No. 693,270. Patented Feb. 11, 1902.

R. H. HANNAH.

WAVE MOTOR.

(Application filed May 9, 1901.)

(No Model.)

FIG. 1.

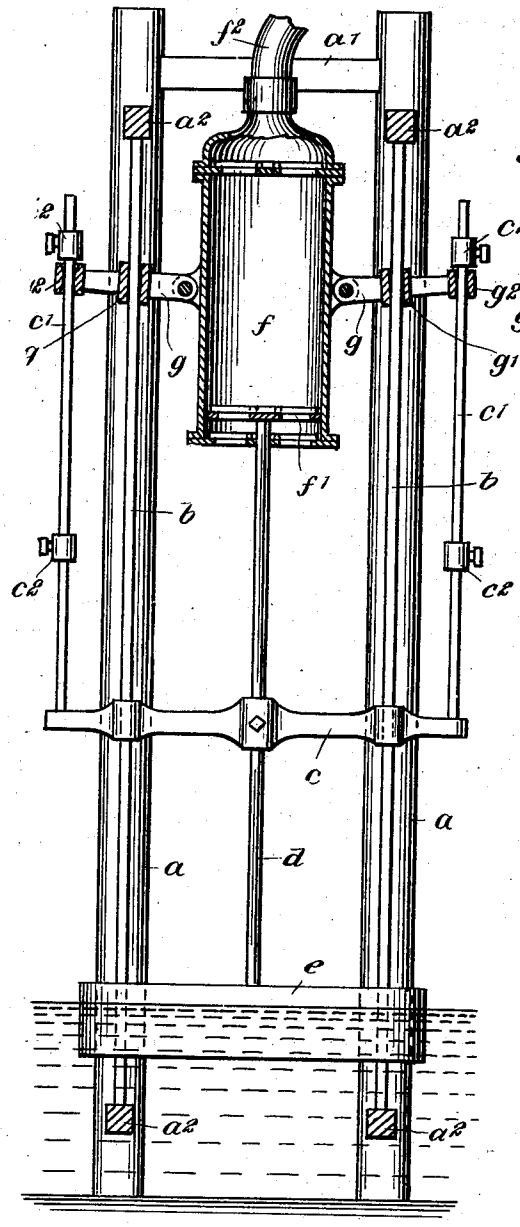
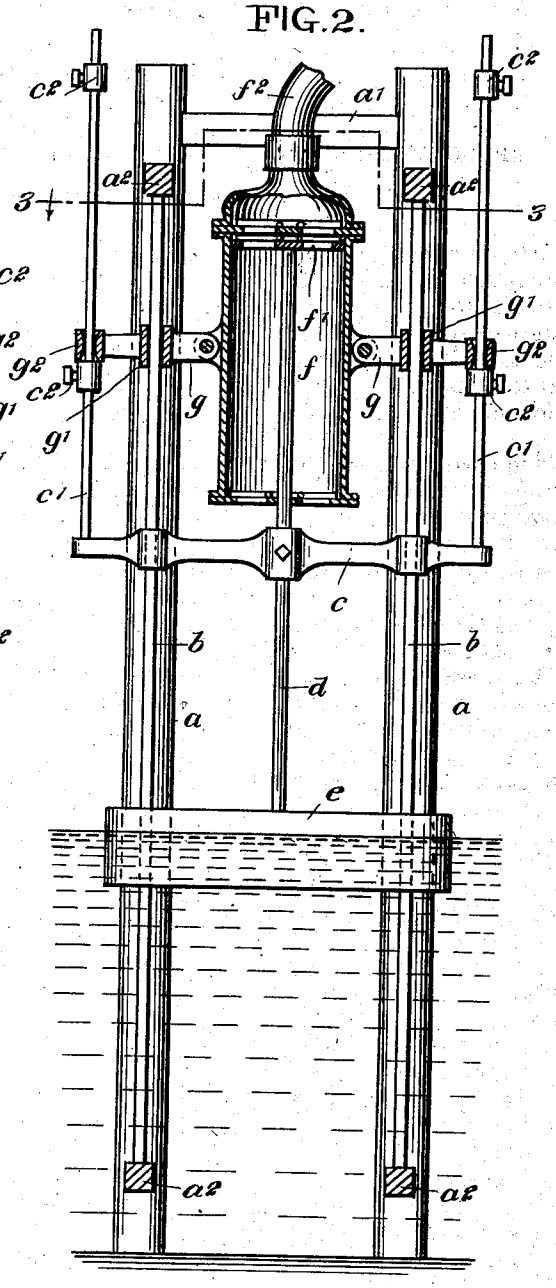



FIG. 2.

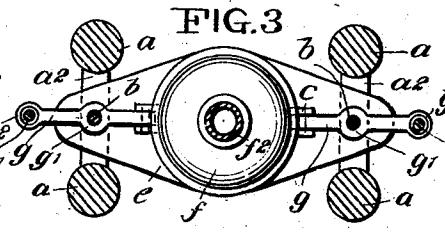



WITNESSES:

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FIG. 3




INVENTOR

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ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

# UNITED STATES PATENT OFFICE.

RICHARD HENRY HANNAH, OF ONTARIO, CALIFORNIA, ASSIGNOR OF ONE-HALF TO JAMES HANNAH, OF SAN PEDRO, CALIFORNIA.

## WAVE-MOTOR.

SPECIFICATION forming part of Letters Patent No. 693,270, dated February 11, 1902.

Application filed May 9, 1901. Serial No. 59,387. (No model.)

*To all whom it may concern:*

Be it known that I, RICHARD HENRY HANNAH, a citizen of the United States, and a resident of Ontario, in the county of San Bernardino and State of California, have invented a new and Improved Wave-Motor, of which the following is a full, clear, and exact description.

This invention relates to a means for deriving motive power from the action of the waves in a body of water, and the special feature of the invention resides in certain novel devices for automatically regulating the position of the parts with respect to the varying elevations of the water due to tides and other causes.

This specification is a specific description of one form of the invention, while the claims are definitions of the actual scope thereof.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a vertical section of the invention. Fig. 2 is a similar view showing the parts in different positions, and Fig. 3 is a sectional plan view on the line 3 3 of Fig. 2.

The working parts of the apparatus are supported on a suitable framing, (indicated at *a*,) which may and preferably does consist of spiles driven down into the bed of the water and connected together by cross-braces *a'* and $a^2$. Between the upper and lower cross-braces $a^2$ rigid guide-rods *b* pass. On these guide-rods works freely a horizontally-disposed cross-head *c*, connected to the rod *d* of a float *e* of any suitable form. The rod *d* is arranged centrally between the guides *b*, and the float *e* is located between the spiles *a*, so as to move freely up and down under the action of the waves, which will raise the float from the position shown in Fig. 1 to that shown in Fig. 2. The rod *d* transmits the motive power of the apparatus, and this power may be used for compressing air, pumping water, or for any other suitable purpose. In the drawings I have shown the apparatus adapted for compressing air, in which connection an air-cylinder *f* is provided. In this cylinder works a piston *f'*, connected with the rod *d* at its upper end. The parts *f* and *f'* are provided with suitable valves, which I will not describe in detail, and from the head of the cylinder *f* passes a flexible discharge-pipe $f^2$ for conducting the air to any suitable point of storage or utilization. To each side of the cylinder *f* is pivotally connected an arm *g*, these arms projecting oppositely and carrying clutch-sleeves *g'*, which work on the guides *b*. The clutch-sleeves *g'* are of such form that when the arms *g* are thrown to an inclination, as indicated in Fig. 1, the sleeves will grip the guides *b* and prevent further movement of the cylinder relatively to the guides. When, however, the arms lie horizontal, as shown in Fig. 2, the clutch-sleeves will be capable of sliding freely on the guides *b*. The outer ends of the arms *g* are provided with sleeves $g^2$, which fit loosely on rods *c'*, carried, respectively, by the ends of the cross-head *c* outside of and parallel with the guides *b*. The sleeves $g^2$ have convexed interior walls, enabling them to slide freely on the rod *c'* notwithstanding that the arms *g* may be at an inclination thereto or to the guides *b*. Each rod *c'* carries two tappets $c^2$, these tappets being arranged, respectively, above and below the sleeves $g^2$. As the float *e* moves up and down the piston *f'* is actuated and the air is compressed in and forced from the cylinder *f*, as will be understood. When the float *e* moves downward and carries with it the rod *d* and piston *f'* to the position shown in Fig. 1, the cylinder *f* drops by gravity sufficiently to incline the arms *g*, and then the clutches *g'* engage the guides *b* and sustain the cylinder against further downward movement. Now should the float fall to a point below that shown in Fig. 1, the tappets $c^2$ at the upper ends of the rods *c'* will strike the sleeves or boxes $g^2$ at the outer ends of the arms *g* and throw down such ends of the arms, thus causing the arms to lie horizontally and causing the clutches *g'* to disengage the guides *b*. The cylinder *f* will then fall downward to accommodate itself to the extreme downward movement of the float *e*, and when the tappets $c^2$ again disengage the boxes or sleeves $g^2$ the arms *g* will again be inclined and the clutches *g'* will again become active. A reversal of the above-described operation will take place should the float *e* move upward above that eleva-

tion which would be commensurate with the position of the cylinder. In Fig. 2 I have shown the parts during this operation—that is to say, the lower tappets $c^2$ are engaged with the sleeves $g^2$, and the piston $f'$ with the upper head of the cylinder, thus holding the arms $g$ horizontal and permitting the cylinder $f$ to be moved upward in time with the extreme movements of the float $e$.

Various changes in the form, proportions, and minor details of my invention may be resorted to without departing from the spirit and scope of my invention. Hence I consider myself entitled to all such variations as may lie within the scope of my claims.

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

1. A wave-motor, comprising a float, means for utilizing the movement thereof, and sustaining devices for said means, the sustaining devices being actuated from the float automatically to adjust themselves to the elevation of the water.

2. In a wave-motor, the combination of a support, a float, means for utilizing the movement thereof, sustaining devices for said means, the sustaining devices comprising clutches working with the support, and tappets actuated from the float for actuating the clutches to permit the adjustment of the said means for utilizing the movement of the float.

3. In a wave-motor, the combination of a support, a float, a cylinder, a rod connected with the float, a piston working in the cylinder and connected with the rod, a clutch for adjustably sustaining the cylinder, and a tappet actuated from the rod and working with the clutch, for the purpose specified.

4. In a wave-motor, the combination of a support, a float, a cylinder, a piston working therein, a rod connecting the piston with the float, an arm pivoted on the cylinder and having a clutch working with a part of the support adjustably to sustain the cylinder, and a tappet actuated from the clutch and working with the arm, for the purpose specified.

5. The combination of a support, a float, a cylinder, a piston, a rod connecting the piston to the float, a guide-rod held on the support, an arm pivoted on the cylinder and having a clutch working on the guide-rod, a cross-head attached to the piston-rod, and a tappet sustained on the cross-head and working with the arm of the cylinder, for the purpose specified.

6. The combination of a support, comprising a guide-rod, a cylinder, an arm pivotally mounted thereon and having a clutch working with the guide-rod, a float, a rod connected thereto, a piston carried by the float-rod and working in the cylinder, a cross-head attached to the float-rod, a rod carried by the cross-head, and tappets fastened to the cross-head rod at opposite sides of the cylinder-arm, the tappets working with said arm, for the purpose specified.

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

RICHARD HENRY HANNAH.

Witnesses:
D. N. BACON,
J. R. POLLOCK.