

(No Model.)

N. O. BOND.
WAVE POWER.

No. 425,927.

Patented Apr. 15, 1890.

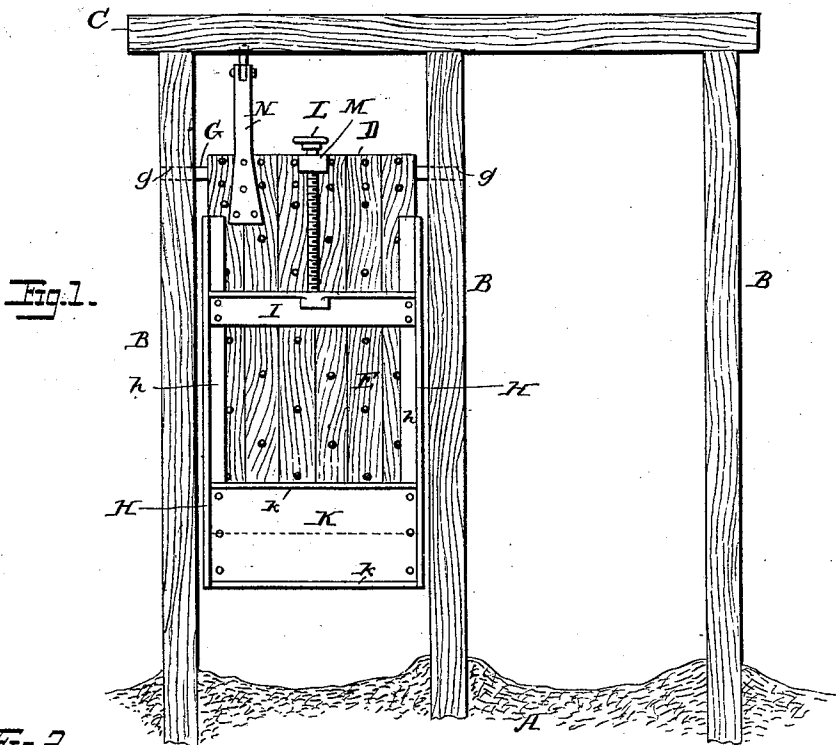


Fig. 1.

Fig. 2.

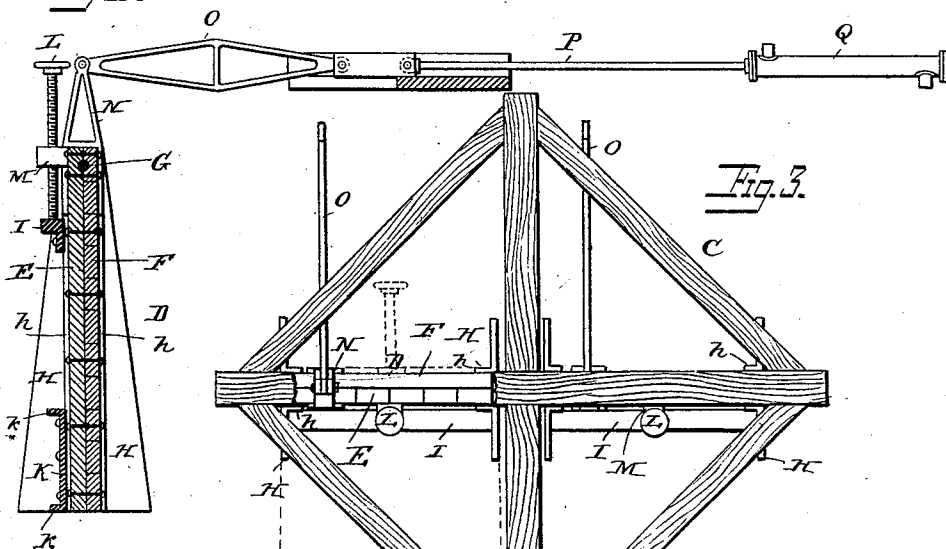


Fig. 3.

Witnesses
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UNITED STATES PATENT OFFICE.

NATHAN O. BOND, OF FAIRFAX COURT-HOUSE, VIRGINIA, ASSIGNOR TO THE BOND WAVE AND TIDE FORCE COMPANY, OF OCEAN GROVE, NEW JERSEY.

WAVE-POWER.

SPECIFICATION forming part of Letters Patent No. 425,927, dated April 15, 1890.

Application filed August 9, 1889. Serial No. 320,236. (No model.)

To all whom it may concern:

Be it known that I, NATHAN O. BOND, a citizen of the United States, residing at Fairfax Court-House, Fairfax county, State of Virginia, have invented certain new and useful Improvements in Wave-Powers, of which the following is a specification.

The great power exerted by the waves of the sea has long been recognized and many devices have been made attempting to utilize this power for the performance of useful work.

My present invention relates to a device adapted to this purpose; and it consists in a construction and arrangement of parts, substantially such as hereinafter pointed out.

Referring to the accompanying drawings, Figure 1 is a front view of one arrangement of devices involving my invention. Fig. 2 is a side view, partly in section, showing the operative parts; and Fig. 3 is a plan view of one arrangement of the gates.

The principal feature of my invention consists of one or more gates or pivoted rocking plates supported by a suitable frame-work and immersed to a greater or less extent in the water of the sea.

In carrying out my invention I provide some suitable structure constituting a frame which is fixed in the bottom of the sea A, and I have shown a number of piles B driven therein or otherwise embedded in the bottom and connected by suitable cross pieces or stringers C. This structure is so placed with relation to the rise and fall of the tide that a portion thereof shall always be immersed in the water, while the top is preferably above the high-water mark. Supported from these piles are one or more gates or plates D, arranged to swing both sides of a vertical plane, and, while these may be variously constructed, I prefer forming them substantially as illustrated in the drawings by using plank and arranging one series or row of planks E vertically and another row F horizontally and securing them together by bolts or other means, so as to form a rigid plate or gate. This gate may be arranged in any suitable manner to swing freely between two adjacent piles; but I have found that a cross-bar G of metal journaled or moving in sockets g,

formed in the piles and having the opposite rows of plank forming the gate recessed and secured thereon, constitutes an efficient and practical arrangement. In this way the two parts of the gate can be drawn together, so as to grasp the rod or cross-bar securely and cause it to rock or move in the journals in the piles, and experience has shown that this structure produces little or no friction and requires no lubrication.

To make the gate more effectual and to receive more of the force of the waves, I preferably provide it with flanges H, extending upon one or both sides, forming a sort of bay, and these are preferably made of metal and of a tapering form, as shown in the drawings. I have found it convenient to provide these flanges with laterally-projecting ribs h, which embrace the edges of the gate and furnish a means whereby the flanges of the two edges may be conveniently connected by the tie piece or pieces I, and thereby held in proper position on the gate.

In some cases, as when there is extremely low water, it is desirable to make the gate extensible, so that more of the force of the water can be utilized, and to do this I provide an extension K, preferably formed of metal and having the strengthening-ribs k, and secured to the flanges H near their bottom, and in this way it serves also as an additional tie-piece to hold the flanges in position. This extension when thus arranged can be moved up and down on the gate by any suitable mechanism, as a screw L, taking into a lug M on the gate and connected to the tie-pieces I, and it will be apparent that the extension and flanges can thus be moved up and down, so as to regulate the amount of surface of the gate immersed in the water at any time.

In case of very severe weather, if desired, the gate can be raised horizontally on its pivot and secured to the cross-pieces by any suitable means.

In order to utilize the power exerted on the gate by the waves, I provide the gate with a standard N, secured to the top portion thereof, and by means of a pitman O, I connect it with the piston-rod P of a pump Q or other suitable device, depending upon the purpose for which the power is used. This pump

or other engine and connections may be mounted in any convenient position on the shore or pier, or otherwise, as the case may be, and it will be evident that when the gate moves backward and forward under the influence of the waves the standard N will be vibrated and will operate by means of the horizontal connections the engine to produce useful work. I have not specifically described any particular form of engine, but have indicated a pump which may be utilized in raising sea or other water, as the case may be. It will be understood that the amount of energy exerted at the engine or pump Q will depend upon the force of the waves on the gate, and the connections are so arranged that whether the gate swings through a small or long arc the force generated will be utilized to the best advantage.

In Fig. 3 I have indicated one plan of arranging two gates by sinking a number of piles and connecting them securely together by tie-pieces and mounting the gates in a line between the two extreme piles and connecting them by means of their separate pitmen to their proper engines or pumps. (Not shown.)

It will thus be seen that I produce an extremely cheap and simple arrangement of parts which I have found to operate successfully in utilizing the wave-power, and it will of course be understood that the power utilized will depend upon the state of the tide controlling the immersion of the gate in the water and the height and force of the waves; but I have found that with this arrangement there is always force enough exerted to maintain a practically constant flow of water from the pump.

While I have described the preferred embodiments of my invention, it will be understood that it is not limited to the materials, construction, or arrangement shown, as all these can be varied by those skilled in the art without departing from the principles set forth.

What I claim is—

1. A wave-power consisting of a gate suspended from piles to vibrate both sides of a vertical plane and provided with a standard arranged on the top of the gate and directly connected with an engine for horizontal operation, substantially as described.

2. In a wave-power device, a swinging gate provided with an extension, substantially as described.

3. In a wave-power, a swinging gate having side flanges extending laterally from the edges of the gate and adapted to form a bay to receive the waves, substantially as described.

4. In a wave-power, a swinging gate provided with side flanges and an extension adjustable on the gate, substantially as described.

5. In a wave-power device, a gate consisting of two layers of plank secured together and sustained near their upper ends and a cross-bar secured therein, the ends of which are journaled in sockets in piles, substantially as described. †

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

NATHAN O. BOND.

Witnesses:

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