

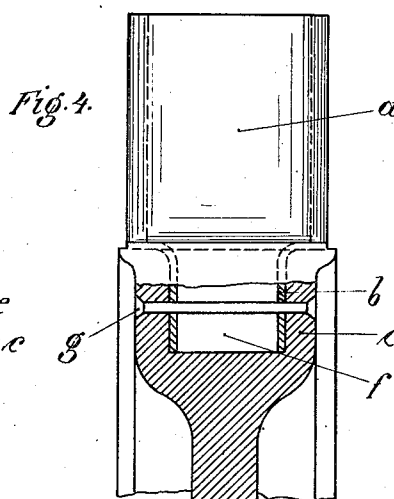
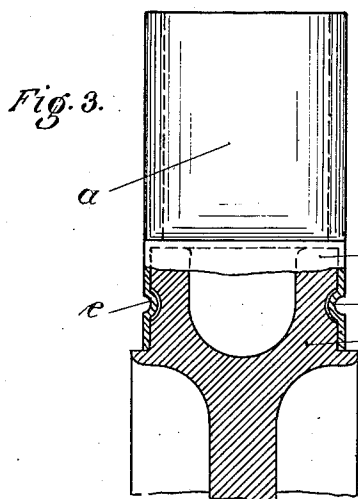
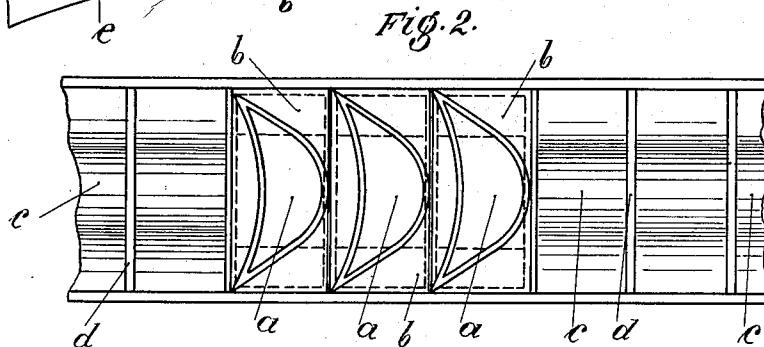
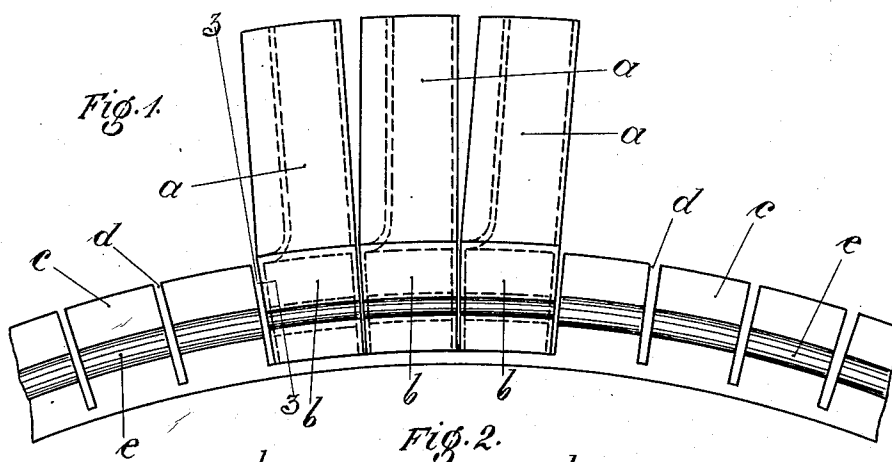
No. 849,992.

PATENTED APR. 9, 1907.

J. R. FRIKART & O. JAEGER.

TURBINE BLADE.

APPLICATION FILED JUNE 22, 1906.



Witnesses:

*E. O. Niedebrand*  
*N. Reynolds.*

Inventors:

*Johann Rudolf Frikart*  
*and Oskar Jaeger,*  
*by Georgie Massie*  
*attorney*

# UNITED STATES PATENT OFFICE.

JOHANN RUDOLF FRIKART AND OSKAR JAEGER, OF MUNICH, GERMANY.

## TURBINE-BLADE.

No. 849,992.

Specification of Letters Patent.

Patented April 9, 1907.

Application filed June 22, 1906. Serial No. 322,876.

*To all whom it may concern:*

Be it known that we, JOHANN RUDOLF FRIKART, engineer, a citizen of Switzerland, and OSKAR JAEGER, engineer, a citizen of Germany, residing at Munich, Bavaria, Germany, have invented certain new and useful Improvements in Turbine-Blades; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improved turbine-blade and means for securing the same; and its object is to provide simple and effective means for securing hollow blades of the crescent shaped cross-section type to the turbine-wheel.

The details of the invention, as hereinafter more fully described and as particularly set out in the accompanying claims, will be readily understood by reference to the accompanying drawings, in which is illustrated a preferred embodiment of the invention with modifications.

In the drawings, Figure 1 is a side elevation of a fragment of a wheel-rim with some blades in position. Fig. 2 is a plan of Fig. 1. Fig. 3 is a cross-section on the line 3 3 of Fig. 1. Fig. 4 is a cross-section of a modification.

The crescent-shaped hollow blade *a* is preferably formed in one piece with its four-cornered foot *b* by pressing from a pipe or by bending of sheet metal to give the configuration shown, in which the foot forms a four-cornered box-like shell with the upwardly-extending crescent-shaped blade. The rim *c* of the wheel is provided at intervals with transverse slots *d*, dividing the rim of the wheel into a plurality of four-cornered sections of a size adapted to fit snugly within the hollow foot *b*. Around the two sides of the wheel-rim a circular groove *e* is provided, and the blade-foot *b* is placed over its section and the metal of the same is pressed into the groove *e* when the blade is in position, the latter being thus securely fastened to the rim.

In Fig. 4 a modified form of attachment is shown according to which the wheel is provided with a circumferential groove *f*, the foot *b* of the blade being made of a size to fit

within said groove. In this case a bolt *g*, extending through the wheel-rim and the blade, holds the two snugly against relative displacement.

It will be obvious that this invention is applicable as well to radial or axial turbines and that slight modifications of the details would adapt the same for a wide range of use without departing from the spirit and scope of the invention.

Having thus described the invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination with a turbine-wheel, of blades having a tubular foot, and means for securing the foot to the rim of the wheel.

2. The combination with a turbine-wheel, of blades having a tubular foot arranged to embrace a portion of the wheel-rim, and means for securing the foot to the rim of the wheel.

3. The combination, with a turbine-wheel, of blades having a tubular foot arranged in telescopic relation to a portion of the wheel-rim.

4. The combination, with a turbine-wheel, of blades having a hollow foot of angular cross-section, and means for securing the foot to the rim of the wheel.

5. The combination, with a turbine-wheel, of blades having a hollow foot of angular cross-section arranged to embrace a portion of the wheel-rim, and means for securing the foot to the rim.

6. The combination with a turbine-wheel provided on the side of its rim with a circular groove, of blades having a hollow foot arranged to embrace a portion of the wheel-rim and provided with an inwardly-extending crease to engage the groove.

7. The combination with a turbine-wheel having its rim divided into sections, of blades each having a hollow foot arranged to receive a section of the rim.

8. The combination with a turbine-wheel having its rim divided into sections and provided on its sides with circular grooves, of blades each having a hollow foot arranged to receive a section of the rim the material of said foot being forced into the said grooves at the sides.

9: The combination with a turbine-wheel  
having its rim divided into sections and pro-  
vided on each side with a circular groove, of  
crescent-shaped hollow blades each having a  
5 four-cornered hollow foot arranged to receive  
a section of the rim, the material of the said  
foot being forced into the said grooves at the  
sides.

In testimony whereof we hereunto affix  
our signatures in the presence of two wit- 10  
nesses.

JOHANN RUDOLF FRIKART.  
OSKAR JAEGER.

Witnesses:

ULYSSES J. BYWATER,  
GEORG KÖRNER.