EXTENSIBLE BOOM WITH LOAD COMPENSATING MEANS

INVENTORS
JAMES H. HOLAN
CURTIS W. VERRELL

ATTORNEYS
EXTENSIBLE BOOM WITH LOAD COMPENSATING MEANS

James H. Holan, Rocky River, and Curtis W. Verrell, Fairview Park, Ohio, assignors to The Ohio Brass Company, Mansfield, Ohio, a corporation of New Jersey


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ABSTRACT OF THE DISCLOSURE

An extensible boom for a derrick or the like having an inner boom section and a telescopically movable outer boom section with a motor unit for extending and retracting the outer boom section with respect to the inner boom section. A movable, auxiliary boom section mounting a sheave head detachably coupled to the outer boom section and a locking mechanism for selectively locking the auxiliary boom section in extended or retracted position with respect to the outer boom section.

This invention relates in general to derricks or cranes, and more particularly to a derrick or crane wherein the boom thereof may be selectively extended and retracted, for adjusting the operating range of “reach” of the derrick. This is a division of the application to James H. Holan and Curtis W. Verrell, Serial No. 388,217, filed Aug. 7, 1964.

The derrick or like apparatus of the invention is illustrated as being of a portable type, mounted on a utility type vehicle and having a load carrying cable system associated therewith, adapted for handling and/or erecting various objects, such as telephone or telegraph poles. Such load carrying cable system generally runs from a power operated winch on the vehicle, and then over the outer end of the extensible boom, and terminates at the load.

The present invention provides a novel removable, extensible auxiliary means for increasing the operating range or reach of the derrick boom. Such auxiliary means being readily adaptable for use with the load carrying and cable compensating system as disclosed in the aforementioned application, Serial. No. 388,217.

Accordingly, an object of the present invention is to provide a novel removable, auxiliary boom section for use with a derrick or crane of the type including an extensible boom incorporating a load carrying cable system.

Another object of the present invention is to provide an auxiliary boom section of the character described which includes means for coupling the same to one of a pair of extensible boom sections for extending the effective length of said one boom section.

A further object of the present invention is to provide an auxiliary boom section of the character described which includes means for locking the same in selected telescoped position with respect to one of a pair of boom sections.

Another object of the present invention is to provide an auxiliary boom section of the character described which includes means for mounting a work platform thereon, and a work platform rotatably mounted on said means.

Other objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings wherein:

FIGURE 1 is a fragmentary side elevational view of an extensible derrick boom having a load carrying cable system coacting therewith for handling a load, and including the automatic compensating means of the invention; a power driven earth boring auger is also illustrated as being supported by the boom;

FIGURE 2 is an enlarged side elevational view of the boom of FIGURE 1 with the boom being shown in an extended condition, and illustrating in greater detail the cable compensating means of the invention;

FIGURE 3 is a fragmentary, enlarged, broken side elevational view and showing means of the invention for extending the effective length of the extensible or outer boom section and illustrating an auxiliary boom section which is selectively locked or attached to the outer boom section of FIGURES 1 and 2, for extending the effective length of the boom; in phantom lines is illustrated the position of the head sheave assembly of such auxiliary boom section when the latter has been moved back into retracted condition in the outer boom section;

FIGURE 4 is an enlarged side elevational broken view of the pin used to lock the auxiliary extension boom section of FIGURE 3 to the outer boom section of the boom;

FIGURE 5 is an end elevational view of the locking pin taken from the right hand end of FIGURE 4;

FIGURE 6 is a transverse sectional view of the auxiliary boom extension taken generally along the plane of line 6—6 of FIGURE 3;

FIGURE 7 is an enlarged, fragmentary, elevational view showing the retaining means for maintaining the locking pin of FIGURES 4 and 5 in locking position;

FIGURE 8 is a fragmentary view of the retaining means of FIGURE 7 taken from the bottom thereof, which is adapted to maintain the locking pin (shown in phantom lines in FIGURE 7) in position; and

FIGURE 9 is a fragmentary top plan view of the auxiliary boom section of FIGURE 3 showing a work platform coupled thereto adjacent the outer end thereof.

Referring now again to the drawings, and in particular to FIGURE 1, there is shown a fragmentary portion of a wheeled utility vehicle 10 having a truck body which carries a movable derrick or crane 12 thereon. The derrick boom 13 may embody an inner or lower generally hollow boom section 14, and an outer, generally hollow extensible boom section 16 which may be received in telescoping relation in the inner or inner section 14 of the boom.

Outer boom section 16 may include reduced size end portion 16a (FIGURE 2) rigidly attached, as by welds, to the main portion of the boom section 16.

The boom, in the embodiment illustrated, is pivotally mounted, as at 18, to super structure 20, which in turn may be mounted on a pedestal 22 adapted for rotational movement about a generally vertical axis, for swinging the boom in a generally horizontal plane and which may be rotatable through 360°. Conventional power means may be provided for so swinging the derrick boom in a generally horizontal plane.

The boom being pivoted, as aforementioned, at 18 may be swung in a generally vertical plane with respect to the vehicle, and in this connection, it may be swung from a position below a horizontal plane passing through axis 18, to a position well above such horizontal plane. Fluid
powered reciprocal motor means 26 and associated linkage 26a of known construction, may be provided for soswing- 
ing the boom in a generally vertical plane.

The boom may be mounted on a corner of the vehicle or it may be mounted anyplace on the vehicle body, and the vehicle may be provided with jack means 30 for aiding in stabilizing the vehicle during utilization of the derrick. 

In the embodiment illustrated, there is shown a power operated earth boring tool 31 mounted on the boom in a known manner for earth boring operations. Such earth-boring tool may be adapted for coupling to either the inner boom section 14 or to the outer boom section 16 for extension and retraction with the outer boom section in a known manner. It will be understood, however, that the boom may or may not have such earth boring tool associated therewith.

Reciprocal fluid powered motor unit 32 (FIGURE 2) may be provided, pivotally connected to the outer boom section 16 and pivotally connected as at 34 (FIGURE 2) to the inner boom section, for selectively extending and retracting the boom. Such structural arrangement for connecting the reciprocal motor unit 32 to the outer boom section 16 and to the inner boom section for extending and retracting the boom sections will be hereinafter described in greater detail.

The outer boom section 16, whose may be of a rect-

angular configuration in transverse cross-section, may embody roller means 58 thereon for facilitating antifric-
tional movement of the outer boom section with respect to the inner boom section during extension and retraction of the boom. There also may be provided roller means 40 (FIGURE 2) mounted on the inner boom section 14, adapted for rolling contact with the outer boom section 16, for facilitating antifrictional movement of the outer boom section with respect to the inner boom section. The boom may carry telescoping fluid transmitting lines 42 (FIG-

URE 2) which have been broken in the interests of clarity of illustration, for transmitting actuating fluid from a source of pressurized fluid disposed on the vehicle outwardly along the boom and to for instance the motor unit 44 (FIGURE 1) of the earth boring tool 31, for actuating the earth boring tool.

A load supporting cable means 46 is mounted on the boom for supporting a load, such as for instance a tele-

phone cable 66, or other load, on the outer end of the boom and automatic compensating means 47 (FIGURE 2) is provided in association with the load supporting cable system 46 for maintaining a load at a selected level while the boom is being extended or retracted. The construction and operation of such compensating means is set forth in the aforementioned application, Serial No. 358,217.

A preferably power operated winch mechanism 48, which may be of conventional fluid powered rotary type, is preferably mounted adjacent the proximal end of the boom, for coaction with the load supporting cable means 46 to selectively extend and retract the cable. In this connection, a conventional spool type distributing valve bank 49 having a plurality of control handles 49a, 49b may be mounted on the vehicle and coupled into the fluid power system in the conventional manner. Control handle 49a may control the application of pressurized fluid to the fluid motor 48a of winch mechanism 48, and control handle 49b may control the application of pressurized fluid to boom actuating motor unit 32.

The cable system 46 may comprise two sections A and B (FIGURE 2) which sections coact between the inner boom section 14 and the outer boom section 16 for maintaining the cable means 46 in a selected position with respect to the boom during extension and retraction of the boom.

Cable section A may commence at the winch mecha-
nism 48 and be reeved thereabout as best shown for in-

stance in FIGURE 4, and then extends outwardly along the boom to pass under an idler roller means 50 (FIG-

URE 2) mounted on the inner boom section 14. From 

roller 50 the cable section A may extend outwardly and be reeved about rotatable generally horizontal pulley 52 (FIGURE 2), of movable compensating pulley block 56. Cable section A then reverses its direction extending back from rotatable pulley 52 and passes upwardly around pulley 56, which may be mounted on the inner boom section 14. From pulley 56 the cable section A may extend outwardly along the boom as shown in FIGURE 2 to pass down through the sheave head 58 preferably movably attached as by bolts extending back from the outer end of porti-on 16a of outer boom section 16.

Sheave head 58 may comprise a pair of generally verti-

cally spaced rotatable pulleys 60, 60a which receive the load cable 46 in antifriction relationship. From pulley 60a, the load supporting cable of section B of the cable preferably passes between a pair of laterally spaced sta-

bilizing roller means 62 mounted on the sheave head, and which guide the cable. The cable is preferably provided with a frictionly slidable and movable plumb weight 66 thereon which is adapted to maintain the cable sys-

tem 46 generally taut at all times. The slidable relationship between the weight 66 and the cable enables the weight to be moved outwardly along the cable if the cable is retracted by means of winch mechanism 48 so that the weight engages the sheave head 58.

The other section B of the load cable 46 is anchored as at 68 to an anchoring lug on the top side of the inner boom section 14, and then is passed rearwardly around idler pulley 70 of compensating pulley block 47. From the pulley 70, the cable section B passes forwardly and preferably under a roller or other holder 72 mounted by means of bracket 72a on boom section 14, and then passes down around idler pulley 74 rotatably mounted on boom section 14. Cable section B then passes through a slot in the top wall of the inner boom section 14 underlying pulley 74 and passes rearwardly interiorly of boom section 14, and above the outer boom section 16, to be anchored as at 76a to an anchoring lug on the top side of the outer boom section 16, generally adjacent its innermost end.

Aformentioned roller means 38, 40 supports the outer boom section interiorly of the inner boom section 14 in antifriction generally spaced relation, and in nonbinding condition with respect to the interiorly disposed section B of the cable system.

Now in accordance with the present invention and with reference to FIGURES 3 to 6, it will be seen that the sheave head 58 has been removed from the outer end 95 of the outer end portion 16a of boom section 16, and in its place there is provided a second sheave head 98 as shown in section 96 which has a sheave head 58a, which may be identical in construction to the sheave head 58 of the first described embodiment, connected to its outer end. The extendible auxiliary section 96 may be preferably manually moved outwardly with respect to the power operated outer boom section 16, and there is provided locking means 98 for maintaining the extendible, or movable auxiliary section 96 in a selected position with respect to boom section 16. When auxiliary section 96 is pulled out, the winch mechanism 48 may be actuated to pay out cable to increase the fixed length of the cable from the winch to the sheave head 58a. To retract auxiliary section 96, locking means 98 may be removed and then the winch may be actuated until weight 66, and associated hook (FIG-

URE 1) engages the sheave head 58a, and further operation of the winch will retract section 96 into outer boom section 16, and to, for instance the position illustrated in dot-dash lines in FIGURE 3. The manually mounted power unit 32 enables retraction of the hollow boom section 96 without interference with power unit 32.

In this connection, the auxiliary boom section 96 which may be of the generally rectangular configuration in cross-section, as shown in FIGURE 6, may possess preferably a series of openings 98a through a side wall thereof, and the outer end portion 16a of boom section 16 of the power operated portion of the boom may also be provided with
a series of openings 98b therethrough, through one of which openings is adapted to extend the locking pin member 100, shown in FIGURES 4 and 5.

The lock pin member 100 comprises a handle portion 102, a flange portion 104 connected to the handle portion, and a plunger portion 106, which is adapted to extend through the openings 98b in boom section 16 aligned with a selected one of the openings 98a in auxiliary boom section 96, and lock auxiliary boom section 96 in a predetermined position with respect to the powered boom section 16.

The inner end of auxiliary boom section 96 is preferably provided with wear plates 108 on the top, bottom and sides thereof, which are adapted to slidingly engage the inner surface of the hollow boom section 16 during manual adjusting of auxiliary section 96 with respect to boom section 16. In this connection, outer boom section 16, rearwardly of end portion 16a may be provided with an access opening 109 in each of the side and top and bottom walls thereof, for installing the wear plates 108 onto auxiliary boom section 96, and welding them as by plug welds 109a, in place. The wear plates may have openings therethrough for facilitating the plug welds 109a.

As shown in FIGURES 3 and 7, the pin lock 100 is adapted to be frictionally held in place by a bracket 110 which has an overlapping frictional coaction with the circular flange 104 on the pin lock 100, and such flange having a cut away portion, as at 112, which when the pin is turned 180° by means of the handle 102, will permit withdrawal of the pin from locking coaction with the bracket 110 and with the boom sections, and thereby permit lengthwise movement of the manually extendible auxiliary section 96 of the boom, or complete removal of such auxiliary section 96 upon removal of the wear plates 108. Of course in order to use the boom and cable system after removal of the auxiliary section 96, a sheave head 58 should be attached to the outer end portion 16a of extendible boom section 16. In phantom lines in FIGURE 3 there is shown the position of the sheave head 58' of auxiliary section 96 when it is moved or slid inwardly or rearwardly its maximum amount and locked in place by lock pin 100.

Auxiliary boom section 96 may also be provided with an opening 114 through the side walls thereof, rearwardly of sheave head 58 for receiving a shaft 116 (FIGURE 9) therethrough. Shaft 116 may rotatably support a work platform 118, which may be of the well known bucket type, for carrying a workman on the outer end of the boom and locating such workman at any desired location within the range of movement of the derrick.

From the foregoing discussion and accompanying drawings it will be seen that applicants' arrangement provides a novel removable, extendible auxiliary section, for increasing the reach of the boom.

The terms and expressions which have been used are as terms of description and not of limitation, and there is no intention in the use of such terms and descriptions of excluding any equivalents of any of the features shown and described, or portions thereof, and it is recognized that various modifications are possible within the scope of the invention claimed.

We claim:

1. An extendible derrick boom for use with mobile platforms or the like, said derrick boom comprising, an inner relatively stationary boom section and at least one outer extendible boom section disposed for telescopic movement with respect to said inner boom section, said outer extendible boom section having a plurality of spaced openings adjacent the outermost end thereof, said auxiliary boom section including a sheave head attached to its distal end, a winch mechanism mounted on said inner boom section adjacent the pivotal mounting of said boom assembly to said support, cable means coacting with said winch mechanism and extending along the boom assembly over said sheave head and downwardly therefrom for supporting a load thereon, said sheave means including a removable locking member insertable through openings in the respective outer and auxiliary boom sections when said openings are in aligned registration with one another, a bracket member attached to the exterior of said outer boom section adjacent the...
outermost ends thereof, and a flange portion on said removable locking member adapted for interlocking underlying coacting engagement with said bracket member upon rotation thereof for retaining said removable locking member in holding coacting engagement in said opening.

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EVON C. BLUNK, Primary Examiner.

H. C. HORNSBY, Assistant Examiner.