

(No Model.)

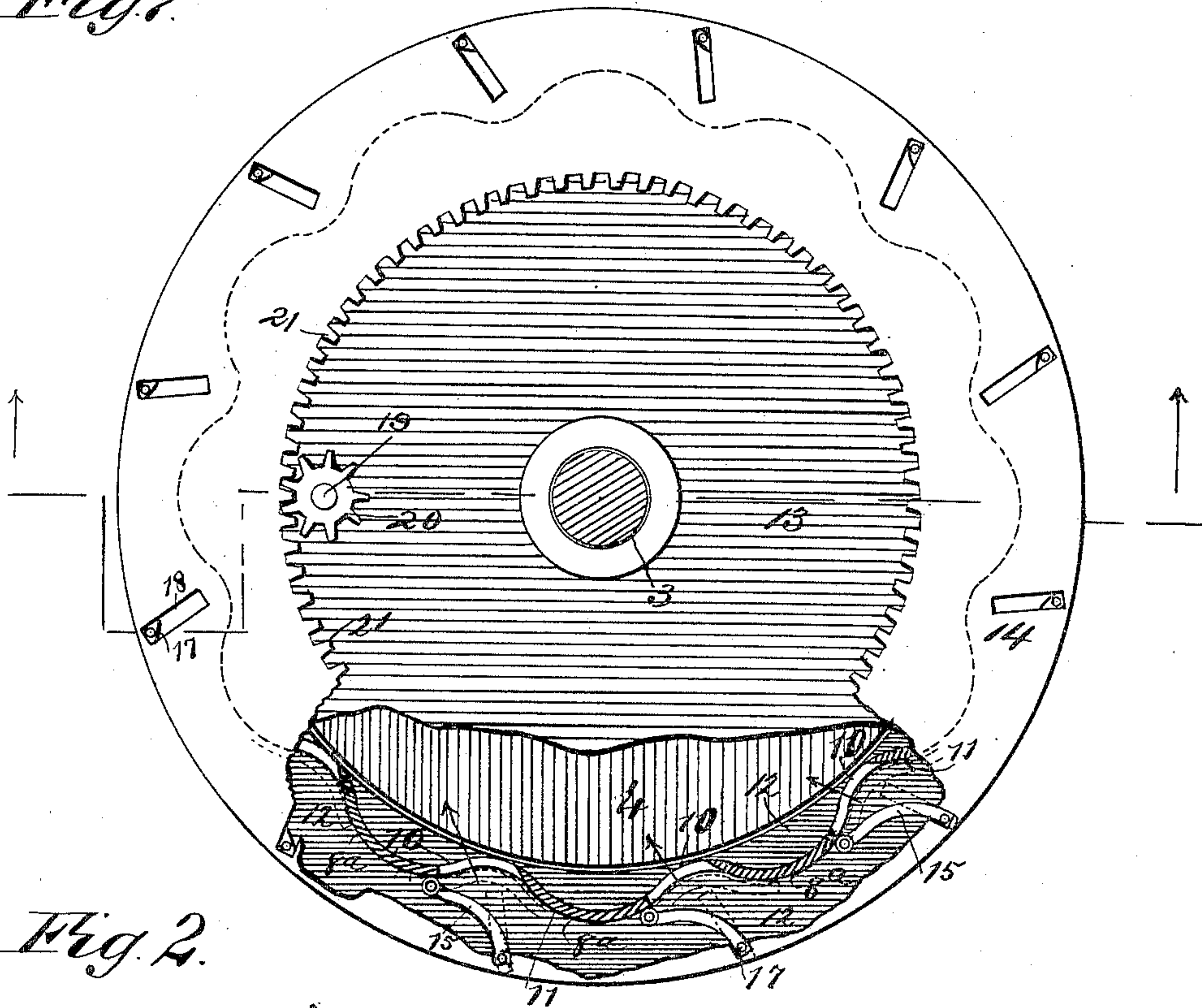
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H. J. ADAMS.  
WATER WHEEL.

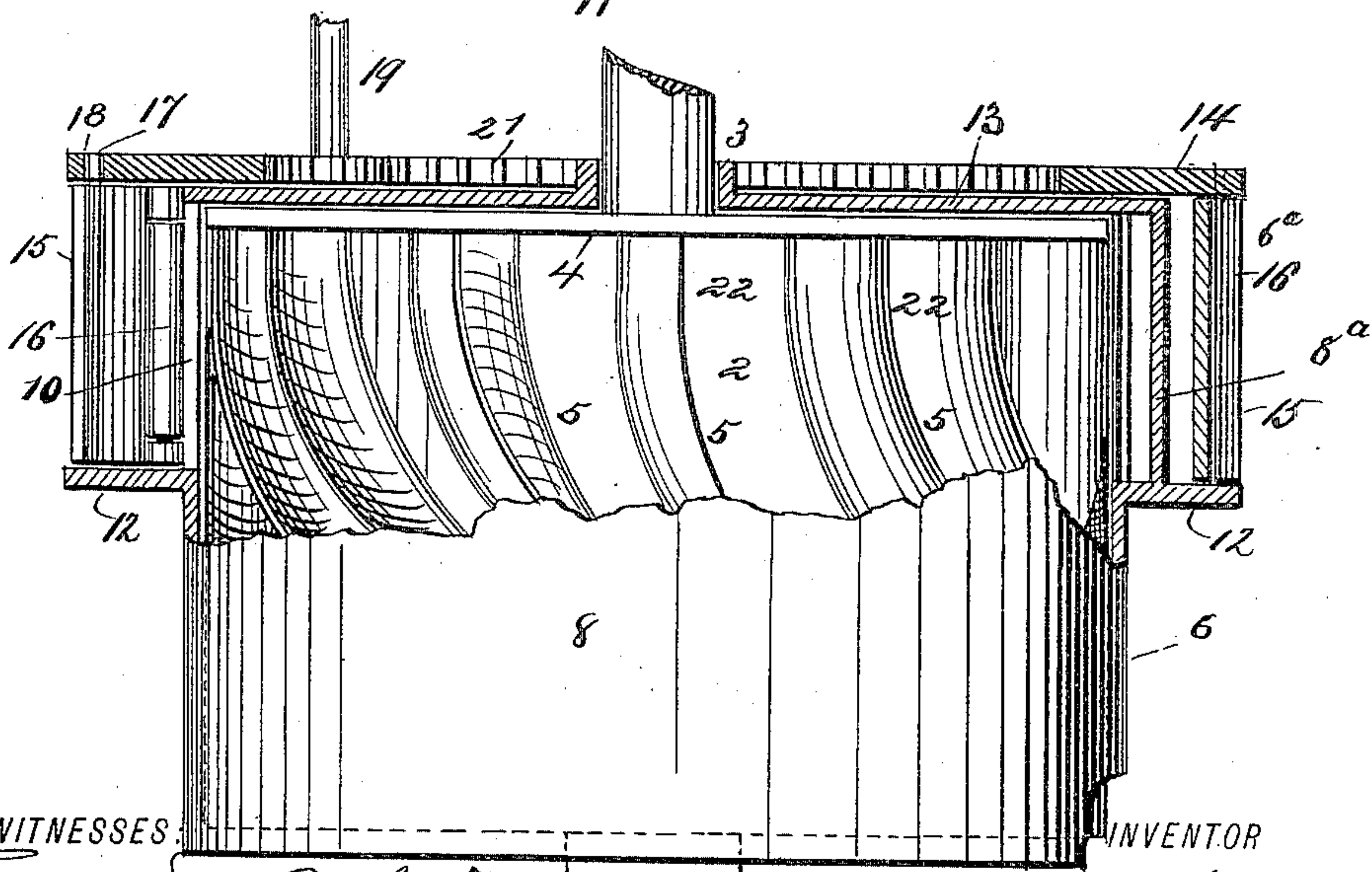
No. 411,210.

Patented Sept. 17, 1889.

*Fig. 1.*



*Fig. 2.*



WITNESSES:  
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INVENTOR  
*H. J. Adams*  
BY *Munn & Co.*  
ATTORNEY

(No Model.)

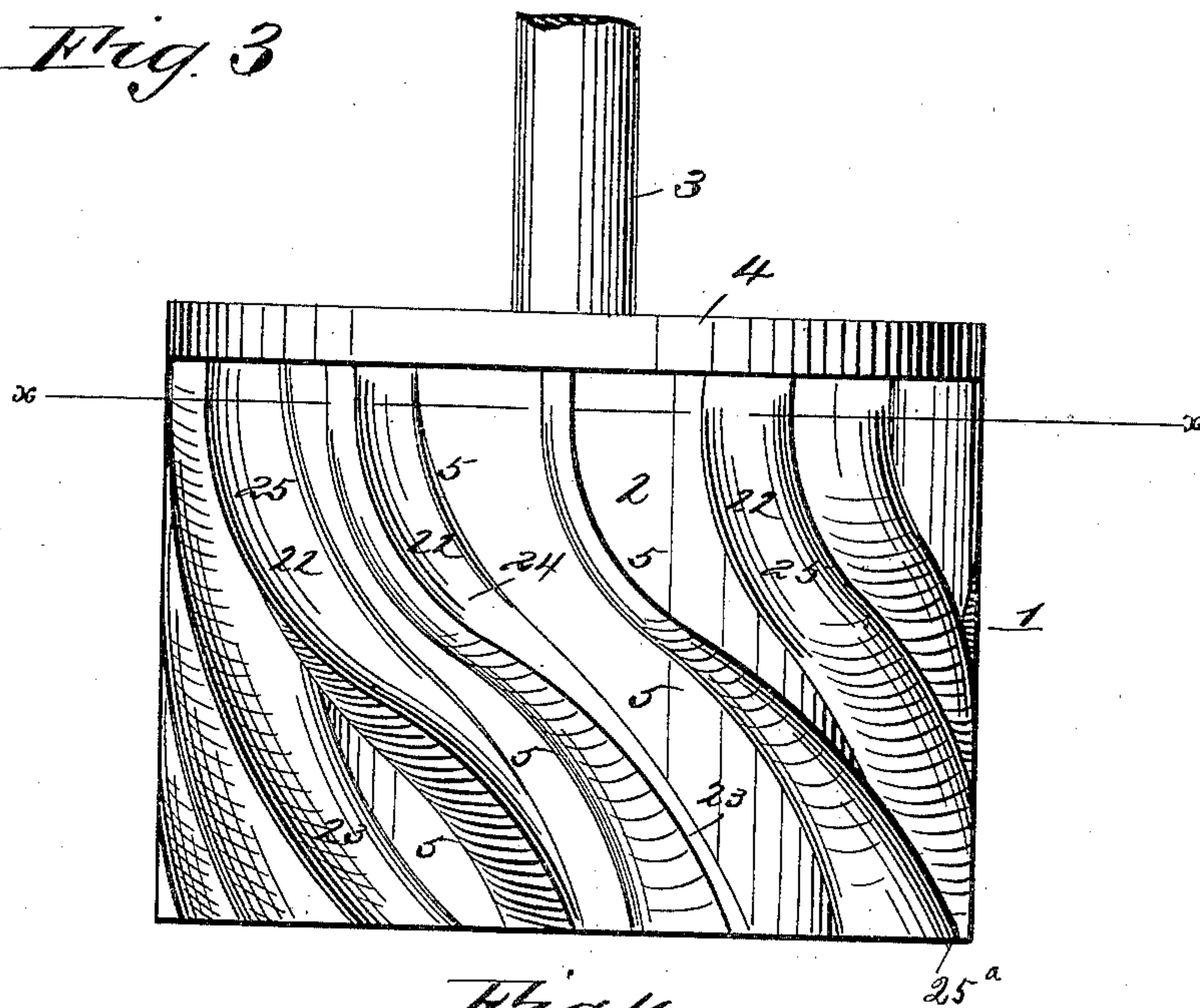
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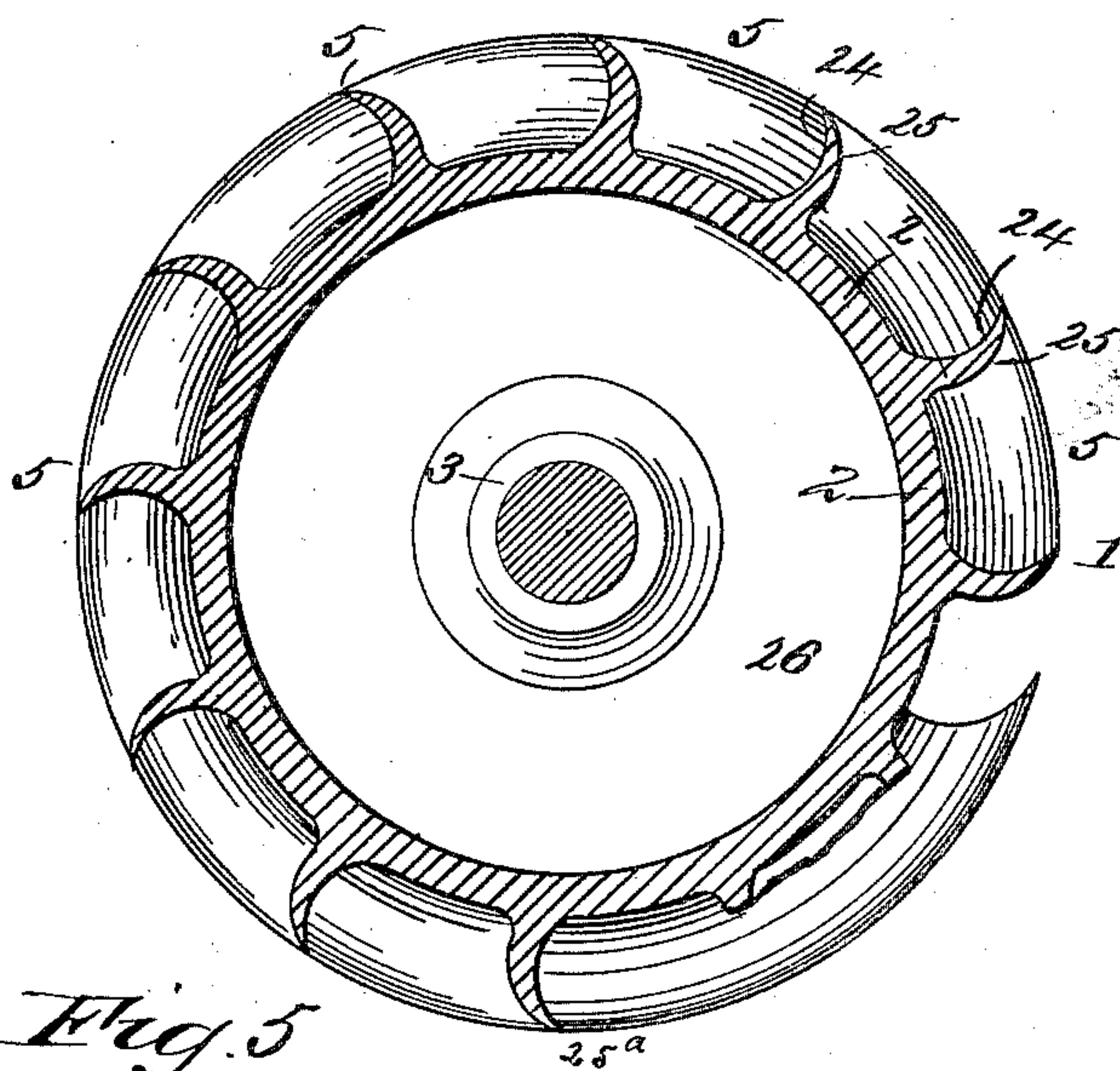
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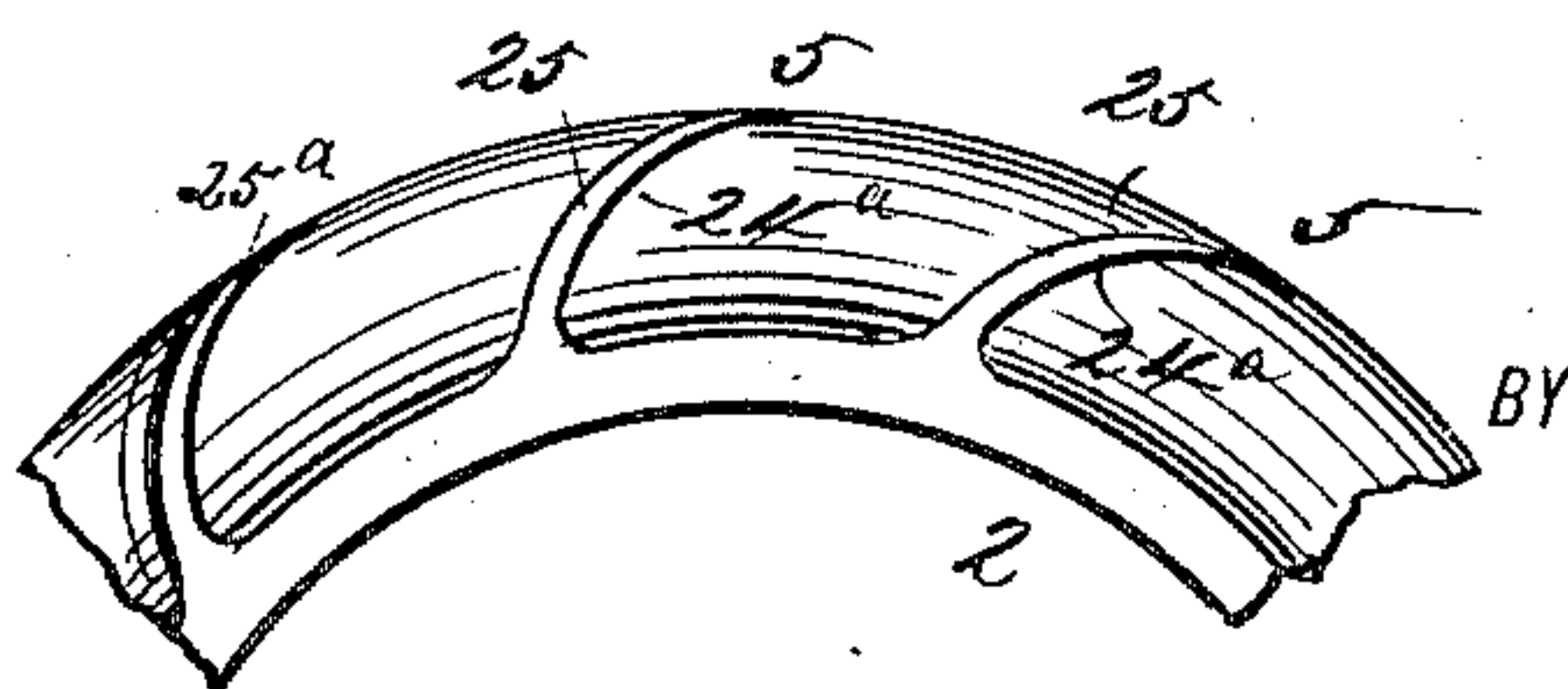
*Fig. 3*



*Fig. 4*



*Fig. 5*



WITNESSES:

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INVENTOR:

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# UNITED STATES PATENT OFFICE.

HENRY J. ADAMS, OF NORTH JAY, MAINE.

## WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 411,210, dated September 17, 1889.

Application filed January 22, 1889. Serial No. 297,176. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY J. ADAMS, of North Jay, in the county of Franklin and State of Maine, have invented a new and Improved Water-Wheel, of which the following is a full, clear, and exact description.

This invention relates to turbine water-wheels, and has for its object to provide a water-wheel of this character, in which friction will be reduced and the effective power correspondingly increased.

The invention consists in a turbine water-wheel and its casing, and in details thereof, constructed and arranged as hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures of reference indicate corresponding parts in all the views.

Figure 1 is a plan view of the invention, partly in section and broken away. Fig. 2 is a side view, partly in section and broken away. Fig. 3 is a detail view of the water-wheel in elevation. Fig. 4 is a detail plan view of the water-wheel, in horizontal section, on the line *xx* of Fig. 3 and partly broken away; and Fig. 5 is a detail view of the lower edge of the water-wheel, shown as broken away.

In carrying out this invention, I provide a water-wheel 1, preferably having a body 2, in the shape of a drum, and provided with a closed top having a flange 4. The buckets 5 of the wheel extend in a reverse spiral line from the flange 4 down the sides of the body 2 of the wheel to the bottom. The buckets may be made integral with the body or be bolted thereto. The wheel 1 is mounted on a shaft 3, having a step 9 adapted to bear on a suitable support set in the flume or other water-way, and is inclosed in a casing 6, made in two sections, a lower cylindrical section 8 fitting loosely over the buckets 5, and an upper section 6<sup>a</sup>, having a sinuous peripheral wall 8<sup>a</sup>, at the base of which is a flange 12. The top 13 of the casing is closed and the bottom 7 open. The inner bends of the wall 8<sup>a</sup> of the casing-section 6<sup>a</sup> are on the line of the periphery of the section 8, and the outward bends form guides 11 for the water to the wheel, openings or gateways 10 being made at the inner bends and extending partly along the outer bends,

as shown, being located so that the water admitted between the inner side of the wall 8<sup>a</sup> and the periphery of the wheel will be guided by the concave portions of the wall against the buckets of the wheel.

Upon the top 13 of the section 6<sup>a</sup> is located a flat ring 14, projecting over the top and in line with the flange 12. Between the projecting portion of the ring 14 and the flange 12 are located gates 15, hinged to the wall 8<sup>a</sup> at 16, and conforming in contour to the sinuous surface thereof, so that when the gates 15 are in the open position a curved surface will be presented, thereby facilitating the passage of water admitted to the wheel. The outer or swinging edges of the gates 15 are provided with lugs 17, which are located and movable in inclined slots 18 in the ring 14, so that accordingly as the ring 14 is rotated in one direction or the other the gates will be opened or closed.

The ring 14 may be operated by any suitable means, and, as here shown, by a shaft 19, provided with a suitable handle or lever at its upper end and a pinion 20 at its lower end, meshing with teeth 21 on the inner edge of the flat ring 14. It will readily be seen that as the ring 14 is partially rotated the inclined slots 18 act on the lugs 17 to operate the gates 15.

To obtain the full and best effect of the water acting on the water-wheel 1, the buckets 5 are constructed with a downwardly and backwardly trending and curved upper portion 22, starting from a vertical line at the top and equaling in length about the height of the water-inlets 10, and a lower portion 23, ending in a vertical line at the bottom, extending from the portion 22 in a reverse spiral line, the concave face 24 of the portion 22 gradually widening at the edge or lip 25<sup>a</sup> as it continues into the portion 23, as shown at 24<sup>a</sup>, Fig. 5, the buckets being concave on their face and having a convex back surface 25 throughout their length.

By means of the foregoing described construction of bucket, water entering the openings 10 will strike against the upper curved portion 22, and will pass downward freely on the inclined widened concave lower portion 23 of each bucket, thereby effectively utilizing the force of the water to turn the wheel



by striking the upper portion of the buckets and discharging readily downward over their lower portion. As angular surfaces over which water may discharge present more op-  
 5 position to the passage of water than do rounded or oval surfaces, the construction of the sinuous wall 8<sup>a</sup> of the casing portion 6<sup>a</sup>, the curved gates 15, and the convex surfaces  
 10 of the buckets 5 permit the free and ready passage of the water acting on the water-wheel 1.

In order to relieve the water-wheel 1 from friction and wear on its pivotal portion and permit it to turn readily, it is preferably  
 15 formed with the chamber or hollow portion 26, which causes the wheel to be buoyed up by the water and to run more easily, besides rendering the wheel lighter on the step.

In operation, the gates 15 being opened by  
 20 operating the ring 14, through the shaft 19 and its gearing, the water entering through the openings 10 is carried, as indicated by the arrows, against the face of the upper portion 22 of the buckets, passes downwardly in the  
 25 spaces between and upon the buckets, and discharges at the lower end of the buckets through the open bottom of the casing 6. The action and direction of the flow of water upon the wheel is such that the latter receives the  
 30 full force of the water to operate the wheel with little or no resistance or friction from the water.

The wheel may be of any required size, the greater the diameter the greater being the  
 35 leverage as the water acts on the wheel farther away from the center.

The water, being caused to strike the upper portion of the buckets in a horizontal plane and then discharge downwardly on the  
 40 lower portion of the buckets, serves to operate the wheel in the most effective manner.

While I have described a specific construction of parts, I do not intend to limit myself thereto, as the parts may be varied without  
 45 departing from the essential features of the invention.

Having thus fully described my invention,

I claim as new and desire to secure by Letters Patent—

1. The water-wheel 1, of even diameter 50 throughout its length and provided with buckets 5, each having a downwardly and backwardly trending curved upper portion 22 and a lower portion 23, ending in a vertical line at the bottom extending from the portion 22 55 in a reverse spiral line, the portion 22 having a concave face 24, gradually widening at the edge or lip 25<sup>a</sup> as it continues into the portion 23, as shown at 24<sup>a</sup>, all of said buckets being convex on their back and concave on 60 their face throughout their entire lengths, substantially as set forth.

2. The combination, with the water-wheel, of the casing having a cylindrical lower section and an upper section 13, having a sinu- 65 ous or corrugated peripheral wall 8<sup>a</sup>, provided with openings 10 in its concavities, the concavities and convexities of said wall being rounded or curved, the gates 15, hinged at the forward edges of said openings and shaped 70 to fit into the said concavities over the openings 10, and means for operating said gates, substantially as set forth.

3. A water-wheel casing formed with a sinu- 75 ous periphery and a cylindrical lower section, water-inlet openings in the upper sinuous section, vertical hinged curved gates for said openings, having lugs on the upper edge and a flat ring mounted to revolve on the top of the casing, having inclined slots engaging the 80 lugs on the gates and provided with gear-teeth, and a shaft carrying a pinion engaging the gear on the ring, in combination with a water-wheel consisting of a drum-like body having a flanged top and buckets extending 85 downward in a reverse spiral having a concave face, a convex back, and widened at the lip toward the bottom, substantially as shown and described.

HENRY J. ADAMS.

Witnesses:

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 R. B. FULLER.