HYDRAULICALLY CONTROLLED ARTICULATED CHAIN SAW MOUNTING ARM STRUCTURE
3 Claims, 7 Drawing Figs.

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ABSTRACT: A chain saw mounting arm structure for supporting a chain saw from a ground vehicle and including a base support boom having one end supported from an associated vehicle for swinging about both horizontal and vertical axes and a second support boom pivotally supported at one end to the free end of the base support beam for angular displacement about an axis extending transversely of the base support boom and the second support boom, the chain saw mounting arm structure also including a support arm member carried by the free end of the second support beam from which an associated chain saw is supported for angular adjustment about three right angularly disposed axes relative to the support member.
HYDRAULICALLY CONTROLLED ARTICULATED CHAIN SAW MOUNTING ARM STRUCTURE

The mounting arm structure of the instant invention is designed to support a chain saw from a ground vehicle such as a crawler tractor movable through a timber area. By means of the chain saw mounting arm structure an associated chain saw may be operated by the operator of the associated ground vehicle in substantially any attitude desired within the reach of the pair of booms of the arm structure either at an elevation close to the ground or at an elevation above the ground equal to the effective combined length of the booms of the mounting arm structure.

The mounting arm structure is fully hydraulically actuated and may therefore be readily powered by the hydraulic system of the associated crawler tractor or the like and the chain saw carried by the mounting arm structure may also be hydraulically actuated in order that the mounting arm structure and chain saw need no other power source than the readily available hydraulic system of the associated crawler tractor.

The main object of this invention is to provide a horizontally as well as vertically extendable support structures for a tool such as a powered chain saw and from which the chain saw is supported for rotation about three generally right angularly disposed axes whereby the chain saw may be effectively operated in any attitude within the horizontal and vertical reach capacities of the support structure.

Another object of this invention is to provide a support structure for a chain saw in accordance with the preceding objects and which is specifically adapted to be supported from a ground vehicle such as a crawler tractor capable of unrestricted movement through timber areas.

A still further object of this invention is to provide a support structure in accordance with the preceding object and which includes fluid motor means for effecting relative movement between relatively movable compliance of the support structure at each articulated joint thereof.

A final object of this invention to be specifically enumerated herein is to provide a chain saw mounting arm structure in accordance with the preceding object which will conform to conventional forms of manufacture, be of simple construction and easy to use so as to provide a device that 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 elements throughout, and in which:

FIG. 1 is a side elevational view of the mounting arm structure of the instant invention operatively associated with a ground vehicle and a chain saw;

FIG. 2 is a top plan view of the assembly illustrated in FIG. 1;

FIG. 3 is an enlarged fragmentary horizontal sectional view taken substantially upon the plane indicated by section line 3-3 of FIG. 1;

FIG. 4 is an enlarged perspective view of the chain saw with portions thereof being broken away and the end of the mounting arm structure from which the chain saw is supported and illustrating the various articulated joints between the free ends of the boom assembly and the chain saw;

FIG. 5 is an end elevational view of the assembly of FIG. 4 as seen from the right side thereof;

FIG. 6 is an enlarged fragmentary sectional view taken substantially upon the plane indicated by the section line 6-6 of FIG. 4; and

FIG. 7 is a fragmentary sectional view taken substantially upon the plane indicated by section line 7-7 of FIG. 6.

Referring now more specifically to the drawings the numeral 10 generally designates a conventional form of land vehicle which may be termed a crawler tractor and which is readily movable through timber area. The tractor 10 is conventionally provided with a hydraulic system (not shown) for operating various accessories thereof and the tractor 10 has been modified by the inclusion of a mounting structure generally referred to by the reference numeral 12 secured on one side thereof. The mounting structure 12 includes stationary upper and lower mounting flanges 14 and 16 between which a turntable or support base including a pair of suitably interconnected upstanding plates 18 and 20 and an upstanding shaft 22 are pivotally supported. The plates 18 and 20 and the shaft 22 are swingable about an axis coinciding with the longitudinal center axis of the shaft 22 and the latter has a worm wheel 24 mounted thereon for rotation therewith. A fluid motor 26 is supported from the lower flange 16 and includes a rotatable output shaft 28 upon which a worm gear 30 meshed with the worm wheel 24 is mounted. Accordingly, actuation of the fluid motor 26 will cause the mount comprising the plates 18 and 20 and the shaft 22 to be swung about the longitudinal axis of the shaft 22.

A mounting arm structure generally referred to by the reference number 32 is supported from the mounting structure 12 and includes a boom assembly referred to in general by the reference numeral 34. The boom assembly 34 includes a first base boom 35 having one end pivotally secured between the upper outer corners of the plates 18 and 20 by means of a pivot fastener 36. The pivot fastener 36 is secured through the base boom 35 and the plates 18 and 20 with the base boom 35 being disposed between the plates 18 and 20 and maintained in spaced relation relative thereto by means of spacing sleeves 38 disposed on the pivot fastener 36 on each side of the base boom 35.

An elongated longitudinally extendable fluid motor referred to in general by the reference numeral 40 has the base end of its cylinder portion 42 pivotally secured between the outer lower corners of the plates 18 and 20 by means of a pivot fastener 44 similar to pivot fastener 36 and the extendable end of the piston rod portion 46 of the fluid motor 40 is pivotally secured to the free end portion of the base boom 35 as at 48. Accordingly, the extendable fluid motor 40 may be actuated to cause pivotal movement of the base boom 35 relative to the mounting structure 12 while the fluid motor 26 may be actuated to cause the base boom 35 to swing about a vertical axis.

The boom assembly 34 also includes a second lift boom 50 having one end thereof pivotally supported from the free end of the base boom 35 as at 52 and a second extendable fluid motor referred to in general by the reference numeral 54 has the base end of the cylinder portion 56 thereof pivotally secured to the base boom 35 as at 58 and the extendable end of the piston rod portion 60 secured to an extension 62 of the boom 50 as at 64. Thus, it may be seen that the extendable motor 54 may be actuated to cause the boom 50 to pivot relative to the boom 35.

A support member 66 is mounted on the free end of the boom 50 by means of suitable fasteners 68 and defines a gear housing in which a worm gear 70 and worm wheel shaft 72 having a worm wheel 74 mounted thereon are journaled. The worm gear 70 is meshed with the worm wheel 74 and the worm gear 70 is driven by a fluid motor 76. The worm wheel shaft 72 projects outwardly of the gear housing 66 and is externally splined as at 78. An elongated support arm structure including a first end portion defining an elongated support block 88 has a splined bore 89 formed in one end thereof and the externally splined end portion 78 of the shaft 72 is secured in the bore 89 whereby the block 88 is mounted for swinging movement with the shaft 72.

The second end portion of the support arm structure comprises an elongated mounting generally referred to by the reference numeral 90 a second gear housing. A worm wheel shaft 92 is journaled from the housing 90 and has a worm wheel 94 mounted thereon. The shaft 92 includes a portion thereof disposed externally of the gear housing 90 and which passes through and is keyed to the end of the block 88 remote from the shaft 72 by a key 96. A fluid motor 98 is supported from the gear housing 90 and includes a rotatable worm gear defin-
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ing output shaft 100 which is meshed with the worm wheel 94. Accordingly, upon operation of the fluid motor 98, the gear housing 90 may be caused to oscillate relative to the adjacent end of the boom 88.

A chain saw generally referred to by reference numeral 102 is provided and includes a base bracket 104 from which the blade 106 of the chain saw 102 is removably supported. A fluid motor referred to in general by the reference numeral 108 is supported from the base bracket 104 in any convenient manner and includes a radial output shaft 110 which is journaled through the base bracket 104 and has a sprocket wheel 112 mounted thereon. The chain 114 of the chain saw 102 is entrained about the sprocket wheel 112 and is therefore powered thereby. The shaft 110 is journaled through a sleeve 116 secured through and maintained stationary relative to the base bracket 104 but rotatably journalled from an elongated support or gear housing 118 also in the form of a gear housing. The end of the sleeve 116 projecting into the gear housing 118 is externally splined at 120 and has a large diameter gear wheel 122 mounted thereon. A fluid motor generally referred to by the reference numeral 124 is externally mounted on the gear housing 118 and includes a rotatable output shaft 126 journaled in the gear housing 118 and having a gear wheel 128 mounted thereon meshed with the gear wheel 122. Accordingly, operation of the fluid motor 124 will cause oscillation of the base bracket 104 of the chain saw 102 relative to the gear housing 118. The support or gear housing 118 includes a shaft portion 130 through a portion of the mount or gear housing 90 upon which a worm wheel 132 is mounted. A fluid motor 134 is supported from the gear housing 90 and includes a worm gear defining output shaft 136 meshed with the worm wheel 132. Accordingly, operation of the fluid motor 134 will cause oscillation of the gear housing 118 relative to the gear housing 90. It will be noted that the shaft 112 is disposed at right angles relative to the shaft portion 130, that the shaft portion is disposed at right angles relative to the shaft 92 and that the shaft 92 is disposed at right angles relative to the shaft 72. Therefore, the base bracket 104 of the chain saw 102 may be swung through a vertical plane by operation of the fluid motor 76 rotated about an axis generally paralleling the longitudinal axis of the chain saw 102 and swung about various inclined axes relative to the block 88 by means of the fluid motors 98, 134 and 124.

The extendable fluid motors 40 and 54 as well as the fluid motors 26, 76, 98, 108, 124 and 134 may be suitably actuated by the conventional hydraulic system (not shown) of the vehicle 10 through suitable controls (not shown) operative to effect extension and retraction of the fluid motors 40 and 54 and selective reverse rotation of the fluid motors 76, 98, 108, 124 and 134. Of course, the fluid motor 108 need not be reversible in that the chain 114 of the chain saw 102 need not be reversed in its direction of movement.

It may therefore be seen that the blade 106 of the chain saw 102 may be adjusted to any desired attitude at an elevation either close to the ground from which the vehicle 10 is supported as illustrated in FIG. 1 of the drawings or at elevation above the ground within the reach of the combined booms 35 and 50. After the attitude of the blade 106 of the chain saw 102 has been adjusted as desired, the fluid motor 124 may be actuated to advance the blade 106 toward the timber which is to be cut by oscillating the base bracket 104 of the chain saw 102 about an axis disposed normal to the medial plane of the base bracket 104.

The foregoing is considered as illustrative only of the principles of the invention. Further, since 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.

We claim:

1. In combination, a mobile base, a turntable supported from said base for oscillation about a first upstanding axis, a first boom having one end thereof supported from said turntable for oscillation about a second horizontal axis extending transversely of said first boom between a generally horizontal position and an upstanding position with the other end of said first boom disposed uppermost, a second boom having one end thereof pivotally secured to the other end of said first boom for oscillation about a third horizontal axis extending transversely of said booms, a generally horizontal elongated arm structure including first and second elongated end portions, the first end of said first end portion being mounted on the other end of said second boom for oscillation about a fourth axis generally paralleling the second and third axes, a first end of said second portion being pivotally secured to the second end of said first end portion about a fifth axis generally normal to said fourth axis and the longitudinal center line of said arm structure when said first and second end portions thereof are aligned, an elongated support having one end journaled from said second end portion for oscillation about a sixth axis generally coinciding with the center line of said arm structure when said first and second end portions are aligned, a tool mounting bracket, means journaling said tool mounting bracket from the other end of said support for oscillation about a seventh axis disposed generally normal to said sixth axis, six motor means operatively associated with the relatively movable components at said sixth axes for causing adjustable oscillation therebetween, said motor means operatively associated with said fifth and sixth axes being disposed above a transverse plan containing the longitudinal center line of said arm structure.

2. The combination of claim 1 wherein the means journaling said tool mounting bracket from the other end of said support include means for coaction with and support of the rotary output shaft of a power tool in coaxial relation with said seventh axis.

3. The combination of claim 1 wherein the fourth motor means is supported from said second boom and the fifth and sixth motor means are supported from said second end portion of said elongated support arm structure.