(No Model.)

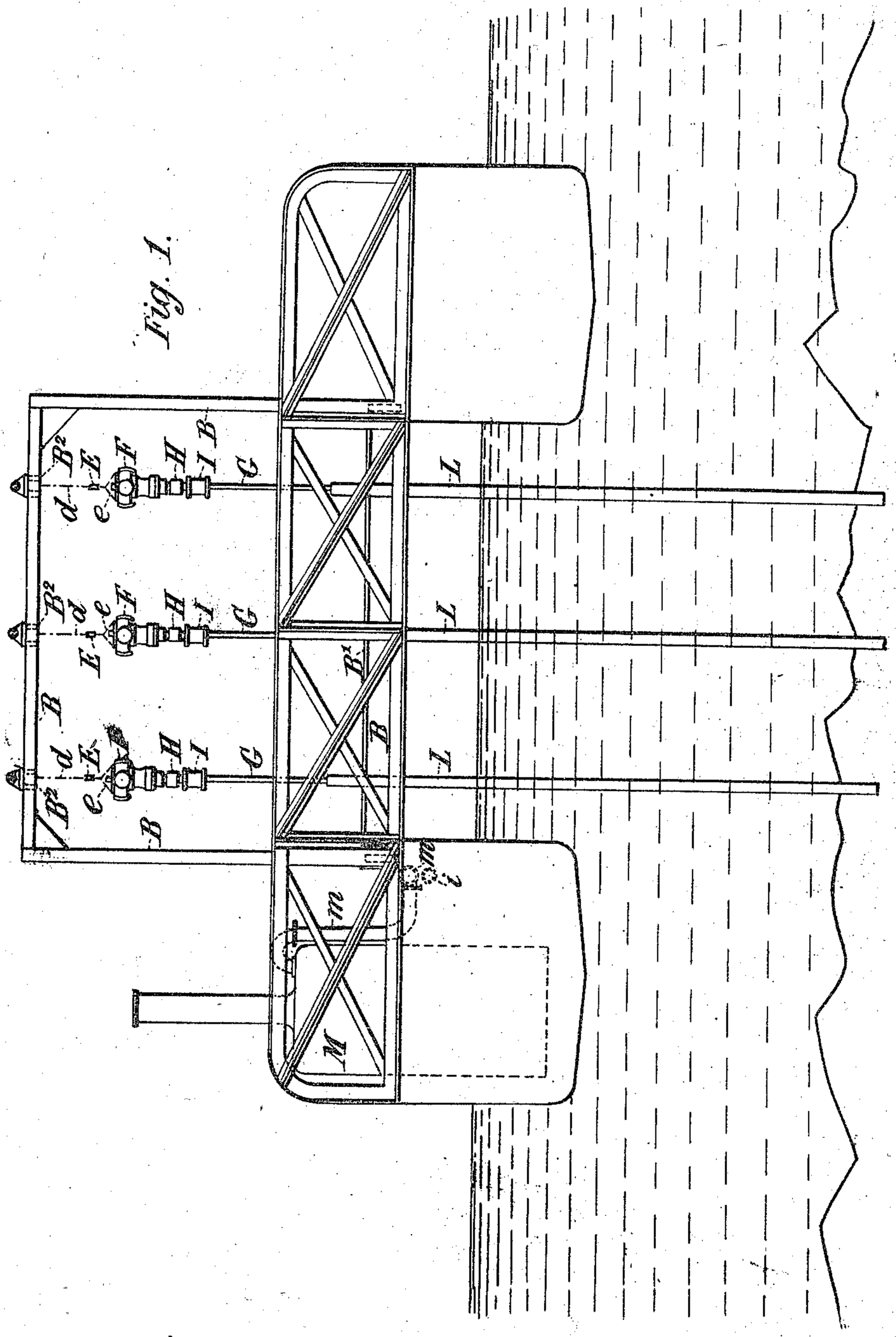
4 Sheets—Sheet 1.

J. T. JONES & J. H. WILD.

APPARATUS FOR BORING ROCKS UNDER WATER.

No. 285,628. Patented Sept. 25, 1883.

Fig. 1.



Witnesses:
Geo. T. Raymer
Ed. L. Moran

Joseph T. Jones
Joseph H. Wild
by their Attorneys
Brown & Brown

(No Model.)

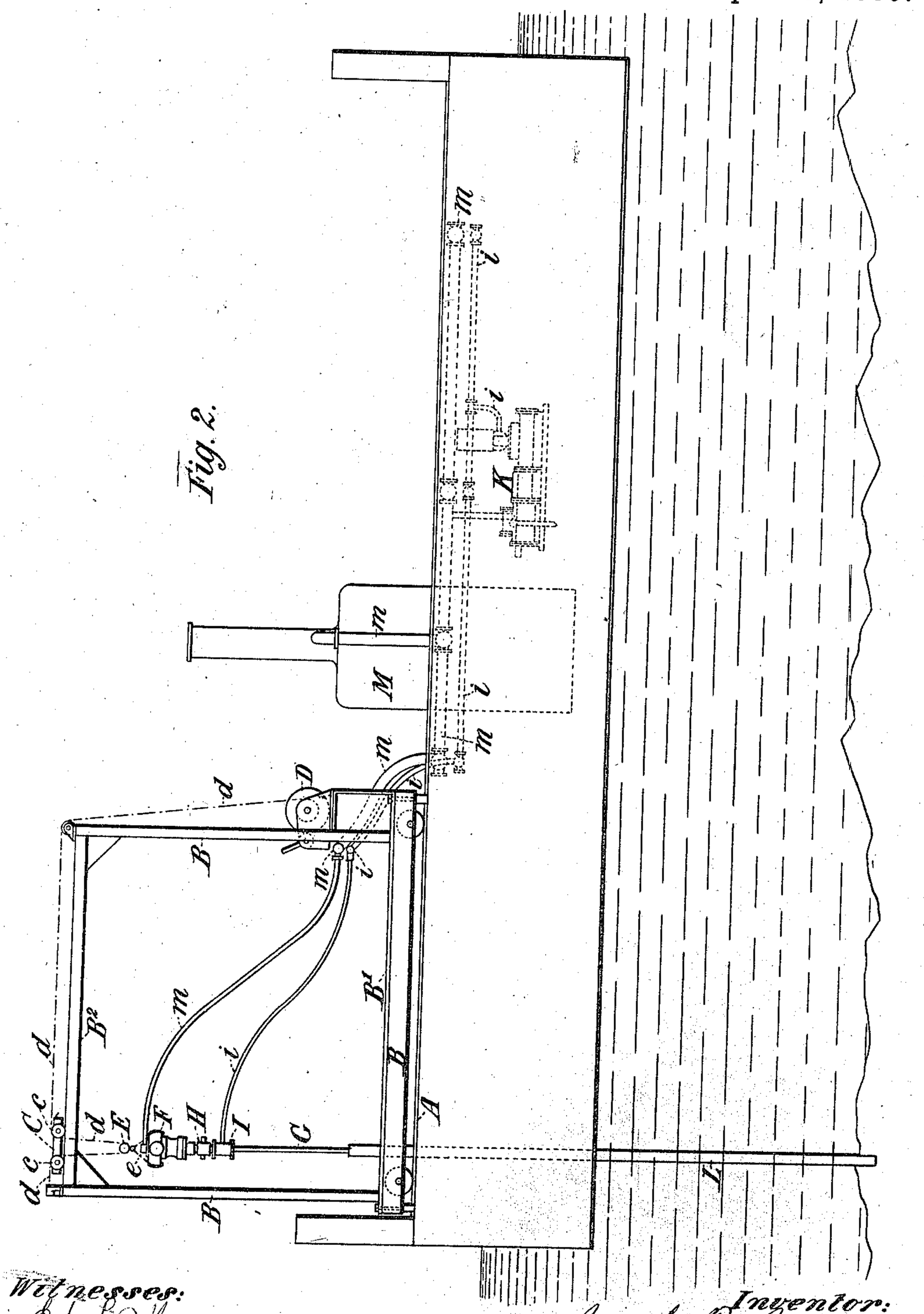
4 Sheets—Sheet 2.

J. T. JONES & J. H. WILD.

APPARATUS FOR BORING ROCKS UNDER WATER.

No. 285,628. Patented Sept. 25, 1883.

Fig. 2.



Witnesses:
Ed L. Moran
Fred'k Haynes

Joseph & Inventor:
Joseph T. Jones
Joseph H. Wild
by their Attorneys
Brown & Brown

(No Model.)

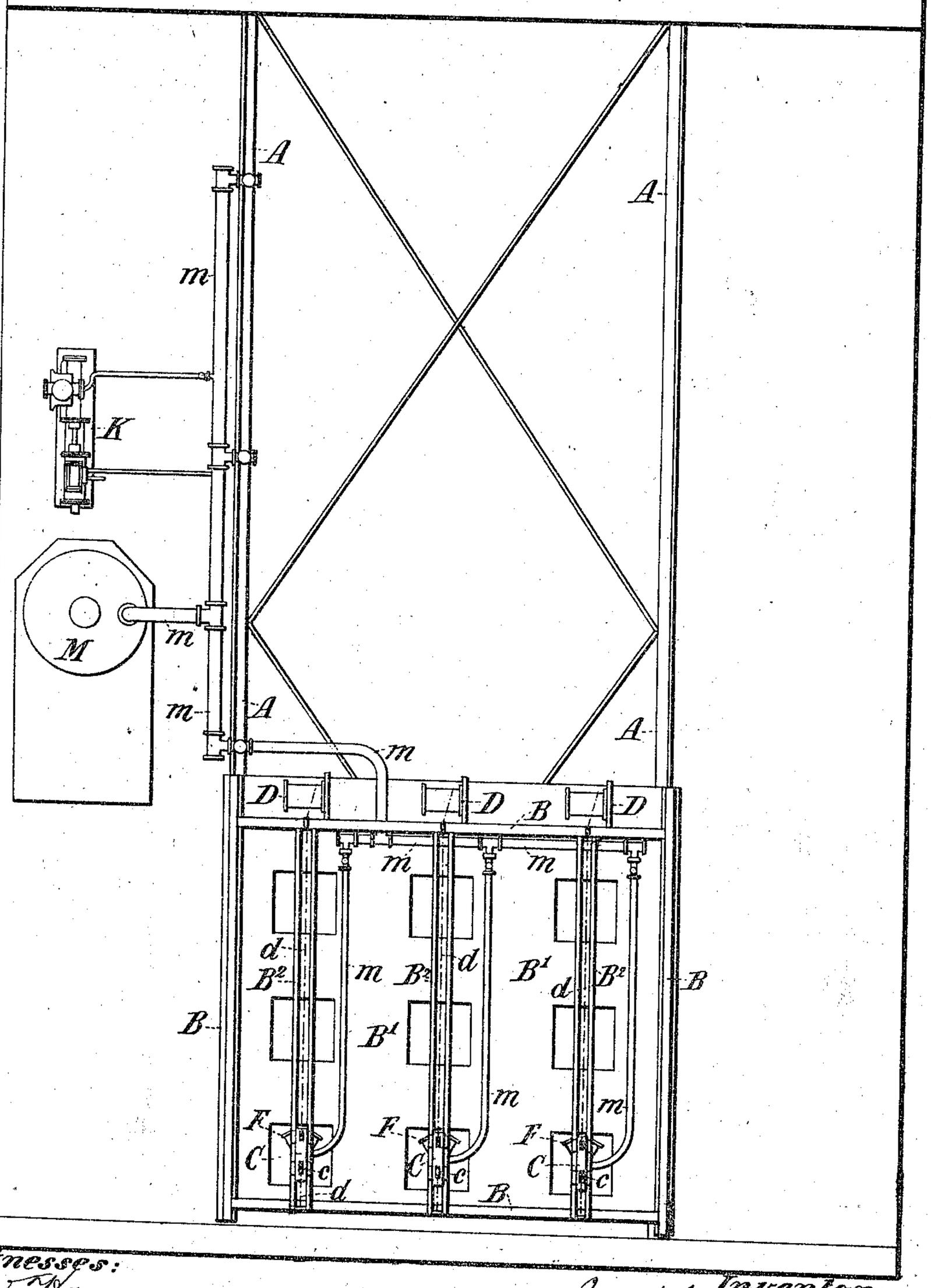
4 Sheets—Sheet 3

J. T. JONES & J. H. WILD.

APPARATUS FOR BORING ROCKS UNDER WATER.

No. 285,628. Patented Sept. 25, 1883.

Fig. 3.



Witnesses:
Chas. Haynes
Ed. L. Moran

Inventor:
Joseph T. Jones
Joseph H. Wild
by their Attorneys
Brown & Brown

(No Model.) 4 Sheets—Sheet 4.

J. T. JONES & J. H. WILD.

APPARATUS FOR BORING ROCKS UNDER WATER.

No. 285,628. Patented Sept. 25, 1883.

Fig. 4.

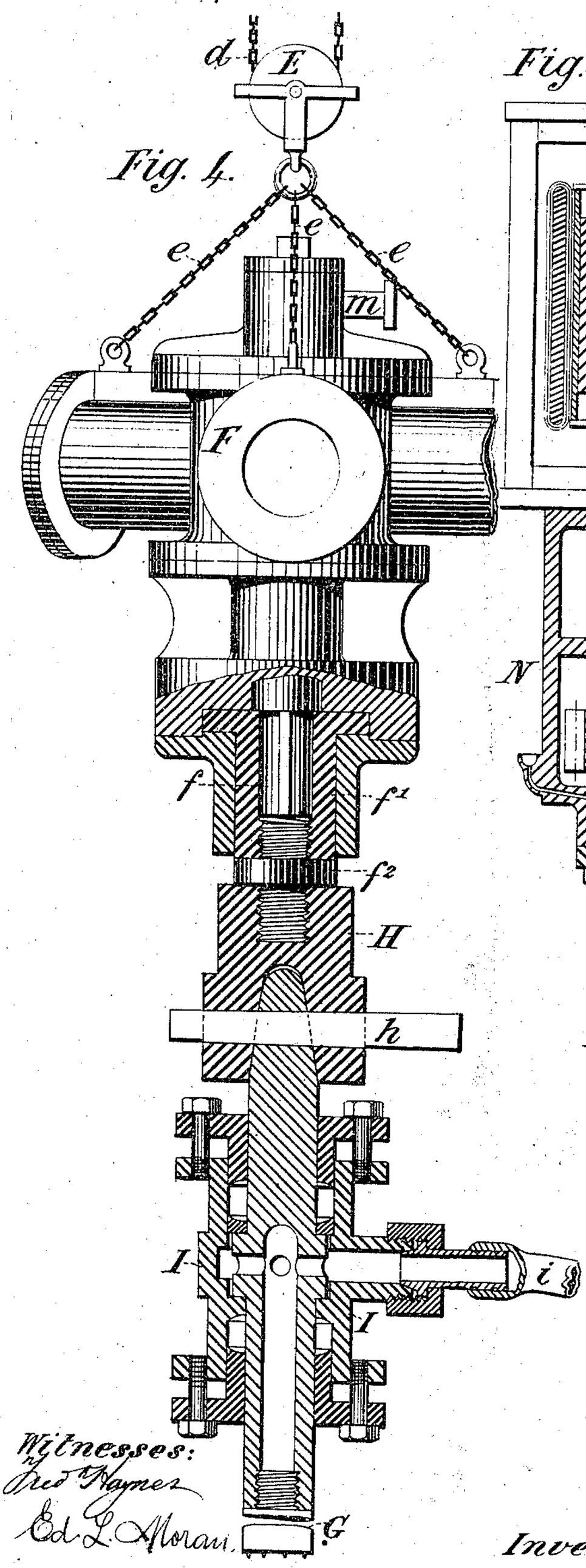


Fig. 5.

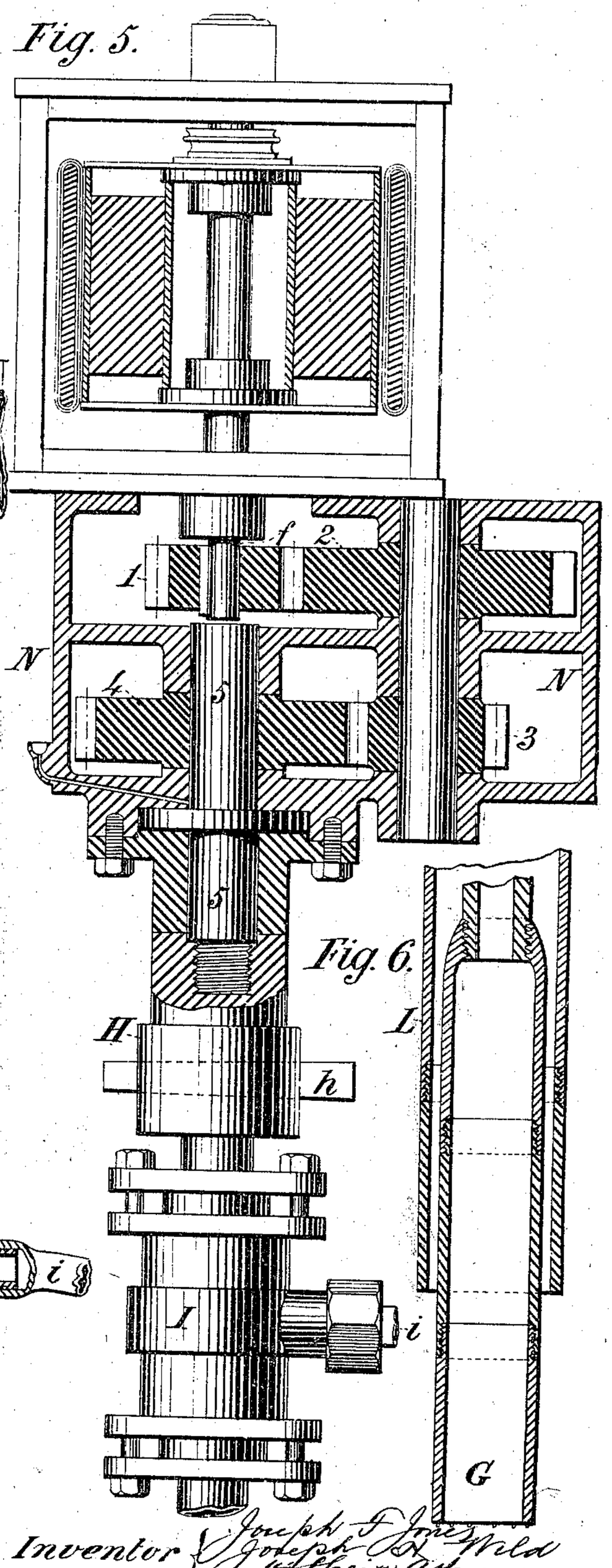


Fig. 6.

Witnesses:
Geo. T. Haynes
Ed. L. Moran.

Inventor: Joseph T. Jones, Joseph H. Wild, by their Attorneys Brown & Brown

UNITED STATES PATENT OFFICE.

JOSEPH T. JONES AND JOSEPH H. WILD, OF LEEDS, COUNTY OF YORK, ENGLAND.

APPARATUS FOR BORING ROCKS UNDER WATER.

SPECIFICATION forming part of Letters Patent No. 285,628, dated September 25, 1883.

Application filed August 26, 1882. (No model.) Patented in England December 22, 1881, No. 5,614.

To all whom it may concern:

Be it known that we, JOSEPH THOMAS JONES and JOSEPH HENRY WILD, both of Leeds, in the county of York, England, have invented Improvements in Apparatus for Boring Rocks, (for which were granted British Letters Patent No. 5,614, dated December 22, 1881,) of which the following is a specification.

This invention relates to improvements in apparatus for boring holes in rocks and hard ground requiring to be removed by blasting; and it consists in a novel combination, with a pendent motor, and a drilling-tool attached thereto, of a supporting-frame, a traveling carriage for shifting the position of the motor and drilling-tool, and which is provided with guide-pulleys, and a supporting-chain or cable passing over said guide-pulleys, and having the motor suspended from the portion of the chain or cable pendent between said pulleys, while the ends of said chain or cable are held fast, the said chain or cable forming the only connection between said motor and its frame and carriage, whereby provision is afforded for the movement of the frame without liability of breaking or straining the tool.

The invention also consists in the combination, with the foregoing motor, tool, carriage, and chain or cable, of a traveling frame supporting the aforesaid traveling carriage, and carrying a winch to which one end of the supporting chain or cable is attached, whereby provision is afforded for shifting the frame with the carriage upon it, or for shifting the carriage alone, and for raising or lowering the drilling-tool and motor.

The invention also consists in the combination, with a double ponton, of a traveling frame extending between and movable lengthwise of the two portions of the ponton, one or more motors suspended from said frame, and one or more drilling-tools attached to and adapted to be operated by said motor or motors.

In applying the invention to subaqueous boring operations to which it is specially adapted, a double vessel or ponton is provided, the two halves thereof being placed at a convenient distance apart and firmly fixed together by means of ties or girders. On these pontons we provide a traveling or movable frame fitted with a platform and spanning the space between the two pontons. This frame serves to carry the lifting-gear and the motors for driving the boring-tools. The frame is so arranged that after the necessary number of holes is bored along the required line between the pontons it can be moved to the position required for the next or any other set of holes without shifting the pontons, thereby insuring perfect accuracy in boring the holes at the required distance from each other. The water-way between the pontons is preferably bridged across by loose planking, a single plank being taken up wherever required to allow the boring-tool to pass freely. The difference in the level of the pontons caused by moving the frame may be adjusted by the filling or emptying of water-tight compartments in the pontons, as required.

In the accompanying drawings, Figure 1 is a front elevation of our improved rock-boring apparatus adapted to a ponton. Fig. 2 is a side elevation of the same. Fig. 3 is a plan view, showing the mode of bracing together the double vessel. Fig. 4 illustrates, on a larger scale, the manner of connecting the boring-tool with the shaft of the motor. Fig. 5 illustrates a system of gearing which may be employed to vary the speed of the boring-tool, and Fig. 6 is a sectional detail view of the lower portion of the boring-tool.

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

The double vessel which we employ is constructed with parallel sides, and is furnished with a pair of rails, A A, laid parallel to each other near the inner sides of the ponton. These rails A serve as a railway for the traveling or movable frame B which is fitted with a reticulated platform, B′, and rises several feet above the platform, to carry rails B^2 for the reception of wheel-carriages C C. The water-way between the pontons is preferably bridged over by loose planking, one or more planks beneath the traveling frame B being taken up as required, to allow the boring-tools

to pass freely. This planking is not, however, shown in the drawings, for the sake of clearness.

The drawings show three of the carriages, one for each boring-tool. In these carriages C are mounted chain or guide pulleys *c*, around which are laid chains *d*, made fast at one end to the top of the frame B, and let down to winches D, mounted on the platform B′ of the frame B. These chains *d* severally carry, at their portions which are pendent between the guide-pulleys *c c*, pulley-blocks E, from which depend chains *e* for carrying the motor-engines F for driving and weighting the boring-tools. These motor-engines may be of any approved construction, and driven by steam, gas, air, or electricity.

In Figs. 1, 2, and 3, we have indicated the employment of a Brotherhood steam-engine for this purpose, and at Fig. 4 we have shown on an enlarged scale the mode of fitting the boring-tool to the shaft of the engine, the object being not only to apply the direct action of the engine to the tool, but also to use the weight of the engine for holding down the tool to its work.

G is the boring-tool, the hollow stem of which is formed in lengths, which are screwed together, and are capable of being readily attached and detached, for the purpose of varying the length of the boring-tool in the well-known manner to adapt it to its work. Made fast to the lower end of the shaft *f* of the motor-engine is a sleeve, *f′*, threaded internally, to receive a screw-coupling piece, f^2. The lower end of this screw-coupling piece enters a tapped socket in a socket-casting, H, which is slotted transversely to receive a key, *h*. The uppermost joint or portion of the boring-tool is made solid at its top end, and shaped to fit a socket in the socket-piece H. This top end is also slotted to receive the key *h*, which, when passed through it, secures the tool to the motor-engine. Immediately below the solid part of this uppermost joint of the boring tool, and at the commencement of the hollow portion thereof, the metal is thickened to allow of its being pierced radially without weakening the part, and to form shoulders against which fit the ends of an annular water-box, I, provided with glands for rendering the same water-tight. This water-box is supplied by a pipe, *i*, with water under pressure from a steam-pump, K, and it is intended to deliver a stream of water to the boring-tool, so as to drive out the borings from the bored hole. In some instances, in order to guide the tool in its work, we first, before applying the tool, insert into the rock a guide-tube, such as that shown at L L L, Figs. 1 and 2. This tube we furnish, like the boring-tool, with a ring of diamond-cutters, and operate it by hand, or otherwise, so as to make it take a firm hold in the rock, its position therein being determined by the operator, that it may correspond exactly to the position intended for the hole which the boring-tool is to form. This guide-tube is built up of suitable lengths, in the same way as the boring-tool, and to any desired height, and it thus serves as a guide for the tool while the tool is entering the rock, and afterward serves to steady it while the boring is proceeding.

On starting to work the attendants slacken the chains *d*, by unwinding the winches, and thereby allow the suspended motor-engines to press their tools into work. As this work proceeds, the attendants continue slowly to lower the engines, and cause them to press down the tools while imparting rotary motion thereto. For the purpose of driving the engines F, steam-supply pipes *m*, leading from a boiler, M, are connected with the steam-chambers of the several engines. These pipes are made flexible, in order to allow for the vertical movement of the engines. When an engine has followed down its tool to a given distance, the tool-stem must be detached therefrom and lengthened by the insertion of another joint-piece, the engine being raised for that purpose, and the operation may then proceed as before.

Fig. 5 shows an arrangement of gearing which may be used for reducing the speed imparted to the boring-tool by the motive-power engine. In this figure a dynamo-electric machine is represented as employed for working the tool. On the shaft *f* of the engine is keyed a spur-pinion, 1, which gears into a spur-wheel, 2, on the axle of which is keyed a pinion, 3. This pinion gears into a wheel, 4, keyed on a short shaft, 5, which is screwed to the socket-piece H of the boring-tool. These gear-wheels, which may be of any desired proportions, are inclosed in a box, N, made fast to the motor-engine, and constituting a coupling-piece for the engine and boring-tool. In this case the sleeve *f′* and the screw-coupling piece f^2 are removed, the coupling-piece or gear-box N temporarily taking their place. By thus interposing the gear-box between the motor and the boring-tool the motor may still be driven at a high speed, even though circumstances should necessitate the driving of the tool at a comparatively slow speed.

Fig. 6 shows in section the lower end of the boring-tool which we prefer to employ, it being surrounded by a guide-tube, as above explained. The tool consists of a number of short tubes screwed together and fitted with a ring of diamond-cutters, thus leaving open the center of the tool for the discharge of water into the bored hole.

In cases where there is a possibility of the hole filling up again with silt after the boring-tube is withdrawn—such as in jointy strata or where hard and soft parts occur alternately—we bore the hole to the required depth with a hollow tool sufficiently large to allow of the explosive material being passed down through the tube to the bottom of the hole. Thus, when the tool is withdrawn, the explosive will be left in its proper position ready for firing.

By the use of this improved apparatus bor-

ing operations may be continuously carried on in tideways and in rough and fair weather. As the dynamo-machine or other suitable motor—such as a three-cylinder Brotherhood engine—serves to weight the boring-rod on which it is secured, the use of any special weights for this purpose is rendered unnecessary.

For boring operations on land we propose to employ an adjustable traveling frame and platform similar to that above described for carrying the boring-rods, but with the addition of vertical guides for steadying the motor, so that the services of one of the attendants can be dispensed with; the dynamo-machines or other suitable motors being suspended from chains and attached direct to the upper end of the boring-rods, and serving to weight the said rods, thus rendering unnecessary a large amount of gearing, flexible driving-connections, and separate weighting apparatus, and greatly simplifying the construction of the machine.

The motors for driving the boring-tools are supported solely by the cables or chains *c*, and neither the motors nor the boring-tools have any other connection with the frame B, or with the vessel or ponton.

We are aware that motors for operating boring-tools have been suspended by chains or cables, but in such case the boring-tools have been attached to cross-heads, which moved in vertical guideways carried by the vessel or ponton. Our arrangement is much more desirable, because there is not nearly so much liability of straining and breaking the boring-tools as there is where the tools are attached to cross-heads fitted to upright guides, which move with every rising, falling, lateral, or rocking movement of the ponton or vessel.

Having now set forth the nature of our invention of improvements in apparatus for boring rocks, and explained the manner of carrying the same into effect, we wish it to be understood that we claim—

1. The combination, with a pendent motor and a drilling-tool attached thereto, of a supporting-frame, a traveling carriage for shifting the position of the motor and drilling-tool, and which is provided with guide-pulleys, and a supporting chain or cable passing over said guide-pulleys and having the motor suspended from the portion of the chain or cable pendent between said pulleys, while the ends of said chain or cable are fast, the said chain or cable forming the only connection between said motor and said frame and carriage, whereby provision is afforded for the movements of the frame without liability of breaking or straining the tool, substantially as described.

2. The combination, with a pendent motor and a drilling-tool attached thereto, of a traveling carriage for shifting the position of the motor and drilling-tool, and which is provided with guide-pulleys, a traveling frame on which the said carriage is movable, a supporting chain or cable passing over said guide-pulleys, and having the motor suspended from the portion pendent between said pulleys and a winch on said traveling frame, to which one end of said chain or cable is secured, while the other end thereof is secured to the frame itself, substantially as herein described.

3. The combination, with a double ponton, of a traveling frame extending between and movable lengthwise of the two portions of the pontons, one or more motors suspended from the frame, and one or more drilling or boring tools attached to and adapted to be operated by said motor or motors, substantially as herein described.

JOSEPH T. JONES.
JOSEPH HENRY WILD.

Witnesses to signature of Joseph Henry Wild:

FREDK. W. SKARDON,
3 Bedford Street, Plymouth, England.
JOHN W. TAW,
57 Neswick St. Plymouth, Englana.

Witnesses to the signature of the above-named Joseph Thomas Jones:

ALFRED DONNISON,
Notary Public. 71 Cornhill, London, England,
BENJ. THOMAS,
Lewisham, London, S. E., England.