No. 616,468. Patented Dec. 27, 1898.

S. H. JONES.

WAVE MOTOR.

(Application filed May 7, 1898.)

(No Model.) 3 Sheets—Sheet 1.

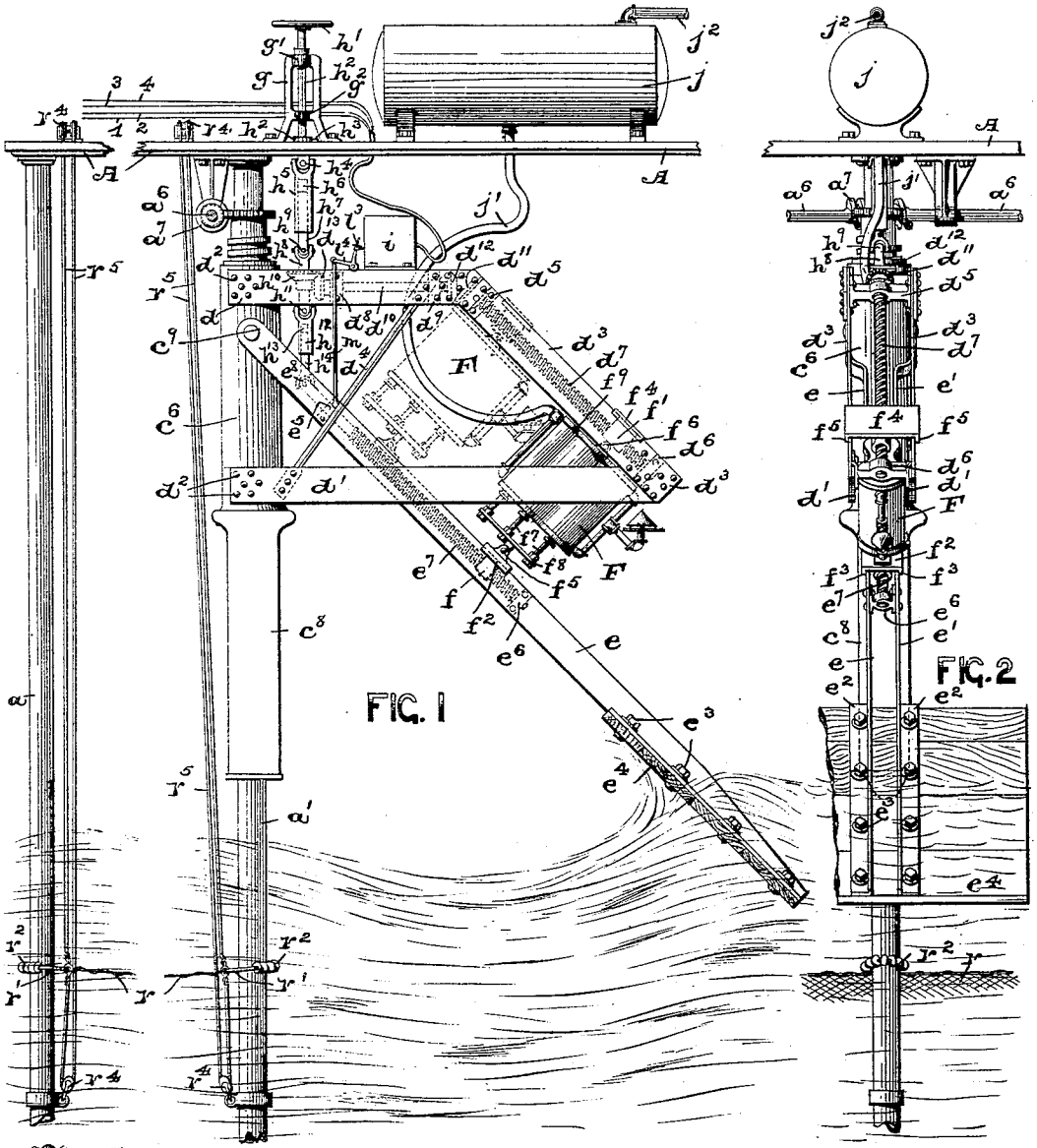

FIG. 1

FIG. 2

WITNESSES:

Marcy L. Trusdell.

Wm. H. Canfield, Jr.

INVENTOR:

SAMUEL H. JONES,

BY

Fred C. Fraentzel,

ATTORNEY

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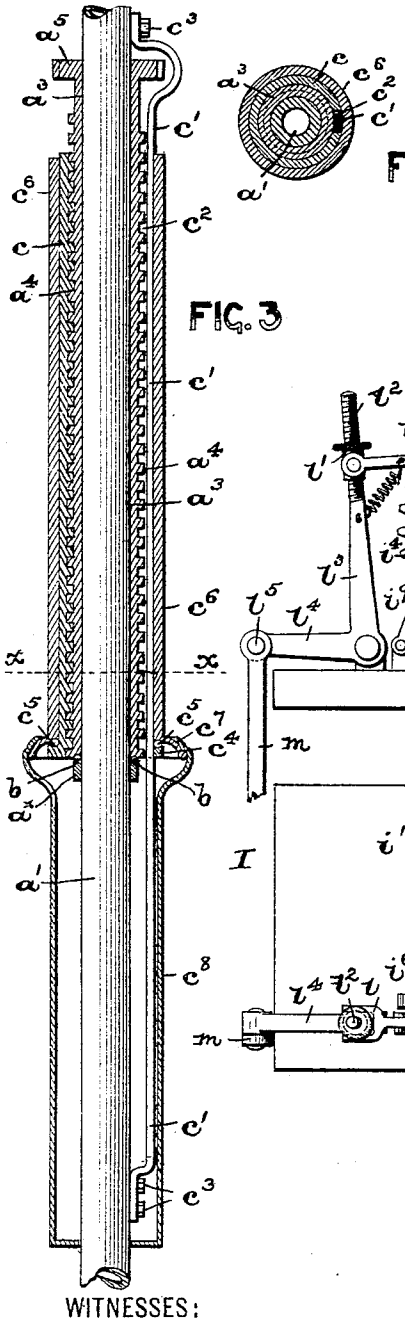

FIG. 3

FIG. 4

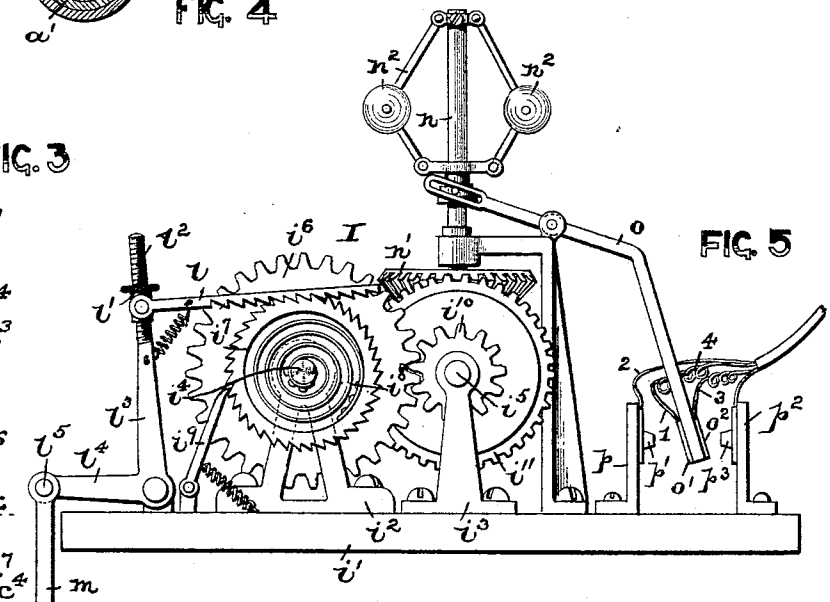

FIG. 5

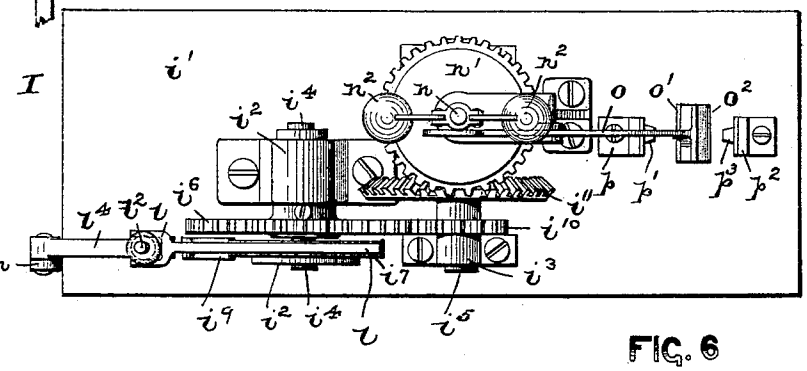

FIG. 6

WITNESSES:

Marcy E. Trusdell.

Wm. H. Baufield. Jr.

INVENTOR:

SAMUEL H. JONES,

BY

Fred C. Fraentzel,

ATTORNEY

No. 616,468. Patented Dec. 27, 1898.

S. H. JONES.

WAVE MOTOR.

(Application filed May 7, 1898.)

(No Model.) 3 Sheets—Sheet 3.

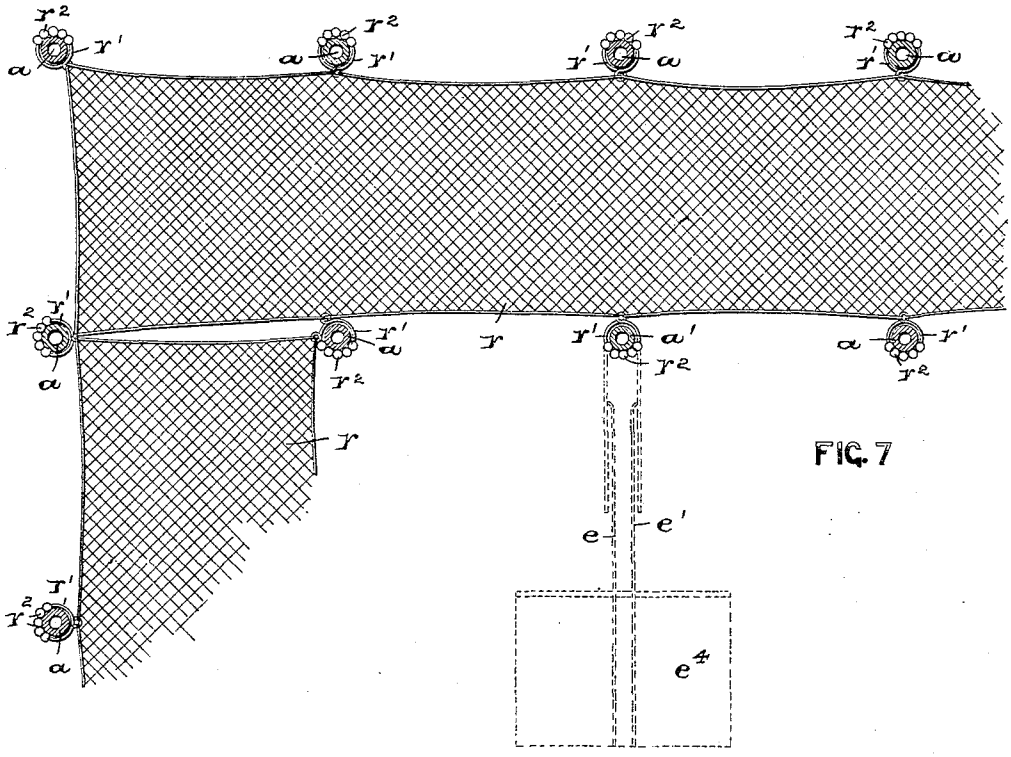

FIG. 7

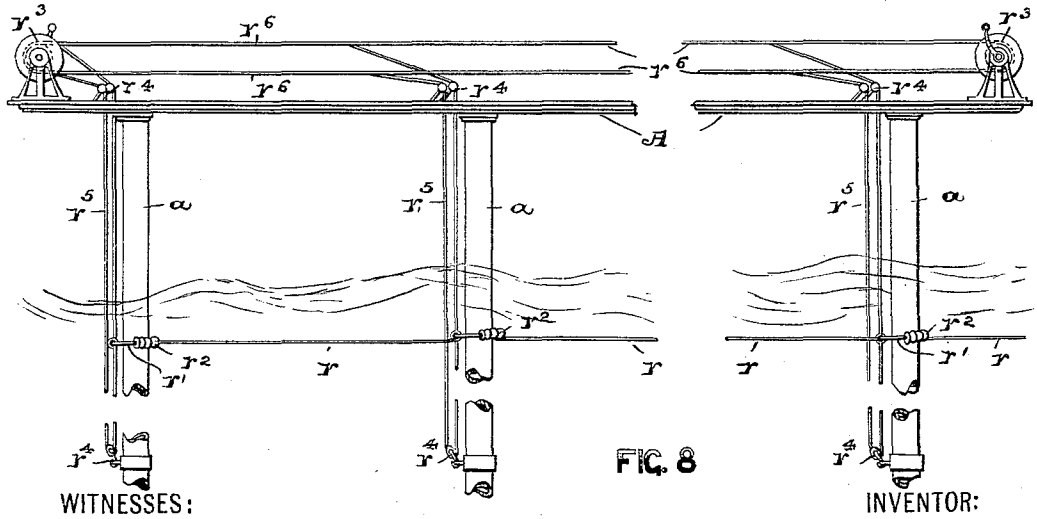

FIG. 8

WITNESSES:

Marcy L. Crandell

Wm. H. Bamfield, Jr.

INVENTOR:

SAMUEL H. JONES,

BY

Fred C. Graentzel,

ATTORNEY

UNITED STATES PATENT OFFICE.

SAMUEL H. JONES, OF NEWARK, NEW JERSEY.

WAVE-MOTOR.

SPECIFICATION forming part of Letters Patent No. 616,468, dated December 27, 1898.

Application filed May 7, 1898. Serial No. 680,015. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL H. JONES, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Wave-Motors; 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, reference being had to the accompanying drawings, and to letters and numerals of reference marked thereon, which form a part of this specification.

My present invention relates to improvements in wave-motors set forth in my previous application, filed February 1, 1898, Serial No. 668,732, and is in the nature more particularly of a novel arrangement of mechanism for rendering the wave-motor more even in its action by counteracting the increase or diminution in wave altitude and wave velocity and also to diminish the storm-waves to a safe size.

My present invention therefore has for its principal object to improve the general construction of wave-motors with a view of providing a mechanism for counteracting the increase or decrease in wave altitude or velocity by moving the air pump or pumps nearer to or farther away from the center of the arc along which the float of the apparatus moves, according as the waves are higher or lower than the average in ordinary weather, the increase or decrease in the size of the waves being automatically indicated to the operator or watchman, who can then actuate the mechanism for moving the pump or pumps farther away from or closer to the point of support of the arm with which the float is connected.

A further object of this invention is to provide in connection with wave-motors a suitable means for quelling dangerous storm-waves by the use of a net spread beneath the surface of the ocean, and also to provide in connection therewith an arrangement of ropes and blocks so that in mild weather the net may be removed to any height desired above the surface of the water, but when a storm is threatened it can be mechanically lowered to a point so far beneath the surface of the ocean that the wave action will not be interfered with. When, however, the waves reach a dangerous height, the net is raised in a horizontal position to a height as near the surface of the water as is necessary to sufficiently modify the wave action, this diminution of the wave action being the more marked as the net is brought nearer to the surface at which its subduing power is the greatest.

Other objects of this invention will be evident from the accompanying description of the several arrangements and combinations of the mechanism comprising my present invention.

My invention therefore consists in the novel construction of apparatus to be hereinafter fully described and in the general arrangements and combinations of the several mechanism, as well as in the details of the construction of the several parts of mechanism, all of which are to be described more in detail in the accompanying specification and then finally embodied in the clauses of the claim.

The invention is clearly illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of the wave-motor embodying the principles of my invention, and Fig. 2 is an end view of the same. Fig. 3 is a vertical section of a portion of one of the piers or piles and a movable collar or sleeve thereon, illustrating one means of rotatively connecting the float therewith; and Fig. 4 is a horizontal section of the same, taken on line x in Fig. 3. Fig. 5 is a side elevation of a motor containing a mechanical governor and an electrical contact-making device for operating an alarm mechanism, and Fig. 6 is a plan or top view of the said parts represented in Fig. 5. Fig. 7 is a plan view of a portion of a net for diminishing the wave action, illustrating in connection therewith in horizontal section one arrangement of piers or piles to which the net is attached, and also indicating in dotted outline the position of the float and pier with which it is connected. Fig. 8 is a side view of the net and piers and a means for raising and lowering the net.

Similar letters and numerals of reference are employed in all of the above-described views to indicate corresponding parts.

In said drawings, A indicates a suitable

platform, bridge, or the like, supported, more particularly as indicated in Figs. 1, 7, and 8, upon the piers or piles a, one of said piers or piles being indicated by the reference-letter a', and forming an essential part of the apparatus for collecting and storing the wave-power. Each pier or pile may be provided with a suitable anchor, as a^2, whereby it is firmly planted in the bottom of the sea at the desired point and at a suitable distance from the shore. As will be seen from Fig. 3, the pile or pier a' has fixed thereto a suitable collar $a^\times$. Resting upon ball-bearings b on said collar and rotatably arranged thereon is a long sleeve a^3, which is provided with an external screw-thread a^4 and has a gear portion a^5, the top of which can be actuated by a worm a^7 on a shaft a^6, in the manner of this construction set forth in my application for Letters Patent, Serial No. 668,732, and for the purposes more fully set forth therein. Upon this screw-thread a^4 of the sleeve a^3 I have placed a second sleeve c, having an internal screw-thread in engagement with the screw-thread a^4, said sleeve c having a reciprocatory, but non-rotative motion on the said sleeve a^3, owing to the arrangement of a bar c', which fits in a longitudinal slot c^2 in said sleeve c, which is much longer than said sleeve and is secured at its ends by means of screws or bolts c^3 to the pier or pile a'. It will thus be clearly evident that while the sleeve a^3 is capable of a rotary motion on the pier or pile a' said bar c' will prevent a similar motion of the sleeve c; but the latter will be capable of an upward or downward motion on the screw-thread a^4 of the sleeve a^3. At the bottom said sleeve c has a bearing portion c^4, provided with antifriction balls or rollers c^5. Rotatively arranged on the said balls or rollers and on the sleeve c, but incapable of a reciprocatory motion thereon, is a third sleeve c^6. The lower end of said sleeve is preferably made cup-shaped, as at c^7, and has attached thereto a suitable apron or covering c^8 to protect the several parts of the bearing from contact with the sea-water.

As clearly illustrated in Fig. 1, immovably secured to the opposite sides of the outer sleeve c^6 by means of bolts, pins, or rivets d^2 are arms d and d', arranged in pairs, the upper pair of arms d being somewhat shorter than the lower pair of arms d' and being connected by the inclined side pieces d^3, substantially as illustrated. Suitable bracing-rods d^4 may also be employed connecting the arms d and d', whereby these several parts form a rigidly-constructed frame. Pivotally secured to suitable studs or pins c^9, projecting from the opposite sides of the sleeve c^6, are a pair of downwardly-extending arms or connecting-bars e and e', the lower ends of which are provided with perforated flanges e^2, which are secured by means of the bolts or screws e^3 to a suitable float e^4, as clearly illustrated in said Figs. 1 and 2; but of course it will be clearly evident that I may use any other suitably-constructed float, to which can be secured a flexible connection or rope attached to the bridge or platform A in the manner and for the purposes set forth in my previous application, Serial No. 668,732. Suitably secured between the said arms or bars e and e' are a pair of screw-threaded bearings e^5 and e^6 and rotatively arranged in said bearings is a screw-threaded rod e^7, while between the two frame-pieces d^3 are arranged a second pair of screw-threaded bearings d^5 and d^6, with a screw-threaded rod d^7 rotatively arranged in said bearings d^5 and d^6. A pair of bearings d^8 and d^9 are also secured between said pair of arms d, and a rod d^{10} is rotatively arranged in the said bearings d^8 and d^9. Said rods d^{10} and d^7 are operatively connected by the miter or bevel gears d^{11} and d^{12}, and on the opposite end of the rod d^{10} is another bevel-gear d^{13}.

In a suitable standard g, secured upon the bridge or platform A and in bearing portions g' and g^2 in said standard, is a vertical rod or shaft h, which is provided at the top with a hand-wheel h' and near the bottom with a ratchet-wheel h^2 and dog h^3 of the ordinary and well-known construction. Connected with the lower end of said rod or shaft h by means of an ordinary universal joint h^4 is a second rod h^5, which is hollow or tubular, as indicated at h^6 in dotted outline in said Fig. 1. Slidably arranged in said socketed part h^6 of the rod h^5 is a rod h^7, and h^8 is another rod which is connected with the lower end of the rod h^7 by means of a universal joint h^9. On the rod h^8 is a bevel or miter gear h^{10}, which is in operative mesh with the gear d^{13} of the rod d^{10}. Connected with the lower end of the rod h^8 by means of a universal joint h^{11} is a rod h^{12}, which is hollow or tubular, as at h^{13}, and has a short rod h^{14}, slidably arranged in its socketed portion h^{13}. Said rod h^{14} is connected with the upper free end of the screw-threaded rod e^7 by means of a universal joint e^8, all of which is clearly indicated in dotted outline in said Fig. 1. It will thus be seen that when the hand-wheel h' is turned in either direction, provided the ratchet-dog h^3 has been disengaged from the ratchet-wheel h^2, the several rods h, h^5, h^8, and h^{14} will cause the rotation of the screw-rod e^7 in its bearings e^5 and e^6, and also that of the rods d^{10} and d^7 in their respective bearings, which are secured between the arms d and the frame-pieces d^3, as will be clearly evident. Of course it will be understood that the socketed portions of the rods h^5 and h^{12} are of necessity provided with grooves and the rods h^7 and h^{14} have the usual forms of ribs arranged in said grooves, or the several rods may be square in cross-section, whereby the several parts are slidably and operatively connected to cause the rotation of said rods or shafts e^7, d^{10}, and d^7 when the hand-wheel h' is turned.

The sliding arrangement of the rod h^{14} in the rod h^{13} is necessary on account of the piv-

otal motion of the connecting-bars e and e', and also the sliding arrangement of the rod h^7 in the rod h^5 is necessary on account of the upward and downward movements of the several frame portions d, d', and d^3 when the sleeve c^6 moves up or down on the pier or pile a'.

Movably arranged on the screw-rods e^7 and d^7 are certain screw-threaded collars f and f', respectively, the collar f having a slide f^2, provided with the guide-flanges f^3, which embrace and slide on the upper edges of the arms or bars e and e', and the collar f', having a slide f^4, provided with the guide-flanges f^5, which embrace and slide on the upper edges of the said frame-pieces d^3. The said slide f^2 has a perforated lug or lugs f^5, and the said slide f^4 is likewise provided with a perforated lug or lugs f^6, and pivotally arranged between said ears or lugs f^5 and f^6 is an air-compressing pump F. Said pump is preferably of a compound construction, comprising three communicating cylinders, the piston-rods f^7 of which are all connected at the bottom with a cross-bar f^8, which is pivotally connected with a pin or bolt in the perforated lug or lugs f^5. The top cover f^9 of said pump F is likewise pivotally connected with the lug or lugs f^6, and it will thus be evident that the pump is operatively arranged in its position between the arms or bars e and e' and the frame-pieces d^3. The air-inlets to and the air-outlets from the pump for forcing the compressed air through a duct or pipe j to an air receiver or tank j on the bridge or platform A are similar in construction to those described in my former application for Letters Patent, Serial No. 668,732, and therefore will not be described in detail here. Thus it will be evident that as the float e^4 rises and falls with the motion of the sea the said bars or arms e and e' will cause a reciprocatory motion of the piston-rods f^7, and hence of the several pistons of the compound pump, which, owing to its pivotal arrangement, easily accommodates itself to the varying positions of the arms or bars e and e', and the air will be pumped into the air-receiver j, from which it can be withdrawn through a pipe j^2 for other uses.

Under ordinary conditions of the wave actions the pump F is in about the position indicated in said Fig. 1; but in case of very high waves, as during a storm, it is desirable that the stroke of the pistons of the pumps shall be shortened, and the operator, therefore, by turning the wheel h' on the shaft h, and in consequence turning the screw-rods e^7 and d^7, can bring the pump F to the dotted position in said Fig. 1 to a point where the action of the pivoted arms or bars e and e' is not so great as at a point farther away from the pivoted support of said arms or bars, and the danger of rendering the pump inoperative is thereby successfully overcome. On the other hand, when the sea has calmed and the waves are lower the hand-wheel h' is turned in the opposite direction, whereby the rotary motions of the screw-rods e^7 and d^7 are reversed and the pump again brought to its former position, so that the reciprocatory movements of the piston-rods f^7 and the pistons thereon will conform to the pivotal action of the arms or bars e and e', with the best results obtainable.

The increase or decrease in the sizes of the waves is indicated to the operator by a suitable alarm mechanism. This mechanism consists, essentially, of a mechanical motor I, one construction of which is represented more particularly in Figs. 5 and 6, and a system of operating-levers for operating said motor from the upwardly and downwardly moving arms or bars e and e', as well as an electrical contact device, which is actuated by the varying speed of the motor I. Said motor and electrical contact device are arranged, for protection, in a suitable casing i, which may be suitably secured on top of the arms d, as illustrated in Fig. 1. The said motor I consists of a pair of standards i^2 and i^3, which are suitably secured on the base i' of the casing i, and a pair of shafts i^4 and i^5, rotatively arranged in the respective bearings of the standard i^2 and i^3. On the shaft i^4 is secured a toothed wheel i^6 and a loosely-arranged ratchet-wheel i^7, which is operatively connected with the shaft i^4 by a spiral spring i^8 of the proper strength and power. The backward movement of the ratchet-wheel i^7 on the shaft i^4 is prevented by a spring-actuated dog i^9, which is in constant engagement with the ratchet-teeth of said wheel i^7. To operate the ratchet-wheel i^7, a rack l is provided, which is pivotally connected with a screw-threaded sleeve l', adjustably arranged on the threaded end l^2 of an arm l^3 of a bell-crank, which is also pivotally secured to the base i', as clearly illustrated in Fig. 5. Connected with an arm l^4 of said bell-crank by means of a pivotal pin l^5 is a connecting-rod m, which has its lower end pivotally secured on a pin or bolt on the hinged float arm or bar e. It will thus be evident that as the float arm or bar e rises and falls said rod m and the bell-crank connection will cause a reciprocatory motion of the rack l, which during its forward movements will actuate the ratchet-wheel i^7, and hence cause an intermittent rotary motion of the same. From an inspection of said Fig. 5 it will be evident that by means of the arrangement of the spiral spring i^8, which, as hereinbefore mentioned, operatively connects the ratchet-wheel i^7 with the shaft i^4 and the toothed wheel i^6 thereon, the intermittent rotary motion of the ratchet-wheel i^7 will be converted into a continuous rotary motion of the toothed wheel i^6. The said wheel i^6 meshes with a toothed wheel i^{10} on the shaft i^5, whereby said shaft is driven and operates a pair of miter-gears i^{11} on the shaft i^5 and a similar gear n' on the vertical shaft n, containing any one of the usual forms of ball-governors n^2. When the waves are high and follow in

rapid succession, the motor I will work with greater speed, whereby when the balls of the governor n^2 spread an arm o, pivotally connected with the standard of the governor, will become actuated to cause a contact-plate o' on said arm o to make an electrical contact at p' of a post p, thereby establishing a complete electrical circuit through the wires 1 and 2 to an alarm or indicator, which indicates the increased wave motion. The operator thus having been notified operates the wheel h' to move the pump near the post or pier a' in the manner and for the purposes previously described. As the speed of the motor and its governor decreases the arm o will be caused to move in the opposite direction until a contact-plate o^2 on said arm is brought against an electrical contact p^3 on a post p^2, thereby establishing a complete circuit through the wires 3 and 4 to a second indicator or alarm, and the operator is informed of the fact that the wave motion is diminished. He thereupon turns the hand-wheel in the opposite direction to move the pump farther away from the post or pier a'.

In Figs. 7 and 8 I have illustrated one arrangement of the piers or piles a and a' and a horizontal net r, which is spread beneath the surface of the ocean to quell the dangerous storm-waves. Said net is attached to rings r' on the said piers or piles, which have rollers r^2 in order that there shall be no binding action of said rings r' when the net is raised or lowered by means of the winches r^3 and the ropes r^5 and blocks r^4 in the manner illustrated more particularly in Fig. 8. I prefer to employ two winches, over the drums of which there passes an endless connection r^6, to which the ends of the ropes r^5 are suitably connected, and when either winch is worked the net r can be raised or lowered for the purposes previously stated in the beginning of this specification.

I am aware that many changes may be made in the several arrangements and combinations of the mechanism herein set forth, as well as in the details of the construction thereof, without departing from the scope of my present invention. Hence I do not limit my invention to the exact arrangements and combinations of the mechanism as described in the previous specification and illustrated in the accompanying drawings, nor to the exact details of the construction of any of the parts thereof.

Having thus described my invention, what I claim is—

1. In a wave-power-storing apparatus, the combination, with a pier or pile, of a float hinged to said pier or pile, a support on said pier, and a series of air-compressing pumps mounted in said support, and in multiple with each other, whereby one pump forces air into the next pump, and said pumps having piston-rods operatively connected with said float, and mechanism for moving said pumps nearer or farther away from the center of support of the float, substantially as and for the purposes set forth.

2. In a wave-power-storing apparatus, the combination, with a pier or pile, of a float hinged to said pier or pile, and having a lateral swimming motion, a laterally-movable support on said pier and an air-compressing pump mounted in said support, said pump having its piston-rod operatively connected with said float, and mechanism for moving said pump nearer or farther away from the center of support of the float, substantially as and for the purposes set forth.

3. In a wave-power-storing apparatus, the combination, with a pier or pile, of a float hinged to said pier or pile, and having a lateral swimming motion, a laterally-movable support on said pier or pile and a series of air-compressing pumps mounted in said support, and in multiple with each other, whereby one pump forces air into the next pump, and said pumps having piston-rods operatively connected with said float, and mechanism for moving said pumps nearer or farther away from the center of support of the float, substantially as and for the purposes set forth.

4. In a wave-power-storing apparatus, the combination, with a pier or pile and a rotatable collar or sleeve on said pier or pile, of a float hinged to said sleeve, a support fixed to said sleeve and an air-compressing pump mounted in said support, said pump having its piston-rod operatively connected with said float, and mechanism for moving said pump nearer or farther away from the center of support of the float, substantially as and for the purposes set forth.

5. In a wave-power-storing apparatus, the combination, with a pier or pile and a rotatable collar or sleeve on said pier or pile, of a float hinged to said sleeve, a support fixed to said sleeve, and a series of air-compressing pumps mounted in said support and in multiple with each other, whereby one pump forces air into the next pump, and said pumps having piston-rods operatively connected with said float, and mechanism for moving said pumps nearer or farther away from the center of support of the float, substantially as and for the purposes set forth.

6. In a wave-power-storing apparatus, the combination, with a pier or pile, and a rotatable and vertically-movable sleeve or collar on said pier or pile, of a float hinged to said sleeve, a support fixed to said sleeve, and an air-compressing pump mounted in said support, said pump having its piston-rod operatively connected with said float, and mechanism for moving said pump nearer or farther away from the center of support of the float, substantially as and for the purposes set forth.

7. In a wave-power-storing apparatus, the combination, with a pier or pile and a rotatable and vertically-movable sleeve or collar on said pier, of a float hinged to said sleeve, a support fixed to said sleeve, and a series of

air-compressing pumps mounted in said support, and in multiple with each other, whereby one pump forces air into the next pump, said pumps having piston-rods operatively connected with said float, and mechanism for moving said pumps nearer or farther away from the center of support of the float, substantially as and for the purposes set forth.

8. In a wave-power-storing apparatus, the combination, with a pier or pile, of a float hinged to said pier or pile, a support on said pier or pile, an air-compressing pump mounted in said support, said pump having its piston operatively connected with said float, mechanism for raising and lowering said support and pump and the fulcrumal point of said float, and means for moving said pump nearer or farther away from the fulcrumal point of the float, substantially as and for the purposes set forth.

9. In a wave-power-storing apparatus, the combination, with a pier or pile, of a float hinged to said pier or pile, a support on said pier or pile, a series of air-compressing pumps mounted in said support, and in multiple with each other, whereby one pump forces air into the next pump, said pumps having piston-rods operatively connected with said float, mechanism for raising and lowering said support and pumps and the fulcrumal point of said float, and means for moving said pump nearer or farther away from the fulcrumal point of the float, substantially as and for the purposes set forth.

10. In a wave-power-storing apparatus, the combination, with a pier or pile, of a float hinged to said pier or pile, and having a lateral swimming motion, a laterally-movable support on said pier or pile, an air-compressing pump mounted in said support, said pump having its piston operatively connected with said float, mechanism for raising and lowering said support and pumps, and the fulcrumal point of said float, and means for moving said pump nearer or farther away from the fulcrumal point of the float, substantially as and for the purposes set forth.

11. In a wave-power-storing apparatus, the combination, with a pier or pile, of a float hinged to said pier or pile, and having a lateral swimming motion, a laterally-movable support on said pier or pile, a series of air-compressing pumps mounted in said support, and in multiple with each other, whereby one pump forces air into the next pump, said pumps having piston-rods operatively connected with said float, mechanism for raising and lowering said support and pumps, and the fulcrumal point of said float, and means for moving said pumps nearer or farther away from the fulcrumal point of the float, substantially as and for the purposes set forth.

12. In a wave-power-storing apparatus, the combination, with a pier or pile, and a rotatable and vertically-movable sleeve or collar on said pier or pile, of a float hinged to said sleeve, a support fixed to said sleeve, an air-compressing pump mounted in said support, said pump having its piston-rod operatively connected with said float, mechanism for operating said sleeve or collar and raising or lowering said support and pump and the fulcrumal point of said float, and means for moving said pump nearer or farther away from the fulcrumal point of the float, substantially as and for the purposes set forth.

13. In a wave-power-storing apparatus, the combination, with a pier or pile and a rotatable collar or sleeve thereon, of an arm or bar hinged to said sleeve and having a float, a support fixed to said sleeve, screw-rods rotatively arranged in bearings on the float arm or bar and the fixed support, a pump or pumps operatively arranged to travel back and forth by the simultaneous rotation of said screw-rods, and said pump or pumps having piston-rods actuated from said float and float arm or bar, substantially as and for the purposes set forth.

14. In a wave-power-storing apparatus, the combination, with a pier or pile and a rotatable collar or sleeve thereon, of an arm or bar hinged to said sleeve and having a float, a support fixed to said sleeve, screw-rods rotatively arranged in bearings on the float arm or bar and the fixed support, travelers or slides connected with said screw-rods, a pump or pumps pivotally connected with said travelers or slides and arranged to travel back and forth by the simultaneous rotation of said screw-rods, and said pump or pumps having piston-rods actuated from said float and float arm or bar, substantially as and for the purposes set forth.

15. In a wave-power-storing apparatus, the combination, with a pier or pile, of a float hinged to said pier or pile, and means actuated from said float to indicate the action of the waves on said float, substantially as and for the purposes set forth.

16. In a wave-power-storing apparatus, the combination, with a pier or pile, of a float hinged to said pier or pile, and means actuated from said float to indicate the action of the waves on said float, comprising a mechanical motor and governor, and an electrical contact device, substantially as and for the purposes set forth.

17. In a wave-power-storing apparatus, the combination, with a pier or pile and a rotatable and vertically-movable sleeve or collar thereon, of a float arm or bar hinged to said sleeve and having a float, a support fixed to said sleeve, a mechanical motor and governor, and an electrical contact device on said support, and means connected with said float-arm to actuate said motor, substantially as and for the purposes set forth.

18. In a wave-power-storing apparatus, the combination, with a pier or pile, and a rotatable and vertically-movable sleeve or collar thereon, of a float arm or bar hinged to said sleeve and having a float, a support fixed to said sleeve, a mechanical motor and governor,

and an electrical contact device on said support, and means connected with said float-arm to actuate said motor, consisting, essentially, of ratchet-wheel and gear mechanism of said motor, a rack in engagement with said ratchet-wheel, a bell-crank connected with said rack, and a connecting-rod pivotally attached to said bell-crank and said float-arm, substantially as and for the purposes set forth.

19. In a wave-power-storing apparatus, the combination, with a pier or pile, and a rotatable and vertically-movable sleeve or collar thereon, of a float arm or bar hinged to said sleeve and having a float, a support fixed to said sleeve, a mechanical motor and governor, and an electrical contact device on said support, and means connected with said float-arm to actuate said motor, consisting, essentially, of a ratchet-wheel and gear mechanism of said motor, a bell-crank, a connecting-rod pivotally attached to said bell-crank and said float-arm, a screw-threaded sleeve adjustably arranged on a screw-threaded portion of one arm of said bell-crank, and a spring-actuated rack pivotally connected with said sleeve and in engagement with the ratchet-wheel of said motor, substantially as and for the purposes set forth.

20. In a wave-power-storing apparatus, the combination, with a pier or pile, of a float hinged to said pier or pile, and means actuated from said float to indicate the action of the waves on said float, comprising a mechanical motor and governor, and an electrical contact device, consisting, essentially of posts p and p^2 having contact-pieces, an arm actuated by the movements of the said governor, contact-pieces on said arm, and electric circuit connections connected with the several contact-pieces, substantially as and for the purposes set forth.

21. In a wave-power-storing apparatus, the combination, with a pier or pile, of a float hinged to said pier or pile, and means actuated from said float to indicate the action of the waves on said float, comprising a mechanical motor and governor, consisting, essentially, of a ratchet-wheel and gear mechanism of said motor, a rack in engagement with said ratchet-wheel, a bell-crank connected with said rack, a connecting-rod pivotally attached to said bell-crank and said float, and an electrical contact device, consisting, essentially of posts p and p^2 having contact-pieces, an arm actuated by the movements of said governor, contact-pieces on said arm, and electrical circuit connections connected with the several contact-pieces, substantially as and for the purposes set forth.

22. In a wave-power-storing apparatus, the combination, with a pier or pile, and a rotatable and vertically-movable sleeve or collar thereon, of a float arm or bar hinged to said sleeve and having a float, a support fixed to said sleeve, a mechanical motor and governor on said support, consisting, essentially, of a ratchet-wheel and gear mechanism of said motor, a rack in engagement with said ratchet-wheel, a bell-crank connected with said rack, a connecting-rod pivotally attached to said bell-crank and said float-arm, and an electrical contact device, consisting, essentially of posts p and p^2, having contact-pieces, an arm actuated by the movements of said governor, contact-pieces on said arm, and electrical circuit connections connected with the several contact-pieces, substantially as and for the purposes set forth.

23. In a wave-power-storing apparatus, the combination, with a pier or pile, and a rotatable and vertically-movable sleeve or collar thereon, of a float arm or bar hinged to said sleeve and having a float, a support fixed to said sleeve, a mechanical motor and governor on said support, consisting, essentially, of a ratchet-wheel and gear mechanism of said motor, a rack in engagement with said ratchet-wheel, a bell-crank connected with said rack, a connecting-rod pivotally attached to said bell-crank and said float-arm, and an electrical contact device, consisting, essentially of posts p and p^2, having contact-pieces, an arm actuated by the movements of said governor, contact-pieces on said arm, and electrical circuit connections connected with the several contact-pieces, substantially as and for the purposes set forth.

24. In a wave-power-storing apparatus, the combination, with a series of piers or piles, and a float, of a net connected with said piers or piles, to decrease the size of the waves, substantially as and for the purposes set forth.

25. In a wave-power-storing apparatus, the combination, with a series of piers or piles, and a float, of a net connected with said piers or piles, to decrease the size of the waves, and means connected with said net for raising and lowering it beneath the surface of the water, substantially as and for the purposes set forth.

26. In a wave-power-storing apparatus, the combination, with a series of piers or piles, and a float, of a net connected with said piers or piles, to decrease the size of the waves, and means connected with said net for raising and lowering it beneath the surface of the water, consisting, essentially, of a winch, ropes passing over the same, and attached to said net, and blocks secured to said piers or piles, having pulley-wheels over which said ropes pass, substantially as and for the purposes set forth.

27. In a wave-power-storing apparatus, the combination, with a pier or pile, and a rotatable and vertically-movable sleeve or collar on said pier or pile, of a float and a float-arm hinged to said sleeve, consisting of a pair of arms e and e', a support fixed to said sleeve, consisting of a pair of arms d and a pair of frame portions d^3, a traveler or slide on said

float-arms, a traveler or slide on said frame portions d^3, screw-threaded bearing portions connected with both said slides or travelers, a pump or pumps connected with said slides or travelers, a screw-rod working in the bearing portion connected with the slide or traveler on the float-arms e and e', a screw-rod working in the bearing portion connected with the slide or traveler on the frame portion d^3, and means for simultaneously actuating said screw-rods, substantially as and for the purposes set forth.

28. In a wave-power-storing apparatus, the combination, with a pier or pile, and a rotatable and vertically-movable sleeve or collar on said pier or pile, of a float and a float-arm hinged to said sleeve, consisting of a pair of arms e and e', a support fixed to said sleeve, consisting of a pair of arms d and a pair of frame portions d^3, a traveler or slide on said float-arms, a traveler or slide on said frame portions d^3, screw-threaded bearing portions connected with both said slides or travelers, a pump or pumps connected with said slides or travelers, a screw-rod working in the bearing portion connected with the slide or traveler on the float-arms e and e', a screw-rod working in the bearing portion connected with the slide or traveler on the frame portions d^3, and means for simultaneously actuating said screw-rods, consisting, essentially, of a rod and gear-wheels connected with the screw-rod in the traveler or slide on the frame portions d^3, a system of vertically-arranged rods and universal joints connected with the screw-rod working in the traveler or slide on the float-arms, a hand-wheel h' for operating the same, and a set of miter or bevel wheels h^{10} and d^{13}, all arranged, substantially as and for the purposes set forth.

In testimony that I claim the invention set forth above I have hereunto set my hand this 3d day of May, 1898.

SAMUEL H. JONES.

Witnesses:
FREDK. C. FRAENTZEL,
FRED. CROW.