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Garrett et al.

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[54] MOBILE LOGGING VEHICLE AND METHOD OF SKIDDING LOGS

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[52] **U.S. Cl.** **212/7,** 212/55, 214/147, 308/3

[51] **Int. Cl.** **B66c 17/06**

[58] **Field of Search** ..... 254/143, 190; 308/3, 60, 73; 214/141, 147 G, 85.5; 212/7, 55

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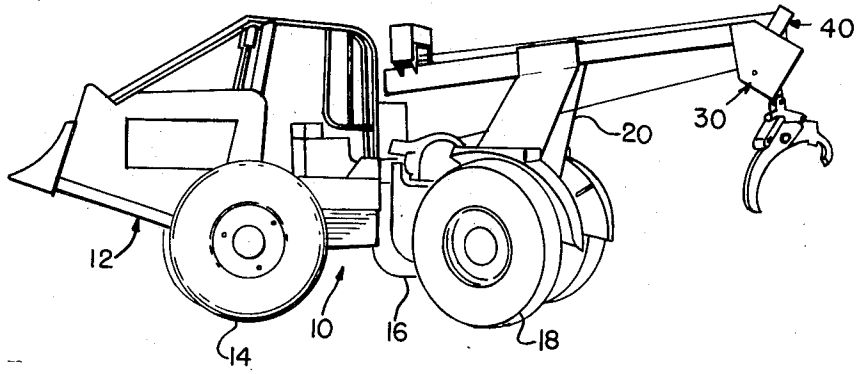
[57] **ABSTRACT**

A mobile logging vehicle is provided with an arch that mounts a telescopic boom. A fairlead is secured to the outer end of the boom. A haul-in line is secured at one end to a winch mounted on the vehicle, passes over a load roller in the fairlead, and is secured at an outer end to a grapple. An opening line is secured at one end to a winch mounted on the boom and passes between spaced guide rollers on the fairlead to position the grapple in the open position on a log. With the fairlead on the outer end of the boom the grapple may be positioned by the operator of the vehicle and closed on the log at the optimum attitude. The grapple is maintained in this general attitude as the boom and haul-in line are retracted. Curved bearings are provided which allow the boom to extend and retract under loading. A method of skidding logs is also disclosed.

3 Claims, 7 Drawing Figures



Patented June 13, 1972 3,669,280

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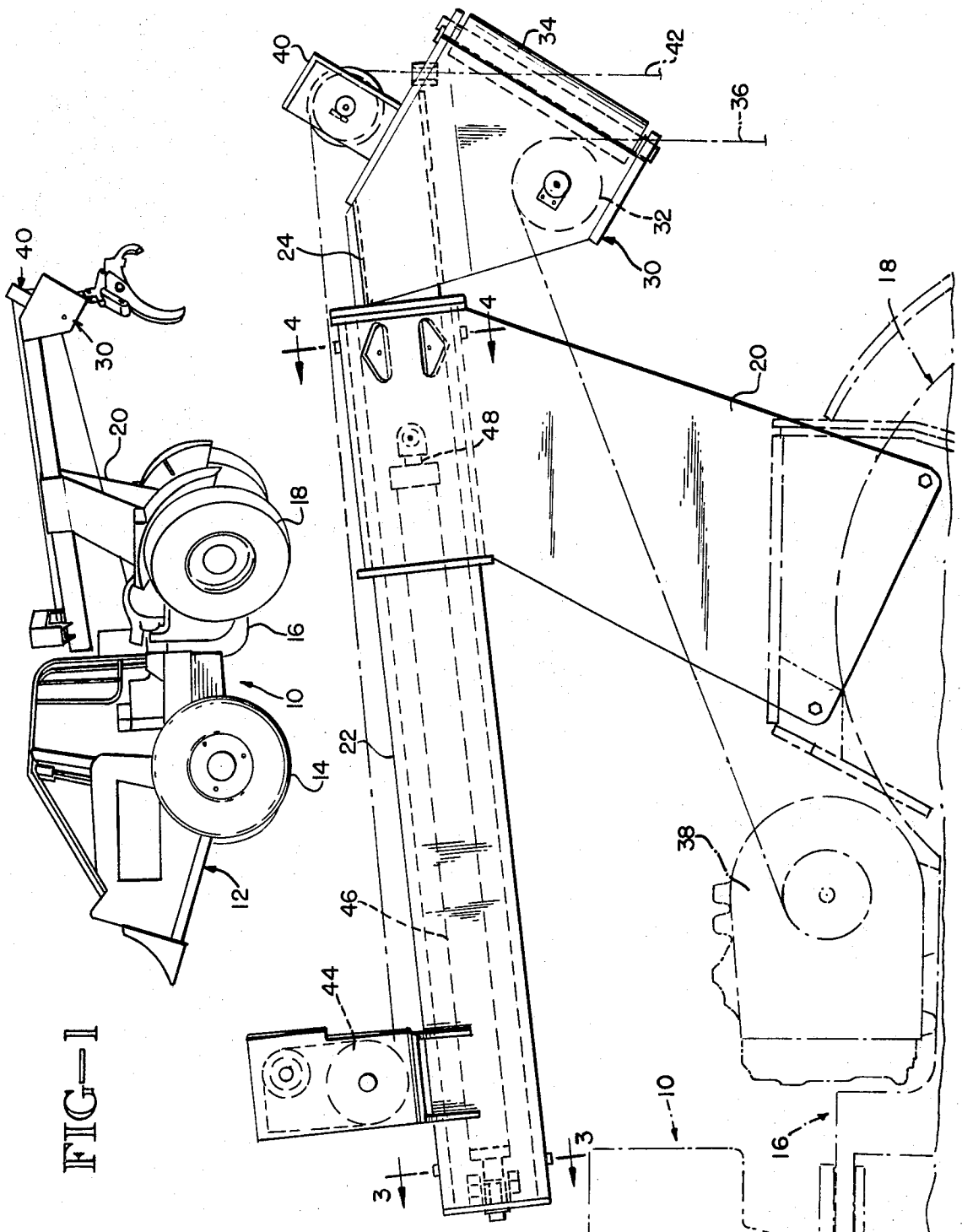

FIG—1

FIG—2

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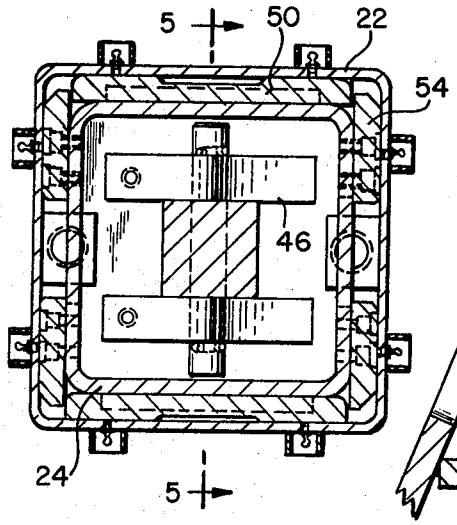
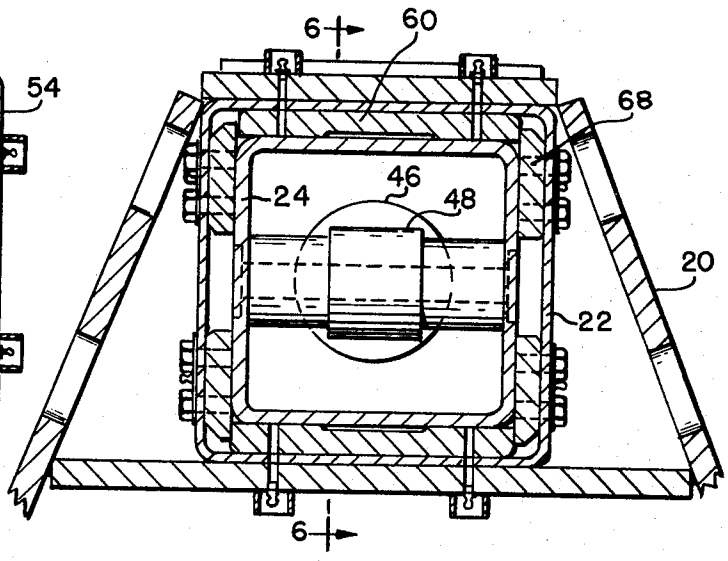
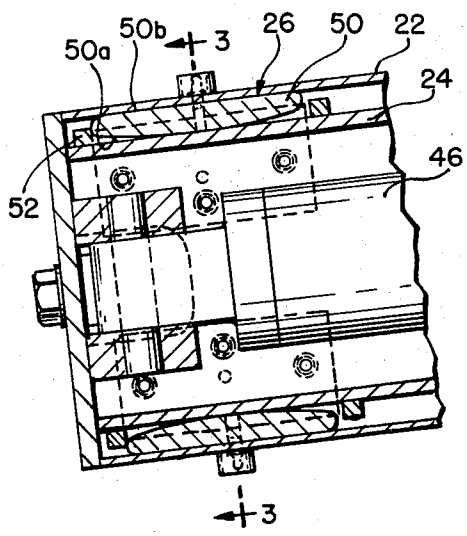


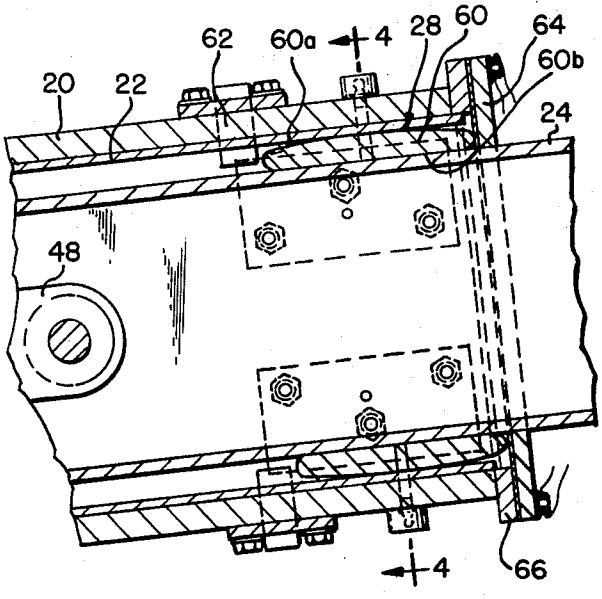
FIG—3



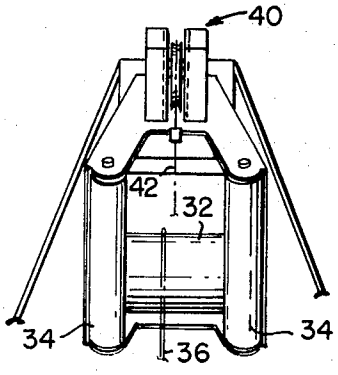
FIG—4



FIG—5



FIG—6



FIG—7

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MOBILE LOGGING VEHICLE AND METHOD OF SKIDDING LOGS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to mobile logging vehicles and, more particularly, to vehicles of the type employing an arch for carrying the weight of the log being transported and to methods of skidding logs.

2. Prior Art Relating To The Disclosure

Various types of mobile logging devices have been used heretofore. Of primary concern in the use of such vehicles is their ability to remove logs that lie in positions difficult to reach. For example, in mountainous regions where much of the present-day logging is done the felled log may rest on a hillside or other location which is inaccessible to the vehicle. Basic ally there are two known systems for reaching logs in these accessible areas. In one system an extendible boom is used to place the outer end of a haul-in line and choker lines in the vicinity of the log. In another system the arch is pivotally mounted on the vehicle and an hydraulically powered grapple is secured to the arch for positioning onto the log. Neither of these known systems are operable to position a cable-operated grapple on a log which lies in a position remote from the vehicle, nor is either system capable of extending the fairlead, through which the haul-in line transmits the load to the vehicle, into a position substantially remote from the vehicle.

SUMMARY OF THE INVENTION

This invention is directed to a mobile logging vehicle that is provided with a boom for positioning a grapple over a log in a generally inaccessible area. The principles involved, however, are equally suitable for use in conveying easily reached logs and for use with choker lines, hooks or the like rather than grapples. Basically the invention employs a fairlead mounted on the end of an extendible boom so that the grapple-supporting or opening line and the haul-in line may be positioned close to the log and preferably above it. In this manner the haul-in line and boom may be retracted so that the fairlead is maintained generally above the log thus enabling the grapple to obtain and keep a solid grip on the log during the initial and subsequent hauling operation.

Another feature of the invention is the provision of bearings between the fixed member of the boom and the extendible member which have curved surfaces to maintain smooth bearing contact between the two members even when the extended boom member is carrying a load. As a result the boom may be smoothly retracted without binding.

Another feature of the invention is the method of skidding logs wherein the grapple is carried out to the remote log.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric view of a mobile logging vehicle, of the articulated type, embodying he principles of the invention.

FIG. 2 is a fragmentary side elevation of the vehicle shown in FIG. 1.

FIG. 3 is a transverse section taken along the line 3—3 of FIG. 2.

FIG. 4 is a fragmentary transverse section taken along the line of 4—4 of FIG. 2.

FIG. 5 is a fragmentary longitudinal section taken along the line of 5—5 of FIG. 3.

FIG. 6 is a fragmentary longitudinal section taken along the line 6—6 of FIG. 4.

FIG. 7 is a fragmentary end elevation of the vehicle.

DETAILED DESCRIPTION OF THE INVENTION

In general, the mobile logging vehicle **10** comprises a forward end section **12** equipped with suitable powered traction wheels **14**. A rear end section **16** is articulately attached to the forward end section and is supported by wheels **18**. Mounted on the rear end section is a transverse arch **20** that is equipped

at its top with a forwardly extending anchor member or inner boom **22**. An extension member or outer boom **24** is telescopically received in the anchor member. First bearings **26** (FIG. **5**) slidably support the innermost end of the extension member **24** within the anchor member **22**. Second bearings **28** slidably support the outermost end of the extension member **24** within the anchor member **22**. Details of the bearings will be given hereinbelow.

Fixed to the outermost end of the extension member **24** is a fairlead **30** having a load roller **32** and a pair of horizontally spaced guide rollers **34**. A haul-in line **36** is positioned over the load roller **32** and passes forwardly onto a haul-in winch **38**. Mounted on the top of the fairlead and midway between the guide rollers **34** is a guide sheave **40** over which passes an opening line **42**. As is apparent in FIGS. **2** and **7** the opening line passes directly between the guide rollers. The opposite end of the opening line **42** is secured to an opening line winch **44**.

As is well understood the haul-in line, when using a two point, cable-operated grapple, for example, is used to tighten the grapple on the log and then pull the grapple and log toward the logging vehicle. The function of the opening line **42** is to support and position the grapple onto the log and maintain the grapple in an open position until lowered onto the log. The preferred type of grapple employed with the present invention is commonly known in the art as a Mar grapple although other types of grapples may be used.

The extension member **24** is extended and retracted by an hydraulic cylinder **46** secured to the forward end of the anchor member **46** and is provided with a piston rod **48** secured to the extension member **24**. As is readily apparent outward movement of the piston rod **48** will extend the extension member **24** whereas inward movement of the piston rod will retract the extension member **24**. Suitable controls are provided in the cab of the vehicle whereby the operator may manipulate the opening line **42** and the haul-in line **36** as well as the position of the extension number **24**.

In operation the vehicle is positioned as close to the log as it is possible. The extension member **24** is then extended placing the grpple over the log. The grapple, suspended from the opening line **42** in an open position, is then lowered onto the log. Next the haul-in line **36** is drawn tight until the grapple has obtained a good bite on the log. Finally the haul-in line and extension member **24** are retracted either together or with the extension member **24** preceding the haul-in line, depending upon the size of the log, continuously maintaining tension in the haul-in line **36** so that the grapple maintains its bite on the log. As is readily apparent the grapple will be lowered by the vehicle operator directly onto the log from above, which is the optimum attitude. Once the grapple has obtained a good bite on the log subsequent angulation of the haul-in line is not critical since the grapple will tend to retain its bite so long as sufficient tension is maintained in the haul-in line.

Using the above system of pulling the log to the vehicle the loading on the bearings between the extension member **24** and the anchor member **22** is increased. For example merely carrying the grapple out to the log present substantial loading since the grapple alone may weight 2,000–5,000 pounds. In order to prevent the extension member from binding in the anchor member it is necessary that the bearings between the two be operable under such loading conditions. An important aspect of this invention is the provision of first and second bearings **26** and **28** which uniquely accommodate this loading while still preserving satisfactory bearing contact between the extension member **24** and the anchor member **22**. Bearing **26** includes upper and lower rocker bearings **50** each having a curved bearing surface **50***a* engaging the extension member **24** and a flat bearing surface **50***b* engaging the anchor member **22**. The rocker bearings are free to slide along the anchor member and are retained against longitudinal movement on the extension member by pairs of spaced locking blocks **52**. Lateral loads on the bearing means **26** are minimal and are absorbed by pairs of spacers **54**, four spacers in all, which

likewise are restrained against longitudinal movement relative to the extension member **24** by locking blocks, not shown. As is readily apparent the bearing **26** moves with the extension member **24** as it is extended. The curved bearing surfaces **50a** of the rocker bearings **50** will accommodate canting of the extension member due to the weight of the load and will distribute the load uniformly over the flat bearing surfaces **50b**.

The second bearing **28** is also provided with a pair of upper and lower rocker bearings **60** each having a curved bearing surface **60***a* in engagement with extension member **24**. The rocker bearings are restrained against longitudinal movement relative to the anchor member **28** by a pair of locking blocks **62** bolted to the anchor member and by a retainer ring **64** bolted to a flange **66** that is secured to the arch **20**. Suitable spacers **68** are provided, four in all, to absorb lateral bearing loads. As is readily apparent the rocker bearings **60** are restrained against longitudinal movement relative to the anchor member **28** as the extension member **24** is extended. The curved bearing surfaces **60a** on the rocker bearings **60** absorb the loads of the canted extension member **24** while under load so that the load is distributed uniformly on the flat bearing surfaces **60***b*.

The method of this invention is directed to grapple skidding logs. Specifically the first step is to position a skidding vehicle as close as possible to the log. Next the grapple is carried out to the log and lowered thereon. Next the haul-in line is tensioned to tighten the grapple on the log. Finally the grapple and log are pulled toward the vehicle.

The apparatus and method disclosed greatly increase the versatility of skidding techniques particularly in reaching logs at locations inaccessible to the vehicle and fastening a cable-operated grapple thereto. While the preferred form of our invention has been illustrated and described it should be understood that variations in the details thereof will be apparent to one skilled in the art. Accordingly, the scope the invention is to be limited only by the proper interpretation of the claims appended hereto.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A log skidding vehicle for skidding remotely positioned logs, comprising an articulated frame capable of being moved while skidding logs, said articulated frame including a forward end section; at least a pair of powered traction wheels rotatably attached to said forward end section; a rear end section pivotally connected to said forward end section; and at least a pair of support wheels rotatably attached to said rear end section; grapple means for gripping a log by moving from a non-gripping open position to a log-gripping closed position; extension means for moving said grapple means toward a log remotely positioned from said articulated frame, said extension means including an upstanding arch rigidly connected at the bottom end to said rear end section, a boom mounted at the top end of said arch, said boom including an anchor member fixed to said arch, an extension member telescopically received in said anchor member, bearing means between said anchor member and said extension member, said bearing means including first and second sets of bearings and means for restraining said bearings against axial slidable movement relative to said extension and anchor members, each of said sets of bearings including upper and lower rocker bearings each having a curved surface engaging the member on which its movement is restrained and a flat surface engaging the other of said members, powered means for extending said extension member; first control means for controlling said grapple means when said grapple means is in the open position, said first control means including a guide sheave mounted on the extended end of said extension member, a first control winch, and an opening line connected at one end to said control winch and at the other end to said grapple means, said opening line passing over said guide sheave; and second control means for moving said grapple means from said open position to said gripping position and for applying a pulling force to said grapple means toward the extended end of said extension member, said second control means including a fairlead secured to the extended end of said extension member, a winch mounted on said rear end section, and a haul-in line connected at one end to said winch and connected at the other end to said grapple means, said haul-in line passing through said fairlead, whereby said fairlead may be extended by said extension member to a position substantially above the remotely positioned log to allow said second control means and said grapple means to apply a substantially vertical lifting force to the remotely positioned log.

2. A mobile log skidding vehicle having a mobile frame and an arch secured to a rear section of said frame; a boom mounted on the outer end of said arch, said boom including an anchor member fixed to said arch, an extension member telescopically received in said anchor member, powered means for extending said extension member; bearing means for slidably supporting said extension member within said anchor member, said bearing means including a first set of bearings located at one end of said extension member, each said bearing of said first set of bearings have a first surface engaging said anchor member, a second set of bearings located at one end of said anchor member, each said bearing of said second set of bearings having a first surface engaging said extension member, first restraining means connected to said extension member for permitting sliding motion between said first surfaces of said first set of bearings and said anchor member when said extension member is moved relative to said anchor member and second restraining means connected to said anchor member for permitting sliding motion between said first surfaces of said second set of bearings and said extension member when said extension member is moved relative to said anchor member, each of said sets of bearings including upper and lower rocker bearings each having a curved surface engaging the member on which its movement is restrained and a flat surface engaging the other of said members, a fair lead secured to the outer end of said extension member and having a generally horizontal load roller and a pair of spaced guide rollers, and a haul-in mechanism including a winch mounted on said frame and a haul-in line mounted on said winch with its free end passed over said roller and between said guide rollers, said haul-in mechanism including means secured to said haul-in line for connecting the haul-in line to a log.

3. A mobile log skidding vehicle as claimed in claim **2**, wherein said first restraining means includes a first set of locking blocks fixed to said extension member and engageable with the axial edges of each bearing of said first set of bearings and said second restraining means includes a second set of locking blocks fixed to said anchor member and engageable with the axial edges of each bearing of said second set of bearings.

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