F. SAMUELSON.

ELASTIC FLUID TURBINE.

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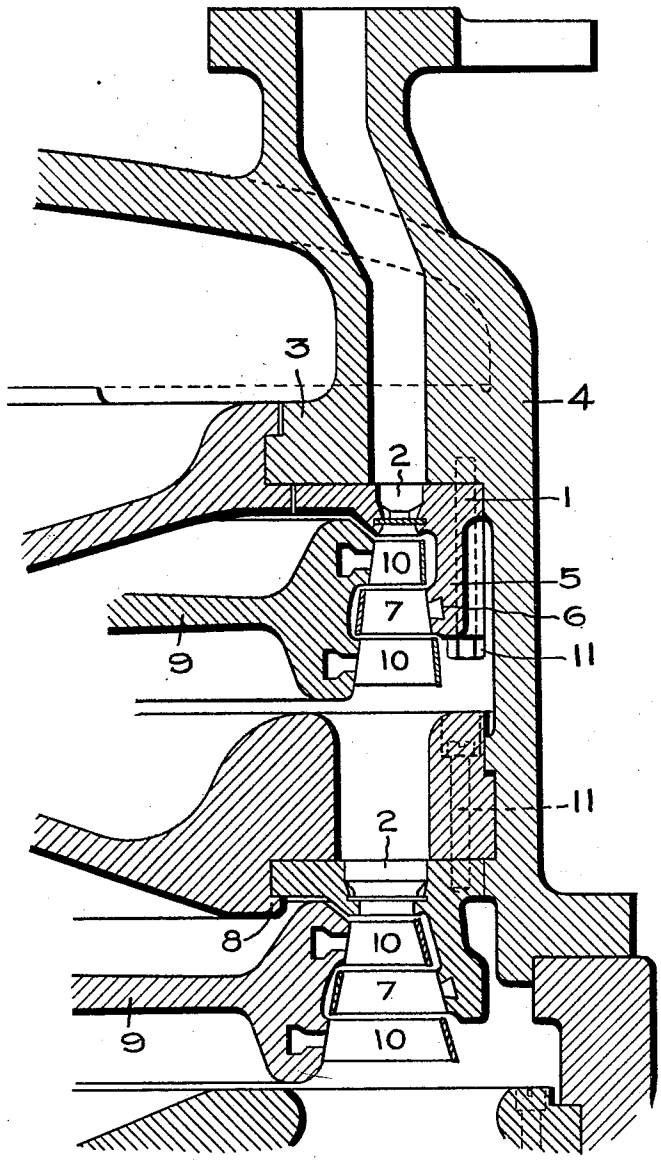
1,042,147. Patented Oct. 22, 1912.



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UNITED STATES PATENT OFFICE.

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ELASTIC-FLUID TURBINE.

1,042,147. Specification of Letters Patent. Patented Oct. 22, 1912.

Application filed March 29, 1911. Serial No. 617,661.

To all whom it may concern:

Be it known that I, FREDERICK SAMUELSON, a subject of the King of Sweden, residing at Rugby, in the county of Warwick, England, have invented certain new and useful Improvements in Elastic-Fluid Turbines, of which the following is a specification.

My invention relates to elastic fluid turbines and has particular reference to the means for securing the nozzles and the stationary or intermediate guide vanes or buckets within the casing of a turbine and in particular a turbine of the well known Curtis type.

In the Curtis turbine it has been customary to secure the intermediate guide vanes either directly to the casing or to a plate secured directly to the casing and separate from the nozzles. This in either case necessitates the machining of a considerable portion of the interior of the casing.

The object of the present invention is to reduce the amount of machining necessary and thereby to reduce the cost of manufacture.

To this end the invention resides in the feature of securing the intermediate guide vanes to a support which is common to them and the nozzles and is secured to the diaphragms between the stages. By this construction only those portions of the interior of the casing with which the peripheries of the diaphragms engage require to be machined. The assembling of the turbine is also simplified, since the rotating and stationary blades and the nozzles and the wheels and diaphragms carrying them may all be assembled in their relative positions on the shaft and then inserted into the casing as a single part.

The accompanying drawing, which is a sectional view of the first two stages of a turbine of the Curtis type, illustrates my invention.

In carrying out my invention according to the embodiment illustrated I provide a ring plate 1, preferably made in sections, in which the inlet supply nozzles 2 for the elastic fluid are formed. This plate is let into or secured on the face of the diaphragm 3 at the end of the casing 4 in any convenient or suitable manner. Projecting from the face of this plate near its periphery and at right angles thereto is a cylindrical ring 5, the depth of which, measuring from the lower face to the face of the plate, slightly exceeds the distance from the face of the plate to the lower edge of the roots of the last row of intermediate vanes. The inner side of this cylindrical ring is grooved at 6 to receive the roots of the stationary vanes 7 which may be secured in place in any well known manner. The segments of the plate 1 and the segments of the ring 5 are preferably cast in one piece. These are secured to the diaphragm 3 by axially extending bolts 11. The plate and ring in the second stage are supported by a lip or shoulder 8 on the diaphragm and also by the bolts 11. The wheels 9 are carried by the shaft, not shown, in any well known manner. Each wheel is provided with two or more rows of buckets or vanes 10 which are secured in any well known manner. The nozzles 2 may be diverging or non-diverging in character. The velocity of the steam due to the nozzles is abstracted in successive fractions by the wheel buckets, the intermediate or stationary buckets 7 serving to direct the steam from one row of wheel buckets to the other.

My invention is particularly useful in turbines where the nozzles extend wholly or largely around the wheel but it is also useful where the nozzle arc is limited.

My invention has been illustrated in connection with a vertical shaft turbine but it is also applicable to horizontal shaft turbines.

It will be seen that the plate and ring are L-shaped in cross-section, and that the leg of the structure which supports the intermediates is separated from the inner wall of the casing by a space. By reason of this latter feature the effects of distortion due to heat are minimized.

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 can be carried out by other means.

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

1. In an elastic fluid turbine, the combination of a casing, a diaphragm for dividing the casing into stages, bucket wheels for the

stages, intermediate buckets located between the wheel buckets, a nozzle for discharging fluid against the wheel buckets which nozzle is formed separately from the diaphragm, and a support located within the casing that is common to the nozzle and the intermediate buckets and is carried by the diaphragm.

2. An elastic fluid turbine comprising a casing, a diaphragm, and a wheel and its buckets with a nozzle plate that is secured to the diaphragm within the casing, said plate having nozzle passages completely formed therein and located intermediate its inner and outer edges, a ring that is secured to the plate, and intermediate buckets carried by the ring which are located between the wheel buckets.

3. An elastic fluid turbine comprising a casing, a diaphragm, and a wheel and its buckets with a nozzle plate, said plate having nozzle passages completely formed therein, means for securing the nozzle plate to the diaphragm which includes a shoulder between it and the diaphragm, a ring attached to the plate, and intermediate buckets carried by the ring and located between the wheel buckets.

4. An elastic fluid turbine comprising a casing, a diaphragm having passages therein leading to the nozzles and a wheel and its rows of buckets, with a plate containing a nozzle that is secured to the low pressure side of the diaphragm, said plate extending beyond the inner and outer walls of the diaphragm passages, a ring which is secured to the plate and is separated from the inner wall of the casing by a space, and intermediate buckets carried by the ring which are arranged in a row and are located between adjacent rows of wheel buckets.

5. An elastic fluid turbine comprising a casing, a diaphragm having passages leading to the nozzles and a circumferential groove adjacent the outlet end of said passages, a wheel and its rows of buckets, an annular plate provided with nozzles and mounted on the diaphragm with its inner edge in engagement with said groove, intermediate buckets arranged in a row between the wheel buckets, and means for supporting the intermediate buckets from the plate.

6. As an article of manufacture a cylindrical structure which is L shaped in cross-section, one leg of said structure being provided with nozzle passages located about midway the inner and outer edges thereof while the other leg is provided with a row of buckets, the plane of the buckets and that of the nozzle passages being perpendicular to each other.

In witness whereof, I have hereunto set my hand this eleventh day of March, 1911.

FREDERICK SAMUELSON.

Witnesses:
CHARLES H. FULLER,
J. A. FOSTER.