J. J. POMPA.

WAVE MOTOR.

APPLICATION FILED JUNE 30, 1908.

913,561.

Patented Feb. 23, 1909.

2 SHEETS—SHEET 1.

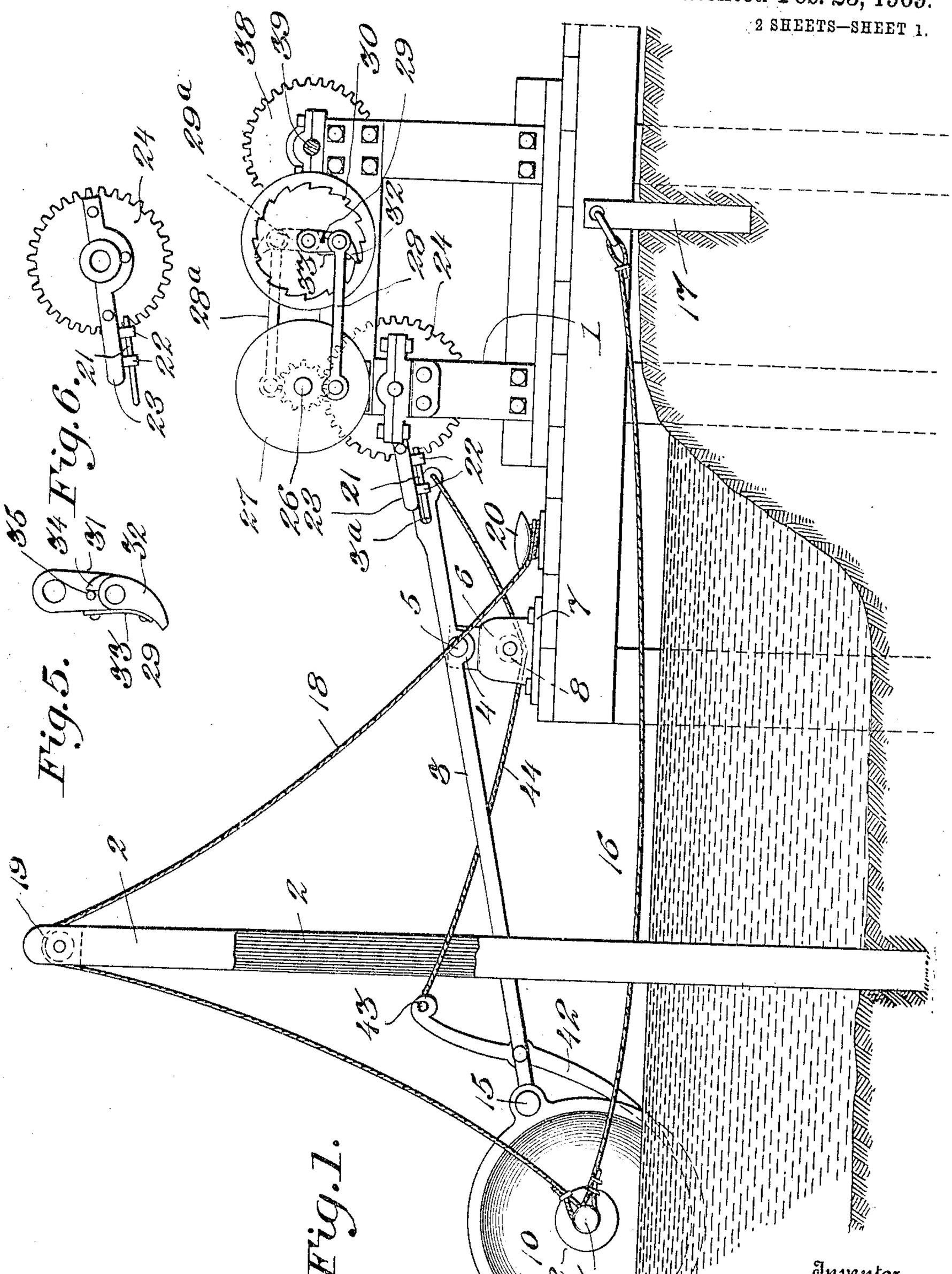

Fig. 1.

Fig. 5.

Fig. 6.

Witnesses

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2 SHEETS—SHEET 2.

Fig. 2.

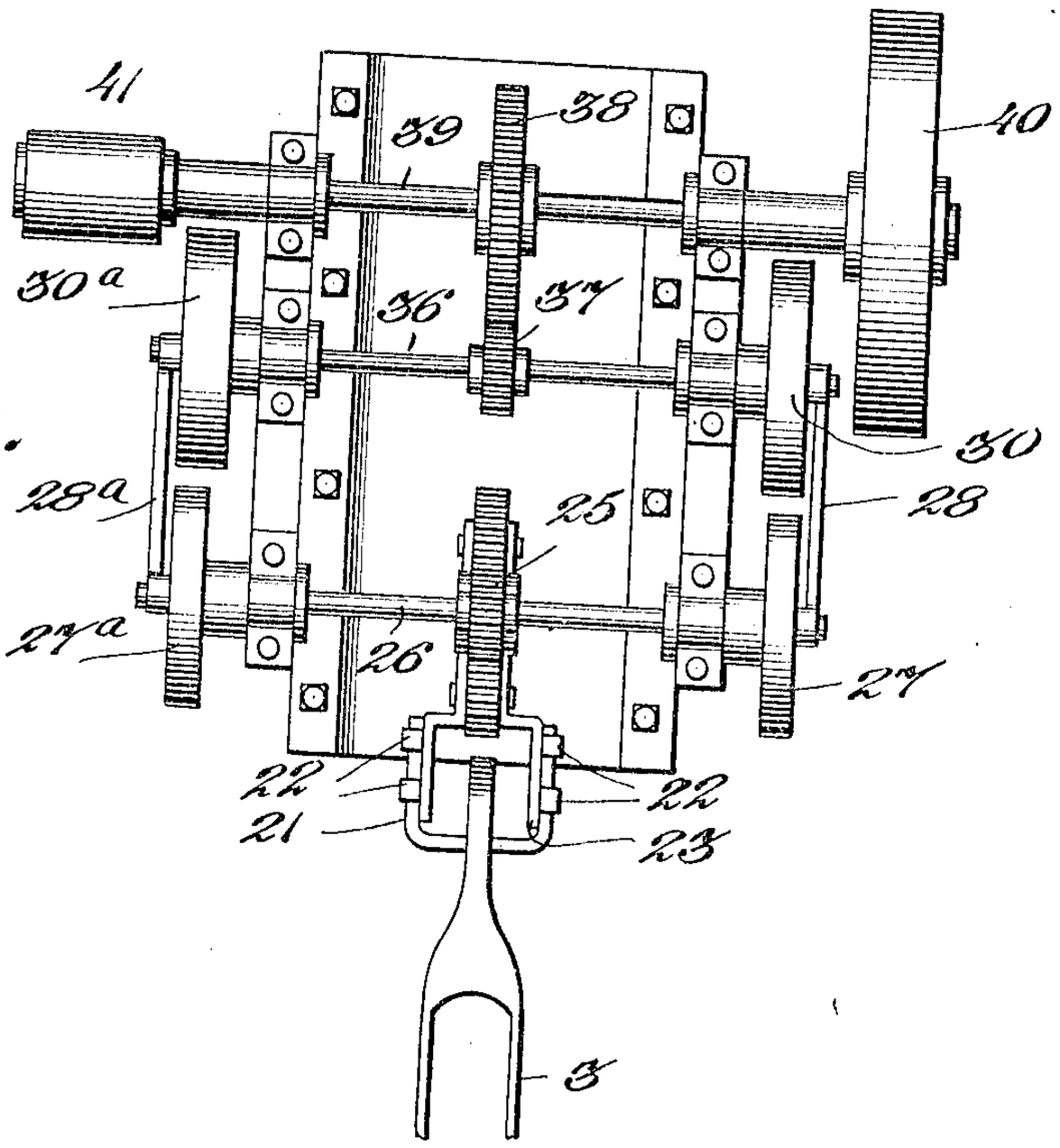

Fig. 3.

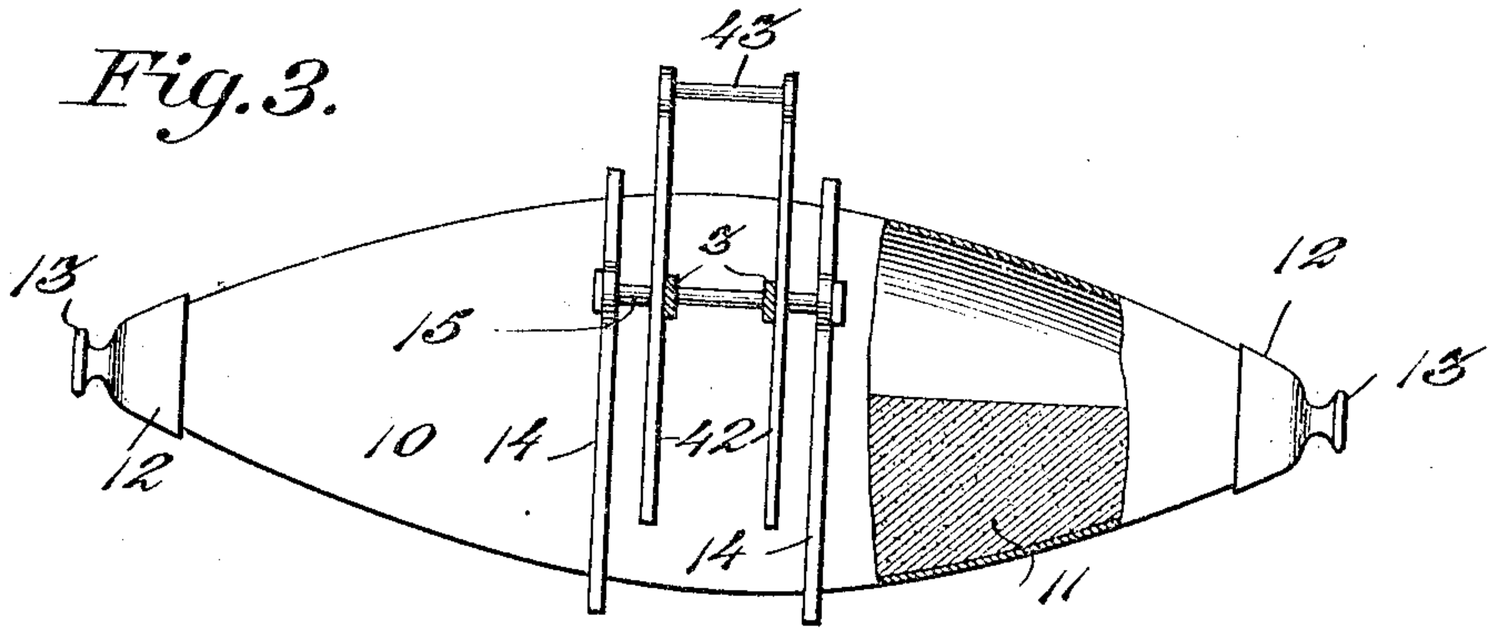

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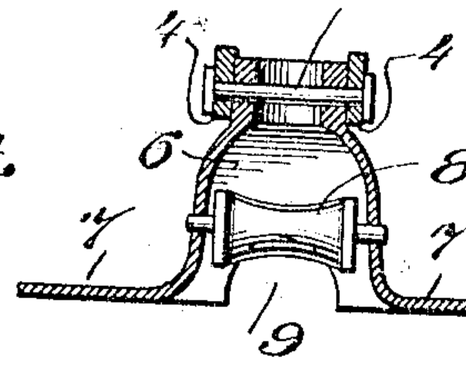
Fig. 4.



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UNITED STATES PATENT OFFICE.

JOAQUIN J. POMPA, OF CABORCA, MEXICO.

WAVE-MOTOR.

No. 913,561. Specification of Letters Patent. Patented Feb. 23, 1909.

Application filed June 30, 1908. Serial No. 441,253.

To all whom it may concern:

Be it known that I, JOAQUIN J. POMPA, a citizen of Mexico, residing at Caborca, in the State of Sonora, Mexico, have invented new and useful Improvements in Wave-Motors, of which the following is a specification.

This invention relates to a wave motor or apparatus for utilizing the forces of the waves of a body of water for converting the same into power for commercial use or for driving a plant of any desired character, the object in view being to provide a simple, efficient and comparatively inexpensive type of motor of this character which is adapted to utilize and transmit the force or power derived from both the rising and falling action of the waves.

With these and other objects in view, the invention consists of the features of construction, combination and arrangement of parts hereinafter fully described and claimed, reference being had to the accompanying drawings, in which:—

Figure 1 is a view in side elevation, with parts in section, of a wave motor embodying my invention. Fig. 2 is a top plan view of the power gear. Fig. 3 is a sectional rear elevation of the float or power element. Fig. 4 is a transverse section through the bearing bracket. Fig. 5 is a detail view of one of the pawls of the ratchet mechanism of the power gearing. Fig. 6 is a similar view of the main drive gear of the power gearing.

Referring to the drawings, 1 designates a suitable supporting frame arranged at or near the bank or shore of the body of water from which the power is to be derived, and 2 designates an upright structure fixed at its lower end in the bed of the stream at a suitable distance outward from the bank and extending upward above the surface of the water. This upright structure preferably comprises a pair of spaced supporting standards which may be connected and braced in any preferred way.

The motor proper comprises a main lever 3 mounted to vibrate in a vertical plane. The lever is bifurcated throughout the major portion of its length, and the arms thereof are formed with bearings 4 pivotally engaging the ends of a pivot pin or bolt 5 mounted upon the upper end of a bearing bracket 6 having lateral base flanges 7 bolted or otherwise suitably secured to the front portion of the frame or platform 1. The body of this bracket is hollow or arched to form a chamber in which is inclosed a guide pulley 8, mounted on a suitable shaft or axle journaled in the side walls of the chamber, the front and rear walls of said chamber being provided with apertures 9 for a purpose hereinafter described.

The lever is eccentrically mounted upon the said bracket 6 and projects mainly beyond the platform 1 outwardly over the body of water through the space between the standards of the upright 2 at a sufficient distance outwardly beyond the same. Pivotally mounted upon the outer forward end of said lever is a hollow float or primary power device 10, which is preferably in the form of a double conical tube sealed air-tight and constructed of sheet metal or other suitable material. The tube contains a suitable ballasting material 11, which fills the lower portion thereof, and is closed and strengthened at its opposite ends by caps 12 having annularly grooved knobs or end pieces 13. Secured in spaced relation to the center of the tube are bands or rings 14 between which extends an axle pin or bolt 15 to which the outer ends of the arms of the lever 3 are pivoted, thus adapting the float to have a limited independent movement in the arc of a circle as it rises and falls under the action of the waves, in which motion it transfers corresponding motions to the lever 3, which will thus be vibrated in a vertical plane on its pivotal support 5. The upward movement of the float is limited by flexible connections 16, in the form of ropes, cables or chains which are attached at their outer ends to the knobs 13 of the float and at their inner ends to stakes 17 driven into the bank on opposite sides of the main frame or platform 1. The downward movement of the float is limited by a similar connection 18 movably suspended from a pulley 19 on the tower or upright 2 and branched at its outer end for connection with the knobs 13 and secured at its inner end by a cleat 20 to the platform 1, about which cleat the said inner end of said cable is adapted to be wound.

The inner end of the lever 3 is slotted, as at 3^a, to loosely and pivotally receive the bight of a yoke 21, the arms of which detachably engage keepers or eyes 22 on yoke arms 23 rigidly fastened to the opposite sides of a main drive gear 24 journaled in suitable bearings carried by the platform 1, whereby the vibratory movement of the lever 3 is adapted to communicate oscillatory move-

ment to the gear 24. The gear 24 meshes with a pinion 25 on a transverse shaft 26, to the opposite ends of which are fixed crank disks 27 and 27ª, to the wrist pins of which are connected the outer ends of links or connecting rods 28 and 28ª connected at their inner ends with pawls or dogs 29 and 29ª arranged to engage the teeth of internal ratchet gears 30 and 30ª, one of the pawls projecting upwardly and the other downwardly for action upon their respective gears in the reverse oscillatory movement of the crank disks deriving their power from the movements of the main drive gear 24. Each pawl comprises a pivotally mounted body portion 31, to which is pivotally connected a tooth 32 controlled by the action of a spring 33 adapting the tooth to swing in one direction. The reverse movement of the tooth is limited by a stop lug 34 formed thereon to engage a stop pin 35 on the body portion, said lug and pin being retained normally in engagement by the action of the spring.

When the lever 3 swings in one direction the pawl operated by one of the disks will engage the teeth of and partially rotate the cooperating ratchet wheel, while the pawl operated by the other crank disk will slip over the teeth of its ratchet wheel and upon the opposite swinging movement of said lever 3 the action of the pawls will be reversed, as will be readily understood, so that as the lever rises and falls the pawls will alternately operate upon their ratchet wheels to continuously drive the shaft 36 on which said wheels are mounted in one direction. The shaft 36 carries a pinion 37 meshing with the gear 38 on a driven shaft 39 which carries at one end a fly wheel 40 and at its opposite end a pulley 41, from which latter power may be transmitted through the medium of a belt to drive any preferred type of machinery. Instead of belt gearing, friction gearing or spur gearing for transmitting the power may be employed.

Fulcrumed upon the outer end of the lever 3 is a bifurcated supplemental power lever 42, which extends above and below the lever 3, the upper ends of the arms of the lever 42 being connected by a cross rod 43, to which is attached one end of a cable or like connection 44 extending through the openings 9 in the bearings 6 in running contact with the pulley 8 and attached at its inner end to the inner end of the lever 3. The lower ends of the arms of the lever 42 are arranged to bear against the surface of the float 10 between the rings 14 and below the pivot 15 of the lever 3. When the float rises with a wave, the motion thereof is directly transmitted to the lever 3, whereby its upper end will be swung downwardly and its lower end upwardly, thus transmitting motion in one direction to the gear 24. Upon the downward movement of the float with the falling wave, the lever will be drawn downward by gravity of the weight of the float and its upper end will be elevated and transfer reverse motion to the gear 24. On the upward motion the float will swing on the pivot 15 out of engagement with the lever 42, while upon the downward movement of the float the latter will descend with the falling wave and turn upon its pivot 15 so that it will engage and transmit motion to the lever 42, which, through the connection 44, will transmit motion to the gear 24, thus increasing the power of the lever mechanism and utilizing the forces of the wave on both its rise and fall to oscillate said gear in reverse directions.

Having thus fully described the invention, what is claimed as new is:—

1. A wave motor comprising a support, a bracket mounted upon the support and having a channel therethrough and a guide pulley arranged therein, a vibrating lever pivotally mounted upon said bracket, a float pivotally mounted upon one end of the lever, a gear oscillated by the action of the lever, a driven gear, ratchet mechanism alternately operated by the first named gear to continuously drive said driven gear, connections for limiting the up and down movements of the float, a supplementary lever pivotally mounted upon the outer end of the vibrating lever and adapted to be actuated by the float upon the descent of the latter, and a flexible connection between said lever and the inner end of the vibrating lever, said connection passing through the channel of the bracket and running in contact with the pulley therein.

2. A wave motor comprising a vibrating lever, a float pivotally mounted upon one end of the lever, power mechanism in operative connection with the inner end of the lever and arranged to be actuated thereby, a supplementary lever pivotally mounted upon the outer end of the vibrating lever and adapted to be actuated by the float upon the descent of the latter, and a connection between said supplementary lever and the inner end of the vibrating lever.

3. A wave motor comprising a vibrating lever, a float pivotally mounted upon the lever, a gear oscillated by the action of the lever, a driven gear, ratchet mechanism alternately operated by the first named gear to continuously drive said driven gear, connections for limiting the up and down movements of the float, a supplementary lever pivotally mounted upon the outer end of the vibrating lever and adapted to be actuated by the float upon the descent of the latter, and a connection between said lever and the inner end of the vibrating lever.

4. A wave motor comprising a vibrating lever, a float carried by one end of the lever, a main drive gear, a yoke carried by said gear and pivotally and slidably connected with

the other end of the lever, a driven gear, and ratchet mechanism operated by said main drive gear for communicating motion to said driven gear.

5. A wave motor comprising a vibrating lever having a longitudinally slotted inner end, a float mounted upon the outer end of said lever, an oscillatory main drive gear, a yoke carried by said gear and slidably and pivotally mounted in said slot, a driven gear, and ratchet mechanism operated by the main drive gear for transmitting motion to said driven gear.

6. A wave motor comprising a vibrating lever, a float mounted upon one end thereof, a drive gear arranged to be oscillated by the opposite end of the lever, a driven gear, ratchet wheels operatively connected with the driven gear and having teeth facing in reverse directions, crank disks operated by the main gear, pivotally mounted pawls to engage said ratchet wheels, each of said pawls comprising a body portion having a spring actuated pivoted tooth, and coacting stop devices on the body portion and tooth to limit the movement of the latter, and links or connecting rods between said crank disks and the pivoted teeth of the pawls, whereby reverse movements of the main drive gear will alternately actuate the ratchet wheels to transmit continuous motion to the driven gear.

In testimony whereof I affix my signature in presence of two witnesses.

JOAQUIN J. POMPA.

Witnesses:

CARLOS CAMPURAND,

JESUS R. NETHUAL.