

[54] LADDER SCAFFOLD VEHICLE

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[51] Int. Cl.E06c 5/04, E06c 7/04

[58] Field of Search.....182/102, 101, 116, 127, 141, 182/208, 207, 63

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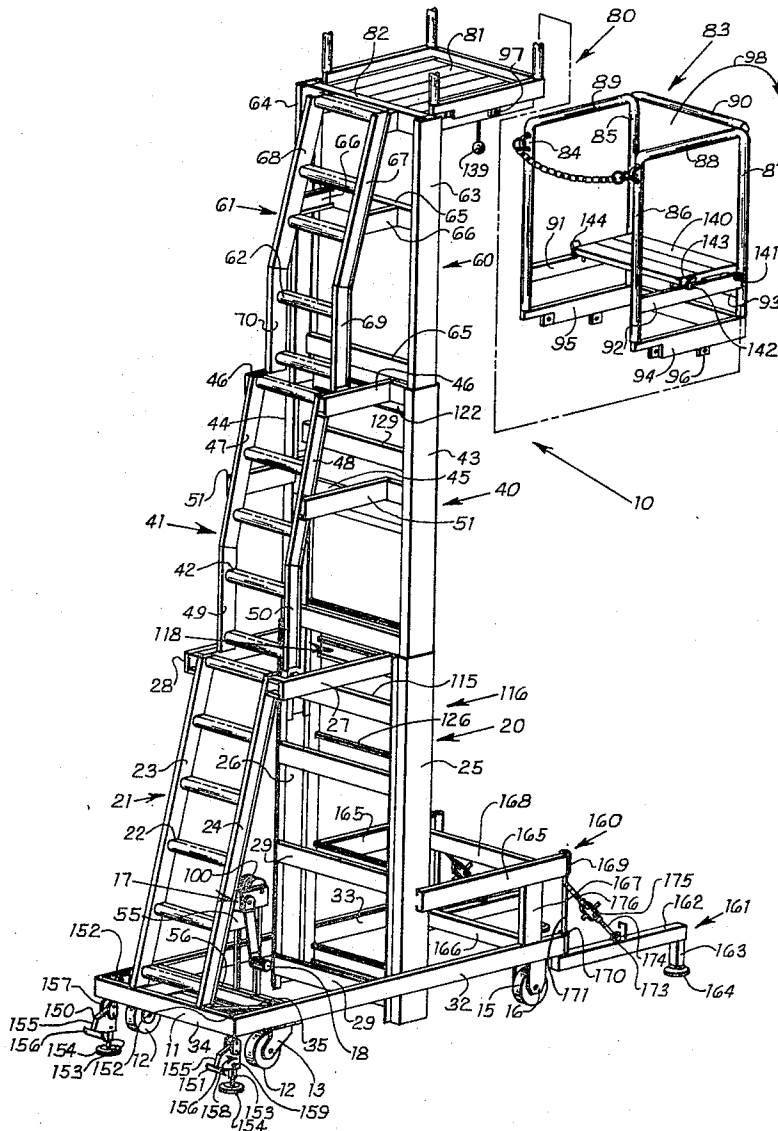
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[57] ABSTRACT

A vehicle having a ladder and a scaffold which may be extended and retracted by a winch and cable arrangement. A main frame mounted on wheels has a sloping ladder fixedly mounted to its top. The ladder is telescopic, having a middle and top ladder section retractable into a lower ladder section. A first platform is fixedly mounted to the top of the uppermost ladder section. A cage surrounds the platform and is pivotable downward. A second smaller platform is erectable on the first platform. Adjustable jack assemblies and braces fixed to the main frame are engageable to prevent movement of the vehicle. The braces are retracted when not in use.

9 Claims, 4 Drawing Figures



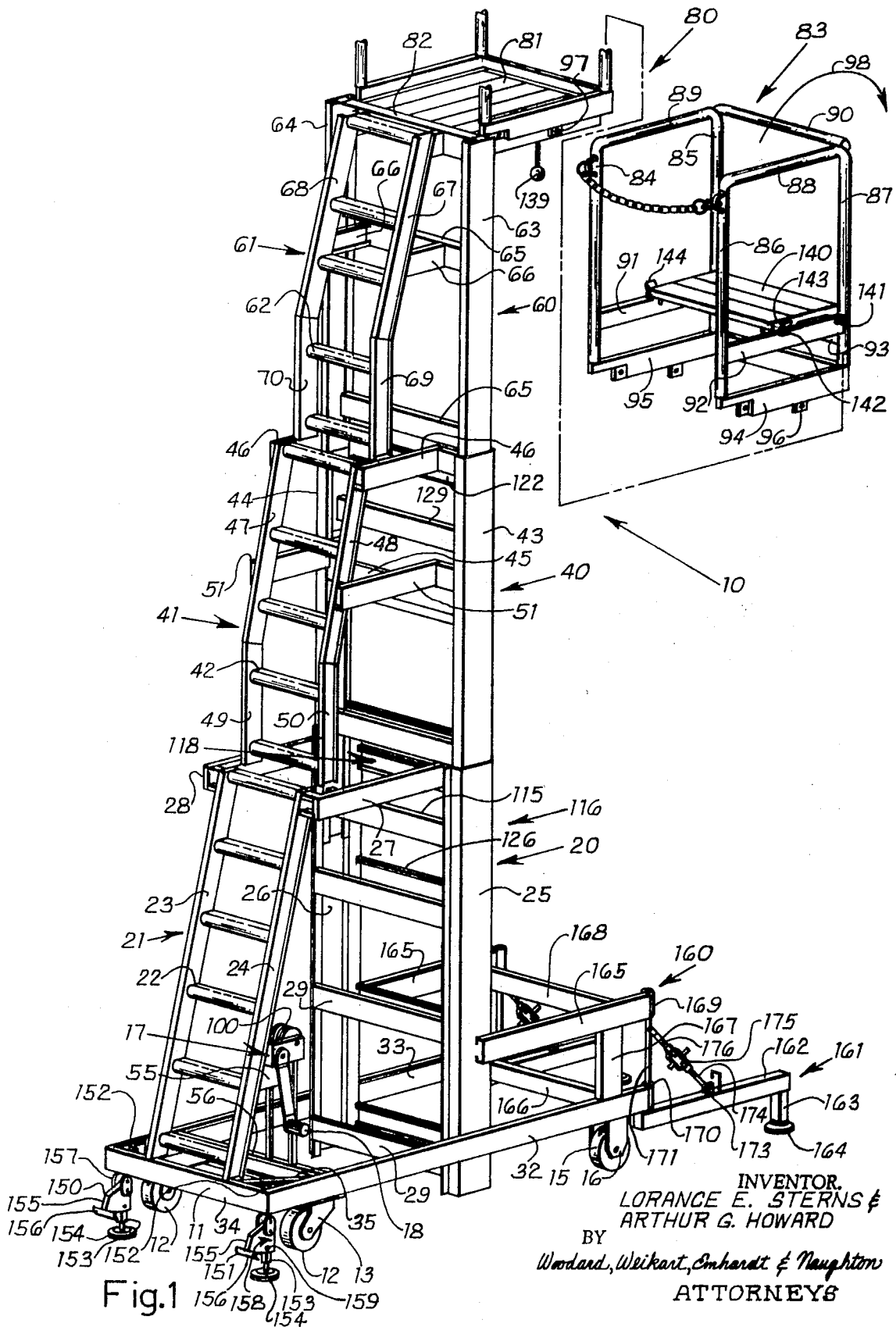


Fig.1

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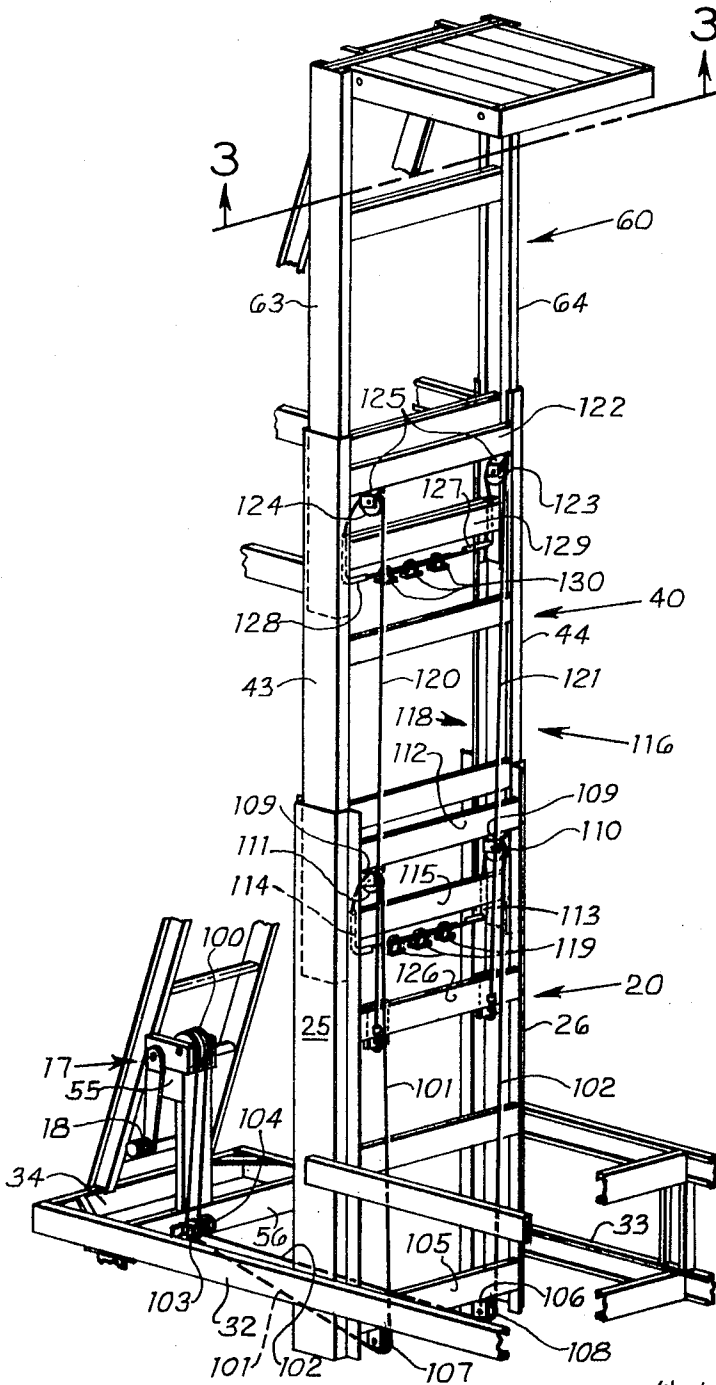


Fig. 2

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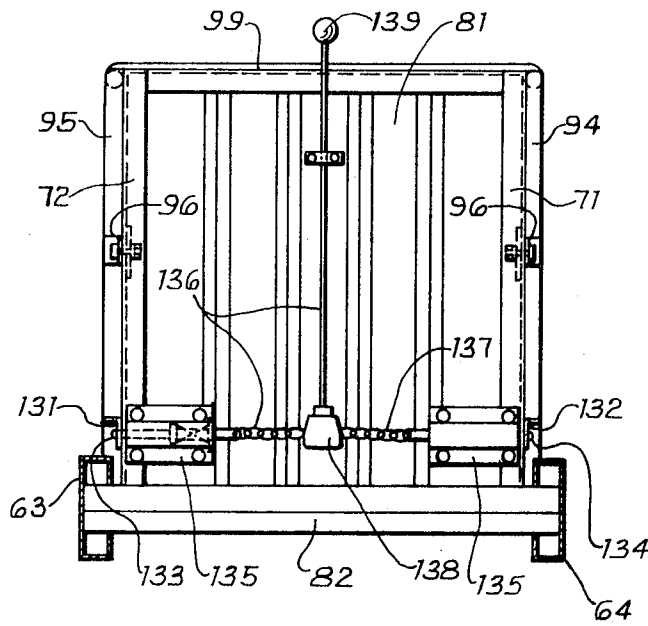


Fig. 3

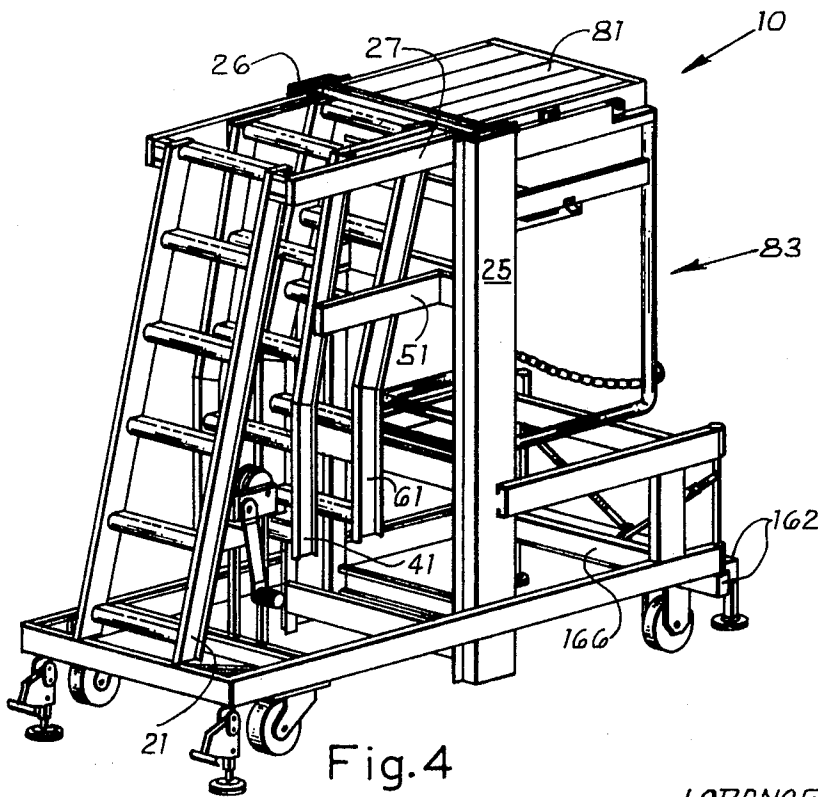


Fig. 4

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LADDER SCAFFOLD VEHICLE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention is an extendable ladder with scaffold.

2. Description of the Prior Art

Maintenance personnel in buildings such as large factories require ladders and scaffolds to paint the ceilings and walls, change lights, et cetera. Several devices have been provided to fulfill this need. Two such devices are disclosed in the following U. S. Pats., No. 2,310,119 issued to Reinhardt; and No. 3,327,810 issued to Johnson et al. In many cases, the device must be moved through doorways from room to room and must therefore be collapsible and mounted on wheels. Due to the height of the extended ladder, the wheels must be spaced adequately apart and braces must be provided to stabilize the ladder. In addition, the ladder should be slanted to facilitate ease of climbing. It can be appreciated that it is very difficult to climb a vertically straight ladder while carrying an object such as a fluorescent light tube. None of the prior art devices include such a slanted ladder scaffold arrangement which can be extended to reach high places and retracted to fit through a doorway.

SUMMARY OF THE INVENTION

This invention is a ladder scaffold vehicle which is extendable and retractable. A sheet metal frame arrangement mounted on wheels has a telescopic slanting ladder fixedly mounted to its top. A winch mounted atop a bracket fastened to the frame is operable to raise and lower two of the ladder sections with respect to the lower ladder section. A first platform is fixedly mounted atop the uppermost ladder section with a pivotable tubular cage surrounding the platform. A second smaller platform is pivotably mounted on the cage above the first platform. Two front adjustable jack assemblies and two rear adjustable jack braces stabilize the vehicle. The braces are retracted when not in use.

It is an object of the present invention to provide a ladder scaffold vehicle which has a slanting ladder and which may be extended to high places and retracted to fit through a doorway.

It is a further object of this invention to provide the previously described ladder-scaffold arrangement which has a slanting ladder when the ladder is only partially extended as well as when the ladder is fully extended.

Yet another object of the present invention is to provide such a ladder-scaffold vehicle which also has adequately spaced wheels, and adjustable jack assemblies and braces to stabilize the vehicle.

In addition, an object of the present invention is to provide such a ladder-scaffold vehicle which is relatively lightweight, made from sheet metal, and which is capable of supporting relatively large loads.

Related objects and advantages of the present invention will be apparent from the following description.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a ladder-scaffold vehicle incorporating the present invention with the top cage removed for sake of clarity.

FIG. 2 is a fragmentary rear perspective view of the vehicle of FIG. 1 particularly showing the winch-cable arrangement.

FIG. 3 is a fragmentary enlarged view of the bottom portion of the scaffold assembly, looking in the direction of arrows 3-3 of FIG. 2.

FIG. 4 is a perspective view of the ladder-scaffold vehicle of FIG. 1 in the retracted position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

For the purposes of promoting an understanding of the principles of the invention, reference will now be made to the embodiments illustrated in the drawing and specific language will

be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended, such alterations and further modifications in the illustrated device, and such further applications of the principles of the invention as illustrated herein being contemplated as would normally occur to one skilled in the art to which the invention relates.

Referring now more particularly to FIG. 1, there is illustrated a ladder-scaffold vehicle 10 having a bottom frame 11 movable across a floor on wheels 12 and 15. Wheels 12 are rotatably mounted to arms 13, which in turn are pivotally mounted to the bottom side of frame 11. Wheels 15 are rotatably mounted to arms 16 which are fixedly fastened to frame 11. The drawing shows only one wheel 15; however, it is understood that a second wheel 15 is mounted to member 33. Vehicle 10 may therefore be pushed by grasping ladder 21 and pushing and guiding the vehicle. Vehicle 10 has a bottom mast assembly 20 fixedly mounted atop frame 11. Middle mast assembly 40 and top mast assembly 60 are slidably mounted to bottom mast assembly 20 with a winch 17 operable in conjunction with cables to extend and retract mast assemblies 40 and 60 from mast assembly 20. Scaffold assembly 80 is mounted atop mast assembly 60.

Frame 11 is made entirely from sheet metal, having C-shaped members 32 and 33 welded to both ends of C-shaped member 34. Struts 35 are welded to members 32 and 34 and members 33 and 34, reinforcing the corners. Arms 13 and 16 are mounted to the bottom flanges of members 32 and 33.

Bottom mast assembly 20 is also made entirely of sheet metal, having a ladder 21 which has rungs 22 fixedly fastened to C-shaped sloping supports 23 and 24 welded and positioned at an acute angle to the top of member 34. Rungs 22 are made from sheet metal and are also C-shaped in configuration. Vertical housing 25 and 26 are welded to members 32 and 33 and are fixedly fastened to supports 23 and 24 by horizontal C-shaped cross members 27 and 28. Reinforcing sheet metal cross members 29 are fixedly fastened to housings 25 and 26, strengthening the mast assembly.

Middle mast assembly 40 is similar in construction to bottom mast assembly 20 and is also made entirely of sheet metal, having a ladder 41 with rungs 42 fixedly fastened between and to sloping supports 47 and 48 and vertical supports 49 and 50. Vertical rails 43 and 44 are C-shaped and are slidably received within housings 25 and 26. Reinforcing members 51 and 46 are welded to rails 43 and 44 and supports 47 and 48. Likewise, cross-members 45 have their ends welded to rails 43 and 44. As shown in FIG. 1, supports 49 and 50 are vertical and are integrally joined to sloping supports 47 and 48. In a retracted position, rails 43 and 44 are contained within housings 25 and 26, with ladder 41 and members 46 and 51 fitting freely through the opening defined by members 27, 28 and 112 (FIG. 2) and the top rung of ladder 21.

Top mast assembly 60 is similar in construction and material to assemblies 40 and 20, having a ladder 61 with rungs 62 fixedly fastened between sloping supports 67 and 68 and vertical supports 69 and 70 integrally joined together. Rails 63 and 64 are of C-shaped sheet metal construction, being connected together by cross-members 65 welded thereto and being joined to ladder 61 by cross-members 66 having ends welded to ladder 61 and member 65. In the retracted position, rails 63 and 64 are slidably contained by rails 43 and 44 with ladder 61 fitting freely through the opening defined by cross-members 46 and 122 (FIG. 2) and the top rung of ladder 41.

A right-angle sheet metal bracket 55 is welded atop of C-shaped cross-member 56, having ends welded to members 32 and 33. Winch 17 is fixedly fastened to the top of bracket 55 by suitable fastening devices, such as bolts and nuts. Handle 18 is rotatably engaged by gearing within winch 17 to a cable wheel 100 having two 3/16-inch-diameter steel cables 101 and 102 (FIG. 2) firmly secured thereon. Winch 17 is provided with a suitable braking and ratchet mechanism to secure wheel 100 in the desired position. Pulleys 103 and 104 are rotatably mounted to the bottom flange of cross-member 56

(FIG. 2) and receive cables 101 and 102 from cable wheel 100. Pulleys 107 and 108 are rotatably mounted to the U-shaped brackets 106 fixedly fastened to the bottom flange of cross-member 105 welded to housings 25 and 26. Cable 101 is received by pulley 107 and routed up the exterior back side 116 of mast assembly 20. Cable 102 is received by pulley 108 and is also routed up the back side 116 of mast assembly 20. Pulleys 110 and 111 (FIG. 2) are each rotatably mounted to U-shaped brackets 109 which are mounted to the bottom flange of the uppermost cross-member 112 welded to housings 25 and 26. Cables 101 and 102 are respectively received by pulleys 111 and 110, and are then routed through cable guides 113 and 114 fixedly fastened to the bottom cross-member 115 welded to rails 43 and 44 of middle mast assembly 40. Guides 113 and 114 are fixedly mounted through the top and bottom flanges of member 115, and are hollow with bottom ends pointing into each other. Cables 101 and 102 loop through pulleys 110 and 111, and extend down the interior back side 118 (FIG. 1) of mast assembly 20. Cables 101 and 102 slide freely through cable guides 113 and 114, and are fastened securely together by conventional wire cable clamps 119.

Cables 120 and 121 (FIG. 2) are fixedly fastened to cross-member 126 of lower mast assembly 20. Member 126 is welded to housings 25 and 26. Cables 120 and 121 extend up the exterior back side 116 of mast assembly 20 and are received by pulleys 124 and 123 mounted to U-shaped brackets 125 fastened to the lower flange of cross-member 122 welded to rails 43 and 44. Cables 120 and 121 are then routed down through cable guides 127 and 128, which are fixedly fastened to the bottom cross-member 129 of top mast assembly 60. The ends of cables 120 and 121 are tied together by wire cable clamps 130 identical to clamps 119.

Mounted to the top of mast assembly 60 (FIG. 1) is scaffold assembly 80, which has a platform 81 fixedly fastened to the uppermost cross-member 82 welded to rails 63 and 64 and joined to ladder 61. Pivotaly mounted to platform 81 is cage assembly 83, having upstanding pipes 84, 85, 86 and 87 integrally connected together by horizontal pipes 88, 89 and 90. Sheet metal channels 91, 92 and 93 are welded to the upstanding pipes, strengthening the overall cage assembly. Base channels 94 and 95 are fixedly mounted to the bottom ends of pipes 84 through 87, each having a tab 96 fixedly fastened to their bottom side for receiving fastener 97. Cage assembly 83 is pivotaly mounted to platform 81 by fasteners 97 securing tabs 96 to the side of platform 81. The cage assembly may be disengaged from the erect position by pivoting the cage assembly in the direction of arrow 98. Base channels 94 and 95 are spaced sufficiently apart to fit around the outside of platform 81.

FIG. 3 is a fragmentary view looking up at the bottom of scaffold assembly 80 in the direction of arrows 3—3 of FIG. 2. Two additional flanges 131 and 132 are fixedly mounted to the bottom sides of base channels 95 and 94 adjacent the uppermost cross-member 82. Flanges 131 and 132 have holes for lockingly receiving pins 133 and 134 slidably mounted to the bottom of platform 81 by pin holders 135. Pins 133 and 134 extend through side walls 72 and 71 of platform 81 and have cables 136 and 137 fixedly attached which are routed through hollow cable guide 138 and across the bottom of platform 81 through the back wall 99. Cables 136 and 137 are then fixedly attached to ball handle 139, which is suspended below the platform. These pin locking devices are quite conventional and typically have springs located in holders 135, forcing the pins outwardly. Thus, handle 139 may be pulled, retracting the pins and allowing flanges 131 and 132 to be pivoted to or from platform 81.

A small platform 140 (FIG. 1) is pivotaly mounted by fasteners 141 to channels 91 and 92. Two spring-loaded pins 142 are slidably mounted to the bottom side of platform 140 for engaging flanges 143 and 144 fixedly mounted atop channels 91 and 92. In the unengaged position, platform 140 is swung up so as to be parallel with tubes 85 and 87. In the event the operator desires to be slightly higher, platform 140 may be

swung down and pins 142 may be slipped through holes provided in flanges 143 and 144. Holes are provided in tubes 85 and 87 to receive pins 142 when platform 140 is in the vertical position forming a wall between tubes 85 and 87.

Since vehicle 10 is mounted on wheels, the vehicle may move when a person is on scaffold assembly 80. Thus, adjustable floor jack assemblies and braces are provided to brace the vehicle and disengage the wheels from the floor. Mounted to the front of frame 11 are identical jack assemblies 150 and 151. A housing 152 is welded to each inside front corner of frame 11 extending down and slidingly receiving spring loaded legs 153 having a rubber or plastic foot 154 fixedly fastened to their bottoms. Hollow members 155 are pivotaly mounted to legs 153 by fasteners 159 each having a handle 156. Hinges 157 are pivotaly mounted to housings 152 and members 155 allowing handles 156 to be pulled up while member 155 pivots about fastener 159 in the direction of arrow 158. Legs 153 will then slide up into housings 152 and the vehicle will rest on its wheels.

Rear braces 160 and 161 are identical, each having an extension 162 pivotaly mounted to members 32 and 33. A leg 163 and foot 164 are fixedly fastened to the end of each extension 162. Two horizontal members 165 are fixedly fastened to housings 25 and 26, and are integrally joined to members 32 and 33 by upstanding frame members 167. Cross-members 166 and 168 are integrally joined respectively to members 32 and 33 and members 165 for structural rigidity. Extensions 162 are pivotaly mounted to rods 171 extending through tubes 169 and 170 fixedly fastened to the end of members 32, 33 and 165. A threaded rod 174 fastened to the top of extension 162 by bracket 173 and a suitable fastening device is threadably received into turnbuckle 175. A second threaded rod 176 is threadably received into the opposite end of turnbuckle 175 and is fastened beneath tube 169 to rod 171. To disengage the rear wheels of the vehicle from the supporting surface, turnbuckles 175 should be rotated thereby applying compression to rods 174 and 176 and causing rear braces 160 and 161 to push the vehicle upwardly. FIG. 1 illustrates only one rear brace 161; however, it is understood that brace 160 is identical.

FIG. 4 illustrates the vehicle in a fully retracted position, with ladders 41 and 61 positioned between ladder 21 and housings 25 and 26. Of course, rails 43, 44, 63 and 64 are positioned between housings 25 and 26. Platform 81 projects out from the top of rails 63 and 64, with cage assembly 83 pivoted in the down position abutting housings 25 and 26. Extensions 162 are pivoted inward adjacent cross-member 166. To erect the vehicle, handle 18 is rotated, causing the middle mast assembly 40 (FIG. 1) to gradually extend up from the bottom mast assembly 20. As the middle mast assembly 40 is extended, the top mast assembly 60 is also pulled and extended out from middle mast assembly 40. After the desired height has been reached, winch 17 is set to hold the cables and cage assembly 83 is pivoted upwardly about fasteners 97. Handle 139 (FIG. 3) is then pulled and released in such a manner that pins 133 and 134 engage brackets 131 and 132. The adjustable jack assemblies and braces are set when the ladder has been positioned in the desired location.

Vehicle 10 may be made from many materials; however, best results have been obtained by producing the entire frame, cross-members, housing, rails and ladders from cold rolled steel sheets. Many variations of the present vehicle are contemplated and included in the present invention. For example, the vehicle may be provided with more than or less than three mast assemblies. Of course, the size of the vehicle may be varied greatly. In one particular embodiment, the vehicle in the fully retracted position is six feet in height and thirty inches in width, thereby allowing passage of the vehicle through a standard doorway. This same vehicle in the fully extended position is sixteen feet high. The present vehicle may also be modified by replacing the manually operated winch with an electrically powered winch.

It will be obvious from the above description that the present invention provides a ladder scaffold vehicle which has a slanting ladder and which may be extended to reach high places and retracted to fit through a doorway. The winch pulley arrangement described allows the slanting ladder to be utilized in the partially extended position as well as the fully extended position. It will also be obvious from the above description that the ladder scaffold vehicle has adequately spaced wheels and adjustable jack assemblies and braces to stabilize the vehicle. In addition, it will be obvious that the ladder-scaffold vehicle is relatively lightweight being made from sheet metal, while capable of supporting relatively large loads.

While the invention has been illustrated and described in detail in the drawings and foregoing description, the same is to be considered as illustrative and not restrictive in character, it being understood that only the preferred embodiment has been shown and described and that all changes and modifications that come within the spirit of the invention are desired to be protected.

The invention claimed is:

1. A ladder scaffold vehicle comprising:
 - a main frame having wheels rotatably mounted thereto;
 - a telescopic ladder mounted atop said frame having a top end and a bottom end, said ladder being slanted from said top end to said bottom end at all times;
 - a first platform fixedly connected to the uppermost portion of said telescopic ladder;
 - telescopic sheet metal channels fixedly mounted to said frame and fixedly attached to said ladder at multiple locations along the length of said ladder, said channels being vertically erect on said frame;
 - cable means operable to extend and retract said telescopic ladder; and,
 - retractable support means operable to stabilize said vehicle.
2. The vehicle of claim 1 additionally comprising:
 - a second platform erectable and connected to said first platform; and,
 - a cage pivotally mounted atop said first platform.
3. The vehicle of claim 1 wherein:
 - said cage has vertically erect tubes connected together extending above said first platform; and,
 - said second platform is pivotally mounted to said cage and is secureable in a horizontal position and in a vertical position, said second platform in said horizontal position is located above said first platform, said second platform in said vertical position forms a wall between said tubes.

4. The vehicle of claim 3 wherein:
 - said channels and said ladder each have a lower section, a middle section and a top section; and,
 - said cable means has a first cable-winch arrangement connected to said lower section and said middle section operable to extend and retract said middle section with respect to said lower section, said cable means also has a second cable arrangement connected to said lower section, said middle section and said top section operable to extend and retract said top section with respect to said lower section and said middle section.

5. The vehicle of claim 4 wherein:
 - said support means has extendable braces pivotally connected to said main frame and foldable against said frame when not in use, said support means has a turnbuckle-rod arrangement operable to lift said vehicle.

6. The vehicle of claim 5 wherein:
 - said frame, said ladder, said first platform, and said second platform are formed from sheet metal.

7. A ladder scaffold apparatus comprising:
 - a frame;
 - a lower mast assembly fixedly mounted to said frame and having a first slanted ladder and a first support connected together;
 - a middle mast assembly mounted atop said frame and fitting within said lower mast assembly in the retracted position, said middle mast assembly being extendable from said lower mast assembly and having a second slanted ladder and a second support connected together;
 - a top mast assembly mounted atop said frame and fitting within said middle mast assembly in the retracted position, said top mast assembly being extendable from said middle mast assembly and having a third slanted ladder and a third support connected together;
 - a scaffold mounted atop said top mast assembly; and,
 - means operable to retract and extend said top mast assembly and said middle mast assembly to and from said lower mast assembly.

8. The apparatus of claim 7 additionally comprising:
 - extendable braces pivotally mounted to said frame and having a turnbuckle-rod arrangement operable to lift a portion of said apparatus; and,
 - adjustable jack assemblies connected to said frame and operable to lift a portion of said apparatus.

9. The apparatus of claim 8 additionally comprising:
 - a cage pivotally mounted to said scaffold assembly; and,
 - a stepping platform mounted to said cage.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,664,458 Dated May 23, 1972

Inventor(s) Lorance C. Sterns and Arthur G. Howard

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Assignment, please delete:

M. S. Churchman, Inc., Indianapolis, Md.

and substitute:

--M. S. Churchman Co., Inc., Indianapolis, Ind.--

Signed and sealed this 28th day of November 1972.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents