

1

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HYDRAULIC DERRICK

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This invention relates to derricks and particularly to such apparatus as is suitable for setting utility poles or handling materials availed of in utility construction and maintenance such as may be related to telephone and electricity transmission.

The invention is particularly suitable for embodiment in such apparatus as is mounted on a vehicle which in itself is not the usual portable derrick or crane support, but may be of substantially conventional truck and body type.

A primary object of the invention is to provide a derrick of the class described, capable of being mounted on a usual type of utility truck body or the like, which derrick is simply operated for erection and use or conversely to be folded and transported thereafter.

Another object of the invention is to provide a simple operating means for such derrick involving hydraulic power means making possible great flexibility and wide range of movement of the boom structure of such apparatus.

Yet another object of the invention is to provide a derrick including a boom moveable from a substantially horizontal travel position, to a generally vertical initial operating position and subsequently to other operating positions through and including those 180 degrees from the inoperative or travel position.

A further object of the invention is to provide a derrick having boom structure therein which includes sheave and cable means therefor, which boom is operable by hydraulic piston and cylinder means to erect the said boom into initial operating position and manipulate the boom thereafter through a range of movement at least 180 degrees from the inoperative or travel position thereof.

A still further object of the invention is to provide a derrick of the class described, having a pivoted A-frame therein adapted to occupy a generally horizontal travel or inoperative position, operating means including a hydraulic piston and cylinder unit connected to the frame and to a support therefor, whereby manipulation of said unit will effect raising of said frame to an initial operating position about 90 degrees from the initial position and subsequent operation between at least 90 and 180 degrees from said position.

Other and further objects of the invention will be understood from a consideration of the specification appended hereto and disclosed in the drawing wherein:

Figure 1 is a side view, somewhat fragmentary in nature showing the boom structure hereof as being mounted upon a truck, said truck being only partially illustrated as to the body thereof, the figure setting forth the various movements within the range of operation of the boom structure.

Figure 2 is a top plan view, largely fragmentary in nature showing the boom of the derrick in inoperative or travel position.

Figure 3 is a view taken about on the line 3—3 of Figure 1 looking in the direction of the arrows.

2

Figure 4 is a fragmentary view again about on the line 4—4 of Figure 1 looking in the direction of the arrows.

Fig. 5 is an enlarged fragmentary view with the telescoping leg extended and connected to the end preparatory to raising the boom into operative position.

Referring now to the drawing, and particularly initially Figure 1 therein, there is disclosed a portion of a utility truck body generally designated 1, this portion being the rear uppermost section of such body, the body of course being mounted upon the usual truck chassis, not shown herein but readily available and known to those skilled in the art.

Since as will be readily understood the portion 1 of the utility truck body for example is sufficiently reinforced as to support thereabove a superstructure in the nature of a frame generally denoted 2, seen in Figure 3 to comprise vertical side members 3 and 4 fixed at their lower ends in any suitable manner to the upper surface of the body 1, and having a transverse cross piece connecting the upper ends indicated at 5.

The frame 2, constituting a support is further braced by means of forwardly extending brace members such as indicated at 6 in Figure 1, extending from the upper surface or portion of the body 1 to the upper extremities of the members 3 and 4.

At the upper extremities of the members 3 and 4 are suitable pivotal bearing members indicated at 7 and 8, the pivotal bearing members 7 and 8 in turn being engaged with an A-frame generally denoted 9 and shown in the full lines in a substantially horizontal condition in the various figures such as 1 and 2.

The A-frame is in reality a boom of course and includes the side frame members 11 and 12 extending from pivotal connections at 7 and 8 and maintained in such connection by means of the pins 13 and 14 provided therefor, through a boom end or outer end generally seen at 15 in Figure 2. The outer end 15 of the boom 9 is suitably arranged so as to support a sheave or pulley 16 thereon over which may be trained a cable such as indicated in dotted lines at 17 in Figure 1, the usual guide and protecting arrangement for the pulley or sheave 16 being provided and indicated at 18 in the various figures.

In order to manipulate the boom structure 9 in a manner to be subsequently described, a suitable hydraulic piston and cylinder unit generally designated 20 is provided, said unit having the cylinder member pivotally connected at the outer end 15 of the boom 9 at a point indicated at 21 in Figure 1, the piston member of the unit 20 having a rod extending therefrom and comprising a leg member 22, which for the purposes hereof will be denoted a telescopic or telescoping leg member, and in alignment therewith preferably and connected integrally thereto is a further portion which will be denoted a stiff leg indicated at 23 in Figure 2.

As will be readily understood, the cylinder member 20 is suitably connected as by means of the lines 25 and 26 to a hydraulic pump denoted 27 and supported any place suitable adjacent the said cylinder unit and having lines of suitable length extending thereto not shown completely in the drawing in order to obviate confusion.

Reverting now to a further discussion of the piston and cylinder unit 20, it will be seen intermediate the end of the telescoping leg 22 and the stiff leg 23 or rather at the juncture thereof, is a connecting means denoted 28 which for the purposes hereof will be known as a second connecting means, which is in the form of an arm or ear having a pivot receiving opening 29 therein, this ear providing some relatively substantial offset from the line of travel of the legs 22 and 23 as moved by the piston rod of the piston and cylinder unit 20. At the

3

outer end of the stiff leg 23 is a further opening denoted 30 which said opening in conjunction with the material through which the same is made constitutes what will be known as first connecting means.

As will be seen in Figure 3, suitably fixed to the transverse member 5 and extending some little distance above the same is a member which will be known as a second connecting instrumentality denoted 32, which includes a structure providing for guiding movement of the stiff leg 23, thus being in the form of what can be called a sort of yoke, which yoke includes therein a spring pressed and spring operated plunger unit 33 adapted to compel a pin 34 of said unit to enter the slot denoted 35 in the yoke for purposes which will be subsequently set forth.

Below the yoke 32 just described is a further yoke 36, substantially similarly constructed so as to have a slot 37 therein into which a plunger 38 of a spring pressed plunger unit 39 is adapted to penetrate, the entire structure just described comprising the unit 36 being denoted a first connecting instrumentality for the purposes hereof.

Both the units 32 and 36 are provided with flexible operating cables 39 and 40 respectively for purposes which will be readily apparent as this description proceeds and referred to subsequently likewise.

There remains to be described the support denoted 41 for the free end of the boom 9 when the same is in inoperative or travel position, and this may comprise a pair of converging leg members 43 and 43a provided at their upper ends with an open U-shaped member 43b in which the boom end 15 is supported as shown in the various figures.

It should be of course noted that transverse pivotal arrangement is provided by the pivot points at 7 and 8 and including the pivot pins 13 and 14 whereby the A-frame or boom 9 may be swung thereabout as indicated in the various positions shown in dotted lines.

Now in order to effect such movement and erection of the boom from the reclining, horizontal or travel position of Figure 1, wherein the boom is shown in full lines, with the appurtenances thereto likewise shown in full lines, suitable operation of the control member 42 for the hydraulic pump unit 27 may be resorted to and thus admit fluid into the line 25 to thereafter cause the piston and cylinder unit to operate moving the telescoping leg 22 outwardly or to the left as viewed in the figures until such time as the pivot opening 29 engages or is engaged by the pin 34 of the second connecting instrumentality 32, the second connecting means as indicated being the offset member 28 and thus engaging the second connecting instrumentalities. When such a point has been reached, the spring pressed pin 34 will automatically move into the opening 29 and thereafter the control unit 42 will be manipulated so as to admit fluid to the line 26 and thus in effect attempt to retract the piston unit and legs 22 and 23 connected thereto. This will cause a pivoting action of the entire A-frame 9 around the pivot points 7 and 8 as will be readily apparent, caused by the offset nature of the pivot point 29, until a position such as indicated in dotted lines, and being nearly vertical in Figure 1 is reached.

At this time the first connecting means 31 on the outer end of the stiff leg 23 will have moved into engagement with the first connecting instrumentalities 36 and the pin, or spring pressed plunger 39 thereof will enter the opening in said first connecting means. Thus, the first and second instrumentalities are now engaged with the first and second connecting means respectively so that the boom is locked in the position in the generally vertical dotted line relationship as shown in Figure 1.

Since this position is obviously only useable under certain extreme conditions, and it is desirable to manipulate the A-frame or boom 9 for various angular positions throughout the extent at least indicated by the arc denoted C, the second connecting instrumentality will be manipulated by means of the cable 39a so as to retract

4

or withdraw the pin 34 from the opening 29 and thereafter the hydraulic pump unit 27 may be manipulated in any suitable manner by means of the controlling member 42 provided so as to raise or lower the boom or A-frame 9 through various positions as necessary whereby the cable 17 may be in turn operated by a suitable winch 44 provided, operating the cable over the sheave 16 previously described.

It will be apparent that manipulation of the hydraulic instrumentalities in a reverse manner to that initially described so as to raise the A-frame or boom 9 from a position such as may be indicated in dotted lines extending to the left in Figure 1 to the nearly vertical position shown in said figure by dotted lines may be resorted to whereby the second connecting means are again engaged with the second connecting instrumentalities by means of the spring pressed plunger 34 thereof. Thereafter it will be necessary to withdraw or retract the plunger 39a from the first connecting instrumentalities whereby the end of the stiff leg 23 will be released and the boom may be lowered into its horizontal or inoperative travel position as shown in full lines in Figure 1.

It will be understood that by the unique nature of the arrangement herein described, an hydraulic boom for derricks has been provided which is simply operated and erected so as to move from a substantially horizontal position through a position 90 degrees therefrom and to and into positions at least 180 degrees from the initial position so as to carry out the operating phases desired to be accomplished.

We claim:

1. In a derrick of the class described, in combination, a boom, a support therefor, pivotal connection of the boom and support, first and second connecting instrumentalities on the support, a leg unit connected to the boom, a reciprocable part in said unit having a first connecting means at the end thereof movable therewith, second connecting means having an offset connecting means therefor, and power means to operate said leg unit and reciprocate the part so as to cause engagement of the second connecting means and second connecting instrumentalities, subsequent reciprocation during such connection effecting movement of the boom to operating position and to a position for engagement of the first connecting means and first connecting instrumentalities, to support the boom during manipulation thereof for operating action.

2. The combination as claimed in claim 1, wherein the first and second connecting instrumentalities are arranged on the support in substantially vertical alignment.

3. The combination as claimed in claim 1, wherein the pivotal connection of the boom and support and the second connecting instrumentalities are axially spaced whereby operation of the power means, with the second connecting means engaged with the second connecting instrumentalities, will effect pivotal movement of the boom to and from initial operating position.

4. The combination as claimed in claim 1, wherein the leg unit includes an hydraulic piston and cylinder unit, the reciprocable part consists of a telescoping leg section and a stiff leg section, said sections being arranged in alignment, the second connecting means described being located at the juncture of the said section, the distance between the first and second connecting means substantially equaling that between the first and second connecting instrumentalities.

5. The combination as claimed in claim 1, wherein the connecting instrumentalities are releasable whereby the boom is moveable to infinite operating positions when the first instrumentalities and first means are engaged, and second instrumentalities and second means disengaged, and said boom may be moved to inoperative position by engagement of the second instrumentalities and second means and release of the first said instrumentalities and first said means.

5

6. In a derrick of the class described, in combination, a support, a boom pivotally connected at its foot thereto on a transverse pivot axis, a leg unit connected at one end to the free end of the boom, said unit having a reciprocable part moveable with respect thereto, a first connecting means at the extremity of the part, a second connecting means on the part spaced a substantial distance from the first and offset from the path of travel of said part, second connecting instrumentalities spaced from the pivot axis, first connecting instrumentalities also spaced from the said axis, and power means to operate said leg unit whereby to move said boom into initial operative position during engagement of said second means and the second instrumentalities, said first means and first instrumentalities being thereby engaged, subsequent disengagement of said second means and second instrumentalities facilitating movement of said boom through a wide range of operative positions by actuation of the power means aforesaid.

7. The combination as claimed in claim 6, wherein the boom is arranged so as to lie in a first substantially horizontal inoperative travel position, the leg unit being similarly located, the power means effects the movement stated so as to cause the boom to move from the first position to a second nearly vertical position constituting the initial operative position, and the boom is moveable in a third operative position through a range from the nearly vertical to and somewhat below a horizontal position 180 degrees removed from the first said position.

8. The combination as claimed in claim 7, wherein

6

sheave means are mounted on the boom, and cable means are trained thereover, said cable means being operable by power mechanism to effect operative action of the cable means in all positions of the boom from the second position to the third position.

9. The combination as claimed in claim 6, wherein the first instrumentalities are arranged a substantial distance below the second instrumentalities, the power means is operable to cause the second connecting means to move into position for engagement with the second connecting instrumentalities, subsequent operation of said power means effecting the stated movement into initial operative position, said operation likewise causing the first connecting means to be positioned for engagement by the first connecting instrumentalities, means to release the second means and instrumentalities, said boom being thereafter moveable into a plurality of operative positions by the power means aforesaid, whilst said first means and first instrumentalities are in connected relation.

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