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SUBAQUEOUS ROCK BREAKER.

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929,832.

Patented Aug. 3, 1909.

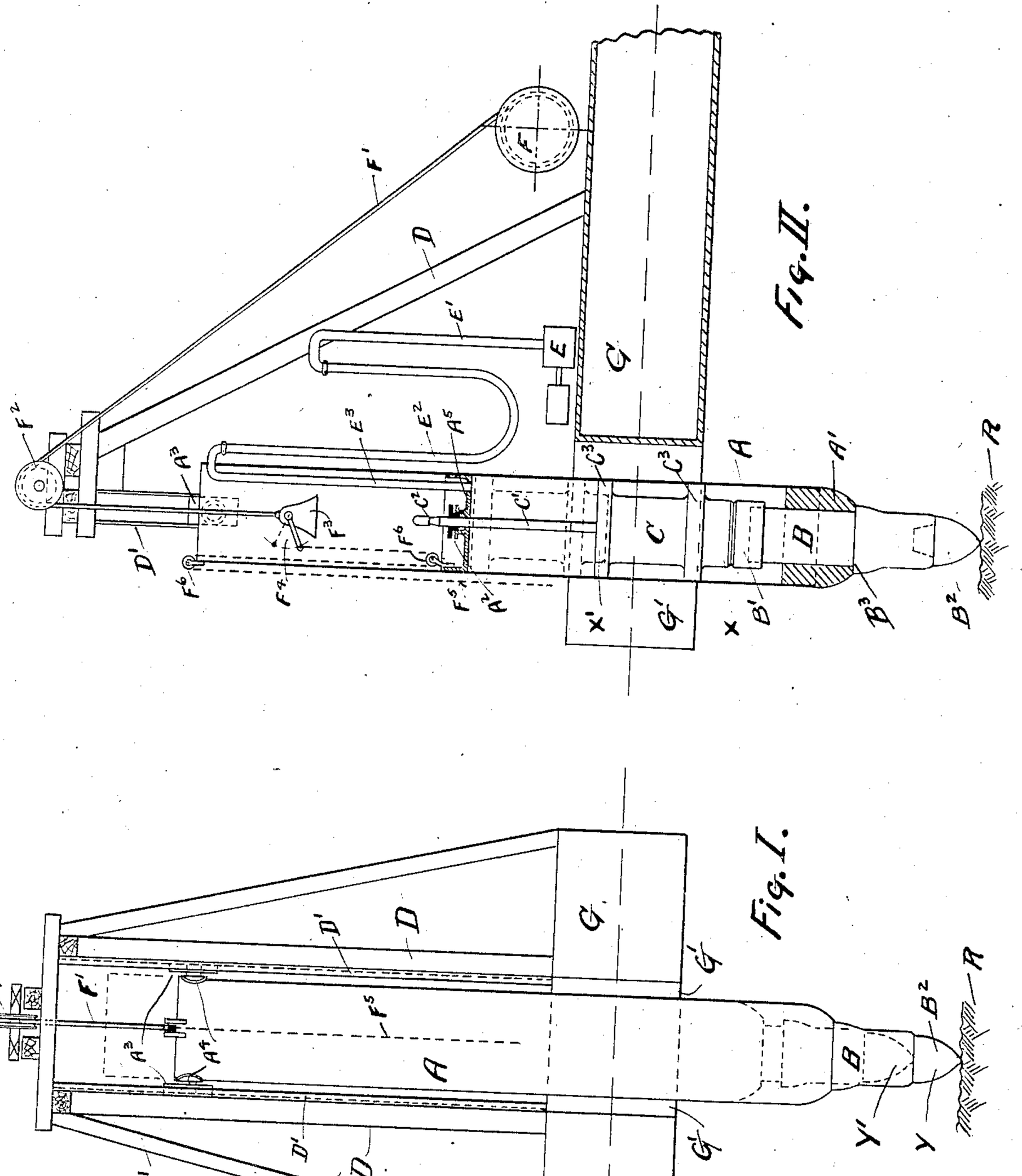

Fig. II.

Fig. I.

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BARTON H. COFFEY, OF BOSTON, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO SUBMARINE COMPANY, OF HOBOKEN, NEW JERSEY. A CORPORATION OF NEW JERSEY.

SUBAQUEOUS ROCK-BREAKER.

No. 929,832. Specification of Letters Patent. Patented Aug. 3, 1909.

Application filed October 24, 1905. Serial No. 284,131.

To all whom it may concern:

Be it known that I, BARTON H. COFFEY, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Subaqueous Rock-Breakers, of which the following is a specification.

The objects of this invention are to remedy certain defects revealed by practical operation and use, in the rock-breaker described and claimed in my Patent No. 657515 dated September 11th, 1900. These defects are twofold—first; when the heavily weighted chisel strikes the rock, a violent side blow is delivered to the tubular caisson, crystallizing same and in time causing breakage. Second:—In certain varieties of rock a fine sand is formed by the impact of the chisel, which works up in the caisson and clogs the action of the chisel, thus reducing the force of the blow delivered, and hence the efficiency of the machine. To overcome these defects I separate the weight and the chisel, (combined in my former patent) allow the chisel to move freely through the bottom of the caisson, adapt the weight to drop through the caisson and strike the chisel, and so transmit the impact of the falling weight to the rock, through the stationary chisel, instead of directly as in the former case. This arrangement of parts gives a flat surface at right angles to the axis of the caisson for the hammer or weight to strike, eliminating any side impact on the walls of the caisson, and so obviating the crystallization and breaking of the cylinder. The action of the stationary point on the rock has more of a splitting and less of a pounding action, and hence less sand is produced than in the former apparatus; what little is formed can not work up in the caisson as the chisel always completely fills the opening in the mouthpiece.

Reference now being had to the drawings:—Figure I is an end view of the hull or float supporting the rock breaking apparatus, floating at the water line W. W. and showing the caisson in the working position marked Y and the moving position in dotted lines, marked Y'. Fig. II is an elevation of Fig. I showing the hull and caisson in section on the center line of Fig. I.

In detail, A is the caisson, a vertical cylinder preferably of steel, with a mouthpiece A' inserted in the lower end, and a diaphragm A^5 and stuffing box A^2 secured firmly to its interior walls, so dividing the caisson into two chambers; secured to the upper end of the caisson are the two pins A^4 which are inserted in the guide shoes A^3, which in turn slide freely in the vertical guides D' secured to the frame D, in turn supported by the hull or float G, and over the well G'. Movable through the mouthpiece A' is the chisel B, carrying on its upper end the cap B' and on its lower end the removable point B^2.

In the lower chamber of the caisson and free to reciprocate vertically therein is the weight or hammer C, fitting the walls of the caisson at the rings C^3; and lifted by the rod C' which passes through the stuffing box A^2 into the upper chamber of the caisson, terminating at the barbed end C^2.

The lifting apparatus consists of a boiler, engine and auxiliaries, not shown, and contained in the portion of the hull G, broken away; the engine turns the drum F, thus operating the cable F' which passing over the sheave F^2 lifts or lowers the bell mouthed clutch F^3 fitted with the trip lever F^4 and trip chain F^5 which in turn is threaded around the sheaves F^6 to bring the free end to the outside of the caisson for convenient operation.

To keep the lower chamber of the caisson free from water in order to permit the hammer C, to reciprocate without undue resistance; compressed air is admitted under a pressure sufficient to overcome the hydrostatic head due to depth of immersion. The source of this air is the compressor E, the pipes E' and E^3 and the flexible hose E^2.

The operation of the machine is as follows:—After the hull G is moored over the ledge either by anchors or spuds, (not shown) the caisson is lowered until the point B^2 rests on the rock R and the caisson touches the shoulder B^3 of the chisel B. In this position it will be observed the entire weight of the chisel and caisson and hammer is upon the rock. The bell-mouthed clutch F^8 is then lowered over the barbed end C^2 of the rod C' engaging same; the clutch is then hoisted raising the hammer C to any desired point within the limit of the machine (as the position X', Fig. II) when a pull on the trip chain F^5 releases the clutch and permits the hammer to fall and strike the cap B' and

so force the chisel point into the rock. When sufficient depth is so obtained at any desired point, the hammer is clutched and raised until it engages the lower side of the diaphragm A^5, on further hoisting, the caisson and chisel lift also, sliding vertically in the guides D′ until the position Y′ Fig. I is assumed; the point B^2 being then clear of the ledge, the hull G can be moved to a fresh position, the caisson and chisel again lowered to the rock and breaking operations resumed.

As in my former patent referred to, the leading features of this invention consists in providing a caisson or cylinder and means for keeping it free from water when submerged, so that the rock-breaking machinery can work unhampered by the water resistance.

As the details of this machine can be varied in many ways familiar to those skilled in the art without departing from the spirit of my invention, I do not limit myself to the construction shown.

Having described my invention I claim.

1. In a subaqueous rock-breaker; a vertical two chambered cylinder or caisson, formed by a dividing diaphragm containing a stuffing box; lifting means in the upper chamber; a hammer adapted to reciprocate in the lower chamber, a rod passing through the stuffing box connecting the lifting means with the hammer: in combination with a chisel and mouthpiece; for the purposes set forth.

2. In a subaqueous rock-breaker, a vertical cylinder divided into two compartments by a diaphragm; openings from the upper compartment to the atmosphere, means for forcing compressed air into the lower compartment: in combination with a chisel and chisel mouthpiece having relative vertical movement: for the purposes set forth.

3. In a subaqueous rock-breaker, a one part mouthpiece, a chisel vertically movable in same, and removable means for limiting the downward movement of said chisel, for the purposes set forth.

4. In a subaqueous rock-breaker, a vertical cylinder; a hammer adapted to reciprocate within the cylinder, and means to reciprocate same; in combination with a stop or diaphragm located between the extremities of the cylinder, and adapted to limit the upward movement of the hammer; whereby the reciprocating means may lift the cylinder, when the hammer and stop are engaged; for the purposes set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

BARTON H. COFFEY.

Witnesses:

JULIA S. BREWSTER COFFEY,

BRADFORD DARRACH, JR.