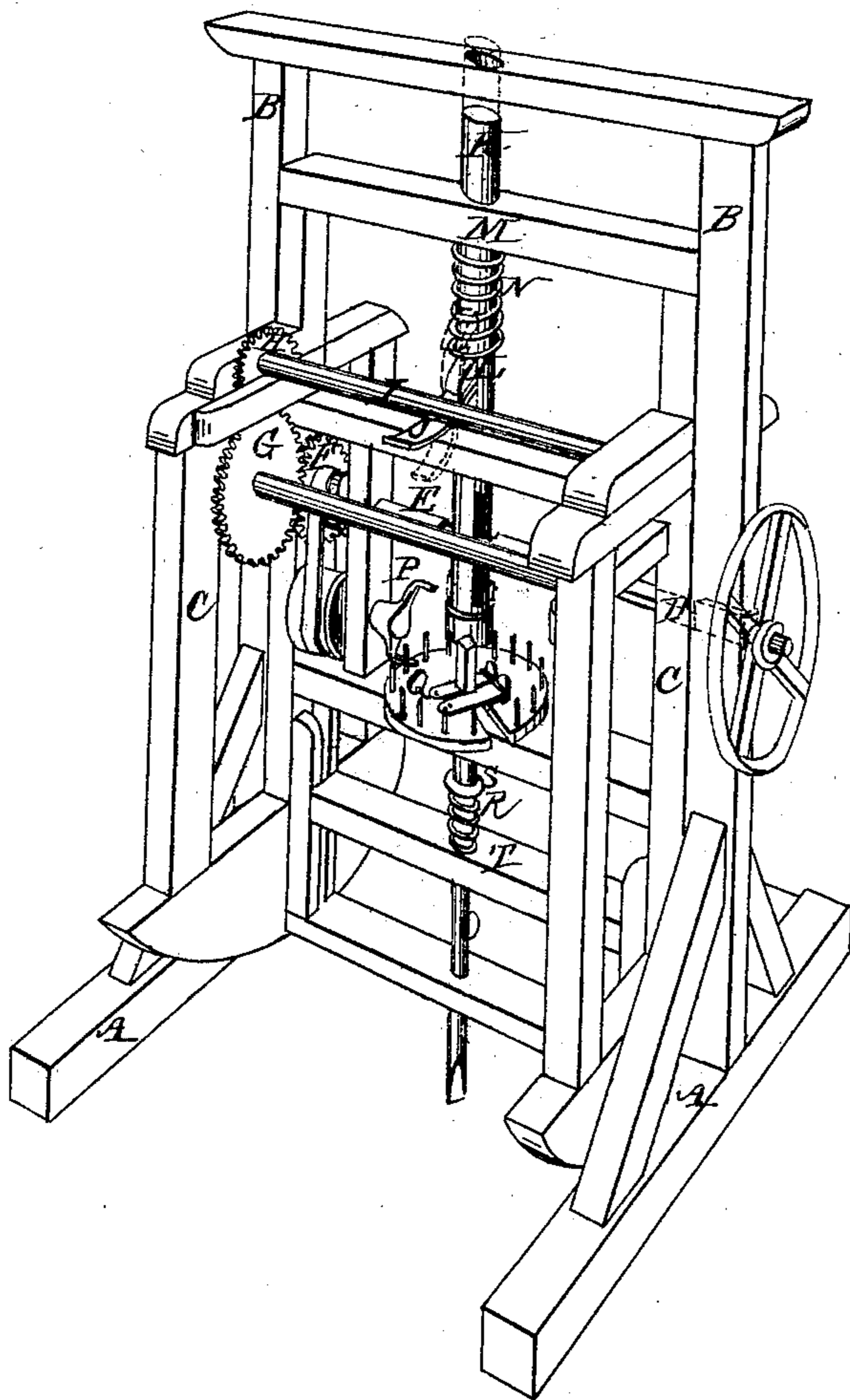


*E. W. Gram,*  
*Stone Drill.*  
*N<sup>o</sup> 82,109.      Patented Sep. 15, 1868.*



*Attest*  
*H. S. Sprague*  
*H. F. Everts*

*Inventor*  
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*Per Attorney*  
*Thos. S. Sprague*

# United States Patent Office.

ERNST W. GRAM, OF NEGAUNEE, MICHIGAN, ASSIGNOR TO HIMSELF, PETER BERG, AND A. P. SWINEFORD.

*Letters Patent No. 82,109, dated September 15, 1868.*

## IMPROVED ROCK-DRILLING MACHINE.

*The Schedule referred to in these Letters Patent and making part of the same.*

### TO WHOM IT MAY CONCERN:

Be it known that I, ERNST W. GRAM, of Negaunee, in the county of Marquette, and State of Michigan, have invented a new and useful Improvement in Rock-Drilling Machines; and I do declare that the following is a true and accurate description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, and being a part of this specification.

The nature of my invention consists in the construction of an apparatus for drilling rock, in such a manner that it may be operated at any angle, by being attached to an oscillating frame suspended in trunnions between suitable posts, and operated by wheels and winch, giving the required reciprocating and rotary motion to the ram and drill.

To enable others to make and use my invention, I will proceed to describe its construction and use.

To the ground-frame or sills, A, are firmly secured upright posts, B, by braces or otherwise. Posts B are provided with hollow trunnions, D, passing through transversely from the outside, their inner ends forming journals and supporting oscillating frame C, and also forming boxes for shaft E, which is provided at its outer end with suitable crank or pulley for transmitting power to the apparatus. Upon shaft E is rigidly secured cog-wheel F, gearing to and with intermediate wheel G, which gears with wheel H, the latter being securely fastened on shaft I, giving motion to thumb-trippers J.

At the upper part, and in the centre of frame C, is placed longitudinal ramrod K, provided with an elongated opening for the admission of shaft E, and is raised by the action of trippers J, with wiper-lifter L. Rod K, being perforated at intervals for the admission of the shank-end of lifter L, admits of the change as may be required, according to the height of the drill to be operated upon.

Enclosing rod K, between lifter L and transverse bar M, is spiral spring N, serving to give a heavier stroke of the drill.

Attached to the lower end of frame C, and below the ram, is placed drill-rod O, which obtains the required check-motion (while being operated upon by the ram) from wrist and arm P, in its rotary motion obtained from wheel F by gearing or belt to the shaft upon which the arm is attached, the said arm and wrist coming in contact with projecting pins extending upwards from the face of wheel Q, which is sleeved by feather or otherwise upon the upper end of the drill, and securing the same in a longitudinal position with the frame. The drill-rod is raised, after receiving the blow from the ram, by compression of spiral spring R encasing the drill-rod, which is provided with collar S, resting on the spring, the lower end of the same spring resting on the adjustable cross-tree T, which moves up and down, and guided by proper ways in the frame at the ends of the same, and secured in place according to the depth of the hole the drill is operating in.

As the drill penetrates the rock, cross-tree T is lowered, as described, and secured, simultaneous with the change of wiper L, to one of the upper perforations, thereby securing the same action of the springs on the several parts, as required, and by the manner in which the frame C is suspended, it will admit of the drill being operated at any required angle, as hereinbefore described, and forming a very convenient apparatus for the purposes intended.

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

The combination of the stationary frame A B, oscillating frame C, trunnions D, shaft E, pinions F G H, shaft I, lifters J, rod K, wiper-lifter L, spring N, drill O, cam P, plate-wheel Q, spring R, and shoulder S, all constructed and arranged substantially as herein described.

ERNST W. GRAM.

Witnesses:

P. B. KIRKWOOD,

C. H. HOPKINS.