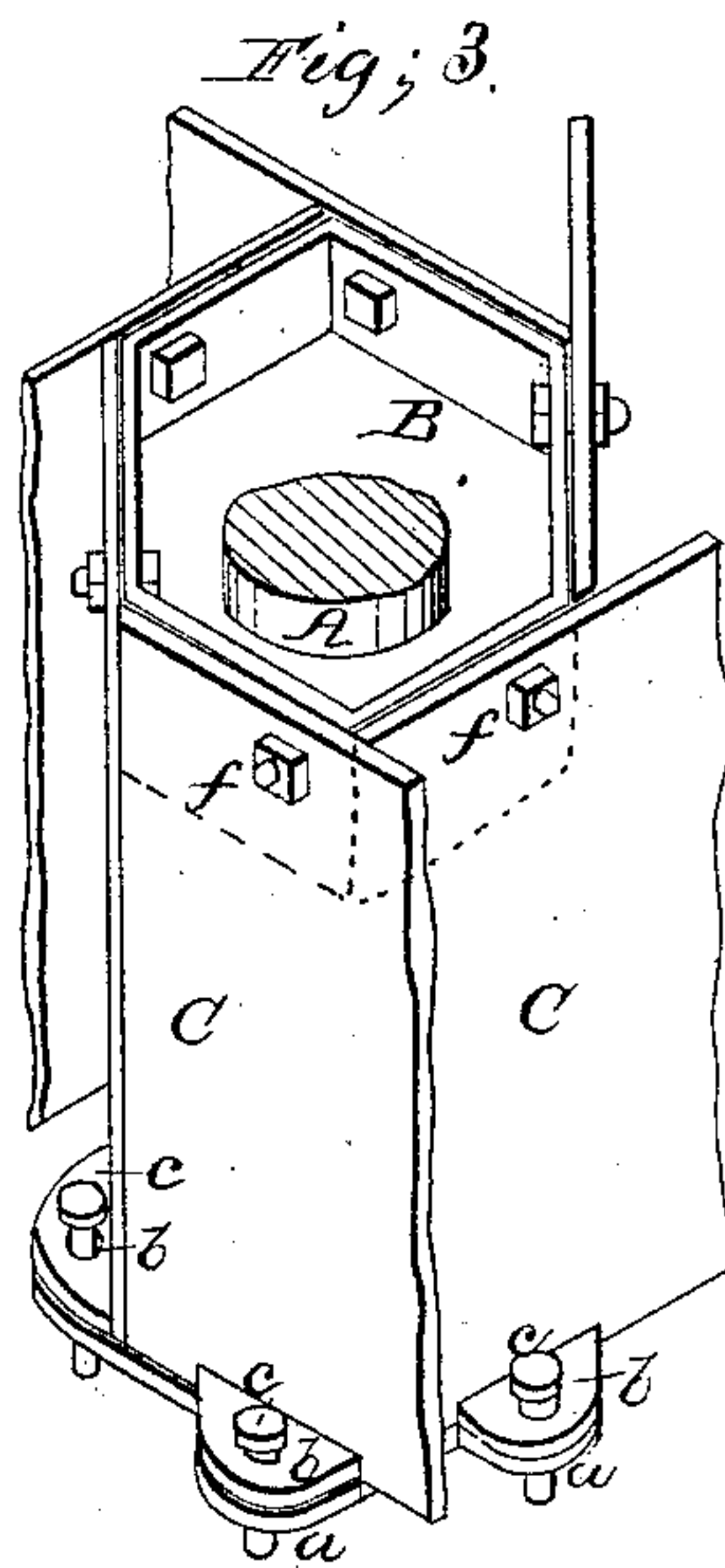
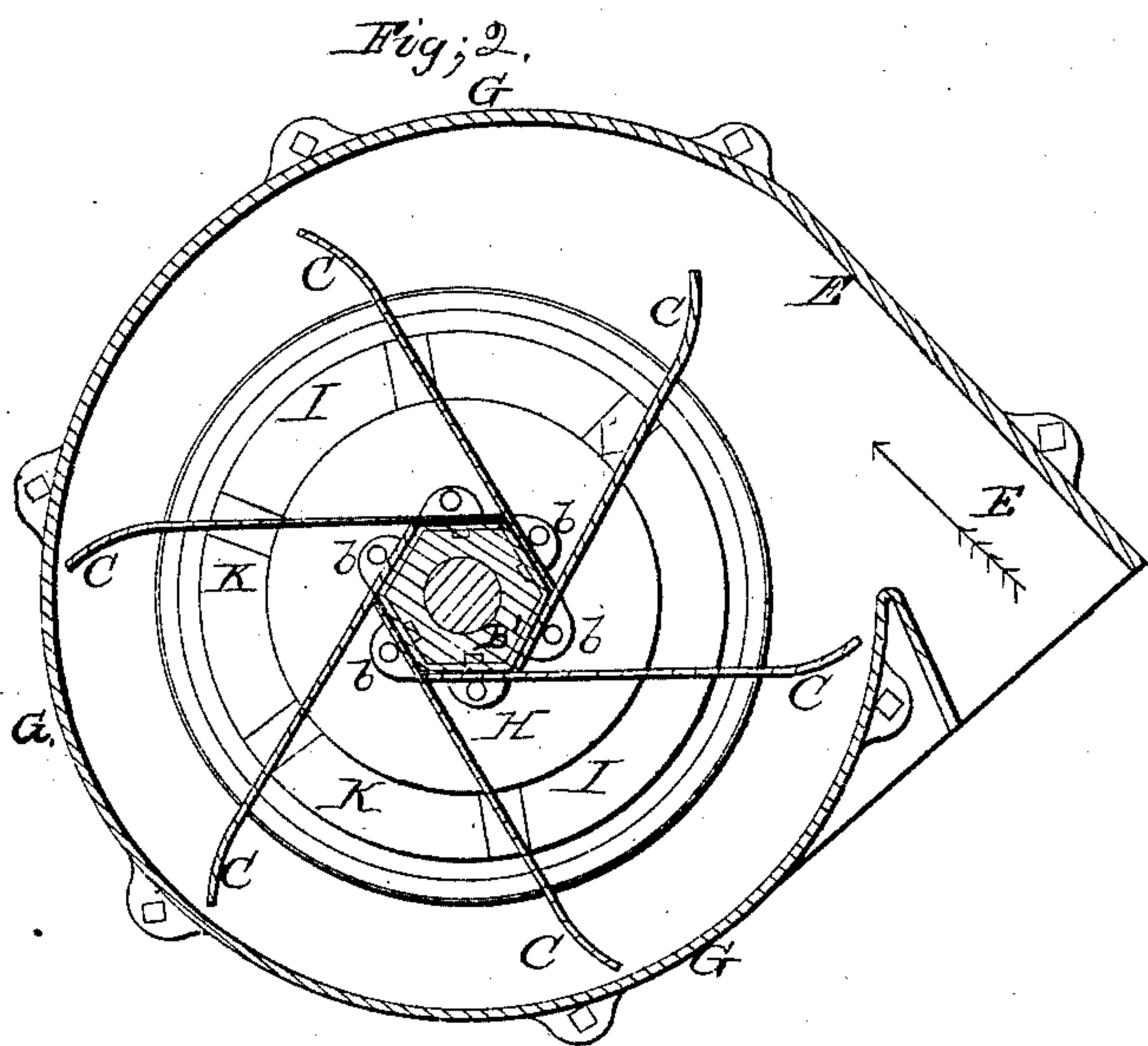
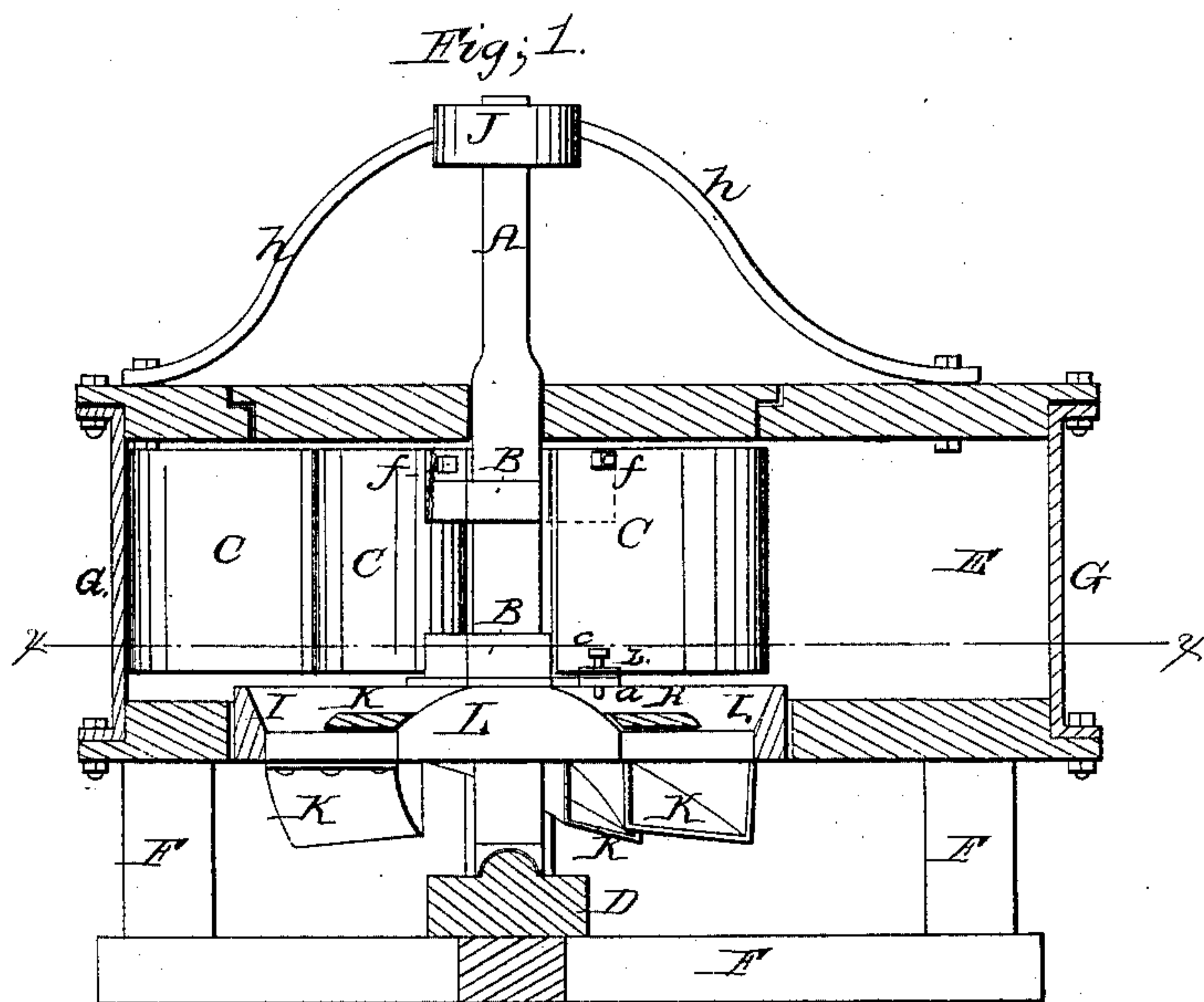


# H. G. Nelson Water Wheel.

N<sup>o</sup> 45069.

Patented Nov. 15, 1864.



Witnesses:

J. L. Judson  
James Mason

Inventor;

H. G. Nelson

By J. Frank He  
Atty.



# UNITED STATES PATENT OFFICE.

HENRY G. NELSON, OF LOCKPORT, NEW YORK.

## IMPROVEMENT IN WATER-WHEELS.

Specification forming part of Letters Patent No. 45,069, dated November 15, 1864.

*To all whom it may concern:*

Be it known that I, HENRY G. NELSON, of Lockport, in the county of Niagara and State of New York, have invented certain new and useful Improvements in the Mode of Constructing Horizontal Water-Wheels; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of the specification, in which—

Figure 1 is a vertical section of my improved wheel. Fig. 2 is a horizontal section on the line *xx* of Fig. 1. Fig. 3 is a perspective view representing a portion of the shaft A, divided hub B B, and floats C C detached.

Like letters designate corresponding parts in all of the figures.

As shown in the drawings, A represents the shaft of a horizontal wheel, B B being collars or divided adjustable sections of the hub, to which the buckets C C are attached in a manner that will be hereinafter described. The shaft A has its lower step at D, resting on the frame work F, which supports the scroll-case G of the wheel.

E is the induction-passage for the water, which, after acting on the buckets C C, escapes through an annular passage or central vent, I I, surrounding the diaphragm H through the turbine attachment, the buckets of which are shown at K K, Figs. 1 and 2. Braces *h h* support the upper box or bearing J of the shaft A.

My method of constructing the hub for attaching the buckets C C is an improvement on that described in the Letters Patent granted to me August 28, 1860, for improvement in water-wheels, and reissued May 21, 1861. In that patent the hub is described as consisting of two polygonal flanged collars secured upon the shaft at a suitable distance apart to receive each a screw-bolt through the top and bottom of one of the buckets and the flange of the collars. In my present improvement I retain the polygonal flanged collar B B, which are attached to the shaft A by bolts, or in any convenient manner, at a proper distance apart, to connect with the upper and lower edges of the buckets C C. On the lower collar, B', a lip, *a*, projects horizontally from each of the planes or faces of the polygon,

and a corresponding lip or flange, *b*, is provided on the lower edge of the bucket.

A pin, *c*, is dropped through holes which coincide in these parts, which secures the bucket to the lower hub, and a screw-bolt, *f*, passed through the flange on the upper hub and the bucket, serves to hold the bucket to its place as securely as is accomplished by double bolting, and possesses the important advantage of enabling a bucket to be removed, if required, and another substituted without taking up the wheel or disturbing the other buckets. By my former mode of construction the lower bolt, being horizontal, could not be removed without separating the parts of the wheel.

The lip *a* furnishes support underneath the bucket, so that its weight does not rest entirely on the bolts, and by this means they are relieved of much wear and liability to be broken by the twisting strain exerted by the buckets.

The buckets C may be made of wrought or cast iron, and are flat, except at the outer extremity, where they are bent slightly forward in the direction of rotation. The water enters the scroll horizontally in the direction of the arrow, impinging squarely on the buckets C, and after having acquired a rapid rotary motion falls through the annular discharge I I into the buckets K of the turbine attachment. These buckets, together with the solid hub L and rim P, are cast in one entire piece and keyed to the shaft A in the usual manner, their inclination being obliquely opposed to the direction acquired by the water in discharging through the space I I, its force, acting both through its gravity and momentum, acts most efficiently on the wheel, augmenting its motion greatly over that of a horizontal wheel simply.

The effect of the diaphragm H is to compel the discharge of the water at the periphery of the turbine, where its force is most effectively applied, and also to diminish the area of the opening to adapt it to the supply of water. Being a separate partition, which rests on the lower hub, L, it may be removed and another substituted by simply taking off the buckets C C. It should be of such a size as to leave the discharge area just sufficient to carry off the amount of water which enters the scroll. The number of turbine buckets which I em-

ploy is the same as that of the horizontal ones C C.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of the turbine buckets K K with the horizontal buckets K K, shaft A, scroll G, and annular eduction-passage I I, arranged and operating substantially as set forth.

2. The diaphragm H, in combination with a wheel composed of the straight buckets C C and turbines K K, arranged in the manner and for the purpose described.

3. In combination with the collars B B' on the shaft A and buckets C C, the supporting-lip *a*, flange *b*, and pin *c*, operating conjointly with the bolt *f*, substantially as and for the purpose set forth.

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

HENRY G. NELSON.

Witnesses:

DANIEL PRICE,

SAMUEL PEIRCE.