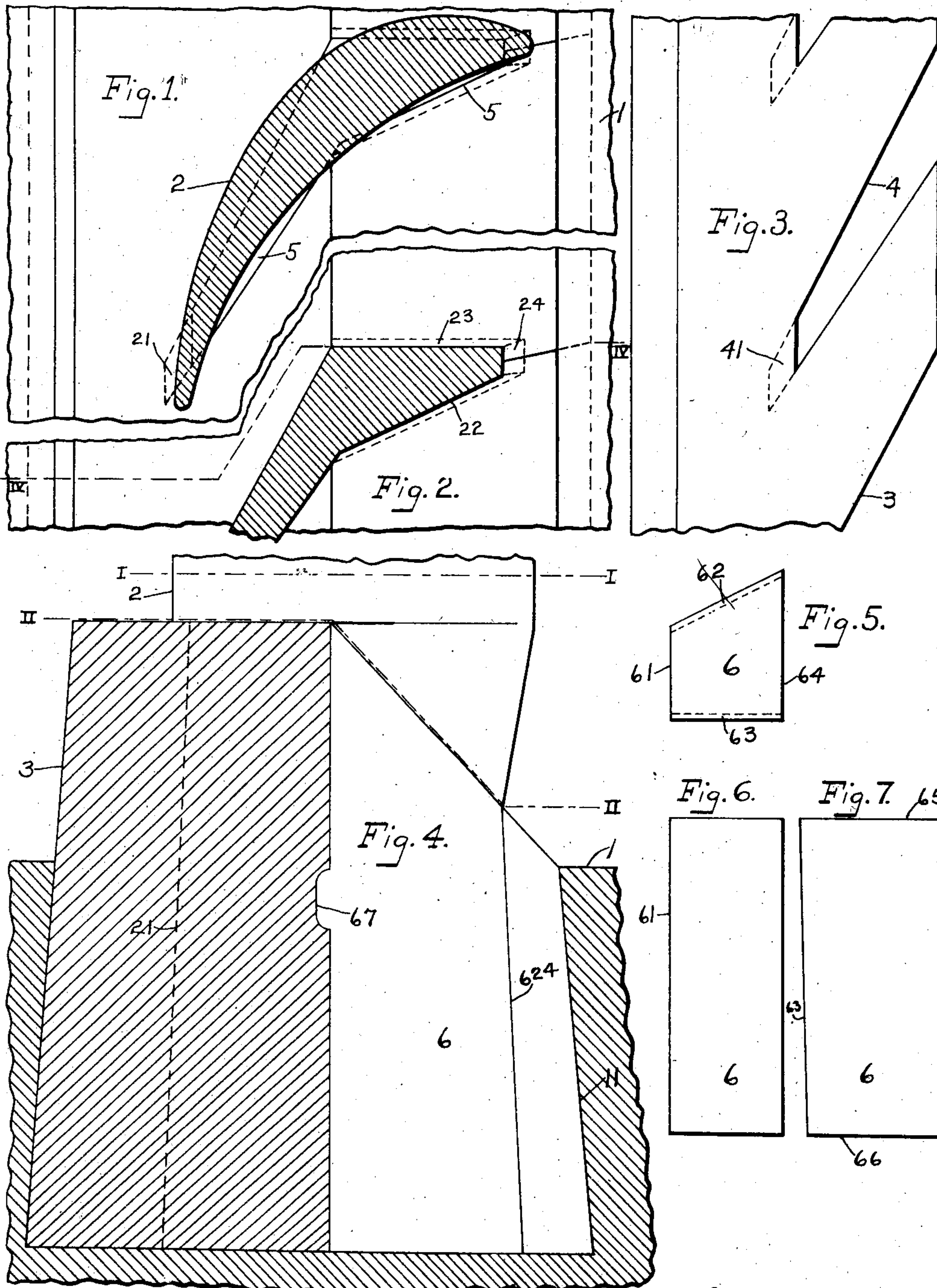


No. 834,788.

PATENTED OCT. 30, 1906.

J. WILSON.
STEAM TURBINE.
APPLICATION FILED APR. 16, 1906.



WITNESSES:

D. K. Allison
A. C. Bassett

James Wilson INVENTOR
BY
G. J. DeWitt ATTORNEY.

UNITED STATES PATENT OFFICE.

JAMES WILSON, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO ALLIS-CHALMERS COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF NEW JERSEY.

STEAM-TURBINE.

No. 834,788.

Specification of Letters Patent.

Patented Oct. 30, 1906.

Application filed April 16, 1906. Serial No. 311,831.

To all whom it may concern:

Be it known that I, JAMES WILSON, a subject of the King of Great Britain, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Steam-Turbines, of which the following is a specification.

The invention relates to steam-turbines, and has for its object the fastening of blades to a base, either cylinder or spindle—that is, either to the stator or rotor, as the case may be.

In the drawings, Figure 1 is a broken view of a blade-fastening looking longitudinally of the blade, the blade being in section on the line I I of Fig. 4. Fig. 2 is a similar view, the blade being in section on the line II II, Fig. 4. Fig. 3 is a similar view of the notched holding-strip. Fig. 4 is a broken sectional view of blade-fastening means, the section being taken on the line IV IV of Fig. 2. Figs. 5, 6, and 7 are three views, on a reduced scale, of the spacing-block.

Referring to the drawings, Figs. 1 to 4, inclusive, are shown on a greatly-enlarged scale. The base 1, which may be either the stator or rotor, has undercut grooves into which the blades 2 are fastened by the holding means. Generally speaking, this holding means consists of a notched holding-strip 3, the notches 4 being cut therein at an angle to one of its sides. The root 5 of the blade 2 being inserted into the notch 4 of the holding-strip 3, the latter is then placed in position in the groove of the base, and spacing-blocks 6 are thereafter inserted between the roots of the blades, the holding-strip 3, and the remaining wall of the groove in the base. These spacing-blocks are then calked so that they will flow into the undercut portions of the groove in the base and any other free space where the metal may flow.

In the fastening means as illustrated in the drawings the holding-strip 3 is shown as projecting considerably beyond the base 1. This projection is desirable in cases where baffling-strips are fastened to the ends of the rings of blades, the projection being approximately equal in length to the extent of the baffling-strip beyond the ends of the blades. The holding-strip need not necessarily, however, project beyond the base, and the projection is not used where the baffling-strips

are not necessary. The holding-strip is shown tapered at the side coacting with the wall of the groove in the base. This wall of the base-groove is correspondingly undercut.

In using the term "undercut" its meaning is intended to refer to any part having any portion within the portion which extends into the groove a maximum distance, extending a less distance into the groove.

The opposite side of the holding-strip 3 is without any taper and coacts with the straight face 61 of the spacing-block 6.

The blades 2 have roots formed by stamping or swaging. These roots are angular in cross-section and, generally speaking, resemble two wedges placed back to back. The plane in which these two wedges meet lies in the plane between the holding-strip 3 and the spacing-blocks 6 when the parts are assembled. The roots extend in the general direction of the blade, so as to avoid any great disturbance of metal in shaping the roots. The roots of the blades are tapered in a peculiar way. That wedge portion which extends into the notches 4 of the holding-strip 3 is tapered at its side edge 21. That portion of the roots which extends between two spacing-blocks is tapered along its side faces 22 23, as well as its side edge 24. The end 41 of the notch 4 is undercut, so as to coact with the tapered edge 21 of the blade-root. The sides 62 63 of the spacing-block 6 are undercut to coact with the tapered side faces 22 23, respectively, of the blade-root.

Spacing-block 6 is originally formed with two of its sides 61 64 parallel. The sides 62 63 are undercut, as just indicated. The top 65 of the spacing-block is preferably formed square, so as to be parallel with the bottom 66; but this is not essential. After being calked the block 6 assumes the shape shown in Figs. 1, 2, and 4. Here its top has become chamfered off at an angle. A projection 67 has been formed thereon by the flowing of the metal into a groove formed in the side of the holding-strip 3. The side 64 has become tapered by the flow of the metal so as to coact with the undercut wall 11 of the groove in the base 1, and the metal of the faces 63 62 of the block 6 has flowed so as to form an undercut wall 624 on the one block and a corresponding undercut wall on the adjacent block. This wall 624 and its adjacent un-

dercut wall coact with the tapered side edge 24 of the blade-root. A projection and groove may be formed upon the coacting walls of strip 3 and blocks 6 and extending in the direction of the length of the blades. This would prevent displacement of the block 6 relative to the strip 3 in a direction longitudinally of the holding-strip 3.

Instead of the notches 4 in the strip 3 being undercut at their ends they may be undercut along their sides and the blade-root correspondingly tapered. Also the spacing-blocks 6 may be formed with straight sides 62 63 instead of being undercut and so forming them as to be undercut and coact with the tapered edge 24 of the blade-root. In this case calking would only be necessary to cause the metal to flow under the side of the groove in the base and, if so constructed, into the notch in the holding-strip 3. A separate calking-strip may be necessary. The block may obviously also be formed so as to fit the blade-roots entirely without any calking and with straight sides 64, except, possibly, for locking ribs and grooves therein, as at 67, Fig. 4. A separate calking-strip may then be inserted between the sides 64 of the spacing-block 6 and the wall of the grooves in the base 1—such, for instance, as is described in the patent to Barth, No. 816,207, March 27, 1906. The side of the groove in the base 1, which would then coact with the calking-strip, would not necessarily have to be undercut, but might partake of the form of a straight side having a groove, as shown in the said patent.

The invention is equally applicable to radial or parallel flow turbines.

It will be seen that by this invention accurate spacing of the blades is insured; the blading material is disturbed to a minimum at the root of the blade; narrow grooves are enabled to be used in the base, thus minimizing amount of holding material; the blades are tapered along their width, as well as along their thickness; a uniform shape of blade-roots may be used, although the angle

of the blades may be changed, as the angle of the notches in the holding-strip and the angle of the side faces 62 63 of the spacing-blocks 50 may be made the variable quantities.

It is desired to be understood that the invention is not limited to the exact details of construction shown and described, for obvious modifications will occur to a person 55 skilled in the art.

It is claimed and desired to secure by Letters Patent—

1. A grooved base, a notched strip in the groove, blades in the notches, and blocks in the groove coacting with the strip and blades. 60
2. A grooved base, a strip in the groove having undercut notches, blades in the notches, and blocks in the groove coacting with the strip and blades. 65
3. A grooved base, a strip in the groove having undercut notches, blades in the notches, and blocks in the groove coacting with the strip and blades and having an undercut portion. 70
4. A grooved base, a notched strip in the groove, blades in the notches, and blocks in the groove coacting with the strip and blades and having an undercut portion. 75
5. A grooved base, a strip in the groove having notches undercut at their ends, blades in the notches coacting along an edge with the undercut notch ends, and blocks in the groove, said blocks having an undercut portion coacting with the side of the blade. 80
6. A base, a blade tapered across its thickness at one portion of the blade-root and across its width at a second portion of the blade-root, and means for fastening the blade to the base, comprising an element coacting with the first portion of the blade-root and a separate element coacting with the second portion of the blade-root. 85

In testimony whereof I affix my signature in presence of two witnesses.

JAMES WILSON.

Witnesses:

G. F. DE WEIN,
JOHN DAY, Jr.