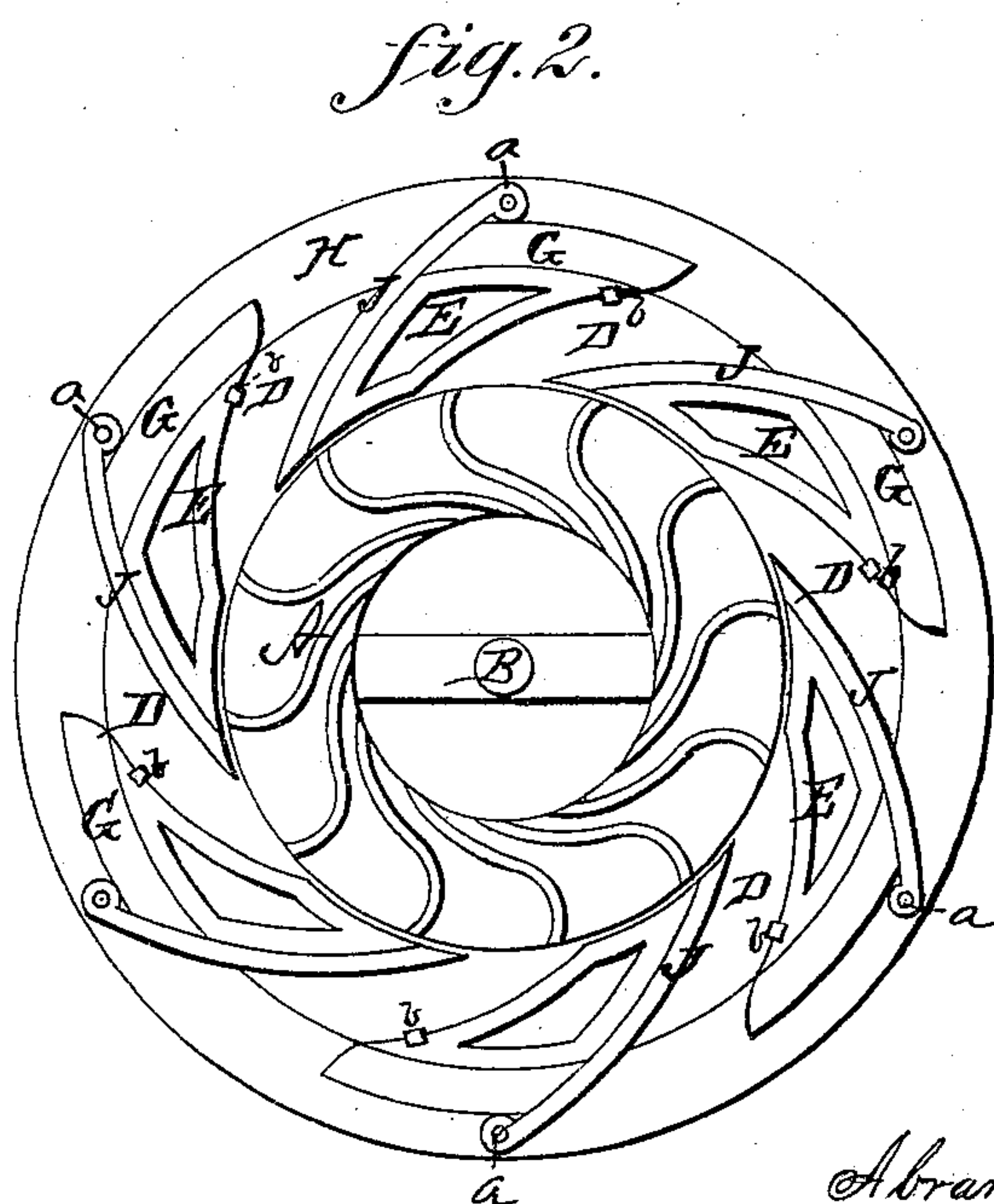
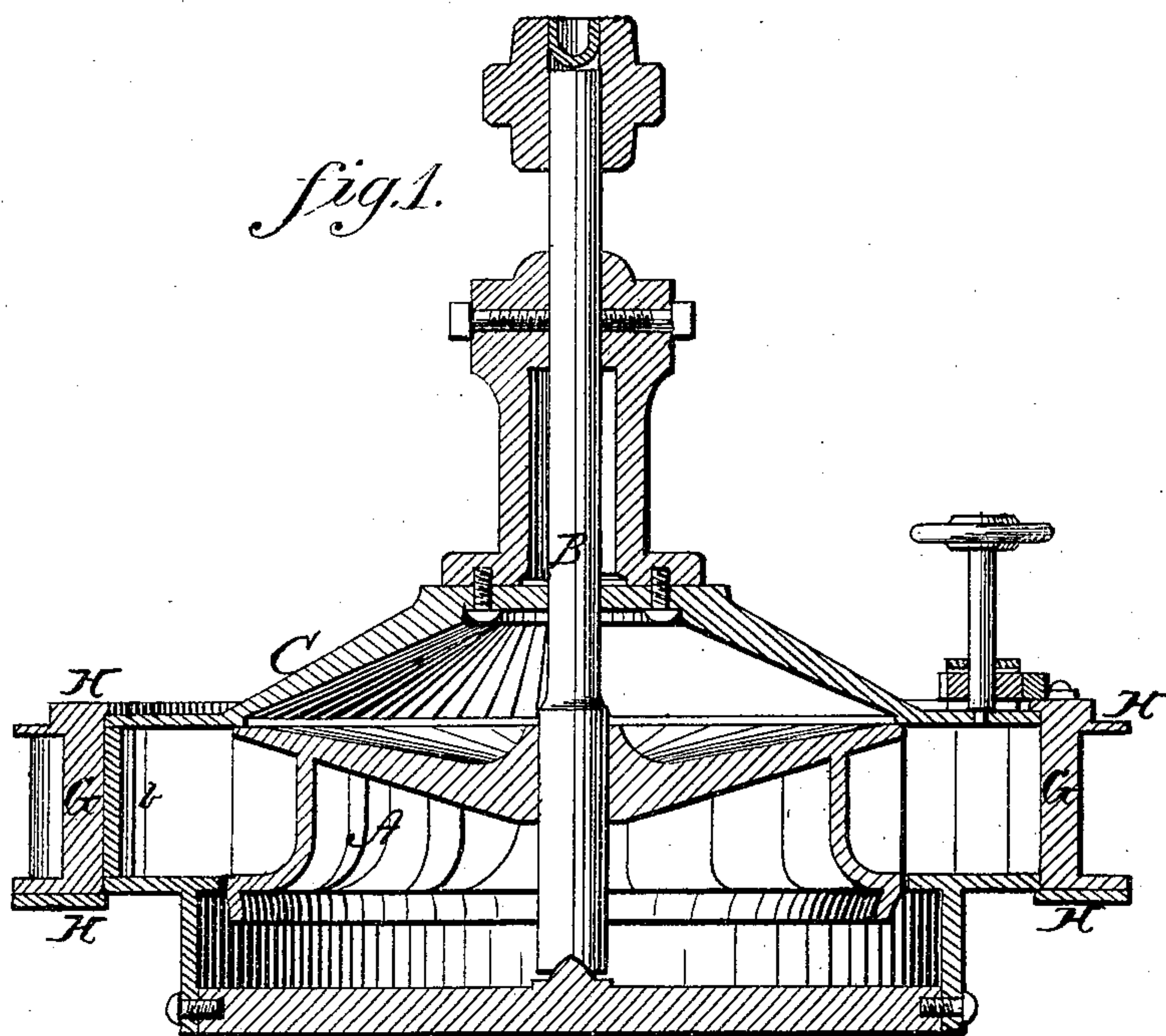


A. N. WOLF.
Water-Wheels.

No. 141,616.

Patented August 5, 1873.



Witnesses
John A. Ellis
Edward E. Ellis

Inventor
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UNITED STATES PATENT OFFICE.

ABRAHAM N. WOLF, OF ALLENTOWN, PENNSYLVANIA.

IMPROVEMENT IN WATER-WHEELS.

Specification forming part of Letters Patent No. **141,616**, dated August 5, 1873; application filed June 17, 1873.

To all whom it may concern:

Be it known that I, ABRAHAM N. WOLF, of Allentown, in the county of Lehigh and State of Pennsylvania, have invented certain new and useful Improvements in Turbine Water-Wheels; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon, which form a part of this specification.

The nature of my invention consists, first, in the construction and arrangement of the series of gates and water-guides; and, second, in the construction and arrangement of the water-guards in the casing of the wheel; all of which will be hereinafter more fully set forth.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawing, in which—

Figure 1 is a longitudinal vertical section of my wheel, and Fig. 2 is a horizontal section of the same.

A represents a turbine water-wheel, of any suitable construction, connected to a shaft, B. C represents the casing, with water-passages D D, between which are double water-guards E E, as shown in Fig. 2. G G represent a series of gates attached to or formed with and between two parallel metallic rings, H H, which are turned so that the gates will open or close the water-passages D D in the casing, as desired, by the usual rack and pinion. Between the rings H H are placed water-guides J J, which extend through the water-passages D D, and are connected to the rings by means of bolts or pins *a a* on the outside periphery. The water-guides swing freely on their bolts or pins in such a manner that, if any substance or obstruction gets into the wheel, the guide will yield until the obstruction has passed,

and then, yielding to the pressure of the water, will resume its proper place, and, by means of the construction of which guides, the proper and most efficient direction of the water is preserved; and the channels D D for the passage of the water narrows as it approaches the wheel. The double water-guards E are provided with rubber or other suitable elastic material, *b*, at the point where the water-guides J strike them when the gates are closed, thereby forming a water-tight joint, preventing leakage.

By the combination of these parts, as constructed, with the wheel A the pressure of the water is so nearly equalized by the suction, which operates to close them, that the gates open and close with great ease, and without danger of breakage by their sudden opening or closing.

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

1. The gates G G and water-guides J J, placed between the two horizontal parallel rings H H, and the guides swinging on bolts or pins *a a*, substantially as and for the purposes herein set forth.

2. The double water-guards E E, forming tapering water-passages D D, and provided with joints *b*, of rubber or other suitable elastic material, substantially as and for the purposes herein set forth.

3. The combination, with the wheel A, of the water-guards E, with joints *b*, rings H, gates G, and swinging water-guides J, substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

A. N. WOLF.

Witnesses:

T. M. ELY,
HENRY T. KLECKNER.