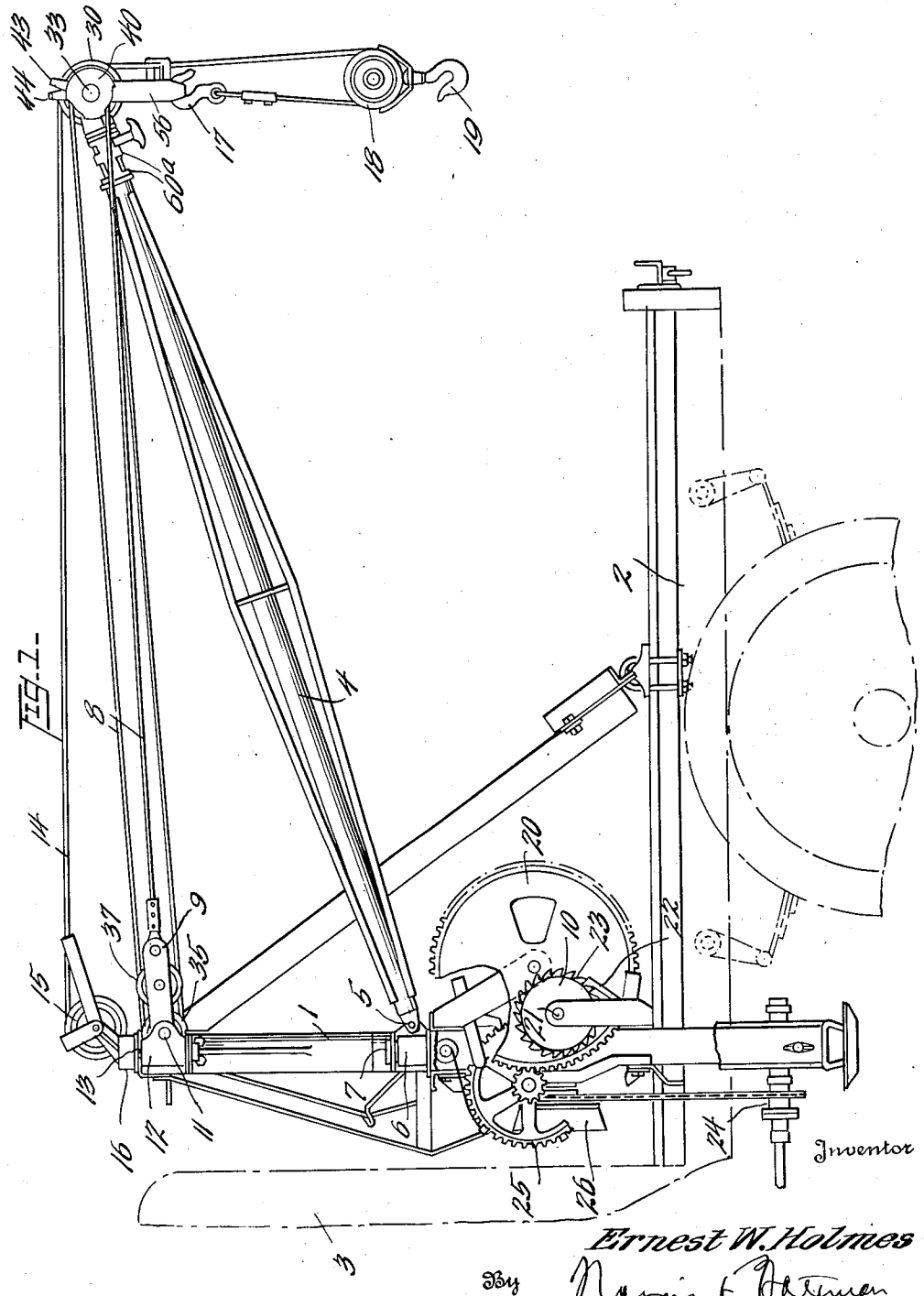
June 8, 1943. E. W. HOLMES 2,321,549

SHEAVE MOUNTING FOR HOISTING BOOMS

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SHEAVE MOUNTING FOR HOISTING BOOMS

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FIG. 2.

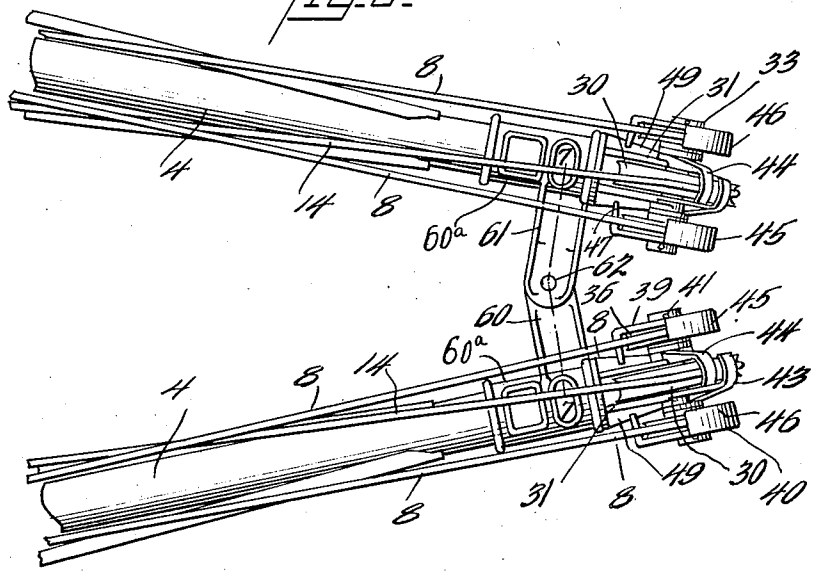


FIG. 3.

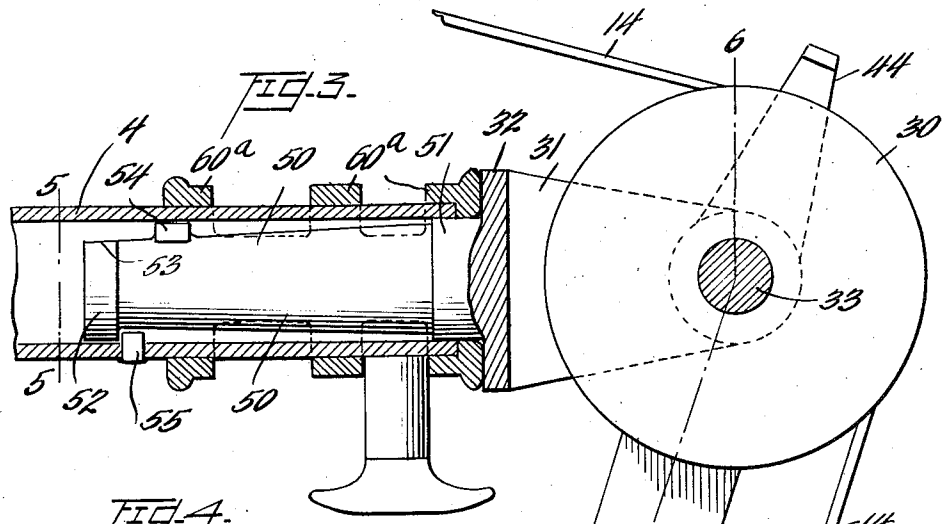
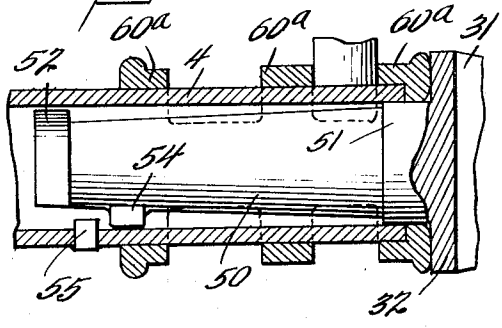


FIG. 4.



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FIG. 5.

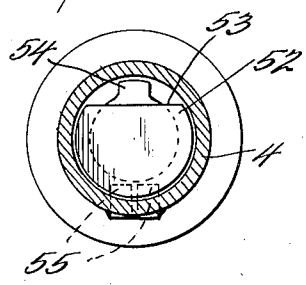


FIG. 6.

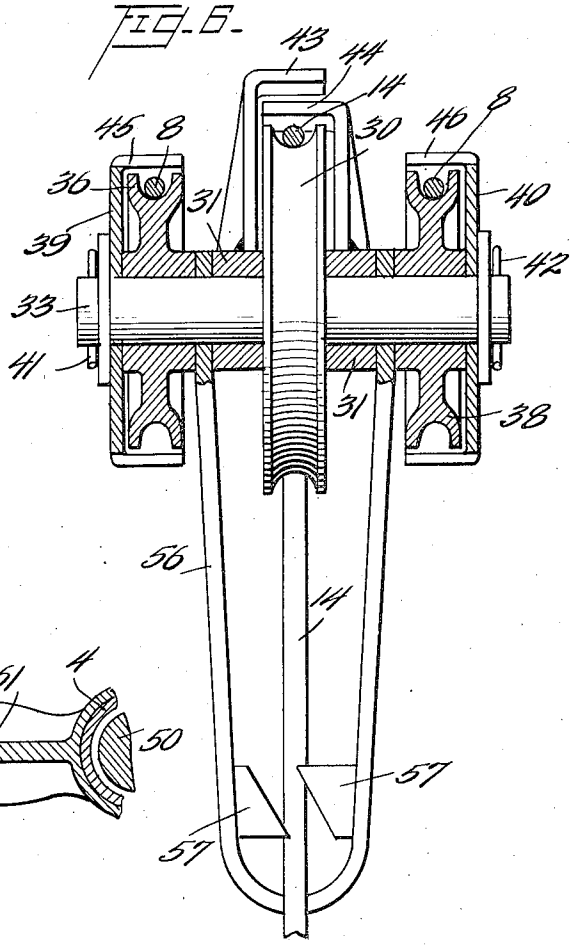


FIG. 7.

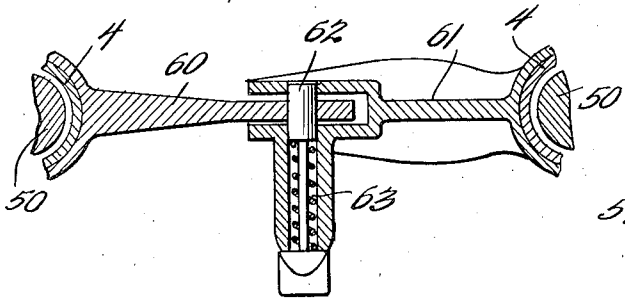
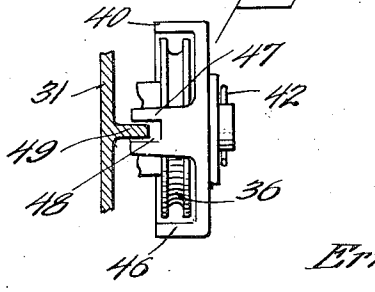


FIG. 8.



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2,321,549

SHEAVE MOUNTING FOR HOISTING BOOMS

Ernest Walter Holmes, Chattanooga, Tenn., assignor to Ernest Holmes Company, Chattanooga, Tenn., a corporation of Tennessee

Application September 26, 1941, Serial No. 412,487

7 Claims. (Cl. 212—144)

The present invention relates to improvements in automobile service and wrecking trucks, and more especially to those of the type shown and described in my prior U. S. patent, Reissue No. 14,720, granted September 2, 1919, in which derrick or hoisting mechanism embodying a pair of companion booms is mounted on a truck or similar automotive vehicle, and is adapted to extricate automobiles from positions in which they may be left as the result of accidents and to tow or haul automobiles to service stations or other desired destinations.

In the developments of wrecking trucks of this double boom type for heavy duty, each boom-supporting cable is passed around a sheave carried by a link attached to the outer end of the boom in order that the boom cable may sustain greater loads imposed on the boom, but it has been found in practice that when the booms are locked together to hold them against lateral swinging, and the hoisting cable of one of the booms is employed for hauling or pulling in a direction laterally of the boom, as for example, in pulling a disabled automobile back onto a road from a side thereof while the wrecking truck occupies a position longitudinally of the road, or substantially so, a lateral stress was imposed upon the boom due to the link connection of the boom cable sheave to the outer end of the boom, which caused the boom cable sheave to swing laterally of the boom under the load applied thereto by the hoisting cable.

The primary object of the present invention is to provide a novel and improved sheave mounting for the derrick or hoisting mechanism of service or wrecking trucks of this type whereby such objection is obviated, and an improved operation of the derrick or hoisting mechanism is attained. According to the present invention, the sheaves for the boom and hoisting cables are journaled coaxially or on the same shaft, and are swivelled to rotate on the longitudinal axis of the boom which intersects or substantially intersects the common axis of the sheaves. The sheaves for the boom and hoisting cables are, therefore, free to swivel freely and in union about the longitudinal axis of the boom under a stress applied laterally of the boom by a load on the hoisting cable while pulling at an angle to the longitudinal axis of the wrecking truck, thus avoiding imposing a lateral strain on the boom or any of the other parts of the apparatus under such conditions.

Another object of the present invention is to provide a novel and improved means for swivelling the sheaves in the outer end of the boom, whereby the sheave mounting may be readily applied to or removed from the boom when the sheave is rotated into one position about the longitudinal axis of the boom, but is securely locked against displacement from the end of the boom when the sheave mounting is rotated into the position it occupies during normal operation of the derrick or hoisting apparatus, in which latter position it is held by the hoisting cable suspended from its respective sheave.

To these and other ends, the invention consists in certain improvements and combinations and arrangements of parts, all as will be hereinafter more fully described, the features of novelty being pointed out more particularly in the claims at the end of this specification.

In the accompanying drawings:

Figure 1 is a side elevation of a derrick or hoisting mechanism for a wrecking truck, the same embodying the present invention;

Figure 2 is a top plan view of the outer ends of the companion booms, the same being shown locked together;

Figure 3 is a side elevation, partly in vertical section, of the outer end of one of the booms, showing the improved sheave mounting applied thereto and locked against detachment;

Figure 4 is a view similar to Fig. 3, but showing the sheave mounting rotated into position for assembly on the boom or detachment therefrom;

Figure 5 is a detail transverse section taken on the line 5—5 in Fig. 3;

Figure 6 is a detail vertical section through the sheaves and sheave mounting, taken on the line 6—6 of Fig. 3;

Figure 7 is a detail section taken on the line 7—7 in Fig. 2, but on an enlarged scale; and

Figure 8 is a detail section taken on the line 8—8 in Fig. 2.

Similiar parts are designated by the same reference characters in the several figures.

The improvements provided by the present invention are applicable generally to derricks or hoisting mechanism of the swinging boom type, but the improvements are particularly applicable to the derricks or hoisting mechanism of wrecking trucks of the general type shown and described in my prior patent hereinbefore referred to, which are adapted for use not only for lifting automobiles or the like from the ground or roadway, but may be employed advantageously in hauling automobiles back onto the road from position at the side of the road where they have

been left as the results of accidents. The invention is shown in the present instance as applied to the derrick or hoisting mechanism of a wrecking truck of that type, but it is understood that the invention is not to be limited to derrick or hoisting mechanism of this particular type, but is applicable generally to derricks or hoisting mechanisms employing a boom and hoisting and boom supporting cables which pass over sheaves mounted on the outer end of the boom.

In the present instance, the derrick or hoisting mechanism to which the present invention is shown applied comprises a frame 1, which is adapted to be mounted on the chassis 2 of a wrecking truck, a portion of which is indicated at 3, this frame having a boom 4 at each side which is pivoted at 5 to a bearing sleeve 6 mounted on a vertical axis 7 at the respective side of the frame, so that the boom may swing vertically about the pivot 5 and may swing laterally about the pivot 7. The boom is supported and is raised and lowered by a boom-supporting cable 8, which is attached at one end to a link 9, and is adapted to be wound at its other end upon a winch 10. The link 9 is pivoted at 11 to a sleeve 12 so that this link may swing vertically, and the sleeve 12 is pivoted at 13 on a respective side of the frame 1 so that the link 9 may swing laterally, in accordance with raising and lowering or lateral swinging movements of the boom. The hoisting cable 14 for each boom passes over a pulley or sheave 15, which is mounted on a swivel 16 on the top of the frame, one end of this hoisting cable being preferably provided with a hook 17 which may be directly engaged with the automobile or other load to be lifted or hauled, and the hoisting cable also preferably passes around a sheave 18 which carries another lifting or hauling hook 19, which may be engaged with the automobile or other load to be lifted or hauled. The other end of the hoisting cable 14 is adapted to be wound upon a drum 20 mounted on the frame 1. The winch 10 may be operated manually, as by a crank applied to the squared end 21 of its shaft, the winch being locked against unwinding by a pawl 22 engaging a ratchet wheel 23 fixed to the winch, whereby the boom may be raised and lowered and held at any desired elevation at its outer or free end. The drum 20 for the hoisting cable 14 may be power driven through a power takeoff 24 driven from the engine of the wrecking truck, the operation of the drum being effected through gearing 25 and controlled by clutch mechanism 26. The construction of the derrick or hoisting mechanism shown in the present instance is like that shown and described in my prior application, Serial No. 266,217, filed April 5, 1939, now Patent No. 2,264,569, granted December 2, 1941, and it will be understood, as is shown in that application, that a pair of swinging booms are provided, one at each side of the frame 1. The sheaves on the outer end of each boom, over which the hoisting and boom supporting cables pass, according to the present invention, differ from the sheave arrangement shown in said prior application. Instead of mounting the sheave or the boom supporting cable on a link attached to the outer end of the boom, as shown in that application, the boom supporting and hoisting cable sheaves, according to the present invention, are mounted coaxially on the outer end of each boom.

As shown in the present instance, the hoisting cable 14 passes over a sheave 30 which is mounted centrally between the arms 31 of a fork-like member 32, and this sheave is journaled to rotate freely on a shaft 33, which extends transversely through the arms 31. Also, in the present instance in which the derrick or hoisting mechanism is adapted for heavy duty, the boom supporting cable 8, after passing from the winch 10, passes around a pulley 35, thence around a sheave 36, thence around a sheave 37 carried by the link 9, thence around a sheave 38, and thence to its attachment to the link 9. The sheaves 36 and 38 are journaled on the shaft 33 at opposite sides of the sheave 30, and at the outer sides of the arms 31 of the sheave mounting. The sheaves 30, 36 and 38 are thus all journaled to revolve freely on the shaft 33, which provides a common axis for these sheaves. In order to prevent disengagement of the boom supporting cable 8 from the sheaves 36 and 38, guards 39 and 40 are provided, these guards being preferably assembled on the respective ends of the shaft 33 and retained thereon by pins 41 and 42 which may extend through holes passing transversely through the ends of the shaft. Also in order to prevent disengagement of the hoisting cable 14 from its sheave 30 when this cable is slack, a pair of guards 43 and 44 are preferably provided which are welded or otherwise fixed to the respective arms 31 of the sheave mounting and overlie the sheave 30. The guards 39 and 40 for the sheaves 36 and 38 are formed with flanges 45 and 46 which surround portions of the peripheries of these sheaves in order to retain the boom supporting cables in the grooves of these sheaves when this cable is slack, portions of the flanges 45 and 46 being cut away to permit the boom supporting cable 8 to pass to and from the respective sheaves, and in order to prevent rotation of the guards 39 and 40, and thus retain the cut away portions of their flanges in positions to clear the boom supporting cable, a portion of the flange of each of these guards is extended to form a lug 47, which is provided with a notch 48 adapted to straddle a rib 49, which projects from the outer side of the respective arm 31 of the sheave mounting.

The sheave mounting is swivelled in the outer end of the boom so that it may rotate about the longitudinal axis of the boom when the hoisting cable exerts a lateral stress upon the boom, as when pulling an automobile or other load at an angle to the longitudinal center line of the wrecking truck. For this purpose, the sheave mounting is formed with a stem or spindle 50, and the boom, or at least the outer end thereof, is of tubular formation, so that the stem or spindle of the sheave mounting may be introduced into the outer end of the boom. The stem or spindle is preferably formed with a shoulder 51 to form a bearing in the outer end of the boom, and about which the sheave mounting may swivel, and the inner extremity of the stem 50 is formed with a cylindrical flange 52, which is also adapted to have a bearing within the tubular outer end of the boom. A portion of the periphery of the flange 52 is cut off or interrupted as indicated at 53, and a lug 54 is provided on the stem 50 at the same side thereof on which the cut-away portion 53 is located, the lug 54, however, being located at a different point axially of the stem 50. The tubular outer end of the boom is provided with a locking means which projects into the boom and is adapted to cooperate with the flange 52, such locking means comprising preferably a pair

of studs 55 which may be welded or otherwise secured in holes drilled into the tubular outer end of the boom. The flange 52 and locking studs 55 are so related that when the sheave mounting is rotated into the position shown in Fig. 4, the cut-away portion of the flange 52 will pass inwardly beyond the locking studs 55, so that the sheave mounting, while rotated into such a position, may be readily assembled in the outer end of the boom or removed therefrom should such become necessary, and when the sheave mounting is rotated into the position shown in Fig. 3, which is its normal position, the uninterrupted portion of the flange 52 will assume a position at the inner side of the locking studs 55, and will thereby lock the sheave mounting against withdrawal from the outer end of the boom, and when the sheave mounting is in such normal position, the stud 54 will bear on the upper side of the surrounding wall of the boom and in cooperation with the shoulder 51, will provide a bearing on which the sheave mounting may swivel in the outer end of the boom and on the longitudinal axis thereof.

The sheave mounting swivels in the outer end of the boom under control of a guide 56 for the hoisting cable 14, this guide being preferably in the form of a loop, the upper ends of which are suspended from the sheave-supporting shaft 33, and the lower portion of which is provided with a pair of cable guiding members 57, it being understood that if the load being lifted or pulled is not directly beneath the sheave 30, but is at either side thereof, the tension on the hoisting cable 14, acting through the guide 56, will rotate the sheave mounting in the outer end of the boom, under the influence of the tension on the hoisting cable 14.

When, as shown in the present instance, the derrick or hoisting mechanism comprises a pair of swinging booms, the booms are each provided with the sheave mounting, as just described, and means is provided for locking the booms together to prevent swinging movement thereof while a load is being pulled from a side of one or the other of the booms. As shown in the present instance, the outer ends of the booms are provided with arms 60 and 61 which extend toward one another, the arm 61 being forked, as shown in Fig. 7 to receive the end of the other arm 60, and a locking bolt 62 is provided on the arm 61 and is adapted to engage, under the action of a spring 63, in holes in the inner ends of the arms 60 and 61 and thereby lock the booms together, as shown in Fig. 2. Each of the arms 60 and 61 is preferably formed with a sleeve-like portion 60a which is slidable onto the outer end of the respective boom, and may rotate thereon and thus avoid strain while a load is applied to one or the other boom. When the booms are locked together, lateral swing of either boom is prevented, and the hoisting or service cable 14 of either boom may then be employed for pulling a load toward the wrecking truck from either side thereof while the truck is standing lengthwise of the road, and the booms extend toward the rear of the truck. When the booms are locked together, and an angular pull from the rear takes place, any tendency to pull the swivel sheave mounting 32 out of the end of the boom will be prevented by the engagement of the flange 52 with the locking studs 55, these parts occupying the position shown in Figure 3 under normal operating conditions, and as the swivel sheave mounting abuts against the outer end of the sleeve-like portion 60a of the respective locking arm 60 or 61, pulling of the locking arm off of the end of the respective boom is prevented.

Although the improved sheave mounting is shown and described as applied to a derrick or hoisting mechanism in which two sheaves are provided with four lines of boom-supporting cable, it will be obvious that the invention is applicable to booms employing two lines of boom-supporting cable, in which case one of the sheaves for the boom-supporting cable may be omitted.

I claim:

1. In hoisting apparatus, the combination of a boom, a sheave mounting swivelled in the outer end of the boom for rotation about its longitudinal axis, a hoisting cable and a plurality of pairs of lines of a boom supporting cable, an inner sheave for the hoisting cable and a pair of outer sheaves for the boom supporting cable, and a shaft supported by said mounting and on which said sheaves are journaled on a common axis transverse to the longitudinal axis of the boom.

2. In hoisting apparatus, the combination of a pair of booms, means for locking together the outer ends of the booms, boom supporting and hoisting cables, and sheaves for said cables, a sheave mounting swivelled in the outer end of each boom for rotation about its longitudinal axis, and a shaft supported by each of said mountings on an axis which intersects the longitudinal axis of the respective boom and on which the respective sheaves are journaled as a common axis.

3. In hoisting apparatus, the combination of a boom and boom supporting and hoisting cables, a forked sheave mounting swivelled in the outer end of the boom for rotation about its longitudinal axis, a sheave for the hoisting cable journaled in the fork of the mounting, and a pair of sheaves for the boom cable journaled on the mounting at opposite sides thereof and coaxially with the sheave for the hoisting cable and equalizing the boom supporting cables at opposite sides thereof when the mounting swivels about the longitudinal axis of the boom.

4. In hoisting apparatus, the combination of a boom and boom supporting and hoisting cables, a forked sheave mounting swivelled in the outer end of the boom for rotation about its longitudinal axis, a sheave for the hoisting cable journaled in the fork of the mounting, a pair of sheaves for the boom cable journaled on the mounting coaxially with the sheave for the hoisting cable and at opposite sides thereof, and guards mounted at the outer sides of the sheaves for the boom cable and having projections thereon cooperative with the respective sides of the boom to prevent rotation of the guards.

5. In a wrecking truck having a pair of booms mounted to swing thereon, means for locking the booms together, and boom supporting and hoisting cables, a sheave mounting swivelled in the outer end of at least one of the booms for rotation about its longitudinal axis, sheaves for the boom supporting and hoisting cables, and a shaft supported by the sheave mounting on which said sheaves are journaled on a common axis which intersects the longitudinal axis of the boom, and a guide for the hoisting cable connected to the sheave mounting for swinging the latter and the sheaves thereon about the longitudinal axis of the boom under a pull applied laterally of the boom by the hoisting cable.

6. In hoisting apparatus, the combination of a boom having a tubular outer end, boom supporting and hoisting cables, sheaves for said cables, a sheave mounting supporting said sheaves and having a portion rotatably and removably extending into the tubular outer end of the boom, and means for locking said mounting in the tubular outer end of the boom while said mounting is in its normal position and for unlocking the mounting therefrom when rotated out of said position.

7. In hoisting apparatus, the combination of a boom having a tubular outer end, boom supporting and hoisting cables, sheaves for said cables, a sheave mounting on which the sheaves are journaled and having a stem swivelled in the tubular outer end of the boom, and projections on said stem and in the tubular outer end of the boom cooperative while said sheave mounting is in its normal position to lock said mounting from axial displacement but relatively movable to release the mounting for removal when the latter is rotated out of said normal position.

ERNEST WALTER HOLMES.