

No. 671,885.

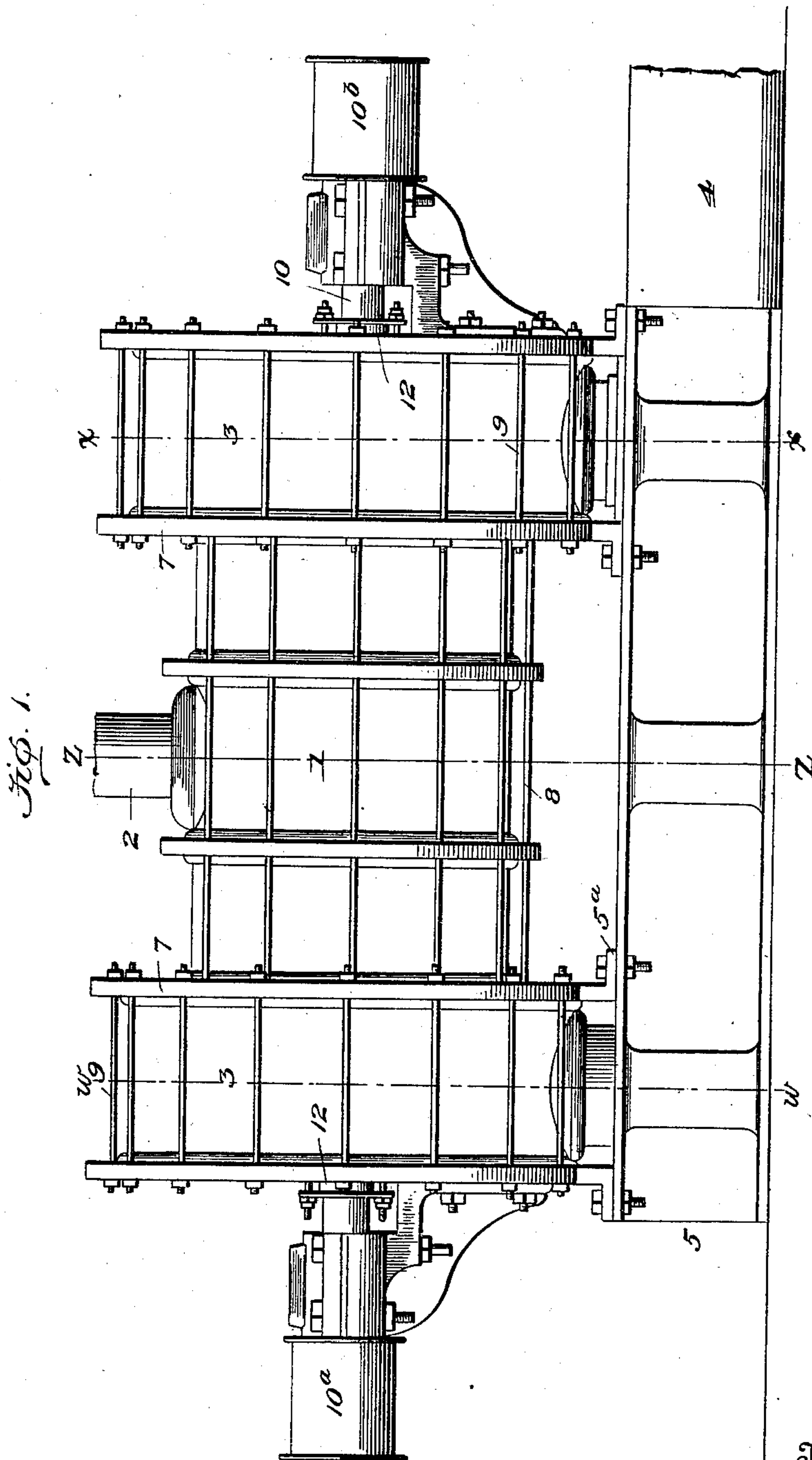
Patented Apr. 9, 1901.

A. HENDRY.
TURBINE.

(No Model.)

(Application filed Aug. 27, 1900.)

7 Sheets—Sheet 1.



Witnesses

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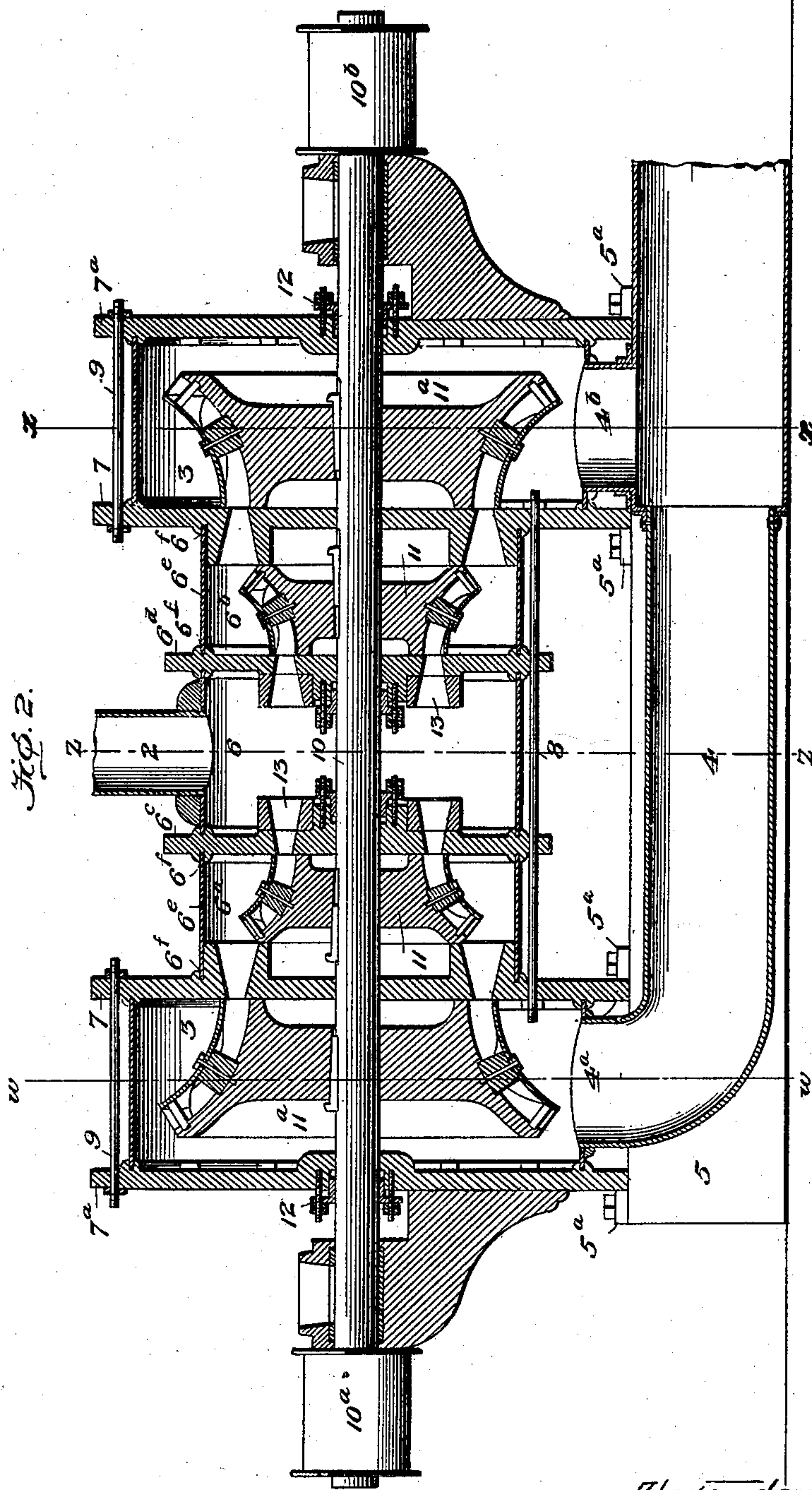
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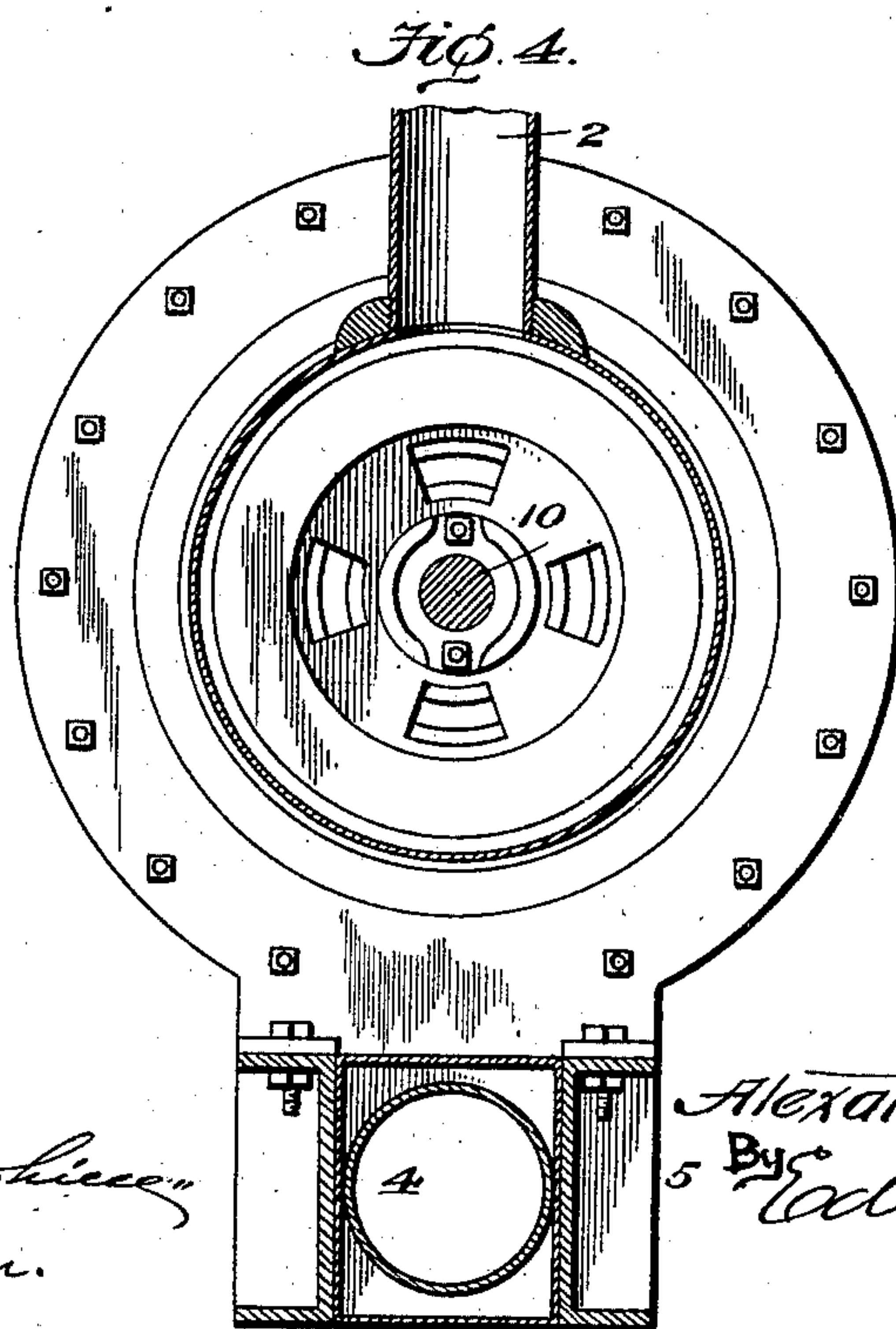
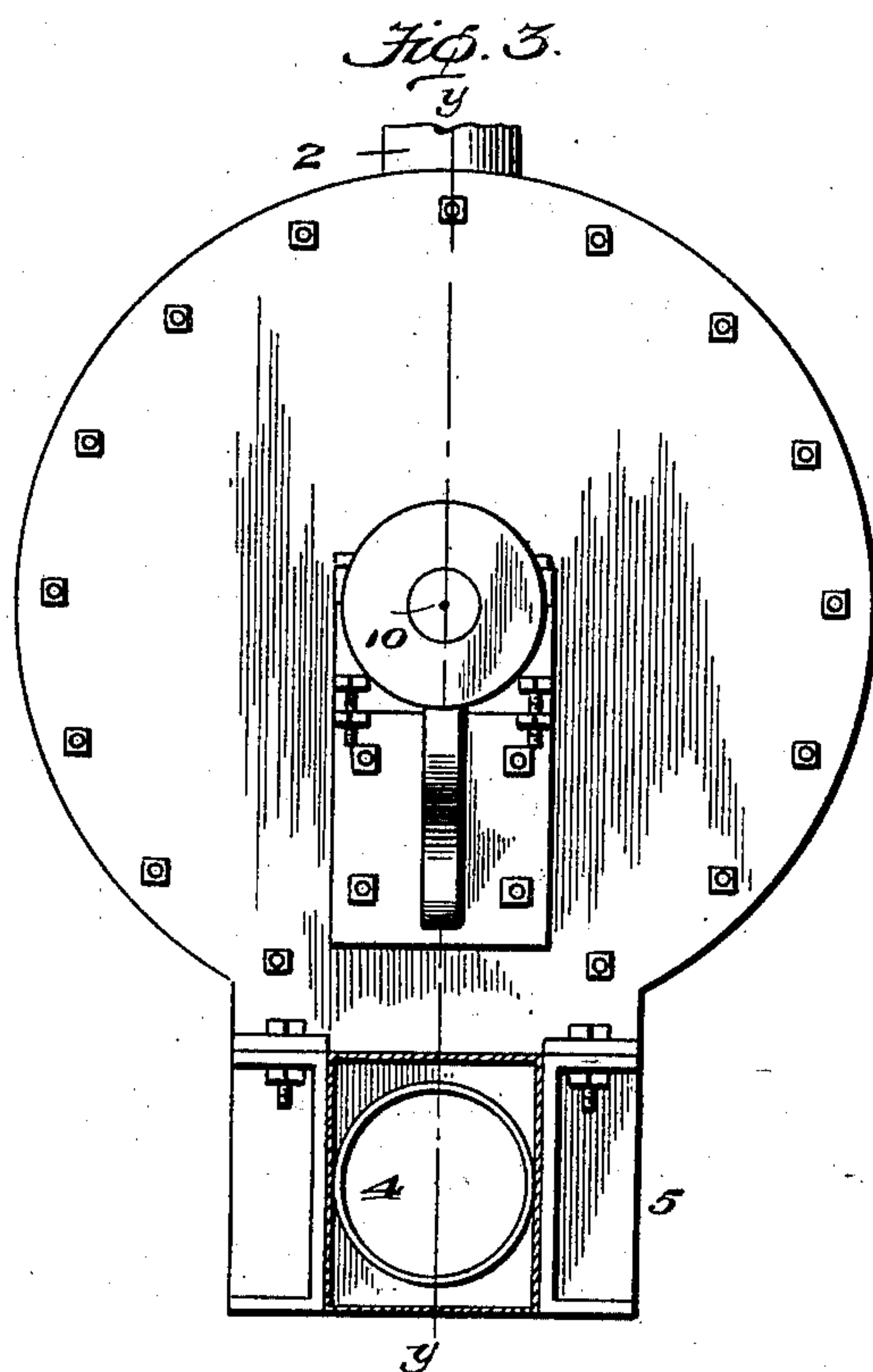
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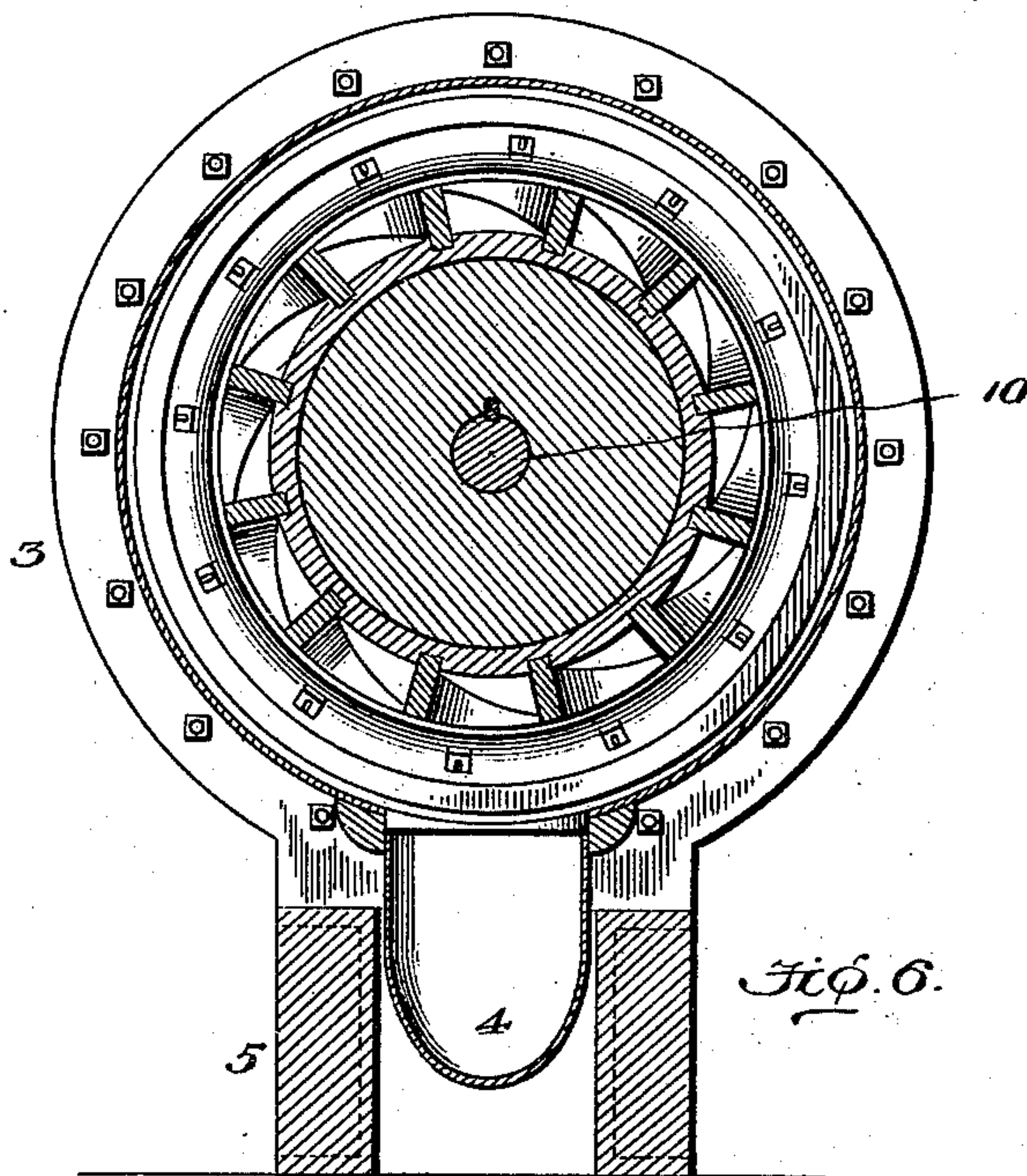
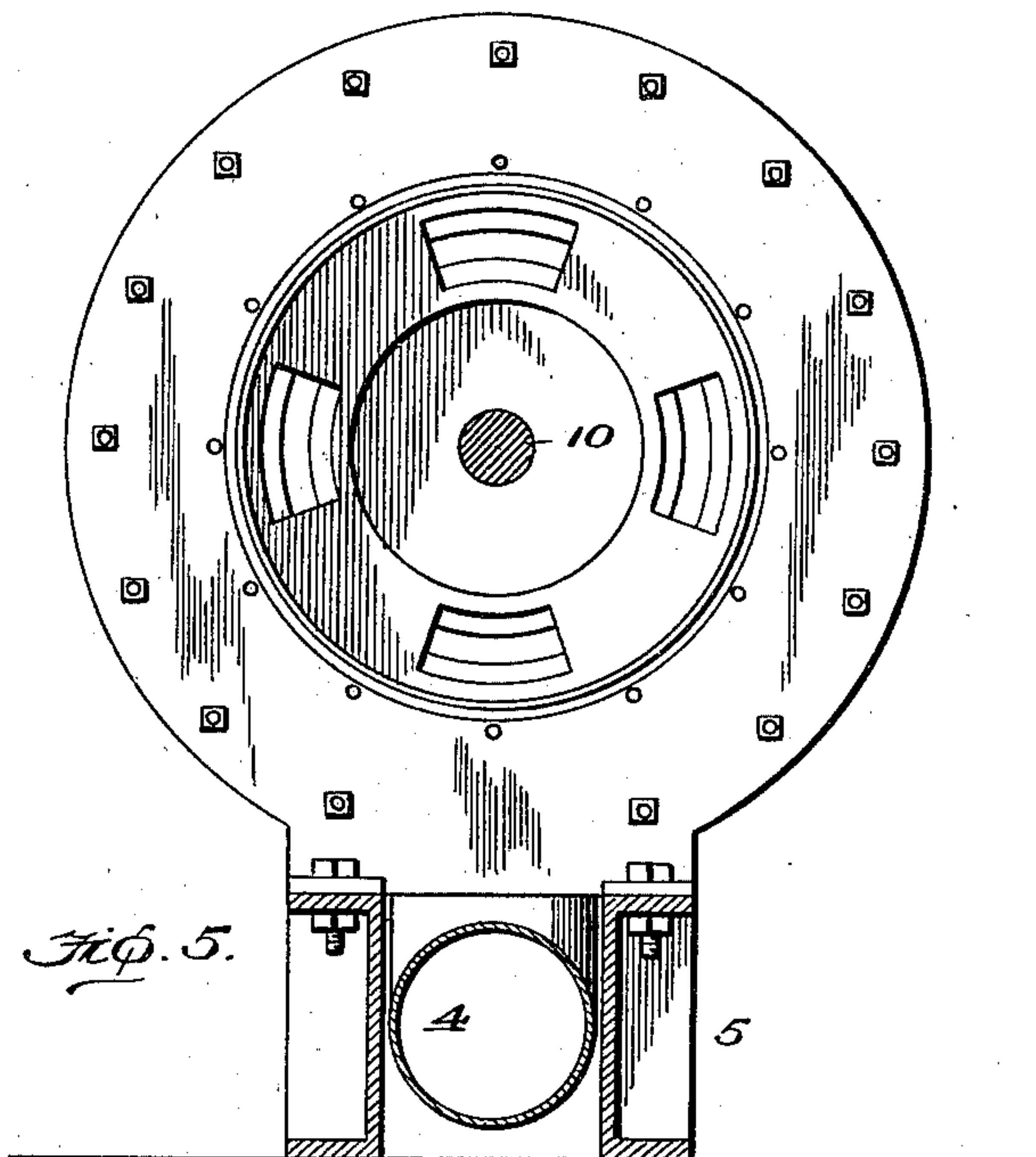
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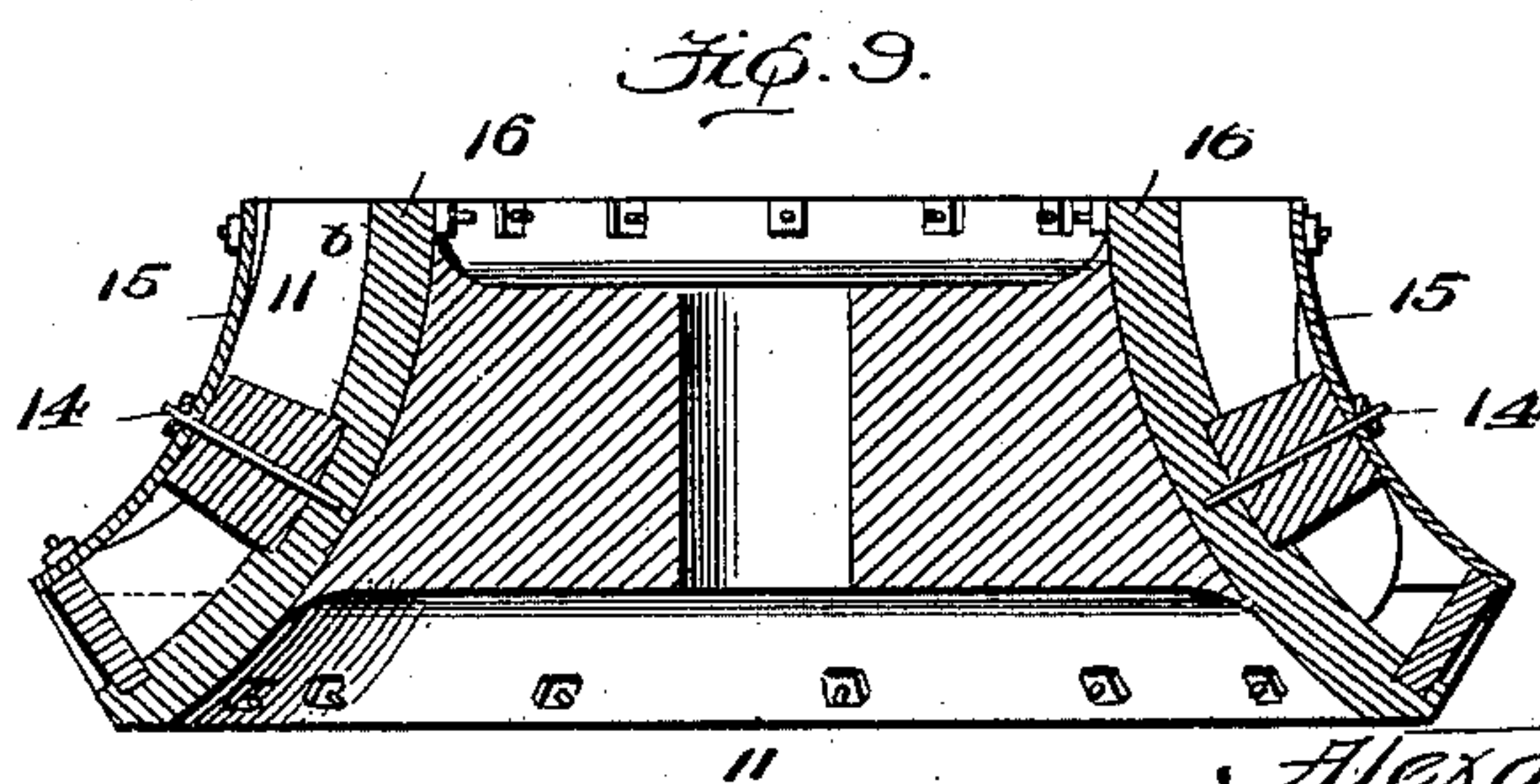
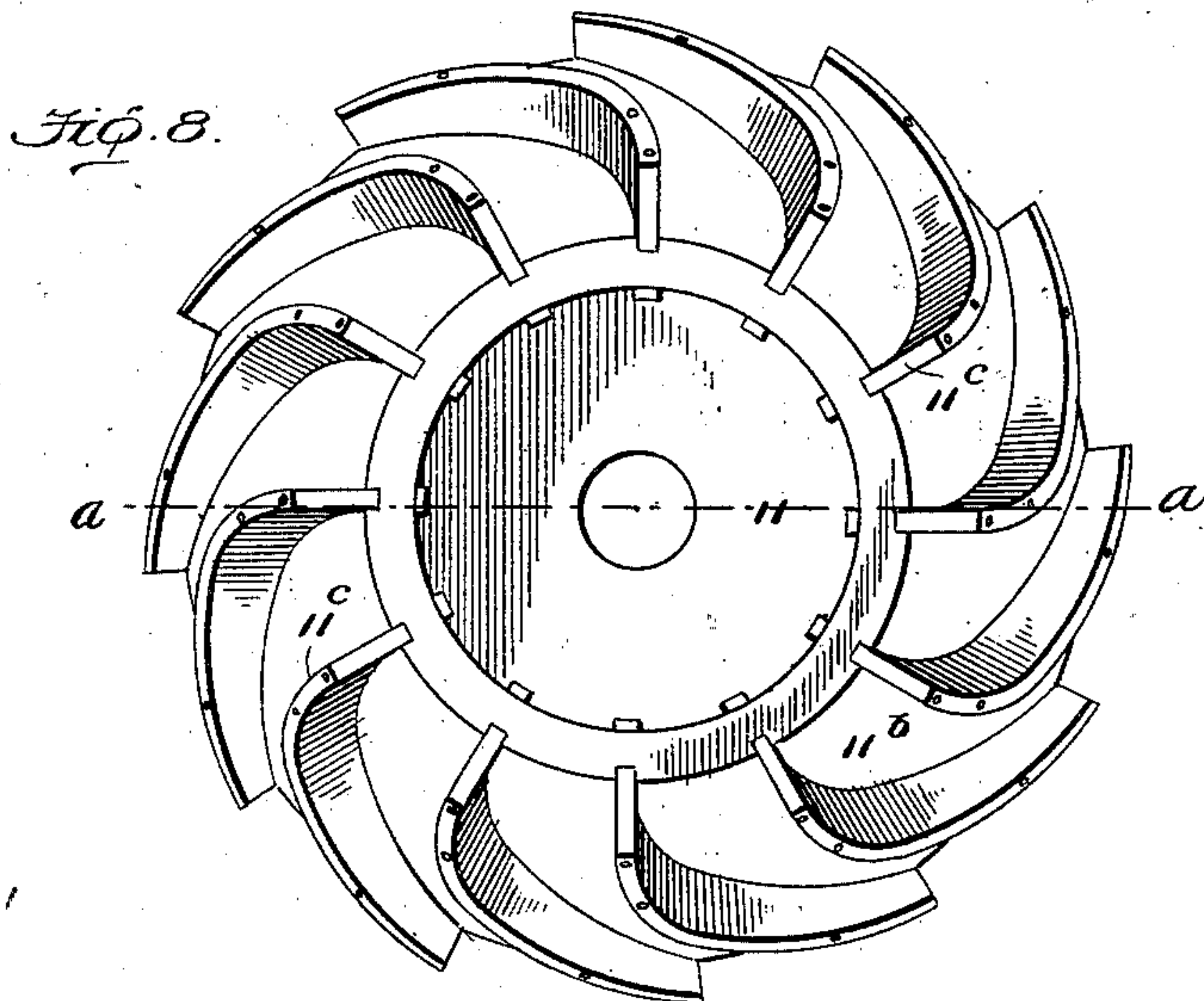
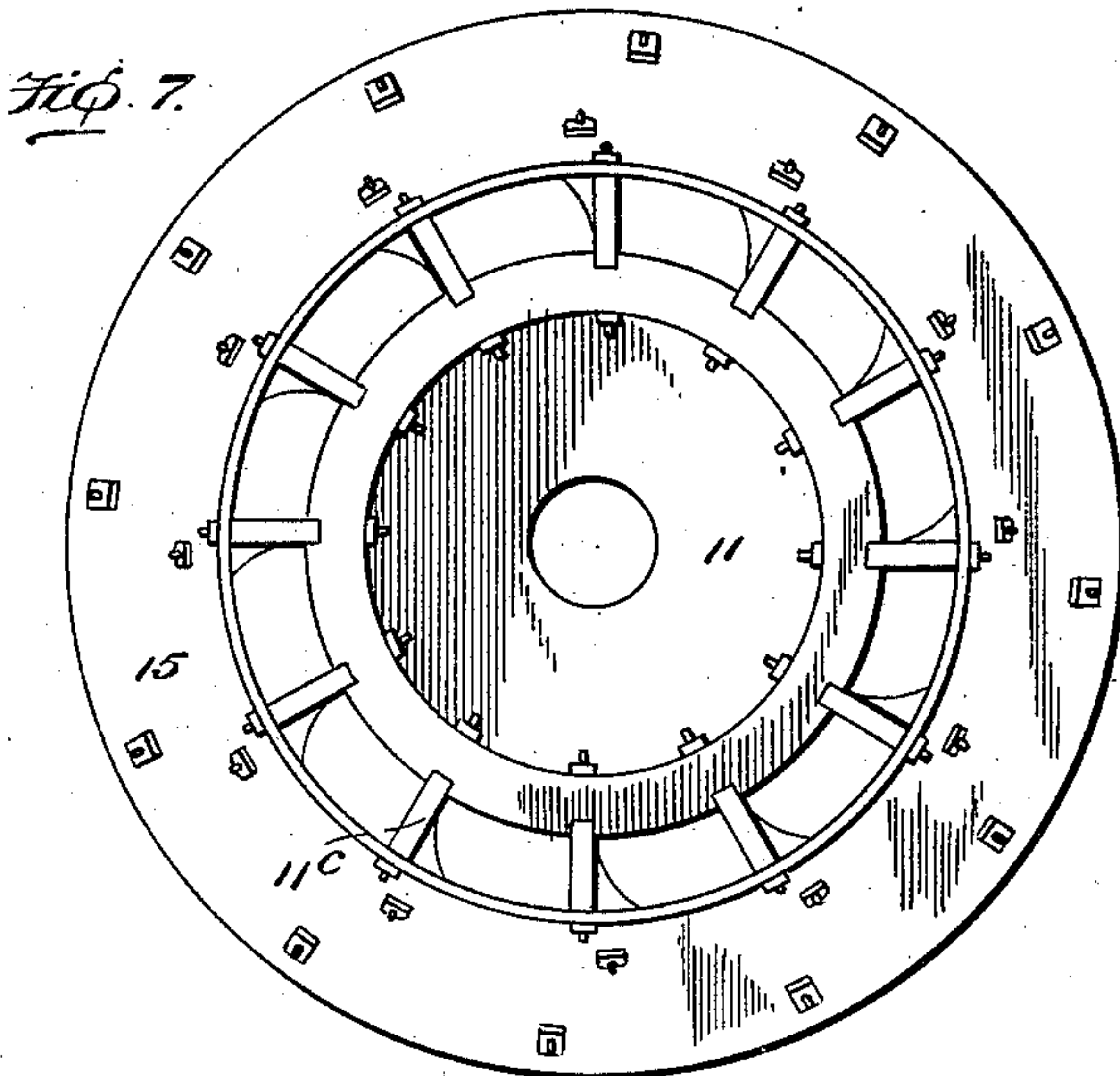
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Witnesses

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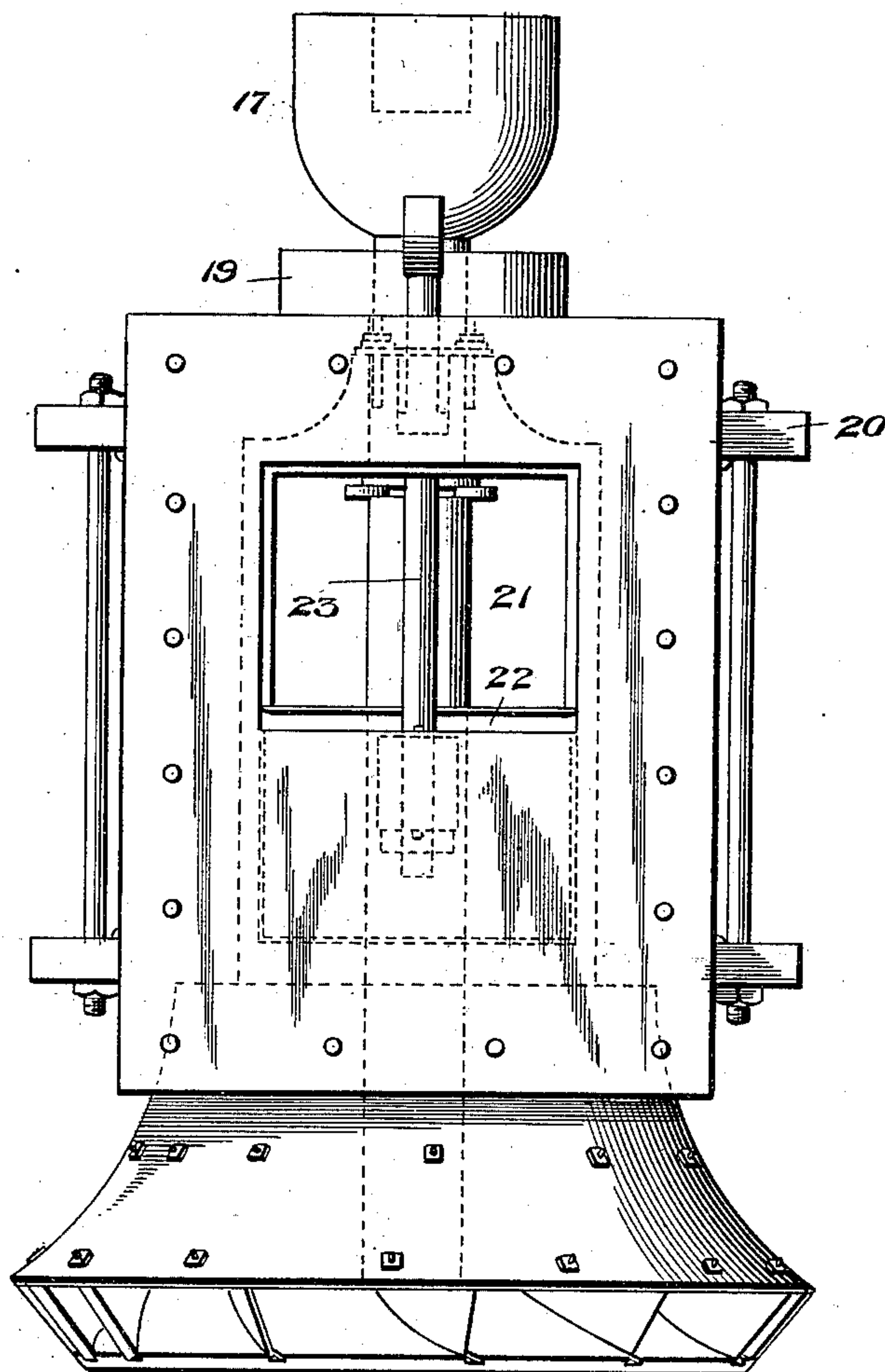


Fig. 10.

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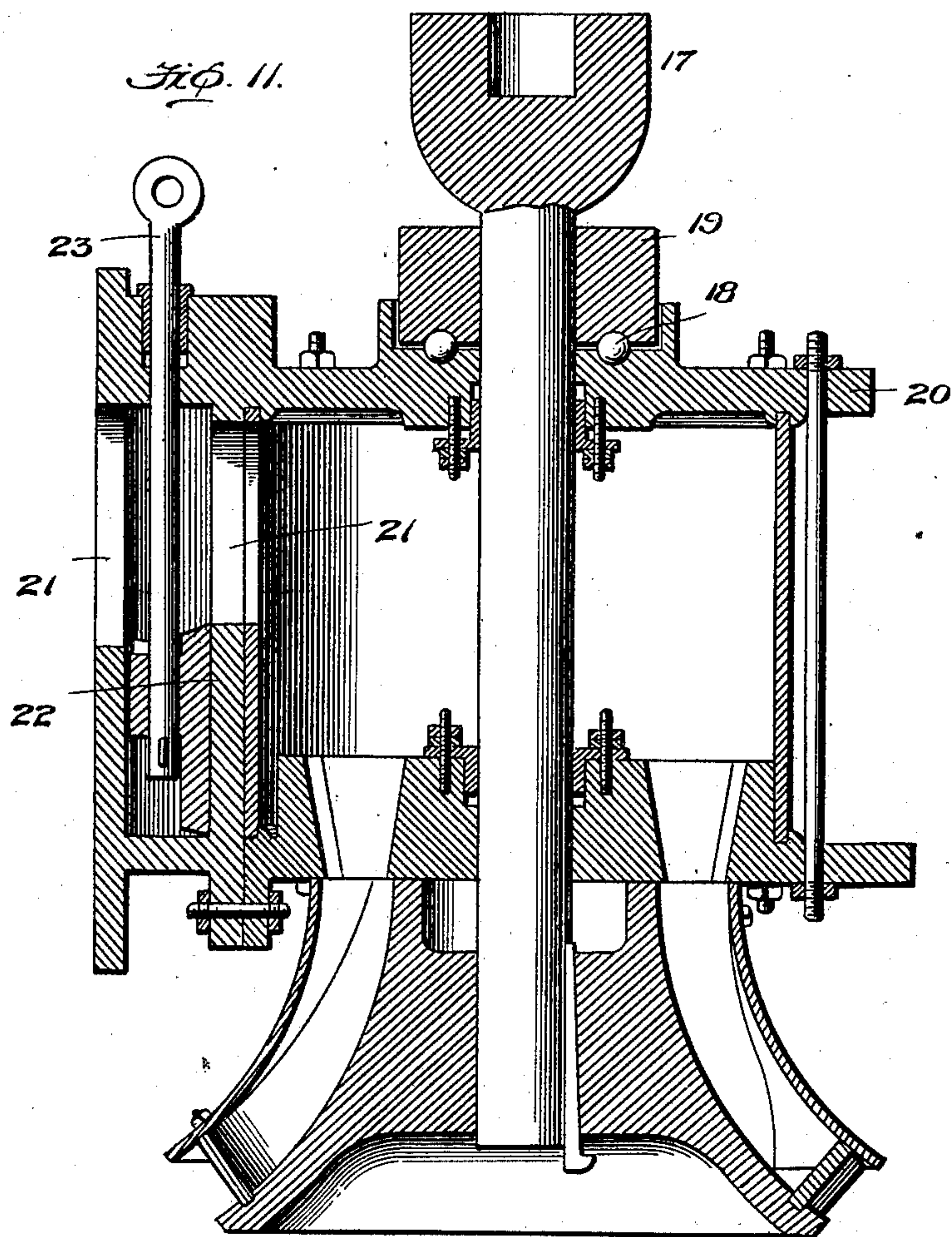
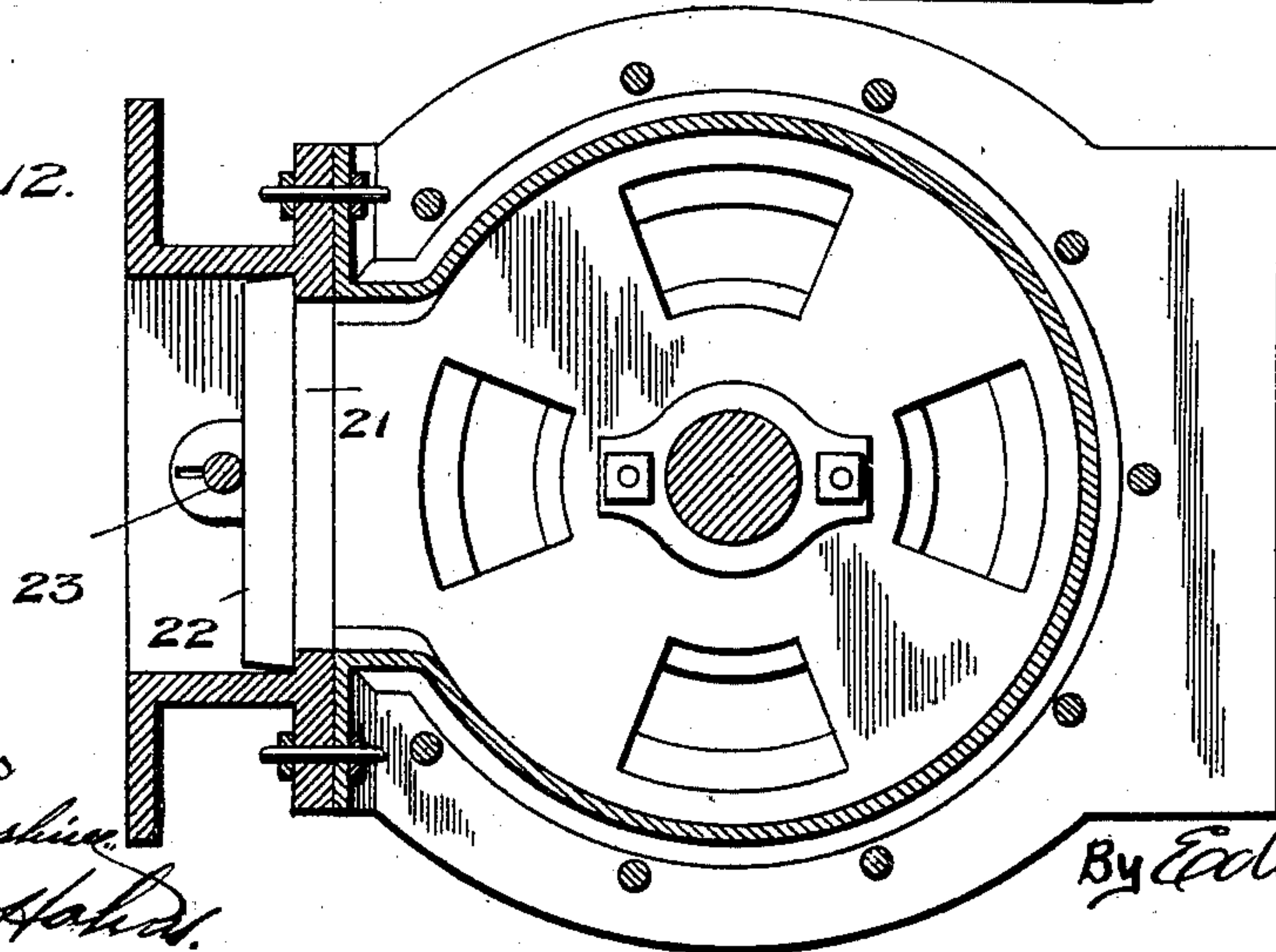


Fig. 12.



Witnesses

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UNITED STATES PATENT OFFICE.

ALEXANDER HENDRY, OF FAYETTEVILLE, ARKANSAS.

TURBINE.

SPECIFICATION forming part of Letters Patent No. 671,885, dated April 9, 1901.

Application filed August 27, 1900. Serial No. 28,182. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER HENDRY, a citizen of the United States, residing at Fayetteville, in the county of Washington and State of Arkansas, have invented certain new and useful Improvements in Turbine Wheels; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain improvements in turbine wheels, which, though generally driven by water, in this instance are driven or run by steam.

In the use of my turbine wheel great velocity is attained, and therefore great driving power of the shaft, at the minimum outlay of expense and the employment of the least amount of machinery. This wheel, while characterized for simplicity and easy running, is built on scientific and skilled lines or principles, whereby provision is made for the expansive action of steam following its initial application, as in exhausting it from the wheel and conducting away the exhaust-steam.

My invention consists of the peculiar construction of the wheel, with its buckets, the combination and arrangement therewith of the steam delivery or feed pipes having tapered delivery or feed ends, and sundry combinations and arrangements of parts, substantially as herein more fully disclosed, and specifically pointed out by the claims.

In the accompanying drawings, illustrating the preferred embodiment of my invention, Figure 1 is a side elevation thereof. Fig. 2 is a vertical section taken on the line *y y* of Fig. 3. Fig. 3 is an end elevation. Fig. 4 is a section on the line *z z* of Fig. 2. Fig. 5 is a section on the line *x x* of Fig. 2. Fig. 6 is a section on the line *w w* of Fig. 2. Fig. 7 is an inner or receiving end view of one of the wheels. Fig. 8 is an elevation of so much of a wheel as discloses more especially the buckets. Fig. 9 is a sectional view on the line *a a* of Fig. 8; and Figs. 10, 11, and 12 are a side elevation, a sectional elevation, and a horizontal section of a modification, showing the embodiment of the invention in the form of a vertical wheel.

It will be understood that latitude is allowed herein as to details, as they may be changed at pleasure without departing from the spirit of my invention and the same yet remain intact and be protected.

In carrying out my invention I employ a suitable closure or casing 1, having a central steam supply or feed pipe 2 and opposite exhaust-steam-receiving chambers 3, with which connect a bottom outlet-pipe 4 in any suitable way to discharge the exhaust-steam. The exhaust-discharge pipe 4 has one end entering or extending a short distance into the lower end of one exhaust-receiving chamber, as at 4^a, and a short nozzle-like pipe extension 4^b, extending into the other of said exhaust-receiving chambers. The casing 1 is mounted and suitably secured upon a preferably rectangular hollow base 5, through which extends and is inclosed the exhaust-pipe 4. The preferable way of securing the casing 1 to said base is by angle-irons 5^a, suitably bolted thereto, as shown. The casing 1 is divided up into several steam chests or chambers 6 6^a 6^b by partitions or walls 6^c 6^d in addition to the exhaust-chambers 3 3, the outer circular wall or shell sections 6^e 6^e 6^e being preferably laterally let into annular grooves 6^f, formed by correspondingly-shaped rings or bosses cast upon or secured to said partitions or walls 6^c 6^d and to plates placed upon the inner sides of the chambers 3, more fully hereinafter referred to. In order to brace the several walls or parts firmly together, rods 8 are employed, passed through said walls and plates 7 and nutted at their ends. Also the exhaust-steam chambers 3 have arranged upon their outer sides plates 7^a 7^a, suitably connected or braced to the plates 7, as shown by rods 9 9, passed through said plates and nutted in place. Suitably mounted upon bearings arranged in the partitions or walls and said side plates of the casing 1 is a shaft 10, bearing the turbine wheels 11 11^a and having suitable power-transmitting pulleys 10^a 10^b. These bearings are equipped with suitable wear-compensating stuffing-boxes, as at 12, &c.

The partitions or walls 6^c 6^d have extending through them chutes 13, with flared receiving ends arranged in the central steam-chamber 6 and their tapered ends opening

into the lateral steam-chests 6^a 6^b and discharging or delivering into the buckets of the wheels 11, as shown. The steam exhausted from each wheel 11 into the chambers 6^a 6^b, respectively, passes into the buckets of each of the two other wheels 11^a, whence it is exhausted into the chambers 3 or condensed, as desired, thus actuating both sets of wheels, driving the shaft 10 with great rapidity and power to serve as a powerful motor. The turbine wheels are each constructed or provided with a circular series of buckets 11^b, having a general outward inclination, also a transverse spirality or curvature with outwardly-divergent side walls, whereby as the steam impact is received thereon the wheel is rotated or turned, and yet the steam as it expands, as when exhausting, will be prevented from "choking" the buckets and consequently permitted to freely escape without any retarding effect whatever upon the rotation of the wheel or wheels. The curved or spiral bottoms 11^c of the wheel-buckets are suitably secured, especially as disclosed by Fig. 9, by screw-bolts 14 passing transversely therethrough and the outer wall 15 thereof and entering the inner wall 16 of the buckets.

In Figs. 10, 11, and 12 is illustrated the application of my invention to a vertical turbine wheel. In this disclosure the wheel-shaft is provided with a suitable coupling socket-piece 17 at its upper end for making connection with the machinery or part to be driven, while ball-bearings 18 are interposed between the upper end-suspending piece 19 of the wheel-shaft and the wheel-casing 20. To this casing is suitably supplied a gateway 21 for the passage of the steam to the wheels, between which is arranged a gate 22 for opening and closing said gateway as occasion may require, the movement or sliding of said gate being effected by actuating a rod 23, suitably connected thereto and guided and packed in said casing.

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

1. A turbine wheel, whose buckets have a general outward or rearward inclination or curvature, with their inner and outer walls parallel to each other, and their side walls diverging outward, substantially as set forth.

2. In a turbine wheel, whose buckets have a general outward or rearward inclination or curvature, with their inner and outer walls parallel to each other, and their side walls diverging outward, and a steam-chute, substantially as set forth.

3. A turbine wheel, whose buckets have a general outward or rearward inclination or

curvature, with their inner and outer walls parallel to each other and their side walls having a transverse spirality or curvature, and diverging outward, substantially as set forth.

4. In a turbine wheel having a series or plurality of wheels whose buckets have a general outward inclination or curvature, with their inner and outer walls parallel to each other, and their side walls diverging outward, a series of steam-chambers, and a series of steam-chutes, delivering the steam to one of said wheels, and said wheel discharging into one of said steam-chambers and the second wheel receiving exhaust-steam from the steam-chamber into which the first wheel discharges, substantially as set forth.

5. In a turbine wheel, having a series or plurality of wheels whose buckets have a general outward inclination or curvature with their inner and outer walls parallel to each other, and their side walls having a transverse spirality or curvature, and diverging outward, a series of steam-chambers and exhaust-steam chambers, with suitable outlets, and steam-chutes receiving steam from one of said steam-chambers and delivering it to one of said wheels, and the second wheel receiving the steam discharged from the latter wheel and discharging it into an exhaust-steam chamber, substantially as set forth.

6. In a turbine wheel, the combination of the wheels, whose buckets have a general outward or rearward inclination or curvature, with their inner and outer walls parallel to each other and their side walls diverging outward, steam chambers and chutes, and the exhaust-chamber, together with bracing or strengthening plates and rods connecting said plates, substantially as set forth.

7. In a turbine wheel, the combination of the wheels, steam-chambers composed of circular sections or shells and partitions or plates having upon their sides annular grooves adapted to receive said sections or shells, substantially as set forth.

8. In a turbine wheel, the combination of wheels, steam-chambers composed of sections or shells and partitions or plates having annular grooves upon their sides to receive said sections, and exhaust-steam chambers, together with bracing-rods connecting the side plates of said exhaust-steam chambers, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

ALEXANDER HENDRY.

Witnesses:

GEO. J. ALBRIGHT,
W. L. SMITH.