B. LJUNGSTRÖM.

ELASTIC FLUID TURBINE.

APPLICATION FILED MAR. 27, 1908.

906,640. Patented Dec. 15, 1908.

Fig. 1

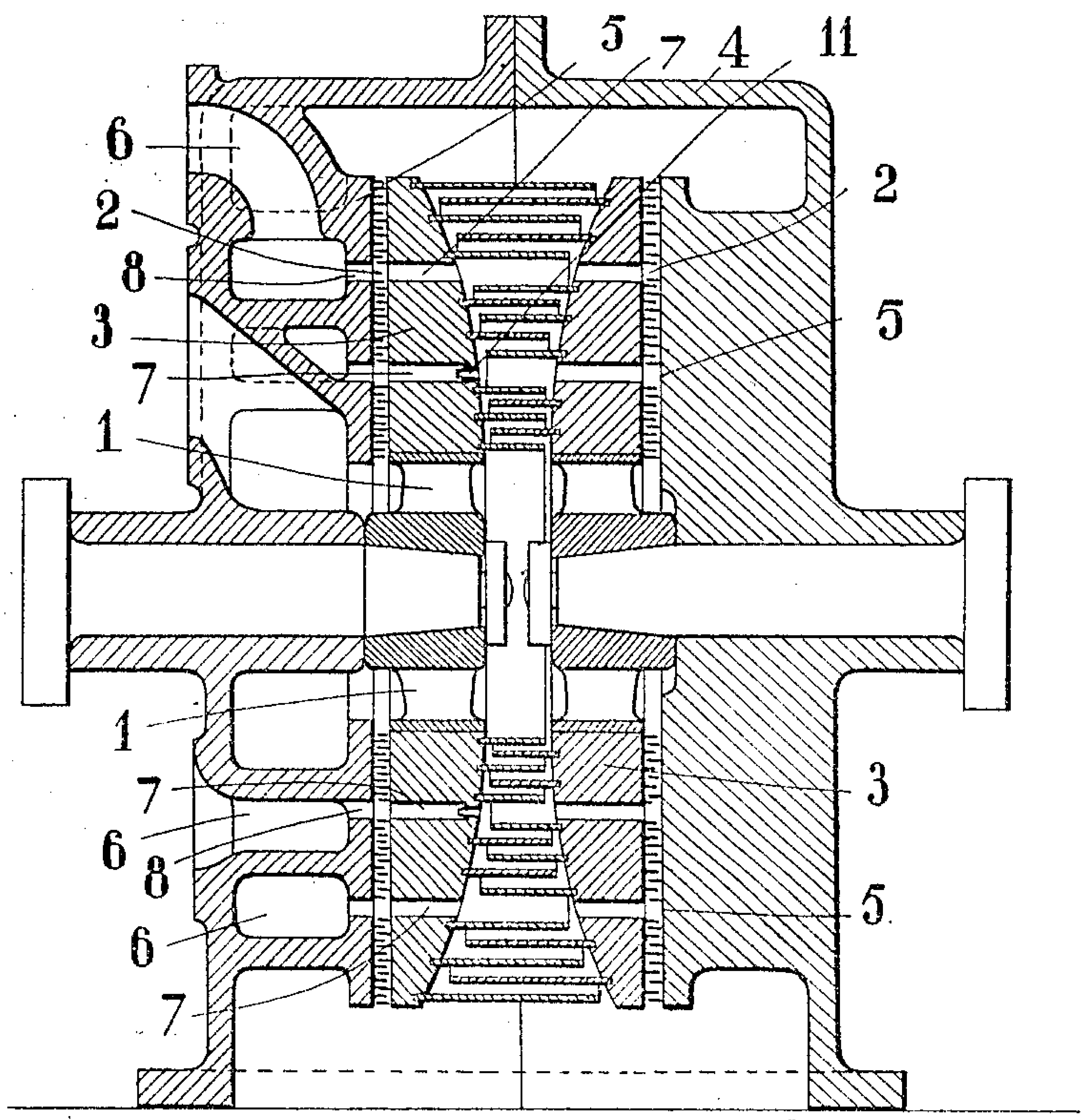


Fig. 2

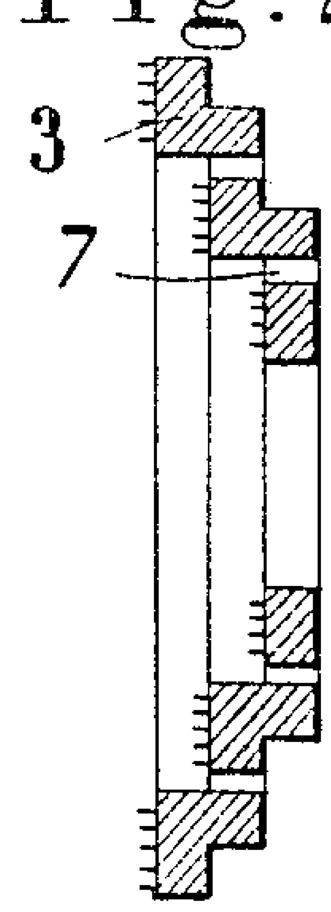
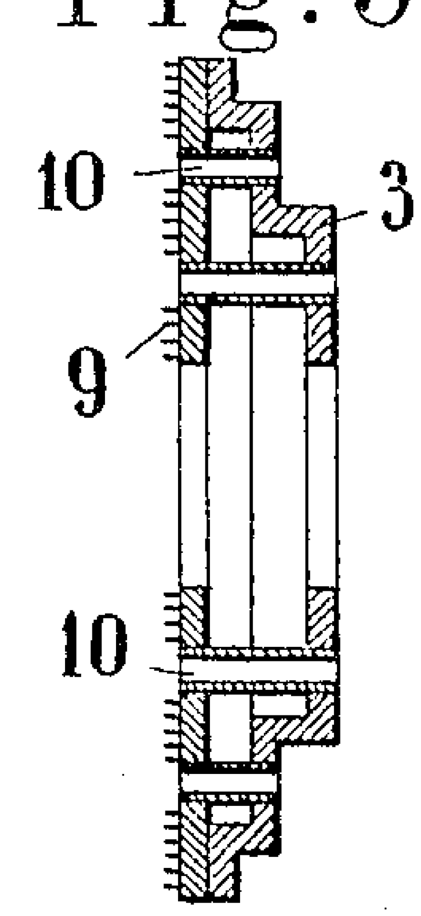


Fig. 3



Witnesses.

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ELASTIC-FLUID TURBINE.

No. 906,640. Specification of Letters Patent. Patented Dec. 15, 1908.

Application filed March 27, 1908. Serial No. 423,682.

To all whom it may concern:

Be it known that I, BIRGER LJUNGSTRÖM, of 18 Grefmagnigatan, Stockholm, Sweden, civil engineer, have invented certain new and useful Improvements in Elastic-Fluid Turbines; 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, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

The present invention relates to an inlet device for the driving medium in elastic fluid turbines, and is especially adapted for radial turbines having overlapping vanes mounted on separate rings and rotating in opposite directions.

The driving medium in ordinary axial turbines is introduced not only through the first stationary vane system but also in one or more places along the length of the turbine in concentric interspaces between the rotary vane rings and the stationary vanes. These inlet channels usually communicate with the governing valve, which, when necessary, for instance on overcharging or in case the pressure of the driving medium becomes too low, admits the medium in one or more places along the length of the turbine.

When one vane system is stationary as is usually the case, the driving medium may be directly introduced between the rotary and stationary vanes through the stationary part of the turbine carrying the last named vanes. It is however, quite different if both series of vanes rotate in different directions and special means such as hereinafter described are necessary for introducing the medium. The rotation of both series can scarcely be carried out in a practical way except in radial turbines, where the vane systems are secured to proper disks rotating in opposite directions.

The invention is illustrated in the accompanying drawing, wherein—

Figure 1 is a vertical section of a radial turbine provided with an inlet device constructed in accordance with my invention and Figs. 2 and 3 are detail vertical sections of modified forms of turbine disks.

As will be seen in Fig. 1 of the drawing, the driving medium is introduced through channels —1— into the naves of the turbine disks —3—; while the axial pressure between the disks is counterbalanced on their rear side by that part of the driving medium, which leaks through to annular baffling devices —2— arranged between the turbine disks —3— and the pressure surfaces —5— of the turbine casing —4—, said surface being parallel to the disks.

In the construction shown the pressure medium required in case of overcharging or for regulating the working of the turbine is introduced through channels —6— and orifices —8— arranged in one side of the turbine casing, or in parts connected thereto, in between certain of the rings of the baffling devices —2— and from there through orifices —7— in the neighboring turbine disk to one or more of the concentric interspaces of the vane rings. These orifices need not run axially as shown, but may be arranged angularly to the shaft through the turbine disks, if thereby more advantageous pressure conditions for the axial balancing on the rear sides of the disks can be attained.

In order to evade irregularities in the pressure conditions a large number of orifices with sufficient passage area should be arranged concentrically in the rotating disk. The channels in the turbine casing may, as indicated in the drawing be arranged concentrically and each channel communicate through orifices with one of the interspaces of the baffling devices, and said interspaces are enlarged by the omission of one or more of the annular projections —2—.

Instead of the turbine-disks —3— having their outer edges in the same vertical plane as shown in Fig. —1—, they may, in order to provide for increasing the width of the vanes, be formed as shown in Fig. 2, wherein turbine-disks —3^a— are formed angular in cross-section and mounted stepwise.

The inner wall of the turbine-casing not shown is made to conform to the position of the several disks and sufficient space is left between the inner and outer periphery of the disks to form orifices —7^a— for the passage of the pressure medium.

If desired the turbine disk may be formed of two plates as shown in Fig. 3, wherein the inner plate —3^b— is formed in steps and the outer plate —9— being plane; conduits —10— passing through the two for the admission of the pressure medium.

The parts through which the driving medium is introduced between the baffling devices need not, as indicated in Fig. 1, be made continuous with the turbine casing but may for instance be in the form of covers secured to one or both sides of the turbine casing.

The inlet device may be arranged at both the turbine disks. It may also, if necessary, be arranged in radial turbines having only one rotating vane-carrying disk.

In order that the orifices in the rotating member may be made smaller than the orifices in the casing concentric grooved members 11 may be inserted axially from the vane-interspace in the turbine disk.

If the turbine disk or the parts connected therewith or adjacent thereto are each separately composed of a plurality of plates, rings segments or such like, the character of the present invention is in no way altered.

I claim:

1. In an elastic fluid pressure turbine, in combination, a rotating member, vanes thereon, a fixed member opposite said rotating member, baffling devices between said members and channels in said fixed member communicating with some of the spaces between the vanes by channels in the rotating member.

2. In an elastic fluid pressure turbine, in combination, a rotating member, vanes thereon, a fixed member opposite said rotating member, baffling devices between said members and channels in said fixed member communicating with some of the spaces between the baffling devices and further communicating with some of the spaces between the vanes by channels in the rotating member.

3. In an elastic fluid pressure turbine, in combination, a rotating member, vanes thereon, a fixed member opposite said rotating member, baffling devices between said members, and channels in said fixed member communicating with some of the spaces between the baffling devices, said spaces communicating with some of the spaces between the vanes by means of channels in the rotating member.

4. In a turbine, in combination, a casing, a rotating member, arranged opposite to the casing, baffling devices between said rotating member and casing, vanes on the rotating member and channels in said casing, communicating with some of the spaces between the vanes by channels in the rotating member.

5. In a turbine, in combination, a casing, a rotating member arranged opposite to the casing, baffling devices between said rotating member and the casing, vanes on the rotating member and channels in said casing, communicating with some of the spaces between the baffling devices, said spaces communicating with some of the spaces between the vanes by means of channels in the rotating member.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

BIRGER LJUNGSTRÖM.

Witnesses:
HJALMAR ZETTERSTRÖM,
K. E. WIBERG.