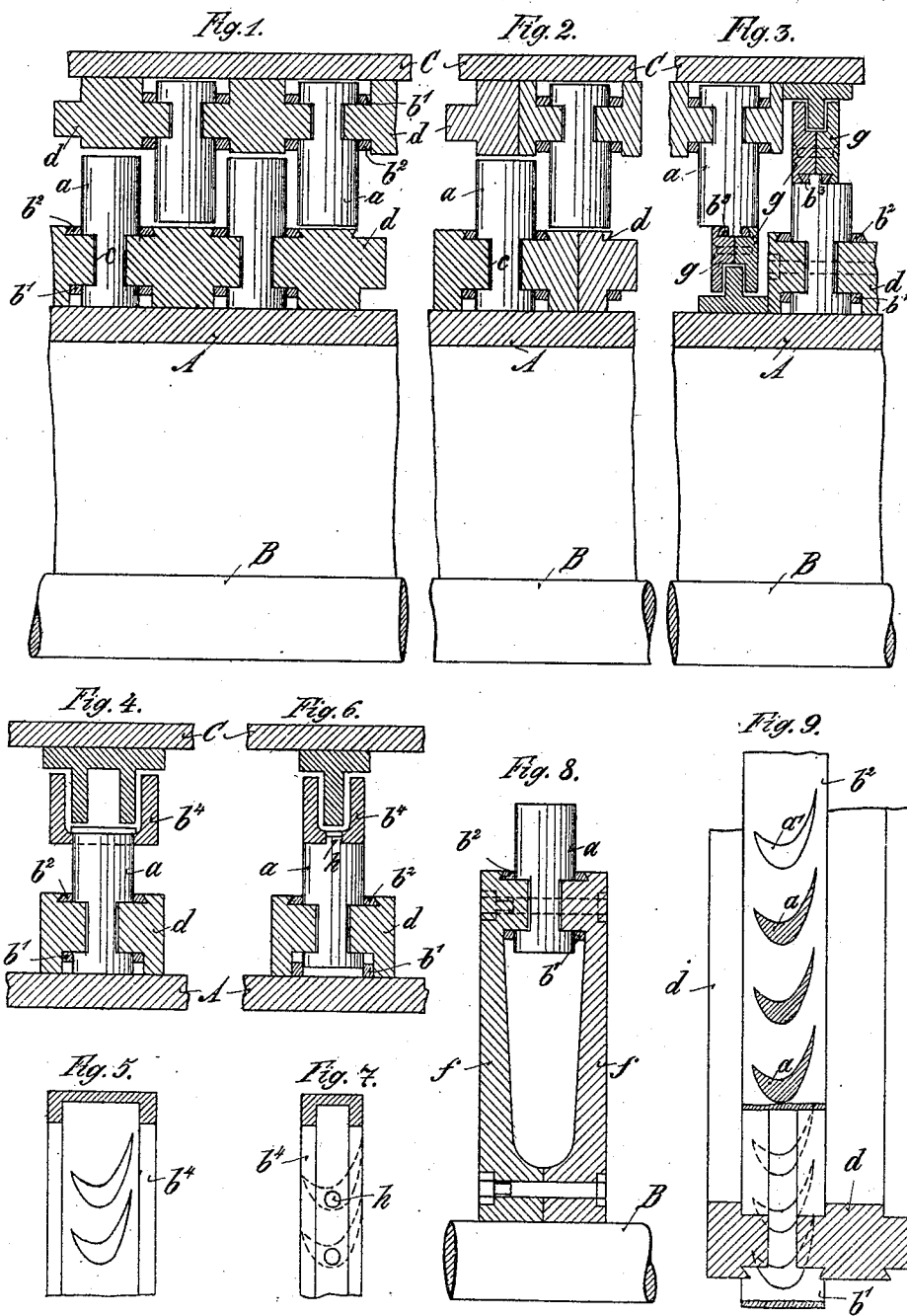


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V. GELPKE & P. KUGEL.
ATTACHMENT OF BLADES FOR TURBINES.

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Witnesses:
J. F. Schilling
G. F. Schubeler
William Essensen
Peter Haber

Inventors:
Victor Gelpke
Paul Kugel

UNITED STATES PATENT OFFICE.

VICTOR GELPKE, OF LUCERNE, SWITZERLAND, AND PAUL KUGEL, OF
DÜSSELDORF, GERMANY.

ATTACHMENT OF BLADES FOR TURBINES.

No. 841,503.

Specification of Letters Patent.

Patented Jan. 15, 1907.

Application filed December 4, 1905. Serial No. 290,283.

To all whom it may concern:

Be it known that we, VICTOR GELPKE, engineer, a citizen of the Republic of Switzerland, and a resident of Lucerne, Switzerland, and PAUL KUGEL, engineer, a subject of the German Emperor, and a resident of Düsseldorf, Germany, have invented new and useful Improvements in Attachments of Blades for Steam or Gas Turbines or Ventilators, of which the following is a specification.

Our said invention relates particularly to the connections between the turbine-blades and the respective parts by which they are carried; and the object of the invention is to provide a simple form of connection by which the blades may be readily and securely attached and thereafter held firmly in the proper position.

To this end the invention includes the novel features of construction and combination and arrangement of parts hereinafter described, and particularly set forth in the appended claims.

In the accompanying drawings, Figure 1 is a longitudinal section through a sufficient portion of an axial flow turbine to illustrate the invention. Fig. 2 is a similar view of a modified form in which divided holding-rings are used. Fig. 3 is a similar view of a still further modification. Fig. 4 is a sectional view of a further modification. Fig. 5 is a sectional plan view of the tightening-ring of Fig. 4. Fig. 6 is a sectional view of a further modification, and Fig. 7 is a sectional plan view of the tightening-ring of Fig. 6. Fig. 8 is a sectional view of a wheel of different shape with one series of blades carried thereby. Fig. 9 is a sectional plan of the form shown in Fig. 1.

In the drawings, the letter A designates the rotary drum or member secured to the turbine-shaft B, and C the stationary casing. The blades are shown at A, and they are spaced the proper distance apart and held in the required relative position to each other by inner and outer consecutive rings b' and b^2 , which are made of sheet metal of such thickness that the openings A' , Fig. 8, of the proper shape to receive the blades may be punched therein at a very low expense.

It is understood that if required the shape of the blade-shanks may in form and size differ from the shape of the blade itself, which of course does not alter in any way the

proper invention. Instead of two rings b' and b^2 , as shown in the drawings, there also may be adapted only one ring or several rings. Each of the cylindrical rings b' and b^2 also may be composed of two or more parts, and instead of the cylindrical form, as shown in the figures, there may be used a conical one.

Between the rings b' and b^2 the shanks of the blades are provided with grooves C, into which project the horizontal flange of the pressure-rings D, which thus hold the rings b' and b^2 and the blades A in their prescribed position and secure the rigid connection with their respective carrying member—that is, drum A or casing C.

If desired, the pressure-rings D of Fig. 1 may be made as divided rings, whether in a symmetrical or unsymmetrical way and with or without intermediate ring, as shown in Figs. 2 and 3. They also may be bolted together or may be replaced by disks F, as shown in Fig. 8.

To reduce the loss of fluid leakage between rotating and stationary parts, a frictionless packing may be useful for that purpose. The free ends of the blades enter with projections in corresponding openings of packing-rings b^3 , and the latter, if it may be found desirable, being reinforced by a special two-part cleft tightening-ring G, embracing opposite sides of ring b^3 .

In the modifications shown in Figs. 4 and 6 a single U-shaped ring b^4 is substituted for the ring b^2 and cleft tightening-ring G of Fig. 3, performing the functions of both.

Having thus described our invention, what we claim is—

1. In a turbine the combination with the blades and their carrying member, of means for securing the blades in place comprising a ring concentric with said carrying member and having openings to receive the blades, said blades having grooves in proximity to said ring, and pressure-rings seated in said grooves, substantially as described.

2. In a turbine the combination with the blades and their carrying member, of means for securing the blades in place comprising inner and outer rings concentric with said carrying member and having openings to receive the blades, said blades having grooves in their sides between the rings and pressure-rings seated in said grooves, substantially as described.

3. In a turbine the combination with the blades and their carrying member, of means for securing the blades in place comprising a ring concentric with said carrying member
5 and having openings to receive the blades, said blades having grooves in proximity to said ring, and pressure-rings seated in said grooves and cleft tightening-rings carried by the free ends of said blades, substantially as
10 described.

4. In a turbine the combination with the blades and their carrying member, of means for securing the blades in place comprising a ring concentric with said carrying member
15 and having openings to receive the blades, said blades having grooves in proximity to

said ring, and pressure-rings seated in said grooves, the free ends of said blades having projections, a ring having openings to receive said projections, and a two-part cleft
20 tightening-ring clamped to the opposite edges of said last-named ring, substantially as described.

VICTOR GELPKE.
PAUL KUGEL.

Witnesses as to signature of Victor Gelpke:
JACOB SCHILLING,
G. F. SCHÜBELER.

Witnesses as to signature of Paul Kugel:
WILLIAM ESSENWEIN,
PETER LIEBER.