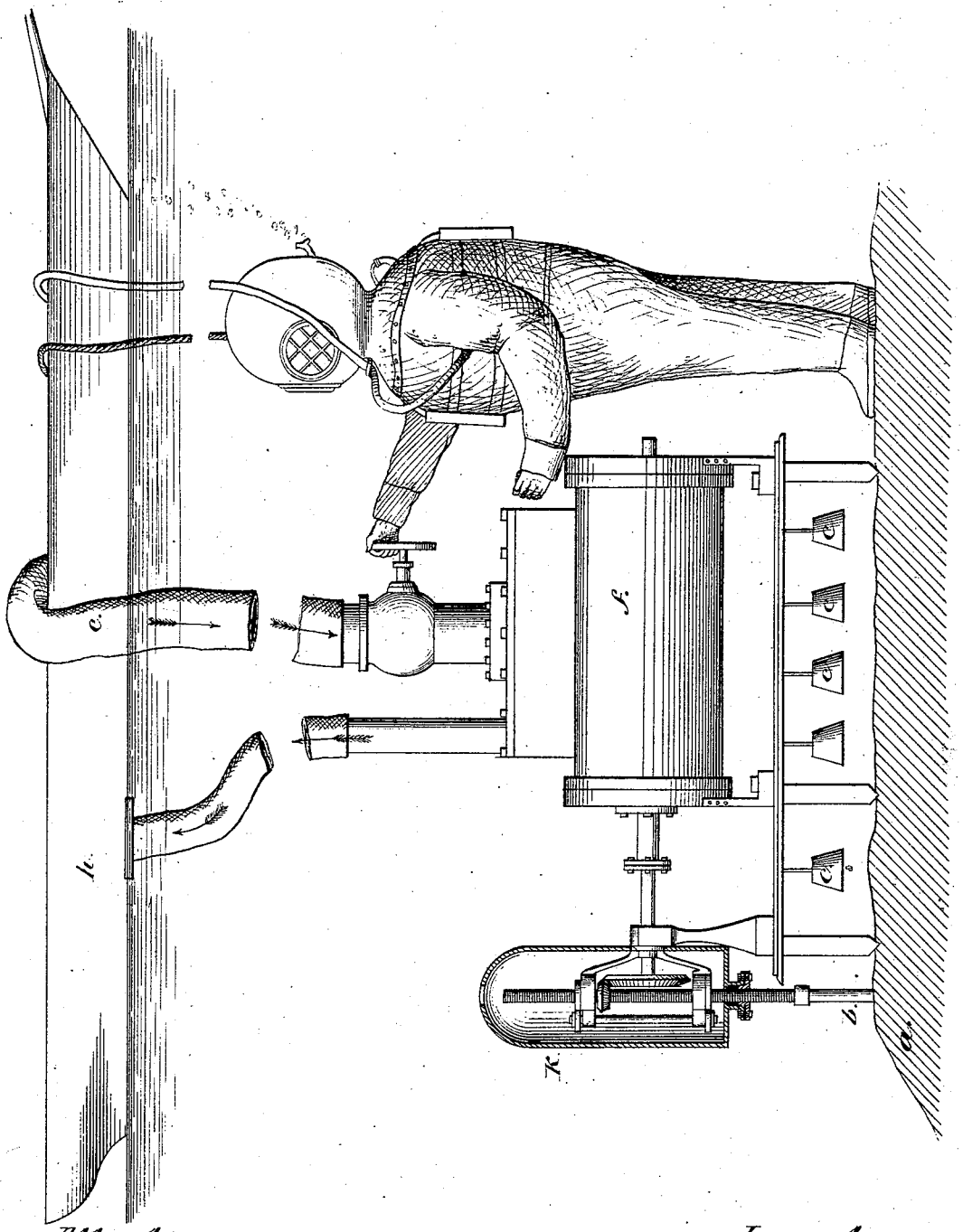
# E. MOORE.

## SUB-MARINE ROCK DRILLS.

No. 183,320. Patented Oct. 17, 1876.

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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN SUBMARINE ROCK-DRILLS.

Specification forming part of Letters Patent No. **183,320**, dated October 17, 1876; application filed March 1, 1876.

*To all whom it may concern:*

Be it known that I, EDWARD MOORE, of the city of Portland, in the county of Cumberland and State of Maine, have invented new and useful Improvements in Submarine Rock-Drilling, of which the following is a full, clear, and exact description, which will enable others skilled in the art pertaining thereto to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which drawings form a part of this specification.

The object of this invention is to avoid the inconveniences and great expense which attend the methods now in use of drilling rock lying beneath the surface of the water, by drills extending above the surface of the water, and operated by power applied directly to them from motors located above that surface. The only effective method of working power-drills in submarine drilling now in use consists in mounting the drill upon a tripod whose feet rest upon the rock at the bottom, and whose top is above the surface of the water, the drill being operated by some sort of an engine located upon the tripod. In such cases the drill is operated by means of some motive power received from a floating vessel anchored near the drill. There are various modifications of this method; but they are all of substantially the same general character, and all involve the use of heavy and cumbrous machinery, which renders them difficult to move about and adjust in proper position, especially in rough weather. The machinery is, moreover, very liable to get out of order and be broken by reason of the great strain upon the tripod and drill from the action of the sea.

My invention consists, essentially, in mounting the drill, with its motor, upon the low tripod or stand, so constructed and arranged that it may be lowered to the bottom and rest near the rock which is to be perforated, the engine being operated by steam or compressed air, or any suitable medium, conducted through the pipe or tube which connects the engine on the tripod to the compressor or other motor located upon a raft or vessel upon the surface.

In carrying out my invention I construct a stand for supporting the engine and drill of any suitable material, and adapted to support the engine and drill at convenient distance above the rock for the operation of the drill and for handling by the divers. The stand on which the engine rests should be made of such size and weight that when the engine and drill are mounted upon it it may be moved by the divers from place to place. Any suitable engine may be used upon it adapted to the nature of the drill or other circumstances. With a rotary drill a rotary engine would be preferable; but any other may be used. From the engine a pipe is made to extend to the compressor or other motor located on board the vessel anchored at a convenient distance. Obviously, the pipe should be, in whole or in part, flexible. I also provide an escape-pipe or suitable valve for the exhaust, which pipe may extend, if desirable, to the surface of the water.

In order to protect the divers from any danger of entanglement or compression of the pipes which supply them with air, I cover the working parts of the machinery with a suitable shield.

In order to give stability to the structure while in operation, and prevent any jar which might result from lack of weight in the engine and its support, and at the same time to allow the weight to be reduced, so that the divers attending the drill may easily remove it from place to place, I add detachable weights, preferably to the legs of the stand on the tripod.

For more particular description of the apparatus which I use in carrying out my invention, I refer to the accompanying drawings, in which—

*a* represents the rock to be drilled; *b*, the drill. *e* is the pipe by which the steam, gas, or compressed air, or other medium, is conveyed to the engine *f*, the upper end of it being connected to the proper apparatus upon the vessel *h*, from which the motive power is supplied. This vessel may be anchored at any convenient point near the work to be done.

The stand is represented as located upon the rock. The shaft of the drill *b*, which is of a length suited to the depth of hole to be bored, extends upward through the shield *k*. This

shield covers such of the working parts of the drill and engine as would be exposed and liable, when in operation, to injure the life-line of the diver. The weights are marked *l*, and are attached to the legs of the stand in such a manner as to be readily connected or disconnected.

The operation of the described apparatus, according to my invention, is as follows: The whole apparatus—that is to say, the tripod or stand upon which the engine and drill are mounted—is sunk to the bottom and located by the divers upon a place where the drilling is to be performed. The drill should be adjusted before lowering, so as to extend no lower than the legs of the stand. The divers arrange the stand so as to rest firmly upon the rock, and if its own weight be not sufficient to cause it to rest firmly, they add the weights provided for that purpose. The drill being adjusted and the connections previously made between the engine and the motor on board of the vessel, by turning suitable valves below, the engine may be started. One hole being drilled, by reversing the engine the drill is withdrawn, in the ordinary way, and the divers, taking hold of the stand, may move it for the purpose of boring another hole, and so on in succession. The engine and working parts of the drill being wholly beneath the surface, the apparatus remains undisturbed in whatever condition the surface of the water may be, provided the vessel containing the steam-generator or compressor remains in its place.

It is obvious that I need not confine myself to any particular form of engine, and it is only necessary that it be constructed of such material as to work under water without corrosion or disadvantage.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. The described method of drilling submarine rock by placing the engine which operates the drill under water and near the rock to be drilled, and operating the engine by compressed air or other suitable medium, through tubes connecting the engine to the compressor or other reservoir located above the surface.

2. A submarine rock-drilling apparatus having an air or other suitable engine constructed to stand upon the rock beneath the surface of the water and operate a drill connected therewith, with suitable connections extended to the air-compressor or other motive power at the surface, and suitable escape pipe or valves for the exhaust.

3. A submarine rock-drilling apparatus, substantially as described, having the working parts covered, as and for the purposes set forth.

4. A submarine rock-drilling apparatus, as described, provided with detachable weights, as and for the purposes set forth.

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Witnesses:

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