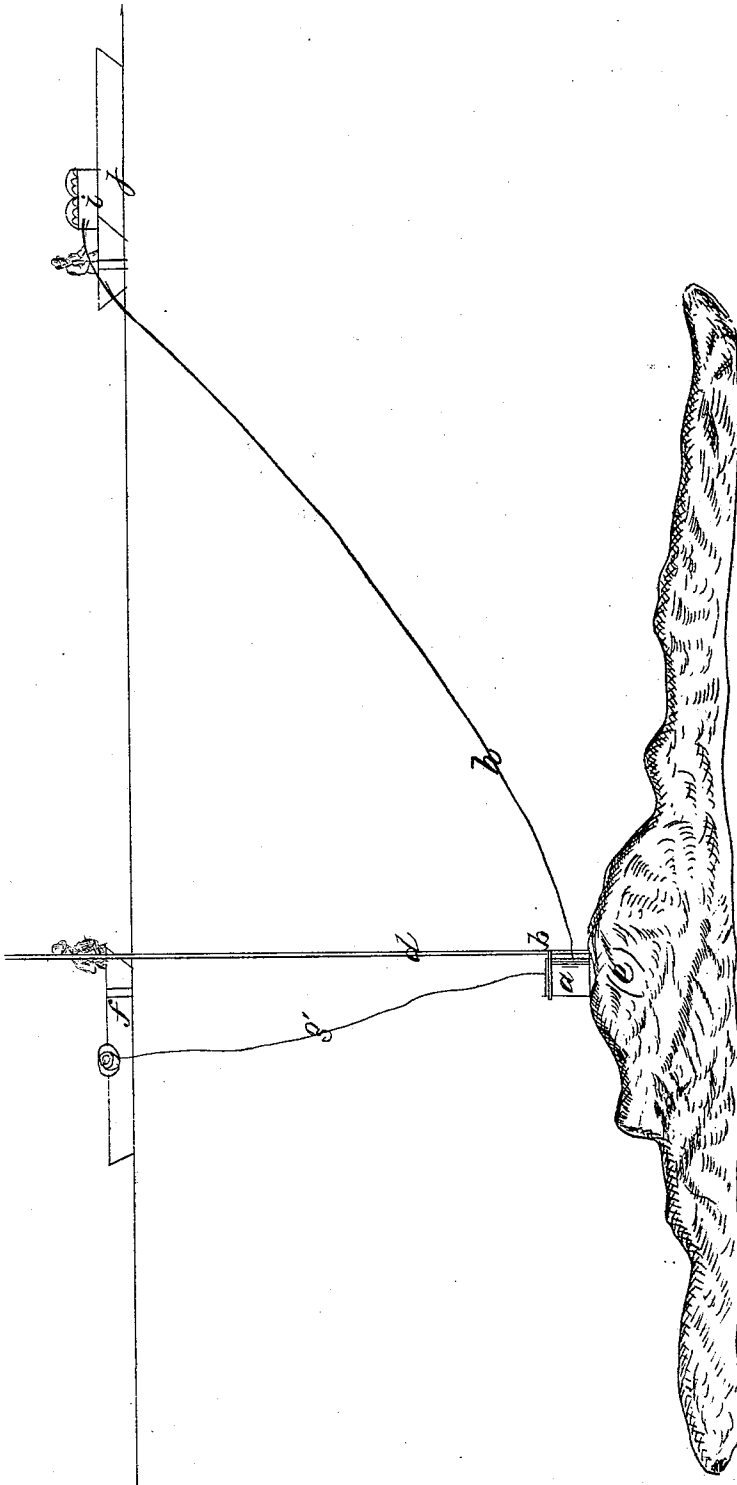


B. MAILLEFERT.

Torpedo.

No. 8,776.

Patented Mar. 2, 1852.



UNITED STATES PATENT OFFICE.

BENJAMIN MAILLEFERT, OF NEW YORK, N. Y.

IMPROVEMENT IN BLASTING ROCKS UNDER WATER.

Specification forming part of Letters Patent No. 8,776, dated March 2, 1852.

To all whom it may concern:

Be it known that I, BENJAMIN MAILLEFERT, of New York, N. Y., have invented a certain new and useful Method of Blasting Rocks Under Water without Drilling or Boring; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing, making part of this specification, which drawing represents an elevation of the apparatus as applied to a rock under water preparatory to the blasting.

It has always heretofore been the practice in all attempts to blast rocks under water to insert the explosive charge in a cavity in or under the rock, under the impression that the rock could not be separated or removed unless the charge were confined within the mass of the rock, or in some suitable cavity under it, or between it and the solid bottom upon which it rests; and, as the drilling of a rock or the making of the required excavation under it for the reception and confinement of the charge is attended with great labor and difficulty when made under water, the discovery of some easier and cheaper method has been for a long time a desideratum. I have discovered, however, that if the explosive charge be confined in a separate vessel and placed on the surface of the rock, and there held until discharged, the surrounding water presents a sufficient resistance to the expanding gases evolved by the explosion to effect the disintegration of the most tenacious rocks. As the resistance of water to the passage of bodies through is as the squares of the velocity and evolution of gases by the explosion is very rapid, I concluded that a resistance would thus be presented by the water which would be quite sufficient to effect the purpose, avoiding thereby the expense and labor of preparing the rock for the insertion of the charge.

The mode of procedure which I have practiced with success is as follows: I take a canister, *a*, made of tin or of other substance, and fill it with gunpowder or its equivalent, and when charged close it up so as to prevent access of water to the powder. The said canis-

ter is provided with one or more loops or staples, *b*, adapted to slide on a guide-rod, *d*, which is let down onto the surface of the rock *e* from a boat, *f*, and after the said guide-rod has been let down in the water to the surface of the rock to be blasted the loop or staples *b* are slipped onto the said rod, and the canister is then let down by a cord, rope, or chain, *g*, from the boat *f*. To the said canister is attached a conducting-wire, *h*, from a suitable galvanic battery, *i*, either on shore or in a boat, *j*, anchored or placed at a sufficient distance not to be injured by the blast. The conductor *h*, it will be understood, passes through the canister to the powder or other igniting and exploding substance therein. After the canister has been let down onto the rock the guide-rod *d* can be withdrawn and the boat moved away far enough not to be injured by the agitation of the water consequent upon the explosion, which is effected by the galvanic battery through the conductor *h*; and as the battery and the manner of exploding gunpowder under water by means of electric currents is well known, it is deemed unnecessary to give a description of this part of the mode of procedure.

Care should be taken, by weights or other known means, so to place the canister or other vessel containing the charge that it will not be carried away by the tide or current before the explosion takes place. The part of the surface of the rock to which it is to be applied must depend upon the form of the rock and the part to be removed, and therefore it can be applied either to the top or the side, as in either case the surrounding water will present the required resistance to effect the disintegration of the rock.

The canister can be made of any desired form, and of any suitable material which can be sealed up to keep out the water and which will readily yield to the explosion; and the quantity of gunpowder for each charge will of course depend on the size of the rock and the quantity to be removed. In the experiments made by me in the harbor of New York such charge consisted of one hundred and

twenty-five pounds of gunpowder, and the battery consisted of nine cups, and the conducting-wire, of copper, was sixty feet long, and of a diameter known as No. 14, properly insulated.

I am aware that hollow bodies, such as the sunken wrecks of ships, have been broken up and dislodged by the explosion of charges of gunpowder placed on or against such wrecks; but I am not aware that it was ever before known that a solid mass, such as a rock, could be disintegrated by the explosion of gunpowder placed under water and on the outside of such mass. I do not therefore claim, broadly, the breaking up of hollow bodies under water

by the explosion of charges placed on the outside of such bodies.

What I claim as my invention or discovery is—

The blasting of rocks under water by placing the explosive charge or charges on or against the surface of the rock to be blasted and using the surrounding water as the means of resistance to the explosion, substantially as herein specified.

BIN. MAILLEFERT.

Witnesses:

CAUSTEN BROWNE,
JAMES SHIELDS.