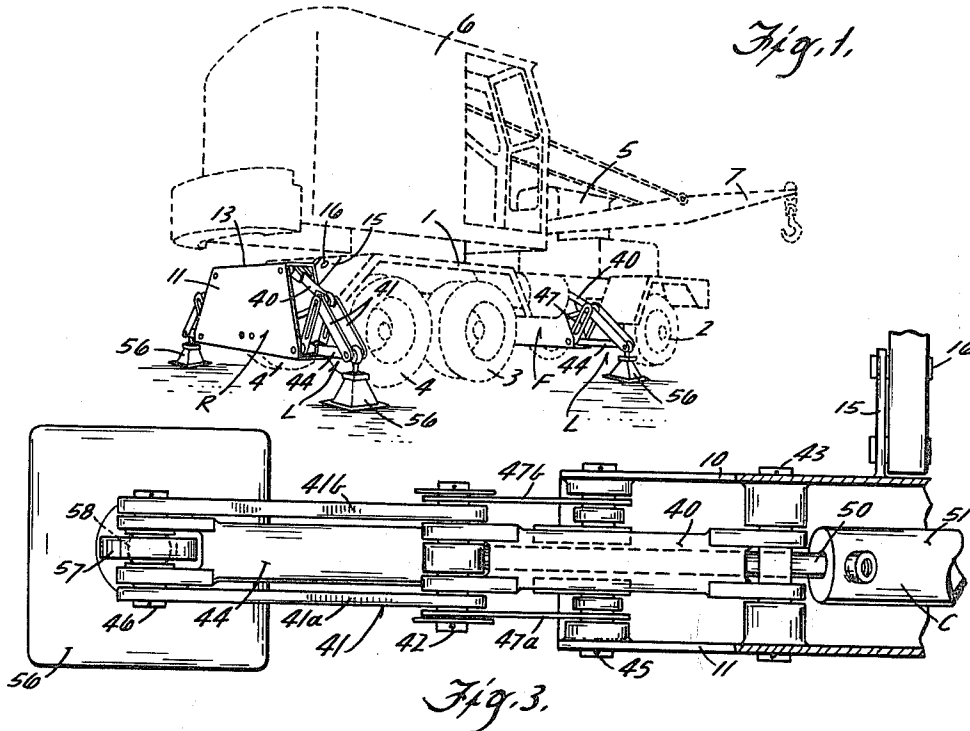
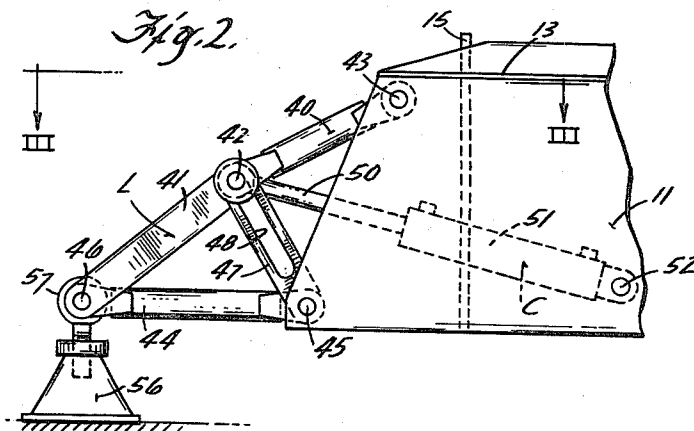


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HYDRAULIC STABILIZER
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HYDRAULIC STABILIZER

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1 Claim. (Cl. 212-145)

This invention relates generally to mobile cranes and more specifically to hydraulic stabilizers for such a crane.

Hydraulically actuated stabilizers, commonly referred to as outriggers, have been used with mobile cranes with some degree of success. These stabilizers bodily lift the entire mobile crane off the ground so as to rigidly hold the crane in a level position regardless of the off-balanced loads imposed by operation of the crane. Four of these outriggers are usually used, one at each corner of the crane to prevent tipping of the crane or vehicle chassis.

These prior art devices, however, do have certain shortcomings which the present invention overcomes. For example, an outrigger system for cranes has heretofore been known wherein the power for raising the vehicle is supplied by a hydraulic cylinder and associated toggle linkage. In operation of the crane, lifting and lowering of a load causes continuous load fluctuations on the outriggers. That means that the actuating mechanisms for the outriggers are subject to a severe and potentially dangerous operating condition because if any one of the actuating mechanisms should fail the vehicle might turn over and injure the operator or bystanders, not to mention the consequent property damage. Other types of heretofore known outriggers systems require heavy and large hydraulic cylinder means in order to be able to withstand the strain imposed thereon in lifting the entire crane off the ground, and these types are not only excessively large, but are also costly to manufacture, subject to failure, unwieldy to operate, and difficult to transport.

Generally, it is an object of the present invention to provide an improved hydromechanical actuating mechanism for outriggers wherein the power for raising the vehicle is supplied by a hydraulic cylinder and associated toggle mechanism, and wherein special provisions are made to protect the system against mechanical failure.

A more specific aspect of this invention is directed to an outrigger of the above type which has an over-center, toggle linkage and a stop link for limiting over center movement of the toggle links in one direction independently of the hydraulic cylinder means connected thereto.

These and other objects and advantages will appear hereinafter as this disclosure progresses, reference being had to the accompanying drawings, in which:

FIGURE 1 is a perspective view of a mobile crane embodying the present invention;

FIGURE 2 is a rear, elevational view of a portion of the rear outrigger shown in FIGURE 1;

FIGURE 3 is a plan view of the device shown in FIGURE 2 but on an enlarged scale and taken along line 3-3 in FIGURE 2;

FIGURE 4 is a rear elevational view of a portion of the outrigger shown in FIGURE 2; showing the parts in a retracted position.

The present invention is used with a mobile vehicle having a truck chassis 1 with front wheels 2 and a pair of rear dual wheels 3 and 4. A driver's cab 5 is provided for the truck chassis for driving the vehicle in transport. A crane cab 6 is mounted on the chassis for rotation about a vertical axis in the well-known manner and has a boom 7 connected therewith and operated therefrom.

Wheels 3 and 4 are traction wheels and are located di-

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rectly under the crane to support its weight while in transport.

When mobile cranes of this type are in operation, severe and off-balance loads are imposed thereon and the rubber tired wheels cannot support these loads, nor do they offer sufficient lateral stability to the crane.

For the purpose of stabilizing and supporting the entire weight of such a crane, a rear outrigger R and a front outrigger F are secured transversely to the chassis.

Generally speaking, each of these outriggers have a transverse support in the form of a hollow box which is fabricated from heavy plate steel, and which boxes are rigidly securable to existing cranes. These boxes are compactly located within the confines of the chassis and also act as storage compartments for the linkages and hydraulic means supported thereon, all of which are now to be described.

The rear outrigger R includes a box having a pair of vertical and parallel sides 10 and 11 which are welded together along their bottom edges by a bottom plate 12 and at their top edges by top plate 13. A pair of forwardly extending attaching plates 15 are secured at each side of the box for detachably but rigidly securing the box to the chassis by large pins 16, which pins 16 extend through aligned holes in the attaching plates and chassis.

It will be noted that the above box is located above the ground for good road clearance and its outer ends are located substantially within the width of the chassis. This box is of narrow width in a fore and aft direction, but is of considerable height so as to accommodate the outrigger linkage to be described presently.

A generally similar box is provided for the front outrigger and includes the vertical and parallel side walls 20 and 21 secured rigidly together by a bottom wall welded therebetween, and a top plate. The front box is detachably secured generally midships of the chassis and therebeneath it, by means of large pins (not shown) which extend through aligned apertures in the side walls (not shown) formed on either side of the chassis as an integral part thereof.

Both of the boxes are thus adaptable to existing mobile cranes without any appreciable modification of the cranes.

At each end of each box is operatively mounted an improved, hydraulically operated, outrigger linkage and as these are all similar in structure and operation, only a description of one is believed necessary.

These linkages L are swingable from an extended, crane supporting position shown in FIGURES 1, 2, and 3, to a transport position as shown in FIGURE 4 where they are compactly nested within their respective boxes.

The linkage L includes a pair of toggle links 40 and 41 which are pivotally connected together at their adjacent ends by a pin 42 presenting a knee joint. The upper link is pivotally connected at its other end, adjacent the upper edge of the box, as by pin 43 extending through the sides 10 and 11. Lower link 41 is actually formed by double struts 41a and 41b so that the upper link 40 can fold therebetween when the linkage assumes the stored, FIGURE 4 position.

The other end of lower link 41 is pivotally connected adjacent the lower edge of the box by lower link 44. Link 44 is connected to the box by pin 45 and to link 41 by pin 46, and also folds partially between link 41 in the collapsed position shown in FIGURE 4.

A slotted link 47 is pivotally connected between the mid-point of the toggle linkage formed by links 40 and 41, and the lower edge of the box. Link 47 is comprised of two flat straps 47a and 47b, one located on each side of the other links. Straps 47a and 47b each have an elongated slot 48 formed lengthwise therein, and in which

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the pin 42 is slidably guided as it moves between the FIGURE 2 and 4 positions.

A double-acting, hydraulic cylinder means C is pivotally connected between the box and the midpoint of the toggle linkage, for forcibly swinging the linkage between the load supporting position of FIGURE 2 and the transport position of FIGURE 4. This means includes a piston rod 50 pivoted on pin 42 and its cylinder 51 pivoted at its head end on pin 52 between the side walls 10 and 11.

At the free end of the linkage is secured a pedestal 56 which is threadably adjustable on the eye bolt 57. The eye-bolt is mounted on pin 46 by a self-aligning, spherical bushing 58.

The screw jack provided by the threaded eye-bolt and pedestal permits the pedestal to be spun on the bolt in order to level up the crane. When in transport position, the pedestal is thrown over the side of the truck chassis.

The geometry of the over-center, toggle linkage and its lost motion connection with the link 47 permits the outriggers to lock into the load supporting position, relieving the hydraulic means of any of this load. The pivot pin 42 goes outwardly over dead center, in respect to pins 43 and 46, and the substantial weight of the crane is transmitted essentially in compression downwardly through links 40 and 41. Link 47 holds the links 40 and 41 from going too far over dead center and thereby collapsing in the outward direction.

The hydraulic system for the hydraulic cylinders operating the outrigger linkages is well known in the art and not shown.

As shown in FIGURE 1, the wheels 3 and 4 are off the ground and the weight of the crane is supported by the outriggers, with no load imposed on the hydraulic system.

It is an easy matter to lower the unit, it only being necessary for the hydraulic means to pull the toggle linkage inwardly past the dead center position. The linkage then can be collapsed compactly within the boxes.

Various modes of carrying out the invention are contemplated as being within the scope of the following

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claim particularly pointing out and distinctly claiming the subject-matter which is regarded as the invention.

What is claimed is:

A stabilizer mechanism for a vehicle having a chassis supported on wheels and a crane or the like mounted thereon, said mechanism comprising a stabilizer arm having a lower pivot center on said chassis, a pair of toggle links, one having an upper pivot center on said chassis above said lower pivot center, and the other pivotally connected with said arm at a predetermined radial distance from said lower pivot center; means pivotally interconnecting said toggle links and presenting a knee joint at a predetermined radial spacing from said upper pivot center; a link swingably connected with said chassis and having a lost motion connection with said knee joint operative to accommodate movement of said toggle links into folded and unfolded conditions by inward and outward swinging movements, respectively, of said knee joint relative to said chassis about said upper pivot center, and to determine an over center position of said knee joint upon said outward swinging movement of the latter through dead center; and a hydraulic activating cylinder for said toggle links, said activating cylinder having one of its relatively reciprocable elements operatively connected with said knee joint and the other pivoted on said chassis in such relation to said over center position of said knee joint that expansion of said cylinder to a length less than its fully expanded length will move said knee joint to said over center position.

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