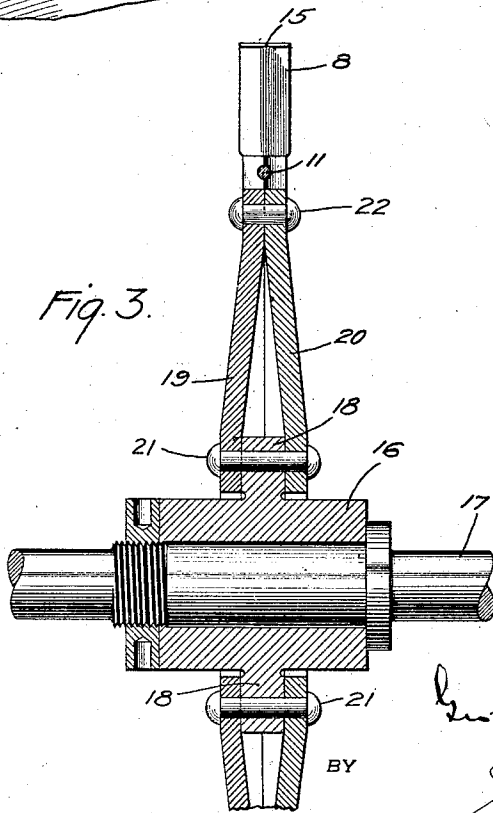
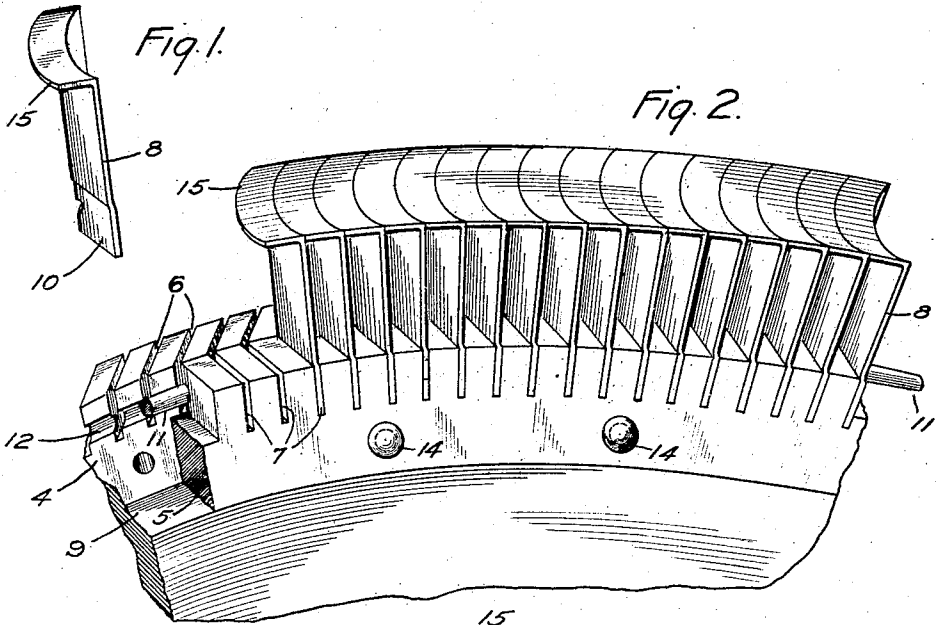


G. WESTINGHOUSE.
 BLADE MOUNTING.
 APPLICATION FILED AUG. 4, 1910.

1,050,187.

Patented Jan. 14, 1913.



WITNESSES:

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UNITED STATES PATENT OFFICE.

GEORGE WESTINGHOUSE, OF PITTSBURGH, PENNSYLVANIA.

BLADE-MOUNTING.

1,050,187.

Specification of Letters Patent.

Patented Jan. 14, 1913.

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To all whom it may concern:

Be it known that I, GEORGE WESTINGHOUSE, a citizen of the United States, and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have made a new and useful Invention in Blade-Mountings, of which the following is a specification.

My invention relates to means for mounting blades, such for example as turbine

blades, in place on a blade-carrying element. An object of my invention is to produce means for mounting blades, such that the blades will be accurately spaced and held firmly in place on the blade-carrying element.

A further object is to produce means whereby a plurality of blades, or all the blades of a blade section, may be simultaneously mounted in place on the blade-carrying element.

These and other objects I attain by means of apparatus embodying the features herein described and illustrated.

In the drawings accompanying this application and forming a part thereof, I have illustrated my invention in connection with the rotating blades of a turbine, with no idea of in any way limiting my invention.

Figure 1 is a perspective view of a turbine blade which forms a detail of my invention; Fig. 2 is a fragmental perspective view of a row of turbine blades in connection with a mounting element embodying my invention; Fig. 3 is a fragmental transverse section of a rotatable blade-carrying element, and illustrates a slightly modified form of my invention.

Referring to Figs. 1 and 2: The blade-mounting element, illustrated as embodying my invention, is formed in two pieces 4 and 5 which are respectively provided with blade mounting slots 6 and 7, adapted to cooperate in receiving the bases of the blades 8 and in locking the blades in place. The piece or member 4 may be formed integrally with the blade-carrying, or rotor element of the turbine, as shown, or it may be secured in place in any suitable manner. The slots 6 extend across and into the peripheral face of the member 4, at an angle to the longitudinal axis of the rotor element, and are open along the lateral faces of the element so that the base portions of the blades may be introduced laterally into them.

The piece or member 5 may be ring-shaped, but for convenience of construction

it is preferably formed in segments and is adapted to be mounted on a shoulder 9 formed on the blade carrying element adjacent to the member 4. Slots 7 extend across and into the peripheral face of the member 5 at an angle equal, but opposite, to the angle of the slots 6, with reference to the longitudinal axis of the blade mounting element. The slots 6 and 7 are so arranged that they cooperate to form substantially V shaped slots in the periphery of the blade-mounting element, when the member 5 is in place.

Each blade is provided with a base portion 10, so formed that it is adapted to snugly fit into the V shaped slots. Before mounting the blades 8 on the blade-carrying element I preferably string them loosely on a wire or strip 11 which extends through openings, formed in the base of each blade at the apex or ridge between the inclined portions of the base. A groove 12 is formed in the lateral face of the member 4, across the slots 6, and is adapted to receive the strip 11 when the bases of the blades are in place in the slots 6. A correspondingly located groove is provided in the lateral face of the member 5 and is adapted to register and cooperate with the groove 12 in receiving the strip 11 and securing it in place.

In mounting the blades 8, I preferably proceed as follows: I first string the blades on the wire or strip 11, and then insert one leg, of the angular base portion of each blade, into one of the slots 6 of the member 4 so that adjacent blades are located in adjacent slots and so that the wire or strip 11 is located in the groove 12. The member 5 is then moved to place, during which operation the projecting legs of the base portions of the blades are slipped into the slots 7. After the member 5 is in place on the shoulder 9 and in contact with the lateral face of the member 4, it is secured to the member 4 by any suitable means, as for example, by means of rivets 14 which extend through registering holes formed in the members 4 and 5 and extending transversely through them.

With this construction, the blades are positively locked in place and are also accurately spaced. It will be apparent that the operation of mounting the blades is materially simplified by my invention and that a number of blades, or all the blades of one blade section, may be secured in place at

the same time. After the member 5 is secured in place the cooperating grooves formed in the members 4 and 5 positively lock the wire or strip 11 in place and therefore positively lock the blades to the blade-carrying element. The V shaped slots formed by the cooperation of the slots 6 and 7, in conjunction with the V shaped base portions of the blades, are effective in preventing lateral displacement of the blades.

I have shown the blades 8 provided with forwardly extending flanges 15 formed at the ends of the blades and adapted to cooperate, when the blades are mounted in a row, to form a shrouding. It will be apparent, however, that any means may be employed for spacing and locking the outer ends of the blades together.

In Fig. 3 I have shown a slight modification of my invention in connection with a rotor element which may be employed, either in a turbine, a fluid compressor or exhauster. The rotor-element consists of a hub or spindle 16, mounted on a shaft 17, and provided with an annular flange 18, on which circular blade-carrying disks 19 and 20 are mounted. The outer end of the disk 19 is provided with slots corresponding to the slots 6 of the member 4 of Fig. 2 and adapted to receive the bases of the blades 8. The blades are secured together by means of a rod or wire 11, as previously described, which extends through openings in the bases of the blades and a groove corresponding to the groove 12 is provided in the lateral face of the disk 19 for receiving the rod, wire or strip 11. The disk 20 is provided on its peripheral edge with slots which correspond to the slots 7 of the member 5 of Fig. 2, and the function of this

disk in securing the blades in place corresponds to the function of the member 5. Any convenient method of procedure may be employed in assembling the disks 19 and 20 and securing the blades 8 in place. The disks are preferably, but not necessarily, secured to the flanges 18 of the spindle 16 by means of rivets 21 and the outer edge of the disks are secured together by means of rivets 22. It will be apparent that the operation of securing the disks together locks the blades 8 in place on the disks and completes the rotor element.

Having thus described my invention, what I claim is:

1. In combination with a plurality of blades, a strip extending through openings in the bases of the blades, a turbine rotor slotted and provided with an annular groove, a removable member provided with slots cooperating with the slots in said rotor to receive the bases of the blades and a groove cooperating with the groove of the rotor to receive and lock in place said strip and means for securing said removable member in place.

2. In combination with a turbine rotor provided with laterally extending blade slots, of a removable member having slots cooperating with the slots in said rotor, blades mounted in said slots and a locking strip for securing said blades in said slots.

In testimony whereof, I have hereunto subscribed my name this 3rd day of Aug., 1911.

GEO. WESTINGHOUSE

Witnesses:

B. B. HINES,

E. M. McCALLISTER.