C. E. SWEET.

SECURING MEANS FOR TURBINE BLADES.

APPLICATION FILED JAN. 25, 1909.

998,862.

Patented July 25, 1911.

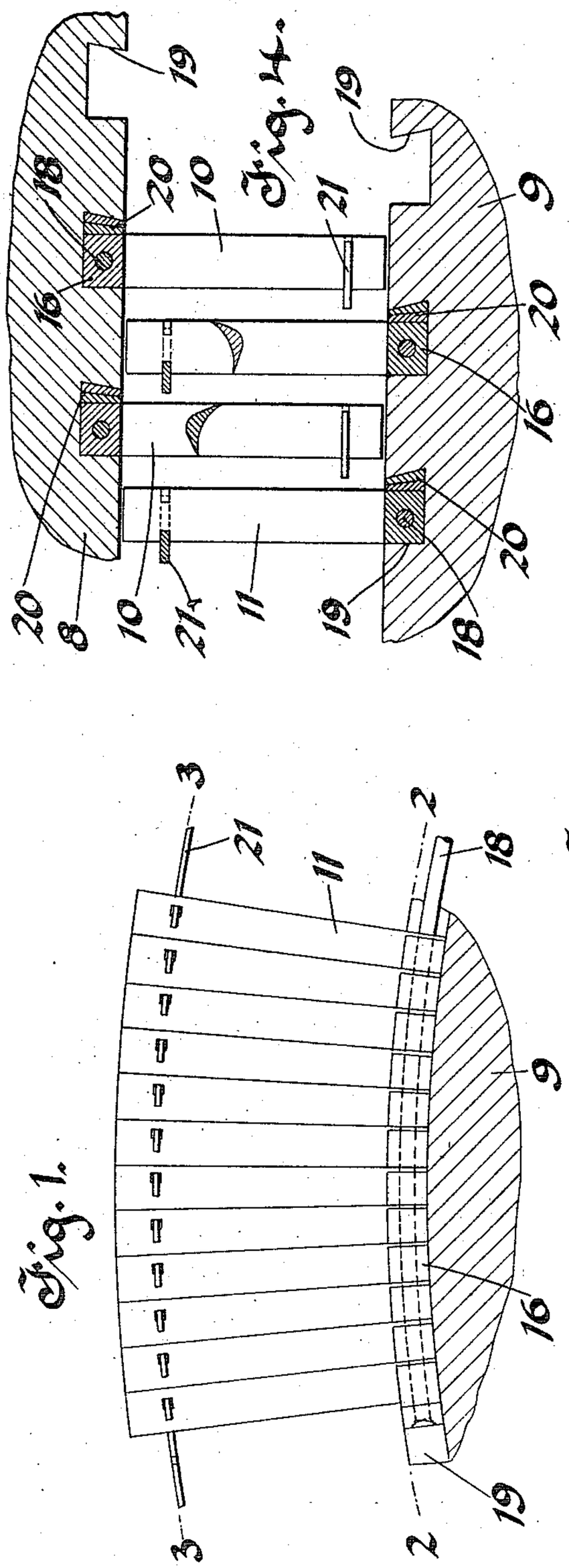

Fig. 4.

Fig. 6.

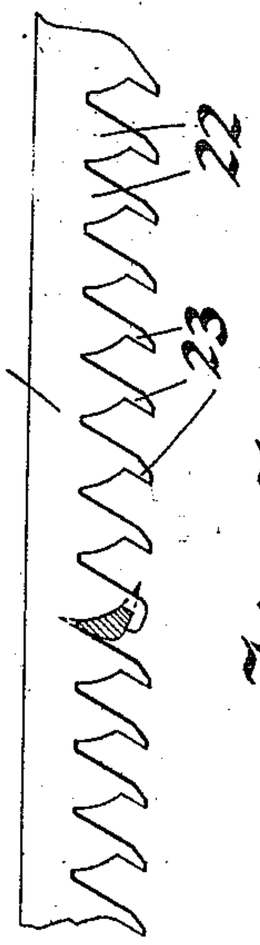

Fig. 7.

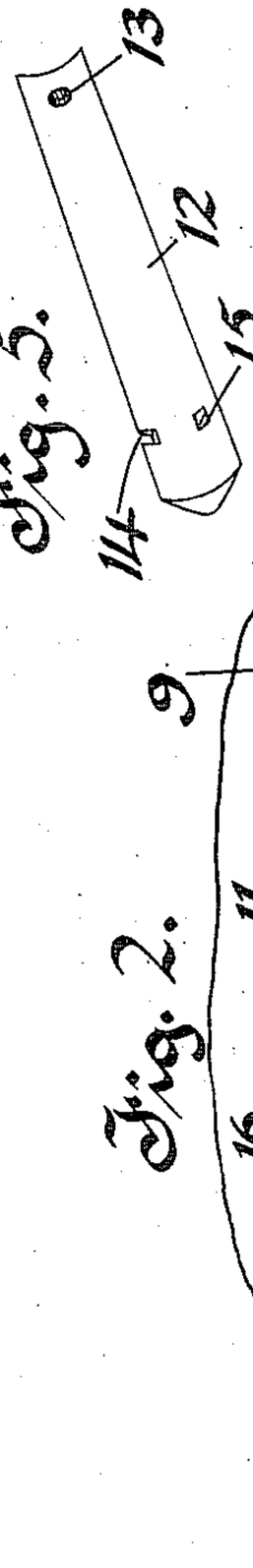

Fig. 5.

Fig. 1.

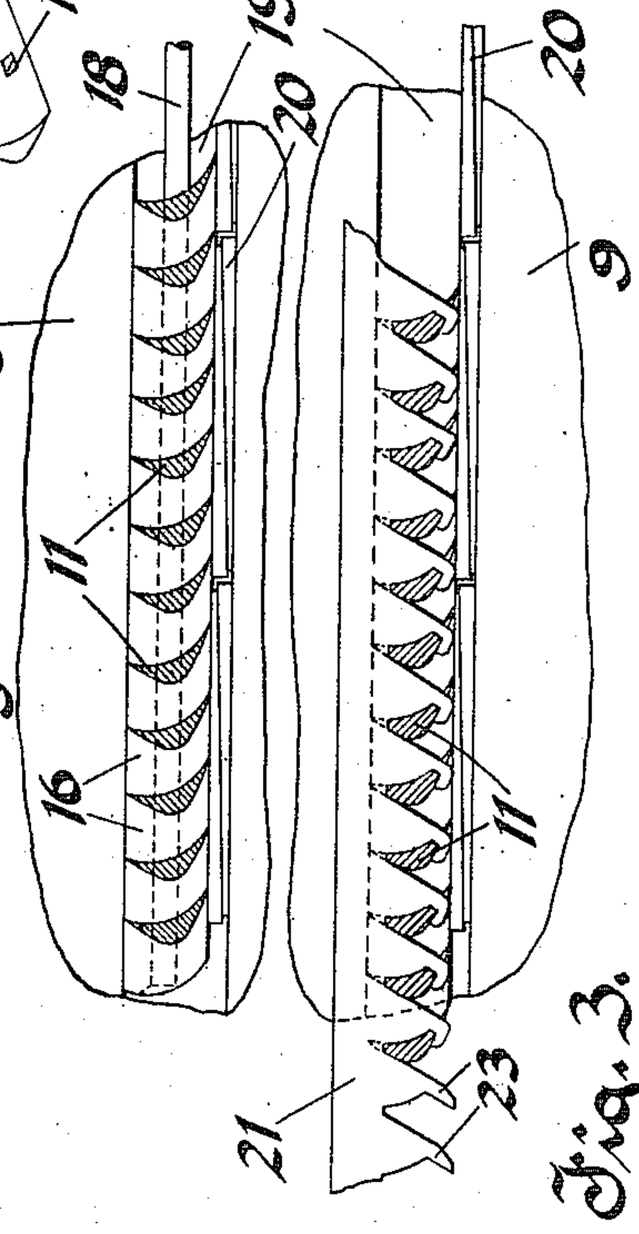

Fig. 2.

Fig. 3.

WITNESSES:

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UNITED STATES PATENT OFFICE.

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SECURING MEANS FOR TURBINE-BLADES.

998,862. Specification of Letters Patent. Patented July 25, 1911.

Application filed January 25, 1909. Serial No. 474,027.

To all whom it may concern:

Be it known that I, CHARLES E. SWEET, a citizen of the United States, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have made a new and useful Invention in Securing Means for Turbine-Blades, of which the following is a specification.

This invention relates to means for securing units together and particularly to securing the blades or vanes of a turbine together whereby they may be attached to the rotor or to the stator of a turbine.

One of the objects of the invention is to provide means for spacing and anchoring the blades suitable distances apart for an obvious purpose.

It is also the object of the invention to improve generally upon the means of securing turbine blades.

In the drawings: Figure 1 is a side elevational view of a plurality of turbine blades secured together and in operative position with relation to the rotor; Fig. 2 is a sectional view on line 2—2 of Fig. 1; Fig. 3 is a sectional view on the line 3—3 of Fig. 1; Fig. 4 is a cross-sectional view through a portion of a rotor and stator of the turbine, showing a number of blades in position; Fig. 5 is a detail perspective view of one of the turbine blades; Fig. 6 is a detail perspective view of a spacing insert to be placed between the blades; and, Fig. 7 is a plan view of one form of blade-securing means.

Referring now to the drawings by numerals of reference, 8 designates the casing or stator of a turbine and 9 the rotor.

10 are the vanes carried by the casing 8 and 11 are the blades carried by the rotor. Each blade is illustrated as comprising a body portion 12, having at its base end an opening 13. Near the end and distant from the base of each blade is a notch 14 in one edge while adjacent thereto an opening 15 is provided. The base end of the blades 12 may be secured together my means of spacing inserts 16, the ends of which conform to the concave or convex blades and each insert is provided with an opening 17 adapted, when in place, to register with the opening 13 of the adjacent blades. A tie-bar or wire 18 is provided, upon which the blades and inserts may be alternately placed, the wires passing through the openings 13 and 17 of the respective elements. The base portions of the blades or vanes may be secured to the stator or rotor by suitable fastening means, as for example, by providing the undercut grooves 19 in the carrying element, and after placing the base portions of the blades in said groove, inserting the wedges or fastening devices 20 in a manner readily understood by reference to Figs. 2, 3 and 4. The free ends of the respective blades are adapted to be spaced from each other but secured definite distances apart by a fastening member best illustrated in Fig. 7. The fastening member may comprise a strip 21 having a plurality of outstanding projections 22 provided with flexible anchoring terminals 23. The projections 22 are preferably spaced apart proper distances to conform to the thickness of the blades which are received in the spaces between said projections, the edges of said projections being preferably formed to lie snugly against the adjacent faces of respective blades and in close proximity thereto. The anchoring portions 23 are flexible, so that they may extend through the openings 15 in the blades 12 and be bent or otherwise upset so as to securely anchor the blades to the strip 21.

By reference to Fig. 5, it will be observed that the notches 14 are in line with the openings 15, this being a convenient construction whereby the notches 14 may be caused to be engaged by the edge of the strip 21 so that when flexible portions 23 of the projections 22 are securely fastened in the openings 15, the blades 12 will be rigidly held to said strip 21 and any liability of accidental displacement will be avoided. It will be observed that the projections 22 serve a dual purpose in that they not only evenly space the blades apart but that they also have means for securely anchoring the blades to the strip in proper spaced relation.

The notches 14 in the blades 12 receive the edge of the strip 21 and this engagement of the blade and strip prevents any longitudinal movement of any of the blades with respect to the remaining ones. Lateral movement of any one blade is prevented by the interlocking engagement of one of the flexible terminals 23 of the projection 22 with the particular blade which it secures.

In accordance with the provisions of the

patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the apparatus shown is only illustrative and that the invention can be carried out by other means.

What I claim is:

1. The combination of two members, one of which is a lashing member and the other a blade, and a flexible outstanding terminal on one of said members for engaging an opening in the other member, and which, when the two members are brought together, is bent into engaging position.

2. The combination of two members, one of which is a spacing member and the other a blade, and an outstanding terminal on one member bent to engage an opening in the other member.

3. The combination of two members, one of which comprises blades, and the other a spacing member, laterally extending means on one member to engage an opening in the other member to lock the engaged member against longitudinal and lateral movement with respect to the engaging member.

4. A strip having flexible outstanding projections spaced apart to receive turbine blades between them, the flexible portions of said projections passing through openings to interlock with the blades to anchor said blades to said strip.

5. A strip having flexible outstanding projections spaced apart to receive turbine blades between them, the flexible portions of the projections being adapted to enter openings in the blades and be bent against the face of the blade.

6. A strip having flexible outstanding projections spaced apart to receive turbine blades between them, blades having openings therein, the shape of the edges of the spaces conforming to the contour of the blades and an outstanding anchoring portion on each of said projections to engage said blades to positively interlock with openings in the blades.

7. A strip having projections spaced apart to receive turbine blades between them, said blades being notched and having openings therein, the notched portion of each blade receiving a portion of the strip, and outstanding anchoring means on said projections to positively engage openings in the blades, said anchoring portions being bent against the blades.

8. A strip having projections spaced apart to receive turbine blades between them, said blades having openings and outstanding means on said projections to enter the openings in the blades and bent to anchor them to the strip.

9. A strip having outstanding bendable projections, blades having notches to be engaged by the strip and provided with openings to receive the projections, said projections being bent after passing through openings, to anchor the blades to the strip.

10. A strip having flexible outstanding projections, blades having notches engaged by the strip and provided with openings to receive the flexible projections, said projections being bent at an angle to their body portions, whereby the blades may be secured to the strip and the projections.

In testimony whereof, I have hereunto subscribed my name this 23rd day of January, 1909.

CHARLES E. SWEET.

Witnesses:
C. W. McGHEE,
GEO. C. WALKER.