(No Model.)

S. M. SMITH.

TURBINE WATER WHEEL.

No. 383,777. Patented May 29, 1888.

Fig. 1.

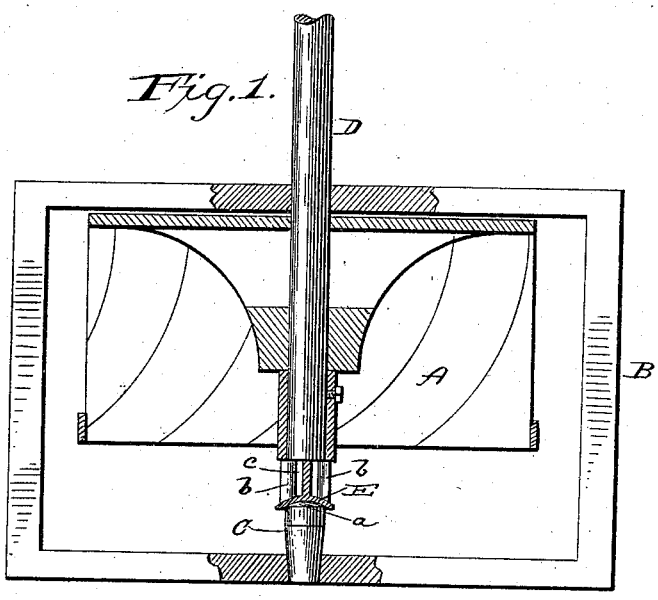


Fig. 2.

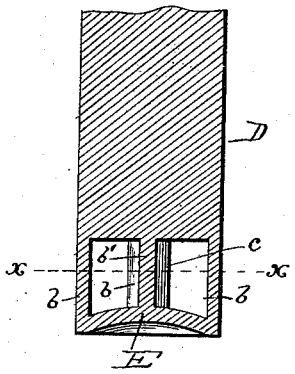


Fig. 3.

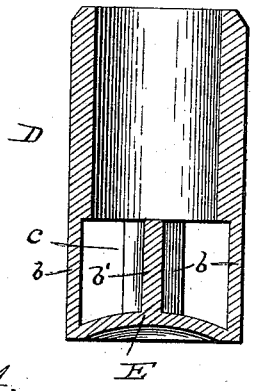
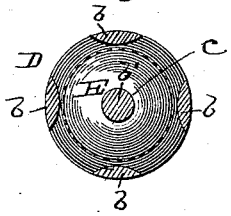


Fig. 4.



Witnesses:
Chas. A. Davis.
John S. Finch Jr.

Inventor:
S. Morgan Smith.
By C. M. Alexander
Atty.

UNITED STATES PATENT OFFICE.

S. MORGAN SMITH, OF YORK, PENNSYLVANIA.

TURBINE WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 383,777, dated May 29, 1888.

Application filed November 18, 1887. Serial No. 255,532. (No model.)

To all whom it may concern:

Be it known that I, S. MORGAN SMITH, a citizen of the United States, residing at York, in the county of York and State of Pennsylvania, have invented certain new and useful Improvements in Turbine Water-Wheels, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to an improved central bearing for the vertical shaft of a turbine water-wheel, said bearing being especially adapted to be supported upon the convex head of a wooden step.

The objects of my invention are, mainly, to prevent heating and to exclude sand and other grit from between the step and lower end of the wheel-shaft, as will be fully understood from the following description and claims, when taken in connection with the annexed drawings, in which—

Figure 1 is an elevation, partly in section, showing my improvement applied to the shaft of a turbine wheel and the step thereof. Fig. 2 is a diametrical section through the lower end of a wheel-shaft having the concavo-convex bearing and its connecting-pillars formed integral with said shaft. Fig. 3 is a diametrical section through the improved bearing formed on a tube or shoe adapted to be secured to and detached from the wheel-shaft. Fig. 4 is a horizontal section through the bearing and its connecting-pillars taken in the plane indicated by dotted line *x x* on Fig. 2.

Referring to the annexed drawings by letter, A designates a turbine water-wheel; B, the frame-work, and C a wooden step having a convex head, *a*, which parts may be constructed in the usual well-known manner.

D designates the vertical shaft, to which the wheel B is secured in a suitable manner, which shaft is journaled above the wheel in the frame A, and below this wheel the shaft is supported upon the convex head *a* of the step C, as clearly shown in Fig. 1.

In Fig. 2 I have represented the improved device, which I am about to describe, integral with the shaft D, and in Fig. 3 I have represented as a modification the device formed on and integral with a tube or thimble, which is adapted to be rigidly secured in a suitable manner upon the lower end of the wheel-shaft D, and to be removed therefrom when desired.

Fig. 1 shows the device represented by Fig. 3 secured in proper place on the shaft D and supported upon the step C.

E designates a concavo convex circular bearing, which is practically of uniform thickness and made sufficiently thin to subserve the purposes hereinafter explained. This bearing E is preferably of greater diameter than the diameter of the convex head *a* of the step C, and its bottom concave side is adapted to closely fit the said convex head *a*, as shown in Fig. 1 of the annexed drawings, thereby excluding grit, and consequently preventing a grinding out of the impinging surfaces when the wheel is in motion.

From the convex top of the bearing E, and rising vertically from the perimeter thereof, are pillars *b*, preferably of the shape shown in the cross section, Fig. 4, which pillars are equidistant from each other and of any suitable height. These pillars, which are integral with the wheel-shaft D, as shown in Fig. 2, and integral with a tubular socket or thimble, as shown in Figs. 1 and 3, leave a cavity, *c*, between the lower solid end of the shaft D and the top of the bearing E, for allowing a free circulation of water when the wheel is in motion, which, by reason of the comparatively thin bearing, will prevent this bearing from heating in consequence of the friction caused by its contact with the wooden step.

It will be observed by reference to Fig. 4 that the lower ends of the pillars *b* are located outside of the circle indicated by dotted lines on said figure, which circle represents the diameter of the convex head *a* of the wooden step C. I thus avoid thickening the metal of the bearing E directly over the said head, and consequently construct the bearing of an even thickness over its point of impingement upon said step and insure coolness of the bearing at all points during the operation of the wheel.

In practice I prefer to employ a central reenforcing post or pillar, *b'*, in the water-circulating cavity *c*, which post is shown in Fig. 2 integral with the bearing E and lower end of the wheel-shaft D. In Figs. 1 and 3 the post *b'* is not a part of the said shaft, but affords a central bearing or support for it. It will thus be observed that the essential feature of this invention lies in the fact that I so dispose the supporting-pillars of the shaft that they do not

bear directly upon the bearing-surface of the step, but are arranged outside of the radius of the bearing-surface thereof, whereby I am enabled to make the bearing-plate E of uniform thickness wherever it bears upon the step, thus insuring an even temperature of the bearing-plate and the step.

The principal objects I have in view in constructing the bearing-plate E with a convex upper surface is to insure the free circulation of the water as the wheel revolves, and thereby prevent the accumulation of dirt and mud upon the bearing-plate, which accumulations would have a tendency to retard the cooling of the plate, and also to make the bearing-plate of a uniform thickness throughout to preserve an even temperature.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a turbine water-wheel, the combination, with a step having its upper bearing-surface formed convex, of a vertical shaft, a bearing-plate, E, concave on its lower face, so as to fit the upper convex surface of the step, the said bearing-plate being of greater diameter than the step, and a series of vertical radially-disposed pillars, *b*, formed integral with the bearing-plate and adapted to support the vertical shaft, these pillars being formed on the bearing-plate at its perimeter and outside of the radius of the step, whereby the water may circulate freely between the lower end of the shaft and bearing-plate and over all parts of the bearing-plate and keep it at a uniform temperature throughout, substantially as described.

2. In a turbine water-wheel, the combination, with the step having a convex upper bearing-surface, of a bearing-plate, E, of uniform thickness throughout and slightly larger in diameter than the step on which it bears, the said bearing-plate having its lower bearing-surface concave, so as to fit the convex bearing-surface of the step, and its upper surface correspondingly convex to shed or throw off sediment and trash, the radially-disposed pillars formed integral with the bearing-plate outside of the radius of the said step, and the vertical shaft supported by the said pillars, whereby a water-circulating chamber is formed between the lower end of the shaft and the upper surface of the bearing-plate, substantially as described.

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

S. MORGAN SMITH.

Witnesses:

CHAS. D. DAVIS,

JOHN S. FINCH, Jr.