No. 779,910. PATENTED JAN. 10, 1905.

C. G. CURTIS.

ELASTIC FLUID TURBINE.

APPLICATION FILED AUG. 1, 1902.

Fig. 1

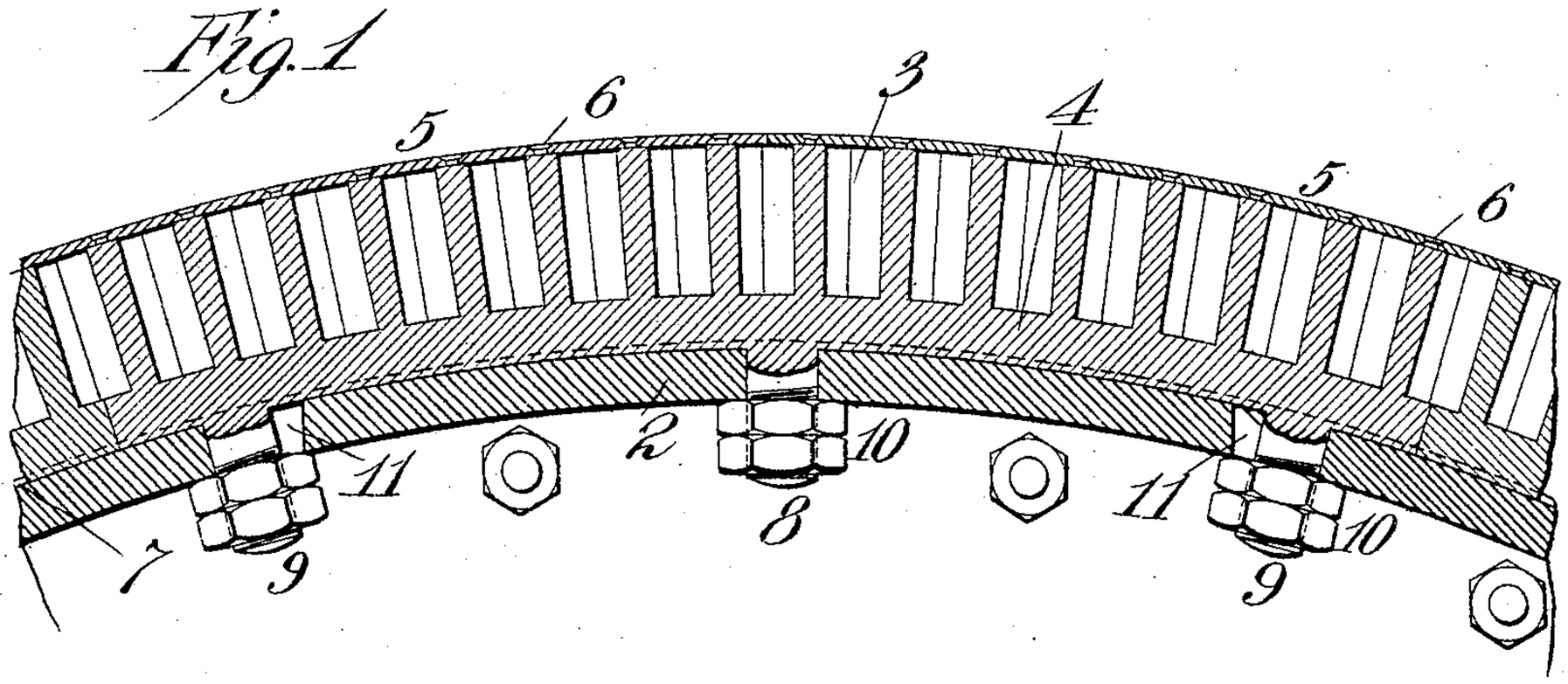
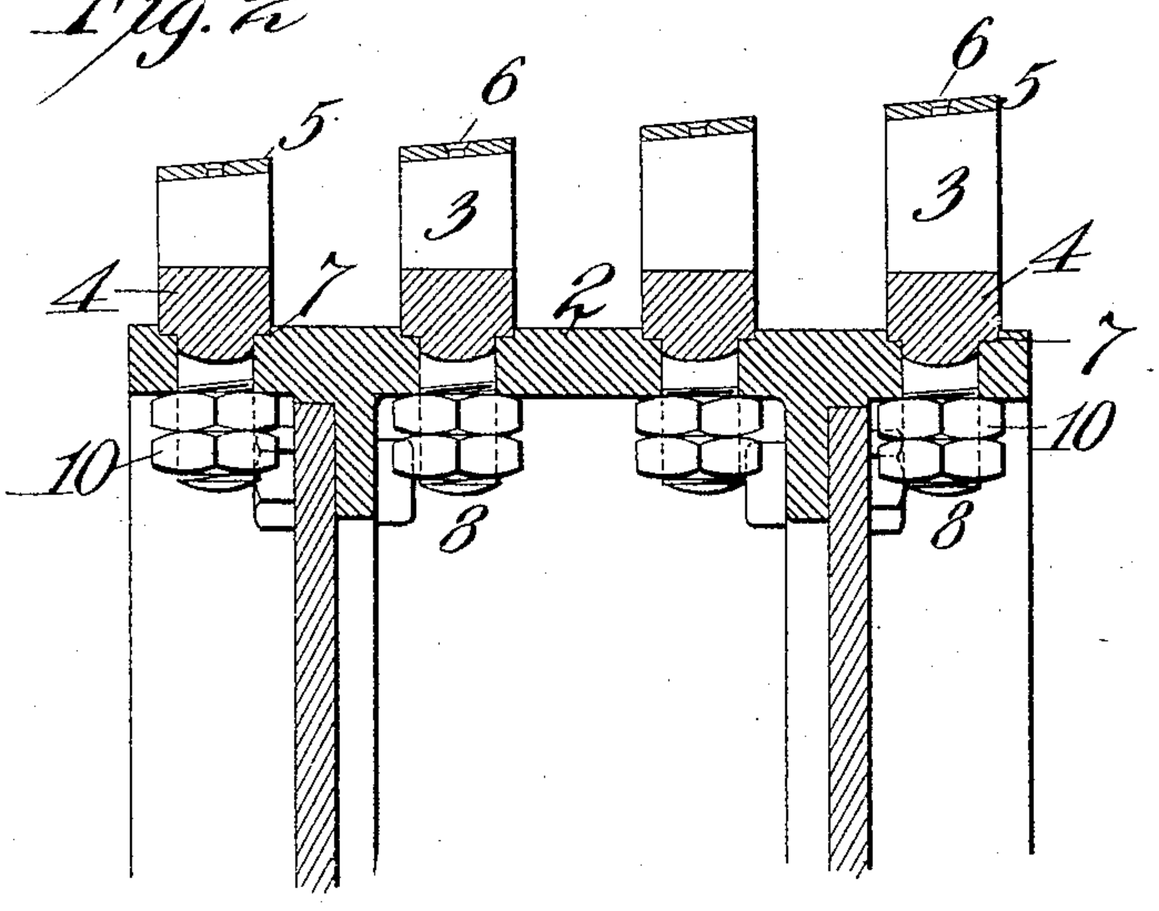


Fig. 2



Witnesses:

Jas. F. Coleman

Jno. Robt Taylor

Inventor

Charles G. Curtis

By Dyer Edmunds & Dyer

Attorneys

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No. 779,910. Patented January 10, 1905.

UNITED STATES PATENT OFFICE.

CHARLES G. CURTIS, OF NEW YORK, N. Y.

ELASTIC-FLUID TURBINE.

SPECIFICATION forming part of Letters Patent No. 779,910, dated January 10, 1905.

Application filed August 1, 1902. Serial No. 117,958.

To all whom it may concern:

Be it known that I, CHARLES G. CURTIS, a citizen of the United States, residing in the borough of Manhattan, city of New York, State of New York, have invented a certain new and useful Improvement in Elastic-Fluid Turbines, of which the following is a description.

The object I have in view is to produce a simple and effective construction for the movable vanes of elastic-fluid turbines and for securing them in position upon the turbine-wheel.

In the accompanying drawings, Figure 1 is a radial section at right angles to the shaft through the wheel-rim and centrally through a set of movable vanes, and Fig. 2 is a radial cross-section through the wheel-rim and the several sets of movable vanes carried thereby.

1 1 are the disks which form the web of the wheel, and 2 is the wheel-rim secured to these disks by means of bolts. Upon the wheel-rim are mounted the desired number of sets of movable vanes 3. The vanes of each set are cut in the outer surfaces of curved blocks, the solid inner portions of these blocks forming vane-bases 4. Bands 5 encircle the outer ends of the vanes and are secured thereto by studs 6, formed integral with the ends of the vanes. The vane-bases 4 have a rectangular cross-section and are set in channels 7, cut in the surface of the wheel-rim. Each set of movable vanes is made up of a number of short sections placed end to end in one of the channels 7 in the wheel-rim and completely surrounding the wheel-rim. Each one of these sections has projecting inwardly from the base 4 a central stud 8 and one or more other studs, 9, on each side of the center. The studs 8 and 9 are formed integral with the vane-base 4. These studs 8 and 9 project through holes in the wheel-rim and have their inner ends threaded to receive nuts 10, by means of which the vane-base is firmly secured to the wheel-rim. The hole through which the central stud 8 passes is made just large enough to accommodate the stud; but the holes in the wheel-rim which receive the studs 9, placed on opposite sides of the center of the vane-section, are enlarged on their inner sides, as shown at 11, so as to permit the studs 9 to pass through them. The studs 9 project inwardly on radial lines, as does the stud 8, and in placing the curved vane-section on the wheel-rim the holes which receive the studs 9 must be cut away on their inner sides to permit these studs to pass through them. After the vane-section is placed in position in the channel in the wheel-rim, with the studs 8 and 9 projecting through to the inner side of the wheel-rim, the nuts 10 are turned upon the studs, drawing the base of the vane-section into the channel in the wheel-rim and securing it rigidly in place.

What I claim is—

1. In an elastic-fluid turbine, the combination with the wheel-rim, of a vane-section having a curved base carrying outwardly-projecting vanes, and studs formed integral with said base and projecting radially from the concave inner face thereof, said studs passing through said wheel-rim for securing the vane-section in position thereon, substantially as set forth.

2. In an elastic-fluid turbine, the combination with the wheel-rim, of a vane-section having a curved base and vanes projecting outwardly therefrom, and studs formed integral with the vane-base and projecting inwardly therefrom on radial lines through holes in the vane-base, the holes which receive the studs located away from the center of the vane-base being enlarged to permit such studs to pass therethrough, substantially as set forth.

3. In an elastic-fluid turbine, the combination with the wheel-rim, of a curved vane-base, vanes cut integral with said base and projecting outwardly therefrom, and studs formed integral with said base and projecting radially from the inner concave face thereof through holes in the wheel-rim for securing the vane-base to the wheel-rim, substantially as set forth.

4. In an elastic-fluid turbine, the combination with the wheel-rim, of a curved vane-base, vanes cut integral with said base and projecting outwardly therefrom, studs formed integral with the vane-base and projecting radially from the inner concave face thereof through holes in the wheel-rim, and an encir-

cling band secured to the outer ends of the vanes by studs formed integral with the vanes, substantially as set forth.

5. In an elastic-fluid turbine, the combination with the wheel-rim, of a curved vane-base made in sections, vanes cut integral with said base and projecting outwardly therefrom, and studs formed integral with said base and projecting radially from the inner concave face thereof through holes in the wheel-rim for securing the vane-base to the wheel-rim, substantially as set forth.

6. In an elastic-fluid turbine, the combination with the wheel-rim having channels therein, of a curved vane-base made in sections, vanes cut integral with said base and projecting outwardly therefrom and studs formed integral with said base and projecting radially from the inner concave face thereof through holes in the wheel-rim for securing the vane-base to the channels in the wheel-rim, substantially as set forth.

This specification signed and witnessed this 25th day of July, 1902.

CHARLES G. CURTIS.

Witnesses:

JNO. ROBT. TAYLOR,

JOHN LOUIS LOTSCH.