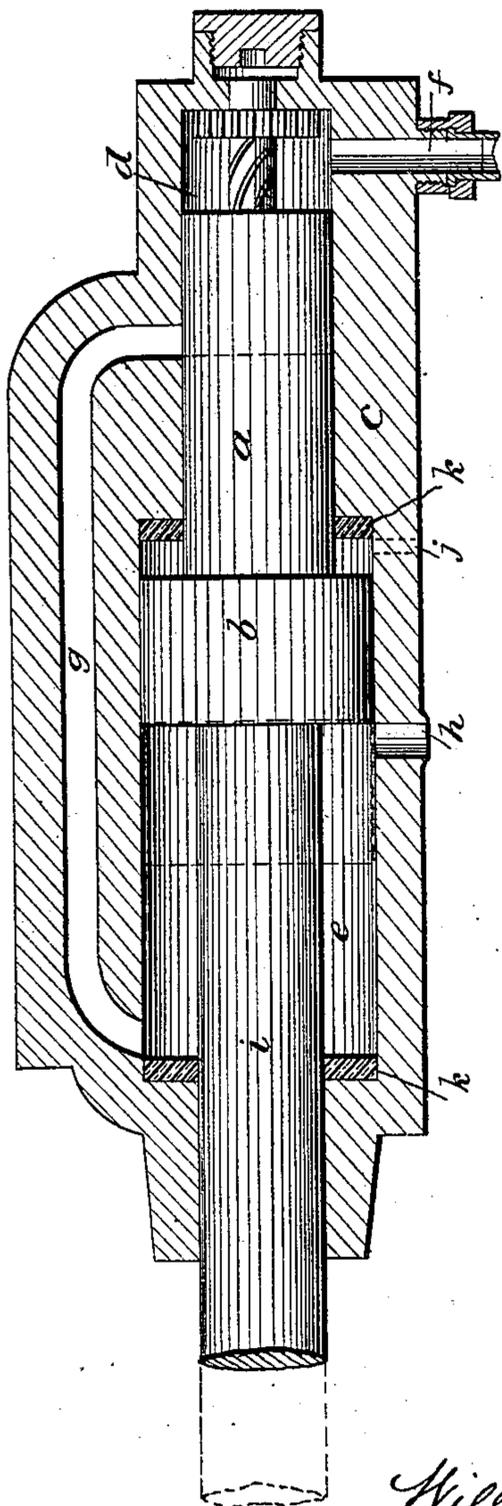


W. L. NEILL.  
Rock-Drills.

No. 226,539.

Patented April 13, 1880.



Witnesses:  
*Franck L. Curand*  
*Harry Finckel*

Inventor:  
*William Lowber Neill*  
By his Attorney  
*Wm. H. Finckel*

# UNITED STATES PATENT OFFICE.

WILLIAM L. NEILL, OF NEW ORLEANS, LOUISIANA.

## ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 226,539, dated April 13, 1880.

Application filed February 21, 1880. Patented in Germany June 13, 1879, in Belgium July 8, 1879, and in France July 11, 1879.

*To all whom it may concern:*

Be it known that I, WILLIAM LOWBER NEILL, of New Orleans, in the parish of Orleans, in the State of Louisiana, have invented certain new and useful Improvements in Rock-Drills, of which the following full, clear, and exact description, taken in connection with the accompanying drawing, is a specification.

The object of my invention is to provide a piston rock-drill operated without the use of valves on the cylinder, and actuated to force the tool against the rock by the direct action of steam, compressed air, or other elastic fluid or agent upon the piston, such piston being retracted or reversed by the same agent acting in part expansively upon its opposite end.

The great requisites of a practically successful rock-drill are simplicity of parts, infrequency of necessity of repairs, and the direct application of the motive power, and I believe I have embodied these in the highest degree in my invention.

My invention consists in a rock-drill composed of a cylinder having two connected chambers of unequal diameters, and a piston having a head or two connected heads, also of unequal diameters, arranged in said chambers, and operated to project the drill or tool by the direct action of the live agent upon its smaller head, and to retract or reverse the drill by such agent acting upon the larger head of such piston partly by expansion, said agent being let into the larger chamber by the valve-like action of the piston, as hereinafter set forth.

The drawing hereinbefore referred to shows the cylinder in a central longitudinal vertical section, with its contained piston in elevation at the end of the reverse stroke.

In carrying out my invention I employ a piston of two different diameters, the upper portion, *a*, being smaller than the lower, *b*. This piston I inclose in a cylinder, *c*, the interior of which is made with two chambers, *d* and *e*, to correspond with the diameters of the piston, about half the length of the cylinder being apportioned to each diameter. The operating agent or elastic fluid enters continuously the smaller chamber *d* through an inlet-port, *f*, whence it passes, by an induction-passage, *g*, in the upper end thereof, to the lower end

of the larger chamber, *e*. This induction-passage *g* is opened and closed by the smaller piston *a*, and is so arranged that the elastic fluid or other agent shall not enter therein until the piston has made a greater portion of its forward stroke. An exit-opening, *h*, for the escape of the fluid from the larger chamber *e* is opened and closed by the larger head or piston *b*.

The boring-tool is connected to the piston-rod *i*, which projects through the outer end of the cylinder, and means, such as a spiral or worm mechanism, are provided for giving to the piston and boring-tool a slight turning motion, as usual, on the return stroke, so that the tool will strike in a fresh place at every forward stroke. An opening, *j*, (see dotted lines,) is made in the side of the cylinder, through which external air is drawn into and expelled from the space above or in rear of the larger head *b* of the piston. The air in this space will serve as an air-cushion for the piston. The opposite ends of the larger chamber *e* may be provided with packing-rings *k k*, if desired or necessary.

The operation of the apparatus is as follows: The operating agent admitted to the smaller chamber acts on the smaller head of the piston, and, driving it, with the boring-tool, forward, causes the drill to strike upon the rock. This motion of the piston opens the outlet *g* at the same time the larger piston-head will have closed the outlet *h* in its chamber. The agent supplied to the smaller chamber will now pass through the outlet or induction passage *g* to the face of the larger head in its chamber, and said head having a greater effective area than the small head, the increased surface for pressure of the fluid thereupon will be sufficient to permit the fluid to overcome the pressure upon the small head, and thus to cause the piston to reverse or be moved back to the position shown in full lines, the dotted lines indicating the forward stroke. This reversal of the piston will be partly due to the expansion of the impelling-fluid, which fluid, forcing the piston back past the outlet *h*, will then escape from the larger chamber. The continuous supply of elastic fluid to the smaller chamber will have the effect of forcing out or forward the piston, as before, and thereby repeating the

blow of the tool upon the rock, the return stroke being afterward effected in the manner before explained.

By constructing the apparatus as above explained I am enabled to obtain a simple and effective rock-boring machine without the necessity of valves and valve-gear, which constantly require repairing.

In Darlington's British patent of May 13, 1873, No. 1,734, like my invention, there is no valve; but, unlike mine, the live agent is used to retract the piston, and the expansive force of such agent is employed to project it, whereas in mine the live agent and its full effective force by direct application is used to project the piston and its expansive force to retract it. Furthermore, the Darlington piston is not one with two heads of unequal diameters, but, on the contrary, its heads are of uniform diameter, one of which has a face or effective area equal to the other less the diameter of the stem or rod, and the cylinder for said piston is of uniform bore throughout plus an increase of port-space at the projecting end, whereas my cylinder has two chambers of unequal diameter to receive two heads of corresponding diameter, whereby the effective force of the fluid is concentrated upon the effective ends or faces of the piston-heads.

What I claim is—

1. A rock-drill provided with a cylinder having two chambers of unequal diameters, in combination with a piston having heads to fit such chambers, operated by the live agent applied directly upon the smaller head to project the piston, and by such agent acting partly by expansion and admitted from the smaller into the larger chamber by the piston at its forward stroke to retract or reverse the said piston, substantially as specified.

2. A cylinder constructed with two communicating chambers of unequal diameters, an inlet and an outlet, in combination with a piston of two unequal diameters corresponding with and working in said chambers, and acting as a valve and an inlet to admit air for cushioning said piston, substantially as described.

3. A rock-drill cylinder having two communicating chambers of unequal diameters, an inlet and an outlet, in combination with a piston of two unequal diameters corresponding with and working in said chambers, and acting as a valve, substantially as described.

To the above specification of my invention I have signed my name this 11th day of February, A. D. 1880.

WILLIAM LOWBER NEILL.

Witnesses:

H. M. NEILL,  
FELIX CONTURIE.