L. GUYNN.

CURRENT MOTOR.

APPLICATION FILED JULY 11, 1910.

986,919.

Patented Mar. 14, 1911.

2 SHEETS—SHEET 1.

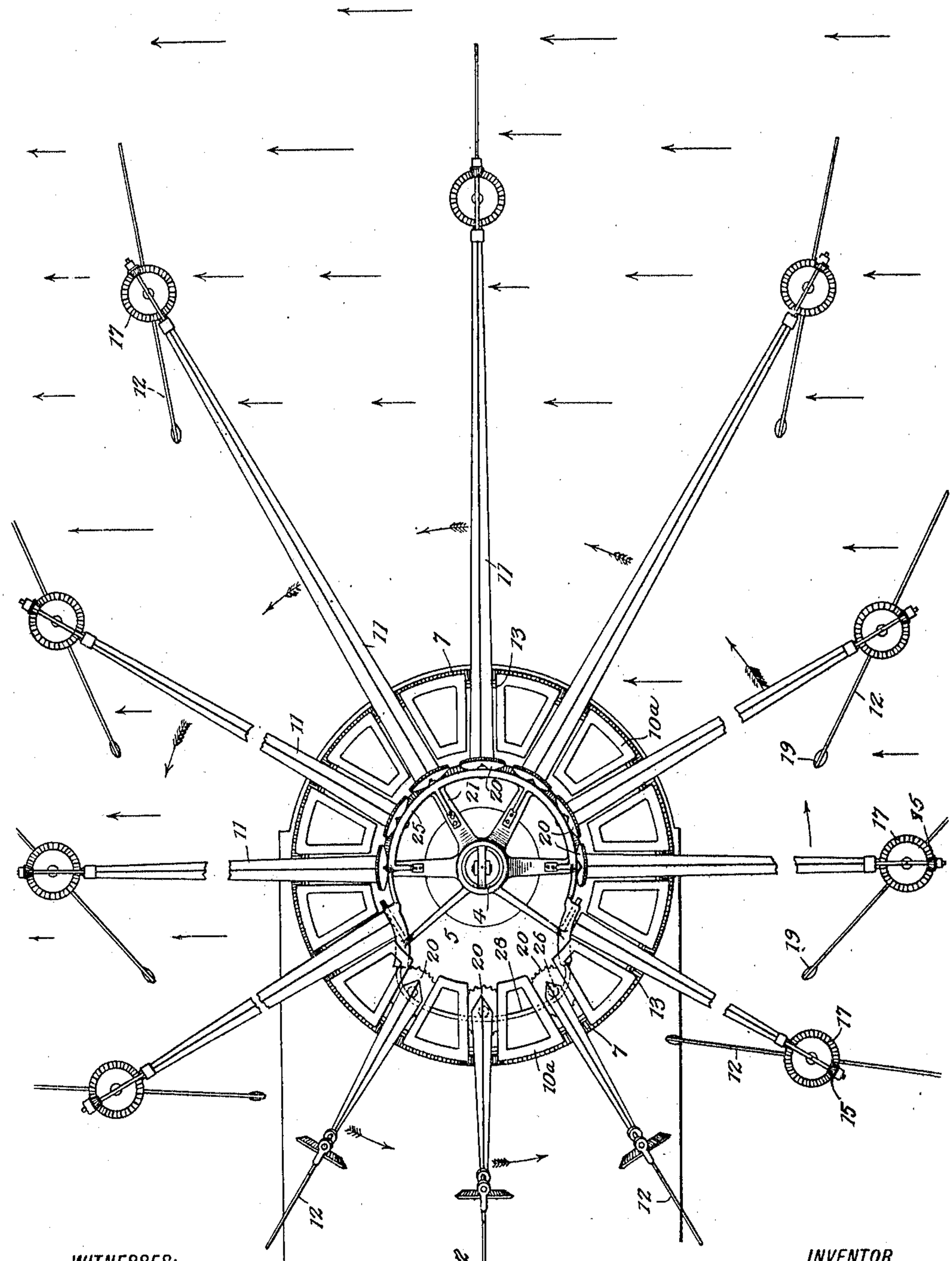

Fig. 1.

WITNESSES:

L. H. Schmidt

Amos W. Hart

INVENTOR

LINCOLN GUYNN,

BY Munn & Co.

ATTORNEYS

L. GUYNN.

CURRENT MOTOR.

APPLICATION FILED JULY 11, 1910.

986,919.

Patented Mar. 14, 1911.

2 SHEETS—SHEET 2.

Fig. 5.

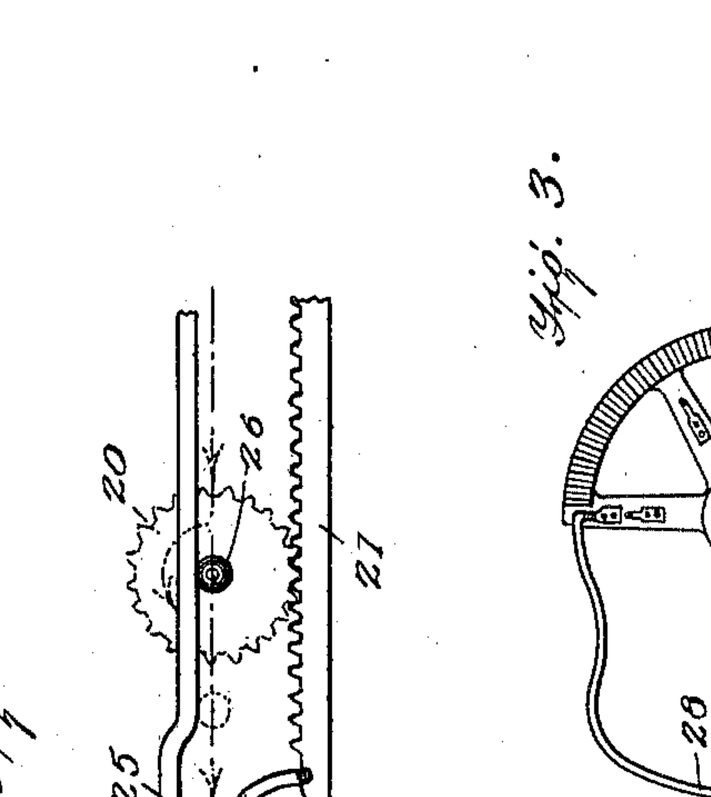

Fig. 6.

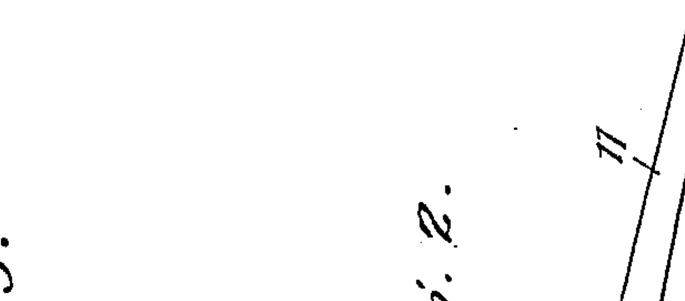

Fig. 2.

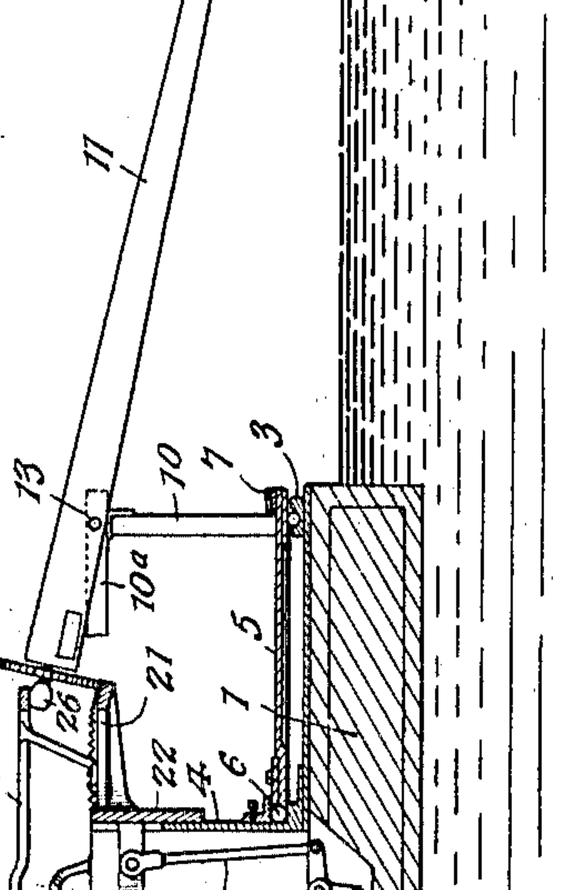

Fig. 3.

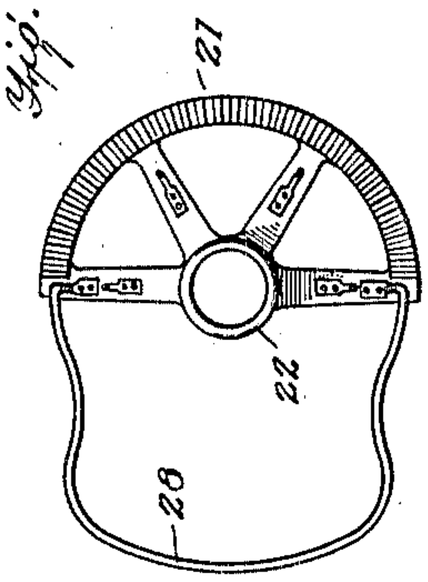

Fig. 4.

WITNESSES:

L. H. Schmidt.

Arnoldstart

INVENTOR

LINCOLN GUYNN,

BY Munn & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

LINCOLN GUYNN, OF SEATTLE, WASHINGTON.

CURRENT-MOTOR.

986,919. Specification of Letters Patent. Patented Mar. 14, 1911.

Application filed July 11, 1910. Serial No. 571,330.

To all whom it may concern:

Be it known that I, LINCOLN GUYNN, a citizen of the United States, and a resident of Seattle, in the county of King and State of Washington, have invented certain Improvements in Current-Motors, of which the following is a specification.

This invention relates to improvements in that class of motors which are designed and adapted to utilize the force of a flowing body of water such as may be found in rivers or ocean tides.

One of the chief objects of the improvements is to provide a motor adapted to project paddles into the water automatically and to a certain required depth so as to utilize in a maximum degree the force or power of the water current, and to reduce to a minimum the friction of the revolving portion of the apparatus.

Another object is to so construct the apparatus that the blades or paddles may be alternately lowered into and raised from the water as the levers to which they are attached are revolved around a central point, the levers being pivoted and tilted to alternately lower and raise them.

Another feature of the invention is the provision of means for adjusting the depth at which the blades or paddles dip in the water. The levers carrying the paddles may be adjusted vertically at the same time that they are swept around in a circle, so as to hold the blades or paddles submerged to any required depth. The same provisions enable the operator at any time to wholly remove all blades or paddles from the current. The blades or paddles are so controlled that they enter the current at an angle to the current, and as the motor under the force of the current exerted on the blades or paddles revolves, the angle of the blades or paddles constantly changes so that when each lever has reached a position at right angles to the current, the blade or paddle is at the same angle, and the change continues, so that the blades or paddles are kept at the most advantageous angle to the current during all the time they are in the same, which may be during fifty or more per cent. of the circle described by the blades or paddles, so that the maximum power of the current is received and transmitted.

The invention embodies other features as hereinafter described.

In the accompanying drawings Figure 1 is a plan view of the motor in operation. Fig. 2 is a sectional elevation of the motor. Fig. 3 is a plan view of a portion of the motor. Fig. 4 is a detail view of the rack and guide. Fig. 5 is a sectional view of the inner end of one of the paddle-carrying levers, together with the gear mounted thereon. Fig. 6 is a vertical cross section of one of the blades or paddles.

1 indicates a float which, in practice, is placed in a stream whose current is to be utilized. Upon this float is secured a circular iron base-plate 2 upon which is fixed an annular rail 3 provided with a groove to receive antifriction balls and constituting a track therefor—see Fig. 2.

The base-plate 2 has a central opening, and at that point a hollow vertical post 4 is secured, it being provided with horizontal flanges, which are, in practice, bolted or riveted to the base-plate. Around this post revolves a horizontal platform 5 which rests upon the antifriction balls in the track and other balls 6 that travel upon the shoulder of the flange securing the post to the base-plate.

Upon the platform 5, at its edge, is secured an annular driving gear 7 with which a driven gear 8 meshes, the latter being mounted upon the horizontal shaft 9 arranged in suitable bearings and which, in practice, is operatively connected with any machinery to be driven. Around and upon the platform 5 and concentric with the hollow post 4 is arranged a series of vertical posts or standards 10 which have enlarged heads 10^a in the form of a truncated wedge—see Fig. 1. The lateral edges or sides of these heads are parallel and between each two is arranged a lever or lever-arm 11 which carries a blade or paddle 12 at its outer end. As shown in Fig. 1, the series of levers 11 extends completely around the platform and they rise and fall successively as the platform revolves. The levers are pivoted at 13 between the heads 10^a and are weighted at their inner ends so that the longer arms of the same are slightly overbalanced. The levers are preferably constructed of wrought iron or steel corrugated lengthwise and tapered for sake of lightness.

A shaft 14 extends through each lever and carries a beveled pinion 15 at its outer end which is journaled in a yoke 16. The aforesaid pinion 15 meshes with a beveled gear 17

whose shaft is journaled in the yoke 16 and is bifurcated and extends down on the sides of the blade or paddle, as shown in Fig. 6, the bifurcated portions being suitably riveted to the paddle. The paddle is likewise strengthened longitudinally by means of metal strips 18 and is weighted at one end 19. On the inner end of the aforesaid shaft 14 is mounted a spur gear 20 that travels over and meshes with a rack 21, the same being semicircular in form as will be understood by reference to Figs. 1 and 3. This rack is fixed on a sleeve 22 which is adapted to slide vertically on the post 4 but is prevented from rotation thereon. This sleeve with the rack and other attachments to be presently described is adjusted vertically by means of rods and levers 23 which are operated by a hand lever 24. Another attachment of the same sleeve 22 is a guide and rack bar 25—see Figs. 2 and 4. This guide and rack bar is arranged over the toothed semicircular rack 21, and the shaft 14 of each lever 11 is extended beyond the gear 20 and provided with an antifriction bearing 26—see Figs. 2 and 5. This bearing is in the nature of a conical roller that is adapted to rotate on balls 27 held in suitable guides fixed on the shaft 14. The roller 26 travels in contact with the under side of the before-described guide 25. The descending ends of the guide 25 are formed as a rack 25ª—see Figs. 2 and 4. Thus, either end constitutes a descending or ascending part which permits operating the motor in either direction, whereby the motor may reverse its action with tide or current without disengaging the blades or paddles from the current. The rack 25ª serves to guide the blades or paddles to the perpendicular when gear 20 descends, or ascends, the blades or paddles thus passing from the perpendicular to the angle at which they should enter the current. On the side opposite the semicircular rack 21 is arranged another guide-bar 28 with which the roller 26 travels in contact during a part of the revolution of the levers and blades around the post 4.

When force is applied sufficient to cause a leyer to dip, its blade or paddle engages the current, and succeeding blades or paddles are also dipped, which causes rotation of the motor or platform with gear 7 attached. In the course of this rotation, the gears 20, mounted on the inner ends of the lever shafts 14, will travel up and onto the semicircular rack 21 and then around the rack, in which movement it is apparent that the shaft 14 will be rotated. The proportions of the different parts of the gears or gearing are such as required to feather the blades or paddles properly; that is to say, to hold them at such angle to the direction of the current that the latter may act thereon with the greatest effect. The blades or paddles are at right angles to the direction of the current only when they have traversed about one-half of their working distance, and the right angle is desirable only when the lever 11 is at a right angle with the current.

When the levers are swung up to the nearly vertical position indicated in Fig. 2, the gear 20 having passed out of contact with the rack 21 and being no longer rotated, the weighted end 19 of the blades or paddles causes them to swing into the vertical position which results from engagement of spur gear 20 with rack 25ª, thus insuring their entering the water again at the proper angle. As the levers pass around with the platform, the roller 26 running on the inner guide bar 28 is gradually carried down from the vertical position and its gear 20 passes up into contact with the rack 21 by which the lever is held in the position required to dip the blades or paddles in the water to the desired depth—see Fig. 2. By the foregoing means and the action of rack 21 and gear 20, the angle of the blades or paddles is also controlled and constantly changed while in the current. The upper guide 25 aids in holding the lever at the required angle both while its gear travels over the rack 21 and after it has passed off the same. The guides being adjustable vertically along with the rack 21, it is apparent through the means of the lever mechanism 23 and 24, the levers may be adjusted at any required angle while the blades are immersed in the water. Said mechanism also enables the operator to wholly remove the blades or paddles from the current at any time.

The operation of the motor as a whole, and especially the gear 20 and rack 25ª, may be further stated as follows. When a lever 11 is near the perpendicular, as represented in lower part of Fig. 1, its blade or paddle, by virtue of weight 19, is vertical or parallel with the lever 11. At the instant that blade or paddle enters the current, the same is several degrees from parallel with the lever 11, as is indicated by the lever pointing to the right in Fig. 1. To produce the change in the angle of the blade or paddle from vertical to that at which it enters the current, is the proper function of the internal rack 25ª by engaging the top of spur gear 20. It will appear by following the direction of arrows in Fig. 1 that while the bottom of gear 20 engages 21, the changing angles of the blades or paddles is produced, as is illustrated in top half of Fig. 1. After 20 shall have passed off 21, and 26 has traveled down on 28 a distance sufficient to raise blades or paddles free of current, the rack 25ª engages the top of gear 20 and as motor moves forward, action on blade or paddle the reverse of that produced from contact of 20 and 21 is produced, and the blade or

paddle is thereby guided to a vertical position or parallel with the lever 11, and by virtue of the weight 19, it so remains, until in its travel about the circumference, it strikes the inclined part of 28 and in ascending the top of gear 20 engages the rack 25ª and this moves the blade or paddle from the vertical to the angle at which it is to enter the current, and it drops into the current as 25ª releases 20, when 21 at once engages 20 and controls angle of blade or paddle during the work period. The reversal of the current will produce the reverse action throughout the motor and its parts, thus producing a reversible motor.

What I claim is:—

1. The improved current motor comprising a suitable base, a central post, a platform revolving around the post and the latter having an annular rack affixed to one side, a series of levers pivoted upon supports secured to the platform, a rotatable shaft operatively connected with each lever and having at its inner end a gear adapted to travel on the aforesaid rack and carrying at its outer end a blade or paddle, and gearing operatively connecting the shaft with the blade or paddle whereby the latter is feathered as the platform and levers are revolved, substantially as described.

2. In a current motor, the combination with a suitable base and a central, vertical hollow post which is fixed in position, of a platform revolving around the post, a driven shaft geared therewith, a series of levers pivoted to supports on the platform and thus carried with it, a vertically adjustable rack supported on the post, means for adjusting the same, shafts journaled in the levers and having gears meshing with the rack, paddles hung from the outer ends of the shafts and levers, and gearing operatively connecting the paddles with the shafts, whereby the paddles may be adjusted to the required depth in the water and feathered in the required manner, substantially as described.

3. The combination with a suitable base support having a central post, a platform adapted to revolve around said post, and means for driving the same, a semicircular rack supported adjustably on the post, means for adjusting the same vertically and preventing its rotation, a series of levers pivoted upon suitable supports carried by the platform, shafts passing through the levers and journaled therein, gears fixed on the inner ends of the shafts and adapted to mesh with the rack, paddles carried on the outer ends of the levers and shafts, and gearing operatively connecting them with the shafts for the purpose of feathering, guides having a fixed connection with the rack whereby they are adjusted vertically with it, and a projection on the inner end of the shafts which works in contact with the guides for raising and lowering the levers to carry the paddles out of and into the water, substantially as described.

4. The combination with a suitable base and a vertical post, of a platform revolving around the latter, a semicircular rack which is adjustable vertically on the post, and means for adjusting the same, a series of levers pivoted upon supports carried by the platform, blades or paddles hung from the outer ends of the levers, and gearing operatively connecting the paddles with the rack, whereby the rack may be adjusted at different heights and the paddles thereby dip more or less in the water, substantially as described.

5. The combination with a suitable base having an annular grooved track, antifriction balls held therein, a revolving platform resting on said balls and provided with an annular gear, a driving shaft having a spur gear meshing with said annular gear, a series of levers pivoted on supports carried by the platform, and means for guiding the levers as they revolve, whereby they are alternately raised and lowered, and blades or paddles affixed to the outer ends of the levers, substantially as described.

LINCOLN GUYNN.

Witnesses:
NEIL LUMAREE,
JAMES LUMAREE.