J. Echols,

Stone Drill.

No. 14,495. Patented Mar. 25, 1856.

Fig. 3.

Fig. 4.

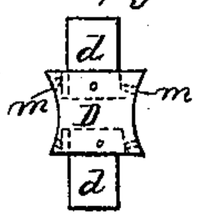


Fig. 5.

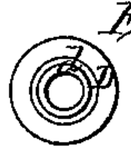
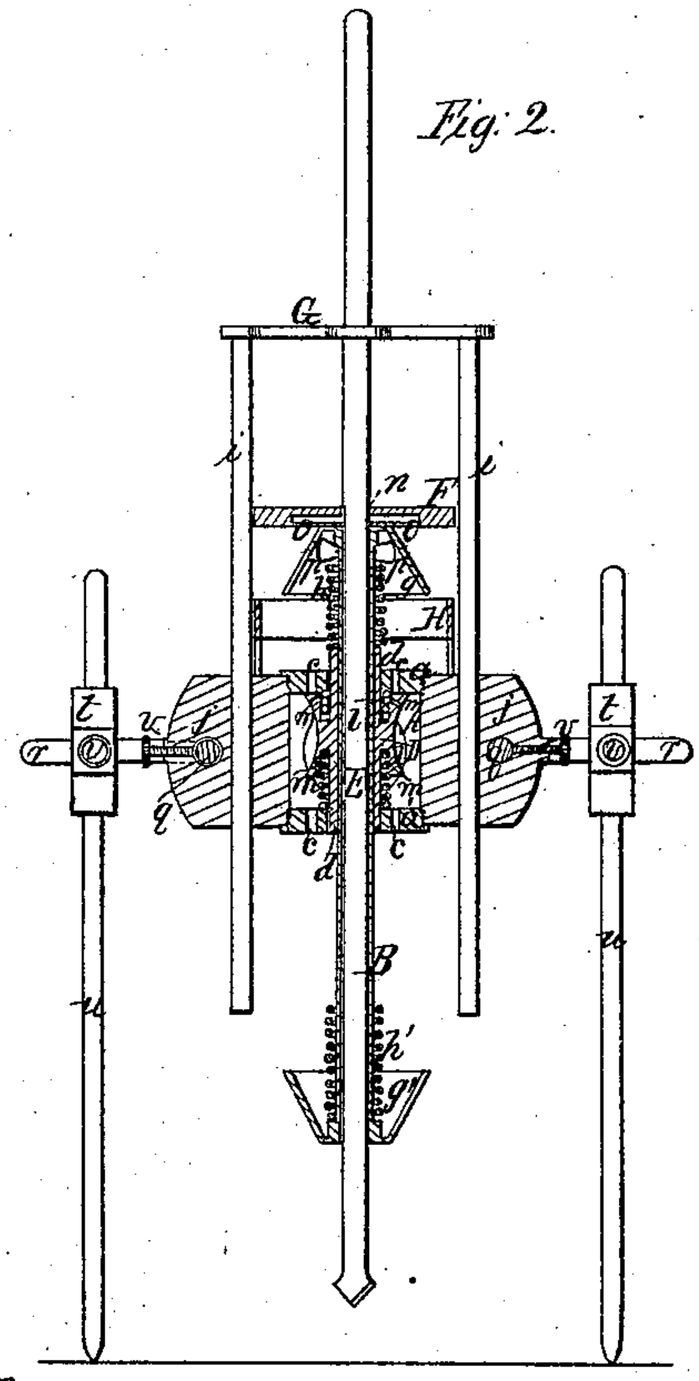


Fig. 6.

Fig. 7.

Fig. 1.

Fig. 2.



UNITED STATES PATENT OFFICE.

JOSEPHUS ECHOLS, OF COLUMBUS, GEORGIA.

STONE-DRILLING MACHINE.

Specification of Letters Patent No. 14,495, dated March 25, 1856.

To all whom it may concern:

Be it known that I, JOSEPHUS ECHOLS, of Columbus, in the county of Muscogee and State of Georgia, have invented a new and useful Machine for Drilling Stone by Water-Power; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1, is a side elevation of the machine. Fig. 2, is a vertical section at right angles to Fig. 1, in the plane indicated by the line *x*, *y*. Fig. 3, is a plan of one of the cylinder heads *a*, *a'*, which are shown in section in Fig. 1. Fig. 4, is a plan of the valve for opening and closing the apertures in the cylinder heads, and Fig. 5, is a side view of the same. Fig. 6, is a plan of the gripper by which the drill bar is lifted, and Fig. 7, is a side view of the same.

Similar letters of reference indicate corresponding parts in the several figures.

A, is a hollow metal cylinder with a nozzle *b*, on one side to connect a hose or other pipe to supply water to the cylinder from any suitable head. This cylinder is fitted with heads *a*, *a'*, having each a series of apertures *c*, *c*, arranged in a circle described from the axis of the cylinder and having each a central orifice to receive the hollow stem *d*, of a valve D, which has annular faces at the top and bottom to close either the apertures *c*, *c*, of the lower head *a'*, or those of the upper head *a*, according as it is elevated or depressed, leaving either the apertures of the upper or those of the lower head open for the escape of water.

B, is a tube working freely through the hollow stem of the valve and having cups *g*, *g'*, at its upper and lower ends, the former cup being inverted. Into one or other of these cups the streams of water escaping at the apertures *c*, *c*, are injected with sufficient force either to lift the tube or drive it down.

E, is the drill bar which is fitted so as to be capable of working freely through the tube B, but is furnished with a gripper F, which by resting on the top of the tube B, enables the bar to be lifted by an upward movement of the tube. It also works in a guide G, above, said guide being adjustable by having its supports *i*, *i*, made to slide in suitable holes in the side lugs *j*, *j*, of the cylinder and secured by binding screws.

To illustrate the action of the water in operating the drill bar I will suppose the cylinder to be supported in a proper fixed position for operation and the valve D, to be in a position the reverse of that shown in Fig. 2, closing the apertures *c*, *c*, in the bottom of the cylinder and leaving open those in the top for the water to be injected with the force due to the head on the pipe, into the cup *g*, which lifts the gripper F, and drill bar until a spring *h'*, which is coiled around the lower part of the tube *b*, and rests on the bottom of the cup, comes in contact with the valve D, and lifts it to the position shown in Fig. 4, thereby closing the apertures *c*, *c*, in the top of the cylinder and opening those in the bottom and causing the water to escape through the apertures in the bottom of the cylinder into the cup *g'*, thereby causing the tube B, to be driven downward. The drill bar descends with the downward motion of the tube and with it the gripper F, which, when arrested by a ring H, attached to the cylinder is made to release the drill bar which continues its movement and by that means the force due to its fall aided by the action of the water in the cup *g'*, drives the drill forcibly into the stone. The tube B, continues to descend after the drill has been released until the valve D, is driven down again by the cup *g*, acting through a spring *h*, on the upper end of the valve stem and closing the apertures in the bottom of the cylinder and opening those at the top for the water to act on the cup *g*, to raise the drill again. Before the tube B, has completed its descent, the gripper has again gripped the drill bar to be in readiness to raise it, when the tube B, ascends.

The springs *h*, *h'*, are only employed to prevent injury by the percussive action of the tube B, in striking the valve, and springs *l*, *l'*, are applied to the valve also to prevent violent slamming. These latter springs are placed in annular recesses in the valve, the said recesses having lateral openings *m*, *m*, for the escape of water and prevention of obstruction to the closing of the valve. The valve when closing either set of apertures is kept tight in its place by the pressure of the column of water in or upon the pipe which supplies the cylinder.

The gripper G, is constructed in the following manner. The upper part consists of a steel plate spring with an aperture *n*, for

the bar to slide freely through and to the ends of this are attached the two jaws *o*, *o*, which, by the elasticity of the upper part are made to bite upon the bar, but when the two ends are driven or fall violently into contact with the ring H, the momentum of the central portion causes the spring to bend in such a manner that the jaws release the bar. This is illustrated in Fig. 7, where the gripper is shown in slack outline in the condition in which it grips the bar and in red outline in the condition it assumes at the moment of striking the ring. When the momentum of the gripper has expended itself, it assumes its original condition and grips the bar again but this time it grips it higher up or farther back as the drill feeds itself after its release by the gripper, and the gripper resumes its action always in a fixed position, that is, while resting on the fixed ring.

The turning of the drill is effected by the action of the water on one or more spiral vanes or screw threads *p*, *p*, within the upper head G.

The cylinder is supported by a framing composed of side rods *q*, *q*, passing through the lugs of the cylinder and a transverse rod passing through a lug in front of the cylinder. These rods are supported in bearings in sliding sockets *t*, *t*, secured to four lugs *u*, *u*. The several parts of this framing are all adjustable and binding screws *v*, *v*, are applied to the several lugs and sliding sockets to secure the adjustment. This adjustable frame enables the machine to be used in difficult positions. The drill may be driven by the action of the water as herein described in any position whatever.

I will observe that disks or nearly flat surfaces might be substituted for the cups *g*, *g'*, but it is preferable to employ cups as they prevent the dispersion of the water.

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

1. The cylinder A, with the apertures *c*, *c*, in its heads the double valve D, with its hollow stem *d*, and the tube B, with its cups *g*, *g'*, all combined, arranged and operating substantially as herein set forth.

2. The gripper F, constructed as described and operating in combination with a ring H, as herein set forth, to grip and let go the drill bar.

3. Furnishing the interior of one of the metal cups *g*, *g'*, with spiral vanes to be acted upon by the water, for the purpose of turning the bar at every stroke, substantially as herein set forth.

JOSEPHUS ECHOLS.

Witnesses:
A. F. BRANNAN,
JNO. J. MCKENDREE.