(No Model.)

J. W. KLINE.

WATER WHEEL.

No. 462,821. Patented Nov. 10, 1891.

Fig. 2.

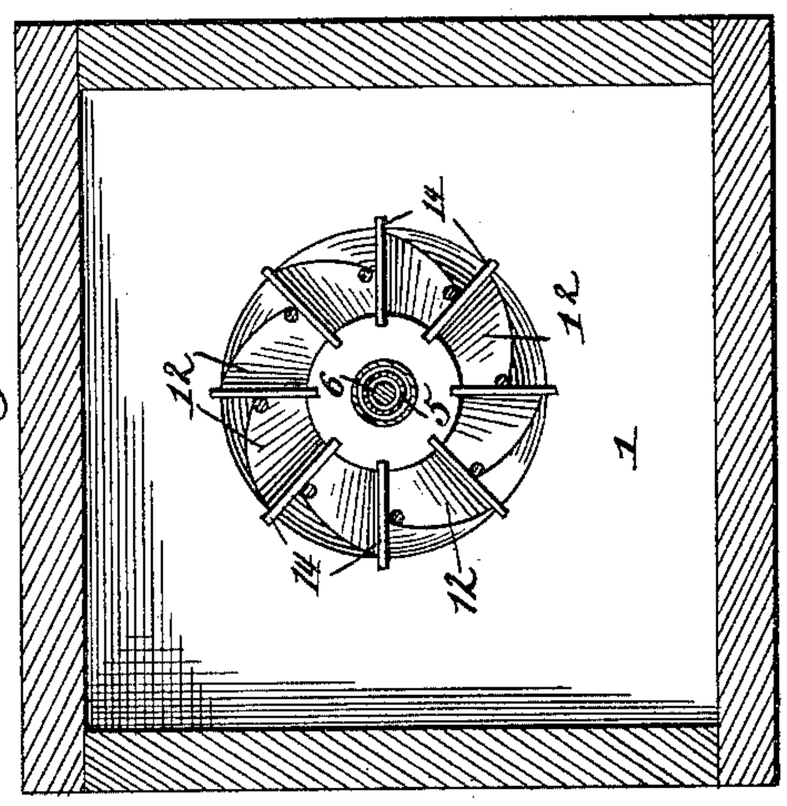


Fig. 3.

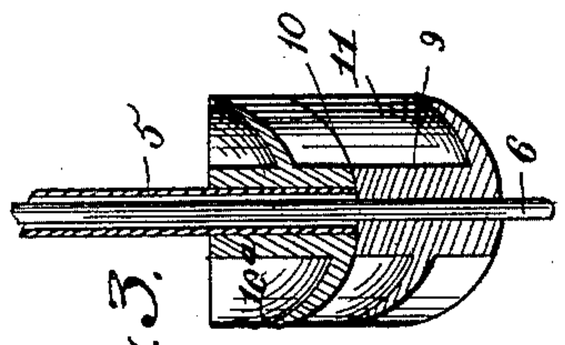
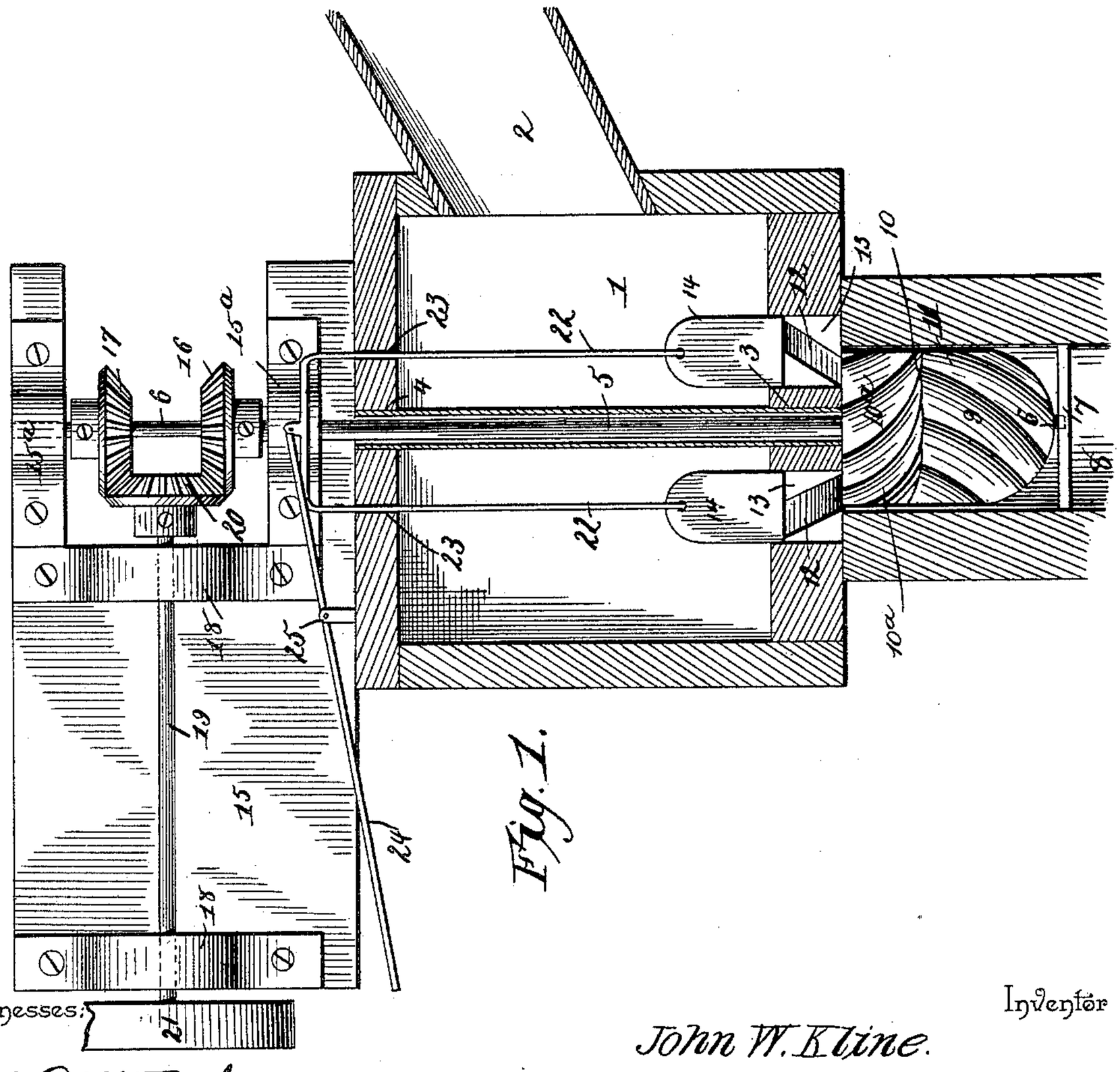


Fig. 1.



Witnesses:
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By his Attorneys,
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UNITED STATES PATENT OFFICE.

JOHN WHITEMAN KLINE, OF WILKES-BARRÉ, PENNSYLVANIA.

WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 462,821, dated November 10, 1891.

Application filed November 18, 1890. Serial No. 371,837. (No model.)

To all whom it may concern:

Be it known that I, JOHN WHITEMAN KLINE, a citizen of the United States, residing at Wilkes-Barré, in the county of Luzerne and State of Pennsylvania, have invented a new and useful Water-Wheel, of which the following is a specification.

This invention has relation to improvements in water-wheels; and it consists in certain details of construction and novel combination of parts hereinafter described, and particularly pointed out in the claim.

Referring to the drawings, Figure 1 is a vertical longitudinal section of the casing, the mechanism therein being shown in side elevation. Fig. 2 is a transverse section taken above the gates. Fig. 3 is a vertical longitudinal section through the buckets or turbines.

Like numerals of reference indicate like parts in all the figures of the drawings.

1 designates the rectangular water-chamber, to which leads the inclined chute 2, having communication with the chamber at one of its side walls. The bottom of the chamber is provided with a central bearing 3 and the top with a vertically-opposite bearing 4, in which is mounted for revolution a hollow or tubular shaft 5, said shaft extending above and below the top and bottom of the casing. Mounted for revolution within the hollow or tubular shaft 5 is a smaller but solid shaft 6, the lower end of which is stepped in a bearing 7, located near the bottom of a discharge-cylinder 8, the inner wall of which somewhat closely surrounds a pair of turbines. The lower turbine 9 is provided with a concaved upper end 10, and in this end is seated loosely the convexed lower end of the upper turbine 10^a. The lower turbine is fixed upon the inner shaft 6, while the upper turbine is fixed upon the outer or tubular shaft 5, and each is provided with spiral wings or grooves 11, those of one turbine disposed in a contrary direction to those of the other. The bottom of the casing 1 is provided with a concentric series of spiral openings 12, each of which is provided at its upper end with a pair of vertical ways 13, in which is mounted for sliding a gate 14. These openings are disposed contrary to the disposition of the wings or grooves of the upper turbine, and are therefore designed to deliver water against the inclined faces of the upper wings, and hence propel the turbine in one direction and the delivery of water from the upper turbine into the lower turbine serves to operate the latter in the opposite direction. The gates 14 may be operated to increase or diminish the outlet of water, and hence the power or force directed against the turbines and to be converted into power, as will hereinafter appear.

15 designates a standard horizontally disposed and located upon the upper side of the casing 1, said standard being provided vertically opposite the bearings 3 and 4 of the casing with a pair of bearing-blocks 15, the lower block receiving the hollow or tubular shaft 5, a slight distance above which said shaft terminates, and the upper block receiving the inner shaft 6, which it will be apparent is longer than the companion shaft. The upper end of the hollow tubular shaft is provided with a beveled pinion 16, while that of the inner shaft is provided with an inverted pinion 17, similar to the pinion 16. Opposite the space between the two pinions 16 and 17 is located a pair of bearing-blocks 18, in which is mounted for rotation a horizontal shaft 19. At the inner end of this shaft a pinion 20, corresponding to the pinions 16 and 17, is located, and the same is engaged at diametrically-opposite sides by the two pinions, which, revolving in opposite directions, combine to operate the pinion 20 and its shaft 19 in one direction. The outer end of the shaft in this instance carries an ordinary belt-pulley 21, but may be provided with any other well-known form of power-converting device.

The several gates 14 may be operated each by a single rod 22, connected thereto and extending through openings 23 up beyond the roof of the casing; or, if desired, as shown in Fig. 1, two or more gates may be operated simultaneously by means of a U-shaped bail passed through the two openings in the casing and connected at its lower terminals to a pair of gates, said bail being operated outside of the casing by means of a lever 24, pivoted, as at 25, to a suitable fulcrum upon the casing. The water delivered by the chute 2 enters the casing 1 and its outflow is regulated, as before stated, by a manipulation of the gates and their rods 22, or by the beforementioned lever, and being delivered at an

angle to the upper turbine exerts the greatest possible pressure or force against the same, and the latter delivers the water to the lower turbine at an angle and in a greater volume and in such a manner as to secure the best possible results. The nesting or seating of the convexed lower end of the upper turbine in the concaved upper end of the lower turbine insures the best possible results from the water, and also insures a smooth frictionless movement in reverse directions of the two wheels with relation to each other. The centrifugal force generated by the rapid rotations of the turbines tend to discharge the water laterally over the edges of the grooves before said water has reached the lower ends of the grooves, and hence in order to avoid such premature discharge and secure the full utility of the volume of water, the bottoms of the wings or grooves are made concave, or, in other words, the wings are curved, as shown, so that the water is retained in the wings until it has nearly reached their lower ends and is prevented from escaping laterally by the seating of the upper turbine within the upper end of the lower one, whereby the wings of the lower turbine receives the water as discharged.

Having described my invention, what I claim is—

The combination, with the casing provided with bearings vertically opposite, of the shaft 6, journaled in the bearings, the spirally-grooved turbine 9, having the concaved upper end and fixed to the shaft 6, the hollow shaft 5, inclosing the shaft 6, the upper turbine 10^a, mounted on the shaft 5, spirally-grooved reversely to that of the turbine 9 and having a convexed lower end bearing in the concaved upper end of the turbine 9, and the gearing for driving the shafts in opposite directions, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

JOHN WHITEMAN KLINE.

Witnesses:
GEO. A. WELLS,
JESSE C. KLINE.