G. HECKERMAN.

WAVE MOTOR.

APPLICATION FILED SEPT. 26, 1918.

1,303,897.

Patented May 20, 1919.

2 SHEETS—SHEET 1.

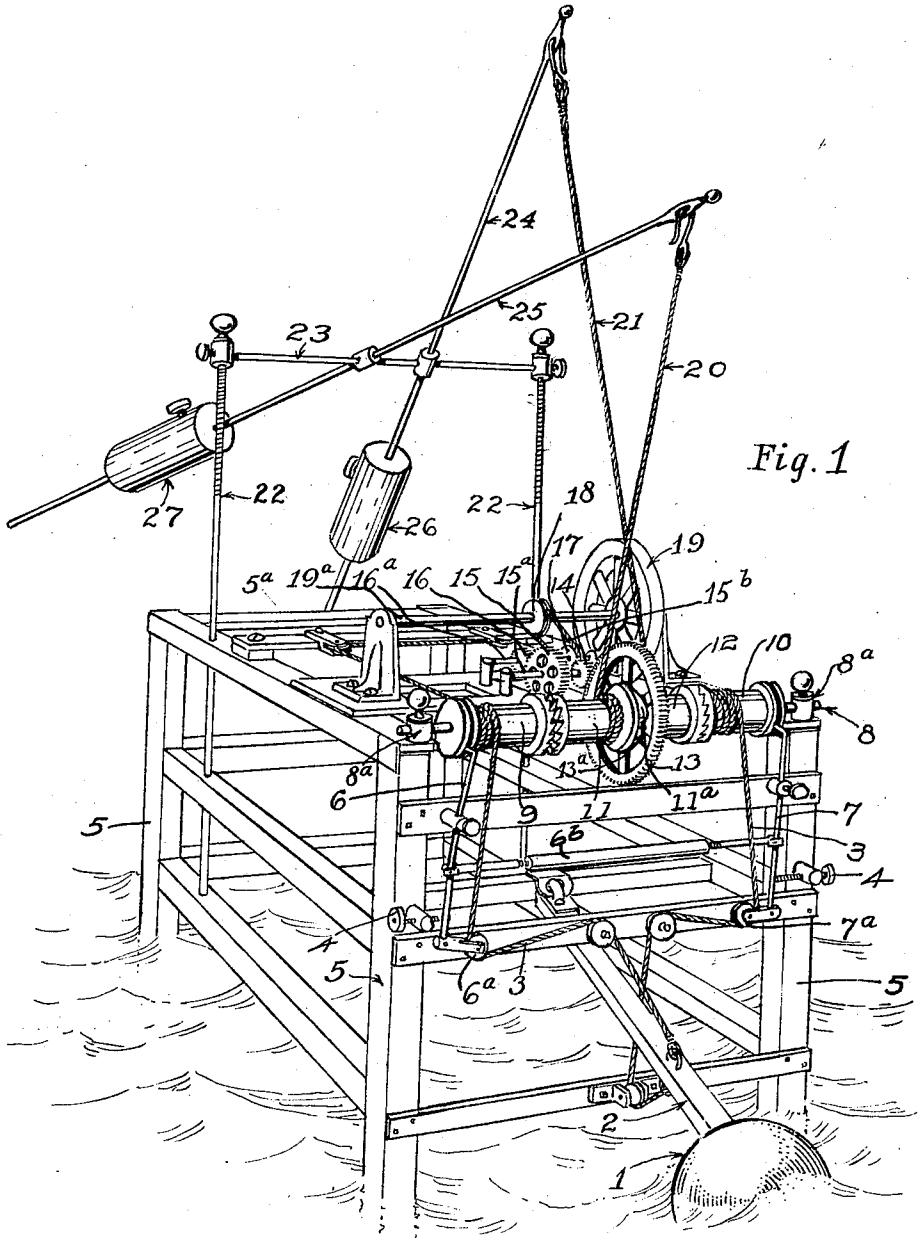


Fig. 1

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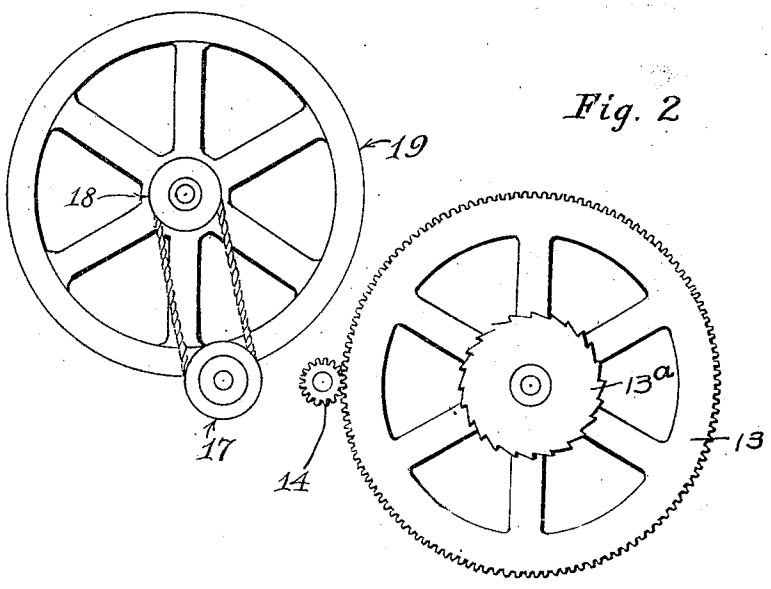


Fig. 2

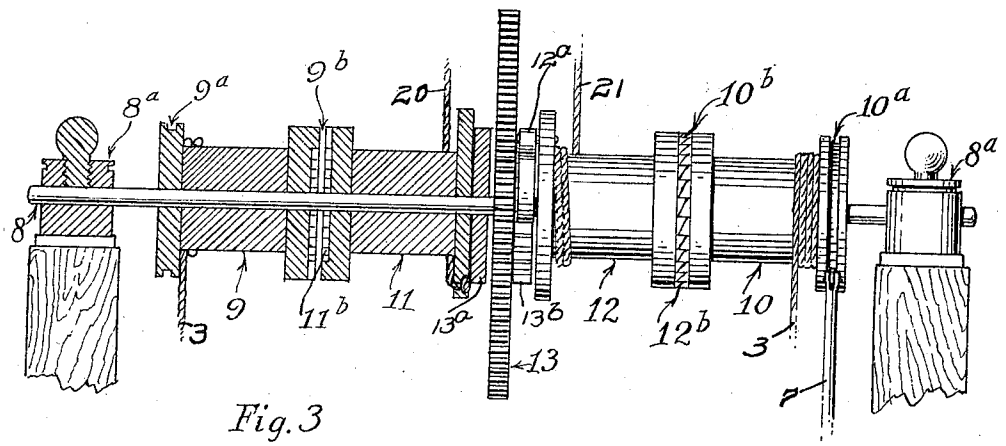


Fig. 3

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UNITED STATES PATENT OFFICE.

GERHART HECKERMAN, OF SAN DIEGO, CALIFORNIA.

WAVE-MOTOR.

1,303,897. Specification of Letters Patent. Patented May 20, 1919.

Application filed September 26, 1918. Serial No. 255,854.

To all whom it may concern:

Be it known that I, GERHART HECKERMAN, a citizen of the United States, residing at San Diego, in the county of San Diego and State of California, have invented certain new and useful Improvements in Wave-Motors, of which the following is a specification.

My invention relates to a motor to be used for producing power caused by the motion of the water along the shores of the ocean or sea, preferably in the breakers, and the objects of my invention are: first, to provide a wave operated motor of this class which utilizes the force of the waves in their inward and outward movement as well as in their upward and downward movement; second, to provide a wave motor of this class in which the power of the waves is directed for raising weights which are allowed to gravitate downwardly producing power; third, to provide a wave motor of this class in which the pendulum or float in the water produces power which is connected separately through different transmission mechanism for revolving a shaft in one direction at all times; fourth, to provide a mechanism of this class in which the clutch mechanism is operated and controlled automatically by the movement of the pendulum or float; fifth, to provide a mechanism of this class in which a plurality of units may be connected together for revolving a shaft in one direction at all times; sixth, to provide a mechanism of this class which is adjustable throughout and very flexible and seventh, to provide a mechanism of this class which is simple and economical of construction, durable, easy to operate, easy to install and which will not readily deteriorate or get out of order.

With these and other objects in view as will appear hereinafter my invention consists of certain novel features of construction, combination and arrangement of parts and portions as will be hereinafter described in detail and particularly set forth in the appended claims reference being had to the accompanying drawings and to the characters of reference thereon which form a part of this specification, in which:

Figure 1 is a perspective view of one unit of my wave motor, Fig. 2 is a side elevational view of the transmission gears of my motor, and Fig. 3 is a partial elevational view of the clutch and cable operating mechanism showing a portion in section to facilitate the illustration.

Similar characters of reference refer to similar parts and portions throughout the several views of the drawings.

The float 1, float support 2, cable 3, adjusting screws 4, frame 5, levers 6 and 7, shaft 8, drums 9, 10, 11 and 12, gear 13, pinion 14, gear 15, pinion 16, sheave 17, sheave 18, fly-wheel 19, cables 20 and 21, supports 22, bar 23, levers 24 and 25 and weights 26 and 27 constitute the principal parts of my wave motor.

The frame 5 consists preferably of a rectangularly shaped frame mounted on piles driven at a suitable place in the water near the shore. Pivotally connected to this frame 5 is the one end of the float support 2 on the lower end of which is mounted a float 1 which is adapted to float in the water and move therewith. Secured to this support 2 on one side is the one end of the cable 3 and secured to the other side of the support 2 is the other end of the cable 3 which extends up over pulleys mounted on the frame, then over pulleys 6^a and 7^a secured on the lower ends of the levers 6 and 7. These levers 6 and 7 are pivoted intermediate their ends and their upper ends are provided with lugs which engage grooves 9^a and 10^a in the outer rims of the drums 9 and 10. These drums are revolubly mounted on the shaft 8 which is secured in the supports 8^a. The other rims of the drums 9 and 10 are provided with ratchet teeth 9^b and 10^b on their outer surfaces which are adapted to engage with ratchet teeth 11^b and 12^b on the drums 11 and 12. Revolubly mounted on this shaft 8 between the inner ends of the drums 11 and 12 is the gear wheel 13 which is provided on one side with ratchet teeth 13^a secured thereto and on the other side with ratchet teeth 13^b secured thereto and secured on the flanges on the inner ends of the drums 11 and 12 are ratchet spring pawls 11^a and 12^a which are adapted to engage said ratchet teeth when the drums move in one direction and slide over said ratchet teeth when these drums move in the opposite direction. Journaled on the frame is an intermediate shaft 15^a upon which is mounted a pinion 14 which engages the gear 13 and mounted on this shaft 15^a is another gear 15 which engages a pinion 16 which is secured on the shaft 16^a and mounted on this shaft 16^a is a

sheave 17 adapted for belt 15^b which extends over the sheave 18 and this sheave 18 is secured on the shaft 19^a and on this same shaft is secured the fly-wheel 19.

The cable 3 is wound around the drums 9 and 10 several turns and the loop end extends over pulleys 5^a which are pivoted to the frame so as to move to the proper position with the winding of the cable 3 on the drums 9 and 10. Secured to the drums 11 and 12 are the cables 20 and 21 and they are adapted to wind on said drums with the revolution of said drums. The upper ends of these cables are secured to the levers 24 and 25 which levers are pivotally mounted on the bar 23 and this bar is supported by means of the support 22. Mounted on the free ends of the levers 24 and 25 are the weights 26 and 27 which are adapted to be raised with the winding of the cables 20 and 21 on the drums 11 and 12 and when released said weights will gravitate, unwinding the cables 20 and 21 and turning the drum and when said drum revolves the spring pawl thereon engages the ratchet teeth secured on the gear 13 revolving said gear which in turn turns the fly-wheel 19 through the gears 14, 15, 16 and sheaves 17 and 18 and belt 15^b. It will be noted that the levers 6 and 7 are connected by a rod 6^b so that said levers move simultaneously with the movement of the support 2.

Though I have shown and described a particular construction, combination and arrangement of parts and portions I do not wish to be limited to this particular construction, combination and arrangement but desire to include in the purview of my invention the construction, combination and arrangement substantially set forth in the appended claims.

It is obvious that with this construction there is provided a wave motor in which the drums are revolved by the movement of the float support and are also shifted longitudinally on the shaft into engagement on one side and disengagement on the other side so that the movement of the float automatically engages and releases the drums upon which the cables are wound for raising the weights and by which the weight revolves the released drum, that while one weight is being raised the other in lowering turns the fly-wheel and main drive shaft so that the movement of the plunger raises the weights and the weights by gravity revolve the fly-wheel.

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

1. In a wave motor, a float adapted to rest in the water, a support to which said float is connected, a frame mounted over the water to which said support is pivotally connected, a cable with one end secured to one side of said support and its opposite end secured to the other side of said support, a pair of drums over which said cable is wound, means for supporting the loop of said cable, a pair of intermediate drums adapted to engage said first mentioned drums when said first mentioned drums are moved to a certain position relative thereto, a gear-wheel mounted between said intermediate drums, a ratchet-wheel secured on each side of said gear-wheel, ratchet pulleys secured to said drums adapted to engage said ratchet-wheels when revolved in one direction and to slide over said ratchet-wheels when revolved in the opposite direction, cables secured to each of said intermediate drums, a lever secured to the free end of each of said cables, a weight mounted upon the opposite ends of each of said levers, and means adapted to engage said first mentioned drums for moving one of said drums into engagement with one of said intermediate drums and simultaneously releasing the opposite drum from the other intermediate drum with the movement of the float support.

2. In a wave motor, a float adapted to rest in the water, a support to which said float is connected, a frame mounted over the water to which said support is pivotally connected, a cable with one end secured to one side of said support and its opposite end secured to the other side of said support, a pair of drums over which said cable is wound, means for supporting the loop of said cable, a pair of intermediate drums adapted to engage said first mentioned drums when said first mentioned drums are moved to a certain position relative thereto, a gear-wheel mounted between said intermediate drums, a ratchet-wheel secured on each side of said gear-wheel, ratchet pulleys secured to said drums adapted to engage said ratchet-wheels when revolved in one direction and to slide over said ratchet-wheels when revolved in the opposite direction, cables secured to each of said intermediate drums, a lever secured to the free end of each of said cables, a weight mounted upon the opposite ends of each of said levers, means adapted to engage said first mentioned drums for moving one of said drums into engagement with one of said intermediate drums and simultaneously releasing the opposite drum from the other intermediate drum with the movement of the float support, and gear means connecting said gear with a drive shaft.

3. In a wave motor, a float adapted to rest in the water, a support to which said float is connected, a frame mounted over the water to which said support is pivotally connected, a cable with one end secured to one side of said support and its opposite end secured to the other side of said support, a pair of drums over which said

cable is wound, means for supporting the loop of said cable, a pair of intermediate drums adapted to engage said first mentioned drums when said first mentioned drums are moved to a certain position relative thereto, a gear-wheel mounted between said intermediate drums, a ratchet-wheel secured on each side of said gear-wheel, ratchet pulleys secured to said drums adapted to engage said ratchet-wheels when revolved in one direction and to slide over said ratchet-wheels when revolved in the opposite direction, cables secured to each of said intermediate drums, a lever secured to the free end of each of said cables, a weight mounted upon the opposite ends of each of said levers, means adapted to engage said first mentioned drums for moving one of said drums into engagement with one of said intermediate drums and simultaneously releasing the opposite drum from the other intermediate drum with the movement of the float support, gear means connecting said gear with a drive shaft, and means for regulating the movement of said drum shifting means.

4. In an apparatus of the class described the combination of a supporting frame, a float pivotally connected thereto, a pair of drums revolubly mounted thereon, a cable with its opposite ends wound on said drums, levers engaging said drums for shifting them longitudinally, pulleys mounted on the opposite ends of said drums over which the ends of said cable extend, other pulleys mounted on the frame over which the ends of said cable extend and are secured to the opposite sides of said float, intermediate drums in alinement with and adapted to be engaged by said first mentioned drums, each carrying a cable adapted to wind thereon, weights supported by each of said cables, a gear mounted between said intermediate floats, ratchet and pawl means in connection with said gear and said intermediate drums for revolving said gear when either of said drums revolves in one direction, whereby said drums and said intermediate drums are engaged and disengaged with the movement of said float.

5. In an apparatus of the class described the combination of a supporting frame, a float pivotally connected thereto, a pair of drums revolubly mounted thereon, a cable with its opposite ends wound on said drums, levers engaging said drums for shifting them longitudinally, pulleys mounted on the opposite ends of said drums over which the ends of said cable extend, other pulleys mounted on the frame over which the ends of said cable extend and are secured to the opposite sides of said float, intermediate drums in alinement with and adapted to be engaged by said first mentioned drums, each carrying a cable adapted to wind thereon, weights supported by each of said cables, a gear mounted between said intermediate floats, ratchet and pawl means in connection with said gear and said intermediate drums for revolving said gear when either of said drums revolves in one direction, whereby said drums and said intermediate drums are engaged and disengaged with the movement of said float, and gear means connecting said gear with the main drive shaft.

In testimony whereof, I have hereunto set my hand at San Diego, California this 17th day of September 1918.

GERHART HECKERMAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."