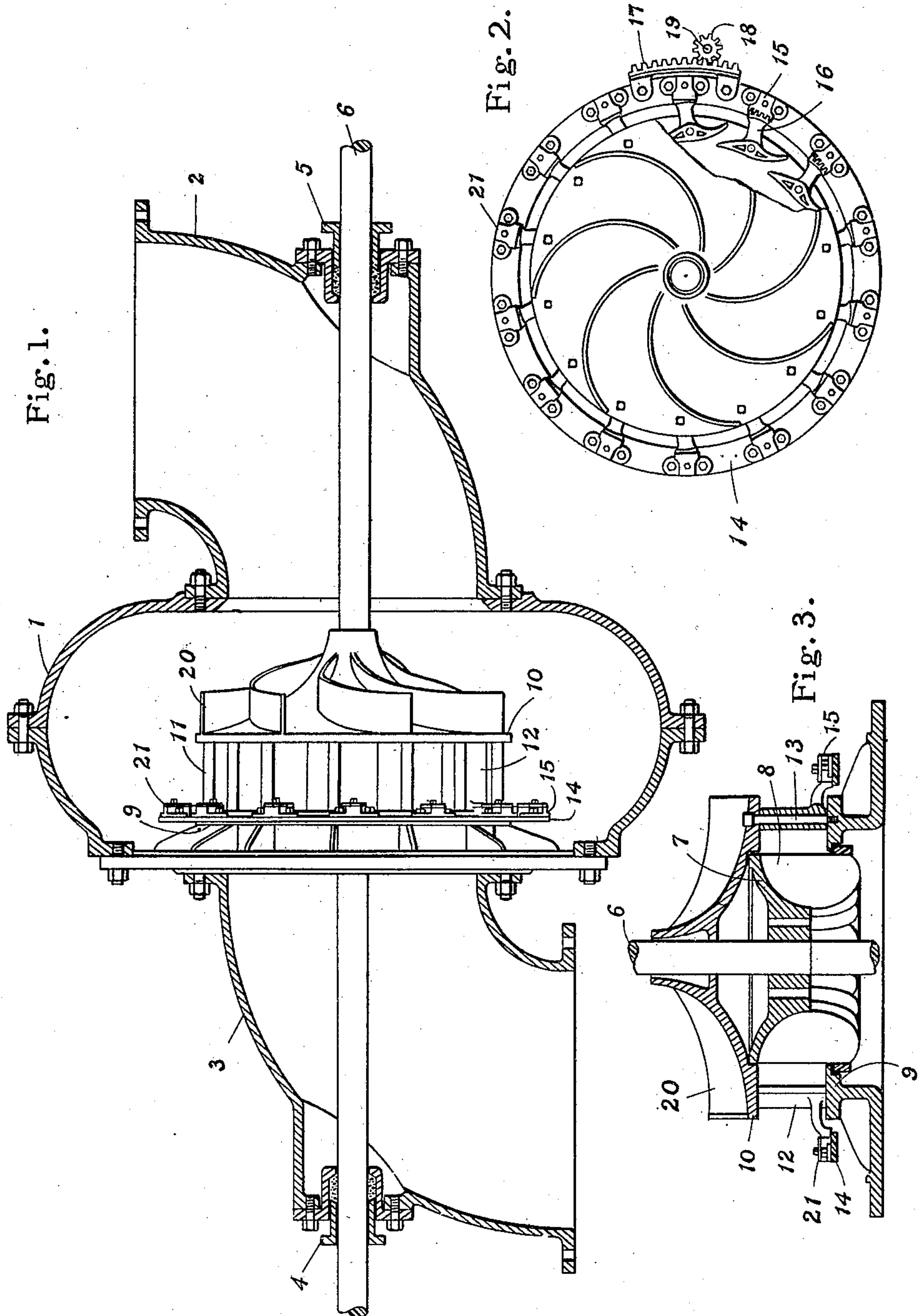


F. TRUMP.  
WATER WHEEL.

APPLICATION FILED MAY 2, 1908.

917,192.

Patented Apr. 6, 1909.



WITNESSES:  
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# UNITED STATES PATENT OFFICE.

FULLER TRUMP, OF SPRINGFIELD, OHIO.

## WATER-WHEEL.

No. 917,192.

Specification of Letters Patent.

Patented April 6, 1909.

Application filed May 2, 1908. Serial No. 430,439.

*To all whom it may concern:*

Be it known that I, FULLER TRUMP, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Water-Wheels, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to water wheels, and more particularly to pressure turbines, the runners or wheels proper of which have cases with a plurality of gates opening around the periphery of the runner, the water being introduced parallel with the wheel shaft and admitted to the runner through the gate openings at right angles to the wheel shaft. Heretofore, in water wheels of this class, the water, being introduced parallel with the shaft, would strike the plate of the wheel casing opposite the penstock inlet, causing the velocity of the current to be checked and eddies to be formed, seriously impairing the efficiency of the current before it reaches the runner, and in actual practice it has been found that the undirected current will frequently press the runner in such manner as to cause the bearings to wear upon one side, thus forcing the runner against the wheel casing and further lessening the efficiency of the wheel.

The object of my invention is to overcome these difficulties by providing means to give the current, which enters the penstock parallel with the shaft, a rotary movement in planes transverse to the axis of the shaft, and thereby direct it uniformly to all the gate openings about the wheel casing, without checking or impairing the velocity of the current and avoiding the unequal wear upon the bearings.

With these and other objects in view, my invention consists of the constructions and combinations hereinafter described and set forth in the claims.

In the accompanying drawings, which form a part of the specifications, Figure 1 is a view of a water wheel placed horizontally in an iron penstock, embodying my invention, the penstock being shown in section and the water wheel in elevation. Fig. 2 is a top or end view showing the scroll vanes, a part of the crown or inlet end plate being broken away to show the gates; and Fig. 3 is a sectional view showing parts of the wheel case and runner.

Like numerals represent the same parts in the several views.

In the drawings 1 represents a penstock having an inlet elbow 2 and a discharge elbow 3, said elbows being provided with suitable bearings 4 and 5 to carry the wheel shaft 6 that extends through the penstock and elbows as shown. A wheel proper or runner 7 is fixed to the shaft 6 and is provided with buckets 8. The wheel casing comprises two oppositely-disposed plates 9 and 10 secured at a fixed distance from each other by columns 11 and bolts 13, and a plurality of gates 12 are arranged to swing upon the bolts 13 between the plates 9 and 10 opening around the periphery of the wheel to admit the water to the buckets 8 of the wheel. A ring 14, having racks 15 fixed thereon and adapted to mesh with the segments 16 on the gates, and an additional rack 17 with pinion 18 meshing therewith, the pinion being fixed on a suitable rod 19, the rod having a hand-wheel thereon (not shown), forms the means of operating the gates. Caps 21 cover the cogs of the segments 16 and racks 15 to protect the same and hold the ring in place.

The plate 10, being the one nearest the penstock inlet, I form concave cone-shaped, as shown, with spiral ribs or vanes 20 thereon, so that the current which enters parallel to the shaft, when it reaches the plate, will, by reason of its concave cone-shape and the spiral ribs, be given a rotary movement in planes transverse to the axis of the wheel and be guided uniformly to all the gate openings in the wheel casing without checking its velocity and avoiding any counter currents or undue strains upon one side of the wheel. It will also be seen that I have arranged the gate opening mechanism at or near the discharge plate of the wheel, so that the water will not be obstructed in its flow to the wheel. Heretofore the gate-operating mechanisms have been arranged at or near the inlet plate of the casing and have formed an obstruction to the current.

Having thus described my invention, I claim:

1. A water wheel and a penstock therefor admitting the water parallel with the axis of the wheel, said wheel comprising a runner, a driving shaft and a casing for the runner adapted to inclose and protect the same, said casing having a plurality of gate openings around the periphery of the runner and means on said casing independent of the



penstock to give a rotary movement to the water in planes transverse to the axis of the wheel, substantially as described.

2. A water wheel and a penstock therefor admitting the water longitudinally with the axis of the wheel, said wheel comprising a runner, a driving shaft and a casing for the runner adapted to inclose and protect the same, said casing having a plurality of gates opening about the periphery of the runner and means imposed on said casing away from the penstock to guide and direct the water uniformly to each of said gates before it reaches the gates, substantially as described.

3. A water wheel and a penstock therefor having inlet and discharge openings, the inlet opening admitting the water longitudinally with the axis of the wheel, said water wheel comprising a runner and a casing therefor having oppositely-disposed plates with a plurality of oscillating gates arranged to open around the periphery of the runner, the plate nearest the inlet of the penstock having spiral ribs or vanes thereon, substantially as described.

4. A water wheel and a penstock therefor having inlet and discharge openings, the inlet opening admitting the water parallel with the axis of the wheel, said water wheel comprising a runner and a casing therefor having oppositely-disposed plates with a plurality of gates arranged to open around the periphery of the runner, the plate nearest the penstock inlet being concave cone-shaped with

spiral ribs or vanes thereon to direct the current uniformly to each of the gate openings, substantially as described.

5. A water wheel and a penstock therefor having inlet and discharge openings, the inlet opening admitting water parallel to the axis of the wheel, said water wheel comprising a runner and a casing therefor having oppositely-disposed plates with a plurality of gates to open around the periphery of the runner, operating mechanism for the gates arranged at or near the discharge plate of the wheel, and spiral ribs or vanes on the plate nearest the inlet of the penstock, substantially as described.

6. A water wheel and a penstock therefor having inlet and discharge openings, the inlet opening admitting water parallel to the axis of the wheel, said water wheel comprising a runner and a casing therefor having oppositely-disposed plates with a plurality of gates to open at intervals around the periphery of the runner, gate operating mechanism arranged at or near the discharge plate of the wheel, and the plate nearest the inlet of the penstock being concave cone-shaped with spiral ribs or vanes thereon, substantially as described.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

FULLER TRUMP.

Witnesses

LESTER C. WHITTEN,  
CLIFTON P. GRANT.