United States Patent

[11] 3,610,367

[72] Inventor George L. Atchey
3715 Bella Vista, Midwest City, Okla.
73110

[21] Appl. No. 49,074
[22] Filed June 23, 1970
[45] Patented Oct. 5, 1971

[54] **COLLAPSIBLE SCAFFOLD**
15 Claims, 9 Drawing Figs.

[52] U.S. Cl. 182/2
[51] Int. Cl. B66f 11/04
[50] Field of Search 182/2, 141

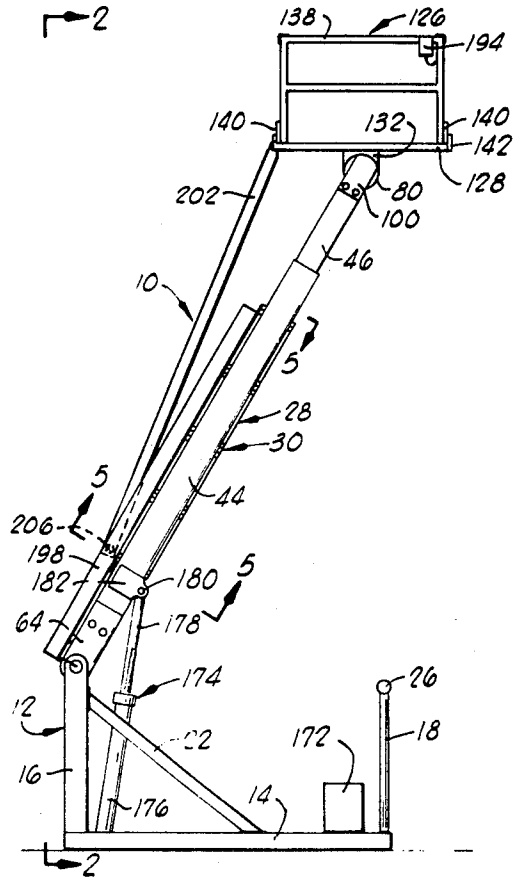
[56] References Cited

UNITED STATES PATENTS

2,196,511	4/1940	Wagner	182/113
2,778,694	1/1957	Mitchell	182/113
3,253,677	5/1966	Krynytzky	182/2
3,396,814	8/1968	Garnett	182/2
3,411,606	11/1968	Oldakowski	182/2
3,526,295	9/1970	Cornet	182/2

Primary Examiner—Reinaldo P. Machado
Attorney—Dunlap, Laney, Hessin & Dougherty

ABSTRACT: A scaffold apparatus having a work platform positioned on one end thereof, which can be expanded to an elevated status, thereby elevating the work platform. The apparatus includes a base structure and a boom assembly pivotingly secured to the base structure and at the opposite ends to a work platform. A pair of piston and cylinder assemblies, interconnected between the base structure and the boom assembly, for elevating the boom assembly and the work platform. The boom assembly is provided with a plurality of beveled gears and beveled pinion gears and linking shafts, interconnected such that, as the boom assembly is elevated, the work platform is pivoted to maintain the horizontal status of the work platform during elevation. The boom assembly is constructed such that the upper portion thereof may be extended or retracted, thereby providing a further or additional elevation of the work platform, and yet allowing the boom assembly to be retracted in a compact inoperative status when not in use.



PATENTED OCT 5 1971

3,610,367

SHEET 1 OF 2

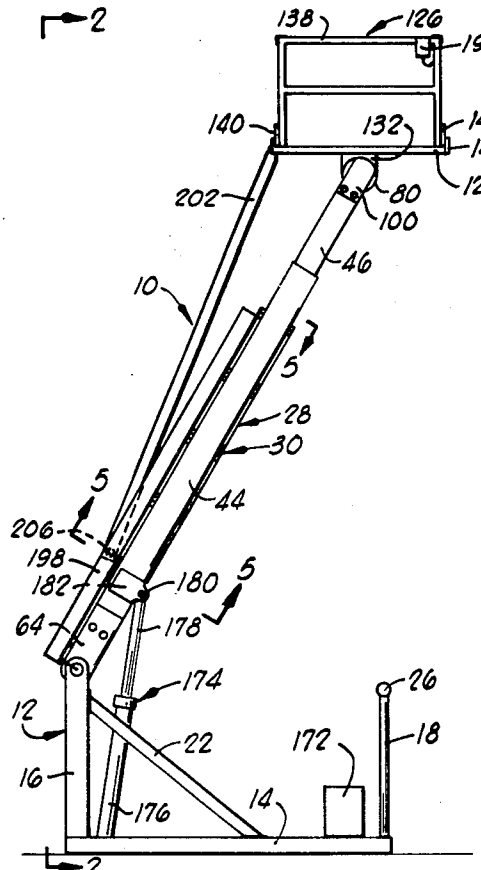


FIG. 1

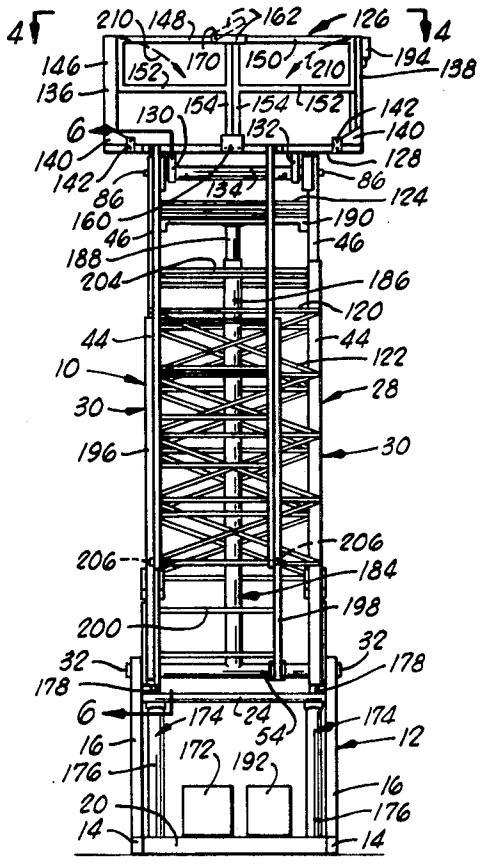


FIG. 2

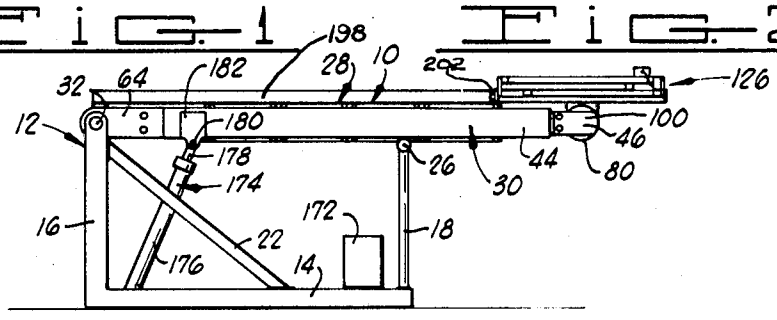


FIG. 3

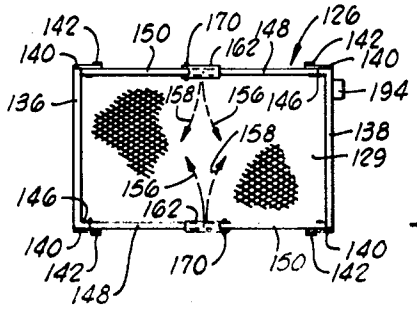


FIG. 4

INVENTOR.
GEORGE L. ATCHEY

BY

Dunlap, Laney, Hessin & Dougherty
ATTORNEYS

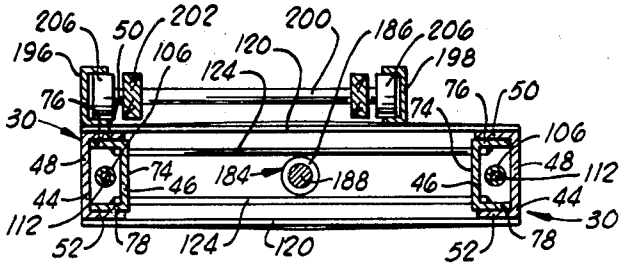


FIG. 5

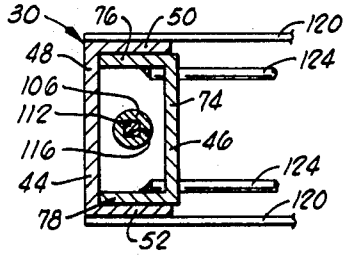


FIG. 9

FIG. 6

FIG. 7

FIG. 8

INVENTOR.
GEORGE L. ATCHEY

BY

Dunlap, Laney, Hessin & Dougherty

ATTORNEYS

COLLAPSIBLE SCAFFOLD

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to expandable work platforms and scaffolding, which can be used to elevate a workman to a high-work location, or folded down into a compact, inoperative status. More particularly, the invention relates to a collapsible scaffold of the type wherein the work platform is pivotally maintained in a substantially horizontal position as the boom assembly is elevated and lowered.

2. Brief Description of the Prior Art

A number of instances exist where it is necessary to elevate a workman above ground level in an outdoor location for the purpose of permitting the workman to make relatively rapid repairs to elevated structures, such as street lights, trolley powerlines, traffic signal lamps, and the like. For this purpose, a number of special vehicles have heretofore been built which incorporate a rather massive scaffolding structure which can be elevated to selected heights, can be swiveled about so as to move the workman in a horizontal direction, and can be driven from one location to another. Many of these structures contain complicated machinery and are relatively expensive to construct and maintain. In most instances, the scaffolding or structure employed to elevate the workman cannot be easily detached or demounted from the framework of the vehicle, but rather, is made a permanent portion of the vehicle, thus rendering the vehicle incapable of other utility, and requiring that both the vehicle and scaffolding structure always be present at the same location. In other instances, equipment of the general type described has been so large in its vertical dimension that freedom of movement of the vehicle is somewhat restricted, and care must be exercised in transversing underpasses and tunnels having limited vertical clearance.

SUMMARY OF THE INVENTION

The present invention provides a collapsible scaffold which can be utilized to elevate a workman to a substantial height, and which basically includes a base structure having opposite end portions and opposite side portions. A base shaft having opposite end portions is secured to one end portion of the base structure. Each one of a pair of elongated boom members has an end portion pivotally secured to one end portion of the base shaft. Means is provided for elevating and lowering the elongated boom members by pivotation on the base shaft. A work platform shaft, having opposite end portions, is rotatingly secured to the end of each of the elongated boom members opposite the end portions of the boom members which are secured to the base shaft. A horizontally extending work platform, having an upper and lower side portion, is secured to the work platform shaft, such that the rotation of the work platform shaft will correspondingly rotate the work platform. Means is provided on at least one of the boom members for interconnecting the base shaft and the work platform shaft, so that pivotal movement of the boom members about the base shaft as the elongated boom members are elevated and lowered will be translated to the work platform shaft, thereby rotating the work platform and, thereby maintaining the work platform horizontal as the elongated boom members are elevated and lowered.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view in elevation of the collapsible scaffold of the present invention as the scaffold appears in its elevated, operative status.

FIG. 2 is a rear view in elevation of the scaffold depicted in FIG. 1.

FIG. 3 is a view similar to FIG. 1, but showing the collapsible scaffold in its collapsed, or inoperative status.

FIG. 4 is a plan view of the work platform employed in the collapsible scaffold of the invention.

FIG. 5 is a view of a portion of the collapsible scaffold taken substantially along the line 5—5 of FIG. 1.

FIG. 6 is a sectional view of one of the elongated boom members of the invention, taken substantially along the line 6—6 of FIG. 2, with certain parts broken away for further clarity.

FIG. 7 is a sectional view of a portion of the elongated boom member of FIG. 6, taken substantially along the line 7—7 of FIG. 6.

FIG. 8 is a sectional view of a portion of the elongated boom member of FIG. 6, taken substantially along the line 8—8 of FIG. 6.

FIG. 9 is a sectional view of a portion of the boom assembly taken along line 9—9 of FIG. 6.

BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENT OF THE INVENTION

In the following description, reference will be made to various portions of the accompanying drawings, with reference numerals associated with lead lines which have arrow heads being utilized to designate broad combinations which include several subassemblies or several elements, and which have a unitary function in the overall operation of the scaffold of the invention. Numerals which are connected to various structural parts by plain lead lines (having no arrowheads) will be utilized to designate individual elements of the structure.

Referring initially to FIG. 1 of the drawings, shown therein and designated by the general reference numeral 10 is a collapsible scaffold constructed in accordance with the present invention.

The collapsible scaffold 10 includes a base structure 12 comprising a pair of substantially parallel, horizontally spaced, horizontal runners 14 (see FIGS. 1, 2 and 3), a pair of substantially parallel, vertical rear cornerposts 16, and a pair (only one is shown in the drawings) of vertical forward cornerposts 18. The rear and forward cornerposts 16 and 18 are each secured at their lower ends to the runners 14, and the rear cornerposts 16 extend to a slightly greater height than the forward cornerposts 18 for a reason hereinafter to be described.

A transverse frame member 20 interconnects the rear ends of the two runners 14, and a second transverse frame member (not shown in the drawings), similar to the transverse frame member 20, is secured between the forward ends of the runners.

For the purpose of reinforcement, a pair (only one is shown) of diagonal braces 22 extend between each runner 14 and each rear cornerpost 16, respectively. Extending between and interconnecting the upper end portions of the rear cornerposts 16 is an upper transverse member 14 which is secured to the rear cornerposts at points spaced downwardly a short distance from their upper ends. A transverse boom supporting bar 26 extends, between, and is secured to, the upper end portions of the forward cornerposts 18.

Mounted on the base structure 12 of the collapsible scaffold 10 is a boom assembly designated by the general reference numeral 28. The boom assembly 28 includes a pair of elongated boom members 30. One end of each of the elongated boom members 30 is pivotally secured to the base structure 12, and more specifically to the upper end portions of the rear cornerposts, 16, by means of a base shaft 32 which extends generally between the rear corner posts 16.

As shown more clearly in FIGS. 2, 6 and 7, the opposite end of portions of the base shaft 32 are respectively keyed by means of a keyway 34 and a key member 36, to each rear cornerpost 16, and are secured thereto. A beveled gear 38 is keyed to each end portion of the base shaft 32 by a keyway 40 and a key number 42. Each beveled gear 38 is positioned on the base shaft 32 in a manner to be more fully described hereinafter.

Each elongated boom member 30 includes a first channel member 44 and a second channel member 46 which is slidingly telescoped in the first channel member. In a preferred form, each stationary channel member 44 is [-shaped and includes a web portion 48 and flange portions 50 and 52. The flange portions 50 and 52 extend generally per-

pendicular to the web portion 48, and are disposed on opposite sides thereof, respectively.

One end portion of each channel member 44 is pivotally connected to the base shaft 32 by means of a transverse hollow sleeve 54. The transverse hollow sleeve 54 extends between and is secured on the opposite ends thereof to each stationary channel member 44, respectively. The base shaft 32 is journaled through the hollow portion of the transverse hollow sleeve 54, and the boom assembly 28 can pivot about the base shaft 32, as will be described in more detail hereinafter.

As shown more clearly in FIG. 7, each stationary channel member 44 has an aperture 56, which extends through the web portion 48 thereof, to accommodate the base shaft 32. A bearing retainer 58 having a groove 60 forward around the inner periphery thereof is secured to the web portion 48 and to each flange portion 50 and 52 of each stationary channel member 44. A bearing 62 is retained in each groove 60 of each bearing retainer 58. Each bearing 62 journals each stationary channel member 44 on the base shaft 32 as the boom assembly 28 is pivoted about the base shaft 32.

As shown in FIGS. 6 and 7, a U-shape cover plate 64, having a web portion 66 and flange portions 68 and 70 is disposed on the lower end portion of each stationary channel member 44, and more particularly the flange portions 68 and 70 of each U-shape cover plate 64 are secured to the leg portions 50 and 52 of each stationary channel member 44, respectively. An aperture 72 extends through each web portion 66 of each U-shape cover plate 64 to accommodate the base shaft 32 which extends therethrough.

In a preferred form, ans as shown more clearly in FIGS. 5, 6, 8 and 9, each sliding channel member 46 is generally [-shaped and includes a web portion 74 and flange portions 76 and 78. The flange portions 76 and 78 extend perpendicularly from each web portion 74, respectively, and are disposed on opposite sides thereof. The flange portions 76 and 78 of each sliding channel member 46 are sized and positioned to slidingly engage each of the flange portions 50 and 52, respectively, of each respective stationary channel member 44. It is therefore apparent, that each sliding channel member 46 can slide in a generally axial direction within each stationary channel member 44, for purposes which will be described in more detail hereinafter.

The uppermost end portion 80 of each sliding channel member 46 is generally circularly shaped and includes, a flange portion 82, which extends perpendicularly thereto and around the outer periphery thereof. An aperture 84 extends through each uppermost end portion 80. A work platform shaft 86 is extended between the sliding channel members 46 and through each aperture 84 in each uppermost end portion 80 of the sliding channel members 46.

As shown in FIGS. 6 and 8, a bearing retainer 88, having a groove 90 formed around the inner periphery thereof, is secured to one side of the uppermost portion 80 of each sliding channel member 46, and to the flange portion 82 of each of the uppermost end portions 80. A bearing 92 is disposed in the groove 90 of each bearing retainer 88. Each bearing 92 is sized and positioned to journal the work platform shaft 86. A beveled gear 94 is keyed on each end portion of the work platform shaft 86 by means of a keyway 96 and a key number 98.

A generally U-shaped cover plate 100 is secured over an upper and portion of each channel member 46. Each cover plate 100 includes a web portion 102 and a flange portion 104 which extends around a portion of the outer periphery of each cover plate. The flange portion 104 if each cover plate 100 is secured to the flange portion 82 of each channel member 46.

As clearly shown in FIG. 6, each beveled gear 38, which is secured to the base shaft 32, and each beveled gear 94, which is secured to the work platform shaft 86, face in generally opposite directions. The purpose of this particular orientation is to face each of the beveled gears 38 and 94 generally toward the open side portion of each stationary channel member 44 and each sliding channel member 46, formed by their respective flange portions 50–52 and 76–78, thereby facilitating repair of the beveled gears 38 and 94, and the various components associated therewith, by simply removing the respective cover plates 64 or 100.

A first pinion shaft 106 is disposed generally between each stationary channel member 44 and each sliding channel member 46 respectively, and is journaled in position therebetween by a bearing and support bracket 108 which is secured to each stationary channel member 44. A beveled pinion gear 110 is secured to the lowermost end portion of each first pinion shaft 106. Each beveled pinion gear 110 is disposed to meshingly engage one of the beveled gears 38. As the boom assembly 28 is rotated about the base shaft 32, each beveled pinion gear 110 will meshingly engage each respective beveled gear 38, thereby rotating the first pinion shaft 106.

A second pinion shaft 112 extends along each sliding channel member 46 and is journaled in position in the respective channel member 46 by a sleeve bearing 113 and support bracket 114 which is secured to each sliding channel member 46 near the upper end portion thereof. In a preferred form, the second pinion shaft 112 has a generally rectangularly shaped cross section, as shown more clearly in FIGS. 5 and 9, and the lower end portion thereof is slidingly splined in a bore 116 which extends axially through a portion of each of the first pinion shafts 106. Thus, when either of the first pinion shafts 106 is rotated, the second pinion shaft 112 slidingly splined therein will also be rotated and yet will remain free to slide axially in the bore 116.

As shown in FIGS. 6 and 8, a beveled pinion gear 118 is disposed on the uppermost end portion of each of second pinion shafts 112. Each beveled pinion gear 118 meshes with one of the beveled gears 94. As each of the second pinion shafts 112 is rotated, thereby rotating each beveled pinion gear 118 respectively, each beveled pinion gear 118 will meshingly engage each beveled gear 94 respectively, and thereby rotate the work platform shaft 86, following the rotational movement of each of the second pinion shafts 112, respectively.

A plurality of horizontally extending transverse members 120 and diagonal brace members 122 (see FIGS. 2 and 5) extend between flange portions 50 and 52 of the two stationary channel members 44. As illustrated in FIGS. 2, 5 and 9, a plurality of transverse members 124 are extended between the sliding channel members 46 and are positioned so as not to interfere with the transverse members 120 during the telescoping or extension of the channel members 46 with respect to the channel member 44.

A work platform 126 is pivotingly, or rotatingly disposed on the upper most end portion of each sliding channel member 46. The work platform 126, as shown more clearly in FIGS. 1, 2 and 4, includes a rectangular base frame 128. An expanded metal floor grid 129 (see FIG. 4) is supported on the base frame 128. Extending downwardly from the underside of the base frame 128 of the work platform 126 are a pair of boom attachment brackets 130 and 132. As shown more clearly in FIG. 2, one end of each boom attaching bracket 130 and 132, is secured to the base frame 128 of the work platform 126, and the opposite ends of the boom attaching brackets 130 and 132 are secured to a sleeve 134. The sleeve 134 extends over and is keyed to the work platform shaft 86 for rotation therewith. As the platform shaft 86 is rotated, the base frame 128, and therefore the work platform 126, will be pivoted a corresponding angular amount.

Disposed on the base frame 128 of the work platform 126 is a pair of side guard fences 136 and 138. The side guard fences 136 and 138 are disposed on opposite ends of the work platform 126, respectively, and in an assembled or operating position, as shown more cleaRly in FIGS. 1, 2 and 4, each side guard fence 136 and 138 extends generally perpendicular to the base frame 128.

Each side guard fence 136 and 138 is secured to pairs of triangularly shaped hinge members 140 which extend generally perpendicular from each side guard fence 136 and 138 and are pivotally secured to the base frame 128 by lugs 142. The

hinge members **140** are secured on the opposite ends of each side guard fence **136** and **138**. Since the interconnection between each hinge member **140** and each lug **142** is offset from the vertical plane of each side guard fence **136** and **138** respectively, when each side guard fence **136** and **138** is pivoted downwardly to a position wherein each side guard fence **136** and **138** is generally parallel to the base frame **128**, a gap will exist between the base frame **128** and each side guard fence **136** and **138**, respectively, for purposes to be described hereinafter.

Each side guard fence **136** and **138**, includes a vertical flange portion **146**, which extends along one side thereof and is generally perpendicular to each side guard fence **136** and **138** respectively. As shown more clearly in FIG. **4**, each side guard fence **136** and **138** is disposed on the base frame **128**, such that the respective flange portions **146** extends from the opposite nonaligned ends of each side guard fence **136** and **138**, respectively.

A pair of gate members **148** and **150** are pivotally secured to the ends of each side guard fence **136** and **138**. Each gate member **148** and **150** includes an upper rectangular portion **152** and a post member **154**, which post member extends from one end portion of the rectangular portion to a position generally adjacent the base frame **128**.

One end of each rectangular portion **152** opposite the post member **154** of each gate member **148**, is pivotally secured to the flange portion **146** of each side guard fence **136** and **138** respectively. Since each flange portion **146** extends a distance from each side guard fence **126** and **128** respectively, when each gate member **148** is pivoted in a direction **156** generally toward each side guard fence **136** and **138** respectively, to a position generally parallel to each respective side guard fence **136** and **138**, it is apparent that a gap will exist between each gate member **148** and each side guard fence **136** and **138** respectively. One end of each rectangular portion **152** opposite the post member **154** of each gate member **150**, is pivotally secured to one end portion, opposite the flange portion **146** end, of each side guard fence **136** and **138** respectively. It is apparent from the foregoing, that each gate member **150** can be pivoted in a direction **158** generally toward each side guard fence **136** and **138** respectively. In a preferred form, the overall vertical height, from the base frame **128** of each side guard fence **136** and **138** and each gate member **148** and **150**, is substantially the same. The horizontal length, with respect to the base frame **128**, of each side guard fence **136** and **138**, is substantially the same as the respective end of the base frame **128**. The horizontal length, with respect to the base frame **128**, of each gate member **150** is such that when each gate member **150** is pivoted in a direction **158**, to a position adjacent the respective side guard fence **136** and **138**, the post member **154** end of each gate member **150** will extend to a position near each flange portion **146** of each side guard fence **136** and **138** respectively, but will not contact the flange portion **146**. The width of each gate member **150** is slightly less than the distance which each flange member **146** extends from each side guard fence **136** and **138**, so that when each gate member **150** is pivoted to a position adjacent each side guard fence **136** and **138** respectively, each respective flange portion **146** will extend slightly beyond each gate member **150** respectively. In a preferred form, the gate members **136** members **138** are constructed identical with respect to form, so that their relative positions on the work platform **128** may be interchanged for purposes of economy in manufacture.

The length of the base frame **128**, extending between the side guard fences **136** and **138**, is slightly greater than the combined horizontal lengths of one of the gate members **148** and one of the gate members **150**, so that, in an assembled position as shown in FIGS. **1**, **2**, and **4**, each gate member **148** and each gate member **150** will extend along the length of the base frame **128**, meeting at substantially the central portion of the base frame **128**.

A retaining plate **160** is secured on each side of the base frame **128** and extends generally perpendicular thereto. Each retaining plate **160** is disposed to arrest the pivotal movement of each gate member **148** and **150**, in a direction opposite the directions **156** and **158**, respectively; by engaging the post member **154** of each respective gate member **148** and **150**.

A latching sleeve **162** is pivotally secured to the upper portion of each gate member **150** by a pin **170**. Each latching sleeve **162** has a generally U-shaped cross section and is provided so that when each latching sleeve **162** is pivoted downwardly, a portion thereof will engage a portion of each gate member **148** respectively. It is apparent that in this position, each latching sleeve **162**, as shown in FIGS. **2** and **4**, will secure the respective gate members **148** and **150** in an assembled position.

For the purpose of elevating the boom assembly **28** to raise the work platform **126** to a desired height, the collapsible scaffold **10** of the invention includes a suitable self-contained powerplant **172**. A typical self-contained powerplant includes a prime mover, which may be a gasoline engine if the collapsible scaffold **10** is to be of the portable type; a hydraulic pump, which is driven by the prime mover; and suitable conduits to supply hydraulic power fluid to a pair of main piston and cylinder assemblies **174** (see FIGS. **1**, **2** and **3**). The powerplant **172** would also include appropriate control and bleed valves arranged to perform the functions of the power plant **172** hereinafter described.

In a preferred form, each main piston and cylinder assembly **174** is identical in construction and includes an elongated cylinder **176**, which is pivotally anchored to the base structure **12**, and a piston located in each cylinder and having secured thereto an elongated piston rod **178**. The upper end of each piston rod **178** is pivotally secured by a pivot pin **180** to a pair of opposed bracket plates **182** which are secured to each elongated boom member **30**. As the power plant **172** is actuated, each piston rod **178** will be extended or retracted and the boom assembly **18** will be elevated or lowered as controlled by the self-contained power plant **172**.

As the boom assembly **28** is elevated or lowered, the work platform **126** will rotate about the work platform shaft **86** as a result of the interconnection between the base shaft **32** and the work platform shaft **86**. Each beveled gear **38** and **94** and each beveled pinion gear **110** and **118** is sized to transmit the relative rotational movement of the base shaft **32** through the first pinion shaft **106** and the second pinion shaft **112** to the work platform shaft **86**, so that the work platform **126** is maintained in a substantially horizontal position with respect to the base structure **12** at each position of the boom assembly **28** during elevation and lowering.

An auxiliary piston and cylinder assembly **184** is disposed between the elongated boom members **30**. The auxiliary piston and cylinder assembly **184** includes an elongated cylinder **186**, which is secured at one end thereof to the transverse hollow sleeve **54**, a piston located in the cylinder **186**, and an elongated piston rod **188**, which is secured at the uppermost end thereof to a transverse brace member **190**. The transverse brace member **190** has its opposite ends secured to the spaced sliding channel members **46** of the two boom members **30**. It is therefore apparent that when fluid power is supplied to the auxiliary piston and cylinder assembly **184**, the piston rod **190** will extend or retract each sliding channel member **46** in each stationary channel member **44** as the piston rod **188** extends from, or retracts into, the cylinder **186**. In any given position of the boom assembly **28**, the height of the work platform **126** with respect to the base structure **12** may be adjusted by simply elevating and lowering each sliding channel member **46** with respect to each stationary channel member **48**.

For the purpose of raising and lowering the piston rod **188**, the collapsible scaffold **10** includes a second self-contained power unit **192**. The second self-contained power unit **192** is similar to the self-contained power unit **172** and generally includes a prime mover, a hydraulic pump, which is driven by the prime mover and supplies hydraulic power fluid through suitable conduits to the auxiliary piston and cylinder assembly

184, and various bleed and control valves. The second self-contained power unit 192 is also supported by, and secured to, the support structure 12 of the collapsible scaffold 10.

It should be noted that the power units 172 and 192 have been shown schematically in FIGS. 1, 2 and 3, solely for the purposes of illustration, and so that the separate functions could be more clearly described. In a preferred form, the power units 172 and 192 are a single power unit with the separate functions as described hereinabove, being accomplished by the use of appropriate control valving which can be shifted to direct the hydraulic power fluid either to the cylinder 174, or to the cylinder 186 or to both. This valving can be controlled from a remote control unit located on the work platform 126 as hereinafter described.

A remote control unit 194 is secured to the side guard fence 138 of the work platform 126. The remote control unit 194 is interconnected with the powerplant 172 and also with the second powerplant 192 of the collapsible scaffold 10, such that the elevating and lowering of the boom assembly 28, and the extension and retraction of the sliding channel members 46 may be controlled by an individual positioned on the work platform 126.

Although the cut out switch is not illustrated in the drawings, it is preferred to provide such a switch in the control circuitry between the control unit 194 and the power units 192 and 172 to function to prevent extension of rod 188 from the cylinder 186 until the boom assembly 28 has been raised to a predetermined extend. In the illustrated embodiment, it is desired that the boom assembly 28 be elevated at least 52° from the horizontal before the piston 188 is extended.

A [-shaped channel 196 has one flange portion thereof secured to one of the stationary channel members 44. A second [-shaped channel 198 has one of its ends pivotally secured to the sleeve 54, and parallel to the [-shaped channel 196. One flange portion of the [-shaped 198 is secured to some of the transverse members 120. The [-shaped channel members 196 and 198 are horizontally spaced and positioned such that the open portions thereof generally face each other, thereby providing a pair of guide rails extending a distance upwardly along the boom assembly 30. A plurality of rungs 200 are secured to the lower flanges of the [-shaped channels 196 and 198 generally near the lower ends thereof.

A ladder 202 having a plurality of rungs 204 is pivotally secured on the upper end thereof to one side of the base frame 128 of the working platform 126. A roller 206 is secured to, and projects from each side of, the lower end of the ladder 202. The ladder 202 and the rollers 206 are sized such that, in an assembled position, each roller 206 will be disposed in one of the [-shaped channels 196 and 198. Thus the ladder 202 is free to slide and pivot in the [-shaped channels to compensate for the varying height of the work platform 126.

OPERATION

Let it be assumed, for the purpose of describing the operation of the collapsible scaffold 10 of the invention, that the collapsible scaffold 10 is in a collapsed position, as depicted in FIG. 3. In this position, the boom assembly 28 has been lowered to a position wherein each elongated boom member 30 is disposed on and generally supported by the boom supporting bar 26, and the boom assembly 28 lies in a plane substantially parallel to the runners 14 of the base structure 12. It should also be noted that, in this position, each sliding channel member 46 has been slid or retracted within each stationary channel member 44 to a position wherein the work platform shaft 86 is at its nearest position with respect to each stationary channel member 44, and the work platform 126 is in its collapsed or inoperative status and extends substantially horizontally and in parallelism with each elongated boom member 30.

With the collapsible scaffold 10 in the collapsed or inoperative position, the collapsible scaffold 10 may be transported to a location where work is to be performed on an elevated structure, such as a telephone line, light pole, traffic light or the like.

When the work location is reached and it is desired to elevate the work platform 126, or in other words to pivot the boom assembly 28 upwardly, the self-contained powerplant 172 is actuated and simultaneously supplies fluid power to each of the main piston and cylinder assemblies 174. As fluid power is supplied to each of the main piston cylinder assemblies 174, each piston rod 178 disposed therein is extended, thereby elevating the boom assembly 28. Accordingly, the extension of each piston rod 178 from each cylinder 176 continues until the maximum elevation of the work platform 126 is attained, or until some intermediate level of the work platform 126 is attained if this is desired. When the desired elevation of the work platform 126 is reached, the fluid power provided to the main piston and cylinder assemblies 174 is shut off, and the boom assembly 28 is locked in this upraised position.

As the boom assembly 28 is elevated, and more particularly as each elongated boom member 30 thereof, is rotated about the base shaft 32, each beveled pinion gear 110 is each of the first pinion shafts 106 will meshingly engage each beveled gear 38 secured on the ends of the base shaft. Accordingly, each of the first pinion shafts 106 will rotate about an axis generally perpendicular to the base shaft 32. Since each of the first pinion shafts 106 is slidingly splined in one of the second pinion shafts 112, each second pinion shaft will follow the rotational movement of the first pinion shaft to which it is connected. As each of the second pinion shafts 112 rotates each beveled pinion gear 118 will rotate correspondingly, and will simultaneously meshingly engage each beveled gear 94, respectively, thereby pivoting the work platform shaft 86. In the form of the invention depicted in the accompanying drawings, each bevel gear 38 and 94 and each respective beveled pinion gear 110 and 118, respectively, is sized, such that the work platform shaft 86 is pivoted to maintain a work platform 126 in a substantially horizontal position as the boom assembly 28 is elevated.

After the boom assembly 28 has been elevated to the maximum height, the work platform 126 may be further extended by means of the auxiliary piston and cylinder assembly 184. If this is desired, the second self-contained power unit 192 is actuated, thereby providing fluid power to the auxiliary piston and cylinder assembly 184. As fluid power is provided to the auxiliary piston and cylinder assembly 184, the piston rod 188 thereof is extended. Since the piston rod 188 is interconnected to each sliding channel member 46 via its connection to the traverse brace member 190, the sliding channel members 46 will be slidingly extended from each of the respective stationary channel members 44, thereby further elevating the work platform 126. Accordingly, extension of the piston rod 188 from the cylinder 186 continues until the desired elevation of the work platform 126 is attained. At this time, the fluid power provided to the auxiliary piston and cylinder assembly 184 is shut off, and the work platform 126 is locked in this extended position. Since the ladder 202 pivotingly and rollingly engages the [-shaped channels 196 and 198 by means of the rollers 206, the ladder 202 will pivot about its end adjacent the [-shaped channels, and will roll therein to compensate for the varying elevation and varying height of the work platform 126.

After the work platform 126 has been elevated to the desired working position and locked therein, the workman may gain access to the work platform 126 by ascending the rungs 200 between the [-shaped channels 196 and 198 and the ladder 202. At extreme elevation of the platform 126, the transverse members 120 can serve as rungs permitting access to the then higher elevated lower end of the ladder 202. When the top of the upper ladder 202 is reached, the workman can pivot the side guard fences 136 and 138, and the respective gate members 148 and 150 to their raised positions and interlock them by means of the latching sleeves 162, in an operating or assembled position as shown in FIGS. 1, 2 and 4. It should be noted at this point that, in some instances, it may be desirable for the workman to open the side guard fences 136 and 138, and the respective gate members 148 and 150 to their operative or assembled positions prior to the elevation of

the work platform **126** by upward pivotation of the boom assembly **28**. This can be easily accomplished, and the workman can stand upon the work platform **126** during the elevation thereof if this should be desired. When used in this manner, the workman can control the elevating and lowering of the work platform **126** by using the remote control unit **194**, which is secured to the work platform **126**. It is therefore apparent, that the entire operation can be performed by a single workman. Using the remote control unit **194**, the workman can also vary the height of the work platform **126** to accommodate his position with respect to the particular apparatus being repaired.

Upon completion of the repairs or other operations carried out by a workman standing on the work platform **126**, while it is in its elevated position, the work platform **126** can be lowered to the position depicted in FIG. **3**, by pivoting the boom assembly **28** generally downwardly about its horizontal pivotal axis and using a metering valve to bleed hydraulic power fluid slowly from each main piston and cylinder assembly **174**. As the power fluid is dispelled from the main piston and cylinder assemblies **174**, the piston rods **178** will move into the respective cylinders **176** under the weight of the boom assembly **28** and the work platform **126**. Thus the boom assembly **28** will gradually be lowered to its collapsed and inoperative status.

In this position, the side guard fences **136** and **138**, and the respective gate members **148** and **150** will be pivoted to their inoperative or collapsed status as depicted in FIG. **3**. Each latching sleeve **162** is pivoted generally upwardly, thereby releasing the engagement between the respective gage members **148** and **150**. Each gate member **150** is then pivoted in a direction **158**, as shown in FIG. **4**, to a position generally adjacent each respective side guard fence **136** and **138**. Each gate member **148** is then pivoted in a direction **156** to a position generally adjacent the respective gate member **150**. It is apparent, that due to the relative size and positioning of each gate member **148** and **150**, with respect to each side guard fence **126** and **138**, respectively, as described hereinbefore, each gate member **148** and **150** will lie in a position substantially parallel to each respective side guard fence **136** and **138**, after each gate member **148** and **150** has been pivoted in the direction **156** and **158**, respectively, to a position as described hereinabove.

It should be noted that prior to pivotingly closing each gate member **150**, the latching sleeve **162** is pivoted downwardly to a position, wherein the latching sleeve **162** generally engages one side portion of the rectangular portion **152** of each gate member **150**. The latching sleeve **162** is retained in this position by the flange portion **146** of each side guard fence **136** and **138** respectively, when the gate member **150** is pivoted into a closed or inoperative position. After the gate members **148** and **150** have been pivoted to the closed or inoperative position, the side guard fences **136** and **138** are pivoted in a direction **210** as shown in FIG. **2**, to a position generally adjacent the base frame **128** of the work platform **126**.

At this point it should be noted that the base structure **12**, and in fact the entire collapsible scaffold **10** of the invention, is constructed in such a manner that it may be portably mounted in the back of a vehicle, such as a pickup truck, and thus transported to various work locations. When the collapsible scaffold **10** is used in this manner, outrigger jacks of the type disclosed in the applicant's copending application Ser. No. 805,773 filed on Mar. 10, 1969 and now U.S. Pat. 3,529,694 may be employed to remove or load the collapsible scaffold **10** from the pickup truck.

It is apparent from the foregoing description that the present invention provides a collapsible scaffold, which can be operated easily and efficiently by a single workman, and a collapsible scaffold which is designed to employ the minimum number of parts. The invention as described hereinbefore, also provides a collapsible scaffold wherein the work platform is retained in a substantially horizontal position, while the boom assembly is being elevated or o lowered about the base structure. Therefore workmen can safely and efficiently operate the collapsible scaffold from a position on the work platform, thereby elevating and lowering the work platform to various work positions.

Although a preferred embodiment of the collapsible scaffold of the present invention has been described in order to permit its construction and operation to be clearly understood by those having ordinary skill in the art, it is to be understood that various changes and modifications may be made to the depicted structure without departure from the basic principles upon which the invention is based. All changes and modifications of this type are therefore deemed to be circumscribed by the spirit and scope of the invention.

What is claimed is:

1. A scaffold structure comprising:

a base structure;

a base shaft having opposite end portions secured to the base structure;

elongated boom means having opposite end portions, one end portion of said boom members being pivotally connected to said base structure;

means for pivotally elevating and lowering the elongated boom means on said base structure;

a work platform shaft having opposite end portions, rotatingly secured to the end portion of said boom means opposite the end portion thereof pivotally connected to said base structure;

a horizontally extending work platform having an upper and lower side portion, the lower side portion thereof being secured to the work platform shaft such that rotation of the work platform shaft rotates the work platform; and

means interconnecting the base shaft and the work platform shaft to transmit the movement of the base shaft in relation to said boom means, as the elongated boom means is elevated and lowered, to the work platform shaft, thereby rotating the work platform and maintaining the horizontal orientation of the work platform as the elongated boom members are elevated and lowered.

2. The scaffold structure of claim **1** wherein the means for elevating and lowering the elongated boom means is defined further to include:

extensible piston and cylinder means connected between the base structure and said elongated boom means to provide power for elevating and lowering said boom means;

means for supplying power fluid to said piston and cylinder means mounted on the base structure.

3. The scaffold structure of claim **1** wherein said base and said work platform shaft are substantially parallel.

4. The scaffold structure of claim **1** wherein the means interconnecting the base shaft and the work platform shaft is defined further to include:

a pair of beveled gears, one beveled gear secured to the work platform shaft and the other beveled gear secured to the base shaft;

a pair of beveled pinion gears, each beveled pinion gear sized and disposed to meshingly engage one of the beveled gears respectively; and

a pinion shaft means having opposite ends, one end of the pinion shaft means being secured to one of the beveled pinion gears and the opposite end of the pinion shaft means being secured to the other beveled pinion gear.

5. The scaffold structure of claim **1** wherein said boom means includes two substantially parallel boom members and wherein each boom member is defined further to include:

a stationary channel member connected at one end thereof to the base shaft;

a sliding channel member having one end thereof connected to the work platform shaft, and the opposite end thereof slidingly disposed in the stationary channel member; and

means to slidingly extend the sliding channel member from the respective stationary channel member, thereby further extending the height of the work platform.

6. The scaffold structure of claim 5 wherein the means to extend each sliding channel member from each stationary channel member, respectively, includes:

a transverse member secured between the sliding channel members;

auxiliary extensible piston and cylinder means connected between the base structure and the transverse member to provide power for extending and retracting each sliding channel member with respect to each respective stationary channel members, simultaneously; and

means for supplying power fluid to said auxiliary piston and cylinder means mounted on the base structure.

7. The scaffold structure of claim 5 wherein the means interconnecting the base shaft and the work platform shaft include:

a pair of beveled gears, one beveled gear secured to the work platform shaft and the other beveled gear secured to the base shaft;

a pair of beveled pinion gears, each beveled pinion gear sized and disposed to meshingly engage one of the beveled gears; respectively; and

a first pinion shaft having opposite ends, one end being secured to the beveled pinion gear meshingly engaging the beveled gear secured to the base shaft;

a second pinion shaft having opposite ends, one end slidingly splined on the end of the first pinion shaft opposite the end secured to the beveled pinion gear, and the opposite end of said second pinion shaft being secured to the beveled pinion gear meshingly engaging the beveled gear secured to the work platform shaft.

8. The scaffold structure of claim 7 wherein said first pinion shaft has a bore of rectangularly shaped cross section extending a distance therethrough from the end of the first pinion shaft opposite the end secured to the beveled pinion gear, and wherein said second pinion shaft is slidingly disposed in said bore and has a cross section sized to matingly and slidingly fit in said bore.

9. The scaffold structure of claim 1 wherein the horizontally extending work platform includes:

a generally rectangularly shaped base frame having opposite sides, secured on one side thereof to the work platform shaft;

a pair of side guard fences generally disposed on one side of the base frame opposite the sides secured to the work platform shaft, extending generally perpendicular to the base frame, in one position thereof, and each side guard fence being pivotally secured to one side of said base frame in such a manner that when each side guard fence is pivoted to a position generally parallel to said base frame, a gap exist between each side guard fence and said base frame;

a pair of gate members secured to the opposite ends of each side guard fence, each gate member being sized such that one of said gate members secured to each side guard fence can be pivoted to a position generally adjacent and parallel the respective side guard fence, and the other of said gate members on the same side guard fence gate members secured to each side guard fence can be pivoted to a position generally adjacent and parallel the respective side guard fence, and the other of said gate members on the same side guard fence as said one gate member can be pivoted to a position generally adjacent said one gate member and such that, in this position, each pair of gate members generally occupy the gap between each respective side guard fence and the base frame when each side guard fence is pivoted to a position generally parallel to said base frame.

10. A scaffold structure as defined in claim 1 and further characterized to include means for changing the length of said boom means.

11. A scaffold structure as defined in claim 10 wherein said boom means includes

a lower portion;

an upper portion slidingly engaging the lower portion for coplanar extension and retraction relative thereto;

and wherein said means for changing the length of said boom means comprises a piston and cylinder means for extending said upper portion relative to said lower portion.

12. A scaffold structure as defined in claim 10 wherein the means interconnecting the base shaft and the work platform shaft is defined further to include:

first gear means on the base shaft;

second gear means on the work platform shaft;

third gear means sized and disposed to meshingly engage the first gear means;

fourth gear means sized and disposed to meshingly engage the second gear means; and

shaft means having opposite ends, one end of the shaft means being secured to the third gear means and the opposite end of the shaft means being secured to the fourth gear means, thereby transmitting the rotational movement of the first gear means to the second gear means.

13. A scaffold structure of claim 10 defined further to include:

extensible ladder means connected between the base structure and the work platform, adapted to extend and retract as the length of the boom means is changed.

14. The scaffold structure of claim 10 wherein the work platform is further defined to include:

a base frame;

a pair of horizontally spaced side guard fences pivotally mounted on opposite sides of the base frame and extending upwardly therefrom in one position thereof; and

a plurality of gate members pivotally connected to the side guard fences and forming a rectangularly shaped enclosure therewith, said side guard fences and gate members being foldable to a horizontally extending superimposed position over said base frame.

15. The scaffold structure of claim 10 defined further to include:

a ladder means connected between the base structure and the work platform and adapted to move up and down the boom assembly as the length of the boom assembly is changed.