L. C. BAYLES.

FLUID OPERATED TOOL.

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1,099,483.

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Fig. 3.

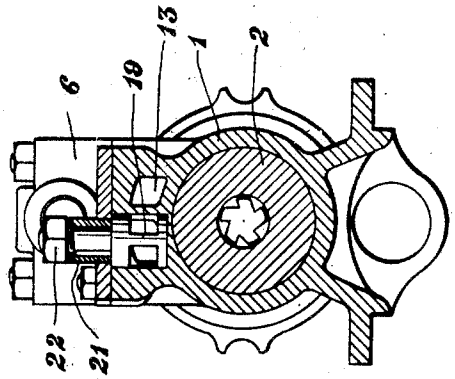


Fig. 4.

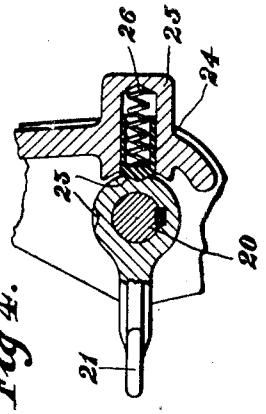


Fig. 1.

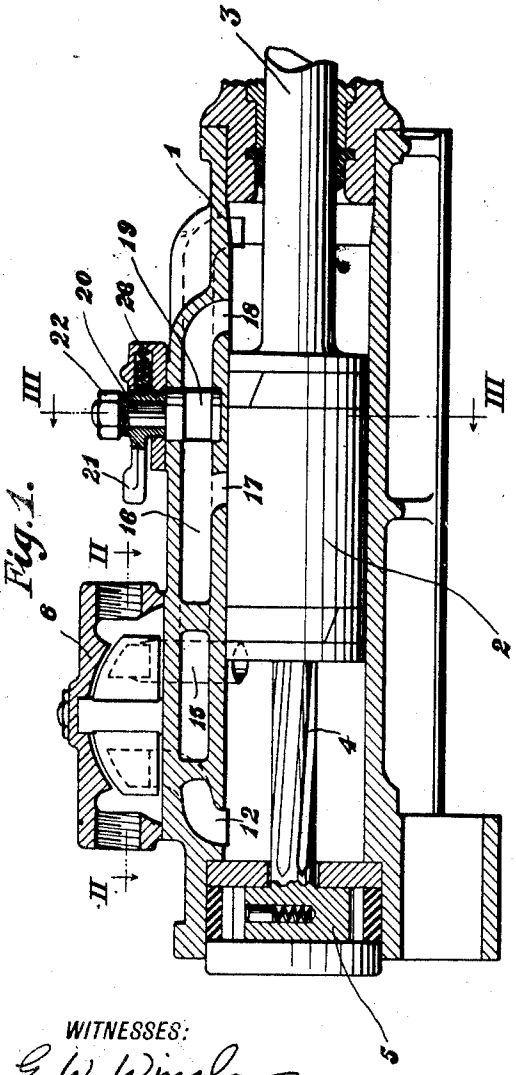
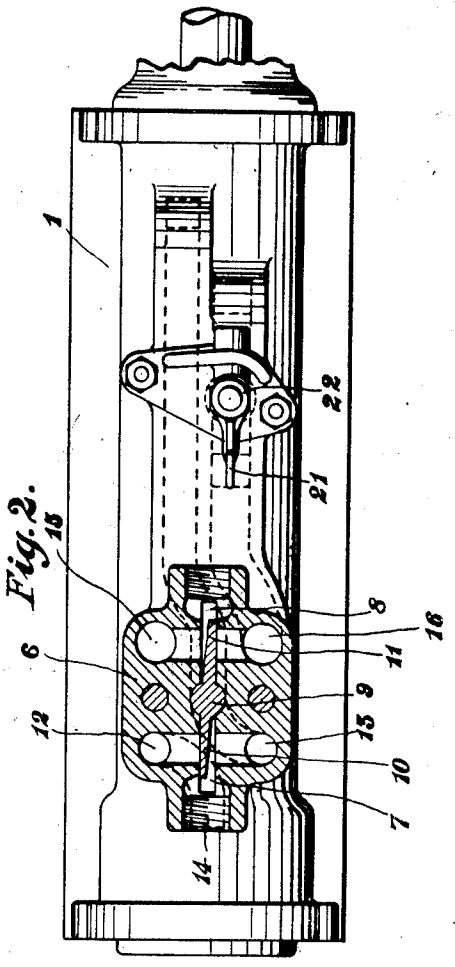


Fig. 2.



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FLUID-OPERATED TOOL.

1,099,483. Specification of Letters Patent. Patented June 9, 1914.

Application filed March 2, 1912. Serial No. 681,089.

To all whom it may concern:

Be it known that I, LEWIS C. BAYLES, a citizen of the United States, residing at Easton, in the State of Pennsylvania, have invented certain new and useful Improvements in Fluid-Operated Tools, of which the following is a specification.

This invention relates to fluid operated drills and more particularly to a valve and port arrangement for such drills.

In the normal use of certain types of drills, such as long stroke piston drills, in order to get the greatest cutting efficiency the drills must be so designed that they will run on a long stroke and have very little air cushion between the piston and the front end. In certain phases of the operation of drills of this kind which are lightly built and will run only on a long stroke, difficulties arise which render their operation unsatisfactory. For example, when a new hole is started obliquely in a rock face such a drill must be throttled down to a very low degree of efficiency, otherwise the steel will glance on the rock face and the piston will hit the front head with a force which is damaging to the drill. Also in drilling through soft rock strata, the drill often cuts faster than the mud can be removed, resulting in a ring of mud around the steel which may cause the breaking of the drill when the operator endeavors to extract the drill by cranking it back while in operation.

The object of the present invention is to so design the drill that the operator can operate the drill either on a long uncushioned stroke or a short cushioned stroke as conditions dictate.

With this object in view I add auxiliary ports for the exhaust nearer the middle of the cylinder and provide means whereby the port or ports normally used for exhaust can be shut at will by the operator and the auxiliary ports alone used thereby allowing a shorter cushioned stroke.

A specific embodiment of my invention is found in the accompanying drawings in which—

Figure 1 is a side view partly in longitudinal section of the complete drill. Fig. 2 is a plan view partly in section through the line II—II, Fig. 1. Fig. 3 is a transverse section through the line III—III, Fig. 3. Fig. 4 is a detail showing the construction of the handle of the auxiliary valve.

The drill shown is of the piston type and comprises a cylinder 1, in which slides a piston 2 directly connected with the tool 3. The piston is revolved by the usual rifle bar 4 attached to the slip ratchet rotation device 5. On the upper side of the cylinder is mounted the main valve chest 6. Centrally placed in the valve chest is a cylindrical bore with two parallel walled slots 7, 8, radiating therefrom. The valve consists of a cylindrical body 9, which is mounted for oscillation in the cylindrical bore of the valve chest, and two tapered wings 10 and 11 having faces controlling the inlet and exhaust of the tool. From opposite sides of valve slot 7, inlet passages 12 and 13 run to opposite ends of the cylinder and are connected by reason of the movement of the valve alternately with inlet opening 14. From the face of valve slot 8, two exhaust passages 15, 16 run to the cylinder the valve being thrown by compression produced in the ends of the cylinder after the piston has covered these exhaust ports, the compression being conveyed to the valve by the inlet passages 12 and 13. Passage 15 opens into the cylinder through a single port. Passage 16, however, divides and opens to the cylinder through two ports 17, 18, at different distances from the end of the cylinder. In the passage 16, between ports 17 and 18, is a valve 19 rotating in a seat in the cylinder casing. Upward from the valve extends a lug 20, on which is keyed a handle 21. A nut 22 prevents the handle from coming off. To hold the valve in open and shut positions the sleeve of the handle is provided with depressions 23, which are engaged by a pawl 24, sliding in a cylindrical seat 25 and actuated by a spring 26.

In operation under normal conditions, the valve 19 remains open allowing the piston to make a full uncushioned stroke. Under conditions requiring a cushioned stroke, the operator closes the valve 19 by means of its handle 21 and the volume of air from the edge of port 17 to the front head is compressed, acting as a cushion and limiting the length of the stroke by throwing the valve sooner.

Although in the drill shown and described the auxiliary port is disclosed only in the tool end of the cylinder, it is often desirable to provide a further auxiliary port in the handle end. Further-

more, although the auxiliary valve shown in the drawings is adapted to be used in only two positions fully open or fully shut, yet it is found in practice that good results are obtained by only partly closing the auxiliary valves, or using a by-pass or leak port in connection with them, and such a construction is considered within the scope and spirit of my invention as expressed in the claims, in which "closing" is to be understood to mean either fully or partially closing.

The invention is not limited to any particular form of valve, nor is it limited to drills of the type wherein the steel is attached to the piston as shown herein.

What I claim is:

1. In a fluid operated drill, a cylinder, its piston, a valve, inlet passages to both ends of the cylinder, controlled by said valve, said passages serving also to convey compression to throw said valve, an exhaust passage controlled by said valve, leading from an end of the cylinder and having two ports opening into said cylinder at different distances from the end thereof, both of said ports being farther from said end than the inlet passage to that end, means for closing the port nearest the end of the cylinder, and exhaust means for the other end of the cylinder.

2. In a fluid operated drill, a cylinder, its piston, a valve, an inlet passage to an end of the cylinder controlled by said valve, an exhaust passage from the same end of the cylinder opening therefrom farther from the end of said cylinder than said inlet passage, means for closing said exhaust passage at will, a second exhaust passage from said cylinder opening therefrom at a point farther from the said end of said cylinder than said first exhaust passage and inlet and exhaust passages for the other end of the cylinder.

3. In a fluid operated drill, a cylinder, its piston, a valve, faces on said valve, inlet passages to the ends of the cylinder leading to said faces, said inlet passages serving also to convey compression from the cylinder to said valve faces to throw said valve, an exhaust passage from said cylinder opening therefrom farther from the end of said cylinder than said inlet passage, means for closing said exhaust passage at will, a second exhaust passage opening from said cylinder farther from said end of said cylinder than said first exhaust passage, and exhaust means for the other end of said cylinder.

4. In a fluid operated drill, a cylinder, its piston, an oscillating valve having wings thereon, inlet passages to the ends of the cylinder controlled by one of said wings, said inlet passages serving also to convey compression from the cylinder to said wing to throw said valve, an exhaust passage from an end of said cylinder controlled by a second wing, said exhaust passage having a plurality of ports opening from said cylinder at different distances from said end, all said ports being farther from said end than the opening of the inlet passage to that end, means for closing the exhaust port nearest said end of the cylinder, and exhaust means for the other end of said cylinder.

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