(No Model.)

P. BREITENSTEIN.

WAVE MOTOR.

No. 538,498. Patented Apr. 30, 1895.

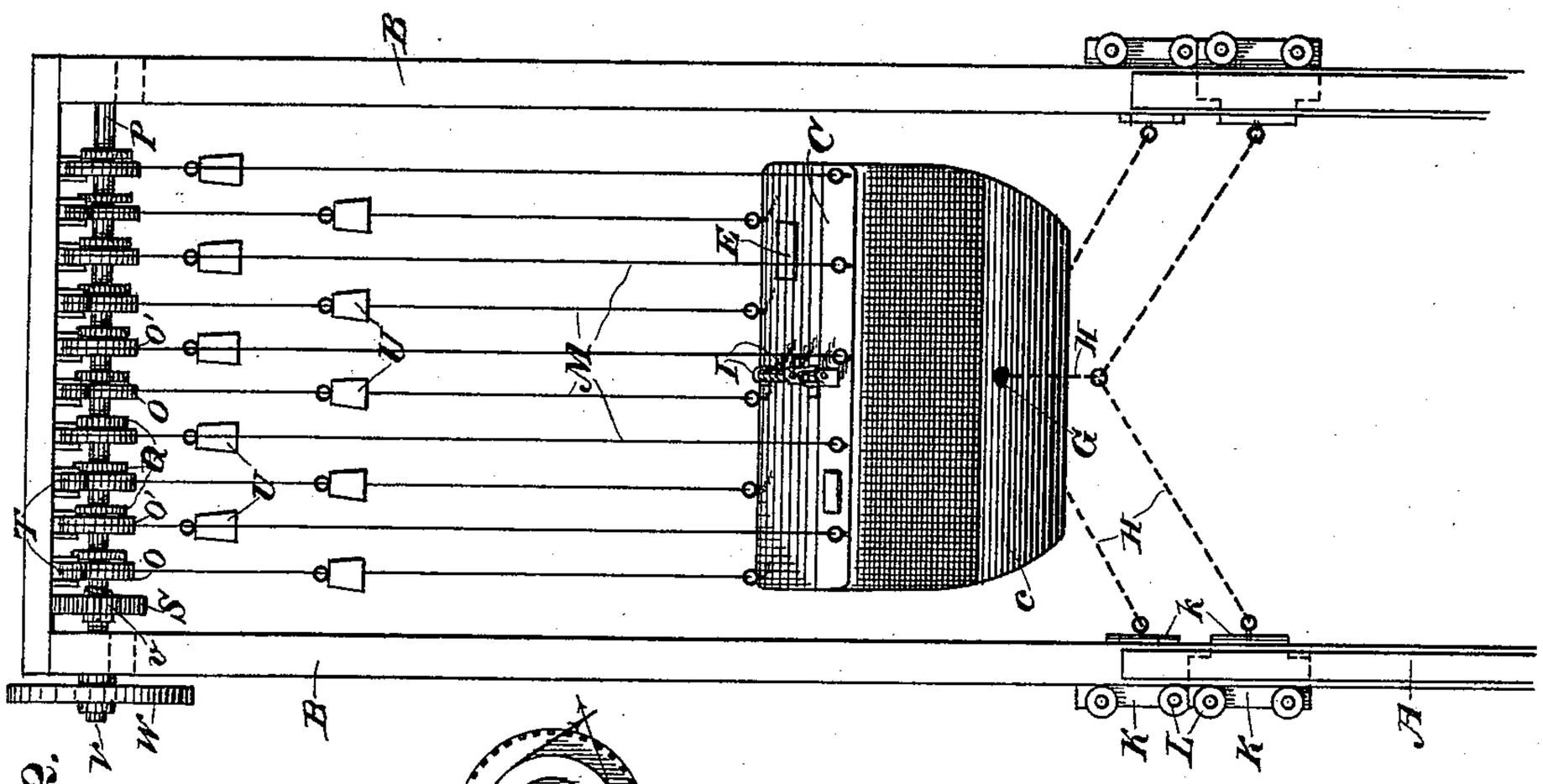

Fig. 2.

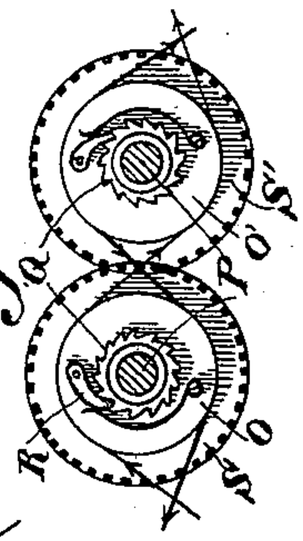

Fig. 3.

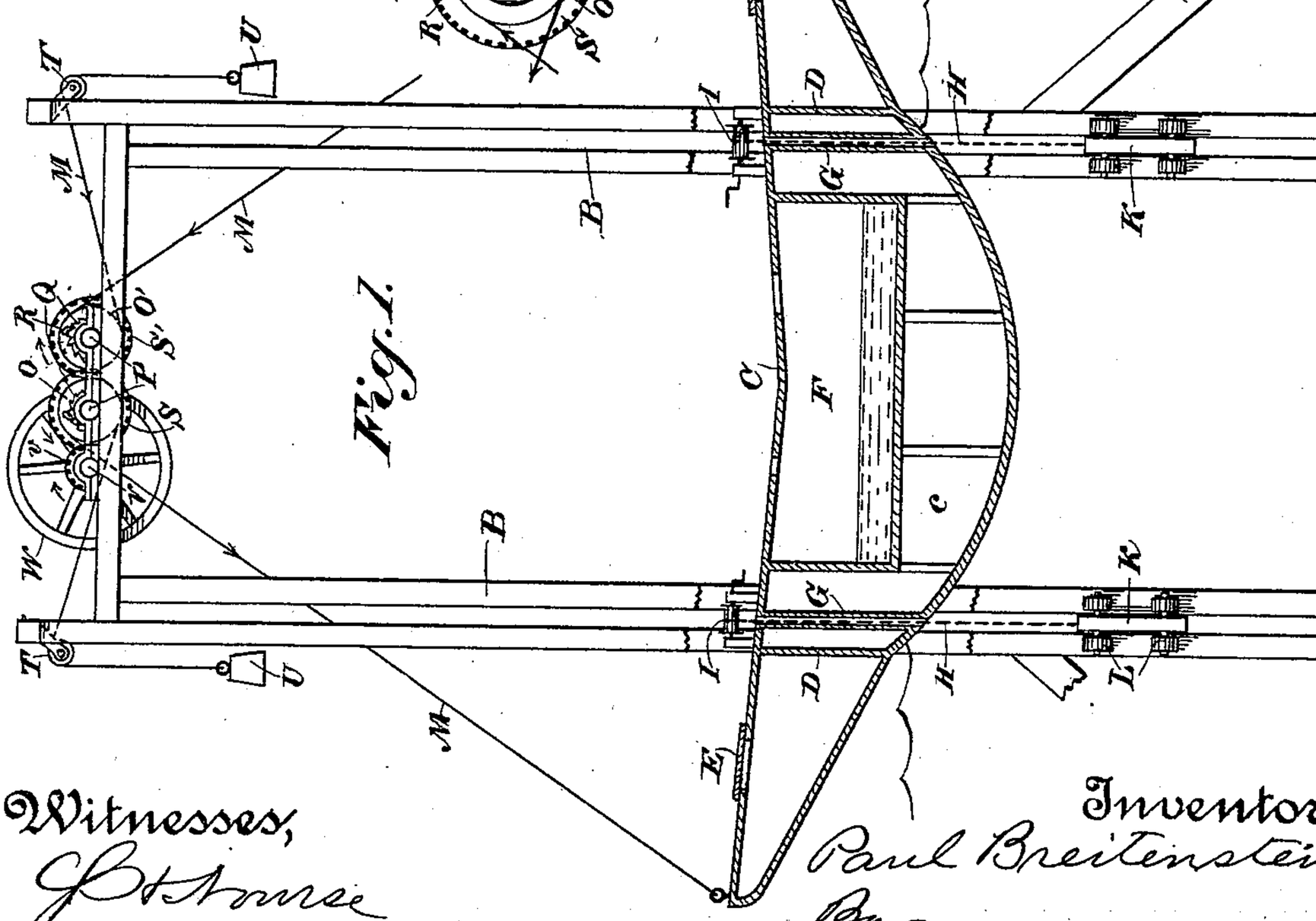

Fig. 1.

Witnesses,
J. B. Howe
H. F. Ascheck

Inventor,
Paul Breitenstein
By Dewey & Co.
Attys

UNITED STATES PATENT OFFICE.

PAUL BREITENSTEIN, OF KLAMATH FALLS, OREGON, ASSIGNOR OF ONE-HALF TO ANTON GLOCK, OF OAKLAND, CALIFORNIA.

WAVE-MOTOR.

SPECIFICATION forming part of Letters Patent No. 538,498, dated April 30, 1895.

Application filed September 18, 1894. Serial No. 523,389. (No model.)

To all whom it may concern:

Be it known that I, PAUL BREITENSTEIN, a citizen of the United States, residing at Klamath Falls, Klamath county, State of Oregon, have invented an Improvement in Wave-Motors; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention consists of an apparatus which is designed to transmit motion and power from a float which is actuated by the rise and fall of the waves, to shafts and machinery by which the power may be transmitted to any desired point.

It consists in certain details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of my apparatus. Fig. 2 is an end view of the same. Fig. 3 is a detail view of the power transmitting device.

In carrying out my invention I provide a frame-work A of heavy timber which is suitably anchored to the bottom, at a point where the waves will have free access, so as to produce a considerable rise and fall of the surface of the water.

The frame-work may be anchored by loading it with rocks, or in any other suitable manner, so as to retain it permanently in place and prevent its being moved by the action of the waves. From this frame-work double vertical posts B B arise, extending upward to a point sufficiently above the highest point reached by the tides and waves, and the upper part serves as a support for the machinery to be afterward described.

Between the vertical posts B is fitted a float C. This float is peculiarly shaped. The central portion of it has a very convex bottom, while the ends extend outwardly in planes inclining upwardly from the termination of the convex portion, until they unite with the top or deck which is properly covered and inclosed. The interior of the ends are separated from the central portion by vertical partitions or diaphragms D and the deck is provided with suitable openings, with trap doors E, through which heavy ballast may be introduced into the end compartments.

The central compartment has formed in the upper portion of it, a tank F which is designed to receive a body of water, and which may then be entirely closed. Around this tank is a considerable space *c* which is filled with air, either at ordinary pressure, or, if desired, the chamber may be made tight enough so that the air may be compressed within it.

Through the deck and bottom of the float pass vertical tubes G which serve as guides through which chains H pass from the winding drums or windlasses I upon the deck of the float. The drums I are used to adjust the lengths of the guide chains.

Below the tubes G and the float, these chains are separated, as shown, and extend outwardly to each side, where they connect with the travelers K. These travelers consist of frames adapted to slide between the adjacent vertical posts B, and they have upon them rollers L which travel against the faces of the posts, thus reducing the friction.

Plates *k* upon the opposite sides of the posts, either plain or provided with rollers, serve to prevent the travelers from leaving their positions between the guiding posts. These travelers and chains prevent the float from being thrown into contact with the post at either side, while at the same time they allow the freest possible vertical movement when acted upon by the waves.

The peculiar shape of the bottom causes the float to be easily acted upon by slight waves and the flattened and inclined portions at the ends, when they receive the force of the waves beneath them, exert a powerful lifting action to tilt the float as the waves pass beneath it, while the weight of the ballast in these ends is sufficient to bring it down again with great power after the passage of any wave beneath it.

The water in the central tank does not entirely fill the tank, and, therefore, as the float is tilted by the action of the waves this water rolls from end to end of the tank and this adds to the motion of the float, while the surrounding body of air gives it sufficient buoyancy to prevent its sinking. In order to transmit the power thus generated by the action of this float, I employ ropes or chains M, the ends of which are secured to the ends of the float as shown, and they pass thence up

over a series of drums O which turn loosely upon shafts P. The shafts P have ratchet wheels Q fixed upon them, and pawls R engage the ratchets when the drums O are turned in one direction so as to transmit the force from the wheels to the shaft, but when the wheels turn in the opposite direction, the pawls pass loosely over the ratchets without imparting any motion to the shaft.

The ropes or chains from the float pass up first over the top of the drum O, connected with one of the shafts, thence beneath the drum O′, connected with the other, thence upwardly over a pulley T and down to the counterbalance weight U. The ropes from the opposite side in a corresponding manner pass over and beneath similar drums connected with the wheel shafts which are actuated by these ropes, and have corresponding counterbalance weights to keep them taut. The ropes are so fixed at opposite ends of the float that the drums and pulleys of the ropes leading from one end, lie between those from the other end, and both sets act upon the same shafts P. It will be seen by this construction that when one end of the float rises, the action of the rope or chain passing over the drum O, will turn a gear S on the same shaft in the direction shown by the arrow, and passing beneath the drum O′ will turn the gear S′ on that shaft in the opposite direction, but as the two mesh or engage with each other, they will be acted upon so as to turn in the proper direction for this meshing. One of these gears S connects with a pinion *v* on a counter-shaft V, through which power is transmitted, and this shaft may have a counterbalance wheel W upon the end to keep up the motion after it has once commenced.

By the similar arrangement of the ropes or chains from the opposite end of the float, it will be seen that when this end of the float rises the chain passing over the corresponding drums O′ and beneath the drum corresponding to O, will rotate the shaft again in the same direction as before, by reason of the pawl and ratchet connections. Meanwhile the opposite end of the float descending will pull upon the rope and the counterbalance weight will rise, while the pawls moving loosely over the ratchet teeth, will allow the shafts to continue their motion in the same direction although transmitted to them by the downward movement of the opposite end of the float.

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

1. A wave motor consisting of an anchored frame-work having vertical guides, a float adapted to tilt and move between said guides, travelers movable up and down upon the guides at each side of the opposite ends of the float, chains connecting said travelers with the float whereby the latter is retained out of contact with the guides while allowed to move up and down, and chains or ropes extending from the ends of the float over pulleys whereby the rise and fall of the float transmits motion thereto.

2. A wave motor consisting of an anchored frame-work vertical guide posts with travelers adapted to move up and down upon said guides, a float fitting between the guides having tubular openings extending vertically through its center, chains connected with the travelers and passing up through said tubes, and winding drums or take up devices whereby the length of the chains is adjusted.

3. The anchored frame with guides, and a float adapted to move and oscillate between said guides by the action of the waves, parallel shafts journaled across the framework above the float having drums turning loosely upon them and wheels fixed to the shafts and gearing with each other, ropes or chains extending from the ends of the float over and under the drums upon the shafts, and pawl and ratchet mechanisms whereby the downward movement of either end of the float will act to rotate the shafts continuously in one direction and the upward movements will relieve them by the disengagement of the pawls from the ratchets.

4. In a wave motor, a rocking or tilting float with vertical guides between which it is movable, said float having the bottom made centrally convex with upwardly inclined plane ends extending outwardly therefrom, chambers formed in said ends adapted to contain ballast, and a central air chamber intermediate between said ballast chambers with a water tank fixed therein as described.

5. In a wave motor, a rocking or tilting float with vertical guides between which it is movable, parallel shafts journaled in supports which are stationary, gear wheels fixed to said shafts and engaging with each other, drums turning loosely upon the shafts, and pawl and ratchet mechanisms by which the drums are engaged to rotate both shafts when turned in one direction, and released when turned in an opposite direction, ropes or chains connected with opposite ends of the float, each set of ropes passing over the drums nearest their point of attachment to the float, and then beneath the drums upon the adjacent shaft, and thence over pulleys to counter-balance weights, whereby the upward movement of either end of the float acts to rotate the two shafts continuously.

In witness whereof I have hereunto set my hand.

PAUL BREITENSTEIN.

Witnesses:
S. H. NOURSE,
H. F. ASCHECK.