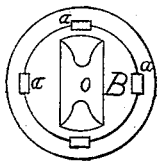
A. BALL.

Turbine Water-Wheel.

No. 211,829. Patented Feb. 4, 1879.

Fig. 1.



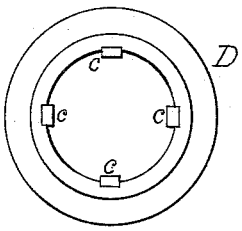


Fig. 2.

Fig. 3.

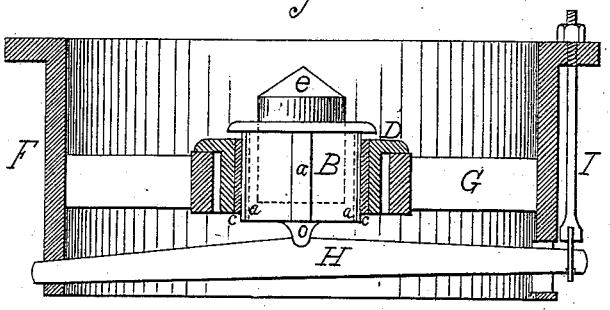
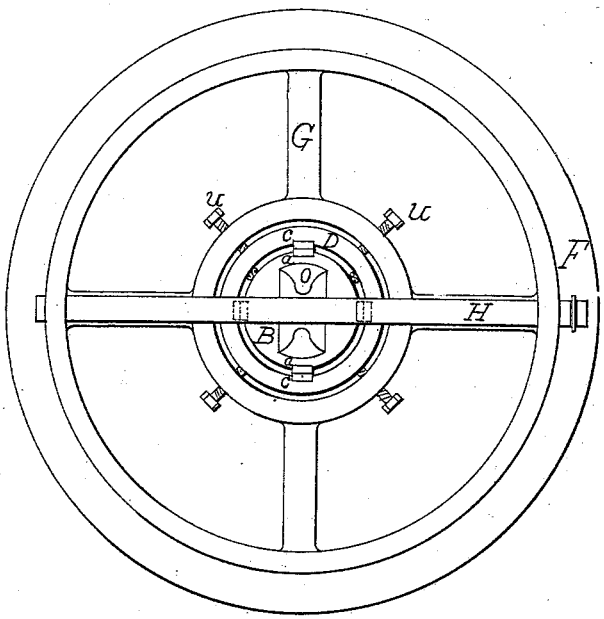


Fig. 4.



Witnesses.

Charles B. Rice

J. Duncan Whann

Inventor.

Albert Ball

UNITED STATES PATENT OFFICE.

ALBERT BALL, OF CLAREMONT, NEW HAMPSHIRE, ASSIGNOR TO THE SULLIVAN MACHINE COMPANY, OF SAME PLACE.

IMPROVEMENT IN TURBINE WATER-WHEELS.

Specification forming part of Letters Patent No. **211,829**, dated February 4, 1879; application filed June 27, 1878.

To all whom it may concern:

Be it known that I, ALBERT BALL, of the town of Claremont, county of Sullivan, and State of New Hampshire, have invented a new and useful Improvement in respect to Turbine Water-Wheels, which improvement is fully set forth in the following specification, reference being had to the accompanying drawings.

My invention relates particularly to the box or case used in turbine water-wheels to hold the wooden step or pivot upon which the shaft of the wheel bears as it revolves, and to the device or ring used for adjusting and holding the step-box in position.

The step-box is usually made of iron. It is placed within a ring or cylinder, also of iron, in such way that it may thereby be adjusted to its true position, and may be raised or lowered within the ring by means of a lever, to which the step-box is attached and upon which it rests. By this lever the wheel itself may be raised or lowered within its curb.

Sometimes, from the rust of the iron of which the step-box and ring are made, the step-box becomes so bound to the ring inclosing it as to interfere with and stop the play or movement of the step-box up and down within the ring.

My invention consists in making the step-box and ring in such way that such parts of the exterior surface of the step-box and of the interior surface of the ring as shall touch or bear one upon the other shall be made of brass, box-bronze, or of some other suitable non-rusting metal, and that intermediate spaces may be left between the bearing parts of the ring and step-box, for the escape of sand and similar substances.

I thus obviate the tendency of the step-box and ring to bind by reason of rust, and secure the free movement of the step-box up and down within the ring.

I have shown in the drawings, by Figure 1, the lower or bottom end of the step-box; Fig. 2, the lower or bottom end of the ring; Fig. 3, a vertical section of step, step-box, ring, &c., in position; Fig. 4, the lower or bottom end of same in position.

In the drawings, *a a* represent the bearing-surface of the step-box, projecting from the outer circumference thereof, and made of brass, box-bronze, or similar material; B, the step-box; *c c*, the bearing-surfaces of the ring projecting from the inner circumference thereof, also made of brass, box-bronze, or similar material; D, the ring; *e*, the step; F, the curb; G, the frame supporting ring, &c.; H, the lever to which the step-box is secured; I, the rod by which the lever H is raised or lowered; *o*, the bottom of step-box; *u u*, set-screws by which the ring and step-box are adjusted to the best position required for the step; *s s*, spaces between the step-box and ring for escape of sand, &c.

When the step-box B is placed in position in the ring D, the surfaces *a a* and *c c* should be made to fit each other, so as to admit of an easy play or movement up and down of the step-box within the ring. The step-box and ring should, however, be so secured that there will be no turning or revolving movement to either the step-box or ring. The step-box and the ring may each be cast in a separate piece made wholly of the brass, box-bronze, or non-rusting metal. As a matter of economy, however, I prefer, first, to cast the bearing parts of each—to wit, *a a* of the step-box and *c c* of the ring—of brass or box-bronze, in separate pieces of suitable form; then to attach the parts or pieces *a a* thus cast to the proper pattern for forming the remainder of the step-box of cast-iron, and the parts or pieces *c c* so cast to the proper pattern for forming the remainder of the ring of cast-iron; then to complete the casting in the usual manner, the parts *a a* and *c c* being left in their proper positions in the molds.

In the castings thus made the brass or box-bronze parts will adhere to the cast-iron parts of the step-box and ring, and thus so much only of the more expensive metal will be used as will be required to attain the desired object.

It is obvious that the brass or box-bronze parts may be of any suitable size and form, and may be as numerous as shall be desired, and they may be secured to the iron part of the step-box or ring in other suitable ways; but I believe the method described to be the more economical.

It is also obvious that when the step-box B and the ring D have been constructed and put together as described, there will be left the

spaces *s s* between the ring and the step-box for the escape of sand, &c.

The step-box and ring, when thus made, fitted, and adjusted, are placed in the frame G, as shown in Figs. 3 and 4, and the step-box is secured to the lever H.

The step-box and ring are then adjusted and held to their true position by the set-screws *u u*.

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

1. The step-box B, having the exterior bearing-surfaces, *a a*, made of brass, box-bronze, or its equivalent, substantially as and for the purpose described.

2. The ring D, having the interior bearing-surfaces, *c c*, made of brass, box-bronze, or its equivalent, substantially as and for the purpose described.

3. The step-box B, having the exterior bearing-surfaces, *a a*, made of brass, box-bronze, or its equivalent, in combination with the ring D, having the interior bearing-surfaces, *c c*, made of brass, box-bronze, or its equivalent, substantially as and for the purpose described.

ALBERT BALL.

Witnesses:

CHARLES B. RICE,

J. DUNCAN UPHAM.