

J. CUMMING.
Improvement in Turbine Water-Wheels.
No. 132,059. Patented Oct. 8, 1872.

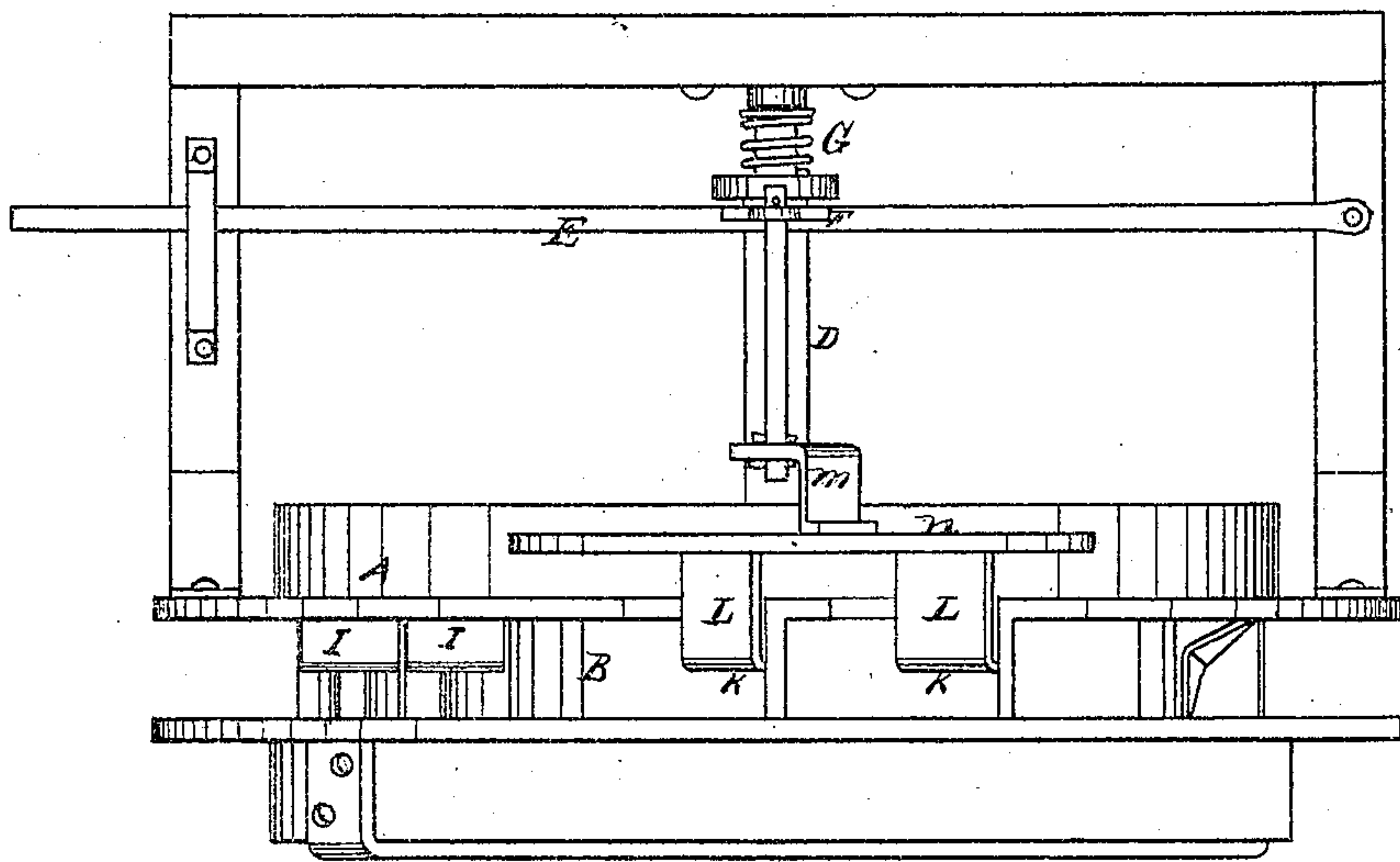


Fig. 1.

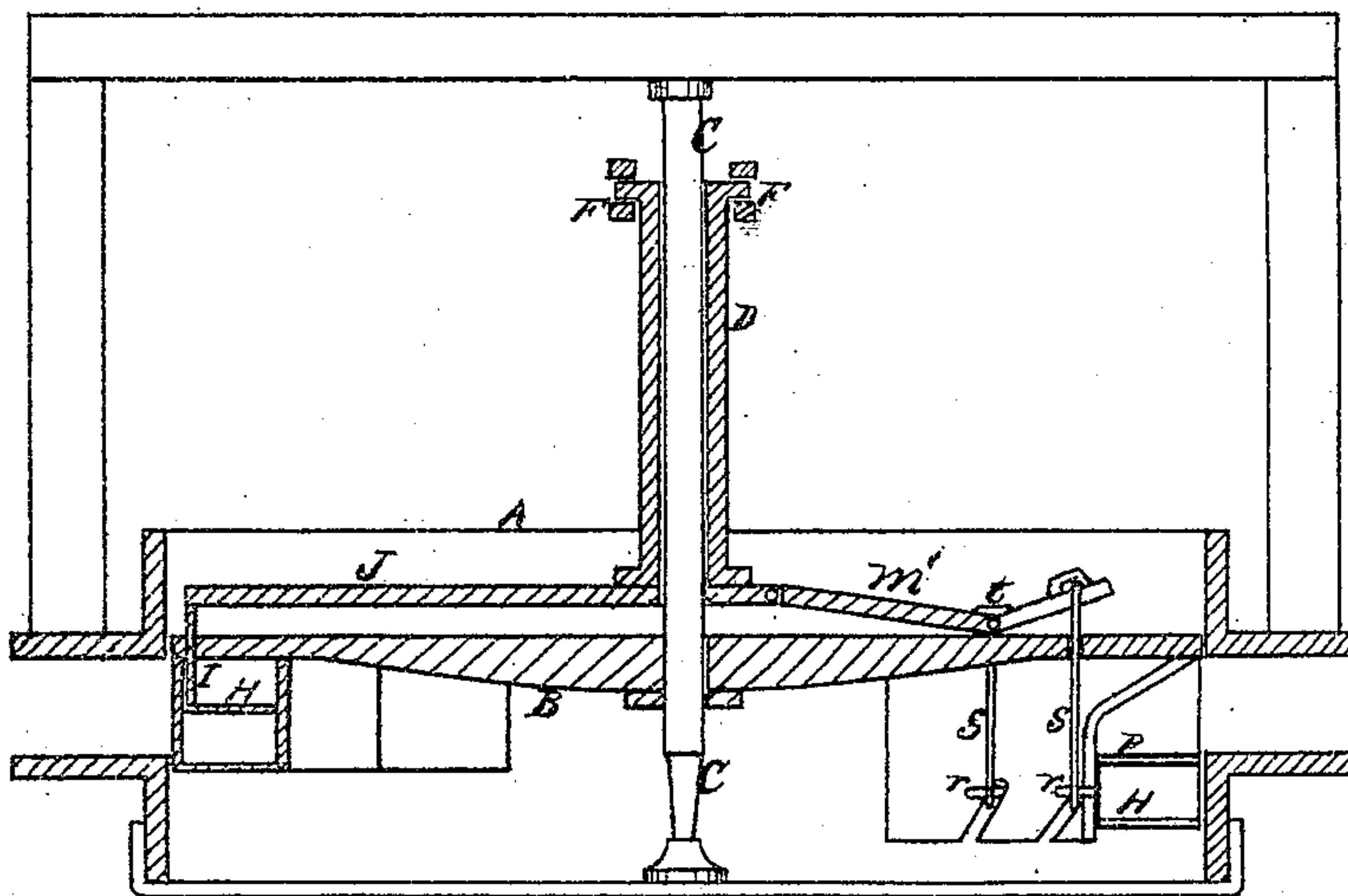


Fig. 2.

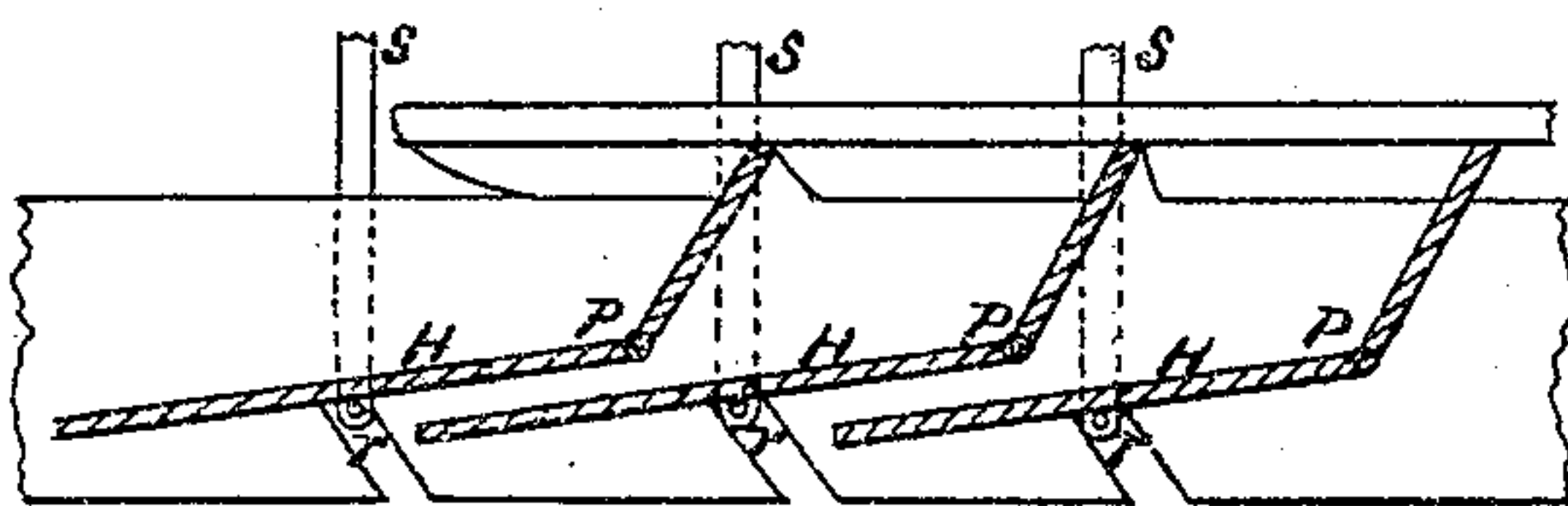


Fig. 3.

Witnesses

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UNITED STATES PATENT OFFICE.

JAMES CUMMING, OF IONE CITY, CALIFORNIA.

IMPROVEMENT IN TURBINE WATER-WHEELS.

Specification forming part of Letters Patent No. 132,059, dated October 8, 1872.

To all whom it may concern:

Be it known that I, JAMES CUMMING, of Ione city, county of Amador, State of California, have invented an Improved Turbine-Wheel; and I do hereby declare the following description and accompanying drawing are sufficient to enable any person skilled in the art or science to which it most nearly appertains, to make and use my said invention or improvement without further invention or experiment.

The object of my invention is to provide an improvement in turbine-wheels by which I am enabled at all times to regulate the relative size of the bucket to that of the gate, so that both are increased and diminished alike. This is accomplished by the peculiar construction of compound sluice-gates attached to a ring and guide-plates, so as to retain the same angle for the water to impinge upon the wheel-buckets, and also to deliver the water in a smooth compressed current upon the buckets at all points of elevation of the gates. These gates are to be used between the guide-plates of the wheel-case and also between the buckets of horizontal discharge-wheels, so as to increase or diminish the capacity of the apertures of the sluices and wheels, as required. My invention further relates to the application of hinged buckets to downward or upward discharge-wheels, so as to diminish or increase the capacity of the apertures of the wheel. A hollow shaft or casing is fixed around the wheel-shaft, so as to revolve with it and at the same time be capable of elevation and depression, carrying with it the devices for operating the guide-plates above mentioned.

Referring to the accompanying drawing for a more complete explanation of my invention, Figure 1 is a side elevation, showing the relative opening of the guide-plates in the wheel and casing in the horizontal discharge-wheel. Fig. 2 is a section, showing the manner of operating the plates of both horizontal and vertically-discharging wheels; and Fig. 3 is a side view of the guide-plates of a vertically-discharging wheel.

In the present case only two buckets of each class and the gates are shown, in order to simplify and more easily explain the invention.

A is the case of the wheel, and B the wheel which has a vertical shaft, C, and the proper

steps and supporting boxes. A casing or hollow sleeve, D, surrounds this shaft, moving up and down on a feather so as to turn with the shaft, and a lever, E, extends across the supporting-frame, so as to be near the shaft, and a suitable clutch, F, serves to elevate or depress the sleeve, so as to open or close the buckets. A spring, G, keeps the sleeve down and prevents the force of the water from opening the buckets wider than desired. The gates in the casing are operated by the same lever, as will be hereafter described. The guide-plates in the horizontally-discharging buckets are constructed of a metal plate, bent so as to conform to the shape of the bucket, as shown, and forming a horizontal diaphragm, H, and an outer face or plate, I, to the bucket-opening. When the diaphragm lies upon the bottom of the bucket the vertical plate completely closes the bucket-opening, and when any size of opening is desired the diaphragm is raised to the proper point by the elevating device, and serves as an adjustable top to the buckets, the portion above the diaphragm being always closed by the vertical plate I. By this arrangement the shape of the bucket always remains the same with the exception of the depth, and thus always presents the same angle for the water to impinge upon. A plate or disk, J, extends outward from the sleeve D and is secured to each of the guide-plates, or if preferred, an arm for each of the guide-plates may be employed, and when the lever is elevated it will be manifest that the bucket-opening will be more or less enlarged. The gates in the casing which supply the water to the wheel are fitted with diaphragms K and vertical plates L, similar to those in the buckets. One or more arms, *m*, connect with a ring, *n*, to which these plates are secured, and the arms are suitably connected with the operating lever, so that both sets of diaphragms and plates in the buckets and casing are simultaneously opened or closed. If the wheel be an upward or downward discharge-wheel it will be manifest that the construction of the buckets will be slightly changed. In this case the bottom plate H of the bucket is hinged at P to the back, and an arm, *r*, extends inward from each of these bottom plates. By means of a link, *s*, this arm is connected with the arm *m'*, which would in this case have to be

pivoted at *t*, so as to act as a lever, and when the operating lever *E* is raised the outer end of the plate *m'* will be depressed, so as to open the discharge of the bucket in the same proportion that the gate is opened. The advantage claimed for this wheel over other turbines is its greater efficiency when the sluices are partly closed. In all other turbines the water enters the buckets under circumstances involving great loss of effect, because the water entering the bucket finds a much greater sectional area than, at its velocity, it can fill. It therefore gets into an irregular oscillating motion, and not only does not discharge with the proper velocity, but loses a part of its active force, which is absorbed in creating the eddying irregular motion, and in other ways. This is all overcome in my wheel, the buckets being always full with much or little water. It has also greater simplicity of construction of wheel-case, guide-plates, and gates, lessening the cost of construction and not being liable to get out of repair.

Having thus described my invention, what

I claim as new, and desire to secure by Letters Patent, is—

1. The guide-plates of the buckets consisting of the diaphragm *H* and plate *I*, when constructed to operate substantially as and for the purpose herein described.

2. In combination with the guide-plates, as described, I claim the disk or arm *J*, and the sleeve or casing *D*, together with the operating-lever *E*, substantially as described.

3. The gates or sluices having the diaphragm *K* and plate *L*, and the ring *n*, connected with the operating-lever, substantially as and for the purpose above described.

4. The combination of a wheel having variable buckets, as shown, and the adjustable supply-gates, when constructed and operated substantially as herein described.

In witness whereof I hereunto set my hand and seal.

JAMES CUMMING. [L. S.]

Witnesses:

L. BRUSIE,

J. W. McMURRY.