

June 10, 1958

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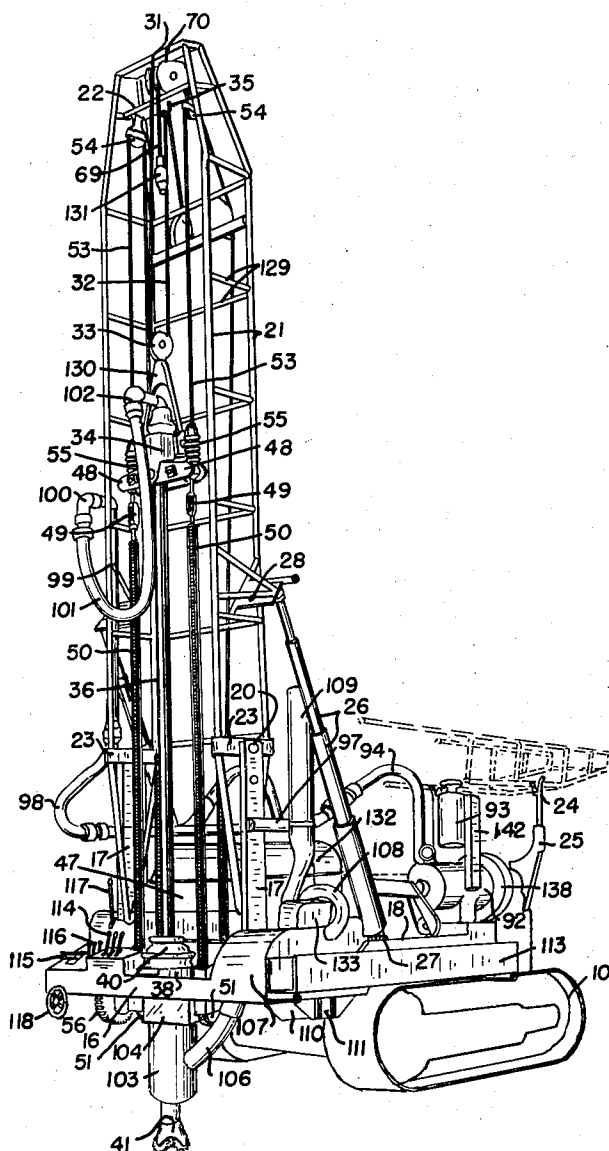
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TRACTOR MOUNTED ROCK DRILLS

Filed Feb. 9, 1955

6 Sheets-Sheet 1

Fig. 1



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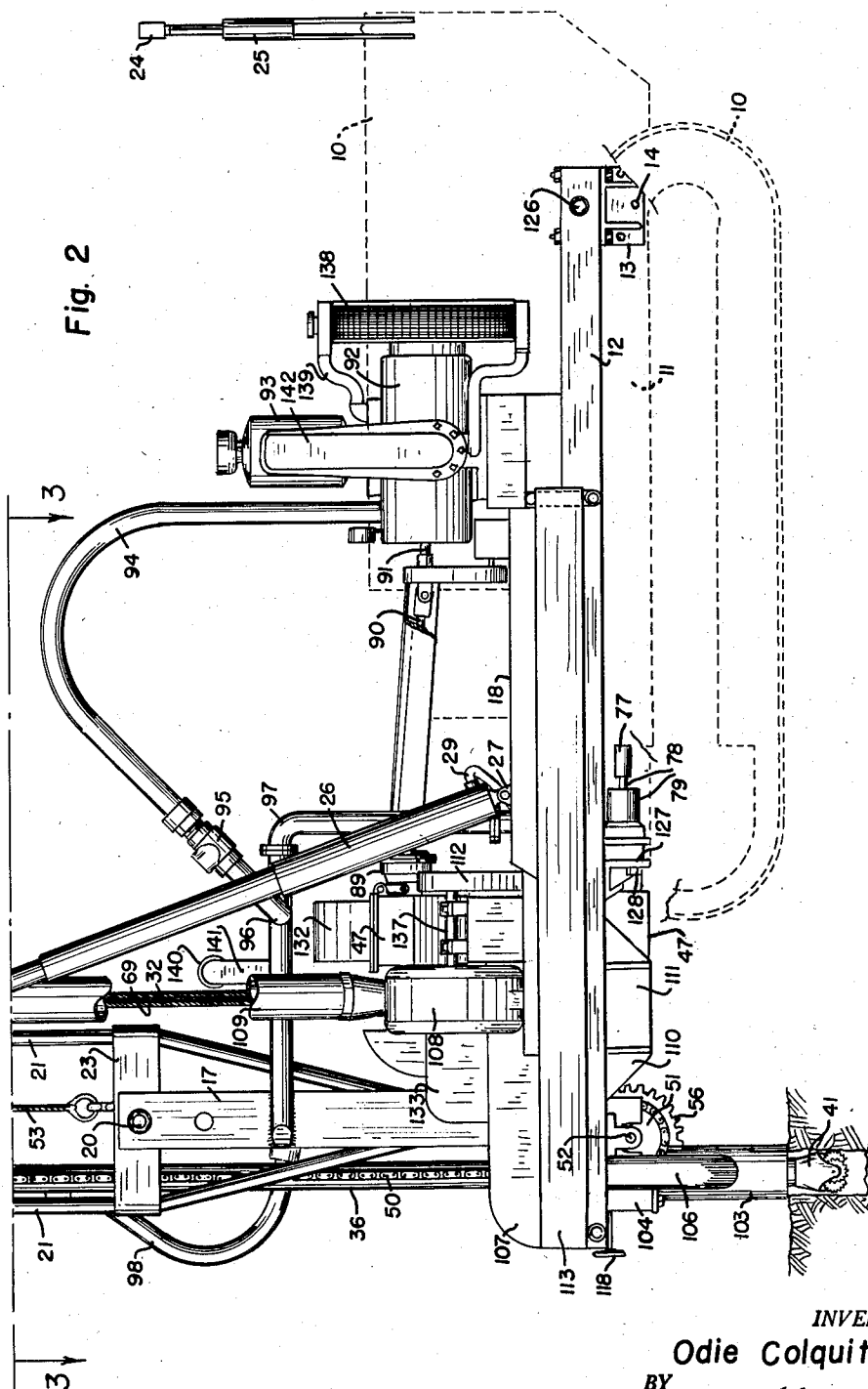
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## TRACTOR MOUNTED ROCK DRILLS

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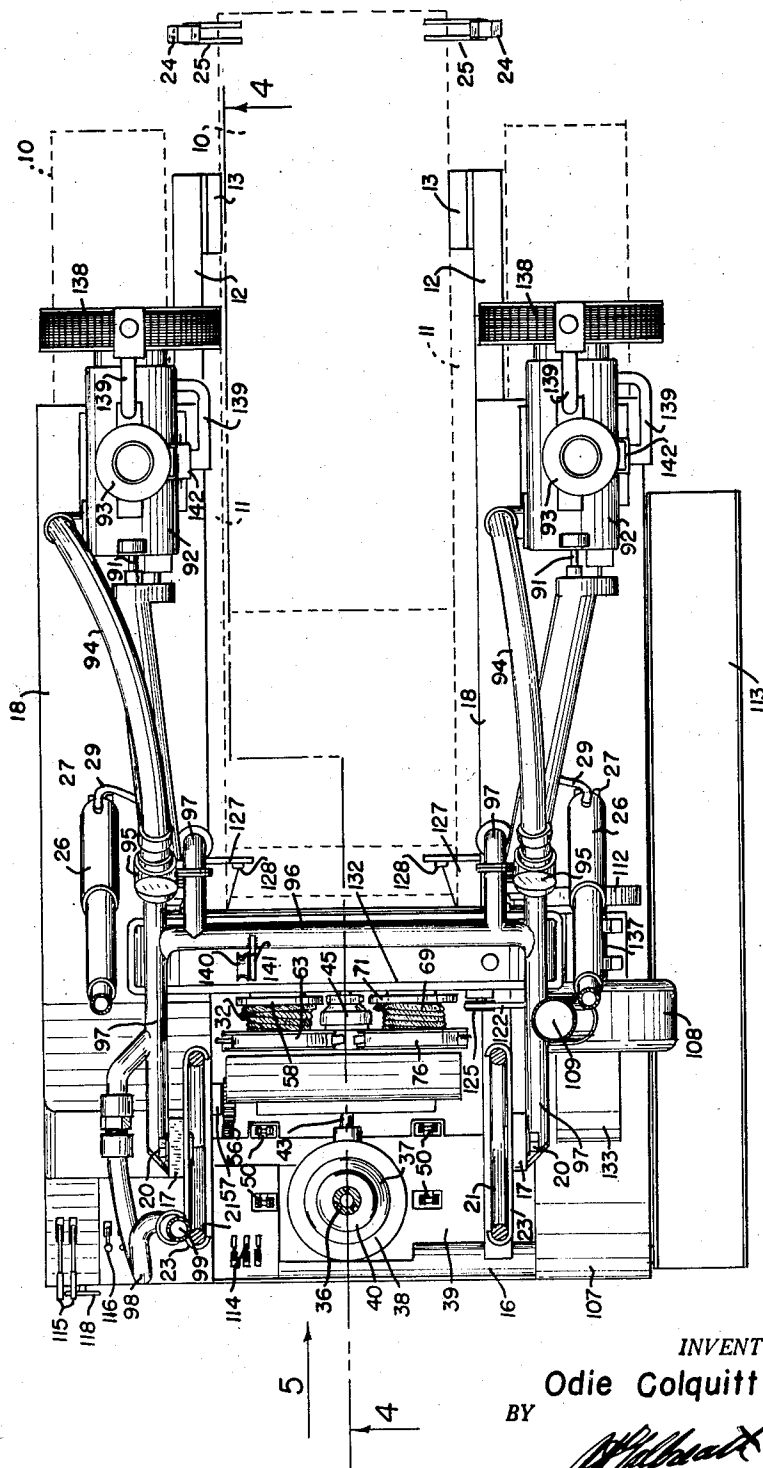
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TRACTOR MOUNTED ROCK DRILLS

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Fig. 3



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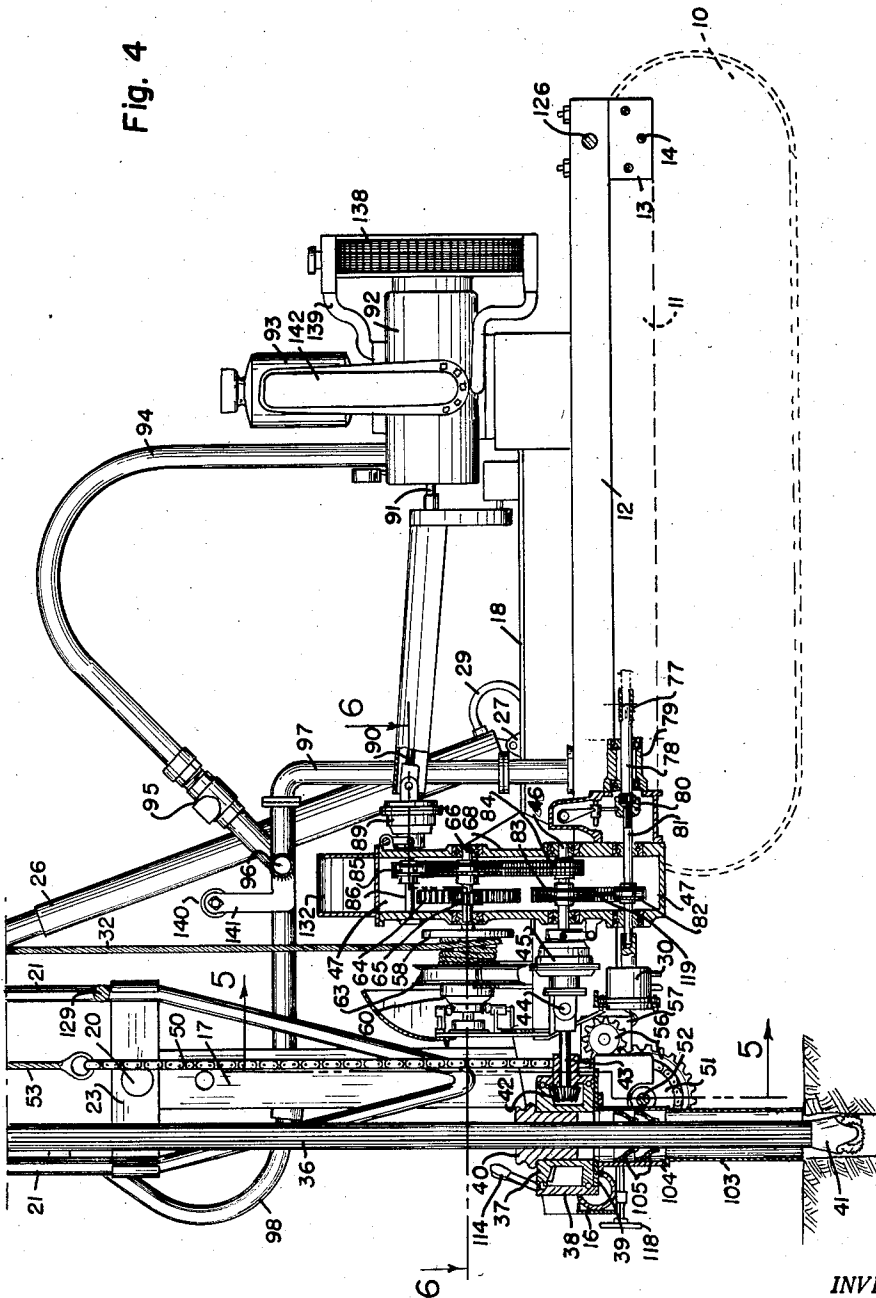
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TRACTOR MOUNTED ROCK DRILLS

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Fig. 4



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TRACTOR MOUNTED ROCK DRILLS

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Fig. 5

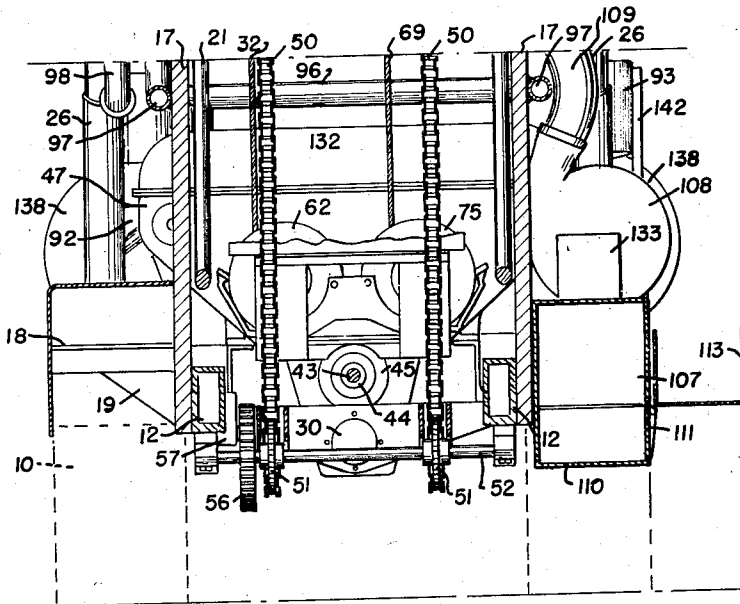
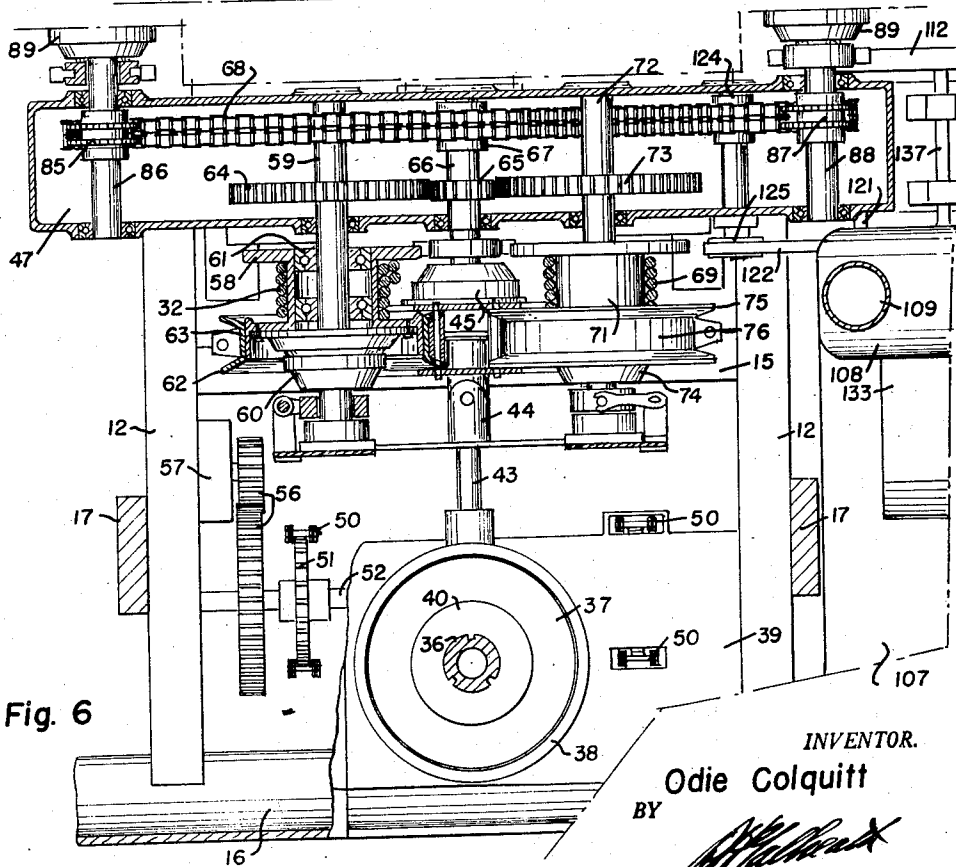


Fig. 6



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## TRACTOR MOUNTED ROCK DRILLS

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Application February 9, 1955, Serial No. 487,086

6 Claims. (Cl. 255-19)

This invention relates to a portable, rotary rock drilling rig, more particularly designed for vertical drilling in rock formations for prospecting and development purposes. The principal object of the invention is to provide a highly efficient, portable rock drilling and well sinking rig which can be quickly and easily mounted on a crawler-type vehicle, such as a "Caterpillar" tractor, as a complete, self-contained unit, and which will not interfere in any way with the normal use of the vehicle so that the rig may, if desired, be allowed to remain in place upon the vehicle while the latter is in use for "dozing," leveling, loading, etc., and to provide a rig of this character which can be quickly and easily hydraulically erected by the tractor operator for immediate use for sinking a test hole or well wherever and whenever desired.

Another object of the invention is to provide a drilling rig which can be quickly and easily removed from the vehicle when desired as a complete, unitary structure without disturbing the functional assembly of either the drilling rig or the vehicle so that the vehicle can be used for other purposes, and so that the rig will be ready for immediate use when replaced on the vehicle or a similar vehicle.

A further object of the invention is to provide highly efficient means for placing a predetermined pressure upon a rock drill to obtain an optimum drilling efficiency at all times with a minimum of wear and tear upon the drilling mechanism; to provide highly efficient pneumatic means for continuously removing the rock dust and chips from the drill hole to provide a constantly clean bottom for the drill; and to provide means for collecting and retaining the rock dust and chips to prevent contamination of the surroundings and to provide a complete log of the hole being drilled.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention, reference is had to the accompanying drawings which form a part hereof. Like numerals refer to like parts in all views of the drawings and throughout the description.

In the drawings:

Fig. 1 is a perspective view of the improved portable rock drilling rig, illustrating it in place on a conventional Caterpillar tractor. The lowered or folded position of the rig is indicated in broken line.

Fig. 2 is an enlarged side view of the lower portion of the improved drilling rig structure, illustrating the position of the supporting tractor in broken line.

Fig. 3 is a horizontal section through the improved rig, taken on the line 3-3, Fig. 2.

Fig. 4 is a longitudinal, medial section, taken on the line 4-4, Fig. 3.

Fig. 5 is a vertical cross-section looking forwardly, taken on the line 5-5, Fig. 4.

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Fig. 6 is a still further enlarged, horizontal section, taken on the line 6-6, Fig. 4.

Fig. 7 is a diagrammatic view, illustrating paths of power flow in the improved drilling rig.

In the drawings, a conventional tractor of the "Caterpillar" type is indicated on the drawing at 10, with its chassis frame at 11. The improved portable deep rock drilling rig is designed to be positioned on the tractor 10 and is mounted on and secured to the chassis frame 11 thereof as a complete, integral drilling unit.

The rig is supported from two hollow, box-like side frame members 12 adapted to be bolted to the sides of the chassis frame 11 adjacent its forward extremity by means of suitable attachment bolts 126. The members 12 are supported upon forward bracket members 13 and rear bracket members 127. The forward bracket members 13 are secured to the sides of the chassis frame 11 by means of suitable bolts 14 and the rear bracket members 127 are secured to the rear of the chassis frame 11 by means of suitable attachment bolts 128. The side frame members 12 extend rearwardly of the tractor 10 and are connected together, rearwardly thereof, to form a complete, U-shaped, rigid rig frame, by means of a tubular rear sill 16 and a cross frame member 15 positioned forwardly of the rear sill 16. Elevated, outwardly-extending platform plates 18 are supported from the side frame members 12, over the treads of the tractor, upon suitable supporting brackets 19, and extend outwardly therefrom along the medial length of the side frame members.

A vertical mast-supporting post 17 is secured to the outer face of each side frame member 12, adjacent the rearward extremity thereof, in any desired manner, such as by welding. The posts 17 arise in transversally spaced relation and carry, adjacent their upper extremities, pivot bolts 20 for supporting an erectable drilling mast.

The mast comprises an elongated, trussed, box-like structure formed of four longitudinally extending tubular longirons 21 held in rigid, parallel relation by means of U-shaped cross frame members 129. The U-shape of the cross frame members provide an open back throughout the length of the mast for the reception of drilling equipment. The mast supports a crown block 22 at its upper extremity, and is provided, adjacent its lower extremity, with rigid side plates 23, through each of which one of the pivot bolts 20 passes so as to hingedly support the mast on the posts 17. The mast can be swung forwardly over the tractor 10 where it will be supported in a substantially horizontal position by means of supporting yoke members 24 mounted in yoke brackets 25 adapted to be secured to the sides of the hood portion of the tractor 10.

The mast can be elevated from its horizontal position (broken line position Fig. 1) to the erected or vertical position (solid line position Fig. 1) by means of two hydraulics, each comprising a series of telescoping hydraulic cylinders 26. The lowermost cylinder 26 of each hydraulic is mounted in a hinge clip 27 secured on one of the platform plates 18. The uppermost cylinder or plunger of each hydraulic is hingedly connected to a side bracket 28, there being one bracket 28 secured on each side of the mast. It can be seen that if the hydraulic cylinders 26 are hydraulically extended, they will lift the mast from the folded to the erected position.

Hydraulic fluid under pressure is supplied to the telescoping hydraulic cylinders 26 from a hydraulic reservoir 132 through the medium of a pressure conduit 29, see Figs. 4 and 7, from a hydraulic pump 30 (Fig. 4) controlled by a suitable two-way valve, as indicated at 146 in Fig. 7 within reach of the operator.

A drilling line 32 extends downwardly from a fixed terminal 35 on the crown block 22 and about a traveling block 33. The traveling block is attached to a bail 130 which supports a drill stem swivel 34. From the travel-

ing block 33, the drilling line 32 extends upwardly and about a guarded crown sheave 31 mounted on the crown block 22 thence downwardly and about a drilling drum 58 (Fig. 7) to be later described.

The swivel 34 swivelly supports a fluted drill stem 36 which extends downwardly through a rotary table 37 (Figs. 3, 4) mounted in suitable thrust bearings in a bearing barrel 38. The barrel 38 is supported on a table plate 39 supported upon the side frame members 12 and the cross frame members 15 and 129. The drill stem 36 is slidably mounted in a drill stem bushing 40 fitted into and keyed or otherwise non-rotatably mounted in the rotary table 37. The drill stem is designed to carry a drill bit 41, or a string of drill pipe terminating in the drill bit 41, as is usual in rotary drilling operations.

The rotary table 37 is provided with beveled teeth which mesh with the teeth of a drive pinion 42. The pinion 42 is driven through the medium of a pinion shaft 43, a universal joint 44, and a suitable clutch mechanism 45 from a drilling shaft 46 journalled in a transmission housing 47. The transmission housing 47 extends transversally of the rig forwardly of the rotary table and is supported from and between the two side frame members 12. The transmission housing also serves to support the hydraulic fluid reservoir 132.

The swivel 34 is provided with two outwardly extending pairs of arms 48. A turnbuckle 49 is suspended from each pair of arms 48 and each turnbuckle supports a roller chain 50. Each roller chain extends downwardly to and about a sprocket wheel 51 (Fig. 5) mounted on a horizontal transversally extending sprocket shaft 52 which is journalled below and extends between the side frame members 12. The chains 50 extend upwardly from their sprocket wheels 51 and terminate in suspension cables 53 (Fig. 1). Each of the suspension cables 53 extends upwardly and about a suspension sheave 54, supported from the crown block 22, thence downwardly terminating in a tension spring 55 connected to one of the pairs of arms 48 on the swivel 34.

Thus, it can be seen that the chains 50, in combination with the suspension cables 53, form endless flexible elements which will travel upwardly and downwardly with the swivel 34. The purpose of the chains 50 is to place any desired drilling pressure on the drill bit 41 by applying a regulated torque to the sprocket wheels 51. The torque is applied to the sprocket shaft 52, through the medium of drive gears 56 (Figs. 5, 7), from a suitable hydraulic motor 57. Hydraulic fluid under pressure is supplied to the motor 57 from the hydraulic pump 30 through a suitable pressure conduit, as diagrammatically indicated at 144 in Fig. 7, and the fluid is returned from the motor 57 to the reservoir 132 through a return conduit 147. The flow to and from the motor 57 is controlled by means of a two-way, reversible flow, control valve, as indicated at 145 in Fig. 7, so that the operator can cause the chains 50 to pull the swivel downwardly to place the proper drilling pressure on the drill bit 41.

The springs 55 serve to maintain the endless flexible elements constantly under tension so as to maintain proper driving contact between the chains and their respective chain sprockets 51. The springs also serve to absorb shocks, for should the drill bit suddenly strike a soft spot and drop, the springs will stretch to prevent excessive strain from being placed upon the cables 53 and their associated mechanism.

The drilling drum 58 is driven from a drilling drum shaft 59 (Fig. 6), journalled in the transmission housing 47, through the medium of a suitable clutch mechanism 60. The drum 58 is rotatably mounted on the drum shaft 59 upon suitable drum bearings 61 and is free to rotate relative to this shaft under the control of the clutch mechanism 60. The drum 58 is provided with a brake drum 62 and brake band 63 by means of which the rotation of the drum 58 is constantly under control of the operator. The drum shaft 59 is rotated from a driven

gear 64 affixed thereon, which meshes with a drum drive pinion 65 keyed on a stub shaft 66 journalled in the transmission housing 47. The stub shaft 66 is driven from a chain sprocket 67 affixed thereon and about which an endless transmission chain 68 within the transmission housing is trained.

A drill-pipe running line 69 (Figs. 1, 5, 6) is suspended over a running sheave 70 on the crown block 22 and extends downwardly to a running drum 71. The running drum is rotatably mounted on a running shaft 72 journalled in the transmission housing 47 parallel to and similarly to the drilling shaft 59. The running shaft 72 carries a driven gear 73 affixed thereto and meshing with the drum drive pinion 65 similarly to the gear 64, and is provided with a clutch mechanism 74, a brake drum 75, and a controllable brake band 76 similar to the clutch mechanism 60, the brake drum 62, and the brake band 63, previously described. Power is supplied to both shafts 59 and 72 simultaneously and in opposite directions from the stub shaft 66.

Thus, it can be seen that the drilling line 32 and the running line 69 are always within control of the operator through the medium of the clutch mechanisms 60 and 74 and the brake bands 63 and 76.

The power for operating the rig is supplied from a power takeoff coupling 77 (Figs. 4, 7) mounted on the forward extremity of a power shaft 78. The power shaft 78 is journalled in a bearing sleeve 79 supported from the transmission housing 47. The power takeoff coupling 77 connects with the conventional power takeoff shaft of the tractor 10, as is usual in power takeoff mechanisms. The power shaft 78 is connected through the medium of a disconnecting clutch 80 with a second power shaft 81 journalled in the transmission housing 47. The second power shaft 81 is directly connected through the transmission housing 47 with the hydraulic pump 30. The second power shaft 81 is provided with a power sprocket 82 which transmits power to a driven sprocket 83 mounted on the drilling shaft 46, through a transmission chain 119.

The drilling shaft 46 also carries a second drive sprocket 84 which drives the endless transmission chain 68. The chain 68 is trained around the second drive sprocket 84, thence around the chain sprocket 67 on the shaft 66, thence around a blower drive sprocket 85 on a first blower shaft 86, thence around a second blower drive sprocket 87 on a second blower shaft 88. The blower shafts 86 and 88 are journalled in the transmission housing 47 and project forwardly therefrom at each side thereof.

The blower shafts 86 and 88 terminate forwardly in clutch mechanisms 89. Each clutch mechanism transmits power through a universal shaft 90 to a shaft 91 of a pneumatic pressure blower 92. The pressure blowers 92 are mounted on the platform plates 18 at each side of the U-shaped frame. The blowers 92 intake air through suitable air filters 93 and discharge the air under pressure through flexible conduits 94 and check valves 95 to a transversely extending, horizontally positioned compressed air pipe 96. The air pipe 96 is welded between and supported on L-shaped pipe brace members 97 which are in turn welded to the posts 17 at their forward extremities. The brace members extend first rearwardly, thence downwardly to a welded connection at their rearward extremities with the side frame members 12 to provide a bracing structure for the posts 17. A cable receiving roller 140 is supported upon suitable brackets 141 from the air pipe 96. The roller is positioned to receive the drilling line 32 when the mast is folded to prevent the line from becoming entangled in the rig mechanism.

The horizontally extending portion of one of the brace members 97 communicates with the air pipe 96 and conveys air forwardly to a flexible mast hose 98 which is connected to and suspended from the lower extremity of a vertical mast pipe 99 which is secured to and extends upwardly along the mast to substantially a mid-position

thereon. The vertical mast pipe 99 terminates at its upper extremity in a downwardly directed elbow 100 from which a flexible swivel follower hose 101 extends to an intake 102 on the swivel 34. The pressure blowers are cooled by water jackets and the water therein is cooled by suitable radiators 138 connected to the water jackets by means of suitable water hoses 139.

The blowers 92, under the control of the clutch mechanisms 89, force air under pressure into the swivel 34, thence down the hollow drill stem 36 and through the pipe string dependent therefrom to the bit 41. The blast of air discharging from the bit picks up rock dust and rock chips from the bottom of the hole, blows them upwardly in the hole about the drill pipe to the ground surface.

The dust, chips and other debris discharges from the hole into a tubular hood 103 which is suspended about the drill stem 36 at the ground surface. The hood 103 depends from a drill stem sleeve 104 secured beneath the table plate 39 about the drill stem. The sleeve 104 is provided with resilient gasket members 105 (Fig. 4) which act as sand and dust traps to prevent the sand and dust from entering into the rotary table mechanism.

A flexible suction tube 106 (Fig. 1) extends from the hood 103 to a rock trap chamber 107 which is supported on the rear extremity of one of the side frame members 12. The air is drawn from the rock trap chamber 107, through an air intake passage 133, by means of a centrifugal suction blower 108 (Figs. 1, 7) which discharges into a vertical dust trapping column 109. A rock collecting pocket 110 is formed in the bottom of the rock trap chamber 107 in which the rocks, dust and chips collect and from which they may be removed at intervals by opening a spring-closed door 111.

The suction blower 108 is driven from an idler shaft 123 (Fig. 7) which carries an idler sprocket 124 within the transmission housing 47. The idler shaft is eccentrically mounted in the housing 47 so that it may be moved transversely to bring the idler sprocket 124 against the transmission chain 68 to take up wear and to maintain the desired working tension in the transmission chain. The idler shaft 123 projects rearwardly from the transmission housing and is provided with a relatively large V-belt drive pulley 125 from which a V-belt 122 extends to a relatively smaller driven pulley 134 on a countershaft 121 (Fig. 7). The countershaft 121 carries a second relatively large drive pulley 135 from which a second V-belt 120 extends to a second smaller driven pulley 136 on the shaft, shown at 137, of the suction blower 108. The ratio between the belt pulleys is such that the suction blower is driven at relatively high speed. The belts are enclosed in suitable protective belt housings 112 (Fig. 3). A pipe trough 113 (Figs. 2, 3) is mounted alongside one of the side frame members 12 for storing lengths of drill pipe until they are needed in the drilling.

It is desired to call attention to the fact that the pump 30 is of a type known as a constant pressure, variable volume pump. Such a pump is illustrated and described in detail in prior Patent No. 2,764,941, October 2, 1956, and such pumps are available on the market under various names, such as "Racine." The pump employs vanes which are radially slidable in a rotor so that they will be centrifugally forced outwardly against the inner wall of an annular pumping chamber which is constantly urged by means of a compression spring to an eccentric position relative to the axis of the rotor to provide maximum volume. As the pressure increases in the pumping chamber, the chamber is urged against the bias of the spring and toward a concentric position so that, when pumping at a low pressure, the chamber is at maximum eccentricity, and as the pressure increases the chamber approaches a concentric position. When the maximum preset pressure is reached, the pumping chamber will be positioned in a concentric position so that the maximum pressure will be maintained without delivery of any fluid. The com-

pression in the shifting-resisting spring can be preset by rotation of a spring-compressing screw, such as indicated at 143 in Fig. 7. In this device the pressure presetting screw is connected with a hand wheel 118 (Figs. 1, 2, 4) within reach of the operator. By rotating the hand wheel the operator can accurately preset the maximum pressure which will be developed by the pump.

This type of pump is especially valuable in operating the hydraulic motor 57, which must constantly maintain a predetermined torque whether rotating or standing. This is accomplished by the constant pressure-variable volume pump 30 which continues to maintain pressure upon the motor 57 at all times so as to develop a constant predetermined torque on the motor shaft, even though there is no rotation thereof. The constant preset torque acts through the chains 50 to maintain an accurate pressure upon the drill bit, regardless of the formation being drilled. For instance, should a soft formation be encountered, the drill will move downward rapidly to relieve the pressure in the motor 57 and correspondingly in the pump 30. This will cause the pump chamber to instantly shift under the influence of the shifting spring so as to increase the fluid flow through the motor and maintain the desired preset pressure on the bit, regardless of the speed of vertical movement. The result is that the drill hole is completed in the shortest possible time without overloading or damaging the equipment.

Suitable levers 114 (Figs. 1, 3) are provided adjacent the operator's position for operating the rotary table clutch mechanism 45 (Figs. 6, 7), and the running cable clutch mechanism 74. Levers 115 are provided for controlling the brake bands 63 and 76, and levers 116 are provided for controlling the hydraulic valves for the hydraulic cylinders 26 and the hydraulic motor 57. Two levers 117 are provided for controlling the blower clutch mechanisms 89.

The operation of the device is believed to be evident from the above. The tractor is driven to the location of the desired drill hole. The proper lever 116 is operated to supply hydraulic pressure to the hydraulic cylinders 26 to elevate the mast to its working position. The drill stem 36 is then lowered by releasing the brake band 76 to bring the bit into engagement with the ground. The rotary table 37 and the blowers 92 are started. Pressure is supplied to the hydraulic motor 57 to place the desired pressure upon the bit 41. Drilling is continued until the full length of the drill stem has been exhausted. The stem is then withdrawn by means of the drilling line 32 and a length of drill pipe with the bit attached is lowered into the hole by means of the running line 69, the latter being provided with a threaded stub 131 for engaging the pipe. The drill stem 36 is then threaded into the drill pipe and the drilling is continued in accord with the usual practice of rotary drilling.

While a specific form of the improvement has been described and illustrated herein, it is desired to be understood that the same may be varied, within the scope of the appended claims, without departing from the spirit of the invention.

Having thus described the invention what is claimed and desired secured by Letters Patent is:

1. A rotary rock drilling mechanism adapted to be mounted upon the chassis frame of a tractor of the type having a power takeoff device, comprising: a horizontal, U-shaped frame consisting of two side frame members adapted to extend forwardly at each side of said tractor chassis frame and rear frame members adapted to extend across the rear of said tractor chassis frame, and having means for securing said side frame members to said tractor chassis frame; a rotary table supported by said rear frame members; a drilling mast pivotally mounted over said table and adapted to swing from a vertical position over said table to a substantially horizontal position over said tractor; hydraulic means for elevating said mast from the horizontal to the vertical position; a vertically-posi-

tioned transmission housing supported between the side frame members and extending transversely of said U-shaped frame rearwardly of said tractor chassis frame; a power shaft journaled in and extending forwardly from said transmission housing; means for connecting said power shaft to the power takeoff device of said tractor; a hydraulic pump driven from said power shaft and supplying fluid pressure to said hydraulic means; a drilling shaft journaled in said housing driven from said power shaft; means for transmitting rotation from said drilling shaft to said table for hole drilling purposes; a pair of spaced-apart drum shafts journaled in said housing and extending rearwardly thereof; a drilling drum mounted on one of said drum shafts; a running drum mounted on the other of said drum shafts; clutch means for clutching said drums to their respective shafts; means in said housing for driving said drum shafts from said power shaft; a flexible drilling line extending from said drilling drum and supporting a hollow drill stem in said mast, said stem extending through said table; and a flexible running line extending from said running drum to said mast for hoisting purposes therein.

2. A rotary rock drilling mechanism adapted to be mounted upon the chassis frame of a tractor of the type having a power takeoff device, comprising: a horizontal, U-shaped frame consisting of two side frame members adapted to extend forwardly at each side of said tractor chassis frame and rear frame members adapted to extend across the rear of said tractor chassis frame, and having means for securing said side frame members to said tractor chassis frame; a rotary table supported by said rear frame members; a drilling mast pivotally mounted over said table and adapted to swing from a vertical position over said table to a substantially horizontal position over said tractor; hydraulic means for elevating said mast from the horizontal to the vertical position; a vertically-positioned transmission housing supported between the side frame members and extending transversely of said U-shaped frame rearwardly of said tractor chassis frame; a power shaft journaled in and extending forwardly from said transmission housing; means for connecting said power shaft to the power takeoff device of said tractor; a hydraulic pump driven from said power shaft and supplying fluid pressure to said hydraulic means; a drilling shaft journaled in said housing driven from said power shaft; means for transmitting rotation from said drilling shaft to said table for hole drilling purposes; a pair of spaced-apart drum shafts journaled in said housing and extending rearwardly thereof; a drilling drum mounted on one of said drum shafts; a running drum mounted on the other of said drum shafts; clutch means for clutching said drums to their respective shafts; means in said housing for driving said drum shafts from said power shaft; a flexible drilling line extending from said drilling drum and supporting a hollow drill stem in said mast, said stem extending through said table; a flexible running line extending from said running drum to said mast for hoisting purposes therein; a pair of blower shafts journaled in said transmission housing and extending forwardly therefrom; a pressure blower supported above each side frame member at each side of said tractor; means for clutching each blower to one of said blower shafts; means for conducting the discharging air from said blowers through said drill stem; and power transmission means in said housing transmitting rotation from said power shaft to said blower shafts.

3. A rotary rock drilling mechanism as described in claim 2, in which the power transmission means in said housing comprises: a drive sprocket mounted on said drilling shaft; a driven sprocket mounted on each blower shaft; a driven gear mounted on each drum shaft; a stub shaft journaled in said housing; a spur gear mounted on

said stub shaft and meshing with both said driven gears; a chain sprocket mounted on said stub shaft; and an endless transmission chain trained about the drive sprocket on the drilling shaft, the chain sprocket on the stub shaft, and the driven sprockets on both blower shafts.

4. A rotary rock drilling mechanism as described in claim 2, having a suction hood suspended from said U-shaped frame about said drill stem and adjacent the surface of the ground; a suction blower mounted on said U-shaped frame; means for conveying air from said suction hood to said suction blower; and power transmission means in said transmission housing for driving said suction blower from said power shaft.

5. In a tractor mounted well drilling rig of the type having a power takeoff, a rotary table drive shaft, a drilling cable drum shaft, and a running cable drum shaft, means for transmitting power to said shafts from said power takeoff, comprising: a transmission housing; said shafts being journaled in, extending through, and projecting rearwardly from said housing; a first driven gear fixed on said drilling cable shaft within said housing; a second driven gear fixed on said running cable drum shaft within said housing; a stub shaft journaled in said housing between said two driven gears; a driven pinion fixed on said stub shaft and meshing with both driven gears; a power shaft journaled in and extending through and forwardly from said housing; a first endless transmission chain device in said housing transmitting power from said power shaft to said rotary cable drive shaft; a second transmission chain device in said housing transmitting power from said rotary table drive shaft to said stub shaft; and means for connecting said power shaft with said power takeoff.

6. In a tractor mounted well drilling rig of the type having a power takeoff, a rotary table drive shaft, a drilling cable drum shaft, a running cable drum shaft, and two blower shafts, means for transmitting power to said shafts from said power takeoff, comprising: a transmission housing, said shafts being journaled in, extending through, and projecting rearwardly from said housing; a first driven gear fixed on said drilling cable shaft within said housing; a second driven gear fixed on said running cable drum shaft within said housing; a stub shaft journaled in said housing between said two driven gears; a driven pinion fixed on said stub shaft and meshing with both driven gears; a power shaft journaled in and extending through and forwardly from said housing; a first endless transmission chain device in said housing transmitting power from said power shaft to said rotary table drive shaft; a second transmission chain device in said housing transmitting power from said rotary table drive shaft to said stub shaft; a sprocket mounted on each blower shaft within said housing, said second transmission chain device meshing with both said sprockets; and means connecting said power shaft with said power takeoff.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

|           |                   |               |
|-----------|-------------------|---------------|
| 1,939,755 | Zerbe             | Dec. 19, 1933 |
| 1,956,200 | Rector            | Apr. 24, 1934 |
| 2,041,690 | Baumeister et al. | May 26, 1936  |
| 2,144,586 | Kelley            | Jan. 17, 1939 |
| 2,281,952 | Ransone et al.    | May 5, 1942   |
| 2,310,001 | Haddock           | Feb. 2, 1943  |
| 2,418,601 | Richards          | Apr. 8, 1947  |
| 2,451,223 | Johansen          | Oct. 12, 1948 |
| 2,564,188 | Burg et al.       | Aug. 14, 1951 |
| 2,594,098 | Vanderzee         | Apr. 22, 1952 |
| 2,665,116 | Brink et al.      | Jan. 5, 1954  |
| 2,711,880 | McKenzie          | June 28, 1955 |
| 2,740,609 | Richardson et al. | Apr. 3, 1956  |