2 Sheets--Sheet 1.

G. E. NUTTING & J. C. GITHENS.

Steam Rock-Drill.

No. 161,631. Patented April 6, 1875.

Fig. 1.

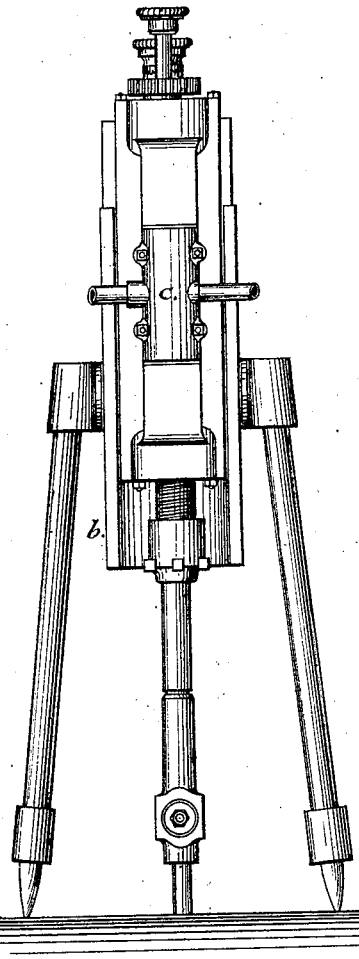
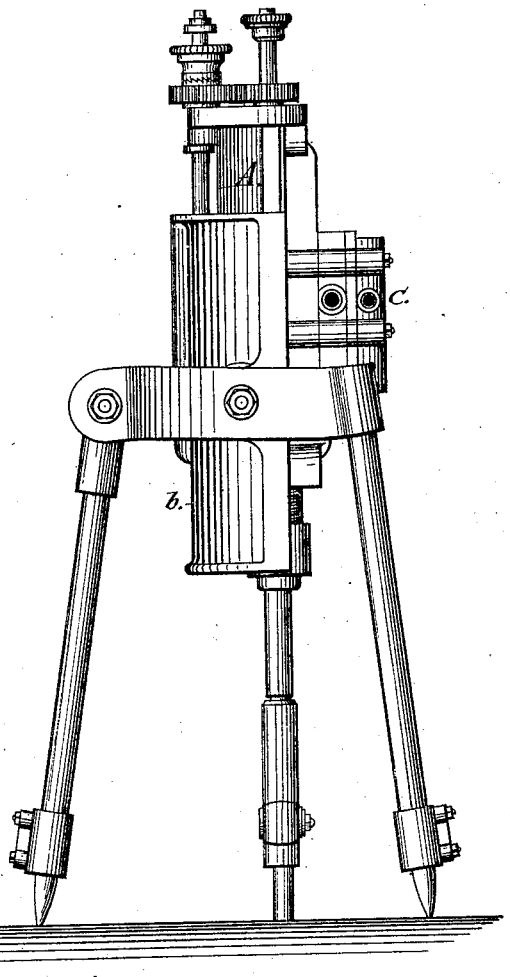


Fig. 2.



Witnesses:
M. Gardner.
Edw. W. Donn

Inventors:
Geo E. Nutting
Joseph C. Githens
By Addison C. Rand
their Atty

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

2 Sheets--Sheet 2.

G. E. NUTTING & J. C. GITHENS.

Steam Rock-Drill.

No. 161,631. Patented April 6, 1875.

Fig. 3.

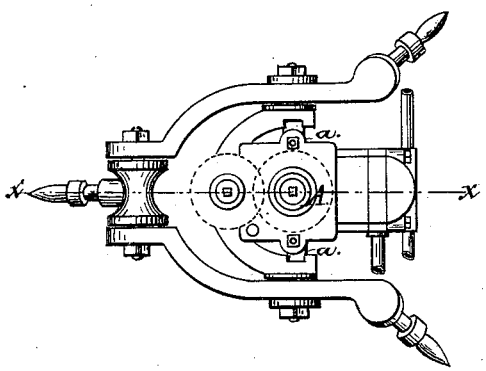


Fig. 4.

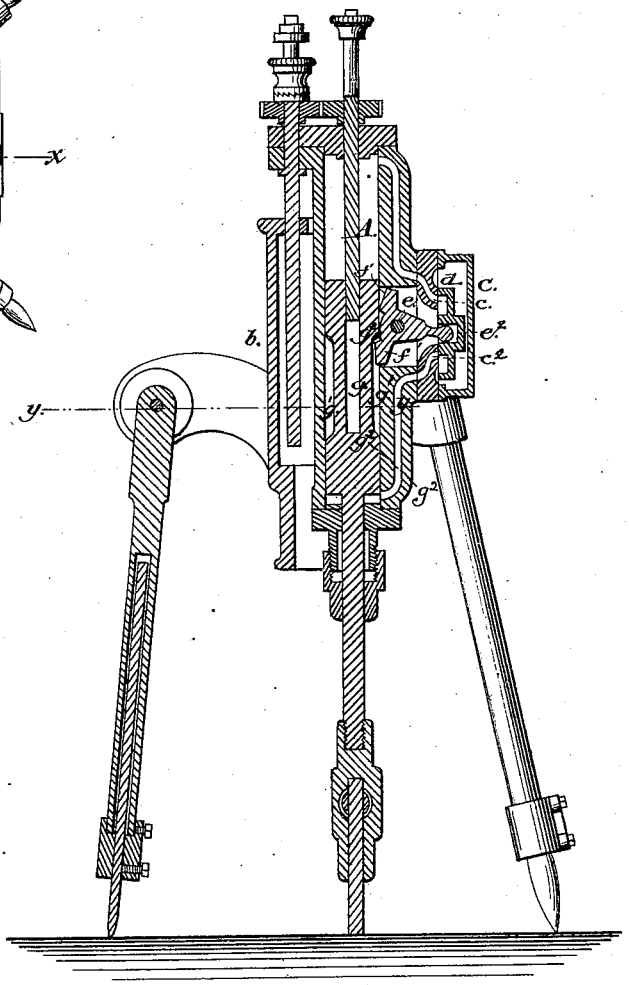
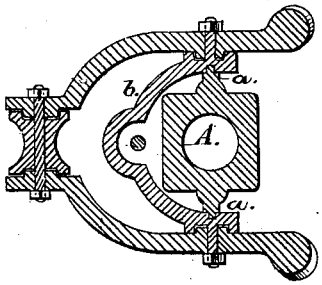


Fig. 5.



Witnesses:

M. Gardner,
Edw. W. Down

Inventors:

George E. Nutting.
Joseph C. Githens.
By Addison C. Rand
Their atty.

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

UNITED STATES PATENT OFFICE.

GEORGE E. NUTTING AND JOSEPH C. GITHENS, OF NEW YORK, N. Y.

IMPROVEMENT IN STEAM ROCK-DRILLS.

Specification forming part of Letters Patent No. **161,631**, dated April 6, 1875; application filed March 20, 1874.

To all whom it may concern:

Be it known that we, GEORGE E. NUTTING and JOSEPH C. GITHENS, of the city and State of New York, have invented certain Improvements in Steam Rock-Drills, of which the following is a specification:

Our invention relates to steam-drills; and consists in the mode of operating the port-valve of the steam-cylinder, which is effected by a rocking lever actuated directly by the piston, in such a manner that the valve moves in the same direction as the piston.

The accompanying drawings are as follows: Figure 1 is an elevation of drill from the side on which the slide-valve is placed. Fig. 2 is a side elevation of drill. Fig. 3 is a plan view. Fig. 4 is a vertical section on line $x\ x$. Fig. 5 is a horizontal section on line $y\ y$.

The drawings represent a steam-cylinder, A, which is provided with external webs $a\ a^1$, for engaging corresponding grooves in a bed or shell, b, which is mounted on trunnions, having their bearings in a yoke, supported by three legs.

The supporting structure, which is commonly called a tripod, will be fully described in an application for a patent therefor which we are about to file in the Patent Office of the United States. We have introduced it into the drawings in this case because of the intimate relation of the supporting structure to the cylinder, and for the purpose of giving a clear idea of the nature, purposes, and mode of operation of the invention described herein.

The cylinder is made to slide back and forth in the grooved shell at the will of the operator by means of suitable mechanism. The devices for effecting this purpose (shown in the drawings) are not herein described, because we do not claim them, they being the invention, as we believe, of Addison C. Rand, of the city and State of New York.

The steam-chest c contains the ordinary slide-valve d, for opening and closing the ports c^1 and c^2. The valve is operated by means of the three-armed lever, which rocks on the pivot e^1. The end of the straight arm of this lever engages a recess, e^2, in the under side of the valve. The other two arms are curved toward the center of the cylinder, and their ends f and f' alternately project into the cylinder, in which position they are alternately engaged by the piston-head g in its backward and forward movement. The piston-head is elongated, and has an annular recess, g^1, in its periphery.

During the outward movement of the piston the end of the rocker f projects into the recess g^1. At the end of the outward stroke the wall of the recess g^2 engages the end of the rocker f and drives it outward, and thus, by reason of the engagement of the straight arm of the lever in the recess e^2, drives the slide-valve in the direction in which the piston is moving, so as to close one port and open the other, and hence reverse the movement of the piston. During the backward movement of the piston the other end of the rocker f' projects into the recess g^1, and in its turn is struck by the opposite wall g^3 of the recess g^1, and the valve is thus again reversed, its movement in this case, as before, being in the same direction as the movement of the piston. This coincidence in the direction of the movements of the valve and piston is important in rock-drills, because of the shock to which the structure is subjected when the drill strikes the rock.

By this mode of construction the valve, when it has been reversed, is prevented from being jarred backward by the continued pressure of the periphery of the piston-head upon the end of the rocker which it has engaged.

We do not describe herein the peculiar construction of our chuck and key for holding the drill-bar; but it will be fully described in an application for a patent therefor, which we are about to file in the Patent Office of the United States.

We claim—

The combination, in the interior of the steam-chest and cylinder of a steam-engine, of the three-armed rocking lever J, the valve I, and the double-headed piston K, having an annular recess between the heads and the inclined surfaces $h\ h'$, constructed and operating as and for the purpose specified.

Witness our hands this 14th day of February, 1874.

GEO. E. NUTTING.
JOSEPH C. GITHENS.

Witnesses:
B. S. CLARK,
J. S. MACKENZIE.