

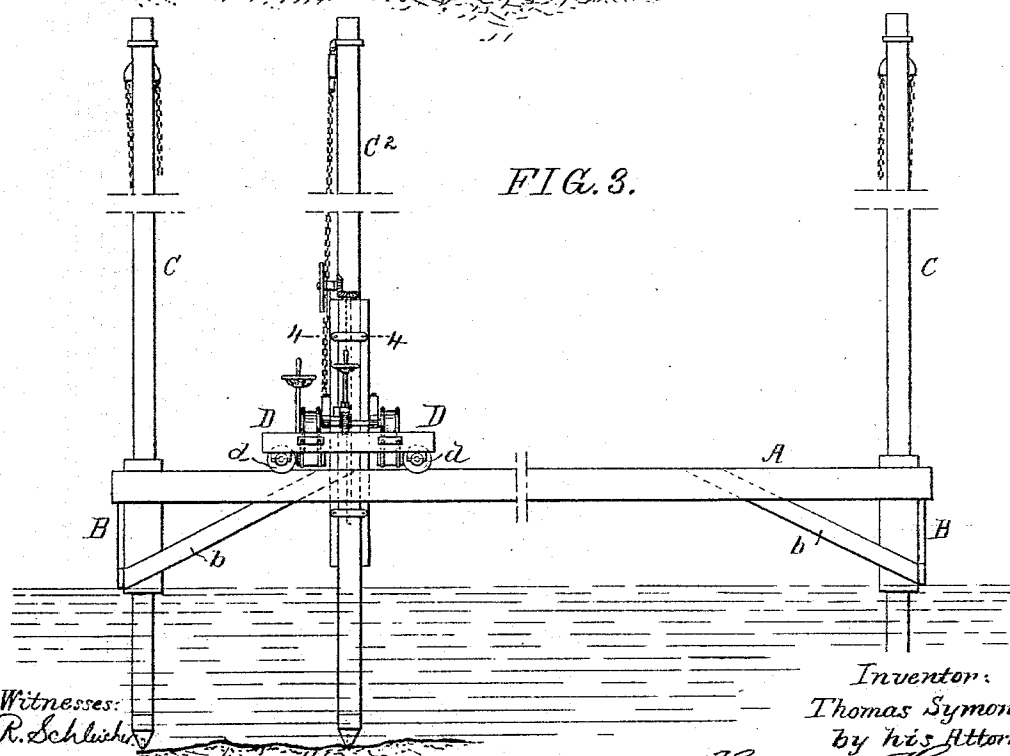
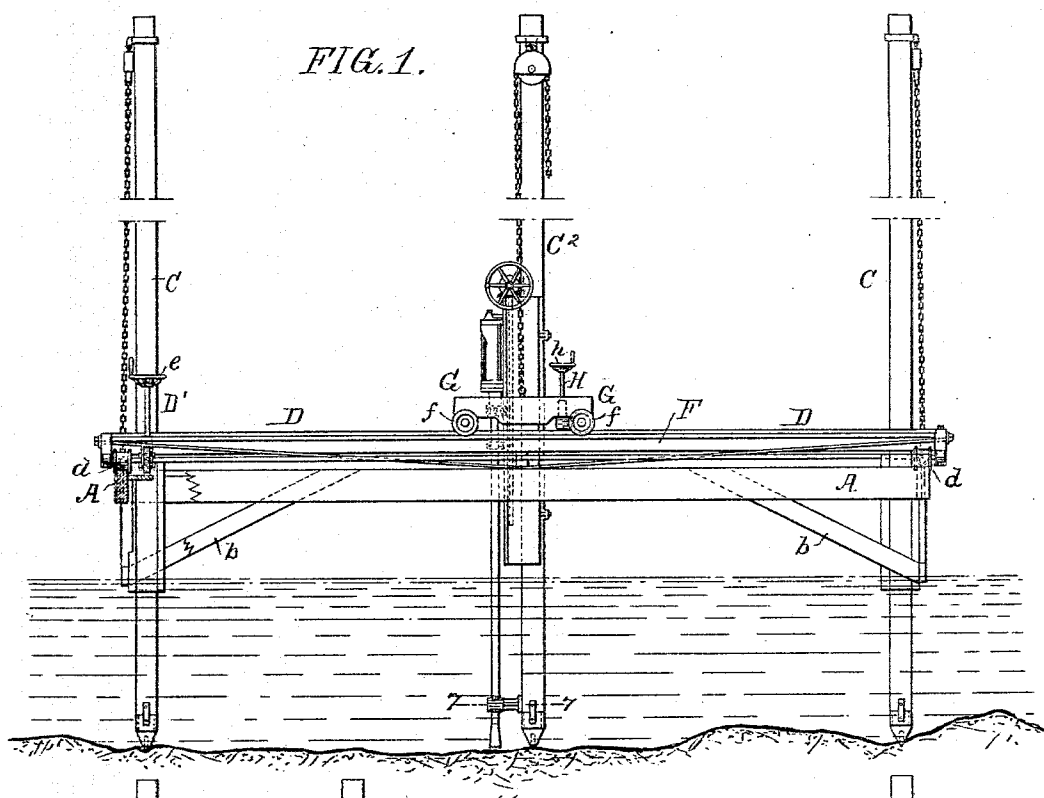
(No Model.)

3 Sheets—Sheet 1.

T. SYMONDS.  
SUBMARINE DRILLING APPARATUS.

No. 516,032.

Patented Mar. 6, 1894.



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F. D. Goodwin

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Thomas Symonds  
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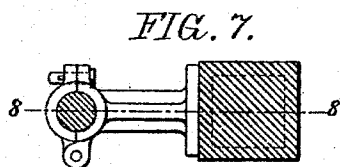
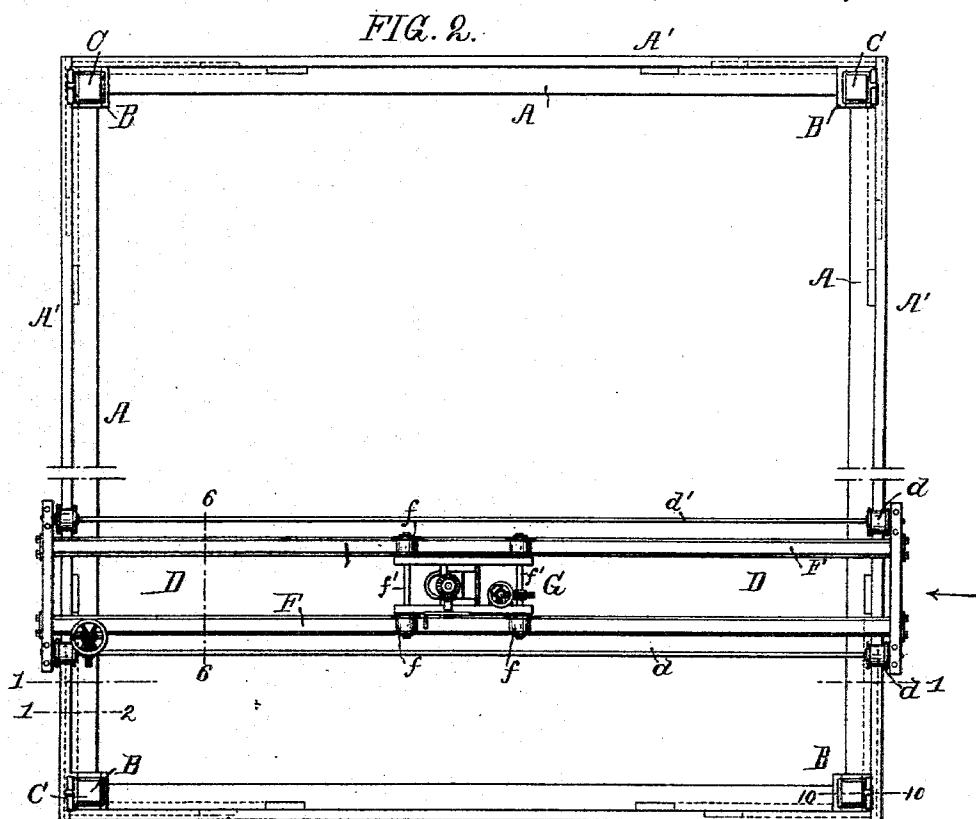
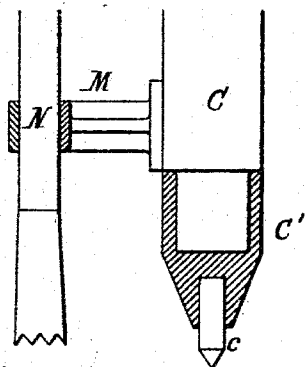


FIG. 8.



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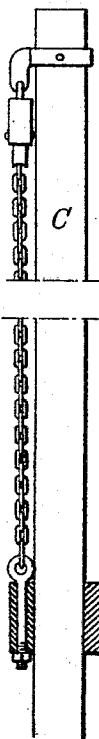
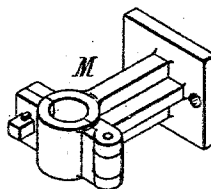


FIG. 9.



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(No Model.)

3 Sheets—Sheet 3.

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FIG. 11.

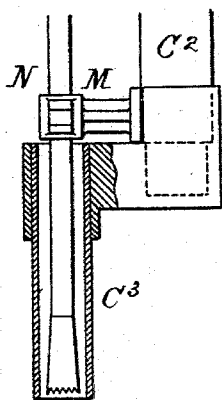


FIG. 4.

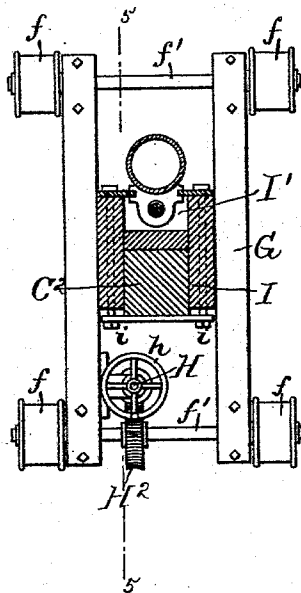


FIG. 5.

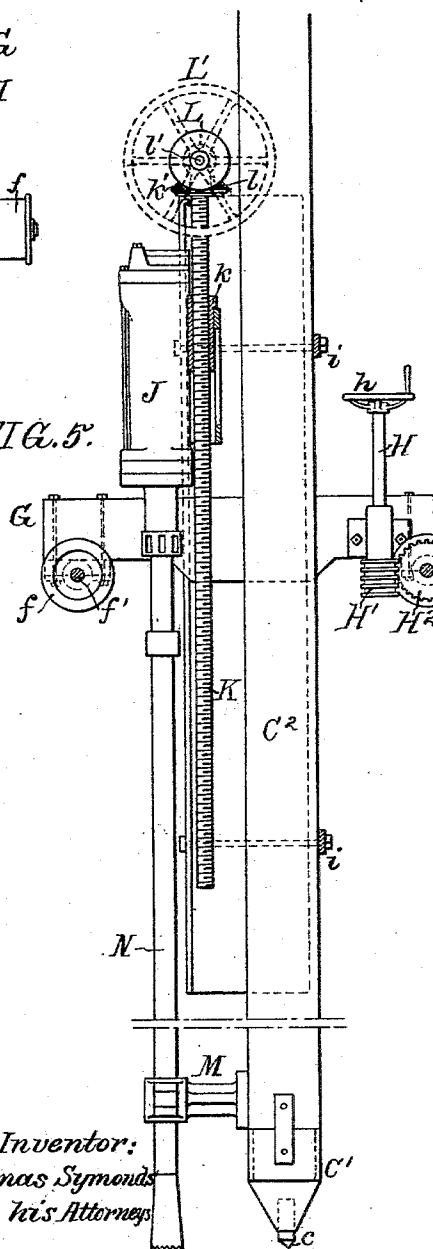
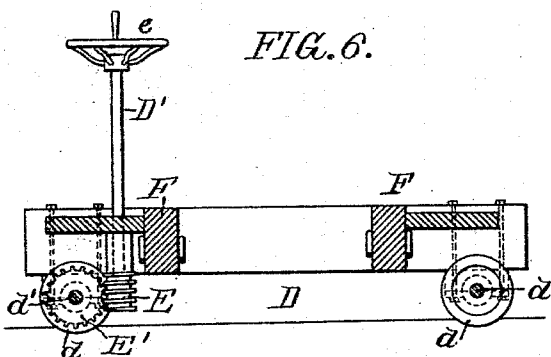


FIG. 6.



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# UNITED STATES PATENT OFFICE.

THOMAS SYMONDS, OF LEOMINSTER, MASSACHUSETTS.

## SUBMARINE-DRILLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 516,032, dated March 6, 1894.

Application filed June 2, 1893. Serial No. 476,381. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS SYMONDS, a citizen of the United States, and a resident of Leominster, Massachusetts, have invented certain Improvements in Submarine-Drilling Apparatus, of which the following is a specification.

My invention relates to certain improvements in devices for supporting, guiding and adjusting rock drills of that character more especially designed for sub-marine drilling, its principal object being to so arrange the supporting frame that the drill may be moved from place to place and accurately adjusted and held in position while at work; and a further object being to so arrange the carrying frame that the vibrations of the drill will not affect the operator, as more fully set forth hereinafter.

In the accompanying drawings:—Figure 1, is an elevation, partly in section, on the line 1—1, Fig. 2, of a sub-marine drilling apparatus constructed in accordance with my invention. Fig. 2, is a plan view of the same. Fig. 3, is an elevation looking in the direction of the arrow, Fig. 2. Fig. 4, is a sectional plan on the line 4—4, Fig. 3, on an enlarged scale. Fig. 5, is a sectional elevation on the line 5—5, Fig. 4. Fig. 6, is a sectional elevation on the line 6—6, Fig. 2. Fig. 7, is a sectional plan on the line 7—7, Fig. 1. Fig. 8, is a sectional elevation on the line 8—8, Fig. 7. Fig. 9, is a perspective view of the guide for the drill shank. Fig. 10, is a sectional elevation on the line 10—10, Fig. 2; and Fig. 11, is a view of the mud guard.

In sub-marine rock drilling one of the principal objections to the ordinary form of drill is that the cylinder which actuates the drill rod is secured directly to the carrying frame in such manner that each reciprocation of the plunger and drill rod will vibrate the carriage and the frame, loosening the parts of the frame and rendering it impossible for a single operator to work upon the frame for any considerable length of time. A further objection is that it is impossible, without the aid of a diver, to adjust the drill in boring position or to move the drill bit from one hole to a point where a second hole is to be drilled and to adjust the same in position for drilling.

Referring to the drawings, A represents a quadrangular frame of any suitable dimensions and provided at each corner with a guideway B braced by suitable struts *b* and arranged to receive spuds C, the latter being each provided with a conical metallic point C' in which is a pointed pin *c* adapted to rest upon the rock and which may be removed to be repointed or replaced by a new pin when worn.

A' are supporting rails of any suitable character and adapted to these rails are the wheels *d* of the carriage D, which extends completely across the frame. One or both of the pairs of supporting wheels *d* are secured to axles or shafts *d'* adapted to suitable bearings in the opposite end frames of the carriage and at a suitable point on the carriage is mounted a vertical shaft D' on which is a hand wheel *e* and near its lower end is a worm E, the teeth of which engage with those of a worm wheel E', mounted upon one of the shafts *d'* so that by turning this hand wheel the said shaft and its wheel will revolve, traversing the carriage to any desired position within the quadrangular frame and to make this adjustment more positive the tracks A' may be cogged and the supporting wheels *d* be in the form of pinions engaging with the cogged track, as will be readily understood.

On the carriage D are longitudinal rails F upon which are supporting wheels *f*, mounted upon axles *f'* held in suitable bearings on a carriage G and the frame of the carriage is provided with suitable bearings for a vertical shaft H at the upper end of which is a hand wheel *h* and at the lower end a worm H', the teeth of which engage with those of a worm wheel H<sup>2</sup> mounted upon one of the axles *f'* so that the carriage G may be adjusted to any desired position upon the carriage D. The tracks F and wheels *f* may also be toothed if desired and may be provided with suitable locking devices to lock the carriage in any position to which it may be adjusted.

The carriage G is provided at or about its central portion with a double guideway I I', the guideway I being of a character somewhat similar to the guideways B at the corners of the quadrangular frame A and being adapted to receive a spud C<sup>2</sup> of a character

similar to the spuds C, except that one side of the guide is open and the spud projects at the open side for some distance from the guide, as shown in Fig. 4. At suitable points on each side of the guide are bolts *i*.

At the top of each of the spuds C and the spud C<sup>2</sup> is hung a block or sheave and at each corner of the quadrangular frame and at the top of the guide I is secured a rope or chain which passes through a sheave on one of the spuds and through which the entire weight of the frame A and the carriages D and G may be placed upon the spuds and the frame lifted to any desired point above the level of the water.

The guide I' is adapted to receive the cylinder of a rock drill J of any suitable character; that shown in the accompanying drawings being that of the well known Ingersoll drill, but the back of the cylinder is provided with curved guides adapted to the guideway I' and is further provided with a receiving nut *k* through which passes an adjusting screw K unconfined at its lower end and at its upper end provided with a bevel gear *k'* with which engages a bevel gear *l* mounted upon a horizontal shaft *l'* held in a bearing L and provided with a balance wheel and operating handle L' so that the cylinder of the drill may be raised or lowered upon the guideway I' to any desired position and be gradually fed down as the drilling progresses.

The central spud C<sup>2</sup> is provided at its lower end with a guide M through which passes the lower end of the drill rod N, the upper end of which is secured in any suitable manner to the ordinary chuck of the reciprocating plunger and each time that it becomes necessary to adjust the drill rod to a new position to drill another opening it is first necessary to raise the spud C<sup>2</sup> clear of the bottom after first raising, of course, the drill cylinder J, or the two may be raised together; this being done the hand wheel *h* is turned to move the carriage G the desired distance to drill another hole and if necessary the carriage D is likewise moved at right angles to the line of movement of the carriage G until the desired position has been reached then the spud C<sup>2</sup> is lowered and by the use of the ropes and shafts which connected the guide I' to the top of the spud C<sup>2</sup> the entire weight of the carriage G is placed upon the spud and the latter is held firmly in its position at the bottom, the drill cylinder is then lowered by the use of the screw K and the reciprocations of the plunger will only vibrate the carriage G as the latter is entirely clear of the carriage D and the quadrangular frame A and the operator may stand either upon the carriage D or the frame A without being subjected to the annoyance of the constant vibration.

By the above described arrangement of the spud and drill the position of each hole to be drilled may be accurately determined so as

to drill holes at equi-distances one from the other throughout the space below the quadrangular frame A without the aid of a diver and the parts may be adjusted more readily and expeditiously than is the case with any of the sub-marine drilling apparatus now in use.

When drilling through a mud bottom I mount on the spud C<sup>2</sup> a sleeve C<sup>3</sup> through which the drill passes, as shown in Fig. 11, the sleeve will work its way through the mud or soft rock until solid rock is reached, it will then act as a mud guard for the drill keeping the mud from the drilled hole.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. The combination of a supporting frame, a carriage adjustably mounted thereon and having guides, a spud, as C<sup>2</sup>, adapted to said guides, and a drill cylinder and drill rod carried by said carriage, substantially as described.

2. The combination of the supporting frame, an adjustable carriage thereon, a double guideway on the carriage, a spud adapted to one of said guideways and adjustably connected thereto, a vertically adjustable drill cylinder adapted to the other guideway, a plunger thereon, a drill rod carried by said plunger and adapted to a lower bearing, as M, and a bearing carried by the spud, substantially as specified.

3. The combination of a supporting frame, an adjustable carriage mounted thereon, a supporting stud, a guideway on said carriage, a drill cylinder mounted on said guideway, an adjusting screw, a nut carried by the drill cylinder and adapted to said screw, a bevel gear on said screw, a horizontal shaft *l*, a bevel gear thereon and an operating handle carried by said horizontal shaft, substantially as specified.

4. The combination of a quadrangular frame, supporting spuds for said frame, a transversely adjustable carriage D mounted upon said frame, a longitudinal adjustable carriage G mounted upon the carriage D, and a drill cylinder and guiding support for said cylinder carried by said carriage G, substantially as specified.

5. The combination of a quadrangular supporting frame, rails thereon, an adjustable wheeled carriage D resting on said rails, a carriage G adapted to said carriage D, a central supporting spud adapted to guideways on the carriage G, and a drill cylinder vertically adjustable on said carriage G, substantially as specified.

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

THOMAS SYMONDS.

Witnesses:

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JOSEPH H. KLEIN.