

F. BROWN.
WAVE MOTOR.

APPLICATION FILED JUNE 24, 1911.

1,018,161.

Patented Feb. 20, 1912.

2 SHEETS—SHEET 1.

Fig. 2.

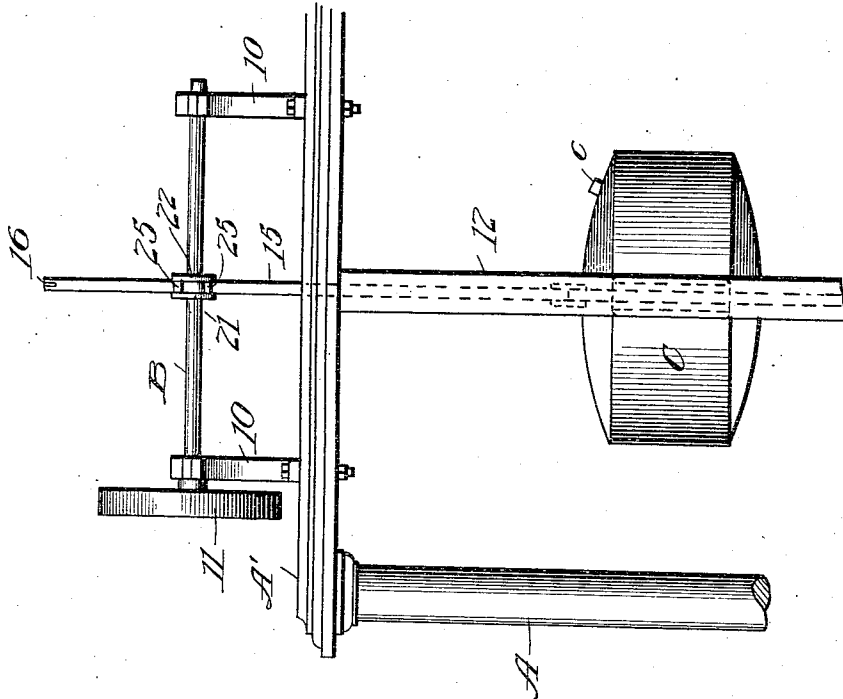
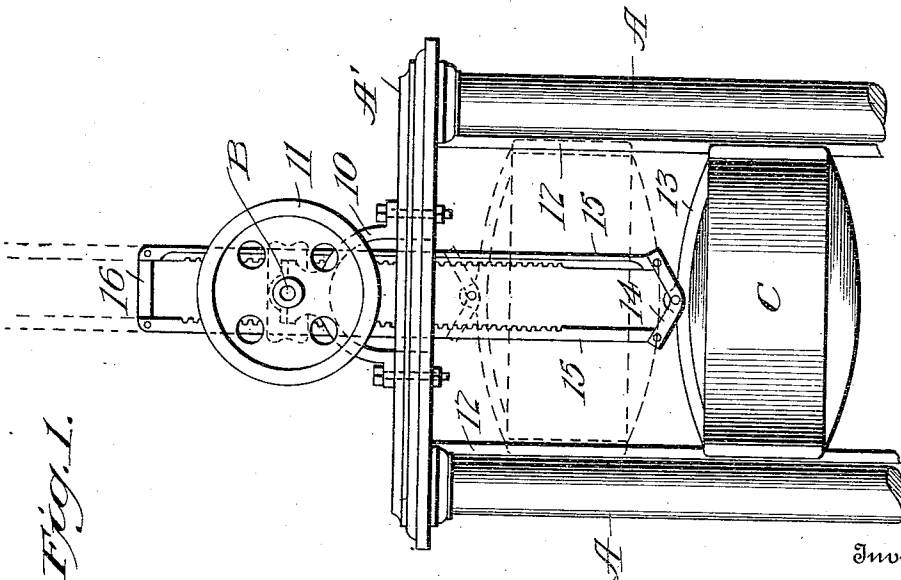


Fig. 1.



Witnesses

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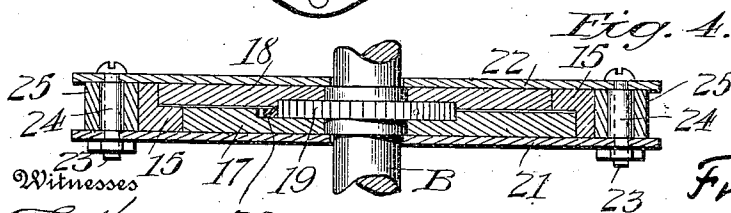
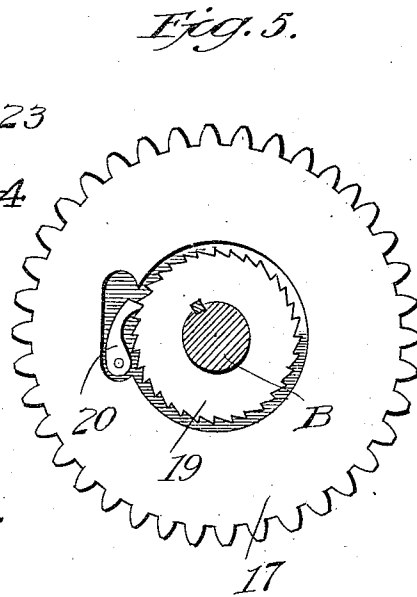
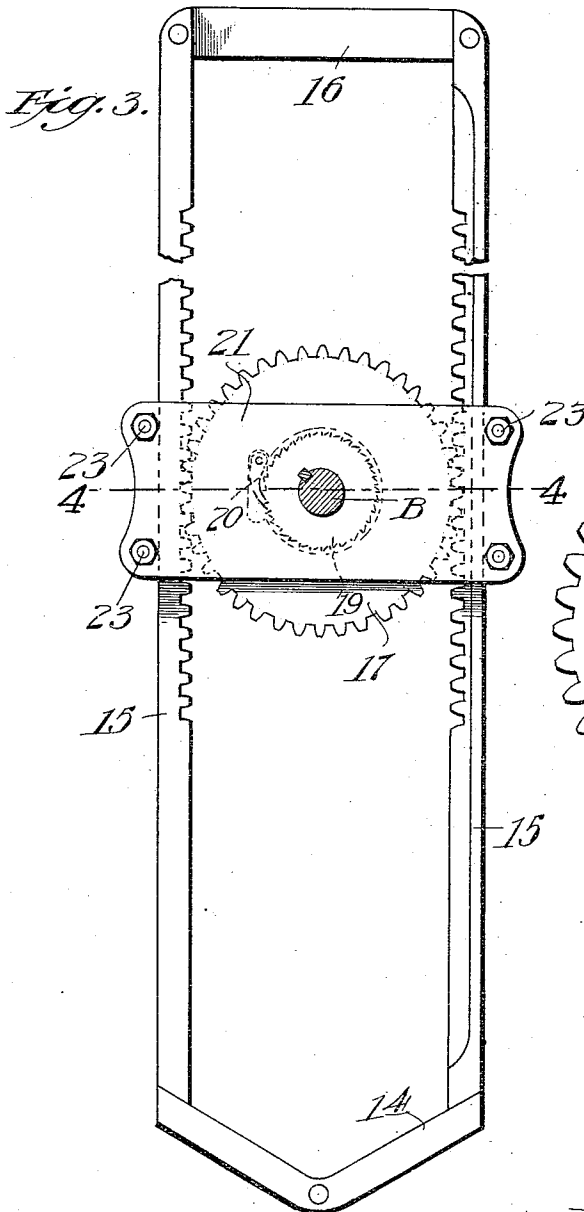
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2 SHEETS—SHEET 2.



Witnesses
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UNITED STATES PATENT OFFICE.

FRANK BROWN, OF ATLANTIC CITY, NEW JERSEY.

WAVE-MOTOR.

1,018,161.

Specification of Letters Patent.

Patented Feb. 20, 1912.

Application filed June 24, 1911. Serial No. 635,197.

To all whom it may concern:

Be it known that I, FRANK BROWN, a citizen of the United States, residing at Atlantic City, in the county of Atlantic and State of New Jersey, have invented certain new and useful Improvements in Wave-Motors, of which the following is a specification.

My said invention consists in certain improvements in the details of construction and arrangement of parts of wave motors whereby such a motor is provided which will be simple in structure, but certain in operation under all conditions of the tide, or waves, all as will be hereinafter more fully described and claimed.

Referring to the accompanying drawings which are made a part hereof and on which similar reference characters indicate similar parts, Figure 1 is a view showing the motor and supporting frame in end elevation, Fig. 2 a side elevation thereof, Fig. 3 a detail view on an enlarged scale of the rack and pinion operating mechanism, Fig. 4 a cross section on the dotted line 4-4 in Fig. 3, and Fig. 5 a detail view showing one of the pinions in elevation and illustrating the ratchet and pawl connection with the power shaft.

In said drawings the portions marked A represent the frame supports, B the power shaft and C the buoy. The frame consists of the posts, or supports, A which may be of reinforced concrete, metal, or any appropriate material and are suitably set and anchored in the bed of the body of water, the waves of which are to be utilized for driving the motor. The tops of said posts are connected by suitable timbers, or a platform, A'. While I have shown only a single buoy, and, therefore only one end of the frame, it will be understood that any number of buoys may be connected with the main shaft in the same manner as illustrated for this one and that the frame and shaft are extended as may be necessary to accommodate the number of buoys desired. The shaft B is journaled in suitable bearings on the top of brackets, or standards, 10 mounted on the top of platform A' and a fly wheel 11 is mounted on said shaft for a purpose to be presently described.

The buoy C is preferably a steel shell of suitable size and form for the purpose and is provided with an aperture closed by a suitable plugs, or valve, *c* through which the shell may be loaded with sea water, or

other material as may be desired to obtain the proper weight to operate with best results under any prevailing conditions of the sea. Said buoy is mounted between vertical guide rails, or tracks, 12, which are appropriately secured to the frame being held thereto by appropriate engaging flanges. A heavy cross bar 13 extends from side to side across the top of each buoy and an angle-iron 14 pivoted to the center thereof with its ends extending outward oppositely from its pivot. Rack-bars 15 are pivoted at their lower ends to the outer ends of said angle-iron 14 and extend upwardly to a sufficient height above the platform A' for the purpose and their tops are pivotally connected to a cross-bar 16.

Mounted on shaft B between the adjacent edges of rack-bars 15 are pinions 17 and 18 which are mounted to rotate loosely on the extended ends of the hub of a ratchet-wheel 19 which is keyed to shaft B. Each of the pinions 17 and 18 are formed with a circular recess in their adjacent faces at their centers, the recesses being of a diameter sufficient to receive the ratchet-wheel 19, one-half of the thickness of the ratchet-wheel being thus inclosed in the recess of pinion 17 and the other half inclosed in the recess of pinion 18. Each of the pinions 17 and 18 have a pawl 20 pivoted in a recess adjacent to the edge of said ratchet-wheel, the pawl of one pinion being adapted to engage with one side of the toothed face of the ratchet 19 and the pawl of the other pinion being adapted to engage with the other side. The rack-bars 15 are formed as best shown in Fig. 4, each having teeth on one side only of its inner edge, the edge of one rack-bar bearing teeth being on the opposite side from the edge of the other rack-bar bearing teeth so that the teeth of one rack-bar engage with pinion 17 on one side of shaft B while the teeth of the other rack-bar engage with pinion 18 on the opposite side of shaft B. The rack-bars and pinions are embraced in a frame composed of cross-bars 21 and 22 mounted on opposite sides thereof and suitably supported from the frame. The outer ends of said cross-bars are connected by bolts 23 and held the proper distance apart by distance sleeves 25, on which are mounted anti-friction rollers 25 against which the rack-bars bear. By this construction the operating gears are held in a compact form and the rack-bars

are enabled to operate freely and at the same time true and steady. Said rack-bars are of a length to extend above the platform A' and shaft B to a height sufficient to operate under all conditions of the tide.

In operation, as will be readily understood from the foregoing description, one of the rack-bars operates as a driving rack-bar during the upward motion of the buoy, while the other rack-bar becomes the driving rack-bar during the downward motion of the buoy. Pinions 17 and 18 are thus alternately locked to ratchet-wheel 19 by pawls 20 to drive the shaft B, the pawl of one pinion sliding freely over the ratchet-face of the ratchet-wheel while the rack-bars are moving upward and the pawl on the other pinion sliding freely over the ratchet-wheel during the downward motion of the rack-bars. Under the momentum of fly-wheel 11 the speed of the shaft may be maintained during the shift of the drive from one side to the other, or even increased beyond that generated by the movement of the buoys the forward movement of said shaft being free. By extending the frame and the shaft and multiplying the buoys any power desired can be readily generated and by suitable gearing transmitted wherever it may be desired to use it as will be readily understood.

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

1. A wave motor comprising a frame, a power shaft journaled in bearings on said frame, a ratchet-wheel keyed to said shaft, a pair of pinions mounted to run loosely one on each side of said ratchet-wheel, pawls for connecting said pinions with said ratchet-wheel, a buoy mounted to be operated by the rise and fall of the waves, rack-bars pivoted to said buoy and engaging one with one of said pinions on one side of the shaft and the other with the other of said pinions on the other side of said shaft, and a guide frame surrounding said pinions and rack-bars, substantially as set forth.

2. A wave motor comprising a frame, a shaft journaled in bearings on said frame, pinions loosely mounted on said shaft, a ratchet connection between each of said pinions and said shaft, rack-bars connected with said pinions one on one side of said shaft and another on the opposite side of said shaft, a guide frame surrounding said pinions and rack-bars, and a floating buoy connected to the lower end of said rack-bars, substantially as set forth.

3. A wave motor comprising a frame, a shaft mounted in bearings on said frame, a floating buoy guided in said frame, rack-bars pivotally connected to said buoy, pin-

ions mounted loosely on said shaft, a ratchet connection between each of said pinions and said shaft, one of said rack-bars engaging one of said pinions on one side of said shaft and the other engaging the other pinion on the other side of said shaft, and a guide frame surrounding said pinions and rack-bars, substantially as set forth.

4. A wave motor comprising a frame, a power shaft, a ratchet-wheel mounted to turn with said shaft, pinions mounted on the hub of said ratchet-wheel on each side thereof, pawls for connecting said pinions with said ratchet-wheel, rack-bars engaging one on one side of the shaft with one pinion and the other on the other side of the shaft with the other pinion, a frame surrounding said pinions and rack-bars for guiding and holding the parts in close relation, and a buoy guided in said frame and connected with the lower end of said rack-bars, substantially as set forth.

5. A wave motor comprising a frame, a power shaft, a fly-wheel on said power shaft, a ratchet-wheel keyed to said power shaft, pinions mounted on each side of said ratchet-wheel and connected therewith by pawls, rack-bars engaging with said pinions on opposite sides of the shaft, a frame surrounding said pinions and rack-bars to form guides therefor, anti-friction roller bearings in said frame against which said rack-bars bear, and a buoy connected to the lower end of said rack-bars, substantially as set forth.

6. A wave motor comprising a frame, a power shaft, pinions loosely mounted on said shaft and connected by ratchet-connections therewith, a pair of rack-bars engaging one with one pinion on one side of the shaft and the other with the other pinion on the other side of the shaft, a buoy guided in said frame, a pivoted angle bar connected with the top of said buoy, and a pivotal connection between each of said rack-bars and said pivoted angle bar, substantially as set forth.

7. A wave motor comprising a frame, a power shaft, pinions loosely mounted on said power shaft, a ratchet connection between said pinions and said shaft, rack-bars for operating said pinions, a buoy mounted between guides in said frame and pivotally connected to said rack-bars by means of a pivoted bar, and a cross-bar connecting the upper ends of said rack-bars by pivotal connections, substantially as set forth.

In witness whereof, I, have hereunto set my hand and seal at Washington, District of Columbia this 16th day of June, A. D. nineteen hundred and eleven.

FRANK BROWN. [L.S.]

Witnesses:

CHAS. E. RIORDON,
L. A. PRICE.