

United States Patent [19]
Carley

[11] 3,744,574

[45] **July 10, 1973**

[54] MOBILE ROCK DRILLING UNIT

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[22] Filed: **July 14, 1971**

[21] Appl. No.: 162,578

[52] U.S. Cl..... 173/27, 173/28, 173/46,

180/79.2 B

[51] Int. Cl. E21c 11/02

[58] **Field of Search**173/22-28,

46, 29; 299/39; 37/117.5;

175/315; 180/79.2 B

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[57]

ABSTRACT

A self propelled, articulated vehicle having a rock drilling unit mounted upon one section. The rock drilling unit is directly mounted to a ground engaging stabilizer unit which is pivotally secured to the section whereby the stabilizer unit may be raised for moving the entire vehicle from place to place. The stabilizer unit will be placed in a ground contacting position during the operation of the rock drill whereby vibration and shock is transmitted to the ground instead of to the vehicle. The vehicle is entirely self contained in that it has a compressor and other equipment necessary for the rock drilling operation.

8 Claims, 3 Drawing Figures

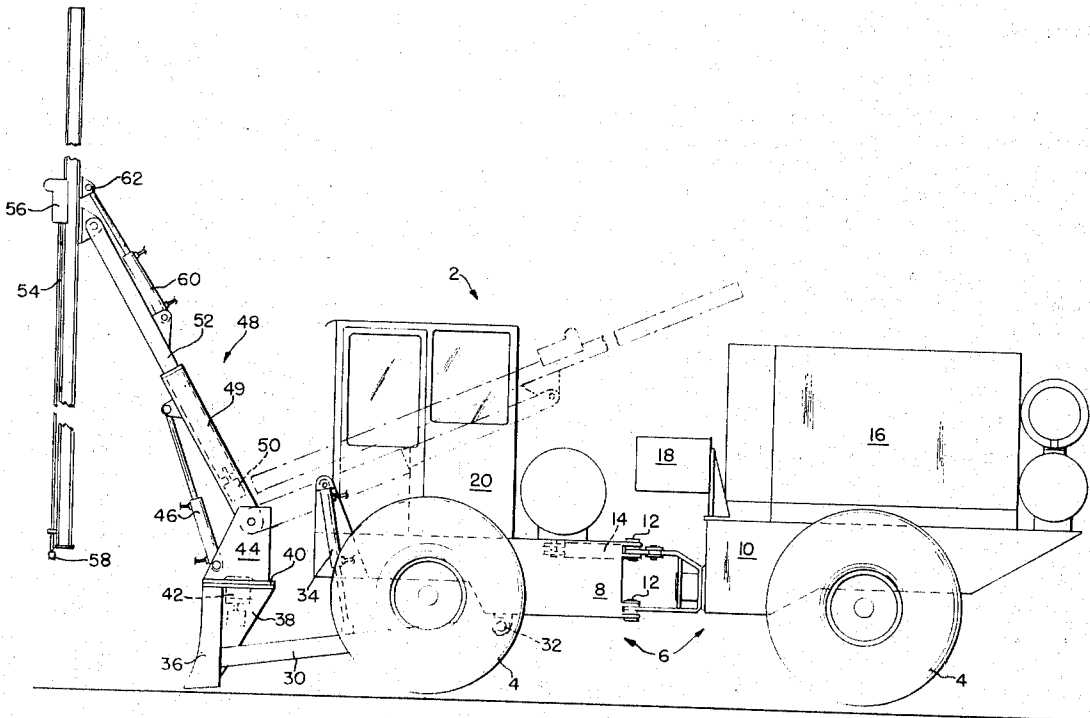
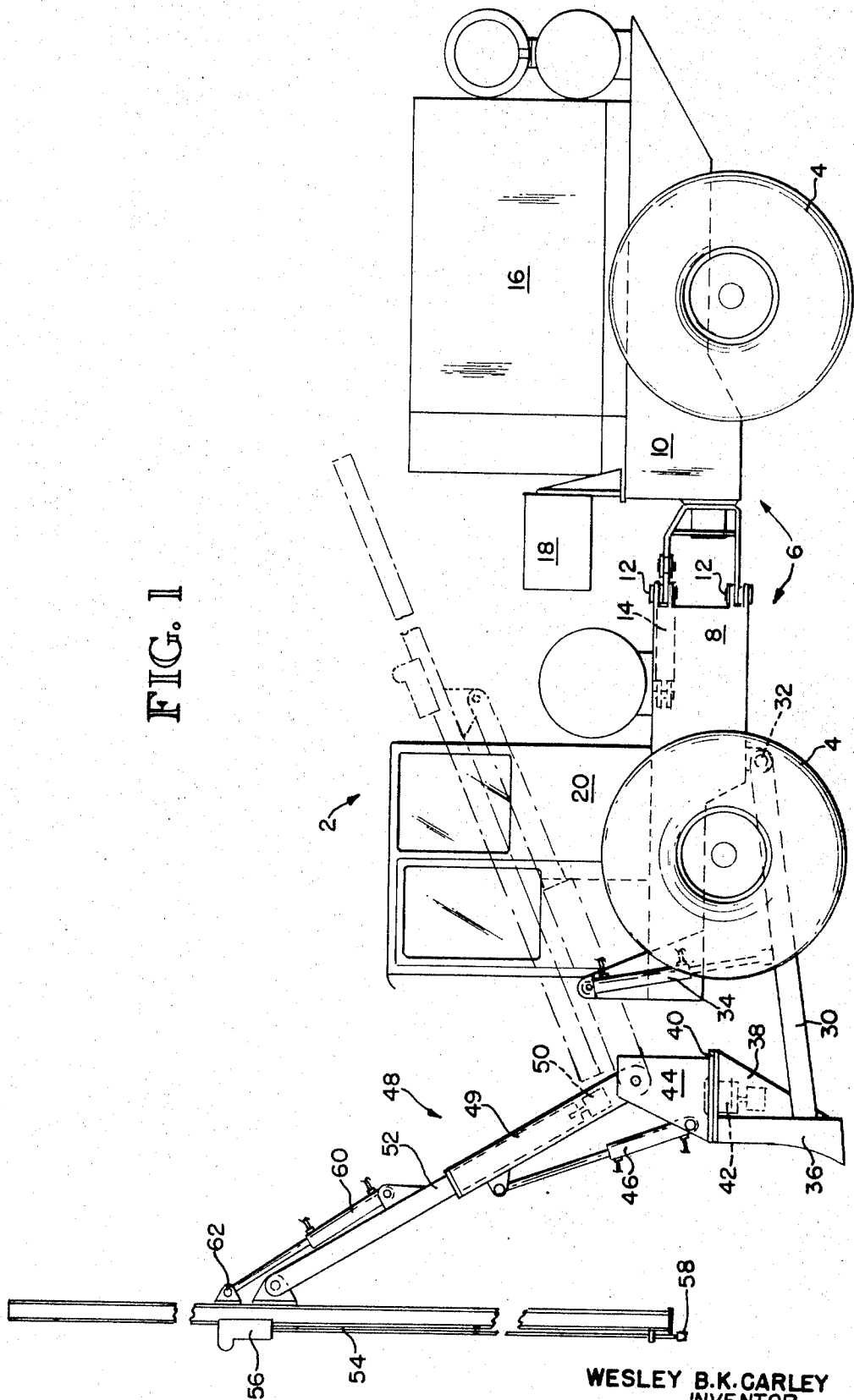


FIG. 1



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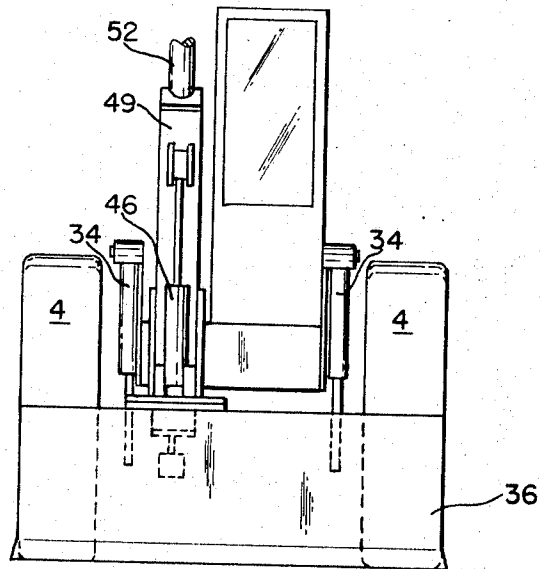


FIG. 2

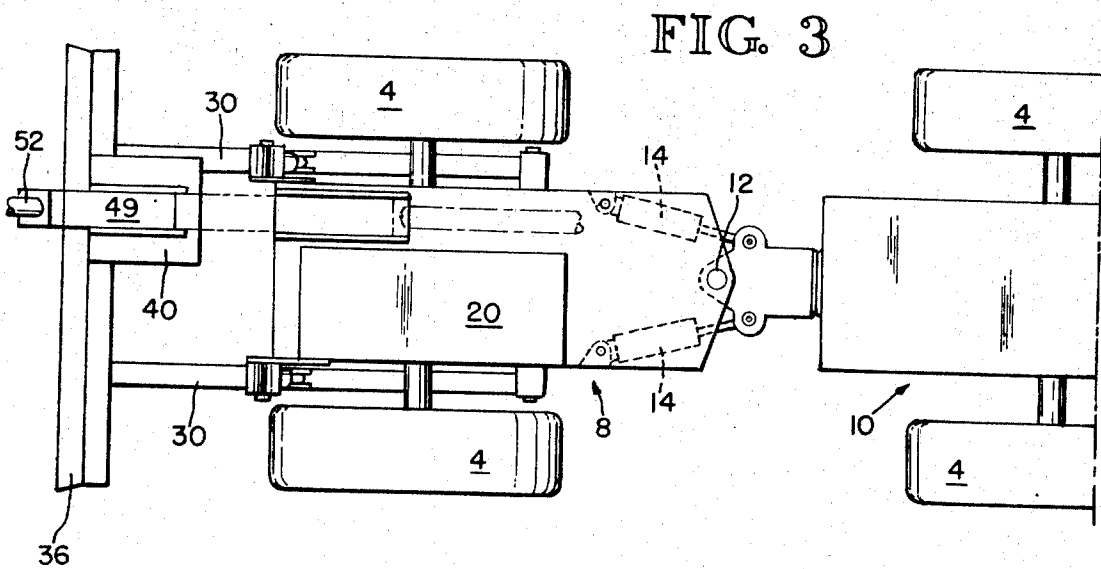


FIG. 3

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MOBILE ROCK DRILLING UNIT

BACKGROUND OF THE INVENTION

Because of the decreasing availability of old growth timber, logging operations have been extended to the higher countries. One of the disadvantages of logging in higher elevation areas is the difficulty of preparing roads to enable the equipment to be brought in to perform the logging function. Roads are likewise used for transporting the harvested trees out of the woods to the sawmill.

Traditionally, the making of roads has been left to caterpillar type tractors or the like but these vehicles have no means for handling solid rock ledges such as are encountered at the higher elevations. It has been found necessary to blast or dynamite the rock ledges out of the way in order to make the roads. The blasting of ledges is an operation which has been extremely time consuming and costly.

In the past the companies making the roads have incorporated a conventional crawler rock drill which includes a rock drill mounted on a crawler type tractor. The equipment heretofore available is capable of moving at two to three miles an hour. It will be apparent that to move the presently incorporated equipment by its own power from place to place is extremely slow. For an operation such as making logging roads, wherein a rock ledge may not be encountered for long stretches, the rock drill may be required in the meantime on another portion of the road wherein a rock ledge has been encountered. It is generally necessary to have a separate piece of equipment to haul the rock drill from location to location or alternatively rely upon a two or 3 mile per hour rate at which the crawler vehicle is designed to travel as it moves from place to place. Both methods of moving the drill from place to place are time consuming and thusly expensive.

One of the difficulties with the automatic rock drill as presently commercially available is in the fact that the drill is operated by a combination of a hammering or driving of the bit into the rock in conjunction with a slight turning of the bit. It is obvious that the 1,300 blows per minute of the standard 90 mm piston stroke at approximately 90-95 lbs per square inch of air pressure cause an extremely large amount of vibration. This vibration is the reason the operator of the heretofore known rock drill has operated the drill from a standing position adjacent the crawler type tractor and further the reason that the crawler type tractor is a basic, simple mechanism limited to slow traverse of the supporting ground. The equipment mounted upon the tractor is limited to the mechanism which is used for the drilling operation itself.

With the above noted problems in mind it is an object of the present invention to provide a mobile rock drill wherein the drill is mounted upon a vehicle which is capable of traversing the surface at a rapid rate.

It is another object of the present invention to provide a mobile rock drilling unit wherein the rock drill itself is mounted upon a ground engaging platform which isolates the vibration of the rock drilling operation to the platform instead of having it transferred to the vehicle itself.

Still a further object of the present invention is to provide a mobile rock drilling vehicle which is articulated and has all wheels driven whereby the vehicle may traverse logging roads which are in extremely poor

condition and would normally prevent the passage of a normal vehicle.

It is still a further object of the present invention to provide a mobile rock drilling vehicle wherein the entire functional control of the vehicle is from within a cab mounted upon the framework and thusly the operator can drive the vehicle when moving it from place to place and can similarly operate the rock drilling operation from the same superstructure.

Yet another object of the present invention is to provide a rapidly moveable mobile rock drilling vehicle wherein the rock drill is capable of a large variety of operational positions and yet may be automatically moved to a position whereat it rests upon the vehicle for rapid transportation from place to place.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view of the inventive articulated vehicle having a rock drill mounted thereon, the phantom lines show the mechanism in position for travel.

FIG. 2 is a front view of the inventive vehicle with the stabilizing platform in the ground contacting position.

FIG. 3 is a plan view of the inventive vehicle.

MOBILE ROCK DRILLING UNIT

As can be seen in FIG. 1 the mobile rock drilling unit includes a motor driven vehicle 2 having a plurality of wheels 4 mounted to an articulated frame 6 having a forward portion 8 and a rearward portion 10. The two sections are linked at pivot point 12 and the relative placement is controlled by hydraulic rams 14. By contracting one of the rams 14 and extending the other, the other, the two sections of the vehicle become non-collinear and thusly able to negotiate corners limited only by the relative interference between the two sections.

The rearwardmost portion of the vehicle 2 carries a compressor 16 which provides the pressure necessary for operating the air drill and other pneumatic equipment as hereinafter described. The compressor is driven by an internal combustion engine (not shown) which is preferably but not limited to diesel power as is the hydraulic pump 18. The rear section of the vehicle can likewise carry the fuel tanks in storage tanks or any other equipment necessary for the independent and self contained operation of the rock drill.

The forward portion of the frame 8 carries the operator's cab 20 which has controls not only for the driving of the vehicle when it is being moved from location to location but also the complete controls for the operation of the rock drill. Thus it can be seen that the present rock drill as carried upon the articulated vehicle becomes much more economical than has been used heretofore. The operator controls all of the functions including the rapid movement of the equipment from place to place from one position and in this position is shielded from the shock normally associated with the rock drill as hereinafter described. Not only is the unit made more economical by the single operator's station to control all of the functions of the vehicle but, further, since the vehicle is capable of traversing distance at a rapid rate it can work upon more than one road building operation without either a great deal of wasted time or the need for additional men and equipment for moving.

As can be seen in FIGS. 2 and 3, the operator's cab is slightly off center of the vehicle such that the rock drill itself may be folded back over the framework for ease in traveling when the vehicle is required to move from place to place. It is to be noted that the rock drill when in the stored position does not in any way interfere with the articulation of the vehicle making the entire unit more versatile. Mounted to the front portion of the frame such that it extends from beneath said frame is a forwardly extending pair of arms 30 pivoted at point 32 and controlled as to position by a pair of hydraulic rams 34.

It is to be noted that the vehicle is designed to be of the four-wheel drive type wherein either the pump 18 will circulate fluid under pressure to a hydraulic motor at each of the wheels or alternatively a motor might be placed beneath the cab which by means of a conventional transmission will transfer the power to each of the wheels. In either event the arms 30 are so located such that when they are moved from the upper traveling position as shown in phantom to their lowermost working position they will not interfere with the operation of the wheels or their driving mechanism. As pointed out hereinabove the vehicle is articulated so therefore the wheels at the forward end of the vehicle do not turn allowing more space for the movement of the arms 30.

Secured to the forward end of the arms 30 is an earth moving blade 36 of more or less conventional configuration and extending across the front of the arm 30 and beyond. The rearward portion of the blade 30 is braced by a pair of triangular shaped members 38 which serve to support a turntable type platform 40 which likewise supports a rock drill actuator 42. The turntable type platform 40 having the boom mounted thereon is positioned by actuator 42 such that the boom may extend from the vehicle at any desirable angle and further may be pivoted such that it extends rearwardly for travel as hereinafter described. The combination of the platform 40, the reinforcing elements 38 and the blade 36 shield the actuator 42 and protect it from damage during operation of the blade.

Extending upwardly from the platform 40 is a pair of ears 44 generally parallel to each other and serving as a trunnion for the boom as hereinafter described. Likewise mounted upon a pair of upstanding ears 44 is a hydraulic ram 46 for controlling the relative angularity of the boom 48 which as described hereinabove is trunnioned between the ears 44. It can thus be seen that between the actuator 42 and the ram 46, the location of the boom can vary greatly and will be continuously under the control of the operator. Mounted within the lower portion 49 of the boom 48 is a boom actuator 50 which controls the relative position of the outer end 52 of the boom relative to the inner end 50. By energizing the actuator 50 the outer portion 52 is caused to rotate within the lower portion 48 thus changing the position of the rock drill itself. Trunnioned to the outer end of the outboard section 52 of the boom 48 is the rock drill 54 having a drifter 56 and a bit 58. Similarly trunnioned to the outboard portion 52 of the boom 48 is a hydraulic cylinder 60 which has the end of its piston rod trunnioned as at 62 to the rock drill. Thus it can be seen that between energization of the motor 42 which pivots the entire boom by rotation of the turntable 40, actuation of the cylinder 46 which raises and lowers the boom, actuation of cylinder 60 which positions the

rock drill relative to the boom and the actuator 50 which causes the boom's interiorly mounted extension 52 to rotate relative to the base portion the location of the rock drill may be infinitely and easily placed. The rock drill and boom structure is not new and does not form a part of the present invention.

By mounting the rock drill upon the blade 36, which is capable of either a raised position during travel or a lowered position during the drilling operation, it is possible for the operator to conduct the drilling operation and have all of the vibration from the rock drill passed directly from the drill through the blade or stabilizing platform to the earth and yet be capable of rapid transport from place to place.

It can thus be seen that the versatility of the rock drill is greatly increased by mounting it on an articulated vehicle as hereinabove described. Even more important, however, is the use of the stabilizing platform upon which the drill is mounted such that the vibrations and noise from the rock drill itself is not transferred back to the vehicle where it would damage equipment and be harmful to the operator but instead is transferred directly to the ground where it will be absorbed without harm. A further advantage to the present invention is in the fact that the stabilizing platform is manufactured in the shape of a blade whereby the articulated vehicle, which because of its four-wheel drive has sufficient power, may be used for moving or removing small obstacles in its own path greatly increasing the versatility of the vehicle. When using the blade as a pusher or clearing mechanism it is to be noted that the equipment mounted to the blade including the turn table 40 will be in an entirely protected position thereby resistant to damage.

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

1. A self propelled mobile rock drilling vehicle comprising;
 - an articulated frame having powered wheels on each section,
 - means for varying the angularity between the sections to control direction during travel,
 - a power source mounted upon one section for driving both the vehicle and an air compressor mounted upon the vehicle,
 - an operator's station mounted upon one section,
 - stabilizer means mounted to one section and adapted to be placed in contact with the ground whenever the drill is in operation and be lifted clear of the ground for travel,
 - rock drilling means mounted upon the stabilizer whereby when the rock drill is in operation the vibration and shock of the drilling operation is transmitted through the stabilizer to the ground instead of to the vehicle thereby effectively isolating the operator and controls from the vibration, and
 - means connecting the compressor to the rock drill, whereby the vehicle may be rapidly moved from place to place and perform its function independently of other equipment and without excess vibration being transmitted to the operator.
2. A vehicle as in claim 1 wherein the power source drives an hydraulic pump which is connected to a hydraulic motor which in turn drives the wheels.

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3. A vehicle as in claim 1 wherein the power source drives an hydraulic pump which drives a motor directly connected to each wheel.

4. A vehicle as in claim 1 wherein the stabilizer means is mounted to the same section as the operator's station and is in the form of an earthmoving blade whereby the vehicle can also serve to move debris.

5. A vehicle as in claim 4 wherein the controls for the stabilizer means, the vehicle movement and the drill operation are at the operator's station which is located such that the operator may control all functions from one place.

6. A self propelled mobile rock drilling vehicle as in claim 1 wherein the stabilizer means is a blade and includes a platform mounted turntable to which the drill is mounted whereby the drill may be moved to a position overlying the vehicle for travel.

7. A rapidly movable self propelled rock drilling vehicle comprising;

at least two articulatable sections secured together for relative movement and including means to con-

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trol the relative position whereby the vehicle may be steered,

a blade movable from a ground contacting position to a raised traveling position secured to the end of one of the sections, said blade having a platform upon the upper portion thereof,

a rock drill mounted upon a turntable based upon the platform,

a power source mounted to the vehicle and adapted to drive the vehicle, a hydraulic pump for other operating functions and a compressor for the rock drill, and

an operator's station upon one of the sections wherein the operator can drive the vehicle, control the position of the blade and operate the rock drill from a single position.

8. A vehicle as in claim 7 wherein the rock drill is movable to a position overlying one of the sections for travel from place to place.

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