K. BAUMANN.

BLADE OR VANE FOR STEAM TURBINES.

APPLICATION FILED MAY 3, 1916.

1,353,710. Patented Sept. 21, 1920.

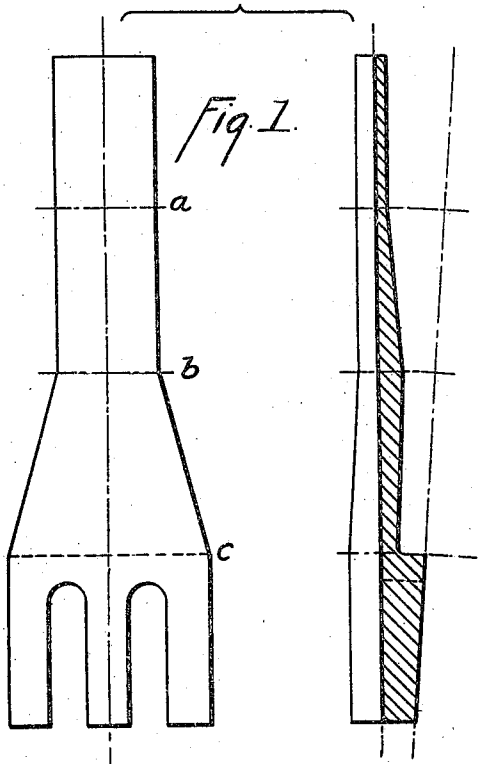


Fig. 1.

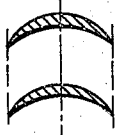


Fig. 1a.

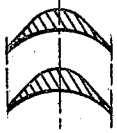


Fig. 1b.

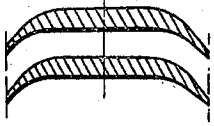


Fig. 1c.

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UNITED STATES PATENT OFFICE.

KARL BAUMANN, OF URMSTON, ENGLAND, ASSIGNOR TO THE BRITISH WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, LIMITED, OF LONDON, ENGLAND.

BLADE OR VANE FOR STEAM-TURBINES.

1,353,710. Specification of Letters Patent. Patented Sept. 21, 1920.

Application filed May 3, 1916. Serial No. 95,145.

To all whom it may concern:

Be it known that I, KARL BAUMANN, a citizen of the Confederation of Switzerland, and a resident of Urmston, in the county of Lancaster, England, have invented a new and useful Improvement in Blades or Vanes for Steam-Turbines, of which the following is a specification.

This invention relates to steam turbines of the axial flow type and has for its object to provide an improved construction of blades or vanes for use in such turbines.

In axial flow turbines designed to have a large output the moving blades in the last row or rows of blades are necessarily of considerable length and the stresses on the blades due to the centrifugal forces set up while the turbine is in operation are very considerable.

In order to enable the blades to withstand such stresses it has already been proposed to increase the thickness of the blades near their root ends and also to taper them in thickness from root to tip. Blades so constructed have, however, the disadvantage that the passages for the steam between the blades become narrow at the roots and very wide at the tips resulting in a decrease in the efficiency of the turbine.

According to the present invention the edges of the active length of the blade nearest its free end are parallel, the width of the blade near the root is increased and the two portions are joined by a section tapering in width.

With this improved construction greater uniformity in the width of the passages between the blades is secured thus improving the efficiency of the turbine. Additional advantages are also obtained inasmuch as the attachment of the blades to the turbine rotor can be carried out in a more substantial manner and the blades are better able to resist vibration.

In the accompanying drawings Figures 1, 1^a, 1^b and 1^c illustrate a form of blade embodying this invention. In this form of blade, which it will be seen is a combination of several forms, one in which the edges are parallel and one in which the edges are tapered toward the root portion, the portion having parallel edges has its outer half of uniform thickness while the inner half tapers in thickness in increasing amounts toward that portion which tapers in width. The portion which tapers in with has its thickness tapered but in decreasing amounts toward the root portion. Figs, 1^a, 1^b and 1^c show respectively the sections at *a*, *b* and *c* of the blade illustrated in Fig. 1, and the passage at similar points between two adjacent blades of this kind. It is understood that the same may be utilized for both the rotor blades and the stator vanes and where this is done the blading is better able to resist any thrust due to differences in pressure between the two sides of the stationary blades or the diaphragms of the turbine.

Having now particularly described this invention what I claim is:

1. An end supported turbine blade having one or more portions of its active length near its tip of uniform width and of increasing width toward the root thereof.

2. An end supported turbine blade having the edges of a section of the outer or free portion thereof parallel while a lower portion gradually increases in width toward the root.

3. An end supported turbine blade having the edges of a portion of its active length parallel, the edges of the root portion farther apart than the edges of the end portion but parallel and the intermediate portion tapered in width from the narrow to the wider portion.

4. A turbine blade having the edges of its active length near its free end parallel, the edges of the root portion farther apart and parallel and the intermediate portion tapered in width; a portion of its active length also being tapered in thickness.

5. A turbine blade having the edges of its active length near its free end parallel, the edges of the root portion farther apart and parallel, and the intermediate portion tapered in width, the greatest thickness of the blade being at the junction of the parallel edge portion adjacent the free end and the portion tapered in width.

In witness whereof I have hereunto subscribed my name this twenty-third day of March, 1916.

KARL BAUMANN.

Witnesses:
W. CHAMIER,
J. W. WALKER.