Nov. 27, 1962 C. T. THOMPSON 3,065,806

ROCK DRILLS

Filed July 16, 1952 2 Sheets-Sheet 1

Fig. 1.

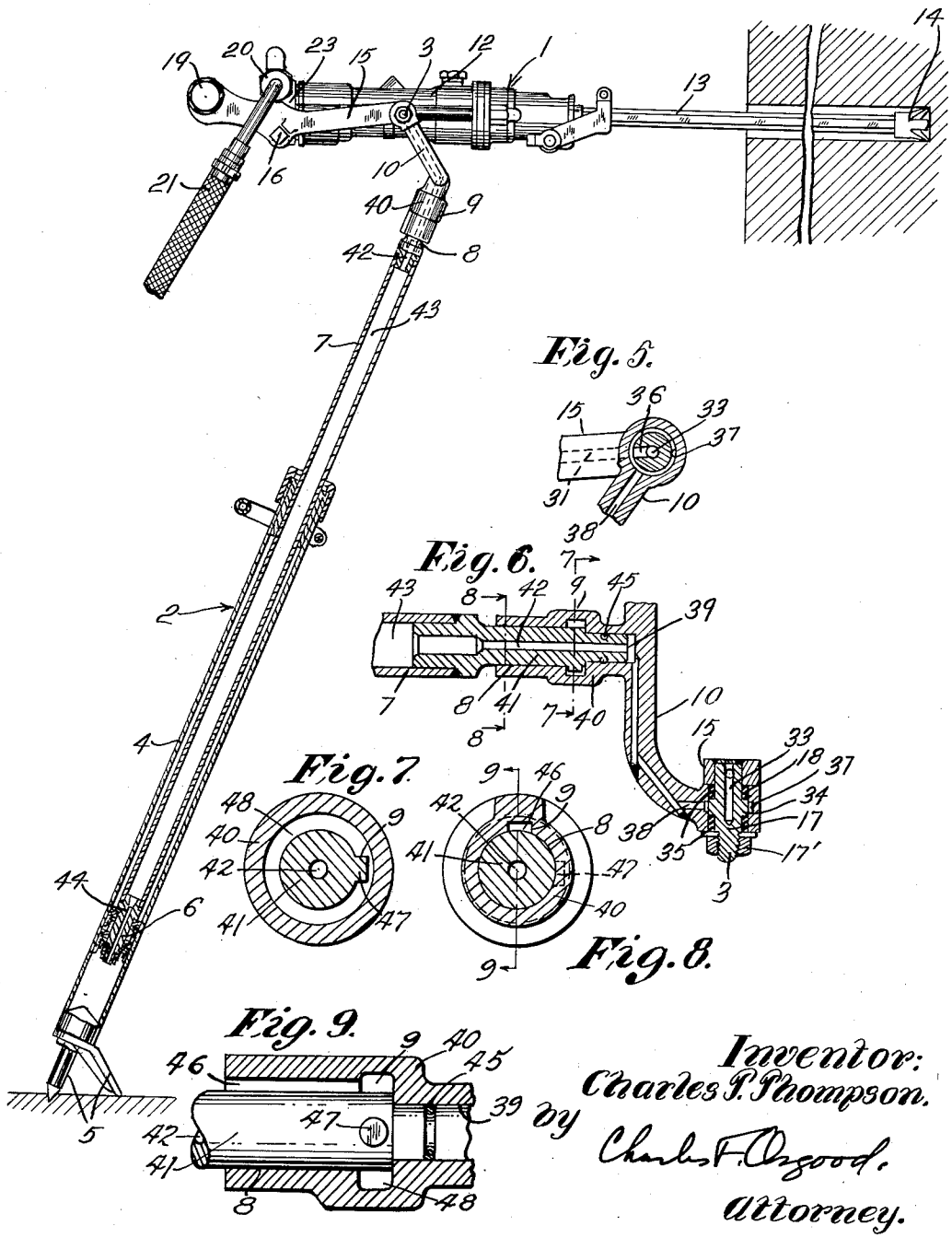


Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

Inventor:
Charles T. Thompson.
by Charles F. Osgood.
attorney.

Nov. 27, 1962 C. T. THOMPSON 3,065,806

ROCK DRILLS

Filed July 16, 1952 2 Sheets-Sheet 2

Fig. 2.

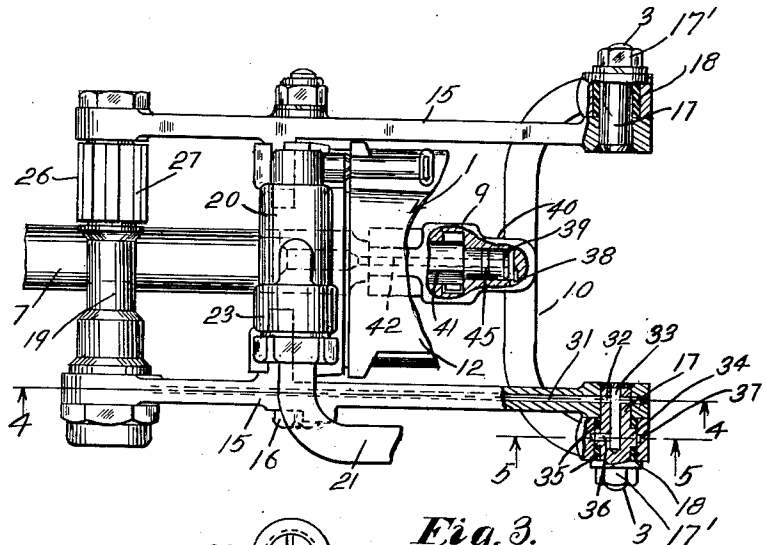


Fig. 3.

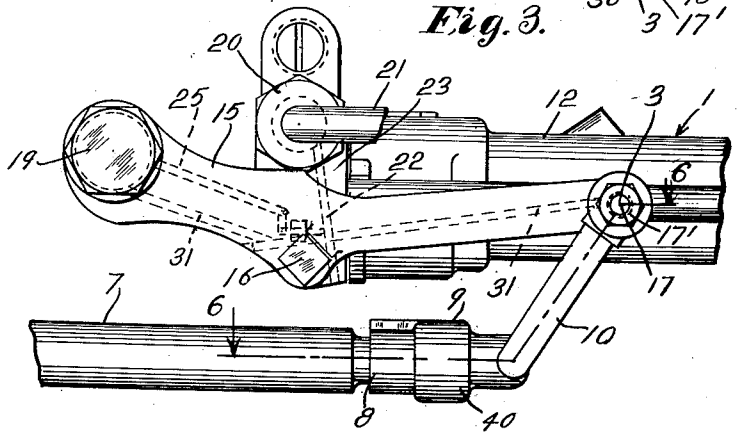
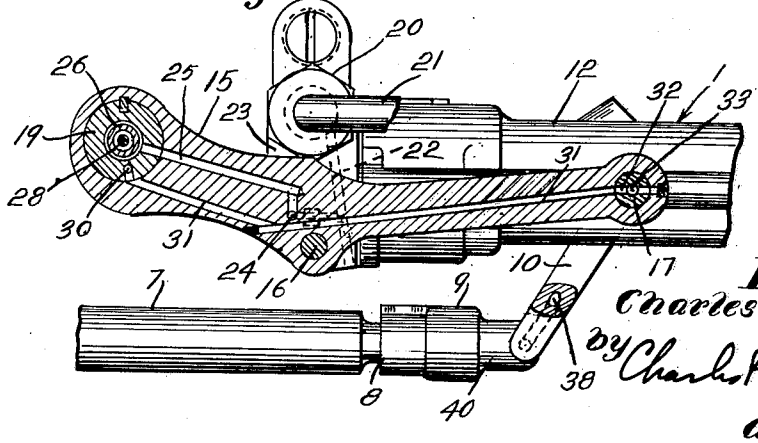


Fig. 4.



Inventor:
Charles T. Thompson
by Charles F. Oxnood,
Attorney.

United States Patent Office 3,065,806 Patented Nov. 27, 1962

3,065,806

ROCK DRILLS

Charles T. Thompson, Newport, N.H., assignor to Joy Manufacturing Company, Pittsburgh, Pa., a corporation of Pennsylvania

Filed July 16, 1952, Ser. No. 299,186
14 Claims. (Cl. 175—124)

This invention relates to rock drills and more particularly to hammer rock drills of the pivoted feed leg type having improved fluid conducting means extending between the hammer drilling tool and the feed leg, through the pivotal connection therebetween, thereby eliminating all loosely hanging external fluid supply hoses with the exception of the single supply hose for the tool.

The present invention resides in improvements over those disclosed in the copending Curtis and Thompson application Serial No. 299,185, now Patent No. 2,908,482, filed of even date herewith, and owned by the same assignee as the present invention. In this copending application an external flexible fluid conducting hose extends loosely between the handle of the drilling tool and the feed leg, and, in the present invention, this flexible connection is omitted and the fluid conducting passage means extends internally through the hinge connection between the tool and the feed leg in an improved manner. Thus, in the present invention, the single supply hose connection for the tool may supply pressure fluid to both the tool and the feed leg without any additional loosely hanging external hose connections which might become entangled and broken and which make handling and operation of the drill somewhat more difficult.

An object of the present invention is to provide an improved rock drill. Another object is to provide an improved hammer rock drill of the pivoted feed leg type. A further object is to provide an improved pivoted feed leg type rock drill having improved fluid conducting connections extending through the hinge pivot thereby eliminating the usual loosely hanging external hose connections. Yet another object is to provide an improved rock drill of the pivoted feed leg type having improved fluid connections, controlled from the drilling tool, for supplying fluid under pressure through the pivotal connection to the feed leg. A still further object is to provide an improved rock drill of the pivoted feed leg type having a fluid supply hose for the drilling tool and fluid conducting passage means extending from the tool supply connection to the feed leg through the transverse pivotal connection between the tool and the feed leg. Still another object is to provide in a tool of the above character a quick detachable connection between the tool and the feed leg and fluid conducting passage means between the tool and feed leg extending through elements of the detachable connection. 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 a rock drill constructed in accordance with a preferred illustrative embodiment of the invention, with the feed leg shown partially in vertical section.

FIG. 2 is an enlarged fragmentary plan view of the improved drill showing the tool support, and with parts broken away in horizontal section.

FIG. 3 is a side elevational view of the drill shown in FIG. 2.

FIG. 4 is a longitudinal vertical section taken on line 4—4 of FIG. 2.

FIG. 5 is a detail vertical section taken on line 5—5 of FIG. 2 and showing a portion of the transverse hinge connection.

FIG. 6 is a sectional view taken in the planes of lines 6—6 of FIG. 3.

FIGS. 7 and 8 are enlarged cross sectional views taken on lines 7—7 and 8—8 of FIG. 6, showing details of the bayonet joint.

FIG. 9 is an axial section taken on line 9—9 of FIG. 8.

The rock drill of the present invention may be of the same general character as that disclosed in the copending Curtis and Thompson application above referred to and generally comprises a hammer drilling tool generally designated 1, and extensible feed leg generally designated 2 and a transverse hinge connection 3 between the drilling tool and the feed leg.

The feed leg 2 is pressure fluid operated and comprises a fluid cylinder 4 having a foot piece 5, and containing a reciprocable piston 6 having an upwardly extending tubular piston rod 7. Detachably connected at 8, desirably by a bayonet joint 9 (FIG. 6), to the upper end of the piston rod is a yoke 10.

The hammer drilling tool 1 is of the pressure fluid operated type and has a usual hammer motor comprising a motor cylinder 12 containing a usual reciprocable hammer piston (not shown) for percussively actuating a drill steel 13 carrying a usual rock drill bit 14. Attached to the sides of the drilling tool are parallel side members or arms 15 secured to the tool by a cross bolt 16, and pivot pins or trunnions 17 secured to the forward ends of the side arms 15 are pivotally engaged in bores 18 (FIG. 2) formed in the arms of the yoke 10 to provide the transverse pivotal connection 3. The axes of the pivot pins or trunnions 17 lie in a transverse line at right angles to lines respectively including the axes of the drilling tool and the feed leg, in the manner shown, whereby the drilling tool and the feed leg may be tilted in upright planes into different angularly related positions. The side arms 15 project rearwardly from the tool and carry a transverse handle 19 adapted to be grasped by the operator to effect supporting, guiding and directing of the drilling tool both during positioning of the drill and during the drilling operation.

The hammer drilling tool has a conventional throttle valve mechanism 20 connected to a fluid supply hose connection 21, and this valve mechanism embodies a usual throttle valve (not shown) positionable to control the operation of the hammer motor of the drilling tool, and, as disclosed in the above mentioned copending application, a passage 22 in the rear head 23 of the tool communicates with a lateral passage 24 and the latter in turn communicates with a passage 25 formed in one of the side arms 15 (FIG. 4). The passage 25 leads to a control valve mechanism 26 carried by the tool handle 19, in a manner also described in the above mentioned application, and this control valve mechanism has an operating sleeve 27 rotatably mounted on the handle 19 and connected to a rotary valve 28 which serves to regulate the pressure in the feed leg cylinder.

Leading from the control valve mechanism is a passage 30 in the handle 19 (FIG. 4) and this passage communicates with a passage 31 in the adjacent side arm 15. The passage 31 extends longitudinally of the side arm and communicates with a passage 32 traversing the adjacent pivot pin 17 and the passage 32 in turn communicates with an axial passage 33 in the pivot pin. Said adjacent pivot pin has an annular external flange 34 which fits the bore 18 in the adjacent yoke arm and arranged at the sides of this flange are sealing washers 35, and a radial passage 36 extends out through the pin flange into communication with an annular groove 37 formed in the wall of the yoke-arm-bore so that the passage 36 is in constant

communication with the groove irrespective of the relative angular positions of the drilling tool and the feed leg about the hinge pivot. The pins or trunnions **17** are threaded (FIG. 6) and by adjusting nuts **17'** threaded on these pins or trunnions the sealing washers **35** may be held under compression variably to effect frictional resistance to pivotal movement of the drilling tool relative to the feed leg. A passage **38** in the adjacent yoke arm (FIG. 6) connects the groove **37** with the front end of a socket **39** in a boss **40** integral with the yoke and a projection **41** on the upper end of the piston rod **7** fits within the boss-socket and has an axial passage **42** which connects the front end of the socket **39** with the hollow interior **43** of the piston rod. An axial passage **44** in the piston **6** (FIG. 1) connects the piston-rod-interior with the cylinder bore beneath the feed piston. Arranged in an annular groove on the projection **41** is a sealing ring **45** (FIG. 6) which sealingly engages the socket-walls to reduce fluid leakage. The bayonet lock **9** includes coacting locking elements on the yoke **10** and projection **41**. The socket in the boss **40** has a longitudinal key-slot or groove **46** along one side wall and a lateral locking lug or pin **47** on the projection **41** is receivable in this key-slot upon insertive movement of the projection **41** within the socket **39**, and when the parts are assembled, relative rotation of the boss and projection effects turning of the pin **47** through 90° in a circular chamber **48** (FIGS. 7 and 9) in the boss to locate the pin out of registry with the key-slot thereby to lock the parts against axial separation.

From the foregoing it is evident that when fluid under pressure is supplied through the hose connection **21** to the throttle valve mechanism **20** of the drilling tool pressure fluid may concurrently flow through passages **22, 24, 25**, past the control valve **28**, through passages **30, 31, 32, 33, 36**, through the pivot pin, groove **37**, passage **38**, socket **39**, passage **42**, the hollow interior **43** of the piston rod and the axial passage **44** to the bore of the feed leg cylinder, and when the control valve **28** is suitably positioned, the bore of the feed leg cylinder may be vented to exhaust through passages **44, 42, 38, 36, 33, 32, 31** and **30** and the valve vent. The control valve mechanism **26** on the tool handle **19** may have its valve **28** readily adjusted to regulate the pressure of the fluid in the feed leg cylinder, and the operator may operate the throttle valve mechanism with one hand and guide and direct the tool and regulate the feed leg pressure with the other hand; and the control valve may be operated without the operator releasing his grip from the tool handle **19**. As the mode of operation of a rock drill of the character disclosed is well known and is fully disclosed in the above mentioned application and also in a copending application to John A. Read, Serial No. 279,014, filed March 28, 1952, also owned by the assignee of the present invention, further description thereof is herein deemed unnecessary.

As a result of this invention an improved rock drill of the pivoted feed leg type is provided having improved fluid conducting connections extending between the drilling tool and the feed leg through the hinge pivot whereby the usual loosely hanging flexible hose between the tool and the feed leg is eliminated. By the provision of the improved fluid flow connection through the hinge pivot between the tool and the feed leg but a single hose connection to the tool serves to supply fluid under pressure both to the drilling tool motor and to the feed leg cylinder. The improved fluid connection through the hinge pivot not only effects supply of pressure to the feed leg but also serves to vent fluid from the leg, and the control valve on the tool handle may control both the fluid supply and the fluid exhaust. The improved structure is simple and durable in design and results in a drill having a minimum of loosely hanging external fluid connections thereby reducing the possibility of interruption of operation of the machine due to tangled and damaged hose connections and facilitating handling and operation of the machine. 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 I claim as new and desire to secure by Letters Patent is:

1. In a rock drill of the character disclosed, a fluid operated drilling tool adapted to actuate a drilling implement, a fluid operated extensible feed leg, a handle attachment secured to said tool and providing a transverse hinge connected between said tool and said feed leg, said handle attachment having a rear handle grip and a forwardly located pivot portion having pivotal connection with said feed leg, said feed leg swingable about its pivotal connection with said handle attachment and disposable at a substantial angle with respect to said tool so that it may feed the tool toward the work during drilling, a fluid supply connection carried by the tool for supplying operating fluid thereto, and fluid supply passage means extending between said fluid supply connection on the tool and said feed leg including passage means extending through the hinge pivot and through which fluid flows to said feed leg.

2. A rock drill as set forth in claim 1 wherein said transverse hinge connection includes a pivot element connected to said handle attachment and a cooperating pivot element connected to the feed leg, and said passage means includes a passage in one of said pivot elements and a communicating annular groove in the other pivot element whereby fluid supply from the connection on the tool to the feed leg may be maintained irrespective of the relative angular positions thereof.

3. In a rock drill of the character disclosed, a fluid operated drilling tool adapted to actuate a drilling implement, a fluid operated extensible feed leg, means providing a transverse hinge connection between said tool and said feed leg and providing a hinge pivot axis located in a plane including the longitudinal axis of the tool, said hinge connection including pivot elements located at the opposite sides of the tool, said feed leg disposable at a substantial angle with respect to said tool so that it may feed the tool toward the work during drilling, a fluid connection extending through one of said hinge pivot elements, and means providing passages on said tool said feed leg with which said fluid connection communicates whereby fluid may flow from the tool to the feed leg.

4. In a rock drill as set forth in claim 3 wherein said hinge connection includes a yoke on said feed leg, said yoke having side arms, a support secured to said tool and carrying said pivot elements engaging cooperating pivot elements on the side arms of said yoke, and said fluid connection includes communicating passages in certain of said pivot elements.

5. A rock drill as set forth in claim 3 wherein sealing means is provided at said transverse hinge connection to prevent fluid leakage at said fluid connection, and adjustable means is provided in coaxial relation with the hinge pivot for variably compressing said sealing means to vary the frictional resistance to pivotal movement of said drilling tool about the hinge pivot relative to said feed leg.

6. A rock drill as set forth in claim 5 wherein said transverse hinge connection comprises threaded pivot pins and said adjustable means including nuts threadedly engaging said pins variably to place said sealing means under compression to vary such frictional resistance to pivotal movement.

7. In a rock drill of the character disclosed, a fluid operated drilling tool adapated to actuate a drilling implement, a fluid operated extensible feed leg, a handle attachment secured to said tool and providing a transverse hinge connection between said tool and said feed leg, said handle attachment having a rear handle grip and a forwardly located pivot connection, said feed leg swingable about its pivotal connection with said handle attachment and disposable at a substantial angle with respect to said tool so that it may feed the tool toward the work during drilling, a fluid supply connection on said tool for supplying operating fluid to the latter, and fluid supply connections between said tool supply connection and said feed leg including fluid conducting passage means extending through the hinge pivot to cause fluid flow from the tool to the feed leg, said passage means including a fluid conducting passage in said handle attachment and a communicating passage on said tool.

8. In a rock drill of the character disclosed, a fluid operated drilling tool, a fluid operated extensible feed leg, a yoke carried by the extensible element of said feed leg, said yoke having side arms, supports secured to said tool and carrying pivot elements pivotally engaging the arms of said yoke whereby said tool may be tilted relative to said feed leg, and fluid conducting passage means extending between said tool and said feed leg to cause flow of fluid to the latter from the tool including fluid conducting passages extending through the tool pivot, said fluid conducting passage means including a passage in one of said supports and a communicating passage in one of said yoke arms.

9. A rock drill as set forth in claim 8 wherein one of said pivot elements comprises a pivot pin on one of said supports, said pin fitting a bore in one of said yoke arms, and said passage means including a passage in said pin and an annular groove in the bore walls and with which said pin-passage communicates.

10. A rock drill as set forth in claim 9 wherein sealing washers are arranged in said yoke-arm-bore and said pivot pin has an external annular flange intermediate said washers, said groove being located between said washers, and said passage in said pin extending outwardly through said flange into communication with said groove.

11. In a rock drill of the character disclosed, a drilling tool adapted to actuate a drilling implement, a fluid operated extensible feed leg, means providing a transverse hinge connection between said tool and said feed leg whereby the relative angular positions of said tool and said feed leg may be varied, said hinge connection providing means including pivot elements at the opposite sides of the tool and a tool attachment engaging said pivot elements, said feed leg disposable at a substantial angle with respect to said tool so that it may feed the tool toward the work during drilling, control valve means carried by said tool, and a fluid connection extending between said valve means and said feed leg and passing through one of the hinge pivot elements to effect fluid flow to said feed leg, said fluid connection including a fluid conducting passage in said tool attachment and a communicating passage in one of said pivot elements.

12. In a rock drill of the character disclosed, a drilling tool adapted to actuate a drilling implement and having a rearward supporting and guiding handle, a fluid operated extensible feed leg, means providing a transverse hinge connection between said tool and said feed leg whereby the relative angular positions of said tool and said feed leg may be varied, control valve means carried by said tool handle, and a fluid connection extending between said valve means and said feed leg and passing through the hinge pivot, said fluid connection including a fluid conducting passage in said handle.

13. In a rock drill of the character disclosed, a hand supported, guided and directed tool for drilling holes at or near the horizontal in an upright face, said tool having a pressure fluid operated motor for actuating a drill steel carrying a drill bit and a handle mounted at the rear end of the tool and having a rear gripping portion which is grasped by the operator in the supporting, guiding and directing of the tool, a pneumatic feed leg adapted to rest at its lower end upon the floor and comprising relatively reciprocable fluid cylinder and piston elements, one of said elements projecting upwardly above the other element, means providing a transverse hinge connection between the upper end of said upwardly projecting element and said handle to permit tilting of said tool and feed leg in upright planes into different angular positions with respect to each other, fluid supply means leading to said tool, control valve means carried by said tool for controlling the supply of operating fluid from said fluid supply means to said cylinder element of said feed leg and including fluid conducting passage means extending through said handle and said transverse hinge connection whereby fluid may be supplied to said feed leg in all relative angular positions of said tool and said feed leg, said control valve means operable to regulate the pressure in said cylinder element by controlling fluid flow from said supply means on the tool to said feed leg and communicating fluid conducting passages on said tool and said feed leg.

14. In a rock drill of the character disclosed, a hand supported, guided and directed tool for drilling holes at or near the horizontal in an upright face, said tool having a pressure fluid operated motor for actuating a drill steel carrying a drill bit and a handle mounted at the rear end of the tool which is grasped by the operator in the supporting, guiding and directing of the tool, a pneumatic feed leg adapted to rest at its lower end upon the floor and comprising relatively reciprocable fluid cylinder and piston elements, one of said elements projecting upwardly above the other element, means providing a transverse hinge connection between the upper end of said upwardly projecting element and said drilling tool to permit tilting of said tool and feed leg in upright planes into different angular positions with respect to each other, fluid supply means leading to said tool, control valve means carried by said tool for controlling the supply of operating fluid from said fluid supply means to said cylinder element of said feed leg and including passage means extending through said transverse hinge connection whereby fluid may be supplied to said feed leg in all relative angular positions of said tool and said feed leg, said control valve means operable to regulate the pressure in said cylinder element by controlling fluid flow from said supply means on the tool to said feed leg, and adjustable means in coaxial relation with the hinge pivot for varying the resistance to relative pivotal movement about said pivot between said tool and said feed leg, said adjustable means including an element past which fluid flows as it passes through said hinge connection.

References Cited in the file of this patent

UNITED STATES PATENTS

13,646	Goodrum	Oct. 9, 1855
1,762,572	Davidson	June 10, 1930
2,168,541	Slater	Aug. 8, 1939
2,289,465	Slater	July 14, 1942
2,400,658	Shepherd	May 21, 1946
2,610,030	Gillerstrom	Sept. 9, 1952

FOREIGN PATENTS

423,578	France	Feb. 18, 1911