March 7, 1939. L. G. YOUNG 2,149,381

CRANE

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Fig.1.

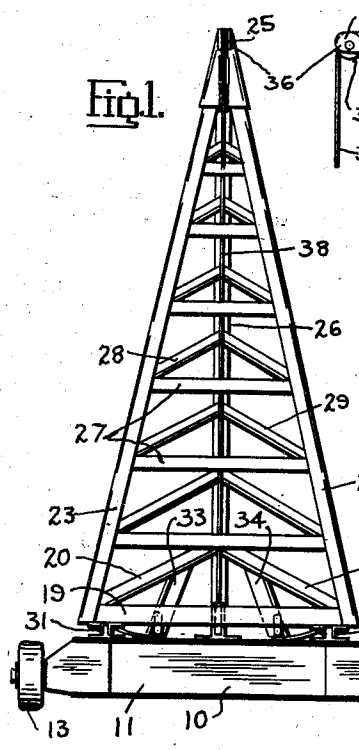


Fig.2.

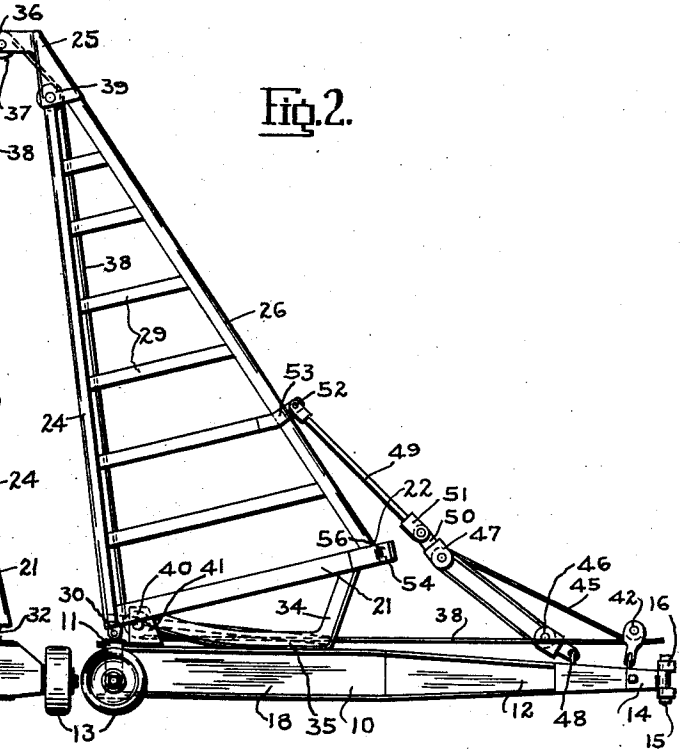
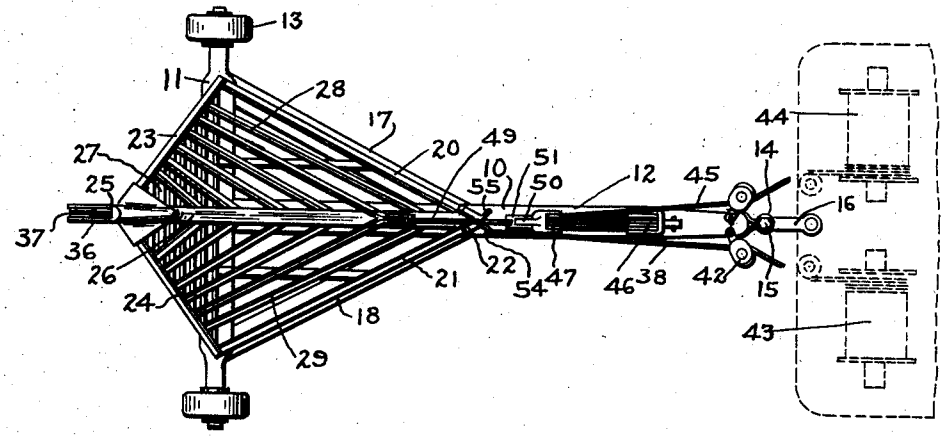


Fig.3.



INVENTOR
Lewis G. Young.
BY
ATTORNEY

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Fig. 5.

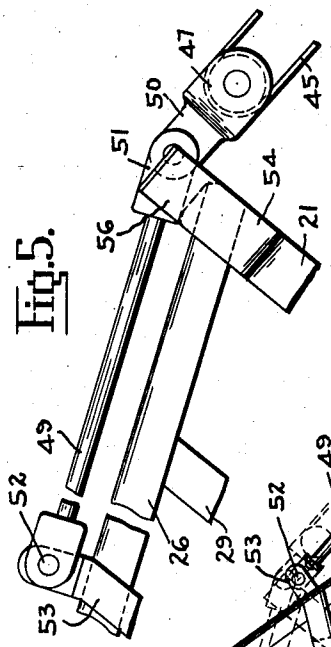


Fig. 4.

INVENTOR
Lewis G. Young.
BY
ATTORNEY

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2,149,381

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CRANE

Lewis G. Young, Sherman, Conn.

Application February 15, 1937, Serial No. 125,738

7 Claims. (Cl. 212—8)

This invention relates to cranes and like mechanisms and more particularly to a crane of the mobile type, which is adapted to be attached to the tail piece of a tractor or like propelling machine for transportation where required.

It is proposed by this invention to provide in a mobile crane a pyramidally shaped boom whereby increased stability and strength, will be obtained, and the possibility of tilting or buckling substantially eliminated.

It is proposed to hinge the pyramidal boom at opposite corners of its triangular base to the cross piece of a T shaped supporting frame, the tail piece of the latter being adapted to be connected to the drawbar of a suitable propelling means, such as a tractor. A broad tread wheel may be journaled to each of the ends of the cross piece of the supporting frame. It is also proposed to dispose the apex of the triangular base of the boom over and supported upon the tail piece of the supporting frame whereby, when the boom is tilted, the sides of the base will form a lever arm against the end of which a lifting force is applied to raise the boom and its load and thereby relieve cable strains, prevent buckling tendencies, and decrease the power required for this operation, as well as permitting the use of a shorter length of cable and the obtainment of a more rapid raising movement of the boom. By the above arrangement the supporting frame for the boom may be of minimum length and the parts being assembled and disposed compactly thereon.

A further object of this invention is to provide a crane of the above type which will be relatively simple in construction, inexpensive to manufacture, comparatively easy to manipulate, strong, compact, and very efficient and durable in use.

With the above and other objects in view the invention consists in the novel features and combinations of parts to be hereinafter described and claimed, with reference to the accompanying drawings wherein;

Figure 1 is a front elevational view of a crane embodying the features of this invention.

Figure 2 is a side elevational view of the same.

Figure 3 is a top plan view of the same.

Figure 4 is a vertical section of the crane boom and, by dotted lines, illustrates the position of the parts when the boom is tilted.

Figure 5 is an enlarged view showing the cooperating disposition of certain of the parts when the boom is tilted.

Referring now to the drawings wherein like reference characters indicate like parts throughout the several figures, the T shaped supporting frame 10 is horizontaly disposed with its cross piece 11 at the front and its tail piece 12 extending rearwardly therefrom. A broad tread ground wheel 13 is journaled to each end of the cross piece 11 and the rear end of the tail piece 12 has a bolt receiving bracket 14 secured thereto whereby it may be secured by a bolt 15 to the drawbar 16 of a tractor or other suitable crane propelling means. The connection of the tail piece 12 of the frame 10 with the drawbar 16 of the tractor and the spaced apart wheels 13 form a three point suspension for the crane whereby it may be readily swung into and out of the position of use. Side braces 17 and 18, extending angularly from an intermediate point on the tail piece 12 to a point adjacent each end of the cross piece 11, are provided to laterally strengthen the frame 10 and to form a supporting surface for a part of the crane boom.

The crane boom is preferably fabricated of angle iron and is constituted by a triangular base having a cross bar 19 disposed across the front, and equal length side bars 20 and 21 which extend rearwardly from the ends of the cross bar 19 and converge together to form the apex 22 of the triangularly formed base. Bars 23 and 24 extend from each end of the cross bar 19 upwardly, and converge together and with a bar 26, extending upwardly from the apex 22, at 25. Suitably spaced apart cross bracing bars 27 are provided to extend between the upwardly extending bars 23 and 24, and cross bars 28 and 29 are provided to extend between the bar 26 and the bars 23 and 24 respectively.

The front cross bar 19 of the base of the boom is hinged to and upon the top of the cross piece 12 of the frame 10, by pivot pins or bolts 30, which pass through suitable brackets 31 and 32 respectively secured to the cross piece 12 and the cross bar 19 and which are disposed, one pair adjacent each end of the cross bar 19. Bars 33 and 34 each bent to extend from points adjacent the apex 22, where they are connected to the side bars 20 and 21 respectively, angularly downwardly to the braces 17 and 18 respectively, along the top surface of the same as at 35 and are then curved upwardly to points adjacent the front end of the side bars 20 and 21 respectively, to which they are connected. The bars 33 and 34, by seating upon the braces 17 and 18 respectively, form spaced apart footings for the boom and maintain it tilted forwardly slightly out of the perpendicular with respect to the frame 10, and support a large proportion of the downward thrust of the

weight of the boom, relieving the pivot pins 30 from this portion of the weight. The bars 33 and 34 with the pivot pins 30, form supporting means for the boom, when a load is being carried thereby and transported from one location to another by moving the entire crane, whereby sidewise tilting is prevented and stability is assured.

A bracket 36 is provided at the upper end 25 of the boom and is adapted to support a rotatable pulley 37 over which a cable 38 is led and directed downwardly into position to have its end fastened to the load, to be raised and carried by the crane. Another pulley 39 is suitably journaled between the upwardly extending bars 23 and 24 adjacent the point they converge, and the cable 38 is led over this pulley and directed downwardly to and over a pulley 40, suitably journaled in a bracket 41 disposed on and secured to the tail piece 12 of the frame 10 adjacent the cross piece 11. From the pulley 40, the cable 28 is directed along the tail piece 12 to a swivel pulley 42, from which it is led to a suitable winding drum 43 which may be mounted upon the crane propelling means if so desired. By manipulation of the drum 43 the cable 28 may be wound thereon to raise the load, or unwound therefrom to lower it in the usual manner.

The boom is raised from a tilted position, as shown in dotted lines in Figure 4, by manipulation of another winding drum 44 to wind up a cable 45 which is reeved through a set of pulley blocks 46 and 47. The block 46 is pivotally secured to the tail piece 12 by suitable means, such as an eyebolt 48 spaced forwardly from the rear end of the tail piece 12. The block 47 is secured to an elongated rod 49 by having an extension 50 of the block 47 pivotally connected to a bifurcated part 51 secured to one end of the rod 49. The other end of the rod 49 is pivotally secured at 52 to a bracket 53, secured to the boom at a point spaced upwardly from its base and disposed on the bar 26. A substantially V shaped bracket 54 is secured at the apex 22 to the base of the boom with it flaring sides 55 and 56 extending substantially laterally, and is adapted to receive the part 51 between these sides, when the boom is tilted forwardly sufficiently to dispose the bar 26 beyond an aligned position with a center line passed through the pivot 52 and the pivot point 55, between the block 46 and the bolt 48, for instance as shown in Figures 4 and 5.

When the boom is tilted sufficiently to cause the part 51 to seat between the sides 55 and 56 and within the V of the bracket 54, the side bars 20 and 21 of the base of the boom constitute a lever arm of what is, in effect, a bell crank form, the other lever arm of which is constituted by the upwardly extending bars 23 and 24. By winding up the cable 45 on the drum 44, a longitudinal pull is exerted upon the rod 49 and the force of this pull will be converted as is obvious from Figure 4 into a downwardly directed pressure upon the apex 22, due to the above described arrangement. This downwardly directed pressure upon the assumed lever arm of the bell crank form, constituted by the bars 20 and 21 and bars 23 and 24 swings the boom about its fulcrum or pivots 30 and raises the other arm of the bell crank form, constituted by the bars 23 and 24. In view of this arrangement, a relatively powerful and rapid swinging movement is given to the boom requiring but a minimum of power to be applied at the drum, and during the period when the greatest weight, constituted by the load and the weight of the boom, is being raised. When the boom is raised sufficiently to assume a substantially vertical position the pull of the cable 45 and rod 49 upon the boom is along a straight line but no appreciable increase in power is required, due to the counterbalancing effect caused by the weight of the rearwardly extending boom base and footings 33 and 34. By the above arrangement only a comparatively short length of cable 45 is required, and the blocks 46 and 47 may be disposed relatively close to the boom, thus conserving lengthwise space for the crane and forming a compact mechanism.

It will be obvious that the drums 43 and 44 may be disposed other than upon the crane propelling means, for instance, upon the frame 10, and that suitable weights may be placed upon the tail piece 12 to counterbalance the crane, when the same is disconnected from a tractor or like propelling means, and in operation when crane is extended supporting or carrying heavy weights.

Because of the two points of support provided for the crane by the wheels 13, the crane may be turned in horizontal rotation by a movement of the toe of the tail piece. The crane may be operated connected to a tractor and in this case, when the load is freed from its resting place and drawn to the end of the boom, the tractor may start and while in motion elevate the boom to its raised position, proceed to its destination, place itself and then lower its load by both extending the boom and lowering from the nose of the boom. It is, therefore, evident that the crane has distinct mobile advantages.

While there has been illustrated and described herein a preferred embodiment of this invention, it is to be understood that the same is not to be limited thereto in all of its details, as the same may be modified thereto in all of its details, as the same may be modified and changed without departing from the spirit and scope thereof as defined in the appended claims.

Having thus fully described the invention what is claimed and for which it is desired to obtain Letters Patent is:

1. In a crane, an upwardly extending boom comprising a triangular base having a bar extending upwardly from each corner and converging together above said base, the base and the front of said boom being in the form of isosceles triangles and the sides being in the form of right angle triangles, a horizontal support for said boom and to which one side of said base is hinged, and a support engaging member depending from said base to engage said support between the hinged side of said base and its apex and to space the base from said support to maintain the front of said boom in a tilted position.

2. In a crane, an upwardly extending boom, a support for said boom, said boom including a base, the forward end of which is hinged to said support, whereby said boom is adapted to be swung between raised and lowered positions, and a boom swinging device connected to said boom, above the rearward end of the base opposite the hinged side, and connected to said support at a point rearwardly of and below said base, a straight line between said points of connection being rearwardly of said rearward end of the base in the raised position of said boom and intersecting said base between its forward and rearward ends in the lowered position, and means on said boom below the point of connection of said swinging device adapted to be engaged by

said boom swinging device in said lowered position, whereby the pull of said swinging device is applied to the boom at a lower point in said lowered position.

3. In a crane, an upwardly extending boom, a support for said boom, said boom including a triangular base, one side of which is hinged to said support, and side portions extending upwardly and converging together, a rod connected at one end to said boom above the corner of said base opposite its hinged side, a cable connected to the other end of said rod, means to impose a pull on said cable, and a rod end receiving member on the corner of the base opposite its hinged side.

4. In a crane, a boom including a substantially upright first member, having a second member secured to and extending rearwardly from the bottom end thereof, and being hinged at its bottom end to a support, a third member extending upwardly from the rear end of said second member and converging toward the upper end of said first member, a rod connected to said third member at a point spaced upwardly from the rear end of said second member, a rod end receiving part on the rear end of said second member, a cable connected to the end of said rod received in said part, and a device to wind up said cable.

5. In a crane, a boom including a horizontally extending front base member, a support to which said front base member is hinged, a rearwardly extending base member, and a member extending upwardly from said front base member, a rod connected at one end to said boom above said rearwardly extending base member, a rod receiving member at the end of said rearwardly extending base member to receive the other end of said rod, and means to cause said rod to impose a downwardly directed pressure on the end of said rearwardly extending base member to rock said boom about the hinged connection between the support and the front base member.

6. In a crane, a support, an upwardly extending boom hinged at its lower end to said support, said boom having a rearwardly extending member, and means to impose a downward pull upon the rear end of said member when said boom is tilted to swing said boom relatively to said support, said means including a rod pivoted at one end to said boom above the rear end of said member, the other end of said rod being adapted to engage the rear end of said member when said boom is tilted forwardly and a cable connected between said tie rod and said support, a straight line between the points of connection of said rod with said boom and said cable with said support being rearwardly of the rear end of said member in the non-tilted position of said boom and intersecting said member between the hinged point and said rear end in the forwardly tilted position of said boom.

7. In a crane, an upwardly extending boom constituted by a triangular base having a bar extending upwardly from each corner and converging together above said base, a support for said boom and to which one side of said base is hinged, a support engaging member depending from said base to space the apex thereof from said support to maintain the boom in a normally slightly forwardly tilted position, a rod pivotally connected at one end to said boom above the apex of said base, the other end of said rod being adapted to engage the apex of said base, when said boom is tilted forwardly, to raise a load and means to impose a downward pull on said last mentioned end of said rod to cause rocking of said boom relatively to said support into its normal position.

LEWIS G. YOUNG.