

PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Cranes with articulated jibs.

We, PACIFIC COAST ENGINEERING COMPANY, a corporation organized and existing under the laws of the State of California, United States of America, of Oak Street and Clement Street, Alameda, State of California, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to cranes. More particularly it relates to a movable shoreside articulated crane.

The demands of the shipping industry require ever larger and greater capacity cranes than have been built in the past in order to speed up the loading and unloading of ships. Cranes which are now being built to meet the increased capacity needs are becoming so large that often a completely different type of crane must be conceived to come within the height restrictions which are often imposed on a harbor area.

Cranes used for unloading docked ships are usually mounted on tracks which run along the edge of the dock to permit the crane to be moved from ship to ship or to adjust to their variable docking positions. Generally, these cranes have a horizontal extension or boom which projects over and across the deck of the ship. In order to position the boom across the ship, or to remove it, the boom must be capable of movement in a vertical plane to avoid interfering with the rigging or superstructure of the ship. It therefore cannot be swung into position by rotating it about a vertical axis. In order to effect the vertical movement of the horizontally extending boom, it generally must be rotated about its inboard end and where it attaches to the supporting structure.

In a harbor area, there are often minimum height limitations for apparatus which extends out over the water when not in use

to prevent such structures from interfering with passing or docking ships. On the other hand, if there are nearby airports there are also maximum height regulations which must be observed. This condition exists in the New York Harbor area.

With a large crane having a long boom, limitations such as have been described prevent the boom from being raised to a vertical position for storage or even during movement to clear a ship's rigging or superstructure. Thus, an arrangement cannot be used which permits the boom to swing horizontally or which swings straight up. Likewise, it cannot be a structure which extends out over the water during storage, unless the projecting portion is above a minimum height, and in order to be competitive costwise, the crane should not need to have any capability of rotating about a vertical axis.

In essence, the boom must retract in a vertical plane while not exceeding a maximum height limitation nor have any over-the-water projecting portions depending below a minimum height limitation when retracted. This presents a difficult problem in providing an articulated crane which satisfies all of these conditions, but it will be observed that the present invention is a new and novel structure that meets and fulfills all of the requirements of the problem.

Briefly, the crane of the present invention comprises:

A supporting structure; an inboard boom section having the inboard end thereof pivotally secured to the supporting structure at an elevated location thereon for arcuate rotation in a vertical plane; an outboard boom section pivotally secured to the outboard end of the inboard boom for movement in a vertical plane; a runway extending along said supporting structure and said boom sections a sheaving system means interconnecting the booms for supporting its out-

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SPECIFICATION AMENDED - SEE ATTACHED SLIP

board boom in an outward projecting attitude when the inboard boom is raised to an upward projecting position; and means for rotating the inboard boom about its inboard end for effecting raising and lowering thereof and permitting the sheaving system to gather in and pay out the articulating rope thereby allowing the outboard boom to rotate relative to the inboard boom.

10 It is therefore an important object of the present invention to provide a crane which has a relatively long horizontal boom which can be rotated in a vertical plane from its working position to its retracted position.

15 It is another object of the present invention to provide a crane which has a horizontal boom which when retracted to its stored position does not extend above a maximum height limitation nor does any portion extending horizontally over the water depend below a minimum height limitation.

20 It is a further object of the present invention to provide a crane which never penetrates above a maximum height limitation during operation or during movement from its working to its retracted position.

25 It is yet another object of the present invention to provide a crane which utilizes only its cargo hoist machinery for moving the horizontal boom from its working position to its retracted position.

30 Other objects and advantages of the present invention will become apparent when the crane is considered in conjunction with the accompanying drawings of which:

35 Figure 1 is a side view in elevation of a preferred embodiment of the crane as contemplated by the present invention:

40 Figure 2 is a schematic representation of the crane:

Figure 3 is a perspective schematic of the reeving of the articulated boom.

45 Reference is made to the drawings for a detailed description of a preferred embodiment of the invention. There shown in Figure 1 is a crane 11 comprising a supporting structure having two sections, a base portion 12 and a superstructure 13, and a horizontally extending boom 14 supported by the superstructure. The base portion has four vertical standing legs 16 which support the superstructure portion. The legs of the base have wheeled means 17 located at their lower extremities which permit movement of the crane along tracks which are usually located parallel and adjacent the edge of the shipping docks. Although four legs are shown in the preferred embodiment, it is conceivable to use a tripod base with two legs on the boom side of the crane, which is nearest the edge of the dock, and a single supporting leg on the rearward track. However, for better balance, and to permit the crane to be constructed in the manner shown, four legs are utilized.

The superstructure portion of the supporting structure is located above the base portion and rises to an apex 18 which is located within the plan of the base section to provide stability to the crane. In the preferred embodiment, a working platform 19 is supported by the structure and is located at an elevated position above the junction 21 of the base portion and the superstructure approximately midway up the superstructure. The working platform supports the machinery house 22 which contains the winch machinery for operating the crane. Floodlights 23 are arranged along the superstructure, the working platform, and the horizontally extending boom for lighting the work area.

The horizontally extending boom is comprised of two sections. The first is the inboard boom section 24 and it is pivotally secured to the superstructure by a first hinge means 26 which has a horizontal axis of rotation perpendicular to the longitudinal axis of the boom. The first hinge means is located at the uppermost edge of the inboard end of the boom. The hinge permits arcuate rotation of the inboard boom section in a vertical plane about the inboard end. The second section of the horizontally extending boom is an outboard boom section 27. This section is secured to the inboard boom section by a second hinge means 28 having an axis of rotation parallel the axis of the first hinge means and which is located at the lowermost edge of the inboard end of the outboard boom section. It pivotally secures the outboard boom section to the lowermost edge of the outboard end of the inboard boom section and permits the outboard boom section to rotate relative to the inboard boom section for substantially horizontal movement in a vertical plane.

Both the inboard and outboard boom sections are constructed such that they have lateral width and depth of structure at their adjacent joining ends 29, 31. This permits a hinge construction having the described characteristics and not just a universal pivot joint. A runway, such as tracks or rails, is mounted on the boom sections 24, 27 and the working platform 19 for supporting the movable trolley 30 of an overhead travelling crane.

Means are supplied for raising and lowering the whole boom in a vertical plane whereby the boom can be articulated from a substantially horizontal position to one where the inboard boom section is supported in substantially a vertical position and the outboard boom section is supported in a raised substantially horizontal position. The concept of the invention provides that when the crane is retracted for storage, the inboard boom section projects upward and the outboard boom section projects outward

from the supporting structure. The term vertically, therefore, does not mean absolutely vertical and it can include a boom which extends upward as little as 45 degrees from the horizontal. Even with such a small angle of lift, a long inboard boom section can cause the outboard boom to be raised a sufficient amount to exceed the minimum height limitations and clear the ship, assuming of course that the inboard section does not itself project over the water below the height limitation. Similarly, the outboard boom section does not have to reside in its retracted position at the horizontal but can hang at a depending angle which might be as much as 45 degrees from the horizontal or extend upward as much as 45 degrees from the horizontal. It is the mechanism by which these pivoting boom sections are articulated that is the novel portion of the invention and not the exact angle to which the boom sections are retracted.

The means for raising and lowering the boom sections in a vertical plane (see Figure 2) includes a first hinged link means 32 which connects the uppermost adjacent edges of the booms for supporting the outboard boom 27 at a generally right angle with respect to the inboard boom 24, when the sections are elevated to the retracted position. The link 32 can simply be a cable but for the present embodiment of the invention it consists of two rigid connecting rods which are pivotally secured at their ends 33, 34 to the adjacent uppermost edges of the boom sections and at the middle of the link 36 to each other. An upper sheave 37 is secured on the superstructure 13 at a point located at an elevation approximately equal to the level of the upper inboard edge of the outboard boom when it is in a raised position. A hoist boom rope 38 and sheaving is anchored 39 adjacent the outboard end of the inboard boom and passes over the upper sheave and down to the winch means 41 located in the machinery house on the working platform. The boom hoist machinery takes in the end of the boom hoist rope to lift the horizontally extending booms. The raising and lowering means also includes a pair of multiple sheaving systems 42 (see Figure 3). The systems are located adjacent the uppermost portion of the junction 43 of the inboard and outboard booms. They are independently secured at the opposite lateral sides 44, 46 of the booms in symmetrical relation to each other and adjacent the uppermost abutting lateral edges 47, 48, 49, 51 of the abutting booms 24, 27. Each of the systems has two sets of sheaves 52, 53 and 54, 56 on axes 57, 58 parallel the axis 28 of the second hinge means with each of the systems having one of the sets of sheaves secured adjacent one of the uppermost outboard edges 48, 49 of

the inboard boom and the other set of sheaves secured adjacent the adjacent corresponding edge 47, 51 of the outboard boom when the booms are in a horizontal position. An equalizer means is secured to the superstructure at a point approximately the same elevation as the location of the previously described upper sheave 37. This equalizing means can be comprised of a pair of spaced sheaves 59, 61 suspended by a harness or secured directly to the superstructure. An articulating rope 62 is reeved through the equalizer means 59, 61 and the sheaving systems 42. The ends of the articulating rope are anchored 63 to the same boom. 70 75 80

When the raising and lowering means is operated to raise the boom from the horizontal position, the winch machinery starts the operation by gathering in the boom hoist rope. This rotates the outboard end of the inboard boom counterclockwise about the first hinge means at the junction of the inboard boom with the superstructure. The articulating rope feeds into the sheaving systems which permits the outboard boom to rotate clockwise relative to the inboard boom. When the outboard boom has rotated approximately to a right angle relative to the inboard booms, the first hinged link reaches its extended length and takes the load of supporting the outboard boom section relative to the inboard boom section and permits the articulating rope to go slack. 85 90 95

When the crane reaches its retracted position, a boom latch 64 engages the inboard crane section to keep it upright and takes the strain off the winch machinery and boom hoist rope. 100

When the boom is lowered, the first hinged link collapses of its own weight as the articulating rope takes the weight of the outboard boom. 105

When the boom reaches the lowered position a second hinged link 66 takes the load from the articulating rope and the boom hoist rope to support the whole boom assembly. This link is formed by a pair of flexible cables with one end of each joined together with a hinge connection 67, for permitting the link to collapse, and the other ends secured one near the apex 18 of the supporting structure and the other to the outboard boom at a pivot connection 68. 110 115

There is a particular advantage to the mode of operation of the present invention, and to the design, which is readily apparent. The winch machinery which is utilized for retracting the boom also accomplishes the articulation of the boom sections. This means that only one set of winch machinery is necessary for retracting the two sections of the boom to the stowed position. This reduces the total cost of constructing the crane, maintaining it, and running it. The 120 125 130

described embodiment of the invention makes efficient utilization of all the structure and machinery which is assembled into the unit, and provides a new and novel improvement in the art of large cranes.

It will be apparent from the foregoing description of the invention in its preferred form, that it will fulfill all the objects attributable thereto, and while it has been illustrated and described in considerable detail, the protection is not to be limited to such details as have been illustrated and described except as may be necessitated by the appended claims.

15 WHAT WE CLAIM IS:—

1. A crane comprising a supporting structure, an inboard boom section having the inboard end thereof pivotally secured to said supporting structure at an elevated location thereon for arcuate rotation in a vertical plane, an outboard boom section pivotally secured to the outboard end of said inboard boom for movement in a vertical plane, a runway extending along said supporting structure and said boom sections, a sheaving system means interconnecting said booms and having an articulating rope, link means interconnecting said booms for supporting said outboard boom in an outward projecting attitude when said inboard boom is raised to an upward projecting position, and means for rotating said inboard boom about its inboard end for effecting raising and lowering thereof and permitting said sheaving system to gather in and pay out said articulating rope for permitting said outboard boom to rotate relative to said inboard boom.

2. A crane comprising a supporting structure, an inboard boom section having the inboard end thereof pivotally secured to said supporting structure at an elevated location thereon by a first hinge means having a horizontal axis of rotation perpendicular to the longitudinal axis of said boom, an outboard boom section having a second hinge means with horizontal axis of rotation perpendicular to the axes of said booms pivotally securing said outboard boom section to said inboard boom section, a runway extending along said supporting structure and said boom sections a sheaving system means interconnecting said booms and having an articulating rope, link means interconnecting said booms for supporting said outboard boom in an outward projecting attitude when said inboard boom is raised to an upward projecting position, and means for rotating said inboard boom about its inboard end for effecting raising and lowering thereof and permitting said sheaving system to gather in and pay out said articulating rope for permitting said outboard boom to rotate relative to said inboard

boom.

3. A crane comprising a supporting structure, an inboard boom section having the inboard end thereof pivotally secured to said supporting structure at an elevated location thereon for arcuate rotation in a vertical plane, an outboard boom section pivotally secured by the lowermost edge of its inboard end to the lowermost edge of the outboard end of said inboard boom section for movement in a vertical plane, said inboard and outboard boom sections having lateral width and depth at their adjacent ends, a runway extending along said supporting structure and said boom sections, and means for raising and lowering said booms in a vertical plane whereby said booms can be articulated from a substantially horizontal position to one where said inboard boom section is supported in a substantially vertical position and said outboard boom section is supported in a raised substantially horizontal position, said means including:

(1) a hinged link means connecting the uppermost adjacent edges of said booms for supporting said outboard boom at a generally right angle with respect to said inboard boom when said sections are elevated to the retracted position,

(2) an upper sheave secured on said supporting structure at a point located at an elevation approximately equal to the level of the upper inboard edge of said outboard boom when said boom is in a raised position,

(3) a boom hoist rope anchored adjacent the outboard end of said inboard boom and passing over said upper sheave,

(4) winch means for taking in the end of said boom hoist rope which extends over said upper sheave,

(5) a pair of multiple sheaving systems including an articulating rope, said systems located adjacent the uppermost portion of the junction of said booms and independently secured at the opposite lateral sides of said booms in symmetrical relation to each other adjacent the uppermost abutting lateral edges of the abutting booms, each of said systems having two sets of sheaves on horizontal axes perpendicular the longitudinal axes of said booms, each of said systems having one of said sets of sheaves secured adjacent one of the uppermost outboard edges of the inboard boom and the other set of sheaves secured adjacent the adjacent corresponding edge of said outboard boom when said booms are in a horizontal position, said articulating rope reeved in said sheaving systems,

(6) equalizing means secured to said supporting structure above the connection of said inboard boom to said structure for engaging an intermediate portion of said articulating rope and permitting it to feed

described embodiment of the invention makes efficient utilization of all the structure and machinery which is assembled into the unit, and provides a new and novel improvement in the art of large cranes.

It will be apparent from the foregoing description of the invention in its preferred form, that it will fulfill all the objects attributable thereto, and while it has been illustrated and described in considerable detail, the protection is not to be limited to such details as have been illustrated and described except as may be necessitated by the appended claims.

15 WHAT WE CLAIM IS:—

1. A crane comprising a supporting structure, an inboard boom section having the inboard end thereof pivotally secured to said supporting structure at an elevated location thereon for arcuate rotation in a vertical plane, an outboard boom section pivotally secured to the outboard end of said inboard boom for movement in a vertical plane, a runway extending along said supporting structure and said boom sections, a sheaving system means interconnecting said booms and having an articulating rope, link means interconnecting said booms for supporting said outboard boom in an outward projecting attitude when said inboard boom is raised to an upward projecting position, and means for rotating said inboard boom about its inboard end for effecting raising and lowering thereof and permitting said sheaving system to gather in and pay out said articulating rope for permitting said outboard boom to rotate relative to said inboard boom.

2. A crane comprising a supporting structure, an inboard boom section having the inboard end thereof pivotally secured to said supporting structure at an elevated location thereon by a first hinge means having a horizontal axis of rotation perpendicular to the longitudinal axis of said boom, an outboard boom section having a second hinge means with horizontal axis of rotation perpendicular to the axes of said booms pivotally securing said outboard boom section to said inboard boom section, a runway extending along said supporting structure and said boom sections a sheaving system means interconnecting said booms and having an articulating rope, link means interconnecting said booms for supporting said outboard boom in an outward projecting attitude when said inboard boom is raised to an upward projecting position, and means for rotating said inboard boom about its inboard end for effecting raising and lowering thereof and permitting said sheaving system to gather in and pay out said articulating rope for permitting said outboard boom to rotate relative to said inboard boom.

boom.

3. A crane comprising a supporting structure, an inboard boom section having the inboard end thereof pivotally secured to said supporting structure at an elevated location thereon for arcuate rotation in a vertical plane, an outboard boom section pivotally secured by the lowermost edge of its inboard end to the lowermost edge of the outboard end of said inboard boom section for movement in a vertical plane, said inboard and outboard boom sections having lateral width and depth at their adjacent ends, a runway extending along said supporting structure and said boom sections, and means for raising and lowering said booms in a vertical plane whereby said booms can be articulated from a substantially horizontal position to one where said inboard boom section is supported in a substantially vertical position and said outboard boom section is supported in a raised substantially horizontal position, said means including:

(1) a hinged link means connecting the uppermost adjacent edges of said booms for supporting said outboard boom at a generally right angle with respect to said inboard boom when said sections are elevated to the retracted position,

(2) an upper sheave secured on said supporting structure at a point located at an elevation approximately equal to the level of the upper inboard edge of said outboard boom when said boom is in a raised position,

(3) a boom hoist rope anchored adjacent the outboard end of said inboard boom and passing over said upper sheave,

(4) winch means for taking in the end of said boom hoist rope which extends over said upper sheave,

(5) a pair of multiple sheaving systems including an articulating rope, said systems located adjacent the uppermost portion of the junction of said booms and independently secured at the opposite lateral sides of said booms in symmetrical relation to each other adjacent the uppermost abutting lateral edges of the abutting booms, each of said systems having two sets of sheaves on horizontal axes perpendicular the longitudinal axes of said booms, each of said systems having one of said sets of sheaves secured adjacent one of the uppermost outboard edges of the inboard boom and the other set of sheaves secured adjacent the adjacent corresponding edge of said outboard boom when said booms are in a horizontal position, said articulating rope reeved in said sheaving systems,

(6) equalizing means secured to said supporting structure above the connection of said inboard boom to said structure for engaging an intermediate portion of said articulating rope and permitting it to feed





equally into each of said sheaving systems, said means for raising and lowering said booms operating from the horizontal position by said winch means gathering in said boom hoist rope and rotating the outboard end of said inboard boom counterclockwise about the junction of said boom and said supporting structure while said articulating rope feeds into said sheave systems permitting said outboard boom to rotate clockwise relative to said inboard boom at a generally right angle with respect to said inboard boom and said inboard boom is raised to a generally vertical position.

4. The crane of claim 3 wherein said hinged link means comprises a pair of connecting rods pivotally secured at their ends to the adjacent boom sections and at the middle of the link to each other.

5. The crane of claim 3 wherein said equalizing means comprises a pair of spaced equalizer sheaves secured to said supporting structure by a harness at a point located at an elevation approximately equal to the level of said upper sheave.

6. The crane of claim 3 including a boom latch for securing said inboard boom to said supporting structure when said boom is in a relatively vertical position and taking the strain off the hoist rope and winch means.

7. The crane of claim 2, wherein a second link means comprising a pair of connecting rods having one end of each of the rods joined together with a pivot connection and the other ends secured one near the top of the supporting structure and the other to said outboard boom for supporting the same when it is in a lower horizontal position.

8. A crane comprising a supporting structure having a base portion including wheeled means at the lower extremities thereof for permitting movement of the crane over the supporting surface and a superstructure portion extending upward relative to and above said base portion, an inboard boom section pivotally secured to said superstructure by a first hinge means having a horizontal axis of rotation perpendicular to the longitudinal axis of said booms located at the uppermost edge of the inboard end of said boom, an outboard boom section having a second hinge means with an axis of rotation parallel the axis of said first hinge rotated at the lowermost edge of the inboard end of said outboard boom section pivotally securing said outboard boom section to the lowermost edge of the outboard end of said inboard boom section, said inboard and outboard boom sections having lateral width and depth at their adjacent ends, a runway extending along said supporting structure and said boom sections means for raising

and lowering said booms whereby said booms can be articulated from a substantially horizontal position to one where said inboard boom section is supported in a substantially vertical position and said outboard boom section is supported in a raised substantially horizontal position, said means including:

(1) a first hinged link means connecting the uppermost adjacent edges of said booms for supporting said outboard boom at a generally right angle to said inboard boom when said sections are elevated to the retracted position,

(2) an upper sheave secured on said superstructure at a point located at an elevation approximately equal to the level of the upper inboard edge of said outboard boom when said boom is in a raised position,

(3) a boom hoist rope anchored adjacent the outboard end of said inboard boom and passing over said upper sheave,

(4) winch means for taking in the end of said boom hoist rope which extends over said upper sheave,

(5) a pair of multiple sheaving systems located adjacent the uppermost portion of the junction of said booms, said systems independently secured at the opposite lateral sides of said booms in symmetrical relation to each other adjacent the uppermost abutting lateral edges of the abutting booms, each of said systems having two sets of sheaves on axes parallel the axis of said second hinge means, each of said systems having one of said sets of sheaves secured adjacent one of the uppermost outboard edges of the inboard boom and the other set of sheaves secured adjacent the adjacent corresponding edge of said outboard boom when said booms are in a horizontal position.

(6) a pair of equalizer sheaves secured to said superstructure at a point approximately the same elevation as the location of said upper sheave,

(7) an articulating rope passing through said equalizer sheaves and reeved in said sheaving systems, said means for raising and lowering said booms operating from the horizontal position by said winch means gathering in said boom hoist rope and rotating the outboard end of said inboard boom counterclockwise about the junction of said boom and said superstructure while said articulating rope feeds into said sheave systems permitting said outboard boom to rotate clockwise relative to said inboard boom until said hinged link is extended to support said outboard boom at a generally right angle with respect to said inboard boom and said inboard boom is raised to a generally vertical position.

9. A crane comprising a supporting

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structure having a base portion including four vertical legs with wheeled means at the lower extremities thereof for permitting movement of the crane along tracks and a superstructure portion extending upward relative to and above said base portion, an inboard boom section pivotally secured to said superstructure by a first hinge means having a horizontal axis of rotation perpendicular to the longitudinal axis of said booms located at the uppermost edge of the inboard end of said boom, an outboard boom section having a second hinge means with an axis of rotation parallel the axis of said first hinge rotated at the lowermost edge of the inboard end of said outboard boom section pivotally securing said outboard boom section to the lowermost edge of the outboard end of said inboard boom section, said inboard and outboard boom sections having lateral width and depth at their adjacent ends a runway extending along said supporting structures and said boom sections, means for raising and lowering said booms in a vertical plane whereby said booms can be articulated from a substantially horizontal position to one where said inboard boom section is supported in a substantially vertical position and said outboard boom section is supported in a raised substantially horizontal position, said means including:

(1) a first pair of connecting rods forming a folding hinged link connecting the uppermost adjacent edges of said booms for supporting said outboard boom at a generally right angle with respect to said inboard boom when said sections are elevated to the retracted position, said connecting rods pivotally secured at their ends to the adjacent boom sections and at the middle of the link to each other,

(2) an upper sheave secured on said superstructure at a point located at an elevation approximately equal to the level of the upper inboard edge of said outboard boom when said boom is in a raised position,

(3) a boom hoist rope anchored adjacent the outboard end of said inboard boom and passing over said upper sheave,

(4) winch means are located on a working platform for taking in the end of said boom hoist rope which extends over said upper sheave and for operating the cargo loading and unloading equipment along the booms,

(5) a pair of multiple sheaving systems located adjacent the uppermost portion of

the junction of said booms, said systems independently secured at the opposite lateral sides of said booms in symmetrical relation to each other adjacent the uppermost abutting lateral edges of the abutting booms, each of said systems having two sets of sheaves on axes parallel the axis of said second hinge means, each of said systems having one of said sets of sheaves secured adjacent one of the uppermost outboard edges of the inboard boom and the other set of sheaves secured adjacent the adjacent corresponding edge of said outboard boom when said booms are in a horizontal position,

(6) a pair of spaced equalizer sheaves secured to said superstructure at a point approximately the same elevation as the location of said upper sheave,

(7) an articulating rope passing through said equalizer sheaves and reeved in said sheaving systems, the ends of said rope anchored to the same boom, said means for raising and lowering said booms operating from the horizontal position by said winch means gathering in said boom hoist rope and rotating the outboard end of said inboard boom counterclockwise about the junction of said boom and said superstructure while said articulating rope feeds into said sheave systems permitting said outboard boom to rotate clockwise relative to said inboard boom while remaining in a generally horizontal attitude until said hinged link is extended to support said outboard boom at a generally right angle with respect to said inboard boom and said inboard boom is raised to a generally vertical position, a second pair of connecting rods forming a hinged link with one end of each rod joined together with a pivot connection and the other ends secured one near the top of the supporting structure and the other to said outboard boom for supporting it when it is in a lowered horizontal position, and a boom latch for securing said inboard boom to said supporting structure when said boom is in a relatively vertical position and for taking the strain off the hoist rope and winch means.

10. The crane of claim 8 wherein the superstructure portion of said supporting structure is rotatable on a vertical axis with respect to said base portion.

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