

July 14, 1964

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3,140,857

METHOD AND APPARATUS FOR HANDLING A LOAD

Filed Aug. 2, 1961

3 Sheets-Sheet 1

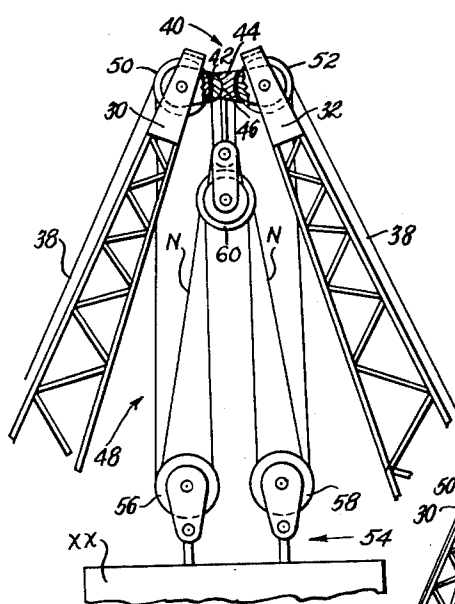


Fig. 2.

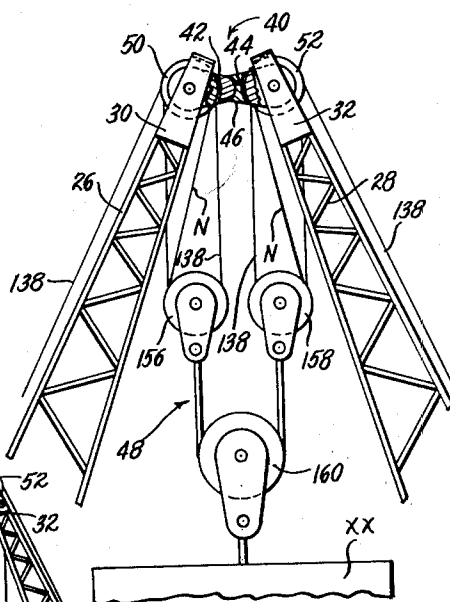


Fig. 3.

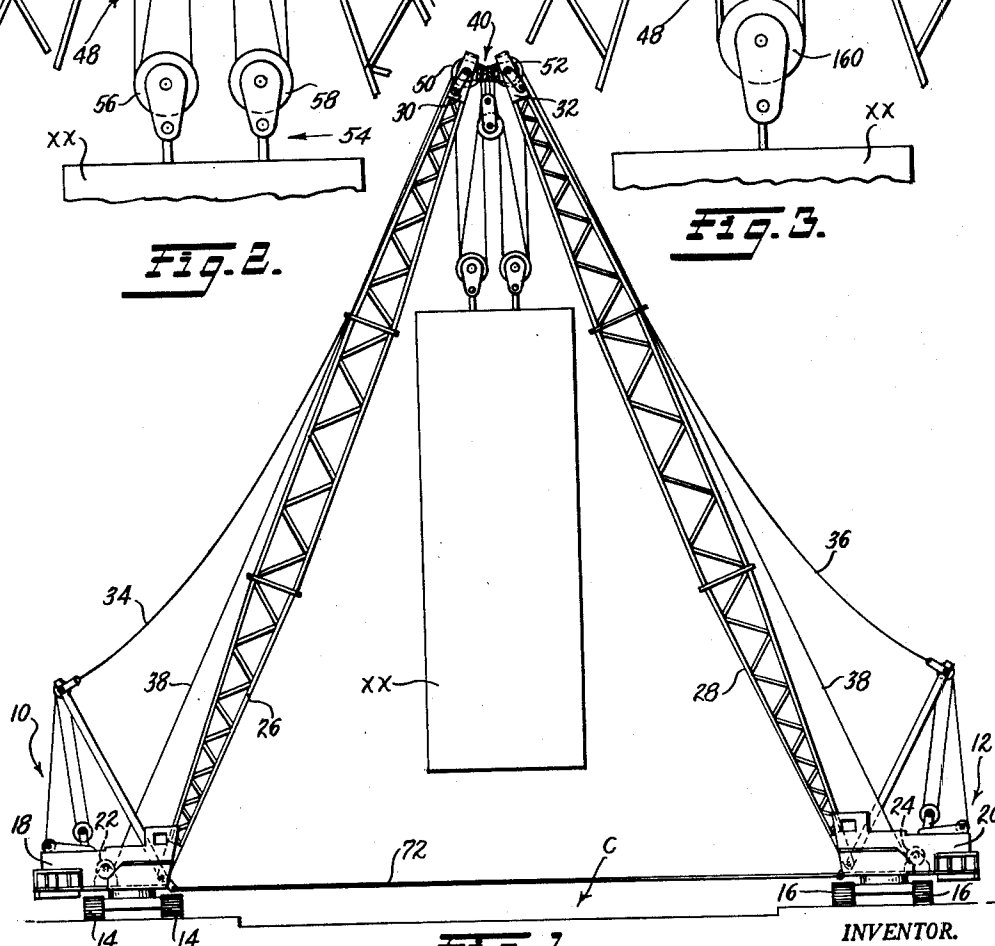


Fig. 1.

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3 Sheets-Sheet 2

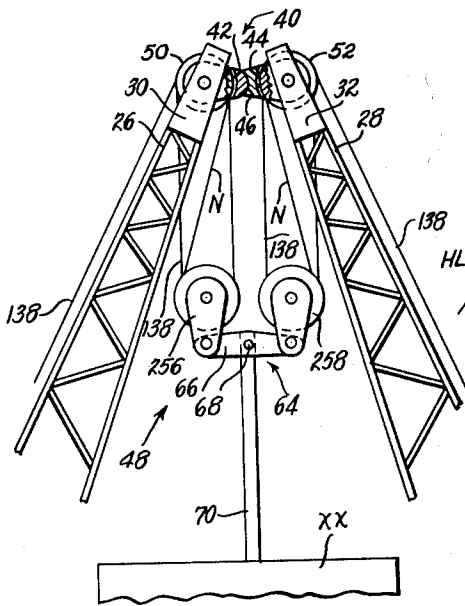


Fig. 4.

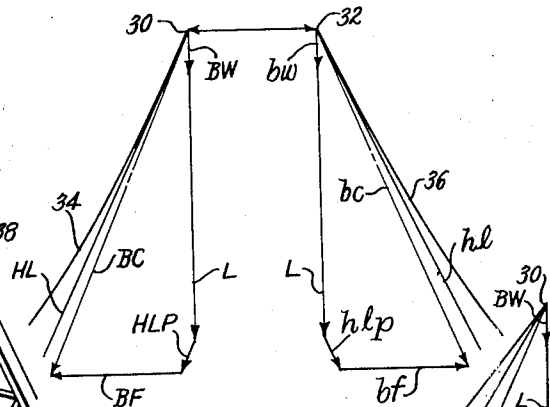


Fig. 5.

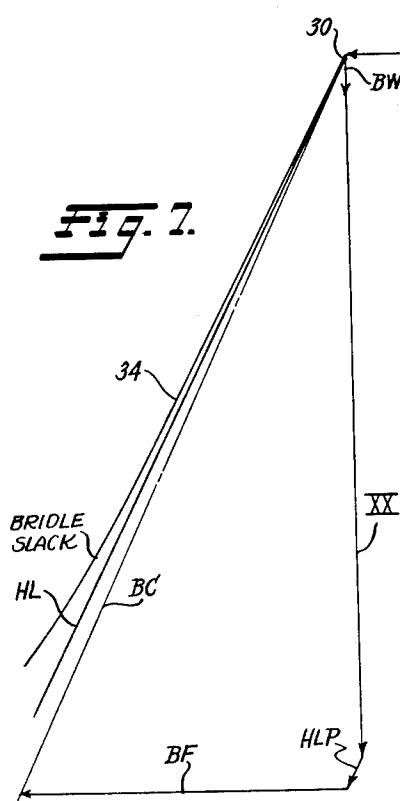


Fig. 6.

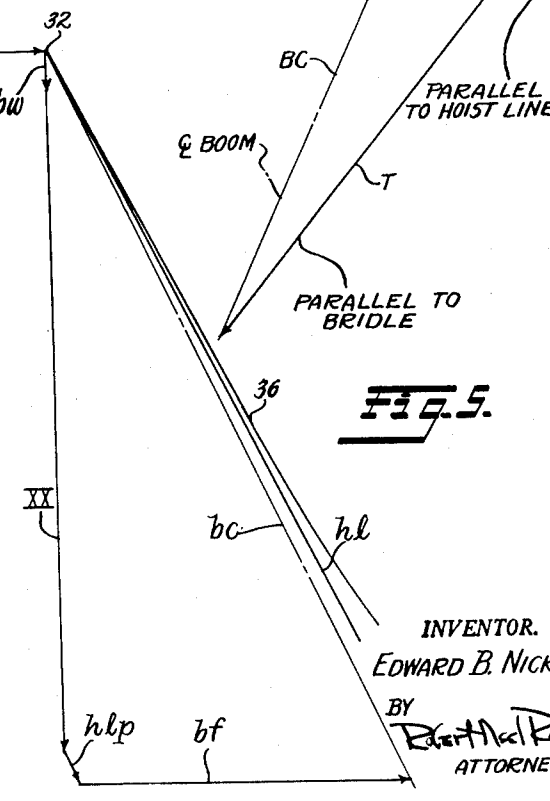


Fig. 7.

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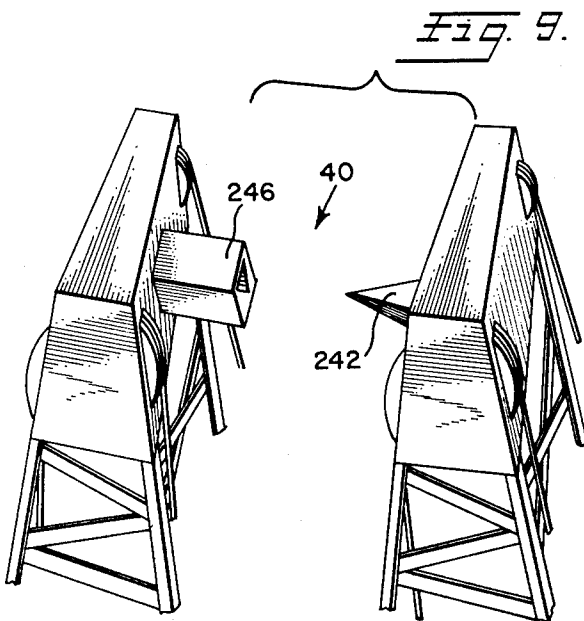
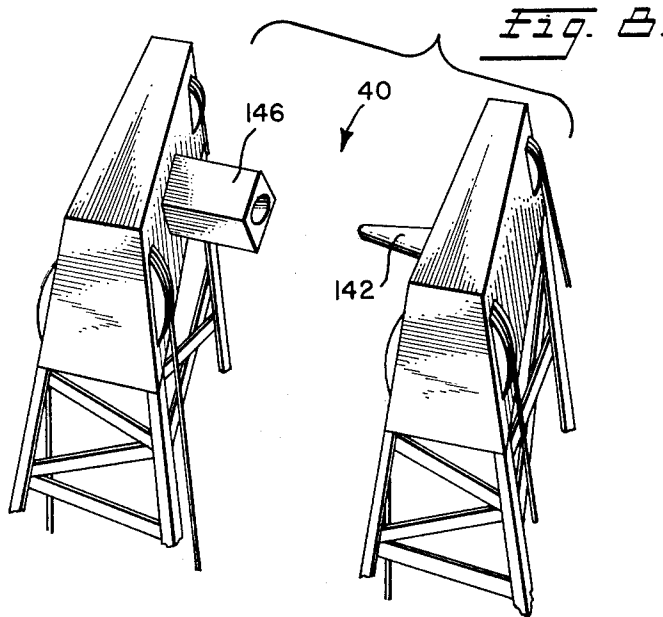
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3 Sheets-Sheet 3



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METHOD AND APPARATUS FOR HANDLING A LOAD

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Filed Aug. 2, 1961, Ser. No. 128,769

29 Claims. (Cl. 254—139.1)

This invention relates to a method and apparatus for handling loads, and more particularly to a method and apparatus for handling, i.e. lifting, transporting, moving, etc., relatively heavy loads.

Current industrial, commercial, military and scientific practices require that relatively heavy loads be handled safely, efficiently, quickly and inexpensively.

In actual practice, it is not unusual today that a load in excess of 500 tons must be lifted and transported from one location to another location and that the only equipment available for handling such a load be mobile type crane units, each having a rated capacity of only 200 tons.

Further, it is believed to be well known that to employ a plurality of mobile type crane units for handling a single load is a very dangerous and hazardous undertaking since the load distribution during the handling of such a load should, at all times, be maintained equally distributed between the crane units employed.

Also, as in the example above, the load to be handled may exceed the combined rated capacity of two of the crane units available which will require that three or more crane units be employed for handling the load which will also naturally increase the danger and hazard of handling the load.

Still further, whenever there is a requirement for handling a load which increases the number of crane units which must be employed and particularly if such conditions require more than two crane units to handle a single load, it becomes very difficult to distribute the load properly between the several crane units which are handling the load and also very difficult to control the load during the handling of the load by the plurality of crane units.

Normally, such conditions and situations require that a large, expensive permanent type of installation be constructed to handle the relatively larger loads with the loads also, in certain instances, being dismantled at one location, transported and then reassembled at the other location.

Accordingly, it is a primary object of this invention to provide a method and apparatus for handling relatively large or heavy loads.

It is also an object of this invention to provide a method and apparatus for safely, economically, efficiently and quickly handling relatively large or heavy loads.

Another object of this invention is to provide a method and apparatus for handling relatively heavy loads without requiring the creation of special, expensive, large and permanent type installations for handling only this type of load.

Yet another object of this invention is to provide a method and apparatus for handling relatively heavy loads without requiring that the load first be disassembled, and then reassembled.

Still another object of this invention is to provide a method and apparatus which enables a load to be handled by equipment which has a normal capacity rating that is less than the load to be handled.

An additional object of this invention is to provide a method and apparatus for employing a plurality of mobile crane units for handling a load which exceeds the combined normal rated capacity of the mobile crane units.

Yet another additional object of this invention is to

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provide a method and apparatus for enabling a plurality of mobile crane units to be employed for handling a single load which decreases to a minimum the danger and hazard usually involved when employing a plurality of mobile crane units in handling a single load.

Yet still another additional object of this invention is to provide a method and apparatus for enabling a crane unit to handle a load in a manner which places the load which is being handled by the crane unit at a distance from the crane unit which is greater than a corresponding distance which usually occurs while handling such a load by conventional types of crane units so that the increase in the distance between the load and the base of the crane unit will effectively decrease the possibility of any interference taking place between the load and the boom structure of the crane unit.

In order to accomplish the desired objects and overcome the disadvantages, as stated above, the invention comprises a method and apparatus for enabling a pair of mobile crane units to handle a load which is in excess of or which is greater than the combined rated capacity of the crane units. In following the teaching of the method or in employing the apparatus of the invention to handle the relatively large load, the boom structures of the crane units which are normally supported by tensioned bridle line arrangements are brought into and maintained in a desired position with the boom structures extending generally upwardly, i.e., more vertical than horizontal, from the respective crane units with the boom structures being disposed in upwardly converging relationship relative to each other with the boom structures being also in supporting relationship one with the other and with the normally tensioned supporting bridle line arrangements being slackened to a substantially non-tensioned condition. A hoist line is provided which comprises an equalizer device having hook blocks and a sheave adjacent to the boom points of the respective boom structures so that the hook blocks may secure a relatively heavy load to the hoist line and the hoisting drums rotated so that the relatively heavy load may be handled as desired. If necessary linkage means may be secured to each of the crane units with the linkage means extending therebetween in a manner to restrain the crane units from moving in generally horizontal directions relative to each other.

Other objects, advantages and important features of the invention will be apparent from the study of the specification following taken with the drawing which together describe, disclose and illustrate preferred embodiments or modifications of the invention and what is now considered and believed to be the best mode of practicing the principles thereof. Other embodiments or modifications may be suggested to those having the benefits of the teaching herein, and such other embodiments or modifications are intended to be reserved especially as they fall within the scope and breadth of the subjoined claims.

In the drawing:

FIGURE 1 is a side elevational view of a pair of mobile crane units handling a load according to the teaching of the instant inventive concept;

FIGURE 2 is an enlarged partial view of a portion of the crane units shown in FIGURE 1 and illustrating one possible form of part of an apparatus for enabling the boom structures of the crane units to effectively support each other and one possible arrangement of an equalizer device of a hoist line therefor;

FIGURE 3 is an enlarged partial view similar to FIGURE 2 of a portion of the crane units shown in FIGURE 1 and illustrating another possible arrangement of an equalizer device of a hoist line therefor;

FIGURE 4 is an enlarged partial view similar to FIGURES 2 and 3 of a portion of the crane units shown in

FIGURE 1 and illustrating still another possible arrangement of an equalizer device of a hoist line therefor;

FIGURE 5 is a force diagram of the forces acting on a boom point of the boom structure of a crane unit and showing a condition wherein the forces are acting on the boom point of the crane unit when the boom structure of the one crane unit is supported by a tensioned pendant bridle line arrangement;

FIGURE 6 is a force diagram of the forces acting on the boom points of the boom structures of the crane units of FIGURE 1 and showing a condition wherein the boom structures effectively support each other with the pendant bridle arrangements of both crane units being slackened and illustrating the effective decrease in the compression forces of the boom structures under a load which corresponds to and is substantially equal to the load illustrated in FIGURE 5 wherein the condition illustrated is for a single boom;

FIGURE 7 is a force diagram similar to the force diagram of FIGURE 6 of the forces acting about the boom points of the boom structures of the crane units of FIGURE 1 wherein the boom structures are disposed in supporting relationship one with the other, but illustrating the effective increase in the load carrying capacity of the boom structures with the compression forces of the boom structures being constant and substantially equal to the compression force of the boom structure shown in the condition as illustrated in FIGURE 5;

FIGURE 8 is a view of a modification of the apparatus which enables the boom structures of the crane units to effectively support each other, and

FIGURE 9 is another modification of the apparatus of this invention.

Attention is now directed to FIGURE 1 of the drawing wherein there is illustrated a method and apparatus for lifting, moving, transporting or, in any other desired way, handling a load XX which is in excess of the rated capacity of the equipment that is available for handling the load XX.

As illustrated in FIGURE 1 of the drawing, the equipment available for handling the load XX may include a pair of mobile crane units 10 and 12 which are provided respectively with crawlers 14 and 16, upper works 18 and 20 each having a hoisting drum 22 and 24 respectively rotatably mounted thereon, elongated boom structures 26 and 28 pivotally mounted to the corresponding upper works 18 and 20 and extending therefrom and terminating in boom points 30 and 32, and pendant bridle line arrangements 34 and 36 for raising, lowering, moving and in conventional normal practice supporting the respective boom structures 26 and 28 with the pendant bridle line arrangements 34 and 36 being usually maintained in a tensioned and taut condition.

In conventional normal load handling practice, a load L will be secured to a hoist line 38 and, as shown in FIGURE 5 of the drawing wherein there is illustrated a force diagram of the forces acting about the boom point 30 of the crane unit 10 when the crane unit 10 is handling the load L alone, in a conventional manner according to normal practices, with the load L being considered as substantially equal to the rated capacity of only the mobile crane unit 10, it is to be noted that the amount of boom compression BC on the boom structure 26 will depend upon the weight of the boom structure BW, amount of the load L being handled, the hoist line pull HLP on the hoist line 38 and the amount of tension T in the pendant bridle line arrangement 34 which is taut.

In order to be able to safely, efficiently, economically and assuredly increase the load handling capacity and ability of the crane units 10 and 12 beyond the rated capacity thereof, either taken alone or in combination, it is necessary that the capacity and ability of the boom structures 26 and 28 be increased in a manner which enables the boom structures 26 and 28 to resist, without collapse or failure, an increase in the compressive forces

BC and *bc* acting respectively therein due to the handling of the load XX which is greater than or in excess of the combined rated capacity of the crane units 10 and 12.

It has been found that by providing apparatus 40 which enables the boom points 30 and 32 of the boom structures 26 and 28 to be brought into supporting relationship, one with the other, in a manner so that the boom structures 26 and 28 are supported from adjacent the boom points 30 and 32 with the pendant bridle line arrangements 34 and 36 of each of the crane units 10 and 12 being placed in a slackened substantially non-tensioned condition and with the boom structures 26 and 28 extending generally upwardly, i.e., more vertical than horizontal, relative to the respective upper works 18 and 20 and disposed in upwardly converging relationship relative to each other, as illustrated in FIGURE 1 of the drawing, that the load handling ability and capacity of the crane units 10 and 12 may be increased beyond the combined rated capacity thereof which will enable the crane units 10 and 12 to handle the load XX.

FIGURES 6 and 7 of the drawing show force diagrams of the resulting effect of forces which are acting about the boom points 30 and 32 of the crane units 10 and 12 with such forces being illustrated therein for the crane units 10 and 12, respectively, as the boom weights BW, *bw*; hoist line pull HLP, *hlp*; hoist line HL, *hl*; boom compression BC, *bc*, and boom force BF, *bf* when the boom structures 26 and 28 are in supporting relationship, one with the other, as described and disclosed above, by employing the apparatus 40 and the resulting effect of the forces amounts to a desired increase in the ability and capacity of the boom structures 26 and 28 of the crane units 10 and 12 to resist collapse or failure due to an increase in the compressive forces which may be acting therein due to any increase in the load L, such as the load XX, which would be greater than or beyond the normal rated capacity of the crane units 10 and 12, either taken alone or in combination.

In FIGURE 6 of the drawing, the desired effective result of employing the apparatus 40 is illustrated in the force diagram by an actual decrease in the resulting boom compressions BC and *bc* with the load L being substantially equal to the rated capacity for a single one of the crane units 10 or 12, as illustrated in FIGURE 5; while in FIGURE 7 of the drawing there is illustrated the resulting forces when the load L is increased by an amount illustrated as the load XX which is greater than or in excess of two times the rated load capacity L and it is to be noted that the boom compressions BC and *bc* do not exceed and are substantially equal to the boom compression as illustrated in FIGURE 5 of the drawing which is the value set as the rated capacity of a single one of the crane units 10 and 12 so that the crane units 10 and 12 may effectively, safely and assuredly handle the load XX, as required.

When the boom structures 26 and 28 are disposed in supporting relationship, one with the other, as illustrated in FIGURE 1 of the drawing with the bridle arrangements 34 and 36 being slackened in non-tensioned condition, the effective resulting forces of the boom structures will be acting horizontally, as illustrated by BF in FIGURES 6 and 7 of the drawing, since while the force from one boom structure does act in a direction that is not horizontal on the other boom structure, the other boom structure must have an equal force due to its own action on the one boom structure with the net result of these two forces, that is, the one boom structure on the other boom structure when the boom structures are in supporting relationship one with the other, is a horizontal force acting between the boom structures at the boom points thereof.

As illustrated in FIGURES 2, 3 and 4 of the drawing, the apparatus 40 includes a first element 42 and a second element 44 which are secured, one each, to the boom structures 26 and 28 adjacent the boom points

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30 and 32 thereof with the first element 42 projecting outwardly from the respective boom point 30, as illustrated, and with the second element 44 having a recessed portion 46 formed to receive, position and releasably maintain the projecting first element 42 therein.

It is also preferable that the point of contact or the center of the area of contact between the elements 42 and 44 lie on a line connecting the centers of the boom points 30 and 32 in order to prevent any bending moment from being introduced into the boom structures 26 and 28.

While the preferred embodiment of the elements 42 and 44 are illustrated as being of ball and socket type configuration, respectively, it is to be understood that other configurations may satisfactorily serve the requirements of this portion of the apparatus 40 wherein the projecting first element 42 may take the form of a sphere, cone, cylinder, pyramid, or the like, with the second element 44 being formed with the recessed portion 46 thereof being of a complementary configuration for receiving, maintaining and positioning the particular first element 42 therein. Accordingly, in FIGURE 8 of the drawing, the first element 42 of the apparatus 40 has been illustrated in the configuration of a cone 142 with the second element 44 having a recessed portion 146 of complementing configuration. In FIGURE 9, the first element 42 is shown in the configuration of a pyramid 242 with the second element 44 having a recessed portion 246 of complementing configuration. It is only required that the elements 42 and 44 be formed and provided with a configuration which will enable the boom structures 26 and 28 to be maintained in a position which enables the boom structures 26 and 28 to be in supporting relationship, one with the other, during the handling of the load XX, as described and disclosed above.

A suitable equalizer device 48 is provided for equalizing the effect of the load XX on the hoist lines employed by the crane units 10 and 12 and one arrangement of the equalizer device 48 is illustrated in FIGURES 1 and 2 of the drawing wherein the hoist line 38 extends continuously from the hoisting drum 22 of the crane unit 10 to the hoisting drum 24 of the crane unit 12 with the intermediate portion of the hoist line 38 passing about boom point sheaves 50 and 52 which are located adjacent the respective boom points 30 and 32 of each of the boom structures 26 and 28. The intermediate portion of the hoist line 38 is reeved with an N number of parts about an apparatus 54 for securing the load XX to the hoist line 38.

The apparatus 54 includes a plurality of hook blocks 56 and 58 and an equalizer sheave 60 with the hoist line 38 being reeved with the N number of parts about the boom point sheaves 50 and 52 and the hook blocks 56 and 58 which are associated respectively therewith and passed about the equalizer sheave 60 with the equalizer sheave 60 being disposed intermediate the hook blocks 56 and 58.

Starting at the hoist drum 22 of the crane unit 10, the hoist line 38 passes along the boom structure 26 to the boom point 30 whereat the hoist line 38 has the N number of parts reeved between the boom point sheave 50 of the crane unit 10 and the hook block 56 associated therewith. From the hook block 56 associated with the crane unit 10 the hoist line 38 passes about the equalizer sheave 60 to the hook block 58 associated with the crane unit 12 whereat the hoist line 38 has the N number of parts reeved between the hook block 58 and the boom point sheave 52 of the crane unit 12 and the hoist line 38 then passes along the boom structure 28 of the crane unit 12 to the hoisting drum 24 thereof.

Another possible arrangement of the equalizer device 48 is illustrated in FIGURE 3 of the drawing wherein each of the crane units 10 and 12 are provided with hoist lines 138 and 138, respectively, and the hoist lines 138 and 138 pass about their respective boom point sheaves

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50 and 52 and then each are reeved between the respective boom point sheaves 50 and 52 and equalizer blocks 156 and 158, respectively, and the equalizer blocks 156 and 158 support an equalizer hook block 160 which may be secured to the load XX in a conventional manner.

FIGURE 4 of the drawing illustrates still another possible arrangement of the equalizer device 48 wherein an equalizer hook block arrangement 64 includes a pivotally mounted bar 66 having equalizer sheave blocks 256 and 258 mounted thereon to each side of a pivot pin 68, and the load XX is secured thereto by a suitable hook structure 70.

Further, if it is desired or if it is deemed necessary, the mobile crane units 10 and 12 may be connected together by suitable means 72 such as a linkage which will resist and prevent undesirable movement of the crane units 10 and 12 relative to each other in a generally horizontal direction. It is to be understood that the linkage means 72 may take any satisfactory form, such as bodily flexible cables, lines, chains or the like, or bodily rigid tie bars, rods or the like, with the linkage means 72 extending between and being secured to the crane units 10 and 12. It is to be understood that the linkage means 72 will not, in any way, hamper, hinder or prevent movement of the crane units 10 and 12 on the respective crawlers 14 and 16 during the transporting or movement of the load XX along a given desired course C and that the employment of the linkage means 72 is a safety factor and if employed, a plurality of the linkage means 72 may be used with the linkage means 72 being disposed at least adjacent to both the front and rear of the crane units 10 and 12 and acting in a manner to maintain the crane units 10 and 12 in the desired position, relative to each other, while handling the load XX either from a stationary location or along the given course C.

In operation, assuming that it is required, desired or necessary to lift, transport or in any other way handle the load XX, for example say 500 tons, it is possible that such load may be easily, speedily, quickly, safely, inexpensively and effectively handled, as desired, by the two mobile crane units 10 and 12 even though the crane units 10 and 12 may each have a capacity rating of only 200 tons which gives a combined aggregate total capacity rating of 400 tons which is substantially less than the load handling capacity required for handling the load XX of 500 tons.

The method which has been found to be the most efficient, safe and satisfactory for handling loads under the conditions as described and disclosed above, wherein the load XX exceeds and is greater than the combined rated capacity of the crane units 10 and 12 is to select the desired type of equalizer device 48 to be used and to employ the preferred hoist line arrangement and position the boom structures 26 and 28 of the crane units 10 and 12, which are provided with the elements 42 and 44, in the generally upwardly projecting, i.e., more vertical than horizontal, position to enable the first element 42 to be received in the recessed portion 46 of the second element 44 so that the boom structures 26 and 28 will be supported adjacent the boom points 30 and 32 thereof and the pendant bridle line arrangements 34 and 36 will be in a slackened substantially non-tensioned condition. If desired or deemed necessary the linkage means 72 may be employed for maintaining the crane units 10 and 12 in the desired position relative to each other. The selected equalizer device is secured to the load XX and the load XX may then be handled by the crane units 10 and 12 in a manner as desired.

In this way, the boom compressions BC and bc of the boom structures 26 and 28, respectively, are decreased a considerable amount, as illustrated by the force diagram of FIGURE 6 wherein the lines thereof illustrate the conditions present when the boom structures 26 and 28 are in supporting relationship relative to each other and the pendant bridle line arrangements 34 and 36 are in a sub-

stantially non-tensioned slackened condition and the boom structures 26 and 28 are handling a load L which is substantially equal to the rated capacity for either one of the crane units 10 or 12.

Similarly, it is believed to be well illustrated in FIGURE 7 of the drawing, by the lines shown therein, that if the boom compressions BC and bc are maintained at a maximum value that the amount of load XX which may be effectively and safely handled by the crane units 10 and 12 when the boom structures 26 and 28 are in supporting relationship relative to each other with the bridle line arrangements 34 and 36 in a slackened non-tensioned condition is greater than the combined rated capacities of both of the crane units 10 and 12.

By being able to dispose the boom structures 26 and 28 in supporting relationship relative to each other through the apparatus 40 with the pendant bridle line arrangements 34 and 36 of the crane units 10 and 12 being in slackened non-tensioned condition, it is possible to eliminate the effect of the bridle tension T on the boom compression BC and bc of the boom structures 26 and 28, as illustrated in FIGURES 6 and 7 of the drawing.

While the invention has been described and disclosed in terms of embodiments or modifications which it has assumed in practice, the scope of the invention should not be deemed to be limited by the precise embodiments or modifications herein shown, illustrated, described and disclosed, and it is to be understood that other such embodiments or modifications are intended to be reserved, especially as they fall within the scope and breadth of the claims herein appended.

I claim as my invention:

1. In combination with a pair of mobile crane units each of which is provided with an upper works having a hoisting drum, elongated boom structure pivotally mounted to the upper works and extending outwardly therefrom and terminating in a boom point whereat there is disposed a boom point sheave, and a bridle arrangement for moving and normally supporting the boom structure with the bridle arrangement being usually in a tensioned condition; apparatus for enabling the crane units to handle a load greater than the rated capacity thereof, said apparatus comprising structure carried adjacent the boom point of each of the boom structures for enabling the boom structures to support each other adjacent the boom points thereof and to place said bridle arrangements in a slackened substantially non-tensioned condition with the boom structures extending generally upwardly from the respective upper works and disposed in upwardly converging relationship relative to each other, a device for simultaneously securing a load to each of the crane units, and means for restraining the crane units from moving in generally horizontal directions relative to each other.

2. The combination as set forth in claim 1 wherein said device comprises at least one hoist line and an equalizer for distributing a load between the boom structures of the crane units.

3. The combination as set forth in claim 1 wherein said device comprises a single hoist line extending from the hoisting drum of one of the crane units to the boom point sheave thereof and then to the boom point sheave of the other crane unit and then to the hoisting drum thereof with that portion of the hoist line which is intermediate the boom point sheaves being reeved about a load equalizer.

4. The combination as set forth in claim 1 wherein said device for securing a load to the crane units comprises a pair of blocks, a hoist line reeved between the boom point sheave of each one of the crane units and one of the blocks, and a load equalizer disposed intermediate the blocks.

5. The combination as set forth in claim 4 wherein said load equalizer comprises an elongated element having each end portion thereof secured to one of the blocks,

and an elongated hook arrangement pivotally secured to an intermediate portion of the elongated element.

6. The combination as set forth in claim 1 wherein said means comprises an elongated linkage extending between and secured to the crane units.

7. The combination as set forth in claim 6 wherein said linkage is bodily flexible.

8. The combination as set forth in claim 6 wherein said linkage is bodily rigid.

9. The combination as set forth in claim 1 wherein said structure of the apparatus comprises an elongated element carried by and projecting from adjacent the boom point of one of the boom structures, and another element carried by the boom point of the other boom structure with the elements being formed with said another element having a configuration for receiving the projecting element.

10. The combination as set forth in claim 9 wherein the projecting element is of substantially spherical-convex configuration and said another element is of substantially concave-spherical configuration.

11. The combination as set forth in claim 9 wherein said projecting element is of substantially conical configuration, and said another element is recessed to receive said projecting element.

12. The combination as set forth in claim 9 wherein said projecting element has a configuration substantially like that of a pyramid, and said another element is recessed to receive said projecting element.

13. In combination with a pair of mobile crane units each of which is provided with elongated boom structure pivotally mounted to the respective crane unit and extending outwardly therefrom and terminating in a boom point, and a bridle arrangement for moving and normally supporting the boom structure with the bridle arrangement being usually in a tensioned condition; apparatus for enabling the crane units to handle a load greater than the rated capacity thereof, said apparatus comprising structure carried adjacent the boom point of each of the boom structures for enabling the boom structures to support each other adjacent the boom points thereof and to place said bridle arrangements in a slackened substantially non-tensioned condition with the boom structures extending generally upwardly from the respective crane unit and disposed in upwardly converging relationship relative to each other, and a device for securing a load to the crane units.

14. In combination with a pair of crane units each of which is provided with elongated boom structure pivotally mounted thereon and extending outwardly therefrom and terminating at a boom point, and an arrangement for moving and normally supporting the boom structure with the arrangement usually being in a tensioned condition; apparatus for enabling the crane units to handle a load greater than the rated capacity thereof, said apparatus comprising structure carried by each of the boom structures for enabling the boom structures to extend generally upwardly in converging relationship and be disposed in supporting relationship relative to each other adjacent the boom points thereof with the arrangements being in a slackened substantially non-tensioned condition.

15. In combination with a plurality of elongated pivotally mounted boom structures each having a boom point and an arrangement for moving and normally supporting the boom structures with the arrangement thereof usually being in a tensioned condition; apparatus for enabling the boom structures to handle a load greater than the rated capacity thereof, said apparatus comprising structures for enabling the boom structure to be supported adjacent the boom points thereof with the arrangements each being in a slackened substantially non-tensioned condition.

16. Apparatus for enabling a pair of mobile crane units each of which is provided with an upper works having a hoisting drum, elongated boom structure pivotally

mounted to the upper works and extending outwardly therefrom and terminating in a boom point whereat there is disposed a boom point sheave, and a bridle line arrangement for moving and normally supporting the boom structure with the bridle line arrangement being in a tensioned condition, to handle a load greater than the rated capacity thereof, said apparatus comprising structure carried adjacent the boom point of each of the boom structures for enabling the boom structures to support each other adjacent the boom points thereof and to place said bridle line arrangements in a slackened substantially non-tensioned condition with the boom structures extending generally upwardly relative to the respective upper works and disposed in upwardly converging relationship relative to each other.

17. The apparatus as set forth in claim 16 wherein the structure comprises an elongated element carried by and projecting from adjacent the boom point of one of the boom structures, and another element carried by the boom point of the other boom structure with the elements being formed with said another element having a configuration for receiving the projecting element.

18. The apparatus as set forth in claim 16 together with means comprising an elongated linkage extending between and secured to the crane units for restraining the crane units against movement in generally horizontal directions relative to each other.

19. Apparatus for enabling a pair of elongated boom structures each of which is provided with a boom point and which are normally supported by a tensioned arrangement to support each other adjacent the boom points thereof, said apparatus comprising structure carried adjacent the boom point of each of the boom structures, said structure being engageable to dispose the boom structures in generally upwardly projecting converging relationship relative to each other and to place the arrangement in a slackened substantially non-tensioned condition.

20. Apparatus for enabling a plurality of crane units each of which has pivotally mounted boom structure normally supported by a tensioned bridle line arrangement to handle a load greater than the rated capacity of the crane units, said apparatus comprising structure for enabling the boom structure of one of the crane units to be supported by the boom structure of the other crane unit with the bridle line arrangement being in a substantially relaxed, slackened non-tensioned condition.

21. The combination as set forth in claim 13 wherein said device comprises a hoist line extending from one of the crane units to the boom point thereof and then to the boom point of the other crane unit and then to the other crane unit with that portion of the hoist line which is intermediate the boom points being reeved about a load equalizer.

22. A method for handling a load in excess of the combined rated capacity of a pair of mobile crane units each of which is provided with boom structure pivotally mounted to the crane unit and extending outwardly therefrom, and a tensioned bridle line arrangement for moving and normally supporting the boom structure; said method comprising disposing the boom structures in generally upwardly converging relationship through movement of the tensioned bridle line arrangements, supporting the boom structures in such converging relationship, releasing the tensioned bridle line arrangements so that each arrangement is in a relaxed slackened substantially non-tensioned condition, providing at least one hoist line and a device for securing a load to the hoist line, and securing such load to the device.

23. A method for handling a load in excess of the rated capacity of a mobile crane unit having an upper works, elongated boom structure pivotally mounted to the upper works and extending therefrom and terminating in a boom point, and a tensioned bridle line arrangement for moving and normally supporting the boom structure; said method

comprising disposing the boom structure in a generally upwardly projecting position through movement of the tensioned bridle line arrangement, maintaining the boom structure in said position by supporting the boom structure adjacent the boom point thereof by another crane unit, releasing the tensioned bridle line arrangement so that such arrangement is in a relaxed slackened substantially non-tensioned condition, providing a hoist line, and securing such load to the hoist line.

24. A method for increasing the load handling capacity of a pair of mobile crane units each of which is provided with an upper works, a hoisting drum on the upper works, elongated boom structure pivotally mounted to the upper works and extending therefrom and terminating in a boom point whereat there is located a boom point sheave, and a tensioned bridle line arrangement for moving and normally supporting the boom structure; said method comprising disposing the boom structures in generally upwardly projecting positions through movement of the tensioned bridle line arrangements, supporting and maintaining the boom structures in said position by bringing the boom structures into supporting relationship one with the other adjacent the boom points thereof, releasing the tensioned bridle line arrangements so that each arrangement is in a relaxed slackened substantially non-tensioned condition, providing at least one hoist line and a load equalizer device for securing a load to the hoist line, securing such load to the device, and then rotating the hoisting drums to handle such load as desired.

25. A method for increasing the load handling capacity of a pair of mobile crane units each of which is provided with elongated boom structure pivotally mounted to the crane unit and extending therefrom and terminating in a boom point, and a tensioned bridle line arrangement for moving and normally supporting the boom structure; said method comprising disposing the boom structures in generally upwardly converging relationship through movement of the tensioned bridle line arrangements, supporting and maintaining the boom structures in such converging relationship by bringing the boom structures into supporting relationship one with the other, releasing the tensioned bridle line arrangements so that each arrangement is in a relaxed slackened substantially non-tensioned condition, providing at least one hoist line for the crane units having a device for securing a load to the hoist line, and securing such load to the device.

26. A method for handling a load comprising employing a pair of crane units each of which is provided with boom structure normally supported by a tensioned bridle line arrangement, disposing the boom structures in generally upwardly converging relationship relative to each other by movement of the tensioned bridle line arrangements, supporting and maintaining the boom structures in said relationship, releasing the tensioned bridle line arrangements so that each arrangement is in a relaxed slackened substantially non-tensioned condition, providing a hoist line, reeving said hoist line about a device for securing a load to the hoist line, and then securing such load to the device to enable such load to be handled by the boom structures.

27. A method of handling a load comprising employing a pair of crane units each of which has a tensioned line supported boom structure, said method comprising placing said boom structures in supporting relationship one with the other and placing said lines in a slackened substantially non-tensioned condition.

28. A method of enabling a plurality of tensioned line supported boom structures to handle a load greater than the rated capacity of the boom structures, said method comprising supporting one of the boom structures in a generally upwardly projecting position by another boom structure with the lines of the boom structures being in a slackened substantially non-tensioned condition.

29. A method for handling a load by a pair of crane units each of which is provided with pivotally mounted elongated boom structure and a tensioned bridle line

arrangement for moving and normally supporting the boom structure; said method comprising disposing the boom structures in supporting relationship one with the other with the boom structures extending generally upwardly in converging relationship by movement of the tensioned bridle line arrangements, maintaining the boom structures in said supporting relationship, releasing the tensioned bridle line arrangements so that each bridle line arrangement is in a relaxed slackened substantially non-tensioned condition, providing hoist lines reeved about a device for securing a load to the hoist lines, securing such load to the device to enable such load to be handled by the crane units as desired.

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