No. 834,558. PATENTED OCT. 30, 1906.

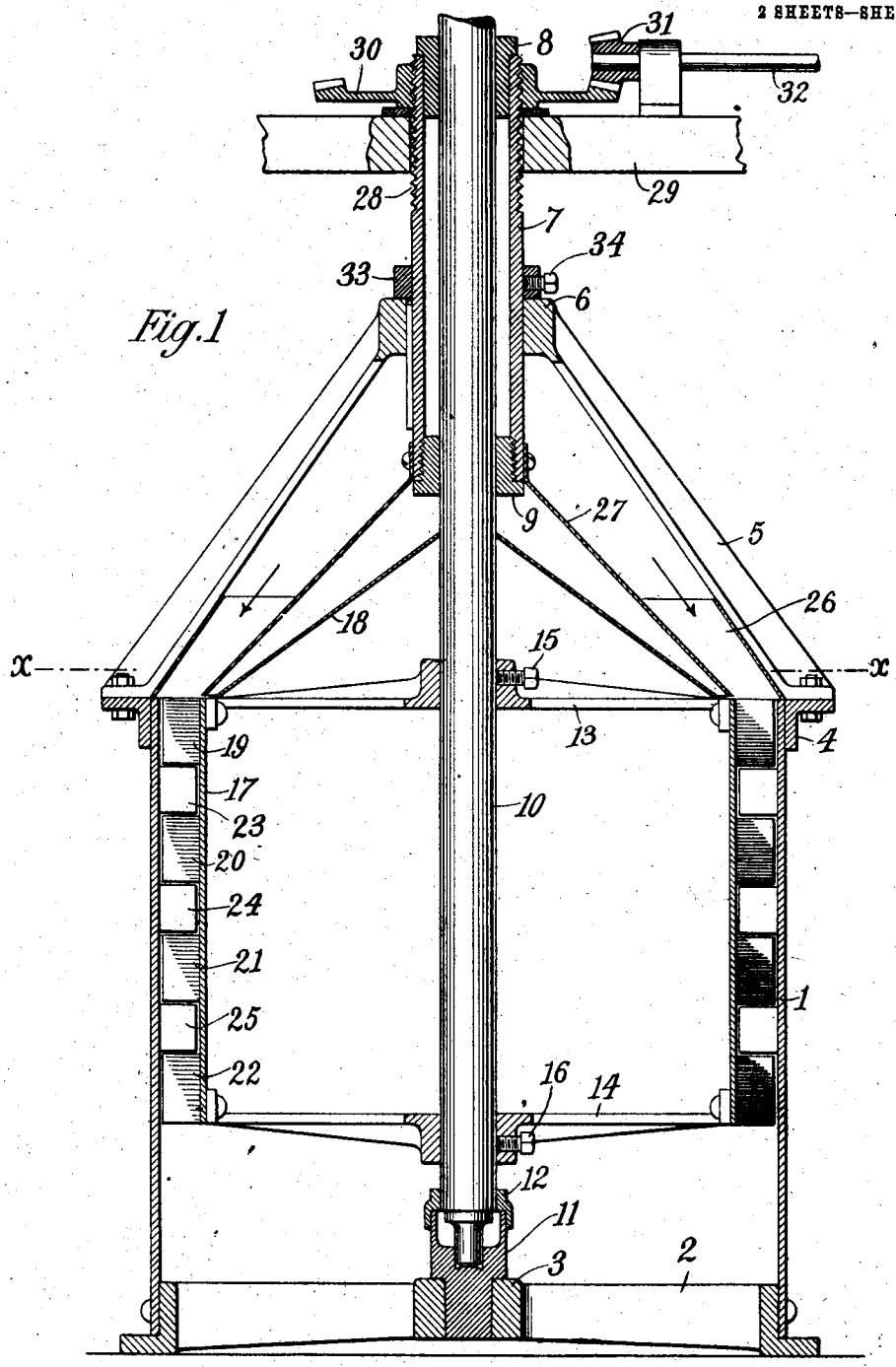
A. BONOM.

HYDRAULIC TURBINE.

APPLICATION FILED JULY 24, 1905.

2 SHEETS—SHEET 1.

Fig. 1



Witnesses

Raphael Netter

S. S. Dunham

A. Bonom, Inventor

By his Attorneys

Kerr, Page & Cooper

THE NORRIS PETERS CO., WASHINGTON, D. C.

No. 834,558. PATENTED OCT. 30, 1906.

A. BONOM.

HYDRAULIC TURBINE.

APPLICATION FILED JULY 24, 1905.

2 SHEETS—SHEET 2.

Fig. 2

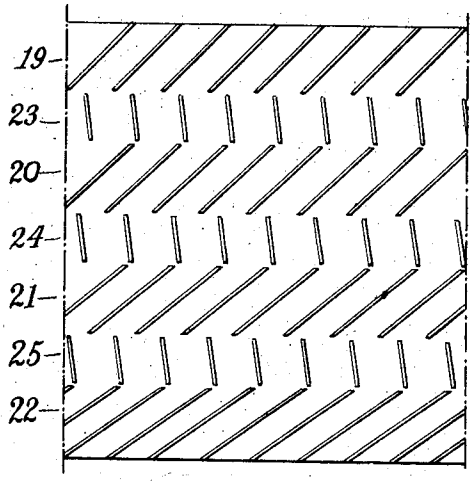
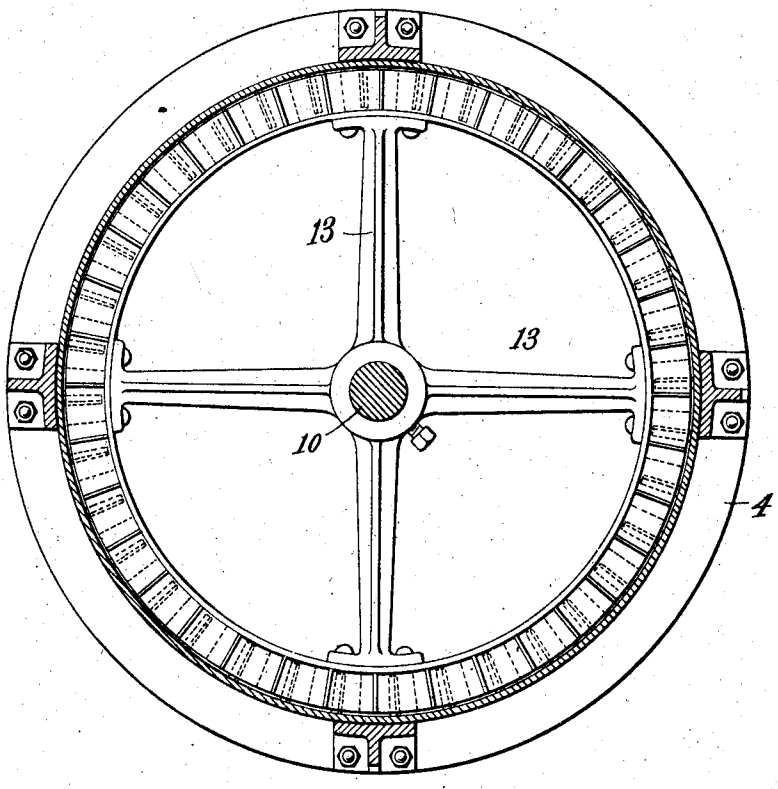


Fig. 3



Witnesses
Raphael Netter
A. A. Denham

A. Bonom, Inventor.

By his Attorneys
Kerr, Page & Cooper

THE NORRIS PETERS CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ALFRED BONOM, OF PATERSON, NEW JERSEY, ASSIGNOR OF ONE-TENTH TO LEON P. DE BLANZY, OF BROOKLYN, NEW YORK.

HYDRAULIC TURBINE.

No. 834,558. Specification of Letters Patent. Patented Oct. 30, 1906.

Application filed July 24, 1905. Serial No. 270,937.

To all whom it may concern:

Be it known that I, ALFRED BONOM, a citizen of the Republic of France, residing at Paterson, in the county of Passaic and State of New Jersey, have invented certain new and useful Improvements in Hydraulic Turbines, of which the following is a specification, reference being had to the drawings accompanying and forming part of the same.

My invention relates to fluid-actuated turbines, more particularly those driven by water, and has for its object to provide an efficient apparatus of this kind which shall be withal simple and inexpensive in construction. To these and other ends the invention consists in the novel features of construction, arrangements of parts, and combinations of elements hereinafter described, and more particularly set forth in the claims.

The preferred embodiment of the invention is illustrated in the accompanying drawings, in which—

Figure 1 is a central vertical section of the apparatus. Fig. 2 is a diagram showing the location and relative arrangement of the stationary and moving vanes. Fig. 3 is a section on line *x x* of Fig. 1.

The outer casing 1 of the turbine is cylindrical in form and is secured to a base 2 in the form of a spider, having at its center a hub 3 adapted to support a bearing for the shaft of the turbine, as hereinafter more fully described. Around the upper edge of the casing 1 is an angle-iron 4, supporting a conical spider 5, having a central opening in its hub 6, through which extends a tubular member 7. At its upper and lower ends the member 7 carries bearings 8 and 9, respectively, for the vertical shaft 10, the lower end of the latter being mounted in a box 11, carried by the hub 3, as before mentioned, and provided with a collar 12. Rigidly secured to the shaft 10 are upper and lower spiders 13 and 14, respectively, the same being held on the shaft by means of set-screws 15 16 to permit ready removal therefrom when desired. On the peripheries of the spiders 13 and 14 is secured a hollow cylinder 17, constituting the member which carries the moving vanes, more fully described hereinafter, and above the upper spider rises a flaring or conical closure 18 to prevent liquid from entering the interior of the cylinder 17 from above. On its outer surface the cylinder 17 carries any suitable number of annular series of vanes inclined to the axis of the cylinder, as indicated at 19, 20, 21, and 22 in Fig. 2. These series of vanes are spaced apart, and into the spaces between the same extend the stationary vanes 23, 24, and 25, carried on the inner surface of the casing 1. The latter vanes are preferably inclined slightly in the opposite direction from those on the rotating element, as shown clearly in Fig. 2.

From the foregoing the operation of the turbine will now be readily understood.

The device is located in the water-conduit in the usual way, so as to be immersed in the liquid flowing therethrough, the only outlet for the liquid from the conduit being through the spider 2, before mentioned. The water entering the turbine at the top, as indicated by the arrows in Fig. 1, strikes the first series of vanes 19 and by reason of the inclination thereof gives the rotating element an impulse in a clockwise direction, as will be readily understood. The streams of liquid issuing from between the first series of vanes 19 strikes the stationary vanes 23 and being thereby straightened or rectified strike the next series of movable vanes 20 at an efficient angle. The rotating element now receives an additional impulse, and as the streams issue from the second series of moving vanes they are rectified by the second series of stationary vanes 24, the operations just described being repeated until the liquid is finally discharged from the lowest series of moving vanes.

It will be understood, of course, that the precise number of series of stationary and moving vanes shown in Figs. 1 and 2—namely, three and four, respectively—is not essential to the invention, since practically any number of series may be employed, as desired, depending upon the work which the motor is to do or upon other considerations.

For the purpose of regulating the admission of water to the blades or vanes the following devices may be provided: Inside of the spider 5 and resting on the edge of the casing 1 is an upwardly-extending conical collar or valve-seat 26. Secured to the tubular member 7, at the lower end thereof, is a depending gate or valve member 27 of conical form and somewhat larger at its lower

end than the upper end of the collar or seat 26. It will now be obvious that if the gate 27 be adjusted vertically upon the shaft 10 the space between the said gate and the seat 26 will be proportionately reduced and the flow of water therethrough correspondingly diminished or even entirely cut off if the gate is raised until it meets the seat 26. For the purpose of thus raising and lowering the gate the tubular member 7 is screw-threaded at its upper end, as shown at 28. Above the supporting member 29 is a bevel-gear 30, having screw-threads engaging those on the tubular member, so that rotation of the gear will raise or lower the said member, as will be readily understood. To effect such rotation of the gear 30, the bevel-gear 31 is provided to mesh therewith, the shaft 32 of the same being provided with any suitable means (not shown) for actuating the same. The tubular member 7 is prevented from descending more than a predetermined distance by a collar 33, which strikes the hub 6 when the said member has reached its lowermost position. The collar 33 is preferably adjustably mounted on the tubular member, as by means of a set-screw 34, so that the limit of movement of the gate 27 may be varied as desired.

From the foregoing description it will be seen that my invention is simple in character and that the various elements thereof may be readily assembled and taken apart, so that all parts of the apparatus are easily accessible. At the same time the turbine is highly efficient, as has been demonstrated by thorough practical tests. It is to be understood that the form herein specifically shown is only the preferred form of the invention, which may be variously embodied without departure from its proper scope.

What I claim is—

1. In a turbine of the kind described, the combination with a cylindrical outer casing, and the rotating element therein, of an upwardly-extending conical seat at the upper end of the outer casing, and a flaring valve member vertically adjustable to coöperate with the said seat to regulate the flow of liquid between the same, and means for adjusting the said valve member, as set forth.

2. In a turbine of the kind described, the combination with a cylindrical outer casing, and a rotating hollow cylindrical member therein, of an inwardly and upwardly tapering seat at the upper end of the outer casing, a downwardly and outwardly flaring valve member above the cylindrical member, and means for adjusting the said valve member relative to the said seat, as set forth.

3. In a turbine of the kind described, the combination with a cylindrical outer casing, a shaft arranged centrally therein, and a cylindrical inner member on the shaft, of an upwardly-extending conical seat on the upper end of the outer casing, a sliding sleeve on the shaft, a conical valve member carried by the sleeve, and means for adjusting the sleeve, as set forth.

ALFRED BONOM.

Witnesses:
M. LAWSON DYER,
PARKER W. PAGE.