

May 7, 1963

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3,088,531

ROCK DRILL CARRIER

Filed Jan. 21, 1960

5 Sheets-Sheet 1

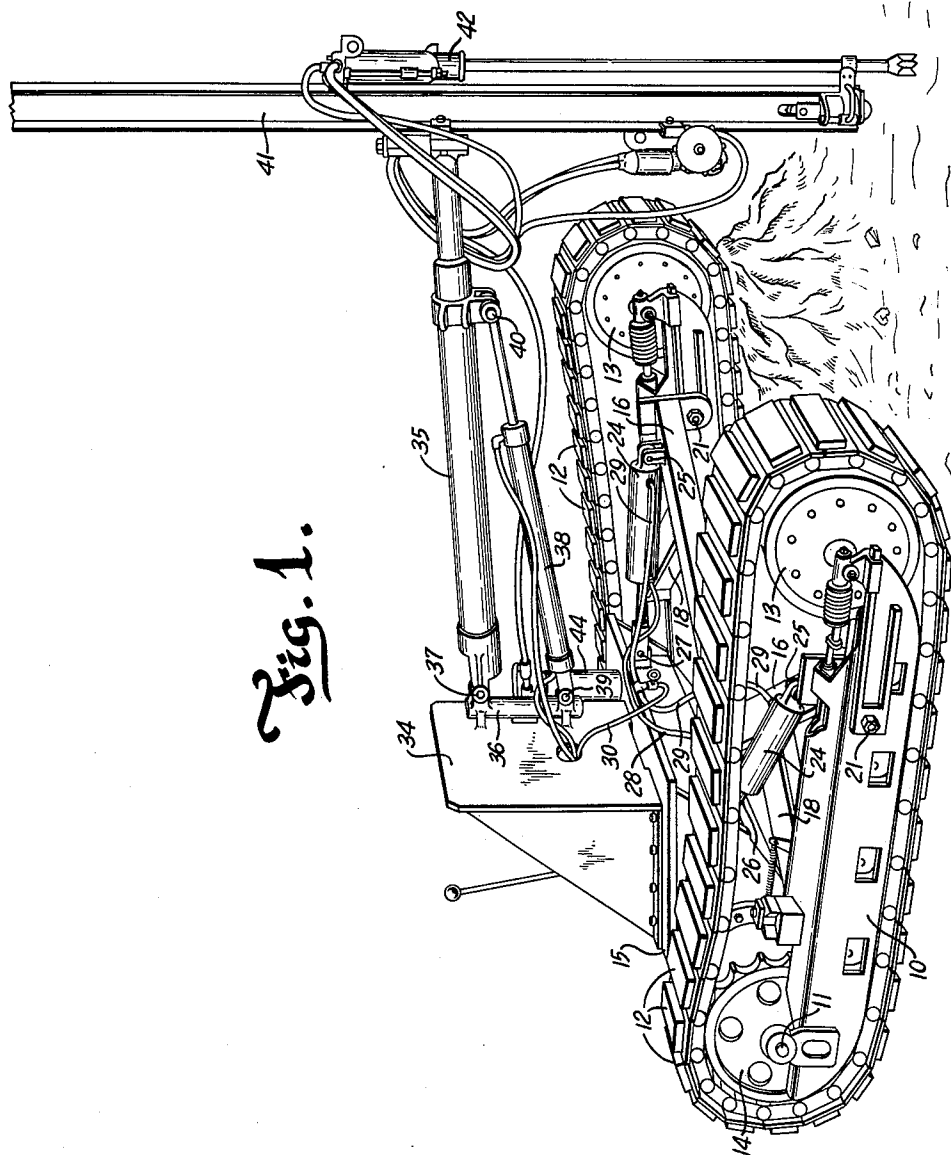


Fig. 1.

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Fig. 2.

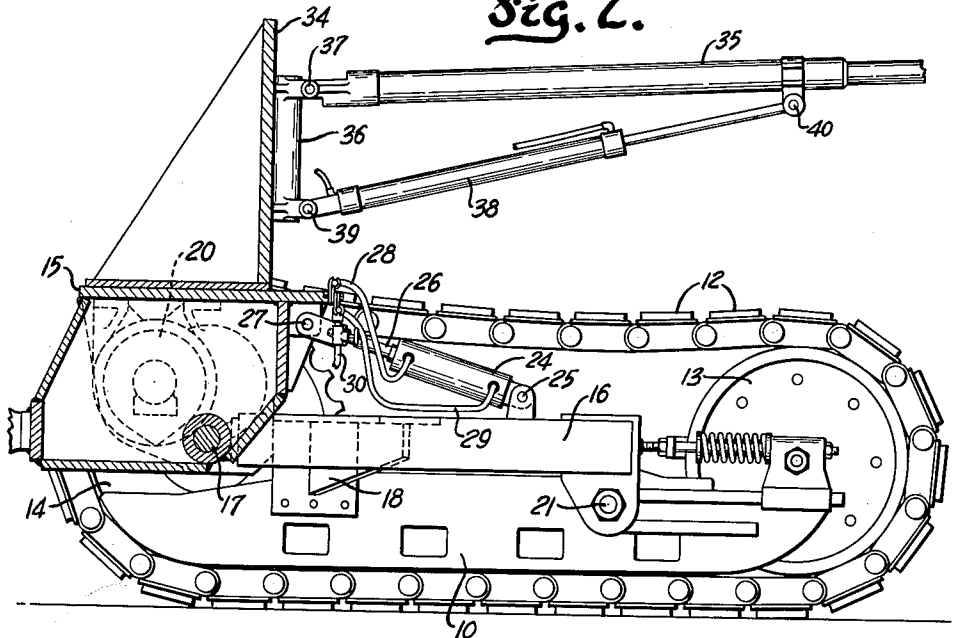
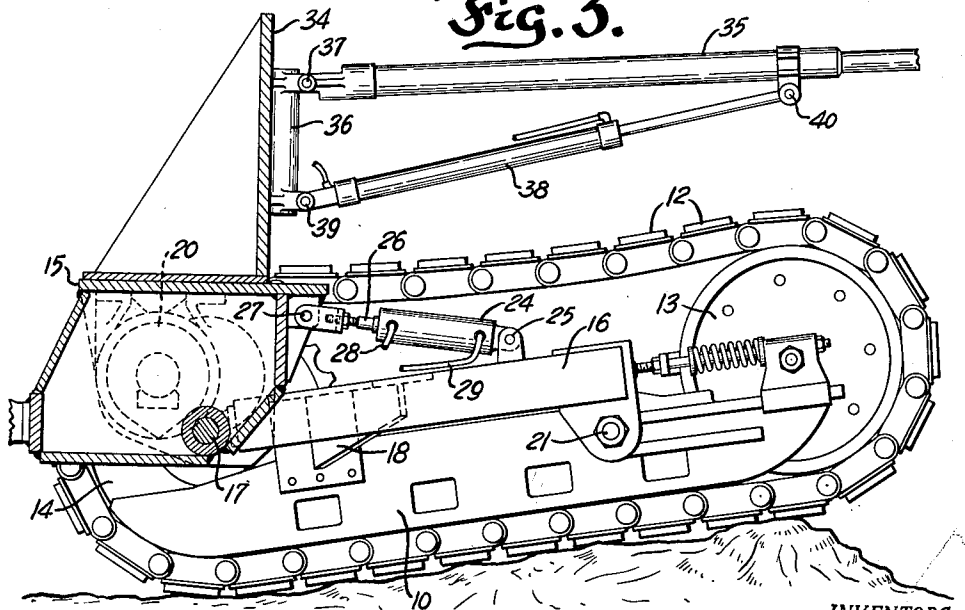


Fig. 3.



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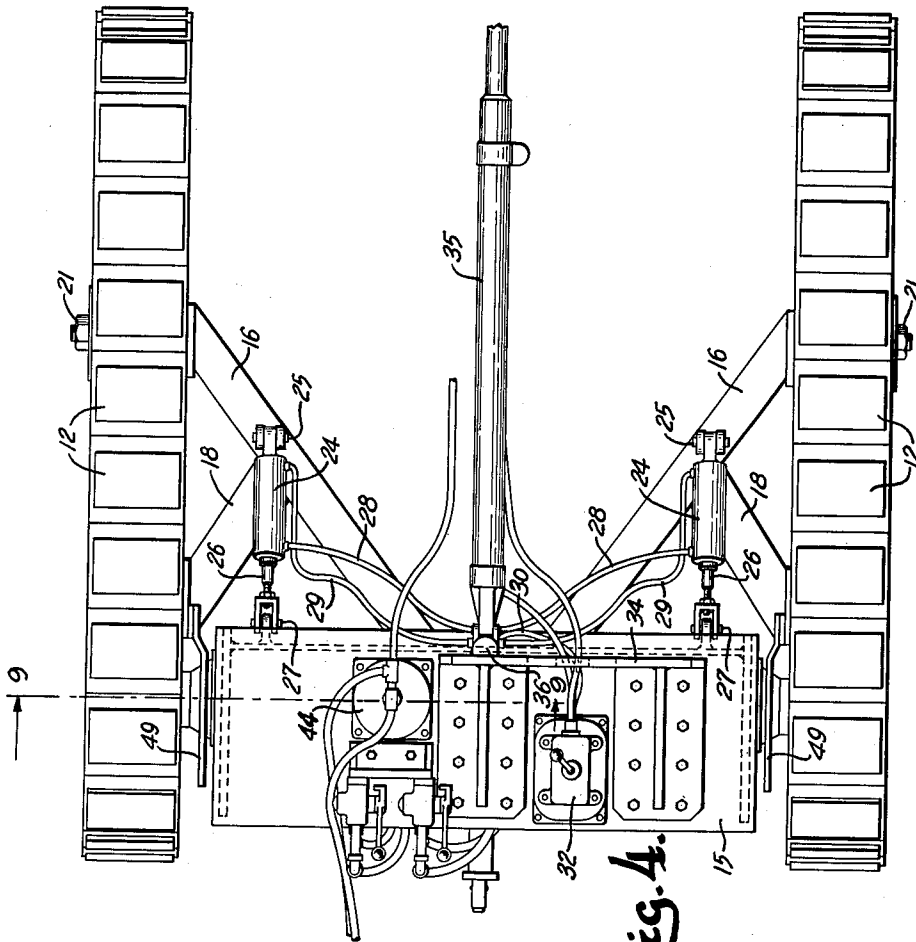


Fig. 4.

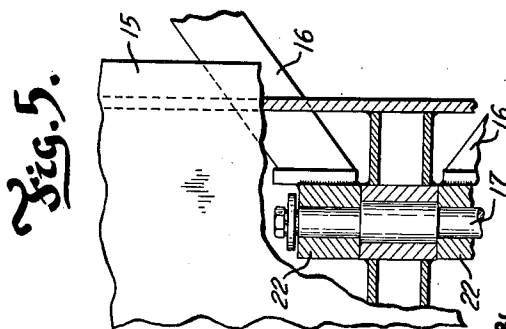
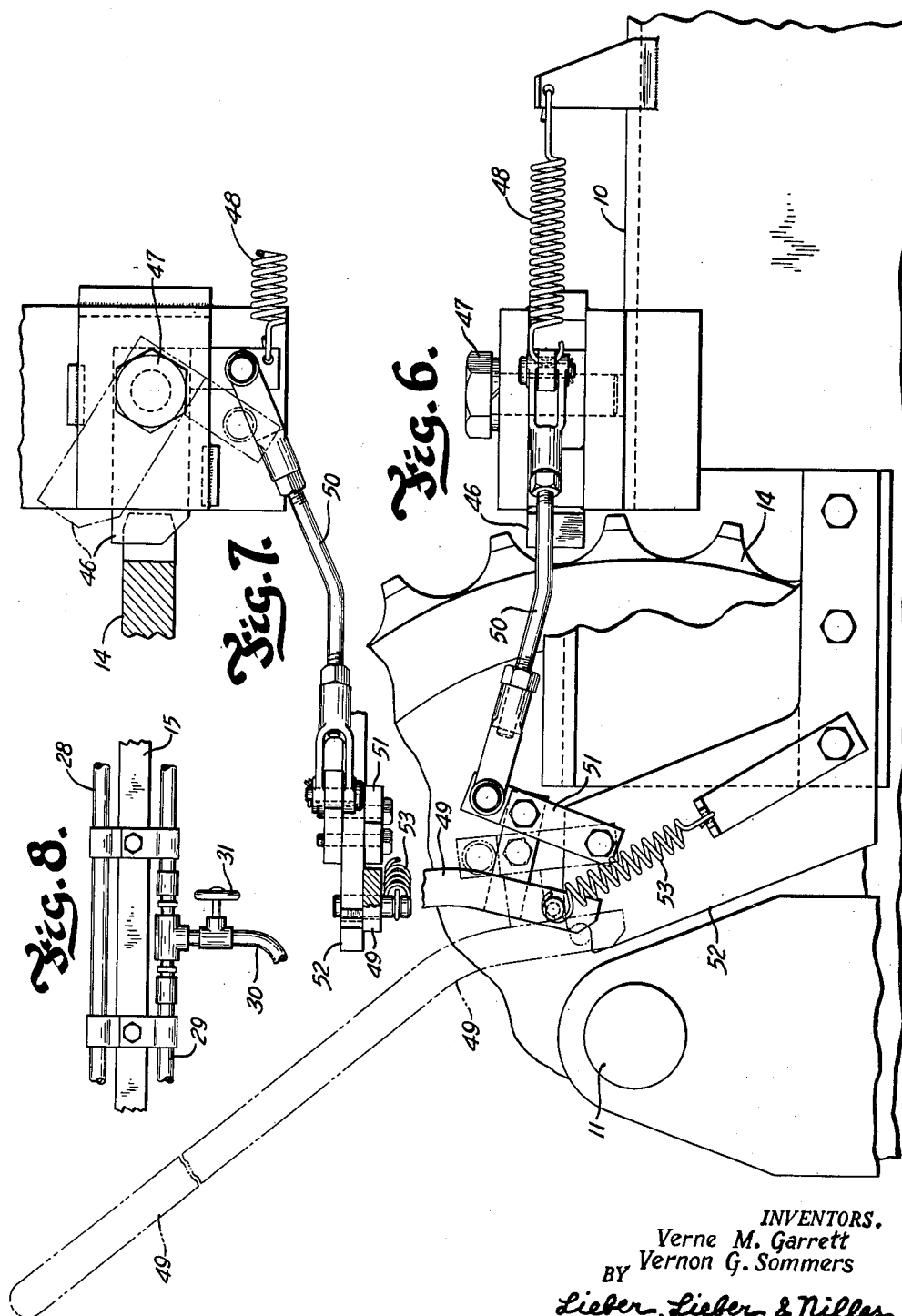


Fig. 5.

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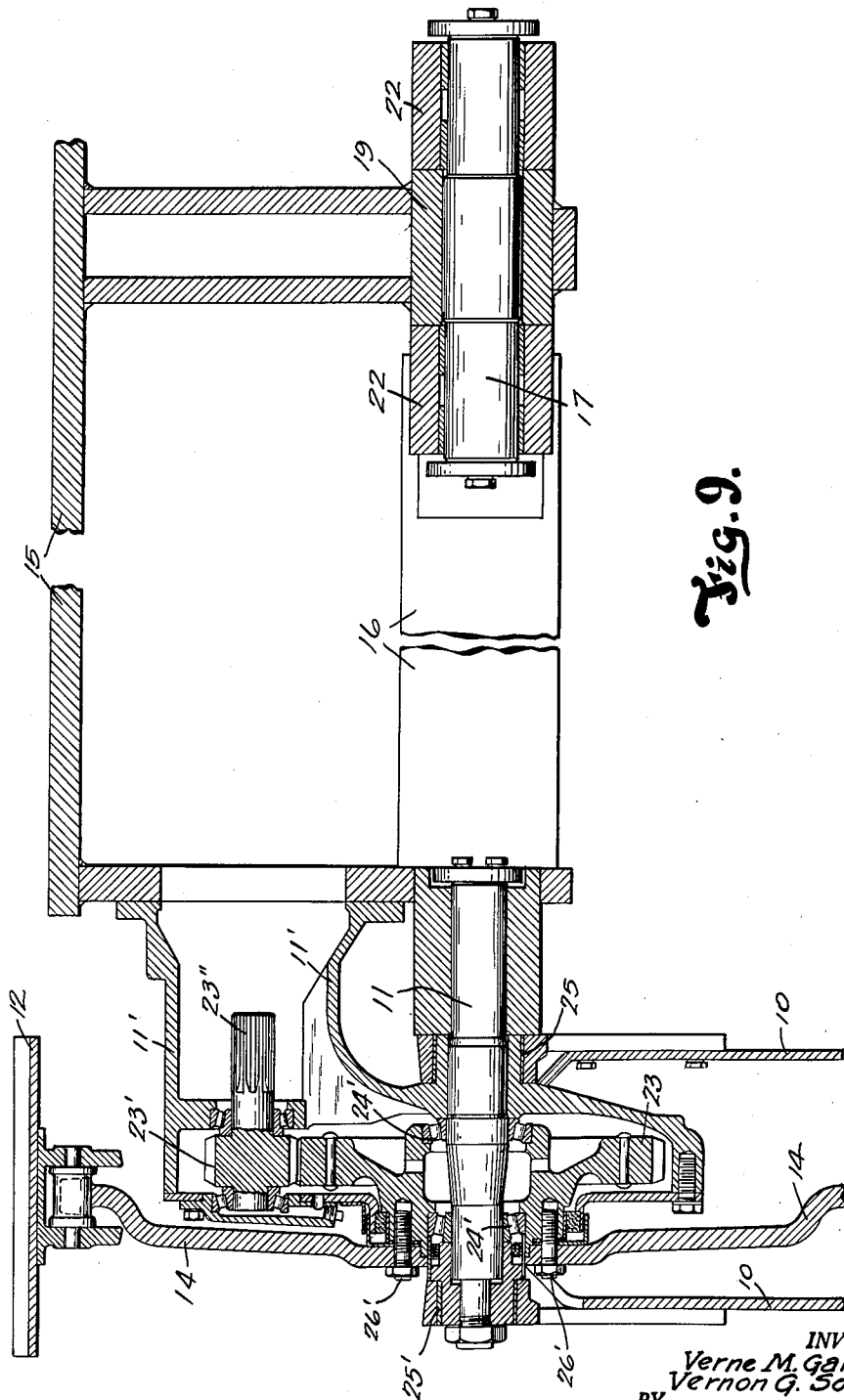


Fig. 9.

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ROCK DRILL CARRIER

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3 Claims. (Cl. 175-201)

The invention relates generally to improvements in the art of transporting and maintaining equipment such as rock drills in proper position while in normal use, and it relates more specifically to improvements in the construction and operation of rock drill cruisers of the type wherein the drilling unit is mounted upon crawler or endless track carrying mechanism.

The primary object of the present invention is to provide an improved rock drill carrier which is simple and durable in construction and highly effective in use.

Another important object of the invention is to provide an improved rock drill transporting mechanism wherein commercially available crawler type track assemblages may be utilized to transfer and hold the drill in proper position while being operated.

A further object of this invention is to provide an improved carriage for rock drills or the like, wherein a pair of laterally spaced endless track assemblages are swingable about a common pivotal axis to permit the tracks to conform with uneven ground, while the drilling mechanism is mounted upon a platform carried by and between the track assemblages and is cooperable with the same pivotal axis but is prevented from excessive tilting due to relative oscillation of the tracks.

Still another object of the present invention is to provide an improved portable transporting and supporting structure for rock drills or similar equipment, in which automatically functioning hydraulic stabilizers are utilized to prevent undesirable displacement of such equipment due to transportation thereof over rough terrain.

An additional object of the invention is to provide improved mechanism cooperable with the sprockets of an endless chain type track layer for rock drills or the like, which is operable from the drill manipulating platform to positively lock the sprockets against rotation.

Another object of this invention is to provide an improved rock drill transporting cruiser embodying a drill carrying platform mounted upon crawler tracks, which functions to automatically and effectively prevent undesirable rocking of the drilling equipment during transportation thereof and to positively maintain the drill in various positions while in use.

These and other more specific objects and advantages of the invention will be apparent from the following description.

A clear conception of the features constituting the present improvement, and of the construction and functioning of a typical rock drill cruiser embodying the invention, may be had by referring to the drawings accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views.

FIG. 1 is a perspective view of a commercial rock drill carrier equipped with a hydraulic boom and a compressed air actuated drill and illustrating the latter in one drilling position;

FIG. 2 is a section at the centerline of the carrier looking toward one of the endless track mechanisms while coacting with level ground, portions of the rock drill assemblage having been omitted;

FIG. 3 is a similar section through the carrier also looking toward one of the endless track mechanisms but

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showing this mechanism coacting with uneven ground and tilted upwardly;

FIG. 4 is a top view of the endless track cruiser with a portion of the rock drill assemblage broken away;

FIG. 5 is a fragmentary section showing the manner in which the rock drill supporting platform is pivotally suspended from the endless track frames through inclined beams;

FIG. 6 is an enlarged side view of a fragment of one of the endless track frames and its track engaging sprocket, showing the mechanism for locking the sprocket against rotation;

FIG. 7 is a top view of the sprocket locking mechanism shown in FIG. 6;

FIG. 8 is a similarly enlarged fragment of the conduits which connect the hydraulic equalizer units, showing the valve for supplying liquid to these units; and

FIG. 9 is an enlarged transverse vertical section taken through the rock drill carrier along the line 9-9 of FIG. 4.

While the invention has been shown and described herein as having been embodied in a self propelled rock drill cruiser wherein the rock drill positioning boom is hydraulically operable and the drill is adapted to be actuated by compressed air, it is not intended to confine the improved features to such an assemblage; and it is also contemplated that descriptive terms employed herein be given the broadest possible interpretation consistent with the disclosure.

Referring to FIGS. 1 to 5 inclusive and FIG. 9 of the drawings, the improved rock drill cruiser comprises in general, a pair of laterally spaced elongated track frames 10 independently swingable about coaxial shafts 11 firmly secured to gear reduction housing walls 11' and each having thereon an endless track 12 coacting with sprockets 13, 14; a platform 15 to which the housing walls 11' are attached and which is disposed between the frames 10 above the shafts 11 and has a rock drill assemblage mounted thereon; a pair of oppositely inclined beams 16 having their adjacent ends swingably attached to the platform 15 by a pivot pin 17 the enlarged mid-portion of which is attached to a hub 19 secured to the platform 15 as in FIGS. 5 and 9, while the opposite swinging ends of these beams 16 are firmly secured to the frames 10 remote from the shafts 11 and their medial portions are likewise connected to the frames 10 by braces 18 as in FIG. 4; and a hydraulic equalizer unit connecting the platform 15 with the medial portion of each beam 16.

The endless track mechanisms including the frames 10, tracks 12 and sprockets 13, 14 are of commercially available and well known construction; and the sprockets 14 about which the frames 10 are swingable, may be positively driven through suitable transmissions each comprising a large gear 23 secured as by bolts 26' to the sprockets 14 driving the tracks 12, the gears 23 being journaled on the adjacent shaft 11 and having pinions 23' meshing therewith and driven through a splined shaft 23'' by independent motors 20 suspended from the platform 15 as shown in FIGS. 2, 3, and 9, and these power transmitting gears coast with antifriction bearings 24' mounted on the shaft 11 between the adjacent housing 11' and the sprockets 14, the track frames 10 being swingable relative to the adjacent housings 11' and shafts 11 on sleeve bearings 25'. The inclined beams 16 which have their ends remote from the pivot pin 17 firmly secured to the frames 10 by means of bolts 21 (FIG. 4) while their medial portions are also connected to these frames by heavy braces 18, are of sturdy construction and have their adjacent ends provided with rigid hubs 22 in which the pin 17 pivots, and the hub 19 of the deck or platform is clamped upon the mid-portion of the pin 17 as shown in FIGS. 5 and 9.

The hydraulic equalizer units which connect the opposite sides of the platform 15 with the medial swinging portions of the adjacent beams 16, constitute an important feature of the present invention, and serve to prevent excessive tilting of the platform due to relative swinging of the carrier frames 10 and tracks 12 upon the sleeve bearings 25 about the axes of their pivot shafts 11 while advancing over rough terrain. Each of these equalizer units comprises a cylinder 24 pivotally attached to the adjacent beam 16 by a pin 25, and a piston and rod 26 reciprocable within the cylinder 24 and having the outer end of its rod pivotally attached to the adjacent side of the platform 15 by another pin 27, as illustrated in FIGS. 2, 3 and 4. The piston 26 divides the interior of the cylinder 24 into segregated lower and upper displacement chambers, and these chambers of the two units are normally filled with liquid while the corresponding upper and lower chambers of these units are interconnected by flexible liquid filled conduits 28, 29 respectively of which the conduit 29 is provided with a leakage liquid replenishing duct 30 having a valve 31 therein and which communicates with a liquid supply pump 32, see FIGS. 2, 3, 4 and 8.

The platform 15 is of rigid construction and besides providing a support for the motors 20, this platform also carries a sturdy bracket 34 to which a hydraulically elongatable rock drill supporting boom 35 is universally swingably attached by means of an upright pivot 36 and a transverse pivot pin 37. This boom 35 is swingable about the pin 37 by a hydraulic power cylinder 38 the cylinder of which is swingably attached to the upright pivot 36 by a second transverse pivot pin 39 and the piston rod of which is pivotally attached to the swinging end of the boom cylinder by still another transverse pivot pin 40, and the plunger of the boom 35 carries a drill feed tower 41 with which a compressed air actuated drill 42 is adjustably associated, as depicted in FIG. 1. The platform 15 also supports a line oiler 44, and all of this rock drill assemblage is of well known structure and operation.

While the mechanism just described enables the rock drill 42 to be placed in various positions and at any desired angle relative to the work, it is also desirable when the drill is in actual use, to be able to positively lock the endless track assemblages against displacement of the carrier. Such locking can be effectively accomplished with the aid of a locking device such as shown in detail in FIGS. 6 and 7 applied to either or both endless tracks. This positive lock comprises a sturdy lug 46 swingably suspended from the adjacent frame 10 by a pivot 47 and which is constantly urged to swing laterally into the path of the teeth of the adjacent rotary sprocket 14 by a tension spring 48; and a lever 49 disposed within easy reach of an occupant stationed at the platform 15 and which is connected with the lug 46 by a link 50 and a mounting arm 51. The lug 46 is so formed that when the lever 49 is swung from the position shown in dot-and-dash lines in FIG. 6 into the solid line position, the lug will be automatically swung toward the path of the sprocket teeth by the tension spring 48, and if a space between successive teeth is disposed in the plane of swinging of the lug 46 it will immediately enter such space and prevent further rotation of the sprocket 14, whereas if no such space is thus available the sprocket may rotate slightly until the next space between its teeth has been advanced to permit the lug to enter and then the lug will also swing into locking position, as illustrated in solid lines in both FIGS. 6 and 7. The arm 51 is swingably mounted upon a pivot arm 52 carried by the adjacent frame 10, and the lever 49 is normally held in inactive position as shown in dot-and-dash lines in FIG. 6 by another tension spring 53 which cooperates with the lever to provide a retaining toggle.

When the various parts of the improved rock drill cruiser have been constructed and assembled as above de-

scribed and a drilling unit has been mounted upon the platform 15, the endless tracks 12 may be independently driven by motors 20 drivingly connected to the sprockets 14 thereof to transport the cruiser from place to place. The two endless or crawler tracks thus swing in vertical planes relative to the platform independently of each other so as to enable these tracks to ride over uneven terrain. Such relative swinging or other displacement of the tracks will cause the cruiser to tilt laterally, but in order to prevent excessive tilting of the drill supporting platform 15, the hydraulic equalizer devices will function automatically.

The platform 15 is pivotally supported by the shafts 11 and the shaft 17 which is carried by the track frames 10 through the inclined beams 16 and bolts 21, and when the carrier is traveling over level ground the shaft 17 will be disposed coaxially of the sprocket shafts 11 and the platform 15 will remain level. However, if the tracks 12 and their carrying frames 10 are relatively vertically displaced, then the liquid will flow through the flexible conduits 29 from the bottom displacement chamber of the higher cylinder 24 into the corresponding displacement chamber of the lower cylinder 24 due to the increase in pressure produced by the rise of the track assemblage with which the higher cylinder is associated. This action equalizes the pressure in the lower displacement chambers of the two cylinders 24 during angular displacement of the tracks, and the platform 15 automatically remains substantially horizontal, as above described, the load distribution on the two laterally separated track assemblages also being substantially equalized.

Whenever liquid flows in either direction through the conduits 29 from the lower displacement chamber of one cylinder 24 into the corresponding displacement chamber of the other, liquid naturally also flows in reverse directions between the upper displacement chambers of the two cylinders through the conduits 28, because all of the displacement chambers and conduits 28, 29 are normally sealed from the ambient atmosphere and are filled with liquid. While the upper liquid filled displacement chambers do not function to prevent excessive tilting of the platform 15, they do serve to permit utilization of the entire weight of the track assemblages to resist upward pressure on the drills during normal operation thereof, through the beams 16. If the upper displacement chambers of the hydraulic equalizers were not filled with liquid upward pressure in the drill would tend to tilt the platform 15 about the shaft 17 and the track assemblages would not resist such tilting action, so that the use of double acting hydraulic devices perform a dual function.

The drill may with the aid of the boom 35 and power cylinder 38 be disposed in any desired direction relative to the platform 15, for transportation and normal use, either fore and aft or sidewise of the cruiser, but during normal use it is necessary to lock the endless tracks against movement. In accordance with the present invention this positive locking may be rapidly and conveniently effected by the operator stationed at the platform 15 where he can also control the transportation of the cruiser and the positioning and operation of the drill, by merely manipulating one or both of the levers 49 to cause the corresponding locking lugs 46 to swing into the spaces between successive teeth of the adjacent sprockets 14 under the influence of the springs 48. Such positive locking of the cruiser carriage should preferably be accomplished before the drilling operation is begun, and the lock should also be released before the unit is moved to a new locality.

From the foregoing description it should be apparent that the present invention in fact provides an improved rock drill cruiser which is simple and durable in construction and highly effective in use. The improved unit is

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obviously extremely flexible in its adaptations and safely manipulable when cooperating with drills of various weights and types. The automatically functioning hydraulic equalizers, besides preventing excessive tilting of the drill supporting platform 15, also function to utilize the full weight of the endless track mechanisms in order to counteract excessive pressures on the drill, and the improved locking device enables the lugs 46 to positively engage the adjacent sprockets 14 upon only slight rotary movement thereof in case a sprocket tooth should be disposed in the path of the adjacent lug. The improved rock drill cruisers can be provided with standard crawler or track laying mechanisms, and the invention has gone into highly successful use.

It should be understood that it is not desired to limit this invention to the exact details of construction and operation of the cruiser herein specifically illustrated and described, for various modifications within the scope of the appended claims may occur to persons skilled in the art.

We claim:

1. A rock drill cruiser comprising, a pair of laterally spaced elongated frames each having an endless ground engaging track thereon, a platform disposed between said frames and having a rock drill assemblage mounted thereon and transportable by said tracks, coaxial shafts pivotally suspending said frames from the opposite sides of said platform for independent swinging of the frames relative to the platform about a common axis, means carried by said shafts for driving said tracks, a pivot pin

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disposed in axial alignment with said shafts and being fixedly suspended from a medial portion and within the marginal confines of the platform between the shafts, rigid beams swingably connecting said pivot pin with said frames remote from said shafts, a hydraulic equalizer unit connecting said platform directly with medial portions of each of said beams, each of said units having a piston reciprocable within a liquid filled cylinder and coacting with the liquid to provide a piston displacement chamber, and a pressure equalizing conduit connecting said displacement chambers of said units.

2. A rock drill cruiser according to claim 1, wherein each of the beams is additionally connected to the frames adjacent the shafts by rigid braces extending between the beam connections to the pivot pin and to the equalizer unit.

3. A rock drill cruiser according to claim 1, wherein the ground engaging tracks are driven by sprockets and a brake is provided which has a lug coacting directly with the sprocket teeth regardless of the relative angular positions of the frames and the platform.

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