J. W. DENNY.

WAVE MOTOR.

APPLICATION FILED FEB. 7, 1911.

1,019,027.

Patented Mar. 5, 1912.

4 SHEETS—SHEET 1.

Fig. 1

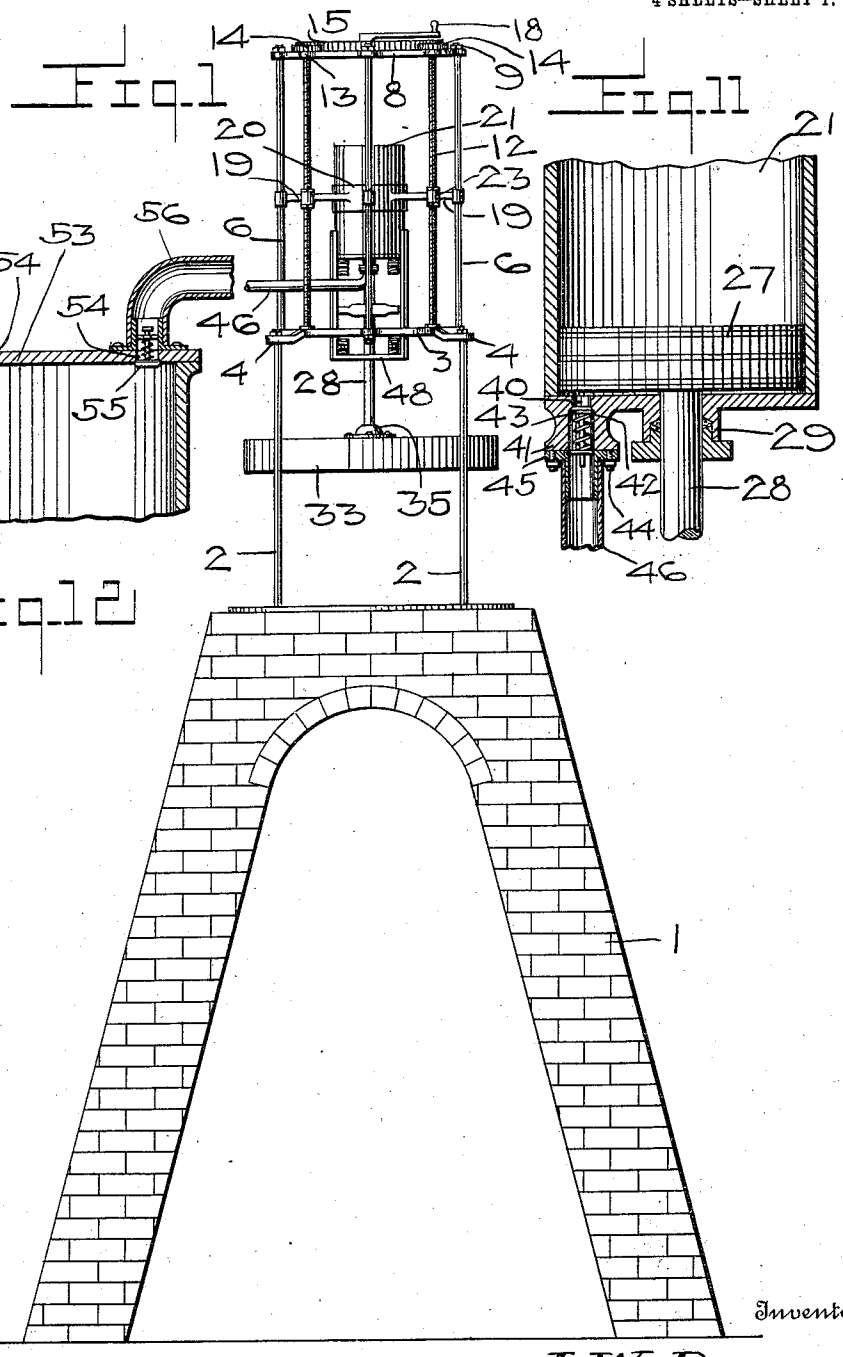


Fig. 11

Fig. 12

Witnesses

Ed. R. Lusby

M. L. Neal.

Inventor

J. W. Denny

By Harry Ellis Chandlee,

Attorneys

J. W. DENNY.

WAVE MOTOR.

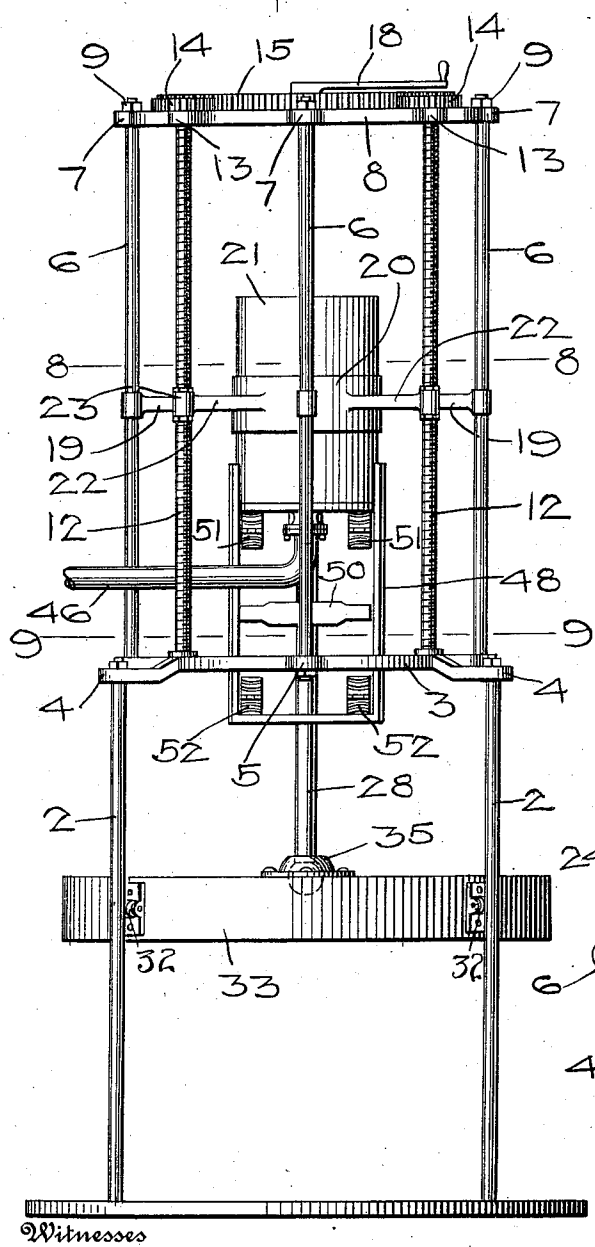
APPLICATION FILED FEB. 7, 1911.

1,019,027.

Patented Mar. 5, 1912.

4 SHEETS—SHEET 2.

Fig. 2



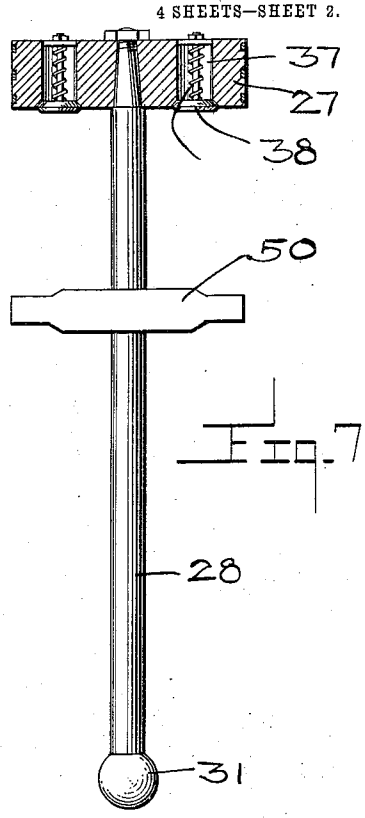
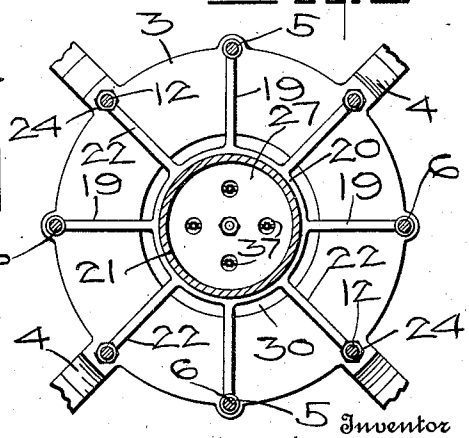


Fig. 7

Fig. 5



Witnesses

Ed. F. Lesby

M. L. Neal.

Inventor

J. W. Denny

By Harry Ellis Chandlee,

Attorney

J. W. DENNY.

WAVE MOTOR.

APPLICATION FILED FEB. 7, 1911.

1,019,027.

Patented Mar. 5, 1912.

4 SHEETS—SHEET 3.

Fig. 5

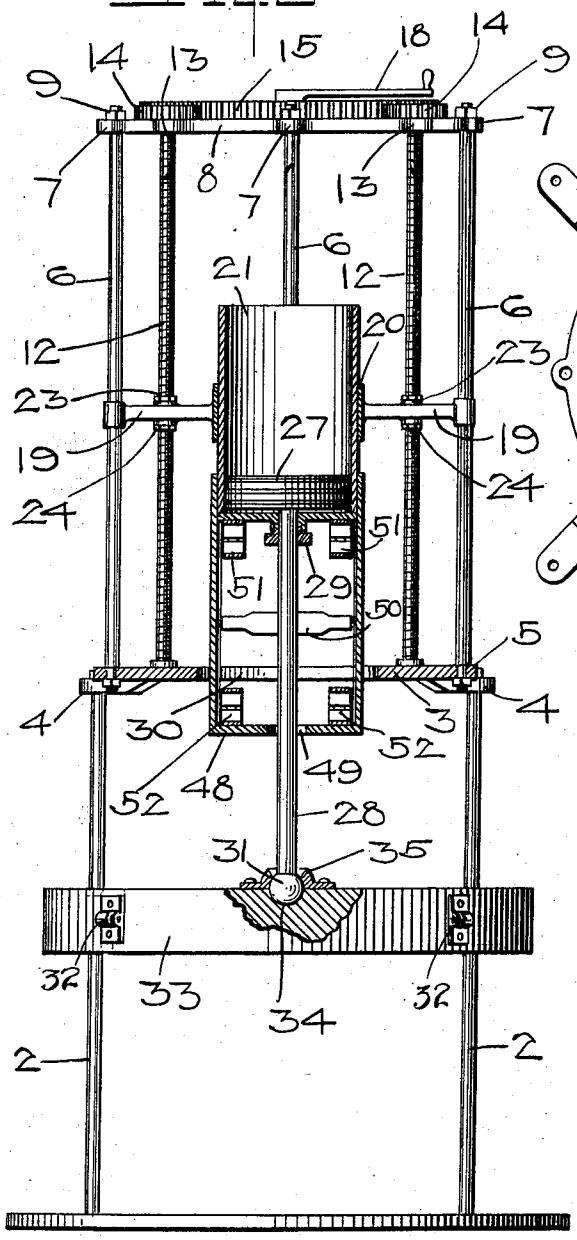


Fig. 15

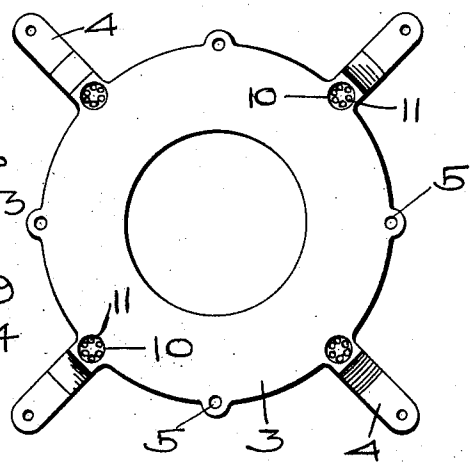
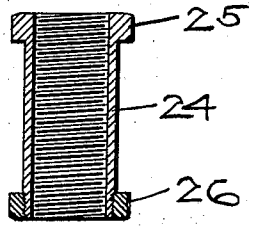


Fig. 10



Witnesses

Ed. R. Lusby

M. L. Neal.

Inventor

J. W. Denny

By Harry Ellis Chandlee,

Attorney

J. W. DENNY.

WAVE MOTOR.

APPLICATION FILED FEB. 7, 1911.

1,019,027.

Patented Mar. 5, 1912.

4 SHEETS—SHEET 4.

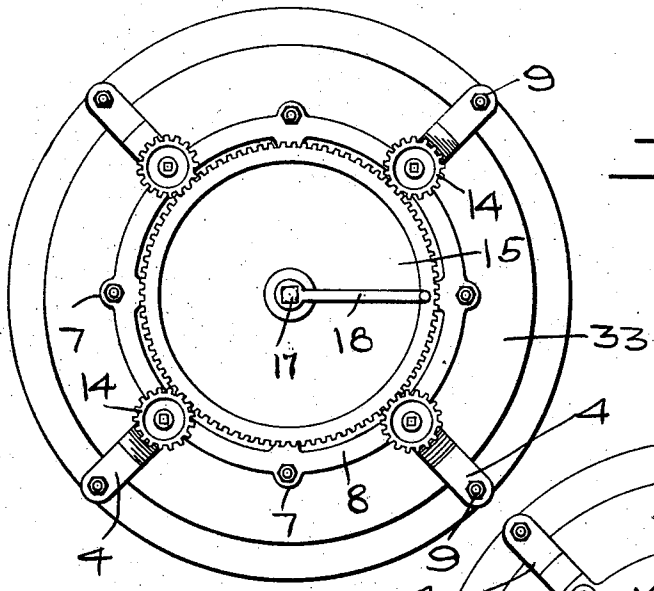


Fig. 4

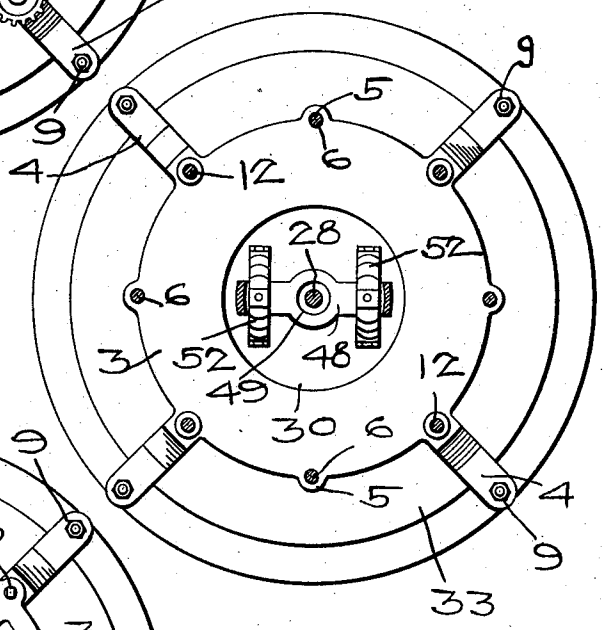


Fig. 5

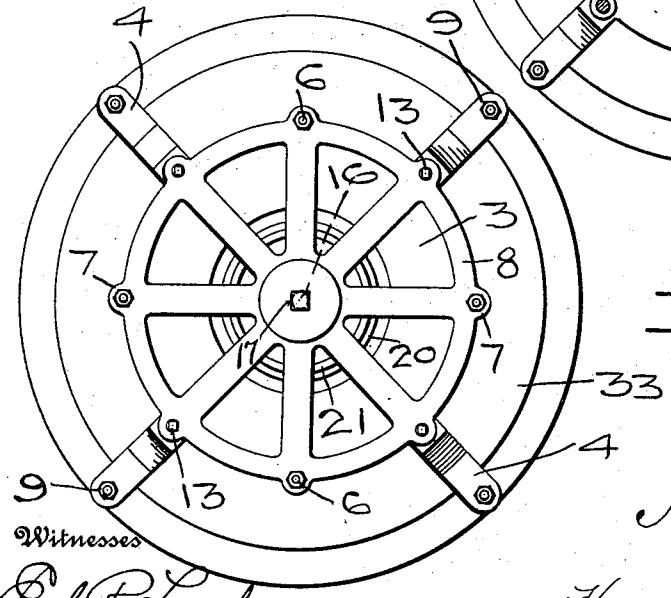


Fig. 6

Witnesses

Ed. R. Lusby

M. L. Neal.

Inventor

J. W. Denny

By Harry Ellis Chandlee

Attorney

UNITED STATES PATENT OFFICE.

JOHN WILLIAM DENNY, OF MAPIMI, MEXICO.

WAVE-MOTOR.

1,019,027. Specification of Letters Patent. Patented Mar. 5, 1912.

Application filed February 7, 1911. Serial No. 607,057.

To all whom it may concern:

Be it known that I, JOHN WILLIAM DENNY, a citizen of the United States, residing at Mapimi, in the State of Durango, Mexico, have invented certain new and useful Improvements in Wave-Motors, of which the following is a specification.

My invention relates to improvements in wave motors, and has for its object provision of an improved motor adapted to be driven by the fluctuations of the tides and the undulation of the waves which will serve to store up a portion of the energy in the movement of said water.

In the drawings I have shown a physical embodiment of my invention, constructed in accordance with the best mode I have so far devised for the application of the principles thereof, but it will be understood that numerous changes in the details of construction within the scope of my claims may be made without departing from the spirit of the invention.

Figure 1 represents a side elevation of the complete machine. Fig. 2 represents an enlarged side elevation of the motor proper. Fig. 3 represents a vertical sectional view of the motor. Fig. 4 represents a top plan view thereof. Fig. 5 represents a similar view of the lower frame plate or deck. Fig. 6 represents a similar view of the upper frame plate. Fig. 7 represents an enlarged detail view of the piston and piston rod. Fig. 8 represents a sectional view on the line 8—8 of Fig. 2. Fig. 9 represents a similar view on the line 9—9 of Fig. 2. Fig. 10 represents an enlarged detail view of the threaded bushing, and Fig. 11 represents a detailed sectional view of the hose connection. Fig. 12 represents a section of a fragmentary portion of the cylinder showing the same equipped with a closing top and connections for adapting the device for use in pumping water.

In the drawings, in which similar characters of reference are employed to denote corresponding parts in the several views, the numeral 1 denotes the foundation or base of the motor formed of concrete or other suitable material and having the posts 2 rising therefrom while secured to the upper ends of said posts is the base plate 3 having sockets 4 in which the tops of the posts are received. Formed in the upper face of said plate are a series of sockets 5 in which are secured the lower ends of the guide rods 6, the upper ends of said rods passing through the sockets 7 in the upper plate 8 and bearing the clamping nuts 9 for supporting said plate. The plate 3 is also provided intermediate adjacent sockets 5 with the bearing-sockets 10 containing the ballbearings 11, while journaled in said bearings 10 are the lower ends of the adjusting spindles 12 which project through the bearings 13 in the upper plate and have secured on their upper ends the pinions 14 in mesh with the gear 15 secured upon the stub shaft 16 projecting upward from the center of the plate 8, said shaft having a squared end 17 on which is engaged the crank 18 for a purpose hereinafter described.

Mounted upon the guides 6 are the arms 19 of the collar 20 in which is secured a cylinder 21, while projecting from the collar 20 intermediate each pair of arms 19 are the arms 22 having sockets 23 in which are engaged the internally threaded bushings 24 having heads 25 engaging one side of the arms and having the nuts 26 engaged on their other ends to secure them in the sockets, said bushings being mounted upon and in threaded engagement with the threaded adjusting spindles 12.

From the foregoing it will be seen that the cylinder is supported by the said engagement of the bushings with the adjusting spindles, while the rods 6 serve to guide the cylinder in its vertical movement and also as connecting braces between the upper and lower plates. To raise or lower the cylinder it is merely necessary to turn the crank 18 which through the gear and pinions will revolve the various adjusting spindles to move the bushings up or down thereon and thus adjust the cylinder.

It will be observed that the cylinder is open at the upper end to admit air, while mounted in the cylinder and making tight engagements with the interior thereof is the piston 27 having the piston rod 28 projecting down through the stuffing box 29 in the bottom of the cylinder and through the central opening 30 in the plate 3 and having formed on its lower end the ball 31.

Mounted between the posts 2 and bearing on its edges the groove anti-friction rollers 32 is the float 33 which may be of either weighted wood or of metal having air chambers to cause the same to float on the top of the waves, the rollers of said float having the posts engaged in their grooves

to cause the float to move vertically between said posts as guides. Formed centrally in the float is a socket 34 in which the ball 31 on the lower end of the piston rod is engaged, a securing plate 35 retaining the ball in the socket which thus permits of a slight rocking movement of the float without disturbing or bending the piston rod.

It will be understood that a wave striking the float will lift the same and thus raise the piston in the cylinder, while on the passing of the wave the weight of the float which will then be unsupported will serve to draw down the piston in the cylinder. Formed in the piston are a series of passages 37 controlled by the valves 38 for allowing air to pass through the piston to the bottom of the cylinder on the upward movement of the piston but being closed by the springs 39 to retain the air in the bottom of the cylinder below the piston on the downward movement of said piston. To permit the escape of air from the cylinder when the air is compressed by the weight of the float drawing the piston down thereon I provide at the bottom of the cylinder the port 40 surrounded by the flange or spout 41, having a flaring passage 42 controlled by an outwardly moving valve 43 to permit the air to flow from the cylinder into said passage. Formed on the spout 41 are a plurality of threaded lugs 44 adapted to project through openings in the ring 45 secured to the hose 46, said hose conducting away the compressed air and being provided with the valve 43 preventing the retrograde movement of the air.

It will be understood that the fluctuation of the tides will cause the float and piston to operate at different heights, and the adjustment of the cylinder through the rotation of the spindles 12 serves to place the cylinder in proper relation to the piston, while to absorb shocks to the cylinder or to the plate 3 occasioned by undue or excessive movement of the float I secure to the lower portion of the cylinder the U-shaped bracket 48 having the central passage 49 in its base in which the piston rod moves, said bracket being of approximately the same length as the cylinder. Secured to the piston rod and moving between the bottom of the cylinder and of the bracket is the abutment bar 50, a pair of elliptical springs 51 being secured to the bottom of the cylinder and a second pair 52 being secured on the upper face of the base of the bracket, the bar 50 reciprocating between said springs which yieldingly limit the movement of the piston rod and take up or absorb the shock of checking its movement in either direction. To permit of extreme vertical adjustment of the cylinder I may form the opening 30 in the plate 3 of sufficient size to allow the bracket with its springs to pass down therethrough.

From the foregoing it will be evident that I have provided a thoroughly practical and efficient wave motor for compressing air which is of simple and inexpensive construction and which will be automatic in operation, requiring merely occasional vertical adjustment of the cylinder when the difference between high and low water marks is great.

In Fig. 12 I have illustrated an attachment for the cylinder of my invention comprising a cap plate 53 having openings 54 therein provided with inwardly opening valves 55, while secured to the plate and in communication with said openings are the pipes 56 which curve downward to have their lower ends below low water level.. It will thus be seen that on its downward stroke the piston will suck in water through the pipes 56, while on its upward stroke the valves 55 will prevent retrograde flow of the water, when said water will pass down through the passages 37 and be contained in the cylinder below the piston, the next downward stroke of the piston forcing said water out through the hose 46 in the same manner as heretofore described in connection with the pumping of the air.

I claim:

1. In a wave motor, the combination with a supporting frame, of a compression cylinder supported by the frame, a piston in the cylinder having a depending piston rod, a float secured to the latter end of the piston rod, the undulations of the waves shifting the float and thus the piston to compress air in the piston, a frame secured to and depending from the cylinder, said frame having a portion providing a guide for the piston rod, an abutment bar secured on the piston rod and lying within the frame, and resilient abutments carried by the cylinder and by the frame for engaging said bar to limit the movement of the bar and thus the piston in either direction.

2. The combination with a supporting frame, of a piston cylinder adjustably supported thereby, a piston working in the cylinder, a depending piston rod secured to said piston, a float secured to the latter end of the piston rod, the undulations of the wave shifting the float and thus through the rod the piston, a depending U-shaped frame secured to the lower end of the cylinder, said frame having an enlarged central portion having an aperture formed therein in which the piston rod slides, spring buffers secured to the under side of the cylinder, additional spring buffers secured to the upper face of the base of the U frame, and an abutment bar secured on the piston rod and adapted to contact with said spring buffers of the cylinders and frame to limit the movement of the piston rod and thus the piston in either direction.

3. A wave motor, comprising a base, supports rising therefrom, a plate secured to the upper ends of the supports, guiding and adjusting supports rising from the plate, a collar having arms engaging said latter supports, a cylinder secured to said collar, a piston in the cylinder, a piston rod depending from the piston through the bottom of the cylinder and the plate, and a float having ball and socket connection with the lower end of said piston rod and guided by the first mentioned supports, the vertical movement of said float occasioned by the undulations of the waves moving the piston to compress air in the cylinder.

4. A wave motor comprising a base, supports rising therefrom, a plate secured to the upper ends of the supports, guide rods secured to and rising from said plate, a second plate secured to the upper ends of said rods, threaded adjusting spindles having their lower ends journaled in the first plate and having their upper ends projecting through the other plate, pinions secured to the said upper ends of the spindles, a central gear secured to the upper plate and in mesh with said pinions, means for rotating the gear and thus the pinions and their spindles, a cylinder, arms projecting radially from the cylinder and having threaded sockets in which the spindles are engaged, the rotation of the spindles serving to vertically adjust the cylinder, an air compressing piston in the cylinder, and means operated by the movement of the waves for reciprocating the piston in the cylinder to cause the operation of said piston.

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

JOHN WILLIAM DENNY.

Witnesses:
JOHN GRAHAM,
ARTURO LA MONT.