No. 665,281. Patented Jan. 1, 1901.

J. S. STEVENSON.

PNEUMATIC TOOL.

(Application filed Oct. 8, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

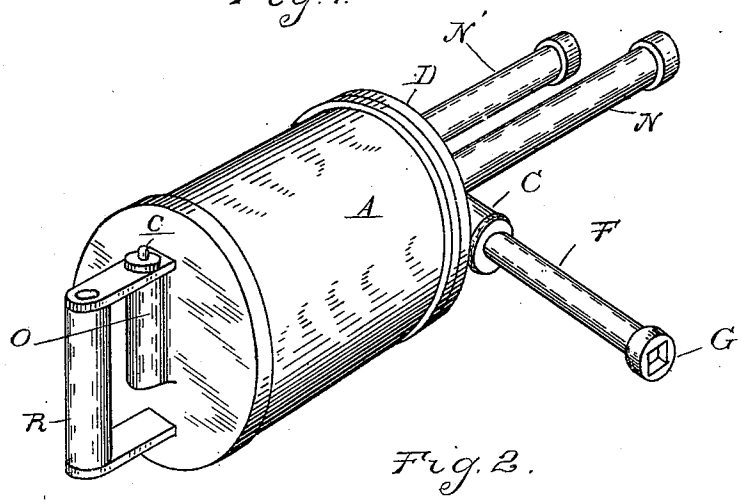
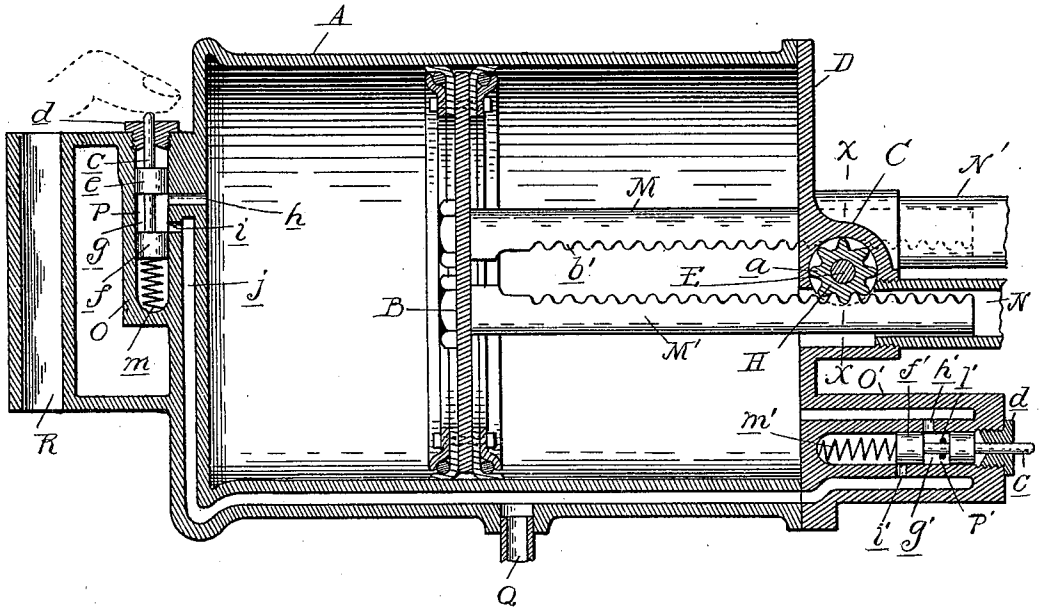


Fig. 2.



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Fig. 3.

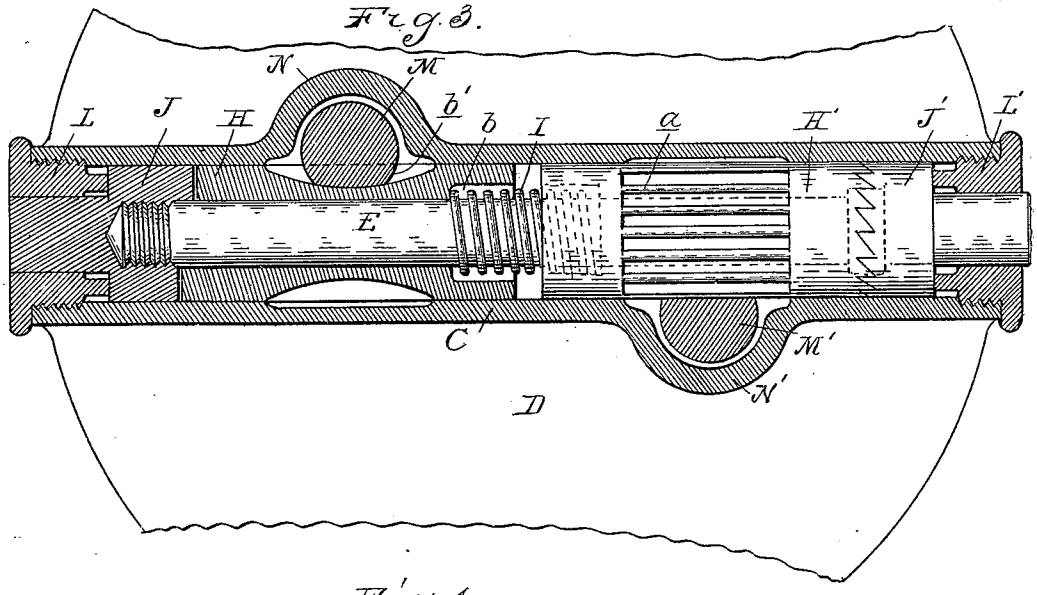
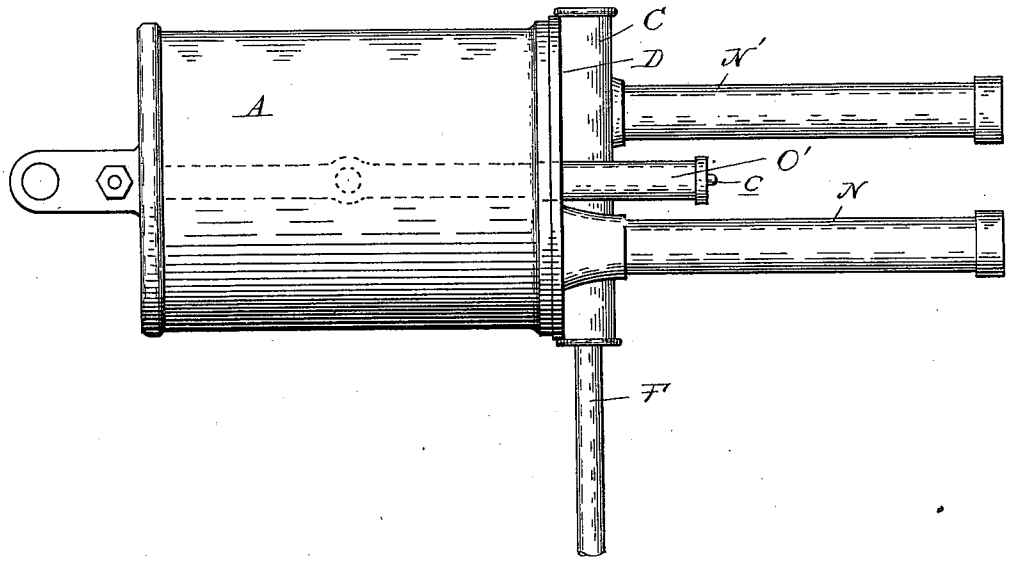


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN S. STEVENSON, OF DETROIT, MICHIGAN, ASSIGNOR TO THE AMERICAN CAR AND FOUNDRY COMPANY, OF SAME PLACE.

PNEUMATIC TOOL.

SPECIFICATION forming part of Letters Patent No. 665,281, dated January 1, 1901.

Application filed October 8, 1900. Serial No. 32,445. (No model.)

To all whom it may concern:

Be it known that I, JOHN S. STEVENSON, a citizen of the United States, residing at Detroit, in the county of Wayne 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 pneumatic tools, and more particularly to that class intended for use in tightening nuts on bolts and for similar purposes.

Heretofore pneumatic tools have been designed for the above purposes; but it has been found in the practical use of such tools that the vibration caused by the rapid movement of the parts is exceedingly tiring to the workman.

It is the object of my invention to obtain a construction which is free from this objection and which at the same time is simple, efficient, and easy to manufacture.

The invention consists in the peculiar construction of a cylinder, a piston therein, and a rotatable tool-holder having a connection with said piston, whereby the reciprocating movement of the latter will impart a rotatory movement continuous in one direction to the tool-holder.

The invention further consists in the peculiar construction, arrangement, and combination of parts, as hereinafter described and claimed.

In the drawings, Figure 1 is a perspective view of the tool. Fig. 2 is a longitudinal section therethrough. Fig. 3 is a cross-section on line *x x*, Fig. 2, upon a larger scale. Fig. 4 is a plan view.

A is a cylinder, and B is a piston therein. At one end of the cylinder is arranged, at right angles to the axis thereof, a cylindrical casing C, preferably formed integral with a detachable head D of the cylinder. Within the casing C is journaled a rotary spindle or tool-holder E. This spindle has a shank F extending out from one end of the casing C and carrying at its end any suitable tool, such as the wrench G.

H H′ are sleeves loosely fitting upon the spindle E and within the bore of the casing C. These sleeves have centrally formed thereon a circumferential series of teeth *a*, forming a pinion, the external diameter of which will fit within the bore of the casing C. The adjacent ends of the sleeves H and H′ have formed therein annular recesses *b*, in which is arranged a coil-spring I, sleeved upon the spindle E.

J and J′ are collars arranged at the opposite outer ends of the sleeves H and H′ and secured to the spindle E. The adjacent faces of the collar J and sleeve H are formed with engaging ratchet-teeth, and the adjacent faces of the collar J′ and sleeve H′ are provided with similar teeth turned in opposite directions.

L and L′ are caps screwed or otherwise secured to the casing C and bearing upon the outer faces of the collars J and J′, so as to form a practically air-tight joint. Upon opposite sides of the casing C and respectively in the central planes of the sleeves H and H′ are arranged piston-rods M M′, which are secured to the piston B and pass outward through suitable apertures in the head D. These piston-rods have formed upon their inner faces rack-bars *b*, adapted to engage with the teeth *a* of the sleeves H and H′, respectively. Surrounding the rods M and M′ are casings N N′, extending outward a sufficient distance to permit the full stroke of the piston B and which form air-tight housings for said rods M and M′.

O O′ are valve-casings arranged at opposite ends of the cylinder A and preferably formed integral, respectively, with the cylinder-casing and the head D. Within these casings are arranged valves P P′ for controlling air admission and exhaust to the opposite ends of the cylinder. As shown in Fig. 2, these valves are of the piston-valve type and fit within the bores of their respective casings, each being provided with an operating-shank *c*, passing outward through a cap *d* of the casing, by means of which the position of the valve may be shifted. As shown, the valve P comprises two separated heads *e* and *f*, forming an annular space *g* between, which in the position shown in Fig. 2 communicates with a port *h*, leading from the valve-casing into the cylinder. In this position of the

valve the channel g also communicates with a port i, connecting with the passage j, formed in the wall of the cylinder and leading to the air-supply conduit Q.

The construction of the valve P′ is similar to that of the valve P, but in the position shown in Fig. 2 the channel g' is cut off from connection with the port i' by the head f'. In this position the channel g' communicates with the port h' and also an exhaust-port l', leading out from the casing O′. m and m' are springs bearing against the valves P and P′, respectively, and tending to hold said valve in the position of the valve P′, Fig. 2.

From the description of parts as above given it will be readily understood that the air is admitted through the conduit Q and passage j, where it will be normally cut off from both ends of the cylinder by the valves P P′, which, as stated, are held in such positions by the springs m and m'. As, however, the valves P and P′ are balanced, a slight pressure on the stem c of either one will be sufficient to shift the valve into the position of the valve P, Fig. 2. This will admit compressed air or other motive agent from the channel j through the ports i into the cylinder, where it will cause the piston B to travel toward the opposite end. In the movement of the piston the racks of the two rods M and M′ engaging with the pinions of their respective sleeves H and H′ will cause said pinions to rotate in opposite directions. At the same time the spring I will press the sleeves H and H′ against the collars J and J′, respectively. As, however, the ratchet-teeth are turned oppositely on the two sleeves, the collar J only will be driven, while the sleeve H′ will slip in its engagement with the collar J′. Thus a rotary movement will be imparted to the spindle E and through the shank F to the wrench or tool G. When the piston has reached the end of the cylinder, if additional rotation is required the valve P may be released and the valve P′ operated, which will admit the motive agent into the opposite end of the cylinder and allow the compressed air previously admitted to exhaust. In the reverse movement of the piston the sleeve H′ will engage with the collar J′, while the sleeve H will slip in its engagement with the collar J, thereby continuing to rotate the tool in the same direction.

The shape and the size of the cylinder and other parts of the casing are such that the operator may conveniently hold the tool in engagement with the work with one hand at each end of the cylinder, and the valves P and P′ are so located that they may be controlled by the thumbs. In order to provide a convenient handhold, a handle R is preferably arranged at one end of the cylinder, and the housing N N′ will serve a similar purpose at the opposite end of the cylinder.

By the term "pneumatic tool" as used in the claims I do not intend to limit my invention to the use of compressed air only, as it is obvious that any fluid under pressure might be employed equally well for the motive agent.

What I claim as my invention is—

1. In a pneumatic tool, the combination with the cylinder and the piston therein, of a rotatable tool-carrying member, rack-bars directly connected to the piston and extending from the latter through the cylinder-casing, pinions sleeved on the rotatable member with which the rack-bars engage, and mechanism for alternately locking said pinions to the rotatable member upon the reciprocatory movement of the piston.

2. In a pneumatic tool, the combination with the cylinder and the piston therein, of a rotatable tool-carrying member journaled in bearings at one end of the cylinder, rack-bars directly connected to the piston and extending from the latter through the cylinder-casing upon opposite sides of the rotatable member, pinions sleeved upon the latter with which the rack-bars engage, and means for alternately locking said pinions to the rotatable member upon the reciprocating movement of the piston.

3. In a pneumatic tool, the combination with the cylinder and its piston, of a rotatable tool-carrying member projecting from one side of the cylinder, a drive mechanism for said member operated by the piston, a housing for the drive mechanism projecting from one end of the cylinder, and a handle at the opposite cylinder end, substantially as described.

4. A pneumatic tool comprising a cylinder, a reciprocatory piston therein, a rotatable spindle journaled in bearings at one end of said cylinder and extending perpendicular to the axis thereof, piston-rods extending upon opposite sides of said spindle and having a rotatory ratchet-driving engagement therewith adapted to alternately rotate the spindle and in the same direction, and an air-tight housing inclosing said piston-rods and spindle.

5. A pneumatic tool, comprising a cylinder, a reciprocatory piston therein, a rotatable spindle extending perpendicular to the axis of said cylinder, a drive connection between said piston and rotatable spindle for imparting rotary movement in the same direction to the latter by the reciprocatory movement of the former, balanced valves at each end of the cylinder for controlling admission and exhaust upon opposite sides of the piston, means for yieldingly holding said valves normally in their exhaust positions, and thumb-pins for operating said valves.

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

JOHN S. STEVENSON.

Witnesses:

M. B. O'DOGHERTY,

H. C. SMITH.