No. 798,292. PATENTED AUG. 29, 1905.

R. A. NORLING.

THROTTLE VALVE.

APPLICATION FILED FEB. 18, 1905.

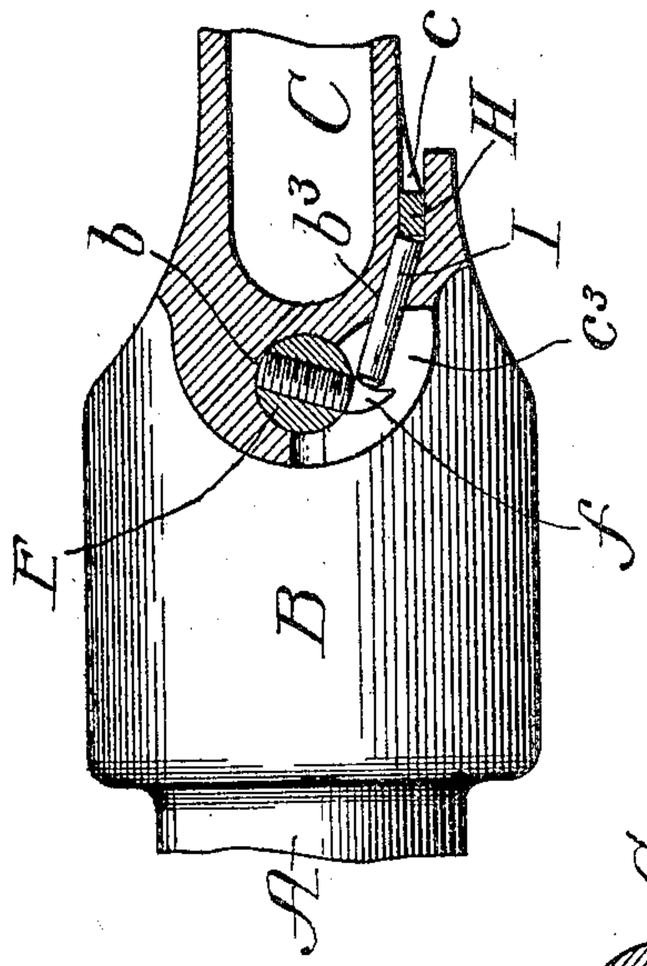


Fig. 3

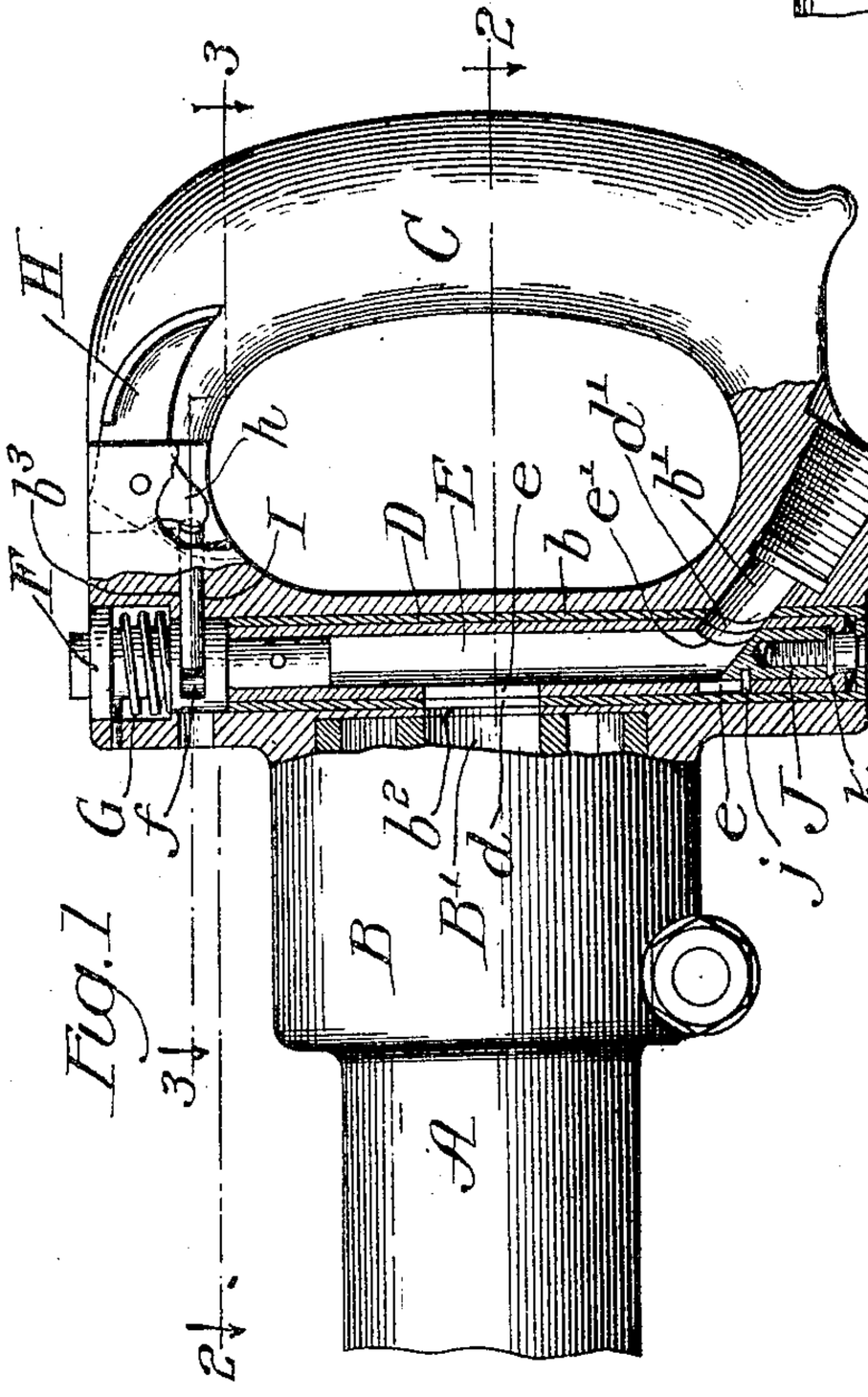


Fig. 1

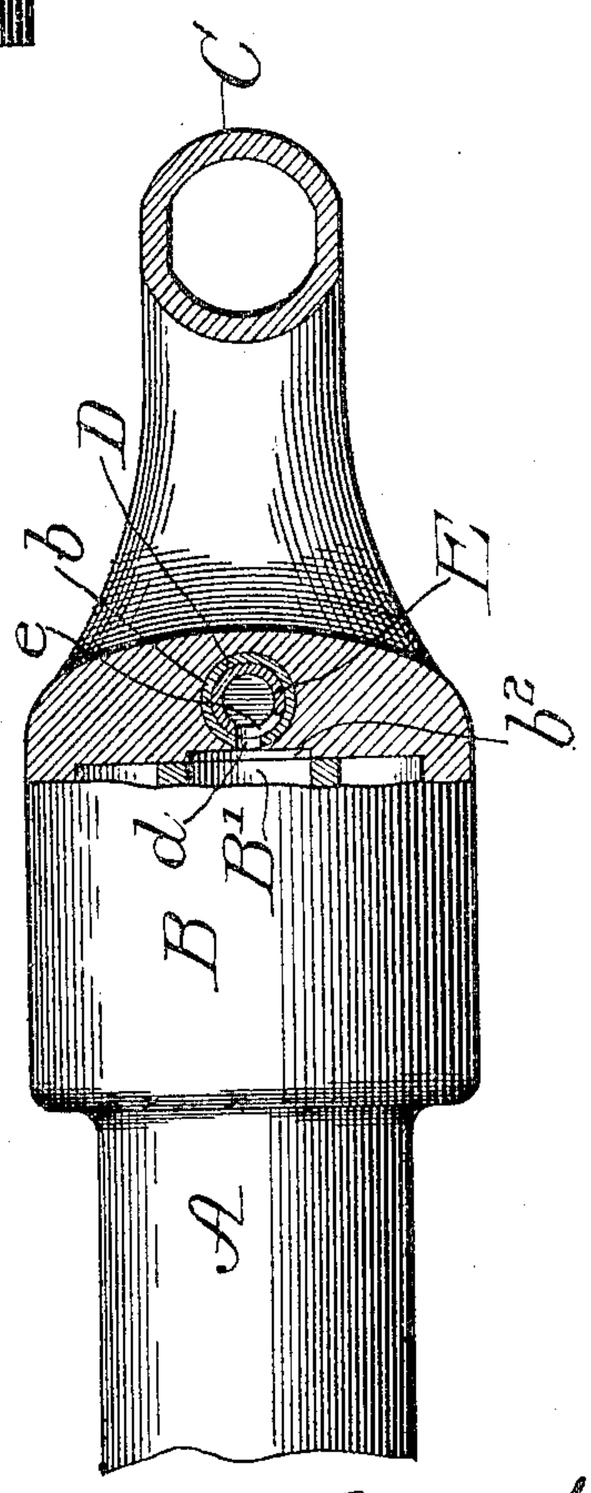


Fig. 2

Witnesses:
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# UNITED STATES PATENT OFFICE.

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## THROTTLE-VALVE.

No. 798,292. Specification of Letters Patent. Patented Aug. 29, 1905.

Application filed February 18, 1905. Serial No. 246,309.

*To all whom it may concern:*

Be it known that I, REINHOLD A. NORLING, a citizen of the United States, and a resident of Aurora, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Throttle-Valves; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

A throttle-valve embodying my invention is shown in the accompanying drawings in connection with a portable pneumatic hammer of that kind embracing a barrel or cylinder, a piston therein, and a controlling-valve through which the air is admitted to and permitted to escape from the opposite ends of the cylinder to give reciprocatory movement to the plunger. Such a throttle-valve, however, may be applied to pneumatic motors or tools of other kinds.

The invention consists in the matters hereinafter set forth, and pointed out in the appended claims.

As shown in the accompanying drawings, Figure 1 is a view in side elevation of a pneumatic hammer of the kind hereinbefore referred to, showing the throttle-valve in central longitudinal section. Fig. 2 is a central longitudinal section of the parts shown in Fig. 1, taken on a plane indicated by line 2 2 of said Fig. 1. Fig. 3 is a detail view, partially in side elevation and partially in section, of the head or cap of the tool, the section being taken on the plane indicated by the line 3 3 of Fig. 1.

As shown in said drawings, A indicates the working cylinder or barrel of the tool, B the hollow cylindric head attached to the inner end of the barrel, and C a handle which is shown as made integral with the said head B.

Within the head B, in a part thereof which forms the end wall of the head and at the base of the handle C, is formed a transverse bore or passage $b$, in which is located the throttle-valve and one end of which communicates with a transverse inlet-passage $b'$, formed in the head at one end of the handle C and the outer end of which is screw-threaded or otherwise constructed for connection with an air-supply pipe through which air or other gaseous fluid under pressure is supplied to the tool. Said bore or passage $b'$ communicates, by means of a centrally-arranged port or opening $b^2$ in the end wall of the head B, with a space or chamber B', from which the air passes to the controlling-valve of the device.

The bore or passage formed in the head B, as hereinbefore described, opens at its ends through opposite sides of the head, and within the same is located a cylindric bushing D, which is fixed immovably in the head and extends from the side thereof at which the inlet-passage $b'$ is located nearly to the opposite end of said bore or passage. Within the bushing D is located a rotative valve-tube E. The bushing D is provided with an aperture $d$, coinciding with the opening $b^2$, while the valve-tube E is provided with an opening $e$, adapted to register with the said opening $d$. The bushing D is also provided with an aperture $d'$, coinciding with the inlet-passage $b'$, while the valve-tube E is provided with a port $e'$ to register with the port $d'$, but which when the valve is turned will be carried out of register with said port, so as to partially or entirely cut off the passage of air from the supply-passage $b'$ to the interior of said valve-tube. Preferably the port $e$ is made wide enough to afford constant communication of the interior of the tube E within the space B' in the head B, so that when the said tube E is turned into the position to bring the port $e'$ out of register with the port $d'$ the air-supply will be cut off at a point adjacent to the inlet-passage $b'$, and no pressure will exist in the interior of the tube E. Leakage of air from said tube when the throttle-valve is closed is thus prevented.

At its end remote from the supply-passage $b'$ the valve-tube E is attached to a rotative plug F, which closes the end of the tube and through the medium of which the same is turned or oscillated. Said plug F fits and turns within the adjacent end of the bore $d$ of the head B, and a spring G is applied to act on said plug F in such manner as to turn the valve-tube in a direction to close the valve. Said spring G is shown in the drawings as having the form of a coiled spring which surrounds a reduced part of the plug F and is engaged at one end with a shoulder on the head B and at its opposite end with the plug. Secured in

the said plug F is a radial arm *f*, adapted to move in a transverse slot *c*, Figs. 1 and 3, formed in the end portions of the handle C.

An actuating-lever H is mounted on the head B at one side of the handle C in proper position for contact therewith of the thumb of the operator when the hand grasps said handle. An endwise-sliding actuating-rod I is mounted in a guide-passage $b^3$, formed in the head B near the base of the handle C, in such position that one end thereof will rest or bear against the laterally-extending arm *h* of the actuating-lever H, Fig. 1. The opposite end of said rod rests or bears against the stud *f*.

From the construction described it will be manifest that when the actuating-lever H is pressed downwardly or inwardly the sliding actuating-pin I will act on the stud *f* to turn the plug F against the action of the spring G, thereby rotating the valve-tube in a direction to open the valve. Upon releasing the lever the spring turns the tube in a direction to close the valve.

In connection with a rotative throttle-valve made as above described I provide means for varying the quantity of air delivered to the machine when the throttle-valve is opened, the same being constructed as follows: Within the outer end of the valve-tube E, or that adjacent to the supply-passage *b'*, is located an endwise-sliding valve-plug J, which fits closely within said tube and the inner end of which is adapted to overlap to a greater or less extent the port *e'* of the valve-tube E when the said plug is moved inwardly. Said plug is held from turning or rotating in said tube E by means of a guide-pin *j*, affixed to the plug and sliding in a longitudinal slot $e^2$, formed in the tube E. For giving endwise movement to the plug a screw-shaft K is provided. The adjacent end of the valve-tube is provided with a centrally-apertured end wall, and the said screw-shaft K has screw-threaded engagement with the plug and passes through the said aperture in the end wall of the valve-tube. The bushing D is also provided with a centrally-apertured end wall through which the shaft also passes. Said screw-shaft is provided outside of the bushing with a milled disk or head K'. Said screw-shaft K is held from outward endwise movement with respect to the valve-tube and bushing by a suitable bearing-shoulder engaging the inner face of the end wall of the valve-tube, said shoulder being conveniently formed by a flange *k* on the shaft. Inward movement of the screw-shaft in the valve-tube and bushing is prevented by contact of the head K' with the outer end of the bushing. To provide for a tight joint between the outer end of the valve-tube and the closed end of the bushing, a packing-ring L is inserted between the head of the bushing and the adjacent end of the sleeve, said packing being also adapted to bear against the cylindric surface of the screw-shaft K.

From the above description it will be manifest that when the adjusting-screw K is turned to carry the plug inwardly the latter will partially overlap and close the port *e'* and that by turning the adjusting-screw to move the plug inwardly or outwardly the supply of air to the machine may be regulated or controlled separately from its control by the turning of the valve-tube through the actuating-lever.

I claim as my invention—

1. A throttle-valve comprising a cylindric valve-chamber provided with lateral air supply and outlet passages and a rotative valve-tube in said chamber which is closed at both ends and provided between its ends with lateral inlet and outlet ports.

2. A throttle-valve comprising a cylindric valve-chamber provided with lateral air supply and outlet passages, and a rotative valve-tube in said chamber closed at both ends and provided with lateral inlet and outlet ports, a spring applied to turn the said tube in one direction and an actuating-lever adapted to act upon the tube to turn the same in the opposite direction against the action of said spring.

3. A throttle-valve comprising a valve-chamber having lateral air supply and outlet passages, a rotative valve-tube in said chamber closed at both ends and provided between its ends with lateral ports adapted to register with the said air supply and outlet passages, a plug secured to one end of said tube, a spring applied to the said plug to turn the tube in one direction, said plug being provided with a radial arm, a pivoted actuating-lever, and an operating connection between said actuating-lever and said arm on the plug.

4. The combination with a barrel provided with a handle and with a cylindric bore extending through the same at the base of the handle and forming a valve-chamber and having an air-supply passage leading laterally into said valve-chamber and an outlet-passage leading laterally therefrom, of a rotative valve-tube located in said valve-chamber, said tube being closed at both ends and provided with a lateral inlet-port adapted to register with the air-supply passage, a plug mounted in one end of the bore and attached to said tube; said plug being provided with a radial arm, a coiled spring acting to turn the plug and tube in one direction, an actuating-lever pivotally mounted on the handle, and a sliding rod transmitting movement from said actuating-lever to said arm.

5. A throttle-valve comprising a cylindric valve-chamber provided with a lateral air-supply passage, a rotative valve-tube located therein and provided with a lateral port adapted to register with said air-supply passage, and adjustable means for varying the size of the said port in the valve-tube.

6. A throttle-valve comprising a cylindric valve-chamber provided with a lateral air-supply passage, a rotative valve-tube in said

valve-chamber provided with a lateral port adapted to register with the said air-supply passage, and an endwise-sliding plug in said tube adapted to control the size of the said inlet-port.

7. A throttle-valve comprising a cylindric valve-chamber provided with a lateral air-supply passage, a rotative valve-tube in said valve-chamber provided with a lateral port adapted to register with the said air-supply passage, an endwise-sliding plug in said tube, the endwise movement of which controls the size of the said inlet-port, and a screw-shaft extending outwardly through the end of the valve-chamber and engaged with said plug for giving endwise movement to the latter.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 16th day of February, A. D. 1905.

REINHOLD A. NORLING.

Witnesses:

C. E. ERIKSON,

F. A. BURGESS.