H. J. HIBSCHLE.

ROCK DRILL.

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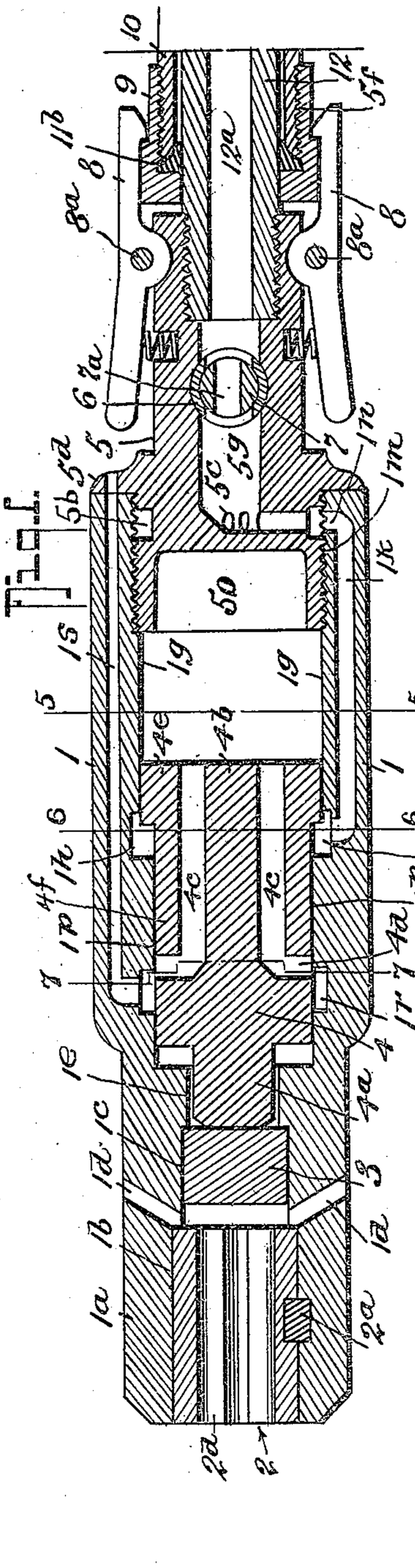
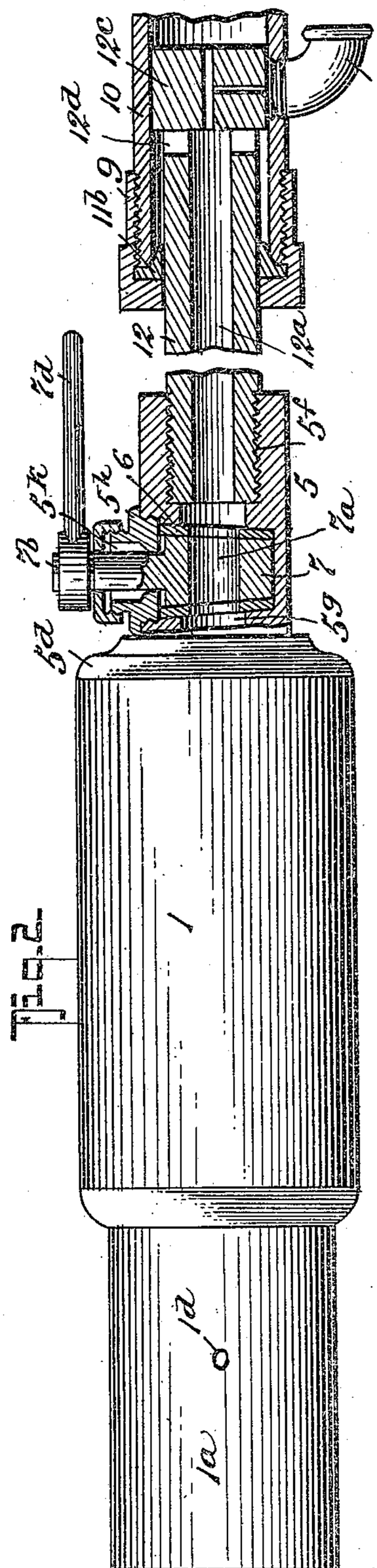
962,350.

Patented June 21, 1910.





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ROCK-DRILL.

962,350. Specification of Letters Patent. Patented June 21, 1910.

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To all whom it may concern:

Be it known that I, HERMAN J. HIBSCHLE, residing at Victor, in the county of Teller and State of Colorado, have invented certain new and useful Improvements in Rock-Drills, of which the following is a specification.

My invention relates to certain new and useful improvements in rock drills of the reciprocating hammer type, and in its generic nature the invention seeks to provide a drill of an improved construction wherein the hammer piston will be of an improved form to give it a maximum operative efficiency; wherein an expansion air chamber is provided to receive the working agent, and by virtue of its expansion to act on the piston after the working agent inlet port has been closed by the forward movement of the piston.

My invention also includes those novel details of construction, combination and arrangement of parts, all of which will be first described and then be specifically pointed out in the appended claims and illustrated in the accompanying drawings, in which—

Figure 1, is a central vertical longitudinal section of the invention. Fig. 2, is a side elevation thereof, parts being shown in section.

Referring now to the accompanying drawings, in which like letters and numerals of reference indicate like parts in all of the figures 1 designates the drill casing whose forward end 1^a is of a reduced diameter and is provided with an internal bore 1^b of one diameter merging with a bore 1^c of a lesser diameter which in turn merges with a bore 1^e of a smaller diameter than the bore 1^c. The bore 1^b receives the drill chuck 2 which is keyed in place by a key 2^a and provided with a Maltese cross-shaped bore 2^d to receive the drill not shown. The bore 1^c receives the striking plug 3 which is shown in detail in Fig. 1, while the bore 1^e is of slightly greater diameter than the striking head 4^a of the hammer piston 4, hereinafter again referred to.

The main body of the casing 1 is provided with an internal bore 1^g merging with another bore 1^p of slightly less diameter than the bore 1^g, and the bore 1^o merges with the bore 1^e, hereinbefore referred to.

1^h represents an annular internal groove at the juncture of the bore portions 1^g—1^p. The groove 1^h receives working agent through the working agent port 1^k that has a portion 1^n at the rear end of the cylinder 1. The cylinder 1 at its rear end is internally threaded as at 1^m to receive the back head plug 5, hereinafter again referred to, the head plug being threaded as at 5^a to coöperate with the internal thread of the cylinder 1.

1^r designates an internal annular groove in the cylinder 1, in the portion of its bore 1^p; the groove 1^r merging with the exhaust port 1^s which runs parallel with the longitudinal axis of the drill and exhausts at the rear end of the body portion of the drill, see Fig. 2.

1^d designates a series of apertures from the internal bore 1^c slanting backward so as to permit small particles of dirt and bits of broken steel, which might accumulate in the striking plug chamber, to be ejected.

The hammer piston 4 comprises a main body portion 4^f of a diameter to fit within the bore 1^k of the cylinder and a portion 4^e at its rear of slightly greater diameter to fit the diameter of the bore 1^g, the hammer piston 4 having its striking head 4^a of a reduced diameter to enter readily the bore 1^e of the drill casing.

It is to be noted that in my improved construction of drill, I provide the hammer piston with a solid core 4^b in longitudinal alinement with its striking head 4^a, so that the full force of the metal may be availed of in striking the drill, thus eliminating the centrally apertured or chambered hammer piston, now commonly used. Surrounding the solid core or central portion 4^b of the hammer piston is a series of ports 4^c which merge with radial ports 4^d that pass to the outside of the hammer piston, as clearly shown in Fig. 1.

5 designates the back head plug which is threaded as at 5^a to enter the rear end of drill casing 1 and form a closure therefor. The back head plug is provided with a flange 5^d that abuts the rear end of the body portion of the casing 1 and forms the closure therefor, the threaded portion 5^a of the head plug being provided with an annular groove 5^b, which when the plug is in place registers with the port 1^n of the live air or inlet port 1^k. A series of ports 5^c connect the groove 5^b with the central internal bore 5^g of the head plug, the bore 5^g running

from end to end and being enlarged at its rear end and internally threaded as at 5^f to receive the feed piston rod 12, hereinafter again referred to. The back head plug 5 has its passage 5^g controlled by a throttle valve 7 whose bushing 6^a fits the aperture or chamber in the back head plug 5. The valve 7 has a passage 7^a and a stem 7^c to receive the wrench 7^d.

The drill is fed to the work by any suitable feeding mechanism, preferably that indicated in the drawings, by reference to which it will be seen a feed piston rod 12 threads into the threaded portion 5^f of the plug 5 and carries a feed piston 2^c that operates in the casing 10, the casing 10 having a cap 9 threaded on the end thereof and carrying a packing 11^b, as shown. The rod 12 has a passage 12^a and ports 12^d through which the working agent from the inlet 10^d passes. Suitable latch devices 8 are pivoted at 8^a to the back head plug 5 and engage the collar 9 to lock the feeding mechanism from operation at times. The back head plug 5 is provided with a countersunk expansion chamber 50, as shown.

When the operator opens the valve 7 the working agent will flow through the passage of the plug 5, enter the port 1^k and from thence be conveyed to the groove 1^h from which it will act upon the piston 4 when the piston is in its forward position to force it rearwardly. As soon as the piston has reached the rearward limit of its stroke, the ports 4^d will come in register with the annular groove 1^h, and the working agent will pass therethrough and to the ports 4^c into the expansion chamber 15 and thus start the hammer piston on its forward movement. As soon as the piston has started on its forward movement and the ports 4^d have become closed, or out of register with the annular groove 1^h, the action of the expanding working agent will serve to force the hammer piston forward until the ports 4^d register with the groove 1^r and permit the working agent to pass through the exhaust 1^s to atmosphere. The expanding force of the working agent serves to give the hammer piston the desired impacting force onto the striking plug 3, which in turn imparts the force onto the drill and forces it in its cutting movement.

The action of the hammer piston may be controlled by the valve 7^b, and as long as the latches 8 do not engage the cap 9, the feeding of the drill to the work will be automatic. When it is desired to use the drill say, in a vertical position then the automatic air feed features are necessary, the latches 8 may be made to engage the cap 9^a and lock the parts together.

From the foregoing description taken in connection with the accompanying drawings, it is thought the complete construction, operation and advantages of my invention will be readily understood by those skilled in the art to which the invention appertains.

What I claim is:—

1. A rock drill comprising a hammer casing having a main body portion and a front end portion, said main body portion having a piston chamber opening through the rear end of said main body portion, said front end portion having a bore merging with said chamber, a hammer piston operating in said piston chamber, a back head plug threaded into said open end of said main body portion and having a countersunk chamber portion, said back head plug having an annular groove, and a fluid passing bore, said plug having radial bores connecting said fluid passing bore with said annular groove, said main body portion having a fluid passage registering with said groove to convey fluid into the interior of said piston chamber to actuate said piston, all being arranged substantially as shown and described.

2. A rock drill comprising a hammer casing having a main body portion and a front end portion, said main body portion having a piston chamber opening through the rear end of said main body portion, said front end portion having a bore merging with said chamber, a hammer piston operating in said piston chamber, a back head plug threaded into said open end of said main body portion and having a countersunk chamber portion said back head plug having an annular groove, a fluid passing bore, said plug having radial bores connecting said fluid passing bore with said annular groove, said main body portion having a fluid passage registering with said groove to convey fluid into the interior of said piston chamber to actuate said piston, and a throttle valve in said back head plug to control fluid passage through said fluid passing bore of said back head plug.

3. A rock drill comprising a hammer casing having a main body portion inclosing a hammer piston chamber, said main body portion being open at one end and internally threaded, said hammer casing having a front end portion provided with a bore of lesser diameter than that of the hammer piston casing, said bore having a plurality of diameters, an impacting plug held in said bore and a drill holding chuck also held in said bore but spaced from said plug, said front end portion having ports entering said bore between said plug and said chuck, a hammer piston operating in said piston chamber and having a projecting end to enter said front end portion bore, said body portion having longitudinal inlet and exhaust channels parallel to the axis of said casing and communicating with the interior of said piston chamber, a back head plug threaded into

the rear end of said hammer casing and having a countersunk chamber portion and an outer annular groove, said back head plug having a flange to abut the rear end of said hammer casing, said flange having a port registering with said exhaust passage of said hammer casing, said back head plug having an inlet, and radial bores connecting said inlet bore with said annular groove, said inlet passage of said hammer casing communicating with said annular groove, all being arranged substantially as shown and described.

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