No. 750,236. PATENTED JAN. 19, 1904.

L. W. TURNBULL.

PNEUMATIC TOOL.

APPLICATION FILED APR. 27, 1903.

NO MODEL.

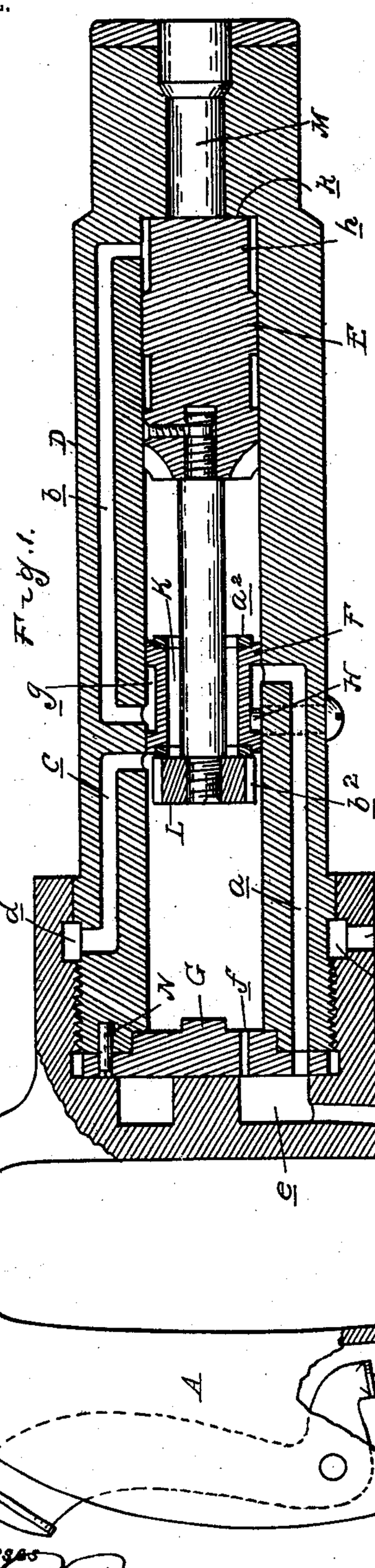

Fig. 1.

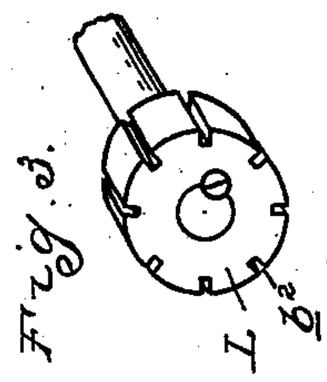

Fig. 3.

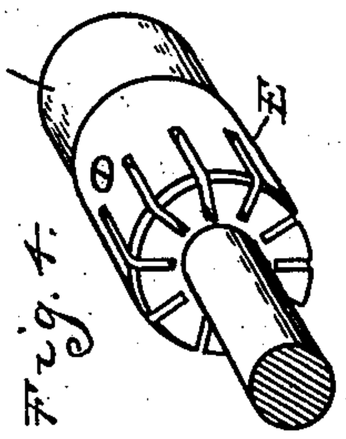

Fig. 4.

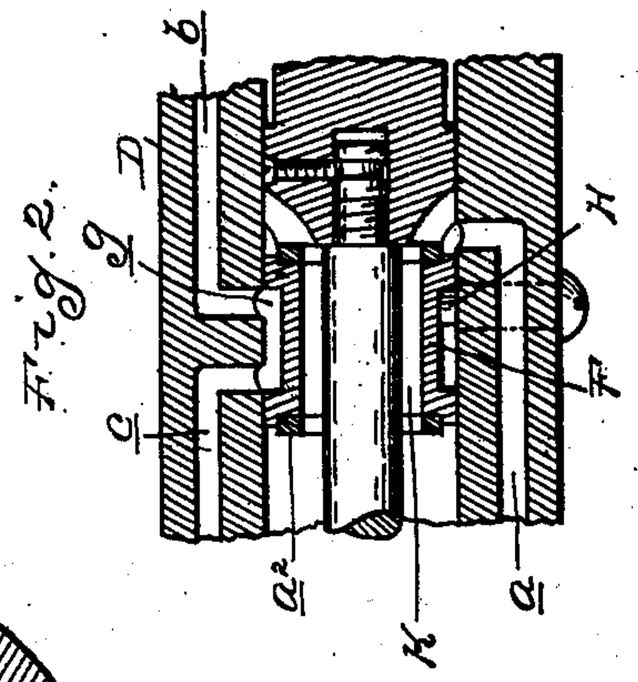

Fig. 2.

Witnesses
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No. 750,236. Patented January 19, 1904.

UNITED STATES PATENT OFFICE.

LUKE W. TURNBULL, OF PORT HURON, MICHIGAN.

PNEUMATIC TOOL.

SPECIFICATION forming part of Letters Patent No. 750,236, dated January 19, 1904.

Application filed April 27, 1903. Serial No. 154,547. (No model.)

To all whom it may concern:

Be it known that I, LUKE W. TURNBULL, a citizen of the United States, residing at Port Huron, in the county of St. Clair and State of Michigan, have invented certain new and useful Improvements in Pneumatic Tools, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to improvements in pneumatic tools in which a piston reciprocates in a cylinder under the pressure of compressed air, steam, or other fluid and delivers a rapid succession of blows upon a tool-holder carrying chisels or bits for cutting wood, iron, or stone, calking and riveting tools for boilers, and similar classes of work; and the objects of my improvements are to construct a tool that is simple in construction, that can readily be taken apart and cleaned and as readily put together again, and at the same time will always be in running order. I attain these objects by the construction illustrated in the accompanying drawings, in which—

Figure 1 shows the tool largely in cross-section with the plunger in the forward position. Fig. 2 shows the valve and plunger in the rear position. Fig. 3 is a perspective view of the collar. Fig. 4 is a perspective view of the piston.

Similar characters indicate the same parts throughout the drawings.

For the sake of clearness the left or handle end of the tool will be called the "rear" end and the right will be called the "forward" end.

The tool is composed of two main parts—the handle A and the cylinder D. Attached to the handle is the feed-pipe C, which conducts the fluid to the tool. The supply of the fluid is controlled by the thumb-lever B, pivoted in the handle and acting on the valve-rod *r*, to which is attached the valve *s*, held up against its seat by a small spring and by the pressure of the fluid. This valve controls the flow of the fluid from the pipe C through passage *t* and passage *u* to the supply-chamber *e*. The plug *w*, screwed into the handle, closes the opening necessary to admit the tools for machining the valve-seat and also serves as a guide for one end of the valve-rod and as a support for the spring. The cylinder D is screwed into a sleeve of the handle, forming a fluid-tight joint. A stop-piece G, positioned with reference to D by means of the pin N, is placed between the end of the cylinder D and the supply-chamber, thus preventing the passage of the fluid from the supply-chamber to the cylinder except through the proper passages. The forward end of the cylinder is closed by the tool-holder M, which has a reciprocating movement in the end of the cylinder, but fits tightly enough to practically prevent the escape of the fluid. The pressure of the operator against the handle, and thus against the chisel, prevents this tool-holder being ejected from the cylinder. Inside the cylinder is the piston E, with its piston-rod, at the opposite end of which is the collar L. Surrounding the piston-rod is the tubular valve F. The piston is quite long, with two annular bearing-surfaces. The forward end *h* is preferably hardened. The piston-rod is shown screwed into the piston and locked in place. The collar L is smaller in diameter than the bore of the cylinder, is screwed onto the piston-rod, and locked in place by a lock-screw. This construction can, however, be changed, as the piston-rod may be made entire with the piston or with the collar. The valve is tubular, as shown, with an exterior annular passage *g*, inclosed by two collars tightly fitting the bore of the cylinder. Passing through the wall of the cylinder is the valve-stop H, the end of which extends into the annular passage *g*, thus limiting the movement of the valve. The valve is actuated by the collar and the piston; but the distance between the collar and piston is such that on the forward stroke the piston will contact with the shoulder *k* and on the rear stroke the collar will contact with the stop-piece G just before the collars on the valve contact with the end of the stop H. The momentum of the valve carries it the remainder of the distance. As will be seen from the drawings, an annular passage K completely separates the valve and piston-rod.

From the supply-chamber *e* a port *a* conducts the fluid to the cylinder. The port *b* connects the annular chamber *g* with the forward end of the cylinder, and the port *c* connects the cylinder with the annular passage *d*, which is in turn connected with the exhaust-port *j*. When the piston is in the forward position, the fluid passes through ports *a* around the valve, then through the by-pass port *b*, and into the forward end of the cylinder. The fluid in the rear end of the cylinder escapes through the port *c* as the piston moves to the rear. Near the end of its stroke the piston engages the valve and moves it to the position shown in Fig. 2. When in this position, the valve connects port *b* with port *c*, permitting the fluid in the forward end of the cylinder to escape, while the fluid entering through port *a* passes between the piston-rod and valve into the rear end of the cylinder, forcing the piston forward. In case the valve should be "on center," a position just a little forward of that shown in Fig. 2, when the port *a* would be closed the mechanism would become inoperative. To prevent this, I provide the stop-plate G with the minute hole *f*, so small that the loss of fluid through the same is practically immaterial, but still large enough to conduct enough fluid into the cylinder to force the piston and the valve forward and so "off center." From this construction it will be seen that it is unnecessary to provide that the cylinder should have any particular angular position with reference to the handle. The stop-plate G turns with the cylinder, this ensuring the registering of the parts *a* of both. The other ports all connect with annular recesses.

In the construction of the tool I may and preferably do insert rings a^2 in the ends of the valve F of relatively soft material to prevent two hard metal surfaces contacting. The collar L may also be recessed peripherally, as at b^2, so that the resistance occasioned by the passage of the collar through the fluid will be reduced to a minimum.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a pneumatic tool, the combination of a cylinder, a tubular piston-controlling valve fitting in said cylinder, a rod movable through said valve without contact, and a piston and a collar at opposite ends of said rod for actuating said valve.

2. In a pneumatic tool, the combination of a cylinder, a tubular valve, a piston fitting in the cylinder, a rod connected to said piston, passing through without contacting with said valve, a collar on the end of said rod, and a stop for determining the movement of the valve.

3. In a pneumatic tool, the combination of the body having a cylinder formed therein extending from the handle end to near the tool end, a piston fitting in one end of the cylinder, an annular controlling-valve fitting in the cylinder near the end of the stroke of the piston, a stem connected to the piston passing through the valve without contacting, a collar or shoulder thereon, a detachable stop for the valve, and a detachable cap for the cylinder.

4. In a pneumatic tool, the combination of a handle having an annular supply-chamber, a cylinder attached to said handle having a port, a plate interposed between the bore of the cylinder and said supply-chamber having one port connecting the port of the cylinder, with the said supply-chamber and a second smaller port connecting the supply-chamber with the said bore.

5. In a pneumatic tool, a cylinder having a fluid-supply port, an exhaust-port and a by-pass port and a tubular valve fitting in the cylinder and provided with an exterior annular chamber for connecting the supply-port with the by-pass port and the by-pass port with the exhaust-port and means for actuating the valve by the piston.

6. In a fluid-actuated tool, a cylinder having a supply-port and a by-pass port, and a tubular valve for permitting the passage of the fluid from the supply-port through said valve to one end of the cylinder and said valve having an exterior annular chamber for permitting the passage of the fluid around said valve and through the by-pass port to the other end of the cylinder.

7. In a fluid-actuated tool, a cylinder having a fluid-supply port, an exhaust-port, and a by-pass port, a tubular valve provided with an exterior annular chamber for connecting the supply-port with the by-pass port and the by-pass port with the exhaust-port, and a piston slidable in said cylinder for actuating said valve.

8. In a fluid-actuated tool, a cylinder having a fluid-supply port and a by-pass port, a tubular valve for permitting the passage of the fluid from the supply-port through said valve to one end of the cylinder, said valve having an exterior annular chamber for permitting the passage of the fluid from said supply-port around said valve and through the by-pass port to the other end of the cylinder, a piston reciprocating in said cylinder, a rod attached to said piston passing through said valve without contacting with the same and a collar on the other end of said rod, said collar and piston serving to actuate said valve.

9. In a pneumatic tool, a cylinder having ports, a tubular valve, having an exterior annular chamber, slidable in said cylinder, a piston slidable in said cylinder, a rod connected to said piston and passing freely without contact through said valve, a collar on the other end of the rod, said rod and piston serving to actuate said valve and a screw-stop passing

through the wall of the cylinder and entering said annular chamber of the valve to control its movement.

10. In a pneumatic tool, the combination of a body having a cylinder formed by a continuous straight bore from one end to near the other, the ports leading into said cylinder, the piston fitting said cylinder and operating at one end, a detachable controlling-valve fitting said cylinder near the end of the movement of said piston, and means for operating said valve by the piston.

In testimony whereof I affix my signature in presence of two witnesses.

LUKE W. TURNBULL.

Witnesses:

PALMER I. CARSON,

JOHN HERR.