

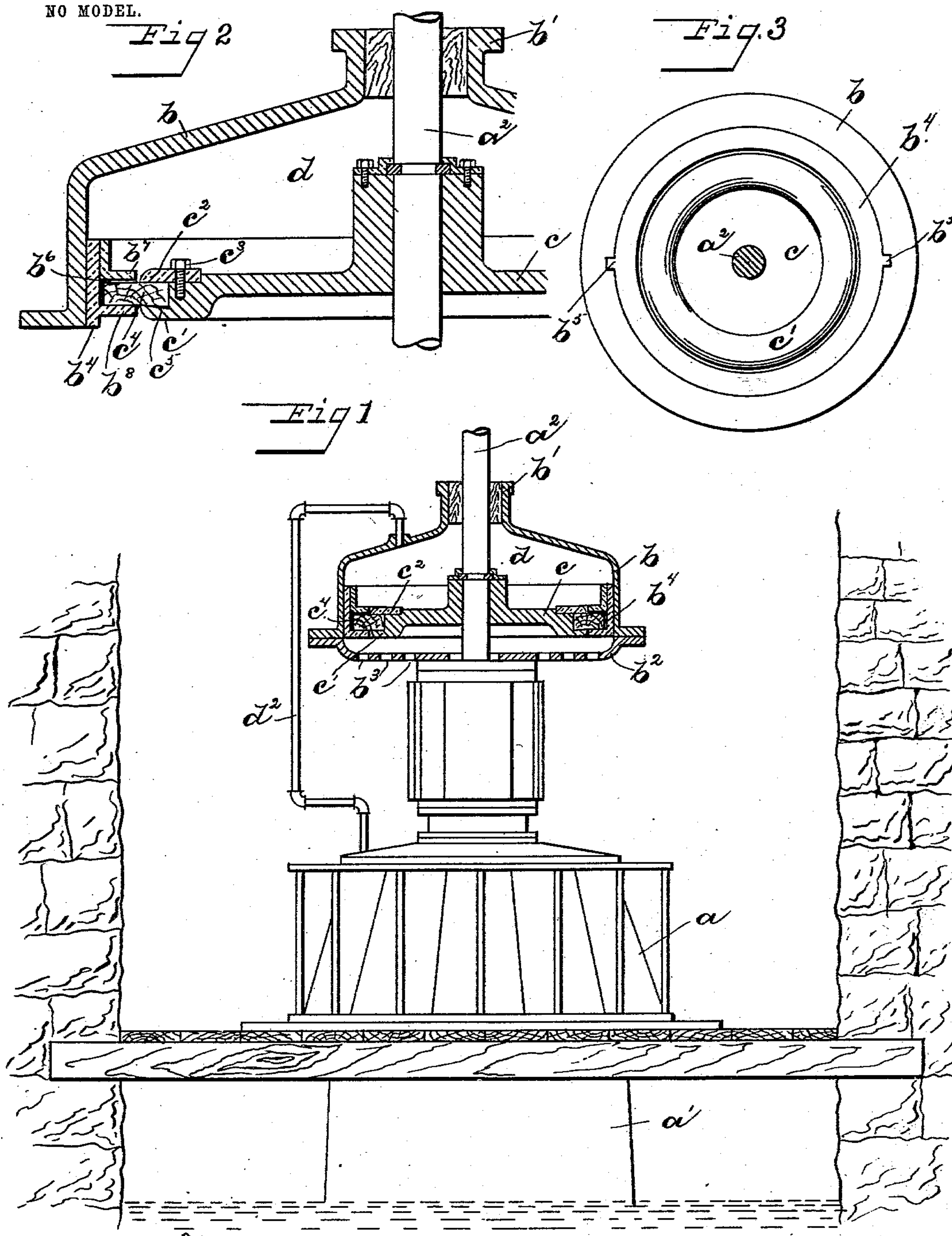
No. 743,595.

PATENTED NOV. 10, 1903.

F. TRUMP.  
BALANCING DEVICE FOR WATER WHEELS.

APPLICATION FILED OCT. 24, 1902.

NO MODEL.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

FULLER TRUMP, OF SPRINGFIELD, OHIO.

## BALANCING DEVICE FOR WATER-WHEELS.

SPECIFICATION forming part of Letters Patent No. 743,595, dated November 10, 1903.

Application filed October 24, 1902. Serial No. 128,554. (No model.)

*To all whom it may concern:*

Be it known that I, FULLER TRUMP, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Balancing Devices for Water-Wheels, of which the following is a specification.

My invention relates to a counterbalance to relieve the end thrust on the step or bearing in water-wheels, and particularly in water-wheels that operate vertically and of the single-discharge type.

The object of my invention is to provide constant means which by the pressure of the water will compensate for or balance the end thrust under normal conditions of operation and to so construct and adapt said devices as to prevent the escape of water through said means or devices.

My invention consists of the constructions and combinations hereinafter described, and set forth in the claims.

In the accompanying drawings, which form a part of this specification, Figure 1 is a water-wheel with a counterbalancing device mounted thereon, shown in section, embodying my invention. Fig. 2 is a detail in section of said device, and Fig. 3 is a bottom view of the ring, showing its engagement with the housing.

Like parts are represented by similar letters of reference in the several views.

In the drawings, *a* represents a water-wheel set in a common form of penstock, with its draft-tube *a'* extending into the tail water in the usual manner. The wheel proper rotates within its casing and transmits its power through a shaft *a<sup>2</sup>*, said shaft being provided at its lower end with the usual step or bearing.

In constructing my device I provide a housing *b* open at one end and journaled at its opposite end *b'* on said shaft, the open end being preferably provided with a plate *b<sup>2</sup>*, having perforations *b<sup>3</sup>* therein, said plate being for the purpose of keeping trash that may be carried by the water away from the parts hereinafter described, and within said housing I provide a ring *b<sup>4</sup>*, splined at *b<sup>5</sup>* to said housing, so as to be capable of sliding longitudinally therein. To the shaft *a<sup>2</sup>* I rigidly attach a diaphragm *c*, the periphery of which

I preferably provide with a flange *c'* and a clamp *c<sup>2</sup>*, opposite thereto, with a bolt *c<sup>3</sup>* to hold in position a radial extension *c<sup>4</sup>*, preferably of wood, which extends within a recess *b<sup>6</sup>*, formed by the upper and lower jaws *b<sup>7</sup>* and *b<sup>8</sup>* on said ring. The flange *c'* is preferably beveled at *c<sup>5</sup>*, and the extension *c<sup>4</sup>* is formed to correspond with said bevel to more firmly hold said extension in place. The thickness of the extension *c<sup>4</sup>* is somewhat less than the width of the recess *b<sup>6</sup>*, so as to permit some lateral movement of said extension in said recess. Furthermore, I preferably allow some space between the periphery of said extension and the bottom of said recess, so that said extension will more freely rotate in said ring.

The diaphragm *c* I form of such dimensions as will under the normal operation of the wheel balance the end thrust, so that the wheel will rest lightly on the usual step or bearing, and the ring *b<sup>4</sup>* I form of such weight and dimensions that under the normal operation of the wheel it will be suspended by the pressure of the water, so that its upper or lower jaw will lightly contact with the extension of the diaphragm. The construction is such that under the variation of the end thrust one or other of the jaws *b<sup>7</sup>* and *b<sup>8</sup>* of the recess is always in contact with the extension of the diaphragm and prevents the escape of water into the vacuum-chamber *d* in the housing back of the diaphragm.

When a diaphragm is extended to contact directly with the side walls of its housing, the longitudinal movement of the diaphragm will wear the contacting parts, causing a leak, whereas by providing a ring such as I have described the lateral play of the diaphragm extension permitted in the recess of the ring substantially allows for the longitudinal movement of the diaphragm, and the wear of the ring and housing where they contact is thereby relieved. The extension of the diaphragm in its rotation will slide in contact with one or the other of the jaws of the recess in the ring, but any wear that may occur from this is of no consequence, for the operation of the ring, as hereinbefore described, is such that one or the other of said jaws is always in contact with said extension.

From the vacuum-chamber *d*, formed in the



housing back of the diaphragm and ring, I provide an outlet  $d^2$ , leading to the discharge of the wheel, through which any water that may leak into said chamber will escape.

5 Having thus described my invention, I claim—

10 1. The combination of a water-wheel, a shaft rigidly connected therewith, a diaphragm on said shaft, a housing for said diaphragm having a vacuum-chamber therein back of said diaphragm, and means between said diaphragm and housing adapted to slide in said housing and to engage the respective sides of said diaphragm, substantially as and for the purpose specified.

15 2. The combination of a water-wheel, a shaft connected therewith, a diaphragm on said shaft, a housing for said diaphragm having a vacuum-chamber therein back of said diaphragm, a ring between said housing and diaphragm adapted to slide longitudinally in said housing and further having a recess therein, the respective sides of which are adapted to alternately engage opposite sides of said dia-

phragm extending into said recess, substantially as and for the purpose specified. 25

3. In a device such as described, the combination with a diaphragm and a housing for said diaphragm, of a ring independent of said diaphragm and housing but adapted to slide in said housing and engage said diaphragm in either direction of its movement, substantially as and for the purpose specified. 30

4. In a device such as described, the combination of a diaphragm, a movable part, and a housing for said diaphragm and movable part, which with said diaphragm and movable part forms a chamber in said housing, said movable part being adapted to slide in said housing and to engage the respective sides of said diaphragm, substantially as and for the purpose specified. 35 40

In testimony whereof I have hereunto set my hand this 18th day of October, A. D. 1902.

FULLER TRUMP.

Witnesses:

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CHAS. I. WELCH.