

P. WAGNER.
 BUCKET WHEEL.
 APPLICATION FILED NOV. 10, 1910.

1,021,222.

Patented Mar. 26, 1912.

Fig. 1.

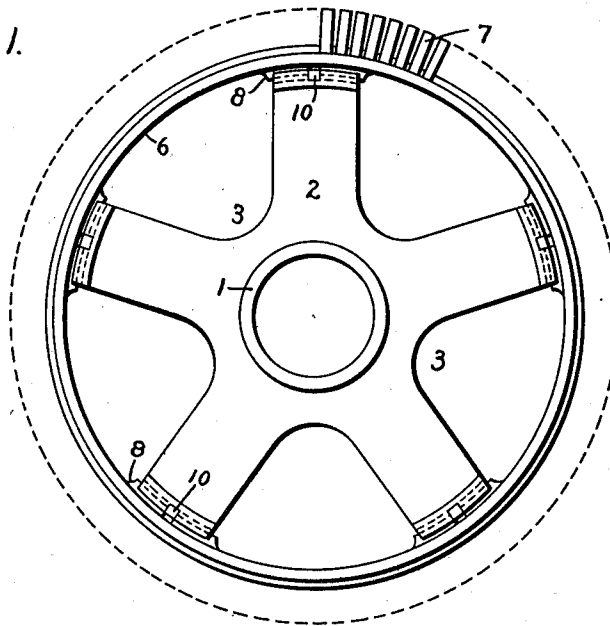


Fig. 3.

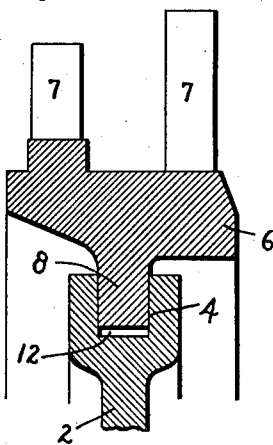


Fig. 4.

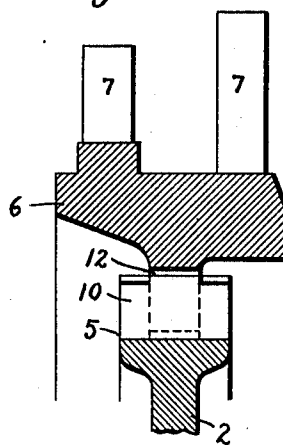
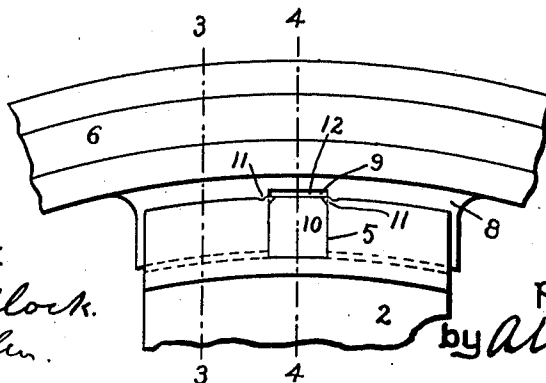


Fig. 2.



Witnesses:
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UNITED STATES PATENT OFFICE.

PAUL WAGNER, OF CHARLOTTENBURG, GERMANY, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

BUCKET-WHEEL.

1,021,222.

Specification of Letters Patent.

Patented Mar. 26, 1912.

Application filed November 10, 1910. Serial No. 591,607.

To all whom it may concern:

Be it known that I, PAUL WAGNER, a subject of the King of Prussia, residing at Charlottenburg, Germany, have invented certain new and useful Improvements in Bucket-Wheels, of which the following is a specification.

This invention relates to elastic-fluid turbines, and its object is to provide a bucket wheel in which unequal expansion of some parts due to heat can produce no harmful strains in other parts.

It is well known that bucket wheels have a tendency to become distorted in operation by reason of the varying temperatures to which they are subjected. The cause of these changes of form lies mainly in the occurrence of partial expansions of certain parts, whose full effect is opposed by adjacent parts. Any distortion of the wheel affects its balance and may injure the buckets by causing them to rub against stationary parts of the machine. I propose to obviate these difficulties by dividing the wheel into independent concentric parts and so connecting them as to insure the transmission to the shaft of the torque exerted by the buckets, while at the same time preserving free relative movement between said parts in a radial direction.

In the accompanying drawing, which shows one embodiment of my invention, Figure 1 is a side elevation of my improved bucket wheel; Fig. 2 is a side elevation on a larger scale of the joint between an arm of the spider and the rim; and Figs. 3 and 4 are cross sections on the lines 3—3, 4—4, Fig. 2, respectively.

The hub 1 has a web 2 which is provided with peripheral notches 3. In the drawing these are quite deep, so that the web assumes the form of a spider. The edge of this web between the notches is provided with a circumferential channel 4, intersected at suitable points by transverse grooves 5.

The rim 6 of the wheel is separate from the web and carries the buckets 7. On its inner surface it is provided with a plurality of inwardly projecting longitudinal ribs 8, adapted to drop into the notches 3 when the web and rim are assembled, and then to be interengaged with the channels 4 by a partial rotation of the rim. This mode of connection maintains the web and the rim in the same plane of revolution. The ribs have

transverse grooves 9 adapted to register with the grooves 5. Locking devices connect the web and the rim, such as keys 10, driven through said grooves 5 and 9 and secured in place in any suitable manner, as for instance by peening the metal of the web over beveled end portions of said key, as shown at 11. These keys transmit the torque of the buckets on the rim to the web and thence to the shaft of the turbine.

There is a small space 12 between the inner edge of the ribs 8 and the bottom of the channels 4 and also between the top of the keys 10 and the outer side of the transverse grooves 5. These spaces permit a free relative movement of the web and the rim in a radial direction under the influence of expansion and contraction. But by securing the rim to the web at several points of attachment, no eccentricity of the rim with respect to the shaft will occur.

Instead of making the connection between the web and the rim near the latter, it may, if desired, be made nearer the hub. Moreover, a similar connection may be made between the web and the hub without departing from the spirit of my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. A bucket wheel for an elastic-fluid turbine having a web and a rim separate from each other, and keys secured in the web that are in movable engagement with the rim so that the parts of the wheel are capable of relative movement in a radial direction.

2. In a bucket wheel for turbines, the combination of a rim having a plurality of inwardly projecting longitudinal ribs provided with transverse grooves, a web having a plurality of arms provided with channels at their outer ends that receive the ribs, and keys secured in the ends of the arms that extend across the channels and are in sliding engagement with the grooves in the ribs so as to permit the rim to move in a radial direction while causing the web and the rim to rotate together.

3. A bucket wheel for an elastic-fluid turbine having a web and a rim provided with interengaging channels and ribs lying in planes of revolution and having a certain radial clearance between them.

4. A bucket wheel for an elastic-fluid turbine having a web and a bucket-carrying

rim provided with interengaging channels and ribs, and transverse locking devices for transmitting the torque of the rim to the web.

5 5. A bucket wheel for an elastic-fluid turbine having a notched web provided with channels in its periphery and having grooves transverse to said channels, a
10 bucket-carrying rim having longitudinal ribs engaging the channels and provided with transverse grooves, and keys adapted to fit in said grooves and transmit the torque of the rim to said web.

15 6. A bucket wheel for an elastic-fluid turbine having a notched web provided with channels in its periphery, a bucket-carrying rim provided with longitudinal ribs adapted to engage in said channels, leaving a radial clearance between them, and trans-
20 verse keys secured to said web and transmitting the torque of the rim thereto.

7. In a bucket wheel for turbines, the combination of a rim having a plurality of inwardly projecting ribs, a web having a plurality of arms provided with channels 25 in their outer ends that receive the ribs, the outer diameter of the ends of the arms being greater than the inner diameter of the ribs, and devices secured to the ends of the arms in transverse relation to the channels 30 and ribs, said devices being in sliding engagement with the ribs so as to permit the web and the rim to move radially relative to each other while causing them to rotate 35 together.

In witness whereof, I have hereunto set my hand this 25th day of October, 1910.

PAUL WAGNER.

Witnesses:

ERICH EBERLEE,

GUSTAV HULBROCK.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."