No. 784,371. PATENTED MAR. 7, 1905.

H. ZOELLY.

ELASTIC FLUID TURBINE.

APPLICATION FILED APR. 5, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

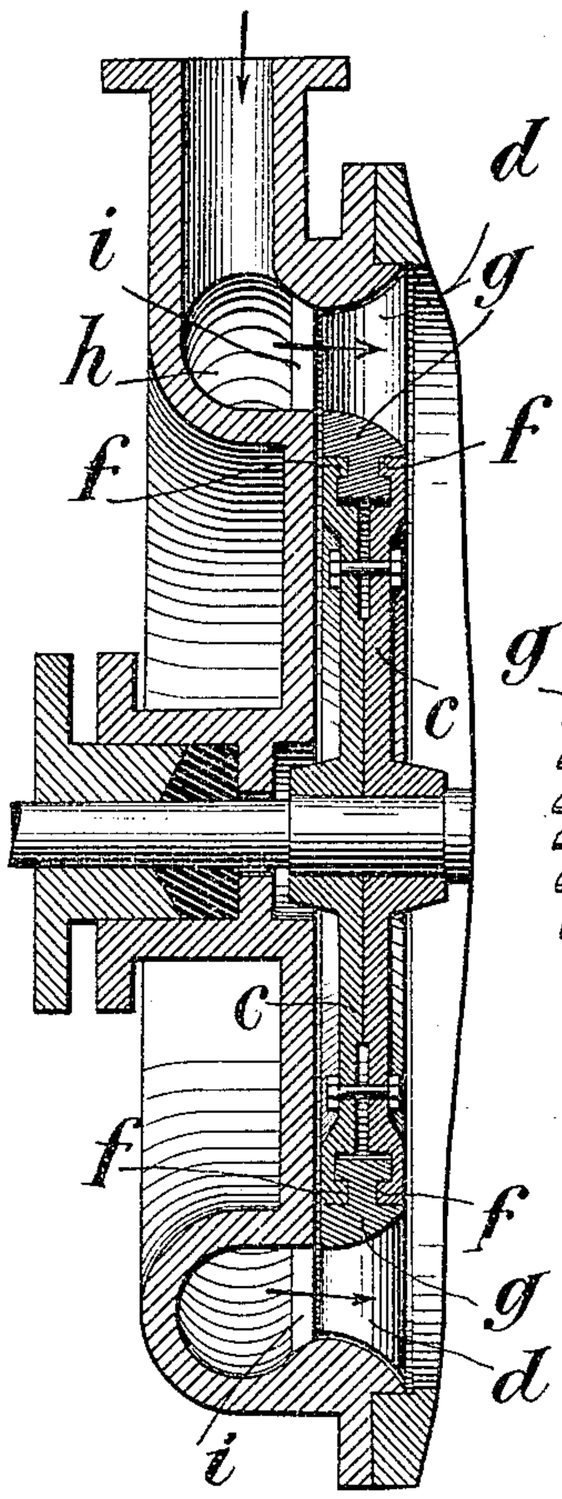
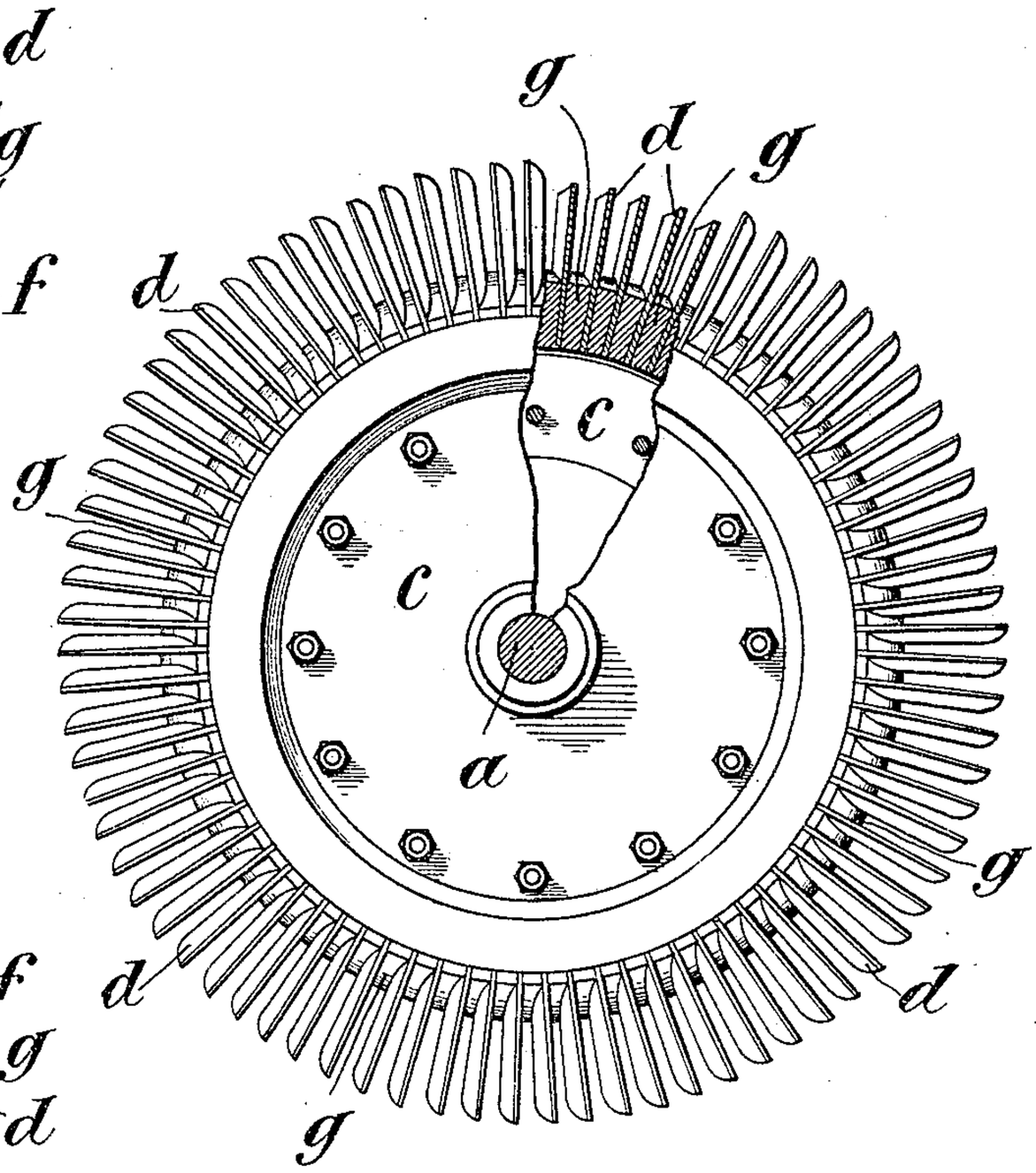


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3

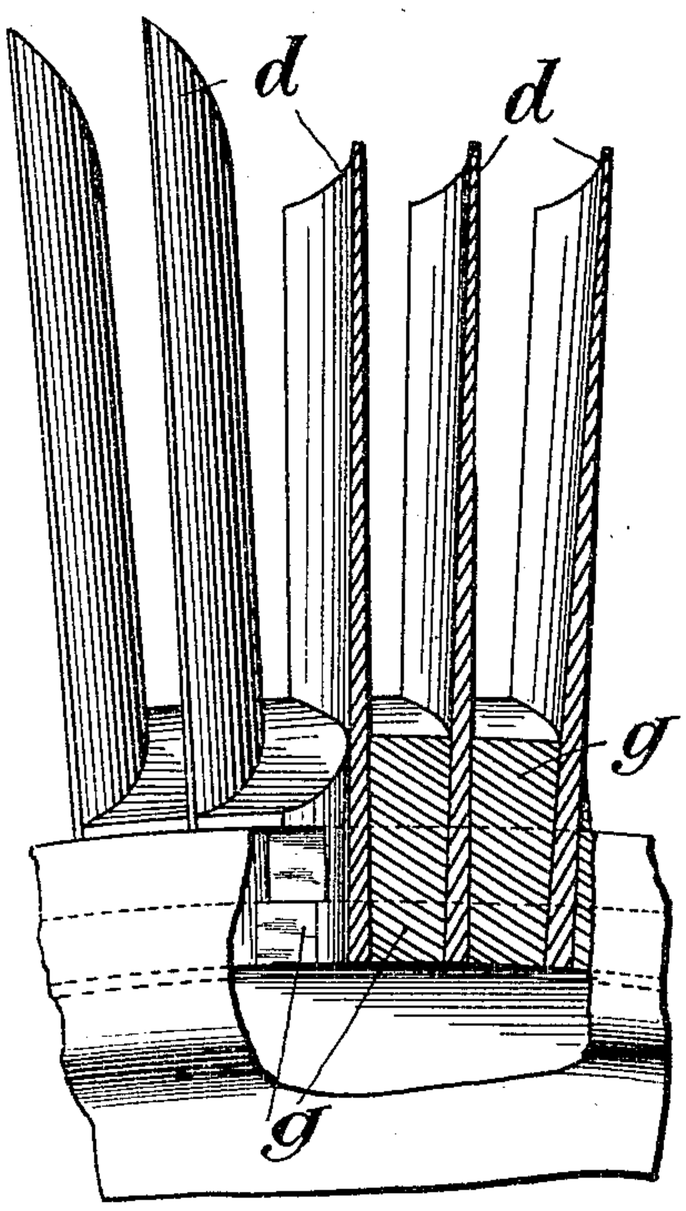


Fig. 5.

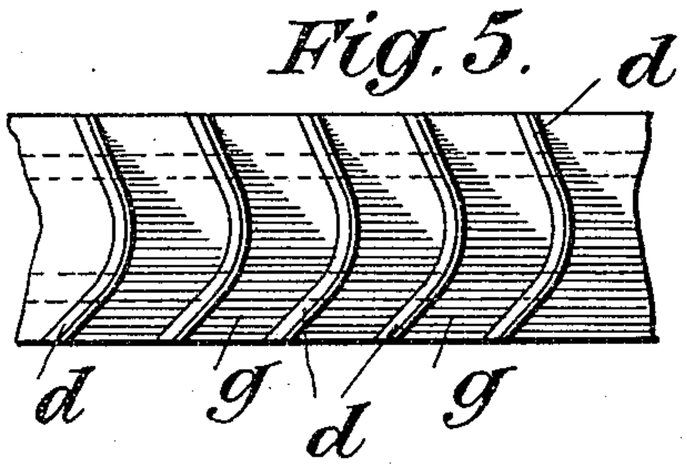


Fig. 4

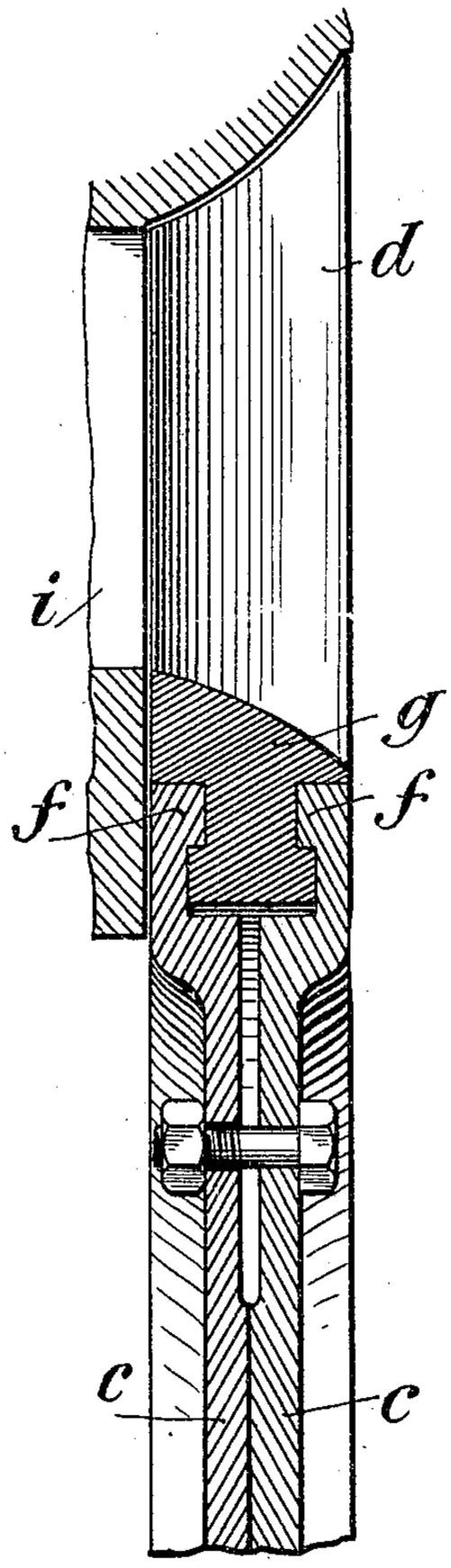


Fig. 6

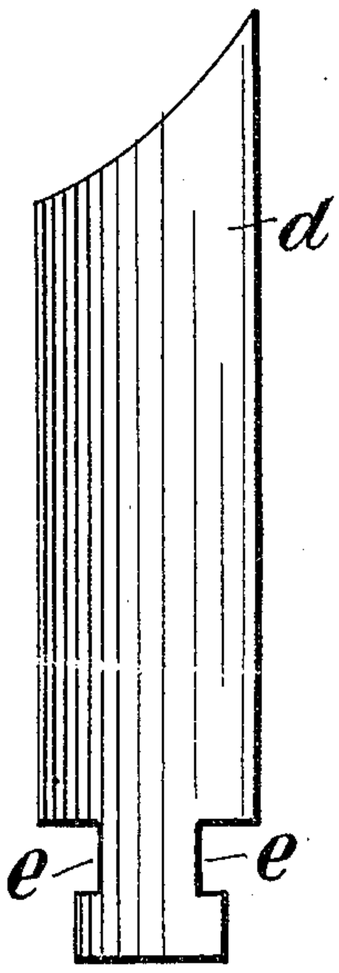


Fig. 7

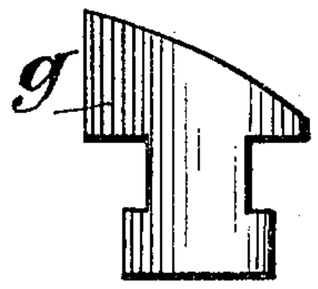
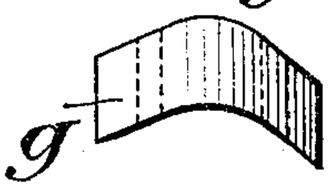


Fig. 8.



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by Steinmetz & Co. Attys.

No. 784,371. Patented March 7, 1905.

UNITED STATES PATENT OFFICE.

HEINRICH ZOELLY, OF ZURICH, SWITZERLAND, ASSIGNOR TO AKTIEN-GESELLSCHAFT DER MASCHINENFABRIKEN VON ESCHER WYSS & CO., OF ZURICH, SWITZERLAND.

ELASTIC-FLUID TURBINE.

SPECIFICATION forming part of Letters Patent No. 784,371, dated March 7, 1905.

Application filed April 5, 1904. Serial No. 201,759.

To all whom it may concern:

Be it known that I, HEINRICH ZOELLY, a citizen of the Republic of Switzerland, residing at Zurich, Switzerland, have invented new and useful Improvements in Elastic-Fluid Turbines, of which the following is a specification.

This invention relates to a driving bladewheel for elastic-fluid turbines having radially-arranged blades. Between the inner ends of every two adjacent blades are arranged filling-pieces whose outer faces serve to limit toward the interior, in a radial direction, the passages for the flow of the motive fluid between the blades. The outer faces of these filling-pieces have a gradual fall in the direction of the flow of the motive fluid between the inlet and outlet ends of the passages, so that the cross-sectional area of said passages gradually increases radially toward the interior.

The accompanying drawings illustrate by way of example a construction of a turbine driving-wheel according to this invention.

In the drawings, Figure 1 is a vertical axial section of a portion of a turbine having a driving-wheel in accordance with this invention. Fig. 2 is a side elevation, partly in section, of a portion of the driving-wheel. Figs. 3 to 8 illustrate details.

On the horizontal turbine-shaft *a* is keyed a driving-wheel in a turbine-casing that serves as a bearing or mounting for the said shaft. This driving-wheel has two wheel-centers *c* arranged flat against each other, forming a two-part center of the wheel. Between the edges of these wheel-centers are clamped the blades *d*, which are arranged radially and in cross-section are thicker at their inner ends and thinner at their outer ends, thus rendering them of uniform strength. These blades are formed at their inner thicker ends with recesses or notches *e*, Fig. 6, into which projections *f*, formed on the edges of the wheel-centers, engage, and thereby hold the blades firmly in place. Between the inner ends of every two adjacent blades there are inserted filling pieces or blocks *g*, Figs. 7 and 8, which are held by the wheel-centers and which serve to fill up the spaces between these ends of the blades, Figs. 2, 3, 5. The outer faces of these filling-pieces limit in a radial direction toward the interior the passage for the flow of the motive fluid between every two adjacent blades. The said passage is also limited in a radial direction toward the exterior by the inner surface of the turbine-casing. *h* indicates a pressure-chamber into which an inlet-pipe opens. From this chamber the motive fluid can enter through the slit or passage *i*, in which the guide-blades are situated, into the passages for the flow of motive fluid in the driving-wheel and will flow through said passages in the direction indicated by arrows in Fig. 1. The outer faces of the filling-pieces *g* are formed with a gradual fall in this direction of flow between the inlet and exit ends of the flow-passages. In consequence of this fall the cross-section of the passages will increase gradually and radially toward the interior in the direction of the flow. The length of the blades becomes gradually greater in the direction of the flow, so that the cross-section of the passage also increases gradually in a radial direction toward the exterior—that is, the shorter edge, Figs. 1 and 4, of each blade moves in front of and is presented to the slits *i*.

In the drawings the outer faces of the filling-pieces are shown as convex surfaces, but they may also be made as plane surfaces.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In an elastic-fluid turbine, the combination with a pressure-chamber and means to direct fluid therefrom, of a turbine-wheel having radially-projecting blades and spacing-blocks interposed between the blades, each blade having a long edge at one side of the wheel and a short edge at the other side of the wheel, said short edges being presented to the directing means, substantially as described.

2. In an elastic-fluid turbine, the combination with a pressure-chamber and directing

means, of a wheel having radially-projecting tapering blades, each blade having a notched shank and long and short lateral edges, said short edges presented to the directing means, and spacing-blocks notched similarly to the blades and having inclined faces, the higher end of each such face between the shorter edges of the blades spaced thereby, whereby a steam-passage is formed increasing in section from the bottom of the blade to the top and from one side to the other, substantially as described.

3. In an elastic-fluid turbine, the combination with a pressure-chamber and directing means, of a wheel having a two-part center, radially-projecting tapering blades, each blade having a notched shank, spacing-blocks notched similarly to the blades and having inclined faces, the notched portions of said blocks and blades held between the two parts of the wheel center, the shorter edges of the blades presented to the directing means and the higher portion of each inclined face of a block between the said shorter edges of the blades spaced thereby, substantially as described.

4. An elastic-fluid turbine, comprising a cover-ring having an internal flaring wall, a wheel having radially-disposed blades the outer edge of which conforms to said flaring wall, and blade-spacing blocks having their outer faces inclined outwardly toward the axis of the wheel, whereby passages expanding in the direction of flow of the fluid are formed between the blades.

5. An elastic-fluid turbine, comprising a cover-ring having an internal flaring wall, a wheel having radially-disposed blades decreasing in thickness from the inner-end to the outer edge which latter conforms to said flaring wall, and blade-spacing blocks having outer faces inclined outwardly toward the axis of the wheel, whereby passages are formed between the blades which expand both radially and in the direction of flow of the fluid.

6. An elastic-fluid turbine, comprising a cover-ring having an internal outwardly-flaring wall, a wheel having radially-disposed, substantially concavo-convex blades, the outer edge of which conforms to said flaring wall, and blade-spacing blocks having their outer faces inclined outwardly toward the axis of the wheel, whereby passages expanding in the direction of flow of the fluid are formed between the blades.

7. An elastic-fluid turbine, comprising a cover-ring having an internal outwardly-flaring wall, a wheel having radially-disposed, substantially concavo-convex blades decreasing in thickness from the inner end to the outer edge, which latter conforms to said flaring wall, and blade-spacing blocks having outer faces inclined outwardly toward the axis of the wheel, whereby passages are formed between the blades which expand both radially and in the direction of flow of the fluid.

8. An elastic-fluid turbine, comprising a casing provided with a fluid-distributing chamber, a circular distributing-port and an outwardly-flaring cover-flange; in combination with a wheel having radially-disposed blades whose outer edges conform to said flange, and blade-spacing blocks whose outer faces incline outwardly toward the axis of the wheel.

9. An elastic-fluid turbine, comprising a casing provided with a fluid-distributing chamber, a circular distributing-port and an outwardly-flaring cover-flange; in combination with a wheel having radially-disposed blades decreasing in thickness from the inner end to the outer edge, which latter conforms to the curvature of the cover-flange, and blade-spacing blocks having convex outer faces inclining outwardly toward the axis of the wheel.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HEINRICH ZOELLY.

Witnesses:
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A. LIEBERKNECHT.