April 15 , 1924. 1,490,755

H. L. WIRT

ELASTIC FLUID TURBINE

Filed Sept. 12 . 1922

Fig.1.

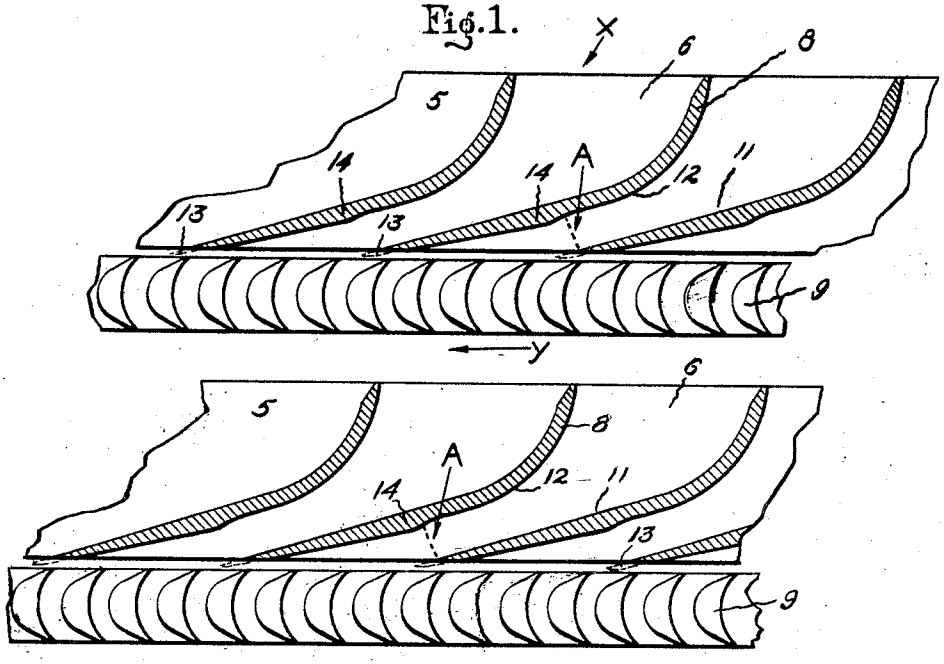
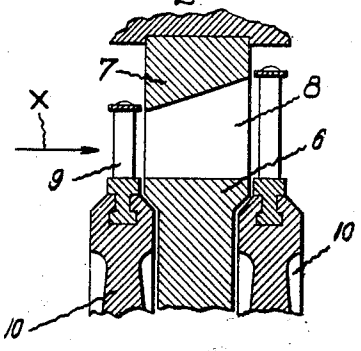


Fig.2.



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Patented Apr. 15, 1924. 1,490,755

UNITED STATES PATENT OFFICE.

HARRISON LORING WIRT, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELASTIC-FLUID TURBINE.

Application filed September 12, 1922. Serial No. 587,809.

To all whom it may concern:

Be it known that I, HARRISON L. WIRT, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Elastic-Fluid Turbines, of which the following is a specification.

The present invention relates to elastic fluid turbines and particularly to the stationary fluid directing elements of such turbines. The object of my invention is to provide an improved fluid directing element structure by the use of which a better efficiency is obtained than with structures heretofore in common use, and for a consideration of what I believe to be novel and my invention attention is directed to the accompanying description and the claims appended thereto.

While my invention is applicable to turbines of either the impulse type or the reaction type it is especially well adapted for use with the former and I have accordingly illustrated and described it as applied to an impulse turbine. It is to be understood, however, that the invention is not limited thereto.

In the drawing, Fig. 1 is a diagrammatic view showing a cylindrical section of a turbine structure having fluid directing elements embodying my invention, the passages being brought into the same horizontal plane, and Fig. 2 is a detail radial sectional view.

Referring to the drawing, 5 indicates a series of fluid-directing passages usually termed nozzles in connection with an impulse machine. These nozzles are defined by radially inner and outer walls 6 and 7 and nozzle plates or partitions 8. Walls 6 and 7 are usually in the form of annular members with the nozzle partitions arranged between them and suitably connected thereto. Adjacent the nozzle partitions are rings of buckets or blades 9 carried by the rotor element of the turbine. In the present instance they are shown as being carried by wheels 10. Elastic fluid enters the nozzles as indicated by the arrow X and is directed by the nozzles against the blades or buckets, the direction of rotation being indicated by the arrow Y. In the following specification, I term the nozzle-defining surface 11 the rear wall of the nozzle and the nozzle-defining surface 12 the front wall of the nozzle.

The structure and operation of a turbine as described above is well understood and the arrangement is to be taken as typical of any suitable turbine structure.

Between the exit ends of the fluid-directing elements, plates or partitions and the inlet edges of the rotating blades or buckets there is always a clearance which may be of the order of 0.20 inches for example, and it will be clear that there are spaces represented by continuations of the plates or partitions up to the entrance edges of the blades or buckets to which no elastic fluid passes directly from the fluid-directing passages. In the drawing, these spaces are represented by the areas contained within the dotted parallelograms 13.

More particularly the object of my invention is to provide a structure wherein the elastic fluid in leaving the fluid-directing passages will be caused to fill the spaces 13 so there will be a substantially continuous solid stream of elastic fluid entering the blades or buckets. To this end I provide the front wall 12 of each fluid-directing passage with a rounded projection 14 located preferably just beyond the plane of the exit end of the passage, which plane is indicated by the line A, and in such a position that it serves to deflect elastic fluid into spaces 13. This deflecting of the elastic fluid stream while it serves to fill spaces 13 does not affect the direction of the flow because such flow is guided and directed by that portion of the front wall of the fluid passages which lies beyond the plane of the exit end as regards the direction of flow. This is due to the fact that the instant the fluid stream tends to leave such guiding surface a region of lower pressure is formed on the guiding surface which tends to restore the stream to the guiding surface and makes it exit from the nozzle at the proper angle.

By the use of a fluid-directing structure embodying my invention I am enabled to provide a structure which will supply a continuous solid stream of elastic fluid to the entrance edges of the blade ring or bucket ring. This means that the blade ring or bucket ring will be continuously supplied with elastic fluid so that the efficiency will be improved. Furthermore, since the regions represented by parallelograms 13 are

filled with elastic fluid, the formation of eddy currents in such spaces is prevented. When such spaces are not filled, eddy currents may form in them, disturbing the flow and effecting losses in efficiency.

In accordance with the provisions of the patent statutes I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the apparatus shown is only illustrative and that the invention may be carried out by other means.

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

1. An elastic fluid turbine comprising a rotor having one or more rings of blades thereon, and fluid-directing elements for directing elastic fluid to the blades, there being clearance spaces between the exit ends of the fluid-directing elements and the entrance edges of the blades, characterized by the fact that the said fluid-directing elements are provided with guiding surfaces immediately following the plane of the nozzle throat which serve to deflect elastic fluid into such spaces.

2. In an elastic fluid turbine, walls forming fluid-directing passages, the front walls of said passages being provided with projections immediately following the plane of the nozzle throat which serve to deflect the stream of elastic fluid toward the rear walls.

3. In an elastic fluid turbine, walls forming fluid-directing passages, the front walls of said passages being provided with projections located just beyond the exit planes of the passages which serve to deflect the stream of elastic fluid toward the rear walls.

4. An elastic fluid turbine having blades, and nozzles for directing elastic fluid to the blades characterized by the fact that the front walls of the nozzle partitions are provided with rounded projections which serve to deflect elastic fluid toward the rear walls.

5. An elastic fluid turbine having blades, and nozzles for directing elastic fluid to the blades, there being clearance spaces between the exit ends of the nozzle partitions and the entrance edges of the blades, characterized by the fact that the nozzle partition which forms the front wall of each nozzle passage is provided with a rounded projection which serves to deflect elastic fluid into the clearance space at the end of the nozzle partition which defines the rear wall of such nozzle.

In witness whereof, I have hereunto set my hand this 11th day of September, 1922.

HARRISON LORING WIRT.