C. S. BURLING.

WAVE MOTOR.

APPLICATION FILED AUG. 2, 1911.

1,056,319.

Patented Mar. 18, 1913.

4 SHEETS—SHEET 1.

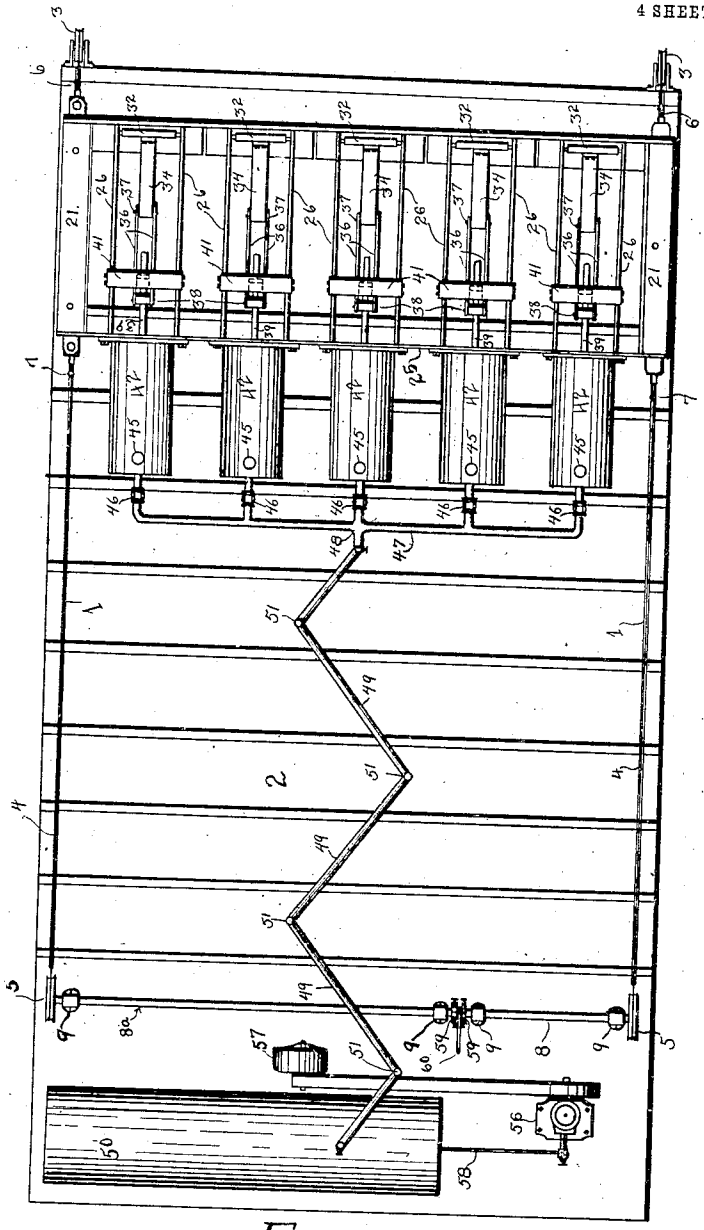

Fig. 1.

WITNESSES.

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4 SHEETS—SHEET 2.

Fig. 2.

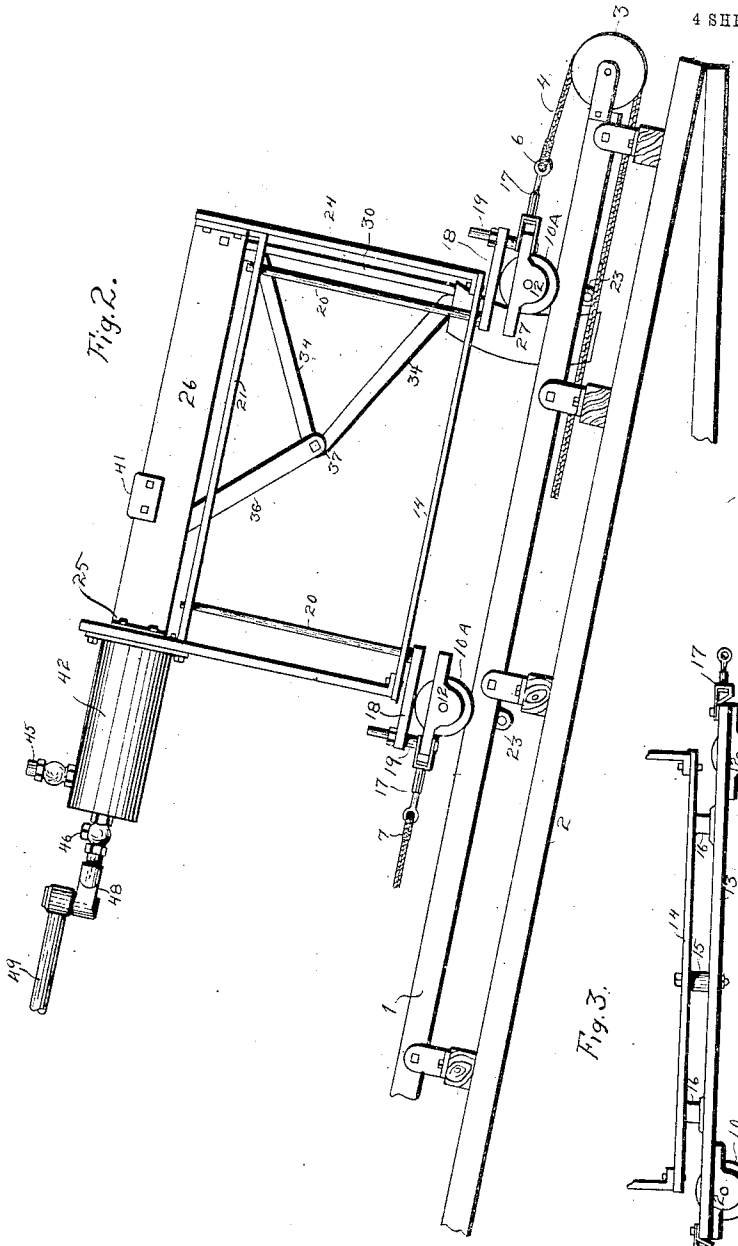
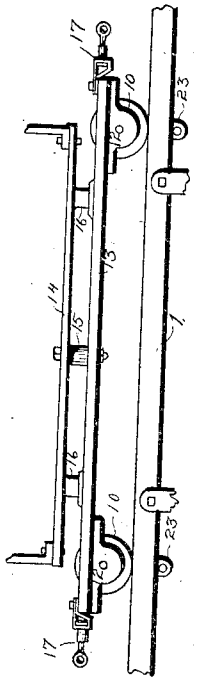


Fig. 3.



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4 SHEETS—SHEET 3.

Fig. 4.

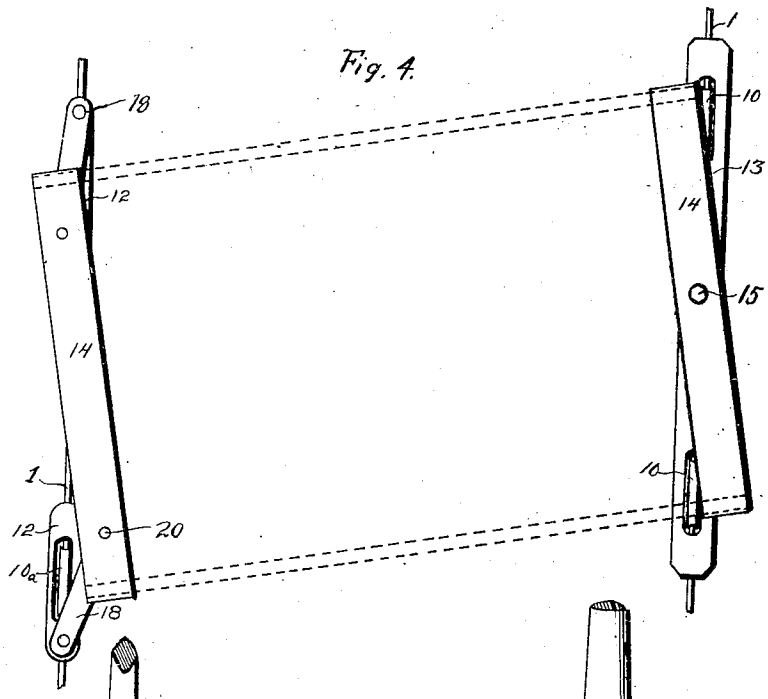


Fig 5

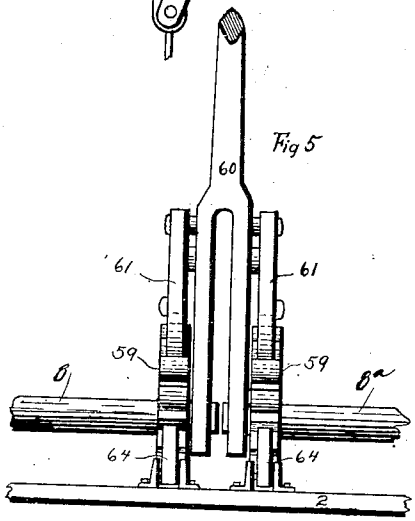
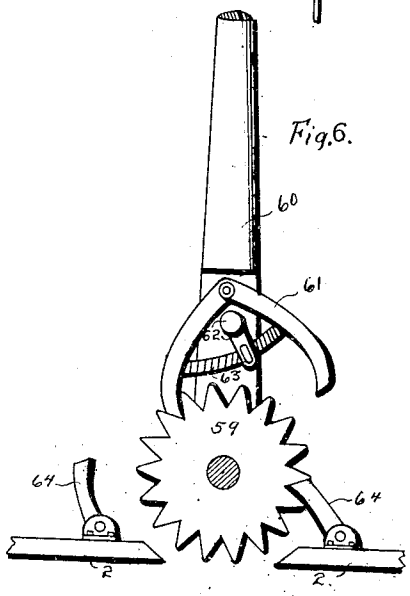


Fig.6.



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4 SHEETS—SHEET 4.

Fig. 7.

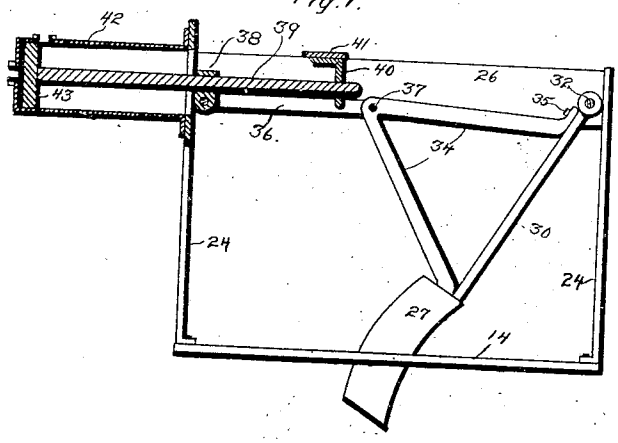


Fig 8

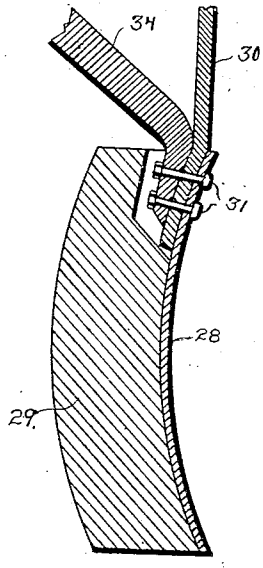
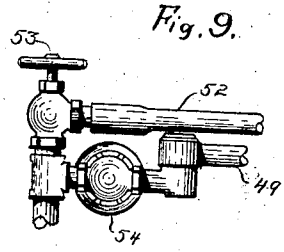


Fig. 9.



WITNESSES

Geo. T. Kemp

T. V. Brown Jr.

INVENTOR

Charles S. Burling

UNITED STATES PATENT OFFICE.

CHARLES S. BURLING, OF SAN JOSE, CALIFORNIA, ASSIGNOR, BY MESNE ASSIGNMENTS, OF TWO HUNDRED AND TWENTY-FIVE ONE-THOUSANDTHS TO WILLIAM BURRIS, TWO HUNDRED AND TWENTY-FIVE ONE-THOUSANDTHS TO GEORGE CROW, TWO HUNDRED AND TWENTY-FIVE ONE-THOUSANDTHS TO H. C. MORTONSEN, TWO HUNDRED AND TWENTY-FIVE ONE-THOUSANDTHS TO G. A. WHITEHURST, AND ONE HUNDRED ONE-THOUSANDTHS TO HANS HANSEN, ALL OF STANISLAUS COUNTY, CALIFORNIA.

WAVE-MOTOR.

1,056,319. Specification of Letters Patent. Patented Mar. 18, 1913.

Application filed August 2, 1911. Serial No. 642,029.

To all whom it may concern:

Be it known that I, CHARLES S. BURLING, a citizen of the United States, residing at San Jose, in the county of Santa Clara and State of California, have invented certain new and useful Improvements in Wave-Motors, of which the following is a specification.

The objects of my invention are, to provide a wave motor which will not only be operated by the impact of the incoming breakers, but will also be operated by the buoyancy of my power producing paddles upon the breakers after they pass within the compressor frame. I do not destroy the breaker by the impact, but, on the contrary, the paddles are carried therewith, and oscillate therein, by reason of their buoyancy, and in this way, I utilized, to the fullest extent, their power creating forces.

Another object of my invention is to construct a wave motor which can not only be adjusted to tide, but can also be adjusted to the angle of the approach of the breakers upon the beach, and by the same means whereby I adjust it to the tide, I can readily remove it beyond the point of impact with the waves in the case of a storm, if I so desire.

I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1, is a plan view. Fig. 2, is a view of one side of the compressor frame and truck upon the track. Fig. 3, is a view of the truck of the compressor frame from the opposite side of Fig. 2. Fig. 4, is a detail plan of the base plates of the compressor frame and truck, showing a position of adjustment. Fig. 5, is a rear view of the lever ratchet for adjusting the compressor frame. Fig. 6, is a side elevation of Fig. 5. Fig. 7, is a vertical section of one of the compressors, and shows a power paddle at the utmost point of compression. Fig. 8, is a detail section of one of the power paddles. Fig. 9, is a detail showing the delineator pipe and the auxiliary hose connection.

Similar figures refer to similar parts throughout the several views.

An inclined beach is best adapted for the construction of my wave motor, and on this beach I construct a trackway of rails 1, upon a suitable foundation, 2. The rails extend from a point within the water below the point of low tide, upward upon the beach to a point thereon a distance beyond the point reached at high tide. A pulley wheel, 3, is attached to the lower end of each rail, in proper bearings, so that the cables, 4, will pass over and under the rail. These cables, 4, follow the track upward and pass around wheels, 5, at the outer end of shafts, 8 and 8^A. Said shafts extend inward on a line with each other, and have bearings on foundation, 2, as shown at 9, Fig. 1. The lower ends of the cables, 4, after passing around the wheels, 5, at the lower ends of the rails, are attached to the truck of the compressor frame, as shown at 6, Figs. 1 and 2. The opposite ends of cables, 4, after passing around wheels, 5, are returned downward over rails 1, and are attached to the upper portion of the truck of the compressor frame, as shown at 7, Figs. 1 and 2. The truck of the compressor frame is provided with wheels 10 and 10^A, and is movable upward or downward on rails 1. Wheels 10 have their bearings in an extension 12 underneath connecting plate 13, as shown at Fig. 3. The bearings 12, of wheels 10^A, are like in form to bearings of wheel 10, but wheels 10^A, as shown at Fig. 2, are not provided with an extension plate. The compressor frame carries the power developing means of the wave motor, and is adjustable on said truck to the angle of the approaching breakers, as is shown in detail in Fig. 4. It is provided with a base plate 14 on either side thereof. On the side where wheels 10 are placed, said base plate is pivoted at its center to the center of connecting plate 13, as shown at 15, Figs. 3 and 4. I provide sliding bearings 16, on either side of pivot 15, to distribute the weight of the compressor frame on the truck, and to distribute the friction occasioned in adjusting the compressor frame. On this side of the compressor frame, and at each end of the connecting plate 13, is attached the swivel connection 17, of cable 4. The up-

per wheel 10^A, is connected at the upper end of truck frame 12 to a plate 18, by pivot 19, to which swivel connection 17, of cable 4, is attached; in the opposite end of plate 18 an upright pivot rod 20, is connected, which rod passes through and has bearings in base plate 14 and upper plate 21 of the compressor frame. A like construction is provided at the lower end of the compressor frame on this side, as shown at Fig. 2. Guides are attached on the inner side of the shaft of the truck wheels, extending downward, with an offset bearing against the under side of the rail, as shown at 23, Figs. 2 and 3, to prevent the truck from leaving the track.

In addition to the parts of the compressor frame, hereinbefore described, the following parts are included in said frame: At each corner thereof, attached at the lower end to an end of base plate 14 is an upright stanchion 24, running upward a distance beyond upper plate 21. At the upper portion of the frame, at each end thereof, a plate 25, connects the upright stanchions 24. These plates and stanchions are rigidly connected at their several points of contact by bolts. For every compressor used, I provide two plates 26, running parallel with plates 21, and bolted at their ends to plates 25. In addition to the functions herein described, plates 26 act as braces, giving strength and rigidity to the compressor frame. The power paddles 27 are constructed of a curved casing 28, Fig. 8, at the side thereof facing the breakers. This casing is of metal to impart strength, and curved because the breakers roll toward the beach and break downward. The opposite side of the paddle is padded with any light material, such as cork, air inflated bags, or the like, as shown at 29, Fig. 8, to give it the sufficient buoyancy to be lifted by, and to ride upon the surface of the breakers after the paddles are swept from their upright position. The arms 30, of the paddles, are connected to the paddle by bolts, as shown at 31, Fig. 8. These arms extend upward, and each arm is attached at its upper end to a shaft 32, running between two of the plates 26, with bearings therein, as shown at Fig. 1. The triangular connection 34, is connected to the paddle arm and paddle by bolts, as shown at 31, Fig. 8; the opposite end of said connection is attached to the upper end of the paddle arm, as shown at 35, Fig. 7. The point of the triangle of said connection extends inward, and stands at a point about on a level with the center of the compressor frame, as shown at Fig. 2, while the motors are not in operation. On each side of the point of the triangular connection 34, a connecting rod 36 is fulcrumed, as shown at 37, Fig. 1. The opposite ends of connecting rods 36 are fulcrumed at the sides of the cross-head 38, as shown at Fig. 1, which is attached to piston-rod 39. The piston-rod 39 runs through the guide 40, which is attached to and extends downward from plate 41. Plates 41 extend over and connect each pair of plates 26, and are bolted to the sides thereof. Cylindrical air compressors 42 are firmly attached to plate 25, as shown at Fig. 1, and extend outward from the compressor frame. Each compressor has an opening through plate 25 equal in size to the circumference of the compressor. Each compressor is provided with a piston-rod 39, a piston-head 43, Fig. 7, an intake valve 45, and an outlet valve 46. The air passes through valve 46 from each compressor into pipe 47, and from pipe 47 it passes through nozzle 48 into the jointed pipe 49, or hose pipe 52, to the storage tank 50. The jointed pipe is made in sections, connected by air-tight adjustable joints, as shown at 51, Fig. 1, to permit the moving of the compressor frame upward or downward upon the track. I have provided an auxiliary means of carrying the compressed air from pipe 47 to the tank to be used in case of a leak in the jointed pipe, or instead of the jointed pipe, if desired, and for this purpose I use a hose 52, connected as shown at Fig. 9 immediately over the jointed pipe; the stop to the hose is shown at 53, and the stop to the jointed pipe is shown at 54. I provide like connections and stops at the point where the air enters tank 50. 56 and 57, Fig. 1, indicate machinery operated by compressed air passing through pipe 58 from the tank 50.

At the inner ends of shafts 8 and 8^A, a ratchet wheel 59 is rigidly attached, operated by forked lever 60, placed therebetween. One fork of said lever is loosely mounted on each of said shafts, as shown at Fig. 5. To each side of lever 60, an interchangeable pawl 61, is pivoted; each pawl 61 is provided with a pawl locking device, shown at 62, Fig. 6, pivoted to the side of lever 60. Each pawl locking device is held in place by a spiral spring 63, connected at the ends thereof to pawl 61. Attached to the foundation 2, on either side of ratchet wheels 59, are the ratchet locking pawls 64, to prevent the turning of shafts 8 and 8^A, and the moving of the compressor frame when properly adjusted.

The movable portion of my wave motor is operated and adjusted as follows:—To move the compressor frame directly up or down the beach, shafts 8 and 8^A are operated together by throwing the corresponding points of the interchangeable pawls 61 into engagement with the ratchet wheels 59. The frame is then moved backward or seaward by means of lever 60. In adjusting the frame to the angle of the approaching breakers, the frame is shifted laterally, as desired, by throwing the proper point of

the interchangeable pawl 61 into engagement with the proper ratchet wheel 59, and operating lever 60, effecting the adjustment by operating from one side of the frame only. In case it is necessary, or more convenient in adjusting the frame to the proper angle of the breakers, or its position on the trackway, the interchangeable pawls 61 are thrown into engagement with the ratchet wheels 59 in opposite directions. When the frame is in the position desired on rails 1, the ratchet locking pawls 64 are thrown into engagement with the ratchet wheels 59, thus locking shafts 8 and 8^A.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is:

1. A wave motor, comprising a trackway upon an inclined beach; a compressor frame adjustable on said trackway, both to the rise and fall of the tide, and the angle of the approaching breakers; a plurality of power producing paddles attached to said frame and means connected with said paddles for developing power.

2. A wave motor comprising a trackway upon a beach; a compressor frame movable on said trackway and adjustable to the rise and fall of the tide, and to the angle of the approaching breakers, a plurality of power producing paddles attached to said frame, adapted to be operated by the impact of the breakers and by their own buoyancy thereon, and means connected with said paddles for developing power.

3. A wave motor adjustable alike to the rise and fall of the tide and to the angle of the approaching breakers.

4. In a wave motor, the combination with a frame of a power producing paddle having a curved, metallic side, and a side paddle with a floating material, an arm extending upward from the paddle and pivoted in the upper part of said frame, a triangular connection, bolted at the upper portion of said paddle and to the upper portion of said arm, a connecting rod, fulcrumed on either side at the point of said triangular connection, a cross-head to which said connecting rods are pivoted, and mechanism for compressing air connected with said frame at a point opposite, and on a level with the point where the arm of the paddle is pivoted to the frame, as shown and described.

5. In a wave motor, the combination of a frame adjustable to the rise and fall of the tide, and to the angle of the approaching breakers, and paddles attached to said frame, adapted to produce power from the impact of the incoming breakers and from the lifting power thereof.

6. In a wave motor, the combination of stationary storage tanks, a trackway, a compressor frame, a series of air compressors attached to said frame, a plurality of power paddles adapted to operate said compressors by power derived from the impact of incoming breakers and by the buoyancy of said paddles riding upon said breakers, and a truck carrying the compressor frame adjustable upon said track to the rise and fall of the tide; of means for conveying compressed air from said compressors to said tank.

7. In a wave motor, the combination with a stationary storage tank, a trackway on a beach, a compressor frame adjustable to the angle of the approaching breakers and to the rise and fall of the tide, and means for adjusting said compressor frame on said trackway; of a jointed pipe connecting the tank and the compressor frame, said pipe being constructed in sections, joined by air-tight joints, and adapted to fold and unfold with the movement of said frame.

8. In a wave motor, an interchangeable connection between a movable frame carrying power developing means, and a stationary storage tank, consisting of a flexible hose and an adjustable jointed pipe, constructed in sections and adapted to fold and unfold with the movement of said frame, as shown and described.

CHARLES S. BURLING.

Witnesses:
GEO. T. KERR,
T. V. BROWN, Jr.