Oct. 21, 1952 C. D. GARLINGER ET AL 2,614,800

PORTABLE ELEVATORY PLATFORM UNIT

Filed Aug. 5, 1947 3 Sheets-Sheet 1

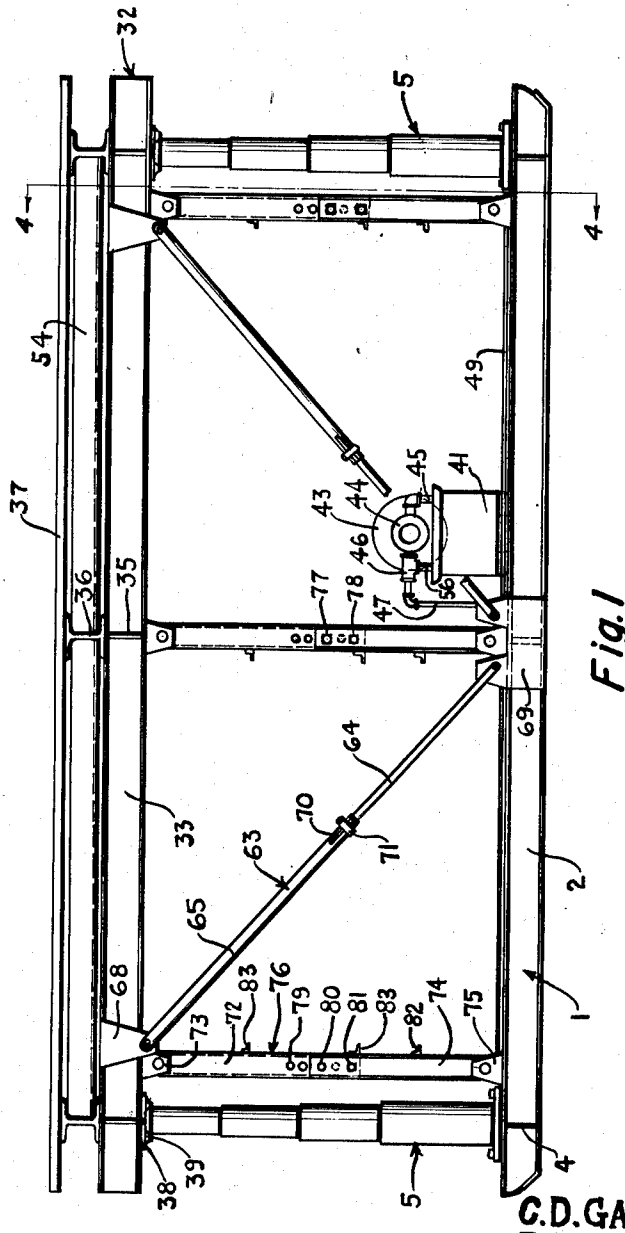


Fig. 1

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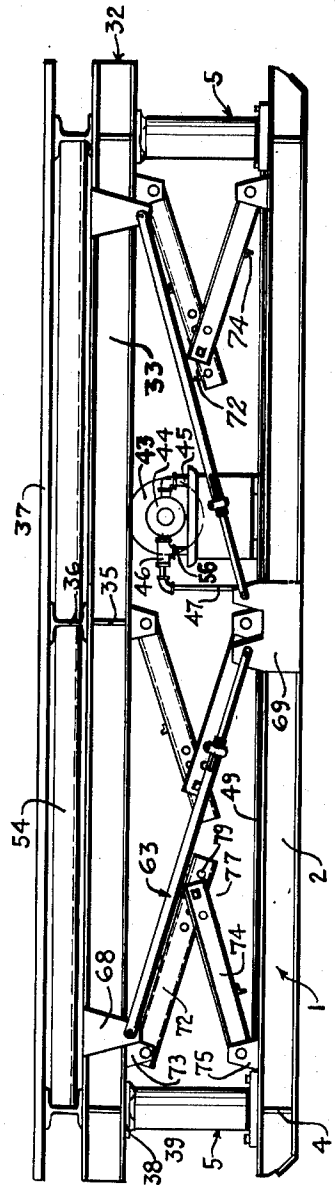


Fig. 2

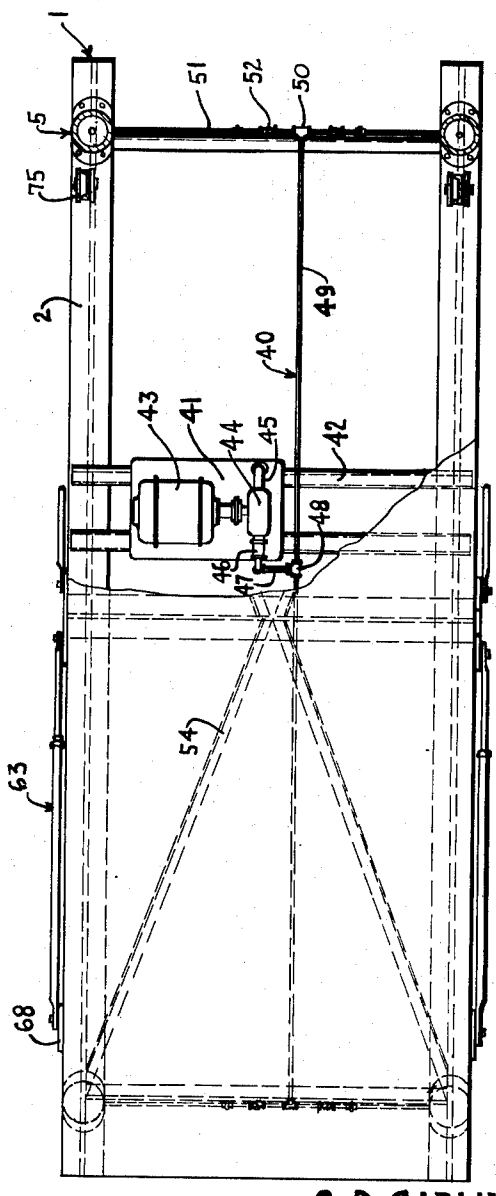


Fig. 3

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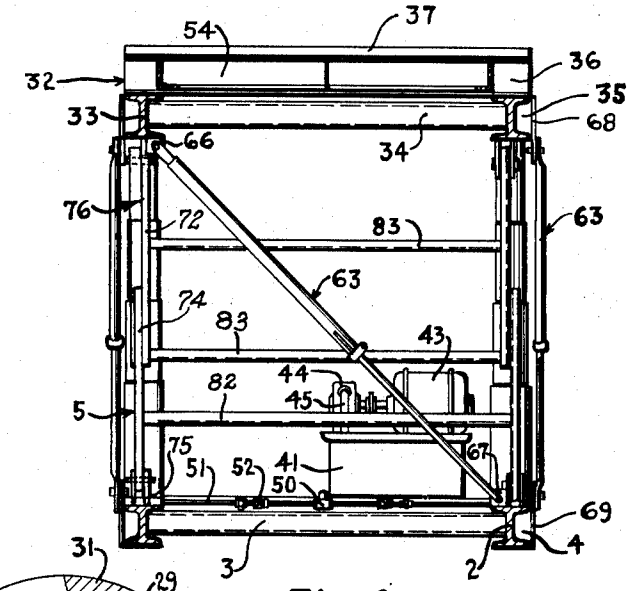


Fig. 4

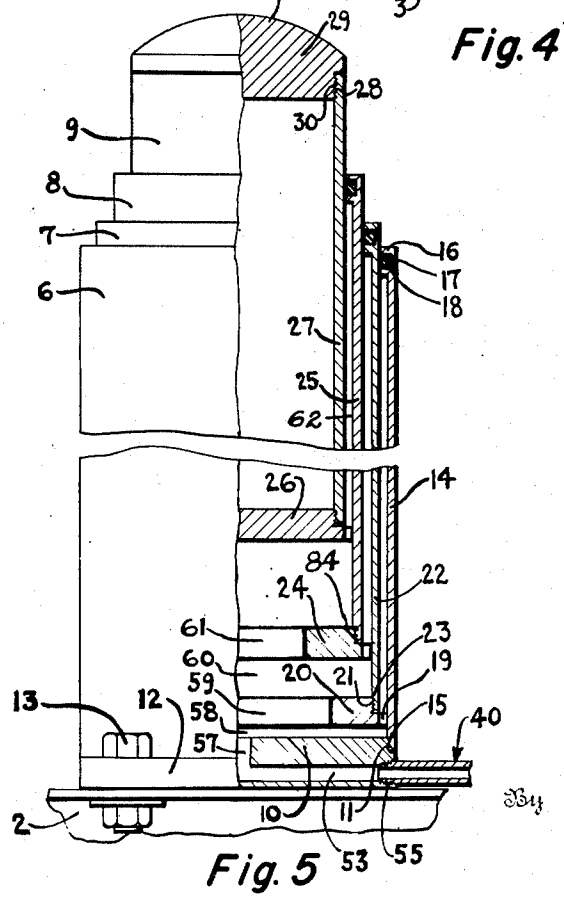


Fig. 5

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PORTABLE ELEVATORY PLATFORM UNIT

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4 Claims. (Cl. 254—2)

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This invention relates to a portable elevatory platform unit of substantial size for use in connection with construction and other operations such as the drilling of oil wells and the like.

An object of this invention is to provide a unit comprising a platform and an accurately controlled elevator in which the elevator consists of fluid operated jacks and in which each jack consists of a plurality of concentric pistons.

A further object of this invention is to provide an elevatory platform unit which is skid mounted and which is further adapted for portability by having the elevator operating fluid contained in a closed circuit integral with the unit.

A still further object of this invention is to provide an elevatory platform unit which permits the platform to be elevated to and rigidly fixed in a multiplicity of level positions.

With the above and other objects in view this invention has particular relation to certain novel features of construction, operation, and arrangement of parts which can manifestly be changed and combined in different ways within the scope and purpose of this invention.

Other objects and advantages of this invention will be apparent from the following description as illustrated in the accompanying drawings in which:

Fig. 1 is a side elevation showing the platform in raised position.

Fig. 2 is a side elevation showing the platform in lowered position.

Fig. 3 is a plan view of the platform with a part thereof cut away to more plainly show the skid and the fluid circuit mounted thereon.

Fig. 4 is an end elevation taken along line 4—4 of Figure 1, showing the platform in raised position.

Fig. 5 is a sectional elevation of one of the jacks.

The base of the unit consists of a skid 1 which comprises two longitudinally extending I-beams 2 which are transversely tied together by channels or suitable structural elements 3. At each of the four corners of the skid thus formed, and on opposite sides of the I-beam webs from the transverse members 3, gusset plates 4 are welded between the I-beam webs and the outer parts of the upper and lower flanges thereof.

In the form of the invention disclosed one jack 5 is shown provided at each of the four corners of the skid. Each jack consists of a cylinder member 6 which contains concentrically therein three pistons 7, 8, 9, respectively. The cylinders 6 have base plates 10 having an upper, externally threaded section 11 and a lower base

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flange 12. The jacks are affixed to the skid 1 by means of bolts 13 passed through the flanges 12 of the cylinders 6 and the upper flanges of the I-beams 2. The tubular member 14 of each cylinder 6 has an internally threaded section 15 at the lower end thereof to be threaded over the threaded section 11 of the base plate 10. The upper end of the tubular member 14 has an inwardly formed flange 16 which has an angular groove 17 therein to receive seal 18.

The pistons 7, 8, and 9 have base plates 20, 24, and 26, respectively, each of which has an externally threaded upper section 21 and each also has a plurality of circumferentially spaced centering and stop lugs 19 on the lower base plate periphery to concentrically space the base plates within the tubular members of the next encompassing element. The tubular members 22, 25, and 27 of the pistons 7, 8, and 9, respectively have internally threaded lower end sections 34 to be threaded over the externally threaded sections 21 of their respective base plates. The upper ends of the tubular elements 22 and 25 have internal flanges 16, grooves 17, and seals 18 of similar construction to those described for tubular member 14. The upper end of tubular member 27 terminates in an internally threaded section 28. The upper end of piston 9 is closed by a cap 29 which has an externally threaded section 30 to be threaded into section 28 of the tubular member 27, and the cap terminates upwardly in a section 31 of substantially spherical contour.

The base of the platform 32 consists of two longitudinally extending I-beams 33 transversely tied together at either end and near the mid-sections thereof by channels or suitable structural members 34. The I-beams 33 are further tied together by three transverse I-beams 36 welded to the top flanges thereof at points substantially directly above the channels 34. Three gusset plates 35 are also provided on each I-beam 33, being welded between the I-beam webs and the outer parts of the upper and lower flanges thereof at points substantially opposite the channels 34. The rectangular platform floor 37 is mounted on top of the I-beams 36, and extends over the area outlined by the platform base. Angles 54 are welded beneath the floor 37 for purposes of strengthening and bracing.

Four flange members 38 are mounted beneath the platform I-beams 33 at each corner. These flanges have lower portions 39 dished to spherical contour to receive the sections 31 of the pistons 9.

The unit is cross-braced by six inter-telescoping pipe members 63 which extend diagonally

from the platform base I-beams 33 to the skid I-beams 2. In all members 63 the larger pipe 65 is the upper element and the smaller pipe 64 is the lower element. There is one cross-brace at either end and in these members the larger pipe 65 is pivotally mounted to plate 66 which is welded to the under side of I-beam 33 and the smaller pipe 64 is pivotally mounted on the plate 67 which is welded to the top of I-beam 2. There are two longitudinally bracing members 63 on either side pivotally connected at the top to plates 68 which plates are welded to the sides of the flanges of the I-beams 33. At the bottom, these longitudinal bracing members 63 are pivotally connected to plate 69 which is welded to the sides of the flanges of the I-beam 2 at a point substantially near the mid-section thereof. The larger pipes 65 have a slot 70 in their lower ends so that they may be tightened to bind the smaller inter-telescoping pipes 64 by setting up on the clamps 71.

The platform unit also has six vertical supports 76 each consisting of an outwardly facing channel 74 pivotally mounted at the bottom to a bracket 75 welded to the top of I-beam 2, and an inwardly facing channel 72 pivotally mounted at the top to bracket 73 which is welded to the lower flange of I-beam 33. One transversely extending bracing angle 82 interconnects each lower outwardly facing channel 74 on one side of the unit to the channel 74 on the opposite side of the unit, and two transversely extending bracing angles 83 correspondingly interconnect each pair of upper inwardly facing channels 72. The channels 72 and 74 are of a length to overlap each other centrally of their combined vertical height. Each lower channel 74 has an upper hole 80 and a lower hole 81 located in its upper end along its longitudinal axis, and each upper channel 72 has a plurality of holes 79 in its lower end along its longitudinal axis to align with the holes 80 and 81.

The jacks 5 are hydraulically operated and the container or fluid tank 41 of the enclosed fluid system 40 is mounted on two transversely extending inverted channels 42 located substantially near the mid-sections of I-beams 2. A motor 43 is mounted on top of the tank 41 to drive the pump 44. The pump discharges through T 46, pipe 47, and T 48, to longitudinally extending line 49 and thence through T's 50 at either end of the line 49, to transverse lines 51. These transverse lines 51 terminate at either end in the jacks 5 at each corner of the skid. Two valves 52 are located in each transverse line 51 on either side of the T's 50.

The enclosed fluid system 40 is interconnected with each jack through a threaded section 55 in the periphery of the base plate 10. Radially extending passages 53 connect each section 55 with the central bore 57 in the upper part of the base plate 10. The base plates 20 and 24 have therethrough central bores 59 and 61 respectively, of such diameter that the area of bore 61 is greater than the difference between the area of bore 59 and the area of the bore 61.

In operation the desired platform elevation is predetermined and bolts 77 are inserted through the upper holes 80 in lower channels 74 and through those holes 79 of the upper channels 72 which will permit the platform to be raised to this desired predetermined elevation. The valves 52 are then opened and the pump 44 is started and takes the fluid from the container 41 through suction line 45 and discharges it through the closed circuit 40 to the jacks 5.

In lowered position the base plates 20, 24, and 26 of the pistons 7, 8, and 9, respectively, rest on the base plates of the next telescoping element exterior thereof. The fluid enters each jack through passage 53 and bore 57 in base plate 10 and passes upward through bores 59 and 61 to exert upward pressure successively against the bottoms of base plates 26, 24, and 20.

After fluid flows into the jacks 5 through the passages 53, it operates as follows: It first moves piston 9 upwardly until lug 19 thereon engages flange 16 on piston 8. Piston 8 is then moved upwardly by the fluid pressure until lug 19 thereon engages flange 16 on piston 7. Then the fluid pressure acts to move piston 7 up until lug 19 thereon engages flange 16 on the cylinder 6. This sequence of operation is obvious from the sizes of the base plates 26, 24, and 20, from the bores 59 and 61, respectively, in the base plates 24 and 20, and from the diameter of the inside 62 of the piston 8.

When the lugs 19 contact the flange 16 of the cylinder 6, or when the channels 72 and 74 are in substantially vertical alignment, the bolts 77 may be inserted in the holes 79 and 80 to stop further upward motion and to put the platform in condition to transfer the load therefrom off of the jacks 5, to be supported by the supports 76.

It is a feature of the construction of the jack mechanism that a degree of dampening control is permitted since as the piston 8 moves upwardly to top position the liquid between the base plate 26 and the annular top surface of the base plate 24 is squeezed out therefrom toward the center of the jack, with the result that the upward movement of the piston 8 undergoes an extent of cushioning. This same effect is obtained as the piston 7 moves upwardly to force the liquid out of the space between the base plate 24 and the annular top surface of the base plate 20 as the piston 7 approaches top position. It is obvious that this feature of construction of the jack permits a fine degree of control of the motion of the pistons 7 and 8 as the load of the platform is raised to its uppermost position.

With the platform at desired elevation lower bolts 78 are inserted through the lower holes 81 in the channels 74 and through corresponding holes 79 in the channels 72. The clamps 71 are then tightened about the slotted sections 70 of pipes 65 to bind the two inter-telescoping pipes 65 and 64 rigidly together thereby giving effectiveness to the cross-braces.

Although the inter-telescoping piston structure of the jacks hereinbefore discussed provides a very positive means of moving the corresponding pistons of each jack upwardly at the same rate of speed so that the sections 31 of each jack are constantly at practically the same height during upward travel, a further compensation is necessary to provide for the unanticipated occurrence of more binding or lagging between the elements of one jack than occurs between the elements of the other jacks, or to compensate for any excess platform load placed over any one jack. This additional compensation is provided for by manually operating the valves 52 when the platform begins to reach the desired elevation so that greater fluid pressure is maintained on any jack which may be lagging in upward travel, or by leaving the fluid pressure on such lagging jack to bring it to desired

elevation after the fluid pressure has been taken off the jacks which have reached the desired elevation. In this manner the platform may finally be brought to a level position in the desired horizontal plane so that the lower bolts 78 may be inserted in the holes 79 and 81 to give rigidity to the vertical supports 76. The spherical contours of the cap sections 31 and the flange portions 39 maintain a sliding ball and socket contact and serve as a further compensating factor during upward travel.

When the lower bolts 78 have been inserted and the clamps 71 have been tightened the pump 44 may be shut down. When this occurs the weight of the platform forces some of the fluid back into the tank 41, and the platform settles on the supports 76 which now carry its load. At this point the valves 52 may be closed so that the jacks below the base plates 26 of the pistons 9 remain full of fluid.

When it is desired to lower the platform the clamps 71 are loosened, the lower bolts 78 are removed, and the valves 52 are opened but the pump 44 remains shut down. The weight of the platform then forces all of the fluid out of the jacks 5 and back through the closed circuit 40, the pipe 47, the T 46, and down through a nipple 56 into the tank or container 41. In this manner the fluid, as it is forced back into the container, acts as a buffer in lowering the platform and any load that may be thereon, without the shock of a rapid descent. It is apparent that this unit also admits the jacks being placed under such pressure, before the valves 52 are closed, that they may help the vertical supports 76 carry the load. If desirable, it is also possible to reverse the pump 44, after the platform load is being carried by supports 76, and return all of the fluid to the tank 41 to remain until such time as it may be desired to lower the platform.

It can be seen that a unit of this character has many adaptations as a combination platform and elevator for outdoor or field construction and other operations such as the drilling of oil wells where it is necessary to raise or lower heavy loads to and from substantial elevations. As it is usually necessary to unload equipment and materials from the levels of motor vehicle beds, the unit can be designed so that when in its lowest position the platform 32 is at a level to conveniently receive materials from such vehicles.

The platform unit may also be used as a jack to raise one or more legs of an oil derrick which may have settled. In such case an end of the unit is placed under a side of the drilling platform and fluid pressure is admitted to that jack or to those jacks which must be actuated to elevate as required. It is also possible to remove the platform 32 entirely so as to use a single jack for elevating.

As the unit is skid mounted it can be attached behind a motor vehicle, or it can be loaded on a truck bed and moved from one location to another.

It is to be understood that references in the specification and claims to positions and directions such as "upper" and "lower," "upward" and "downward," "above" and "below" apply to the device as illustrated in the drawings wherein the upper portion of the device is shown as uppermost. It is obvious that mechanical changes may be made in the structure, and equivalents may be substituted for the parts shown and we reserve the right to make such

mechanical changes, substitutions and adaptations within the scope of the invention as comprehended by the appended claims.

What is claimed is:

1. With an elevatory platform including a portable frame and a platform member adapted to be elevated above said portable frame, jacks under at least each corner of said platform member, each jack comprising, a cylinder having a base and a set of concentric pistons therein, a base plate for each piston, the base plate of the innermost piston being solid and being adapted to seat on the base plate of the surrounding piston, the base plate of the outermost piston being adapted to seat on the cylinder base, the successive base plates outwardly from the innermost base plate having concentric and successively larger bores therethrough, said cylinder bases being rigidly mounted on said frame, a ball and socket connection between the top of each innermost piston and said platform member, a closed fluid circuit mounted on said frame to communicate with said cylinder bases and said pistons exterior of said innermost piston, a reversible direction pump for pumping fluid into and out of said jacks, valves in said circuit for controlling the admission of fluid to each jack, a fluid tank in said circuit, by-pass means connected to the discharge of said pump so that with said valves open and said pump shut down, the descending platform weight will force said fluid from said jacks into said tank, upright supports for said platform member adjacent said jacks, each support including, an upper support section pivotally mounted at its upper end to said platform member, a lower support member pivotally mounted at its lower end to said portable frame, means pivotally connecting the other ends of said support sections, and additional means to connect the other ends of said support sections to form a substantially rigid upright support of said sections when said platform member is elevated, and diagonally extending pairs of intertelescoping brace members between said uprights, the uppermost member being pivotally connected to said platform member proximate one upright and the lowermost member being pivotally connected to said frame proximate an adjacent upright, and connection means for each pair of brace members to connect said pair of brace members together.

2. With an elevatory platform including a portable frame and a platform member adapted to be elevated above said portable frame, jacks under at least each corner of said platform member, each jack comprising, a cylinder having a base and a piston means therein, said cylinder bases being rigidly mounted on said frame, a ball and socket connection between the top of said piston means and said platform member, and means on said frame to supply fluid to, and to withdraw fluid from each jack cylinder individually to individually operate said piston means, upright supports for said platform member adjacent said jacks member, each support including, an upper support section pivotally mounted at its upper end to said platform member, a lower support member pivotally mounted at its lower end to said portable frame, means pivotally connecting the other ends of said support sections, and additional means to connect the other ends of said support sections to form a substantially rigid upright support of said sections when said platform member is elevated between said uprights, and diagonally extending

pairs of inter-telescoping brace members, the uppermost member being pivotally connected to said platform member proximate one upright and the lowermost member being pivotally connected to said frame proximate an adjacent upright, and connection means for each pair of brace members to connect said pair of brace members together.

3. With an elevatory platform including a portable frame and a platform member adapted to be elevated above said portable frame, jacks under at least each corner of said platform member, each jack comprising, a cylinder having a base and a piston means therein, said cylinder bases being rigidly mounted on said frame, a ball and socket connection between the top of said piston means and said platform member, and means on said frame to supply fluid to, and to withdraw fluid from each jack cylinder individually to individually operate said piston means and upright supports for said platform member adjacent said jacks, each support including, an upper support section pivotally mounted at its upper end to said platform member, a lower support member pivotally mounted at its lower end to said portable frame, means pivotally connecting the other ends of said support sections, and additional means to connect the other ends of said support sections to form a substantially rigid upright support of said sections when said platform member is elevated.

4. With an elevatory platform including a portable frame and a platform member adapted to be elevated above said portable frame, jacks under at least each corner of said platform member,

each jack comprising, a cylinder having a base and a piston means therein, said cylinder bases being rigidly mounted on said frame, a ball and socket connection between the top of said piston means and said platform member, and means on said frame to supply fluid to, and to withdraw fluid from each jack cylinder individually to individually operate said piston means, and diagonally extending pairs of inter-telescoping brace members, the uppermost member being pivotally connected to said platform member proximate one upright and the lowermost member being pivotally connected to said frame proximate an adjacent upright, and connection means for each pair of brace members to connect said pair of brace members together.

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