

Filed June 3, 1965

BOOM FOR LOADING DEVICE

4 Sheets-Sheet 1

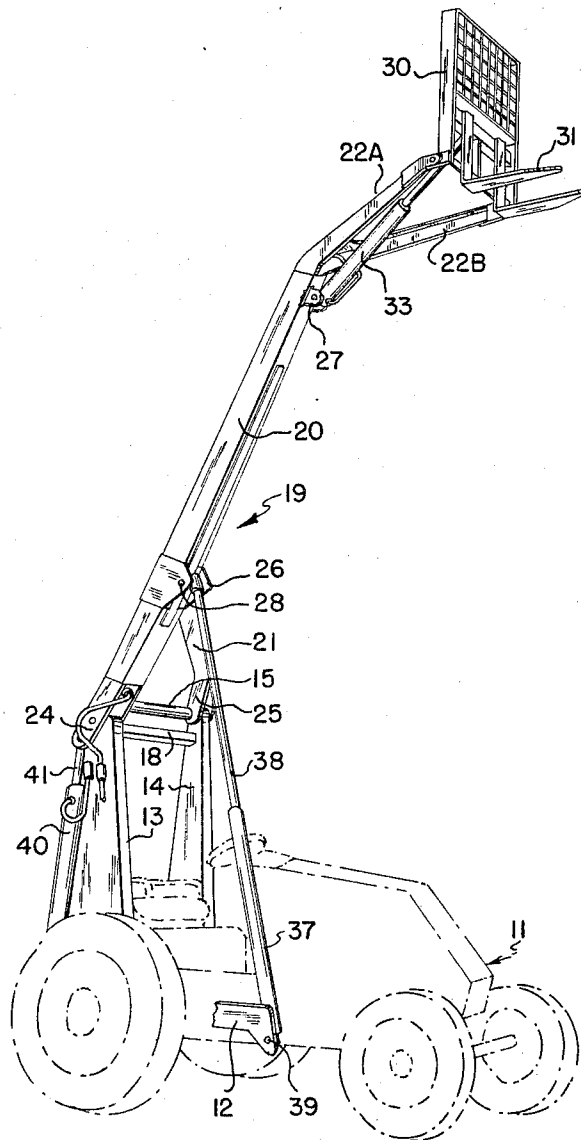


FIG. 1

WILLIAM S. WEST

BY *Worthing, Trent,
Ginger and Root.*
ATTORNEYS.

ATTORNEYS.

Nov. 29, 1966

W. S. WEST

3,288,316

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4 Sheets-Sheet 2

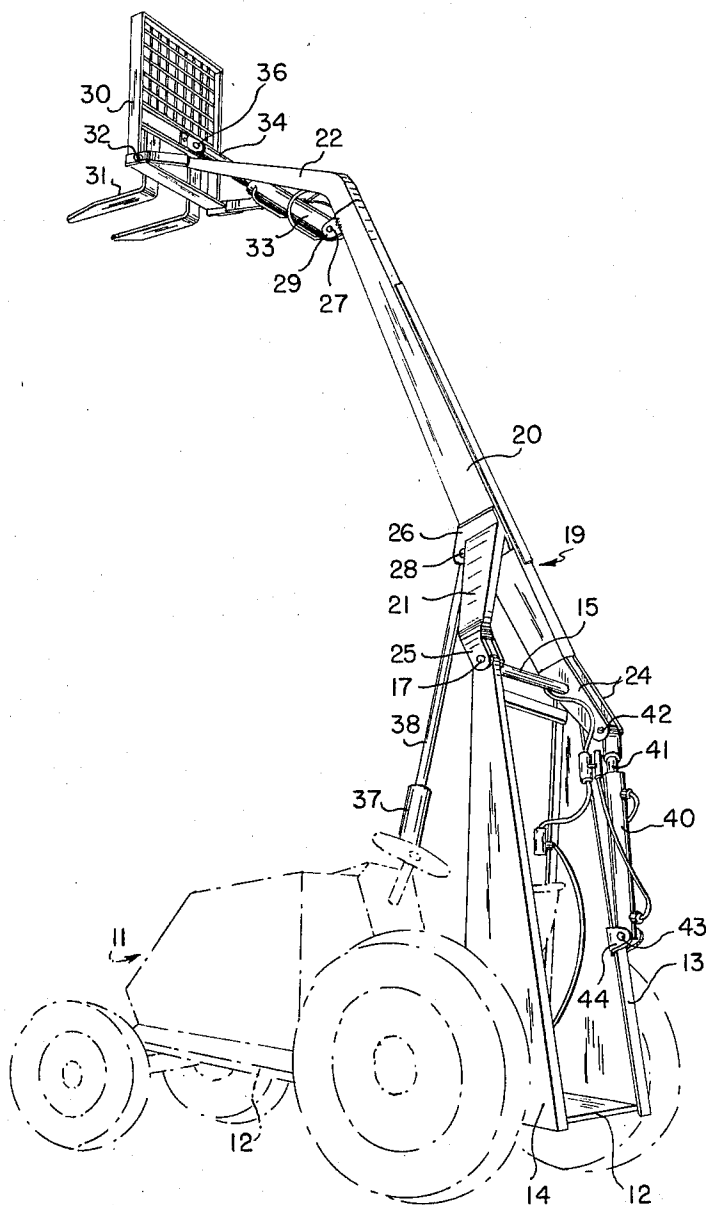


FIG. 2

INVENTOR

WILLIAM S. WEST

BY

W. S. West, Trust,
Attorneys and Counselors

ATTORNEYS

Nov. 29, 1966

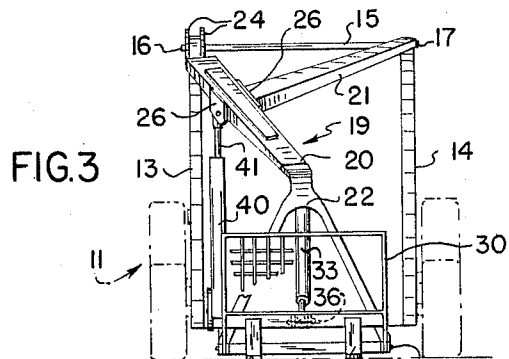
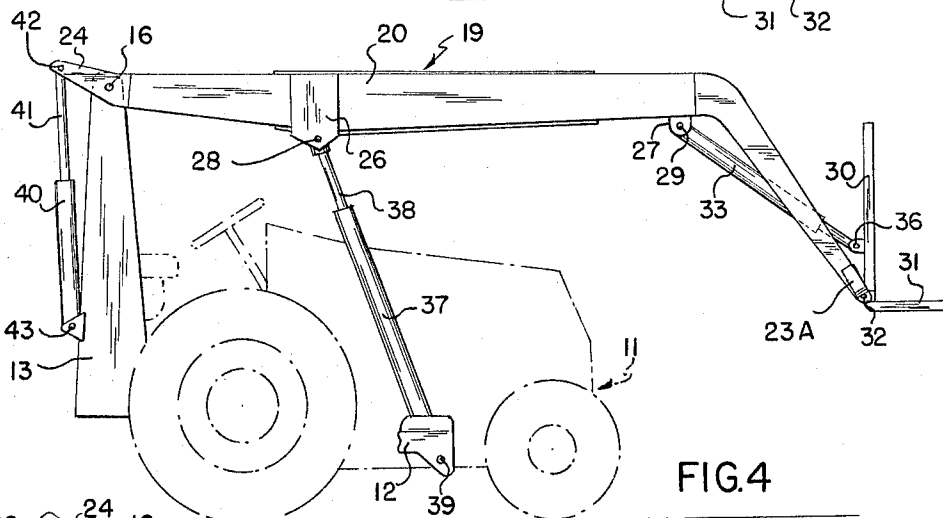
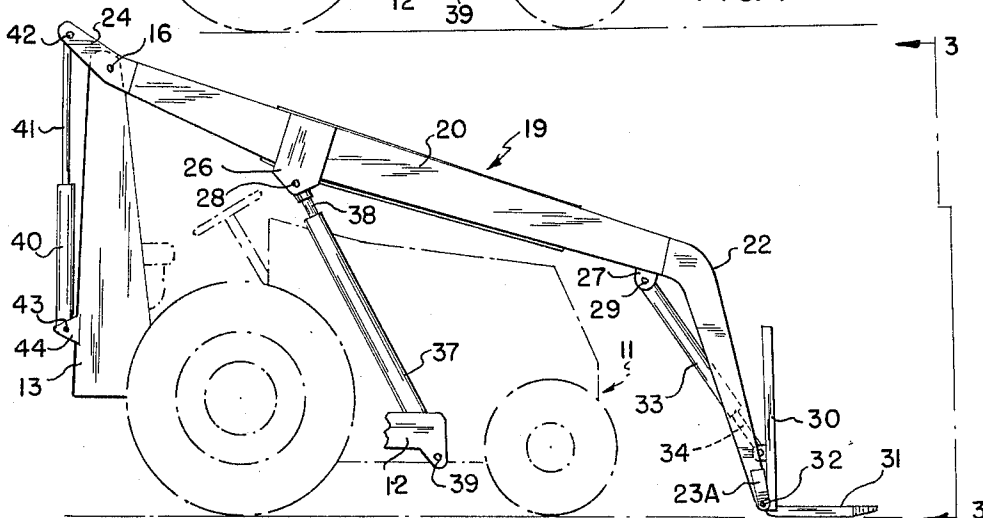
W. S. WEST

3,288,316

BOOM FOR LOADING DEVICE

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4 Sheets-Sheet 3



INVENTOR.

WILLIAM S. WEST

BY
*Woodling, Knead,
Gump and Hunt.*
ATTORNEYS

Nov. 29, 1966

W. S. WEST

3,288,316

BOOM FOR LOADING DEVICE

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4 Sheets-Sheet 4

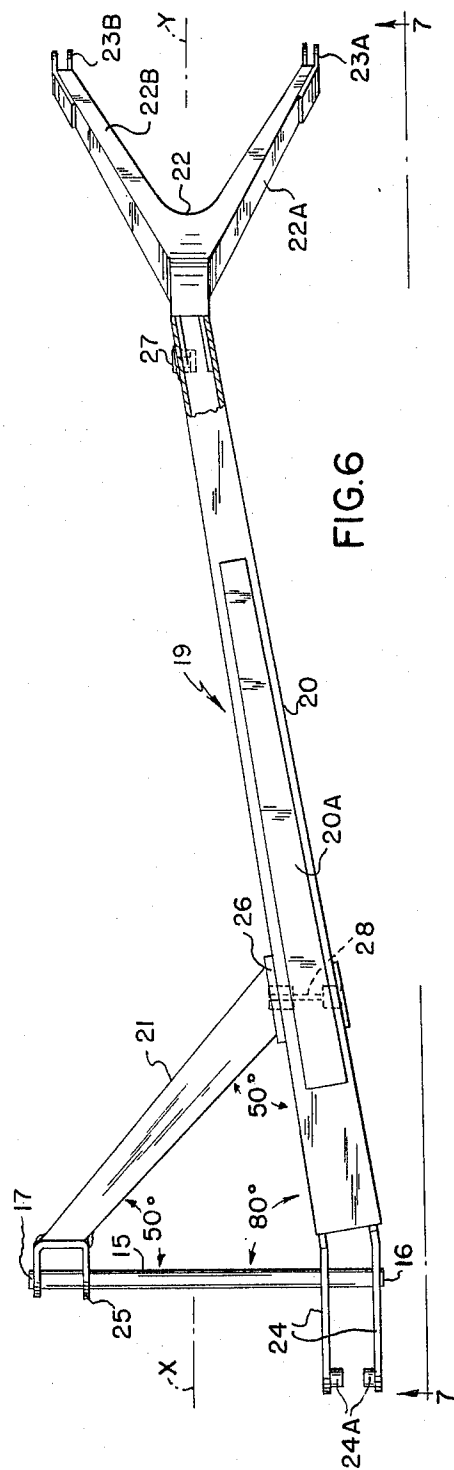


FIG. 6

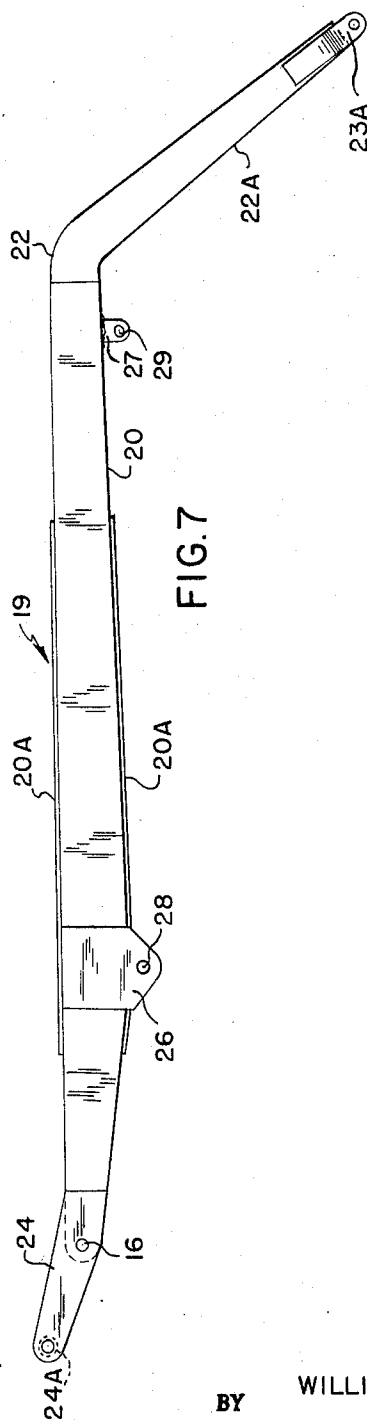


FIG. 7

INVENTOR

WILLIAM S. WEST

BY

*W. S. West, Jr.,
Engineer and Architect*
ATTORNEYS

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3,288,316

BOOM FOR LOADING DEVICE

William S. West, 1512 Clubside Drive, Cleveland, Ohio

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10 Claims. (Cl. 214-771)

My invention relates to loading devices having a boom that is swingably raised and lowered.

An object of my invention is to provide for an improved boom structure which increases the visibility to the operator of the forward end of the boom.

Another object is the provision of a boom structure which provides a maximum line of sight between the operator seated on the loading device and the load carried by the forward end of the boom.

Another object is the provision for an improved boom structure which minimizes weight requirements while providing a maximum of strength and rigidity in relationship to the weight of the boom structure.

Another object is the provision of a boom structure which increases the maneuverability and ease of operation of the loading device incorporating such a boom structure.

Another object is the provision of an improved boom structure on a loading device so constructed as to enable the boom structure to require less lateral working room in which to operate.

Another object is the provision for obtaining more efficient results by a novel and useful structure.

Other objects and a fuller understanding of the invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is a perspective view of a loading device having the boom positioned in elevated position, the tractor of the loading device being shown in broken lines;

FIGURE 2 is another perspective view of the same loading device with the boom in an elevated position and taken from the other side of the loading device;

FIGURE 3 is a front end view of the loading device with the boom in the lowermost position and looking in the direction of the arrows 3-3 of FIGURE 5;

FIGURE 4 is a side view of the loading device showing my improved boom structure positioned in a generally horizontal plane;

FIGURE 5 is also a side view of the loading device similar to that of FIGURE 4 but showing the boom structure in its lowermost position;

FIGURE 6 is a plan view of my improved boom structure removed from the loading device and partially in section; and

FIGURE 7 is a side view of the boom structure shown in FIGURE 6 and looking in the direction of the arrows 7-7 of FIGURE 6.

The loading device to which my invention is applicable includes a boom structure, associated load support member, required piston and cylinder assemblies, and a tractor or wheeled vehicle upon which the loading structure is mounted. In the drawings, the tractor or wheeled vehicle is indicated in broken lines and is denoted by the reference character 11. This tractor 11 has a supporting frame 12 upon which the loading structure is mounted.

At the rearwardmost end of the frame 12 of tractor 11 are two upright spaced members or standards 13 and 14, upright member 13 being on the right side of the frame and upright member 14 being on the left side of the frame. The upper ends of the upright members 13 and 14 are braced by a cross-brace 18. Extending across the extreme upper ends of the upright members 13 and 14 is a cross-piece or shaft 15 which provides a first pivot connection 16 on the right side and a second pivot connection 17 on the left side of the tractor.

My improved boom structure is denoted generally by

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the reference character 19. This boom structure 19 has a first arm portion 20 and a second arm portion 21 which are joined together at an angle of approximately 50 degrees to each other by a bracket plate 26 suitably welded to the adjoining portions of arm portions 20 and 21. Secured to the forward end of the first arm portion 20 by welding and a bracket 27 is a forked forward portion 22, this forward portion 22 having similar sides extending at an acute angle to each other as illustrated, one side being denoted as 22A and the otherside being denoted as 22B. At the lowermost end of the forked sides 22A and 22B there are provided by welding thereto suitable pivot supports 23A and 23B as shown. Extending along the upper and lower surfaces of first arm portion 20 are reinforcing plates 20A.

Secured by welding or other suitable means at the rearward end of the first arm portion 20 is a long bracket member 24 having two spaced sides and carrying bearing portions 24A at the rearward end thereof. Secured by welding or other suitable means to the rearward end of the short or second arm portion 21 is a short bracket member 25. The bracket members 24 and 25 are journaled upon the pivot connections 16 and 17, respectively, provided at the opposite ends of the shaft 15. It is to be noted that the bracket member 24 extends rearwardly beyond the shaft 15 a greater distance than does the bracket member 25. The bracket members 24 and 25 are in effect made integral with the boom 19 so as to move therewith. Also the forked forward end 22 is in effect made integral with the boom 19 so as to move therewith.

In the preferred form of my invention, the included angle between the axis of shaft 15 and the centerline of arm portion 20 is on the order of 80 degrees; the included angle between the axis of shaft 15 and the centerline of arm portion 21 is on the order of 50 degrees; and the included angle between the respective centerlines of arm portions 20 and 21 is on the order of 50 degrees. As better seen in FIGURE 6, the axis of shaft 15 and the centerlines of arm portions 20 and 21 together provide a triangle. It is noted that a centerline, indicated by the line X-Y in FIGURE 6, equidistant between the pivot connections 16 and 17 on shaft 15 in passing through the center of the forked forward portion 22 extends through this triangle. It is also to be noted that the major portion of the arm portion 20 is on one side of this centerline X-Y and also that the joint connecting the arm portions 20 and 21 is to one side of the centerline X-Y. Assuming that the operator of the loading device sitting on the seat of the tractor behind the steering wheel has his head oriented on this centerline, it is seen that the blockage of his view is minimized and that for much of the boom structure, the view is unobstructed along this centerline during the operation of the loading device and particularly in its upper ranges and lower ranges of movement.

Pivotaly connected to the frame 12 on the right side of the tractor by a pivot connection 39 is a piston and cylinder assembly used for hoisting the boom structure, this assembly being made up of a hydraulic cylinder 37 from which extends the piston stem 38. The upper end of the piston stem 38 is pivotaly connected to the bracket 26 by a pivot connection 28. By appropriate supply, exhaustion and control of fluid to and from the cylinder 37, the boom 19 may be raised and lowered as desired.

A load supporter, made up of back member 30 and supporting fingers 31 extending at right angles thereto, is pivotaly carried by the pivot supports 23A and 23B on the forward ends of forked portion 22. By means of pivot connections 32. A piston and cylinder assembly, including a cylinder 33 and a piston stem 34 extending therefrom, is provided for tilting the load supporter relative to the forked portion 22. The cylinder 33 is pivotaly connected by pivot pin 29 to bracket 27 provided at the

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junction of the arm portion 20 and the forked portion 22. The piston stem 34 is pivotally connected by the pivot connection 36 to the back member 30 of the load supporter. By suitable supply, exhaustion and control of fluid to the tilting cylinder 33, the angle of the load supporter, made up of back member 30 and fingers 31, may be varied relative to the plane of the boom 19.

A compensating piston and cylinder assembly is provided for automatic adjustment of flow of fluid to and from the tilting cylinder 33. The compensating cylinder and piston assembly includes a compensating cylinder 40 from which extends a piston stem 41. The lower end of the compensating cylinder 40 is pivotally connected by a pivot connection 43 to a supporting bracket 44 carried by upright member 13. The upper end of the piston stem 41 is pivotally connected by pivot connection 42 to the bearing portions 24A on the respective sides of the long bracket 24.

By suitable fluid conduits interconnecting the cylinders 33 and 40, the tilting piston and cylinder assembly is actuated in accordance with the actuation of the compensating piston and cylinder as the long bracket member 24 is raised and lowered with the boom structure. By suitable controls operable by the operator of the loading device and accessible from the seat of the tractor, fluid from the fluid pumping system of the loading device is admitted and exhausted to the various fluid cylinders of the apparatus, as desired.

As seen in the drawings, this boom structure provides great advantages to the operator in giving him increased visibility of his operations and particularly in the operation of picking up a load with the load supporter while the boom is in its lowermost position. He is also able to better keep in view the load and to observe the position of the several parts with a minimum of obstruction. It has been found that more efficiency is obtained in the operation of the loading device while at the same time the required weight and mass of the boom is minimized. Economy in the fabrication of the device is also obtained. The angular arrangement and disposition as described and illustrated aids in carrying out the objectives and desirable features of this invention.

The present disclosure includes that contained in the appended claims, as well as that of the foregoing description.

Although this invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.

What is claimed is:

1. In a loading device for a tractor or the like, the combination of a pair of spaced upright beams carried by the tractor or the like near the rear thereof, pivot connections carried by said upright beams adjacent spaced upper ends thereof, the respective axes of said pivot connections being in alignment with each other, a boom member having a first arm portion pivotably connected to a first of said pivot connections and a second arm portion pivotably connected to a second of said pivot connections, a forked supporting member secured to the forward end of said first arm portion substantially at the junction of said first arm portion and a vertical reference plane disposed substantially midway between said pivot connections, a load-engaging member carried by said forked supporting member, said second arm portion intersecting and extending beyond said reference plane and being secured to said first arm portion at a location beyond said reference plane and intermediate of said first connection and said junction whereby said boom member extends forwardly from said second arm portion to the forked supporting member on only one side of said ref-

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erence plane from said location to said junction to diminish interference with the view forwardly to the forked supporting member from near the rear of the tractor, the distance between said second pivot connection and said location being substantially less than the distance between the said first pivot connection and said junction.

2. A loading device as claimed in claim 1 and in which said location where the second arm portion is secured to the first arm portion is substantially closer to the said first pivot connection than to said second pivot connection and in which the included angle between the first and second arm portions is an acute angle, said acute angle being greater than twice the included acute angle between the first arm portion and said reference plane.

3. A loading device for a tractor or the like comprising the combination of supporting means carried by the tractor adjacent the rear thereof, a pair of laterally spaced pivot connections having a common horizontally disposed axis and carried by said supporting means, a boom member having a first arm portion and a second arm portion disposed in a common plane, each said arm portion being pivotably carried by a respective pivot connection to swing up and down on said pivot connections, said first arm portion being longer than said second arm portion and extending forwardly from its respective pivot connection to a junction with a vertical reference plane disposed equidistantly between said pivot connections, said second arm portion extending forwardly from its respective pivot connection and intersecting and extending beyond said reference plane, said second arm portion being connected to said first arm portion at a location spaced from said reference plane and at a location intermediate of said junction and the respective pivot connection of the first arm portion, said boom member forwardly of said location to said junction being disposed on one side of said reference plane to provide a visual view therealong unobstructed by the boom member on the other side of the reference plane forwardly of said location, said second arm portion forwardly of said location to said junction and rearwardly from said location being disposed along a common longitudinal axis.

4. A loading device as claimed in claim 3 and in which said second arm portion is shorter than the distance along the first arm portion from its respective pivot connection to the said junction.

5. A boom for a lifting device carried by a tractor or the like, said boom having a first arm portion and a second arm portion disposed in a common plane and pivotably carried at laterally spaced positions by said tractor or the like to swing up and down on a common axis, said second arm portion being connected to said first arm portion at an acute angle thereto at a location intermediate said common axis and the forward end of the first arm portion, said first arm portion, said second arm portion and a reference line parallel to said common axis extending between said arm portions forming a triangle, the included angle between said first arm portion and said reference line being substantially greater than the included angle between said second arm portion and said reference line, said first arm portion forwardly of said location being disposed on one side of a vertical reference plane normal to said common axis that is disposed equidistant between said laterally spaced positions and extending on said one side to a junction of the forward end portion of said first arm portion and said reference plane to provide a clear line of sight on the other side of said reference plane.

6. A boom as claimed in claim 5 and including a supporting member secured to said forward end portion of said first arm portion, said supporting member being adapted to carry load-engaging means thereon.

7. In a lifting device for a tractor or the like, the combination of first and second upright members carried by the tractor or the like and spaced apart laterally thereof, a horizontally disposed shaft extending between and

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carried by the upper end portions of said upright members, a boom member pivotably carried by said shaft at the spaced positions therealong for swinging up and down in an arc on the axis of said shaft, said boom member having a first arm portion and a second arm portion disposed in a common plane and swinging together, said first arm portion being more than twice the length of said second arm portion and being disposed on one side of a vertical reference plane normal to said axis and extending at an acute angle to said axis from said shaft to the juncture of the free end of the first arm portion and said reference plane, the said second arm portion extending at an acute angle to said axis from said shaft and intersecting said reference plane, said second arm portion being joined to said first arm portion at an acute angle thereto intermediate of said shaft and said free end thereof, the boom member being free for a line of sight therealong on the other side of said reference plane from said second arm portion to said free end of the first arm portion.

8. The combination claimed in claim 7 and including a load-carrying member carried by said free end of the first arm portion and extending forwardly therefrom equally on both sides of said reference plane.

9. The combination claimed in claim 7 and including a pin member secured to the boom member adjacent the juncture of said first and second arm portions, and a hydraulic ram assembly interconnecting said pin member and said tractor or the like for the raising and lowering of said boom member.

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10. An improved boom member for a lifting device, said boom member having a first beam and a second beam disposed in a common plane, the first beam being substantially longer than the second beam, the second beam being connected to the first beam intermediate the ends thereof at an acute angle, the first beam forwardly and rearwardly of the location of the connection with said second beam being disposed along a common longitudinal axis, said beams being pivotably supportable to swing on a common axis at spaced positions along said axis, the beams and said axis forming a triangle, the included angle between said axis and said first beam being substantially greater than the included angle between said axis and said second beam, and the included angle between said axis and said first beam being substantially greater than the included angle between said first and second beams, the first beam extending from said second beam to the free end of the boom member on one side of a reference plane normal to said axis equidistantly between the intersections of the center lines of said beams and said axis.

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HUGO O. SCHULZ, *Primary Examiner.*