Feb. 7, 1956 S. D. GUNNING 2,733,896

PORTABLE DRILLING RIG

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FIG. 2

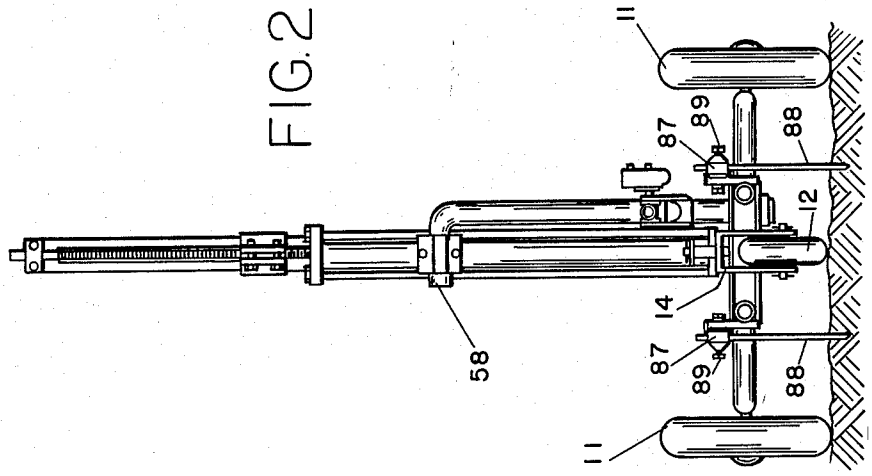
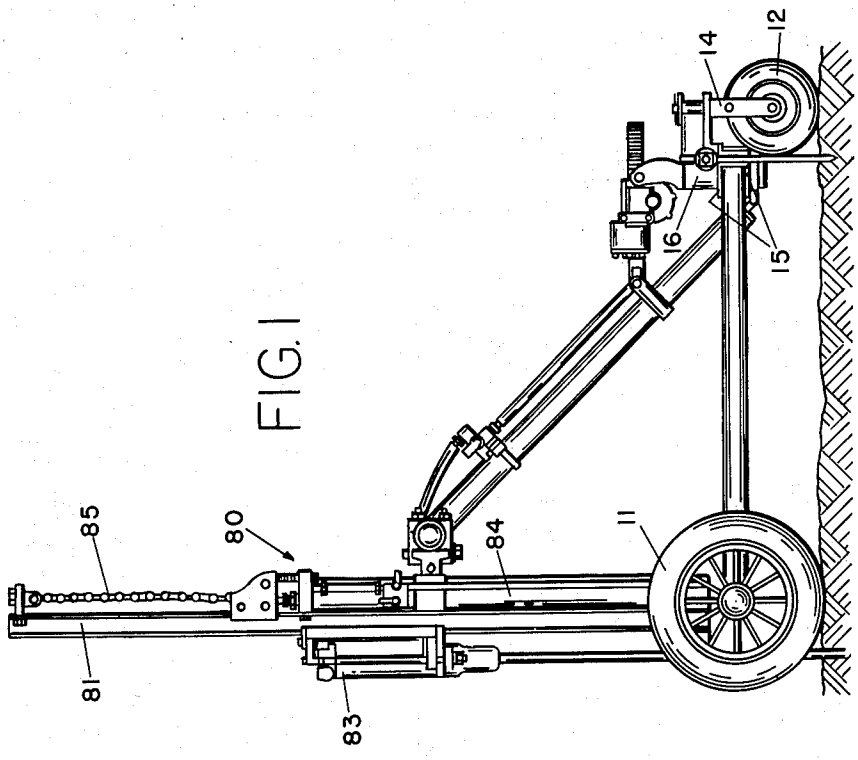


FIG. 1



SAMUEL D. GUNNING

INVENTOR.

BY

ATTORNEY

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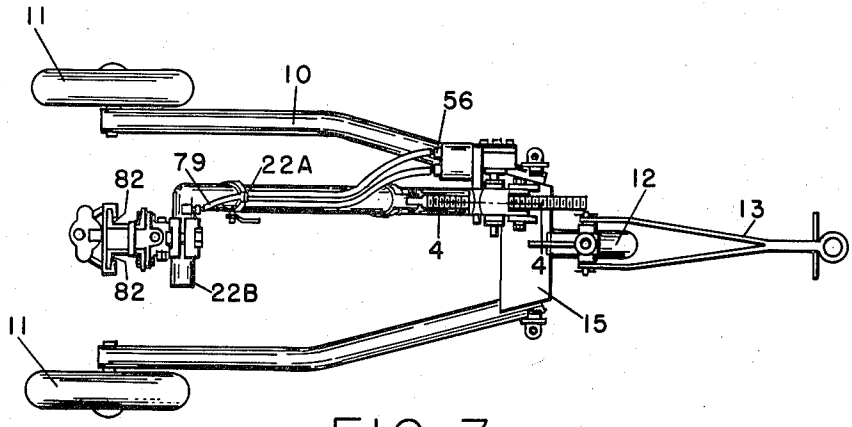


FIG. 3

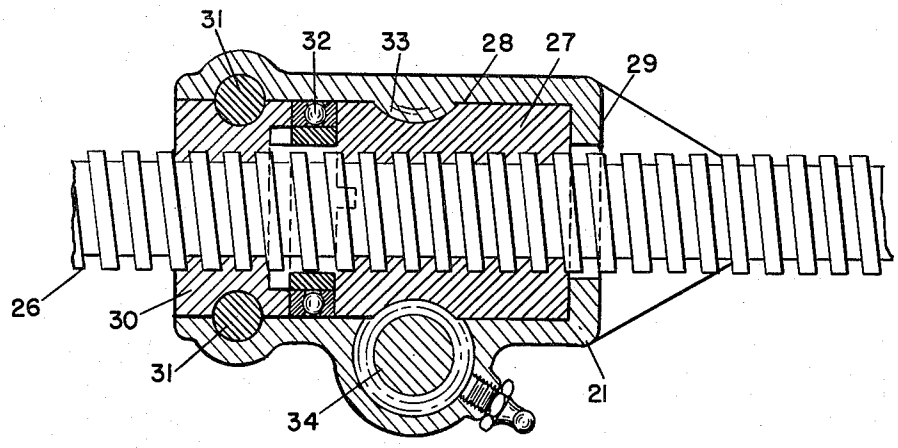


FIG. 4

SAMUEL D. GUNNING
INVENTOR.

BY

ATTORNEY

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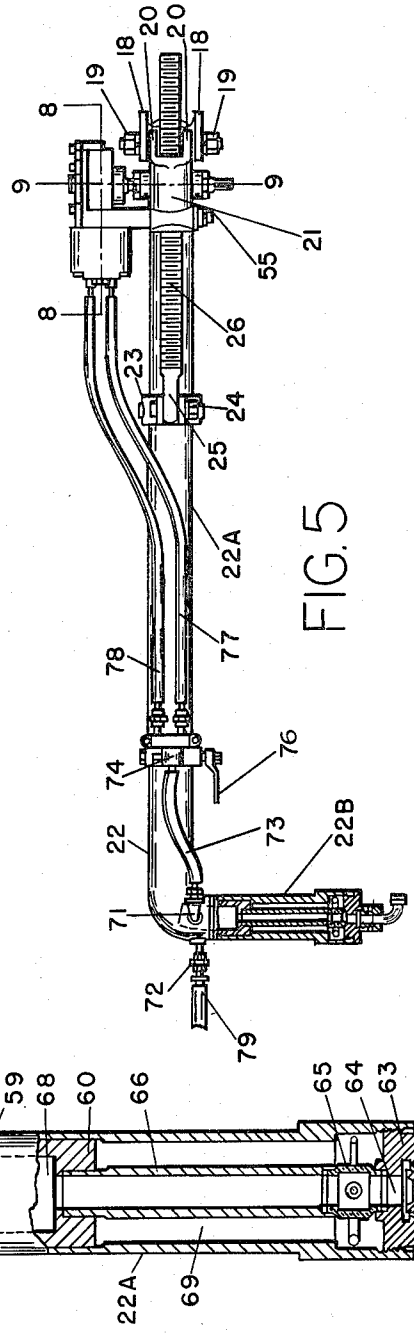


FIG. 5

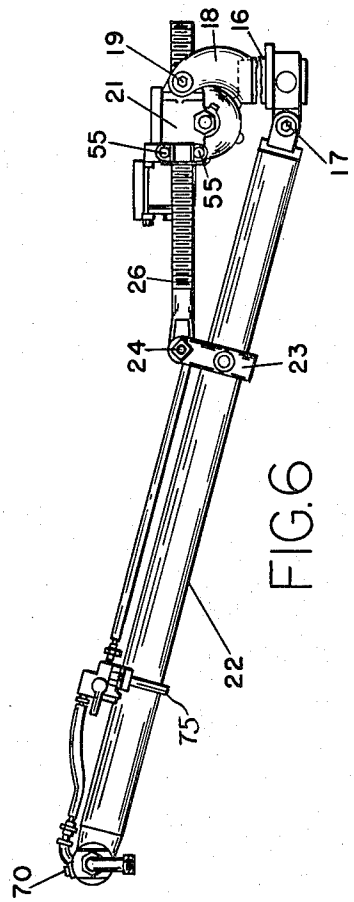


FIG. 6

FIG. 7

SAMUEL D. GUNNING
INVENTOR.

BY

ATTORNEY

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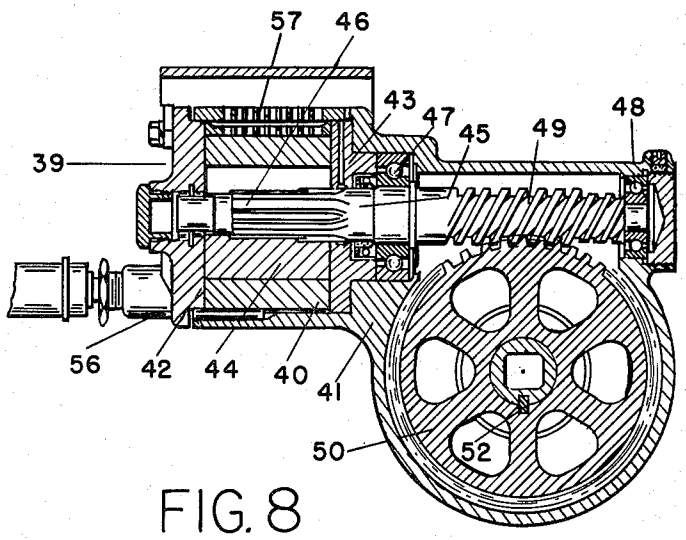


FIG. 8

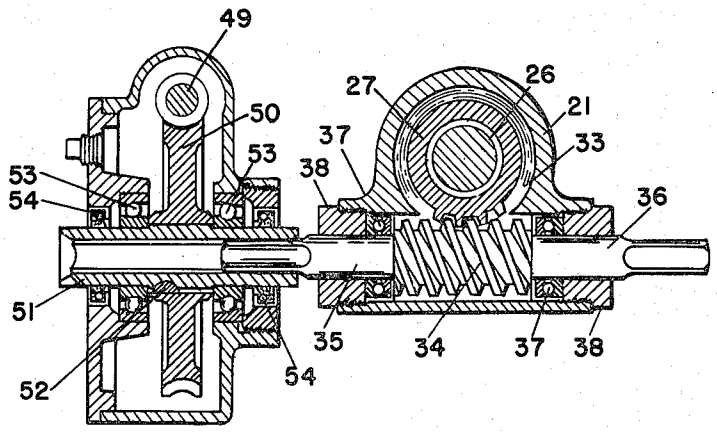


FIG. 9

SAMUEL D. GUNNING
INVENTOR.

BY

ATTORNEY

United States Patent Office 2,733,896 Patented Feb. 7, 1956

2,733,896

PORTABLE DRILLING RIG

Samuel D. Gunning, Cleveland Heights, Ohio, assignor, by mesne assignments, to Westinghouse Air Brake Company, a corporation of Pennsylvania

Application December 12, 1950, Serial No. 200,430

5 Claims. (Cl. 255—51)

This invention relates broadly to rock drills, but more particularly to a portable drilling rig of the wagon drill type.

One object of this invention is to produce a portable drilling rig of simple construction, relatively light weight, which is strong, durable and efficient.

Another object of this invention is to produce an improved portable and readily movable drilling rig constructed and arranged in a manner enabling the drill to be moved in a multiplicity of drilling positions.

Another object of this invention is to produce a portable drilling rig having a wheel supported frame of simple construction, and a substantially L-shaped drill carrying boom pivotally carried by the frame, thereby enabling all operative parts to be readily accessible to the operator.

Other objects of this invention not at this time more particularly enumerated will be clearly understood from the following detailed description.

In the drawings which illustrate the invention:

Figure 1 is a side elevational view of the entire drilling rig, showing the drilling apparatus in perpendicular relation with the wheel supported frame.

Figure 2 is an end elevational view of the drilling rig shown in Figure 1.

Figure 3 is a top plan view of the rig shown in Figure 1.

Figure 4 is an enlarged longitudinal sectional view taken through line 4—4 in Figure 3.

Figure 5 is an enlarged top plan view partly in section, of the L-shaped drill supporting boom, and Figure 6 is a side view thereof.

Figure 7 is an enlarged view of the portion shown in section in Figure 5.

Figure 8 is a enlarged longitudinal sectional view taken through line 8—8 in Figure 5.

Figure 9 is an enlarged cross sectional view taken through line 9—9 in Figure 5.

Referring to the drawings in which like symbols designate corresponding parts throughout the several views, 10 represents a substantially U-shaped frame supported at its open end by two wheels 11, and at its closed end by a caster wheel 12. This frame, and in fact the entire drilling rig, is movable on its three wheels by a handle 13 pivotally secured to the caster wheel yoke 14. Preferably, the frame has its sides made of tubular members having welded to the top and bottom of their inner ends, two heavy gusset plates 15 which form the end or cross member of the frame. Extending vertically through the two gusset plates 15 and projecting below and above the plates, there is a post 16 rigidly secured to the gusset plates by any suitable means such as a weld. Between the two plates 15, the post 16 is provided with integral lugs carrying a pivot pin 17 having its pivotal axis parallel to the axis of the wheels 11 and located below the upper plate 15 or below the surface of the frame 10. The upper end of the post 16 is formed by a yoke which includes two spaced lugs 18, each carrying a pin or bolt 19 by which similar lugs 20 of a transmission housing 21 are pivotally connected to the post 16.

Capable of carrying a drilling apparatus, there in an L-shaped boom 22, having a supporting leg 22A and arm 22B extending at right angles therefrom. The free end of the leg 22A is pivotally connected to the post 16 by the pivot pin 17. Near that end, the boom is provided with an integral collar 23 having spaced lugs extending upwardly therefrom and carrying a cross bolt 24, by which the apertured end 25 of an actuating screw 26 is pivotally connected to the boom 22. The screw 26, which by virtue of its pivotal connection with the cross bolt 24, is held against rotation on its own axis, extends through a nut 27, which has complemental threads cooperating with the screw threads for effecting longitudinal movement of the screw upon rotation of the nut. The nut 27 is rotatably mounted within a cylindrical flat bottom bore 28 provided in the transmission housing 21, the bottom of the bore being pierced as at 29 to enable free longitudinal movement of the screw 26 between the housing lugs 19. The nut is retained in the bore 28 by a collar 30 secured in the open end of the bore by cross bolts 31 and spaced from the nut by a suitable thrust bearing 32.

Cut in the external wall of the nut 27, there are teeth of a worm gear 33 operatively engaged by a worm 34, which worm is rotatably mounted in the housing 21 transversally of and below the screw 26 as clearly shown in Figure 4. As shown in Figure 9, the worm 34 has reduced shafted portions 35 and 36 each extending beyond the housing 21 through a thrust bearing 37 and retaining nut 38. Outside of the nuts 38 the shafted end portions 35 and 36 are of square cross section through which the worm 34 can be turned by hand by simply fitting a crank handle, not shown, on the shaft 36, or preferably turned by power by connecting the shaft 35 to the power unit shown in Figure 8. The power unit comprises a compressed air actuated reversible rotary motor 39, of any suitable type well known in this art. Such motor generally includes a stator 40 which in this instance is fixed in a housing 41 between end plates 42 and 43. In the stator, there is the usual vane carrying rotor 44 keyed to a shaft 45 by splines 46. One end of the shaft 45 is journalled in the plate 42, and adjacent the plate 43 it is journalled in a ball bearing 47. From the last bearing, the shaft 45 extends further into the housing 41 where its other end is journalled in a ball bearing 48. The portion of the shaft 45 between the two bearings 47 and 48, is adequately machined to form a worm 49 operatively engaging a worm wheel 50, which wheel is carried below the worm 49 on a hollow cross shaft 51. The wheel is preferably secured to the shaft by a key 52, and the shaft journalled within bearings 53. The ends of the shaft 51 extend through the wall of the housing 41 where they are surrounded by wipers 54.

The housing 41 of the power unit 39 is rigidly secured to the transmission housing 21 by cross bolts 55, and is located with the hollow shaft 51 in coaxial alignment with the worm 34. The interior of the shaft 51 is of square cross section having fitted therein the square shank of the end portion 35 of the worm 34, through which rotation from the worm wheel 50 is transmitted to the worm 34 and in turn to the worm gear 27 and nut 26. Also provided in the motor housing 41 are two inlet connections 56 and exhaust ports 57 through which motive fluid such as compressed air may be admitted and exhausted to effect rotation of the rotor 44.

As previously stated, the drill carrying boom is substantially L-shaped, with its leg 22A preferably made solid and its arm 22B made of a tubular member welded to the leg as at 59. This welded joint is reinforced by a heavy wall liner 60 which forms the inner end of the arm 22B. As shown in Figure 7, the arm contains a motive fluid conduit which includes a swivel connector 61 rotat-

able in a gland nut 62 screwed in an end plate 63, the plate 63 in turn being screwed in the free end of the arm 22B in fluid tight engagement therewith. This plate has a central bore 64 extending therethrough and affording a seat for one end of a relatively short sleeve 65, while the other end thereof is seated in a tube 66 which extends therefrom and terminates in the liner 60. Motive fluid supplied to the connector 61 by a flexible conduit secured to its threaded end 67, may thus be admitted into a chamber 68 formed in the liner 60. The space between the tube 66 and the inner wall of the arm 22B, forms a lubricant reservoir 69 which may be filled with lubricant through a filler plug 70. The sleeve 65 is made of any suitable porous material enabling limited flow of lubricant therethrough, which lubricant is then carried by the motive fluid flowing through the sleeve to the fluid actuated parts of the drilling rig.

Leading from the chamber 68 are two connections 71 and 72, the connection 71 having a hose 73 attached thereto for supplying motive fluid to a valve housing 74, which is rigidly secured on the leg 22A of the boom 22 by a U-shaped clamp 75. This valve housing has a throttle valve rotatable therein and operable by a handle 76 for controlling supply of motive fluid through one of two hoses 77 and 78, which lead therefrom to the motor housing 21 and are secured to the latter by the connections 56.

From the connection 72 leads a hose 79 supplying motive fluid to a drilling apparatus which can be of any suitable type. As shown, it includes a relatively long drill guiding frame 81 formed with longitudinally extending guides 82 on which is slidably guided a rock drill 83. Carried by the guiding frame 81, there is also a fluid actuated feeding mechanism 84 operatively associated with the rock drill 83 for imparting feeding motion thereto through a chain 85. Since this drilling mechanism does not form a part of the present invention, no further description is thought necessary other than pointing out that it is connected to the arm 22B by a detachable clamp 86, and may be positioned on the arm not only vertically as shown, but in any desired position around the arm.

To positively hold the wagon drill in drilling position, the base frame near the inner end thereof carries laterally spaced brackets 87 supporting anchoring legs 88, which legs can be driven in the ground and be rigidly secured to the brackets by set screws 89.

The boom 22 can be raised or lowered with respect to the base frame 10, by rotating the worm 34, see Figure 9. This rotation of the worm can be effected either manually by rotating a crank handle, not shown, fitted on the square shank of the worm reduced portion 36, or by using the compressed air motor 39. In this last instance, the operator will rotate the throttle valve handle 76 to position the throttle valve for admitting motive fluid through either conduit 77 or 78, depending upon the direction of rotation required for the motor 39. Rotation of the motor in either direction is transmitted to the shaft 45 and its worm 49, and therefrom to the worm gear 50 and its hollow shaft 51. This last shaft being also coupled to the worm 34, will transmit rotation thereto and to the nut 27. Since nut 27 is held against longitudinal movement and is operatively associated with the screw 26, it will be understood that rotation of the nut will effect longitudinal movement of the screw in one or the other direction, and the consequential raising or lowering of the boom 22. When the boom has been moved to the desired position, the throttle valve, through its handle 75, can be moved to shut off the supply of motive fluid to the motor 39. Thereafter, the engagement of worm 49 with wheel 50 together with the engagement of worm 34 with wheel 27 will afford an efficient and positive lock for holding the boom 22 in the desired position.

With reference to Figure 3, it will be noticed that the boom 22 is pivotally connected to the base frame, in offset relation with respect to the longitudinal center axis of the frame, thereby enabling the drill supporting cross arm 22B, and the drilling mechanism 80 carried thereby, to be located on said longitudinal center axis. In other words, in order to maintain the drilling mechanism 80 equally spaced from the side members of the frame, the boom 22 has its pivotal connection located closer to one side of the frame than the other.

Because the pivotal connection 17 between the end of the boom 22 and the frame is underslung, that is, located below the surface of the base frame, it is possible to position the boom closer to the ground than heretofore possible with drilling apparatus of the wagon drill type.

From the foregoing description, it will be understood that the substantially L-shaped drill carrying boom, together with its self-contained motive fluid connection and lubricator, constitutes a simple construction, which is strong, durable, efficient and of lighter weight than former wagon drills of equal capacity.

The details of structure and arrangement of parts shown and described may be variously changed and modified without departing from the spirit and scope of the invention.

I claim:

1. In a portable drilling rig, the combination of a wheel supported frame, a boom having a supporting leg extending longitudinally of said frame and a drilling apparatus carrying arm extending at right angles from said leg, a pivotal connection between the free end of said leg and said frame, a motive fluid chamber in the inner end of said arm, motive fluid conveying means including a swivel connection in the free end of said arm and a conduit leading therefrom to said chamber, lubricant supplying means to said conduit including a lubricant reservoir in said arm surrounding said conduit, a pivotal movement effecting mechanism carried by said frame in operative engagement with said leg including a fluid actuated motor, and at least one motive fluid conveying conduit between said chamber and motor carried by said boom.

2. In a portable drilling rig, the combination of a wheel supported frame, a boom having a leg pivotally connected to said frame and an arm extending at right angles from said leg, a fluid actuated drilling apparatus carried by said arm, a motive fluid chamber in the inner end of said arm, motive fluid conveying means including a swivel connection in the free end of said arm and a conduit leading therefrom to said chamber, lubricant supplying means to said conduit including a lubricant reservoir in said arm surrounding said conduit, a pivotal movement effecting mechanism carried by said frame in operative engagement with said leg including a fluid actuated motor, at least one motive fluid conveying conduit between said chamber and motor carried by said boom and connected to said last conduit, means carried by said boom for controlling supply of motive fluid to said motor, and a motive fluid conveying conduit leading from said chamber to said drilling apparatus.

3. In a portable drilling rig, the combination of a wheel supported frame, a boom having a supporting leg extending longitudinally of said frame and a drilling apparatus carrying arm extending at right angles from one end of said leg, a pivotal connection between the other end of said leg and said frame, a pivotal movement effecting mechanism carried by said frame in operative engagement with said leg including a fluid actuated motor, a fluid conveying conduit between said arm and motor, and means in said arm conveying motive fluid to said conduit including a motive fluid supplied swivel connection in the free end of said arm.

4. A drilling apparatus supporting boom consisting of a leg and an arm extending at right angles therefrom, carrying means for said boom pivotally connected to the free end of said leg, a fluid actuated drilling apparatus carried by said arm, means supplying motive fluid to said apparatus including a conduit in said arm, and lubricant

supplying means to said conduit including a lubricant reservoir in said arm operatively connected to said conduit.

5. In a portable drill, the combination of a wheel supporting frame, a one piece L-shaped boom consisting of a leg and an arm extending at right angles therefrom, a pivotal connection between one end of said leg and said frame, a fluid actuated drilling apparatus carried by the arm of said boom, a pivotal movement effecting mechanism carried by said frame in operative engagement with the leg of said boom including a fluid actuated motor, a motive fluid chamber within one end of said arm, means in said arm conveying motive fluid to said chamber, and two fluid conveying conduits leading from said chamber, one to said drilling apparatus and the other to said motor.

References Cited in the file of this patent

UNITED STATES PATENTS

2,044,878	Curtis	June 23, 1936
2,104,341	Curtis	Jan. 4, 1938
2,123,897	Holmes	July 19, 1938
2,217,674	Curtis	Oct. 15, 1940
2,225,324	Slater	Dec. 17, 1940
2,316,672	Curtis	Apr. 13, 1943
2,318,595	Curtis	May 11, 1943
2,360,318	Dickenson	Oct. 17, 1944
2,491,273	Lehner	Dec. 13, 1949
2,500,931	Curtis	Mar. 31, 1950