No. 634,967. Patented Oct. 17, 1899.

W. W. TYLER.

TURBINE WATER WHEEL.

(Application filed Oct. 20, 1898.)

(No Model.) 3 Sheets—Sheet 1.

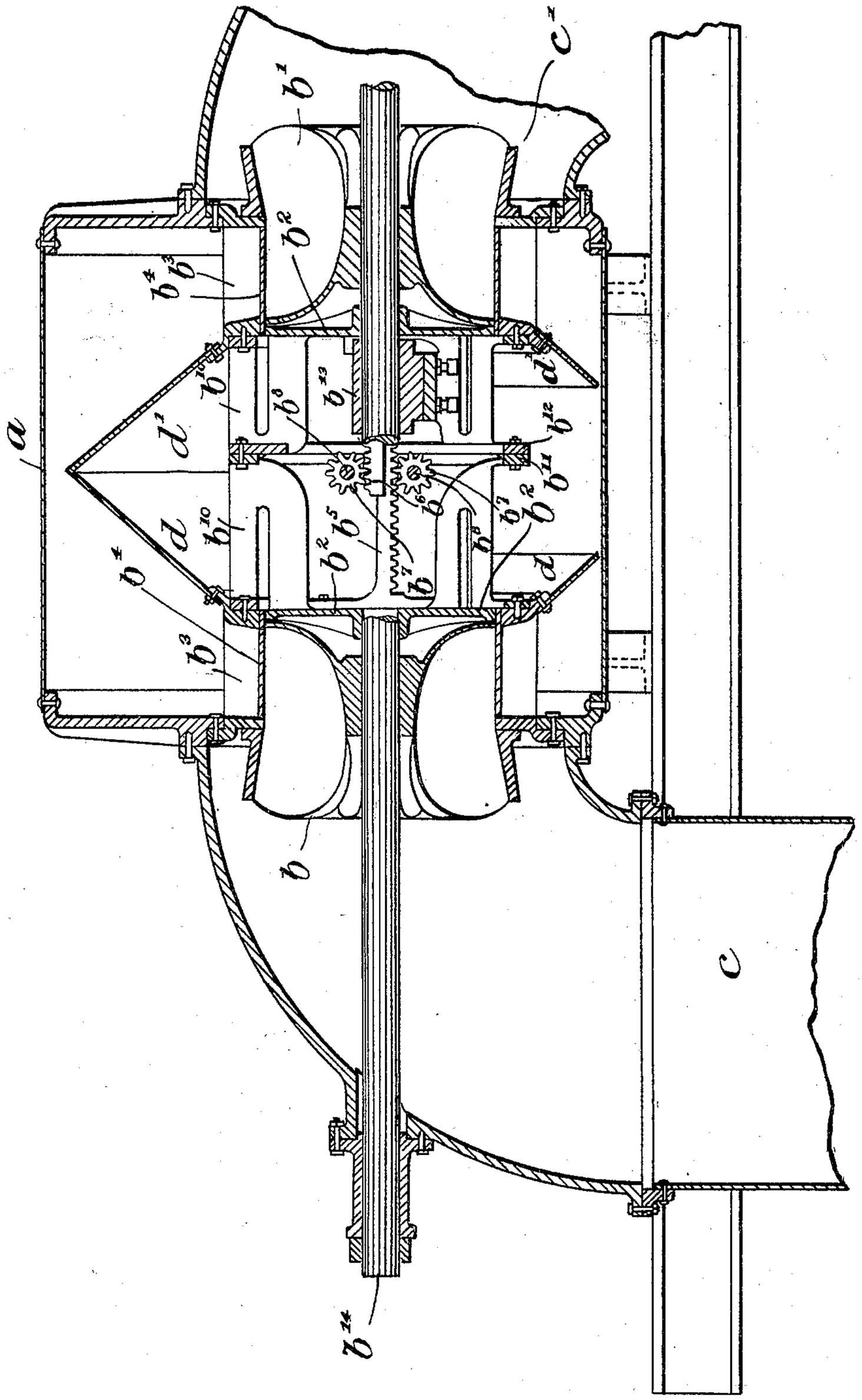

Fig. 1

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Fig. 2

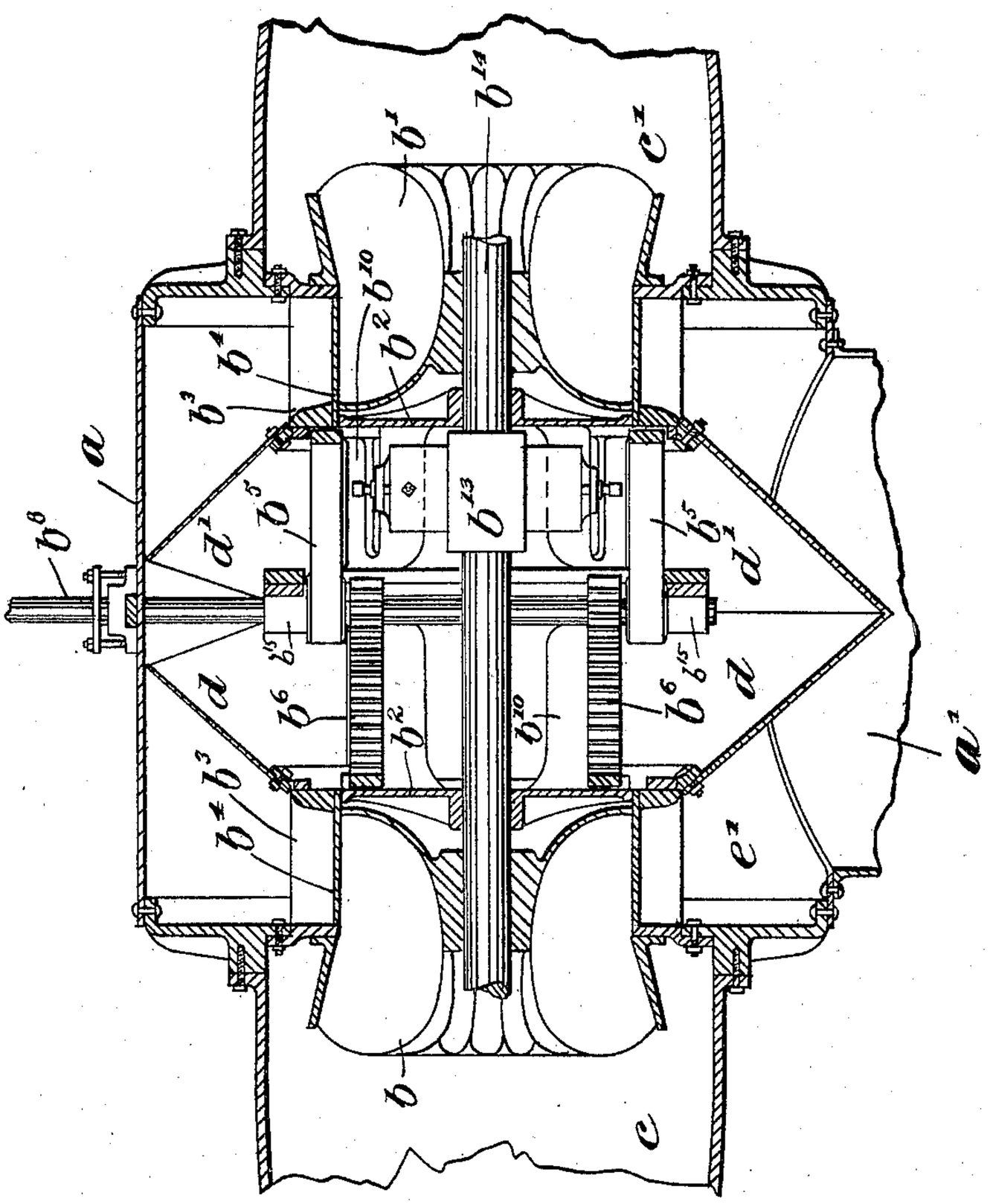

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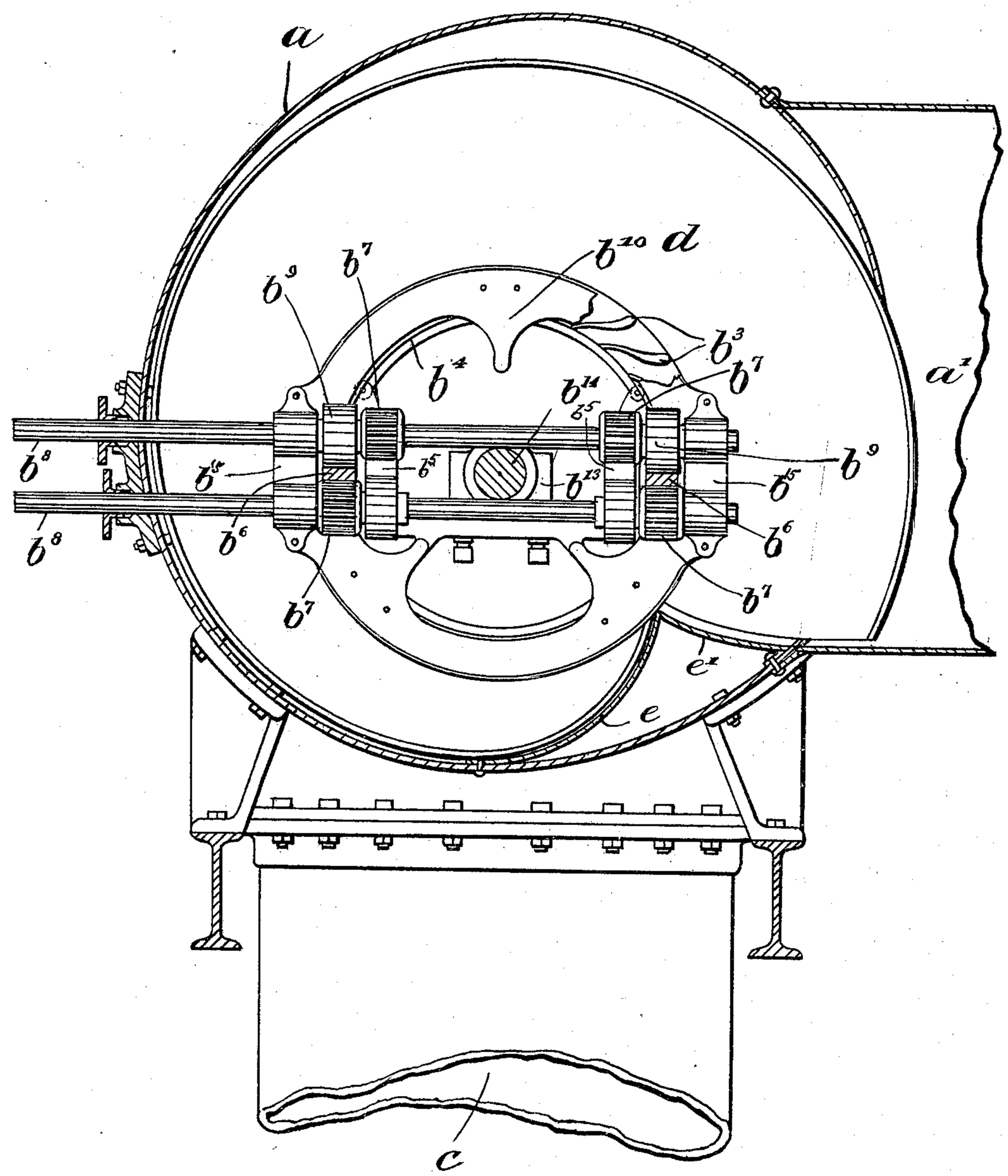
Fig. 3



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UNITED STATES PATENT OFFICE.

WILLIAM W. TYLER, OF DAYTON, OHIO.

TURBINE WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 634,967, dated October 17, 1899.

Application filed October 20, 1898. Serial No. 694,088. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. TYLER, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Turbine Water-Wheels, of which the following is a specification.

My invention relates to improvements in turbine water-wheels; and it especially relates to that class of wheels which are arranged in pairs, two wheels on the same horizontal shaft, within an outer cylinder or penstock.

The object of my invention is to provide an arrangement for wheels of this character which shall be simple, strong, and compact in construction and one in which the water is conveyed to the wheels in such a manner that a high velocity of water may be obtained, and thus decrease the size of the water-passages. I attain this object by the constructions shown in the accompanying drawings, in which—

Figure 1 is a vertical longitudinal sectional view of a device embodying my invention. Fig. 2 is a horizontal longitudinal sectional view taken at right angles to Fig. 1. Fig. 3 is a vertical transverse sectional view of the same.

Like parts are represented by similar letters of reference in the several views.

In the said drawings, a represents an outer casing, preferably cylindrical in form. a' is the inlet-opening, which leads thereto.

b and b' are the water-wheels, which are located at each end of the outer casing or cylindrical penstock a and arranged to discharge into the discharge or draft tubes c and c'. The wheels b' are placed eccentrically between the ends of the casing or penstock a, and a division is formed in the penstock by means of the inclined plates or cones d d', the outer edges of which cones are bolted to the chute-frames, and the inner edges extend from the chute or gate openings of the wheels at an angle until they meet at or near the center of the casing a or come in contact with the inner periphery thereof. These plates d and d', if extended until they meet, would form substantially cone-shaped deflectors; but in view of the fact that the wheels set eccentrically to the casing the perimeters of the cones are cut off, so that the length of the inclined side of each cone is increased as it extends around the cylinder. The outer casing or penstock is also further provided with plates e and e', which plates are bolted to the outer casing at their outer ends and are bent in such a way that the inner ends of said plates meet at the chute or gate openings of the wheel and at one side of the inlet-opening a'. These two plates, together with the outer casing, form a spiral-shaped passage extending from the inlet-opening around the wheel. The inclined plates or cones d and d', being set into the casing thus formed, also divide the space into two chambers, one for each wheel, and by reason of the decrease in the diameter of these cones, as before described, this space is reduced in both directions, so that the water which enters the cylinder is deflected around the wheels in a spiral direction and also in a lateral direction, thus decreasing the water-space from the point of inlet to the point at which the last of the water is finally utilized. This not only gives to the wheel a supply proportionate to the use, but also gives a velocity to the water which permits the use of smaller passages than where such velocity is not obtained.

Within the space formed by the cones or division-plates d and d' I place a gate-rigging, and also by the constructions to be described form a support for the main or wheel shaft. Each wheel has its own casing, which will be formed in any suitable manner, preferably with the crown-plate b^2, the chutes b^3, and the cylinder-gate b^4. The cylinder-gate b^4 is adapted to be moved through a suitable circular slot in the crown-plate b^2 and pass down along or in front of the chute b^3. For operating this cylinder-gate I employ, preferably, for each gate two racks b^5 and b^6. These racks are T-shaped—that is, the main stem constitutes the rack and the cross-bar of the T constitutes a foot or projection which extends out and is bolted onto the edge of the cylinder-gate. Each of these racks is operated by a pinion b^7 on a shaft b^8, which extends through the outer casing a at a point where the cones d and d' are cut off so as to leave a suitable space, as shown in Fig. 2. The gate-operating racks on each wheel are placed in opposite directions, and each of the

shafts b^8 is also provided with plain rolls or wheels b^9, placed opposite the pinions on the other shaft, these rolls or wheels being adapted to come on the back of the racks and hold them in contact with their operating-pinions.

To the crown-plates of the wheel-casing for the wheels b and b' there is secured the yokes b^{10}, which yokes are also bolted or otherwise secured to the chutes of said casing. These yokes on their inner sides are preferably connected by circular plates or rings b^{11} and b^{12}, which are bolted together, as shown in Fig. 1, thus firmly connecting the wheel-casings and forming a solid connection through from one end of the penstock to the other. To these yokes or to the frame thus formed I also preferably secure a bearing b^{13} for the main wheel-shaft b^{14}, which may be extended through the penstock and the draft-tubes c and c' through suitable bearings in a well-known manner.

In forming the deflecting plates or cones d and d' and the partitions which divide the penstock into the scroll-shaped chambers I do not so construct the plates that they will be a complete bar to the water, but simply use them as deflectors, the parts being so connected that the water may find its way through into the central chamber, in which the gate-rigging is located, and thus furnish a backing for the plates which for this reason may not be of great strength. The gate rods or shafts, however, will be passed through suitable stuffing-boxes in the usual way to prevent the escape of water. The yokes or framework connecting the same are also provided with suitable bearings b^{15} for the gate rods or shafts b^8, so that the entire gate-rigging, as well as the main shaft, is supported within the chamber formed by the deflecting-plates.

I have shown the spirally-arranged casing with the inclined or cone-shaped deflecting-plates in connection with the cylinder-gate; but it is obvious that this may be used with any other form of gate with equally good results.

Having thus described my invention, I claim—

1. In combination with the outer casing or penstock and a wheel supported at each end thereof, the inside cones extending to the inner periphery of said casing forming deflectors for the respective wheels, the said wheel-casings being joined together by a framework which lies wholly within the space inclosed by the cones, substantially as specified.

2. The combination with the outer casing having the inclined plates or cones extending from the perimeters of the respective wheels at an angle toward each other and the inner periphery of the casing so as to deflect the water to the respective wheels and form an inner chamber, the yokes extending from the respective wheel-casings and joined together wholly within said chamber forming a solid connection from one end of said penstock to the other, and gate-operating mechanism on said yokes and inclosed within said chamber, substantially as specified.

3. The combination with the outer casing or penstock and the respective wheels located at each end thereof eccentric to said casing, and said casing being formed cylindrical-shaped as described, inclined cones the cones being cut off at the perimeter by cylindrical-shaped casing so as to form chambers reduced laterally, substantially as and for the purpose specified.

4. The combination with the outer casing or penstock, the wheels located at each end thereof, the angularly-arranged plates or cones within said casing forming deflectors for said wheels and an inner chamber between said wheels, and the framework connecting the casings for said wheels which extends through said chamber and is connected together wholly therein, gate-operating mechanism in said chamber consisting of T-shaped racks, pinions operating the same, and loose rolls or wheels operating in connection with said racks, substantially as and for the purpose specified.

5. The combination with the casing or penstock and the wheels therein, and the angularly-arranged plates or cones within the casing, the plates or cones being placed eccentrically within the casing to correspond to the wheels which are similarly placed, an inner chamber between said plates and cones, gate-rigging wholly within the chamber and gate-operating rods extending through the penstock or casing at a point between the plates or cones where the same are cut off at the perimeter whereby the said gate-rods are out of the way of the flow of the water, substantially as specified.

6. The combination with the outer casing having the inclined plates or cones extending from the perimeters of the respective wheels at an angle toward each other and the inner periphery of the casing so as to deflect the water to the respective wheels and form an inner chamber, yokes or supports extending from the respective wheel-casings and joined together wholly within said chamber forming a solid connection and adapted to receive the cylinder-gate when moved through the crown-plate, and gate-operating mechanism on said supports and inclosed within said chamber, substantially as specified.

In testimony whereof I have hereunto set my hand this 13th day of October, A. D. 1898.

WILLIAM W. TYLER.

Witnesses:
R. G. HOEN,
ELIZABETH H. RYAN.