

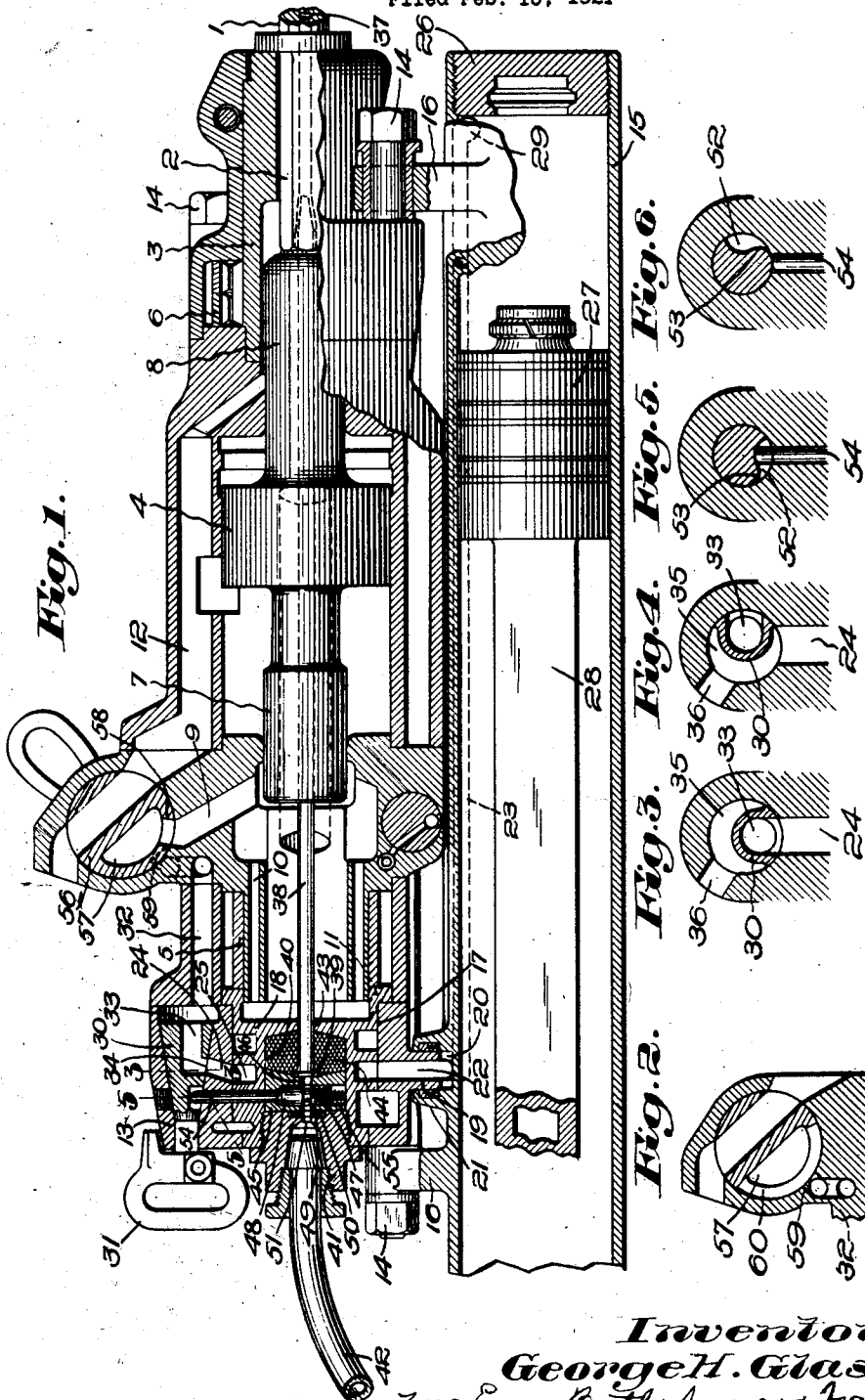
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G. H. GLASER

DRILLING MACHINE

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Inventor:
George H. Glaser,
by **Ernest Booth, James & James**
Attys.

UNITED STATES PATENT OFFICE.

GEORGE H. GLASER, OF WINTHROP, MASSACHUSETTS, ASSIGNOR TO GEORGE H. GILMAN, OF BELMONT, MASSACHUSETTS.

DRILLING MACHINE.

Application filed February 15, 1921. Serial No. 445,208.

To all whom it may concern:

Be it known that I, GEORGE H. GLASER, a citizen of the United States, and a resident of Winthrop, county of Suffolk, State of Massachusetts, have invented an Improvement in Drilling Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

My invention relates to drilling machines and particularly but not exclusively to a hammer drill provided with a feed cylinder and piston for feeding it to the work.

My invention will be best understood from the accompanying drawing and the following description of a specific embodiment thereof submitted for illustrative purposes while its scope will be more particularly pointed out in the appended claims.

In the drawings:

Figure 1 shows an elevation of the submitted embodiment of my invention, parts being shown broken away and other parts in longitudinal section;

Fig. 2 is a transverse section of the controlling valve in the plane of the port supplying the feed cylinder; and

Figs. 3, 4, 5 and 6 respectively illustrate the controlling positions of the feed cylinder throttle and its associated cam, Figs. 3 and 5 respectively being sections on the lines 3—3 and 5—5 of Fig. 1 and Figs. 4 and 6 respectively representing sections on the lines 3—3 and 5—5 of Fig. 1 with the parts moved to another operating position.

In general, the submitted embodiment of my invention includes a drilling tool, a hammer for moving the tool longitudinally, a motor for moving it angularly and a feed cylinder and piston for moving it up to the work.

Referring to the drawings, the hollow drill steel 1 is provided with a polygonal shank 2 for insertion in the chuck 3, which for this purpose is provided with a shank receiving socket of cross-section similar to that of the shank, in order that when the chuck is rotated, the drill steel must rotate with it. For actuating the drill steel I provide a hammer 4 which imparts percus-

sion thereto; and a rotary engine which rotates it. The rotor of the engine is indicated at 5 and in cooperation with gearing and shafts not shown serves to drive the reduction gearing indicated at 6 for turning the chuck. As the details of the hammer and of the mechanism for causing the chuck to rotate are not claimed in this application, the same will not be described except in so far as necessary to show how they are applied to or cooperate with the invention claimed.

The drill steel is formed with a bore 37 for conducting cleansing fluid to the drilling point and for supplying such bore I provide the usual water tube 38 having at its rear end the flange 39.

The hammer has a rearward extension 7 of reduced diameter and a forward extension or hammer bar 8. Motive fluid is supplied to the hammer through a passage 9 whence it finds its way through the passages 10 to maintain a constant pressure at the rear end of the bore receiving the extension 7. From this bore lead the intake passages 11 (only one of which is shown) for the rotary engine. The exhaust for the hammer is indicated by the passage 12, while the rotary engine is exhausted by any suitably positioned passages to the atmosphere. It will be noted by this arrangement that whenever the passage 9 is supplied with motive fluid, both the hammer and rotary engine will be supplied.

The tool actuator formed by the mechanism for imparting rotative and percussive action to the tool includes a casing formed of suitable sections comprising the end section or head block 13 which provides a closure for the casing. These sections are held together by suitably arranged side bolts 14 and arranged in parallelism with the casing is the feed cylinder 15 which is provided with perforated ears 16 through which the side bolts pass to hold the casing and cylinder in assembled relation.

For convenience of manufacture the end section 13 is provided with an opening 17, which carries the portion 18 forming the rear head of the hammer cylinder. Exteriously of the casing I provide a nipple 19 which projects into the socket 20 of the boss

21 carried by the feed cylinder and is provided with a passage 22 in communication with the feed cylinder admission and exhaust passage 23. Angularly disposed in the section 13 with relation to the passage 22 and as illustrated 180 degrees from the passage 22, is a passage 24, and placing these passages in communication is the annular recess or passage 25 formed on the exterior of the member 18.

The feed cylinder is provided with the front head 26 and slidably mounted in the cylinder is a piston 27 carrying the rod 28, which, as will be understood by those skilled in the art, is adapted to engage a suitable support or abutment. The passage 23 hereinbefore referred to communicates with the space between the piston and head 26 through a port 29. For controlling the admission and exhaust of motive fluid to and from the port 29 I provide a valve 30 having an operating handle 31 and carried by the portion of the end section 13 opposite the nipple. This valve is of the turning plug type and is supplied with motive fluid through a passage 32 which in a manner hereinafter described is in constant communication with the source of motive fluid.

As illustrated by Figs. 1, 3 and 4, the valve 30 is provided with a longitudinal passage 33 and a port 34 placing the passage in communication with the exterior lateral surface of the valve. In the same plane as the port 34, the valve is cut away to form an arcual exterior groove 35 and placing the groove in communication with the atmosphere is the passage 36 extending through the wall of the portion of the casing section forming the valve cage. When the valve is in the position illustrated by Fig. 3, the passages 32 and 24 are placed in communication for supplying motive fluid through the port 29 to force the piston 27 outwardly relatively to the feed cylinder and with the valve in the position illustrated by Fig. 4, the passage 24 is placed in communication with the atmosphere through the valve groove 35 and passage 36 to exhaust the feed cylinder and permit the feed piston to move inwardly relatively to the feed cylinder.

The rear cylinder head portion 18 is provided with a rearwardly opening socket 40 and closing the socket is a plug 41 which carries the swivelled waterhose connection 42. The water tube is inserted through an opening 43 in the bottom of the socket and is of such length that the flange 39 of the water tube is spaced from such bottom. Surrounding the portion of the tube in the socket is a packing 44 of rubber or like material. Interposed between the plug 41 and the packing is a valve block 45 provided with an axial passage 46 and a transverse passage 47. The passage 47 preferably is

cylindrical in cross-section and reciprocally mounted therein is a cylindrical piston valve 48 provided with the reduced diameter portion 49, which in the position of parts shown by Fig. 1 acts to establish communication between the water supply connection and the water tube through the passage 46 of the block. When the valve is moved to its lowermost position as viewed in Fig. 1, the reduced diameter portion of the valve will be moved out of register with the passage 46 and the supply of water will be interrupted. To provide a water-tight joint between the plug and the valve block I provide the forward face of the plug with a recess carrying the packing 50, which surrounds the end of the passage 51 leading through the plug to the valve block.

For operating the valve 48 I provide the valve 30 with the recessed portion 52, the bottom of which forms a cam surface 53. Providing a cam follower for the cam surface is a pin 54 which as illustrated by Fig. 1 abuts the cam surface at one end and at its opposite end the adjacent end surface of the valve 48. For holding the cam, the pin and the valve in operative relation I provide a spring 55 located in the bore 47 of the valve block 45 beneath the valve as viewed in Fig. 1. As shown the cam surface is so related to the port 34 of the valve that when the valve is in the position of parts illustrated by Fig. 3 and the motive fluid is supplied the feed cylinder, the cam and its follower are in the position illustrated by Fig. 5 and water is supplied the bit. When the valve is in the position of Fig. 4, under which condition the feed cylinder is vented to the atmosphere, the cam and its follower are in the position illustrated by Fig. 6 in which case the supply of water to the feed is interrupted.

For controlling the passage 9 supplying motive fluid to the parts actuating the drill steel I have shown a control valve 56 having a live air passage 57 in communication with the exterior of the valve through a port 58 adapted to be moved in and out of communication with the passages 9 and 12. The passage 32 leading to the feed valve 30 communicates with the seat for the valve 56 through a port 59, and establishing communication between this port and the live air passage 57 is an angularly extended passage 60 so formed that in all positions of the valve 56 the live air passage 57 will be in communication with the passage 32. The live air passage 57 of the valve may be placed in communication with the air hose in any suitable manner of which the art presents numerous examples.

Although I have described for purposes of illustration one specific embodiment of my invention, it is to be understood that my invention is not limited to the details of this

embodiment and that extensive deviations may be made therefrom without departing from the spirit of my invention.

Claims:

- 5 1. In a rock drilling machine, a hammer drill having a casing containing a piston and provided with a chuck carrying a hollow drill steel, said casing at its rear end having a rearwardly opening socket, a
10 cleansing fluid tube extending axially into said piston and opening into said socket, a packing for said tube, a block for compressing said packing, a member carrying a
15 cleansing fluid supply connection screw-threaded into the end of said socket, a passage extending through said member and block for conducting cleansing fluid to said
20 tube, a valve chamber in said block, a valve in said chamber, said valve moving transversely to said passage for controlling said
25 passage, a throttle valve for controlling the motive fluid for said machine, and a cam actuated by said throttle valve for moving said first mentioned valve.
3. In an air operated drilling machine, a
30 casing, a closure for said casing having a rearwardly open socket, a cleansing fluid tube carried by said closure and opening into said socket, a cleansing fluid supply connection
35 carried by said socket and opening into said socket, a valve for controlling the cleansing fluid supply located in said socket, a valve at the side of said casing for controlling the air supply, and a cam operated by
40 the last mentioned valve for actuating the first mentioned valve.
4. In an air operated drilling machine, a
45 casing, a closure for said casing having a rearwardly opening socket, a cleansing fluid tube having its rear end in said socket, a plug closing said socket and carrying a
50 cleansing fluid connection, a block located in said socket forwardly of said plug and having a valve chamber carrying a valve
55 for controlling the cleansing fluid, said valve being mounted for reciprocation transversely of said socket, a rotary valve at the side of said casing for controlling the air supply, said rotary valve having its axis parallel
60 to said tube, and a cam carried by said rotary valve for actuating said first named valve.
5. In a drilling machine, a casing, a closure therefor having a rearwardly opening
65 socket, a cleansing fluid tube carried by said

closure and opening into said socket, a cleansing fluid supply connection carried by said socket and opening into said socket, a valve for controlling the cleansing fluid supply located in said socket forwardly of said
70 connection, means including a rotary cam for moving said valve, said cam being located exteriorly of said socket, and means for moving said valve.

6. In a drilling machine, a casing, a closure therefor having a rearwardly opening
75 socket, a cleansing fluid tube carried by said closure and opening into said socket, a cleansing fluid supply connection carried by said socket and opening into said socket, a
80 valve for controlling the cleansing fluid supply located in said socket forwardly of said connection, a passage in said closure for conducting motive fluid for opening said machine, a separate valve for said passages,
85 cam means for causing the first mentioned valve to be moved by motion of the last mentioned valve, and a handle located exteriorly of said casing for operating said last mentioned valve.

7. In a drilling machine, a casing, a closure therefor having a rearwardly opening
90 socket, a cleansing fluid tube having its rear end in said socket, a plug closing said socket and carrying a cleansing fluid connection, a block located in said socket forwardly
95 of said plug and having a valve chamber carrying a valve for controlling the cleansing fluid.

8. In a drilling machine, a casing, a closure therefor having a rearwardly opening
100 socket, a cleansing fluid tube having its rear end in said socket, a packing member for said tube in said socket, a block in said socket located rearwardly of said
105 packing and abutting the same, a cleansing fluid controlling valve carried by said block, a plug closing said socket and abutting the block, a cleansing fluid connection carried by said plug, and means of forcing said plug
110 into said socket for compressing said packing.

9. In a drilling machine, a casing, a closure therefor having a rearwardly opening
115 socket, a cleansing fluid tube having its rear end in said socket, a packing member for said tube in said socket, a block in said socket located rearwardly of said packing and abutting the same, a cleansing fluid
120 controlling valve carried by said block, a plug closing said opening and abutting the block, a cleansing fluid connection opening into said socket, and means of forcing said plug into said socket for compressing
125 said packing.

10. In a drilling machine, a tool, its actuator comprising a casing, a feed cylinder, said feed cylinder and casing being in side
130 by side relation, an air supply for said feed cylinder comprising a conduit at one side

of said casing, a cleansing fluid supply including a valve located within said casing and substantially axially thereof, an angularly disposed passage in said casing for
5 conducting air from said air supply connection around said valve to the opposite side of said casing, and a passage connecting said angularly disposed passage with said feed cylinder.
10 11. In a drilling machine, a tool, its actuator comprising a casing, a rearward casing section having a cylindrical opening, a member inserted in said cylindrical opening and having a surface conforming to the surface
15 of said cylindrical opening, a recess in one of said surfaces forming an arcuate passage, a cleansing fluid control valve carried interiorly of said member, a feed cylinder,

at the side of said casing, a passage connecting said arcuate passage with said feed cylinder, and a motive fluid supply passage connected to said arcuate passage.

12. In a rock drill, a hammer piston, a casing therefor having a head-block at its rearward end, a drill steel carried by said casing, a
25 tube mounted in said head-block for conducting cleansing fluid to said drill steel, a reciprocatory valve within said head-block and being positioned rearwardly of said tube and transversely thereto, a valve at the side
30 of said casing, and means causing operation of said last named valve to operate the first named valve.

In testimony whereof, I have signed my name to this specification.

GEORGE H. GLASER.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,553,897, granted September 15, 1925, upon the application of George H. Glaser, of Winthrop, Massachusetts, for an improvement in "Drilling Machines," an error appears in the printed specification requiring correction as follows: Page 3, line 84, claim 6, for the word "opening" read *operating*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 27th day of October, A. D. 1925.

[SEAL.]

KARL FENNING,
Acting Commissioner of Patents.