Jan. 19, 1960 E. W. HOLMES, JR., ET AL 2,921,697

HOISTING APPARATUS

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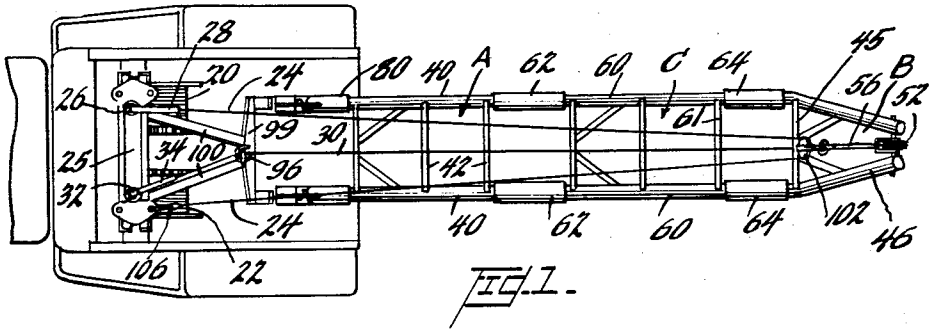


FIG. 1.

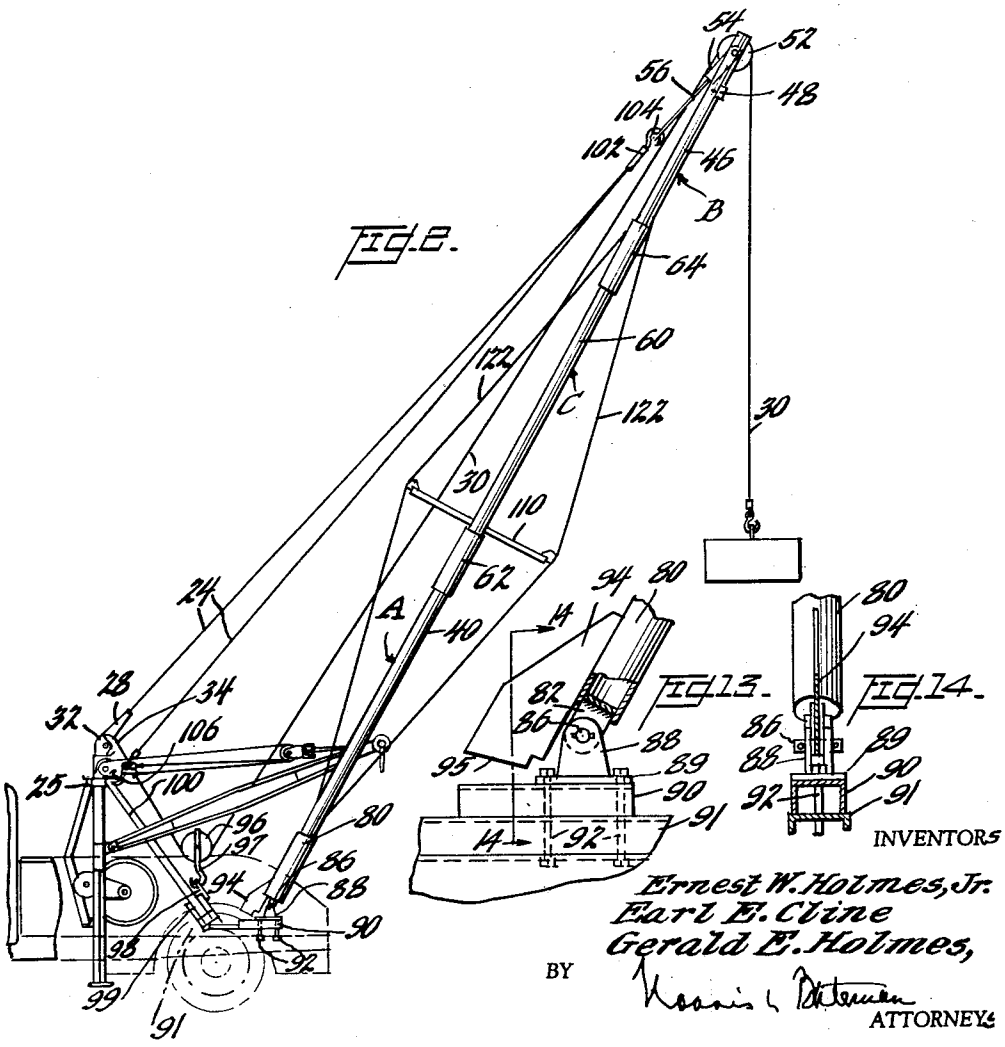


FIG. 2.

FIG. 13.

FIG. 14.

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HOISTING APPARATUS

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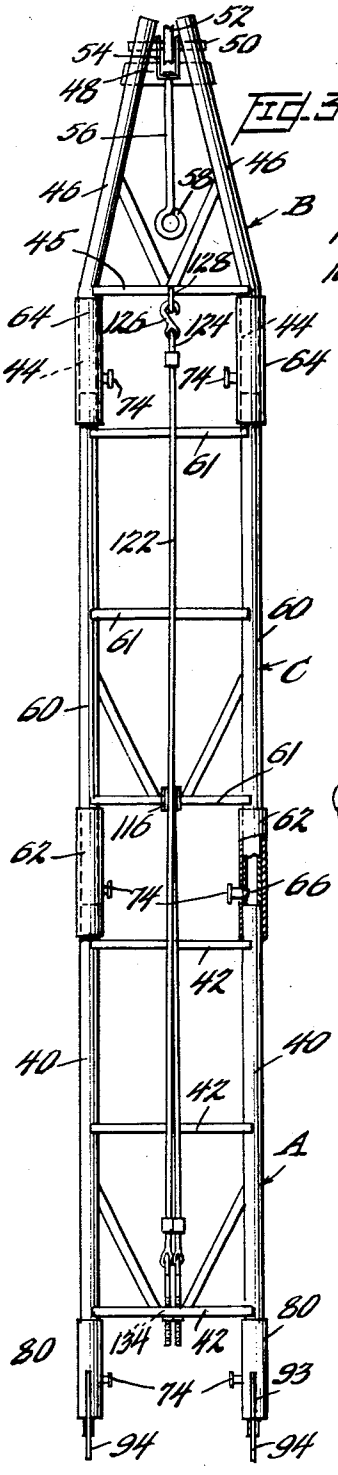


FIG. 3.

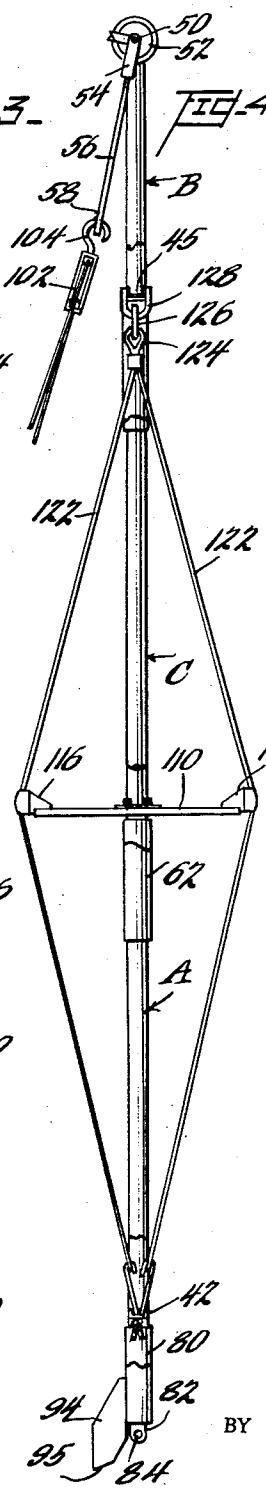


FIG. 4.

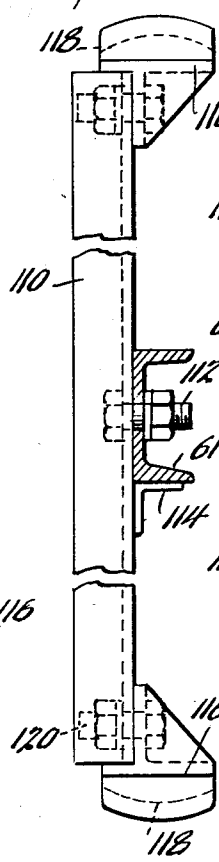


FIG. 5.

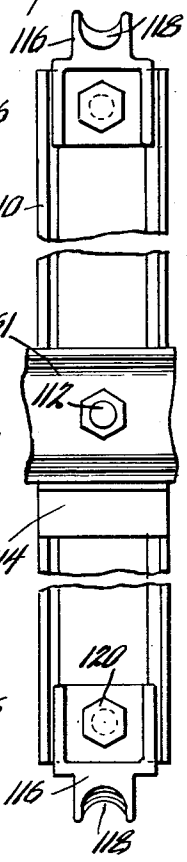


FIG. 6.

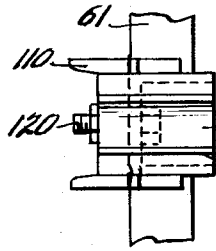


FIG. 7.

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HOISTING APPARATUS

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FIG. 8.

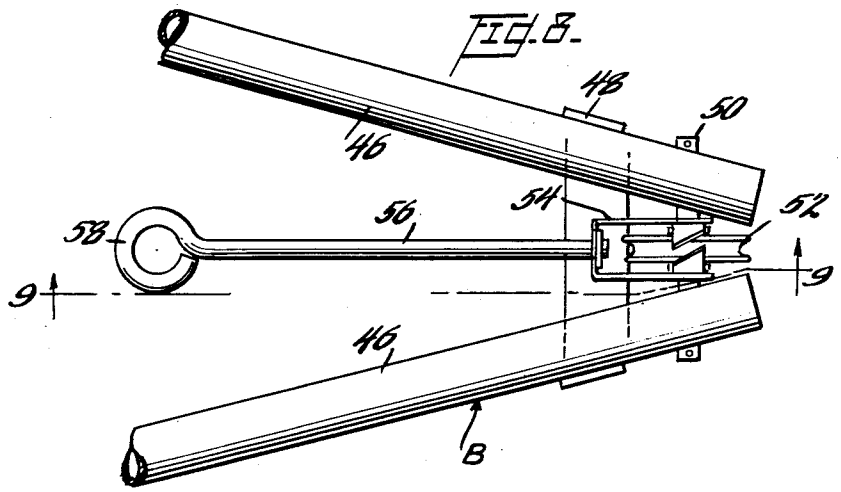


FIG. 9.

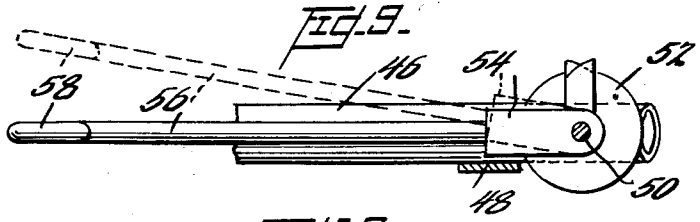


FIG. 10.

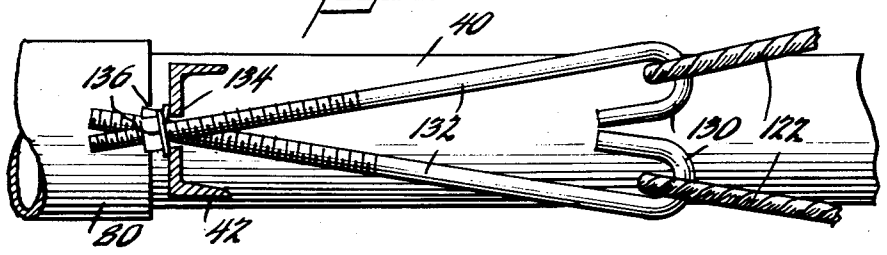


FIG. 11.

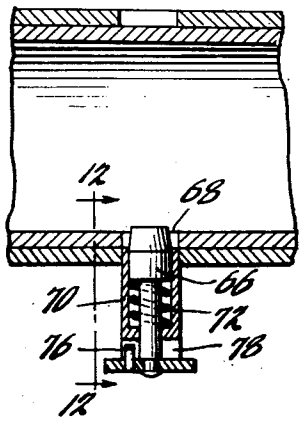
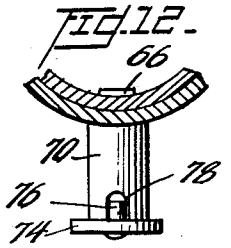


FIG. 12.



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2,921,697

HOISTING APPARATUS

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Application January 3, 1956, Serial No. 556,839

1 Claim. (Cl. 212—144)

The present invention relates to hoisting and similar apparatus, and the primary object of the invention is to provide novel and improved apparatus of this character which may be used with facility in performing various operations such as the setting of signs, placing beams in buildings under construction, lifting of equipment to the top or upper part of a building, loading and unloading of freight cars or trucks, and for various other operations.

A more particular object of the invention is to provide an auxiliary boom as an attachment for an automobile wrecker which will adapt such a wrecker to perform various operations such as those described above, the auxiliary boom being provided with means for rigging it with cables which may be operated by the cable winding mechanism such as commonly employed in such wreckers, means being provided for removably attaching the auxiliary boom to the wrecker so that it may readily be detached therefrom and thereby avoid interfering with the operations usually performed by a wrecker.

Another object is to provide such an auxiliary boom which is of sectional construction whereby its length may be varied to enable different kinds of operations to be performed, as by shortening the boom when objects in close proximity to the wrecker are to be lifted or handled, and by lengthening the boom sufficiently to enable objects to be lifted to a considerable height or lifted while located at a considerable distance from the wrecker or hoisting mechanism.

Another object of the invention is to provide such a boom with trussing means which may readily be applied to the boom when assembled to increase its length, thereby ensuring ample weight-lifting capacity thereof, and which may readily be removed when the boom is to be shortened.

A further object of the invention is to provide such an auxiliary boom which is of relatively light weight construction and which can be manufactured inexpensively.

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 in detail, the features of novelty being set forth more particularly in the claim at the end of this specification.

In the accompanying drawings—

Figure 1 is a top plan view of the rear end of a wrecker having an auxiliary boom according to the present invention attached thereto.

Figure 2 is a side elevation of the structure shown in Fig. 1.

Figure 3 is a detail view of the auxiliary boom detached from the wrecker.

Figure 4 is a side elevation of the boom as viewed from the right in Fig. 3.

Figure 5 is a detail view partly in section and on an enlarged scale of a member of the truss for the boom.

Figure 6 is a view of Fig. 5 looking toward the left in that figure.

Figure 7 is a view of the under side of Fig. 5.

Figure 8 is a top plan view of the outer end of the auxiliary boom on an enlarged scale.

Figure 9 is a section on the line 9—9 in Fig. 8.

Figure 10 is a detail view on an enlarged scale of the anchor for the lower end of the truss.

Figure 11 is a detail sectional view showing adjacent portions of boom sections and the locking means therefor.

Figure 12 is a fragmentary section on the line 12—12 in Fig. 11.

Figure 13 is a detail side elevation partly in section and on an enlarged scale, of means for mounting the auxiliary boom on a wrecker.

Figure 14 is a section on the line 14—14 in Fig. 13.

Similar parts are designated by the same reference characters in the several views.

Preferably and as shown in the drawings, the invention is applied to an automobile wrecker of the type having two booms and two separate cable winding drums designated 20 and 22, an example of a wrecker of that type being disclosed in Patent No. 2,264,569, dated December 2, 1941, which discloses power means for operating such drums, and to which reference may be had for detailed illustration and description thereof, a cable 24 leading from the drum 20 over a sheave 26 swivelled on the top of a frame 25 at one side of the wrecker and having a pivoted cable guide 28 associated therewith, and a cable 30 leading from the drum 22 over a sheave 32 swivelled on the top of said frame at the other side of the wrecker and having a pivoted cable guide 34 associated therewith. The cable 24 is employed for supporting the boom and raising and lowering it, and the cable 30 is employed for raising and lowering the load, as will be hereinafter described.

The auxiliary boom provided by the present invention comprises a base section A and a top section B, and one or more intermediate sections C which may be used to increase the length of the boom as may be desired. Each boom section is composed preferably of a pair of laterally spaced tubular side members and cross members rigidly connecting them. As shown, the base section A comprises a pair of parallel side members 40 and cross members 42 welded or otherwise rigidly fixed to the side members at suitable intervals longitudinally thereof to form a rigid structure. The top section B comprises a pair of laterally spaced side members portions 44 of which are parallel and rigidly connected by a cross member 45 and upwardly extending portions 46 which converge and are rigidly secured together by a transverse tie member 48 which is welded or otherwise rigidly fixed thereto. The upper ends of the converging portions 46 of the top section are spaced apart, a shaft 50 extends through these ends of the top section, and a sheave 52 is journaled on this shaft. The shaft 50 extends through a yoke 54 which straddles the sheave 52, and a rod 56 having an eye 58 thereon is securely fixed to the yoke 54. Each intermediate section C comprises a pair of tubular side members 60 which are spaced apart laterally to the same extent as the side members 40 of the base section A and the parallel portions 44 of the top section B, so that the base, top and intermediate sections may be assembled with their side members in alinement and their ends in abutting relation, and the side members 60 of the intermediate section are rigidly connected by cross members 61.

The base, top and intermediate sections are provided with means for detachably connecting them so that the base and top sections A and B, or these sections and one or more intermediate sections C can be assembled and secured in alinement to form the auxiliary boom, and disassembled for transportation. Such connecting means

comprise preferably sleeves which are telescoped over the ends of the side members of adjacent sections when assembled. As shown, the lower ends of the connecting sleeves **62** on the base section A are fitted tightly over the upper ends of the side members **40** and welded thereto; these sleeves extending beyond the upper ends of the side members **40** and forming sockets adapted to receive removably the lower ends of the side members **60** of an intermediate section C. The lower ends of the connecting sleeves **64** on the intermediate section C are fitted tightly over the upper ends of the side members **60** of this section and welded thereto, and these sleeves extend beyond the upper ends of the side members **60** and form sockets at their upper ends to receive removably the lower ends of the parallel portions **44** of the side members of the top section B. When the side members of the boom sections are constructed from pipe of appropriate size, the upper socket portions of the connecting sleeves are preferably reamed out to proper size to provide sliding fits with the side members of adjacent sections to be inserted therein.

If a shorter boom is desired, the intermediate section C may be omitted and the base and top sections A and B assembled and connected directly by inserting the lower ends of the parallel portions **44** of the top section in the sockets in the upper ends of the sleeves **62** on the base section. When a longer boom is desired, two or more intermediate sections similar to the section C may be assembled between the base and top sections A and B.

Each of the connecting sleeves is provided with means for securing the ends of the side members of an adjacent section in the socket portions of these sleeves, such securing means comprising preferably a spring plunger **66** secured to the socket portion of the sleeve and positioned thereon to enter a hole **68** appropriately located in the end of the side member of a boom section to register with the plunger when such end of a boom section has been fully inserted in the socket portion of the sleeve, as shown in detail in Fig. 11. Each spring plunger is slidable radially of the socket portion of the respective sleeve in a housing **70** welded or otherwise fixed to the sleeve, and is engageable in the hole **68** of the adjacent boom section under the action of a compression spring **72** which holds the plunger in the hole. The plunger is provided at its outer end with a head **74** for operating it, the head being preferably provided with a pin **76** which is engageable with the outer end of the housing **70** when the plunger is withdrawn and turned into one position to retain the plunger in retracted position to facilitate insertion of the respective side member of an adjacent boom section, said pin entering a slot **78** in the outer end of the plunger housing when the plunger is rotated through a partial revolution and thereby releasing the plunger for engagement in the hole **68** under the action of the spring **72** to lock the adjacent boom sections from separation. When adjacent boom sections are assembled, the lower ends of the side members of each boom section seat on the upper ends of the side members of the next lower section to transmit between the sections the longitudinal load imposed on the boom.

Means are provided for mounting the auxiliary boom on a supporting structure, the mounting means shown in the present instance being adapted to support the auxiliary boom detachably on a wrecker and comprising preferably a pair of sleeves **80** forming sockets adapted to receive removably the lower ends of the side members **40** of the base section A, each of these sleeves being provided with a spring plunger to enter a hole in the lower end of the respective side member of the base section, as shown in Fig. 11. Each of the sleeves **80** has a pivot lug **82** welded or otherwise secured thereto, this lug having a hole **84** to receive a pivot pin **86** supported by a bracket **88** having a base plate **89** to rest on a suitable base such as an inverted channel iron **90** on the floor of the wrecker, the floor being designated **91**, the bracket **88**, base plate **89** and base **90** being firmly secured by bolts **92** to the floor **91** of the wrecker. The pivotally connected lug **82** and bracket **88** provide for fore and aft swinging movements of the auxiliary boom in order to locate the boom for lifting or lowering of the object, and in order to prevent undue forward swing of the boom over the pivot pin **86**, each sleeve **80** has a radially projecting stop plate **94** rigidly secured thereto as by welding. The stop plate has a heel **95** which is offset forwardly from the pivot **86** and is so shaped that it will engage and bear on the base **90** before the boom reaches a critical angle in its forward swing where its center of gravity would be forward of the pivot pin **86**. A pair of the sleeves **80** and supporting brackets **88** are preferably attached permanently to a wrecker to receive the lower ends of the side members of the base section A when the auxiliary boom is to be used, and the ends of the base section may be released by retraction of the spring plungers and withdrawn from said sleeves when the auxiliary boom is not to be used.

A sheave **96** is provided under which the cable **30** from the drum **22** passes, this sheave having a hook **97** for attaching it to an eye **98** secured to a bracket **99** which may be bolted to the floor **91** of the wrecker. The sheave **96** is located centrally between the sides of the wrecker and on a line longitudinal of the wrecker and passing centrally between the sheaves **26** and **32**, and a sheave **102** is attached by a hook **104** thereon to the eye **58** on the rod **56** at the outer or upper end of the boom, the cable **24** passing around the sheave **102** and having on its end remote from the drum **22** a hook **106** which is engageable with a rigid part of the frame **25** of the wrecker.

Trussing means is provided for strengthing the boom for increasing its load capacity when one or more intermediate sections are used between the base and top sections without unduly increasing the weight of the boom. Such trussing means comprises a truss post **110** which is preferably in the form of a channel iron which is rigidly secured midway of its length, as by a bolt **112**, to a cross member, such as the cross member **61** of an intermediate boom section C, rotation of the post on said bolt being prevented by an angle iron **114** which may be welded or otherwise fixed rigidly to the cross member **61**. A shoe **116** having a groove **118** therein is fitted between the flanges of the post **110** at each end thereof and fixed thereto as by a bolt **120**, the grooves in the shoes extending longitudinally of the boom section centrally between its sides, and the shoes being located respectively above and below the boom when the sections thereof are assembled. The intermediate boom section C provided with the truss post may be assembled as one of two or more intermediate sections of the boom.

A pair of truss cables **122** are provided to extend longitudinally above and below or opposite sides of the boom when an intermediate section provided with the truss post is assembled in the boom. These truss cables are secured together at one end and to a ring **124** which is provided with a hook **126**, the latter being engageable with an eye **128** welded or otherwise secured to the cross member **45** of the top boom section B. The portions of these truss cables intermediate of their length extend through the grooves in the shoes **116** and the other ends of these truss cables are secured to hooks **130** on a pair of truss cable tensioning rods **132** having screw-threaded ends to extend through a pair of apertures **134** in the lowermost cross member **42** of the base section of the boom and located centrally of the width thereof, the extremities of these rods having nuts **136** threaded thereon and bearing against the lower side of said cross member. The truss cables, when assembled on the boom extend longitudinally above and below the boom and centrally of the width thereof, and by adjusting the nuts **136**, the truss cables above and below the boom may be tensioned equally and to the required extent to stiffen

the boom transversely of the plane of the boom sections. The boom is thereby strengthened to resist any forces tending to bend or distort it transversely of its plane, although the boom when assembled may be of considerable length. Tensioning of the truss cables also applies a longitudinal compression on the boom which acts to maintain the ends of the side members of the assembled boom sections in solid abutting engagement and thereby stabilize and maintain the boom sections in proper assembled relation.

In applying an auxiliary boom according to the present invention to a wrecker of the type for example as that disclosed in the patent hereinbefore referred to, the brackets **88** with the sleeves **80** pivotally connected thereto are bolted to the floor of the wrecker truck, the booms usually employed for lifting an end of a disabled automobile for towing or for similar purposes are swung to the respective sides of the body of the wrecker, and the service cables **24** and **30** are removed from those booms. The lower ends of the side members of the base section A of the auxiliary boom may then be inserted into the sleeves **80**. The desired number of sections to provide a boom of the desired length are assembled by inserting the lower ends of the sections above into the sleeves secured to the respective lower section while the spring plungers are retracted, and the spring plungers released to lock the assembled sections from displacement during the handling of the boom. The cable **24** from the cable winding drum **20** on the wrecker is then extended along the auxiliary boom to and around the sheave **102** attached to the top section and the hook **106** on the end of this cable is engaged with the frame **25** of the wrecker, and the cable **30** from the cable winding drum **22** on the wrecker is reeved under and around the sheave **96** and then extended to the upper end of the boom centrally between its sides and over the sheave **52** from which this cable may extend downwardly for connection to the object to be lifted. Operation of the cable drum to wind the cable **24** thereon will swing the auxiliary boom after assembly to the appropriate height and angle, about the pivot pins **85**, under a pull applied to the cable **24** which serves to support the auxiliary boom and to adjust it to the desired operating inclination, and operation of the cable winding drum **24**, after the object to be lifted has been connected to the cable **30** from this drum, will serve to raise or lower the object.

The tension applied to the portions of the cable **24** connected to opposite sides of the transverse frame **25** of the wrecker is equalized by the sheave **102** positioned centrally of the width of the top boom section and is therefore distributed equally between the sides of the boom, so that the resultant force applied by this cable will act in a line longitudinally of the boom and centrally of its width and therefore will not exert any stress on the boom tending to distort it transversely. The tension applied to the cable **30** in lifting or lowering or supporting an object suspended therefrom will act longitudinally and centrally of the boom, due to the central and longitudinal position of this cable, so that the reaction of the load on this cable will not exert any stress on the boom in a direction to distort it transversely. The auxiliary boom may therefore be of relatively light construction and possess maximum weight lifting capacity relatively to its weight, and the boom and its sections may be handled with facility.

After the auxiliary boom has served its purpose, it may be detached from the wrecker by retracting the spring plungers on the sleeves **80** and withdrawing the ends of the side members of the base section from these sleeves which, with the brackets **88** may remain in place on the wrecker for subsequent use, the boom may be lowered with the aid of the cable winding drum **20** and cable **24**, and the boom sections may be dis-assembled and loaded on the wrecker for transportation.

Although the auxiliary boom as shown comprises one intermediate section, it is to be understood that different numbers of intermediate sections may be employed interchangeably between the base and top sections to provide a boom of desired length by assembling therewith as one of the intermediate sections an intermediate section having the truss post and rigging the truss cables over and under respectively the shoes on the ends of the truss post and securing the ends of the truss cables at the base and top of the boom in the manner hereinbefore described, the resulting structure in each instance being reinforced by the truss against lateral deflection between its ends under the load imposed thereon.

We claim:

An auxiliary boom for a wrecker comprising a pair of laterally spaced side members, sleeves to receive respective ends of the side members, a pair of laterally spaced brackets having means for rigidly securing them to the wrecker, means for pivotally mounting said sleeves on the respective brackets for swinging movement forwardly and rearwardly on a horizontal axis, and means including a stop plate fixed to and projecting from the respective sleeves in a direction transversely of said horizontal axis for preventing forward swinging of the boom past a position where its center of gravity is forward of said horizontal axis.

References Cited in the file of this patent

UNITED STATES PATENTS

290,780	Manson	Dec. 25, 1883
570,124	Crosby	Oct. 27, 1896
844,990	Allan et al.	Feb. 19, 1907
1,732,047	Holmes	Oct. 15, 1929
2,168,837	York	Aug. 8, 1939
2,264,569	Holmes	Dec. 2, 1941
2,503,340	Kipper	Apr. 11, 1950
2,516,364	Caddell	July 25, 1950