross-member of said pair that defines the one axis of said pair of upper positioning axes to which said members of the one end section are pivotally mounted; one cross member of said upper pair forming a support for the other end of said members of the top section, and means detachably connecting said other end of the top section to said one cross-member so that the scaffold may be erected and collapsed.

2. In a scaffold assembly as defined in claim 1, said means connecting the support members of the diagonal support section at their upper ends comprises pivot means whereby the one end section may be folded upwardly to lie along the diagonal support section.

3. In a scaffold assembly as defined in claim 1, means associated with said means pivotally mounting the support members of the diagonal support section at their lower ends on said lower positioning axis to position a lower portion of said diagonal support section in an inwardly-offset relation with the other end section having the third cross member whereby the other end section may be folded downwardly to lie substantially parallel to the diagonal support section.

4. In a scaffold assembly as defined in claim 1, said means pivotally mounting the support members of the diagonal support section at their lower ends cooperating with lower end portions of said support members and with the third cross-member to position said lower end

portions in an inwardly-offset relation with the other end section having the third cross member whereby the other end section may be folded downwardly to lie substantially parallel along the diagonal support section, and means positioning the one end of the floor section and the upper ends of the one end section in an offset relation with the one axis of said upper positioning axes about which they are pivotally mounted, whereby the floor section may be folded downwardly and said one end section may be folded upwardly to lie substantially parallel along the diagonal support section.

5. In a scaffold assembly wherein a pair of end support sections are connected at their tops by a floor section, the top of one end section and the bottom of the other end section are connected by a diagonally-extending ladder and the end and floor sections and the ladder constitute a unit that may be collapsed and erected, and improved collapsible construction comprising, a pair of upper cross-members each forming an upper portion of one of the pair of end sections defining a pair of upper positioning axes, members of the floor section pivotally mounted at one end about one axis of said pair of upper positioning axes whereby the floor section may be folded downwardly to lie along the ladder, upwardly-extending members of one end section of the pair of end sections being pivotally mounted at their upper ends about one axis of said pair of upper positioning axes whereby said end section may be folded about said axis to lie along the ladder, a third cross-member forming a lower portion of one end section of the pair of end sections and defining a lower positioning axis, said ladder being pivotally mounted on said lower positioning axis whereby the end section having the third cross-member may be folded downwardly to lie along the ladder, said ladder being connected at its upper end to the one cross-member of said pair that defines the one axis of said pair of upper positioning axes to which said members of one end section are pivotally mounted; one cross-member of said upper pair forming a support for the other end of said members of the floor section, and means for detachably connecting the other end of the floor section to said one cross-member so that the scaffold may be erected and collapsed.

6. In a scaffold assembly as defined in claim 5, means connecting the upper ends of the upwardly-extending members of the one end section in an outwardly-offset relation with respect to the one axis of said pair of upper positioning axes about which they are pivotally mounted, whereby said end section may be folded to lie substantially parallel along the ladder.

7. In a scaffold assembly as defined in claim 5, means associated with the lower end portion of the ladder section and with the third cross-member pivotally connecting said lower end portion in an inwardly-offset relation with vertical members of the one end section having the third cross member.

8. In a scaffold assembly as defined in claim 5, means positioning said upper pair of cross-members above and below a common horizontal plane, and means for positioning the floor section on a substantially parallel horizontal and vertically-spaced plane with respect to said common horizontal plane.

9. In a scaffold assembly as defined in claim 5, means connecting the members of the floor section in an upwardly-offset relation with respect to the one axis of said pair of upper positioning axes about which they are mounted, whereby said floor section may be folded to lie substantially parallel along the ladder.

10. In a scaffold assembly as defined in claim 9, means mounting the one cross-member of said upper pair to which the other end of the floor section is detachably connected, in an upwardly-offset relation with respect to the one axis of said pair of upper positioning axes with respect to which the members of the floor section are connected in an upwardly-offset relation, whereby the floor section may lie on a substantially level horizontal plane when its other end is detachably connected by said detachable connecting means to said one cross member.

11. In a scaffold assembly wherein a pair of end support sections are connected at their tops by a floor section, the top of one end section and the bottom of the other end section are connected by a diagonally-extending ladder, and the end and floor sections and the ladder constitute a unit that may be so collapsed and erected, an improved collapsible construction comprising, a first cross-bar forming an upper portion of one end section and defining a pivotal axis, members of the floor section pivotally mounted at one end in an upwardly-offset relation about said axis whereby they may be folded downwardly to lie parallel to the ladder, upwardly-extending members of a first of the end sections pivotally mounted at their upper ends in an outwardly-offset relation about said axis whereby they may be folded upwardly to lie parallel to the ladder, a second cross-bar forming a lower portion of the other of the end sections and defining a second pivotal axis, said ladder being connected at one end to said first cross-bar and being pivotally mounted on said second axis in such a manner that said other end section may be folded downwardly to lie parallel to the ladder, a third cross-bar forming an upper portion of said other end section and defining a support for the other end of the floor section, and means for detachably securing said other end of the floor section to said third cross-bar so that the scaffold may be erected and collapsed.

12. In the scaffold assembly defined in claim 11, an inwardly-offset portion adjacent the end of the ladder which is pivotally mounted on said second pivotal axis and which enables said other end section to be folded downwardly to lie parallel to the ladder.

13. In the scaffold assembly defined in claim 11, said first and third cross-bars being positioned on horizontal planes that lie below the floor section, and open-bottom grip portions on said detachably securing means projecting downwardly from said other end of the floor section to detachably engage downwardly on said third cross-bar whereby said other end of the floor section is moved upwardly to detach it from said third cross-bar.

14. In the scaffold assembly defined in claim 13, trunnion means secured to the members of the floor section at the one end thereof to position them in an upwardly-offset relationship about the pivotal axis defined by said first cross-bar, said pivotal axis being positioned on a horizontal plane that lies below the horizontal plane of said third cross-bar, and said members of the floor section being supported by said grip portions and said trunnion means on a horizontal plane when the assembly is erected.

15. In a scaffold assembly wherein a pair of substantially rectangular end support sections are connected at their tops by a floor section, the top of one end section and the bottom of the other end section are connected by a diagonally-extending ladder, and the end and floor sections and the ladder are connected as a unit to swing the end and floor sections from an erected position to a collapsed position along the ladder, an improved collapsible construction comprising, a pair of upper cross-bars each forming an upper portion of one of the pair of end sections and defining a pair of upper positioning axes, longitudinal members of the floor section pivotally mounted at one end in an upwardly-offset relation on one axis of said pair of upper positioning axes whereby they may be folded downwardly to lie substantially parallel to the ladder, upwardly-extending members of one end section of the pair of end sections being pivotally mounted at their upper ends in an outwardly-offset relation about one axis of said pair of upper positioning axes whereby they may be folded about said axis to lie substantially parallel to the ladder, a third cross-bar forming a lower portion of one end section of the pair of end sections and defining a lower positioning axis, the ladder being

pivotally connected at its upper end with respect to the pivotally mounted end of the floor section at the upper positioning axis to which said longitudinal members of the floor section are pivotally mounted and being pivotally mounted at its lower end and in an inwardly-offset relation with respect to said lower positioning axis whereby the end section whose upper cross-bar defines the upper positioning axis with respect to which the ladder is pivotally connected may be folded to lie substantially parallel to the ladder, one cross-bar of said upper pair forming a support for the other end of the floor section, and down-clamping means for detachably securing the other end of the floor section to said one cross-bar so that the scaffold may be erected and collapsed.

16. In the scaffold assembly defined in claim 15, trunnions carried by said longitudinal members at said one end of the floor section, and said trunnions and said down-

clamping means positioning the floor section on a horizontal plane above said pair of upper positioning axes when the assembly is erected.

17. In the scaffold assembly defined in claim 15, open-bottom latch portions on said down-clamping means projecting downwardly from the floor section to detachably engage over the associated upper positioning axis.

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CERTIFICATE OF CORRECTION

Patent No. 2,941,616 June 21, 1960

Charles F. Grover et al.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, line 17, before "end" insert -- opposite --; column 5, line 17, for "and", second occurrence, read -- an --; line 20, before "defining" insert -- and --.

Signed and sealed this 26th day of July 1960.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents