J. E. WRIGHT.

TIDE MOTOR.

APPLICATION FILED DEC. 27, 1916.

1,304,238.

Patented May 20, 1919.

2 SHEETS—SHEET 1.

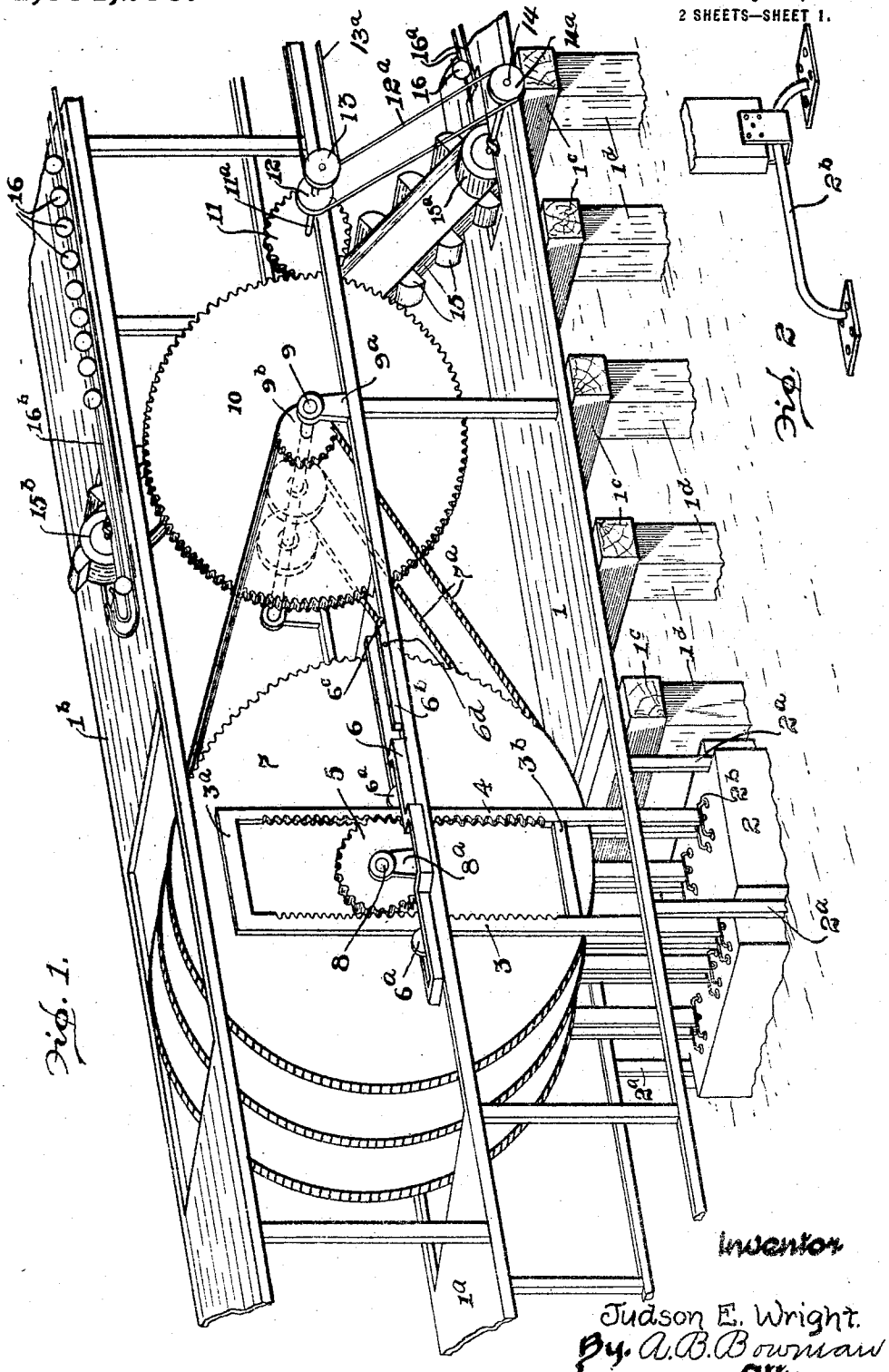


Fig. 1.

Fig. 2.

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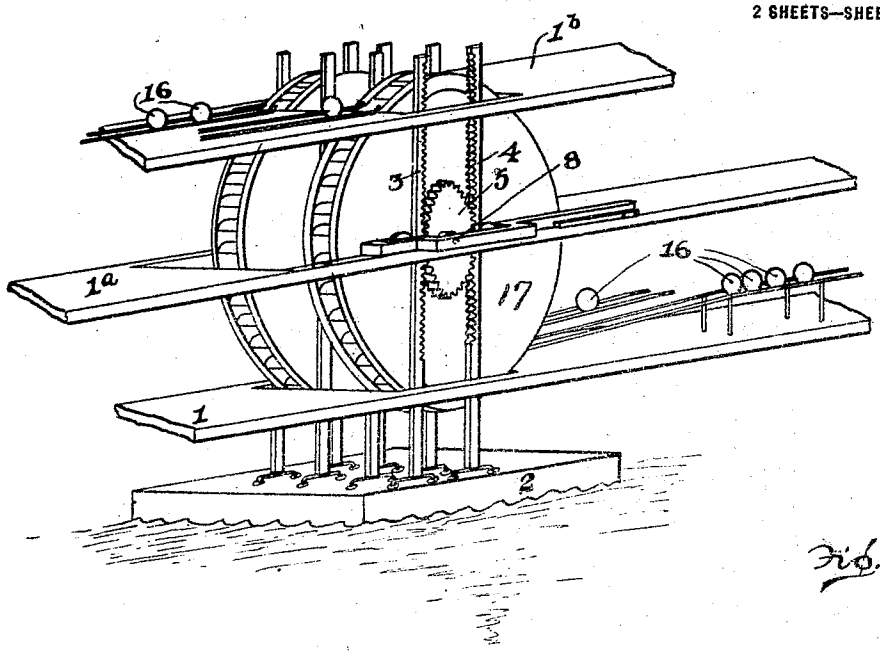


Fig. 4.

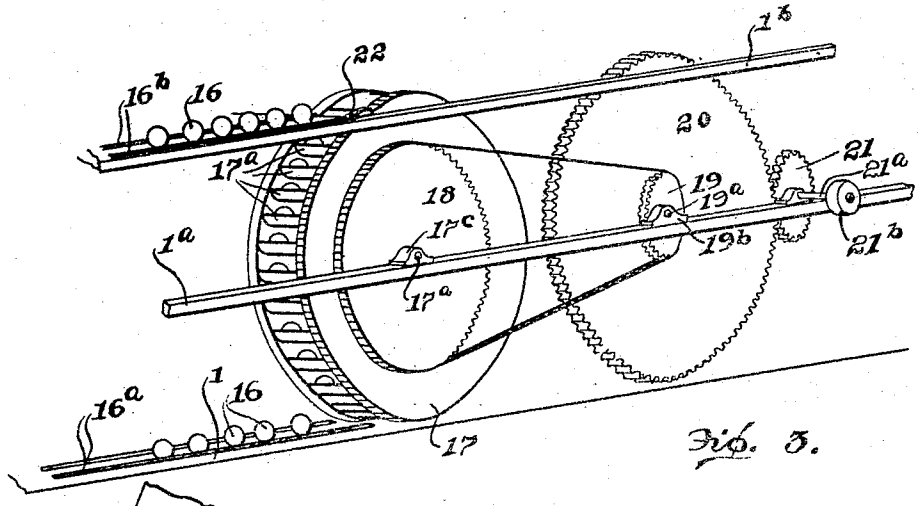


Fig. 3.

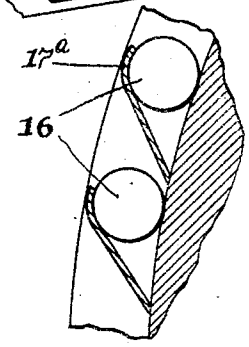


Fig. 5.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JUDSON E. WRIGHT, OF SAN DIEGO, CALIFORNIA, ASSIGNOR OF ONE-HALF TO CHARLES FREY, OF SAN DIEGO, CALIFORNIA.

TIDE-MOTOR.

1,304,238. Specification of Letters Patent. Patented May 20, 1919.

Application filed December 27, 1916. Serial No. 139,111.

To all whom it may concern:

Be it known that I, JUDSON E. WRIGHT, 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 Tide-Motors, of which the following is a specification.

My invention relates to a motor to be used for developing power from the rise and fall of the tide, and the objects of my invention are, first, to provide a motor of this class with means for storing energy by which power will be produced during the time there is none or but slight movement of the tide; second, to provide a motor of this class in which power will be produced by the revolving of a shaft in one direction as the tide moves either up or down; third, to provide a motor of this class in which one or a large number of units may be used in connection with each other or singly for driving a power shaft; fourth, to provide a motor of this class in which the force of gravity is utilized for producing the power when the tide is practically at a stand still and, fifth, to provide a motor of this class which is simple and economical of construction, durable, easy to operate, continuous in its action, and 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 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 my device for producing power when the tide is active and showing one form of means for storing energy for operating the power shaft when the tide is inactive, all shown in connection with a fragmentary portion of a wharf or supporting structure. Fig. 2 is a detailed perspective view of the guide means upon which the gear racks are shifted. Fig. 3 is a perspective view of the gravity actuated means for operating the power shaft when the tide is inactive from the energy stored while the tide is active. Fig. 4 is a modified form of structure used for storing energy while the tide is active to be used by the structure shown in Fig. 3 for revolving the power shaft when the tide is inactive or nearly so, and Fig. 5 is a fragmentary sectional view of the sphere carrying wheels showing the pockets for supporting the spheres.

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

The wharf 1, float 2, gear racks 3 and 4, gear 5, gear rack shifting device 6, sprocket 7, shaft 8, shaft 9, gear 10, gear 11, sheave 12, sheave 13, shaft 14, conveyer 15, spheres 16, wheel 17, sprocket 18, sprocket 19, gear 20 and gear 21 constitute the principal parts of my motor. The wharf is preferably composed of three floors 1, 1^a and 1^b placed one above the other and preferably supported by means of transverse beams 1^c and piles 1^d. Beneath the floor 1 and between the piles is a very large float 2 of suitable weight floating in the water, and it is held in its position by means of guides 2^a but permitting it to rise and lower with the rise and fall of the water with the varying tides. Secured to the top of this float are a plurality of pairs of guide members 2^b as shown best in Fig. 2 of the drawings and secured to each pair of guide members 2^b is a pair or gear racks 3 and 4 which are vertically positioned and supported upon said float and held in certain spaced relation to each other by means of cross bars 3^a and 3^b so that the gear 5, with which the teeth of the racks are adapted to engage, will only engage with one rack at a time, said racks being shifted sidewise so that the rack 3 engages with one side of the gear when the tide is rising, and the rack 4 engages with the other side of the gear when the tide is falling, and for shifting said racks I have provided a shifting device 6, mounted on the floor 1^a and adapted to be shifted longitudinally thereon provided with rollers 6^a adapted to engage the outer edges of the racks 3 and 4 for reducing the friction between said shifting device and said gear racks. This shifting device 6 is also provided with a lever 6^b pivotally mounted on the floor 1^a at 6^c, and said lever is pivotally mounted on the shifting device at 6^d so that when said lever is thrown over it shifts and holds said shifting device 6 in a certain shifted position placing one of the racks 3, 4 in engagement with the gear 5. The gear

5 is mounted upon the shaft 8 and is revolved by said racks 3 or 4 as hereinbefore described and rigidly secured to this shaft are a plurality of sprockets 7. In this case I have shown three, but there may be more or less as desired for forming a unit, and there may be as many units as desired. This shaft 8 is supported on the floor 1^a by means of the bearing 8^a. Mounted on the same floor and spaced from said shaft 8 is another shaft 9 mounted on a bearing 9^a. On this shaft are a plurality of sprockets 9^b in line with the sprockets 7, and said sprockets 9^b and 7 are connected by means of the chains 7^a, and mounted on this same shaft 9 is a large gear 10 which engages another smaller gear 11 mounted on the shaft 11^a, and mounted on this shaft is a sheave 13 which is provided with a belt 13^a for extending to any driven mechanism it is desired to drive by the motor. The objects of the gears 10 and 11 are to provide greater speed to the shaft 11^a, the size of the gears being made suitable to drive the driven mechanism as desired. Mounted on this shaft 11^a is also a sheave 12 which is provided with a belt 12^a which engages a sheave 14^a mounted on a shaft 14 on the floor 1 of the wharf. Mounted on this shaft 14 is also a sheave 15^a for the conveyer 15 which is an ordinary endless bucket and belt conveyer which is supported on a sheave 15^b on the upper floor 1^b of the wharf. In connection with the lower end of the conveyer 15 is a track 16^a adapted as a guide for the spheres 16 which is slightly inclined, adapted to roll the spheres 16 into the buckets which carry them up to the floor 1^b and there release them upon a similar track 16^b which is also inclined, adapted to carry the spheres to the wheel 17 on this same floor where they gravitate into the pockets 17^a in the wheel 17 and thereby revolve said wheel 17 and are emptied from the pockets on the floor 1 on to the inclined track 16^a from whence they gravitate to the conveyer 15. It will be here noted, however, that when the tide is sufficiently active to produce power in addition to the raising of the spheres 16 to the floor 1^b that the spheres 16 are carried by the conveyer 16, and the wheel 17 revolves, and that the wheel 17 is only used for producing power when the tide is inactive or nearly so. It will also be here noted that the wheel 17 is only one unit of which there may be a plurality as desired for producing the proper amount of power. This wheel 17 is mounted on a shaft 17^a journaled in a bearing 17^c on the floor 1^a and mounted on this same shaft 17^a is a sprocket 18 provided with a chain which extends to another sprocket 19 secured to a shaft 19^a which is journaled in bearings 19^b a suitable distance from the bearing 17^c and mounted on this same shaft 19^a is a large gear 20 which engages a gear 21 which is mounted on a shaft 21^a, and upon this shaft 21^a is secured a sheave 21^b provided with a belt which extends to the driven mechanism as desired. It will thus be noted that the mechanism shown in Fig. 3 of the drawings and just described is an auxiliary mechanism for operating the driven mechanism by means of the spheres 16 stored on the floor 1^b while the tide is active for use for power when the tide is inactive. In Fig. 4 of the drawings I have shown a modified form of structure for raising the spheres from the floor 1 to the floor 1^b from the conveyer 15 shown in Fig. 1 of the drawings, the float, wharf, rack, gear 5, spheres and sphere tracks being the same as is shown in Fig. 1 of the drawings, and the wheels 17 mounted on the shaft 8 are the same as the wheels 17 shown in Fig. 3 of the drawings. The spheres 16 are raised from the floor 1 to the floor 1^b by gravitating into the pockets of wheel 17 and are carried upward by the operation of the floats 2 operating the shaft 8 as hereinbefore described. It will be here noted that the racks 3 and 4 are shifted manually, and that the spheres are controlled in their tracks manually for producing proper and continuous power to the driven mechanism at all times as required by the variations of the activity of the tide. In order to hold the wheels 17 and sprocket 7 when not in use I have provided pawls 22 to be manually operated for holding the same.

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

It is obvious that with this construction there is provided a tide motor which will produce power to be utilized by a driven mechanism while the tide is active, either rising or falling, that there is provided an auxiliary for providing power to this driven mechanism while the tide is inactive, that a sufficient quantity of spheres may be stored on the floor 1^b to operate the driven mechanism for a considerable length of time during inactivity of the tide or for repair of the general mechanism which may be utilized for producing power as described, that there may be as many units of the general mechanism as is required to produce the required power.

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

1. In a tide motor, a wharf comprising

three floors spaced apart one above another, a float adapted to rise and fall with the water below said wharf, a plurality of vertical guides for preventing side movement of said float, a plurality of pairs of gear rack members each pair shiftably connected to said float at their lower ends, a gear revolubly mounted between said rack members on the middle floor of said wharf, means for facilitating the manual shifting of said rack members whereby the opposite members are engaged by said gear, a plurality of wheels mounted on the shaft provided with a plurality of pockets in their outer edge, a track for each wheel for guiding balls to the pockets in said wheel on the lower floor of said wharf, a track on the upper floor for each wheel for guiding the balls from the pockets of said wheels, a plurality of other wheels revolubly mounted on the second floor of said wharf adapted to receive the balls from the tracks in the upper floor whereby said wheels are turned by the weight of said balls for producing power in their descent to the lower floor.

2. In a tide motor, a wharf comprising three floors spaced apart one above another, a float adapted to rise and fall with the water under said wharf, a plurality of wheels revolubly mounted on the second floor of said wharf provided with a plurality of pockets in their outer edges, means connecting said float with each of said wheels for revolving said wheels with the rise and fall of said float in the water, a track for each wheel for guiding balls to the pockets in said wheel on the lower floor of said wharf and a track on the upper floor for each wheel for guiding the balls from the pockets of said wheel, a plurality of other wheels revolubly mounted on the second floor of said wharf adapted to receive the balls from the tracks in the upper floor whereby said wheels are turned by the weight of said balls for producing power in their descent to the lower floor.

In testimony whereof, I have hereunto set my hand at San Diego, California, this 16th day of December 1916.

JUDSON E. WRIGHT.

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