April 28, 1964 L. J. ZAHNER ETAL 3,130,815

SCAFFOLD TYPE LIFT

Filed Dec. 15, 1961 3 Sheets-Sheet 1

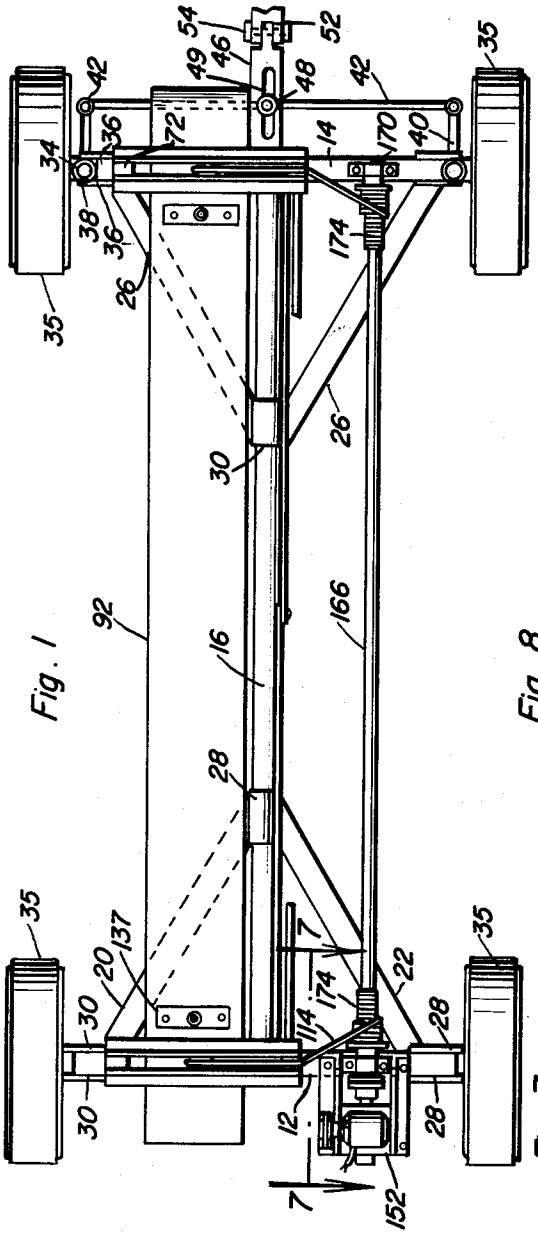


Fig. 1

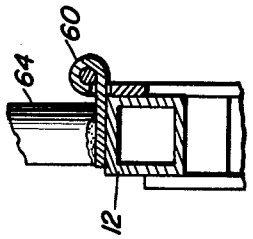


Fig. 9

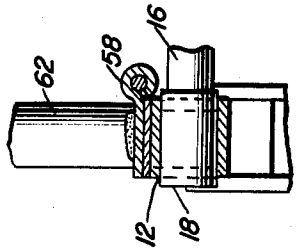


Fig. 8

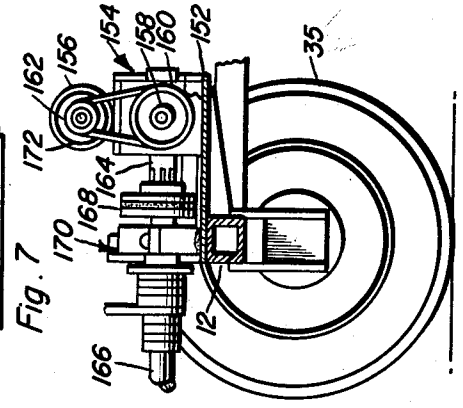


Fig. 7

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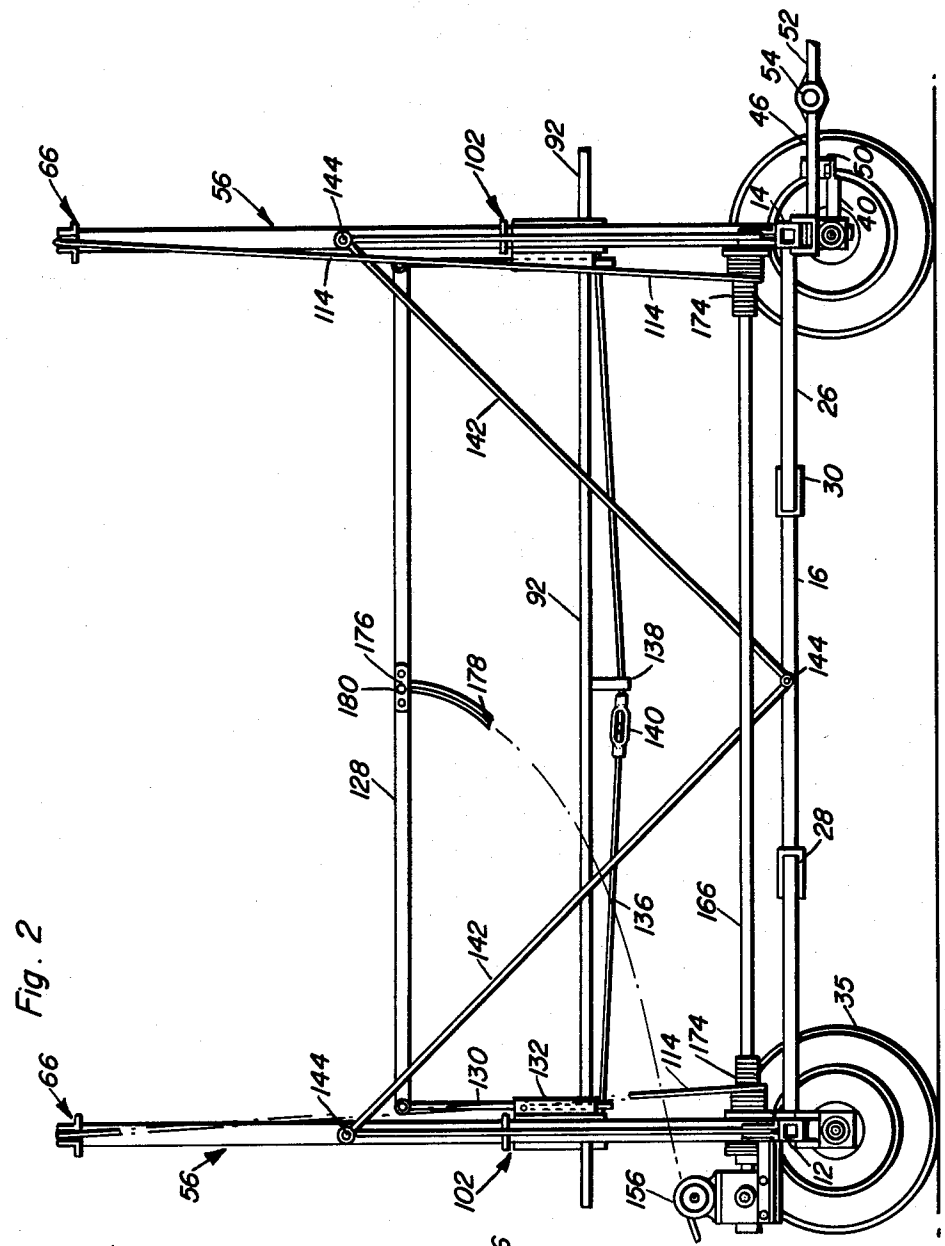


Fig. 2

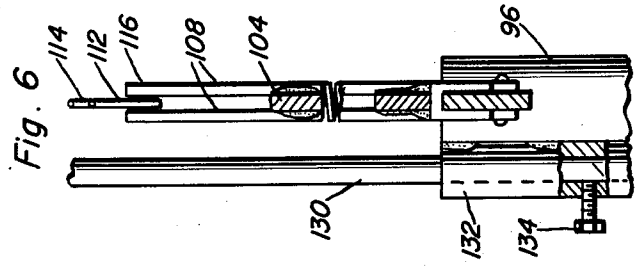


Fig. 6

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SCAFFOLD TYPE LIFT

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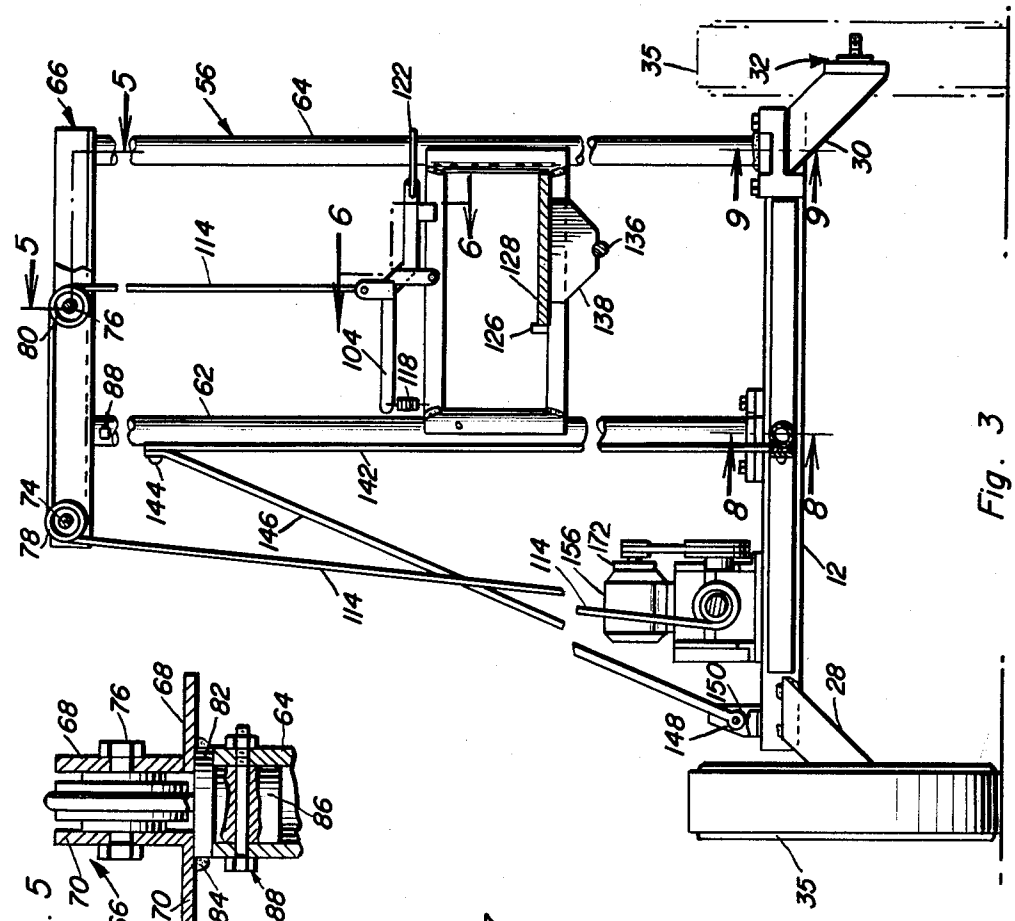


Fig. 3

Fig. 5

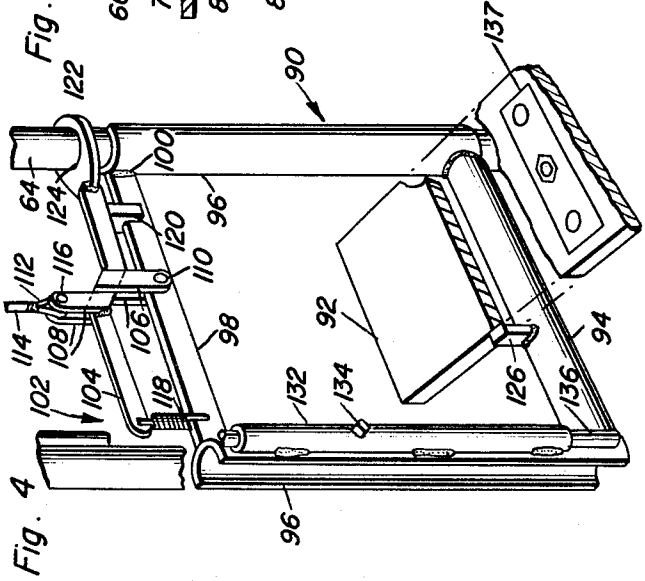


Fig. 4

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United States Patent Office 3,130,815 Patented Apr. 28, 1964

3,130,815

SCAFFOLD TYPE LIFT

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8 Claims. (Cl. 182—112)

This invention relates to scaffolds and lifting devices, and more particularly to a power operated scaffold movable in a vertical direction.

It is a primary object of the invention to provide a scaffold mounted on wheels whereby it is easily moved and transported from place-to-place.

It is another object of the invention to provide a scaffold, which is not only portable and light in weight, but is also callapsible whereby it may be folded into a compact unit.

It is another object of the invention to provide a scaffold which is operated up and down by power means, and control means are mounted on the movable portion of the scaffold whereby anyone carried on the scaffold may control the power means for raising and lowering himself.

It is yet another object of the invention to provide a scaffold which has numerous safety features such as a handrail and also a safety latch for preventing accidental falling of the scaffold.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a plan view of the invention;

FIGURE 2 is a side elevational view with the wheels on the near side removed;

FIGURE 3 is a cross-sectional vertical view taken through a central portion of the device and looking toward the rear end thereof;

FIGURE 4 is a perspective view of a portion of the invention and the safety brake therefor;

FIGURE 5 is a vertical cross-sectional view on an enlarged scale taken substantially on the plane of line 5—5 in FIGURE 3;

FIGURE 6 is a cross-sectional view taken substantially on the plane of line 6—6 in FIGURE 3;

FIGURE 7 is a vertical cross-sectional view taken substantially on the plane of line 7—7 in FIGURE 1;

FIGURE 8 is a cross-sectional view on an enlarged scale taken substantially on the plane of line 8—8 in FIGURE 3; and

FIGURE 9 is a cross-sectional vertical view on an enlarged scale taken substantially on the plane of line 9—9 in FIGURE 3.

As shown in the drawings, the scaffold includes a frame assembly 10 which comprises two laterally extending axle members 12 and 14 of hollow rectangular cross section and connected at their centers by a longitudinally extending member 16 of hollow construction. As shown in FIGURE 8, the axles 12 and 14 each have a horizontally extending tubular sleeve 18 extending through and secured in their central portions. The ends of the longitudinally extending tubular member 16 extend into and are secured by conventional means to the tubular sleeves 18. The frame assembly 10 is braced diagonally by means of four diagonally extending braces 20, 22, 24 and 26 which extend diagonally between tubular sleeves 28 and 30 and the outer ends of the axles. The tubular sleeves 28 and 30 telescopically receive the longitudinally extending tubular member 16 as shown in FIGURE 1.

Each end of the rear axle 12 is rigidly secured to pairs of parallel wheel supporting plates 28 and 30. As shown in FIGURE 3, these plates extend diagonally downwardly and outwardly from the axle 12 and have conventional journal assemblies 32 secured to their outer ends for removably and rotatably supporting wheels 35. Each of the wheels 35 include a conventional rim and pneumatic tire mounted on the assemblies 32.

Each end of the axle 14 supports a vertically extending kingpin 34 by means of parallel plates 36 secured to the axle 14 and the journals 38 for the kingpins. The bottom end of each kingpin is secured to a forwardly extending arm 40. The forward ends of the arms 40 are pivotally connected to each other by means of a tie rod 42 and vertically extending pins 44 which extend through alined eyes in the arms and tie rod. The central portion of the tie rod 42 is secured to a horizontally extending tongue 46 by means of a headed stud 48 and a bracket 50. The tongue 46 is connected to a tow bar 52 by means of a pivot pin 54 extending through alined apertures in the overlapping ends of the tongue and tow bar. The other end of the tongue 46 is pivoted to member 14 for rotation about an upstanding axis.

Two substantially identical vertically extending supports 56 are pivotally secured to the axles 12 and 14 as by hinges 58 and 60 as shown in FIGURES 3, 8 and 9. As shown in FIGURE 3, each of the supports 56 comprise a pair of parallel and vertically extending spaced tubular columns 62 and 64. As shown in FIGURES 8 and 9, the inner column 62 is welded to the upper leaf of hinge 58 while the lower leaf of the hinge is welded to the upper surface of the axle 12. This prevents the hinge from interfering with the member 16. The column 64 is welded to one leaf of the hinge 60 while the other leaf of the hinge 60 is welded to the inner vertically extending edge of the axle 12.

The upper ends of the columns 62 and 64 are rigidly connected by a beam 66. The beam 66 comprises two horizontally extending, parallel, spaced angle members 68 and 70 secured together by means of a block 72 and pulley axles 74 and 76 which extend between and are welded or bolted to the angle members. Mounted on the axles 74 and 76 are pulleys 78 and 80 respectively. The angle members 68 and 70 are also secured together by circular members 82 welded thereto by welds 84 and having reduced lower ends 86 extending into the upper ends of the columns 62 and 64 and removably secured therein by bolt and nut assemblies 88.

Slidably mounted between the columns 62 and 64 of each support 56 is a platform support 90 for supporting the horizontally extending platform 92 which extends between the two supports 56 and is supported on the tubular member 94 of the platform support 90. The tubular member 94 is welded at each end to the lower end of a vertically extending guide member 96 which is semicircular in cross section as shown in FIGURE 4. The upper ends of the guide members 96 are connected by a brace member 98 and welds 100. A safety device 102 is pivotally connected to the brace 98, and includes a generally horizontally extending lever 104 having a pair of lugs 106 extending downwardly therefrom and a pair of lugs 108 extending upwardly therefrom. The pair of lugs 106 embrace the brace 98 and are pivotally connected thereto by means of a generally horizontally extending pin 110. The upper ends of the lugs 108 embrace the end loop 112 of cable 114, and are pivotally connected thereto by means of a pin 116. As viewed in FIGURE 4, a tension coil spring 118 is connected between one end of the lever 104 and brace 98 thereby resiliently urging them together. The other end of the lever 104 abuts against a stop member 120 on brace 98

and is secured to a flat plate 122 which has a bore 124 therethrough for slidingly receiving the column 64. Normally the cable 114 urges the lever 104 against stop 120 whereby the plate 122 is perpendicular to the axis of column 64 thereby permitting the column to slide through bore 124. An upstanding lug 126 is welded to the central portion of the tubular member 94, and this lug in conjunction with one of the guide members 96 prevents lateral sliding of the platform 92.

A handrail 128 extends parallel to the platform 92 and is supported several feet thereabove by means of downwardly extending rods 130 which are pivotally secured to each end of the handrail and extend into tubular sleeves 132 welded to the innermost guide member 96 as shown in FIGURE 4. The rods 130 are detachably secured to the sleeves 132 by means of setscrews 134.

A metal rod 136 is connected between the ends of the platform 92 at its lower side, and the middle portion of the rod is deflected downwardly by a generally triangular plate 138. The rod 136 is tightened by means of a turnbuckle 140 whereby the platform 92 is substantially strengthened and made more rigid.

The supports 56 are prevented from pivoting on their supporting hinges 58 and 60 by diagonal rods 142 which extend between the center of the member 16 and the outermost guide members 96. The rods 142 are pivotally connected at their ends by removable pins 144. The supports 56 are reinforced laterally by means of struts 146 which are riveted to the upper central portion of the columns 62 and are pivotally connected by removable pins 148 to angle members 150 welded to the upper surfaces of the axles.

A generally horizontally extending support structure 152 is mounted on the upper surface of one end of the axle 12 as shown in FIGURES 1 and 7. Mounted on the support 152 is a transmission 154 and an electric motor 156. The transmission 154 comprises a horizontally extending shaft 158 rotatably supporting a pulley 160 which is drivingly engaged with the pulley 162 which is driven by the motor 156. The inner end of the shaft 158 has a worm gear thereon which engages with a gear on the transmission shaft 164. The shaft 164 is connected to the cable shaft 166 by means of a flexible coupling 168. The shaft 166 is rotatably journalled at its ends on the axles by means of journal assemblies 170. Preferably, the pulley 162 is also connected to the motor 156 by a conventional centrifugally engaged clutch 172.

A small drum 174 is secured to each end of the shaft 166 and has wound thereon a steel cable 114. The drums 174 also preferably include a self-adjusting cable holder, not shown, which allows the cable to turn in either direction without kinking. Each of the cables 114 extend upwardly from the drums 174 and is looped over the pulleys 78 and 80, and is secured to a lever 104 as shown in FIGURES 4 and 6.

A manually operable switch 176 is secured to the rail 128 and is operatively connected to the electric motor 156 by means of a flexible conductor 178. The motor 156 may be a D.C. type and operated by storage batteries, or it may be an A.C. type.

In operation, the portable scaffold is connected to a towing vehicle by means of the tow bar 52 whereby it is towed to the desired location. The tow bar 52 and tongue 46 steer the front wheels 35 by means of the tie rods 42, the arms 40 and the kingpins 34. To use the scaffold, the electric motor 156 is connected to a suitable source of electricity and the operator mounts the platform 92. By moving the toggle lever 180 of switch 176, the operator can control the direction of rotation of motor 156 for lifting or lowering the platform 92 by means of the cable 114 as desired.

Referring to FIGURE 4, it is clear that as long as there is tension on the cable 114, the spring 118 will be under tension for urging one end of the lever 104 downwardly. However, the tension in cable 114 will overcome the tension of spring 118 for urging the other end of the lever against the stop 120 thereby maintaining plate 124 in a horizontal position whereby it is normal to the tubular column 64. However, if the cable 114 should break or if for any other reason its tension should be reduced substantially, the spring 118 will urge one end of the lever 104 downwardly whereby the plate 122 will become tilted and the relatively sharp edges of bore 124 will grip and bite into the surface of column 64 for preventing downward movement of the platform 92. It is to be noted that the heavier the load on the platform 92, the more the sharp edges defining bore 124 will bite into column 64.

When the scaffold is not needed, it may be folded and stored in a compact space. The folding or collapsing of the scaffold is accomplished by removing the nut and bolt assemblies 88 and beams 66 shown in FIGURE 5, by removing the pins or bolts 144, and folding the supports 56 downwardly toward each other by means of their hinges 58 and 60. The rods 142 and 146 may also be pivoted downwardly on their hinges 144 and 148 respectively until they also lie substantially flat with the supports 56. When these parts are folded downwardly upon the upper surfaces of the axles 12 and 14, the scaffold occupies a space comprising a minor fraction of the space it occupies when it is assembled for operation.

While the guide members 96 are illustrated as having plain bearing surfaces, these members could be provided with rollers or roller bearings, or a plurality of roller members could replace the guide members. This would substantially reduce the friction between safety device 102 and columns 62, 64.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A lifting device comprising an elongated base, a pair of elongated supports pivotally secured to opposite end portions of said base for rotation about generally parallel axes extending transversely of said base between substantially vertical upright operative positions and generally horizontally disposed collapsed positions overlying said base, a support member slidably mounted on each of said supports for guided movement longitudinally therealong between raised and lowered positions when said supports are disposed upright and against movement laterally of said supports, each of said support members including a generally horizontally disposed platform supporting portion extending transversely of said base, an elongated platform member extending between and having its opposite ends removably resting upon said portions of said support members, rotatable pulley means carried by the upper end of said support members, rotatable winding means supported from said base, and elongated flexible tension members wound partially about the winding means and including two free end portions passed upwardly over said pulleys and secured to said support members.

2. The combination of claim 1 wherein said free ends are connected to said support members by means of safety devices, said safety devices each including a brake for gripping the corresponding support member and operable in response to reduction of the tension of the corresponding tension member to grip the corresponding support and prevent the associated support member from moving downwardly therealong.

3. The combination of claim 2 including a reversible motor means operatively connected to said winding means and including controls supported from said platform member for effecting operation of said motor means.

4. A lifting device comprising an elongated base, a

pair of elongated supports pivotally secured to opposite end portions of said base for rotation about generally parallel axes extending transversely of said base between substantially vertical upright operative positions and generally horizontally disposed collapsed positions overlying said base, a support member slidably mounted on each of said supports for guided movement longitudinally therealong between raised and lowered positions when said supports are disposed upright and against movement laterally of said supports, each of said support members including a generally horizontally disposed platform supporting portion extending transversely of said base, an elongated platform member extending between and having its opposite ends removably resting upon said portions of said support members, rotatable pulley means carried by the upper end of said support members, rotatable winding means supported from said base, and elongated flexible tension members wound partially about the winding means and including two free end portions passed upwardly over said pulleys and secured to said support members, said pulley means being mounted for rotation about axes disposed at generally right angles to said first-mentioned axes and extending transversely of said supports, said winding means including a pair of drums journaled from said base for rotation about axes extending longitudinally of said base and disposed in transverse alignment with the lower ends of corresponding ones of said supports and to one side of said base.

5. The combination of claim 4 including a shaft journaled for rotation from said base about an axis extending longitudinally of the latter, said winding drums being mounted on opposite end portions of said shaft for rotation therewith.

6. The combination of claim 5 including reversible motor means drivingly connected with said shaft.

7. The combination of claim 6 including a remotely operable control for said motor means supported from said platform member.

8. The combination of claim 4 wherein said frame is mounted on a plurality of wheels, means for steering at least one of said wheels and operably connected thereto.

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