

C. C. TUCH.
 ROTARY WATER MOTOR.
 APPLICATION FILED MAY 16, 1913.

1,100,632.

Patented June 16, 1914.

Fig. 1.

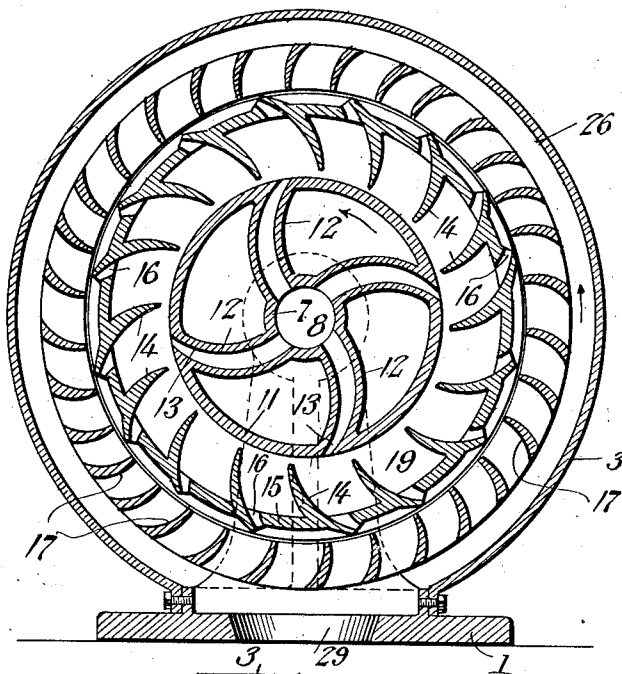
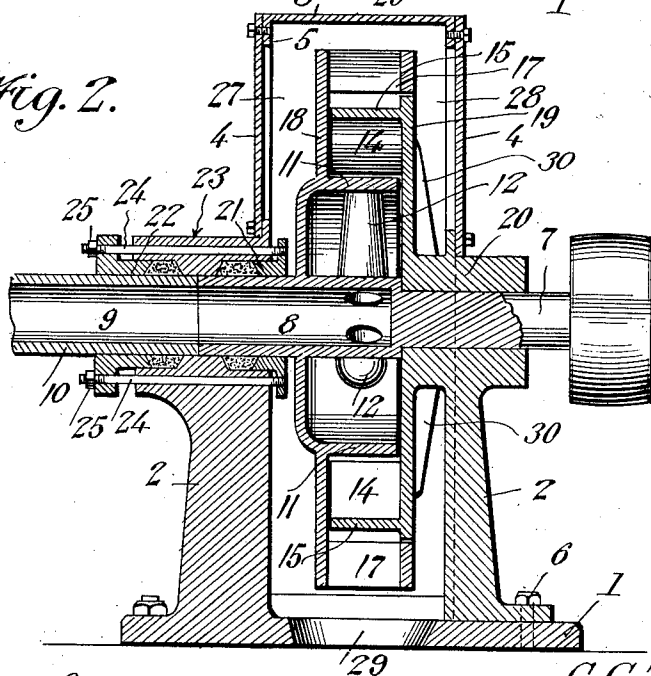


Fig. 2.



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Witnesses

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ROTARY WATER-MOTOR.

1,100,632.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHRISTIAN C. TUCH, a citizen of the United States, residing at Honolulu, in the county of Honolulu and Territory of Hawaii, have invented new and useful Improvements in Rotary Water-Motors, of which the following is a specification.

This invention relates to rotary water motors or turbines, the object of the invention being to provide a simple and practical form of turbine motor of the class described, which embodies novel means for taking advantage of both the reaction of the water pressure and the direct action of the pressure, and delivering the power, generated by the combined action referred to, to a common shaft, from which the power may be belted off to any suitable point.

A further object of the invention is to provide in a motor of the class described, a rotor embodying an inner member operating on the reaction principle, and an outer member rigidly connected to and carried by the inner member and acting under the direct pressure of the water, the said outer and inner members of the rotor being connected to a common shaft for transmitting the power generated by the motor as a whole.

With the above and other objects in view, the invention consists in the construction, combination and arrangement of parts, as will be hereinafter more fully described, illustrated in the accompanying drawings, and pointed out in the claims hereunto appended.

In the drawings: Figure 1 is a vertical longitudinal section through a turbine motor, embodying the present invention. Fig. 2 is a vertical transverse section through the same, taken diametrically of the shaft.

The motor contemplated in this invention comprises a suitable supporting base 1 provided with upwardly extending and oppositely arranged pedestals 2. To the structure comprising the parts 1 and 2, a rotor casing is secured, said casing embodying a cylindrical outer wall 3, and the end or head walls 4 and 5. As shown in Fig. 2, the wall 3 may be provided with inturned flanges 5, to which the side walls or heads may be bolted or secured in any desired manner.

In order to give access to the casing and enable the same to be removed from the remainder of the structure, one of the pedes-

tals, shown at the right hand side of Fig. 2, may be detachably connected to the base 1 by bolts 6, or the equivalent thereof.

7 designates the shaft of the motor on which the rotor is mounted fast, the said shaft 7 being hollow or provided with a central longitudinal bore 8 which communicates with the corresponding bore 9 of an outer stationary shaft section 10 forming an inlet for the water which is thus fed to the center of the rotor and distributed outwardly tangentially therefrom. With this object in view, the rotor comprises a rim 11 concentric with the shaft 7 and arranged at a suitable distance therefrom and connected thereto by means of hollow spokes 12 which are curved in the direction of their length, so as to form substantially tangential discharge orifices or nozzles 13, by means of which the water passing outwardly under pressure through the channels or passages in the spokes is directed tangentially against a circular series of fixed vanes 14.

Any desired number of vanes 14 may be employed in the construction of the motor, and these vanes are inclined in a direction reverse to the direction of the outer ends of the spokes 12, as clearly shown in Fig. 1, so that as the water escapes from the discharge orifices 13, it is directed almost perpendicularly to the inner concaved faces of the blades 14, said blades being substantially concavo-convex in cross section, as shown in Fig. 1.

All of the concavo-convex vanes 14 are connected to a common fixed rim 15, near the outer edges of the vanes, as shown in Fig. 2, and the rim 15 is provided adjacent to the concavo face of each vane with an opening or port 16, through which the water contained in the pockets formed between the vanes is discharged, in the form of a strong jet against a circular series of blades 17, which constitute the outer section or member of the motor, the inner section of which is formed by the shaft 8, the spokes 12 and the rotary rim 11.

The blades 17 of the outer series are concavo-convex in cross section, being similar in shape to the vanes 14, and the said blades 17 are inclined reversely to the vanes 14, so that as the water escapes through the ports 16 under the direction given thereto by the concaved faces of the vanes, the jets of water are directed tangentially from the fixed rim

15 and almost perpendicularly against the concaved faces of the blades 17, so that the direct action of the water is made effective at this point, the same operating directly
5 against the blades 17 to propel the outer section or member of the rotor.

The blades 17 are connected to the inner member of the rotor at one side by means of a web 18, as shown in Fig. 2, while the
10 stationary vanes 14 are connected at one side to a web 19 which is formed integrally with the bearing 20 of one of the pedestals 2, in which the shaft 7 is journaled, as shown in Fig. 2.

15 21 and 22 designate stuffing boxes for preventing leakage of the water through the bearing 23, in which the hollow end of the shaft 7 is journaled, as shown in Fig. 2, said stuffing boxes being adjustable by means of
20 bolts 24 and nuts 25.

From the foregoing description, it will now be seen that the water delivered under pressure into the hollow shaft 8 of the rotor is carried outwardly through the hollow
25 spokes 12, and escaping from the tangentially arranged ports or orifices 13 at the outer extremities of said spokes and in the rim 11, is directed against the stationary vanes 14, thereby setting up a reaction which
30 causes a rotation of the shaft 7 and rim 11 in an anti-clockwise direction, as indicated by the arrows in Fig. 1. The direction of the water arrested by the vanes 14 is changed, and the water is delivered tangentially from the stationary rim 15 against
35 the blades 17 of the outer section of the rotor, the water at this point acting directly against the blades 17 to propel the outer section of the rotor in the same direction as the
40 inner section of the rotor. In this way, advantage is taken of the direct and indirect action of the water under pressure in escaping from the hollow shaft 8 into the outer annular exhaust water space 26 and the
45 spaces 27 and 28 at opposite sides of the rotor, the water then passing through an outlet or exhaust port 29 shown for convenience as extending through the base or bed 1 of the motor.

50 30 designates radially extending reinforcing

ribs on the outer side of the web 19 of the stationary rim 15.

What is claimed is:

1. A combined direct and reaction turbine motor, comprising oppositely arranged
55 bearing pedestals, a tubular water intake shaft journaled rotatably in said pedestals, a stationary cylindrical casing, a circular series of stationary vanes supported by one of said pedestals, and a rotor fast on said
60 shaft and comprising an inner member and an outer member, said members being arranged upon the inner and outer sides, respectively, of the circular series of stationary vanes, and the outer member embodying
65 a circular series of blades which are inclined reversely to the stationary vanes, whereby the inner member of the rotor receives its motion through the reaction of the water and the outer member of the rotor is pro-
70 pelled by the direct action of the water.

2. In a turbine motor, the combination of a cylindrical stationary casing having an outlet, oppositely arranged bearing pedestals, a tubular water intake shaft journaled
75 rotatably in said pedestals, a stationary disk supported by one of said pedestals, a stationary rim on said disk concentric with said shaft located between the shaft and the casing and provided with openings through the
80 same, a series of stationary inclined vanes on the inner side of the fixed rim, and a rotor embodying an inner member and an outer member arranged, respectively, at opposite sides of said stationary rim and
85 vanes supported thereby, the inner member embodying a rotary rim, and tubular spokes connecting said rotary rim with the hollow shaft and opening out tangentially through
90 said rotary rim, the outer member embodying a circular series of blades inclined reversely to the stationary vanes and having a fixed relation to the inner member of the rotor.

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

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Witnesses:

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