April 6, 1943. J. K. MOSSER 2,315,641

TURBINE BLADE SHROUD FASTENING

Filed Jan. 16, 1942

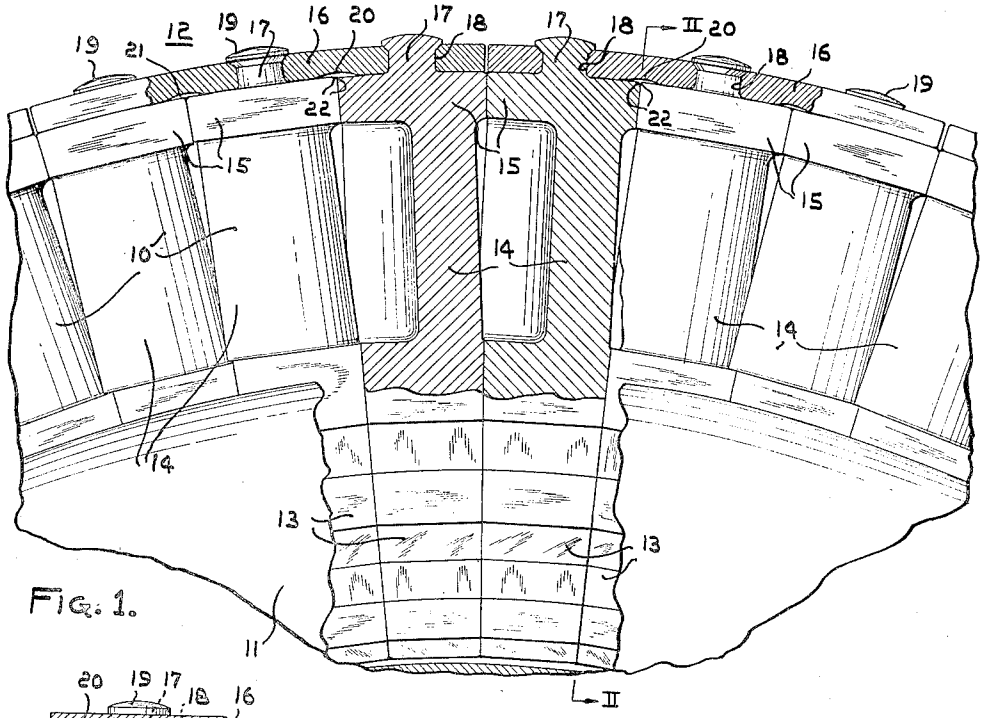


FIG. 1.

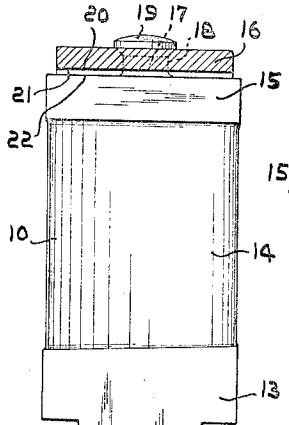


FIG. 2.

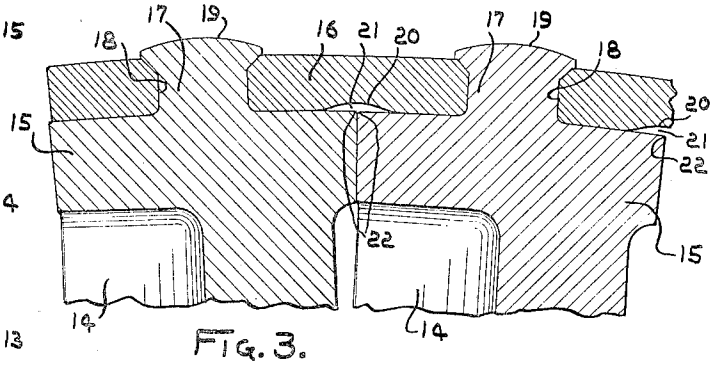


FIG. 3.

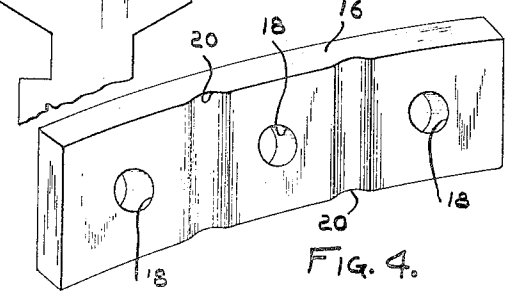


FIG. 4.

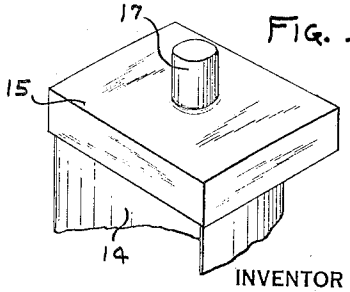


FIG. 5.

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TURBINE BLADE SHROUD FASTENING

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Application January 16, 1942, Serial No. 426,946

2 Claims. (Cl. 253—77)

My invention relates to a row of turbine blades having individual integral shroud elements disposed circumferentially in end-to-end relation together with tie bands cooperating with tenons formed on the blades for connecting the latter in groups, and it has for its object to provide a tie band having inner transverse and shallow grooves overlying contiguous edges of shroud elements to avoid contact with such contiguous edge corners.

Where turbine blades having individual shroud elements are connected by arcuate shroud bands having openings through which riveted or headed tenons extend, difficulty on account of contiguous edge corners may be experienced both in manufacture and in operation. Small variations in manufacture are inevitable with the result that, instead of the contiguous outer courses of shroud elements being in alignment, one corner may be offset with respect to the adjacent one, with the result that the corner of greater radius will bear tightly against the inner face incident to riveting the band in place, thereby not only interfering with assembly but resulting in a state of initial stress at the section over the engaged corner. Furthermore, in operation, blade deflection due to centrifugal and vibratory effects, tends to produce offsetting of corners; and, in resisting this action a severe localized stress condition may be set up in the section of a band over the corner exerting pressure thereon. To avoid overstressing of the bands, I provide the inner sides of the latter with shallow grooves bridging the contiguous end corners of the shroud elements.

This and other objects are effected by the invention as will be apparent from the following description and claims taken in connection with the accompanying drawing, forming a part of this application, in which:

Fig. 1 is a fragmentary view partly in elevation and partly in section showing the improved turbine blade shroud construction;

Fig. 2 is a sectional view taken along the line II—II of Fig. 1;

Fig. 3 is a detail sectional view drawn to larger scale than Fig. 1; and

Figs. 4 and 5 are detail isometric views of a tie band and the outer end of a turbine blade, respectively.

In the drawing, the row of blades 10 is carried by the rotor 11 and has a shroud construction, at 12.

Each blade includes a root element 13, a blade element 14 and a shroud element 15. The root and shroud elements 13 and 15 of the row are arranged circumferentially in end-to-end relation and form inner and outer boundaries for the blade passages.

The shroud construction, at 12, is formed by the shroud elements 15, the tie bands 16 and the tenons 17, the tie bands and tenons connecting the blades 10 in groups. Each tie band has openings 18 for the tenons and the latter are provided with riveted or headed portions 19 overlapping the boundaries of the tenon openings to hold the tie bands in place with respect to the outer surfaces of the shroud elements.

The tie bands have shallow concave grooves 20 extending widthwise and at the inner faces thereof to form spaces 21 which bridge the contiguous shroud element corners 22 of each blade group.

Each tie band 16 is made of suitable metallic material of uniform section which is machined or ground to provide the shallow concave grooves 20.

Provision of the recesses facilitates manufacture and assembly and assures of operation without overstressing the tie band at any section, particularly at sections immediately over the contiguous corners 22. If there is offsetting of a pair of adjacent outer corners 22 of a group, the tie band may be secured in place without interference. Furthermore, as the bridging recesses 20 provide spaces accommodating offsetting, offsetting due to centrifugal or vibratory effects may occur without overstressing at any tie band section immediately over a corner.

While the invention has been shown in one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications without departing from the spirit thereof, and it is desired, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What is claimed is:

1. In an elastic fluid turbine, a row of blades; shroud elements integral with the respective blades and arranged circumferentially in end-to-end relation to form a shroud construction; and means for connecting the blades in groups comprising segmental tie bands each of which overlaps the shroud elements of the blades of the associated group and means for joining each tie band to the shroud elements overlapped thereby; each tie band being of uniform section and having relatively wide and shallow grooves formed at its inner side, extending transversely

thereof and bridging contiguous outer corners of the shroud elements.

2. In an elastic fluid turbine, a row of blades; shroud elements integral with the respective blades and arranged circumferentially in end-to-end relation to form a shroud construction; and means for connecting the blades in groups comprising tenons integral with and extending outwardly from the respective shroud elements, segmental tie bands having openings through which the tenons extend, and headed or riveted portions provided by the tenons in overlapping engagement with respect to the tie bands to hold the latter in place with respect to the shroud elements; each tie band being of uniform section and having relatively wide and shallow grooves formed at its inner side, extending transversely thereof and bridging contiguous outer corners of the shroud elements.

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