the steam-chest, an exhaust-port on each end of the steam-chest and adapted to be alternately connected with the central annular groove in the piston, and an exhaust in the cylinder and on each side of the steam-inlet, substantially as and for the purposes described.

In testimony that I claim the foregoing I have hereunto set my hand this 7th day of November, 1895.

ADAM SCHEID.

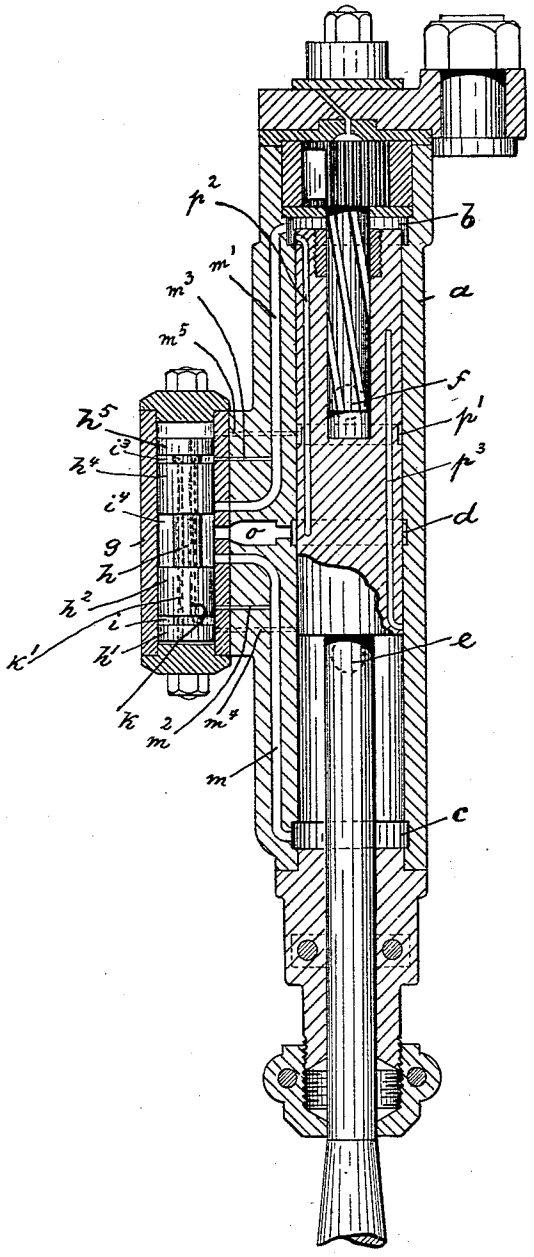
Witnesses:
ALFRED GARTNER,
DUNCAN M. ROBERTSON.

(No Model.)

# A. SCHEID.

## ROCK DRILL.

No. 555,128. Patented Feb. 25, 1896.

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# UNITED STATES PATENT OFFICE.

ADAM SCHEID, OF HARRISON, NEW JERSEY.

## ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 555,128, dated February 25, 1896.

Application filed November 13, 1895. Serial No. 568,800. (No model.)

*To all whom it may concern:*

Be it known that I, ADAM SCHEID, a citizen of the United States, residing in Harrison, Hudson county, and State of New Jersey, have invented certain new and useful Improvements in Rock-Drills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to letters of reference marked thereon, which forms a part of this specification.

The object of my present invention is to provide a rock-drill of simple, strong and durable construction, reliable and efficient in operation, and in which drill the piston and the trip-valve are operated by live steam only.

The invention consists in the novel arrangement and connection between the steam-chest, the trip-valve and the cylinder of said rock-drill, and also in the arrangement and combination of parts, hereinafter more fully described and claimed.

In the accompanying drawing, which represents a central longitudinal section of the improved rock-drill, $a$ is the cylinder and $p$ the drill-rotating piston, which latter is provided at its center with an annular groove $p'$, and with two ports $p^2$ and $p^3$ penetrating the side walls of the piston and extending in opposite directions, and having a length equal to about three-quarters of the length of the said piston.

The cylinder $a$ is provided at or near each end with an annular groove or chamber $c$ (and $b$) and in its center with an annular groove $d$. On each side of said annular groove $d$ and a specified distance therefrom are arranged the exhaust holes or ports $e$ and $f$, penetrating the wall of the cylinder or connected with an exhaust through channels in any desired manner, as will be manifest. On one side of the cylinder is arranged the steam-chest $g$ containing the trip-valve $h$. This steam-chest communicates through port $m$ with the annular chamber $c$ at the lower end of the cylinder and through port $m'$ with the annular chamber $b$ at the upper end thereof.

Leading from the ends of the steam-chest into the cylinder $a$ are two ports $m^4$ and $m^5$, adapted to convey the exhaust from the steam-chest into the annular groove $p'$ of the piston, which, during the operation, communicates respectively with the exhaust-holes $e$ and $f$ in cylinder $a$.

The steam-inlet $o$ is arranged in the cylinder and communicates through ports with the annular groove $d$ of cylinder $a$ and with the chamber $i^4$ of steam-chest $g$.

The trip-valve consists of the piston-rod having two series of double heads $h'$ $h^2$ and $h^4$ $h^5$, forming a series of annular chambers $i$, $i^4$ and $i^3$, respectively, and are adapted to alternately open and close the various ports, as hereinafter described.

Ports $m^2$ and $m^3$ connect the ports $m$ and $m'$ with the steam-chest and the annular chambers $i$ and $i^3$, respectively, which latter chambers $i$ and $i^3$ are also connected by ports $k$ and $k'$ with the opposite ends of the steam-chest. Said ports $k$ and $k'$ are arranged in the piston-rod of the trip-valve, as clearly shown.

Suppose the trip-valve and drill-piston to be in the position shown in the drawings. Steam enters through inlet $o$ into the annular ring $d$ and from there through port $p^2$ into the annular chamber $b$, thus starting the downward movement of the piston. Simultaneously the steam from said chamber $b$ passes through channel $m'$ and port $m^3$ into the annular chamber $i^3$ and from there through port $k'$ to the lower end of the steam-chest and forces the trip-valve upward. The ports $m$ and $m^3$ are thus closed, while the ports $m'$ and $m^2$ are opened. During this operation the piston has moved downward a sufficient distance to close the communication between the annular grooves $d$ and $b$ through port $p^2$ and between the upper end of the steam-chest and the annular groove $p'$ through port $m^5$, which latter communicated with the exhaust-hole $f$. The steam now enters through chambers $i^4$ and port $m'$ into the upper end of the cylinder and completes the downward movement of the piston. When the latter has reached its lowermost position, the exhaust-hole $f$ is opened and allows the exhaust from the upper end of the cylinder to escape, and as the lower end of the steam-chest at that