Feb. 23, 1954 H. R. PEARSON 2,670,177

LOG LOADING BOOM

Filed April 7, 1951

3 Sheets-Sheet 1

Fig. 1

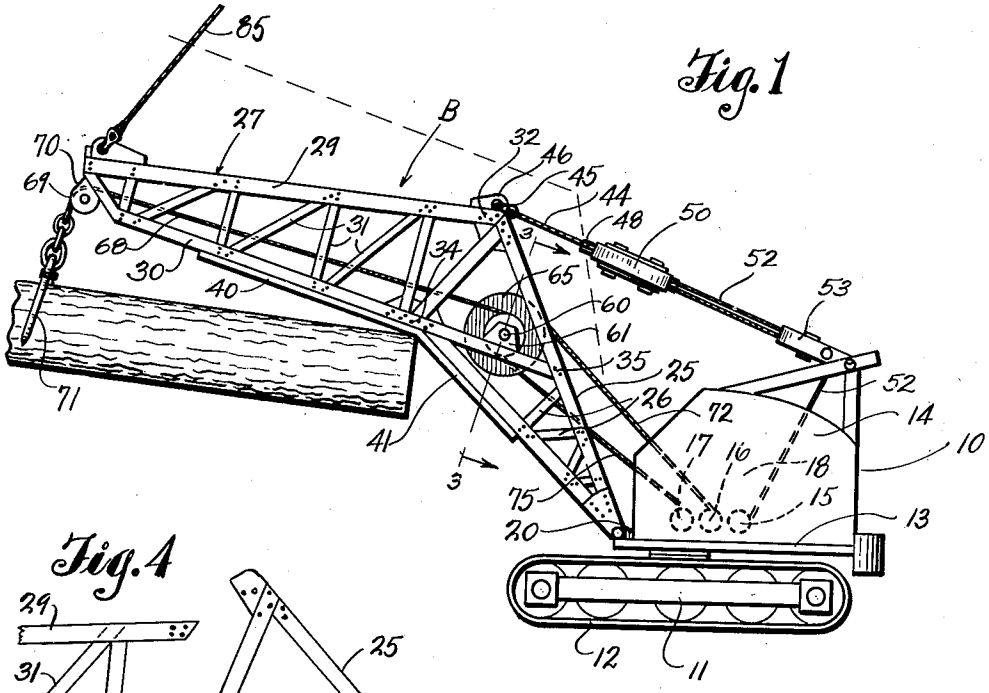


Fig. 4

Fig. 2

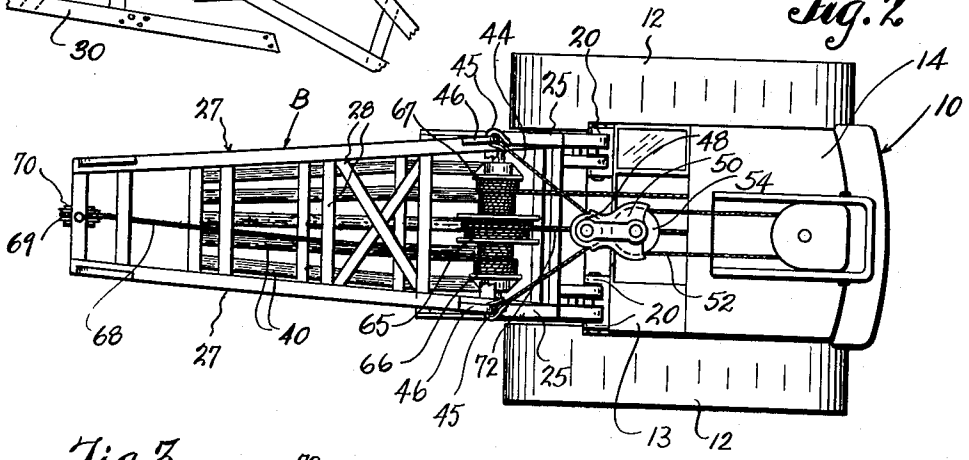
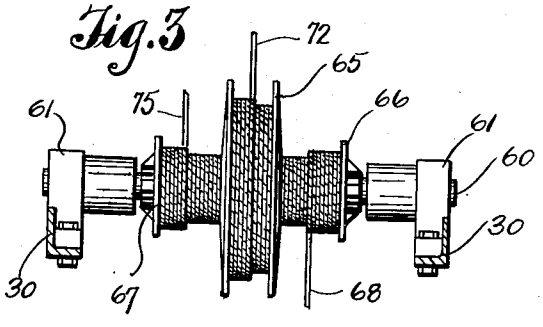


Fig. 3



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Fig. 5

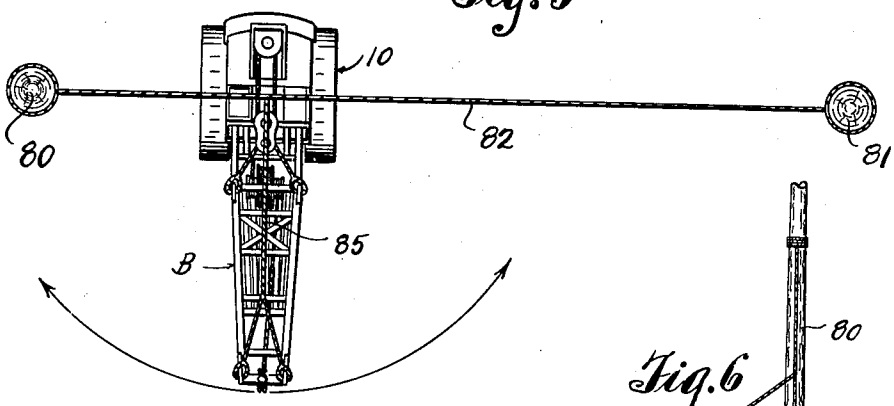


Fig. 6

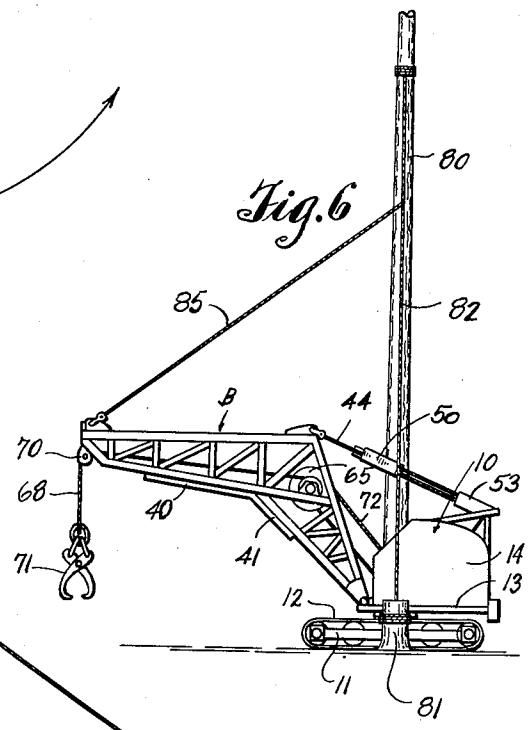


Fig. 7

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Fig. 8

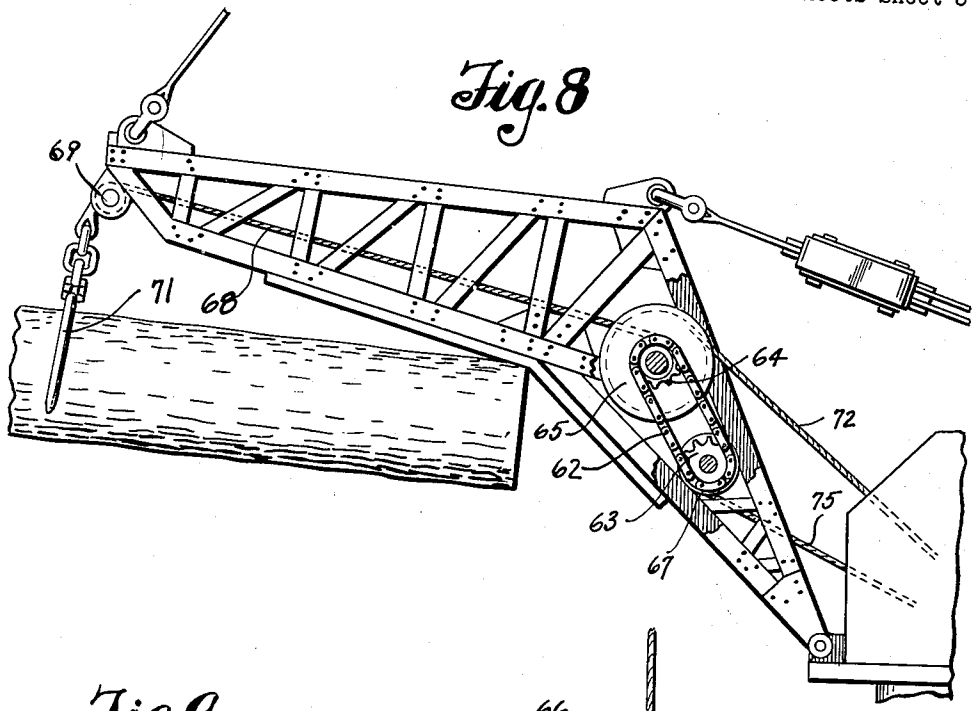


Fig. 9

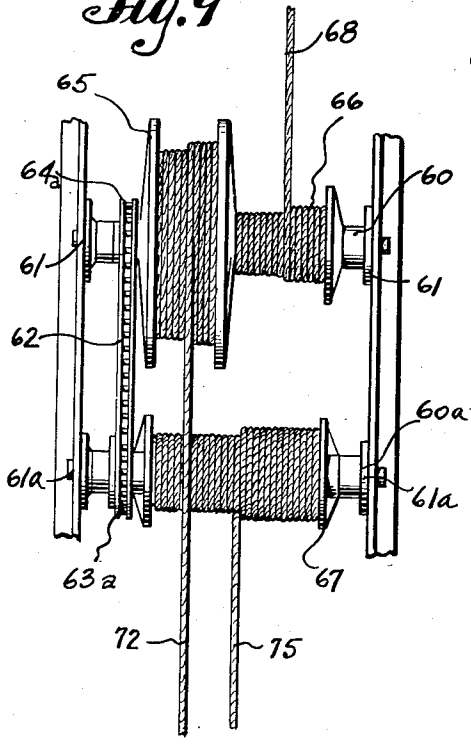
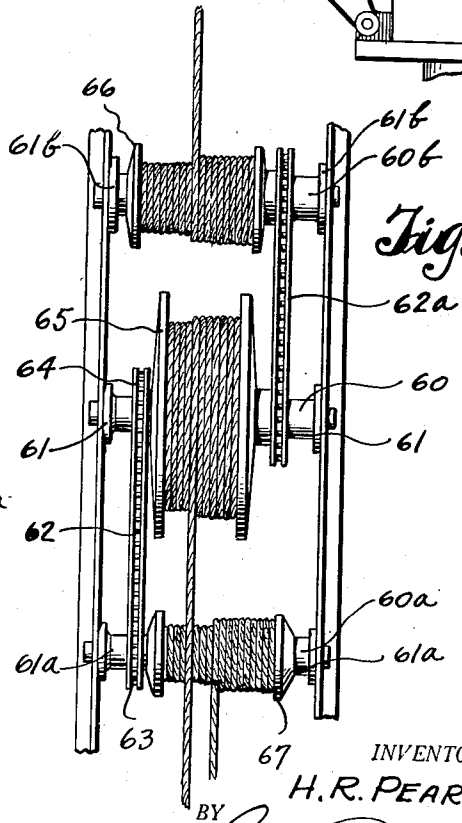


Fig. 10



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UNITED STATES PATENT OFFICE

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LOG LOADING BOOM

Herschell Ray Pearson, Everett, Wash.

Application April 7, 1951, Serial No. 219,775

4 Claims. (Cl. 254—184)

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This invention relates to log handling cranes and it has reference more particularly to improvements in mobile cranes designed for the lifting and loading of yarded logs or the like, of large size, onto a car or truck; this application being a continuation in part of my pending application, Serial No. 96,377, now abandoned. It being the principal object of the invention to provide a log loading crane that is characterized by use therewith of a novel, knee-type boom including therein certain cables and cable winding drums, in a power multiplying combination.

It is also an object of my invention to provide a log handling boom of novel design, that may be readily applied for use to present day power shovels as a replacement for the usual shovel boom, and which, as applied thereto may be operated and controlled for the handling of logs, by the same cables, cable winding drums and control devices as already provided for the operation and control of the shovel boom.

It is also an object of my invention to provide a novel combination of cable winding drums in the boom itself, through which a multiplication of lifting power for the expeditious handling of extremely heavy logs, or loads is effected.

A still further object of the invention is to provide a boom that may be readily dismantled and disassembled to provide for easier transportation in moving the crane from place to place.

Further objects of the invention are to be found in the novel details of construction of parts, and in their combination and mode of use as will hereinafter be fully described.

In accomplishing the above mentioned 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 mobile vehicle, of power shovel type, equipped with a log loading boom embodying the improvements of the present invention therein.

Fig. 2 is a top, or plan, view of the same.

Fig. 3 is a cross-section taken on line 3—3 in Fig. 1.

Fig. 4 is a fragmental view showing the manner of disconnecting the arm portion of the boom from the leg portion.

Fig. 5 is a plan view of the crane, illustrating the utilization of a spar tree and guy line to give support to the boom.

Fig. 6 is a side elevation of the same.

Fig. 7 is an end view of parts shown in Fig. 5.

Fig. 8 is a side view of a log loading vehicle showing an alternative drum arrangement and with a portion of the boom broken away for purposes of better illustration.

Fig. 9 is a plan view of the alternative form of drum arrangement.

Fig. 10 is a plan view of another alternative form of drum arrangement.

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Referring more in detail to the drawings—

10 designates, in general, a vehicle of power shovel type, comprising a frame structure 11, which is here shown to be equipped with crawler-type treads 12, but which might be equipped with ordinary types of supporting wheels. Supported upon the frame structure 11 for turntable action, is a horizontal floor or platform 13, on one end of which the boom embodied by this invention, and designated in general by reference character B, is hingedly mounted for vertical swinging adjustment. Also supported on the platform 13, at the end thereof that is opposite that which supports the boom, is a cab 14 in which the engine, the various controls, and cable winding drums that are used in connection with the boom, are located in any practical arrangement.

It is to be understood in this connection that the platform 13 is adapted, as in the usual power shovel, to be mechanically turned in different directions about a vertical axis, for moving a lifted load from one position to another, as presently explained, and may be held secure at any set position; the mechanism for effecting this action not being herein shown as it forms no part of my invention.

Mounted on the platform 13 are cable winding drums 15, 16 and 17, which might be arranged as indicated in Fig. 1 or in other suitable manner for the paying out or winding in of the individual cables that, respectively, control the raising and lowering of a log or load relative to the boom, and for turning the slack winding drum. The drums are revolubly mounted in a frame structure that is designated by reference numeral 18.

The means or devices for driving the various drums and for controlling them for drawing in or paying out the cables used thereon, is not herein shown, but it is to be understood that these mechanisms may be like any of the usual mechanisms provided on power shovels for this purpose, or any other suitable means.

The platform 13 preferably would comprise a heavy and substantial casting, formed at one end, in transverse alignment, with lugs or ears 20—20 to which the lower end of the boom B is hingedly attached, as presently explained. The boom extends upwardly and away from the vehicle, in the longitudinal direction of the base, as noted in Figs. 1 and 2, and it is the intent that its weight as sustained by the platform, be counterbalanced to substantial extent by the weight of the cab, the engine and the various cablewinding and control means located therein.

The boom B is an open truss form of structure, comprising an inner end portion which I will refer to as the mounting leg, and an extended outer portion which I will refer to as the boom arm; this latter portion being fixed at an obtuse angle relative to the leg as shown best in Fig. 1. A boom now in use has a mounting leg portion six-

teen feet long and an arm about twenty feet long. The inside angle formed by leg and arm is approximately 140 degrees, and in mounting the boom on the vehicle, the angle is faced downwardly as shown best in Fig. 6.

More specifically describing the construction of the boom: The mounting leg portion comprises opposite side frames 25—25, in parallel, vertical planes and rigidly joined by cross beams and diagonal bracing. Each frame 25 comprises an upper and lower chord, and these are joined in upwardly diverging relationship by a plurality of struts or braces such as those at 26 in Fig. 1.

The extended arm portion of the boom, likewise, comprises opposite side frames 27—27 joined in spaced relationship as shown in Fig. 2 by cross beams 28. Each of these opposite side frames comprises an upper chord 29 and a lower chord 30 (see Figs. 1 and 4) joined by struts or braces as at 31, and the chords of each frame converge toward the outer end of the arm, with the upper chord extended somewhat beyond the lower chord.

At their inner ends, the top chords 29 are bolted, as at 32, to fish plates at the upper ends of the top chords of the leg portion of the boom. The lower chords 30 of these side frames extend across the upper ends of the bottom chords of the leg portion and to the top chords, and are bolted thereto as at 34 and 35. By reason of the manner of connection, it is possible to easily and readily disconnect these parts of the boom for disassembly whenever such is desirable in order that long haul transportation may be made easier.

Within the angle-forming surfaces of the boom, the leg and arm portions are covered with suitable plates or slats as at 40 and 41 for heeling the logs while being lifted and swung to unloading position. These plates or slats extend along their respective sections of the boom to substantial distances as has been illustrated particularly in Figs. 1 and 6.

The boom is adjustably supported in operative position by means of a cable yoke 44 that is attached by means of hooks 45 at its ends to ears 46—46 that are fixed to the boom at the hip angle. This cable 44 extends over a wheel 48 in a pulley block 50, shown best in Fig. 2. Another cable 52 extends from the cable winding drum 15 over suitably arranged pulleys in a block 53 and about a pulley wheel 54 in block 50 and is dead ended in block 53. By the winding in and paying out of the cable 52 from this drum 15, the boom will be raised and lowered accordingly, and by locking the drum against rotation, the adjustment of the boom will be retained.

Mounted to rotate on a cross shaft 60 that is mounted in bearings 61 that are secured on the inner end portions of the lower chords 30 of the arm portion of the boom, is a large cable winding drum 65 and at opposite sides thereof and rotatable therewith are drums 66 and 67 as best shown in Fig. 3.

A cable 68 is secured to and wound on the drum 66 and extends therefrom to the outer end of the boom and there passes over a sheave wheel 69 mounted in a block 70 suspended from that end of the boom. At its end this cable is equipped with tongs 71 for the picking up of a log that is to be handled by the crane.

Another cable 72 is wound in on the large drum 65 and extends therefrom to the power driven drums 16. When this cable is wound onto drum 16, it operates to rotate the large drum 65 in such direction as to turn the drum 66 to wind the cable 68 thereonto, thus to lift the log held by tongs 71. Yet another cable 75, is wound on drum 67 and extends therefrom to the engine driven cable drum 17. The direction of winding is such that when the cable 75 is wound onto drum 17, it causes the drums 65 and 66 to be rotated in such direction as to pay out the tong cable from drum 66. This is to give slack in cable 68.

In Figs. 8 and 9 I have illustrated an alternative arrangement or positioning of the drums 65, 66 and 67. For the purpose of describing this arrangement, the same reference numerals will be used where applicable. In this construction, the drums 65 and 66 are coaxially mounted to rotate on the shaft 60 which shaft is mounted in the bearings 61—61, and the bearings are secured on the boom. Below and rearward of the shaft 60 and drums 65 and 66 and parallel to the shaft 60 is a shaft 60*a* which is mounted for rotation in the bearings 61*a*—61*a* which bearings are also secured to the boom. The drum 67 is mounted for rotation on the shaft 60*a*. The simultaneous rotation of the shafts 60 and 60*a* is accomplished by means of the sprocket chain 62 which revolves about the alined sprocket wheels 63 and 64. These sprockets being fixedly mounted on the shafts 60*a* and 60 respectively. With reference to the cables it is to be noted that the cables 68 and 75 are wound on their respective drums in the same direction whereas the cable 72 is wound on drum 65 in a reverse direction so that when the cable 72 is unwound from drum 65, the cables 68 and 75 are wound onto drums 66 and 67.

The load lifting cable 68 is wound on the drum 66 and passes therefrom over the sheave 69 and at its outer end is equipped with tongs 71. The cable 72 wound on drum 65, extends to the power drum 16 to provide means for rotating the drums 65 and 66. The cable 75, wound on the drum 67 extends therefrom to the engine driven drum 17. When the drum 65 is caused to be rotated by the unwinding of the cable 72, the drum 66 will rotate as will the shaft 60 and sprocket wheel 64. This in turn will cause the sprocket chain 62 to revolve thereby rotating in the same direction, the sprocket wheel 63, shaft 60*a* and drum 67. The rotation of the drum 66 will cause the cable 68 to be wound thereon, lifting the load held in the tongs 71.

For the unwinding or paying out of the cable 68, the cable 75 is unwound from the drum 67 by and onto the drum 17 and thereby rotating the sprockets 63 and 64 in reverse direction and permitting the cable 68 to be paid out from the drum 66. This rotation winds the cable 72 onto drum 65.

In Fig. 10 I have illustrated another alternative drum arrangement wherein each drum is mounted on a separate shaft which are in parallel relationship. In this illustration, the load lifting drum is above and forward of the drum 65 and the drum 67 is below and rearward of the drum 65. The drum 65 is mounted on a shaft 60 and the shaft rotates in bearings 61—61. The drum 67 is mounted on the shaft 60*a* and this shaft rotates in bearing 61*a*—61*a*. The drum 66 is mounted on shaft 60*b* and is rotated in bearings 61*b*—61*b*. For the functional rotation of the drum simultaneously, I employ sprocket chains 62 and 62*a* which interconnects the several drums. The sprocket chain 62 revolves about the sprocket wheels 63 and 64 which are mounted on the shafts 60*a* and 60 respectively. The sprocket chain 62*a* revolves about the

sprocket wheels 63*a* and 64*a* which are mounted on the shafts 60*b* and 60 respectively.

The various cables are wound upon their respective drums in the same direction as previously described and the drums are caused to rotate in the same manner. The unwinding of the cable 72 from the drum 65 will rotate the drums 66 and 67 and the cables 68 and 75 will be wound on the drums and the load will be lifted by the cable 68.

Except for changes or modifications described, the construction of the vehicle, boom and other parts is substantially the same and the mode or manner of operation is identical. The use of separate shafts and alternative drum arrangements permits the use of a narrower or smaller boom and by using sprockets of varying sizes, the speed and power factors may be altered.

In setting up the crane for an operation, it is sometimes desirable, especially if exceedingly heavy loads are to be lifted, to locate the crane in such position relative to the spar tree or other high support, that a cable can be drawn over the vehicle from said spar to serve as an anchor for a boom suspending member. In Figs. 5, 6 and 7, I have designated a spar tree at 80 and a tree or stump at 81. The crane 10 is located between the tree and stump and a guy line or cable 82 is drawn taut from the tree to the stump, passing directly over the axis of the turntable. A cable 85 is attached at one end to the cable 82 directly above the turntable and at its other end is attached to the outer end of the boom, as in Fig. 6, as a support for the boom. With this arrangement of parts, the boom may swing freely but at all times will be supported through this cable connection, making it possible to lift greater loads without danger of tipping the vehicle.

To lift and move a log, the boom B after being properly elevated, would, by rotation of the turntable base, be extended over the log so that the tongs 71 could be easily applied thereto. Then, with the tongs applied, the cable winding drum 16 is energized and by reason of its cable 72 being wound thereon, the drum 65 will be rotated. Rotation of this relatively large drum causes cable 68 to be wound onto the smaller drum 66 and the log thereby lifted. By proper location of the tong in applying it to the log, a selected end of the latter may be caused to lift first, and this end can be caused to heel against the boom in the hip angle as shown in Fig. 1. Then by further winding in of the cable 68, the other end of the log will be lifted clear of the ground and to the desired elevation, for example as indicated in Fig. 1. Then the boom may be swung about the axis of the turntable to an unloading position, at which the log may be lowered onto a car or truck.

The handling of logs in this manner is especially advantageous where logs are to be loaded onto a car or truck since, in the heeling of the log against the boom as explained, it is retained in a definite position relative to the boom and it is therefore possible to lay it down in a definite manner.

The main advantages to be gained by the present boom design result in the arrangement of cable winding drums therein whereby the lifting power may be greatly increased; in the provision for rotating these drums to give slack in the tong cable; in the suspending of the boom from the spar tree guy line; and in the provision for ready disconnection and disassembly of the parts of the boom for easier transportation on long hauls.

Specific details of construction may be altered without departing from the spirit of the invention.

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

1. A power multiplying mechanism comprising three cable winding drums, one of said drums being of relatively large diameter and the other two being of relatively small diameter, means interconnecting the three drums to cause them to rotate in unison and each to change its direction of rotation with change in direction of either of the others, a load lifting cable wound on one of the drums of relatively small diameter and adapted to be paid out therefrom for connection with a load and to be wound thereonto to draw in the load, two selectively operable power driven drums, a cable wound on the drum of relatively large diameter and extended therefrom to the first of the said power driven drums for winding thereonto, this to effect the driving of the said three drums and the winding in of the load lifting cable onto its drum, and another cable wound on the other drum of relatively small diameter and extended to the second of the said two power driven drums and adapted to be wound thereonto thus to cause driving of the said three cable winding drums in a direction reverse to that effected by the winding in of the cable on the first of said power driven drums.

2. A power multiplying mechanism as recited in claim 1 wherein the said three cable winding drums are co-axial and are joined for rotation in unison.

3. A power multiplying mechanism as recited in claim 1 wherein the said cable winding drum of larger diameter and the cable winding drum of smaller diameter that carries the cable that extends to the said first power driven drum are coaxially joined for rotation in unison, and the other of said cable winding drums of smaller diameter is mounted independently of the coaxial cable winding drums, removed from and parallel thereto, and wherein the said means interconnecting the said three cable winding drums comprises a positive driving connection between the coaxially joined cable winding drums and the other cable winding drum.

4. A power multiplying mechanism as recited in claim 1 including a frame, three drum mounting shafts fixed in said frame in parallel relationship and mounting the said three cable winding drums thereon respectively, and wherein the said means interconnecting the three cable winding drums comprises sprocket wheels on the cable winding drums and sprocket chain belts operating about the sprocket wheels.

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