

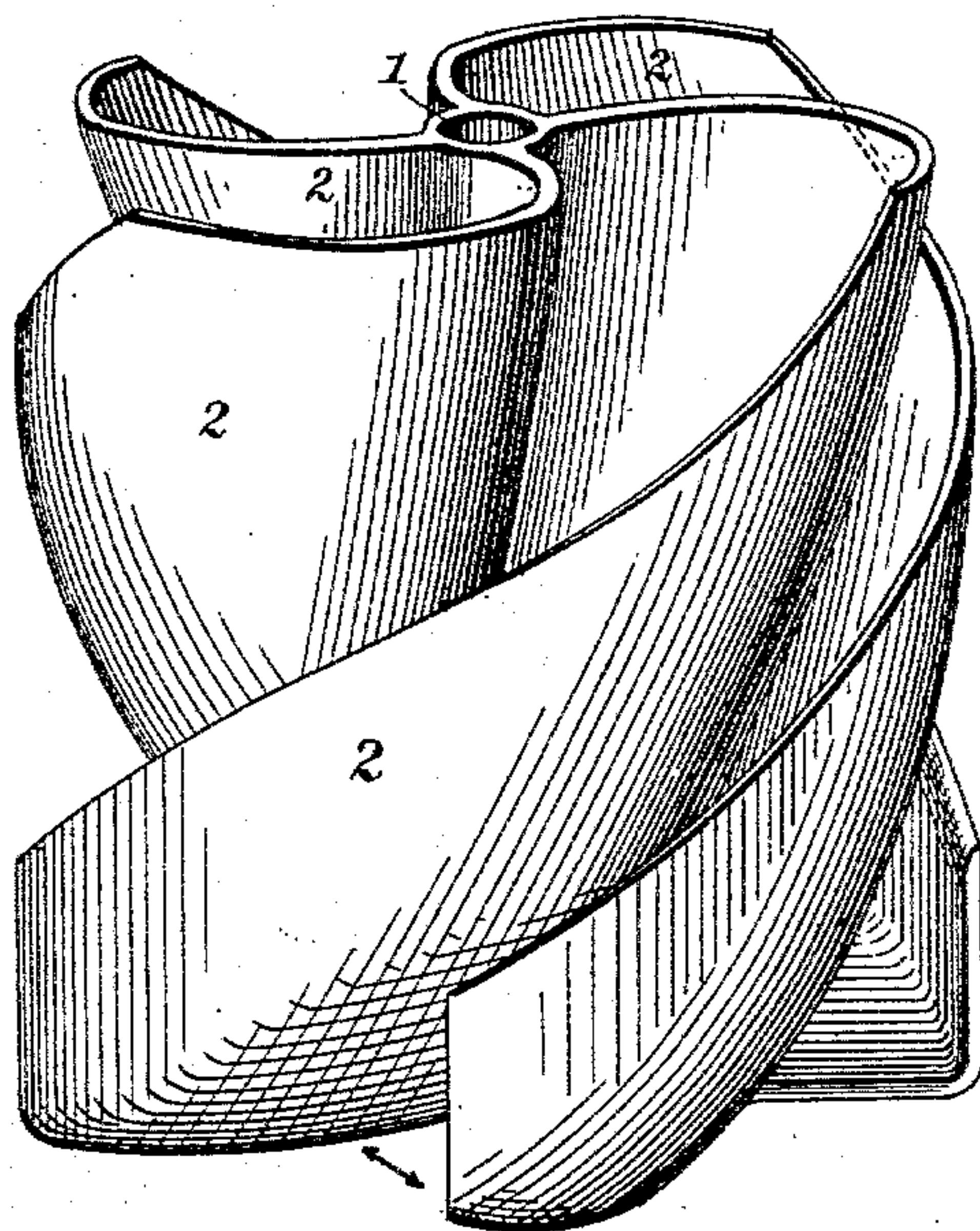
(No Model.)

J. W. STULTS.  
TURBINE WATER WHEEL.

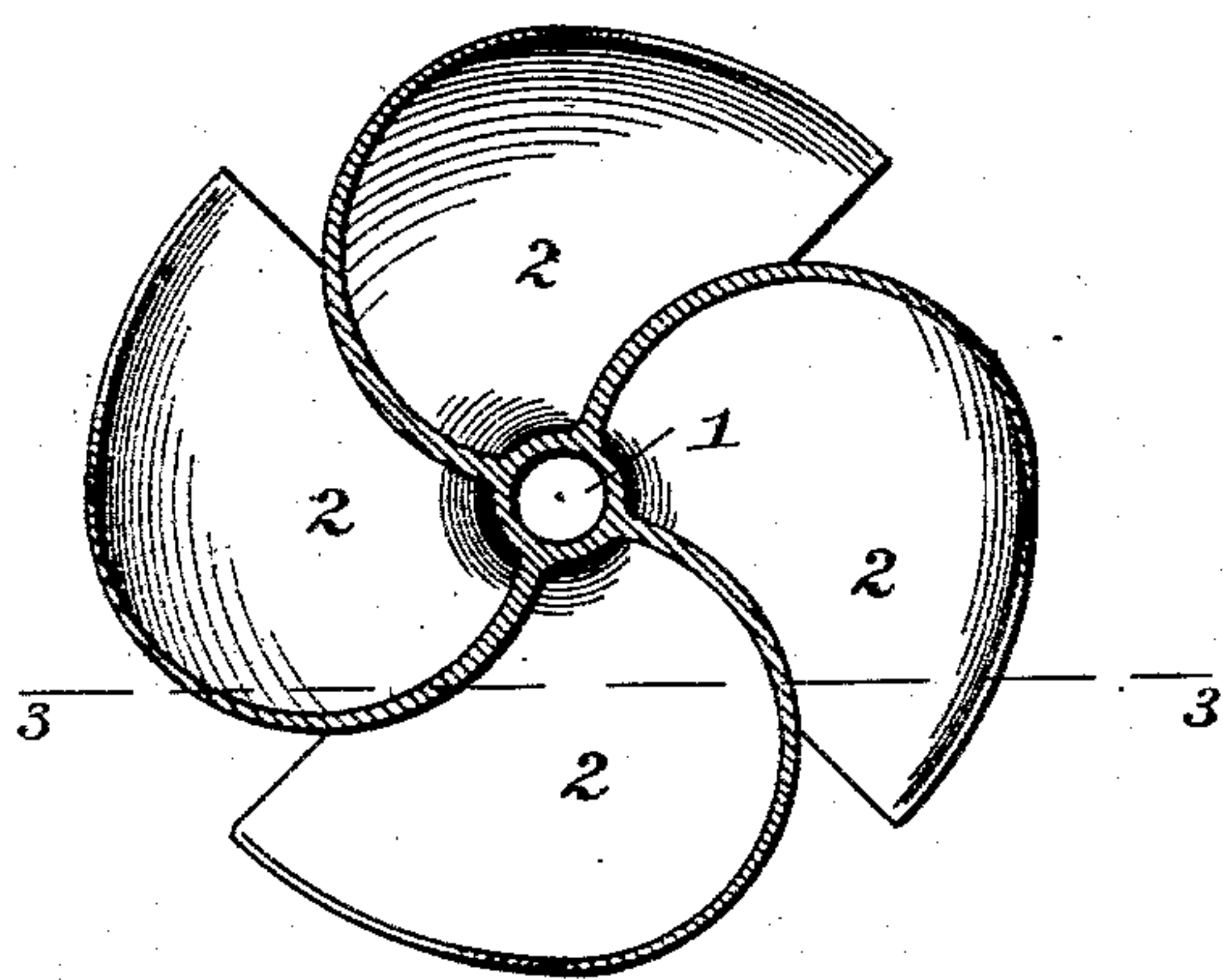
No. 533,679.

Patented Feb. 5, 1895.

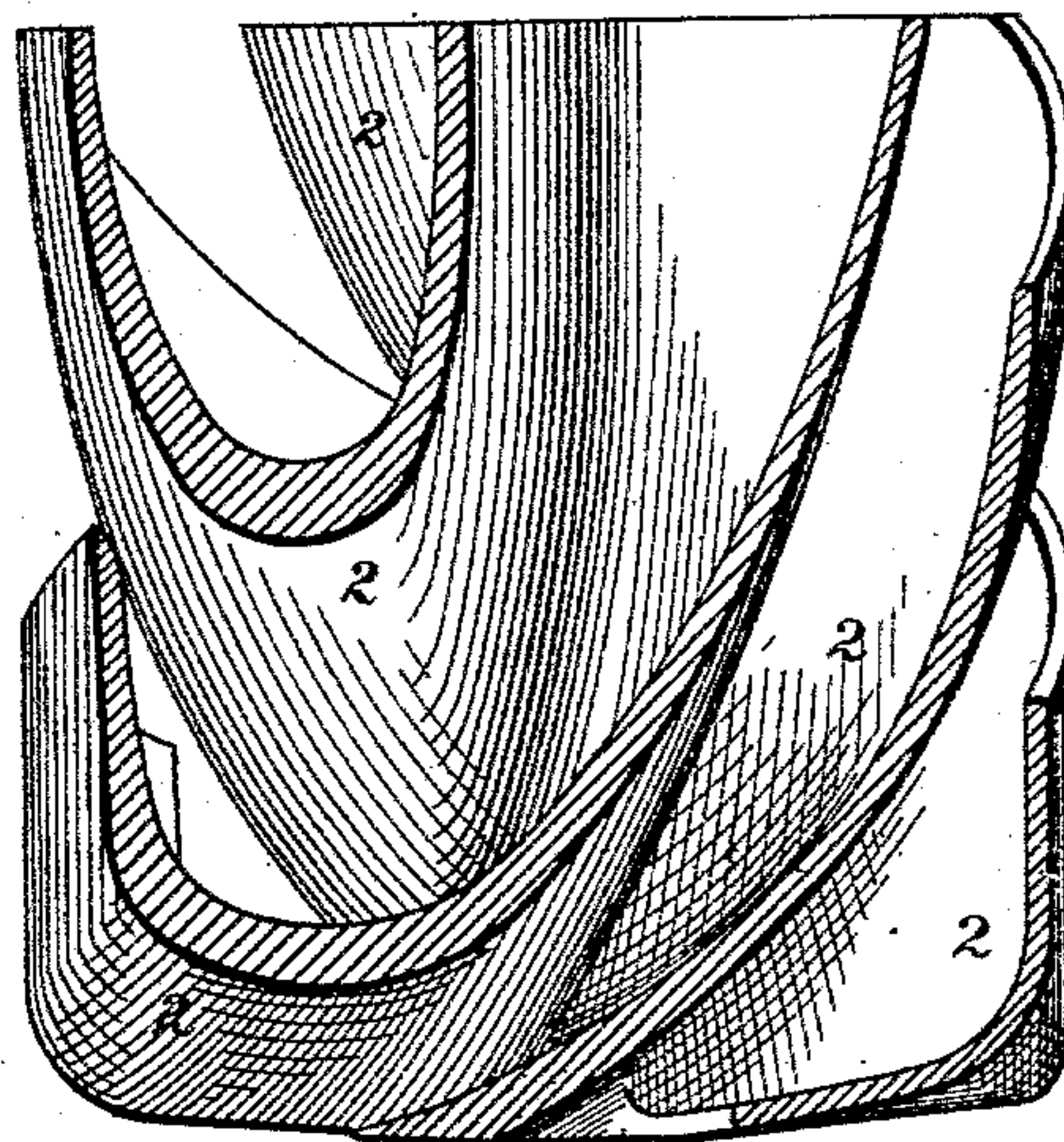
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



Inventor

*Jacob W. Stults*

Witnesses

*Chas. W. Oursund*  
*John A. Tiggers.*

By *his* Attorneys,

*Chas. Snow & Co.*



# UNITED STATES PATENT OFFICE.

JACOB W. STULTS, OF SPRINGDALE, ARKANSAS.

## TURBINE WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 533,679, dated February 5, 1895.

Application filed February 21, 1894. Serial No. 501,035. (No model.)

*To all whom it may concern:*

Be it known that I, JACOB W. STULTS, a citizen of the United States, residing at Springdale, in the county of Washington and State of Arkansas, have invented a new and useful Turbine Water-Wheel, of which the following is a specification.

My invention relates to improvements in water-wheels; and particularly to that class known thereof as turbine-wheels.

The objects of my invention are to produce a wheel, the buckets or blades of which have such shape and disposition as will utilize to the fullest extent the force and velocity of water to which the same is subjected, and which will discharge said water the instant the same becomes "dead" or loses its velocity and force, whereby it is the aim of my invention to accomplish with a minimum amount of water and force a maximum amount of speed and power.

Referring to the drawings:—Figure 1 is a perspective view of a turbine water-wheel embodying my invention. Fig. 2 is a transverse or horizontal sectional view of the same. Fig. 3 is a vertical transverse sectional view thereof at one side of the central hub.

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

In practicing my invention I may cast the entire wheel integral, or if so desired, I may cast the hub and the buckets separate, assembling the buckets upon the hub and securing them in position in the manner preferred. In either instance, however, the buckets are of the same shape and are similarly disposed. In the present instance I have shown the wheel as formed integral, and, as will be observed the same consists of a central tubular hub 1, of a length desired, and in accordance with the size of wheel preferred, and at equidistant points upon this hub are formed the spiral buckets 2, which extend from top to bottom of the hub and spirally around the same, whereby they terminate at their lower ends at a point diametrically opposite their upper ends. The buckets in cross-section are truly semicircular or U-shape from their upper ends to their lower ends. The said lower ends of the buckets are cut off, or terminate, on a diametrical line drawn through the axis of the wheel, so that the

water is discharged at the lower ends of the buckets diametrically opposite the point at which it enters.

While I have described the buckets as equidistant from each other, it is to be further observed that the lower discharge ends of the buckets are disposed closer to the back of the next succeeding bucket than the upper ends of such buckets are disposed to each other, thereby providing a construction in which the spiral space between the buckets is downwardly tapering, being narrower or more contracted at its lower end where a portion of the water discharges than at the upper end where the water enters as shown in Fig. 3. This construction of wheel provides means for retaining or confining the water sufficiently long within the buckets to completely utilize the same, while at the same time not interfering with the free discharge of the dead water, inasmuch as the wheel is usually used without a casing.

It will of course be understood that the wheel may be constructed with three buckets as well as with four buckets as illustrated in the drawings, and the number of buckets employed are varied according to the size of the wheel and the work required of it.

In practice, the hub is of course mounted upon a suitable spindle or axle, and the water having the proper fall is let into the upper ends of the buckets in the usual manner. By reason of the continuous spiral curve given to the buckets I avoid as much as possible, or in other words, reduce to a minimum, the friction of the water against the walls of the buckets as they are successively brought under the stream. I may employ any number of buckets, but prefer four for ordinary use. I proportion and dispose the buckets in the manner stated in order to get rid of the "dead" water at once, which, as is known, is such water whose force has been expended and which after such time is practically a dead-weight, which retards the free revolution or rotation of the bucket. I also avoid the necessity of employing a casing for the bucket, though of course such may be employed if desired, but merely for the purpose of covering the same.

At this point further attention is directed to the manner in which the spiral buckets



are disposed with respect to the vertical hub. It will be observed by reference to Figs. 1 and 2 of the drawings, that the buckets are not only arranged at equidistant points around the hub, but at their inner edges the said buckets lead off from the hub in true radial lines, or at substantially right angles to the vertical length thereof, and thereby provide an arrangement which tends to throw the water out toward the outer edges of the buckets and away from the hub, this construction being in contradistinction to the construction of water wheels in which the buckets lead off from the hub in substantially tangential lines, and which therefore necessarily tend to hold the water in toward the hub of the wheel, and retard to some extent the outward throw of the water toward the outer edges of the wheel. Furthermore, by reason of the radial or right angular disposition of the inner edges of the buckets at the hub of the wheel, it will be further observed that the said buckets are relatively arranged with respect to each other so as to form outwardly flared spaces therebetween from their inner to their outer edges, to provide for the free discharge of dead water at the sides of the wheel. By experiment, I have found that with a wheel of the herein described construction, the water loses some of its effective force before it reaches the lower end of the wheel, and, therefore, by having the buckets embrace substantially one half of the circumference of the wheel, the said buckets will hold the water sufficiently long to receive the benefit of the power derived from the force thereof, while at the same time providing for the free discharge of the water as soon as it loses its effective force or becomes dead. With respect to the operation of the wheel, it is to be noted that by reason of the radial disposition of the inner edges of the buckets, the water, as soon as it enters the buckets, will be directed out toward the outer edges of

the buckets, and will be carried toward the bottom of the wheel in the U-shaped channels formed by the buckets, and when the wheel is first started, since the speed or travel of the water will be greater than that of the wheel, the water will cling to the buckets until this condition is reversed and the wheel has attained a greater speed than the water. At this time the water begins to discharge out at the sides of the wheel from between the buckets at an intermediate point between the upper and lower ends of the wheel, and this discharge of the water is freely permitted by reason of the outwardly flared spaces between the buckets. The water that is not discharged out at the sides of the wheel passes out through the contracted discharge spaces between the lower ends of the buckets.

Having described my invention, what I claim is—

The herein described turbine wheel consisting of a central vertical hub, and a plurality of spiral buckets, U-shaped in cross section, and arranged at equidistant points around the hub and leading off therefrom at their inner edges in true radial lines or at substantially right angles to the vertical length of the hub, said buckets each embracing one half the circumference of the wheel whereby their lower ends terminate at points diametrically opposite their upper ends, and said buckets being also relatively arranged with respect to each other to form outwardly flared spaces therebetween from their inner to their outer edges to provide for the free discharge of dead water at the sides of the wheel, substantially as set forth.

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

JACOB W. STULTS.

Witnesses:

J. R. HARRIS,  
J. P. DEEVER.