G. H. GILMAN.

PRESSURE FED TOOL.

APPLICATION FILED MAY 15, 1909.

1,150,592. Patented Aug. 17, 1915.

Fig. 1

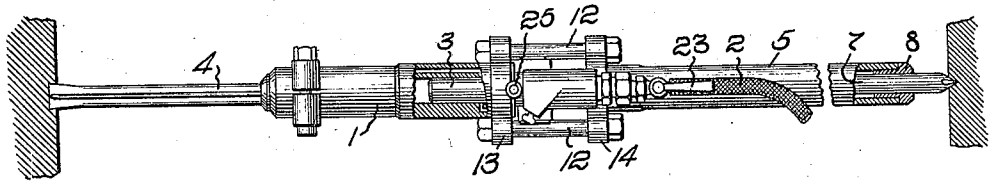


Fig. 2

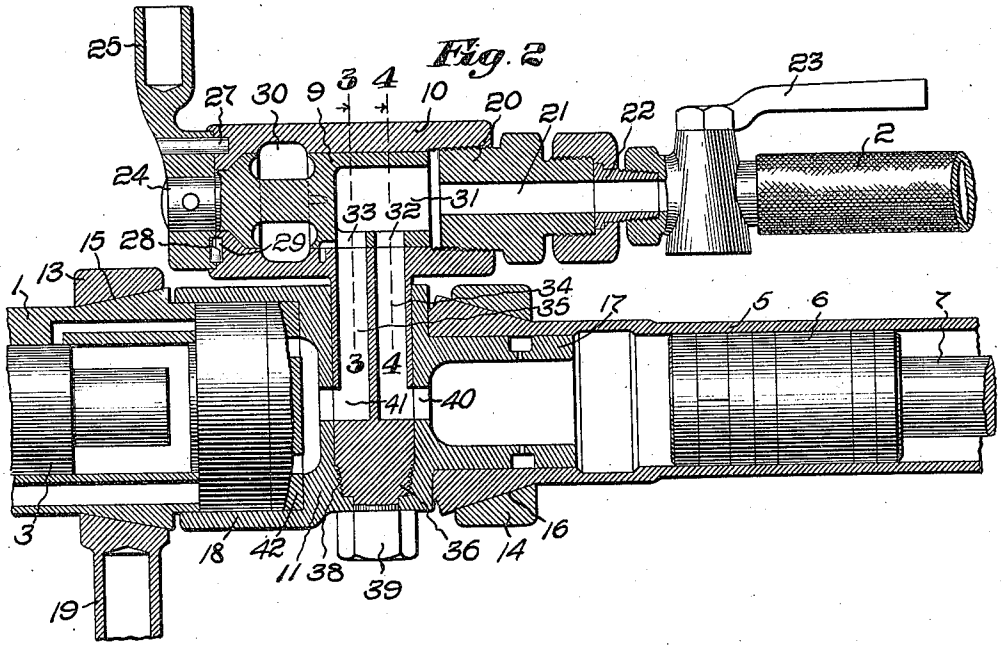


Fig. 3

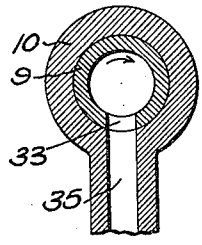


Fig. 4

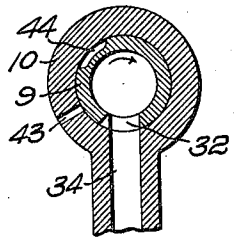
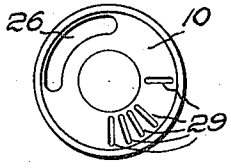


Fig. 5



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by Emery Booth Attys.

UNITED STATES PATENT OFFICE.

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PRESSURE-FED TOOL.

1,150,592. Specification of Letters Patent. Patented Aug. 17, 1915.

Application filed May 15, 1909. Serial No. 496,256.

To all whom it may concern:

Be it known that I, GEORGE H. GILMAN, a citizen of the United States, residing at Claremont, in the county of Sullivan and State of New Hampshire, have invented an Improvement in Pressure-Fed Tools, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to pressure-actuated tools, being more particularly concerned with the provision of improved feeding devices for such tools.

The invention will be best understood by reference to the following description when taken in connection with the accompanying illustration of one specific embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawings: Figure 1 shows in plan, partly broken away, a pressure fed hammer drill embodying one form of my invention; Fig. 2 is a longitudinal, sectional elevation, on an enlarged scale, showing the controlling valve for the feed and the tool and the passages leading therefrom; Fig. 3 is a sectional elevation on the line 3—3 in Fig. 2 looking in the direction of the arrow; Fig. 4 is a sectional elevation on the line 4—4 in Fig. 2 looking in the direction of the arrow; and Fig. 5 is an end view of the valve sleeve with the handle removed.

Referring to the drawings and to the embodiment of my invention there disclosed for illustrative purposes, I have there shown a pneumatic tool, herein of the hammer drill type having the cylinder 1, so connected to suitable pressure-actuated feeding apparatus that the pressure fluid supplied thereto through the pipe 2 acts not only reciprocatively to move the hammer piston 3 against the shank of the cutter bit or drill 4, but also acts initially to advance the tool toward the work and hold the drill forcibly pressed against the same while the tool is in operation, all as represented in Fig. 1.

While pressure-actuated feeding means of any suitable construction may be employed, herein I have provided a feeding cylinder 5 adapted to coöperate with a suitable feeding piston 6 contained therein. Either the piston or cylinder as desired may be connected to the tool, the remaining part serving to support the apparatus either by abutting against a wall or other support (as in Fig. 1), or by direct attachment to some fixed object. In the present instance the cylinder 5 is secured to the tool to move therewith on the piston, the latter having the piston rod 7 which projects through the plug 8 fixed in the rear end of the cylinder and provided with a foot or pointed end adapted to secure a firm hold in the rock.

In the present form of apparatus the pressure fluid for actuating both the feed and the tool is controlled by means of a throttle valve 9, such valve being mounted in a sleeve or casing 10 apart from and exterior to the connecting piece or head block 11, which latter is interposed between and rigidly secured to the feed cylinder 5 and the tool cylinder 1.

The connecting piece or head block 11 is brought into firm, rigid connection with the feed cylinder and tool by means of tie bolts 12 provided with suitable nuts, which bolts serve to draw together the clamping collars 13 and 14. The collars are provided with interiorly tapered seats engaging the flared or tapered walls 15 and 16, respectively, formed on the tool cylinder 1 and the feed cylinder 5. The forward end of the feed cylinder 5 by this means is drawn up rigidly over a reduced projecting portion 17 on the connecting piece, while the rear end of the hammer drill is drawn snugly into a shell 18 formed at the opposite end of the connecting piece.

The forward collar 13 is provided with a radially projecting handle 19, by means of which rotative movement may be imparted to the tool during operation thereof.

Referring now to the throttle valve 9 which controls the feeding pressure and the motive fluid for the tool, the latter is held seated within the sleeve 10 by the threaded tapered plug 20, which latter has a central fluid admission passage 21 and is connected with the feed pipe 2 by means of the nipple 22, a hose line throttle valve 23 of ordinary construction being preferably employed in the pipe 2 between the source of supply and the apparatus. At its opposite

end the throttle valve 9 has a reduced portion 24 which projects out of the sleeve 10, to which is pinned or otherwise rigidly secured the operating handle 25.

Preferably means are provided for limiting the range of handle movement, such, for example, as the arc-shaped groove 26 (Fig. 5) formed in the outer face of the sleeve 10 and receiving a pin 27 carried by the inner face of the handle. To position the valve in the various positions to which it will be customarily turned while, at the same time, permitting graduated movement thereof, suitable means are employed, such as the spring catch 28 carried by the inner face of the handle and adapted to engage any one of a series of depressions 29 formed at suitable intervals in the face of the sleeve. Within the sleeve there is also provided an annular lubricating chamber 30, the details of which, however, forming no part of the present invention, are not herein shown.

From the admission aperture 21 pressure fluid enters a chamber 31 formed in the cup-shaped end of the throttle valve 9, the latter being provided with a pair of radial ports 32 and 33 adapted to control the pressure fluid for the feed cylinder and the tool, respectively. When the valve is turned these parts are brought into or out of registration with passages 34 and 35, respectively, which are formed lengthwise the laterally extending stem piece 36, the latter attached to or formed integrally with the sleeve 10. The connecting piece or head block is suitably formed to receive the stem piece 36, the latter being secured in the head block by its tapered threaded end 38 and the nut lock 39.

When the valve 9 is turned to bring the radial port 32 into registration with the passage 34, pressure fluid is admitted through the said passage to the feed passage 40, which leads through the head block to the feed cylinder, and the latter is thereby forced forwardly or outwardly on the piston. Likewise, when the valve is positioned to bring the radial port 33 into registration with the passage 35, pressure fluid is admitted through the tool admission passage 41 to the constant pressure chamber 42 of the hammer drill, causing actuation of the same. The particular construction of the hammer drill and its controlling valve is of no essential importance, and the details thereof are not shown, it being understood that any suitable form of tool may be employed, such, for example, as that shown in my prior Patent No. 902,288.

To place the feed cylinder in communication with the atmosphere, when desired, suitable means are provided, such as a duct or passage 43 (see Fig. 4) extending laterally through the walls of the sleeve and adapted to be placed in communication with the feed cylinder passage 34 in a certain position of the valve by means of a groove or pocket 44 on the side of the valve, such groove being shown in Fig. 4. In this position of the valve, which may be regarded as its central or inoperative position, the port 33 is shut off from the tool admission passage, and the feeding cylinder being opened to the atmosphere, the apparatus is in its contracted state with the tool out of operation. The port 32 is of greater angular extent than the port 33, as will be clear from Figs. 3 and 4, so that, when the valve is moved farther to the left (as viewed in Figs. 3 and 4), or in the direction of the arrow, the feed cylinder port will be slightly opened in advance of the tool admission port. This is the second position of the valve, and in this position the tool may be advanced slowly toward the work to position the drill by the slight initial pressure fluid admitted to the cylinder. At the same time, the atmospheric passage 43 is cut off from the feed cylinder. With the tool thus positioned it is then usual to start the hammer gently in operation to spot the hole before full pressure is turned on to the tool. From the position described the throttle may be turned either to the full-on position, or first to an intermediate position for the purpose of spotting the hole, and then to the full-on or some one or more intermediate positions.

It will be seen that the throttle valve is located entirely outside of and apart from the head block. This not only materially simplifies its construction and facilitates the examination of the valve and its removal for purposes of repair or for other reasons, but relieves the valve of much of the vibration transmitted to those parts of the head block which are in direct line with the tool. Moreover, being arranged, as it is in the form illustrated, parallel although out of line with the axis of the tool, such vibration as is imparted thereto has little effect in wearing the seating surface of the valve. As shown it is virtually a part of the hose line or constitutes an extension thereof.

While I have herein shown and described for the purpose of illustration, one concrete form or embodiment of my invention, it is to be understood that the same is not limited to the details of construction, or relative arrangement of parts, or to the application herein made of the various features thereof, but that the same may be modified within wide limits without departing from the spirit of my invention.

Having thus described my invention, what I claim is:

1. In a tool feeding apparatus, the combination with a pressure-actuated tool of a pressure actuated feeding device therefor

comprising a fixed and a movable member, a connecting member between the tool and the movable member and having passages leading in opposite directions to the tool and feeding device, respectively, said movable member, connecting member and tool constituting a movable unit, a hose line, hose line connection attached to said connecting member and a single throttle valve differentially controlling said passages, said throttle valve being located outside the connecting member and in the hose line connection.

2. In a tool feeding apparatus, the combination with a pressure actuated tool of a pressure actuated feeding device therefor comprising a coöperating feeding cylinder and piston, one fixed and the other movable, a headblock uniting the tool and feeding device, said movable feed member, headblock and tool constituting a movable unit, and a single throttle valve for the tool and feeding device located upon said movable unit but exterior to the headblock and having its axis parallel with the axis of the tool.

3. In a tool-feeding apparatus, the combination with a pressure-actuated tool, of a pressure-actuated feeding device therefor, a headblock uniting the feeding device and tool, a sleeve member exterior to the headblock, a stem for the sleeve member extending into the headblock and provided with passages leading from the sleeve member to the feeding device and tool, and a throttle valve in said sleeve member adapted in one position to admit pressure fluid to the feeding device, and in another position to admit pressure fluid both to the feeding device and to the tool.

4. In a tool feeding apparatus, the combination with a pressure-actuated tool of a pressure-actuated feeding device therefor comprising a fixed and a movable member, a connecting member between the feeding device and tool, said fixed member, connecting member and tool constituting a movable unit, a valve exterior to said connecting member but connected to and movable with said movable unit, a member connecting the valve and the connecting member and provided with two passages leading through the connecting member to the tool and feeding device, respectively, said passages being controlled by said valve to admit pressure fluid to the feeding device in one position and in another both to the feeding device and to the tool.

5. In a tool-feeding apparatus, the combination with a pressure-actuated tool of a feeding piston and a feeding cylinder therefor, one fixed and the other movable, a connecting member between the tool and the movable feed member, said connecting member being provided with passages leading in opposite directions to control independently the feed and the tool, a removable stem projecting from the connecting member and provided with passages connected with said passages in the connecting member, a casing exterior to the connecting member to which the stem is connected, and a valve in said casing controlling said passages.

6. In a tool feeding apparatus, the combination with a pressure-actuated tool of a pressure-actuated feeding device therefor comprising a coöperating feeding cylinder and piston one fixed and the other movable, a headblock uniting the tool and feeding devices and provided with passages leading in opposite directions, respectively, to the tool and feeding device, said movable feed member, headblock and tool constituting a movable unit, and a single throttle valve for the tool and feeding device and controlling the passage of pressure fluid through said oppositely leading passages, said valve being located upon said headblock but exterior thereto, said valve being adapted in one position to admit fluid pressure to the passage leading to the feeding device and in another position to admit fluid both to the passage leading to the feeding device and to the passage leading to the tool.

7. In a tool feeding apparatus the combination with a pressure-actuated tool of a pressure-actuated feeding device therefor comprising a fixed and a movable member, a connecting member between the tool and the movable member having passages leading in opposite directions to the tool and the feeding device respectively, said movable member, connecting member and tool constituting a movable unit, a hose line, a hose line connection attached to said connecting member and a single throttle valve controlling said passages, said throttle valve being located outside the connecting member and in the hose line connection, said valve in one position being adapted to admit pressure fluid to the passage leading to the feeding device and in another position to admit pressure fluid both to the passage leading to the feeding device and to the opposite passage leading to the tool.

8. In a tool feeding apparatus, the combination with a pressure-actuated tool of a pressure-actuated feeding device therefor comprising a coöperating feeding cylinder and piston, one fixed and the other movable, a headblock uniting the tool and feeding device, said movable feed member, headblock and tool constituting a movable unit, and a single throttle valve for the tool and feeding device located upon said movable unit but exterior to the headblock and having its axis parallel with the axis of the

tool, said headblock having passages leading in opposite directions to the tool and feeding device and said throttle valve being adapted to independently control the pressure fluid through said passages.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

GEORGE H. GILMAN.

Witnesses:
J. A. BRUCE,
A. E. DORSEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."