Oct. 13, 1959 J. C. CURTIS ET AL 2,908,482

ROCK DRILL

Filed July 16, 1952 2 Sheets-Sheet 1

Fig. 1.

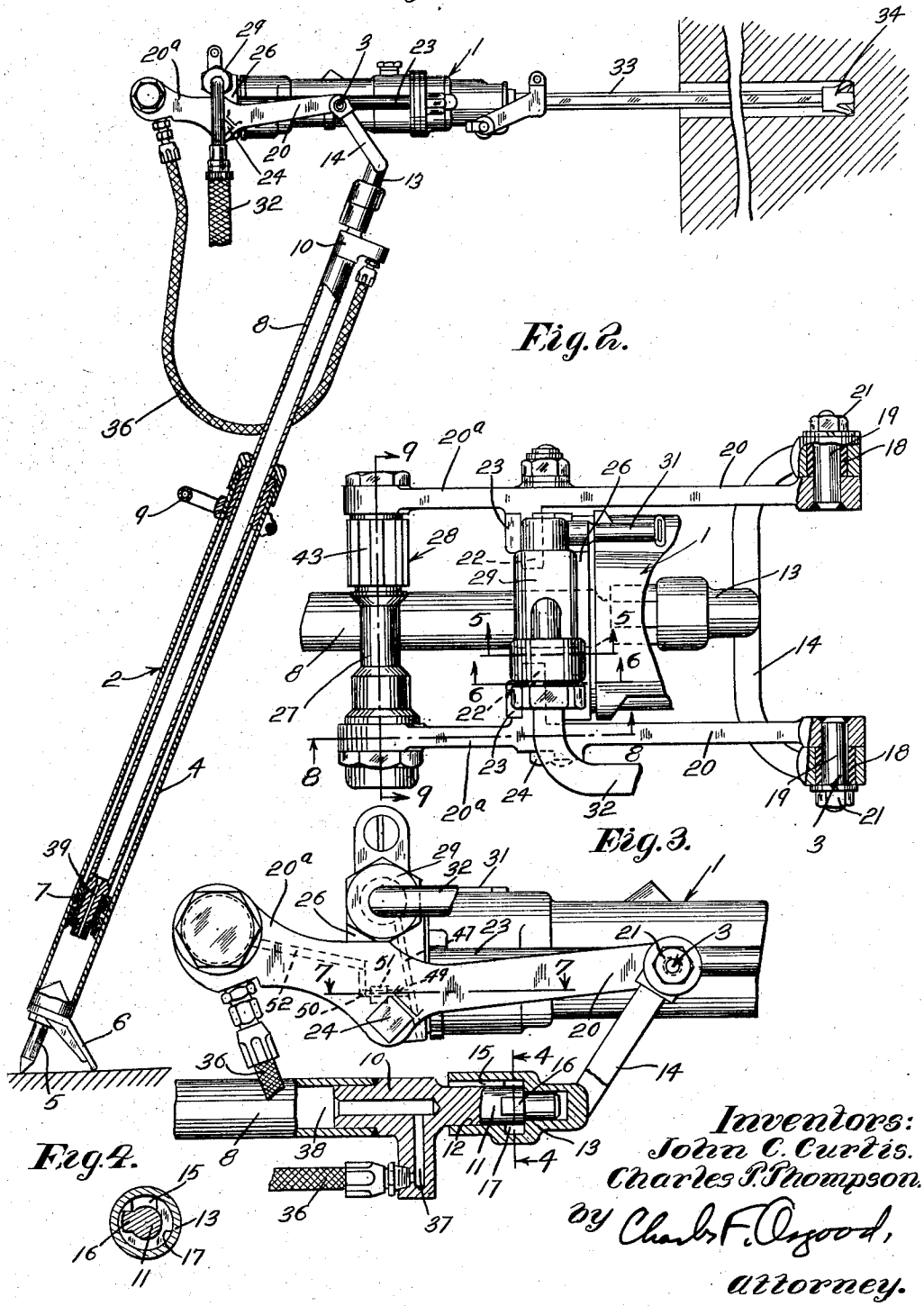


Fig. 2.

Fig. 3.

Fig. 4.

Inventors:
John C. Curtis.
Charles P. Thompson.
by Chas. F. Osgood,
attorney.

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Fig. 5.

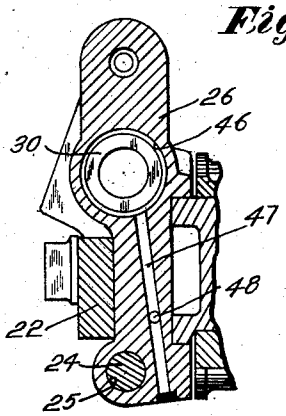


Fig. 6.

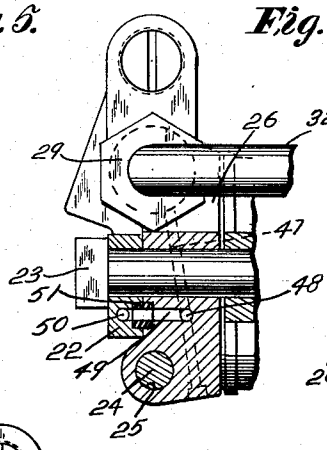


Fig. 7.

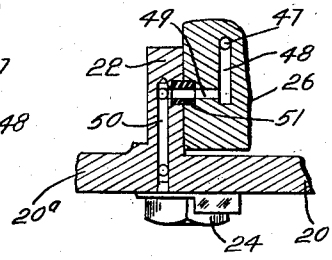


Fig. 8.

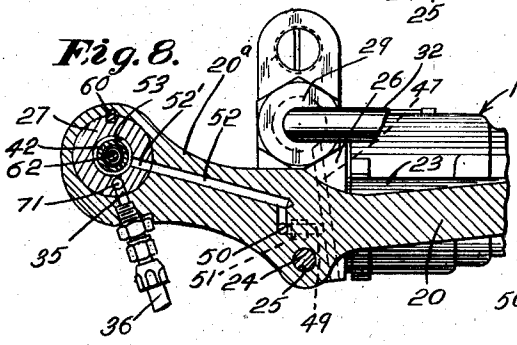


Fig. 9.

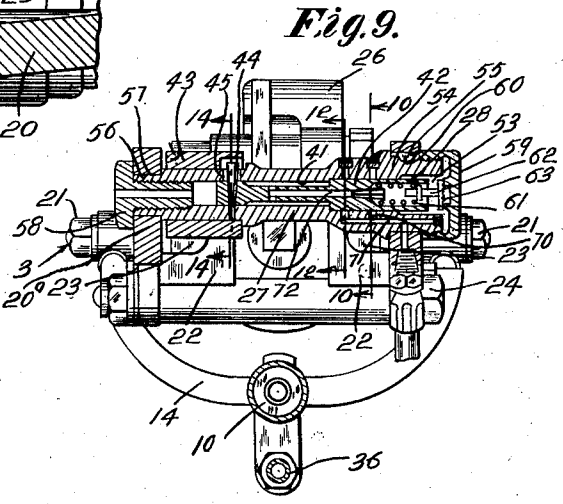


Fig. 10.

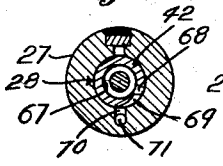


Fig. 11.

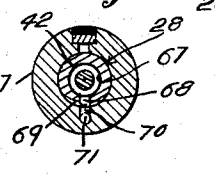


Fig. 12.

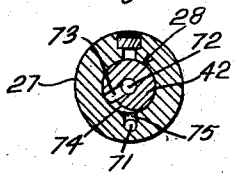


Fig. 13.

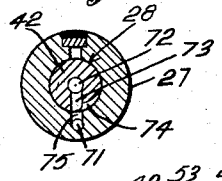


Fig. 14.

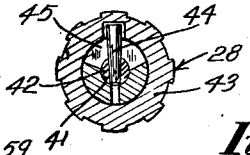
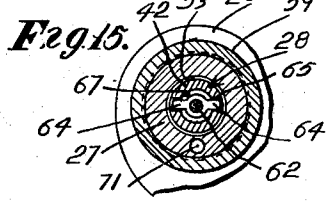


Fig. 15.



Inventors:
John C. Curtis.
Charles P. Thompson.
by Charles F. Osgood,
attorney.

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2,908,482

ROCK DRILL

John C. Curtis and Charles T. Thompson, Newport, N.H., assignors to Joy Manufacturing Company, Pittsburgh, Pa., a corporation of Pennsylvania

Application July 16, 1952, Serial No. 299,185

7 Claims. (Cl. 255—45)

This invention relates to rock drills and more particularly to a hammer rock drill of the pivoted feed leg type having improved means for attaching the hammer tool to the feed leg and improved control means for the feed leg operable from the tool handle.

The present invention relates to improvements over those disclosed in the copending application to John A. Read, Serial No. 279,014, filed March 28, 1952, now abandoned, owned by the same assignee as the present invention. In this copending application the hammer drilling tool is supported and fed by a pneumatic feed leg which is hingedly connected to the tool support on a transverse axis arranged at right angles to lines respectively including the longitudinal axes of the hammer tool and the feed leg whereby relative swinging movement in upright planes may occur between the tool and the feed leg during the drilling operation. Such a feed leg and its mode of operation are well known in the art and the present invention resides in improvements in such known type of rock drill in that improved means are provided for attaching the drilling tool to the feed leg and improved control means operable from the tool handle are provided whereby the tool may be readily attached to the feed leg and wherein but a single fluid supply hose leads to the tool thereby eliminating one of the loosely hanging fluid supply hoses of the above mentioned Read application.

An object of the present invention is to provide an improved rock drill. Another object is to provide an improved rock drill of the pneumatic, pivoted, extensible feed leg type. A further object is to provide an improved supporting means for the drilling tool on the feed leg. A still further object is to provide an improved control means for the extensible feed leg whereby the fluid supply connections to the drill are simplified. Yet another object is to provide an improved quick detachable connection between the tool support and the feed leg whereby the parts may be quickly separated and assembled, as desired. These and other objects and advantages of the invention will, however, hereinafter more fully appear.

In the accompanying drawings there is shown for purposes of illustration one form which the invention may assume in practice.

In these drawings:

Fig. 1 is a side elevational view of an illustrative form of the improved rock drill, with the pneumatic feed leg partially shown in vertical section.

Fig. 2 is an enlarged fragmentary plan view showing the tool support and its hinge connection with the feed leg.

Fig. 3 is a fragmentary side view of the structure shown in Fig. 2, with the quick detachable connection between the tool support and the feed leg shown in vertical section.

Fig. 4 is a detail cross section taken on line 4—4 of Fig. 3, showing details of the bayonet lock.

Fig. 5 is a vertical section taken on line 5—5 of Fig. 2.

Fig. 6 is a vertical section taken on line 6—6 of Fig. 2.

Fig. 7 is a detail horizontal section taken on line 7—7 of Fig. 3.

Fig. 8 is a vertical section taken on line 8—8 of Fig. 2.

Fig. 9 is a cross section taken on line 9—9 of Fig. 2, illustrating the control valve mechanism carried by the tool handle.

Fig. 10 is a detail vertical section taken on line 10—10 of Fig. 9.

Fig. 11 is a view like Fig. 10 with the valve shown in a different position.

Fig. 12 is a detail vertical section taken on line 12—12 of Fig. 9.

Fig. 13 is a view like Fig. 12 with the valve shown in a different position.

Fig. 14 is a detail vertical section taken on line 14—14 of Fig. 9.

Fig. 15 is a detail vertical section showing the sliding interlocking connection between the detent plunger and the rotary valve.

In this illustrative embodiment of the invention, as shown in the drawings, the hammer drilling tool is generally designated 1, the pneumatic feed leg is generally designated 2 and the transverse hinge connection between the tool and the feed leg is designated 3.

The pneumatic feed leg 2 comprises a feed cylinder 4 having a bottom abutment engaging point 5 and a cooperating lateral foot piece 6, and a piston 7 is reciprocable in the cylinder and has an upwardly extending tubular piston rod 8. A transporting handle 9 is attached to the forward portion of the feed cylinder whereby the feed leg may be readily transported.

The upper end of the piston rod 8 has a member 10 rigidly secured, as by welding, thereto and this member has a cylindrical forward projection 11 which is receivable in a socket 12 of a boss 13 integral with a yoke 14. The socket has a longitudinal key slot or groove 15 along one sidewall and a lateral locking lug or key 16 on the projection 11 is receivable in this groove upon insertive movement of the projection 10 within the socket 12, and when the parts are assembled, relative rotation of the boss and projection may effect turning of the lug 16 through 90° in a circular chamber 17 (Fig. 4) in the boss to locate the lug out of registry with the groove thereby to lock the parts against axial separation. Thus a bayonet lock is provided between the feed leg and the tool support whereby the parts may be quickly attached or released as desired, without the use of special tools or wrenches.

The yoke-arms carry bearing sleeves 18 in which studs or pinlike trunnions 19, secured, as by welding (Fig. 2), to parallel support members or side arms 20, are rotatably mounted and these studs serve as pivot elements and have retaining nuts 21 threaded thereon to hold the parts in position. The parallel support members or arms 20 have inturned lateral lugs 22 intermediate their ends and the conventional side bolts 23 of the hammer tool 1 secure the lugs 22 rigidly to the rear end of the tool (Fig. 6) with the support members or arms 20 extending longitudinally along the opposite sides of the tool, as shown most clearly in Fig. 2. A cross bolt 24 passes openings in the support members and through a transverse bore 25 in the rear tool-head 26, and this bolt, when tightened, aids in holding the arms 20 rigidly on the tool. The rearward projections 20*a* of the tool supporting arms 20 carry a transverse grasping handle 27 which has a control valve mechanism, generally designated 28, carried thereby (Fig. 9) whereby the pressure in the feed leg cylinder may be regulated as desired without the operator releasing his grasp from the tool-handle 27, as later explained. By adjusting the nuts 21 threaded on the studs 19 the frictional binding contact between the yoke arms and the supporting arms 20 may be varied

thereby to vary frictionally the relative pivotal movement between the tool and the feed leg.

The hammer tool 1 has a usual throttle valve mechanism 29 carried by its back-head and including a usual rotary throttle valve 30 (Fig. 5) provided with an operating handle 31 (Fig. 2), for controlling flow of fluid under pressure from a usual swiveled supply hose connection 32 to the motor cylinder of the hammer motor, in a manner well known in the art. The hammer motor contains a usual reciprocable hammer piston (not shown) actuated by pressure fluid for delivering impact blows to the shank of a conventional drill steel 33 which carries a usual rock drill bit 34 (Fig. 1). A passage 35 controlled by the control valve mechanism 28, is connected by a flexible hose 36 (Fig. 8) to a passage 37 (Fig. 3) communicating with the hollow interior 38 of the piston rod 8, and an axial passage 39 in the piston 7 connects the piston-rod-interior with the cylinder-bore beneath the piston, as shown in Fig. 1.

Now referring to the detail structure of the control valve mechanism 28 it will be noted that transverse tool handle 27 has an axial bore 41 containing a rotary control valve 42, and an operating or control sleeve 43 rotatably mounted on the handle-exterior is connected by a wedge-pin 44 to the valve. As shown in Fig. 14, this wedge-pin passes through an arcuate slot 45 in the tool handle and the end-walls of this slot serve to limit the extent of rotary movement of the valve. Communicating with a chamber 46 at one end of the throttle valve 30 (Fig. 5) is a passage 47 which communicates with a lateral passage 48 (Fig. 7) in the rear head of the tool, and a longitudinal passage 49 communicates with a passage 50 in one of the arm-lugs 22. A rubber washer or annular packing 51 seals the passage 49 as it extends from the tool-head into the arm-lug (Fig. 6) to prevent leakage at the joint. The passage 50 extends laterally in communication with a passage 52 in one of the arms 20 (Fig. 8) and a communicating passage 52' in the handle 27 communicates with a chamber 53 at one end of the valve-receiving bore 41, as shown in Fig. 9.

As is also shown in Fig. 9 the transverse handle 27 is of cylindrical shape and has its large circular end 54 fitting a bore 55 in one of the arms 20 and in its opposite reduced end 56 fitting a bore 57 in the other arm, and when the arms 20 are detached from the yoke 14, they may be separated to detach the handle 27. When the handle is assembled on the arms, as shown in Fig. 9, the head of a plug 58 threaded within one end of the handle, and a cap 59 threaded exteriorly on the opposite end of the handle, engage the outer remote sides of the arms 20 to hold the handle rigidly in position. A key 60 holds the handle against undesired rotation within the arm-bores. A coil spring 61 is arranged between a shoulder on the valve and a plunger 62 for holding the valve axially in position within its bore and this plunger has serrations at 63 engaging similar serrations on the cap 59. The spring pressed plunger 62 has lateral lugs 64 which slidingly interlock with slots 65 in the valve so that when the valve is rotated the plunger rotates therewith and the coacting serrations on the plunger and the cap serve to hold the valve in its adjusted positions. The interlocking lug and slot connection 64, 65 between the spring-pressed-plunger and the valve permits limited axial movement of the plunger relative to the valve as the valve is rotated.

From the foregoing it is evident that when fluid under pressure is supplied through the hose connection 32 to the throttle valve mechanism 29 of the hammer tool 1, fluid concurrently may flow through passages 47, 48, 49, 50, 51 and 52 to the chamber 53 of the control valve mechanism 28 carried by the tool handle 27. The valve 42 has an axial bore 67 communicating with the chamber 53 and, as shown in Fig. 10, a radial port 68 in the valve has on its periphery a communicating V-shaped or tapering notch 69 communicable with a port 70 which in turn communicates with a longitudinal passage 71 connected to the passage 35. As shown in Fig. 9, the valve 42 has an axial vent passage 72 which leads to atmosphere, and this vent passage communicates with a radial port 73 in the valve (Fig. 12) which has on its periphery a communicating V-shaped or tapering notch 74, tapering oppositely from the notch 69, and this notch 74 is communicable with a port 75 connected to the longitudinal passage 71. The V-shaped notches 69 and 74 are so arranged circumferentially of the valve that when the supply through the notch 69 is being gradually cut off the vent through the notch 74 is being gradually opened, and when the supply notch is completely cut off from the supply, the venting notch is fully opened and vice versa. Thus, an extremely sensitive control of the pressure in the feed leg cylinder may be obtained.

The rock drill during normal use is set up as shown in Fig. 1, and the operator grasps the handle 27 to effect guiding and directing of the hammer tool with respect to the work. During the drilling operation the operator may rotate the control sleeve 43 to regulate the feeding or supporting pressure within the feed leg without completely releasing his grasp from the handle 27 and may thus regulate the pressure in the feed leg as the drill is concurrently guided and directed, with but one hand. As the feed piston 7 imparts an upward thrust to the hammer tool the operator may concurrently press downwardly and inwardly on the tool handle at the rear end of the tool to effect feeding of the drill bit axially toward the work. By arranging the feed control valve on the tool handle it is possible for the operator to support the drill with one arm and to guide and direct the tool with the other arm while at the same time controlling the pressure in the feed leg, thus facilitating handling and control of the drill. Since the general mode of operation of a rock drill of the type disclosed has been fully described in the above mentioned Read application and is generally well known in the art further description hereof is herein deemed unnecessary.

As a result of this invention an improved rock drill of the pivoted feed leg type is provided having improved means for attaching the drilling tool to the feed leg and for controlling the feeding pressure in the feed leg. By the provision of the improved feed control means the elimination of all but one of the supply hose connections to the tool has been made possible with the single hose connection supplying fluid both to the tool motor and to the feed leg, and the feeding pressure may be easily regulated as desired. The improved tool support for mounting the tool on the feed leg provides an extremely rigid structure, and the bayonet lock enables quick detachment and assembly of the parts. These and other advantages of the invention will be clearly apparent to those skilled in the art.

While there is in this application specifically described one form which the invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What we claim as new and desire to secure by Letters Patent is:

1. A rock drill of the character disclosed comprising a unitary drilling tool for actuating a drilling implement, a fluid actuated extensible feed leg including an extensible element, and a combined feed leg and handle attachment for said tool comprising a pair of elongated parallel supporting arms extending longitudinally along the sides of and rigidly secured to said tool, said arms projecting a substantial distance rearwardly beyond the rear end of said tool, pivot elements connecting the front ends of said arms to the upper end of said extensible element for hingedly mounting the tool on said feed leg,

and a handle carried at the rear ends of said arms and extending transversely and spaced a substantial distance rearwardly of said tool for supporting and directing the latter during its operation, said supporting arms providing leverlike portions for said handle whereby manipulation of the tool by said handle is facilitated.

2. A rock drill as set forth in claim 1 wherein a control valve mechanism is carried by said handle and has communication with a fluid supply connection on said tool for controlling the flow of pressure fluid to said feed leg, and fluid passage means is provided between said supply connection and said valve mechanism including a fluid conducting passage in one of said supporting arms.

3. A rock drill as set forth in claim 1 wherein said unitary tool has longitudinal side bolts for securing the parts thereof together and said supporting arms extend longitudinally of said tool at the outer sides of said side bolts in spaced relation from the latter, said supporting arms having lateral lugs, said bolts engaging said lateral lugs for securing said supporting arms rigidly to said tool.

4. A rock drill as set forth in claim 3 wherein a cross bolt arranged transversely on said tool passes through openings in said supporting arms intermediate the ends of the latter and engage the outer sides of said supporting arms for rigidly detachably securing said supporting arms against the sides of said tool.

5. In a rock drill of the character disclosed, a unitary drilling tool for actuating a drilling implement, a combined handle and feed leg attachment for said tool comprising an elongated support rigidly attached to said tool, said support extending longitudinally of said tool and projecting rearwardly from said tool, a handle carried at the rear end of said support and spaced a substantial distance rearwardly of the tool for supporting and directing said tool during its operation, an extensible feed leg, and a transverse hinge connection between the front end of said support and the upper end of said feed leg, said support providing a leverlike portion for said handle whereby manipulation of the tool by said handle is facilitated.

6. A rock drill of the character disclosed comprising a fluid actuated drilling tool for actuating a drilling implement, a fluid actuated extensible feed leg, an elongated support rigidly attached to said tool and extending

longitudinally of said tool, said support projecting rearwardly from said tool, a handle carried at the rear end of said support for supporting and directing said tool during its operation, a transverse hinge connection between the front end of said support and said feed leg, a fluid supply connection on said tool, said tool having a throttle valve for controlling the flow of fluid from said supply connection to said tool for operating the latter without interfering with the flow of fluid to said feed leg, a control valve carried by said handle, fluid passage means extending between said tool supply connection and said control valve including a passage in said support, and a fluid connection between said passage in said support and said feed leg and controlled by said control valve for supplying fluid to said feed leg.

7. A rock drill of the character disclosed comprising a self-contained drilling tool for actuating a drilling implement, an extensible feed leg, a combined handle and feed leg attachment for said tool comprising elongated supporting arms extending longitudinally in parallelism at opposite sides of said tool and rigidly secured to the latter, said arms projecting a substantial distance rearwardly from said tool, a transverse handle carried at the rear ends of said arms and spaced a substantial distance rearwardly of said tool for supporting and directing the latter during its operation, a pivot member carried by the upper end of said feed leg, and a transverse hinge connection between the front ends of said supporting arms and said pivot member, said supporting arms providing leverlike portions for said handle whereby tilting of said tool about said hinge connection is facilitated.

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