H. H. WAIT.

TURBINE BLADE.

APPLICATION FILED MAR. 19, 1910.

961,329.

Patented June 14, 1910.

Fig. 3.

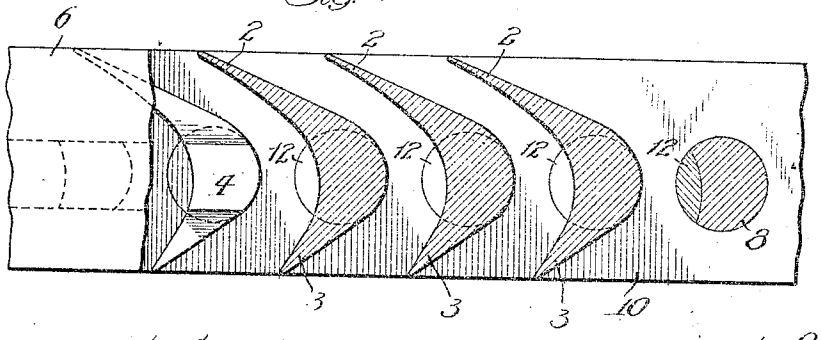


Fig. 1

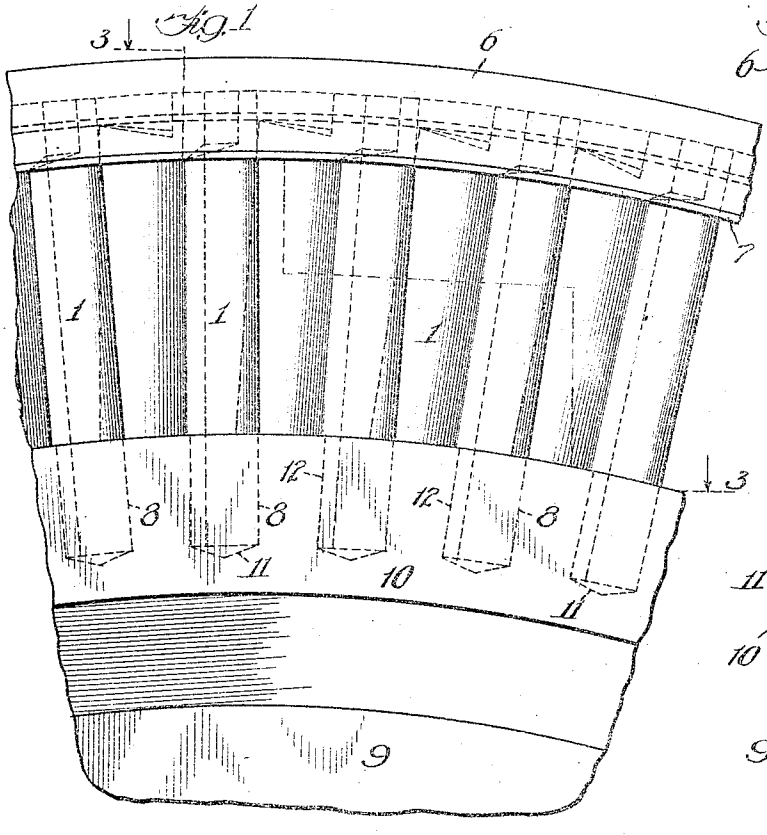
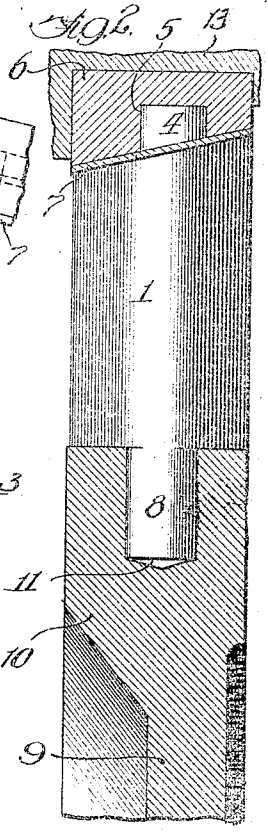


Fig. 2.



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TURBINE-BLADE.

961,329. Specification of Letters Patent. Patented June 14, 1910.

Application filed March 19, 1910. Serial No. 550,462.

To all whom it may concern:

Be it known that I, HENRY H. WAIT, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Turbine-Blades, of which the following is a full, clear, concise, and exact description.

This invention relates to the structure and mode of mounting the stationary guide blades and diaphragms of fluid pressure turbines. Its object is to provide a blade of simple construction, which is cheap to manufacture and which can be readily and accurately assembled to provide passages that will guide the fluid so as to impinge in a suitable manner upon the usual sets of rotary turbine blades.

A further object is to secure, in a simple manner, the outer ends of the stationary blades to the turbine casing and their inner ends to the stationary diaphragm so that said diaphragm is firmly and securely held in place and will not be displaced by reason of the difference in pressure to which the opposite sides of the diaphragms are subjected.

My invention consists of a turbine blade of concavo-convex cross-section having its exit tip more elongated than its entrance tip and having its opposite ends formed with a root and a tang adapted, respectively, to fit in a socket in the periphery of the diaphragm disk and in a channel or groove in a supporting ring which surrounds the outer ends of said blades.

Another feature of my invention consists in providing a cover plate for the inner face of the aforementioned grooved ring, said cover plate being provided with perforations to receive the outer tangs of the blades.

In the preferred embodiment of my invention the roots of the blades have the cross-section of a circle less a curved segment corresponding to the concave side of said blades; said roots fitting in circular sockets in the periphery of the stationary diaphragm, the space in said circular sockets not occupied by said tangs being filled by some ductile material.

These and other features of my invention may be more readily understood by reference to the accompanying drawings, in which,

Figure 1 is a fragmentary view in side elevation of a stationary diaphragm, the outer retaining ring and the interposed blades; Fig. 2 is a radial section between adjoining blades, showing a blade in front elevation; and Fig. 3 is an enlarged view on the broken line 3—3 of Fig. 1.

Similar characters of reference refer to similar parts throughout the several views.

The guide portions 1 of the turbine blades of my invention are of concavo-convex cross-section, the exit tips 2 thereof being more elongated than the entrance tips 3. Said blades at their outer ends are provided with tangs 4 having straight, parallel sides adapted to be received in an annular channel or groove 5 in the supporting ring 6. The inner face of the supporting ring is covered by a cover plate 7 which is provided with a series of openings or perforations corresponding to the cross-sectional contour of the tangs 4, said tangs thus extending through the cover plate 7 into the channel 5. The cover plate 7 thus lies between the body of the blade 1 and the retaining ring 6 and serves to cover over those portions of the channel 5 which are not occupied by the tangs 4.

The inner ends of the blades 1 are provided with roots 8 which are preferably of a circular cross-section less a convexo-convex segment at the front surface of the root, the concave surface of said root being a longitudinal prolongation of the concave surface of the body of the blade.

The stationary diaphragm or disk 9 is preferably provided with a rim 10 of increased axial thickness, said rim having in its periphery a series of radial, circular sockets 11 which are adapted to receive the blade roots 8. After the blade roots are set in place in said sockets 11, they are held firmly secured to the diaphragm by calking in malleable metal in the concavity on the front of the blade root, such calking or filler pieces being indicated at 12 in Fig. 3.

The retaining ring 6 may be secured to the inner surface of the turbine casing 13 in any suitable manner, as for example, it may fit in a channel formed in the casing, as shown in Fig. 2. The blades 1 being thus securely fastened to the ring 6 at their outer ends and to the diaphragm 9 at their inner ends, said diaphragm is thereby firmly held against displacement and no other support therefor is required. By reason of this structure and arrangement the stationary

guide blades may be arranged around the entire periphery of the diaphragm.

Having thus described my invention, what I claim is:

1. In a fluid pressure turbine, the combination with a stationary diaphragm, guide blades secured to the periphery of said diaphragm, said guide blades having each a tang on its outer end, and a supporting ring having a channel for receiving said tangs.

2. In a fluid pressure turbine, the combination with a stationary diaphragm, guide blades secured to the periphery of said diaphragm, said guide blades having each a tang on its outer end, a supporting ring having a channel for receiving said tangs, and a cover plate overlying said channel, said cover plate being provided with perforations through which said tangs extend into said channel.

3. In a fluid pressure turbine, the combination with a stationary diaphragm having a series of radial sockets about its periphery, guide blades having roots secured within said sockets, and a supporting ring having a channel for receiving the outer ends of said blades.

4. In a fluid pressure turbine, the combination with a stationary diaphragm having a series of radial sockets of circular cross-section in its periphery, guide blades having roots of concavo-convex cross-section fitting in said sockets, the convex surface of said roots corresponding to the curvature of the walls of said sockets and fitting therein, and filler pieces fitting in said sockets upon the concave face of said root.

5. In a fluid pressure turbine, the combination with a stationary diaphragm having a series of radial sockets of circular cross-section in its periphery, guide blades having roots of concavo-convex cross-section fitting in said sockets, the convex surface of said roots corresponding to the curvature of the walls of said sockets and fitting therein, filler pieces fitting in said sockets upon the concave face of said root, a supporting ring having a channel for receiving the outer ends of said blades, and a cover plate overlying said channel, said cover plate being provided with perforations through which said outer ends of the blades project into said channel.

6. A turbine blade comprising a suitable guide portion, a root of concavo-convex cross-section, the convex surface of such root being the arc of a circle and the concave surface thereof being a longitudinal prolongation of the concave surface of said body portion of the blade, and a tang at the outer end of said blade having parallel plane side faces.

In witness whereof, I hereunto subscribe my name this seventeenth day of March, A. D., 1910.

HENRY H. WAIT.

Witnesses:
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GEO. C. DAVISON.