No. 745,900. PATENTED DEC. 1, 1903.

W. PAYTON.

PNEUMATICALLY OPERATED PERCUSSIVE TOOL.

APPLICATION FILED APR. 7, 1903.

NO MODEL.

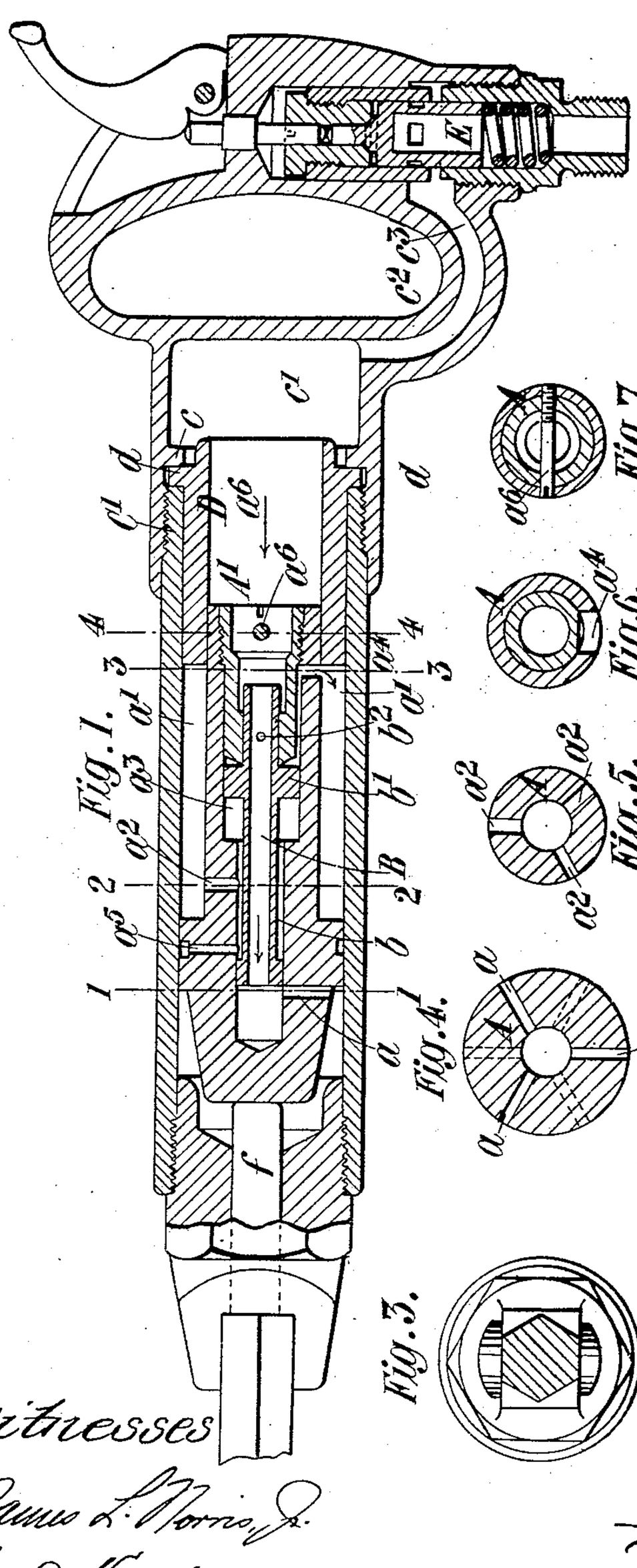

Fig. 1.

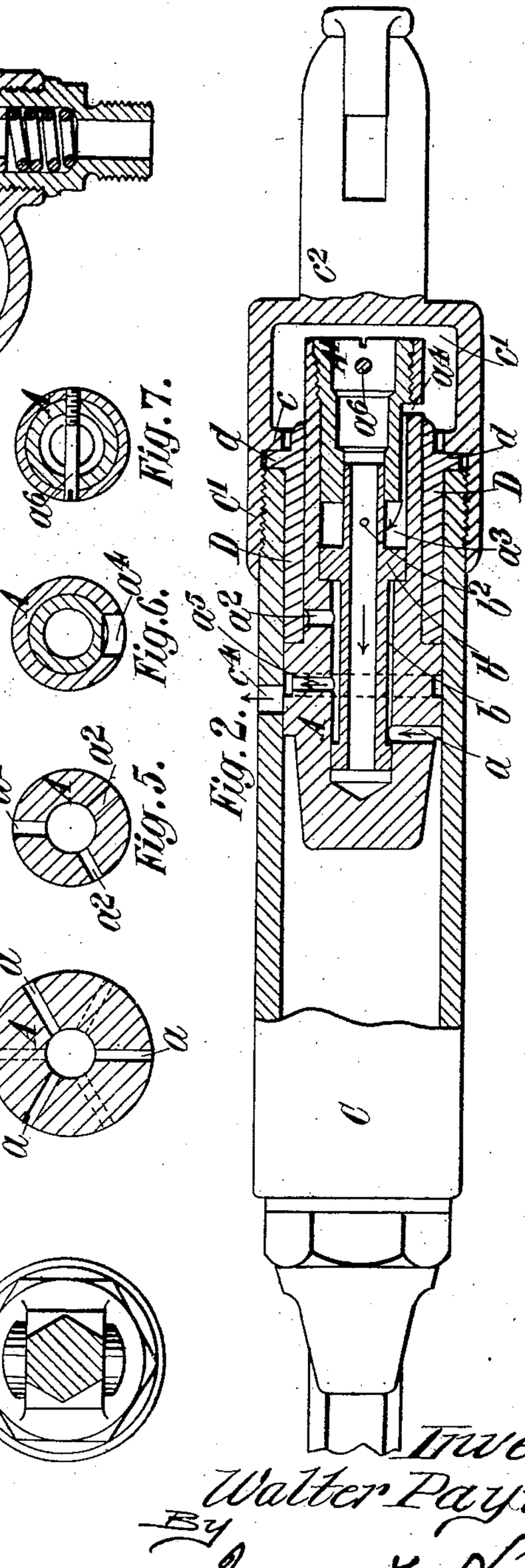

Fig. 2.

Fig. 7.

Fig. 6.

Fig. 5.

Fig. 4.

Fig. 3.

Witnesses
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No. 745,900. Patented December 1, 1903.

UNITED STATES PATENT OFFICE.

WALTER PAYTON, OF RICHMOND, ENGLAND.

PNEUMATICALLY-OPERATED PERCUSSIVE TOOL.

SPECIFICATION forming part of Letters Patent No. 745,900, dated December 1, 1903.

Application filed April 7, 1903. Serial No. 151,540. (No model.)

To all whom it may concern:

Be it known that I, WALTER PAYTON, engineer, a subject of the King of Great Britain, residing at 138 Sheen road, Richmond, in the county of Surrey, England, have invented certain new and useful Improvements in Pneumatically-Operated Percussive Tools, of which the following is a specification.

This invention relates to pneumatically-operated percussive tools, especially those in which there is a reciprocating piston constituting a hammer which is adapted to deliver a succession of rapidly-recurring blows on a chisel, calking, or similar tool located in the path of the piston, said piston having two diameters, the smaller of which reciprocates within a sleeve and projects into a chamber to which the motive fluid has access and the larger of which reciprocates within a cylinder. The parts are so arranged that the reciprocations of the piston are caused by the smaller end of the piston being constantly pressed upon by the motive fluid and the larger end being alternately pressed upon by the motive fluid and opened to an exhaust space or chamber situated between the larger end of the piston and the sleeve and open to the atmosphere through a passage formed in the cylinder, such alternation being controlled by a longitudinally-sliding valve of the differential type located axially within the piston. The motive-fluid chamber is put in communication with the source of supply by a flexible tube provided with a controlling inlet-valve.

An important feature of my invention has reference to the reversal of the sliding valve to change the direction of the piston's stroke, which is effected by means of a port or passage in the piston alternately passing into the motive-fluid chamber and the exhaust-chamber of the tool as said piston reciprocates.

In order that my invention may be clearly understood and readily carried into practice, I will describe the same more fully with reference to the accompanying drawings, in which—

Figure 1 is a central longitudinal section of the tool. Fig. 2 is another central longitudinal section of the said tool, taken in a plane at right angles to Fig. 1. Fig. 3 is a front end elevation. Figs. 4, 5, 6, and 7 are cross-sections of the piston, taken, respectively, on the lines 1 1, 2 2, 3 3, and 4 4 of Fig. 1.

A is the piston, B the longitudinally-sliding valve, and C the body of the tool, in which said piston reciprocates. The said piston is, as aforesaid, formed of two diameters, of which the smaller reciprocates freely, but in an air-tight manner, in the fixed sleeve D. This sleeve is provided with a flange *d*, which lies between the rear end of the body C and a shoulder *c* of the portion C′ of the cylinder, this portion of the cylinder being provided with a screw-threaded socket to screw upon the rear end of the body C and securely retain said sleeve D in place, which then constitutes an annular partition. The two portions C and C′ when thus screwed together constitute the working cylinder, within which the motive fluid operates to reciprocate the piston, as hereinafter explained. The portion C′ of the cylinder is extended rearwardly, so as to form the chamber *c*′, into and out of which the smaller end of the piston moves when reciprocating. This chamber is larger in diameter than the part of the piston that moves within it and is in constant communication with the motive fluid when the piston is reciprocating. The said portion C′ has formed as part of it a handle c^2 to enable the apparatus to be held in the hand of the workman, and such handle is formed with a passage c^3, through which the motive fluid has access to the interior of the said chamber *c*′ when the controlling inlet-valve E is opened.

The aforesaid sliding-valve B is constructed of a cylindrical tube arranged centrally within the piston and having its forward end always exposed to the motive fluid. The said tube is open at both of its ends, and its forward end is made of larger diameter than its rearward end, so as to allow of the motive fluid always pressing with greater force upon its forward end than upon its rearward end. The forward end of the piston is provided with radial passages *a a*, through which the motive fluid is admitted to the forward end of the piston when the valve B is in its rearward position. When the said valve is in its forward position, the motive fluid will pass to

the exhaust chamber or space a' by means of a recess b, formed in the valve, which recess allows the radial passages a in the piston to be put in communication with other radial passages, a^2, formed in the piston and communicating with the exhaust chamber or space a'. The said sliding valve B is provided with an enlargement or collar b', which is free to reciprocate a short distance within a chamber a^3, formed in the piston. The forward face of this enlargement or collar is constantly open to the exhaust chamber or space a', and its rearward face is alternately put in communication with the motive fluid and the said exhaust chamber or space by means of a port a^4, formed in the piston, which port by the movements of the piston is alternately carried into the motive-fluid chamber c' and into the exhaust chamber or space a'. Such alternate action causes the sliding valve by reason of the difference of the areas of its two faces to reciprocate at the times and in the manner required for operating the piston.

When the piston is near the end of its rearward motion, it covers a passage c^4, through which the exhaust fluid passes to the atmosphere, thereby causing the fluid between said piston and the sleeve D to act as a cushion to the piston. To permit of the exhaust continuing without impairing the action of the cushion, additional and distinct exhaust-passages a^5 are formed in the piston, which come into use at the moment the exhaust chamber or space a' is being cut off from the exhaust-passage c^4.

In order that the pressure of the motive fluid when acting upon the rearward face of the enlarged part of the sliding valve may be maintained as long as is desired, the said sliding valve is provided with a small transverse passage b^2, through which the motive fluid may have access to said rearward face of the enlarged part of the sliding valve, and thereby keep the latter in position; but such passages b^2 will be cut off from such rearward face when exhaustion from it has permitted the reversal of the valve. The rearward end of the piston is provided with a screw-threaded tubular end piece A', which is held firmly in place by a cross-pin a^6. The hollow portion of the inner part of this end piece is made of a diameter to receive the smaller end of the sliding valve, so as to act as a guide therefor.

The valve E, which is situated in the handle c^2 for controlling the inlet of the motive fluid, may be of any usual or desired form.

The rear end f of the tool is cylindrical and is fitted centrally in the forward end of the apparatus in the usual manner. I have shown in the drawings means for holding the tool in place; but the same are not claimed herein.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. In a pneumatic percussive tool, the combination with the casing constituting the working cylinder, of a piston, a sliding tubular valve in said piston, the forward end of which is of a greater diameter than its rearward end and is constantly exposed to the pressure of the motive fluid, an enlargement or collar on said valve working in a chamber in the piston and having its forward side constantly open to the exhaust-chamber and means whereby the rearward side of said collar is subjected to the fluid-pressure when the piston is at one end of its stroke and is open to the exhaust when the piston is at the opposite end of its stroke for the purpose specified.

2. In a pneumatic percussive tool, the combination with the casing constituting the working cylinder, of a piston having two diameters, a sliding tubular valve in said piston, an enlargement or collar on said valve working in a chamber in the piston, which chamber communicates on one side of said enlargement or collar with a port in the piston, an annular partition within said cylinder through which the portion of the piston of smaller diameter reciprocates and alternately brings said port to opposite sides of the aforesaid annular partition thereby putting the said port alternately in combination with the motive fluid and the exhaust-chamber substantially as and for the purpose described.

3. In a pneumatic percussive tool, the combination with the casing constituting the working cylinder, of a piston having two diameters, a sliding tubular valve centrally located in said piston, a head at the forward end of said valve controlling radial ports in the portion of the piston of larger diameter, an enlargement or collar on said valve working in a chamber in said piston, which chamber communicates on one side of said enlargement or collar with a port in the piston, a flanged sleeve fixed within said cylinder through which sleeve the portion of the piston of smaller diameter reciprocates and alternately brings the aforesaid port to opposite sides of the sleeve substantially as and for the purpose specified.

In testimony whereof I have hereunto set my hand, in presence of two subscribing witnesses, this 25th day of March, 1903.

WALTER PAYTON.

Witnesses:

T. SEELY WARDLE,

WALTER J. SKERTEN.