H. S. LOUD & J. PANTER.

TURBINE BLADE AND VANE.

APPLICATION FILED JULY 14, 1909.

953,016. **Patented Mar. 22, 1910.**

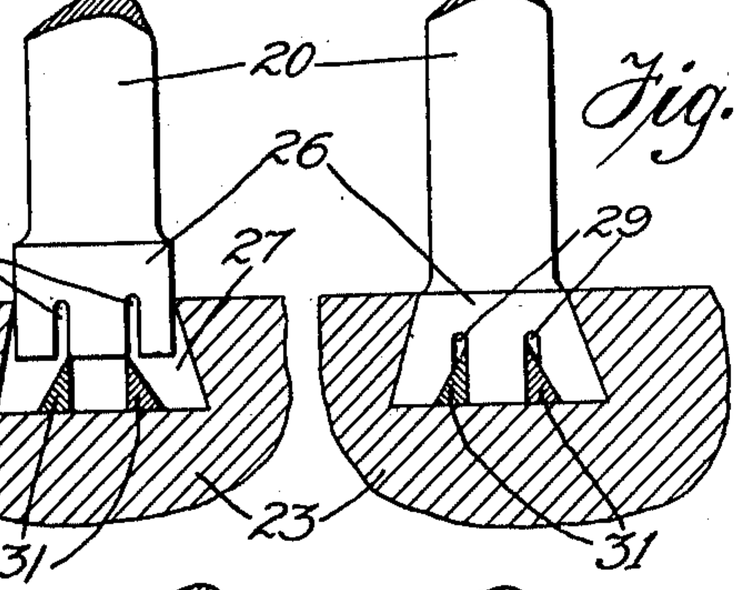

Fig. 2.

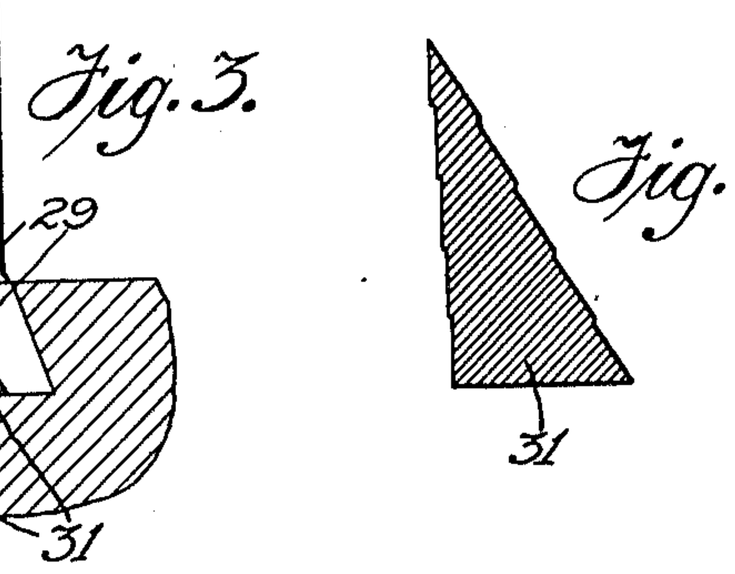

Fig. 3.

Fig. 6.

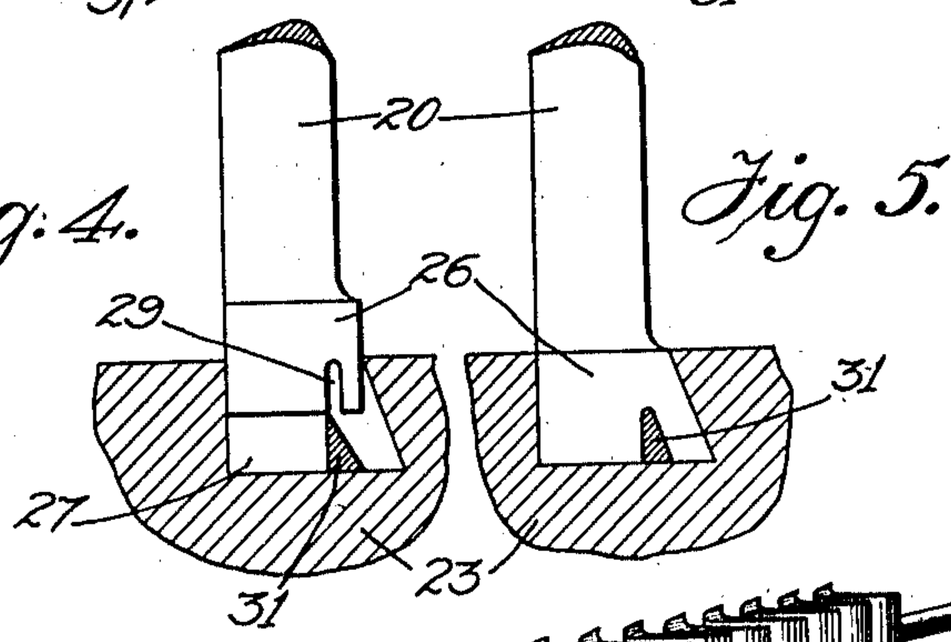

Fig. 4.

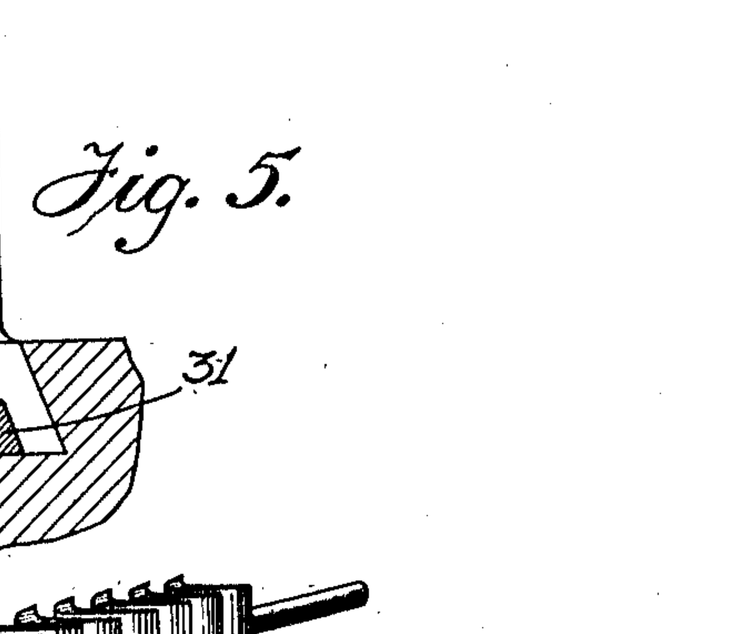

Fig. 5.

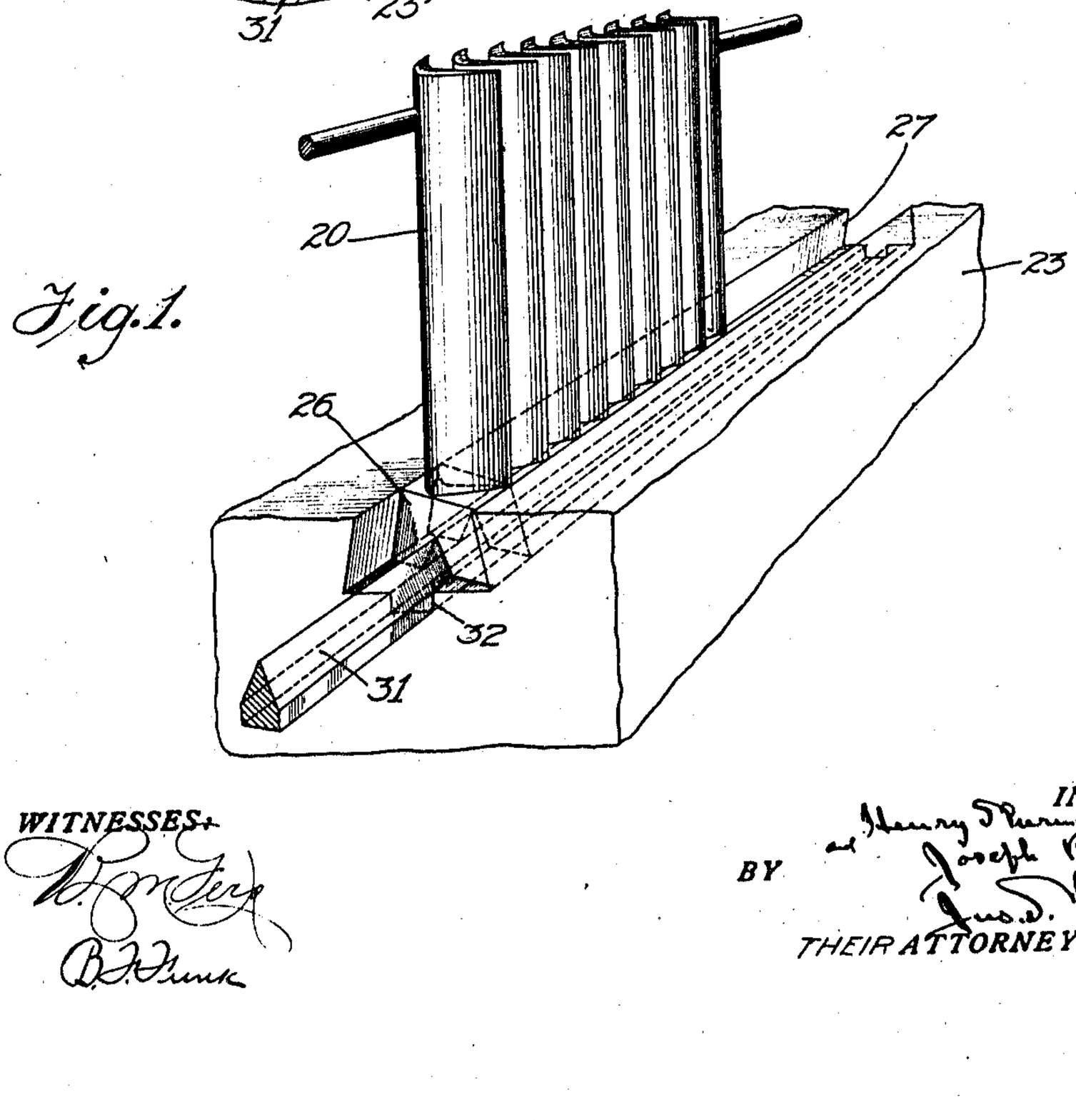

Fig. 1.

WITNESSES:

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UNITED STATES PATENT OFFICE.

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TURBINE BLADE AND VANE.

953,016. Specification of Letters Patent. **Patented Mar. 22, 1910.**

Original application filed April 20, 1907, Serial No. 369,283. Divided and this application filed July 14, 1909. Serial No. 507,559.

To all whom it may concern:

Be it known that we, HENRY SHERMAN LOUD and JOSEPH PANTER, citizens of the United States, and residents, respectively, of Morristown, Morris county, in the State of New Jersey, United States of America, and Stretford, Manchester, in the county of Lancaster, England, have made a new and useful Invention in Turbine Blades and Vanes, of which the following is a specification.

This invention relates to elastic fluid turbines and more particularly to turbine blades and vanes, and is a division of an application filed by us April 20th, 1907, and given Serial No. 369,283.

The object of the invention is to produce effective means for mounting blades upon a rotor and vanes upon a stator element of the turbine.

The rotary working elements of a turbine which receive the working fluid are ordinarily termed buckets or blades, and the stationary directing elements are termed vanes.

Our invention relates to means which are equally effective in mounting the blades on the rotor element or vanes in the stator element, and for that reason and also for the sake of brevity we will hereinafter use the term rotating blades and the stationary vanes.

In the drawing accompanying this application and forming a part thereof: Figure 1 is a perspective view of a plurality of blades mounted in a portion of a blade-holding element. Figs. 2 to 5 inclusive, are detail views of modifications of our invention, and Fig. 6 is a sectional view of a detail of our invention.

In each of the figures the blade mounting element is provided with grooves or slots into which the ends of the blades may be introduced and spread apart to be locked in the grooves by being distorted. Each blade 20, is provided with a distortable end which is adapted to more or less snugly fit into the groove 27, formed in the blade-mounting elements 23.

Referring to Figs. 2 and 3: it will be observed that each slot or groove 27, is provided with two expansion wedges 31, and the swaged end 26 of each blade is provided with two slots 29. The blade is secured to the mounting element 23 by the wedge 31, which expands or distorts the blades so that they will fit into the undercut portions of the slots 27. In forcing the blades into place by the wedges 31 in the slots 27 the swaged ends are caused to expand into gripping contact with the undercut walls so that any liability of the blades pulling out will be prevented.

In Figs. 4 and 5 a modification is shown in which only one side of the slot 27 is undercut and in which but one expansion strip or wedge piece 31, is utilized. The swaged end of the blade 26 is provided with a slot 29, but the slot is located at one side of the mounting portion. By such an arrangement the blade is secured in place by forcing the portion of the swaged end into gripping contact with the undercut wall of the slot through the agency of the expansion strip 31. With this arrangement the major portion of the swaged end is undistorted.

In Fig. 6 a sectional elevation of an expansion strip is shown. The strip is provided with longitudinally extending ridges which cause it to more firmly grip the adjacent faces of the swaged end portions of the blades.

In Fig. 1 the invention is shown in which the wedge shaped member 31 is mounted in a slot 32, which is cut in the inner face of the slot 27. The swaged portions 26 of the blades are of such shape that when the blades are in place and secured to the member 23 by any one of the methods disclosed, the working faces of the blades will be turned to the correct angle for efficient operation, thereby overcoming the necessity of gaging the blades.

In all of the forms shown, the ends of the blades are secured in place by being expanded over an expansion piece or strip which is located in the bottom of the recess

formed in the mounting element of the turbine.

What we claim is:

In combination in an elastic fluid turbine, a blade holding element, a mounting element provided with a blade-holding slot, a blade provided with a swaged mounting portion located within said slot, a groove at the bottom of said slot and an agent, located in said groove and coöperating with said swaged mounting portion to secure said blade into said slot.

In witness whereof, I have hereunto subscribed my name this 15th day of June 1909.

HENRY SHERMAN LOUD.

Witnesses:

WM. H. CAPEL,

ROBERT HARRISON.

In witness whereof, I have hereunto subscribed my name this 2nd day of July 1909.

JOSEPH PANTER.

Witnesses:

N. H. SHEARD,

JAS. STEWART BROADFOOT.