July 13, 1965 L. J. LANDRY 3,194,413

EXTENDABLE BOOM

Filed Oct. 8, 1962 3 Sheets-Sheet 1

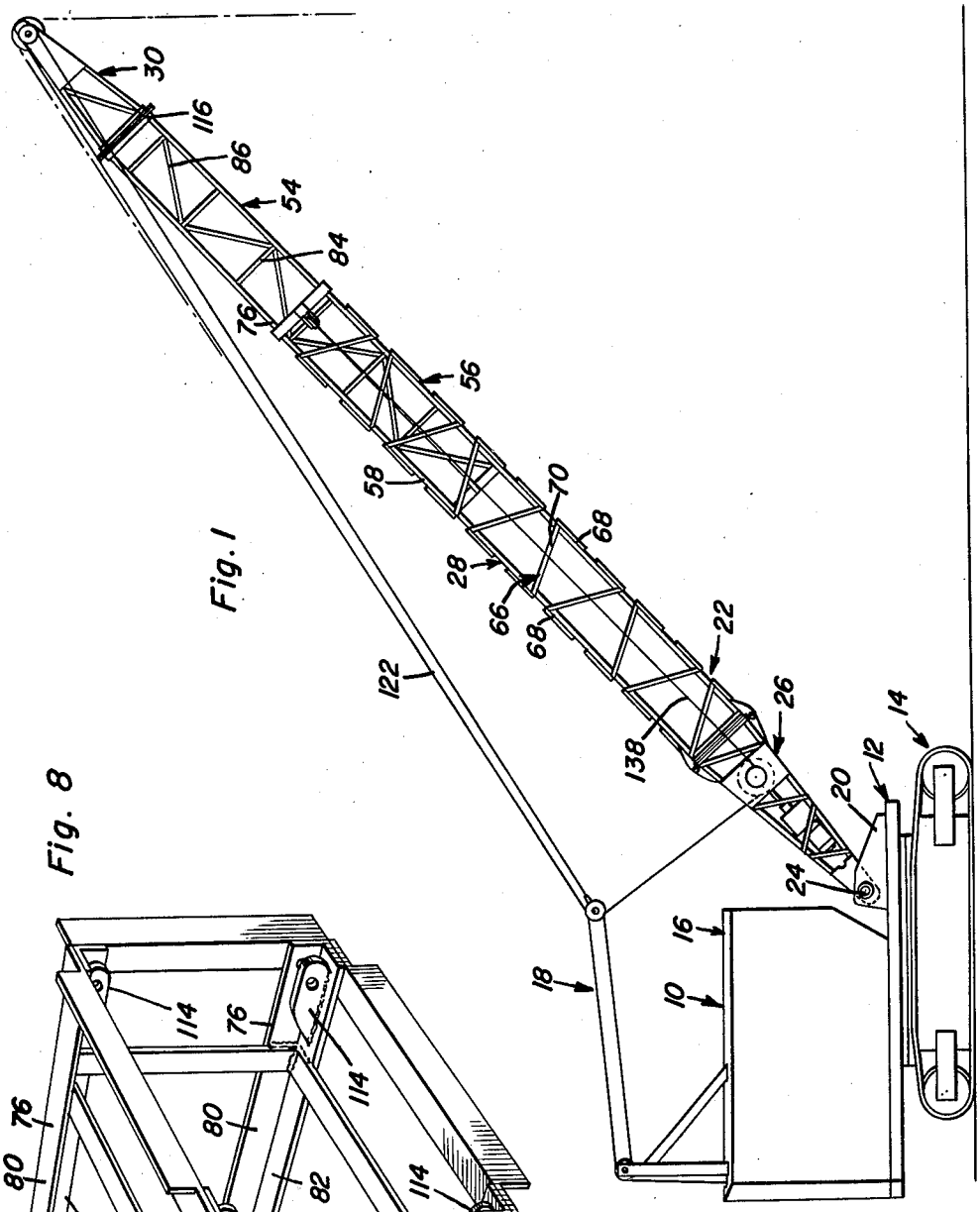



Fig. 1




Fig. 8

Louis J. Landry

INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jackson

Attorneys

July 13, 1965 L. J. LANDRY 3,194,413

EXTENDABLE BOOM

Filed Oct. 8, 1962 3 Sheets-Sheet 2

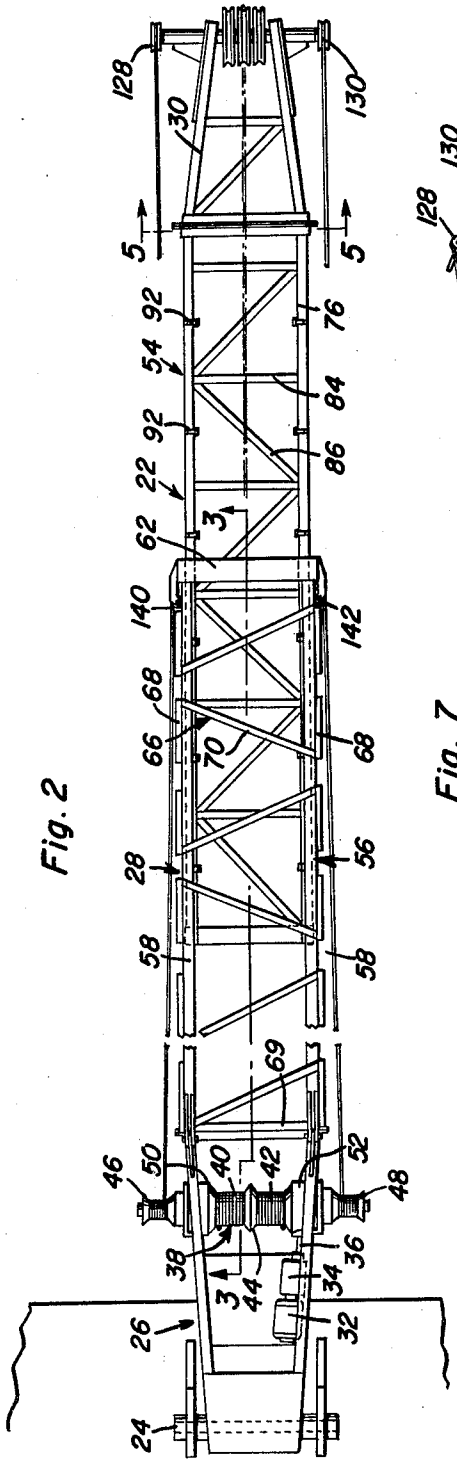


Fig. 2

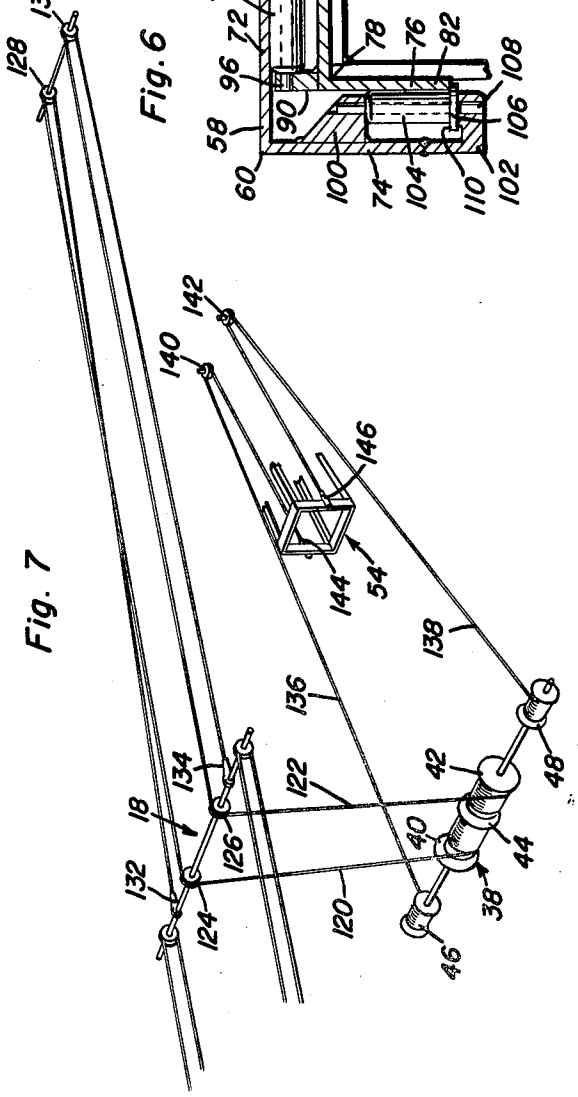


Fig. 7



Fig. 6

Louis J. Landry
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

July 13, 1965 L. J. LANDRY 3,194,413

EXTENDABLE BOOM

Filed Oct. 8, 1962 3 Sheets-Sheet 3

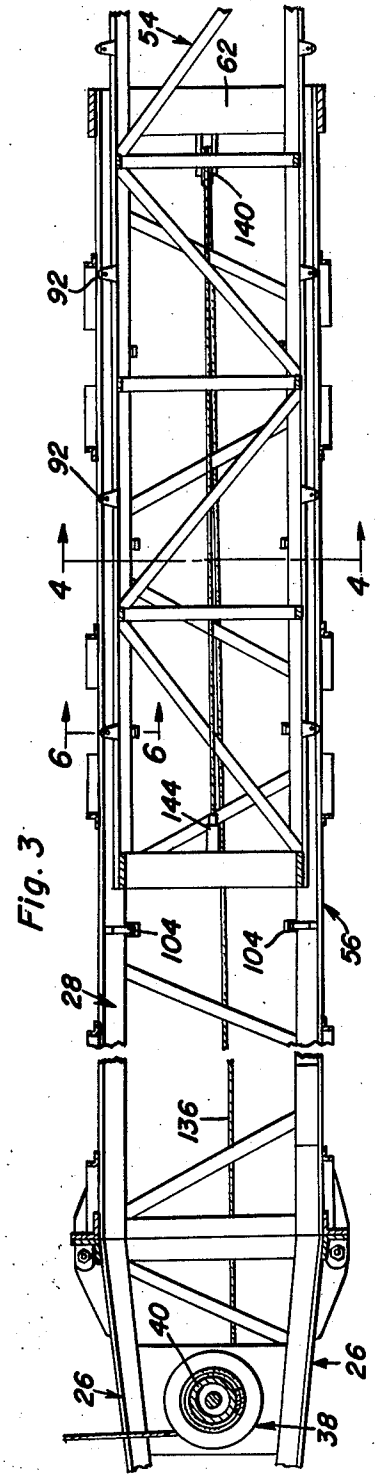



Fig. 3

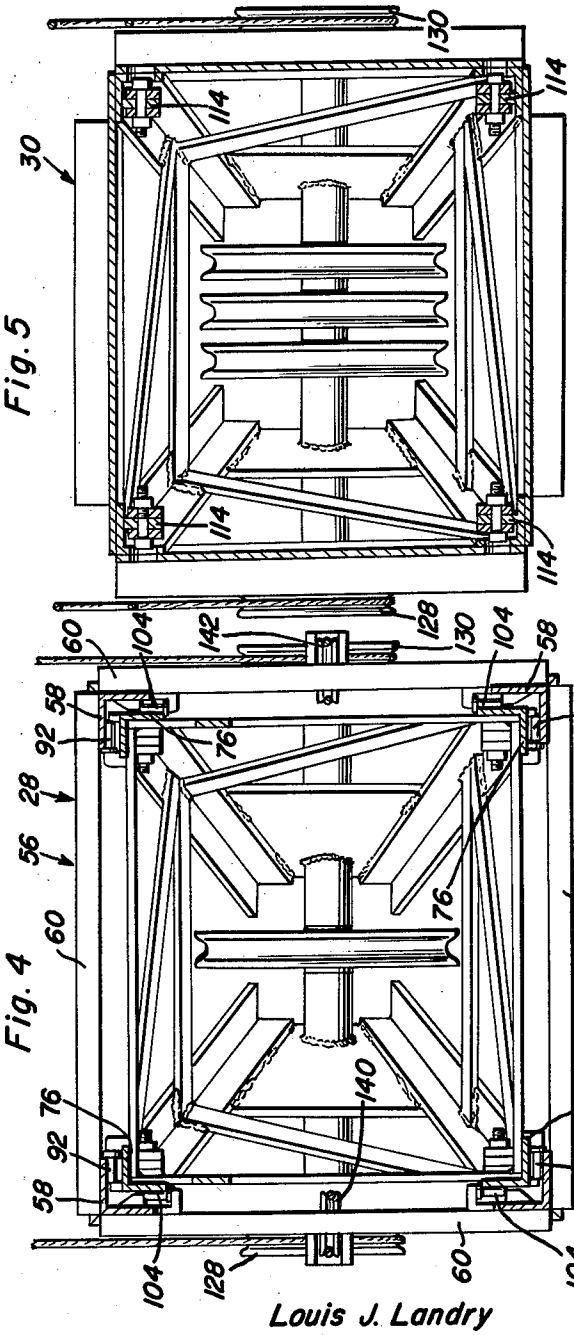



Fig. 5

Fig. 4

Louis J. Landry
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

United States Patent Office 3,194,413 Patented July 13, 1965



3,194,413

# EXTENDABLE BOOM

Louis J. Landry, 210 Darbonne St., Sulphur, La.

Filed Oct. 8, 1962, Ser. No. 229,081
7 Claims. (Cl. 212—55)

This invention relates to a novel and useful extendable crane boom and more specifically to a crane boom including inner and outer sections mounted together for longitudinal extension and retraction. In addition, the crane boom of the instant invention is designed specifically as a replacement for a rigid boom on substantially any type of crane presently in use. The extendable boom of the instant invention includes pennant lines which are reeved in a manner enabling the extendable boom to be used on any type of crane having a gantry assembly. Still further, the extendable boom of the instant invention is provided with winch beams for raising and lowering the free end of the boom and for extending and retracting the extendable sections of the boom. In this manner, any suitable source of power may be utilized.

In addition to the above, the extendable boom of the instant invention has its inner and outer extendable sections constructed in a manner whereby the inner upper section is guidingly mounted for longitudinal reciprocal movement and against lateral movement relative to the outer lower section in at least three different directions. Still further, the extendable boom also includes means for guidingly supporting the upper inner section thereof against rotational movement about its longitudinal axis relative to the outer lower boom section.

The main object of this invention is to provide an extendable boom which may be readily utilized as a replacement for the rigid boom on substantially any type of crane utilizing a gantry assembly.

A further object of this invention is to provide an extendable boom in accordance with the immediately preceding object having electric motor means drivingly connected to winch means mounted thereon for raising and lowering the free end of the boom and for extending and retracting the upper inner section of the boom.

Another object of this invention is to provide an extendable boom with the telescoped sections thereof constructed in a manner whereby the upper inner section of the boom is guidingly supported from the lower section thereof for longitudinal reciprocal movement and against lateral movement in at least three directions relative to the outer lower section of the boom.

Yet another object of this invention, in accordance with the immediately preceding object, is to provide an extendable boom whose upper inner section is supported from the outer lower section for longitudinal extension and retraction and against rotational movement relative to the lower outer boom section.

A final object of this invention to be specifically enumerated herein is to provide an extendable boom in accordance with the preceding objects which will conform to conventional forms of manufacture, be of simple construction and easy to operate so as to provide a device which will be economically feasible, long-lasting and relatively trouble-free in operation.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a side elevational view of a crane having the extendable boom of the instant invention mounted thereon;

FIGURE 2 is a fragmentary top plan view of the embodiment illustrated in FIGURE 1 on somewhat of an enlarged scale;

FIGURE 3 is a fragmentary enlarged sectional view taken substantially upon the plane indicated by section line 3—3 of FIGURE 2;

FIGURE 4 is an enlarged transverse sectional view taken substantially upon the plane indicated by section line 4—4 of FIGURE 3, with only a single lift line pulley shown;

FIGURE 5 is a transverse sectional view taken substantially upon the plane indicated by section line 5—5 of FIGURE 2 and on somewhat of an enlarged scale;

FIGURE 6 is an enlarged fragmentary sectional view taken substantially upon the plane indicated by section line 6—6 of FIGURE 3;

FIGURE 7 is a fragmentary perspective view of the supporting cables for the extendable boom showing the manner in which the pennant lines may be reeved over the gantry assembly of a crane and the manner in which the winch means carried by the extendable boom may be utilized to raise and lower the free end of the boom and also to extend and retract the extendable upper inner section of the boom; and

FIGURE 8 is a fragmentary enlarged perspective view of the upper end of the extendable upper inner section of the boom shown with the head end thereof removed.

Referring now more specifically to the drawings, the numeral 10 generally designates a conventional type of crane. The crane 10 includes a platform or base generally referred to by the reference numeral 12 which is supported by means of a crawler tread assembly generally referred to by the reference numeral 14. A cab and prime mover housing generally referred to by the reference numeral 16 is supported from the main frame of base 12 and it may be seen that a gantry assembly generally referred to by the reference numeral 18 is supported from the upper portion of the cab and prime mover housing 16.

The mounting frame or base 12 includes a pair of mounting flanges 20 to which the lower end of the extendable boom 22 is pivotally secured by means of an axle pin 24. The extendable boom 22 includes a pyramidal butt section generally referred to by the reference numeral 26, a main section generally referred to by the reference number 28 and a generally pyramidal head section generally referred to by the reference numeral 30.

With attention now directed more specifically to FIGURES 2, 3, 8 of the drawings it may be seen that the butt section 26 includes an electric motor 32 which is drivingly connected to a gear reduction assembly 34 having an output shaft 36. The output shaft 36 is drivingly connected to a main winding drum assembly 38 including first and second halves 40 and 42 separated by a divider flange 44. In addition, a pair of auxiliary winding drums 46 and 48 are supported from the butt section 26 and are rotated from the main winding drum 38 through a pair of clutch and brake assemblies 50 and 52 respectively. The clutch and brake assemblies 50 and 52 may be of conventional design similar to those now in use on existing cranes. It will be noted that the main winding drum 38 is approximately twice as great in circumference as the auxiliary winding drums 46 and 48.

The main section 28 of the boom 22 comprises an upper inner section generally referred to by the reference numeral 54 and an outer lower section generally referred to by the reference numeral 56. The outer lower section 56 includes four generally parallel and longitudinally extending angle members 58 which form the four corner longitudinal edges 60 of the outer lower section 56. Corresponding ends of the four angle members 58 are interconnected by means of four transversely extending brace members 62. In addition, each pair of adjacent

angle members 58 are interconnected, intermediate their opposite ends, by means of a plurality of Z-shaped brace members generally referred to by the reference numerals 66 which each include a pair of generally parallel arms 68 interconnected by means of a diagonal leg 70. The arms 68 of each Z-shaped member 66 are secured to the adjacent flanges 72 and 74 of adjacent ones of the angle members 58.

The upper inner section 54 also includes four angle members 76 which each define a corner longitudinal edge 78 thereof. Each of the angle members 76 includes a pair of flanges 80 and 82 and it may be seen that adjacent ones of the flanges 80 and 82 of adjacent angle members 76 are interconnected by means of transverse brace members 84 and diagonal brace members 86. The brace members 84 and 86 are secured to the inner surfaces of the flanges 80 and 82 in any convenient manner such as by welding and the arms and legs 68 and 70 of the Z-shaped members 66 are secured to the outer surfaces of the angle members 58. In this manner, corresponding ones of the angle members 58 and 76 have their inner and outer surfaces of respective flanges disposed in confronting relation.

From FIGURE 6 of the drawings it may be seen that each of the flanges 80 has a pair of journal blocks fixedly secured thereto in any convenient manner such as by welding and that the journal blocks 88 and 90 rotatably support a roller 92 having a flange 94 on one end by means of an axle pin 96. In this manner, the roller 92 is disposed in rolling contacting engagement with the inner surface of the corresponding flange 72 and the inner face 98 of the flange 94 is disposed in sliding engagement with the free longitudinal edge of the flange 72.

Likewise, each of the flanges 74 has a pair of journal blocks 100 and 102 mounted thereon in any convenient manner such as by welding and the journal blocks 100 and 102 rotatably support a roller 104 having a flange 106 thereon by means of an axle pin 108. The rollers 104 are each disposed in rolling contacting engagement with the outer surface of the corresponding flange 82 and the inner face 110 of each flange 106 is disposed in sliding contacting engagement with the free edge of the corresponding flange 82.

Accordingly, by means of the rollers 92 and 104, the upper inner section 54 is slidably guided within the outer section 56 for longitudinal reciprocal movement and against lateral movement in four directions and against rotational movement relative to the outer section 56. If it is desired, the inner and outer sections 54 and 56 can be constructed of any polygonal shape.

With attention now directed to FIGURE 8 of the drawings it may be seen that the head section or head end 30 may be removably secured to the upper end of the inner section 54 by means of apertured lugs 114 carried by the supper ends of the angle members 76 and similar apertured lugs carried by the head section 30. Pivot pins 116 are secured through corresponding ones of the apertured lugs 114 carried by the sections 30 and 54. It is also to be understood that the butt section 26 is also secured to the lower end of the outer lower section 56 in a similar manner.

With attention now directed to FIGURE 7 of the drawings it may be seen that a pair of pennant lines or cables 120 and 122 have one pair of free ends wound about the drum halves or sections 40 and 42 respectively and are entrained over idler pulleys 124 and 126 supported from the gantry assembly 18. The free ends of the pennant lines 120 and 122 are then entrained over pulleys 128 and 130 respectively rotatably supported on the free end of the head section 30 and secured at points 132 and 134 respectively on the gantry assembly 18.

A pair of lift lines or cables 136 and 138 have their free ends wound about the auxiliary winding drums 46 and 48 in a direction opposite to that in which the pennant lines are wound about the drum halves 40 and 42.



The free ends of the lift lines 136 and 138 are entrained about pulleys 140 and 142 respectively journalled from the upper end of the outer lower section 56 and are secured at points 144 and 146 to the lower end of the upper intersection 54.

In operation, rotation of the main winding drum 38 in a clockwise direction as viewed in FIGURE 7 of the drawings will unreel the pennant lines or cables 120 and 122 and enable the free end of the boom 22 to be lowered. At the same time, however, the lift lines or cables 136 and 138 are being wound about the auxiliary winding drums 46 and 48 whereupon the effective length of the boom is increased thereby maintaining the approximate same predetermined angle during extension of the boom 28. On the other hand, if the main winding drum 38 is rotated in a counter-clockwise direction as viewed in FIGURE 7 of the drawings, the pennant lines 120 and 122 will be wound on the drum halves 40 and 42 which would normally have a tendency to raise the free end of the boom 22. However, rotation of the main winding drums 38 in a counter-clockwise direction as viewed in FIGURE 7 of the drawings will effect clockwise rotation of the auxiliary winding drums 46 and 48 thereby shortening the boom 22 and still maintaining the approximate same inclination of the boom 22.

If it is desired to actually raise or lower the boom 22, the clutch and brake assemblies 50 and 52 may declutch the auxiliary winding drums 46 and 48 and brake the latter in order to enable rotation of the main winding drums 38 relative to the auxiliary winding drums 46 and 48. In this manner, the auxiliary winding drums 46 and 48 may also be in effect rotated relative to the main winding drum 38 in order that the lifting cables 136 and 138 may be initially wound thereon or replaced when needed.

It is to be understood that the rollers 92 and 104 are constructed of nylon or some other hard material having some resilient properties. Further, additional idler pulleys 124, 126, 128 and 130 may be utilized together with extra reaches of the pennant lines 120 and 122 extending between the gantry assembly 18 and the head section 30 of the boom 22. Still further, additional idle pulleys 140 and 142 together with further idle pulleys carried by the lower end of the inner section 54 may be provided with additional reaches of the lifting cables 136 and 138 extending between the upper end of the outer section 56 and the lower end of the inner section 54 may be provided. The clutch and brake assemblies 50 and 52 may be similar to that utilized on existing tulsa winches and modified as necessary.

Finally, it is contemplated that warning systems may be built into the boom assembly to warn the operator when approaching limits of travel of the upper inner section 54.

Although the boom assembly of the instant invention is illustrated and described herein as being used in conjunction with a crane utilizing a gantry, it is to be understood that it may also be used on a wheeled type of machine. Further, the boom assembly of the instant invention could also be used as a "stiff leg" or gin-pole with only minor modifications being necessary to convert it for use as a gin-pole.

The foregoing is considered as illustrative only of the principles of the invention. Further, some numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. In combination, a mounting frame, an upstanding boom pivotally secured at its lower end to said frame for movement about a horizontal axis, said boom including upper inner and lower outer sections mounted

together for relative movement between extended and retracted positions, a gantry assembly supported from said frame and elevated above the lower end of said lower section, a first cable supporting said boom and having one end operatively connected to reversible winding means carried by said lower section and the other end connected to said upper section, means reeving said first cable between said winding means, said gantry, and the upper end of said upper section, a second lift cable having one end operatively connected to said winding means and the other end connected to the lower end of said upper section, means reeving said second cable between said winding means, the upper end of said lower section, and the lower end of said upper section, said winding means including means for inversely winding and unwinding said first and second cables at rates enabling the angle of said boom to be maintained substantially constant during extension and retraction of said boom, said reversible winding means being spaced toward the upper end of said boom from its axis of rotation relative to said frame, and said gantry being spaced above said axis a distance greater than the distance between said axis and said winding means.

2. The combination of claim 1 wherein said winding means includes means for also winding and unwinding one of said cables independently of the other of said cables.

3. The combination of claim 1 wherein said outer section includes diagonal braces forming each of the sides thereof secured between the outer surfaces of the adjacent flanges of adjacent angle members.

4. The combination of claim 1 wherein said inner section includes diagonal braces forming each of the sides thereof secured between the inner surfaces of the adjacent flanges of adjacent angle members.

5. In combination, a mounting frame, an upstanding boom pivotally secured at its lower end to said frame for movement about a horizontal axis, said boom including upper inner and lower outer sections mounted together for relative movement between extended and retracted positions, a gantry assembly supported from said frame and elevated above the lower end of said lower section, a first cable supporting said boom and having one end operatively connected to reversible winding means carried by said lower section and the other end connected to said upper section, means reeving said first cable between said winding means, said gantry, and the upper end of said upper section, a second lift cable having one end operatively connected to said winding means and the other end connected to the lower end of said upper section, means reeving said second cable between said winding means, the upper end of said lower section, and the lower end of said upper section, said winding means including means for inversely winding and unwinding said first and second cables at rates enabling the angle of said boom to be maintained generally constant during extension and retraction of said boom, said reversible winding means being spaced toward the upper end of said boom from its axis of rotation relative to said frame, and said gantry being spaced above said axis a distance greater than the distance between said axis and said winding means, said inner and outer end sections each being generally polygonal in cross section and including a plurality of longitudinally extending and generally parallel angle members opening diagonally inwardly extending along each corner edge thereof, each of said angle members including a pair of angularly disposed longitudinally extending flanges generally paralleling the adjacent sides of the corresponding boom section, each of said angle members including a plurality of flanged rollers spaced longitudinally thereof each journalled for rotation about an axis extending transversely thereof and disposed in a plane generally paralleling the plane in which one of the flanges thereof is disposed, each of said rollers being disposed on the side of said one flange adjacent the corresponding flange of the other section and disposed in rolling contact with the side of said corresponding flange and with the inner side of its flange engaging the free longitudinal edge of said corresponding flange.



6. The combination of claim 5, said winding means including means for also winding and unwinding one of said cables independently of the other of said cables.

7. In combination, a mounting frame, an upstanding boom pivotally secured at its lower end to said frame for movement about a horizontal axis, said boom including upper inner and lower outer sections mounted together for relative movement between extended and protracted positions, means connected between said boom and said frame for pivoting said boom about said axis and for extending said upper section relative to said lower section, said inner and outer sections each being generally polygonal in cross section and including a plurality of longitudinally extending and generally parallel angled members opening diagonally inwardly extending along each corner edge thereof, each of said angle members including a pair of angularly disposed longitudinally extending flanges generally paralleling the adjacent sides of the corresponding boom section, each of said angle members including a plurality of flanged rollers spaced longitudinally thereof each journalled for rotation about an axis extending tranversely thereof and disposed in a plane generally paralleling the plane in which one of the flanges thereof is disposed, each of said rollers being disposed on the side of said one flange adjacent the corresponding flange of the other section and disposed in rolling contact with the side of said corresponding flange and with the inner side of its flange engaging the free longitudinal edge of said corresponding flange.

**References Cited by the Examiner**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 2,545,047 | 3/51 | Russell | 212—55 |
| 2,819,803 | 1/58 | Obenchain | 212—55 |
| 3,029,954 | 4/62 | Grant | 212—55 |
| 3,073,457 | 1/63 | Thomas | 242—144 |


SAMUEL F. COLEMAN, *Primary Examiner.*

KARL J. ALBRECHT, ERNEST A. FALLER, *Examiners.*