

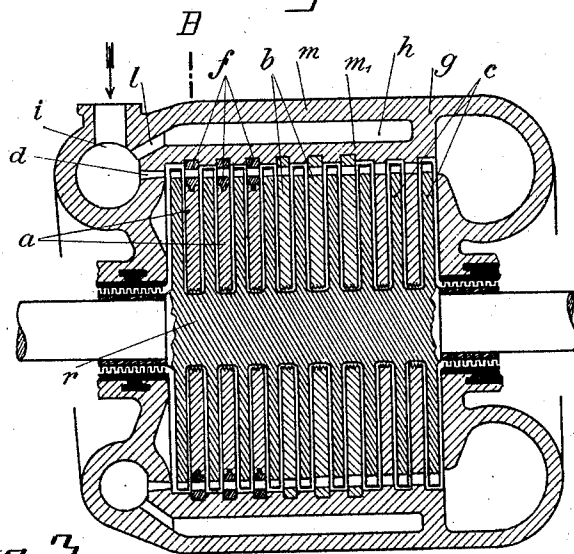
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1,541,834

F. LÖSEL
AXIAL TURBINE

Filed April 21, 1924

Fig. 1



A

Fig. 2

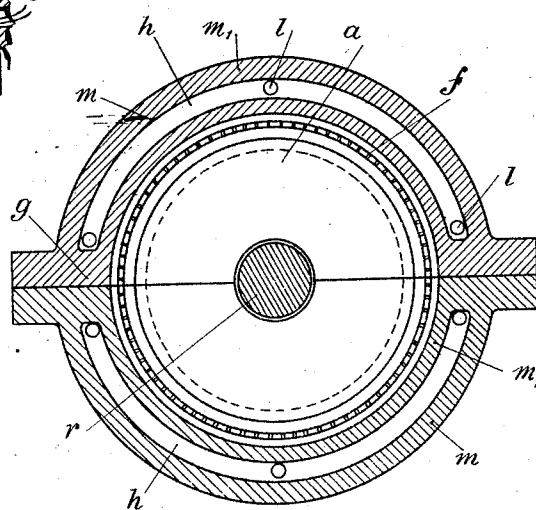
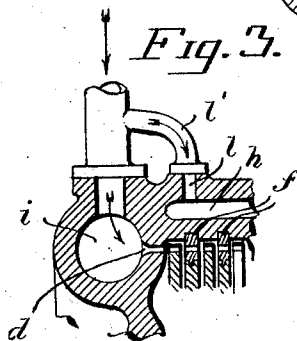


Fig. 3.



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UNITED STATES PATENT OFFICE.

FRANZ LÖSEL, OF BRUNN, CZECHOSLOVAKIA.

AXIAL TURBINE.

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To all whom it may concern:

Be it known that I, FRANZ LÖSEL, a citizen of Czechoslovakia, residing at Brunn, Czechoslovakia, have invented certain new and useful Improvements in Axial Turbines, of which the following is a specification.

My invention relates to axial turbines operated by steam or gas under pressure provided with a heating jacket.

The main object of the invention is to provide means by which the carrier of the stator-nozzles and diaphragms is heated from the exterior and interior and by which the pressure exerted by the diaphragms or blades against the carrier is elastically balanced from the exterior of the carrier but within the casing of the turbine.

Another object is to hold the inner parts firmly enclosed, and to hold them together steam-tight, without, however, interfering with expansion of the parts due to heat.

Another object is to strengthen and stiffen the whole casing throughout its entire length, without substantially increasing its weight or making the structure bulky and expensive.

Other objects and advantages will appear from the following specification.

With these objects in view my invention consists in that a space surrounding the carrier and extending over the entire length of the series of stator and rotor elements in the turbine, divides the casing into an inner and an outer casing and directly communicates, at the high-pressure or front-end, with the main carrying the high-pressure, high-temperature fluid, so that the high-pressure, high-temperature fluid can penetrate to the said space.

In the accompanying drawing I have shown by way of example two embodiments of my invention.

Fig. 1 is a longitudinal section and Fig. 2 a transverse section on the line A B Fig. 1 of a steam turbine constructed in accordance with my invention, Fig. 3 shows a modification of the connection between the high-pressure main and the jacket space.

Referring now to the drawings, the cylindrical carrier m' , which carries the stationary diaphragms and guide-nozzles, encloses, together with the outer casing m , the hollow space h which surrounds the carrier m' in its whole length. The inner carrier and outer casing are preferably cast in one integral piece. This hollow space h , annular

in shape, communicates by openings l with the live steam supply chamber i carrying the steam jets d so that the turbine jacket is heated by live steam. The stator carrier m_1 and the casing m coaxial therewith, strengthen and stiffen the turbine frame g and render it resistant to warping and distortion.

The steam jacket h may also be connected with the supply conduit for the driving agent by pipes instead of directly communicating with the supply chamber i as shown in the fragmental Fig. 3, where a branch-pipe l' is indicated connecting the high-pressure main with the hollow space h .

The turbine itself is preferably of the multistage disc wheel type as illustrated in the drawings, wherein a, b, c are the stationary or stator discs interposed between the revolving discs of the rotor r . The stator discs a are connected with the stator carrier m_1 of the turbine frame g by blades or nozzles f which project into grooves of the carrier, and into grooves of the diaphragm discs a . The stator discs b are shrunk or cast into the carrier m_1 and the stator discs c are cast integral with the carrier m_1 . The blades of the stator discs b and c are integral with these discs and may be made in any desired or preferred manner such as casting and milling. In reaction turbines the stator blades are preferably directly secured to the stator carrier m_1 .

In steam turbines with a heating jacket as heretofore constructed, the exhaust steam from the low pressure end of the turbine or steam from an intermediate point was partly used for heating and the turbine frame did not form a rigid continuous hollow body extending over the entire length of the turbine.

This construction is not satisfactory more particularly in high pressure turbines in which the driving agent is highly superheated inasmuch as under these conditions the parts expand, owing to the high temperatures, to a great extent and in different degrees. In such turbines it is necessary that the parts of the frame surrounding the internal structure expand to a greater extent and, what is even more important, more rapidly than the internal structure itself. This condition is fully satisfied by the present invention as the heating jacket is heated uniformly by live steam and the hollow space is kept under high steam-pressure

from the high-pressure end. When exhaust steam is supplied from the low pressure end of the turbine or steam from an intermediate point thereof to the heating jacket no efficient heating of the parts of the frame adjacent to the internal structure can be obtained, but there is rather a cooling because the temperature of the steam at lower pressure points is lower than the steam temperature at the high pressure end of the turbine. In consequence thereof the parts of the casing adjacent to the internal structure expand to a less extent and more slowly than the internal structure itself which is exposed to the action of hotter steam. This results in the danger that the casing may be destroyed and that it becomes necessary to provide for unduly great play between parts to be connected whereby the losses by leakage are increased.

My invention provides the further advantage that the differences in pressure acting on the stator carrier m_1 are comparatively small so that it may be comparatively thin and somewhat elastic. Consequently the pressure acting on the stator carrier m_1 from its outside causes a very slight bending of the same and results in the internal parts being closely embraced and held together in a steam tight yet elastic manner without, however, interfering with their expansion by heat. The outer wall m of the heating jacket h must of course be of sufficient strength, its strength and stiffness being notably increased by the stator carrier m_1 .

While in the foregoing I have described my invention as applied to a steam turbine it will be obvious that it is equally applicable to gas turbines.

What I claim is:

1. An elastic fluid turbine of the axial flow multistage type comprising a cylindrical carrier for the stator elements which are surrounded as well as carried by said carrier, an outer casing spaced from the cylindrical carrier and cast integral therewith at both the front and rear ends, said carrier and outer casing forming therebetween a continuous chamber surrounding the carrier over the whole length thereof, and means to supply elastic fluid to said continuous chamber including a direct connection at the high pressure end with the high pressure supply.

2. An elastic fluid turbine of the axial flow multistage disc wheel type, comprising a carrier for the diaphragms which are surrounded as well as carried by said carrier, an outer casing cast integral with the carrier at both front and rear ends and spaced therefrom to form a continuous hollow chamber surrounding the carrier and extending over the whole length of same, and means to provide at the high pressure end only direct connection between the chamber and the high pressure end.

3. An elastic fluid turbine of the multistage disc wheel type, comprising a casing and a carrier or support for diaphragms and their nozzles, both of which are surrounded as well as carried by said support, said support being cast integral with said casing at both the front and rear ends to form therebetween a continuous fluid jacket extending over the entire length of the internal parts of the turbine and surrounding same and communicating with the high pressure fluid supply at the high pressure end and being subjected to the pressure and temperature of the live fluid over the entire length of the internal parts.

4. An elastic fluid turbine of the axial flow multistage type, comprising a carrier for diaphragms and their guide blading, said carrier surrounding as well as carrying said diaphragms and their guide blading and being cast integral with said casing which is axially divided and forms with said carrier a continuous chamber in the upper part of the turbine casing and a continuous chamber in the lower part of the turbine casing, said continuous chambers extending over the entire length of the internal parts of the turbine and surrounding same, and connections with the high pressure fluid source at the high pressure end of the turbine to fill said continuous chambers with high pressure live fluid and subject them to the pressure and temperature of the live fluid over the entire length of the internal parts.

In testimony whereof I affix my signature in presence of two witnesses.

FRANZ LÖSEL.

Witnesses:

CARL WINTERS,
ANT. G. FIEMAN.