

No. 841,139.

PATENTED JAN. 15, 1907.

A. H. GIBSON.

ROCK DRILL.

APPLICATION FILED JULY 28, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

Fig. 2.

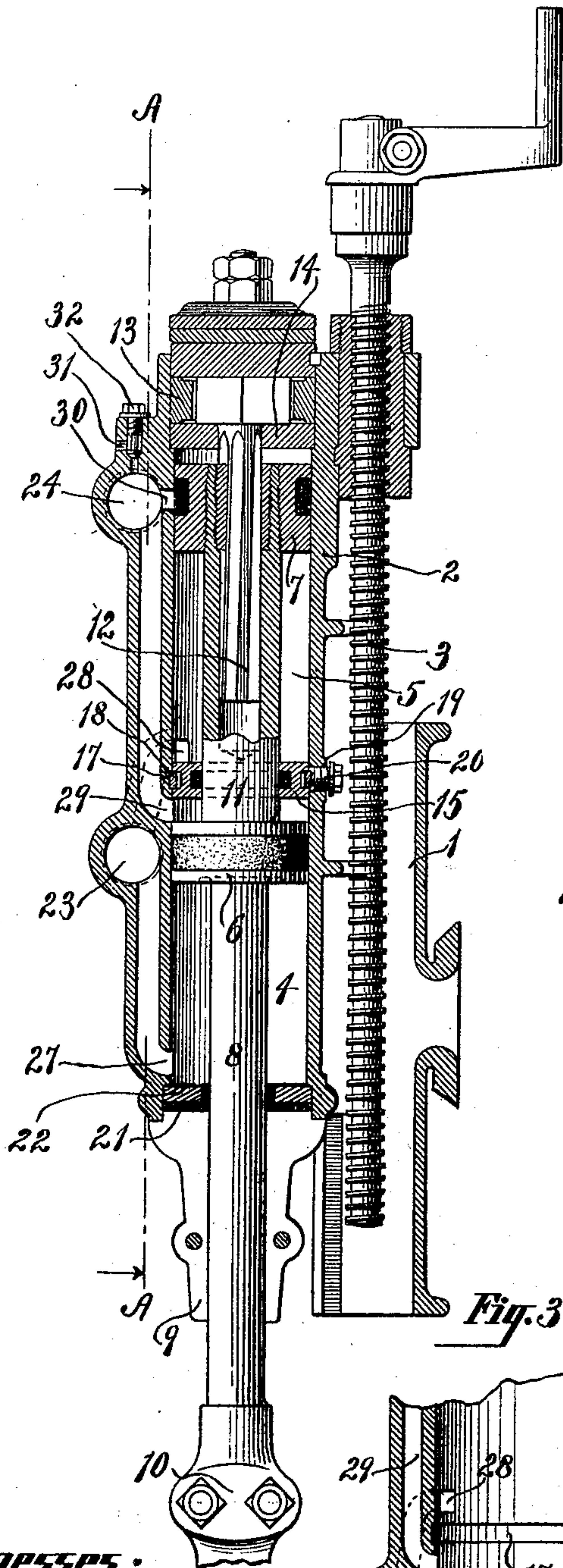
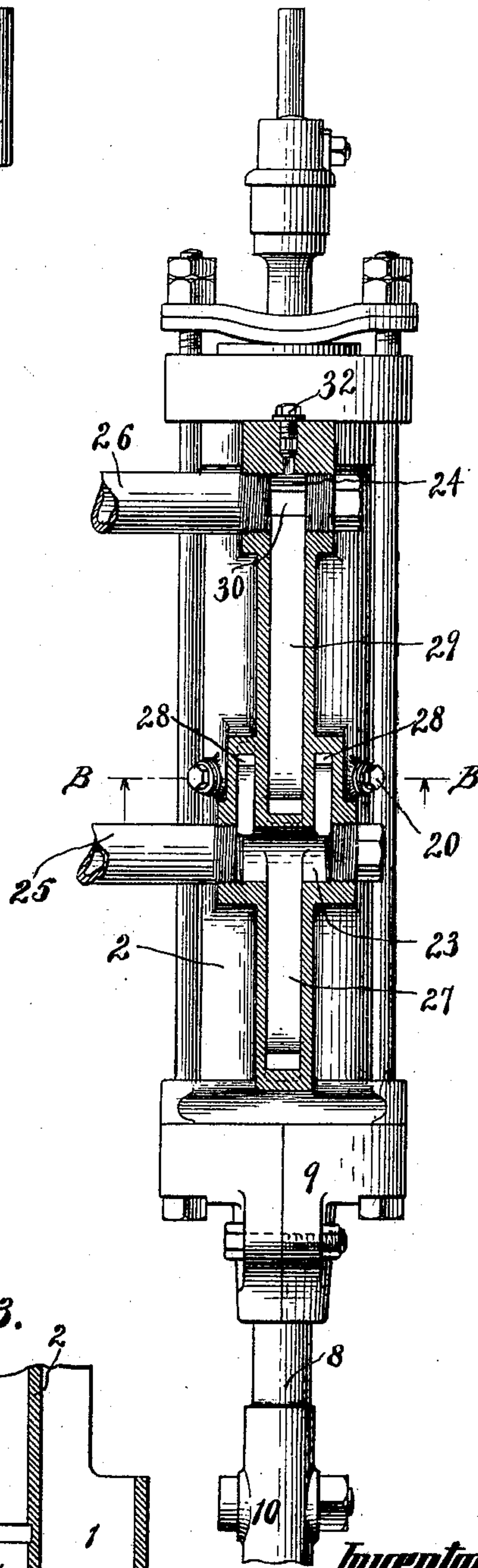
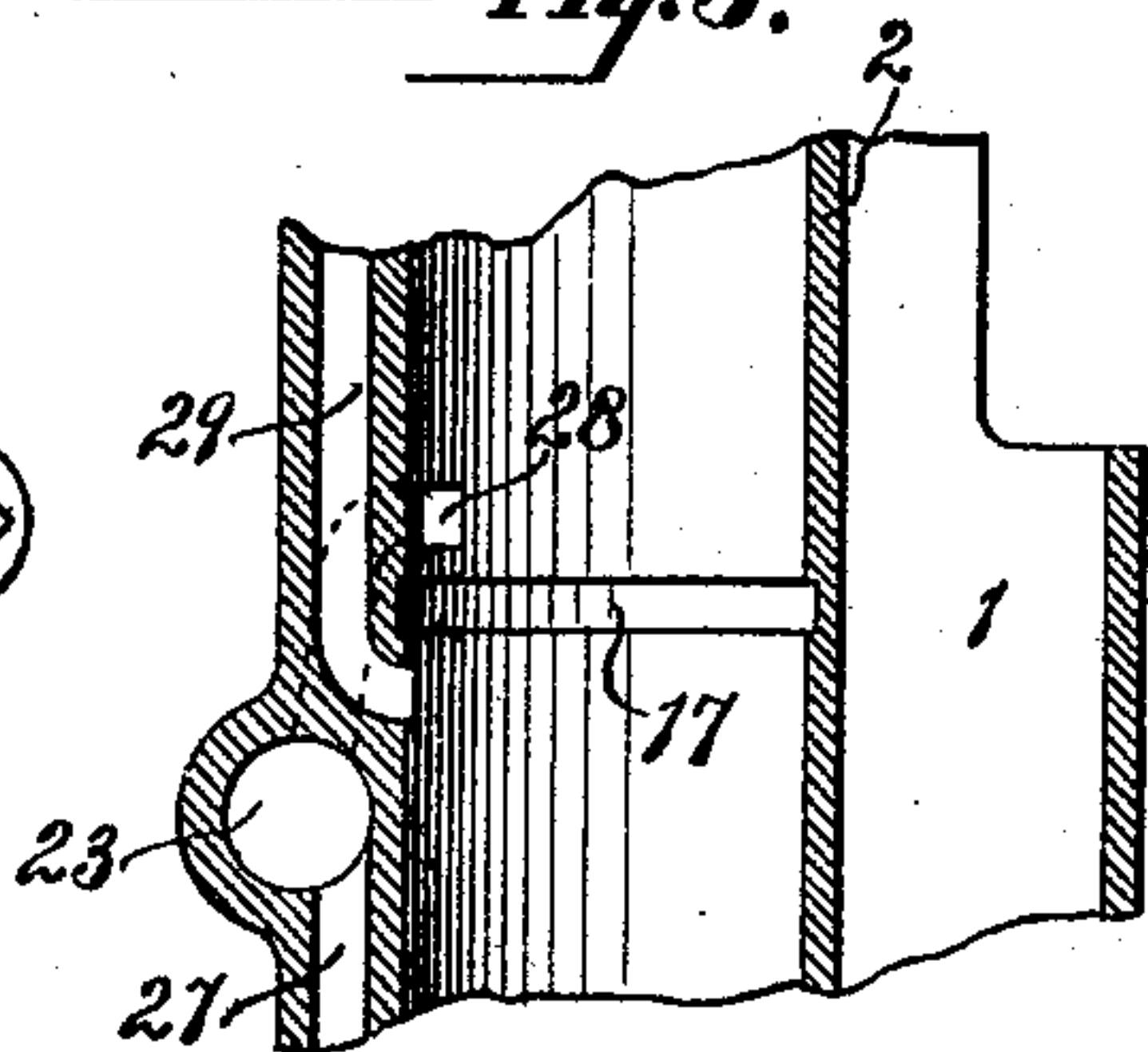


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4.

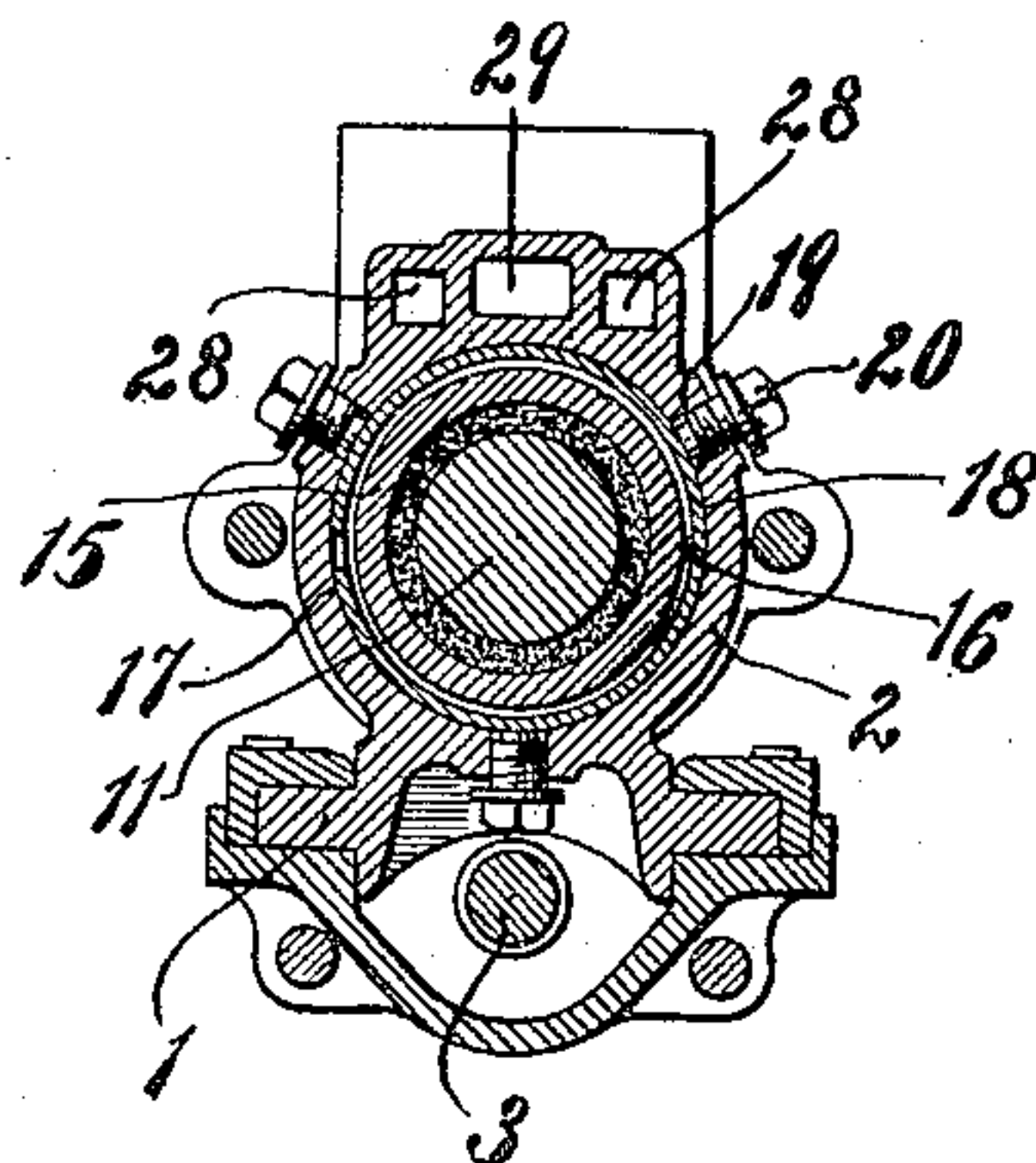


Fig. 5.

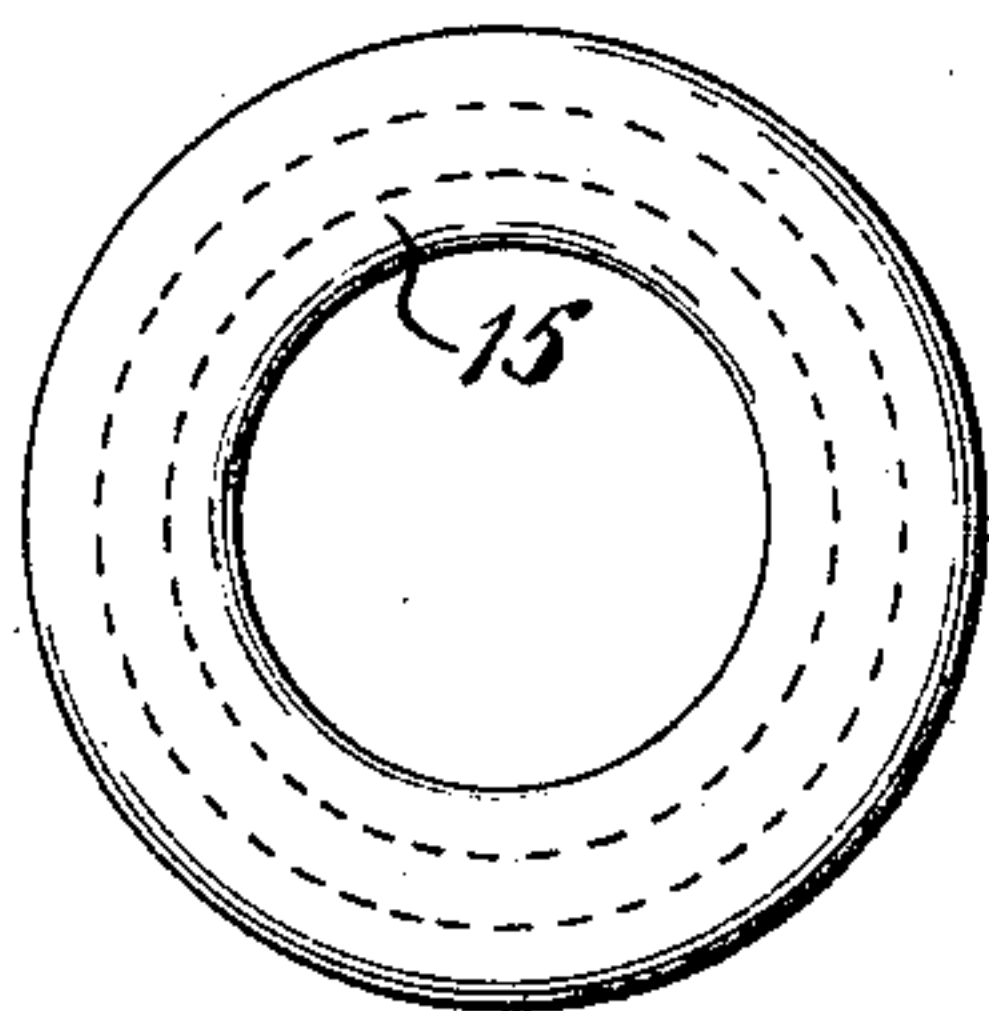


Fig. 6.

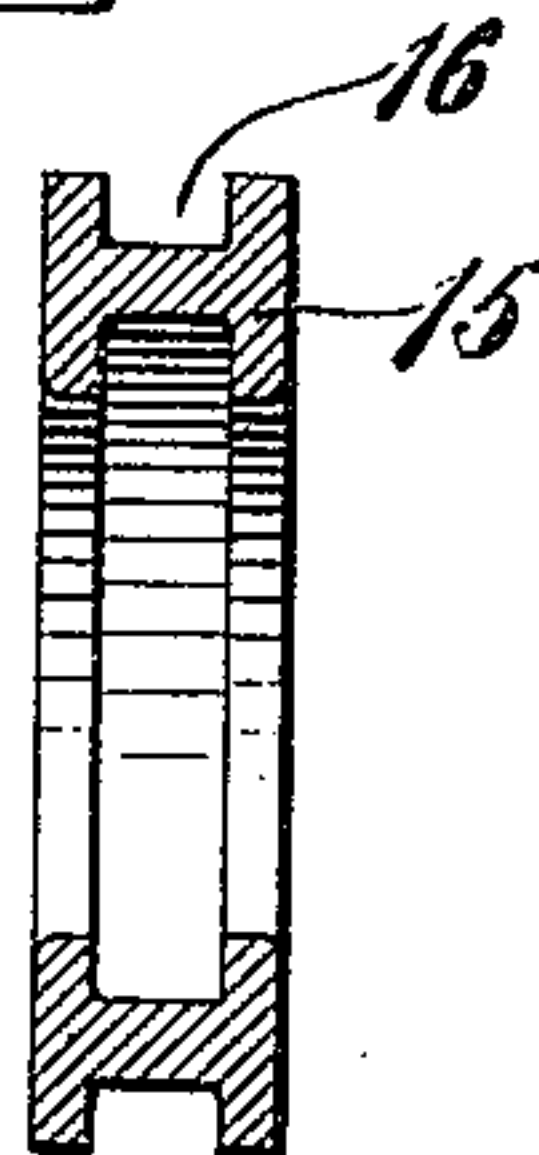
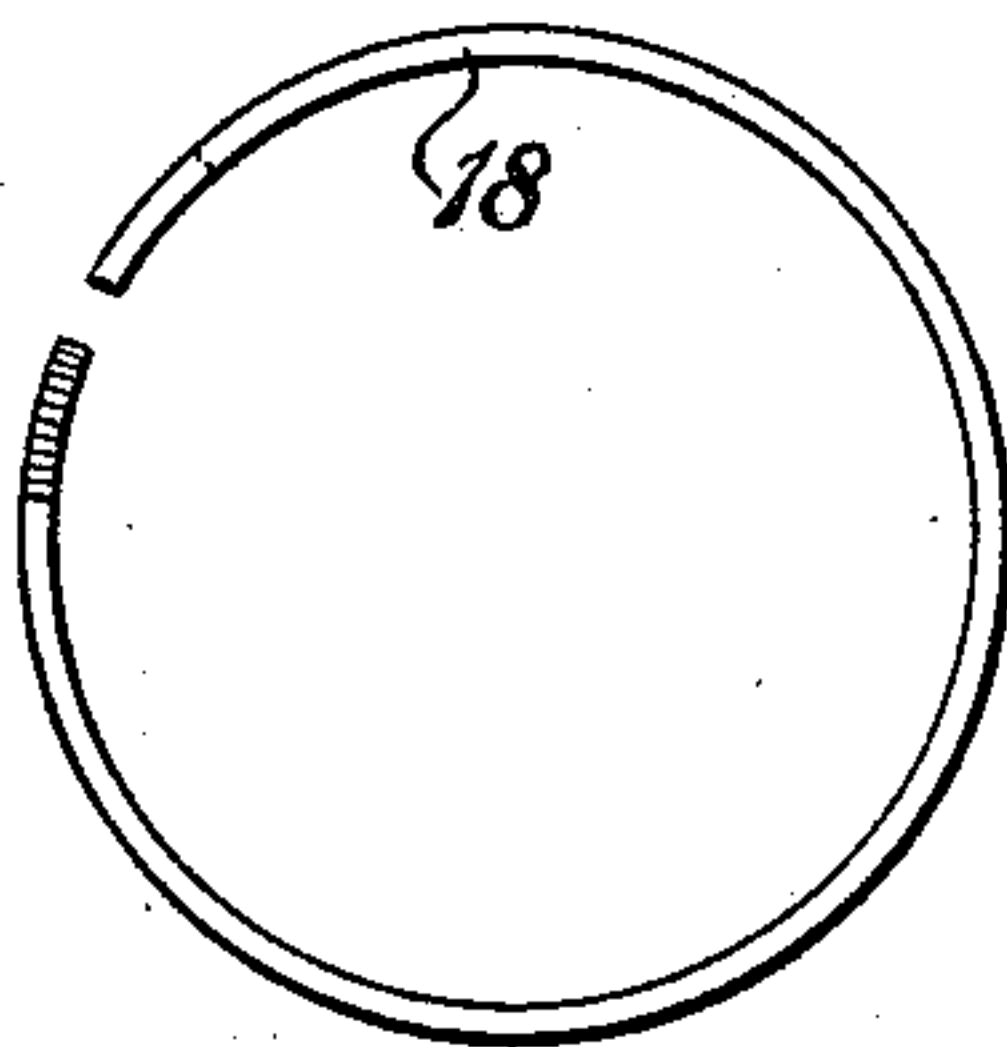


Fig. 7.



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UNITED STATES PATENT OFFICE.

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ROCK-DRILL.

No. 841,139.

Specification of Letters Patent.

Patented Jan. 15, 1907.

Application filed July 28, 1905. Serial No. 271,602.

To all whom it may concern:

Be it known that I, ARTHUR H. GIBSON, a
subject of the King of Great Britain, and a
resident of Easton, in the county of North-
ampton and State of Pennsylvania, have in-
vented a new and useful Improvement in
Rock-Drills, of which the following is a speci-
fication.

The object of my invention is to provide
certain improvements in that class of rock-
drills which are used in connection with re-
ciprocating columns of air whereby a very
large piston area is obtained without the ne-
cessity of making the whole drill-cylinder too
large in diameter for convenient operation,
and also to produce a structure in which the
center of gravity of the piston is located far-
ther back with regard to the shell than has
heretofore been common, and also a struc-
ture wherein a reduced cushioning effect for
the piston is obtained.

A further object is to provide a drill in
which the several parts may be very readily
assembled.

With these objects in view my invention
comprises a drill worked by reciprocating col-
umns of air, the cylinder being provided with
a plurality of piston-chambers and the piston
being provided with heads fitted to recipro-
cate in the several chambers.

My invention further comprises means for
connecting one air-tube to the corresponding
rear ends of the piston-chambers and the
other air-tube to the corresponding front
ends of the piston-chambers.

In the accompanying drawings, Figure 1
represents the drill in longitudinal central
section. Fig. 2 is a transverse section taken
in the plane of the line A A of Fig. 1 looking
in the direction of the arrows. Fig. 3 is a
fragmentary section showing a portion of
the interior of the drill-cylinder with the
division-ring removed. Fig. 4 is a transverse
section taken in the plane of the line B B of
Fig. 2 looking in the direction of the arrows.
Figs. 5 and 6 are side views and cross-sec-
tions, respectively, of the division-ring; and
Fig. 7 is a view of the split locking-ring.

The shell of the drill is denoted by 1 and
may be of the usual construction. The drill-
cylinder is denoted by 2, and it is mounted
in the usual manner on the shell 1 and is
moved toward and away from its work by

the feed-screw 3. The interior of the cylin-
der is divided into a plurality of piston-cham-
bers, in the present instance two piston-
chambers, the front chamber being de-
noted by 4 and the rear chamber by 5. The
drill-piston is provided with a plurality of
heads corresponding to the number of pis-
ton-chambers, in the present instance front
and rear heads, (denoted, respectively, by 6
and 7.) This piston is provided with a front
extension 8, which passes through the front
head 9 of the drill and is provided with the
usual chuck 10 for the attachment of the
drill-tool thereto. This piston is further-
more provided with a rear hollow extension
11, which is engaged with the rifle-bar 12,
connected with the rotation device 13, of
well-known and approved construction. The
back head of the cylinder is denoted by 14
and forms the rear end of the back piston-
chamber 5. The division-ring which divides
the interior of the cylinder into front and
rear piston-chambers is denoted by 15, and
it is inserted into and locked in its position as
follows: The periphery of the ring 15 fits
snugly the inner wall of the cylinder. The
ring 15 is provided with a circumferential
groove 16, which is arranged to be brought
into alinement with an annular groove 17 in
the inner wall of the cylinder. A split lock-
ing-ring 18 of greater thickness than the
depth of the annular groove 17 is arranged
to lock the division-ring 15 in position. The
circumferential groove 16 in the ring is of
sufficient depth for the locking-ring to be de-
pressed entirely within the periphery of the
division-ring when the same is being inserted
into position or removed therefrom.

For the purpose of releasing the division-
ring 15 from its position the cylinder 2 is pro-
vided with a plurality of holes 19, communi-
cating with the bottom of the annular groove
17, in which holes are located set-screws 20,
arranged to force the split ring 18 inwardly
within the periphery of the division-ring 15
or to permit the split ring 18 to expand into
locking position, according to the direction in
which the said set-screws are turned. In the
present instance I have shown three of these
holes 19 and set-screws 20, located at equal
distances around the periphery of the cylin-
der.

The rear piston-head 7 is removably se-

cured on the rear extension 11 of the piston, so that the said piston-head may be removed through the back of the cylinder, and thus permit the balance of the piston to be removed through the front of the cylinder when so desired.

A washer 21, of leather or other suitable material, is interposed between the split front head 9 and the washers 22, which form the front end of the front piston-chamber 4 of the cylinder. This washer 21 serves to prevent the leakage of air through the separation between the two parts of the front head.

The passages 23 24 in the cylinder 2 are attached to the air-tubes 25 26 of an air-pressor, (not shown herein,) through which tubes air columns are caused to reciprocate for operating the drill-piston. The front ends of the front and rear piston-chambers 4 and 5 are connected to the passage 23 through ports 27 28, and the rear ends of the said front and rear chambers are connected to the passage 24 through ports 29 30. The port 28 is bifurcated, as shown clearly in Fig. 2, for convenience in arranging the cores in casting, to make the machine symmetrical, &c. The port 30 at the rear of the rear piston-chamber 5 is spaced a short distance from the end of the chamber, so as to form a cushion of air after the piston-head 7 is moved sufficiently far to the rear to cut off the said port. This is the only cushioning required for the piston, as the space to the rear of the front piston-head 6 is open at all times to the rear port 29 of the front piston-chamber 4.

The piston-heads are so arranged on the piston that they can never hit the division-ring 15 during their reciprocating movements, but may the one hit the front head 9 and the other the back head 14.

The air-release outlet 31 and its controlling valve 32 are arranged in communication with the rear passage 24 for the purpose of letting out air after the drill stops working, so that the drill may be easily moved by hand, and also to permit the release of air-pressure so as to permit the motor to readily restart the drill.

It is to be understood that any motor for reciprocating columns of air may be used in connection with this drill—as, for instance, the electrically-driven pressor constructed and operated as illustrated in my copending application filed April 27, 1905, Serial No. 257,736.

What I claim as my invention is—

1. A percussive tool-cylinder, a division-ring dividing the cylinder into front and rear chambers, a piston having front and rear pis-

ton-heads, two air-pressor tubes, valveless passages leading from one air-pressor tube to the front ends of the front and rear chambers and valveless passages leading from the other air-pressor tube to the rear ends of the said chambers whereby the tool-piston may be operated by reciprocating columns of air.

2. A percussive tool-cylinder, a division-ring dividing it into front and rear chambers, a piston having front and rear piston-heads, two air-pressor tubes, valveless passages leading from one air-pressor tube to the front ends of the front and rear chambers and valveless passages leading from the other air-pressor tube to the rear ends of the said chambers, the passage-port for the rear end of the rear chamber being spaced a short distance from the end of the chamber for forming a cushion of air on the back stroke of the piston.

3. A percussive tool-cylinder, a division-ring dividing the cylinder into front and rear chambers, a piston having a front extension, a piston-head thereon in the front chamber, and a hollow rear extension projecting into the rear chamber, a piston-head secured to the end of the said rear extension and a rotating device having a forwardly-extended rifle-bar working in said hollow rear extension.

4. A percussive tool-cylinder, a division-ring dividing the cylinder into front and rear chambers, a piston having a front extension, a piston-head thereon in the front chamber and a hollow rear extension projecting into the rear chamber, a piston-head removably secured to the end of the said rear extension and a rotating device having a forwardly-extended rifle-bar working in said hollow rear extension.

5. The combination with the cylinder of a rock-drill, of a division-ring for separating the interior of the cylinder into front and rear piston-chambers, the inner walls of said cylinder having an annular groove therein and the division-ring having a circumferential groove therein, a split ring located in the two grooves for locking the division-ring in the cylinder and means carried by the cylinder for forcing the split ring entirely into the groove in the division-ring for permitting the removal of the division-ring from the cylinder.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 24th day of July, 1905.

ARTHUR H. GIBSON.

Witnesses:

H. D. MAXWELL,

FRANK P. McCLUSKEY.