No. 711,859. Patented Oct. 21, 1902.

W. M. HOLDEN.

PNEUMATIC TOOL.

(Application filed Dec. 24, 1900.)

(No Model.)

Fig. 1.

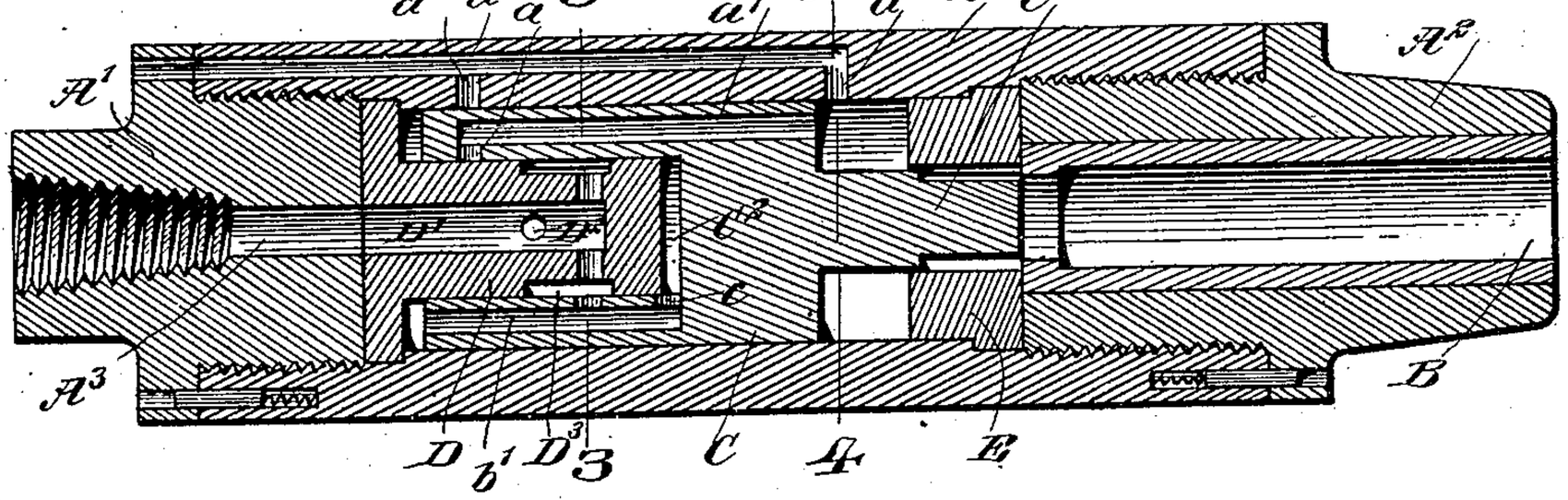


Fig. 2.

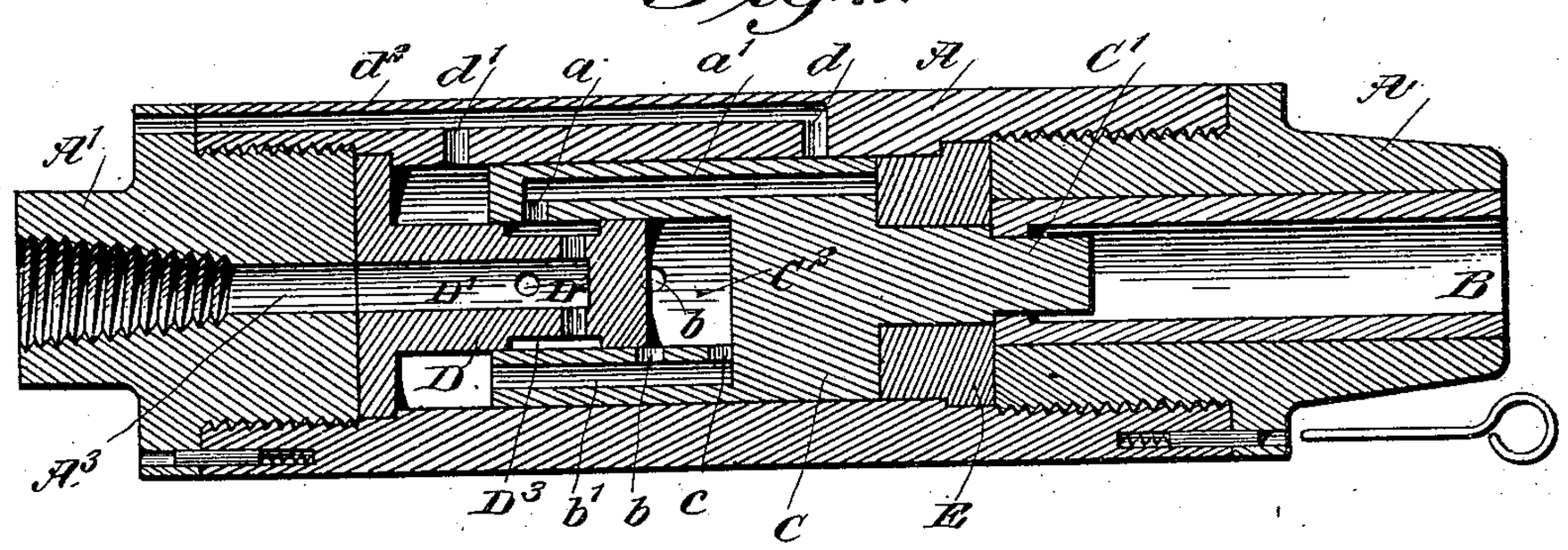


Fig. 3.

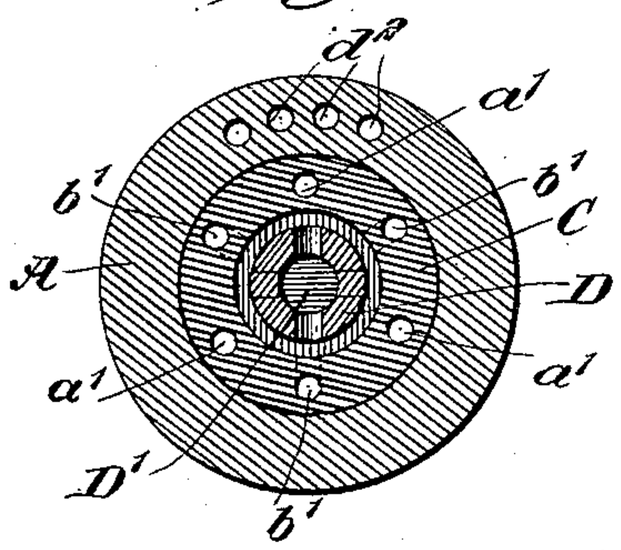
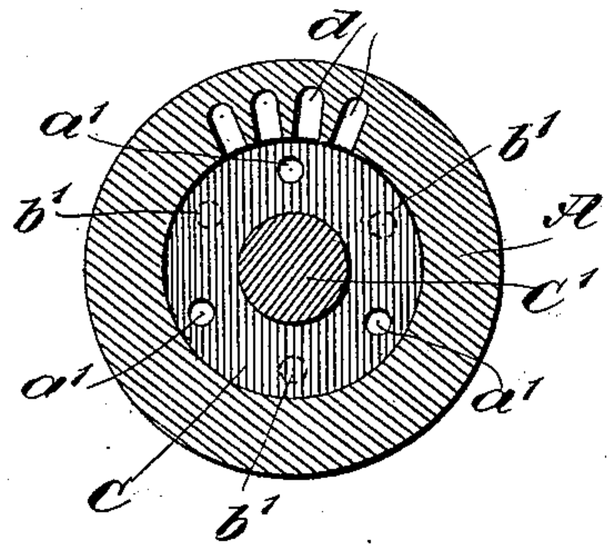


Fig. 4.



WITNESSES:

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WILLIAM M. HOLDEN, OF BARRE, VERMONT.

PNEUMATIC TOOL.

SPECIFICATION forming part of Letters Patent No. 711,859, dated October 21, 1902.

Application filed December 24, 1900. Serial No. 40,939. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. HOLDEN, a citizen of the United States, and a resident of Barre, in the county of Washington and State of Vermont, have invented a new and Improved Pneumatic Tool, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved pneumatic tool arranged without a valve and constructed so as to insure a uniform pressure on all sides of the piston and produce a free reciprocation thereof without practically any friction, the tool being composed of but few parts not liable to get out of order and readily accessible to permit convenient cleaning or repairing whenever necessary.

The invention consists of novel features and parts and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a longitudinal central section of the improvement. Fig. 2 is a similar view of the same with parts in a different position. Fig. 3 is a transverse section of the same on the line 3 3 in Fig. 1, and Fig. 4 is a like view of the same on the line 4 4 in Fig. 1.

The pneumatic tool consists, essentially, of a cylinder A, having cylinder-heads A' A^2, of which the head A^2 is provided with a bushing B for containing a tool-stock (not shown) adapted to receive blows in quick succession from a hammer C', integral with one end of a piston C, mounted to reciprocate in the cylinder A on an inlet-head D, having a recess D' in register with a central opening A^3 in the cylinder-head A'. The latter is connected in the usual manner with a suitable source of motive-agent supply, so that the motive agent can pass into the inlet-head D and impart a reciprocating motion to the piston C in the manner hereinafter more fully described.

The recess D' in the inlet-head D is connected by openings D^2 with an annular groove D^3, arranged externally of the inlet-head D, near the inner end thereof, as is plainly indicated in Figs. 1 and 2. The groove D^3 is adapted to register alternately with ports *a* and *b*, of which the ports *a* open into longitudinal channels *a'*, extending in the piston C and leading to the hammer end of the piston. The other ports *b* open into longitudinal channels *b'*, extending in the piston to its outer end, said channels *b'* having ports *c* at their inner ends leading into a recess C^2, into which extends the inlet-head D. Exhaust-ports *d d'* lead from the inside of the cylinder A into longitudinal channels d^2, leading to the outside, as is plainly shown in Fig. 1.

When the several parts are in the position illustrated in Fig. 1, then the motive agent passing into the inlet-head D passes from the recess D' thereof through the openings D^2 into the annular groove D^3 and from the latter by the ports *b* into the channels *b'* to the outer end of the cylinder, and also by the ports *c* to the inner end of the recess C^2, so that pressure is exerted against the piston C to slide the latter from the left to the right into the position shown in Fig. 2. When this takes place, the ports *b* and *b'* are cut off from the annular groove D^3, while the ports *a* connect with the said groove, and consequently the motive agent now passes from the inlet-head D by way of the recess D', openings D^2, groove D^3, ports *a*, and channels *a'* to the hammer end of the piston, so that the piston is moved back to its former position—that is, from the right to the left—as shown in Fig. 1. The exhaust-steam in the ends of the cylinder A passes alternately through the ports *d d'* into the channels d^2 and from the latter to the outside.

In order to properly guide the hammer C', the latter extends through a washer E, held at the inner end of the head A^2, as is plainly indicated in Figs. 1 and 2.

From the foregoing it is evident that no valves whatever are employed, as the piston C simply reciprocates in the cylinder A and on the inlet-head D, which by its special construction delivers the motive agent to the ports *a* and *b* alternately as the piston is reciprocated, and as the channels *a' b'* extend in opposite directions it is evident that the steam is alternately passed to opposite ends of the cylinder to give the desired reciprocating movement to the piston.

Having thus fully described my invention,

I claim as new and desire to secure by Letters Patent—

1. The combination with the casing or cylinder having exhaust-ports, and an inlet-head for the motive agent rigid with the cylinder, of the tool-operating piston having a head in front of said inlet-head and a sleeve extending rearwardly over said inlet-head and forming a recess or chamber between the inlet-head and the head of the piston, the inlet-head and piston having inlet-ports arranged to conduct the motive agent to the opposite ends of the piston and to the recess or chamber between the inlet-head and the piston-head, as set forth.

2. The combination with the casing or cylinder having exhaust-ports and provided with an inlet-head for the motive agent rigid therewith and projecting into the cylinder, of the tool-operating piston having a head in front of said inlet-head, and a sleeve extending rearwardly over said inlet-head and forming a recess or chamber between the inlet-head and the head of the piston, the inlet-head having an external annular groove communicating with the interior of the inlet-head, the sleeve portion of the piston being provided with ports adapted to register alternately with the said annular groove of the inlet-head and communicating with longitudinal channels in said piston extending to opposite ends thereof, the channel extending to the outer end of the sleeve portion of the piston having a port at its inner end communicating with the recess or chamber between the inlet-head and the piston-head, as set forth.

3. A pneumatic tool, comprising a cylinder or casing, cylinder-heads screwing in the ends of the cylinder, one of said heads being provided with a bushing for containing a tool-stock, a washer held in the cylinder at the inner end of said head, the other cylinder-head having a central opening and adapted for connection with a source of motive-agent supply, an inlet-head arranged in the cylinder and held rigidly in place by said cylinder-head, the inlet-head having a central recess in registry with the central opening in said cylinder-head, and a piston mounted to slide in said cylinder, and having a hammer-head at its forward end having guided movement in the said washer, and a rearwardly-extending sleeve portion arranged to slide on the inlet-head, the piston, the inlet-head and the casing being provided with ports for the passage of the motive agent and adapted to be covered or uncovered by the movement of the piston, as set forth.

4. A pneumatic tool, comprising an inlet-head for the motive agent, a cylinder into which extends the said inlet-head, and a piston mounted to slide in said cylinder and on said inlet-head, the cylinder having two sets of exhaust-ports spaced apart and communicating with a series of longitudinally-extending channels, opening at one end of the cylinder, the inlet-head having an external annular groove and openings leading from the interior of the inlet-head to said groove, the said piston having two sets of longitudinal channels leading to opposite ends of the piston, the channels leading to the rear end of the piston having ports at their inner or forward ends leading into a recess or chamber between the inlet-head and the piston-head, the piston being further provided with sets of ports leading to the respective channels and registering alternately with the annular groove of the inlet-head, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM M. HOLDEN.

Witnesses:

BURT H. WELLS,

MAMIE GORMAN.