E. SCHNEIDER.

HOOPING BAND FOR THE MOVABLE BLADES OF STEAM OR GAS TURBINES.

APPLICATION FILED JULY 21, 1920.

1,371,328. Patented Mar. 15, 1921.

3 SHEETS—SHEET 1.

Fig. 1.

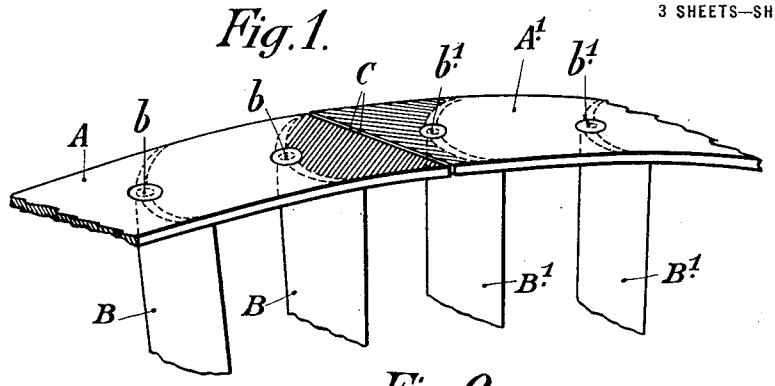


Fig. 2.

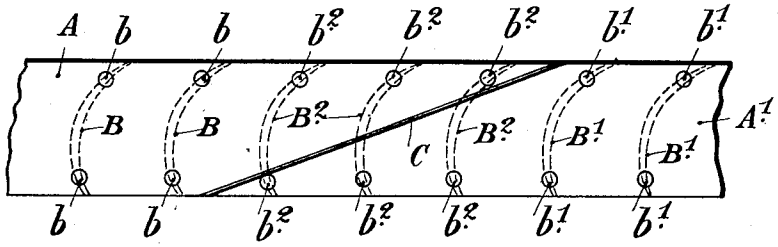


Fig. 3.

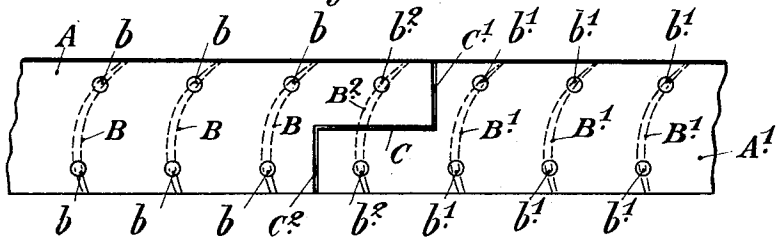
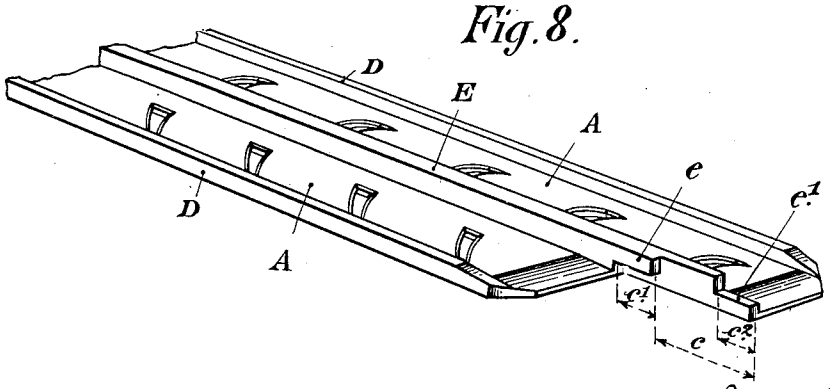


Fig. 8.



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3 SHEETS—SHEET 2.

Fig. 5.

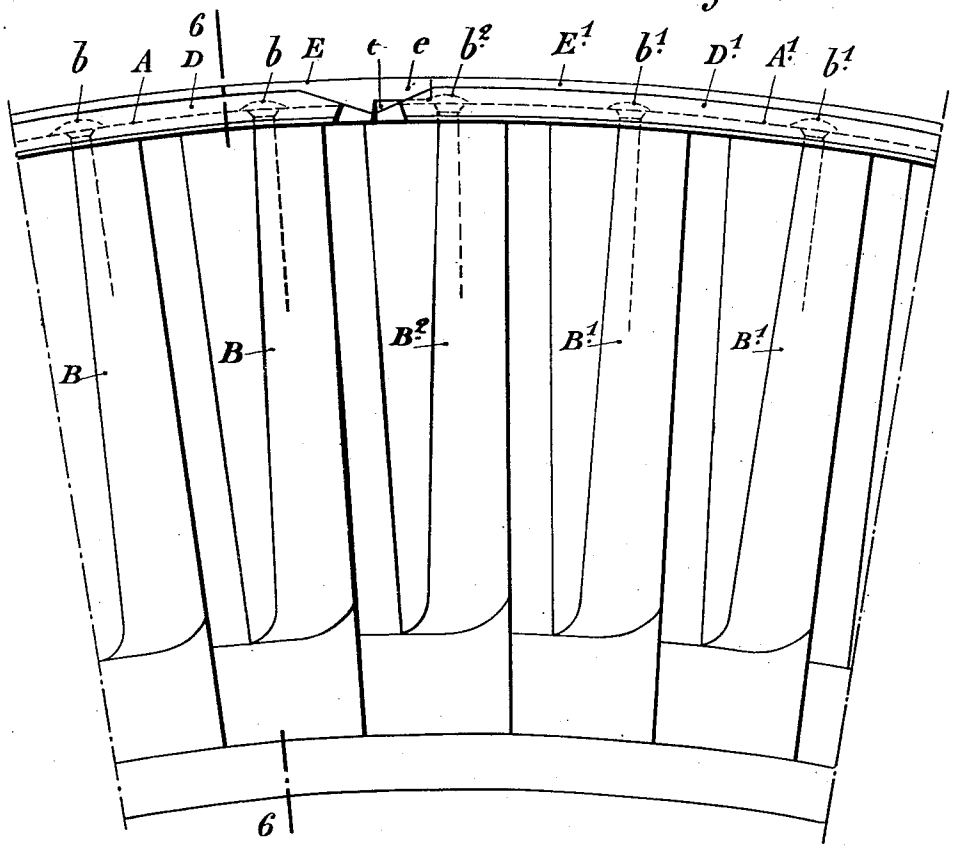
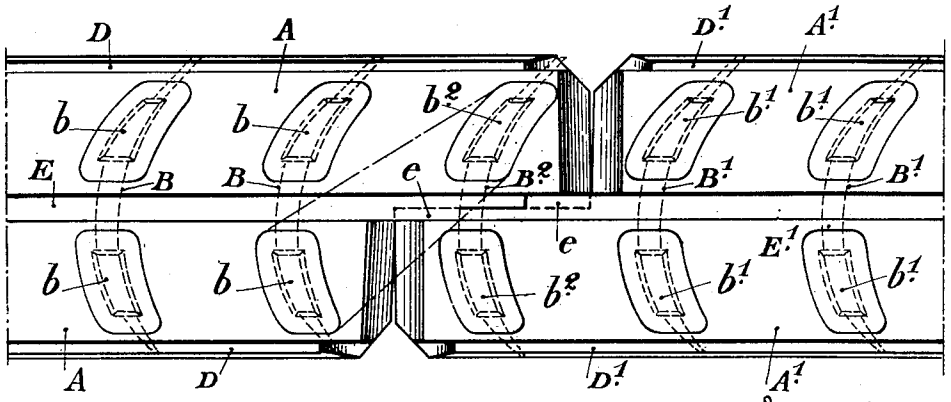


Fig. 4.



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3 SHEETS—SHEET 3.

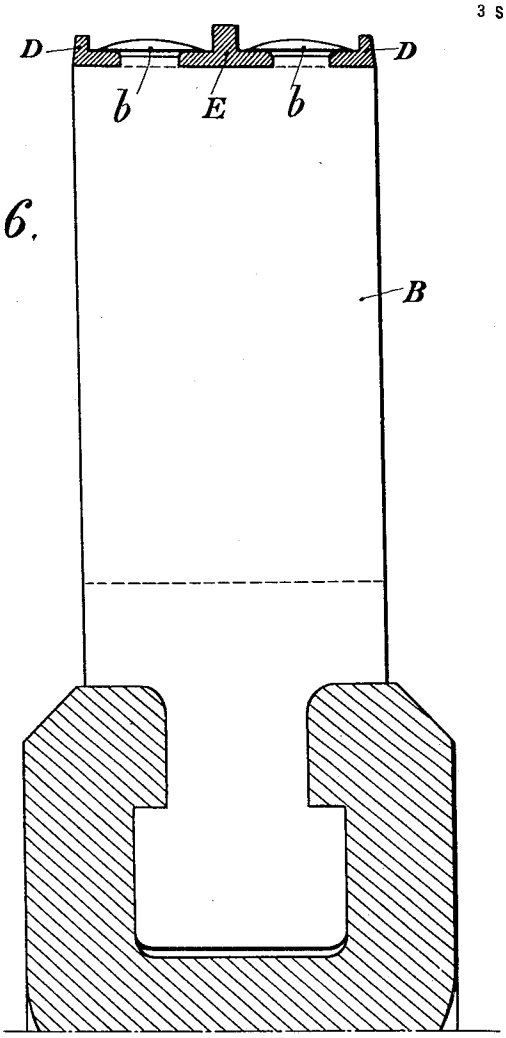


Fig. 6.

Fig. 9

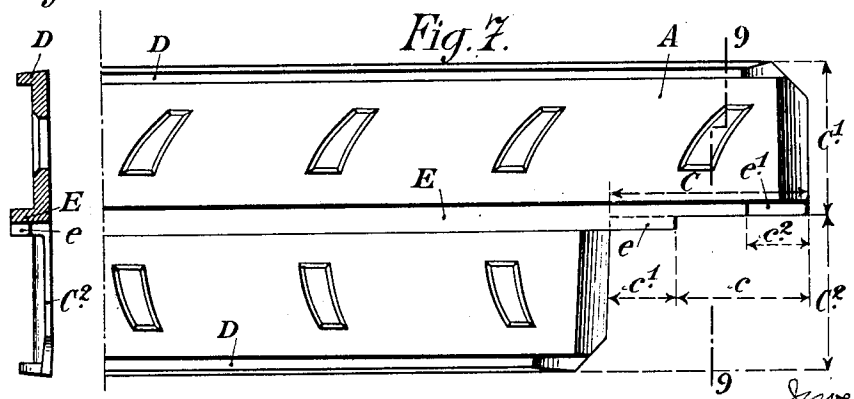


Fig. 7.

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UNITED STATES PATENT OFFICE.

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HOOPING-BAND FOR THE MOVABLE BLADES OF STEAM OR GAS TURBINES.

1,371,328. Specification of Letters Patent. Patented Mar. 15, 1921.

Application filed July 21, 1920. Serial No. 397,949.

To all whom it may concern:

Be it known that I, EUGÈNE SCHNEIDER, a citizen of the Republic of France, residing at Paris, France, have invented new and useful Improvements in Hooping-Bands for the Movable Blades of Steam or Gas Turbines, which invention is fully set forth in the following specification.

In turbines having low peripheral speeds wherein the movable blades are connected together at their outer ends by hooping bands, these bands are generally divided into a series of independent sections. The fixing of these sections on the blades that they cover, is effected by means of tenons formed in one piece with their respective blades and riveted to the band sections.

In the accompanying drawings illustrating the invention,

Figure 1 is a diagrammatic perspective view showing the known method of constructing such devices;

Figs. 2 and 3 are developed diagrammatic plans cutting the ends of adjacent sections of the hooping bands in two different forms of the invention;

Fig. 4 is a developed plan view of two connected band sections embodying constructional details of the invention;

Fig. 5 is a corresponding elevation;

Fig. 6 is a cross-section on the line 6—6 of Fig. 5;

Fig. 7 is a developed plan view of the end of one of the band sections;

Fig. 8 is a corresponding perspective view;

Fig. 9 is a cross-section on the line 9—9 of Fig. 7.

In Fig. 1, A and A^1 are two adjacent sections of a hooping band to which there are riveted respectively a group of blades B and a group of blades B^1. A gap C is left between the consecutive sections A, A^1.

Now, in turbines having a very high peripheral speed, this manner of construction entails a great drawback.

Under the action of centrifugal force the free end (hatched portion) of each section exerts by reason of its overhang, a bending strain upon the rivets b, b^1.

The present invention has for its object to provide an improved construction of hooping bands in which this drawback is obviated.

For this purpose, the joint or gap C between two sections A, A^1 of the hooping band, instead of being free between two adjacent blades B, B^1 crosses at least one blade which is riveted to both the two adjacent sections. This arrangement provides between the adjacent sections a connection by means of one or more blades common to the two sections.

This invention may be carried into effect as shown in Fig. 2 by cutting the ends of adjacent sections A, A^1 diagonally in such a manner that their joint C will cross one or more consecutive blades B^2 which are riveted to both sections by means of two tenons b^2. In practice, it will be sufficient to make the joint C cross a single connecting blade B^2. This joint instead of being made in a straight line, will follow in that case, as shown in diagram in Fig. 3, a broken line C^1—C—C^2 comprising a middle portion C parallel to the edges of the sections and two end portions C^1, C^2 at right angles to said edges.

Referring more particularly to Figs. 4 to 9, the adjacent band sections A and A^1 cover each a group of blades B, B^1 respectively. Another blade B^2 which is crossed by the broken joint, is riveted by means of a tenon b^2 to the section A and by means of another tenon b^2 to the adjacent section A^1.

The sections are formed each with two side ribs D, D^1 respectively and a middle rib E, E^1 respectively.

In the practical construction illustrated, a mutual engagement is effected between the adjacent ends of the middle ribs E, E^1.

For this purpose, the rib E is half cut away for a portion c of the extent of the joint section C. For the remaining portion c^1, the rib E is also half cut away as shown in Fig. 8, that is to say, the lower half of the rib is removed for the extent c^1. An overlap e is formed for half the thickness and half the depth of the rib E. On the other hand, the portion c^2 of the remaining half rib is removed for the upper half of the depth as shown in Fig. 8.

By this means a supporting nib e^1 is formed on the front end of the rib E. Since the rib E^1 of the band section A^1 is cut symmetrically relatively to the plane of the common longitudinal axis, the result is that the rib E^1 engages with its overlap e upon

the nib e^1 of the rib E, and by means of its nib e^1 under the overlap e of the rib E, as shown in Figs. 4 and 5.

It will be noted that the overlap e of the segment A which holds the nib e^1 of the adjacent section A^1, and prevents it from rising under the action of centrifugal force, is situated wholly between the dot and dash lines in Fig. 4 connecting the rivets b and b^2 of the section A, so that the entire strain taken by an overlap e is converted into a simple pulling force acting upon the said rivets. The action of the bending strain due to the overhang acting upon the said rivets, is thus considerably diminished.

The free ends which have a very small extent comprised between the end rivets and the transverse portions of the joint, alone have a tendency to rise under the action of centrifugal force. In order to diminish this effect as much as possible, the said free ends may be cut diagonally and chamfered, as shown in Figs. 4, 8 and 9.

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

1. In a turbine, a hooping band for the blades formed in sections, consecutive sections having abutting ends extending across the band between points diagonally disposed on opposite edges of the band, the abutting ends passing over the end of at least one blade riveted to both sections, said sections having medial longitudinal ribs abutting each other with mutually engaging overlaps and nibs.

2. In a turbine, a hooping band for the blades formed in sections, consecutive sections having abutting ends extending across the band between points diagonally disposed on opposite edges of the band, the abutting ends passing across the end of at least one blade having tenons riveted to both sections, said sections having the extremities of their ends cut away beyond the tenons to reduce the weight of the overhang.

3. In a turbine, a hooping band for the blades formed in sections, consecutive sections having abutting ends extending across the band between points diagonally disposed on opposite edges of the band, the abutting ends passing over the end of at least one blade having a tenon riveted to each section, said sections having medial ribs abutting each other with a mutual engaging overlap extending over the blade between the tenons riveting the blade to both sections.

4. In a turbine, a hooping band for the blades formed in sections, consecutive sections having abutting ends extending across the band between points diagonally disposed on opposite edges of the band, the abutting ends passing over the end of at least one blade having a tenon riveted to each section, said sections having medial ribs abutting each other with a mutual engaging overlap extending over the blade between the tenons riveting the blade to both sections, and said sections having the extremities of their ends outside of their ribs cut away beyond the tenon connection to reduce the weight of the overhang.

5. In a turbine, a hooping band for the blades formed in sections, consecutive sections having abutting ends extending across the band with their edges in a broken line between points diagonally disposed on opposite edges of the band with the two ends of the line at right angles to the edges of the band and the middle part of the broken line parallel to said edges, thereby constituting longitudinal projections in the abutting ends of the sections that are complements of each other in the width of the band, and a blade having an end extending across the band to intersect the division between the two longitudinal projections and having a tenon riveted into each of said projections.

6. In a turbine, a hooping band for the blades formed in sections, consecutive sections having abutting ends extending across the band with their edges in a broken line between points diagonally disposed on opposite edges of the band with the two ends of the line at right angles to the edges of the band and the middle part of the broken line parallel to said edges, thereby constituting longitudinal projections in the abutting ends of the sections that are complements of each other in the width of the band, said sections having medial longitudinal ribs abutting each other with mutually engaging overlaps which are divided longitudinally by the division between the longitudinal projections, and a blade having an end extending across the band to intersect the division between the two longitudinal projections and having a tenon riveted into each of said projections.

In testimony whereof I have signed this specification.

EUGÈNE SCHNEIDER.

Witnesses:
ANDRÉ MOSTICKER,
CLEMENT S. EDWARDS.