No. 735,054. PATENTED AUG. 4, 1903.

O. D. H. BENTLEY.

MEANS FOR ADJUSTING INTERMEDIATE BUCKETS.

APPLICATION FILED APR. 22, 1903.

NO MODEL.

Fig. 1.

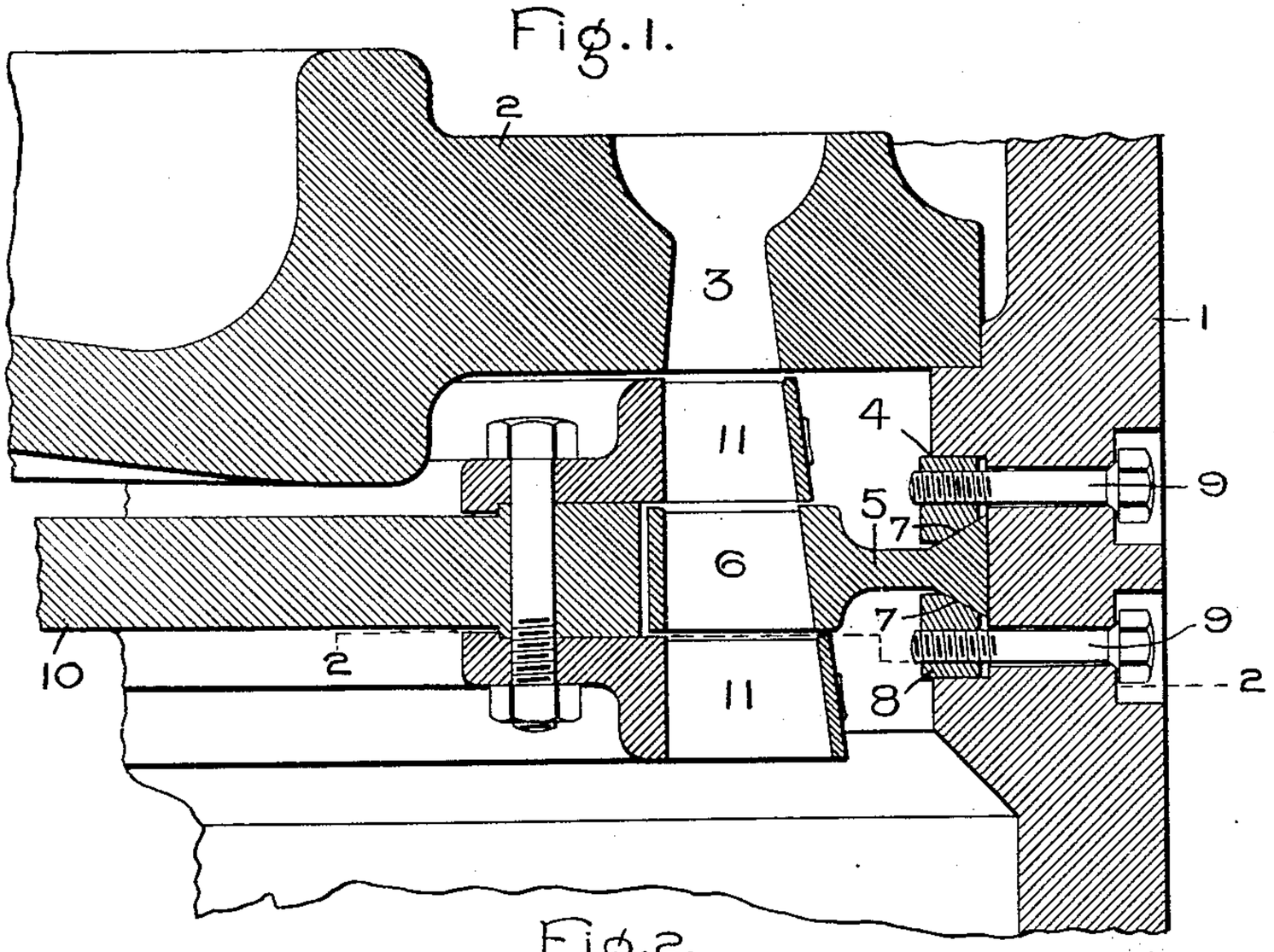


Fig. 2.

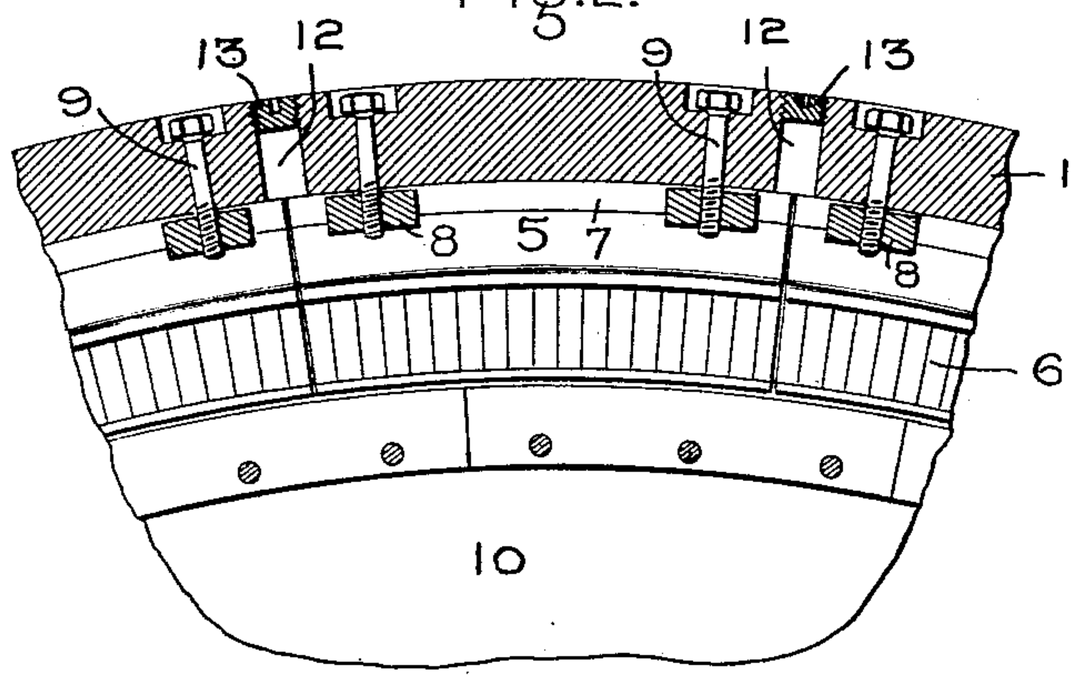
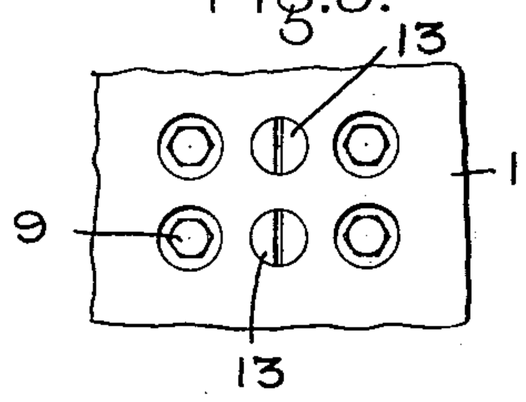


Fig. 3.



Witnesses:
Marcus L. Byng.
Benjamin F. Lee

Inventor:
Oliver D. H. Bentley,
by Allen S. Dann
Att'y.

No. 735,054. Patented August 4, 1903.

UNITED STATES PATENT OFFICE.

OLIVER D. H. BENTLEY, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

MEANS FOR ADJUSTING INTERMEDIATE BUCKETS.

SPECIFICATION forming part of Letters Patent No. 735,054, dated August 4, 1903.

Application filed April 22, 1903. Serial No. 153,746. (No model.)

To all whom it may concern:

Be it known that I, OLIVER D. H. BENTLEY, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Means for Adjusting Intermediate Buckets for Elastic-Fluid Turbines, of which the following is a specification.

Elastic-fluid turbines of the jet type are provided with intermediate buckets located between the adjacent rows of wheel-buckets for the purpose of properly directing the passage of motive fluid from one wheel to the next. Between the rows of wheels and intermediate buckets are small clearances through which more or less steam escapes. These clearances are made as small as possible, frequently being as low as two, and at times as high as five, hundredths of an inch. It sometimes happens that it is necessary to adjust these clearances, either while the wheel is stationary or revolving, and it is preferable to do this without opening the casing or shell which incloses the working parts.

My invention has for its object to provide a means whereby the intermediates can be accurately and finely adjusted in a direction parallel to the wheel-shaft without opening the inclosing casing, and this while the wheel is revolving or stationary, as desired.

In the accompanying description and claims appended thereto I have set forth with particularity what I believe to be novel and of my invention.

In the drawings which are attached to and made a part of this application, Figure 1 shows an embodiment of my invention, the said figure being a partial axial section of a turbine. Fig. 2 is a partial plan view of a turbine on a somewhat smaller scale, and Fig. 3 is a detail view showing the relation of the attaching means to the sight-openings.

1 represents the wheel casing or shell, which is provided with a shoulder on which is seated the diaphragm 2. The diaphragm is provided with a nozzle 3, which may be expanding or otherwise for imparting velocity to the fluid stream and discharging it against the wheel-buckets. The casing is provided with a circumferential groove 4, which receives the outer end of the support 5, that carries the intermediate buckets or fluid-discharging means 6. The groove is provided with walls located at right angles to each other, and the support for the intermediates is provided with one flat wall which engages with the cylindrical face of the groove and with oppositely disposed and inclined or beveled faces 7, with which the adjusting-blocks 8 engage. The adjusting-blocks are arranged in pairs and preferably situated at or near the ends of the segmental support for the intermediate, although additional blocks can be used if desired. Each of the blocks is provided with one flat surface which engages with the wall of the groove in the casing and with a beveled or inclined surface which engages with the corresponding surface on the intermediate support. The blocks are retained in place by bolts 9, that are accessible from the outside of the casing, so that the intermediates, which are located entirely within the casing, can be adjusted without opening the casing. This is particularly important where the turbine is connected to a condenser, as it prevents the entrance of air. By rotating the upper bolt backward and the lower bolt forward the intermediate bucket-support 5 can be moved upward in a direction parallel to the axis of the wheel for the purpose of adjusting the intermediate buckets with respect to the wheel-buckets. If it be desired to lower the intermediate buckets, the reverse operation takes place. The wheel is provided with a web 10, having a peripheral flange, to which the wheel-buckets 11 are secured. The particular means employed for securing the wheel-buckets in place forms no part of the present invention. It is sufficient that the buckets be rigidly attached to the wheel.

In Fig. 2 I have shown the intermediate buckets 6 as being arranged in groups and each group provided with a segmental support 5. The arc covered by the intermediates will vary with different kinds of machine. At each end of a segmental bucket-support is provided a pair of adjusting blocks or wedges 8, whereby the intermediates can be adjusted as a whole in a direction parallel with the wheel-axis or one end can be raised slightly while the other is depressed. This

independence of adjustment is desirable when the turbine is being assembled; but under ordinary conditions of service both ends of the intermediate would be adjusted by a corresponding amount and in the same direction.

In order to determine the exact relation between the intermediates and the buckets, I have provided small openings 12 in the casing, each of which is provided with a removable cover or plug 13. These openings are preferably situated opposite the line of division between adjacent segmental bucket-supports, so that the position of two of the supports can be observed through one opening. I have provided two openings for each segmental support.

I have illustrated my improvement in adjusting devices applied to one form of means for discharging fluid to a bucket-wheel; but obviously it is not limited to the particular form shown.

In accordance with the provisions of the patent statutes I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is merely illustrative and that the invention can be carried out by other means.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an elastic-fluid turbine, the combination of a casing, a bucket-wheel, intermediate buckets and their support, and devices located within the casing and acting on opposite sides of the support for moving the intermediate buckets in a direction parallel to the wheel-axis.

2. In an elastic-fluid turbine, the combination of a casing, a bucket-wheel mounted therein, intermediate buckets situated within the casing and between rows of wheel-buckets, adjusting-blocks located within the casing for moving the intermediate buckets in a direction parallel with the wheel-shaft, and means extending through the casing for moving the blocks.

3. In an elastic-fluid turbine, the combination of a casing, a bucket-wheel mounted therein, intermediate buckets situated within the casing and between the rows of wheel-buckets, a pair of adjusting devices engaging with opposite sides of the intermediates for adjusting them, and means for moving the said devices.

4. An elastic-fluid turbine comprising a casing, a wheel having rows of buckets, and intermediate buckets situated between the rows of wheel-buckets, in combination with a support for the intermediate buckets, and adjusting-blocks which engage therewith, the said support and blocks having an inclined surface between them.

5. An elastic-fluid turbine comprising a casing, a wheel having rows of buckets, and segmental intermediate buckets located between the rows of wheel-buckets, in combination with adjusting-blocks arranged in pairs at opposite ends of each segmental intermediate.

6. An elastic-fluid turbine comprising a casing, a wheel having rows of buckets, segmental intermediate buckets located between the rows of wheel-buckets, a support for the intermediates having beveled or inclined surfaces, adjusting-blocks arranged in pairs on opposite sides of the support and located near the ends thereof, and means for adjusting the blocks from a point outside of the casing.

7. An elastic-fluid turbine comprising a casing, a wheel having rows of buckets, segmental intermediate buckets located between the rows of wheel-buckets, in combination with adjusting-blocks for moving the intermediate buckets in a direction parallel to the wheel-axis, and a sight-opening formed in the casing having a detachable cover through which the position of the intermediates can be observed.

8. In an elastic-fluid turbine, the combination of a casing, a bucket-wheel having rows of buckets, intermediate buckets arranged in segments, and a sight-opening located in the casing adjacent to the line of division between the adjacent segmental intermediates.

9. In an elastic-fluid turbine, the combination of a bucket-wheel, a casing therefor having a groove, intermediate buckets, a support for the buckets mounted in the groove, and adjusting-blocks which engage with a wall of the groove and with the support.

10. In a turbine, the combination of a casing, a bucket-wheel mounted therein, means for discharging fluid to the wheel-buckets located within the casing, and wedges for adjusting said means.

In witness whereof I have hereunto set my hand this 18th day of April, 1903.

OLIVER D. H. BENTLEY.

Witnesses:

ALEX. F. MACDONALD,

HELEN ORFORD.