W. C. WHITCOMB.

MOTOR ACTUATED HAND TOOL.

APPLICATION FILED APR. 30, 1906.

908,920.

Patented Jan. 5, 1909.

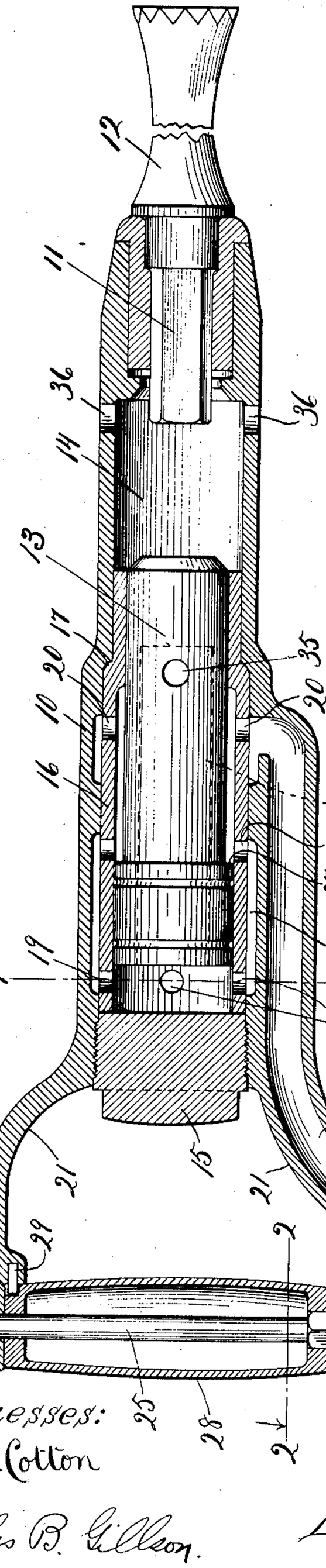

Fig. 1.

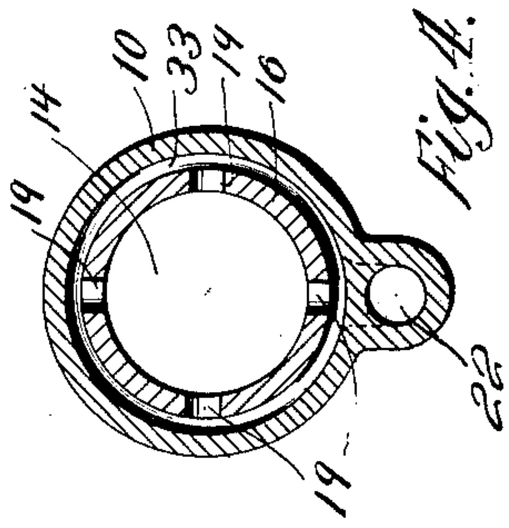

Fig. 4.

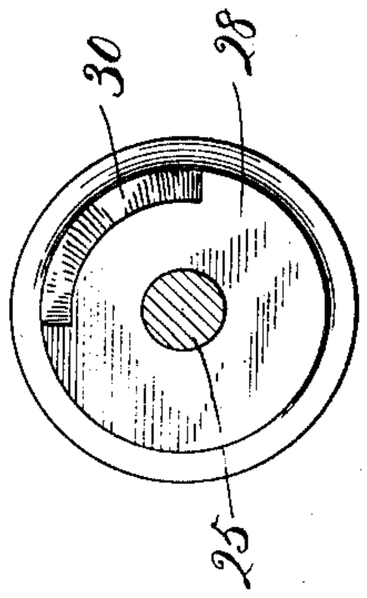

Fig. 3.

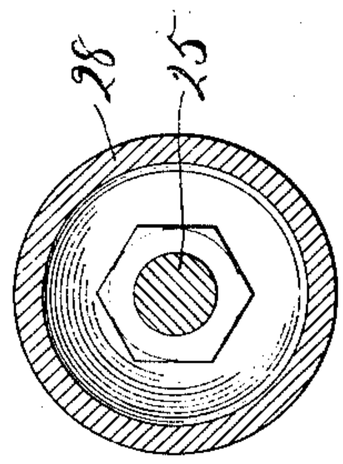

Fig. 2.

Witnesses:
W. H. Cotton
Charles B. Gillson.

Inventor:
William C. Whitcomb

By Louis A. Gibson Atty.

UNITED STATES PATENT OFFICE.

WILLIAM C. WHITCOMB, OF CHICAGO, ILLINOIS, ASSIGNOR TO GEORGE D. WHITCOMB COMPANY, A CORPORATION OF ILLINOIS.

MOTOR-ACTUATED HAND-TOOL.

No. 908,920. Specification of Letters Patent. Patented Jan. 5, 1909.

Application filed April 30, 1906. Serial No. 314,476.

To all whom it may concern:

Be it known that I, WILLIAM C. WHITCOMB, a citizen of the United States, and resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Motor-Actuated Hand-Tools, of which the following is a specification, and which are illustrated in the accompanying drawings, forming a part thereof.

The invention relates to hand tools of that type in which there is incorporated with the tool an actuating motor, and particularly to those which operate by means of a succession of blows and which have, therefore, when at work a considerable amount of vibration. To be operated effectively these tools generally require the use of both hands of an attendant to hold them to their work, and it is essential, therefore, in their construction to provide means for controlling the motor-actuating fluid capable of being adjusted by the attendant without making it necessary for him to release his grip on the tool, for, if he must start the tool while it is held with but one hand, before he can regain his grip with the other, its vibration may be so great as to have passed entirely beyond his control. An attempt has been made to overcome this difficulty by providing the device for controlling the motor fluid with a thumb-piece which must be grasped and held by the attendant so long as the tool is in operation, but this construction is objectionable, for the vibration of the tool causes the hand to become cramped and it is therefore almost impossible to avoid accidental release of the thumb-piece and a consequent shutting off of the power supply.

The invention consists, in a motor actuated hand tool, of means for controlling the motor fluid which can be operated by the attendant without impairing his grip on the tool, and in certain details of construction, all to be hereinafter described and claimed.

The invention has for its object to improve and simplify the construction of devices of this kind.

In the accompanying drawings—Figure 1 is a central longitudinal section of a motor-actuated hand tool, in the construction of which the invention is exemplified; Fig. 2 is a sectional detail on the line 2—2 of Fig. 1; Fig. 3 is an end elevation of a grip-piece of the tool, a detail of the device for controlling the motor fluid upon which the grip is mounted appearing in cross-section; and Fig. 4 is a sectional view on the line 4—4 of Fig. 1.

The particular form of hand tool illustrated in the drawings is a pneumatic rock-drilling device, such, for example, as is used in certain mining operations, and it is of the type commonly termed a plug drill. It comprises a power cylinder 10, recessed at its forward end to receive the stem 11 of a drilling tool 12, and a plunger or piston 13, so constructed that it may be reciprocated at a high rate of speed within the chamber 14 of the cylinder by means of compressed air and impact at each of its forward strokes on the end of the drilling tool.

The inner or upper end of the power-cylinder 10 is provided with an openable head in the form of a screw-plug or nut 15, and the walls of the cylinder are protected against wear by means of a bushing 16, which is seated on a shoulder 17 formed by contracting the diameter of the cylinder wall at its forward end, and is held to its seat by the screw-plug. This bushing is provided with port openings 18, 19 and 20 for the admission of the compressed air for driving the piston 13, and these openings are controlled to produce the desired reciprocation by the movement of the piston itself, while the bushing and the piston may be bodily withdrawn from the cylinder for the purpose of repair by removing the screw-plug 15.

The tool is provided with a grip stock 21, having a duct 22, through which the motor fluid is led to the power cylinder. As shown, the grip stock 21 is of yoke form and the duct 22 passes along one of the branches of the yoke. At the outer end of the duct is a threaded socket 23 for the attachment of a hose, not shown, communicating with the power supply. A valve 24, provided with a channel for the purpose of establishing communication between the socket 23 and the duct 22, is mounted in the grip stock. In the form of construction illustrated the body of the valve is slightly tapered, and it is rotatably mounted in that branch of the yoke having the duct 22, while a stem 25 of the valve extends across the yoke and is journaled in its other branch, as indicated at 26. A threaded nut and washer 27 are applied to the outer end of the valve stem for the purpose of adjusting the valve in its seat.

A grip-piece 28, preferably of such size and

shape that it may be conveniently and firmly grasped by the hand, is carried by the valve stem 25 and is fixed against rotation thereon, while a pin 29, carried by one of the branches of the grip stock, plays in a groove 30 of the grip-piece to limit its rotation and that of the valve. A reservoir 31 for lubricant is mounted on the grip stock preferably above the valve 24 and communicates, by means of a minute aperture 32, with the duct 22 when the valve 24 is open.

In using the device a supply of compressed air will be continuously delivered at the threaded socket 23 and the tool will be held to the work preferably in a substantially vertical position by grasping the cylinder 10 near its forward end, in one hand, and the grip-piece 28 in the other. To start the drill the grip-piece 28 is rotated to bring the channel of the valve 24 into register with the duct 22 and to open the passage 32 leading from the lubricator reservoir 31. Compressed air then enters the power cylinder 10 in front of the head of the piston 13 through the port openings 20, and during the beginning of the advance stroke, that is, when the parts are in the position illustrated in Fig. 1 of the drawings, is led by means of the port openings 18 and an annular chamber 33 formed in the cylinder wall, to the port openings 19, by which it is admitted ~~to the~~ space behind the piston and drives it forward. As the piston advances access of the air to the space behind it is cut off by the closing of the port openings 18 by the piston itself, and the forward stroke is completed by the momentum of the piston and by the expansion of the air admitted before this port was closed.

Near the end of the forward stroke the air which effects this movement exhausts through a passage 34 and lateral openings 35 in the body of the piston to the forward end of the cylinder chamber 14, from which it readily escapes to the atmosphere through port openings 36. The return stroke of the piston is accomplished by pressure of air, entering the cylinder through the port openings 20, upon an annular face 37 of the piston head which, however, in order that it may not interfere with the advance stroke of the piston, is of limited area, for it is then also exposed to the air pressure.

Preferably the openings 20 are closed near the end of the forward stroke of the piston for the purpose of cushioning its movement, so much of the return stroke as occurs before these openings are again uncovered being effected in part by the recoil of the piston and in part by the expansion of air thus confined. If the grip-piece 28 is properly grasped by the hand at the beginning of each operation, the valve for controlling the motor fluid may be held wide open or in any desired adjusted position by the effort of holding the tool to its work and the vibration of the tool, has no effect upon it.

The bushing 16 may be easily withdrawn for the purpose of renewal by removing the screw-plug 15 which closes the inner end of the cylinder wall, and the grip piece 28, this latter being easily effected by unscrewing the nut 27 and withdrawing the valve 24 and its stem 25.

I claim as my invention—

1. In combination, a cylinder, a differential piston reciprocable within the cylinder, a fluid duct leading into the cylinder adjacent that end in front of the smaller face of the piston, a port in the wall of the cylinder adjacent its other end, a second port in the wall of the cylinder intermediate of its ends and separated from the first-named port a distance greater than the length of the head of the piston, a passage leading through the wall of the cylinder connecting the ports, and an exhaust port for the space behind the larger face of the piston openable when the piston approaches the forward end of the cylinder.

2. In a fluid-actuated hand tool, in combination, a cylindrical chambered body having an annular shoulder formed in the wall of the chamber intermediate of its ends, a pair of channels formed in the wall of the chamber at one side of the annular shoulder and a fluid duct leading into the channel next adjacent the annular shoulder, a cutting tool mounted at that end of the body of the tool beyond the annular shoulder from the fluid duct, the head of the tool entering the chamber of the body, a removable cap normally closing the other end of the chamber of the tool body, a differential piston having a stem for engaging the head of the tool, and a bushing for the piston removable from the chamber of the tool body through the end normally closed by the cap, said bushing having a contracted inner end for engaging the annular shoulder in the wall of the chamber of the tool body and for slidingly receiving the stem of the piston and having a port opening adjacent the annular shoulder communicating with that channel in the wall of the tool body which is entered by the fluid duct, and a pair of ports communicating with the other channel in the wall of the chamber of the body of the tool, the ports of said pair being separated a distance greater than the length of the head of the piston.

WILLIAM C. WHITCOMB.

Witnesses:
C. I. CROSMAN,
CHARLES B. GILLSON.