

June 26, 1951

S. S. MCINTYRE
LOG HANDLING DERRICK

2,558,306

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3 Sheets-Sheet 1

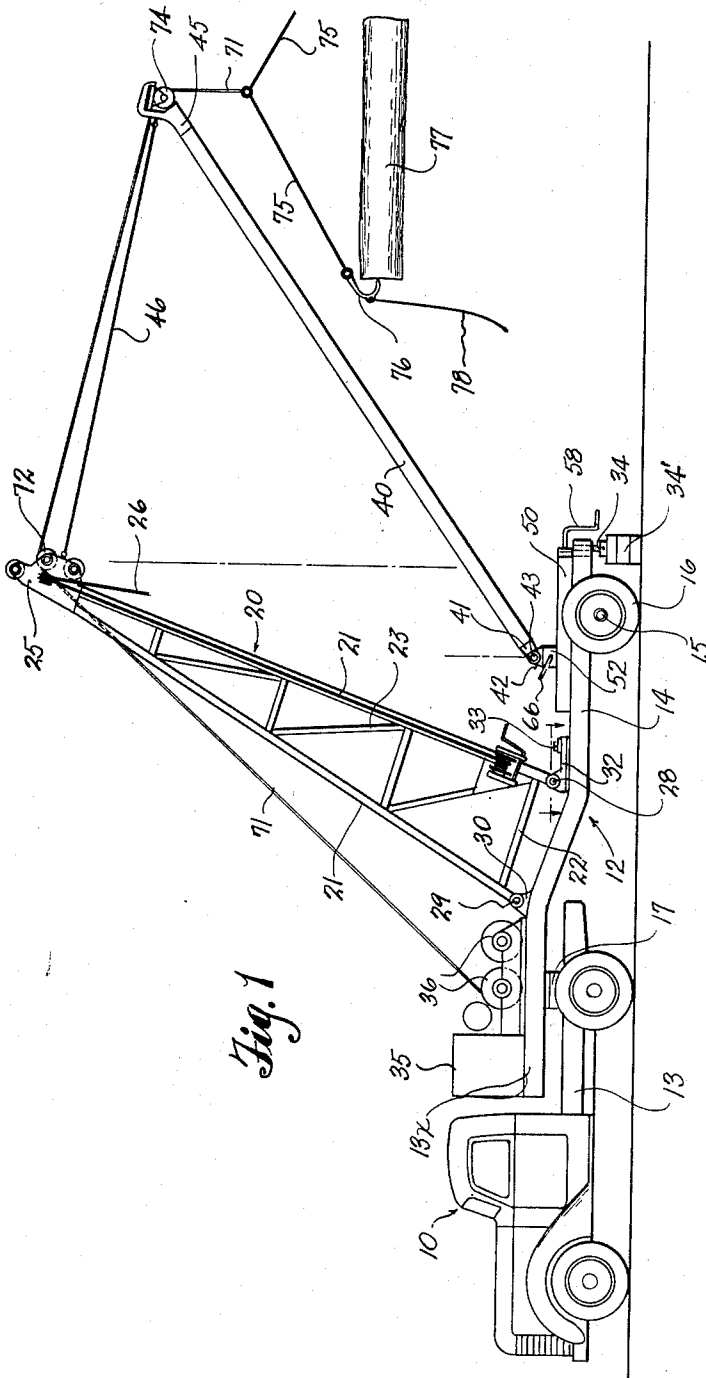


Fig. 1

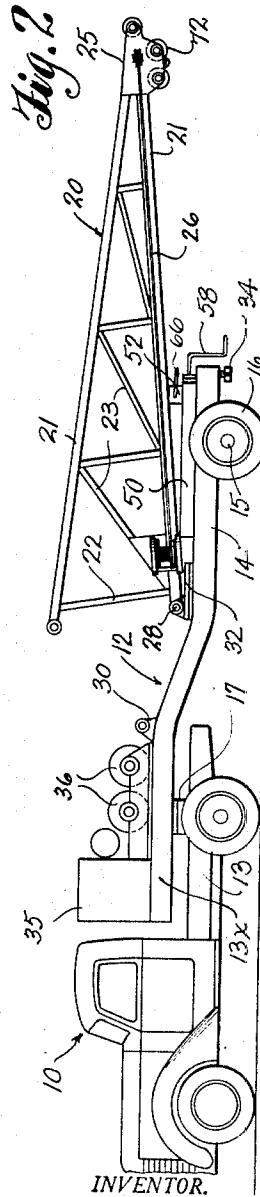


Fig. 2

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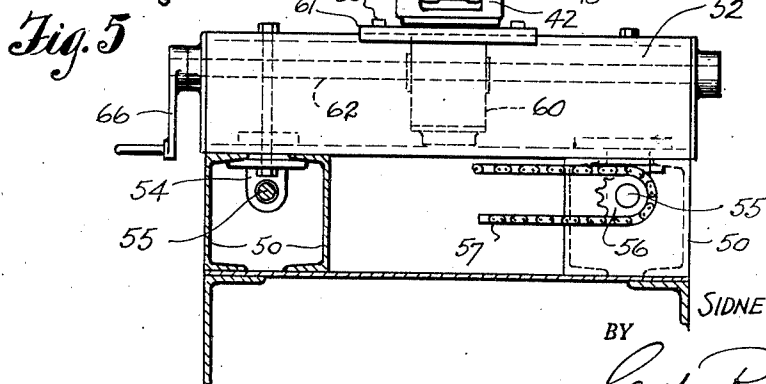
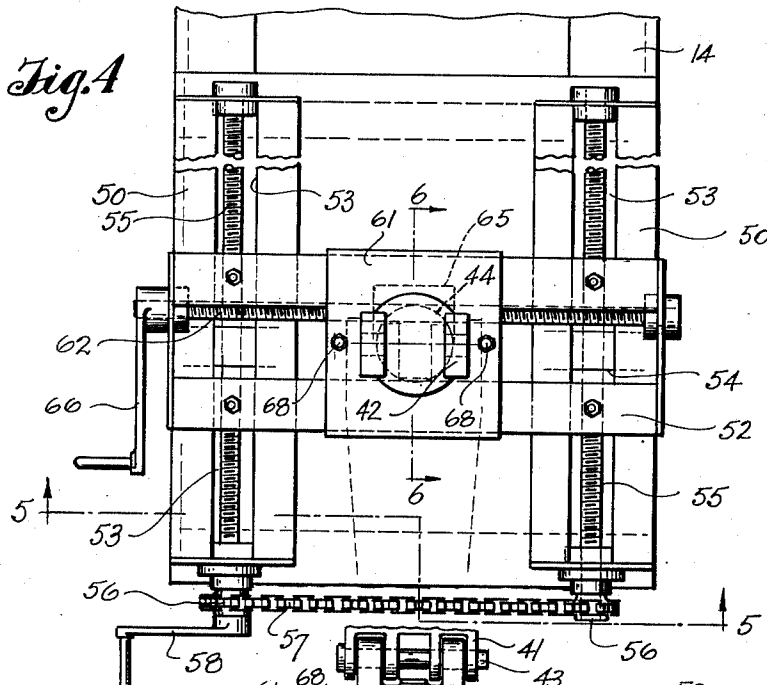
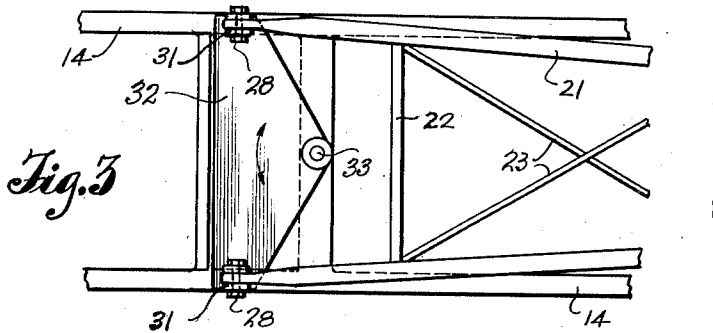
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Fig. 6

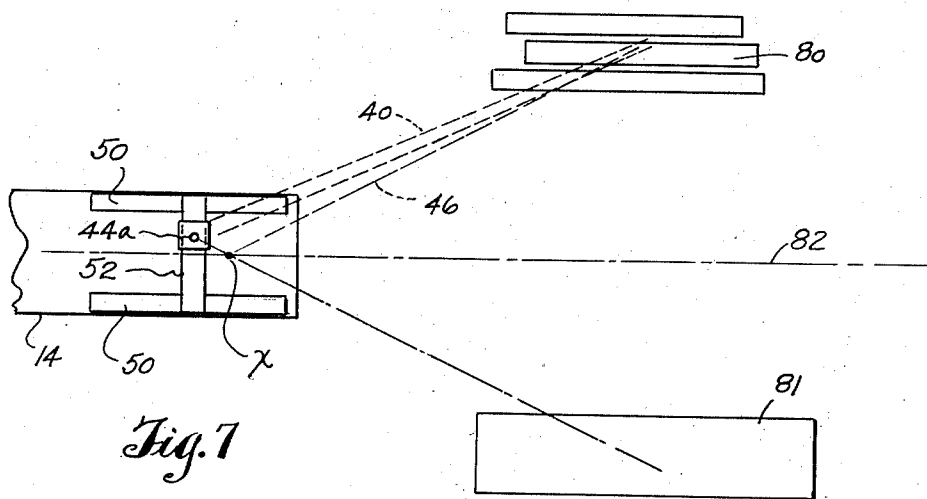
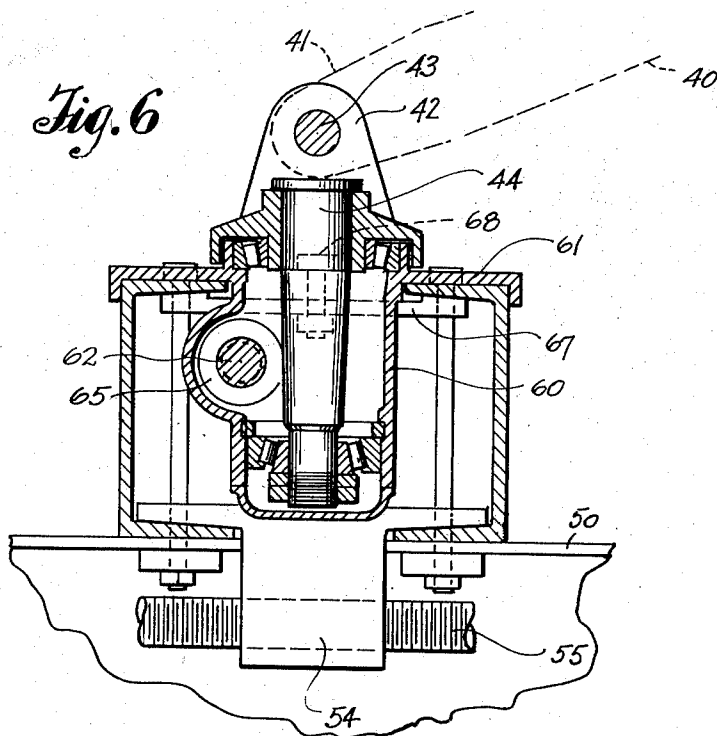


Fig. 7

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2,558,306

LOG-HANDLING DERRICK

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8 Claims. (Cl. 212-59)

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This invention relates to log handling equipment and has reference more particularly to improvements in portable derricks designed especially for the lifting and loading of logs, for example, a derrick for lifting logs from a yarded supply and loading them onto a truck for transportation, or for lifting logs from a truck onto a railway car, or for performing similar work.

It is the principal object of this invention to provide a portable derrick, that may be easily and readily moved from place to place over highways or along logging roads; which is especially adapted for use in logging operations as practised in the Pacific Northwest where logs are generally long and extremely heavy and where it is necessary that their transportation from the forests be by truck and trailer units. Furthermore, to provide a derrick of the above stated kind wherein provision is made whereby the weight of a load, as held in suspension from the boom of the derrick, may be used to swing the boom from loading to an unloading position.

More specifically stated, it is the object of this invention to provide a derrick having its boom mounted for swinging about a pivot axis, and wherein the point of support of the base end of the boom may be moved relative to a point on the derrick from which the swinging end of the boom is suspended, thus to determine the direction of swing of the boom under the weight of a suspended load, the point at which the loaded boom will come to rest, and to regulate the speed or force with which it is caused to swing.

It is also an object of my invention to provide novel means for the support of the boom so that the above mentioned adjustments may be easily and quickly accomplished.

Still another object of the invention is to provide a portable derrick wherein the derrick mast may be readily lowered and the device adapted for travel on highways or logging roads.

Still further objects of the invention reside in the combination of its parts; in their detail of construction and mode of use of the device, as will hereinafter be fully described.

In accomplishing these and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Fig. 1 is a side view of a portable derrick embodied by the present invention, showing the mast or spar as erected for use.

Fig. 2 is a side view of the same, showing the mast as lowered for travel of the conveying vehicle.

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Fig. 3 is an enlarged plan view of a portion of the truck frame, showing the mast attaching plate as pivoted thereto.

Fig. 4 is a plan view, showing the means for adjusting the position of the supporting means for the base end of the boom.

Fig. 5 is a cross section taken on line 5-5 in Fig. 4.

Fig. 6 is an enlarged, vertical section, taken on the line 6-6 in Fig. 4.

Fig. 7 is a plan view diagrammatically illustrating the swinging of the boom to a place of rest as determined by the position of the pivot axis of its lower end relative to its point of suspension from the derrick.

Referring more in detail to the drawings—

For its principal use at this time, I prefer to mount the derrick on a road vehicle of semi-trailer type, as shown in Figs. 1 and 2, wherein 10 designates, in general, an automotive truck suitable for the present use, and 12 designates a trailing vehicle on which the derrick and equipment associated therewith is mounted, as will presently be fully described.

The truck 10 has a chassis or frame structure 13, and the trailing vehicle 12 has an elongated frame structure 14, the rear end of which is supported by a cross axle 15 of suitable kind, equipped at its ends with ground wheels 16. At its forward end, the trailing vehicle has an upwardly offset horizontal portion 13x, which overlies the rear end portion of the truck frame and is connected thereto by means of a fifth wheel mechanism, designated generally by reference numeral 17.

Mounted on the frame structure of the trailing vehicle is the derrick mast, or spar, designated in its entirety by numeral 20. This mast is shown to be of angle iron construction, and comprises four upwardly converging corner beams 21, connected across their lower ends by cross beams 22 and along their lengths by suitable diagonal bracing 23. At their upper ends the four corner beams are joined with a housing 25 from which guy lines 26 extend to opposite sides of the structure to stabilize and secure it when erected and in use.

It is shown in Fig. 2 that the two rearward corner posts 21 of the mast are pivotally connected at their lower ends, by hinge pins indicated at 28, to the trailer frame in such manner as to permit the derrick, or mast, to be swung in a vertical plane between lowered and erected positions, and to extend in the longitudinal plane of the trailer. When the mast is in its erected position, the two forward corner posts of its frame

structure are secured by bolts indicated on Fig. 1 at 29, to anchor plates 30, fixed to the trailer frame, to hold it rigidly in its erected position. In its erected position, the upper end of the mast overhangs the rear end portion of the trailer on which the boom, presently described, is pivoted.

In its lowered position, as in Fig. 2, the mast 20 may rest on a cross member at the rear end of the trailer chassis, or if desired, it might be supported at its rear end by means of a caster wheel for trailing support. To accommodate the device to caster wheel support, the forward end of the derrick is provided with means for pivoted connection with the trailer chassis as seen best in Fig. 3 wherein it is shown that the pivot bolts 28 which secure the derrick legs, are applied through vertical ears 31 formed at opposite edges of a plate 32 that, rearwardly of the bolts 28, has a vertical pivot pin connection 33 with the chassis. This permits the desired fifth wheel action when the derrick is being trailed along a roadway.

When the trailer is set in a position for use of the derrick, the rear end of the trailer frame is blocked up to take weight off the wheels 16 and to give more stability to the derrick. As noted in Fig. 1, screw jacks 34 are affixed to the trailer frame at its rear end and at opposite sides and these may be adjusted into supporting contact with blocks 34' that are set in the ground. By means of these jacks, the trailer frame may also be leveled up. After the vehicle has been leveled up, the guy lines 26 are extended and secured to suitable anchoring means to retain the structure against lateral tipping under heavy loads.

Mounted on the forward end of the trailer frame is an engine 35, and this has operative connection with cable winding drums 36 for use of the latter as presently explained.

The derrick boom, designated by reference numeral 40, is here shown to comprise a single, straight pole, equipped at its inner end with a hinge bearing 41 whereby it is mounted for up and down swinging of its outer end. The hinge bearing 41 is fitted to a similar hinge member 42 and the parts are joined by a horizontal hinge pin 43. The part 42 is fixed on the upper end portion of a pivot pin 44 which is rotatably mounted by means presently described.

At its outer end, the boom is equipped with a pulley housing 45 to which the outer end of the boom suspending cable 46 is attached; the inner end of this cable being fastened to the housing 25 at the top end of the derrick frame, and the cable is of such length that it will suspend the boom in an upwardly inclined position that is most practical for the intended use, for example, as seen in Fig. 1.

It is to be understood that in the arrangement of parts as above described, the upper end of the mast or spar 20 is disposed in the longitudinal, vertical plane of the trailing vehicle, and a vertical line through the point of connection of the cable 46 with the housing 25 is rearward of the vertical axial line of the pivot line 44. Therefore, the weight of the boom or any load suspended from its outer end, will have a tendency to automatically swing the boom into a vertical plane passed through the axis of pin 44 and the point of attachment of the boom suspending cable 46 with the mast.

Therefore, it is apparent that in making provision for shifting the location of pivot pin 44 laterally from a neutral position in the central vertical plane of the trailer frame 12 toward opposite sides thereof, to more or less extent, the di-

rection toward which the boom will swing and position at which it will come to rest under the weight of its load, may be controlled. Also, it is apparent that the rate of swinging under any given load may be increased or decreased by shifting the location of the pivot pin 44 in the longitudinal direction of the trailer frame farther from or nearer to a perpendicular line through the point of attachment of cable 46 with the mast housing 25.

For shifting the pivot pin 44 in opposite directions transversely and also longitudinally of the trailer frame, I have provided the mechanism that is shown best in Figs. 4 to 6 inclusive, wherein 50—50 designates parallel guideways that are disposed at opposite sides of the rear end portion of the trailer frame longitudinally of the frame and fixed rigidly thereto. Mounted on these guideways, transversely of the trailer, is a cross beam 52, and fixed to and depending from opposite ends of the cross beam 52, through longitudinal slots 53 in the top walls of the guideways 50—50, are lugs 54. Threaded through these lugs, and revolvably fixed in and extending lengthwise of the corresponding guideways, are adjusting shafts 55—55. Sprocket wheels 56—56 are fixed on the extended rear end portions of these shafts and a sprocket chain belt 57 is placed thereabout to cause the shafts to rotate in unison. A crank 58 is fixed on one shaft 55 for the rotation of the shafts, thus to effect the forward or rearward shifting of the cross beam 52 on the guideways.

The cross beam 52 is of hollow form, and mounts thereon a bearing housing 60 that rotatably mounts the pivot pin 44 therein for rotation about a vertical axis. The bearing housing 60 has a central body portion that depends through a longitudinal slot in the top wall of the beam 52 and is formed with a horizontal supporting flange 61 integral with the upper end of the housing. A threaded shaft 62 extends from end to end of the cross beam 52 and is rotatably fixed therein. This shaft is threaded through a nut 65 fixed in the housing 60 and thus provides, that, by rotation of shaft 62 in opposite directions, the housing 60 will be shifted in opposite directions along beam 52, thus to shift the pivot pin 44 accordingly. To provide for the rotatable adjustment of cross shaft 62, it is equipped at one end with a crank 66. To secure this adjustment and relieve the shaft 62 of strain, I have applied clamp plates, as at 67 in Fig. 6, to the under sides of the beam flanges, and draw them tight by means of bolts 68 that extend through the upper end flange 61 of the housing 60.

In connection with the engine 35, I provide the cable winding drum 36 on which a cable 71 is wound. This cable is extended to the top of the mast over a guide sheave 72 mounted in housing 25, and extends rearwardly and over a sheave 74 that is pivotally suspended from the outer end of the boom. Paired lines 75—75 have ends attached to the outer end of the cable 71 and at their outer ends are equipped with hooks 76—76 for engaging with the ends of a log 77, as in Fig. 1, for handling the latter. To these hooks 76 short pull lines 78 are attached.

Assuming the parts to be so constructed, and the derrick to be erected and properly secured as in Fig. 1, the use of the apparatus would be as follows:

It is practical for the trailer frame to be so positioned that its central longitudinal line will pass between the location of the load that is to

be picked up and the vehicle that is to receive the load, for example, as in Fig. 7, wherein the logs to be handled are designated at 80 and the vehicle to receive them is designated at 81, and the longitudinal central line of the trailer is designated as line 82.

Since it is desirable that the load, as conveyed by the boom, should come to rest over the vehicle 81, the mounting for the pivot pin 44 is then so adjusted by turning of crank 66, that it will substantially coincide with a line drawn from the load center of vehicle 81 through a line dropped perpendicularly from the point of connection of cable 64 with the mast. In Fig. 7, the perpendicular line is designated at x and the pivot pin 44 is indicated at 44a.

Then, by means of the two short pull lines 78, workmen may pull on the cable 71, while its winding drum is held against rotation, to swing the boom to a position over the logs 80. The hooks 76 are then applied to the ends of a log and the cable 71 is next wound in on the drum 36 to lift the log to proper height for loading. Under weight of the log, the boom will then automatically swing to a position of rest over the vehicle, and the log may be deposited thereon by paying out the cable 71.

The extent of swing of the boom may be made more or less by moving the pivot pin 44 farther from or closer to the center line of the mounting vehicle, and also, it will be understood that the farther the pivot pin 44 is shifted from the vertical line through the point of connection of cable 46 with the mast, the greater will be the swinging force. If the pin 44 is brought into vertical alignment with this point of connection of the cable, the tendency of the boom to swing is overcome.

Derricks of this kind may be mounted on permanent bases, and on portable bases of various kinds, and may be constructed in various ways without departing from the spirit of the invention. For logging operations, it is practical that they be easily and readily portable and that provision for leveling up be associated with the vehicle. Also, that provision be made for lowering the mast to an easily portable position as has been provided for, and as shown in Fig. 2.

Having thus described my invention, what I claim as new therein and desire to secure by Letters Patent is:

1. In a derrick of the character described, a base structure, a boom mounting means movably secured to the said base structure, a boom mounted at its inner end by said mounting means for horizontal swinging through an arc of operation, a mast erected on the said base structure having an upper end portion overhanging the arc of operation of the base end portion of the boom, a connector suspending the outer end of the boom from the overhanging portion of the mast, and means on the base structure supporting the boom mounting means and operable for effecting lateral adjustment of the said boom mounting means relative to the general direction of the boom.

2. In a derrick of the character described, a longitudinal base frame, a boom mounting means movably secured to the base frame, a boom mounted at its inner end by said mounting means for swinging horizontally through an arc of operation extending to opposite sides of the central longitudinal line of the base frame, a mast erected on the base frame and having an upper end portion that overhangs the arc of operation of the base end portion of the boom in the cen-

tral longitudinal plane of the base frame, a connector suspending the outer end portion of the boom from the overhanging portion of the mast, and means mounted in the base frame for shifting the said boom mounting means in a direction transversely of and to opposite sides of the longitudinal center line of the base frame.

3. A derrick as recited in claim 2 including also means mounted in the base frame for shifting the said boom mounting means in the longitudinal direction of the base frame while in any position of lateral adjustment.

4. In a derrick of the character described, a longitudinal base frame, a boom mounting means, a supporting beam therefor extending transversely of the base frame, a boom pivotally mounted at its inner end by said mounting means for swinging through an arc of operation that extends to opposite sides of the said central longitudinal line of the base frame, a mast erected on the base frame and having an upper end portion overhanging the arc of operation of the base portion of the boom in the central longitudinal plane of the base frame, a connector suspending the outer end of the boom from the overhanging portion of the mast, and means for shifting the boom mounting means along its supporting beam from a neutral position to opposite sides of the central longitudinal line of the frame.

5. In a derrick of the character described, a longitudinal base frame, a boom mounting means, a supporting beam therefor, extending transversely of the base frame, a boom pivotally mounted at its inner end by said mounting means for swing through an arc of operation that extends to opposite sides of the said central longitudinal line of the base frame, a mast erected on the base frame and having an upper end portion overhanging the arc of operation of the base end portion of the boom in the central longitudinal plane of the base frame, a connector suspending the outer end of the boom from the said overhanging portion of the mast, means for shifting the said boom mounting means to different positions along its supporting beam to change the normal position of rest of the boom and another means for shifting said supporting beam in the longitudinal direction of the said base frame to increase or decrease the effective overhang of the mast.

6. A mobile derrick comprising a longitudinal base frame, a cross beam extending transversely of the said base frame, a boom mounting pivot means mounted by and movable along said beam, a boom mounted at its inner end by said pivot means to swing horizontally through an arc of operation that extends to opposite sides of the base frame, a mast erected on the base frame and inclined to overhang the arc of operation of the base end portion of the boom, a cable suspending the outer end portion of the boom from the overhanging portion of the mast, means for lifting and suspending a load from the outer end of the boom, a shaft revolvably mounted in the said cross beam longitudinally thereof and having threaded connection with the said boom mounting pivot means, and means for rotating the said shaft to move said pivot means to different positions transversely of the frame.

7. A derrick as recited in claim 6 including also guideways extending longitudinally of and at opposite sides of the said base frame, and supporting the opposite ends of said cross beam thereon, shafts rotatably fixed in said guideways longitudinally thereof and having threaded con-

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nections with ends of the cross beam and means for rotating said shafts in unison to move the said beam lengthwise of the base frame to change the degree of inclination of the axis about which the boom swings.

8. A mobile derrick comprising a road vehicle having a longitudinal frame, a mast erected thereon and inclined rearwardly to overhang the rear end portion of the frame, guideways mounted along opposite sides of the rear end portion of the frame, a cross beam supported at its ends on said guideways and movable therealong, a boom mounting pivot supported on and movable along said cross beam, a boom hingedly attached at its inner end to the said pivot means to swing horizontally to opposite side of the longitudinal line of the frame, a cable suspending the outer end of the boom from the overhanging portion of the mast, means for shifting and securing the said pivot means at the different positions of ad-

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justment along the cross beam, means for securing and shifting the cross beam along the said guideways, cable winding means on the frame, cable guide sheaves on the mast and boom ends, a cable extending from the drum over said sheaves and means at the end of the cable for support of a load.

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