

T. J. ALCOTT.
Water-Wheels.

No. 139,699.

Patented June 10, 1873.

Fig. 1.

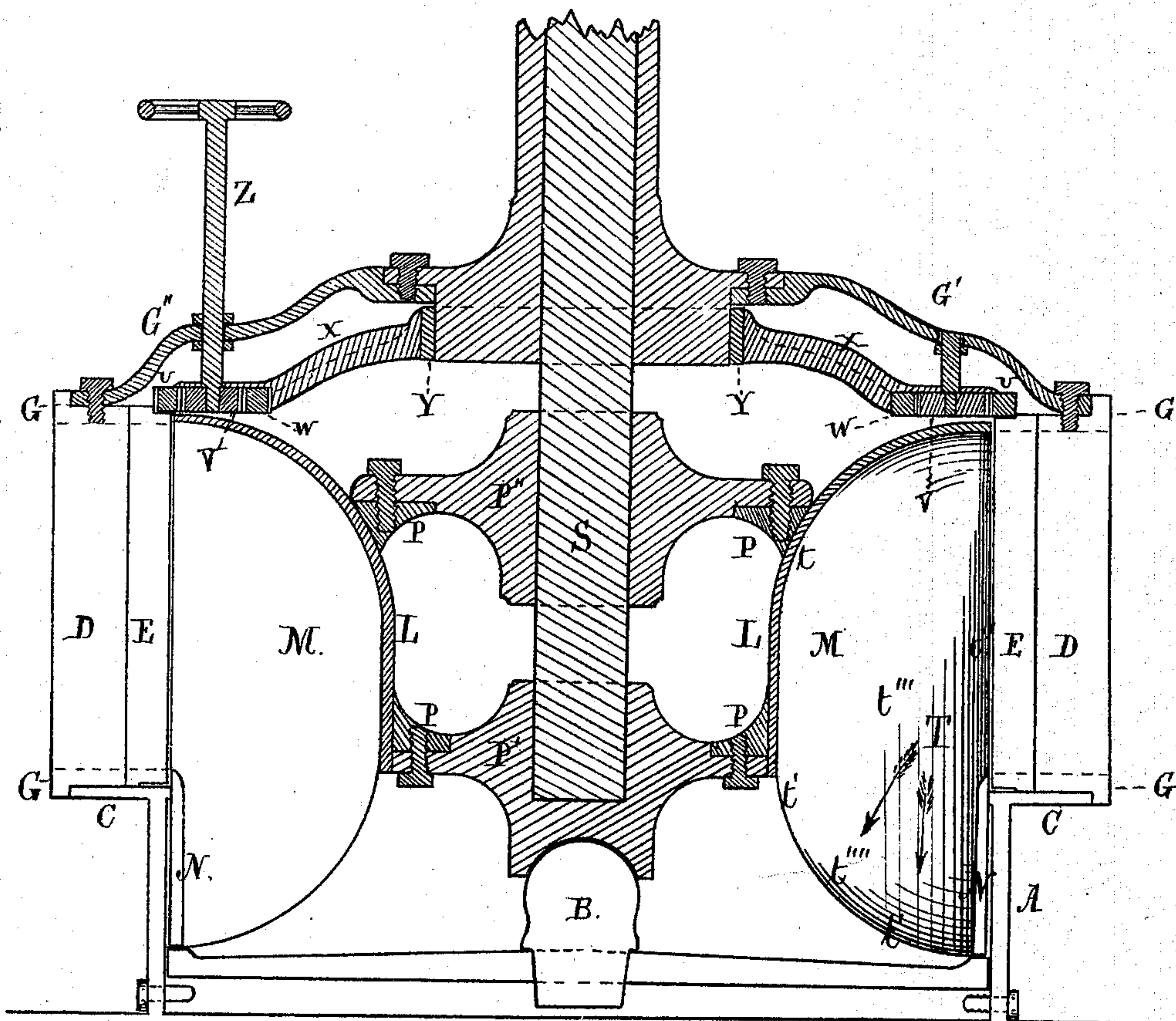


Fig. 5.

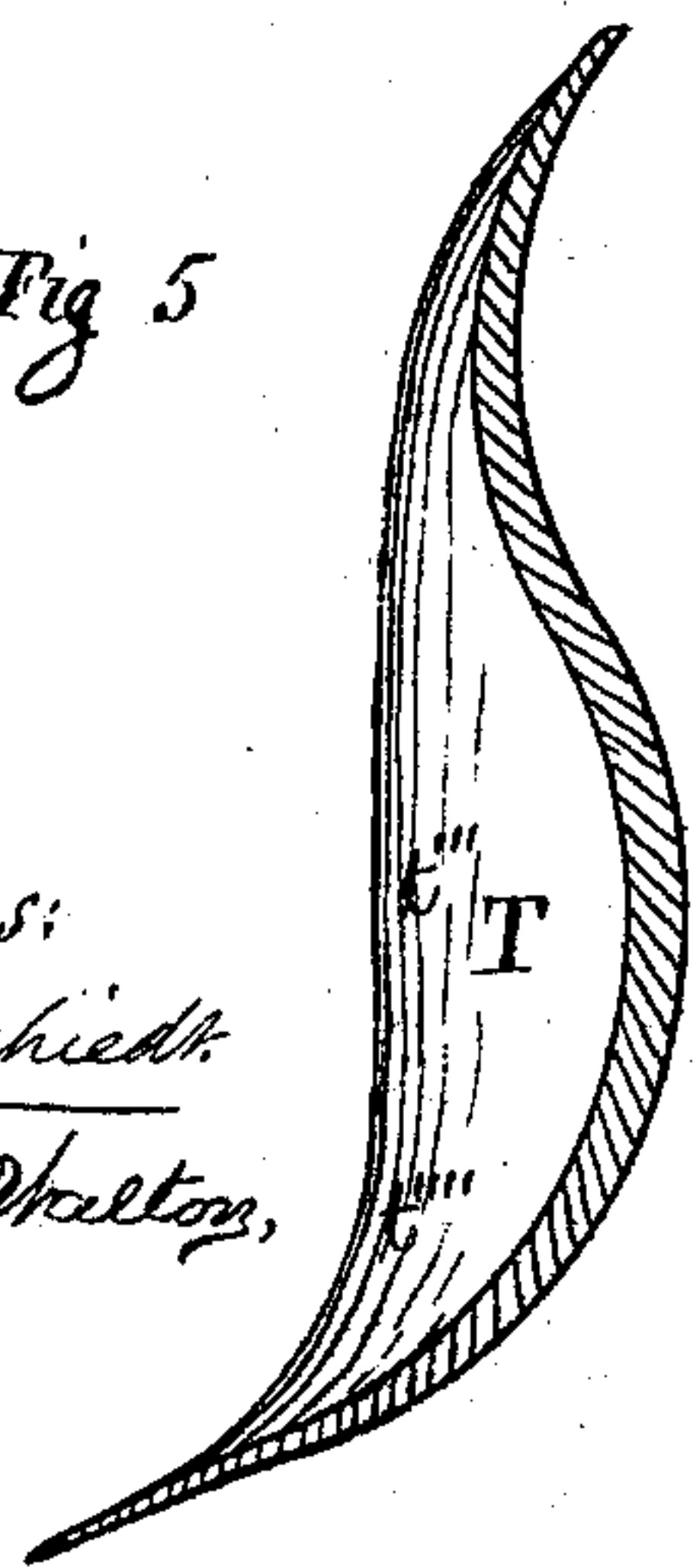


Fig. 6.



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Fig. 2.

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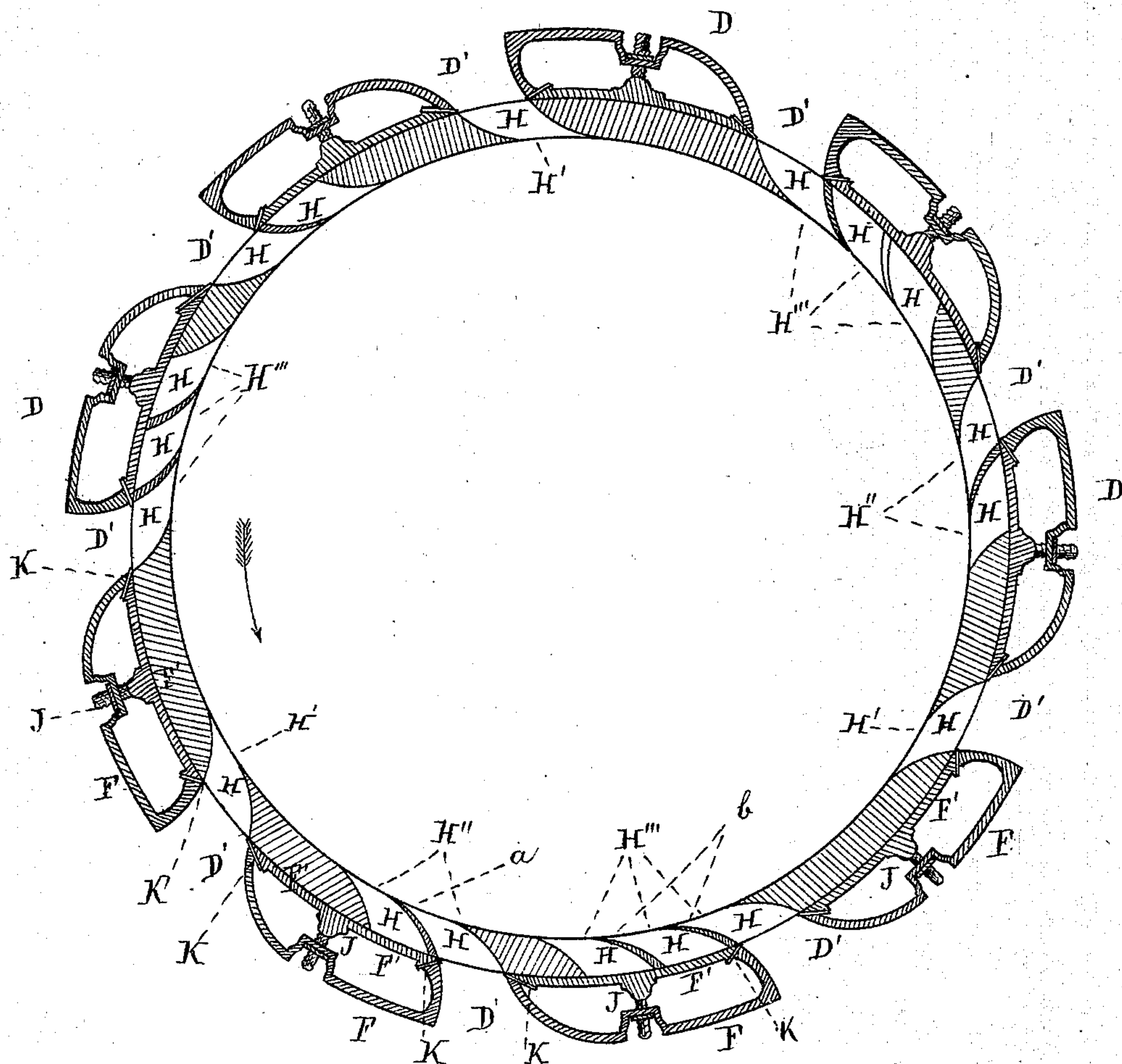
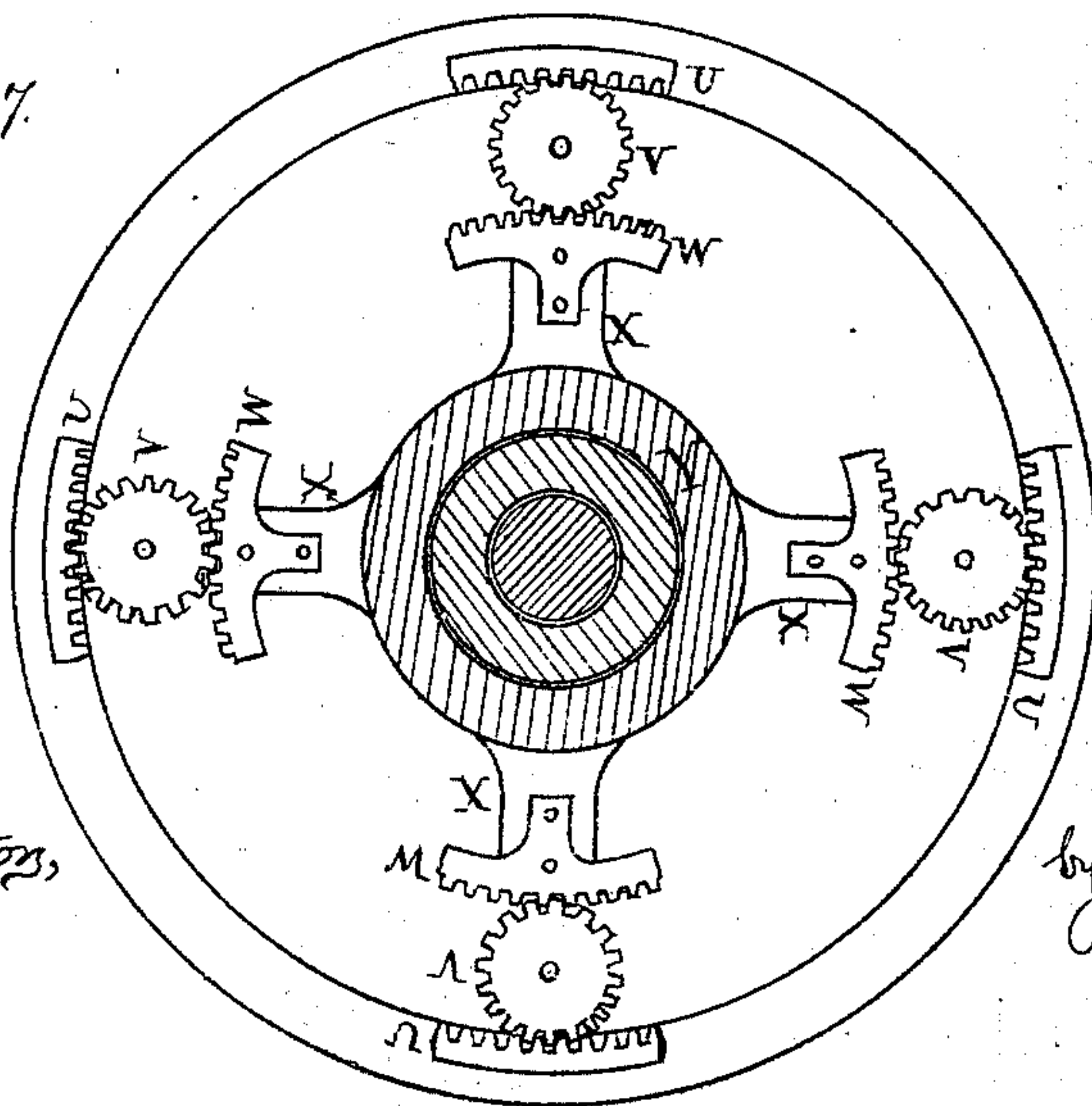


Fig. 7.



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Fig. 4.

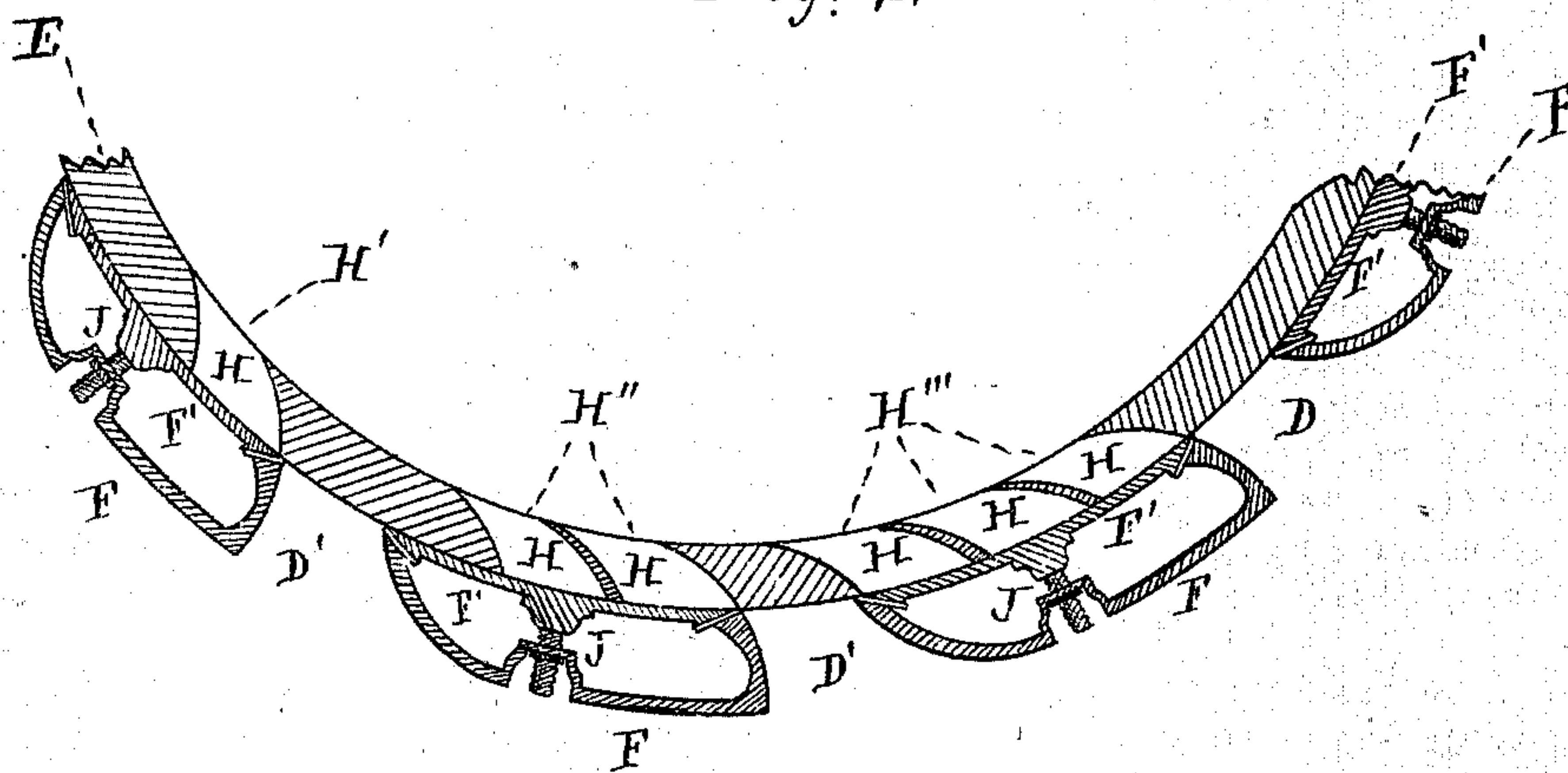
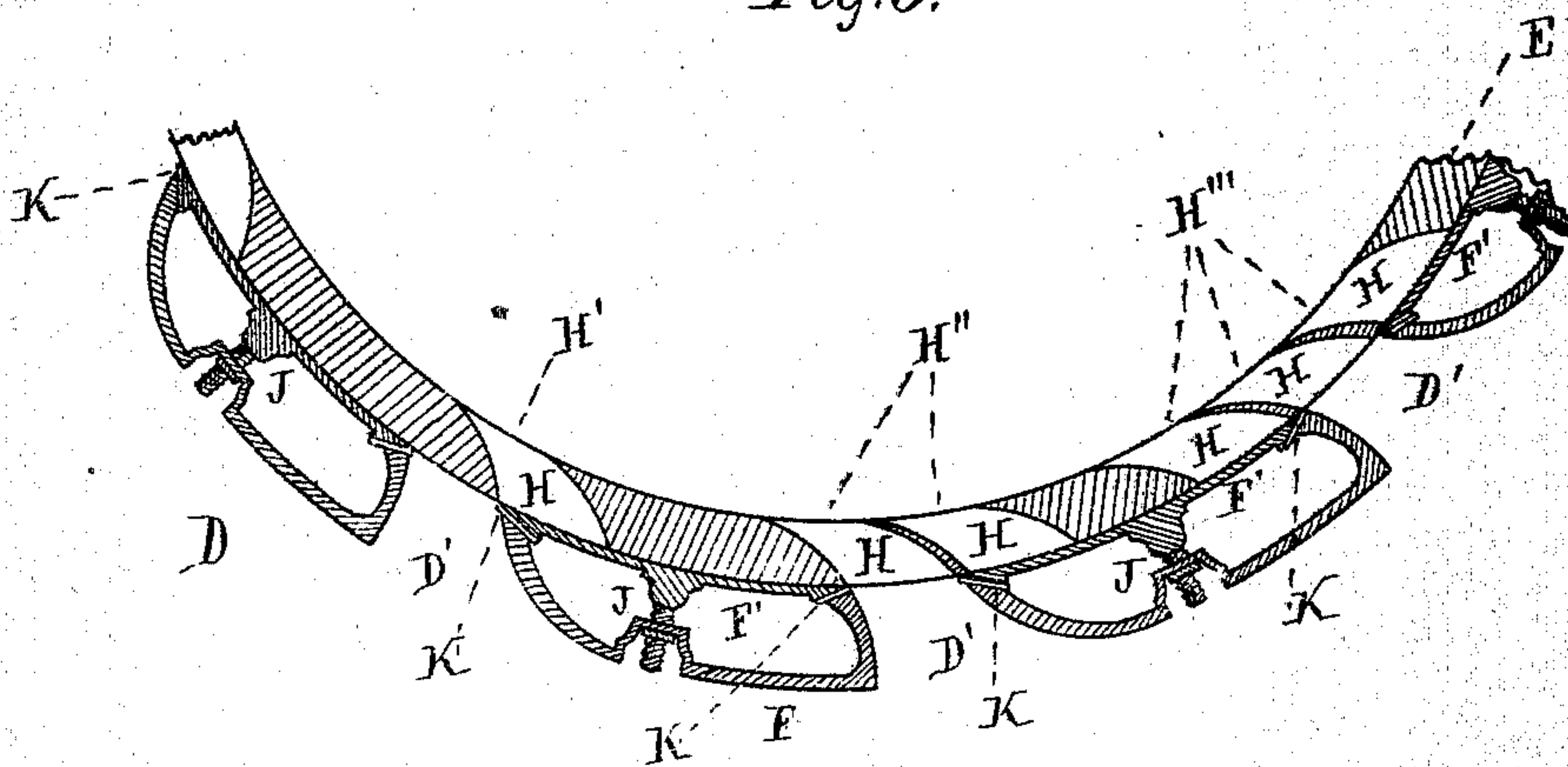


Fig. 3.



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UNITED STATES PATENT OFFICE.

THOMAS J. ALCOTT, OF MOUNT HOLLY, NEW JERSEY.

IMPROVEMENT IN WATER-WHEELS.

Specification forming part of Letters Patent No. **139,699**, dated June 10, 1873; application filed February 19, 1873.

To all whom it may concern:

Be it known that I, THOMAS J. ALCOTT, of Mount Holly, county of Burlington and State of New Jersey, have invented a new and useful Improvement in Turbine Water-Wheels; and I do hereby declare that the following is a clear and exact description of the nature thereof, sufficient to enable others skilled in the art to which my invention appertains to fully understand, make, and use the same, reference being had to the accompanying drawings making part of this specification, in which—

Figure 1 is a central vertical section of the device embodying my invention. Fig. 2 is a top or plan view (in section) of the wheel-ring or gate and walls, and Figs. 3 and 4 are similar views of portions thereof. Figs 5 and 6 are respectively vertical and transverse views of one of the buckets. Fig. 7 is a top view, showing the means for operating the gate.

Similar letters of reference indicate corresponding parts in the several figures.

This invention consists in the construction of the walls of the casing of the wheel. It also consists in a cast metallic hub and means for attachment thereto of the rim which carries the buckets. It also consists in a concave upper rim and buckets and rim on the lower outer edge of buckets made in one casting, in combination with upper hub and arms and lower casting, which, when secured to upper concave rim, not only forms a hub for the rotating shaft, but also forms the concave foot which rests on wooden center or step, thereby making a better wearing-surface than the ordinary forged shafts, which are more expensive, more easily corroded, or destroyed by the action of the water, while, at the same time, the wheels are more easily cast without the solid center to rim, and prevents all liability of the casting being destroyed by the buckets parting from the outer rim by shrinkage.

It further consists in the construction of the inner adjustable gate-ring, the same having issues or chutes, one series of which being equal to the openings in the outer casing; another series being equal to twice the size of

said openings; and another series being equal to three times the size of said openings, which, being divided by metal plates, makes each of the openings or issues in the inner ring to correspond in size to the outer openings or waterways, whereby, by adjusting the ring, there may be obtained full packed issues of water in all that are open, whether using one-third, two-thirds, or the full capacity or power of the wheel, without contracting the flow of water in such issues as may be opened, and also by the said ring the water may be entirely shut off.

Referring to the drawings, A represents the draft-tube, consisting of a rim or band which rests vertically on, or is connected to, the saddle on which the step B is supported. C represents an annular plate, which projects horizontally from and is cast with the upper edge of the draft-tube, and supports the walls D and gate E. The walls D are in sections, with chutes D' between them, and consist of outer upright shells F and inner facing-plates F', which are arranged between horizontal plates G, with which the shells F are cast, said plates being of uniform size and formation, the lower plate being supported on and bolted to the annular plate C, and the upper plate being bolted to the cover G', to which the dome is connected. The gate E is encircled by the walls D, and consists of a cylindrical ring, which is constructed with issues or chutes H, which direct the water from the chutes D' of the walls to the wheel within the gate.

It will be seen that the construction of the plate C, plates G, cover G', and gate E is such that, by the conformation of the parts to each other, the walls D, and their supporting-plates G, and gate E may be readily reversed and adapted for either a right or left wheel, as may be required or necessary. The walls in the present case are nine in number, and the facing-plates F' thereof are connected to the shells F by screws or bolts J, which are fitted to said plates and shells, which two parts form a hollow body, and the ends thereof which approach each other have a space between them for the reception of strips of rubber, leather, or other suitable packing K,

which strips are held and adjusted by the screws or bolts J, bear against the outer faces of the gate E, and form water-tight and pliable joints between the side edges of the wall and said gate, thereby preventing wear on the facing-plates, rendering easy operation of the gate, and obviating the otherwise occurring ill effects of corrosion, gritty substances, &c., and preventing sticking or binding of the gate-ring against the wall. The gate E consists of a vertical ring or band with chutes or issues H, and rests on the plates C of the draft-tube, as has been stated. The issues H correspond in height to the walls D, but in the present case there are three series of issues, but more or less may be used, one series, H', being equal to the width of the chutes between the section of the walls D, another series, H'', being equal to twice the size thereof, and another series, H''', being equal to three times the size of the said chutes, and so on. Each series H'' is equally divided by a vertical plate, *a*, and each series H''' is formed into thirds by two similar plates, *b b*, said plates *a b b* constituting portions of the gate.

When the gate is in position, as in Fig. 2, all of the chutes D' of the outer casing or walls are open and permit the passage of water through one issue of each of series of issues of the gate, (and consequently to the buckets,) in which case I am enabled to use full-gate. Now turn the gate in the direction of the arrow, a distance equal to the width of one of the chutes D', (see Fig. 3,) and it will be perceived that the series H' of the issues H are covered by the respective sections of the walls, and but one issue of each of the other series H'' and H''' remain open, so that the flow of water through the uncovered chutes D' and the open issues is not diminished at said chutes, there being no contraction of the open issues. Now, as one series is entirely closed I am using two-thirds gate. Then, again, move the gate in the direction of the arrow, the distance of one chute, and it is seen that the series H' and H'' are covered by the sections of the walls and consequently closed, but there will be left open one issue of each of the series H''', so that one-third gate is in use. In all these movements of the gate those issues which are open are of the same size, and there is no diminution thereof in obtaining the two-thirds and one-third gate, whereby the flow of water during the respective adjustment of the gate is reliably proportional in the ratio of thirds. When one more turn of the gate is made all of the issues are covered by the walls, the gate being thus entirely closed and the water shut off. (See Fig. 4.)

L represents a concave rim, whose widest portion is above. With this ring is cast the buckets M and the band N which encircles and closes the outer lower portion of the buckets. On the inner face of the ring L I form a rim or lug, P P, to which the arms of the

hub are bolted or secured, which hub is formed in sections P' P'' of cast metal. S represents the shaft, which is constructed, as usually, of wrought metal and fitted in the cast-metal sections of the hub. The lower section P' is fitted on the wooden step or center B, thereby making a better wearing-surface than the ordinary forged shafts, which are more expensive, easily corroded, or destroyed by the action of the water. At the same time the wheel is more easily cast without the center to rim, and prevents all liability of the destruction of the casting by the buckets parting from the outer rim by shrinkage. The inner edges or sides *t* of the buckets M are curved inwardly to conform to the convex form of the convex rim L, and then curve outwardly at *t'* from the lower termination of said rim to the outer edges or sides *t''*, which latter are flush with the gate-rim, and are set a little ahead of the inner edges *t'*. The lower portions of the buckets curve under each other, and each bucket M is in vertical and horizontal sections, somewhat of an S-shape, with a grooved depression or cavity, T, which, extending near the outside or edge *t''*, begins a little below the top, deepens at *t'''* as it passes the center, and widens at *t''''* to the curved edge *t'*, so that there is presented a curved depression for the direct impact of water, whereby the water will be well packed, which is most desirable. When full-gate is on, the discharge of water will be both vertical and central, as shown by the arrows 1 and 2, so as to utilize every part of the bucket, and consequently obtain full percentage of the water applied, and when there is on a partial gate the discharge will only be vertical, due to the depression T, the water acting on the periphery without being directed or scattered to the center, but power thus obtained will be reliably proportional to the full-gate. On the top of the gate-ring E I arrange and secure, at diametrically-opposite points, segments U, with which engage pinions V, suitably mounted, which pinions are engaged by toothed segments W, which are secured to arms X projecting from a ring or band, Y, which encircles the dome below the cover and has an axis thereon. A hand-wheel shaft, Z, is attached centrally to one of the pinions V, and by properly rotating said shaft it turns or opens and closes the gate ring. In these movements the various pinions V and toothed segments W also rotate, and thus cause uniformity in the movements without binding or undue bearing at any one point of the ring.

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

1. The walls, consisting of the shells F and adjustable plates F', substantially as and for the purpose set forth.

2. The cast metallic hub, the lugs or rim P, rim L, and shaft S, combined and operating as herein set forth.

3. The concave rim, buckets, and encircling rim cast in one, in combination with the sectional hub, substantially as and for the purpose set forth.

4. The inner gate-ring E formed with issues H, constructed of differential series, respectively, H' H'' H''', in connection with the walls with chutes D', equal to one issue of the series

of the ring E, substantially as and for the purpose set forth.

The above signed by me, this 10th day of February, 1873.

THOMAS J. ALCOTT.

Witnesses:

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