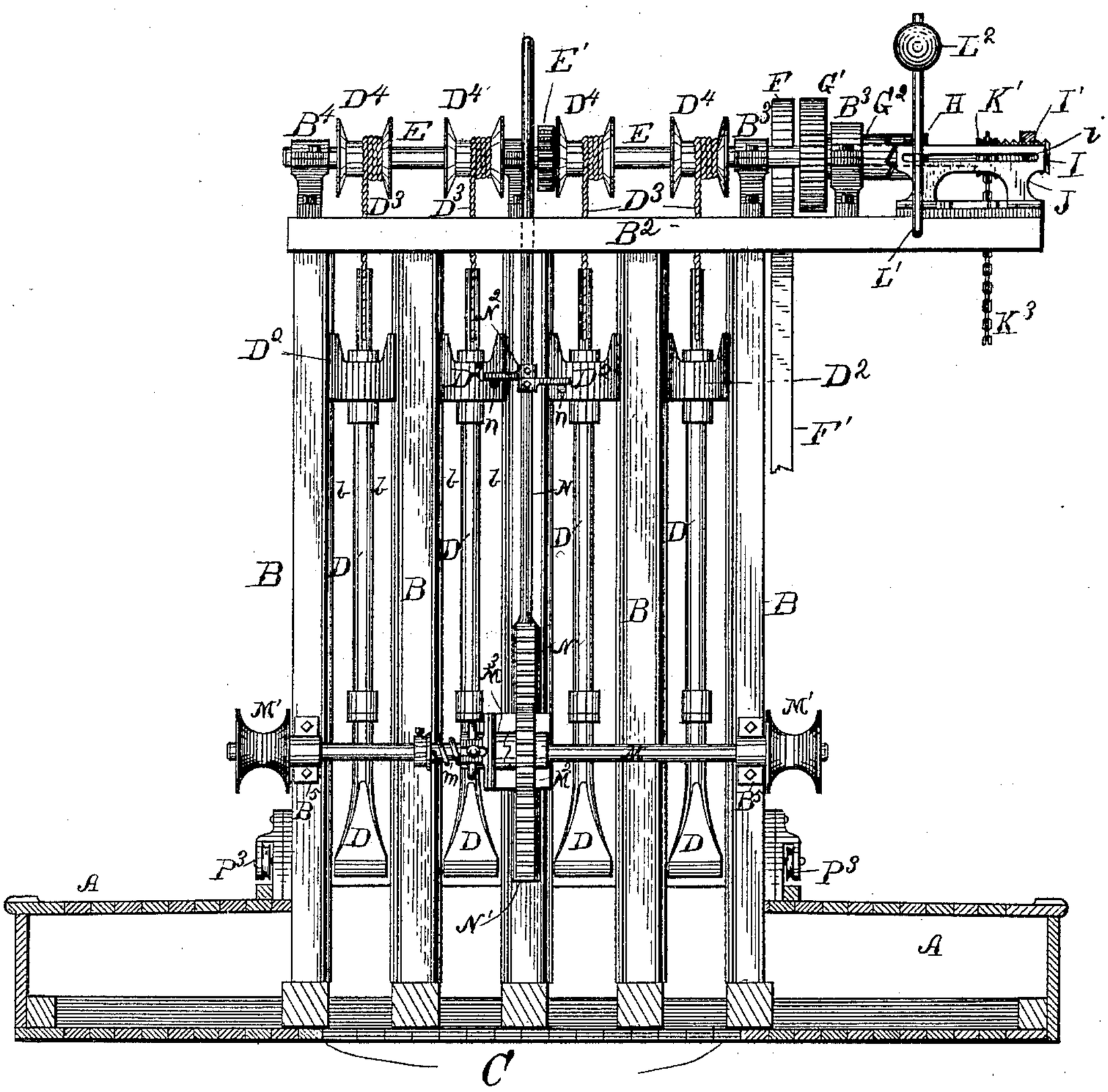
(No Model.) 3 Sheets—Sheet 1.

H. C. FINCH.

MACHINE FOR BREAKING SUBMERGED ROCK.

No. 339,090. Patented Mar. 30, 1886.

Fig. 1.



Witnesses:
F. F. Holden.
Gomer Jones

Inventor
Henry C. Finch
per Hallock & Hallock
Attys.

(No Model.) 3 Sheets—Sheet 2.

H. C. FINCH.

MACHINE FOR BREAKING SUBMERGED ROCK.

No. 339,090. Patented Mar. 30, 1886.

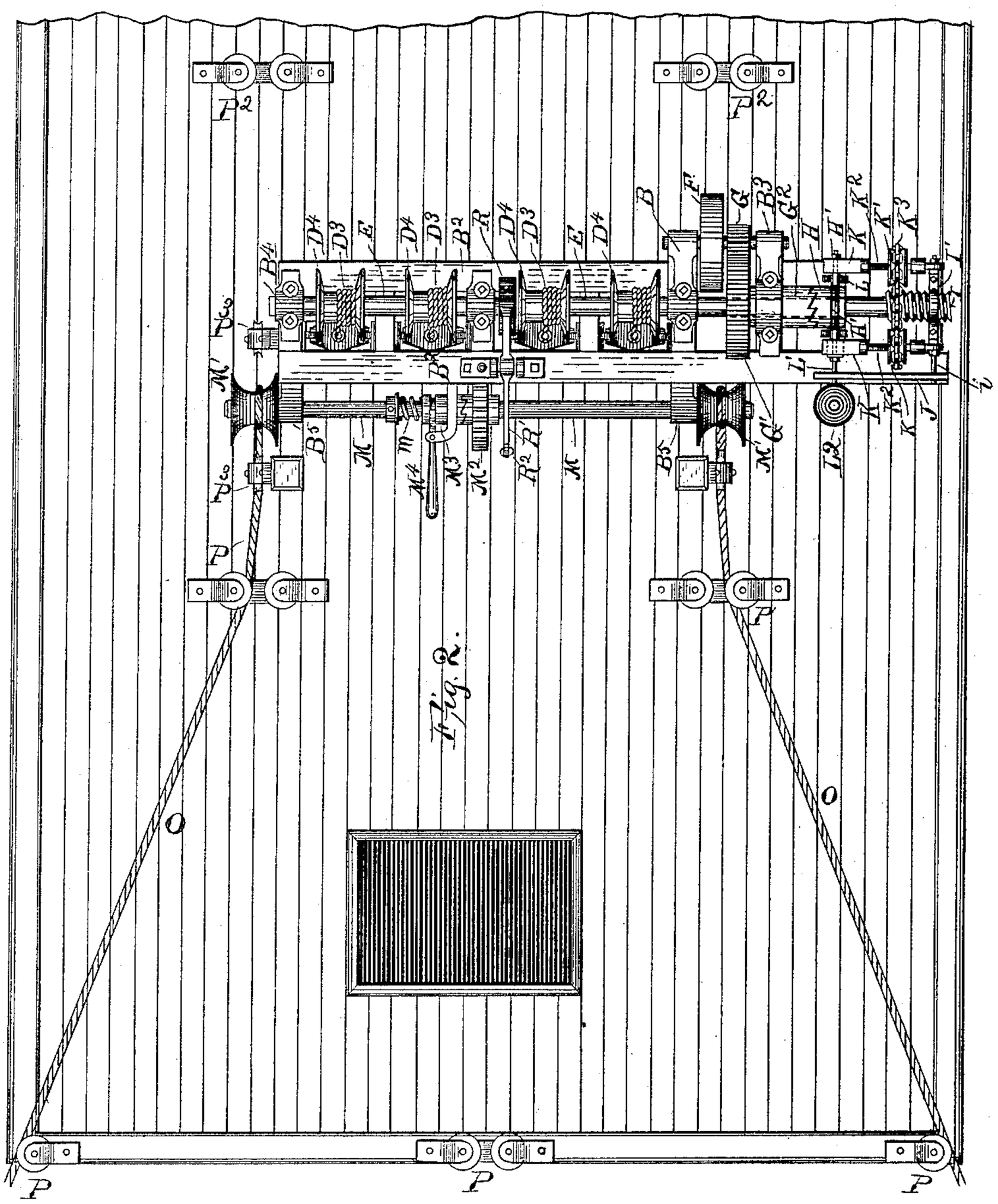


Fig. 2.

Witnesses:
F. F. Holden.
Gomer Jones.

Inventor
Henry C Finch
Per Hallock & Hallock
attys

(No Model.) 3 Sheets—Sheet 3.

H. C. FINCH.

MACHINE FOR BREAKING SUBMERGED ROCK.

No. 339,090. Patented Mar. 30, 1886.

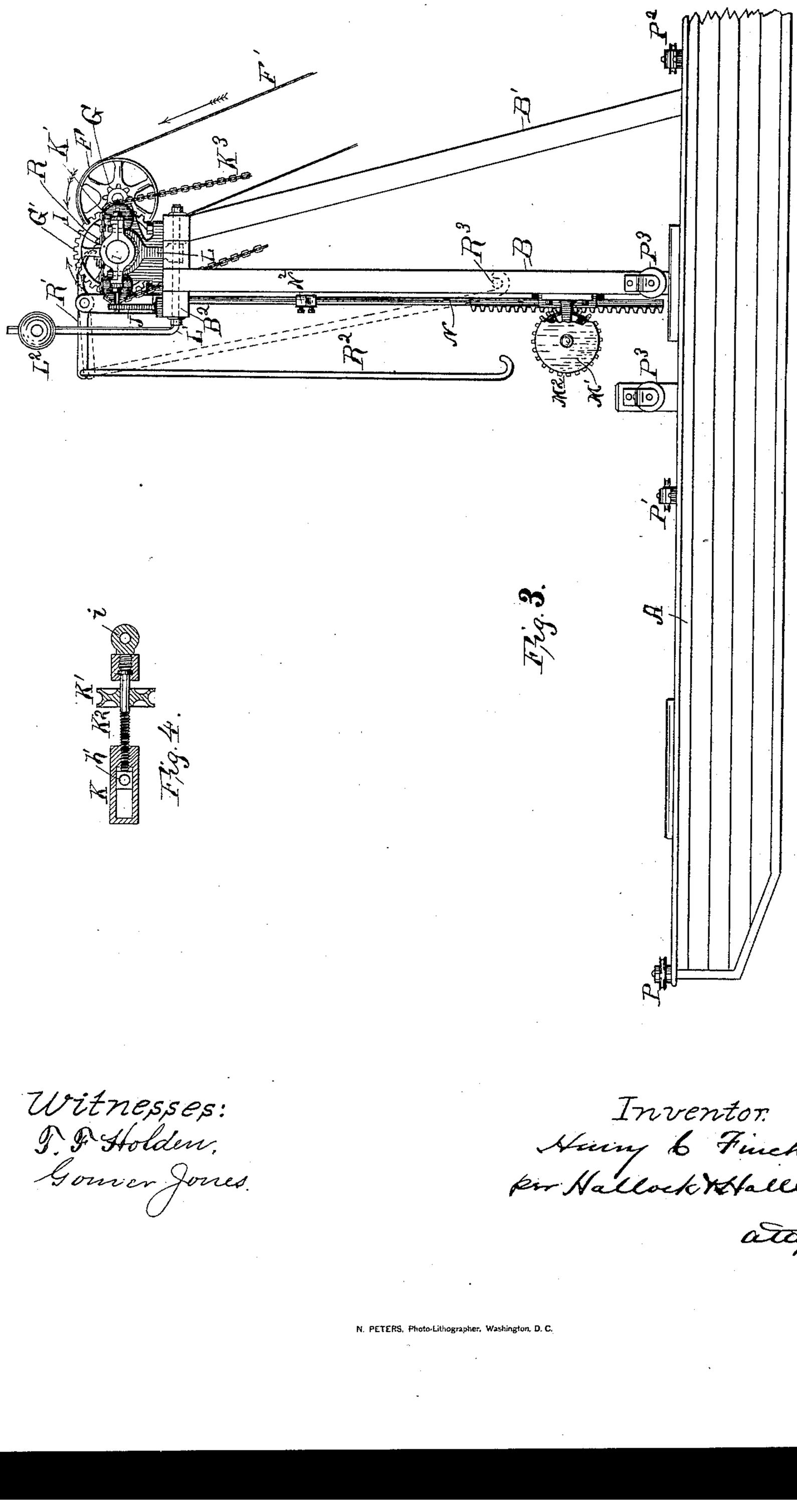


Fig. 3.

Fig. 4.

Witnesses:
F. F. Holden.
Gouverneur Jones.

Inventor:
Henry C. Finch,
per Hallock & Hallock
attys

UNITED STATES PATENT OFFICE.

HENRY C. FINCH, OF OIL CITY, PENNSYLVANIA.

MACHINE FOR BREAKING SUBMERGED ROCK.

SPECIFICATION forming part of Letters Patent No. 339,090, dated March 30, 1886.

Application filed June 9, 1885. Serial No. 168,122. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. FINCH, a citizen of Great Britain, residing at Oil City, in the county of Venango and State of Pennsylvania, have invented certain new and useful Improvements in Machines for Breaking Submerged Rock; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention has for its object the provision of a machine for breaking up submerged rocks. The use for which the said machine is particularly intended is the breaking up of the fossiliferous rock found in the beds of rivers—such as certain rivers in the State of South Carolina—which rock is used for its phosphate as a fertilizer after being ground into a powder.

My invention, therefore, consists in parts and combinations of parts for the purposes above named, as will hereinafter be fully set forth, and pointed out in the claims.

My invention is illustrated in the accompanying drawings, as follows:

Figure 1 is a front elevation of the rock-breaking mechanism, as seen mounted on a scow or float, which is shown in the figure in vertical transverse section. Fig. 2 is a top or plan view of the device and the scow or float on which it is mounted. Fig. 3 is a side elevation. Fig. 4 is a detail of construction of one of the parts of the mechanism, and will be explained in proper place hereinafter.

The general features of the machine are as follows: A scow or float, A, on which is a derrick, B B′, centrally arranged over a well or opening, C, through the float, and stamps D, which are lifted up by mechanism and allowed to fall down through the opening C upon the rock in the bottom of the stream. Besides the means provided for raising and dropping the stamps, I provide means for holding the float in place and gradually moving it as the work of stamping progresses. All of these features will be fully described in the following general description.

The float A is in the form of a float boat or scow decked over, and the derrick is formed of strong timbers B B′ B^2, framed together and firmly secured to the boat. The timbers B B B B are set vertically and are provided with guides *b b*, &c., for the stamp cross-heads D^2 to stride upon. As shown in the drawings, four stamps are provided for, but of course more or less may be used.

The stamps proper consist of bits D, stems or sinker-bars D′, and cross-heads D^2. These stamps are lifted by ropes D^3, which wind upon spools D^4 on a shaft, E, which is mounted in hangers or brackets B^3 B^3, and B^4 on the plate B^2 of the derrick. The stamps descend by gravitation, the shaft E being released from the mechanism which propels it to lift the stamps and allowed to revolve freely by the unwinding of the ropes D^3 from the spools D^4.

The mechanism for operating the shaft E to lift the stamps is as follows: A counter-shaft having a drive-pulley, F, and pinion G is mounted in the brackets B^3 B^3, and is driven by a belt, F′, which connects with a motor on the deck of the boat. The gear-pinion G meshes with a larger gear, G′, which is sleeved on the shaft E and journaled in the bracket. The hub or sleeve G^2 of the pinion G′ is provided at its outer end with a ratchet-clutch formation. Another sleeve, H, which is feathered onto the shaft E, is also provided with a similar clutch formation, and engages with and disengages from the one just named by sliding on the shaft E. The feathering of this sleeve H on the shaft is not shown in the drawings further than the groove *f* in the shaft, (seen in Fig. 2;) but it is an ordinary construction and needs no illustration. This sleeve H is moved forward and back on the shaft by a screw, I, on the shaft, a yoke, I′, which is a nut on said screw I, which is held from rotating by an extension thereof being held in a guide-slot in the plate J, and a sliding frame, K K^2, which engages with a yoke, H′, on the sleeve H.

In conjunction with the above device for moving the sleeve H there is a yoke, L, crank-shaft L′, and weight L^2 on the end of the crank-arm, which moves the sleeve H rapidly after it has been started far enough by the screw to throw the ball L^2 past the center of gravity either way. The ends of the yoke H′ being held in slots in the frame-piece K, this movement of the sleeve H by the ball and lever L^2 L′ is permitted.

A more minute description of this shifting

device is as follows: Fig. 4 is a longitudinal section of one of the parts marked K K^2 in the other figures. It consists of a yoke or slotted piece, K, a screw, K^2, which screws into the piece K lengthwise and enters the slot therein at one end. The other end of the screw K^2 is swiveled in a head, i', which connects with the nut-yoke I', which is on the screw I. A sprocket-wheel, K', is attached to the screw-rod K^2. A sprocket-chain, K^3, runs over the two sprocket-wheels K' K'. This is an endless chain, and hangs down where the operator can reach it. By pulling the chain one way the screws K^2 K^2 are screwed into and thus shorten the length of the slot in the yoke K, and if pulled the other way the reverse is the result and the slot is lengthened. The yoke H' on the sleeve H is held at each end by blocks h' in the slots of the yoke K.

As shown in Figs. 1 and 2, the shaft E has been rotated and wound up the ropes, lifting the stamps, and the parts are all in the position they occupy just before the clutch H G^2 is disengaged. The screw I has carried the nut I' out nearly to the end of the screw. This has drawn the parts K K along, so that the blocks h' h' are at the end of the slots, and any further movement will draw the yoke H' and sleeve H, and also begin to tip the ball L^2 past the center of gravity and cause it to fall toward the outside, and this will give a quick movement to the sleeve, moving the yoke H' rapidly to the other end of the slots in the parts K. This of course disengages the clutch H G^2, and the shaft E is free to revolve by the unwinding of the ropes D^3 as the stamps drop. This movement will cause the screw to revolve backward and draw the parts I' K K' K^2 forward and push the sleeve H toward the sleeve G^2, and as soon as this movement has gone far enough to push the ball L^2 over the center of gravity it will fall forward and quickly carry the sleeve H into engagement with the sleeve G^2, and this will reverse the rotation of the shaft E again.

The object in lengthening or shortening the slots in the yokes K by the screw-rods K^2 is to vary or regulate the height to which the stamps will be drawn up. If the slot is shortened, the stamps will not be drawn up so far, because the screw I will not make so many revolutions to effect the shifting device as where the slot is longer. As before stated, this lengthening or shortening the slot is effected by drawing the sprocket-wheel chain one way or the other.

The means for moving the boat as the stamps are operated are as follows: On the front of the derrick, near the deck, is a counter-shaft, M, on which are spools M' M'—one at each end—and a spur-gear, M^2, near the middle. A vertical bar, N, having thereon a rack, N', which gears with the pinion M^2, is properly guided on the derrick. On this bar are dogs N^2, which engage with pins *n* on the cross-heads of the stamps nearest it. When the stamps are drawn up, the bar N is also drawn up, and this revolves the shaft M. The cables O, which hold the boat in place in the stream, are looped around the spools M', so that as the shaft M is revolved the cables are drawn in or the boat is drawn ahead. If it is not desired to move ahead at each stroke of the stamps, the pinion M^2 can be made loose by opening the clutch M^3, which is done by moving the hand-lever M^4.

When it is desired to hold the stamps up, the rod R^2 is loosened from its fastening R^3, (see Fig. 3,) and this will let the pawl R' engage with the ratchet R on the shaft E and hold the shaft against being revolved by the weight of the stamp.

What I claim as new is—

1. In a machine for breaking submerged rock, the combination, substantially as set forth, of the float A, the well or opening C through said float, the derrick B B' B^2, erected over said well, the stamps D D' D^2, moving vertically on the guides *b b* on said derrick and through said well, the shaft E on the top of said derrick, having thereon the spools D^4, the ropes D^3, connected with said stamps and winding upon said spools, and gearing, substantially as set forth, for operating the said shaft E to wind said ropes upon said spools and lift said stamps, and when so wound to release said shaft, so that said stamps can descend by gravity.

2. In a machine for breaking submerged rocks, the combination, substantially as set forth, of a boat or float having thereon a derrick, a stamping device rigged upon said derrick substantially as set forth, and a windlass or winch for towing said float, which is actuated from the said stamping device when the stamps are hoisted up.

3. In a machine for breaking submerged rock, the combination, substantially as set forth, of a float, a derrick mounted on said float, a series of stamps rigged upon said derrick and operating vertically through a well or opening in said float upon the rocks below, a hoisting device for lifting up said stamps, consisting of the ropes D^3, spools D^4, shaft E, and gearing, substantially as shown, for rotating said shaft, and a releasing device for allowing said shaft E to revolve backward by the weight of the said stamps, said releasing device consisting of the screw I, yoke I', yokes K K, screws K^2 K^2, yoke L, shaft L', and ball L^2, yoke H', and clutch-sleeve H.

In testimony whereof I affix my signature in presence of two witnesses.

H. C. FINCH.

Witnesses:
JNO. K. HALLOCK,
WM. P. HAYES.