

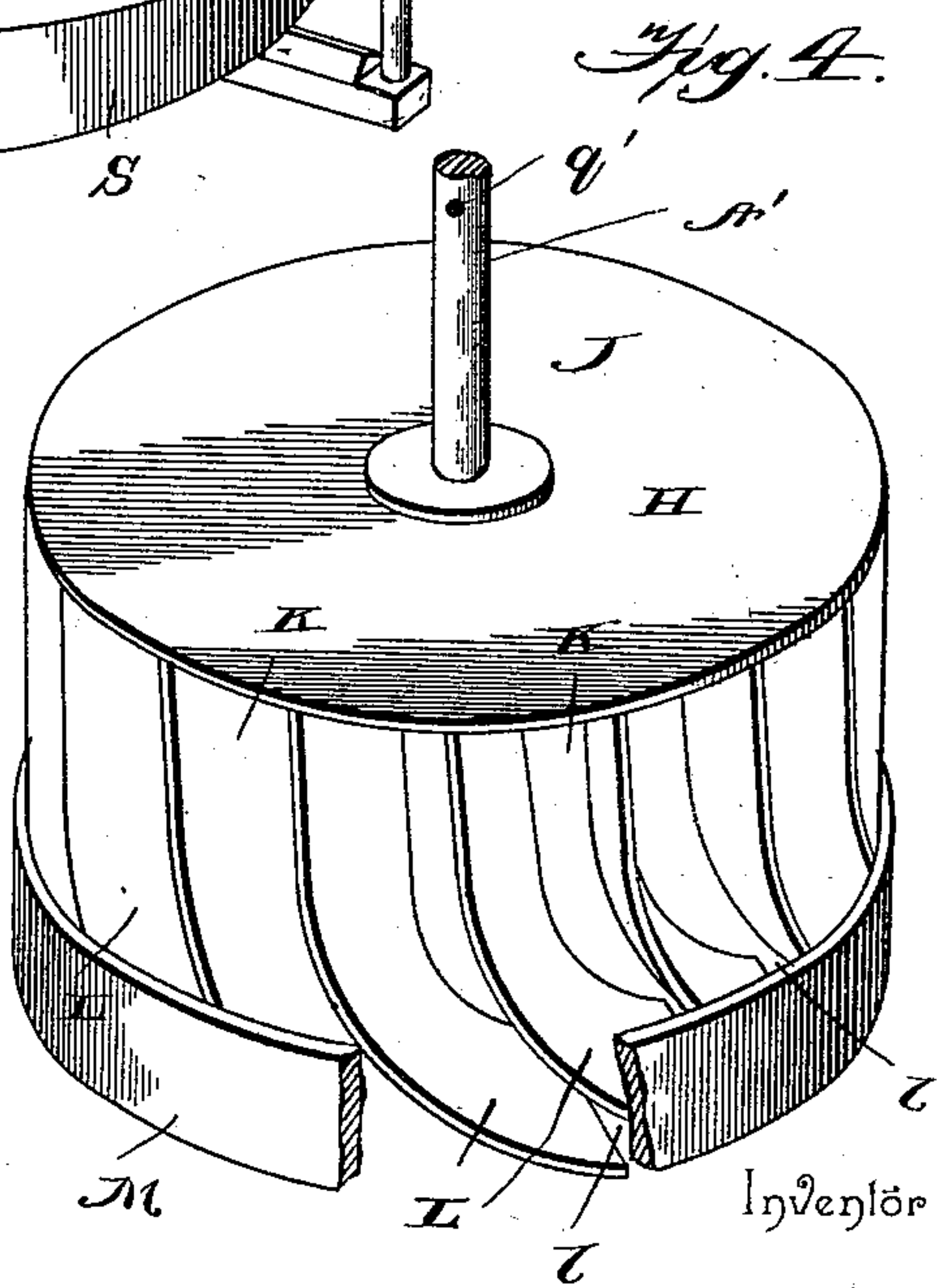
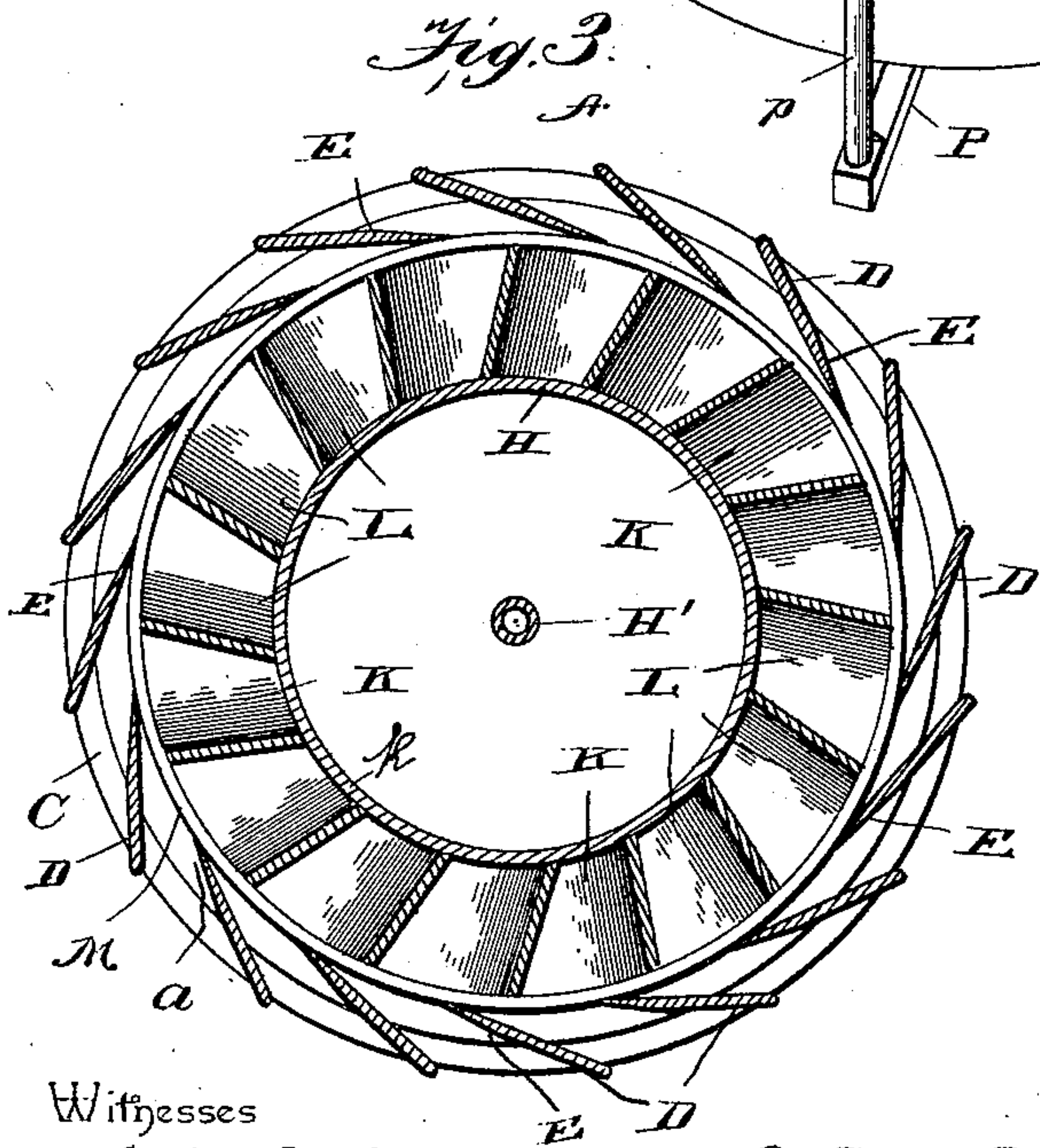
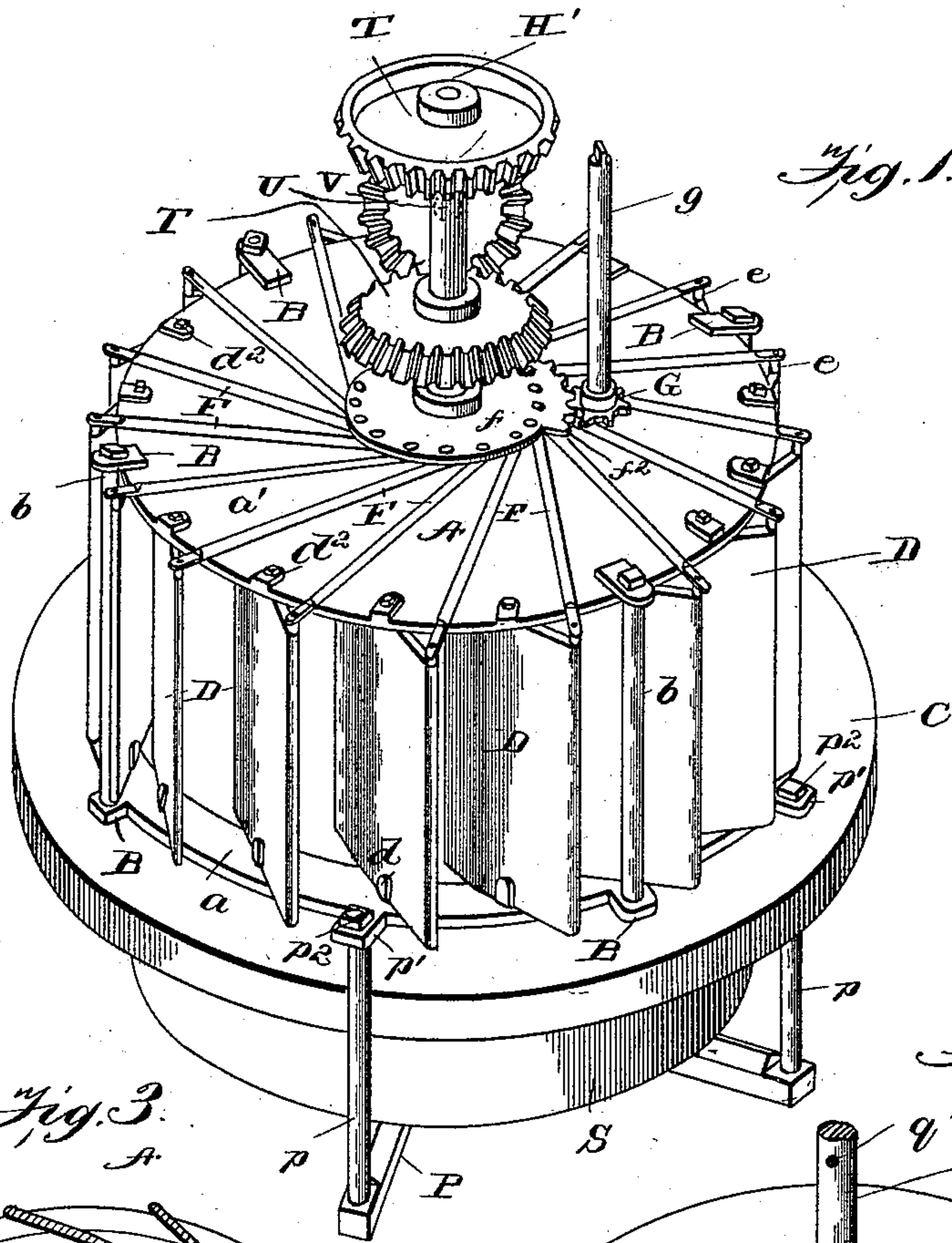
(No Model.)

2 Sheets—Sheet 1.

C. A. CHASE.
WATER WHEEL.

No. 521,152.

Patented June 12, 1894.



Witnesses

John C. Shaw.
D. O. Halchuk.

By *W. C. S.* Attorneys.

Charles A. Chase.

CA Snow & Co.

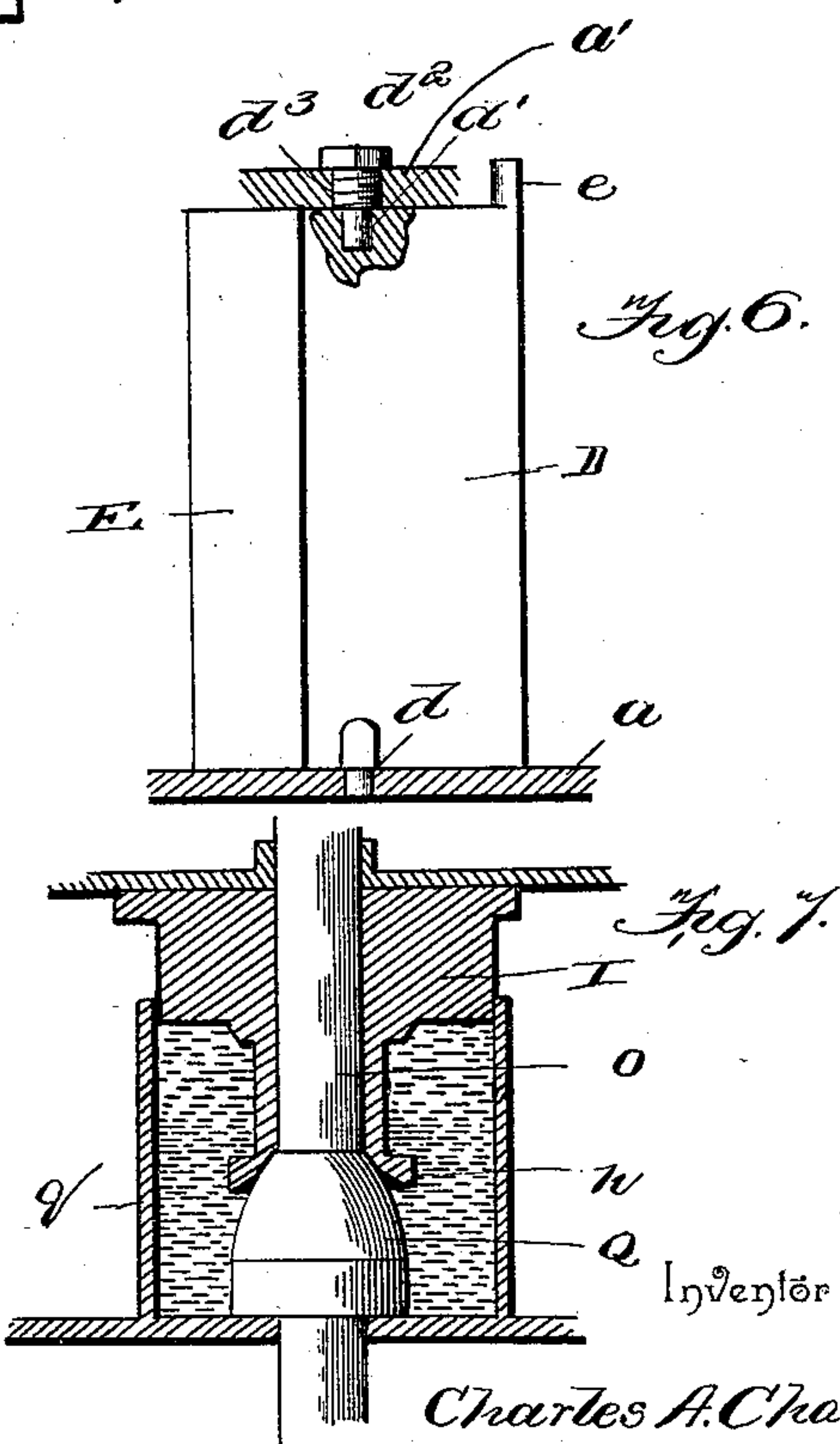
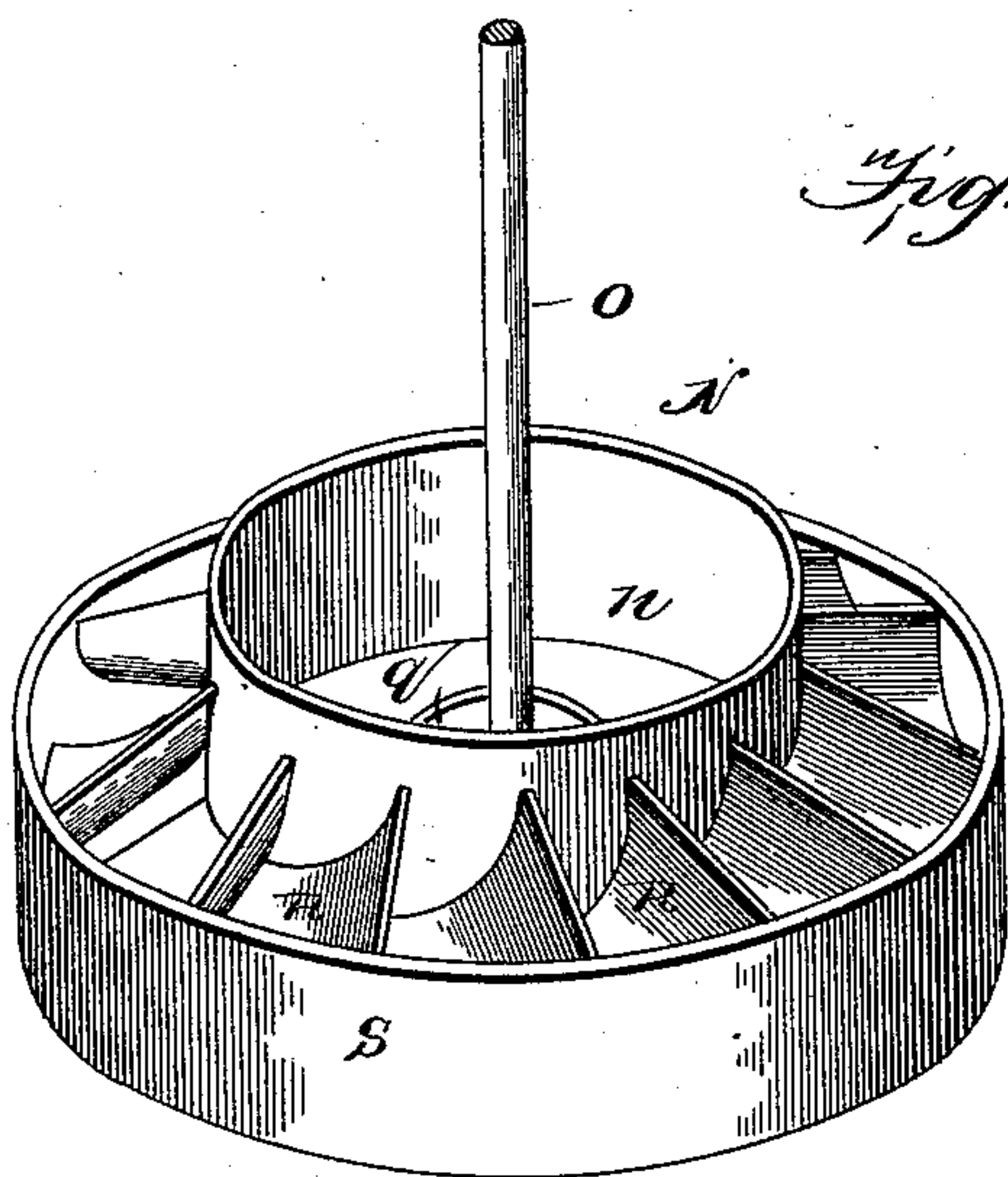
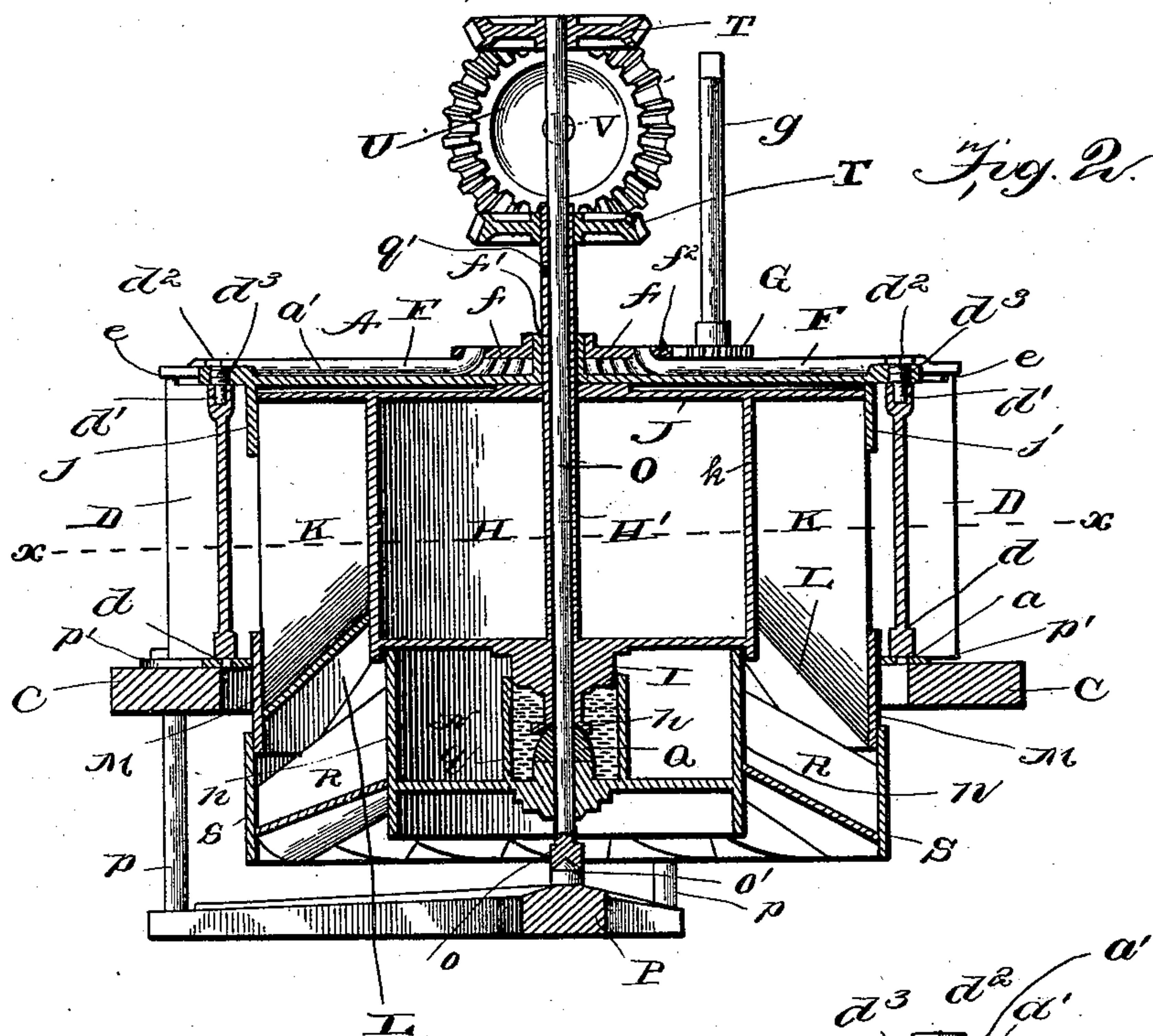
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By his Attorneys.

Charles A. Chase

UNITED STATES PATENT OFFICE.

CHARLES A. CHASE, OF HOULTON, MAINE.

WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 521,152, dated June 12, 1894.

Application filed August 15, 1893. Serial No. 483,196. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. CHASE, a citizen of the United States, residing at Houlton, in the county of Aroostook and State of Maine, have invented a new and useful Water-Wheel, of which the following is a specification.

This invention relates to turbine water wheels.

The main object of the present invention is to provide certain improvements in turbine water wheels whereby the full power of a head of water is completely utilized.

To this end the main and primary object of the present invention is to effect a combination of oppositely moving wheels, specifically constructed with special reference to securing the full power from the head of water carried by the flume in which the wheel is arranged.

With these and other objects in view which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

In the accompanying drawings: Figure 1 is a perspective view of a water wheel constructed in accordance with this invention. Fig. 2 is a central vertical sectional view thereof. Fig. 3 is a horizontal sectional view on the line $x-x$ of Fig. 2. Fig. 4 is a detail in perspective of the upper water wheel. Fig. 5 is a similar view of the lower water wheel. Fig. 6 is an enlarged detail sectional view showing more clearly the pivot connection of one of the upper wheel gates. Fig. 7 is an enlarged detail sectional view showing more clearly the step connection of the upper wheel on the lower wheel.

Referring to the accompanying drawings, A represents the upper wheel casing comprising the lower casing ring a , and the imperforate top plate a' , both of which are provided with the off-standing perforated lugs B, connected by the casing bolts b , which securely hold the ring and top plate together and spaced apart from each other. The lower casing ring a , of the wheel casing, rests on the supporting flange C, which is adapted to be bolted onto the bottom of the flume in which the water wheel is arranged, in order

to permit the head of water to have a side inlet into the upper wheel casing, the water being directed within the upper wheel casing by means of the circumferential series of overlapping casing gates D. The gates D, are designed to close or open the space between the edges of the casing ring and top plate, and are each provided with the lower integral pivot pins d , turning in perforations in the casing ring a , and at their upper edges with the sockets d' , adapted to receive the lower unthreaded extremities of the removable pivot screws d^2 . The removable pivot screws d^2 , work in the threaded openings d^3 , formed in the top casing plate a' , near the edges thereof, and thereby providing a convenient removable pivot connection of the several gates with the upper wheel casing. The gates D, are perfectly straight upon both sides, but are provided with inner beveled ends E, which serve to direct the water into the wheel casing without offering any resistance thereto, which would naturally break up the even flow of water, and each of the said gates are provided at their upper outer corners with the upwardly projecting engagement pins e , which receive the outer perforated ends of the adjusting arms F. The adjusting arms F, are arranged approximately radially on top of the wheel casing, and are provided with inner angled ends which pivotally engage perforations in the circular adjusting plate f . The circular adjusting plate f , is loosely mounted on the upper bearing collar f' , projecting from the top of the wheel casing and is provided at its edge with a toothed segment or portion f^2 , which is engaged by an adjacent pinion G, which is mounted on the lower end of the adjusting shaft g . By turning the adjusting shaft g , the overlapping gates D, can be adjusted so as to vary the spaces there-between, in order to admit as much water as desired, or said gates can be turned to work flat against and overlap each other, whereby the upper wheel casing will be completely closed in, so that no water will be admitted thereinto to impart motion to the upper wheel H, thereof. The upper water wheel H, is constructed in substantially the same form as that described and claimed by me in my former patent numbered 492,862, but in the present invention is mounted on

the vertical hollow shaft H', the upper portion of which works through and projects above the upper bearing collar f', on top of the wheel casing, while the lower extremity of said shaft at the bottom of the wheel terminates in a concaved bearing end h, directly above which and projecting from the bottom of the said wheel is the enlarged bearing collar I, the function of which, together with the lower bearing end of said hollow shaft, will be more particularly referred to. The upper horizontal water wheel H, has its top plate J, work inside of the depending bearing and guide ring j, projecting within the wheel casing from the top plate thereof, in order to steady the upper water wheel in its revolutions within the wheel casing, and said upper water wheel is provided with a radial series of off-standing vertical water buckets K, projected from the central core k, in the same manner and disposition as set forth in my former patent above referred to. In the present invention the vertical water buckets K, have lower curved discharge aprons or tongues L, which overlap each other to form bottom discharge spaces l, and said discharge aprons or tongues are disposed at about an angle of forty-five degrees, and have an outward declination toward the tongue inclosing ring M, which encircles the lower discharge ends of the water buckets of the upper wheel, in order to confine the water therein and utilize the fall thereof to its fullest extent. The outward declination of the discharge ends of the water buckets serves to throw the discharging water out toward the inclosing ring M, and thereby secure a greater power or leverage from the discharge of such water. The discharging water from the upper horizontal water wheel H, discharges into the buckets of the lower water wheel N. The lower water wheel N, is adapted to revolve in a reverse direction to the upper water wheel and is provided with a central hub portion n, attached to the vertical wheel shaft O. The vertical wheel shaft O, is provided at its lower end at the bottom of the lower wheel with the bearing socket o which fits onto the step o', projected centrally from the vertically adjustable step spider frame P. The step frame P, is provided at the extremity of its arms with the hanger posts p, threaded at their upper ends to work through the perforated supporting lugs p', projecting from the casing ring a, and are engaged by the adjusting nuts p², working on top of the ring lugs, thereby providing an adjustment for the said frame whereby the wear on the bearing parts can be readily compensated for in order to always secure a steady working wheel. The vertical wheel shaft of the lower discharge-turned water wheel N, works inside of and projects above the vertical hollow shaft H', of the upper wheel, and at the base of the shaft H', and on top of the lower water wheel is mounted the step block Q,

onto which rests and works the lower concaved bearing end h, of the hollow shaft H'. Surrounding the step block Q, and also rising from the top of the lower water wheel is the circular oil cup q, which snugly receives the enlarged bearing collar I, of the upper wheel, thereby securing a thoroughly lubricated and easy working step bearing for the upper water wheel as well as the lower wheel, and sufficient quantities of oil are admitted into the said oil cup by means of the oil hole q', piercing the hollow shaft H', above the wheel casing, as is clearly shown in the drawings.

Referring more particularly to the construction of the lower water wheel it will be clearly seen from the drawings that the same is provided with a radial series of short water buckets R, projected at an angle from the hub n, thereof. The said water buckets R, are formed in the same shape and arranged in the selfsame disposition as the lower discharging aprons or tongues of the upper wheel buckets, though reversely and of shorter lengths than said upper wheel-buckets, said buckets R, being arranged at an angle of about forty five degrees, and having an outward declination to the bucket-inclosing rim S, toward which the water is directed by the disposition of the buckets R. The said bucket inclosing rim works outside of or overlaps the lower edge of the ring M, of the upper bucket, so that there can be no escape of water at the connection between two wheels and to prevent lateral vibration of the two wheels during operation, and while revolving in reverse directions to each other. Reversely disposed beveled gear wheels T, are attached to the upper ends of the shafts H' and O, respectively, and are both engaged by the single vertical gear wheel U secured to one end of a transmitting shaft V, which is rotated in one direction by the different rotations of the two water wheels.

Now from the foregoing it is thought that the construction, operation and many advantages of the herein-described water wheel will be readily apparent. A point to be noted is that there are the same number of gates D, as there are buckets to the upper wheel, in order that each gate will serve as a guide to direct the water straight into one of the buckets of the upper wheel, and further, the buckets of the lower wheel are less in number than those of the upper wheel whereby a much larger vent is given for the discharge of the water from the upper wheel so that the tendency of the water to back up from the lower wheel will be entirely obviated without the known expedient of using a larger lower wheel with enlarged buckets, which necessarily cause the water to spread over a large surface and consequently lose some of its power. As the water is admitted to the upper water wheel a revolving motion is imparted thereto, while the water which has been directed into its buckets discharges off of the lower curved ends thereof at such an angle as to greatly

assist in the turning of the wheel, and falls into the upper portions of the buckets of the lower wheel, which are disposed at a reverse angle to the upper wheel buckets. The discharge water which passes through the buckets of the lower wheel causes the said lower wheel to revolve in a reverse direction to the upper wheel, and is therefore utilized twice before being finally discharged from the wheel.

10 Modifications will suggest themselves to those skilled in the art, and I will have it understood that changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described the invention, what is claimed, and desired to be secured by Letters Patent, is—

20 1. In a water wheel, the horizontal wheel casing comprising the connected top plate and lower casing ring, said top plate having threaded openings near its edge, a circumferential series of overlapping straight casing gates arranged between the edges of the top plate and said casing ring and having projecting engagement pins at their upper outer corners lower integral pivot pins engaging said casing ring, and unthreaded sockets at their upper edges, removable pivot screws engaging the threaded openings of the casing top plate and having lower unthreaded extremities projecting into the unthreaded sockets of said gates, to detachably pivot the same in the wheel casing simultaneously controlled arms pivotally engaged at one end with said engagement pins to adjust all of the gates, and a bucket wheel arranged inside of the wheel casing, substantially as set forth.

40 2. In a water wheel, the combination of an upper wheel having a radial series of water buckets provided with lower curved discharge aprons having an outward declination, and an inclosing ring completely encircling said aprons, and a lower reversely turning water wheel of substantially the same diameter as and arranged to fit the lower bottom portion of the upper wheel and provided with a radial series of short angularly disposed buckets

50 arranged reversely to the discharge aprons of the upper wheel buckets and also having an outward declination, and a bucket inclosing ring encircling the lower of the wheel buckets to confine the water directly thereagainst, and adapted to have its upper edge overlap or work outside of the lower edge of the bucket inclosing ring of the upper wheel said lower wheel buckets being arranged in a less number and being of shorter lengths than those of the upper wheel, substantially as set forth.

3. In a water wheel, the inclosing gate inclosed wheel casing having perforated lugs, a step frame having hanger posts adjustably suspended from the perforated lugs of said casing and provided with a central step, an upper bucket wheel arranged to work inside of said wheel casing and having a lower bearing end, and a lower reversely turning bucket water wheel working inside of the lower end of the upper wheel, and having a lower bearing end bearing on the step of said step frame, a step on its upper side which forms a bearing for the lower bearing end of the upper wheel and an oil chamber entirely inclosing the step connection between the upper and lower wheels, substantially as set forth.

4. The combination of an upper bucket water wheel having a hollow shaft provided with an oil hole, terminating at its lower end in a concave bearing, and having directly thereabove an enlarged bearing collar, and a stepped lower bucket water wheel having a vertical shaft working inside of the hollow shaft of the upper wheel, a step block at the base of said shaft to form a bearing for the lower end of said hollow shaft, and a circular oil cup receiving the enlarged bearing collar of the upper wheel shaft, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affix my signature in the presence of two witnesses.

CHARLES A. CHASE.

Witnesses:

M. JOSEPHINE WEBBER,
S. CARRIE MILLER.