No. 855,258.

PATENTED MAY 28, 1907.

J. W. NEAL.

WAVE MOTOR.

APPLICATION FILED MAR. 16, 1906.

4 SHEETS—SHEET 1.

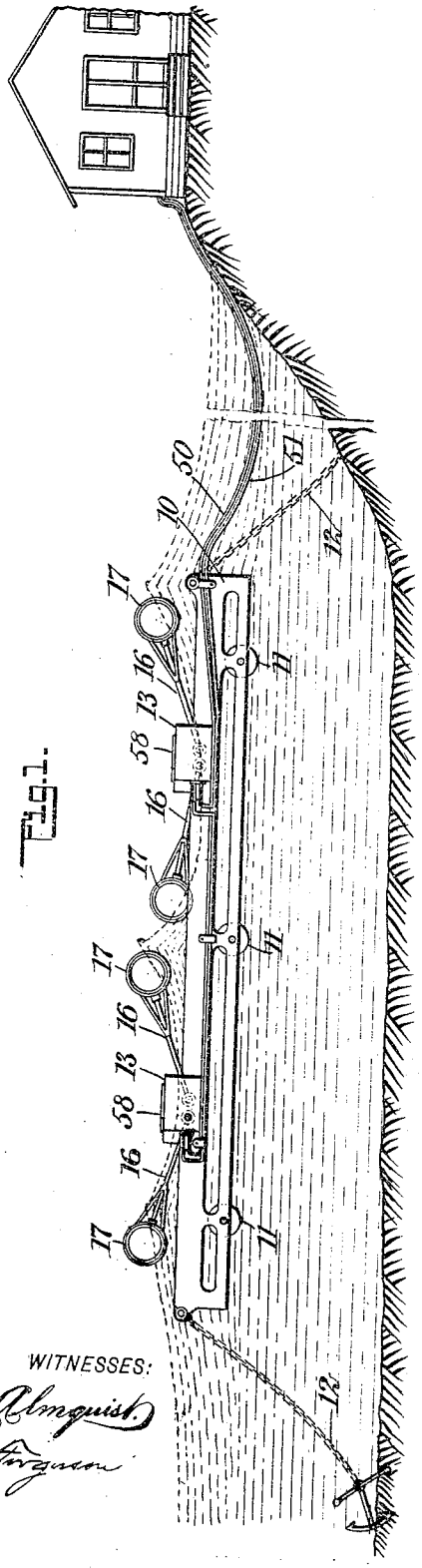


Fig. 1.

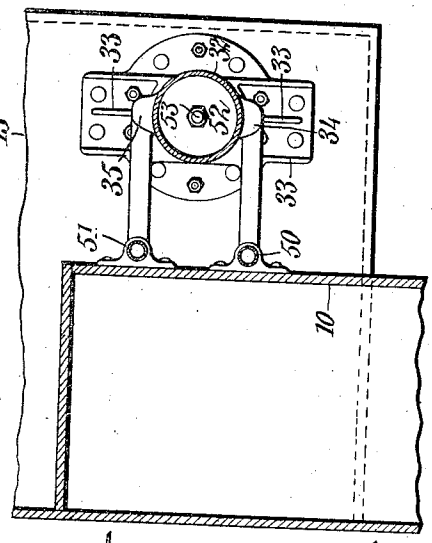


Fig. 3.

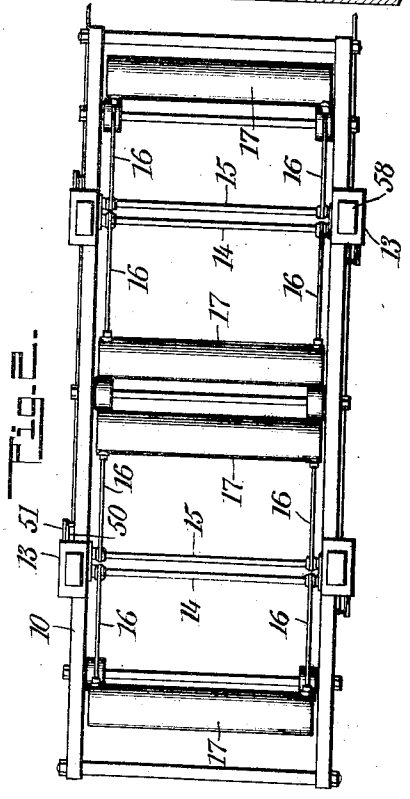


Fig. 2.

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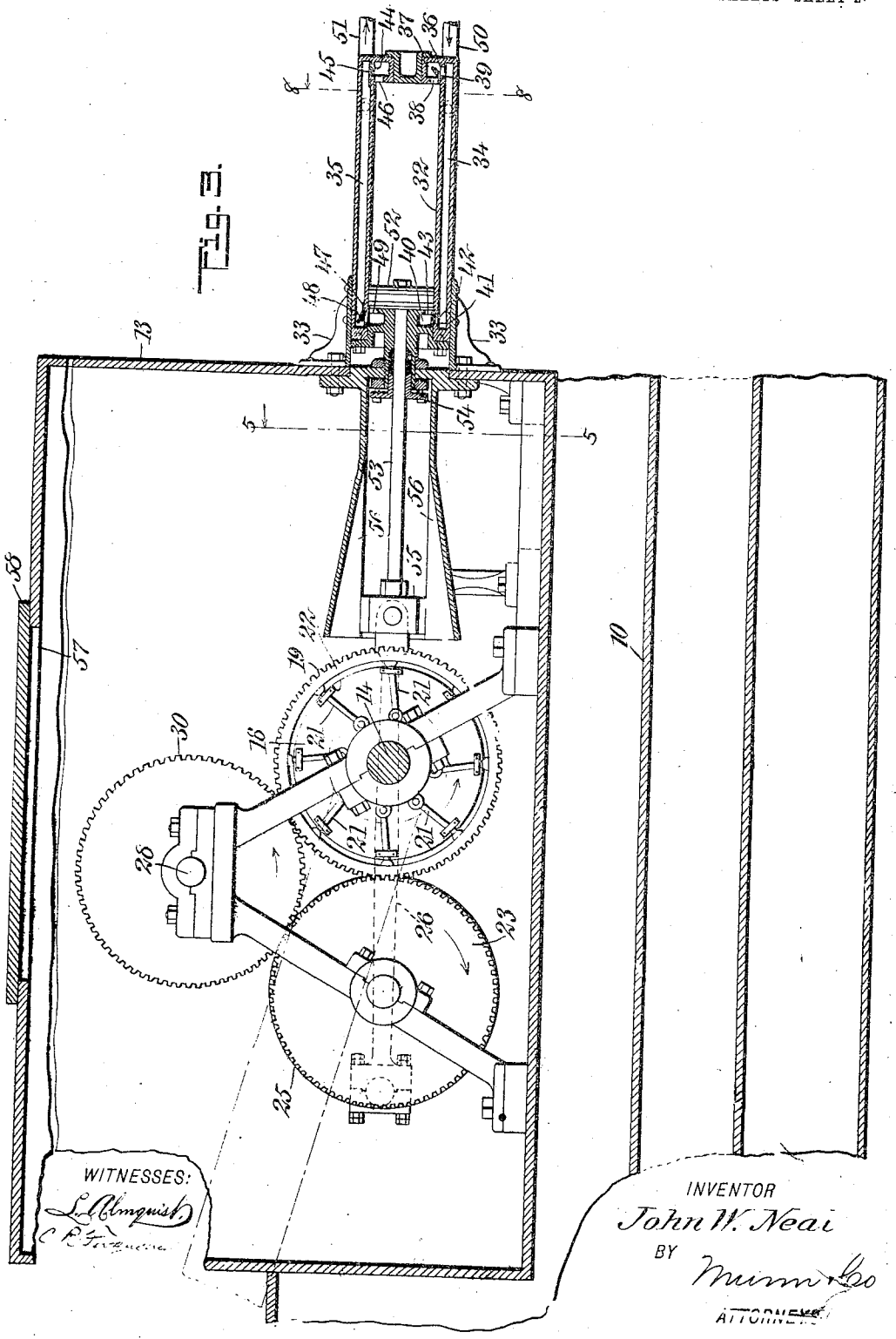
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4 SHEETS—SHEET 2.

Fig. 3.



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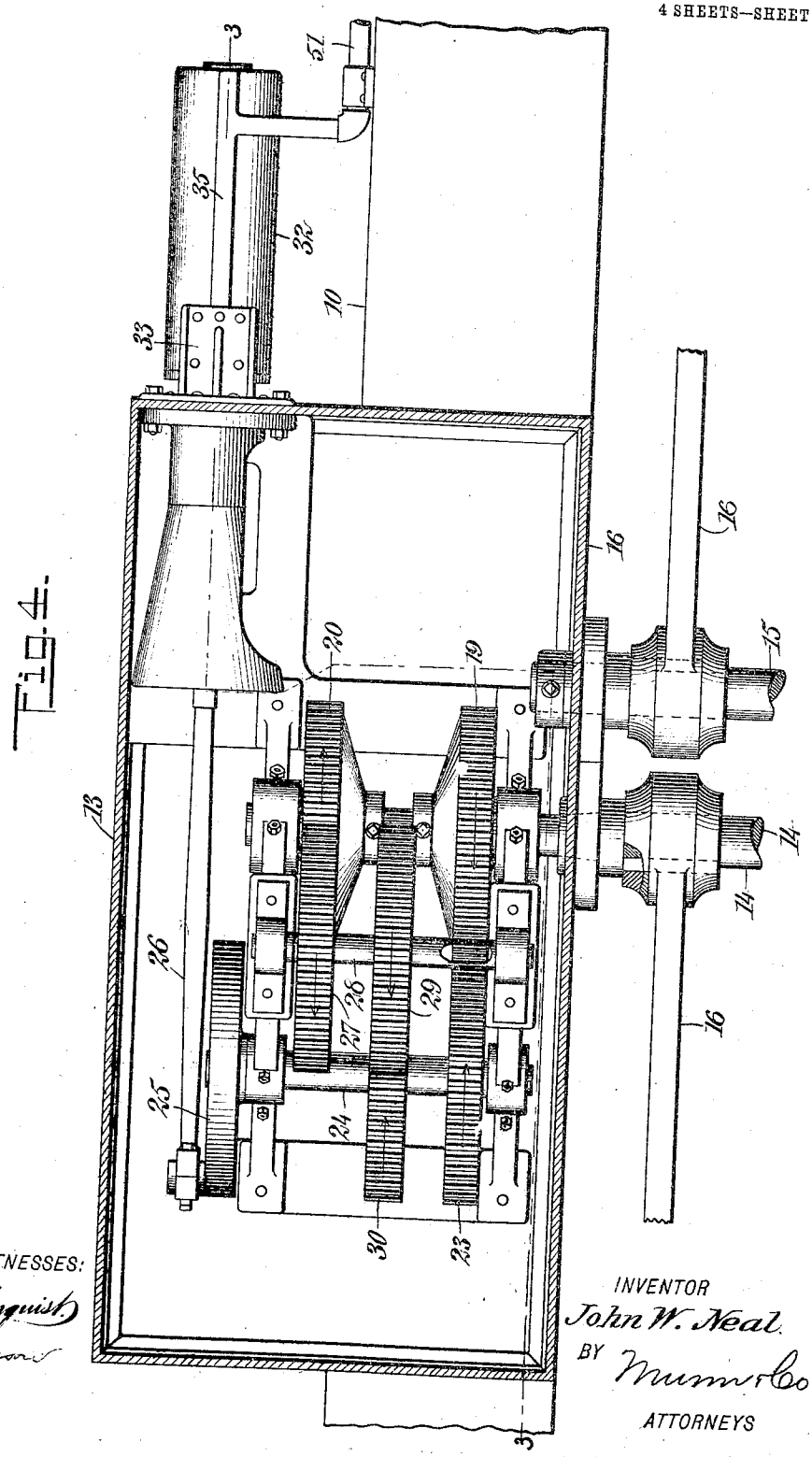
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4 SHEETS—SHEET 3.

Fig. 4.



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4 SHEETS—SHEET 4.

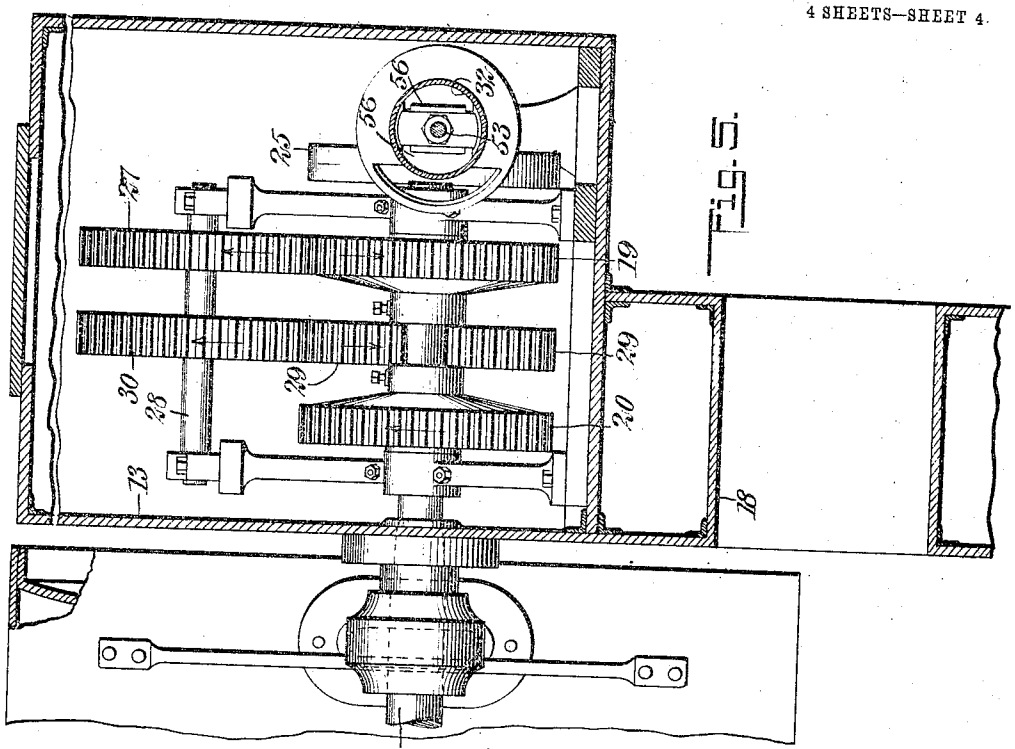


Fig. 5.

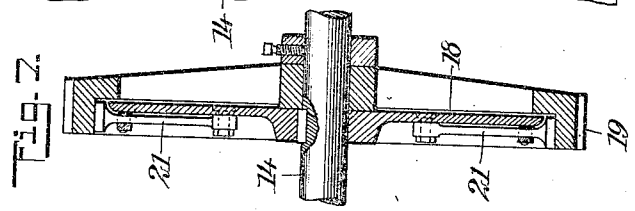


Fig. 7.

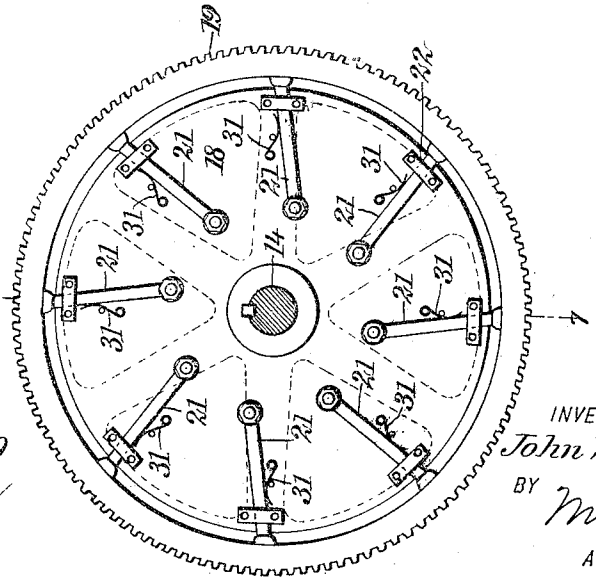


Fig. 6.

WITNESSES:

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UNITED STATES PATENT OFFICE.

JOHN W. NEAL, OF KEALIA, TERRITORY OF HAWAII.

WAVE-MOTOR.

No. 855,258. Specification of Letters Patent. Patented May 28, 1907.

Application filed March 16, 1906. Serial No. 306,422.

To all whom it may concern:

Be it known that I, JOHN W. NEAL, a citizen of the United States, and a resident of Kealia, Kauai, Hawaii, have invented a new and Improved Wave-Motor, of which the following is a full, clear, and exact description.

This invention relates to improvements in wave motors, the object being to provide a wave motor of comparatively simple construction, that will respond quickly and with even motion to any degree of wave movement, and providing power for machinery on land.

Other objects of the invention will appear in the general description.

I will describe a wave motor embodying my invention and then point out the novel features in the appended claims.

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 figures.

Figure 1 is a side elevation of a wave motor embodying my invention; Fig. 2 is a plan thereof; Fig. 3 is a section on the line 3—3 of Fig. 4; Fig. 4 is a plan of the air compressor gearing; Fig. 5 is a section on the line 5—5 of Fig. 3; Fig. 6 is a detail showing the clutch mechanism employed; Fig. 7 is a section on the line 7—7 of Fig. 6; and Fig. 8 is a section on the line 8—8 of Fig. 3.

The motor comprises a frame 10 of box-like construction and preferably the frame will be provided with rollers 11 so that it may be conveniently launched or drawn over the land. When the device is in the water it is anchored as indicated at 12. Arranged on opposite sides of the frame are casings 13 which contain the gearing for operating the compressors.

Shafts 14, 15 extend across the frame 10, one of said shafts, being extended into the casing at one side, for instance, shaft 14 leads into the casing 13 indicated at the upper side of Fig. 2, while the shaft 15 leads into the opposite casing and it may be here stated that while I have indicated four sets of gearings and four compressors, I do not limit my invention to any particular number. A description of the operating gearing in one casing will answer for all. Extended from each shaft within the casing are arms 16, to the outer ends of which hollow floats 17 are attached, these floats being designed to rise and fall with the wave movements. Keyed to the shafts 14 within its casing are clutch disks 18 and mounted loosely on the shaft and co-acting with the disks are gear wheels 19, 20, the inner sides of which, as clearly indicated in Fig. 7 project over the disks and are designed to be engaged by friction clutch members 21 which are pivotally connected to the disks; and near their outer ends these clutch members move in guides 22 attached to the disks. The clutch members are arranged at a slight tangent with relation to the shaft, the members at one side being arranged at a reverse tangent to those at the other side, as it is to be understood that one gear wheel remains idle while the other is in motion; that is, when the float moves upward it will cause a movement of the disks to force the clutch device into engagement with one gear wheel and release the clutch device from the opposite gear wheel, and this will be reversed when the float moves downward.

The gear 19 meshes with a gear wheel 23 on the crank shaft 24 provided with a crank wheel 25 from which a pitman 26 extends to the compressor as will be hereinafter described. The gear wheel 20 meshes with a gear wheel 27 on a countershaft 28 and on this countershaft is a gear wheel 29 engaging with a gear wheel 30 on the crank shaft 24. By this arrangement of gearing the crank shaft will be kept in constant motion in one direction only while the float moves up and down. The clutch members are held yieldingly by means of springs 31 connected to the disk and engaging with the clutch members.

I will now describe the compressor: It consists of a cylinder 32 connected to the casing 13 by means of brackets 33 and it will be seen that the cylinders extend outward from the casings into the water so that the cylinders are kept cool without employing the usual water-jacket. Each cylinder is provided at its lower side and extended through its wall with an inlet port 34, and at its upper side with an inlet port 35; at the outer end the port 34 communicates with the interior of the cylinder through a port 36 leading into a chamber 37 which has port communication 38 with the interior of the cylinder; the port 36 is controlled by a valve 39 here shown as a flap-valve, but any other form of valve may be employed.

At the inner end, the port 34 has communication with a chamber 40 through a port 41

controlled by a valve 42 and the said chamber communicates with the cylinder through a port 43.

At its outer end the port 35 communicates with the chamber 37 through a port 44 controlled by a valve 45, and the chamber has communication with the cylinder through a port 46. At the inner end, the said port 35 communicates with the chamber 40 through a port 47 controlled by a valve 48, and communication between the chamber and cylinder is provided through a port 49.

A flexible air tube 50 extends from any suitable point on land, for instance, from a power house, to the port 34 and a similar flexible pipe 51 leads from the port 35 to supply the compressed air to the machinery to be driven on land or in the power house.

Operating in the cylinder is a piston 52, the rod 53 of which moves through a stuffing-box 54 and the inner end of the rod connects with a cross-head 55 movable in guides 56. The pitman 26 has pivotal connection with the cross-head 55 as clearly indicated in the drawings.

Each casing has a man-hole 57 so that the machinery can be conveniently reached for operating or repairing. The man-hole has a cover 58 which is suitably secured in position to prevent the entrance of water.

In the operation, as the piston moves inward, opening the valve 39 and closing the valve 45, on this inward movement by this arrangement, air will be drawn into the cylinder and the air at the rear side of the cylinder will be forced through the port 47 into the port 35 and out through the pipe 51. On the reverse movement, the valves 39 and 48 will be closed and the valves 45 and 42 will be opened; thus air will be drawn in at the rear side of the piston and forced out from the front side of the piston.

In my invention, it will be observed that the oscillating motion of the floats will keep the crank continually revolving in one direction only, and continually compressing air with the least oscillating motion. If the floats rise one inch and then fall three inches, and again rise one-half inch, the crank shaft will make a revolution of four and one-half inches. This means that if the fulcrum is one-fifth the float must rise five inches, to cause a revolution of one inch of the crank shaft.

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

1. In a wave motor, a buoyant frame, a shaft supported on the frame, a float having connection with the shaft, two gear wheels loosely mounted on the shaft, clutch devices carried by the shaft for each gear wheel and operating alternately, and a crank rotated in one direction only by the alternate operation of said gear wheels.

2. In a wave motor, a buoyant frame, a casing on the frame, a shaft extended into the casing, a float having connection with the shaft, two gear wheels loosely mounted on the shaft within the casing, clutch devices carried by the shaft for each gear wheel and operating alternately, a crank rotated in one direction only by the alternate operation of said gear wheels, and a compressor carried by the frame and operated in said gearing.

3. In a wave motor, a buoyant frame, a casing mounted on the frame, a shaft extended into the casing, two disks rigidly connected to the shaft, gear wheels loosely mounted on the shaft adjacent to the disks, clutch devices carried by the disks for engaging with the gear wheels, the clutches on one disk being inclined in an opposite direction to the clutches on the other disk, a float having connection with said shaft, a crank shaft, driving connection between said gear wheels and the crank shaft, whereby the crank shaft is rotated continuously in one direction upon the up and down movement of the float, and a device on the frame operated from the crank shaft.

4. A wave motor comprising a buoyant frame, a plurality of casings arranged on opposite sides thereof, shafts extended into the casings, arms extended from the shafts, floats supported by said arms, crank shafts in the casings, driving connections between the floats and crank shafts, and air compressors carried by the frame and operated from the crank shafts.

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

JOHN W. NEAL.

Witnesses:
E. McCORRISTON,
M. R. TEVES.