W. A. SMITH.

ROCK DRILLING APPARATUS.

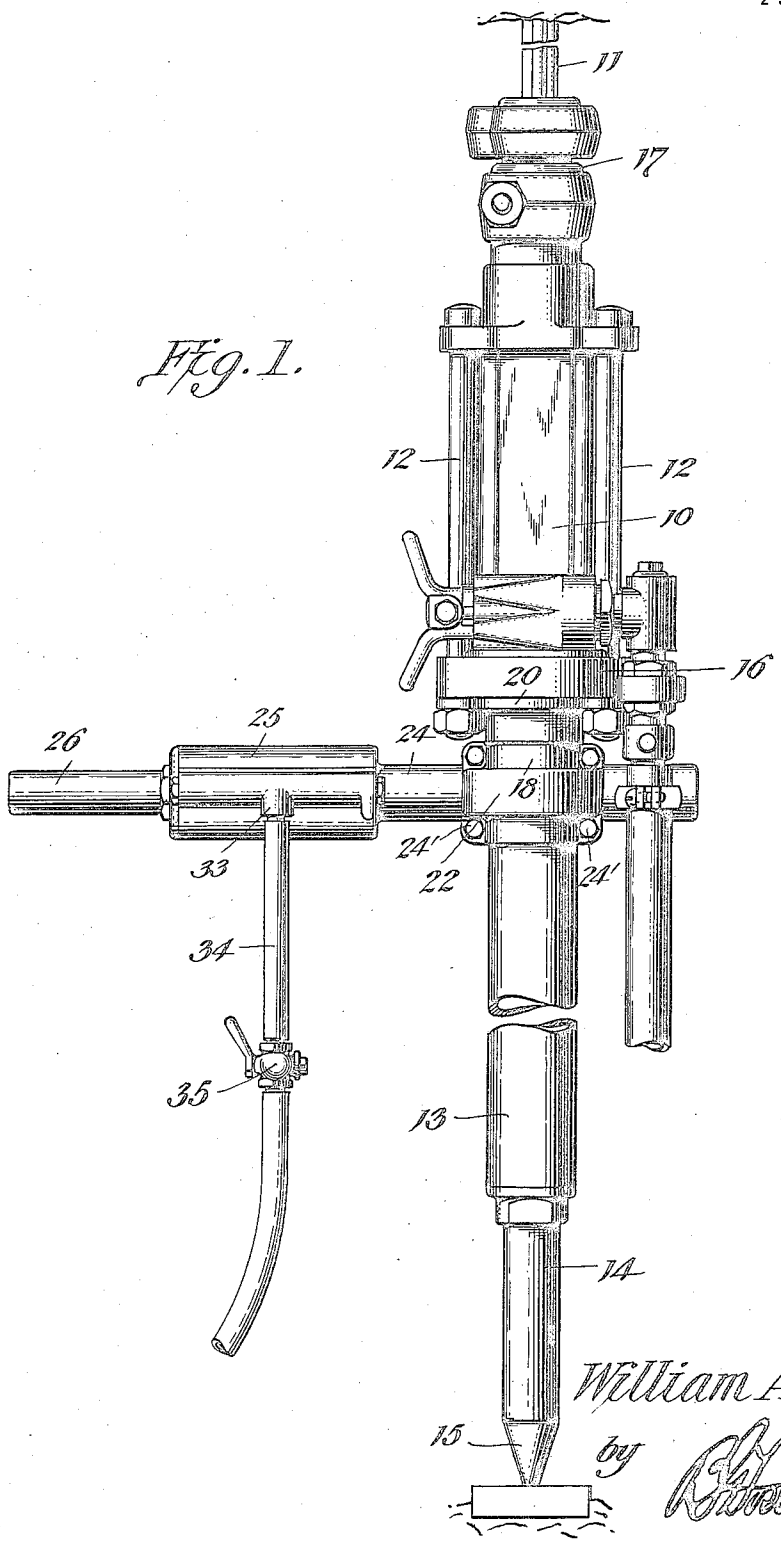
APPLICATION FILED DEC. 27, 1915.

1,196,041.

Patented Aug. 29, 1916.

2 SHEETS—SHEET 1.

Fig. 1.



Inventor,

William A. Smith.

by

Attorney

W. A. SMITH.

ROCK DRILLING APPARATUS.

APPLICATION FILED DEC. 27, 1915.

1,196,041.

Patented Aug. 29, 1916.

2 SHEETS—SHEET 2.

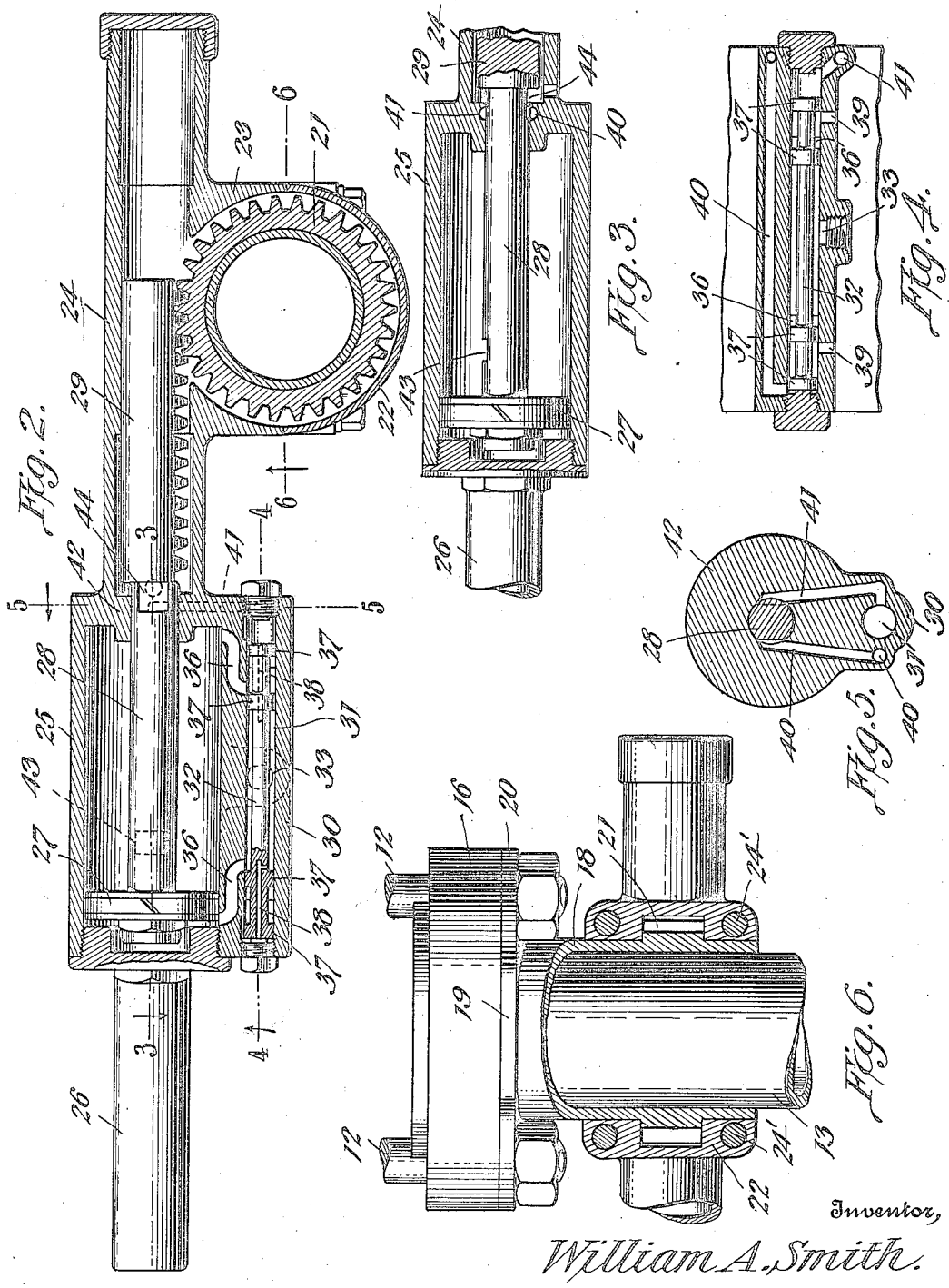


Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Inventor,

William A. Smith.

By

Attorney

UNITED STATES PATENT OFFICE.

WILLIAM A. SMITH, OF DENVER, COLORADO, ASSIGNOR TO THE DENVER ROCK DRILL MANUFACTURING COMPANY, OF DENVER, COLORADO, A CORPORATION OF DELAWARE.

ROCK-DRILLING APPARATUS.

1,196,041. Specification of Letters Patent. Patented Aug. 29, 1916.

Application filed December 27, 1915. Serial No. 68,794.

To all whom it may concern:

Be it known that I, WILLIAM A. SMITH, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented new and useful Improvements in Rock-Drilling Apparatus, of which the following is a specification.

The present invention relates to rock drilling apparatus, and more particularly the means for turning the same.

One of the primary objects is to provide a simple and yet very effective mechanism that will secure an automatic rotation of the drill bit.

A further object is to provide a device of this kind that is in the form of an attachment applicable especially to the type of drilling apparatus in which the feed is secured by fluid under pressure.

One embodiment of the invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a side elevation of drilling apparatus equipped with the present invention. Fig. 2 is a horizontal sectional view on an enlarged scale through the turning means. Figs. 3, 4 and 5 are sectional views taken respectively on the lines 3—3, 4—4 and 5—5 of Fig. 2, and Fig. 6 is a detail view partially in section through the casing and gear carrying sleeve.

Similar reference numerals designate corresponding parts in all the figures of the drawings.

In the embodiment illustrated, a motor of well known type, designated generally by the reference numeral 10, is employed. This motor is preferably of the hammer type and operates on a drill bit 11 in a manner well understood. The motor is held in assembled condition by side bolts 12, as will be understood by those skilled in the art. The said motor and drill bit are held in working position by feeding means, consisting of a cylinder member 13 in which operates a piston having a portion 14 projecting from the rear end of the cylinder, and pointed to provide a spur 15. The cylinder is secured to the motor by being attached to a head block 16, and said head block, as is well known, is held in place by the side bolts 12. So far as described, this structure is well known.

The mechanism for turning the drill bit in the present embodiment, effects a partial rotation of the motor 10 and the cylinder 13, which together form a unit, the two parts, as will be readily understood, being rigidly fixed together, and the drill bit 11 being held against rotation in the motor chuck 17. This mechanism includes a sleeve 18, which is slipped over the cylinder 13, and snugly receives the same, said sleeve having an outstanding flange 19 at its upper end, which flange is provided with ears 20 through which the bolts 12 pass, said bolts thus affixing the sleeve rigidly to the motor 10 and cylinder 13. Incidentally, it will thus be seen that the bolts constitute common means for securing all these parts together. The said sleeve 18 is provided between its ends with an external toothed gear 21, and said gear is surrounded and inclosed by a casing, comprising two parts 22 and 23 held together by bolts 24'. The casing is thus held on the sleeve by the gear, but can be removed by separating the said parts. The part 23 includes a tubular transversely extending projection 24 having an enlargement 25 and terminating at its free end in a handle grip 26.

The enlargement 25 constitutes a cylinder within which is mounted a reciprocatory piston 27, the rod 28 of said piston operating in the tubular extension 24 and being coupled to a rack bar 29 that reciprocates in said extension 24. The rack bar 29, as shown, is in mesh with the gear 21. It will thus be evident that if the handle 26 is held against turning and the piston 27 is reciprocated, this reciprocatory motion will be transformed by the rack 29 and gear 21 into an oscillatory movement, and said oscillatory movement will be imparted to the drilling apparatus, and consequently to the bit 11. Any desired means may be employed for effecting the operation of the piston 27.

In the embodiment described, the cylinder 25 is provided with an enlargement 30 on one side, constituting a valve casing, and provided with an internal longitudinally disposed valve chamber 31 housing a valve, designated generally by the reference numeral 32. Fluid, under pressure, is admitted to the valve chamber 31 through a central port 33, said port being in communication with any suitable supply, which is conducted thereto by the hose line 34, and said

hose line contains a throttle valve 35. From end portions of the valve chamber 31, ports 36 lead to the ends of the cylinder 25 on opposite sides of the piston 27, and these ports are controlled by the said valve 32. This valve, as shown, comprises a central stem, having spaced enlargements 37 at both ends, and ports 38, formed longitudinally in the end portions of the valve, which communicates with the central chamber of the valve casing and with the end portions beyond the valve. Exhaust ports 39 also lead from the end portions of the valve chamber 31, said exhaust ports being located respectively between the two end enlargements 37. In addition, exhaust channels 40 and 41 extend from the end portions of the valve chamber 31 into the head 42 of the cylinder 27, and these ports are brought into communication with the space within the extension 24 by channels or cut-away portions 43 and 44 formed in the sides of the piston rod 38 at opposite end portions thereof.

Briefly described, the operation of the mechanism is as follows: When the drilling apparatus is in operative position and also in operation, if the fluid under pressure is admitted to the valve chamber 31 through the hose line 34, it will be noted that this fluid will pass through the rear or outermost channels 36, and acting behind the piston, force said piston inwardly, the exhaust in advance of the piston taking place through the opposite channel 36 between the enlargements 37 of the valve and out through the adjacent exhaust 39. When the piston 27 reaches the end of its stroke, the channel or cut-away portion 43 will communicate with the port 41, thereby permitting the exhaust of the fluid from the inner end of the valve chamber 31, while the fluid will pass through the opposite channel 38 and against the opposite end of the valve 32, thereby shifting said valve. When so shifted, the ports will be the reverse of those shown, and the fluid will be admitted against the opposite side of the piston 27, and consequently reversing the movement of the piston. All that is therefore necessary is to hold the turning mechanism against movement by means of the handle 26, whereupon the drilling apparatus will be bodily oscillated and the drill bit will be given a corresponding movement.

It will be evident that this structure is exceedingly simple and that it may be modified in various ways. It will also be observed that it can be manufactured in the form of an attachment, which is applicable to a drill without the necessity of modifying the structure, inasmuch as it is only necessary to remove the nuts of the side bolts 12, slip the sleeve and casing over the cylinder 13 until the ears 20 are upon the ends of the bolts 12, and then replace the nuts on said bolts.

From the foregoing, it is thought that the construction, operation and many advantages of the herein described invention will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. The combination with drilling apparatus, of a handle therefor, and means mounted on the handle for turning the drilling apparatus.

2. The combination with drilling apparatus, of means for bodily turning the same, and a handle for holding the turning means from moving with the drilling apparatus.

3. The combination with drilling apparatus, of means for bodily oscillating the same, and a handle connected to the oscillating means for manually holding it from turning with the drilling apparatus.

4. The combination with drilling apparatus, including a motor, of fluid operated feeding means for the drilling apparatus, and automatic means associated with the feeding means and moving with the motor for turning the latter.

5. The combination with drilling apparatus, including a motor, of fluid operated feeding means for the drilling apparatus, including slidably telescoping members, one of which is connected to the drilling motor, and power driven means mounted on said member and moving with the same and the motor for bodily turning the latter.

6. The combination with drilling apparatus, including a motor, of fluid operated feeding means for the apparatus, including slidably telescoping members, one of which is connected to the drilling motor, a reciprocatory motor mounted on the member, and means operated by the reciprocatory motor for bodily oscillating the drilling motor.

7. The combination with a drilling motor, of fluid operated feeding means therefor, including a cylinder and a piston operating in the cylinder, one of the latter being connected to the motor and together with said motor constituting a unit, and a turning motor mounted on the unit and moving therewith for bodily turning the same.

8. The combination with a drilling motor, of fluid operated feeding means therefor, including a cylinder and a piston operating in the cylinder, one of the latter being connected to the motor and together with said motor constituting a unit, a turning motor mounted on the unit and moving therewith

for bodily turning the same, and a handle for manually holding the motor against turning.

9. The combination with a drilling motor, of fluid operated feeding means, including a cylinder connected to the drilling motor, and a piston operating in the cylinder, a motor mounted on the cylinder and movable therewith, and means for oscillating the cylinder and drilling motor from said second motor.

10. The combination with a drilling motor, a feeding motor and a turning motor, of common means for securing all three motors together.

11. The combination with a drilling motor, a feeding means therefor and a turning means for the drilling motor, of side bolts for the drilling motor engaging the feeding means and turning means for securing all together.

12. The combination with a drilling motor and feeding means therefor, of a gear fast to the motor, a casing surrounding the gear, and a motor in the casing and having a gear element meshing with said gear.

13. The combination with a drilling motor and feeding means, of a sleeve fixed to the drilling motor and having a gear, and a turning motor having a gear element meshing with said gear.

14. The combination with a drilling motor, of telescoping feeding members therefor, one of which is connected to the drilling motor, a sleeve gear surrounding said member and also connected to the drilling motor, and a turning motor having a connection with the gear.

15. The combination with a drilling motor, of telescoping feeding members therefor, a gear surrounding one of the feeding members and separable therefrom, common bolts connecting one of the feeding members and the gear to the drilling motor, and a turning motor engaged with the gear.

16. The combination with a drilling motor, of telescoping feeding members therefor, a gear surrounding one of the feeding members and fixed against movement with respect to the drilling motor, a casing surrounding the gear and in which the feeding member is rotatable, and a motor mounted on the casing and connected to the gear.

17. The combination with a drilling motor, of telescoping feeding members therefor, a sleeve surrounding one of the members and connected to the motor, said sleeve having an external gear, a casing surrounding the gear and having a projecting portion provided with a cylinder, and a reciprocatory piston operating in the cylinder and having a rack in mesh with the gear.

18. An attachment for the purpose set forth, comprising a gear and means for mounting the gear upon the exterior of drilling apparatus and attaching it thereto, a casing surrounding the gear and rotatable with relation thereto, means for holding the casing against rotation with the drilling apparatus, and a motor mounted on the casing.

19. An attachment for the purpose set forth, comprising a gear and means for attaching the gear to drilling apparatus, a casing surrounding the gear, a motor mounted on the casing, and a handle for manually holding the motor and casing against movement.

20. An attachment for the purpose set forth, comprising a sleeve having a gear and means for engaging the side bolts of a drill, and a motor associated with the gear.

21. An attachment for the purpose set forth, comprising a sleeve having ears for engagement with the side bolts of a motor, said sleeve also having an external gear, a casing surrounding the gear in which said gear is rotatably mounted, a handle projection extending from the casing and including a motor, and a gear connection between the motor and said external gear.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILLIAM A. SMITH.

Witnesses:
JAMES R. ELMENDORF,
JESSIE TURNER.