

G. ARROWSMITH.
Turbine Water-Wheel.

No. 164,668.

Patented June 22, 1875.

Fig. 1.

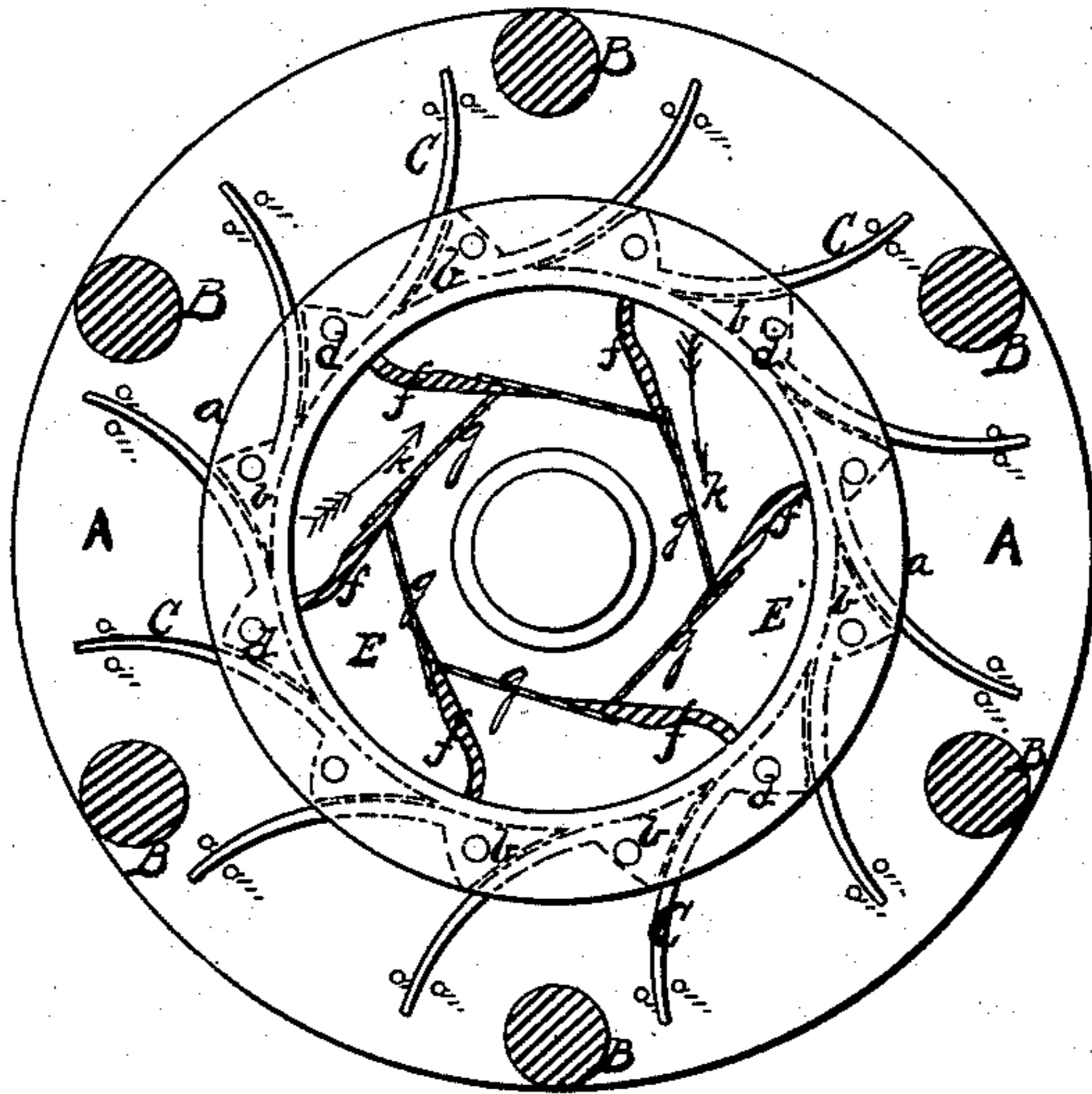


Fig. 2.

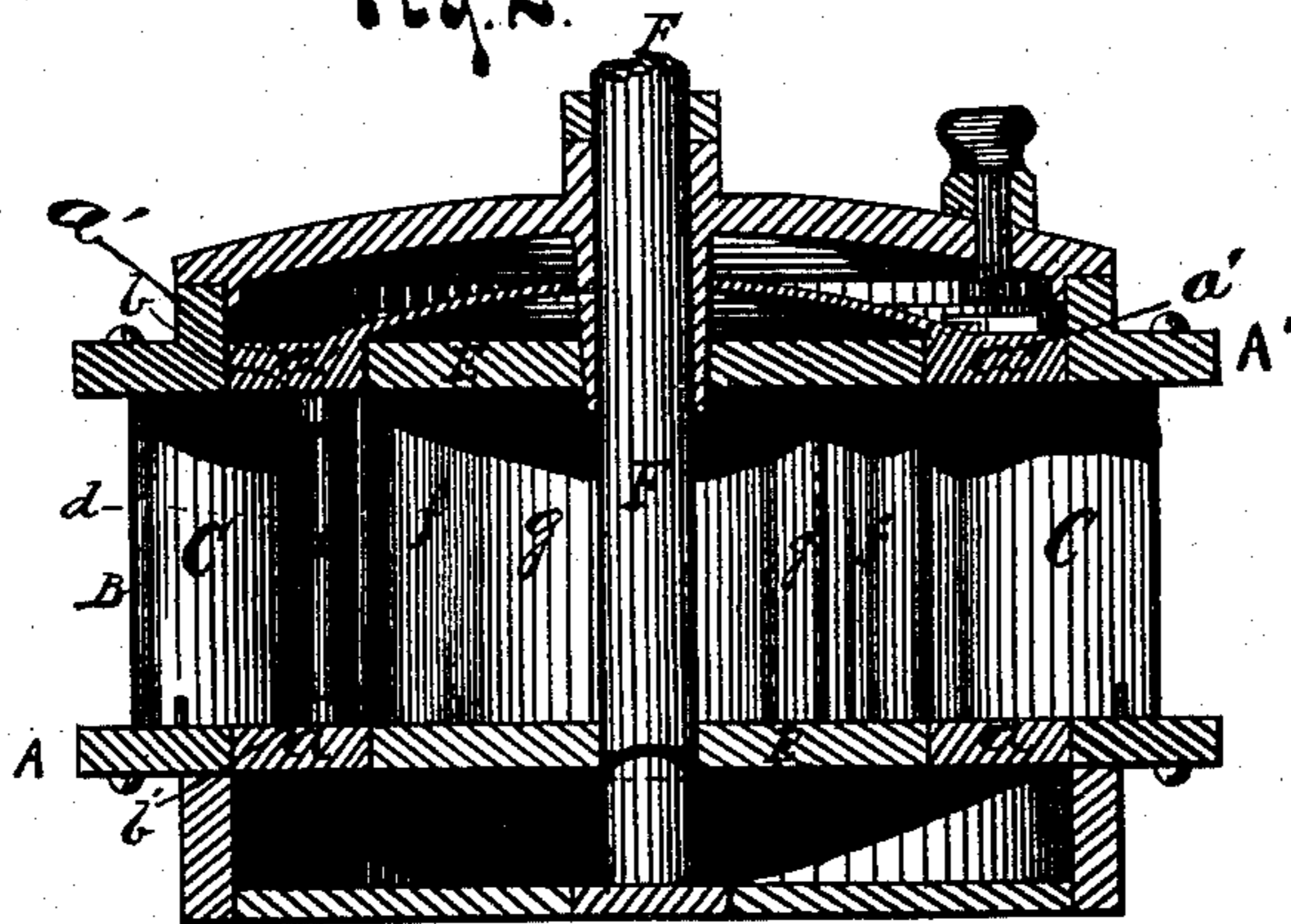
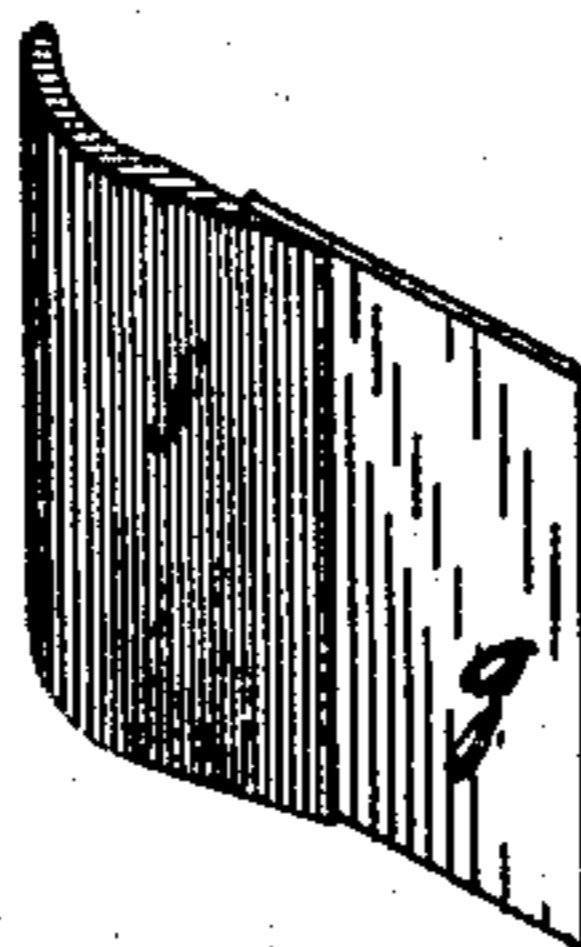


Fig. 3.



WITNESSES:

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INVENTOR,

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GEORGE ARROWSMITH, OF BUFFALO, NEW YORK.

IMPROVEMENT IN TURBINE WATER-WHEELS.

Specification forming part of Letters Patent No. **164,668**, dated June 22, 1875; application filed April 23, 1875.

To all whom it may concern:

Be it known that I, GEORGE ARROWSMITH, of Buffalo, in the county of Erie and State of New York, have invented certain Improvements in Turbine Water-Wheels, of which the following is a specification:

My invention relates to improvements in the buckets of water-wheels; and my invention consists in providing each bucket with a spring or auxiliary bucket, which projects from the end of the bucket, and when the latter are in position in the wheel the said springs are converted into auxiliary spring-buckets, and, projecting forward from the main bucket, will meet or nearly meet the back of the adjacent bucket, whereby a back-action of the water is secured; and when the pressure of water on the said buckets is too great, the spring auxiliary buckets will open and permit the passage of the surplus water; and when the pressure which effects this has been removed, the auxiliary buckets will spring into their proper position.

In the drawings, Figure 1 is a plan in section. Fig. 2 is a vertical cross-section through the middle. Fig. 3 shows a bucket detached, having the supplementary spring-bucket.

A A' are two metal rings, forming the top and bottom of the outside frame. These are secured by being bolted together by means of posts B B B. (See Fig. 1.) Placed at equal distances apart between the two rings A A' are movable gates C in an upper and lower frame, *a a*, their inner ends projecting forward until they nearly strike the outer periphery of the water-wheel E, and, when closed, rest against the back of the gate next before them, as clearly shown in Fig. 1. Lugs *b b'* are formed on the outside of each gate, one at the top and one at the bottom, and through these a rod, *d*, passes, and through the case A A', and is attached firmly to the upper and lower gate-frame *a a'*.

Of course, the top and bottom gate-frames *a a'* move together, and are actuated by any suitable device operated from above, thus

gradually widening the passage or narrowing it, to regulate the flow of water on the wheel. A special effect is also obtained by fastening these gates to the frames *a a'*, as a simultaneous and equalized movement is produced, and the pressure of the water is the same on all the buckets of the wheel.

E is the wheel, moving on shaft F, having the usual stationary buckets *f f*. *k k* indicate the water-passage between each bucket. By leaving these passages open a large quantity of the water flows through without any power being obtained from it. To prevent this, and utilize this water, I provide each bucket with a metal spring, *g*, which projects forward until they almost or fully meet the back of the next bucket, as shown in Fig. 1. By this means a back action is got from the water that would otherwise be wasted; and by making the piece *g* springy, if too great a pressure is brought to bear upon them, they will open and let the surplus water through, and when the pressure is removed will spring back in place.

This is an important feature of my invention, as I am enabled to get a double effect, namely, first, force or percussion of the water; and, second, the reaction, thus utilizing a great deal of water or power now entirely lost.

I claim—

The buckets *f*, provided with the springs *g*, projecting forwardly from and beyond the ends of the buckets, substantially as described, whereby, when the buckets are in position in the wheel, the said springs will form auxiliary buckets, and, projecting forward, will meet, or almost meet, the back of the adjacent bucket, for the object herein stated.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

G. ARROWSMITH.

Witnesses:

T. H. PARSONS,
J. R. DRAKE.