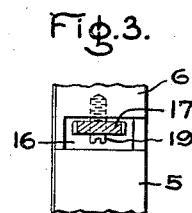
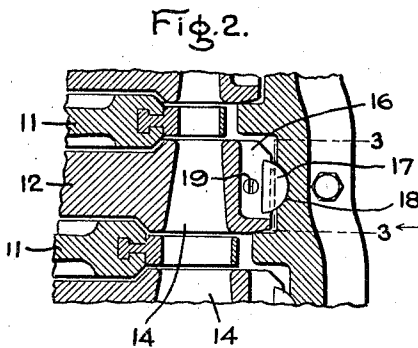
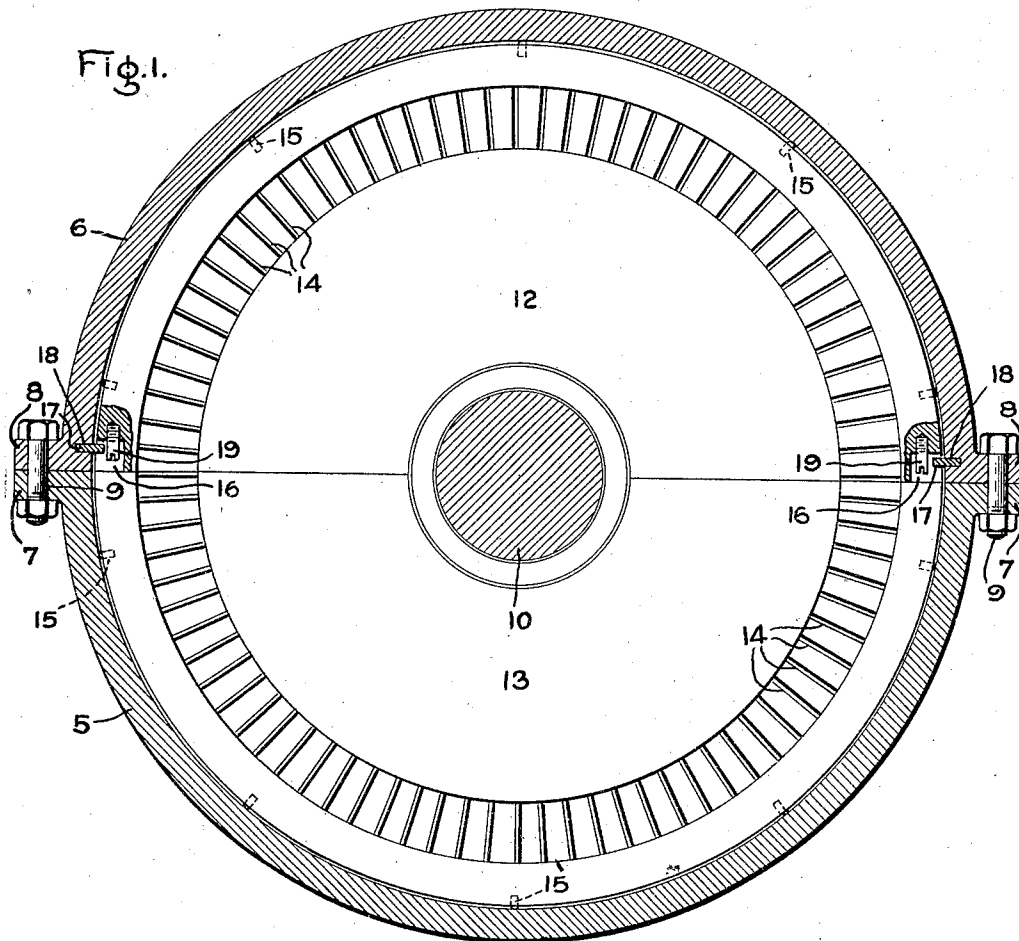


G. E. ROBB.
ELASTIC FLUID TURBINE.
APPLICATION FILED APR. 14, 1920.

1,362,437.

Patented Dec. 14, 1920.



Inventor:
George E. Robb,
by *Alvin G. Davis*
His Attorney.

UNITED STATES PATENT OFFICE.

GEORGE E. ROBB, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELASTIC-FLUID TURBINE.

1,362,437.

Specification of Letters Patent.

Patented Dec. 14, 1920.

Application filed April 14, 1920. Serial No. 373,936.

To all whom it may concern:

Be it known that I, GEORGE E. ROBB, a citizen of the United States, residing at Schenectady, in the 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 turbines of the type wherein the turbine shell or casing is divided into stages by diaphragms, which diaphragms contain partitions forming nozzle passages for directing elastic fluid against the buckets of a turbine wheel. In such turbines the shell is split to form upper and lower halves and the diaphragms are formed in corresponding halves and fit into the halves of the shell between the bucket wheels. When the turbine is assembled, the halves of each diaphragm meet in the central horizontal plane of the turbine shell and are supported and centered in the shell by means of crushing pins or other suitable means.

In assembling a turbine of this character, it is desirable to first assemble the upper halves of the diaphragms in the upper half of the shell or casing prior to placing it in position in the lower half and this requires the provisions of a holding or supporting means for the upper halves of the diaphragms to keep them in place therein while the upper half of the shell is being placed on the lower half. Such holding or supporting means must be of such character that after the upper half of the casing with the diaphragm halves therein is assembled on the lower half, the holding means will not interfere with the correct positioning of the diaphragm and its expansion and contraction under temperature changes. Such a holding or supporting means for the upper half of the diaphragm is desirable also so that when the turbine is dismantled the upper halves of the diaphragms may be lifted off with the top half of the turbine casing.

More particularly, the object of my invention is to provide an improved arrangement for supporting the upper halves of the diaphragms of a turbine in the upper half of the shell, and for a consideration of what I believe to be novel and my invention, at-

tention is directed to the accompanying description and the claims appended thereto.

In the drawing Figure 1 is a transverse sectional view through the casing of a turbine showing a diaphragm in side elevation and illustrating my improved supporting means; Fig. 2 is a horizontal, sectional view of a fragment of a turbine, and Fig. 3 is a section taken on line 3—3, Fig. 2 looking in the direction of the arrow.

Referring to the drawing, 5 indicates the lower half of a turbine shell or casing and 6 the upper half, the two halves being provided with flanges 7 and 8 which are fastened together by bolts 9. 10 indicates the turbine shaft on which are mounted bucket wheels 11, as is well understood. In the turbine casing between wheels 11 are diaphragms comprising upper and lower halves 12 and 13 in which are partition plates 14 forming nozzles for directing elastic fluid against the buckets of the bucket wheels. In the present instance the diaphragm is shown as being centered and supported in the turbine shell by means of crushing pins 15, although any suitable arrangement may be used for this purpose. The foregoing may be taken as typical of a turbine structure of the type to which my invention relates.

Now, according to my invention, I provide recesses 16 in the flat edge of the upper half 12 of the diaphragm at what may be termed the two corners of such half, and in the adjacent portion of the upper half 6 of the casing I provide projections 17 which extend into recesses 16 in a position to be engaged by the bottom of recesses 16. Recesses 16 may be made by cutting a slot of suitable depth at each corner of the diaphragm half, which slot may extend from one side face of the diaphragm, as shown in Fig. 2, to a point short of the other side face. Projections 17 may be in the form of keys which are driven into slots 18 in the inner face of the turbine shell. Preferably I employ keys of the semi-circular shape shown as they are easy to insert and a curved slot to receive them is easily made. Also they provide a broad flat surface for engagement with the upper half of the diaphragm. To prevent keys 17 from coming out should they work loose, I provide pins 19 which are threaded into the bottom of recess 16 and stand in front of keys 17.

Pins 19 are preferably sufficiently long so they cannot work out on account of the close proximity of the upper edge of the lower half of the diaphragm. When the turbine is assembled, as is clear from the drawing, projections 17 are spaced from the walls of recess 16 so that the diaphragm is free to center itself and expand and contract independently of projections 17.

When the turbine is being assembled, the upper half 6 of the turbine shell is inverted, the diaphragm halves 12 placed therein and keys 17 and pins 19 put into position. Now, when the upper half 6 of the shell is turned over, the diaphragm halves will drop down against projections 17 and thus be held in such upper half while it is lowered into position on the lower half 5. When positioned, the upper half of the diaphragm engages the lower half and is raised away from projections 17. In dismantling the machine, when the upper half of the turbine shell is lifted, the upper halves of the diaphragm will engage projections 17 and be lifted along with the shell.

By my improved arrangement I provide a fastening means for the upper halves of turbine diaphragms which is simple in structure, easy to put into place and remove, and by the use of which there is no danger of the fastening means working out and hence failing to function when needed. This latter is a most important consideration, for should a heavy diaphragm half fall from the upper half of the casing while being assembled or removed, serious damage might result not only to the machine but to any workman standing near. It is furthermore to be noted that the improved fastening is put into place without making holes through

the turbine shell, and that it requires no parts to be fitted steam tight.

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. In an elastic fluid turbine comprising a casing and a diaphragm made in upper and lower halves, means for supporting the upper half of the diaphragm in the upper half of the casing comprising members which project from the inner wall of said upper half of the casing adjacent its open side, the corners of said diaphragm half having recesses to receive said members, the arrangement being such that when the turbine is assembled, said members stand in spaced relation to the walls of said recesses, and pins in said diaphragm half which stand in front of said members to prevent their coming out.

2. In an elastic fluid turbine, a casing half having slots in its inner surface adjacent its open side, keys in said slots which project inwardly beyond the surface of said casing half, a diaphragm half in said casing half provided with slots into which said keys project, and means in said last named slots which stand in front of said keys to prevent their coming out.

In witness whereof I have hereunto set my hand this 13th day of April, 1920.

GEORGE E. ROBB.