

No. 660,961.

Patented Oct. 30, 1900.

W. D. JONES & W. O. PIERCE.
PNEUMATIC HAMMER FOR ROCK DRILLS.

(Application filed July 23, 1900.)

(No Model.)

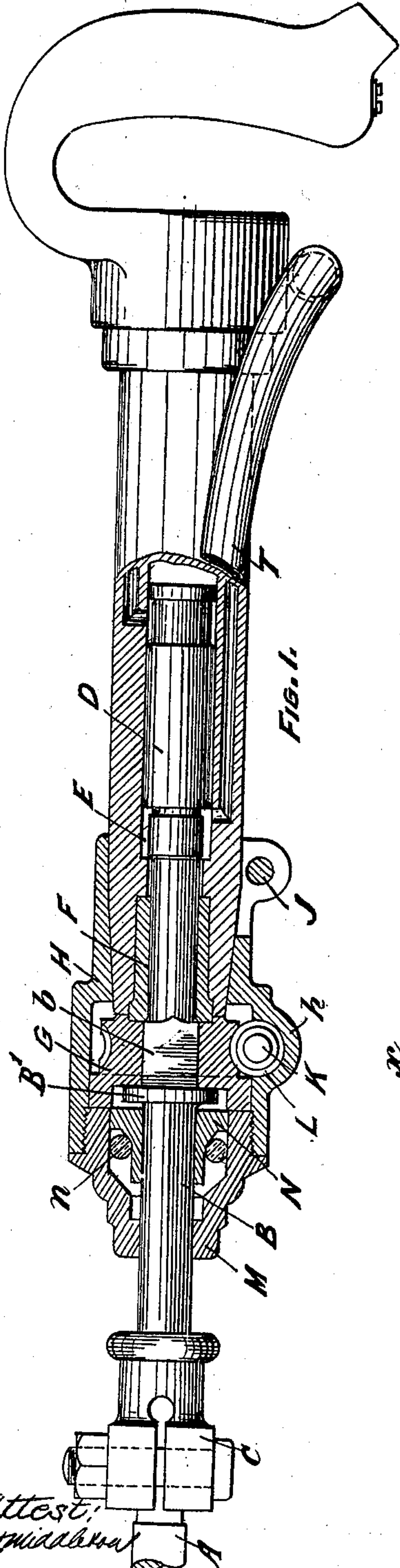


Fig. 1.

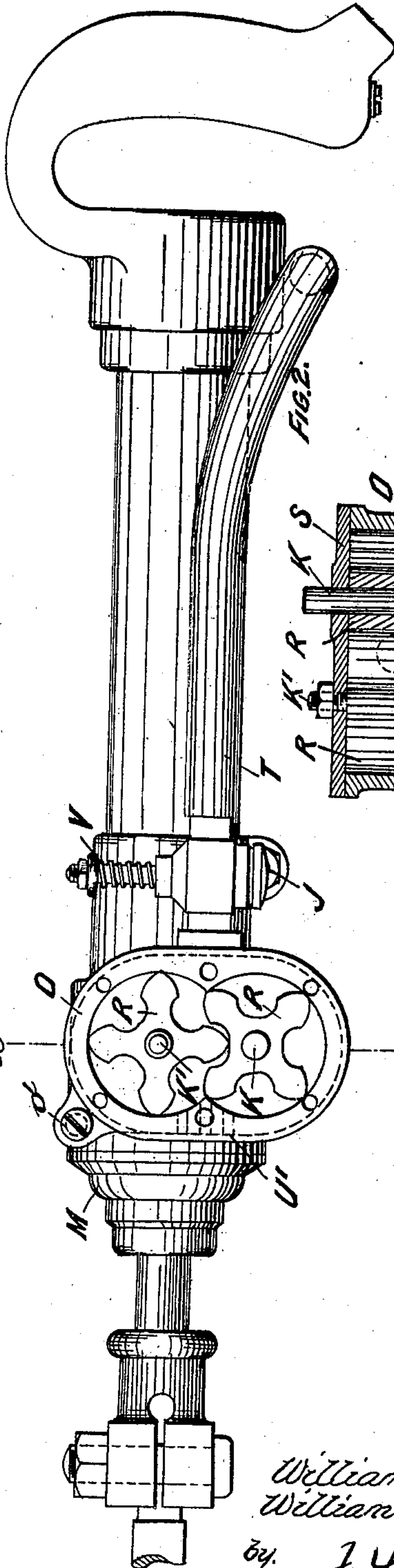


Fig. 2.

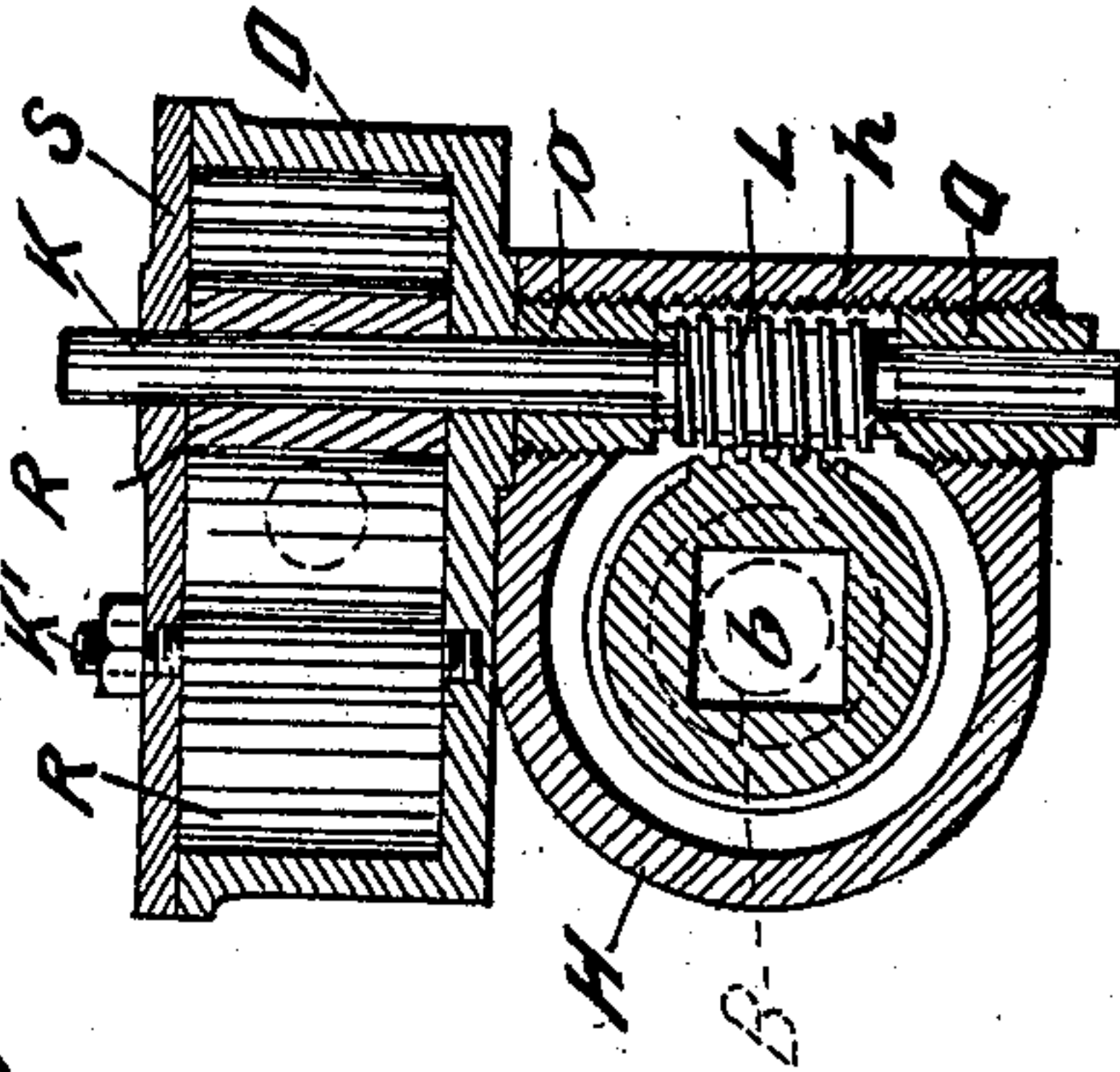


Fig. 3.

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Col. L. Reed.

Inventors
William D. Jones.
William O. Pierce.
by J. L. Wadsworth
att.

UNITED STATES PATENT OFFICE.

WILLIAM DAVID JONES AND WILLIAM OWEN PIERCE, OF PENMAEN-MAWR, ENGLAND, ASSIGNORS OF ONE-THIRD TO WILLIAM MAINE TREGLOWN, OF LONDON, ENGLAND.

PNEUMATIC HAMMER FOR ROCK-DRILLS.

SPECIFICATION forming part of Letters Patent No. 660,961, dated October 30, 1900.

Application filed July 23, 1900. Serial No. 24,552. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM DAVID JONES and WILLIAM OWEN PIERCE, citizens of Great Britain, and residents of Penmaen-Mawr, England, have invented certain new and useful Improvements in Pneumatic Hammers for Rock-Drills and the Like, (for which application for patent has been made in Great Britain, No. 19,421, bearing date September 27, 1899,) of which the following is a specification.

This invention relates to pneumatic hammers and other automatic percussive tools in which the cutting operation is effected by a succession of blows, and has for its object to render such tools applicable for use as drills, and more especially for use in drilling or boring rock and stone. In such pneumatic hammers and similar tools as usually employed the cutting-tool is loosely fitted at the end of a cylinder, within which a free piston slides, which upon the admission of fluid-pressure is forced against the head of the cutting-tool inwardly projecting within the cylinder, the piston being automatically retracted and again forced upon the inwardly-projecting head of the tool, thereby effecting a succession of blows upon the tool, whereby the cutting or other operation is automatically effected.

The invention consists in providing means for the automatic rotation of the cutting-tool in such pneumatic hammers and similar automatic percussive tools, whereby a combined rotary and percussive action is automatically given to the cutting tool or bit, which is thereby rendered conveniently applicable for drilling or boring.

The means for rotating the tool are operated, preferably, by the exhaust from the cylinder or direct from the power-supply, compressed air being the motive power that is preferably employed.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 represents in partial longitudinal section an automatic hand hammer or drill in which the invention is embodied. Fig. 2 is an elevation corresponding thereto; and

Fig. 3 is a transverse vertical section on the line X Y, Fig. 2.

The drawings represent one convenient arrangement in which the invention can be carried into effect as applicable to a pneumatic hammer or tool.

In carrying the invention into effect, as illustrated in the drawings, A is the cutting tool or bit, which is preferably secured to a shank B by means of a clamping-collar C, whereby various cutting-bits are capable of being employed. The shank B has a short and determined longitudinal movement, whereby the percussion of the sliding piston D may be taken up. The shank B projects within the cylinder E of the hammer or tool and slides within a sleeve F, provided in the extremity thereof. The shank B is preferably formed of square section at the part *b*, and a toothed sleeve or worm-wheel G is mounted upon the shank at that part, so that the worm-wheel and shank rotate together.

A sleeve H is fixedly clamped in position to the end of the cylinder E by means of bolts J. This sleeve is provided with a transverse boss *h*, within which is carried a spindle K. Upon this spindle is mounted a worm L, which gears with the toothed sleeve or worm-wheel G.

The sleeve H serves to carry a cap M, mounted upon the shank B, within which slides a damping or elastic ring N to contact with a flange B', provided upon the shank. A ring or other elastic element is provided between the ring N and the cap M, so that the tool may rebound or jump at each stroke of the piston on contact of the flange B' with the ring N.

A casing O is fitted upon the sleeve H and carries within it the vane-wheels R, by means of which the rotation of the cutting-tool or of the shank B is effected. The casing O is screwed to the sleeve H by means of the screwed boss *o*, and the spindle K passes there-through and carries the worm L before referred to, the opposite extremity of the spindle K being carried within a screwed sleeve Q, screwed within the lower part of the boss *h*.

One vane-wheel R is keyed to the spindle

K and gears with another secured upon the spindle K'. A plate or cover S is secured to the casing, and the casing is fixedly mounted in position upon the sleeve by means of the
 5 pin o'. The compressed air or other motive fluid is led into the motor-casing O by the flexible pipe T and passes out through a series of exhaust-ports U upon the other side of the casing O.

10 The flexible pipe T is preferably connected with the exhaust-port of the cylinder E, or it may be secured to the main supply.

A relief-valve V may be provided for the purpose of arresting the rotation of the tool
 15 when required, or other means for the same purpose may be provided.

In the operation of the tool it will be understood that a continuous percussive action is given to the shank B, which is in turn communicated to the tool. Meanwhile the shank
 20 and tool are caused to rotate to a degree dependent upon the ratio of the gearing employed and of the power-supply to the rotating device.

25 It will be of course understood that the invention is applicable to hammers or tools which are operated by steam, water, or compressed air and that any other automatic means of rotating the cutting than those described may be employed—as, for example, a
 30 single vane-wheel, which may be either fixed onto the shank or cutting-tool or which may communicate motion thereto through a worm and worm-wheel or other gear in the manner substantially as hereinbefore described.

35 Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In pneumatic hammers and other automatic percussive tools, means for effecting
 40 the rotation of the cutting-tool, consisting of a motor, a toothed wheel slidably and directly mounted upon the cutting-tool, and gear between the motor and the toothed wheel substantially as described.

2. In pneumatic hammers and other automatic percussive tools, means for effecting
 50 the rotation of the cutting-tool, consisting of a motor, a toothed wheel slidably mounted upon the cutting-tool, gear between the motor and the toothed wheel, a flange upon the cutting-tool, and an elastic ring with which

the said flange contacts on each stroke of the piston, for the purposes and substantially as described.

3. In pneumatic hammers and other automatic percussive tools, a sleeve secured to the extremity of the cylinder and held from rotary movement therewith, a motor mounted
 55 upon said sleeve, a toothed wheel within the sleeve slidably and directly mounted upon the cutting-tool, and gear between said toothed wheel and motor, substantially as described.

4. In combination, the cutting-tool, a non-rotating cylinder, a piston therein, a sleeve
 65 fixed to the extremity of the cylinder, a toothed wheel within the sleeve mounted directly and slidably upon the stem of the tool, a worm engaging the toothed wheel and supported by the sleeve and means for turning
 70 the worm, substantially as described.

5. In pneumatic hammers and other automatic percussive tools, means for effecting
 75 the rotation of the cutting-tool, consisting of a motor, a toothed wheel slidably mounted upon the cutting-tool, gear between the motor and the toothed wheel, and a pipe connection between the motor and the exhaust-port of the cylinder, substantially as described.

6. In combination, the cylinder, and piston, a sleeve fixed to the end of the cylinder, a
 85 toothed wheel within the sleeve slidably and directly mounted on the stem of the tool, a motor-casing also carried by the sleeve, a vane-wheel therein, a power-supply pipe leading to the casing and an operating connection between the vane-wheel and the toothed wheel.

7. In combination, the drill, the cylinder
 90 and piston, a power-supply conduit leading to the cylinder, a motor for rotating the drill and a connection between the motor and drill, the said motor being operated by the exhaust from the cylinder, substantially as
 95 described.

In witness whereof we have hereunto set our hands in presence of two witnesses.

WILLIAM DAVID JONES.
 WILLIAM OWEN PIERCE.

Witnesses:

DANIEL JONES,
 CHARLES CLARKE.