Jan. 26, 1932. K. BASSLER 1,842,957

BRIDGE BAND FOR BLADE GROUPS OF TURBINE ROTORS

Filed Nov. 12, 1929

Fig. 1.

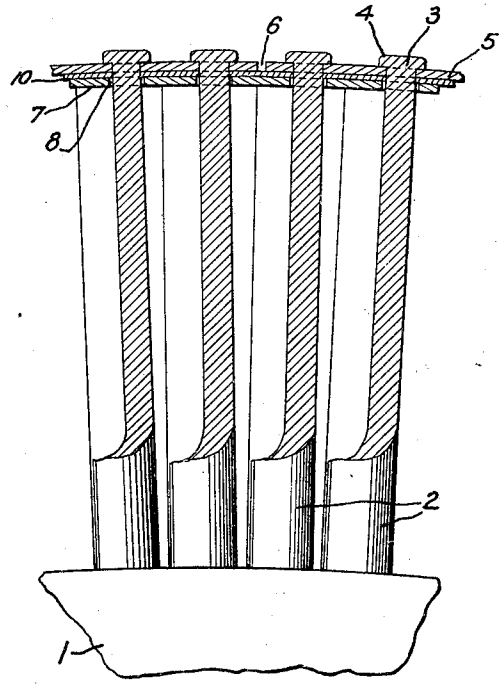
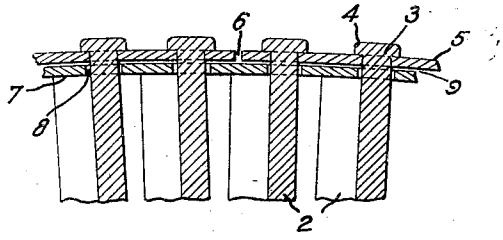


Fig. 2.



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UNITED STATES PATENT OFFICE

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BRIDGE BAND FOR BLADE GROUPS OF TURBINE ROTORS

Application filed November 12, 1929, Serial No. 406,696, and in Germany March 22, 1929.

The present invention relates to turbine rotors for elastic fluid turbines, wherein the outer ends of the blades carried by the rotor are connected into groups by a sectionalized bucket cover riveted into place by tenons on the ends of the blades, this being a well-known turbine rotor construction.

One object of the invention is to provide an improved construction and arrangement for fastening together the blade ring groups whereby such groups are held from transverse movement relatively to each other and from vibrating, but at the same time the groups are free to expand in a peripheral or circumferential direction.

For a consideration of what is believed to be novel and the invention, attention is directed to the following specification, and the claims appended thereto.

In the drawings, Fig. 1 is a view partly in section of a portion of a turbine rotor embodying the invention, and illustrating the method of assembling, and Fig. 2 is a detail sectional view of a portion of the construction shown in Fig. 1 but with a separating material used in assembling the construction removed.

Referring to the drawings, 1 indicates a turbine rotor on which are mounted the blades 2. The blades are provided at their outer ends with tenons 3 which are riveted over as is indicated at 4 to fasten in place the blade cover 5. The blade cover 5 is made in sections of suitable length whereby the ring of blades is divided into groups. Fig. 1 of the drawings shows only a portion of two adjacent blade groups, the line of division between the bucket cover segments of the two groups being indicated at 6.

According to the invention, adjacent blade ring groups are fastened together by means of a short bridge band 7 which is located preferably beneath the blade cover 5. In the present instance it is shown as embracing two blades of each group, but it will be understood that it may embrace a fewer or greater number of blades. The bridge band is provided with openings 8 through which the tenons 3 project and in the case of either one or both of the blade groups these openings are elongated so as to permit relative circumferential movement of the groups relatively to each other. Also, in the case of one or both of the blade groups the bridge band 7 is separated from the cover section 5 by a space 9 as is shown particularly in Fig. 2. In a transverse direction the tenons 3 fit the openings 8 closely whereby the blade groups are held from movement transversely relatively to each other. The provision of the space 9, which is of a predetermined width, is an important feature of the invention because a somewhat loose fit between the bridge band and the blade cover is necessary in order to permit of the relative circumferential movement.

In constructing a turbine rotor as shown, the blade cover segments 5 and the bridge bands 7 are positioned on the blade ends with the tenons projecting through the holes in them after which the tenons are riveted down. In this connection it is important that, in the case of at least one of the blade groups, the cover section be not riveted down tightly on the bridge band. To insure against this there is placed between the bridge band and the cover section prior to the riveting operation, a strip of easily removable material 10, which serves to insure a space of predetermined width between the bridge band and the cover segment after the riveting operation is completed. The readily removable material 10 may comprise, for example, a thin strip of mica which is rubbed to a powder by the riveting operation, and is easily removed, or it may comprise an easily fusible metal which when the turbine rotor is completed can be removed by being melted out without endangering the blades. In Fig. 1 the thickness of the material 10 is considerably exag-

gerated in order to clearly illustrate the invention. It will be understood that a material of a thickness to give the desired space is to be used. While the bridge band is of a nature such that it permits readily of expansion in a circumferential direction of adjacent blade groups at the same time, it functions also to dampen vibration of the blade groups as a whole. The vibration damping effect takes place due to the close relation between the adjacent surfaces of the bridge and cover members and the relative movability of these members in circumferential direction. This arrangement permits the bridge and cover members to engage each other during vibrations whereby the adjacent surfaces cause frictional resistance which dampens oscillatory movement of the rotor.

Thus it will be readily understood that the arrangement according to my invention, which comprises the provision of bridge members in closely spaced relation to the corresponding blades with circumferentially elongated holes in the bridge members, is readily adapted to allow relative circumferential oscillations between the individual blade groups and thereby to dampen the oscillations by frictional resistance and impact between the adjacent surfaces of said cover and bridge members.

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

1. The combination of a turbine rotor having a ring of blades provided with tenons on their outer ends and cover sections connected to the outer ends of the blades by said tenons to form blade groups, of a bridge band connecting together blades of adjacent groups, said bridge band in the case of at least one of said groups having elongated holes through which tenons of the blades pass and being spaced a predetermined amount from said cover section.

2. The combination of a turbine rotor having a ring of blades provided with tenons on their outer ends and cover sections connected to the outer ends of the blades by said tenons to form blade groups, of a bridge band connecting together blades of adjacent groups, said bridge band being located beneath adjacent cover section ends and in the case of at least one of said groups, having elongated holes through which tenons of the blades pass, and being concentrically spaced by a predetermined amount from said cover section.

3. In a turbine rotor having a ring of blades provided with tenons on their outer ends and cover sections connected to the outer ends of the blades by said tenons to form blade groups, a bridge band provided beneath said cover sections for connecting together blades of adjacent groups, said bridge band being closely spaced from said cover sections and being provided with openings through which the tenons of the blades pass, said openings being of the same dimension as the tenon in a direction axially of said rotor and being elongated in a direction circumferentially of said rotor, whereby the adjacent surfaces of said bridge members and covers are adapted to engage each other during vibrations and to form a frictional resistance for damping the vibrations.

In witness whereof, I have hereunto set my hand this 25th day of October, 1929.

KURT BASSLER.