Aug. 1, 1961 K. E. TYLER 2,994,402

SCAFFOLD UNIT CONSTRUCTION

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Fig. 1

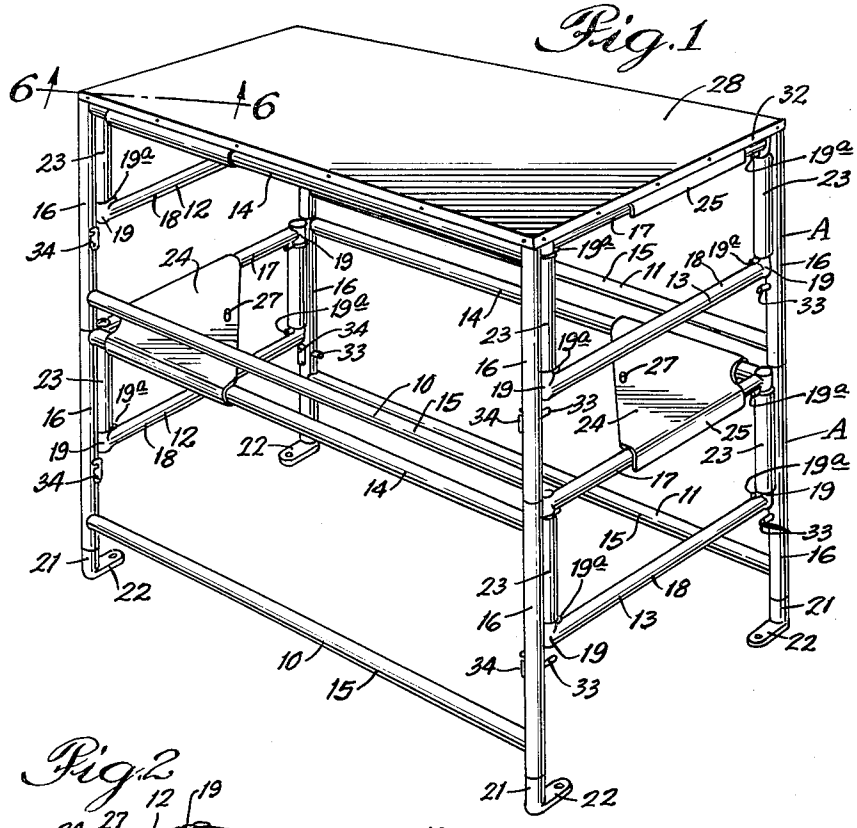
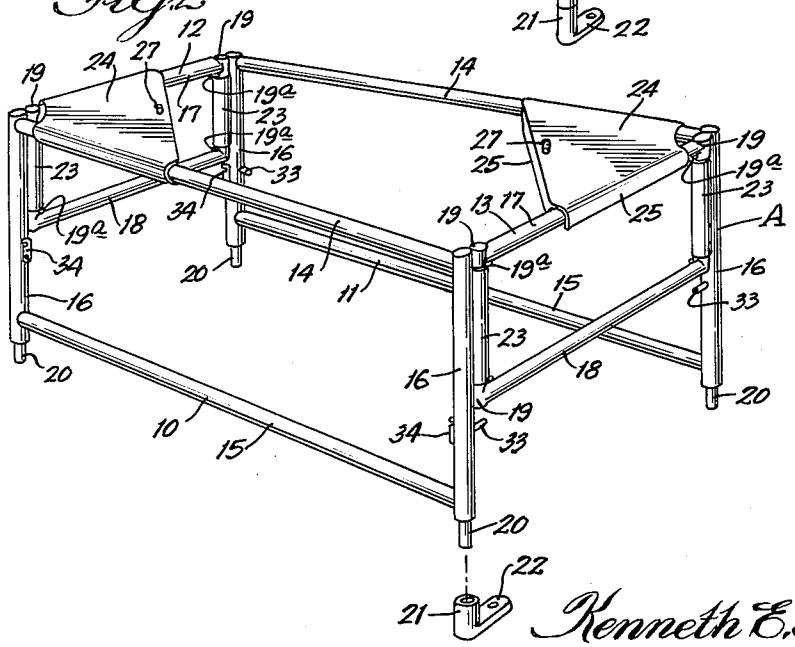


Fig. 2



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Fig. 3

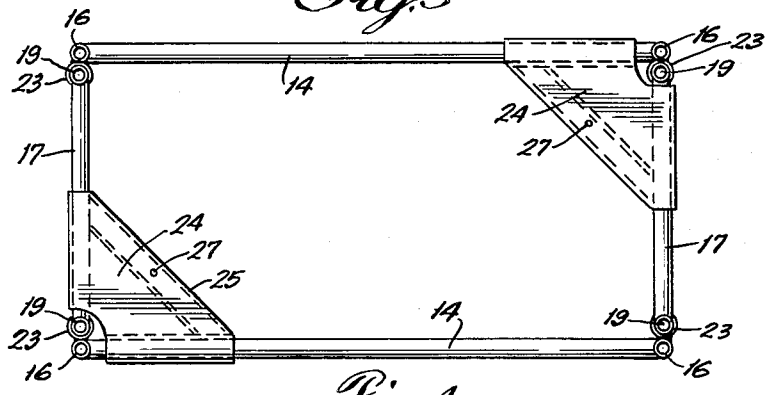


Fig. 4

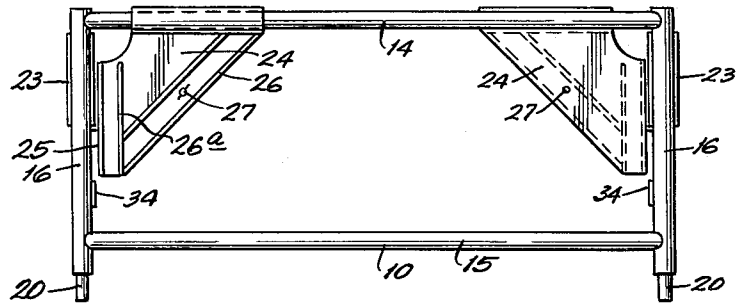


Fig. 5

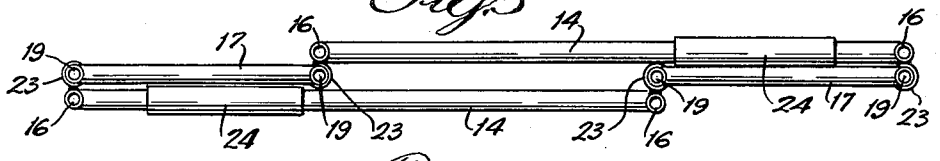
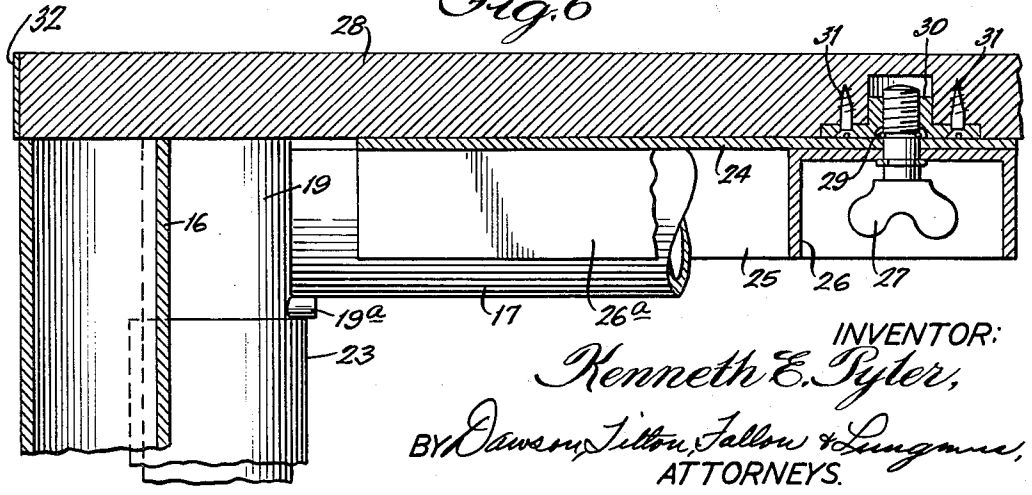


Fig. 6



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SCAFFOLD UNIT CONSTRUCTION

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5 Claims. (Cl. 182—152)

This invention relates to scaffolding, and more specifically, to the construction of scaffold units which are collapsible and stackable.

Conventional scaffolds are usually heavy and cumbersome structures and are therefore generally unsuitable for use in circumstances requiring scaffolding which is capable of being quickly erected, moved and collapsed or disassembled as, for example, in the staging of theatrical productions. Commercially available structures which approximate the weight and mobility requirements are not satisfactory for such purposes because they fall considerably short of meeting other essential requirements. They either lack the necessary strength and rigidity or they are incapable of being readily collapsed into compact units for storage and handling.

Accordingly, one of the main objects of the present invention is to provide a scaffold unit structure which overcomes the aforementioned defects and disadvantages of present structures. Another object is to provide a collapsible scaffold unit of relatively light weight which is extremely sturdy when unfolded and which may be readily collapsed into a flat compact unit for carrying and storage. An additional object is to provide a collapsible scaffold unit which may be arranged with other similar units to form a vertical series or stack, the entire series being collapsible into flat condition without first separating the connected units. A further object is to provide a unit which is extremely stable in both vertical and horizontal directions without the need for cross bracing between the spaced opposing vertical frames thereof. A still further object is to provide improved locking means in the form of locking corner gussets for rigidly holding the scaffold in expanded condition, the locking gussets being readily movable into releasing positions when collapsing of the scaffold is desired. In this connection, it is a specific object of the present invention to provide a removable top or platform which cooperates with the locking gussets to prevent their release when the parts are assembled.

Other objects will appear from the specification and drawings in which:

FIGURE 1 is a perspective view showing a pair of scaffold units of the present invention in nested and expanded condition, the top unit of the combination being equipped with an attached platform.

FIGURE 2 is a perspective view showing a single expanded unit with the platform top removed thereform.

FIGURE 3 is a top plan view of a scaffold unit as illustrated in FIGURE 2.

FIGURE 4 is a side elevation of an expanded scaffold unit with the gussets thereof in released positions.

FIGURE 5 is a top plan view of the scaffold structure in completely collapsed condition.

FIGURE 6 is an enlarged sectional view taken along line 6—6 of FIGURE 1 and showing details of the platform attaching means.

Referring to the drawings, FIGURE 2 shows a scaffold unit generally designated by the letter A and provided with a pair of side frames 10 and 11, and a pair of end frames 12 and 13. The two side frames are of the same size and shape, as are the corresponding end frames, and extend along parallel vertical planes. Similarly, the end frames 12 and 13 extend along spaced vertical and parallel planes.

As shown in the drawings, each of the frames is composed of interconnected vertical and horizontal tubular members. Side frames 10 and 11 are generally rectangular in shape, each having an upper horizontal tube 14, a lower horizontal tube 15, and a pair of vertical end tubes or legs 16. These tubular elements are welded or otherwise secured together to form the respective frames and may be fashioned from steel, aluminum, or any other suitable material.

The end frames 12 and 13 are similarly formed from vertical and horizontal tubular frame members. Upper frame members 17 and lower frame members 18 extend horizontally between corresponding pairs of vertical members 19 to define end frames of generally rectangular shape. While the end frames as shown consist of several straight pieces of tubing welded or otherwise secured together at their ends, it will be understood that these end frames or selected vertical and horizontal portions thereof may be formed integrally from single sections of tubing bent into the closed rectangular shapes illustrated in the drawings.

In FIGURE 2 it will be noted that the upper members 14 and 17 of the side and end frames all lie along substantially the same horizontal plane adjacent the upper ends of vertical tubes 16 and that the lower members 18 of the end frames are disposed intermediate the upper and lower ends of the side frames' vertical members. The lower end portions of the vertical members 16 are reduced in diameter to provide connecting portions 20 which may be received within the sockets of shoes 21 or within the sockets provided by the exposed upper ends of the legs or vertical members 16 of another scaffold unit disposed directly therebelow. Thus, the reduced leg portions 20 and the sockets defined by the upper ends of vertical legs 16 provide means for securely interconnecting successive units of a vertical series when such units are stacked. Preferably, shoes 21 are provided with horizontal flanges or bases 22 which are apertured for securing a scaffold unit, or the lowermost unit of a vertical series to a floor surface.

The vertical members 19 of the end frames are rotatably carried along the inner opposing surfaces of legs 16 by hinge tubes 23. The hinge tubes are welded or otherwise secured to legs 16 and are disposed in parallel relation to those legs. As shown in the drawings, the hinge tubes 23 are somewhat shorter than the vertical distance between the upper and lower horizontal end frame members 17 and 18 so that the ends of the tubes are spaced vertically from those members. Lugs or shoulders 19a are welded or otherwise secured to the exposed portions of the vertical members 19 adjacent the ends of the hinge tubes and frictionally engage those tubes to prevent independent vertical movement of the end frames without, of course, interfering with pivotal movement of such frames.

The scaffold unit of the present invention is rigidly locked in open or expanded condition by a pair of diagonally disposed gussets 24, each of the gussets serving to maintain a right angle relation between the upper horizontal members of an end and side frame. As shown in the drawings, each gusset has the general shape of a right triangle and, when in locked or latched position, has its flat upper surface extending along the horizontal plane defined by the upper ends of the tubular vertical members 16 and 19. A first side portion of each gusset is pivotally and slidably connected to one side of a side frame to provide a permanent but rotatable and slidable connection between the parts. A second side portion (at right angles to the first) extends over the upper horizontal member of an end frame and is provided with a downwardly turned flange 25 which engages the outer surface of members 17 and thereby effectively resists forces tending to increase the angle formed by the horizontal frame members connected by the gusset.

As shown in FIGURES 2, 4 and 6, an inverted U-shaped channel member **26** is welded or otherwise secured to the underside of each gusset along the hypotenuse thereof. Another reinforcing member **26***a* (FIGURES 4 and 6) extends along the underside of each gusset in spaced parallel relation with depending flange **25**. When the gussets are in their horizontal locking positions, the upper horizontal frame members **17** are snugly received between the parallel flanges **25** and members **26***a*, thereby locking the side and end frames of the scaffold against relative pivotal movement.

Each of the gussets **24** is provided with a captive screw **27** for securing a top platform **28** in place. Preferably, as illustrated in FIGURE 6, both the reinforcing channel **26** and the gusset plate are provided with aligned apertures through which the captive wing screw or bolt projects. It will be seen that the shank of the screw is reduced in diameter and that a C-shaped spring **29** extends about the screw's reduced portion to hold it in place even when it is not threaded into the recess of a platform fitting.

The top **28** may be formed from plywood or any other suitable material and is recessed along its under-surface to receive threaded fittings **30**. These connecting fittings are secured to the under surface of the platform by screws **31** or by any other suitable means, and, as shown in FIGURE 6, are flush with the lower surface of that platform.

It is believed apparent that when the captive screws of the gussets are tightened within the threaded fittings of the platform, the platform's under surface is drawn into tight contact with the flat upper surfaces of the gussets. Since the depending flanges **25** of the gussets will release the transverse frame members **17**, only when the gussets are pivoted upwardly about their rotatable connections to longitudinal frame members **14**, and since the two captive screws hold the diagonally-disposed gussets in tight surface contact with the platform, the platform effectively cooperates with the gussets to hold these gussets in locking positions.

Preferably, the platform **28** is provided with a metal edging **32** to reinforce and protect the edges of the plywood panel. In FIGURES 1 and 6 it will be noted that the edges of the platform are substantially flush with the sides and ends of the scaffold and that there are no tubular frame members which project outwardly beyond those edges. Hence, a plurality of scaffold units may be placed side-by-side with the platform tops of the respective units providing a substantially continuous support surface.

In the structure illustrated in the drawings, I have provided certain of the legs **16** with horizontally and inwardly projecting pins **33** adapted to be engaged by hooks **34** of another scaffold unit for connecting units in side-by-side or end-to-end relation. Such connecting means will not interfere with the folding action of the scaffold units so that therefore an entire formation of connected units might be fully or partially collapsed and thereafter moved or even stored without detaching and separating those units. However, it is to be understood that other connecting devices such as bolts or straps might also be used for holding the legs of adjacent units together.

The rigidity of the scaffold unit of the present invention results largely from the substantial vertical length of the hinge tubes **23** and their relation to members **19**, and the substantial surface contact between the corner gussets and the horizontal frame members **14** and **17**. Thus, longitudinal distorting forces applied to the upper part of the unit will be effectively resisted by the gussets **24** and by the elongated hinge connection of those gussets to the longitudinal frame members **14**. Similarly, should lateral forces be directed against the upper part of the unit, the tubes which hold the vertical members **19** of the end frames along the legs **16** of the side frames will prevent such forces from laterally distorting the structure. In this connection, lugs **19***a* play an important part in preventing vertical displacement of the end frames with reference to the side frames, thereby insuring structural rigidity. As a result, even where a number of such units are stacked one upon the other, the vertical series provides extremely firm and unyielding support and will not sway in either longitudinal or lateral directions.

To collapse or fold the scaffold unit, the platform top **28** is first removed and the corner gussets are then pivoted about longitudinal frame members **14** into the vertical released position illustrated in FIGURE 4. A worker standing at one corner of the scaffold may then urge an end frame into parallel relation with the adjacent side frame to which it is hingedly connected, thereby folding the scaffold into the collapsed condition shown in FIGURE 5. In its flat collapsed state the compact scaffold may be easily moved from place to place or may be stored in a relatively small amount of space. It will be noted that even when the scaffold unit is collapsed there are no members which project laterally beyond the outermost vertical planes of the side frames.

Where several scaffold units are arranged in a vertical stack it is not necessary to separate the units before fully collapsing them. For example, the two unit arrangement shown in FIGURE 1 may be collapsed by first removing the platform top **28**, then lifting and releasing the corner gussets of both units, and finally folding both units simultaneously while they are still in stacked relation. Such simultaneous folding (or unfolding) of two or more nested units is particularly important in theatrical presentations where the time alloted for the changing of scenery and sets may be extremely limited.

Since the lower members **18** of the end frames are disposed substantially intermediate the upper and lower ends of legs **16**, it is apparent that when several units are stacked the members **18** will be spaced substantially equidistant from the end frame members **17**, disposed directly therebelow and thereabove, (FIGURE 1). As a result, the parallel and substantially uniformly spaced frame members **17** and **18** provide an effective ladder for climbing upwardly and downwardly along the stacked units.

Normally, the gussets **24** are released by simply pivoting them upwardly and laterally about horizontal tubular frame members **14**. However, when such units are arranged in a vertical series, it will be noted (FIGURE 1) that the lower horizontal member **15** of the scaffold unit disposed directly thereabove will prevent the gussets from being swung about 270° arcs into their depending released positions. Despite this restriction imposed by the lower horizontal members, the gussets may still be quickly and easily released by simply lifting them until flanges **25** are disposed above the upper members **17** of the end frames and then sliding the gussets longitudinally along upper side members **14** until the gussets can be dropped downwardly into their vertical positions without interference from members **17**.

While I have disclosed an embodiment of the present invention in considerable detail for purposes of illustration, it will be understood by those skilled in the art that many of these details may be varied considerably without departing from the spirit and scope of the invention.

I claim:

1. A collapsible scaffold having parallel side and end frames hingedly connected at the corners thereof, said side and end frames having horizontal upper frame members all lying along substantially the same horizontal plane, a pair of diagonally disposed gussets each being hingedly connected along one edge portion thereof to a horizontal member of one of said frames for pivotal movement about its respective pivot axis between a substantially horizontal raised position and a substantially vertical lowered position and having a second edge portion adapted to rest upon and to interlock with a horizontal member of an adjacent frame when said gusset is in raised position, and a removable platform top resting upon and detachably secured to said gussets when the

same are in raised positions, said top and gussets cooperating to prevent pivotal movement of the gussets and to prevent collapsing of said scaffold when said top is in place and secured to said gussets.

2. A collapsible scaffold unit comprising a pair of vertical and parallel side frames, a pair of vertical and parallel end frames extending between said side frames at the ends thereof and being hingedly connected to said side frames for movement into positions parallel with the side frames when the scaffold is collapsed and into positions disposed at right angles to the side frames when said scaffold is fully expanded, said side and end frames being provided with horizontal tubular members disposed at substantially the same elevation, and a pair of diagonally disposed locking gussets each extending between horizontal tubular members of a side and end frame adjacent the hinged connection thereof, each gusset being rotatably mounted upon one of the horizontal tubular members of said respective side and end frames for movement between a lowered vertical position beneath the horizontal member upon which the same is mounted to permit movement of the side and end frames into substantially parallel relation as the scaffold unit is collapsed and a raised horizontal position interlocking with the horizontal tubular member of the other of said frames for locking said scaffold in expanded condition, each of said gussets being provided with connecting means adapted for securing a platform upon the top of said scaffold unit.

3. In a collapsible scaffold structure having hingedly connected side and end frames each formed from horizontal and vertical tubular members, a corner gusset for releasably locking a side and end frame against relative movement, said gusset having one side portion pivotally secured to a horizontal member of one of said frames for pivotal movement of said gusset between a substantially horizontal raised position and a substantially vertical lowered position, said gusset having a second side portion adapted to rest upon and to lock with the horizontal member of an adjacent frame when said gusset is raised, whereby, said frames of said scaffold are locked together by said gusset when the same is raised and are released for relative pivotal movement when said gusset is lowered, said gusset when lowered being suspended beneath the horizontal member to which the same is pivotally secured to permit movement of said side and end frames into substantially parallel relation when said scaffold structure is collapsed, said scaffold also being provided with a removable platform top, and means for connecting said gusset to said top in surface engagement therewith when said gusset is raised to prevent movement of said top and to prevent pivotal movement of said gusset.

4. A collapsible scaffold unit comprising a pair of vertical and parallel side frames, a pair of vertical and parallel end frames extending between said side frames at the ends thereof and being hingedly connected to said side frames for movement into positions substantially parallel with the side frames when said scaffold is collapsed and into positions disposed substantially at right angles to said side frames when the scaffold is fully expanded, said side and end frames being provided with horizontal members disposed at substantially the same elevation, a pair of locking gussets each extending between horizontal members of a side and end frame adjacent the hinged connection thereof, each gusset being rotatably mounted upon one of the horizontal members of said respective side and end frames for movement between a lowered depending position to permit movement of the side and end frames into substantially parallel relation as the scaffold unit is collapsed and a raised substantially horizontal position interlocking with the horizontal member of the other of said frames for locking said scaffold in expanded condition, the respective gussets being swingable about respectively different pivot axes, each of said gussets being provided with connecting means for securing a platform upon the top of said scaffold unit.

5. The structure of claim 4 in which said locking gussets are diagonally disposed with reference to said scaffold unit.

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