June 5, 1923.

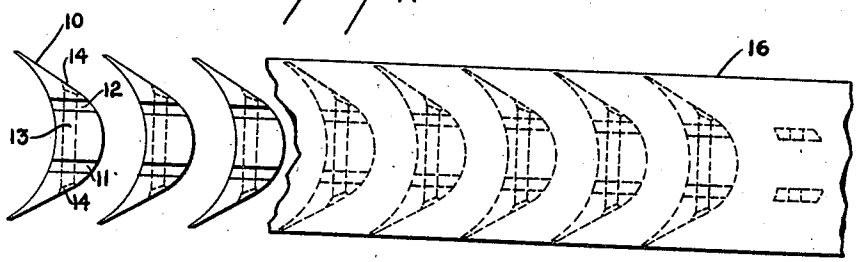
J. E. SNYDER

1,457,404

BLADE SHROUDING

Filed July 9, 1920

Fig. 1.



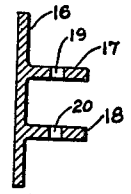


Fig. 3.

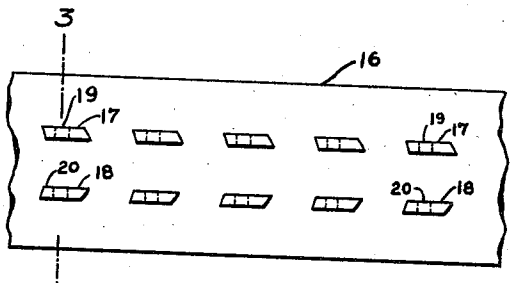


Fig. 2.

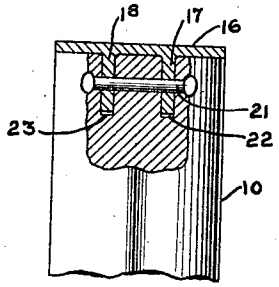


Fig. 5.

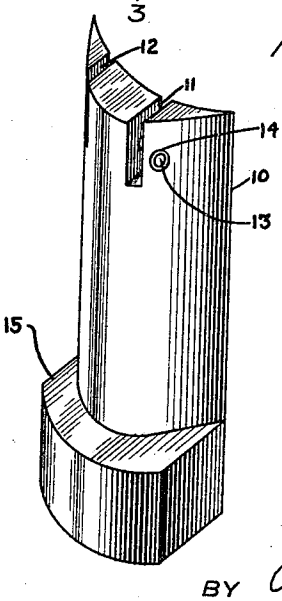


Fig. 4.

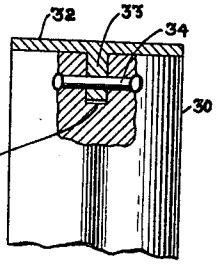


Fig. 6.

WITNESSES:

W. M. Berg.

R. B. Wakefield

INVENTOR.

John Edwin Snyder

BY

D. C. Davis

HIS ATTORNEY

Patented June 5, 1923. 1,457,404

UNITED STATES PATENT OFFICE.

JOHN EDWIN SNYDER, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

BLADE SHROUDING.

Application filed July 9, 1920. Serial No. 394,992.

To all whom it may concern:

Be it known that I, JOHN EDWIN SNYDER, a citizen of the United States, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Blade Shrouding, of which the following is a specification.

This invention relates to blading for elastic fluid turbines and has for an object to produce new and improved means for securing the outer ends of the blades together and for forming a cover for the fluid passages formed between adjacent blades.

The blades of elastic fluid turbines are subjected to vibration creating shocks during the delivery of motive fluid to the turbine, and it is necessary to eliminate the tendency of the blades to vibrate. This is accomplished in my present invention by securing together the outer ends of a number of blades located in one row so that each blade so secured cooperates with the other blades in resisting vibrations.

With some types of turbine blades it is desirable to provide a cover or shroud member for the outer or free ends of the blades, so that the fluid passing between the blades is confined to a well defined path and is not spilled outwardly past the ends of the blades. For this reason it is customary to provide the outer ends of the blades of the impulse type with a cover or shroud member, which is sometimes also employed as a means for tying the outer ends of the blades together.

My invention contemplates a new and improved blade tie for the outer ends of the blades which also constitutes a shroud or cover for the blades of a row and is illustrated in the accompanying drawing in which—

Figure 1 is a plan view of a row of blades with part of the shroud broken away; Figure 2, a plan view of the shroud; Figure 3, a sectional view taken on line 3—3 of Fig. 2; Figure 4, a perspective view of the blade; Figure 5, a view of the blade and shroud in combination and broken away to make the structure clear; and Figure 6, a modification of my invention.

In accordance with my invention the tip of the blade 10 is provided with two longitudinal slots 11 and 12. A rivet hole 13 with its axis normal to the sides of the slots is countersunk at both ends 14 to receive the rivet heads. The spacing block 15 is an integral part of the blade 10 and serves to maintain the blades at the required distance from each other.

The shroud member consists of a flat strip 16 with tongues 17 and 18 which are of the required shape and size to fit the slots 11 and 12 in the tips of the blades. The holes 19 and 20 are provided in the tongues 17 and 18 so that when the tongues are inserted in the slots 11 and 12 of the blades, the holes 14, 19 and 20 coincide thereby permitting a rivet to be inserted to fasten them together.

In Figure 5 is shown the shroud mounted on the blade and broken away to more clearly illustrate the connection between the shroud and blade. The tongues 17 and 18 attached to the flat strip 16 of the shroud are made slightly shorter than the depth of the slots 11 and 12 in the blades so that slight clearance spaces 22 and 23 are formed between the tips of the tongue 17 and 18 and the bottom of the slots 11 and 12. The rivets 21 when inserted through the holes in the blades and tongues and headed over at both ends serve to hold the blades and shroud in rigid connection.

In Fig. 6 is shown a modification of my invention in which the blade 30 is provided with a single longitudinal slot 31, and the strip 32 of the shroud is provided with a single tongue 33. A rivet 34 is provided as in the previous case to fasten the blade and shroud rigidly together.

While I have shown my invention in two forms, 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 I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What I claim is:—

1. The combination of a turbine blade having a slot of uniform cross section in the tip thereof, a shroud member engaging the end of the blade having a tongue of uniform cross section which projects into the slot, and means for securing the tongue within the slot.

2. The combination of a row of turbine blades each having longitudinal slots of uniform cross section in the tips thereof, a

shroud member engaging the ends of the blades and having tongues of uniform cross section within the slots, and rivet means to secure the tongues within the slots.

3. The combination of a row of turbine blades each having longtudinal slots with parallel side walls in the tips thereof, a shroud member for the blades having tongues adapted to closely engage the side walls of the slots and slightly shorter than the depth thereof, whereby a clearance space is provided in the bottom of each slot, and rivets passing through the blades and the tongues normal to the said side walls, whereby the tongues are secured in the slots.

4. The combination of a turbine blade having a slot in its tip, a shroud member for the blade having a tongue adapted to fit the side walls of the slot and slightly shorter than the depth thereof, and rivets passing through the blade and the tongue and adapted to restrain the tongue in the slot against the action of centrifugal force, whereby the arrangement of the tongue and the slots precludes the transmission to the rivets of shearing stresses caused by unequal expansion of the shroud member and of the blade.

In testimony whereof, I have hereunto subscribed my name this first day of July, 1920.

JOHN EDWIN SNYDER.