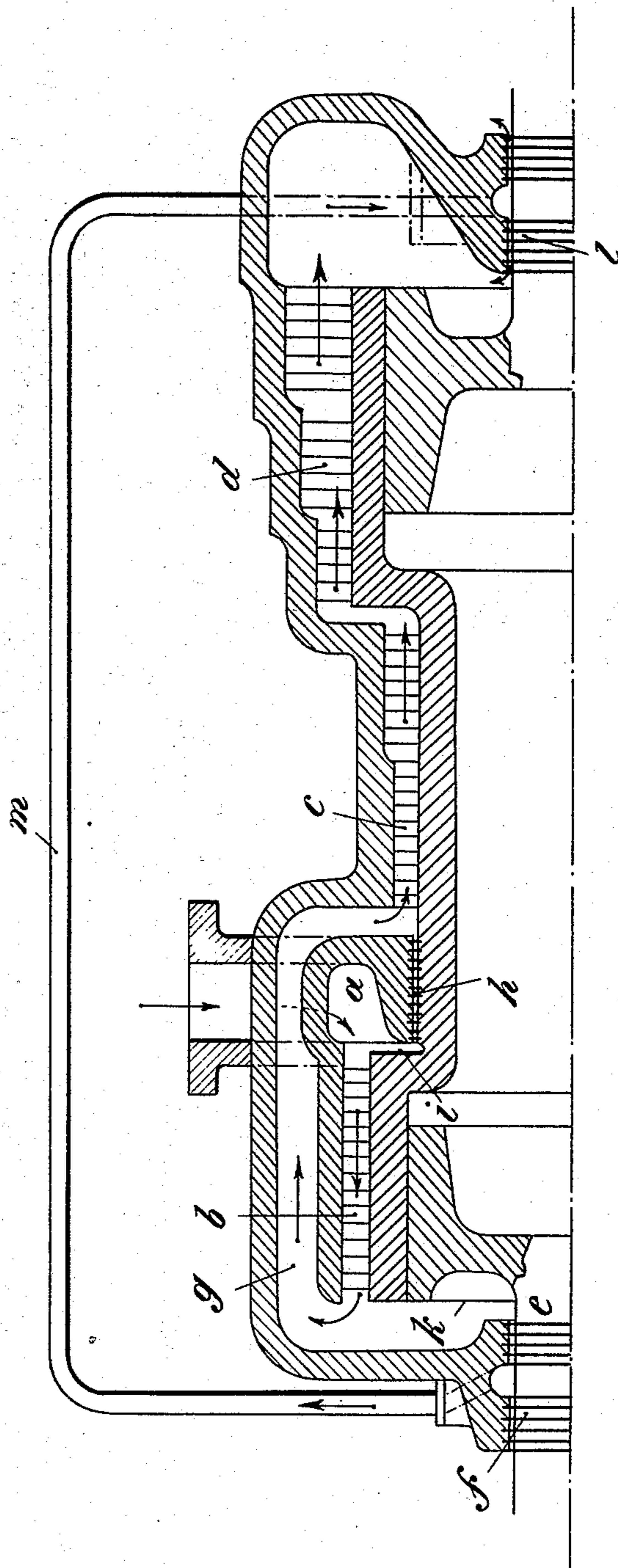


C. ROTH.
ELASTIC FLUID TURBINE.
APPLICATION FILED OCT. 18, 1906.

924,108.

Patented June 8, 1909.



Witnesses
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UNITED STATES PATENT OFFICE.

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ELASTIC-FLUID TURBINE.

No. 924,108.

Specification of Letters Patent.

Patented June 8, 1909.

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To all whom it may concern:

Be it known that I, CARL ROTH, engineer, a citizen of Switzerland, and a resident of Munich, 94 Ismaningerstrasse, in the Kingdom of Bavaria, Germany, have invented a certain new and useful Improvement in Elastic-Fluid Turbines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

My invention relates to elastic fluid turbines and has for its object to provide a turbine of this type which will be free from all axial thrust and in which the loss of steam through the packing between the high and low pressure parts will be reduced to a minimum.

The invention will be described with reference to the accompanying drawing which illustrates in longitudinal section one example of a turbine embodying the features of the invention, and in which:

a is the high pressure steam chest, *b* the high pressure part, *c* the intermediate or first low pressure part, and *d* a further low pressure part, of the turbine.

For the purpose of the present invention, the turbine is arranged, as shown, in such a manner that the steam entering at *a* first traverses the high pressure part of the turbine *b* in one direction, and then the low pressure parts of the turbine *c*, *d* in the opposite direction. The high pressure part *b* is mounted on a drum of greater diameter than the adjacent or immediately following low pressure part *c* and can be advantageously formed as an impulse turbine with partial admission, or in certain circumstances as a reaction turbine. The latter may, for instance, be the case where the steam of lowered tension, or a part of it, after having done work in the high pressure part, is drawn off from the turbine for any other purposes, such as heating. At the end of the high pressure part, in which the steam has expanded to say about $1\frac{1}{2}$ atmospheres, the drum terminates to form a chest *k*. This chest *k* is shut off from the outer air by means of a stuffing box or labyrinth packing *f* on the shaft *e*. The steam then after passing the high pressure part *a* traverses a re-

turn channel *g* and enters the intermediate or low pressure portion *c*, arranged on the reduced part of the drum, which portion can be then increased in diameter in the known manner to form the further low pressure portion *d*.

Between the steam inlet and the intermediate or low pressure parts, and on a reduced part of the drum, is arranged a labyrinth packing *h* which shuts off the high pressure admission steam against the pressure prevailing at the end of the high pressure part of the turbine. In place of the labyrinth packing *h* a few rows of blades can be arranged with smaller or larger free sectional area, so that these rows of packing blades are connected with the said high pressure part so that a part of the steam passes with a lowered tension direct to the part *c*. Between this packing and the high pressure part on the wider portion of the drum is provided an annular surface or shoulder *i*, the dimensions of which are so calculated with reference to the various pressures and surfaces that, taking into consideration any onesided axial pressure that may occur, the turbine is freed from axial or end thrust. Beyond the low pressure part is another stuffing box or labyrinth packing *l*, which must be arranged to prevent the outside air rushing into the vacuum. This packing may be attained by conveying the steam escaping, intentionally or otherwise, from the stuffing box *e* of the high pressure part through the pipe *m* to the packing *l*.

What I claim is:

1. In an elastic fluid turbine, the combination with the shaft, of a casing, a packing between the shaft and the casing, a drum having a high pressure part and a low pressure part, and a single packing between the casing and the drum located between the high pressure part and the low pressure part.
2. In an elastic fluid turbine, the combination with the shaft, of a casing, a packing between the shaft and the casing, a drum having a high pressure part and a low pressure part, means for causing the fluid to traverse the low pressure part in the opposite direction to the high pressure part, and a single packing between the casing and the drum located between the high pressure part and the low pressure part.
3. In an elastic fluid turbine, the combination with the shaft, of a casing, a packing between the shaft and the casing, a drum

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having a high pressure part and a low pressure part, means for causing the fluid to traverse the low pressure part in the opposite direction to the high pressure part, a single
5 packing between the casing and the drum located between the high pressure part and the low pressure part, and a shoulder on the drum located between the high pressure part and the last-named packing.

10 4. In an elastic fluid turbine, the combination with the shaft, of a casing formed with a steam chest extending downwardly to the shaft, a packing for the steam chest between the shaft and the casing, a drum having a
15 high pressure part directly communicating with the steam chest and having a low pressure part, blades in said high pressure part,

an inlet for the motive fluid to the high pressure part, a packing on the low pressure part of the drum adjacent to the fluid inlet, blades
20 in the low pressure part, a shoulder between said packing and the blades of the high pressure part, and means for conducting the motive fluid from the blades of the high pressure part to the blades of the low pressure
25 part.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

CARL ROTH.

Witnesses:

ABRAHAM SCHLESINGER.

LOUIS G. MULLER.