

June 10, 1947.

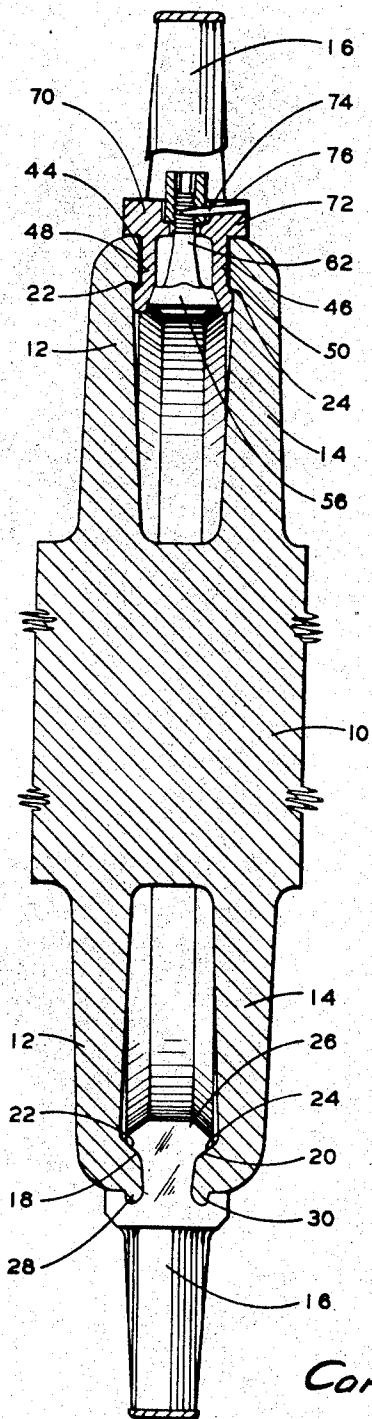
C. R. SODERBERG

2,421,855

TURBINE BLADE LOCKING DEVICE

Filed July 23, 1943

2 Sheets-Sheet 1



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FIG. 1

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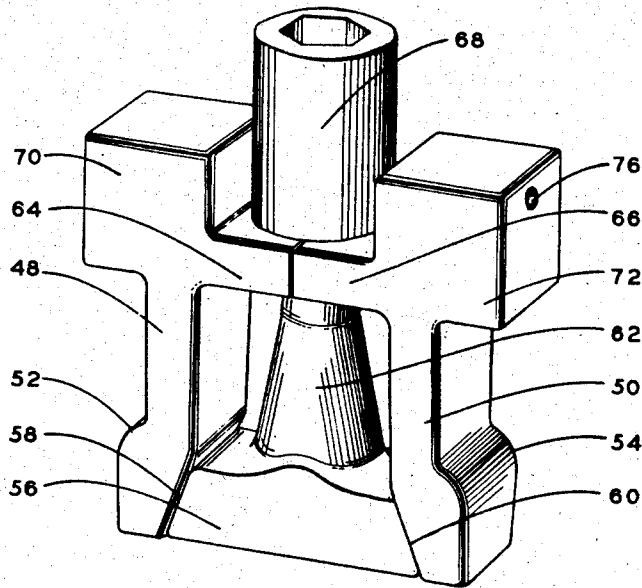


FIG. 2

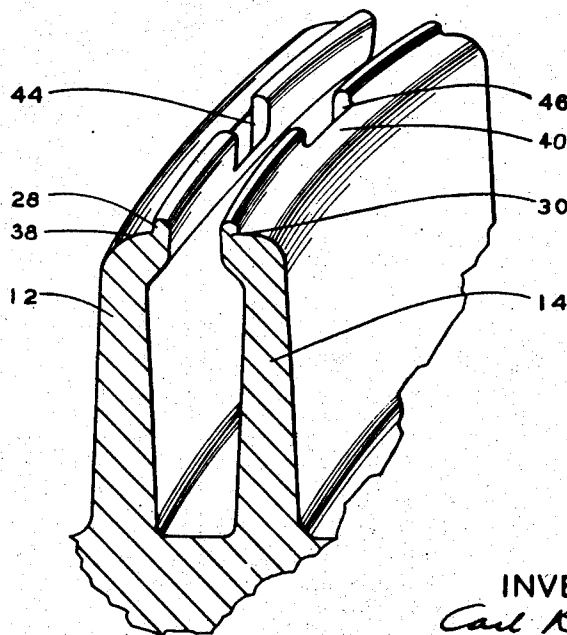


FIG. 3

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TURBINE BLADE LOCKING DEVICE

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Application July 23, 1943, Serial No. 495,923

12 Claims. (Cl. 253—39)

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The copending application of Soderberg, Serial No. 495,924, filed July 23, 1943, which issued as Patent No. 2,414,278 on January 14, 1947, shows a blade mounting in which the root has opposed converging surfaces fitting between similar surfaces on spaced integral discs forming the rotor. A feature of this invention is a locking device for filling the opening through which blade roots of this type are inserted between the discs.

Another feature is a locking device made up of filler pieces engaging the opposed discs and a wedge holding the pieces against the discs.

In assembling a set of blades on a turbine rotor, the variations in circumferential thickness of the blade roots resulting from machining tolerances, varies the width of the space to be filled by the locking piece. A feature of this invention is a locking device, the effective thickness of which is readily changed without affecting the function of the device.

Other objects and advantages will be apparent from the specification and claims, and from the accompanying drawings which illustrate an embodiment of the invention.

Fig. 1 is a sectional view through a section of the turbine rotor.

Fig. 2 is a perspective view of the locking device.

Fig. 3 is a fragmentary perspective view of the rotor.

The rotor 10 has a pair of opposed integral discs 12 and 14 supporting a row of turbine blades 16 at their peripheries. The rotor may have a number of axially spaced rows of blades alternating with rows of nozzles on a turbine casing surrounding the rotor. Discs 12 and 14 have opposed converging surfaces 18 and 20 adjacent to and facing toward each other for engagement with cooperating converging surfaces 22 and 24 on root 26 of blade 16. Surfaces 18 and 20 and also surfaces 22 and 24 converge toward the periphery. Discs 12 and 14 also have peripheral flanges 28 and 30.

To permit insertion of the blade root between the discs, slots 44 and 46 are formed in the adjacent surfaces of the discs at their outer end. These slots form an opening between the discs which is slightly greater than the axial width of the blade root which must pass through the opening.

After all of the blades have been assembled, the remaining space is filled by the locking device including filling pieces 48 and 50 which at their inner ends have obliquely extending surfaces 52 and 54 engaging with the converging surfaces

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22 and 24 on the discs. A wedge 56 extends between the inner ends of filling pieces and engages opposed converging surfaces 58 and 60 adjacent to each other on pieces 48 and 50.

A stud 62 on wedge 56 extends through an opening formed in opposed lugs 64 and 66 on the inner surfaces of filling pieces 48 and 50 and has a clamping nut 68 engaging the upper surfaces of these lugs for tightening the wedge in position. Pieces 48 and 50 have outwardly projecting lugs 70 and 72 which engage with the substantially cylindrical surfaces 38 and 40 on the opposed discs and locate the pieces on the discs.

As shown in Fig. 2, the thickness of wedge 56 is less than the thickness of pieces 48 and 50 so that if the filling pieces are too thick to fit between the blades on the rotor, the pieces may be reduced in thickness by machining on one of the side surfaces. In this way the locking device is adapted to fill the space between the turbine blades in spite of variations in the width of this space.

When the locking device has been clamped between the discs, nut 68 is locked in place by a pin 74 extending through an opening 76 in piece 50 and into the nut.

It is to be understood that the invention is not limited to the specific embodiment herein illustrated and described, but may be used in other ways without departure from its spirit as defined by the following claims.

I claim:

1. A locking device for a turbine rotor having spaced discs between which blades are mounted, said device including filling pieces engaging opposed surfaces of said discs, the opposed surfaces of the pieces adjacent to each other converging toward the periphery of the disc, and a wedge fitting between said pieces and engaging said converging surfaces.

2. A locking device for a turbine rotor having spaced discs between which blades are mounted, said device including filling pieces engaging opposed surfaces of said discs, the opposed surfaces of the pieces adjacent to each other converging toward the periphery of the disc, a wedge fitting between said pieces, and engaging said converging surfaces and means for fastening said wedge in position.

3. A locking device for a turbine rotor having spaced discs between which blades are mounted, said device including filling pieces engaging opposed surfaces of said discs, at least one of said pieces having a projecting lug on its inner surface, a wedge fitting between said pieces, a

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stud on said wedge, and a nut on said stud engaging said lug.

4. A locking device for a turbine rotor having spaced discs between which blades are mounted, said device including filling pieces engaging opposed surfaces of said discs, each of said pieces having a projecting lug extending toward the other piece, a wedge between said pieces, a stud on said wedge extending between said lugs, and a nut on said stud engaging said lugs.

5. A locking device for a turbine rotor having spaced discs between which blades are mounted, the opposed surfaces of said discs having portions converging toward the peripheries of the discs, said device including filling pieces each engaging a disc, the pieces having oblique sections engaging the converging portions of the disc surfaces, and clamping means for holding said pieces in position.

6. A locking device for a turbine rotor having spaced discs between which blades are mounted, the opposed surfaces of said discs having portions converging toward the peripheries of the discs, said device including filling pieces each engaging a disc, the pieces having oblique sections engaging the converging portions of the disc surfaces, and a wedge between said pieces for holding the oblique sections of the pieces against the converging surfaces on the discs.

7. A locking device for a turbine rotor having spaced discs between which blades are mounted, the opposed surfaces of said discs having portions converging toward the peripheries of the discs, said device including filling pieces each engaging a disc, the pieces having oblique sections engaging the converging portions of the disc surfaces, and clamping means for holding said pieces in position, each filling piece having a projection at its outer end and extending over the outer surface of the disc.

8. A locking device for a turbine rotor having spaced disks between which blades are mounted, the opposed surfaces of said disks having portions converging toward the peripheries of the disks, said device including spaced filling pieces, each engaging one of the opposed surfaces of the disks, the pieces having oblique sections engaging the converging portions of the disk surfaces, and a wedge located between and engaging said pieces for holding said pieces in position, said wedge tapering toward the periphery of the disk for moving the filling pieces apart, and means for moving the wedge into position between the pieces.

9. A locking device for a turbine rotor having spaced disks between which blades are mounted, the opposed surfaces of said disks having portions converging toward the peripheries of the disks, said device including spaced filling pieces, each engaging one of the opposed surfaces of the disks, the pieces having oblique sections engaging the converging portions of the disk surfaces, and a wedge located between and engaging said pieces for holding said pieces in position, said wedge tapering toward the periphery of the disk for moving the filling pieces apart, said wedge having a radially projecting threaded portion, and a clamping nut engaging said portion for moving said wedge to piece-locking position.

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10. A locking device for a turbine rotor having spaced discs between which the root sections of a row of blades are mounted, said device being positioned between and filling the space between the roots of adjacent turbine blades in the row, said device including spaced filling pieces engaging opposed surfaces of said discs and a wedge between and engaging with said pieces for holding them in position, said wedge having opposed surfaces engaging with said filling pieces and said wedge extending substantially radially between said filling pieces, the inner end of said wedge adjacent to the axis of the disc being wider than the outer end so that said wedge converges in a direction radially outward of the disc in order to wedge the filling pieces apart by radial outward movement of the wedge.

11. A locking device for a turbine rotor having spaced discs between which the root sections of a row of blades are mounted, said device being positioned between and filling the space between the roots of adjacent turbine blades in the row, said device including spaced filling pieces engaging opposed surfaces of said discs and a wedge between and engaging with said pieces for holding them in position, said wedge having opposed surfaces engaging with said filling pieces, said wedge extending substantially radially between said filling pieces, the inner end of said wedge adjacent to the axis of the disc being wider than the outer end so that said wedge converges in a direction radially outward of the disc in order to wedge the filling pieces apart by radial outward movement of the wedge, and means for fastening said wedge in position between said filling pieces.

12. A locking device for a turbine rotor having spaced discs between which the root sections of a row of blades are mounted, said device being positioned between and filling the space between the roots of adjacent turbine blades in the row, said device including spaced filling pieces engaging opposed surfaces of said discs and a wedge between and engaging with said pieces for holding them in position, said wedge having opposed surfaces engaging with said filling pieces, said wedge extending substantially radially between said filling pieces, the inner end of said wedge adjacent to the axis of the disc being wider than the outer end so that said wedge converges in a direction radially outward of the disc in order to wedge the filling pieces apart by radial outward movement of the wedge, and means accessible externally of the discs for fastening said wedge in position between said discs.

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The following references are of record in the file of this patent:

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Number	Name	Date
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