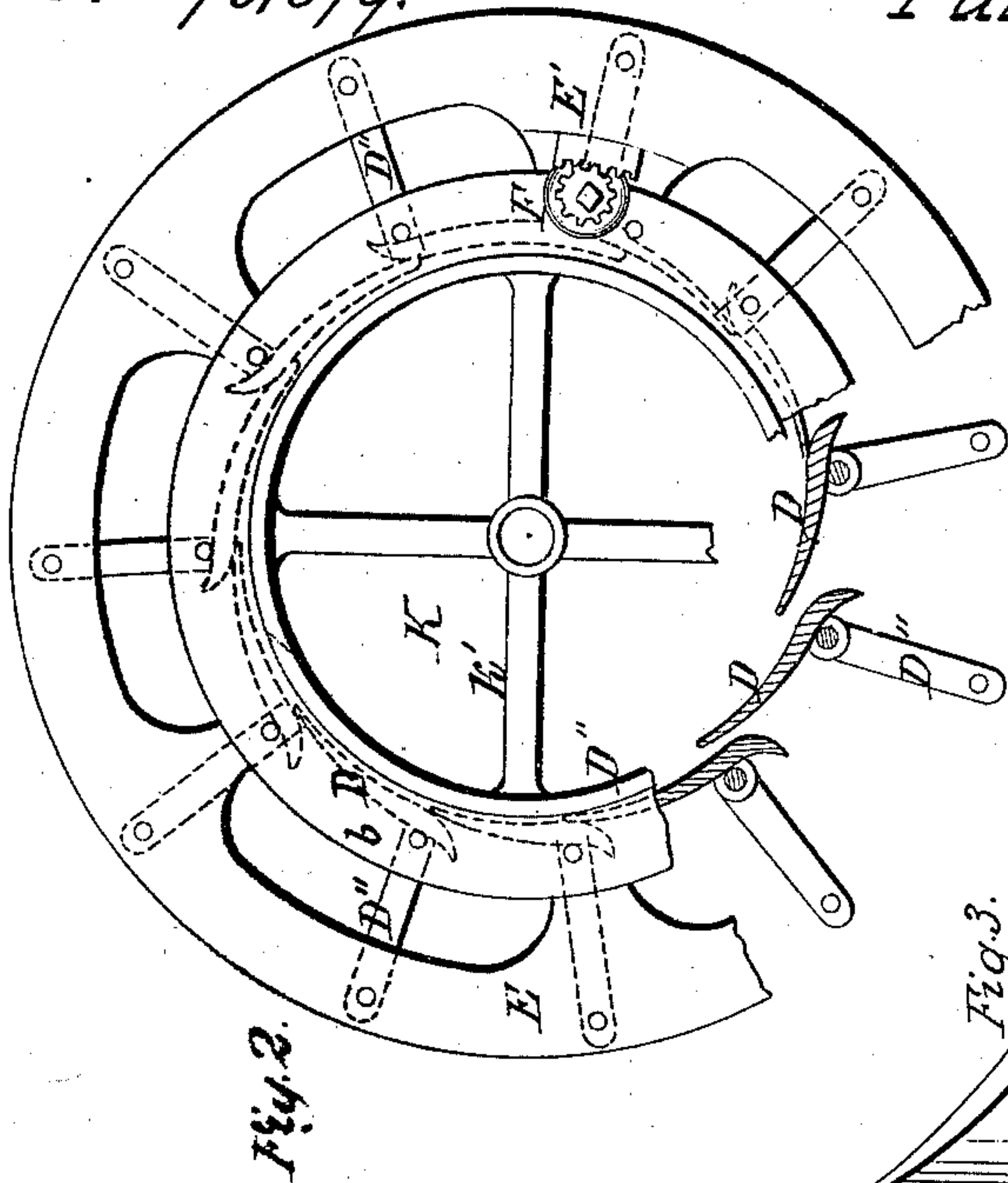


*T. Leffel.*

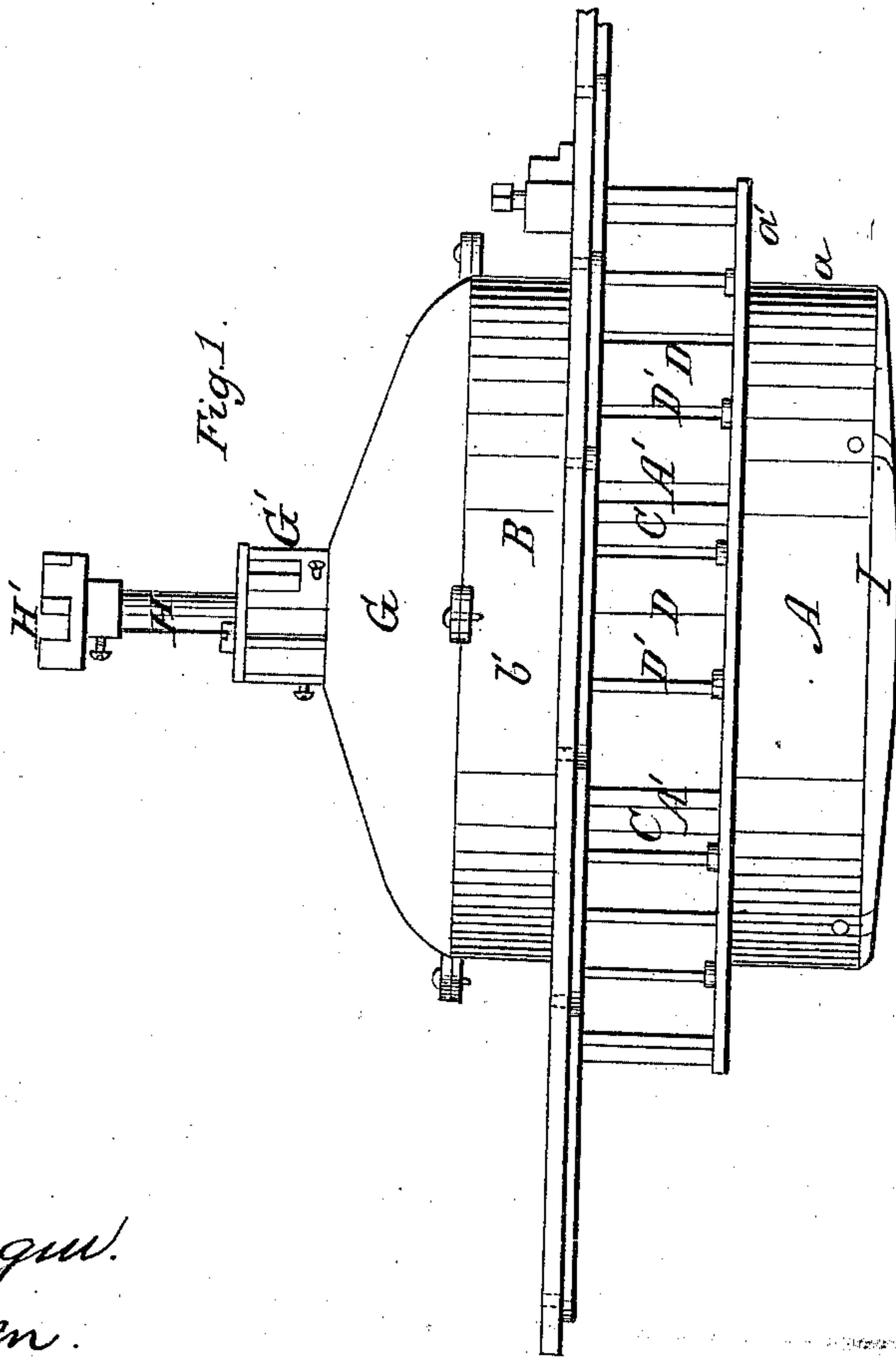
*Water Wheel.*

*N<sup>o</sup> 78,879.*

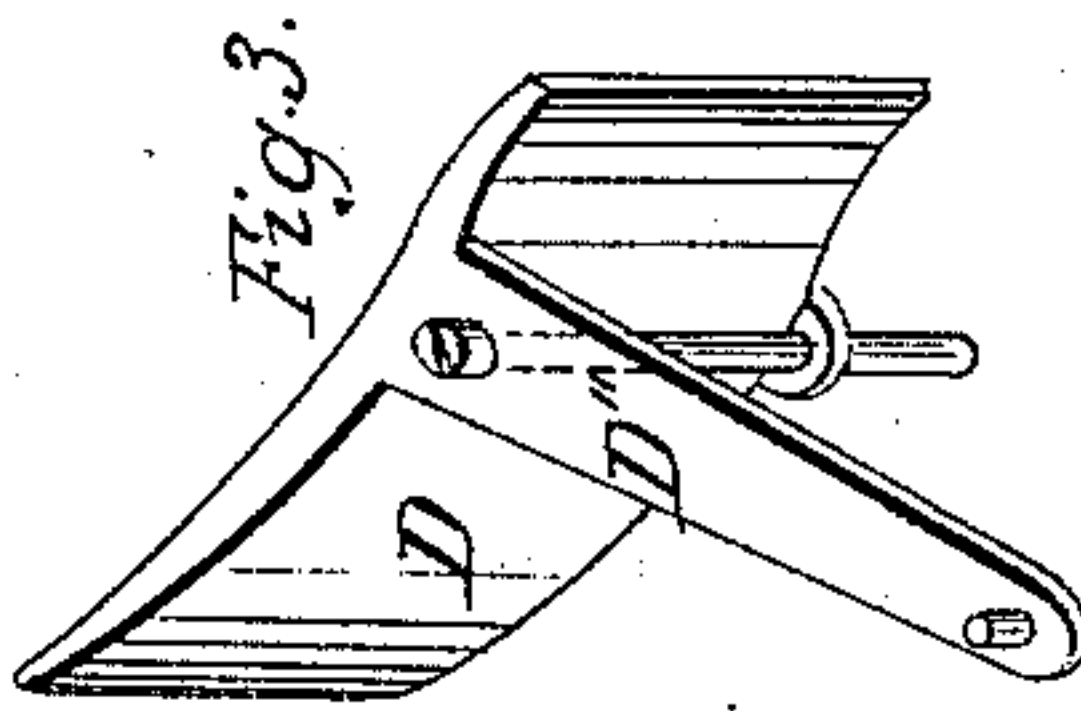
*Patented Jun. 16, 1868.*



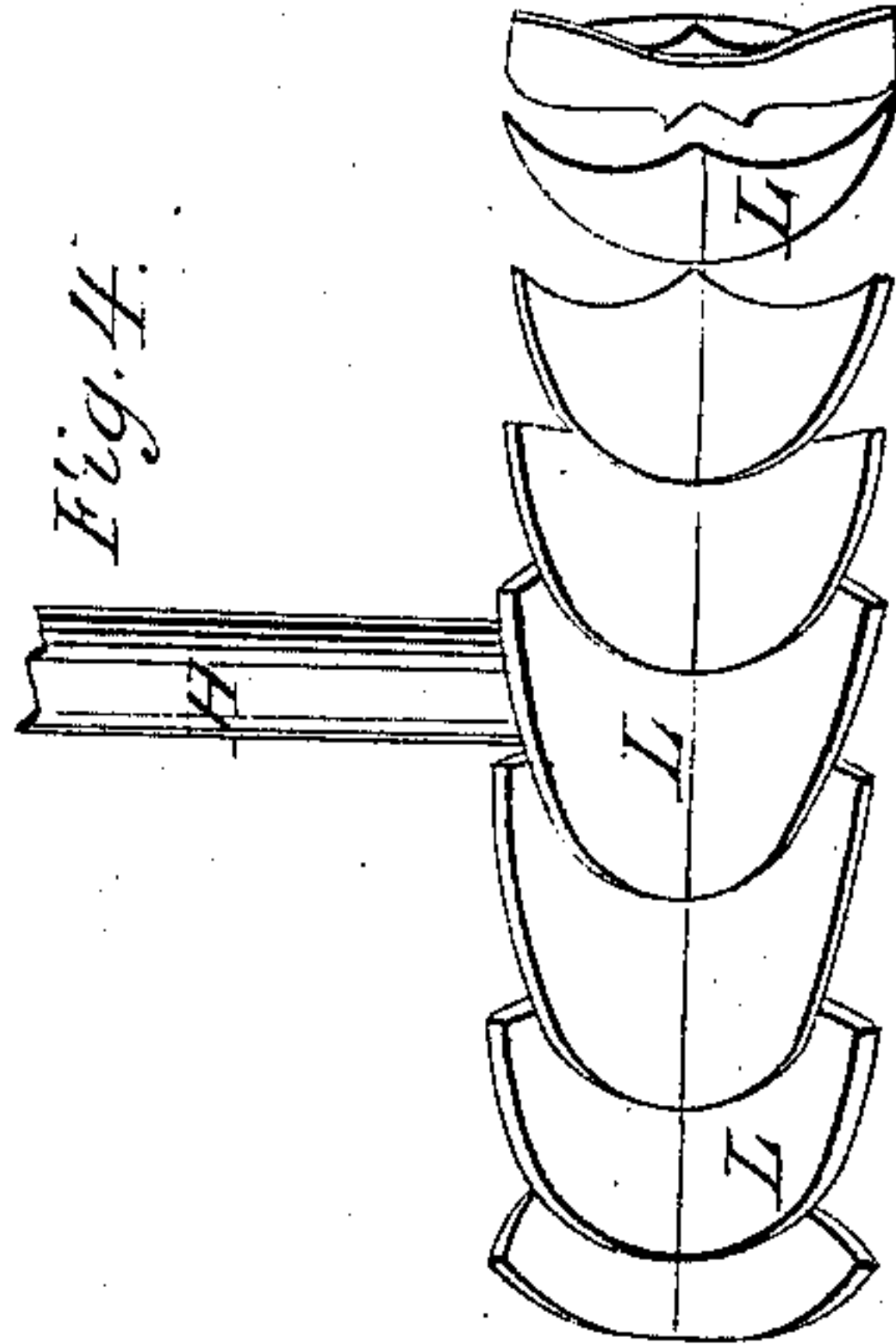
*Fig. 2.*



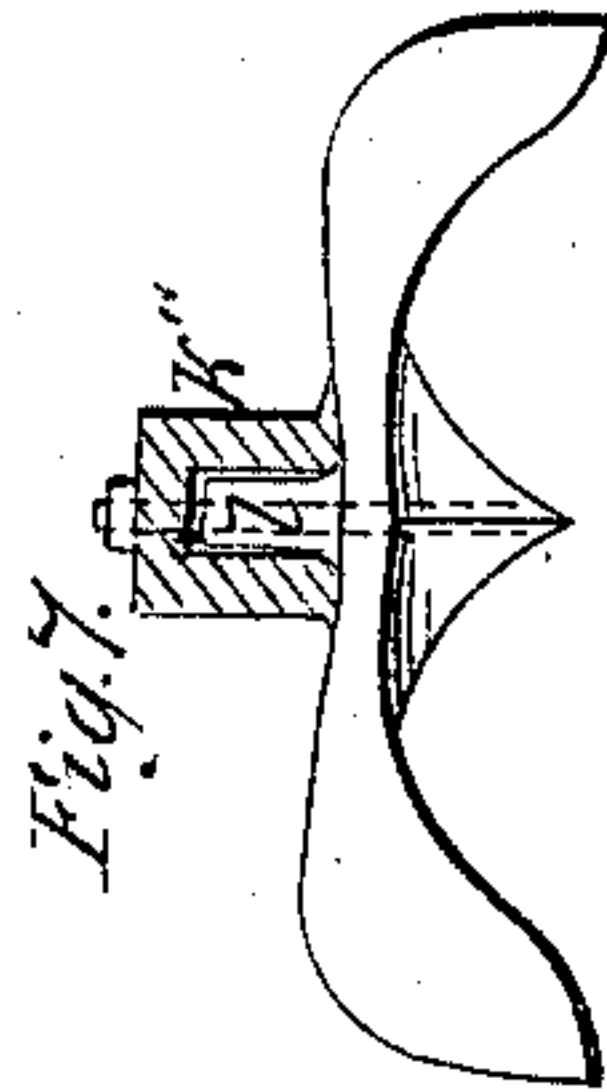
*Fig. 1.*



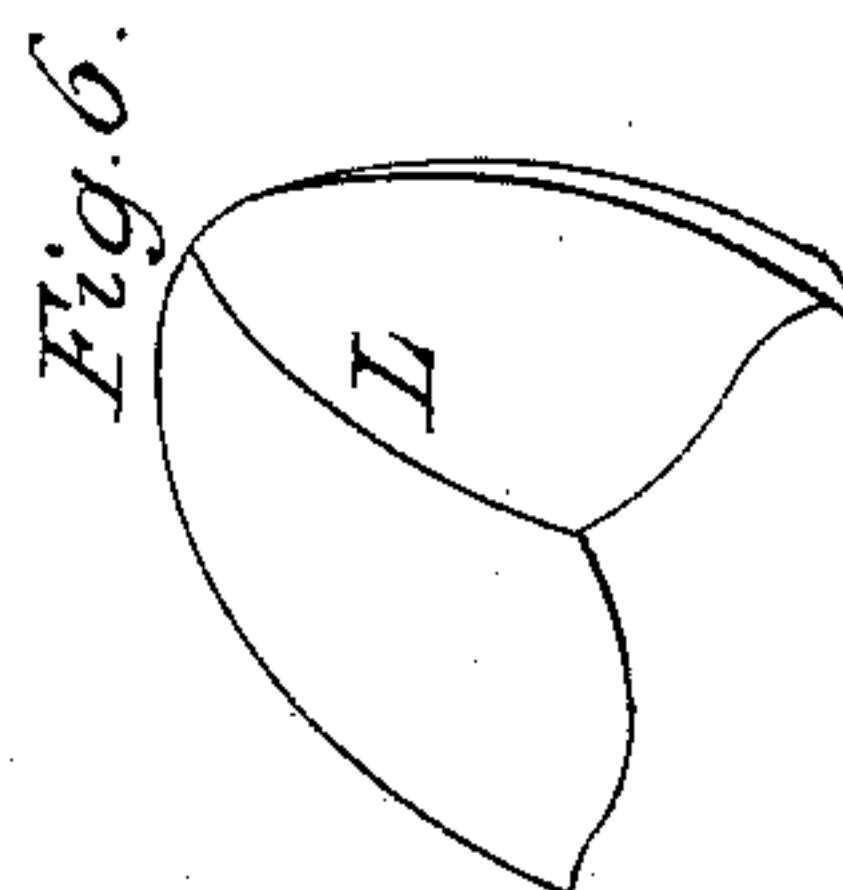
*Fig. 3.*



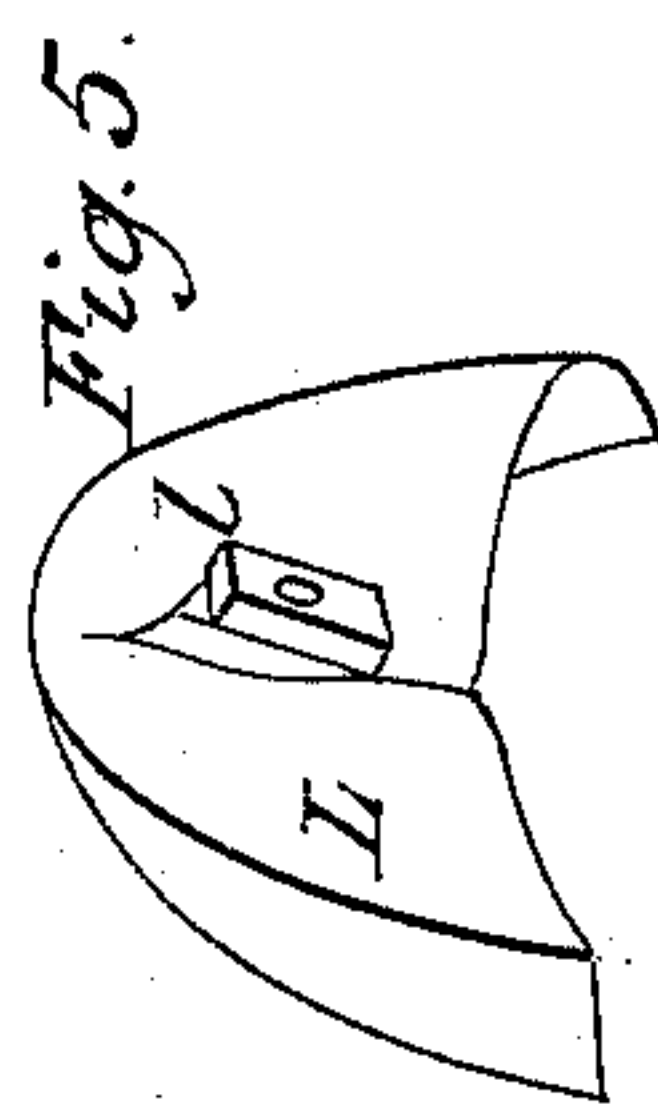
*Fig. 4.*



*Fig. 7.*



*Fig. 6.*



*Fig. 5.*

*Witnesses:*  
*J. H. Sprague.*  
*C. F. Clausen.*

*Inventor:*  
*Thomas Leffel*  
*D. P. Hollingsworth,*  
*his Atty.*



# UNITED STATES PATENT OFFICE.

THOMAS LEFFEL, OF SPRINGFIELD, OHIO, ASSIGNOR TO HIMSELF AND  
HENRY C. BARNETT, OF SAME PLACE.

## IMPROVEMENT IN WATER-WHEELS.

Specification forming part of Letters Patent No. 78,879, dated June 16, 1863.

*To all whom it may concern:*

Be it known that I, THOMAS LEFFEL, of Springfield, in the county of Clarke and State of Ohio, have invented a new and useful Improvement in Water-Wheels; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making part of this specification, in which—

Figure 1 is an elevation; Fig. 2, a plan, partly in section; Fig. 3, a perspective view of one of the gates; Fig. 4, an elevation of the wheel; Fig. 5, an elevation of one side of one of the floats; Fig. 6, an elevation of the opposite side of the same; Fig. 7, an elevation, showing the end of one of the same.

The same letters in all the figures indicate the same parts.

My invention relates to that class of water-wheels in which the water is received horizontally, and, passing through a series of gates, (which perform also the functions of guides for giving proper direction to the water,) is discharged upon the periphery of the wheel, and escapes through the center of the wheel.

My improvements consist, first, in a novel form of bucket or float; second, in the manner of attaching said float.

In the annexed drawing, A is the cylinder, which is composed of a vertical tube, *a*, large enough to receive the wheel, and a horizontal flange, *a'*. This tube is intended to be set in the bottom of a flume or fore-bay, and it may be connected with the tail-water by an air-tight tubular extension of any required length. The horizontal flange *a'* rests on the floor, and sustains the weight of the casing and wheel. B is a metallic ring, consisting of a tubular portion, *b'*, and a horizontal flange, *b*. The diameter of the tube is sufficient to permit the wheel to be passed therethrough. These flanges are connected by bolts *A'*, passing through tubular columns, on which the upper flange is supported and maintained in a position parallel with the plane of the lower flange *a'*. The open space thus left between the flanges is filled by a series of oscillating gates, D, which I prefer to form substantially as shown. These gates, turning upon bolts *D'*, passing through lugs thereon, serve both to shut off or regulate the supply of water, and to control the di-

rection thereof. The levers or arms *D''* are rigidly attached to the gates at their center of oscillation, and extend outwardly radially to the wheel, where they are connected by pins or bolts, on which they turn, to the ring E. This is a metallic ring, concentric with the wheel and casing, and having bearings, as shown, against the edge of the flange *b*. It rests on the levers *D''*, and is caused to revolve far enough to open and close the gates by means of the rack *E'* thereon, meshing into the pinion F attached to said flange. The shaft of said pinion may be conducted to such place as is most convenient for operating the gates. As the ring is turned the levers *D''* will be moved with it, so that, turning on their fulcrums *D'*, they shall open or close the gate D. The dome G rests on the tube *b'*, being united thereto by bolts passing through lugs on the tube. This dome covers the wheel, and on top of it is cast a bush, *G'*, inclosing the shaft H, and fitted to receive follower-blocks in the ordinary manner, the only peculiarity being that this bush is cast with, and forms a part of, the dome, instead of being supported therefrom on collars, arms, or in other manner. The lower end of the wheel-shaft rests on a bridge-tree, I, which, instead of bolting to the cylinder A, as is ordinarily done, I propose to cast in one piece therewith, the construction of the dome G and the tubular case B being such as to allow the wheel to be introduced into, or withdrawn from, the casing from above. The case herein described may be used with any of the class of water-wheels alluded to. I prefer, however, a wheel of the following peculiar construction: K is the wheel. It is secured to the shaft which passes through a central hub. From this hub there are radial arms *K'*, supporting a ring, *K''*, to which the floats L are attached in the following manner: The float is constructed with a central longitudinal fin, *l*, which is received into a corresponding groove on the periphery of the ring *K''*. The float is then secured by bolts passing through the ring *K''* into the float. The float is of the peculiar form shown. On the edge it has a parabolic curve. It has a central longitudinal ridge, and the sides are turned outward to form two diverging issues from the point to the aperture of discharge.



The water, entering through the gates, presses against the floats, forcing them forward in the direction of its current, while the water, having transferred its moving force to the wheel, falls behind, and, passing through the apertures formed above and below the ring, between the point of one bucket and the heel of the one on which it has been acting, escapes into the center of the wheel, thence falling through the cylinder A into the tail-race.

As both the upper and lower sides of the wheel are precisely alike, the wheel may be used to run either to the right or left, as may be desired, by simply reversing it on the shaft. The guides, of course, will require to be adapted to the direction in which the wheel is to run. The points in which this wheel and casing are distinguished from all others are, the peculiar form of the bucket, and the mode of attaching it to the ring K'', so that the water pressing against the bucket shall be discharged, both below and above the ring, into the center of the wheel, flowing through the space between the point of one bucket or float and

the heel of the float against which it has acted, there being no other obstruction to its discharge into the center of the wheel than that caused by the narrow ring to which the floats are attached.

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

1. A wheel formed of a series of single floats, the faces of which are constructed in the form described, and which are centrally attached to a ring, K'', and arranged to receive and discharge the water substantially in the manner set forth.

2. The combination of the floats L and ring K'', when respectively constructed and connected substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS LEFFEL.

Witnesses:

DAVID M. COCHRAN,  
C. ALBIN.