(No Model.)

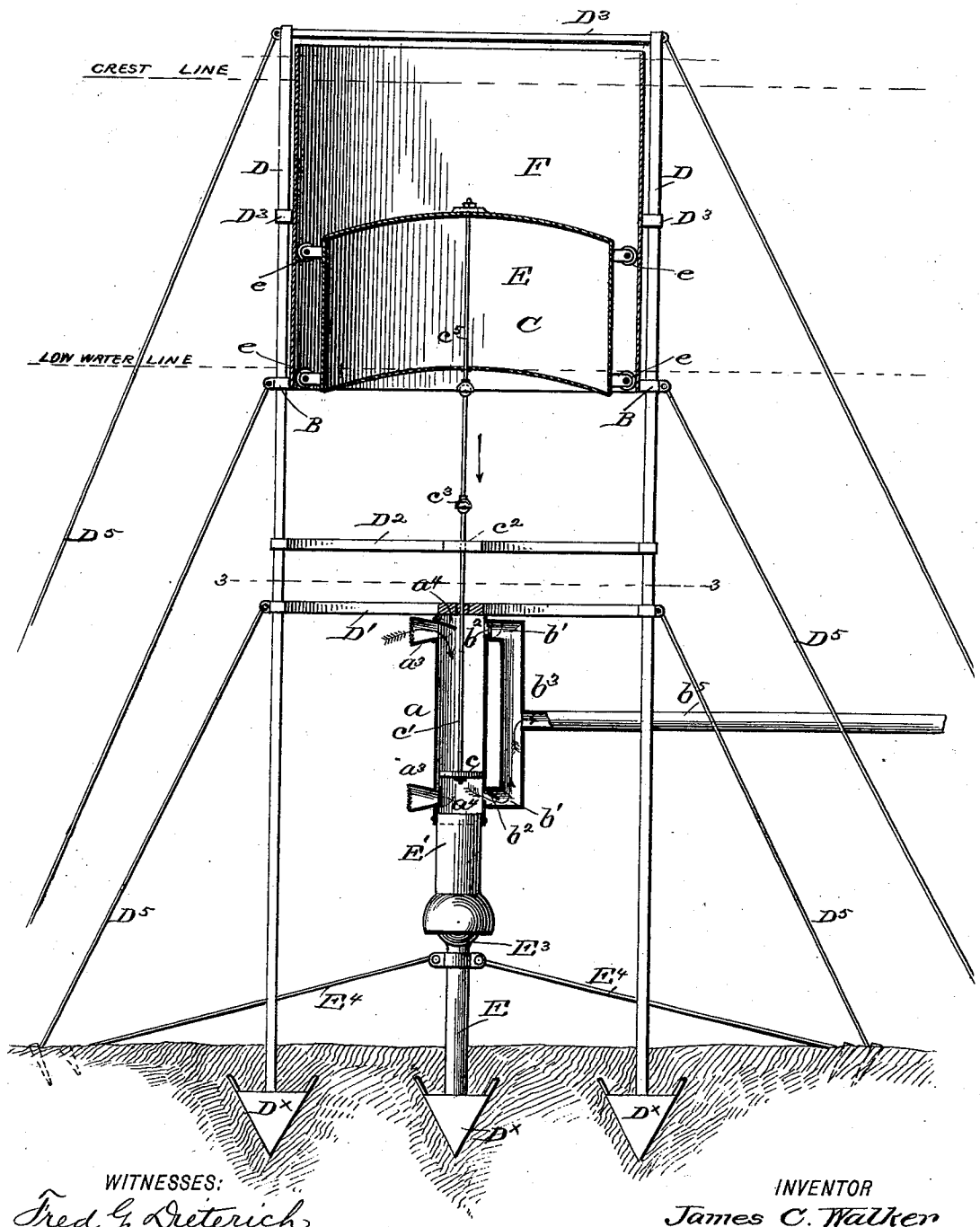
2 Sheets—Sheet 1.

J. C. WALKER.

WAVE MOTOR.

No. 510,741. Patented Dec. 12, 1893.

Fig. 1



WITNESSES:

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

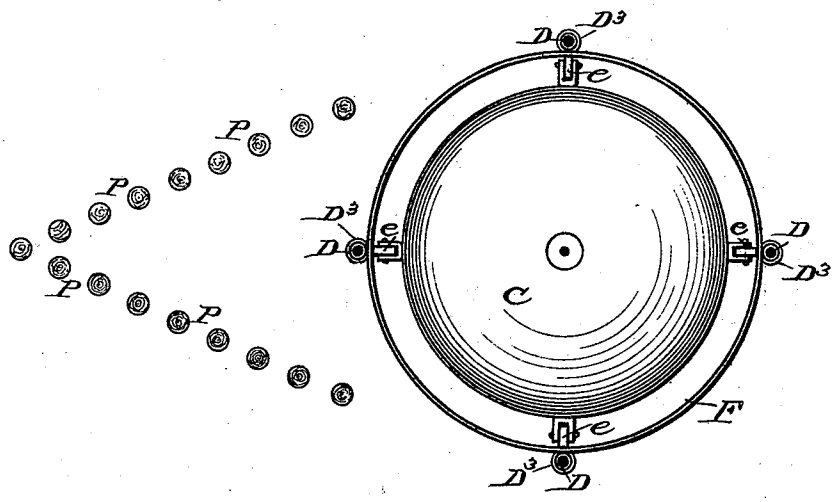
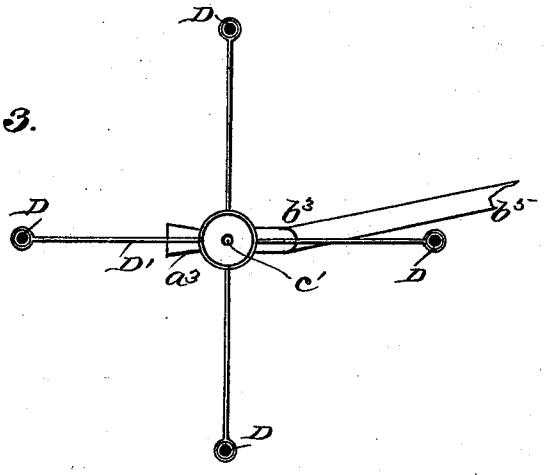


Fig. 3.



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UNITED STATES PATENT OFFICE.

JAMES C. WALKER, OF WACO, TEXAS.

WAVE-MOTOR.

SPECIFICATION forming part of Letters Patent No. 510,741, dated December 12, 1893.

Application filed June 8, 1893. Serial No. 476,957. (No model.)

To all whom it may concern:

Be it known that I, JAMES C. WALKER, of Waco, in the county of McLennan and State of Texas, have invented a new and Improved Wave-Motor, of which the following is a specification.

My invention relates to means for utilizing wave power and it has for its object to provide an apparatus, simple in its construction, and effective for its desired purpose, and it consists in the peculiar arrangement and novel combination of parts, such as will hereinafter be first described and then particularly set out in the claims, reference being had to the accompanying drawings, in which—

Figure 1 is a sectional elevation of my improved apparatus, showing it in position for use. Fig. 2 is a plan view thereof illustrating the break water or protecting devices combined therewith and Fig. 3 is a horizontal section of the same on the line 3—3 on Fig. 1.

The apparatus which in practice is located in the sea near the shore, consists of a supporting frame formed of four tubular standards or pipes D, D, joined at the top by horizontal pipes or braces D^3 the lower ends of such pipes D D having spear or anchor points $D^\times$ $D^\times$ whereby they can be securely held in place as they are inserted by hydraulic or other means; the frame work being braced laterally by the brace cables and anchors D^5 D^5 as shown. To break the impact force of the oncoming wave against the supporting frame I arrange a series of piles P P in front of such frame, set to form a ⌿ shaped break water as most clearly shown in Fig. 2, and such piles are set as deep as practicable in the bottom of the sea and extend upward to the highest water line; they being set apart far enough to admit the water flowing between them freely and are braced at the top at a point above the water line.

C, indicates a water tight air chamber, which I term the buoy, it being held for vertical reciprocal movement in a casing F open at the top and bottom, which is strongly secured to the standards D by the braces D^3 at the top and the braces B at the sides and bottom; the buoy C being provided with guide wheels *e e* which run against the sides of the casing F as shown. By providing a casing for the buoy it will be protected from the shock and impact of the wave and thereby enable it to rise and fall as nearly perpendicularly as possible.

The standards D are further braced by the cross braces D^2 D′ and to the lower one D′ of such braces, is secured the upper end of a pump cylinder *a*, the lower end of which connects with a stock portion E′, the lower end of which terminates in a socket portion which embraces a ball E^3 at the head of a pile E which terminates at its lower end in a bearded anchor which is driven in the sand; the pile being also braced by the lateral anchor braces E^4 E^4.

At one side at its opposite ends the cylinder *a* has cone shaped inlet ports a^3 a^3, screened at their outer ends, which serve to feed the water into the cylinder, their inner ends having automatic back pressure valves a^4 a^4 which close to prevent water escaping from the cylinder back into the sea. Diametrically opposite the inlet ports a^3 a^3, the cylinder *a* has outlet ports *b′ b′* which have valves b^2 b^2 opening into a union pipe b^3, which connects at opposite ends with the ports *b′ b′*, and with which connects the delivery or shore pipe b^5.

c indicates the piston and *c′* the piston rod, which extends up through the head of the pump and the cross bar D^2 as at c^2, and terminates in a ball, which is encompassed by a socket c^3, from which a rod extends upward, and which in turn has a ball and socket connection with a rod c^5 which passes through water tight joints in the buoy C and is secured thereto as shown.

The manner in which my apparatus operates is as follows: As the wave reaches the buoy it rises until the crest of the wave passes; the buoy then sinks as the wave recedes until the trough line is reached; it then rises again as the wave approaches. As the buoy rises it draws the piston up, which action draws the water into the cylinder through the lower port a^3, and as the valve b^2 at the opposite side and the valve a^4 at the upper inlet are at this time closed, the water in the upper end of the cylinder will be forced out through the upper port *b′* into the delivery pipe b^5 which delivers it to a suitably arranged elevated storage tank on the shore. When the piston moves down as the buoy sinks into the trough of the wave, the water is drawn

in at the top of the cylinder and forced out through the lower port b^2, as will be clearly understood from the drawings.

By arranging the several parts as stated, it will be readily seen that the force of the wave will be expended in lifting the buoy, and when the wave recedes the weight of the buoy will depress the pump piston, the rise of the piston and the power developed thereby depending upon the height of the wave and the size of the buoy, and the power developed by the descent depending on the weight of the buoy and its fall, the practical lift of such buoy being in proportion to the displacement of water.

By providing ball and socket couplings for the pump cylinder, buoy and piston rod connections, an approximately uniform operation can be maintained on the pump, irrespective of irregular lateral strain on such parts.

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

1. In a wave motor mechanism, in combination, a supporting frame, having an open ended casing at its upper end, adapted to extend from the normal trough line to above the crest line of the wave, a float held to travel therein by the rise and fall of the wave, a double acting pump having its cylinder held below the center of such float chamber, a shore discharge pipe connected with such pump, said pump having its piston rod extended and connected with the under side of float, and the anchorage and brace members for the pump all arranged substantially as shown and described.

2. In a wave motor mechanism, the combination with the main supporting frame, provided with a casing F at its upper end, the buoy C vertically movable therein, and the pile member E, of pump devices located between the buoy and the pile E, a jointed connection between the pump and the pile, and the pump piston rod and the buoy all arranged substantially as shown and for the purposes described.

3. The combination of the standards D, the casing A at its upper end, the buoy C having guide rolls engaging the casing and vertically movable therein, the cross bar D′, the pile E, the pump a secured at its upper end in the bar D′ and having a ball and socket joint with the pile E at its lower end and a connection between the pump piston and the float all arranged substantially as shown and described.

4. The combination with the supporting frame, the float C vertically movable thereon, of the pump cylinder a, connected at its upper end to the frame and having a barbed pile E at its lower end, said cylinder having valved inlets a^4 at one side, and valved outlets b^2 at the other side, said outlets having a union pipe connection b^3 provided with a discharge member b^5, the piston rod c, the rod c' and the float rod c^5 and intermediate connections between the rods c^5 and c all substantially as shown and for the purposes described.

JAMES C. WALKER.

Witnesses:
FRED G. DIETERICH,
SOLON C. KEMON.