

No. 680,357.

Patented Aug. 13, 1901.

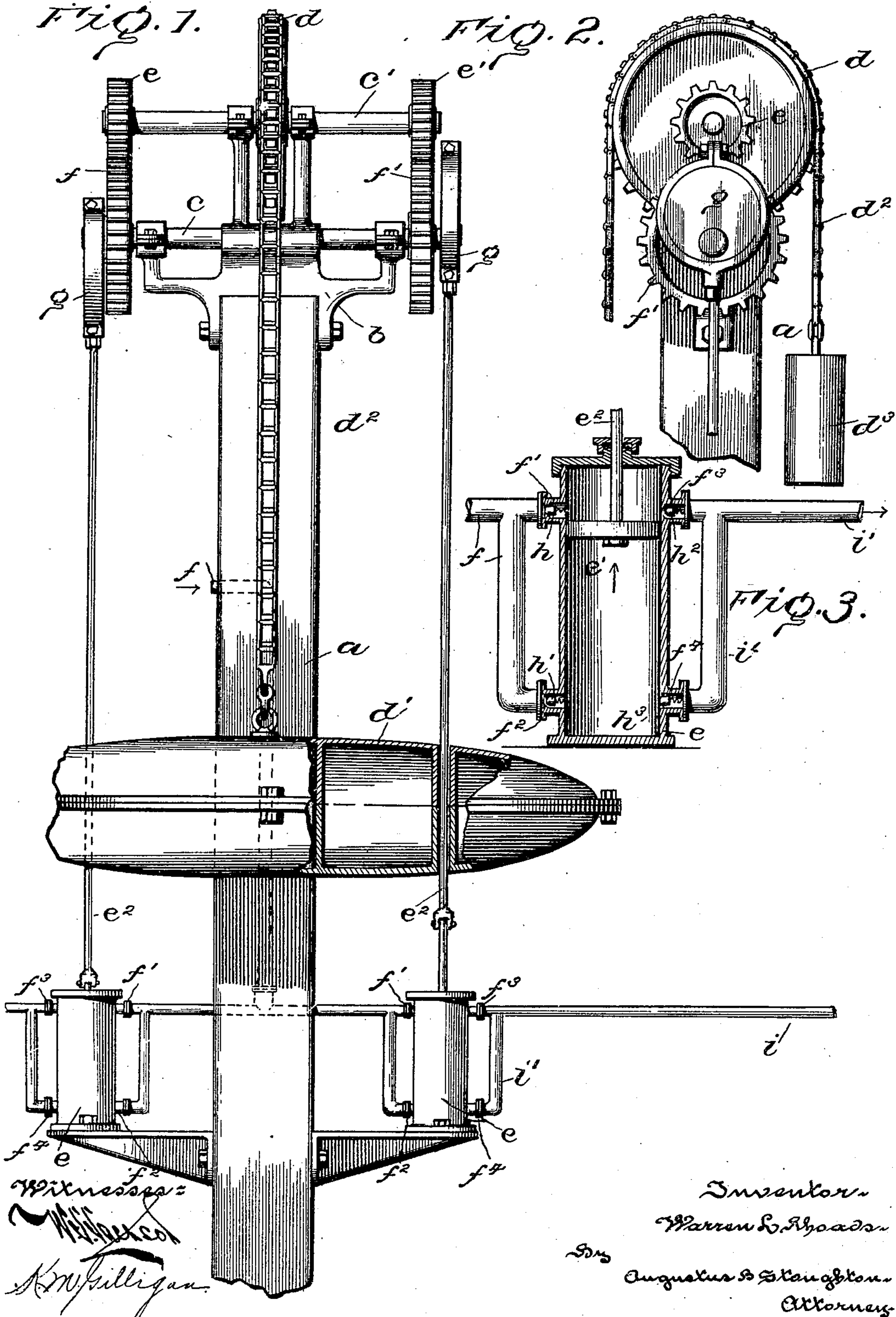
W. L. RHOADS.
WAVE POWER APPARATUS.

(Application filed Oct. 8, 1900.)

(No Model.)

FIG. 1.

FIG. 2.



UNITED STATES PATENT OFFICE.

WARREN L. RHOADS, OF LANSDOWNE, PENNSYLVANIA.

WAVE-POWER APPARATUS.

SPECIFICATION forming part of Letters Patent No. 680,357, dated August 13, 1901.

Application filed October 8, 1900. Serial No. 32,426. (No model.)

To all whom it may concern:

Be it known that I, WARREN L. RHOADS, a citizen of the United States, residing in Lansdowne, in the county of Delaware and State of Pennsylvania, have invented certain new and useful Improvements in Wave-Power Apparatus, of which the following is a specification.

It is one object of the present invention to provide simple, durable, and efficient means for obtaining power from the waves of the ocean, sea, or other large body of water.

Another object of the invention is to provide means whereby the air-compression cylinder or cylinders shall be submerged, and thus keep cool the air compressed and delivered for use or storage, and a still further object is to so arrange the air-inlets in the air-compression cylinder or cylinders that said inlets have communication with the atmospheric air above the level of the sea.

To these and other ends hereinafter set forth the invention consists of the improvements hereinafter described and claimed.

The nature, characteristic features, and scope of the invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, and in which—

Figure 1 is a front elevational view, partly in section, of apparatus embodying features of the invention. Fig. 2 is a side elevational view of the upper portion of the same; and Fig. 3 is a sectional view, drawn to an enlarged scale, of one of the air-compressing cylinders.

Referring to the drawings, *a* is a guide, post, or pile secured by any suitable means in upright position in respect to the bottom of the ocean, sea, or other large body of water. Mounted on top of this post or pile *a*, either stationary, as shown, or revolvably mounted thereon, is a casing or head *b*, forming a bearing for shafts *c* and *c'*. Upon the shaft *c'* there is mounted a sprocket-wheel *d*. This wheel has a rotary movement imparted to it, first in one direction and then in the other, by a float and sprocket-chain *d'*, caused by the float riding up and down upon the waves of the ocean. A counterbalance, as *d''*, is secured to the opposite end of the sprocket-chain to that occupied by the float. The float *d'*, as shown, is hollow and may be somewhat

of the shape of a boat or bowl. In the present instance the post or pile *a* passes through the float.

Air-compressing cylinders *e*, which may be located beneath the water, are provided with pistons *e'* and piston-rods *e''*. *f* is an air-intake, preferably concealed in the post or pile *a* and communicating with the interior of the air-compression cylinders by means of valved inlets *f'* and *f''*. The cylinders are also provided with valved discharge-inlets *f'''* and *f''''*. As shown, the piston-rods are connected with eccentrics *g*, mounted upon the shaft *c*, the shaft being rotated through the intervention of suitable gearing interposed between the shafts *c* and *c'*.

A description will now be given of the air-compression cylinders and with special reference to Fig. 2. The valves in the air-inlet and air-outlet ports are arranged to act by pressure and by vacuum and are equipped with springs, as shown. Assuming the piston to be traveling in the direction of the arrow, the valve *h'''* is closed by reason of the vacuum created in the cylinder, and the valve *h''* is opened, thus permitting atmospheric air to enter into the interior of the cylinder. At the same time the valve *h* was closed by reason of the pressure created by the piston, and the valve *n''* was opened, thus permitting compressed air to be discharged through the pipe *i*, either to be used or stored, as the case may be. On the downward movement of the piston the valves would be reversed and compressed air would be discharged through the part *h'''*, and thence by way of pipe *i'* to the main discharge-pipe *i*. By having the air-compressing cylinders submerged they are kept cool, which is a great advantage in the compression of air, and, further, by discharging it in submerged pipes the compressed air is kept at a low temperature. It should also be borne in mind that the discharge-pipes need not be submerged, but could be extended above the water-line to the shore, if desired.

It will be obvious to those skilled in the art to which the invention relates that modifications may be made in details without departing from the spirit thereof. Hence I do not limit myself to the precise construction and arrangement of parts hereinabove set forth and illustrated in the drawings; but,

Having thus described the nature and objects of the invention, what I claim as new, and desire to secure by Letters Patent, is—

1. Apparatus of the class recited comprising a post or pile having a driving-wheel, a float movable in respect to the post or pile, a submerged air-compression cylinder having a piston and having an air-intake carried by the post or pile and independent of the float and located above the water-line, and means interposed between the driving-wheel and said piston for operating the piston, substantially as described.

2. Apparatus of the class recited comprising a fixed post or pile having a sprocket-wheel, a movable float penetrated by said post or pile and adapted to operate the sprocket-wheel, a sprocket-chain, submerged air-compression cylinders having pistons and valved inlet and outlet ports and an intake located above the water-line, and means sub-

stantially as described for operating said pistons.

3. Apparatus of the class recited comprising a fixed post or pile provided with a sprocket-wheel, a sprocket-chain, a movable float penetrated by said post or pile and connected to said sprocket-wheel by means of the sprocket-chain, submerged air-compression cylinders having pistons and valved inlet and outlet ports, an air-intake separate from the float and located above the water-line, and means interposed between the sprocket-wheel and pistons for operating the same, substantially as described.

In testimony whereof I have hereunto signed my name.

WARREN L. RHOADS.

In presence of—

W. J. JACKSON,

K. M. GILLIGAN.