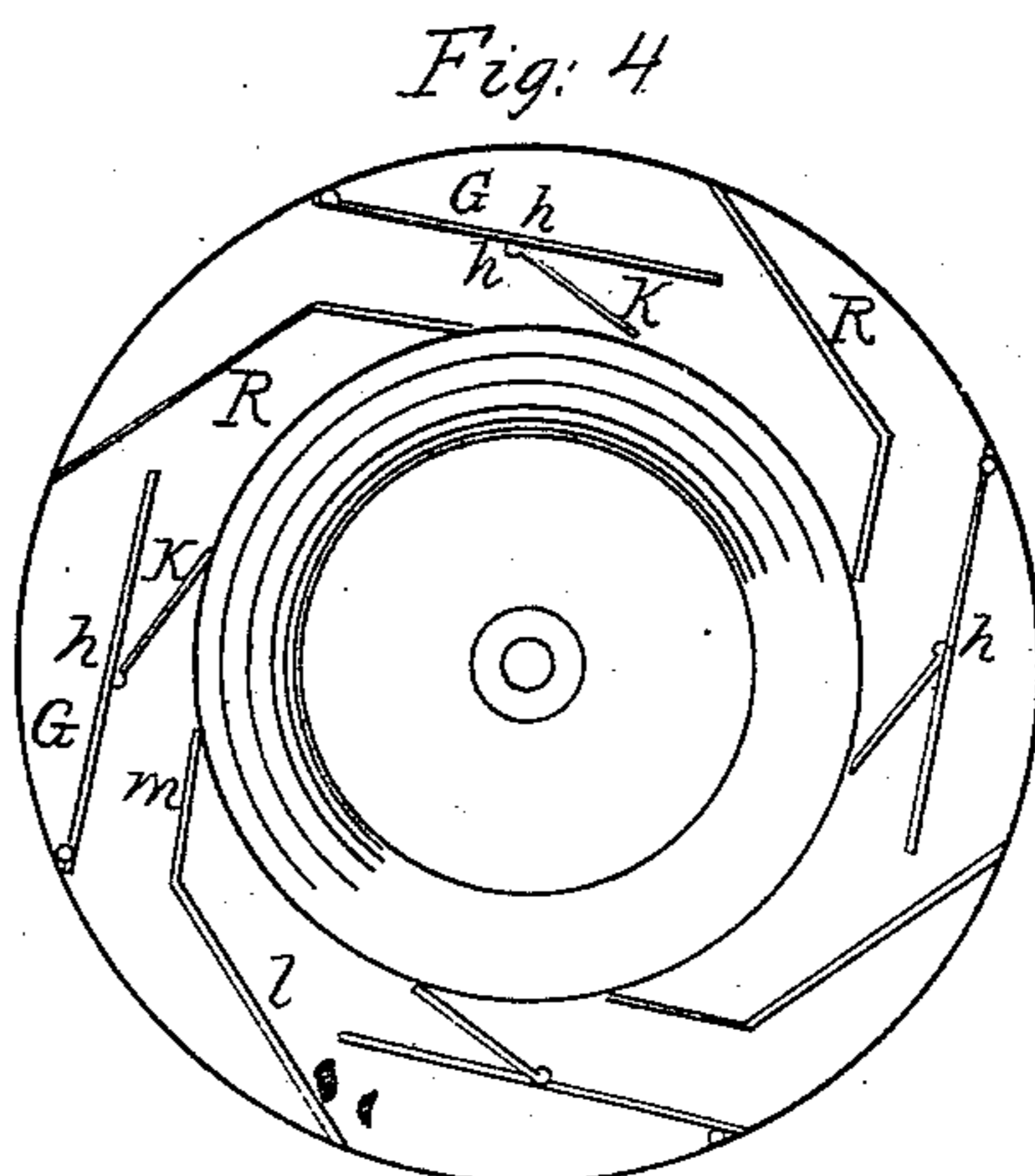
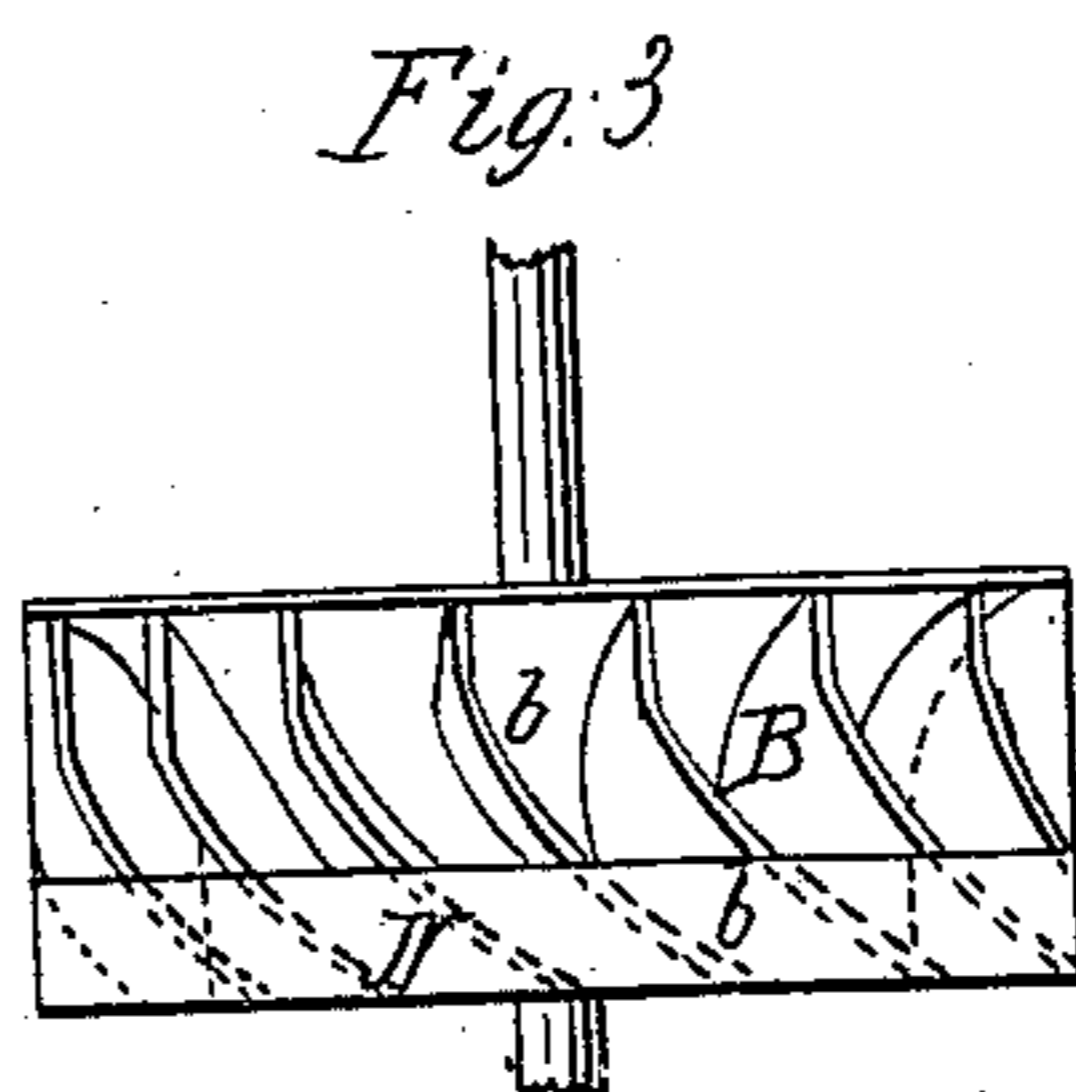
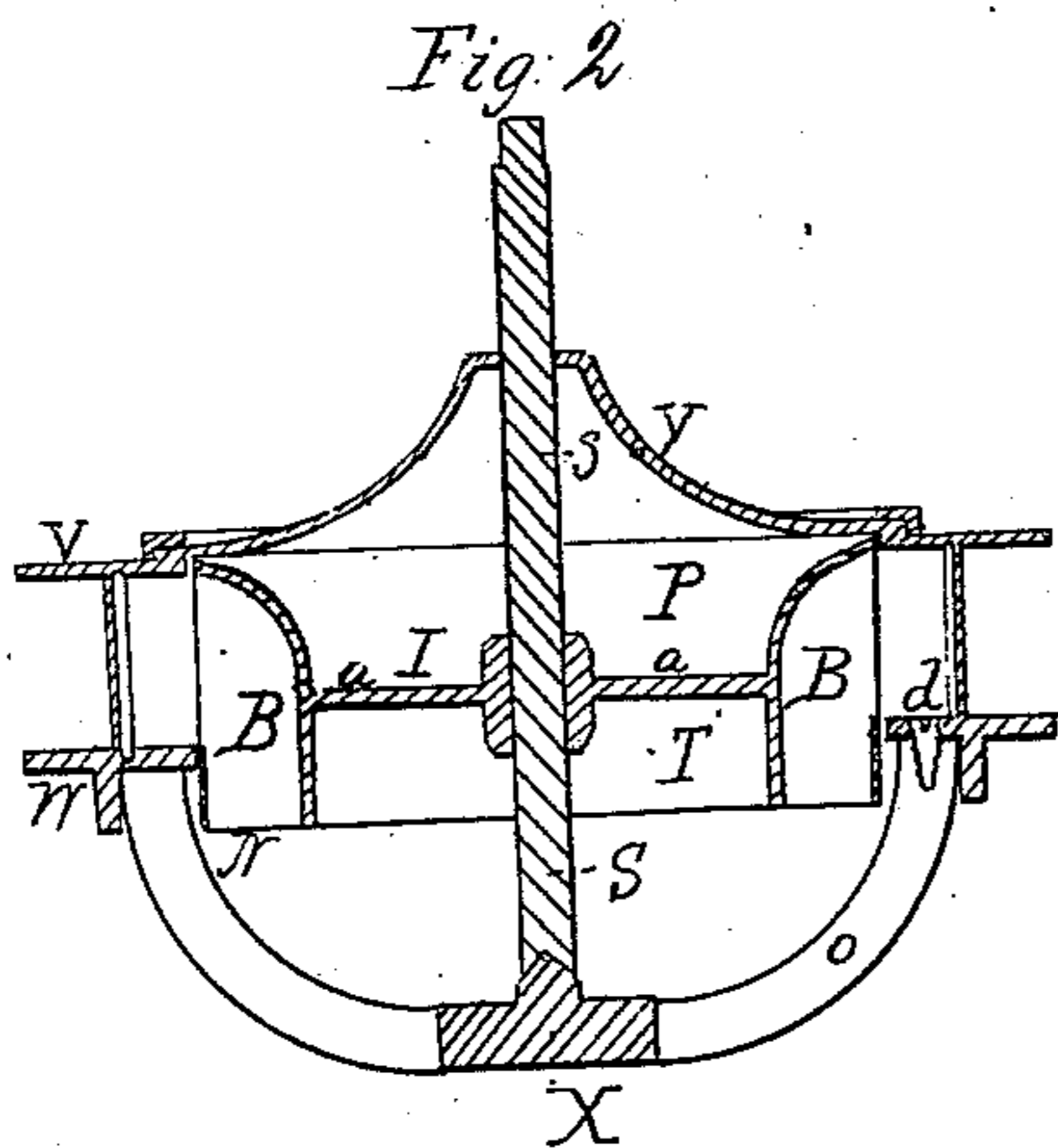
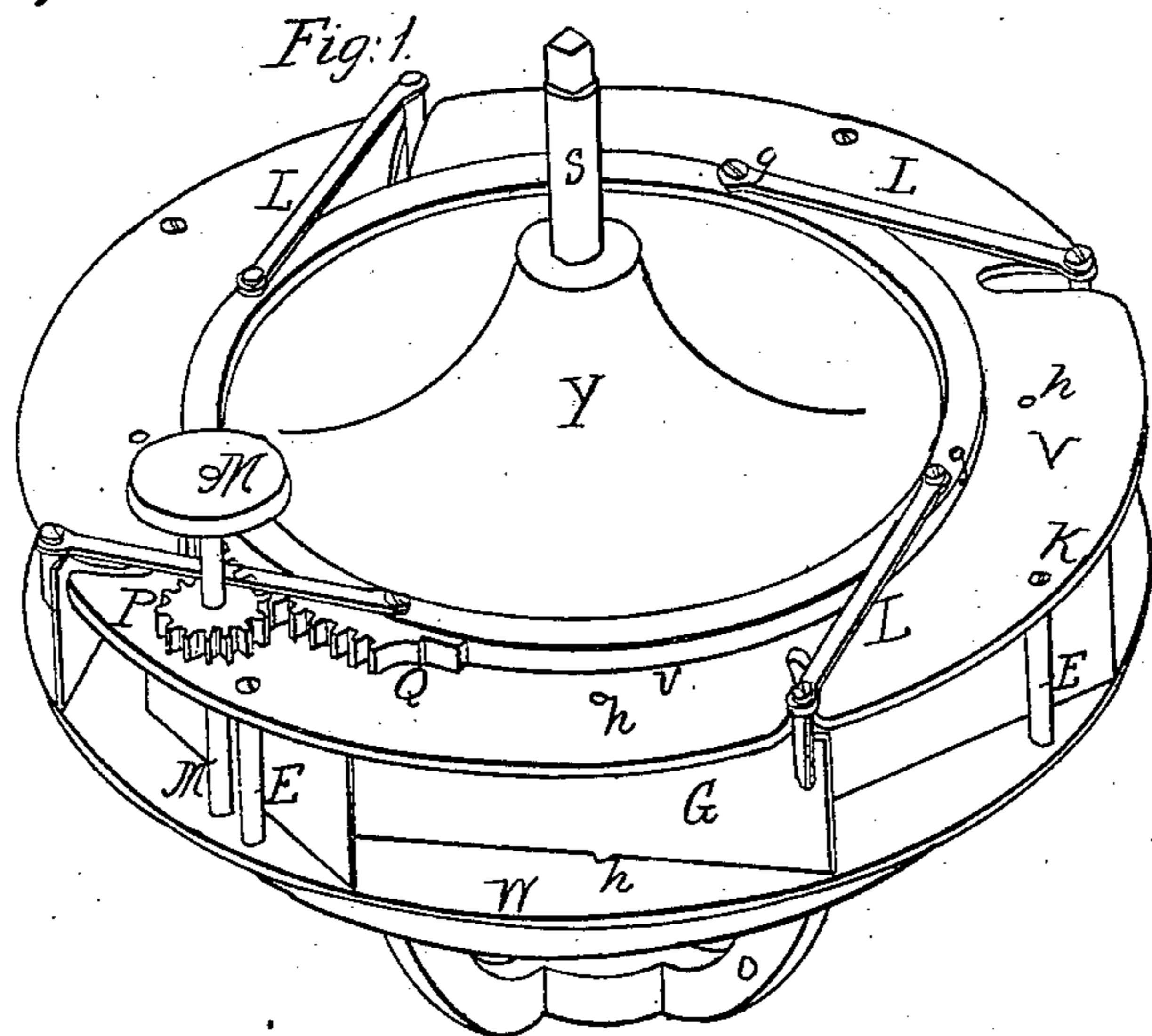


H. Van De Water.

Turbine Wheel.

Nº 94,259.

Patented Aug. 31, 1869.



Witnesses:

Wm. Tour
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United States Patent Office.

HENRY VAN DE WATER, OF ATTICA, NEW YORK.

Letters Patent No. 94,259, dated August 31, 1869.

IMPROVEMENT IN WATER-WHEEL.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, HENRY VAN DE WATER, of Attica, in the county of Wyoming, and the State of New York, have invented a new and useful Improvement in Turbine Water-Wheels; and I do hereby declare that the following is a full and exact description thereof, which will enable others skilled in the art to make and use my invention, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

Figure 1 is a perspective view of a turbine water-wheel, with my invention applied thereto.

Figure 2 is a vertical central section of the same.

Figure 3 is a detached view of the wheel, showing the curvilinear form of the buckets.

Figure 4 is a top view of the valve-seat, with my invention applied thereto.

My invention relates to that class of hydraulic motor commonly known as the Jonval turbine water-wheel, and consists in the particular construction and disposition of the gates and guide-plates.

In the drawings, in which like letters represent like parts—

X is the shaft-step.

S is the vertical wheel-shaft, which is keyed, or otherwise firmly joined to the centre of the partition-plate I, so that when the shaft revolves, the wheel must revolve also. The said shaft S rests upon the step or bearing X.

I is the central partition-plate, to wit, a circular disk, firmly joined to the interior periphery of the hollow cylinder B.

T is the hollow cylinder or tubular casing.

Above the partition-plate I, the said cylinder curves upward and outward, forming a figure which may be described as being generated by the revolution of the two parallel lines $a-a$, and the arc of ninety degrees b , at the extremities of the same, about the central shaft S, as an axis of revolution, the said parallel lines being perpendicular to the said axis, and also perpendicular to the diameter of the circle of which the said arc b is a quadrant, passing through the extremity of the said arc b .

B B are the buckets, which are placed upon the outer periphery of the said hollow cylinder, which curves upward and outward at an arc of ninety degrees, as above described. The form of the buckets is distinctly portrayed in fig. 3, and they occupy the space marked b in fig. 2.

The sides $b b$ of the said buckets are curved in the form of an inverted cycloidal arc, and the tangent to cycloid at the lower edge of cycloidal surface, where the water leaves the buckets, is seventeen degrees from the horizon.

N is the tubular casing, encompassing the lower outer edges of the buckets, below the valve-seat W.

G G are curved arms, the intersection of which forms the step X, supporting the shaft S, and the upper extremities of which form a support for the valve-seats, to which they are secured by means of screws d , or bolts.

W is the valve-seat, on the under side of which is a tubular casing, surrounding the said arms G G.

V is the top piece, which is fastened to the valve-seat by means of screws f , inserted into the journal E. The said top piece, for a third of its radial depth from the outer circumference, is a horizontal plane; it then takes a quasi-conical form, as is represented in figs. 1 and 2, (Y.)

R is a ring, concentric with the said top piece V, but revolving independently from it about the quasi-conical part of the said top piece Y. If I prefer so to do, however, I cause the whole part Y to be detached from the top piece V, and to revolve independently upon it, performing the services rendered by the said ring.

Q is a toothed segment or rack-piece, secured to the said ring, which gears into a pinion attached to the shaft M, which has its bearings in the top piece K, and is stepped in the valve-seat W.

L L L L are the gate-rods, attached by the pivot-screws g to the said rings, (or, if I prefer, to a revolving conical top, Y,) in such a manner as to revolve freely about the same. The ends of the said rods b are attached in the same manner to pins fastened to the outer edge of the gates.

G G are the rectangular valve or wicket-gates, revolving upon the central pivots $h h$, which are stepped in the valve-seat W, and have bearings in the top piece V, (h .) The said gates are immediately actuated by the gate-rods L.

R R are the guide-plates, the planes of which are alike perpendicular to the plane of the valve-seat W and the plane of the top piece V, and are permanently secured between the same.

The said guide-plates are bent so as to form two parts, l and m , the angle of the intersection of the planes of such parts being about one hundred and thirty-five degrees.

The inner plate m is a secant plane to the periphery of the movable wheel, forming, with a radius, cutting the circumference of said movable wheel at the point of intersection, an angle of about one hundred and eight degrees. The length of the said inner part may be about one-half that of the said outer part.

K K are stay-plates, the planes of which are also secant to the periphery of the said movable wheel, at the same angle as inner guide-plates, hereinbefore mentioned.

Having thus endeavored to describe clearly the construction and arrangement of the various parts of my

invention, I will now proceed to describe its practical operation.

The valve-gates G are actuated by the shaft M, the pinion P of which gears into the segmental rack R. By turning the said shaft, the quantity of water to be admitted to the movable wheel is adjusted with the greatest accuracy, and the said gates being pivoted or stepped at their centre of gravity, are moved with the greatest ease.

The inner portion of the guide-plates m, and the stay-plates K, prevent the water from passing around the wheel and interfering with other columns of water entering the same, when the said gates G are either wholly or partially open.

When entirely closed, the gates G and the outer guide-plates l form a rectangular parallelopipedon, a compact figure, well adapted to protect the inner mechanism of the wheel, and resist extraneous pressure.

By this arrangement, it is believed that the force of the water is utilized in a more favorable manner than in any other water-wheel, of the class known as the Jonval turbine now in use.

The peculiar form of the buckets, the back of which, receiving the percussion of the head, is a curved surface, generated by the revolution of the inverted arc of ninety degrees, and the sides of which are inverted cycloidal surfaces, is believed to be eminently adapted to the use for which they are intended, for the percussion of the water upon the said curved back of the buckets has a tendency to raise or buoy up the wheel upon the columns of water.

This inclined inside (fig. 3) at the top of the wheel not only gives the water an easy direction downward,

to its point of discharge, but, from the water being admitted at the under side of this top, it tends to raise the wheel up from the foot. In this manner the direct impulse of the water upon the upper part of the bucket is secured, and the smooth, easy discharge and reaction of water of the Jonval turbine upon the lower part of the bucket, without subjecting the same to enormous downward pressure, exerted upon the old form of wheels.

It will be observed (*vide* fig. 4) that no matter at what position the gates are placed, the water must at all times strike the wheel at the same angle of inclination, and from having only one-half of the guides movable as gates, there are fewer joints to wear and leak, and fewer parts to get out of order.

Claims.

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

1. The relative arrangement of the rectangular valve-gates G, stepped upon the valve-seat W, revolving upon a central pivot, h, and operated by the gate-rods L, with the guide-plates R and stay-plates K, substantially as described.

2. A water-wheel of that class known as the Jonval turbine, formed by the combination and arrangement of the valve-gates G, the valve-seat W, the gate-rods L, the guide-plates R, the stay-plates K, and the buckets B, substantially as described.

HENRY VAN DE WATER.

Witnesses:

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