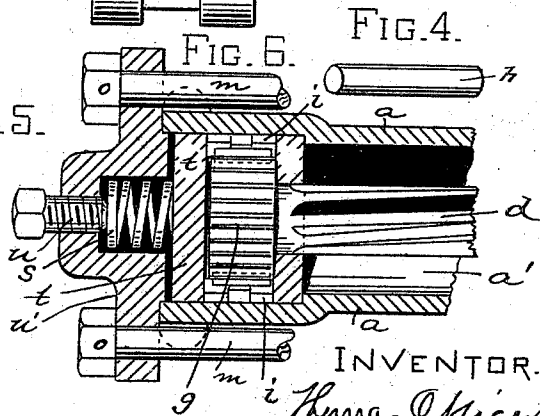
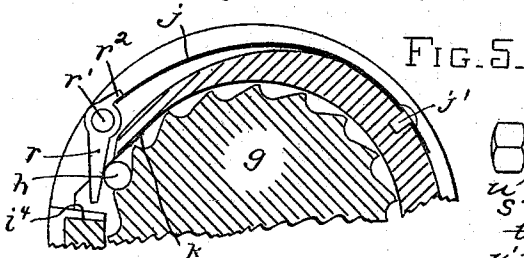
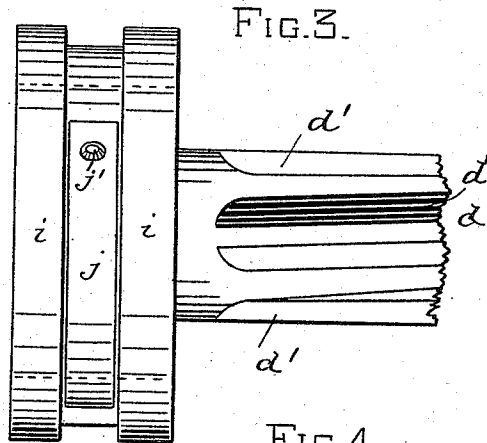
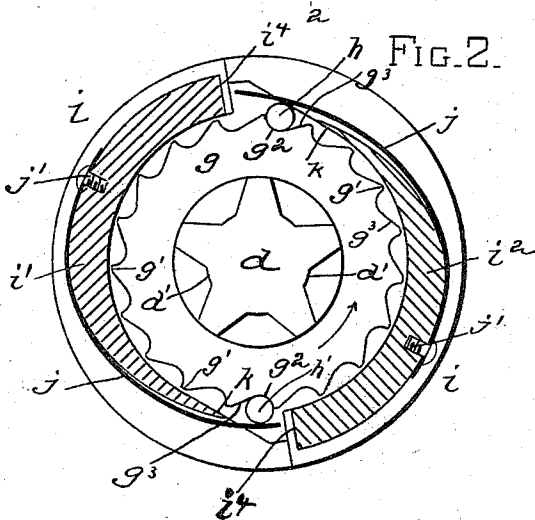
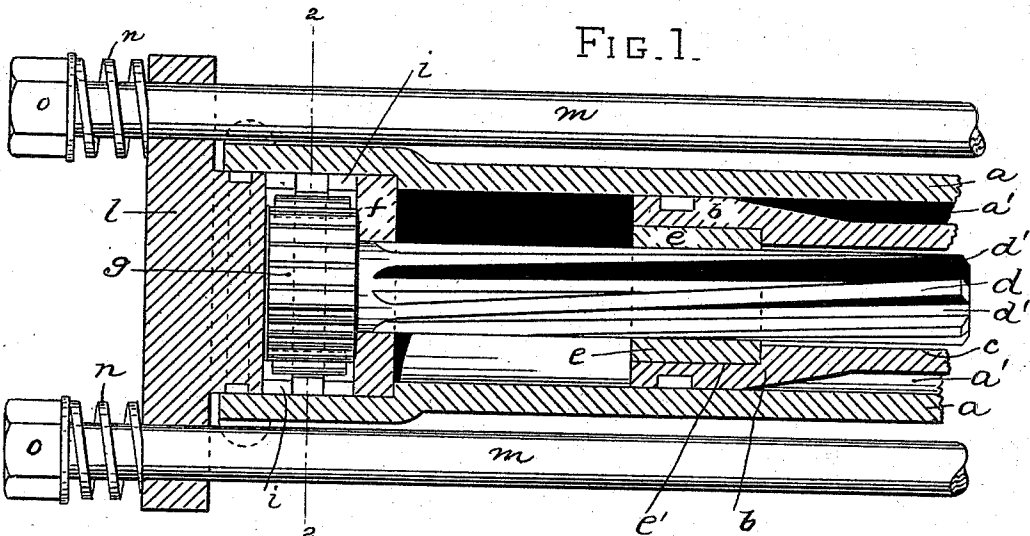


(No Model.)

T. OFFICER.
ROCK DRILL.

No. 580,462.

Patented Apr. 13, 1897.



WITNESSES:

W. H. Tamm
Robert C. Litten

INVENTOR.

Thomas Officer
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ATTORNEYS

UNITED STATES PATENT OFFICE.

THOMAS OFFICER, OF CLAREMONT, NEW HAMPSHIRE, ASSIGNOR TO
THE SULLIVAN MACHINERY COMPANY, OF SAME PLACE AND CHI-
CAGO, ILLINOIS.

ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 580,462, dated April 13, 1897.

Application filed August 12, 1896. Serial No. 602,499. (No model.)

To all whom it may concern:

Be it known that I, THOMAS OFFICER, a resi-
dent of Claremont, in the county of Sullivan
and State of New Hampshire, have invented a
new and useful Improvement in Rock-Drills;
and I do hereby declare the following to be a
full, clear, and exact description thereof.

My invention relates to rock-drills.

The special form of rock-drill to which my
invention is applicable is that in which a cyl-
inder is employed with a piston operating
therein and a spiral rifle-bar working in a
nut in the piston, together with mechanism
at one end of said rifle-bar for permitting of
the rotation of the rifle-bar upon the descent
of the piston, but holding said rifle-bar from
rotation upon the upward stroke of the pis-
ton, whereby the piston itself is turned upon
the upward stroke.

The present invention relates to an im-
proved form of mechanism for holding the
rifle-bar during the upward stroke of the pis-
ton and for releasing said mechanism in case
the drill-bit should be prevented from turn-
ing.

My invention comprises certain new fea-
tures in this form of mechanism, all of which
will be fully hereinafter set forth and claimed.

To enable others skilled in the art to make
and use my invention, I will describe the same
more fully, referring to the accompanying
drawings, in which—

Figure 1 is a sectional view of the upper
part of a common form of rock-drill to which
my invention has been applied. Fig. 2 is a
section on the line 2 2, Fig. 1. Fig. 3 is a
view of the friction-ring or segments with
the rifle-bar projecting therefrom. Fig. 4 is
a view of one of the rollers. Figs. 5 and 6
are modified forms of my invention.

Like letters indicate like parts in each of
the figures.

As the form of rock-drill to which my in-
vention is applicable is so well known, I have
not deemed it necessary to illustrate the valve
mechanism and the lower part of the appa-
ratus, as there are different forms of valve
mechanism which may be used, and such
valve mechanism forms no part of my inven-
tion.

The letter *a* represents the upper portion
of a suitable cylinder having the piston-cham-
ber *a'* therein, together with the valve-con-
trolled ports (not shown) for admitting steam
to the ends of said piston-chamber. Within
the chamber *a'* is the piston *b*, whose rod ex-
tends down therefrom and which has attached
thereto a suitable drill-bit. The piston *b* has
the cavity *c* formed therein, adapted to receive
the rifle-bar *d*. This rifle-bar has the spiral
grooves *d'* formed therein, said grooves en-
gaging with the rifle-bar nut *e*, secured within
a recess *e'* at the upper end of said piston.
The upper end of the rifle-bar *d* passes through
an opening in the division-collar *f*, and on the
upper end of said rifle-bar is a ratchet-head *g*.
This ratchet-head *g* has the teeth *g'* formed
in its circumference, said teeth having the
curved recesses *g²* and the inclines *g³* leading
therefrom to the periphery on a preferably
straight line. The curved recesses *g²* are
adapted to receive the rollers *h h'*.

Surrounding the ratchet-head *g* and rest-
ing upon the division-collar *f* is the friction-
ring *i*. Said friction-ring may be formed in
separate halves or segments *i' i²* or may be
formed in one piece. I prefer to employ the
divided ring, however, for the reasons more
fully hereinafter set forth. The friction-ring
i has the groove *i³* formed therein and the
openings *i⁴* leading from said groove to the
interior of said ring. Secured at *j'* within
said groove *i³* are the springs *j*, said springs
being adapted to bear against the rollers *h h'*
and normally hold them within the curved
seats *g²* of the ratchet-teeth *g'*. Formed on
the inner face of the ring *i* are the inclines
k. Resting on the ring *i* is the head *l*, suffi-
cient space being left between said head and
the ratchet-head *g* to permit of the turning
of said ratchet-head without friction. Pass-
ing through the head *l* are the rods *m*, the
lower ends of said rods being held within the
lower head of the cylinder and springs *n* be-
ing interposed between said head *l* and nuts
o at the upper end of said rods. In this man-
ner by tightening the nuts *o* the head *l* may
be forced down onto the ring *i*.

When my improved rock-drill is in opera-
tion, as the piston *b* descends the rifle-bar *d*

will turn in the direction of the arrow in Fig. 2. This is due to the fact that the rollers h h' are free to move into the deepest part of the incline, which is equal to the diameters of said rollers, whereby the said rollers can pass over the tops of the teeth, pushing back the springs as they move. The springs will be forced back as the rollers pass over the points of the teeth, but said springs will force said rollers down onto the next teeth. On the upward stroke, however, of the piston b the rifle-bar is prevented from turning by means of the rollers h h' . The roller h comes in contact with the incline k and prevents the rotation of the rifle-bar. By having the segments i i^2 I obtain more friction, as the said segments are forced by the action of the rollers on the inclines against the inner face of the case containing said segments. This does not occur where the ring is made in one piece. I prefer to employ an odd number of teeth in the ratchet-head, so that the roller h' rests in the bottom of a tooth the same as the roller h , but does not come against the incline k' . The object of this is to catch the ratchet at less than the whole travel of the tooth. If it travels half a tooth, the roller h' will stop it. If it travels a whole tooth, the roller h will catch the ratchet. The rollers work very easily on the teeth, and instead of sliding in the manner of the pawl they roll from one tooth to another, which gives less wear. There is also very little wear upon the rollers. The rifle-bar being held against rotation in this way, upon the descent of the piston the piston and the rifle-bar nut e will be compelled to turn. In case, however, the drill-bit should be held from turning in the rock for any reason and it is impossible for it to turn then sufficient pressure will be exerted to move the ring or parts i , whereby the strain on the drill parts is not too great and the piston ascends without injury to the drill parts.

In Fig. 5 I have shown a modified form of my apparatus in which, instead of having the springs j bear directly upon the rollers h h' , I employ a lever r , pivoted at r' , which bears against said rollers. The inner end of the lever r has the lug r^2 , with which the end of the spring engages.

In Fig. 6 I dispense with the springs n , interposed between the head l and the nuts o on the rods m , and use a central spring s , which bears directly upon the plate t . A set-screw u , passing down through the head u' , regu-

lates the tension of said spring s , whereby the plate t can be forced down upon the frictional ring or segments, or can be loosened to permit the friction-ring to turn readily, which is desirable in some cases where the drill is to be used for broaching, in which case the piston is not revolved.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a rock-drill, the combination with a suitable cylinder having a reciprocating piston therein, of a spiral rifle-bar engaging said piston, a ratchet-head on said rifle-bar, a friction-ring composed of segments surrounding said ratchet-head, a head pressing down upon said friction-ring, rollers engaging the teeth of said ratchet-head and the inner face of said friction-ring, and springs acting upon said rollers, substantially as set forth.

2. In a rock-drill, the combination with a suitable cylinder having a reciprocating piston therein, of a spiral rifle-bar engaging said piston, a ratchet-head on said rifle-bar, a friction-ring composed of segments surrounding said ratchet-head, a head pressing down upon said friction-ring, rollers engaging the teeth of said ratchet-head, and inclines on the inner face of said friction-ring, substantially as set forth.

3. In a rock-drill, the combination with a suitable cylinder having a reciprocating piston therein, of a rifle-bar engaging said piston, a ratchet-head on said rifle-bar, a friction-ring composed of segments surrounding said ratchet-head, a head pressing down upon said friction-ring, rollers engaging the teeth of said ratchet-head and inclines on the inner face of said ring, and springs acting upon said rollers, substantially as set forth.

4. In a rock-drill, the combination with a suitable cylinder having a reciprocating piston therein, of a rifle-bar engaging said piston, a ratchet-head on said rifle-bar, a friction-ring composed of segments surrounding said ratchet-head, a head pressing down upon said friction-ring, rollers engaging the teeth of said ratchet-head and inclines on the inner face of said ring, and springs secured within a groove formed in said ring and adapted to engage said rollers, substantially as set forth.

In testimony whereof I, the said THOMAS OFFICER, have hereunto set my hand.

THOMAS OFFICER.

Witnesses:

H. W. PARKER,
E. J. TENNEY.