May 26, 1959 C. V. MORRIS 2,888,151

HYDRAULIC FOLDING GOOSENECK BOOM

Filed Dec. 28, 1953 2 Sheets-Sheet 1

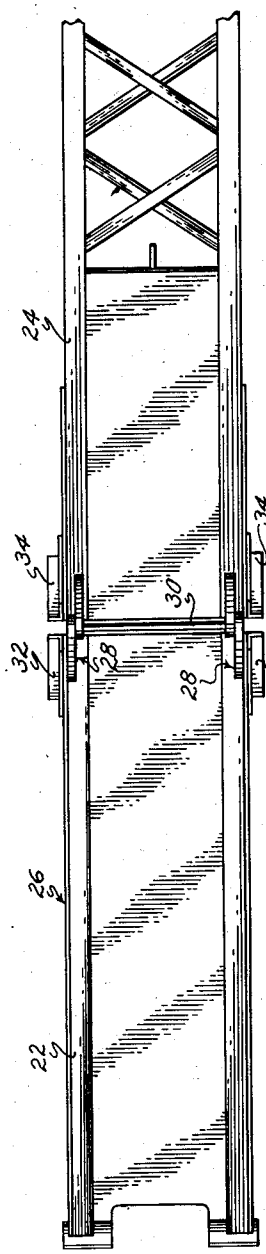


Fig. 1.

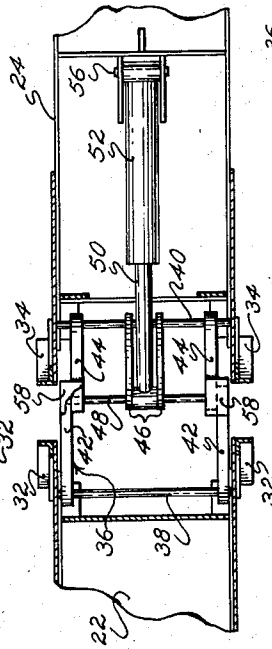


Fig. 3.

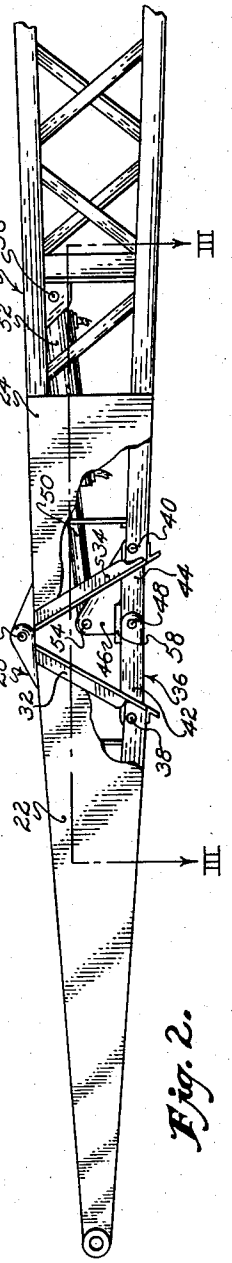


Fig. 2.

INVENTOR.
Carrol Vernon Morris
BY
ATTORNEY

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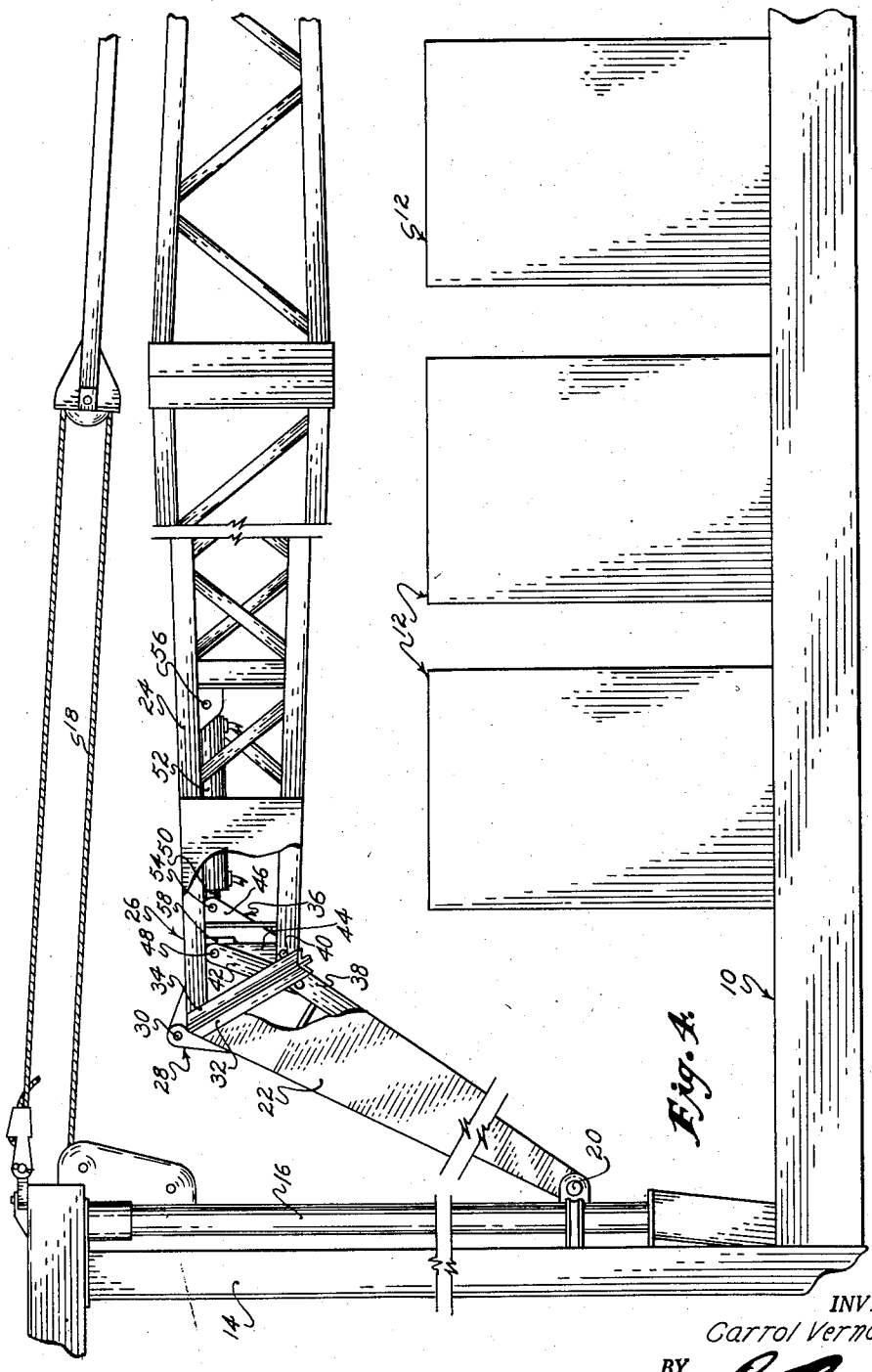


Fig. 4.

INVENTOR.
Carrol Vernon Morris
BY
ATTORNEY

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2,888,151

HYDRAULIC FOLDING GOOSENECK BOOM

Carrol Vernon Morris, Kansas City, Mo., assignor to Pitman Manufacturing Company, Kansas City, Mo., a partnership composed of Raymond O. Pitman and Raymond F. Pitman

Application December 28, 1953, Serial No. 400,641

2 Claims. (Cl. 212—144)

This invention relates to improvements in cranes, derricks, and other lifting structures utilizing an elongated boom swingable on a horizontal axis and/or a vertical axis for raising and lowering relatively heavy objects, the primary aim of the present invention being to provide a foldable gooseneck boom including a novel joint between the relatively swingable sections of the boom.

It is the most important object of the present invention to provide a boom including a pair of normally end-to-end sections, hingedly interconnected for swinging movement of their proximal ends toward and away from each other and having power-actuated toggle linkage operably interconnecting the said ends of the sections in spaced-relationship to the point of articulation.

Other objects include many important details of construction of the manner of mounting the sectional boom of the present invention, all of which will be made clear or become apparent as the following specification progresses.

In the drawings:

Figure 1 is a fragmentary, top plan view of a hydraulic folding gooseneck boom made pursuant to the present invention.

Fig. 2 is a fragmentary, side elevational view thereof, parts being broken away for clearness.

Fig. 3 is a fragmentary, cross-sectional view taken on line III—III of Fig. 2; and

Fig. 4 is a side elevational view showing the boom in a folded condition and illustrating the manner of mounting the same on a support.

As will hereinafter appear, the primary problem overcome through use of boom structure such as that shown in the drawings, relates to the transportation of the boom to and from a point of use when the same is operably mounted on a truck bed. By virtue of the fact that conventional booms lie flatly on the bed of the truck when not in use and while being transported, it is virtually impossible to utilize the said bed for receiving other machinery or apparatus to be carried by the truck.

As will hereinafter appear therefore, the foldable boom of the present invention permits use of truck bed **10**, as shown in Fig. 4 of the drawings, for carrying of other machinery, devices and the like such as are diagrammatically illustrated in Fig. 4 and designated by the numeral **12**. In Fig. 4 of the drawings there is also illustrated one way of operably mounting the boom of the crane upon the truck bed **10** which includes upright framework **14**, having a standard **16** mounted thereon for rotation on a vertical axis. Winch means (not shown) operably coupled with a cable **18** which is in turn connected with the boom, serves to raise and lower the latter as it swings on a horizontal axis **20** serving to mount the boom on the rotatable standard **16**.

The boom about to be described may consist of a plurality of sections, but for purposes of illustration there has been shown but one pair of such sections **22** and **24**, the boom being designated in its entirety by the numeral

26. Cable **18** may be coupled with boom section **24** as shown in U.S. Letters Patent No. 2,717,701, or otherwise, as desired. The form and construction of the sections **22** and **24**, except at their proximal ends, forms no part of the present invention and may be varied as desired. The said proximal ends of the sections **22** and **24** are, however, of special construction and interconnected by hinge means broadly designated by the numeral **28**, including a transverse hinge pin **30**. When the boom **26** is extended with the sections **22** and **24** in alignment as shown in Figs. 1 to 3 inclusive, the adjacent ends of the sections **22** and **24** converge toward the hinge pin **30** as best seen in Fig. 2 of the drawings.

Flange means **32** and **34** on the sections **22** and **24** respectively, are disposed for interengagement when the boom **26** is folded to a position where the section **24** is disposed horizontally over the articles **12**, as shown in Fig. 4.

In addition to the hinge means **28**, toggle linkage, broadly designated by the numeral **36** is utilized to interconnect the sections **22** and **24**. Linkage **36** includes pivot shafts **38** and **40** mounted on the sections **22** and **24** respectively, in spaced parallelism to the hinge pin **30**, links **42** swingably mounted on the shaft **38** and links **44** and **46** swingably mounted on the shaft **40**. The links **42** are pivotally coupled with the links **44** and **46** by means of a pivot rod **48** in spaced parallelism to the hinge pin **30** and to the pivot shafts **38** and **40**.

The links **46—46** are in the nature of triangular-shaped plates and receive one end of a piston stem **50** forming a part of fluid power means that includes a cylinder **52**. The stem **50** is pivotally connected to the linkage **36** by a rotatable connection with the plates **46—46** through use of a pivot pin **54**. A pivot **56** swingably secures the cylinder **52** to the section **24**. Swinging movement of the toggle linkage **36** in one direction is limited by stop plates **58** rigidly secured to the links **44—44** and extending into overlying engagement with the links **42—42** when the boom **26** is extended with the sections **22** and **24** in alignment as shown in Figs. 1 to 3 inclusive.

The extensible power means **50—52** is of the double-acting ram-type and may be used in conjunction with the means for swinging the boom **26** on axis **20** and which includes the cable **18** to either extend the sections **22** and **24** as shown in Figs. 1 to 3 inclusive, or "break" the joint therebetween and thereby position the sections as illustrated in Fig. 4 of the drawings.

As the piston stem **50** is retracted from the extended position shown in Figs. 2 and 3, the pivot pin **54** which is normally spaced both from the pivot rod **48** and the hinge pin **30** in substantial alignment therewith as shown in Fig. 2, moves upwardly and inwardly to the position shown in Fig. 4, thereby swinging the linkage **36** and permitting the flanges **32** and **34** to move into interengagement.

During such retraction of the stem **50**, the stops **58** are free to move away from the links **42**, whereas the extent of outward movement of the stem **50** relative to the cylinder **52** is limited by the stops **58** moving into engagement with the links **42**. Manifestly, the cylinder **52** is coupled with a source of energy such as hydraulic fluid, together with suitable control valves, all of which are not illustrated and which may take any desired form.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:

1. In a boom structure having an inner boom section and an outer boom section, the latter normally extending outwardly from said inner section at an angle relative thereto with the proximal ends of the sections in interengagement, presenting an outside corner and an inside corner between the sections; hinge means at one of said

corners, pivotally interconnecting the sections for vertical swinging movement of the outer section relative to the inner section; toggle means including a pair of links having pivot means interconnecting the same, said links being normally disposed in a folded condition and pivotally interconnecting the sections at the other of said corners; power means coupling one of said sections with one of said links for straightening the latter to an extended position spanning the distance between the sections as the outer section is swung into alignment with the inner section, thereby separating said proximal ends to a position converging relatively as said hinge means is approached, said proximal ends of the sections and said toggle means forming a triangle when the links are extended and said proximal ends are separated, said power means being coupled with said one link to force the links into the confines of said one section when the toggle means is swung to said folded condition, each link being provided with a shaft pivotally connecting the same with its corresponding section; and structure pivotally connecting said pivot means with one of said shafts, said structure being provided with pin means disposed between said pivot means and said hinge means in substantial alignment therewith when the toggle means is extended, said power means comprising a fluid piston and cylinder assembly pivotally interconnecting said pin means and said outer section.

2. In a boom structure having an inner boom section and an outer boom section, the latter normally extending outwardly from said inner section at an angle relative thereto with the proximal ends of the sections in interengagement, presenting an outside corner and an inside corner between the sections; hinge means at one of said corners, pivotally interconnecting the sections for vertical swinging movement of the outer section relative

to the inner section; toggle means including a pair of links having pivot means interconnecting the same, said links being normally disposed in a folded condition and pivotally interconnecting the sections at the other of said corners; and power means coupling one of said sections with one of said links for straightening the latter to an extended position spanning the distance between the sections as the outer section is swung into alignment with the inner section, thereby separating said proximal ends to a position converging relatively as said hinge means is approached, said proximal ends of the sections and said toggle means forming a triangle when the links are extended and said proximal ends are separated, said power means being coupled with said one link to force the links into the confines of said one section when the toggle means is swung to said folded condition, there being stop means on said one link engaging the other of said links when the toggle means is extended whereby to limit the extent of outward swinging movement of the links.

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