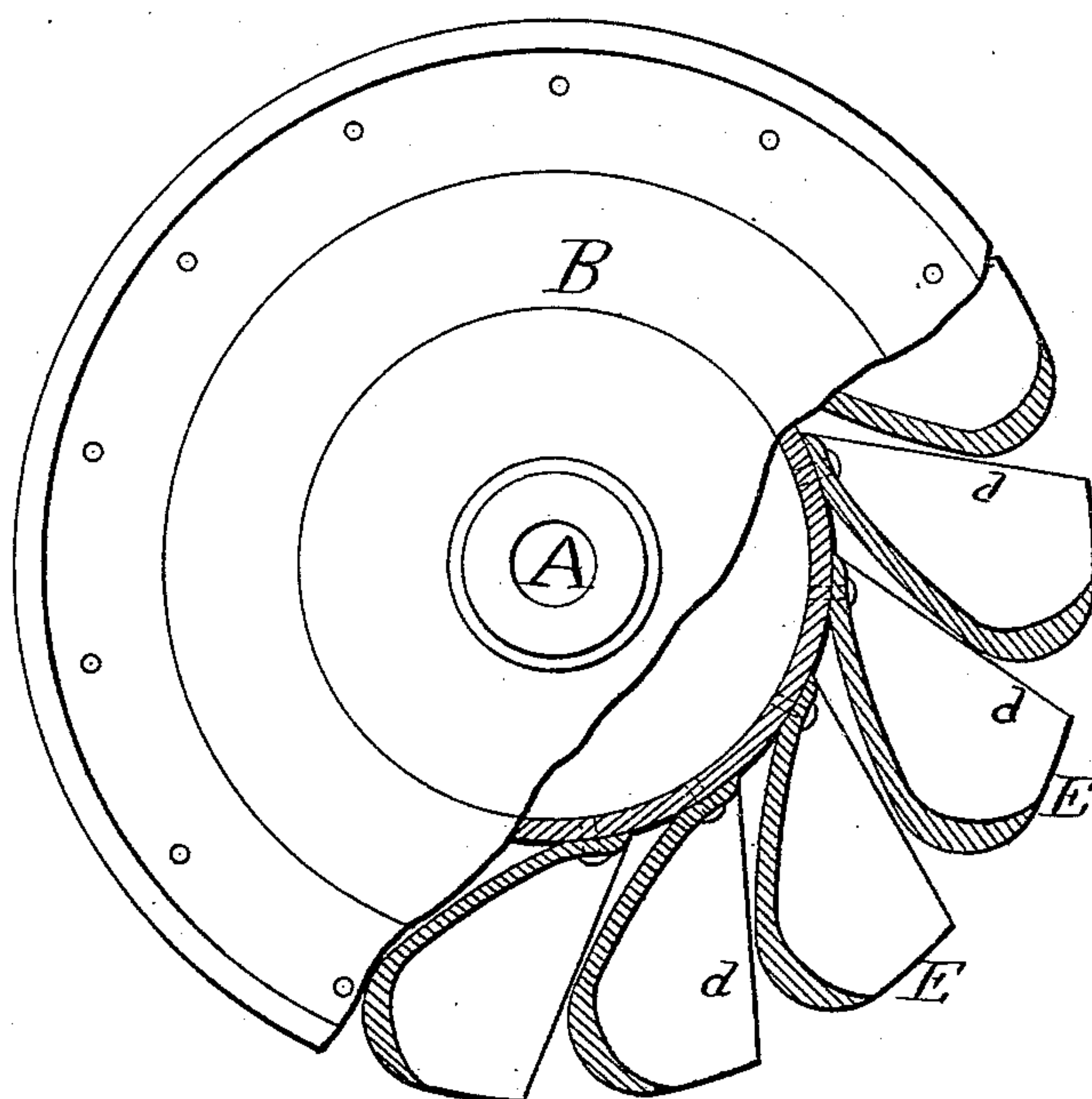


**T. B. COURSEY.**  
**Turbine Water-Wheels.**

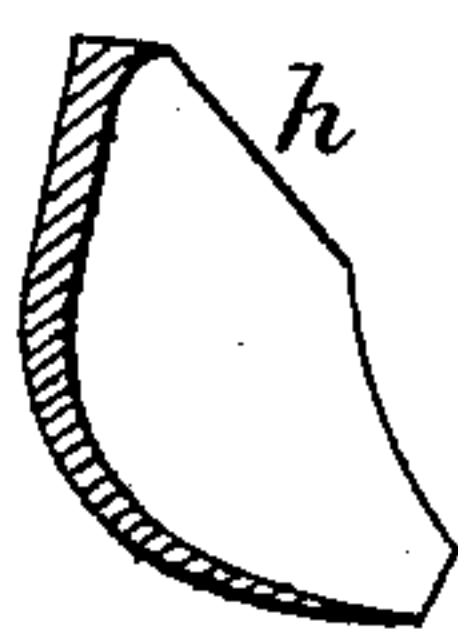
No. 148,935.

Patented March 24, 1874.

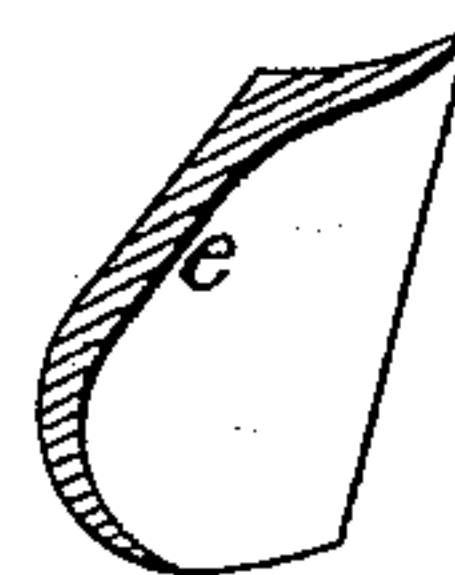
*Fig. 1.*



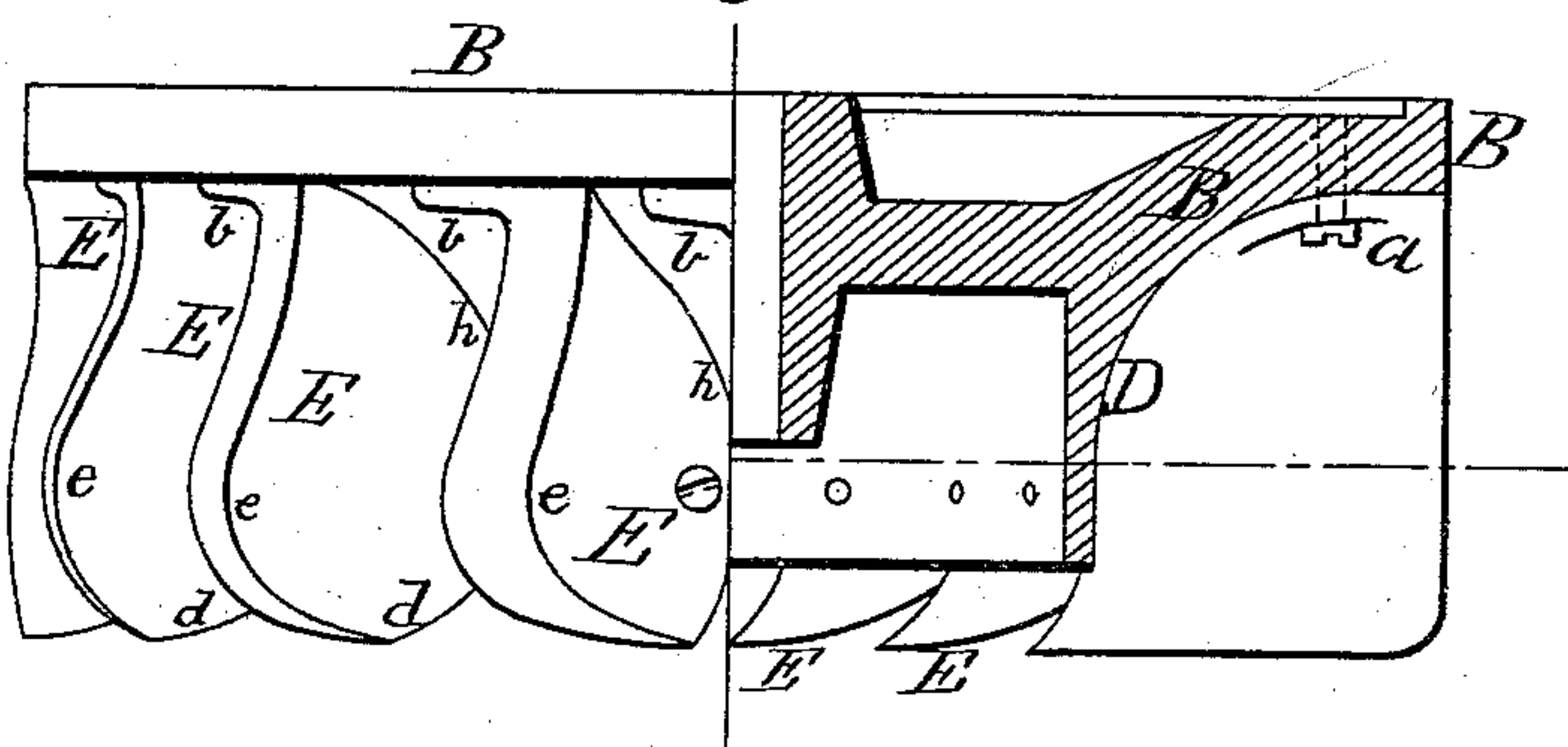
*Fig. 3.*



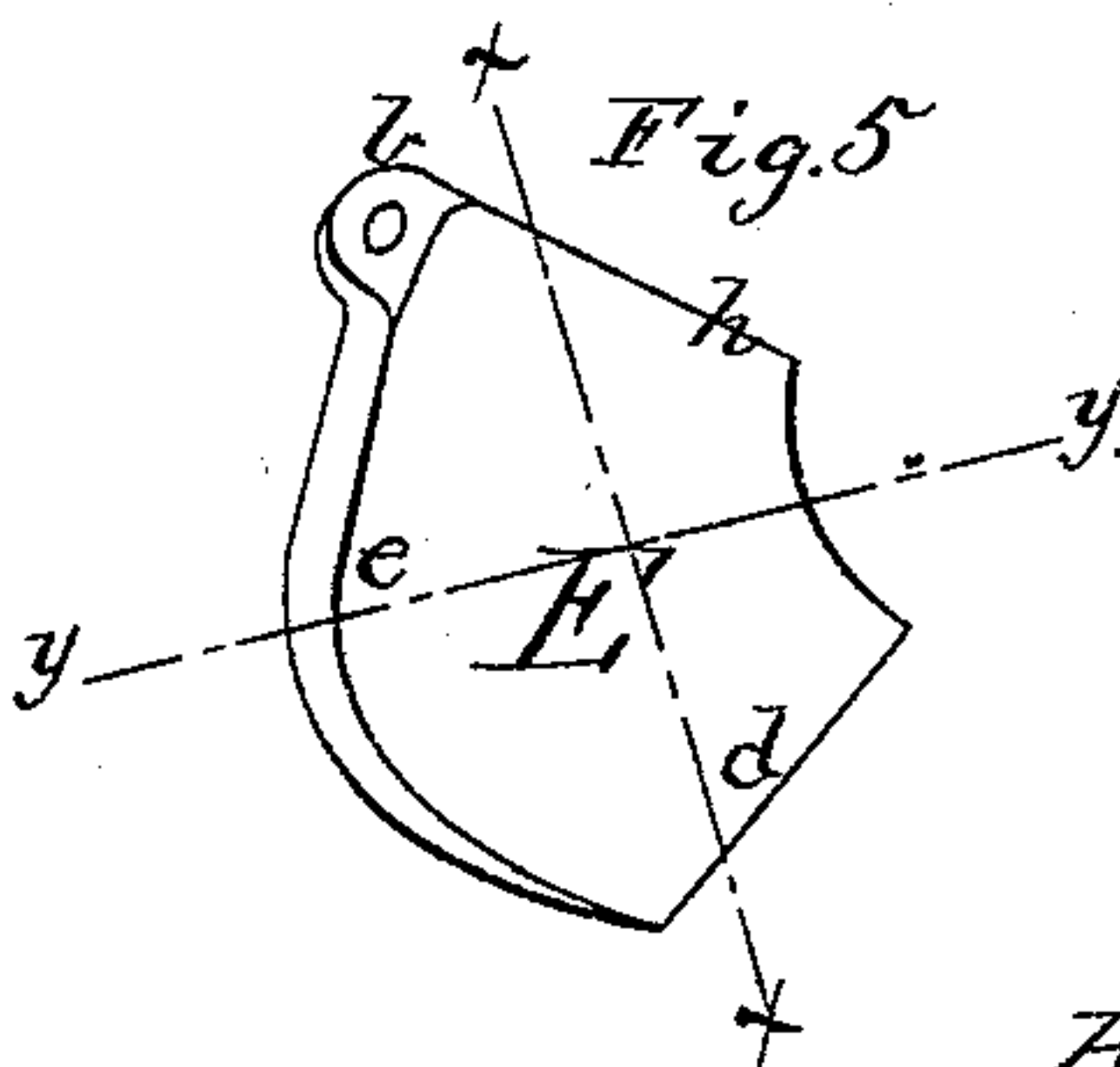
*Fig. 4.*



*Fig. 2.*



*Fig. 5.*



*Witnesses.*  
*Wm. Hornum*  
*Wm. E. Chaffee*

*Inventor:*  
*Thomas B. Coursey*  
*By* *Cox & Cox* *Attys.*



# UNITED STATES PATENT OFFICE.

THOMAS B. COURSEY, OF KENT COUNTY, DELAWARE.

## IMPROVEMENT IN TURBINE WATER-WHEELS.

Specification forming part of Letters Patent No. **148,935**, dated March 24, 1874; application filed January 20, 1874.

*To all whom it may concern:*

Be it known that I, THOMAS B. COURSEY, of Kent county, Delaware, have invented certain new and useful Improvements in Turbine Water-Wheels, of which the following is a specification, reference being had to the accompanying drawings.

The invention relates to that class of water-wheels known as turbine; and consists in the peculiar structure and arrangement of the buckets about the center of the wheel, as hereinafter more specifically set forth. The object of the invention is to provide a form and arrangement of buckets that will utilize to the greatest possible extent the volume of water introduced to the wheel by retaining its power as near the periphery of the wheel as possible, and then securing its reactionary power as it passes off.

Figure 1 is a top view of a device embodying the elements of the invention, partly in section. Fig. 2 is a side elevation, partly in section. Fig. 3 is a section of the bucket, Fig. 5, on the line *x x*. Fig. 4 is a section of same on the line *y y*. Fig. 5 is a detached view of the bucket E.

In the accompanying drawings, A represents the wheel-shaft, placed vertically in the center of the plate B, which is provided about its center with the circular hub or plate D, having its inner faces vertical and its outer curving concavely gradually downward a suitable distance, the concavity and curve vanishing near the circumference of the plate B, leaving a proper extent of its surface near its circumference horizontal. The buckets E are arranged consecutively about the hub or plate D, and rigidly secured thereto in any suitable manner, and also rigidly attached to the horizontal portion of the plate B by a bolt or screw, *a*, passing through the lip *b*, which projects from the upper outer rear portion of each of the buckets, which are arranged so that the lower horizontal edge *d* of each succeeding bucket overlaps the rear of the bucket in front of it, each of these edges projecting at a similar tangent from the circumference of the circular plane of the vertical wall of the hub or plate D, the buckets being placed as nearly

as possible upon the plane of the chord of the arc of one-fourth ( $\frac{1}{4}$ ) of the circumference of the plate B; for the reason that by this arrangement the water in the scroll strikes the bucket near its outer edge adjacent to the lip *e* at right angles to the center of the wheel, which, hence, obtains the greatest possible power, the water being held, as it were, upon or near the periphery of the wheel. The buckets E are formed so as to fit in a water-tight manner upon the surfaces to which they are attached.

When in position, the form of the bucket E may be described as follows: Its outer rear surface is partially vertical, but at about two-thirds of its extent downward it curves downward, forward, and toward the center of the wheel. The lower edge extends farthest forward on the inside; thence it inclines outward and rearward at about an angle of forty-five degrees, ( $45^{\circ}$ .) The outer side or edge of the bucket is provided with the concavo-convex lip *e*, which extends forward of the greatest concavity of the bucket, and is reduced in front to a thin edge, vanishing at the base of the horizontal (or nearly so) lower portion of the inside of the bucket. A second flange, *h*, is provided on the interior edge of the bucket, which extends along the same, forming a slight angle with the inner surface thereof, which is generally concave and widest at its lower parts, thence gradually narrowing until it reaches the base of the bucket.

By this construction and arrangement, the direct action of the water in the scroll is upon the inner surface of the buckets adjacent the lips *e*, or their outer edges, whence, after expending a portion of its momentum, the water presses continuously upon the bucket, driving the wheel forward. The pressure, being still continued, comes next upon the lower portion of the interior of the bucket, exhausting its power upon the lower part of the lip *e*, and thence passing off outwardly, and follows, generally, in its descent, the lip *e*, thus continuing until it passes over the points of the buckets, upon the parts adjacent which the reactionary power is exerted as the water escapes, driving away the "tail-water."

The above form of wheel is to be used with

a scroll or register gate of proper dimensions. Moreover, the construction permits the use of the lip *b*, thus securing an excellent means of attachment without diminishing the utility of the bucket.

I am aware that turbine wheels have been constructed having lips on the exterior edges of their buckets and operated by water admitted from above, as shown in the device for which Letters Patent of the United States were issued to Boyland and Buchanan, dated June 27, 1871; but such is not, however, the nature of my invention; but

What I do claim as my invention, and desire to secure by Letters Patent, is—

The wheel formed of the plate B and hub or plate D having secured thereon, in the manner stated, the buckets E, having the form shown, and provided with the lips *e*, arranged to hold the water near the outer edge of the buckets and discharge it rearward, substantially as shown and described.

In testimony that I claim the foregoing improvements in turbine water-wheels, as above described, I have hereunto set my hand and seal this 15th day of January, 1874.

THOMAS B. COURSEY. [L. S.]

Witnesses:

JAMES B. ANDERSON,  
S. D. SMITHERS.