No. 672,306. Patented Apr. 16, 1901.

T. BARROW.

PNEUMATIC TOOL.

(Application filed June 6, 1899.)

(No Model.)

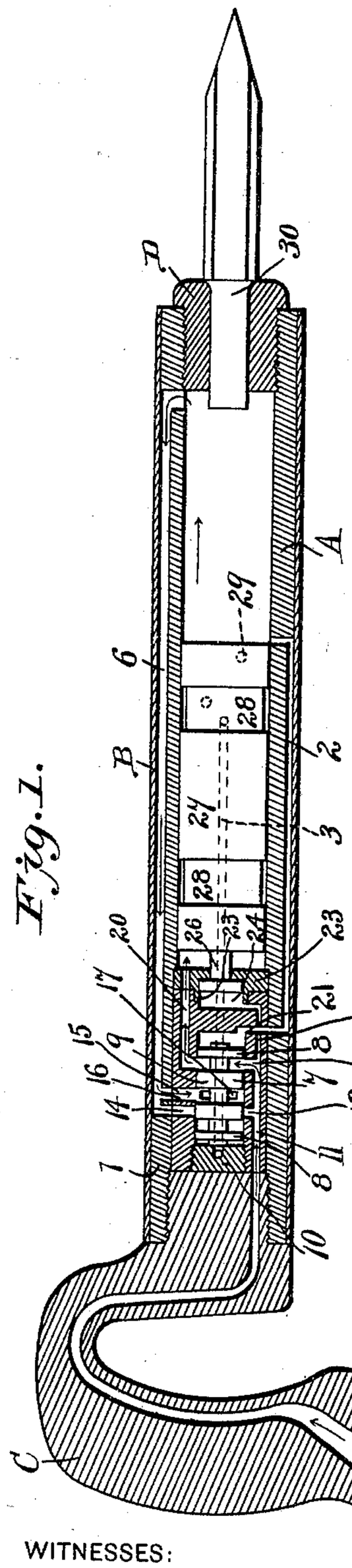

Fig. 1.

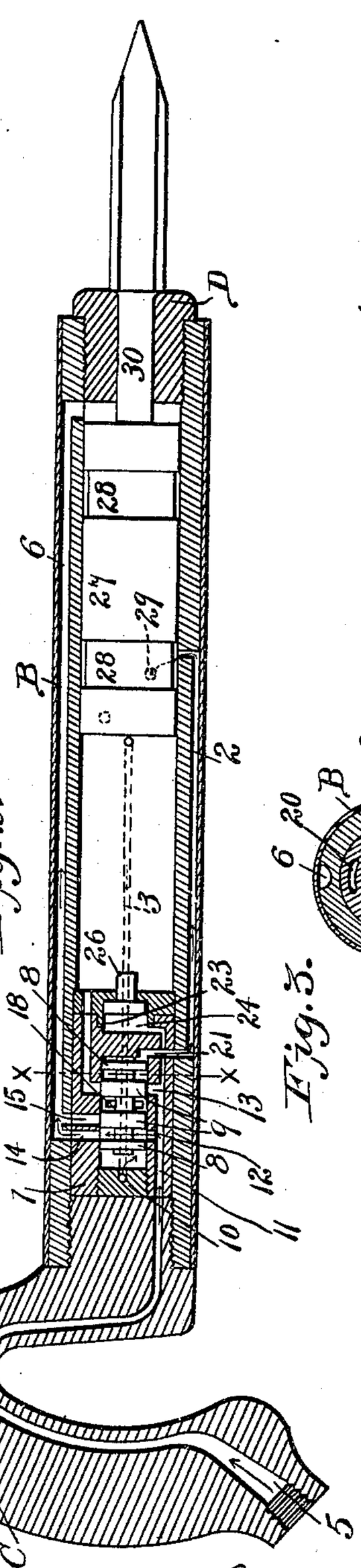

Fig. 2.

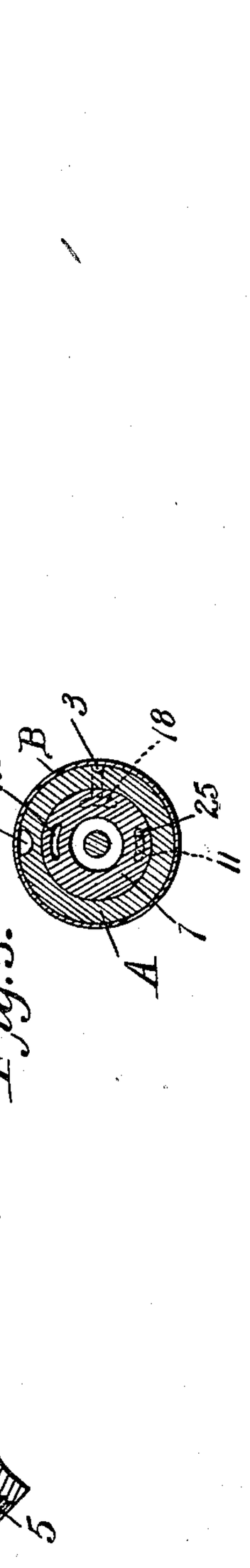

Fig. 3.

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PNEUMATIC TOOL.

SPECIFICATION forming part of Letters Patent No. 672,306, dated April 16, 1901.

Application filed June 6, 1899. Serial No. 719,563. (No model.)

To all whom it may concern:

Be it known that I, THOMAS BARROW, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Pneumatic Tools; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to that class of tools in which compressed air or other pressure medium acts upon a piston to cause it to deliver blows in rapid succession to a cutting, calking, riveting, or chipping tool.

The object of this invention is to produce a cheap, simple, yet very efficient tool of this character in which the various parts are so arranged as to secure the greatest amount of working energy, while at the same time reducing the shock of the return blow of the piston to a minimum; and with these objects in view my invention consists of the parts and combination of parts, as will be more fully hereinafter pointed out.

In the drawings, Figure 1 is a vertical longitudinal section of my improved tool with the piston in its upper position. Fig. 2 is a similar view showing the piston in its striking position, resting against the bit of the tool. Fig. 3 is a vertical cross-section on the line $x\ x$, Fig. 1.

A represents the barrel of my improved tool, C the exterior covering or finish, and D the handle thereof. The ends of the barrel are provided with interior screw-threads by means of which the handle C is secured in one end of the barrel, while the tool-holder D is secured in the other end.

1 is a valve-box, of cast-iron, steel, or brass, turned and made a "driving fit" in the barrel and provided with ports corresponding with ports in the barrel, to be hereinafter referred to.

2 is a port formed in the barrel A on one side, one end of which opens into the barrel below the uppermost position of the hammer, while the other end opens into the valve-box.

4 is a port extending through the outside covering or jacket and the barrel.

3 is a port formed in and through the barrel, through which the exhaust-air may pass from the top of the valve down between the barrel and the cover or jacket B and out through the port 4.

5 is an inlet for the air or other pressure formed in the handle C, and 6 is another port formed in the barrel immediately underneath the cover or jacket B, said port opening at one end into the lowermost part of the barrel, while the other end opens into the valve-box

1. The valve-box has a central bore in which the valve 7 reciprocates, said valve comprising two piston-heads 8 and two sliding valves 9, and 10 is a screw-threaded plug secured in the top of the central bore of the valve-box.

11 is a port or air-passage formed in the valve-box, registering at one end with the air-inlet 5 in the handle C.

12 and 13 are openings cut through the upper wall of the port 11, leading into the valve-bore of the box.

14 and 15 are two ports cut through the top of the valve-box and separated by means of the partition 16. The barrel A has ports similar to and registering with the ports 14 and 15, separated by a partition registering with and forming a continuation of the partition 16, said ports all leading into the port or passage 6 between the jacket and the barrel.

17 and 18 are openings or ports opening into the valve-bore, the port 17 providing for the exhaust-air from the bottom of the hammer, the air passing up between the barrel and jacket and out through the port outside of the jacket, the port 17 providing for the exhaust from the top of the hammer.

20 is a port formed in the valve-box, one end opening into the valve-bore, while the other end opens into the barrel.

21 is a port at the bottom of the valve-bore, registering with the upper end of the port or passage 2.

22 is a collar having a central opening and

a flange 23, extending around said opening, which engages tightly with the lower end of the valve-box, said collar having an opening registering with the port 20 of the valve-box. This collar, with the valve-box, forms a chamber 24, which is connected with the port 11 by means of a comparatively small port 25, formed to one side of the port 11, as shown in Fig. 3, thus running back of the port 2.

26 is a piston or buffer having an annular head adapted to work in the chamber 24, while the stem of the piston works in the annular opening in the collar 22.

27 is the hammer, provided with peripheral groove 28.

29 is a port through the barrel A.

The parts being positioned as shown in Fig. 1, air is admitted through the handle into the port 11, from which it passes through port 13 into port 20 and thence into the barrel A on top of the hammer 27, thereby forcing the hammer down to give a blow to the tool 30, the air in front of the hammer in the barrel being forced into the lower end of the port 6, from which it escapes through the port 16, through the valve-opening 17 outside the tool. As soon as the upper edge of the hammer passes or clears the port 3 in the barrel the air-pressure on top of the hammer rushes into said port and passes up the port to an opening in the plug 10, through which it escapes into the valve-bore, (in the valve-box in front of the piston 8 of the valve,) thereby forcing the valve down and moving the slide 9 over the port 17, thereby closing it, at the same time opening the ports 12 and 14, thus permitting the compressed air to pass through the ports 12 and 14 into the port or passage 16 to the bottom of the barrel A under the hammer 27, thus throwing the hammer upward to its original position. When the hammer is forced downward, a certain amount of air escapes from the barrel through the port 2 into the valve-bore back of the piston 8^a. As soon as the valve is forced back to open the ports 12 and 14 the air in front of piston 8^a escapes through port 2 into the upper annular groove 28 of the hammer and passes from the tool through the port 29. When the hammer gets high enough, the air passes from the barrel into the port 2, thence into the valve-bore back of piston 8^a, thereby forcing or throwing the valve to the position shown in Fig. 1 and opening the ports 13 and 20 and closing the ports 12 and 14 and opening the port 17. In this position the exhaust can escape through port 3 into the lower annular groove 28 in the hammer and thence out through the port 4. The exhaust from the top of the hammer, as it is forced upward, passes through the exhaust 18. When the valve is forced upward, as shown in Fig. 1, one of the slides 9 closes the port 18, thus closing all avenues of escape for the air when the hammer is descending until the hammer passes the port 3, when the operation above described takes place.

The port 25, forming a contracted continuation of port 11 into the chamber 24, is always open, whereby a constant pressure is always exerted within said chamber upon the annular head of the piston or buffer 26. Thus when the hammer is forcibly returned to its upper position it strikes the stem of the buffer, which is thereupon forced in the chamber 24 against the compressed air, which acts as a cushion and takes up all concussion, thereby relieving the operator of the jars and shocks incident to this class of tools as heretofore constructed.

It is obvious that I may employ some suitable means to automatically cut off the motive force when the tool is temporarily out of use.

What I claim, and desire to secure by Letters Patent, is—

1. In a tool of the character described, the combination with the valve-box, having a central bore, one end of which is closed, of a valve adapted to slide in said bore, inlet and discharge ports formed in said box, a flanged collar having a central opening and abutting one end of the valve-box thereby forming a chamber, a buffer mounted in said chamber and projecting through the central opening and a port formed in said flanged collar communicating with the inlet-port.

2. In a tool of the character described the combination with the valve-box having a central bore, one end of which is closed, of a valve adapted to slide in said bore and comprising two piston-heads and two sliding valves, a flanged collar abutting one end of the said box thereby forming a buffer-chamber, a central opening in said collar, a buffer mounted in said chamber and extending through said central opening, a port formed in the flange of said collar communicating with the inlet-port, the port 2 opening into the barrel below the uppermost position below the hammer and into the valve-box, the ports 3 and 4, the inlet-port 5, and the port 6 one end of which opens into the lowermost part of the barrel while the other end opens into the valve-box.

3. In a pneumatic tool, the valve-box comprising the valve-bore, a constantly open port reversing and exhaust ports and a buffer-chamber connected with the said open port in combination with a buffer working in the buffer-chamber and a valve comprising a piston at each end and two intermediate slides adapted to register with the reversing and exhaust ports.

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

THOMAS BARROW.

Witnesses:
H. B. PUMPHREY,
MYRA PANGBURN.