United States Patent

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[73] Assignees **Jones Tool & Machine, Inc.**

[54] **HYDRAULICALLY CONTROLLED ARTICULATED CHAIN SAW MOUNTING ARM STRUCTURE**
3 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **248/2,** 214/147, 248/278
[51] **Int. Cl.** **F16m 11/04**
[50] **Field of Search** ..... 248/2, 16, 278, 279, 280, 281; 214/147, 147 (T), 147 (G), 146.5, (1RCM); 144/34

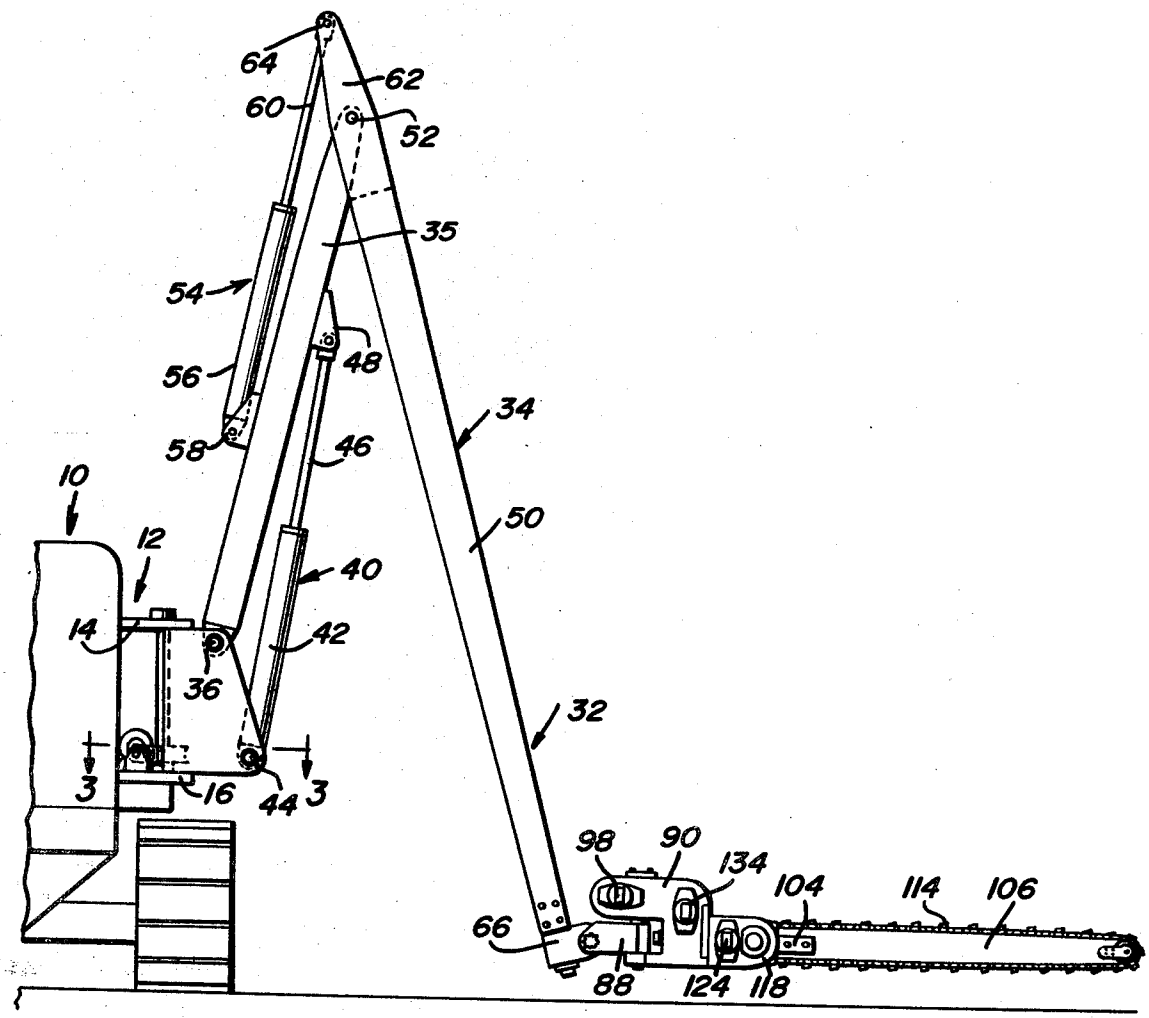
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ABSTRACT: A chain saw mounting arm structure for supporting a chain saw from a ground vehicle and including a base support boom having one end supported from an associated vehicle for swinging about both horizontal and vertical axes and a second support 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 boom from which an associated chain saw is supported for angular adjustment about three right angularly disposed axes relative to the support member.



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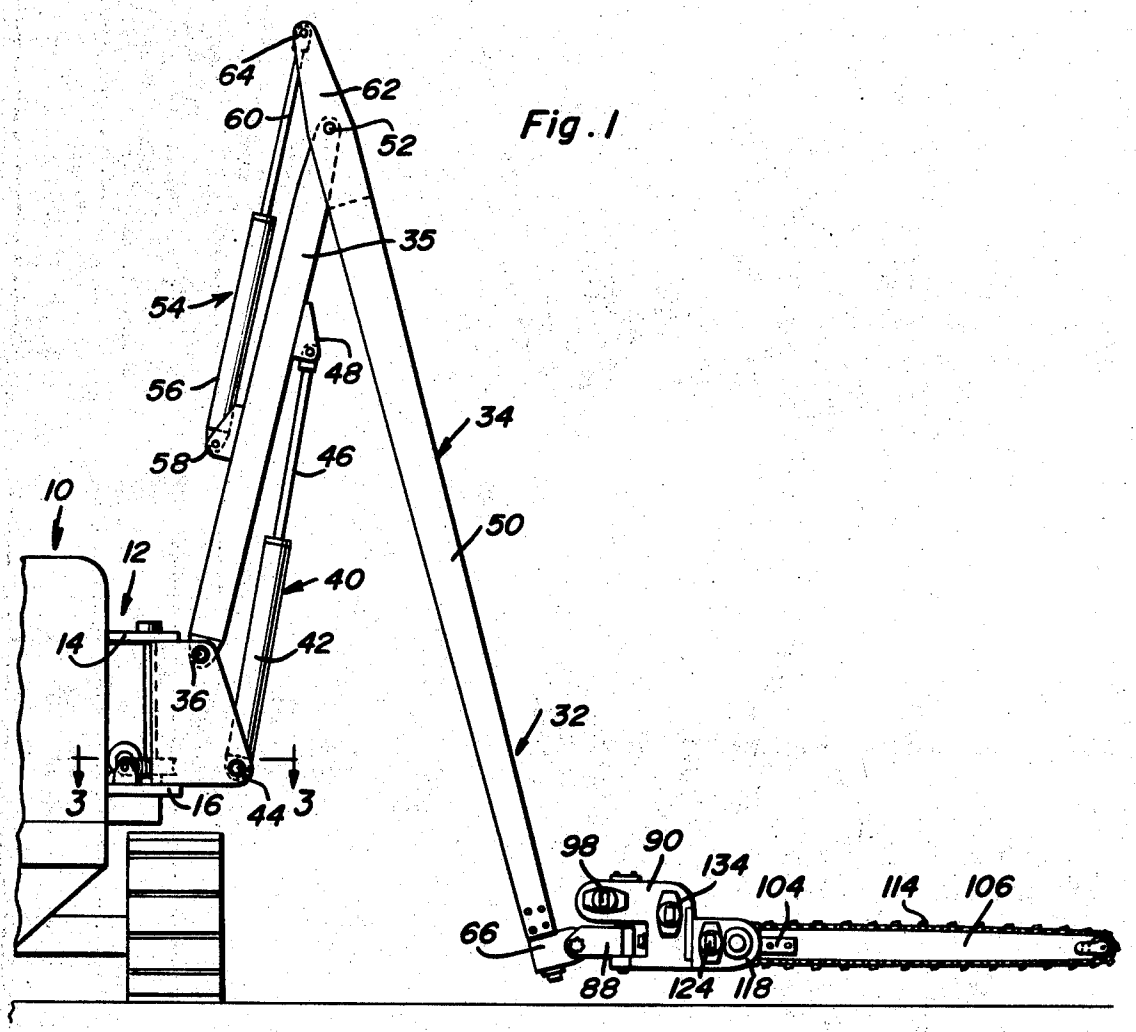


Fig. 1

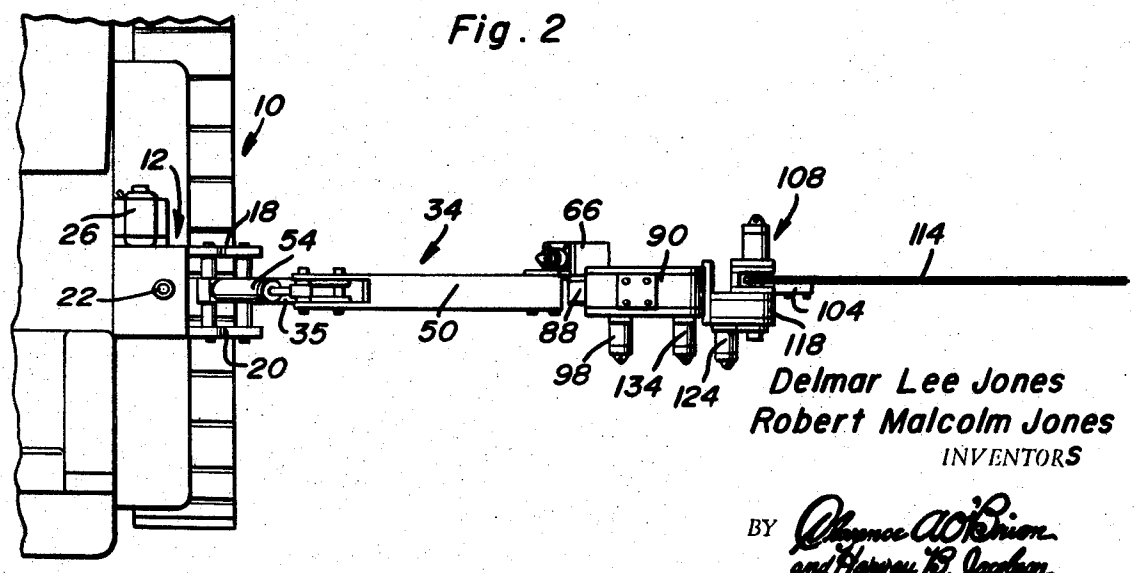


Fig. 2

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Fig. 4

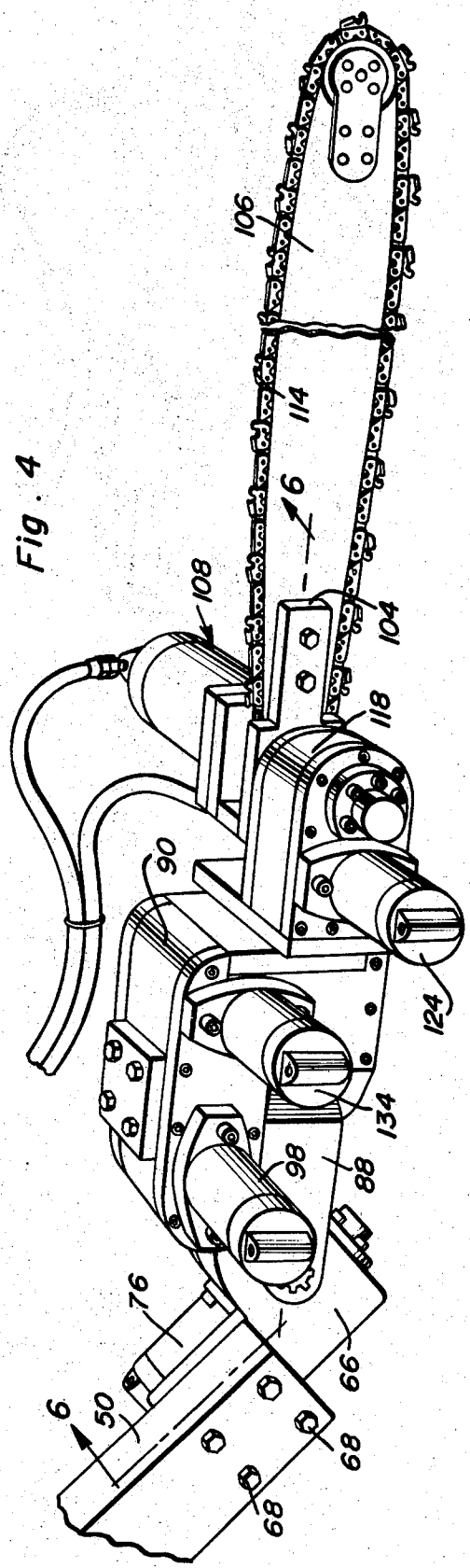


Fig. 5

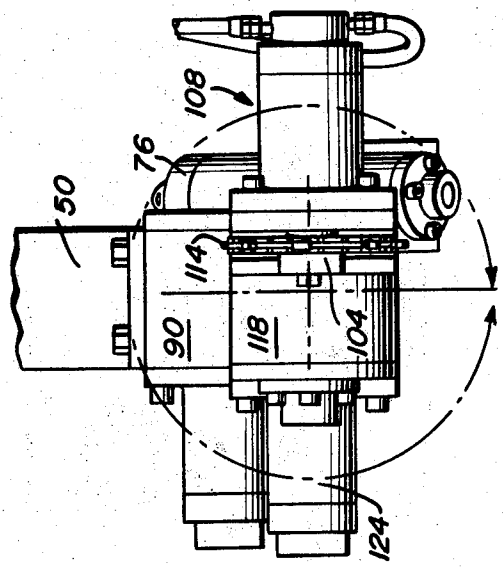
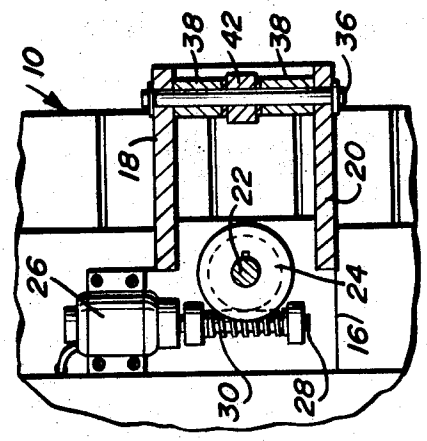


Fig. 3



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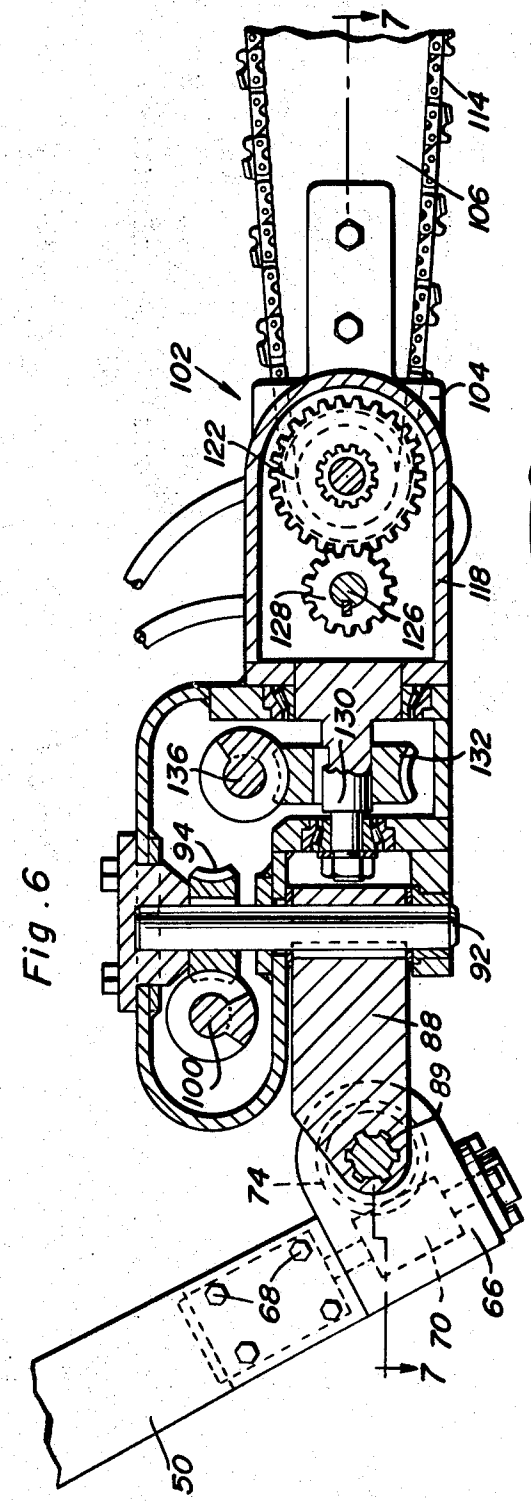


Fig. 6

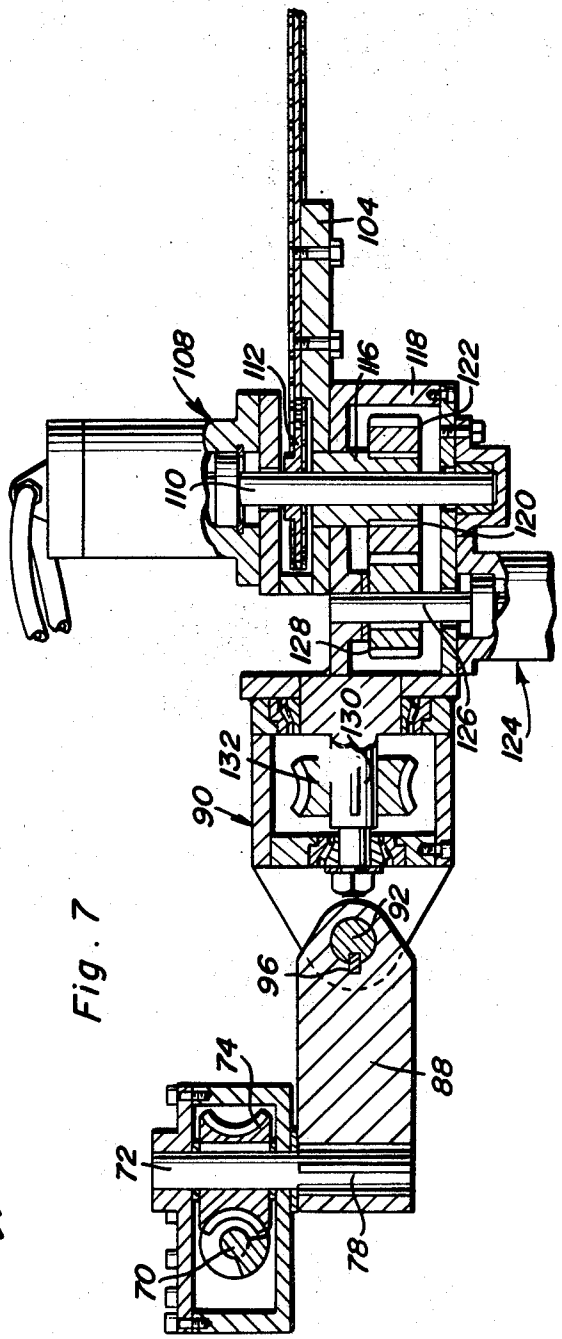


Fig. 7

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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 actuatable 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 parts 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 end of the boom assembly and the chain saw;

FIG. 5 is an end elevational view of the assemblage 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 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 mount generally referred to by 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-

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 block **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 **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 journaled 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 as 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 **9 0** 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 variously 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 journaled 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.