

G. FORNER.
ELASTIC FLUID TURBINE.
APPLICATION FILED DEC. 30, 1911.

1,061,737.

Patented May 13, 1913.

Fig. 1.

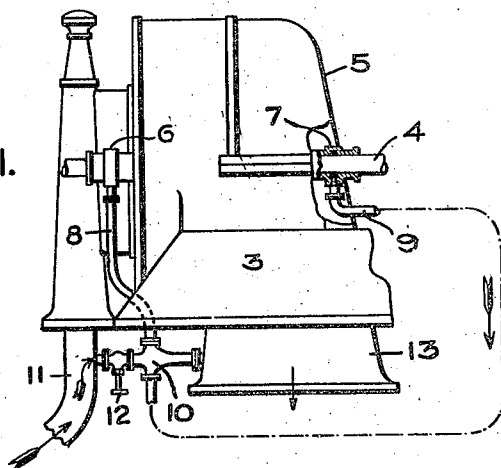


Fig. 2.

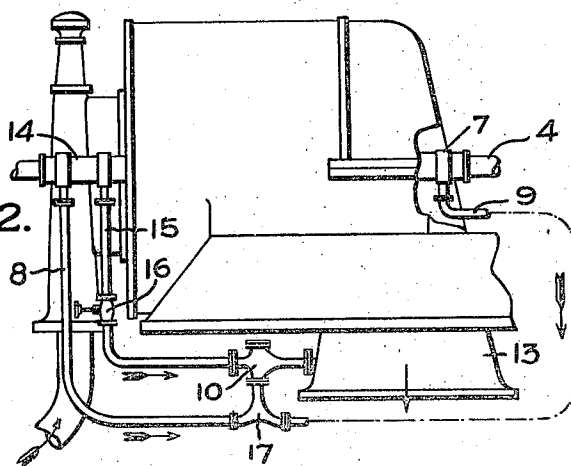
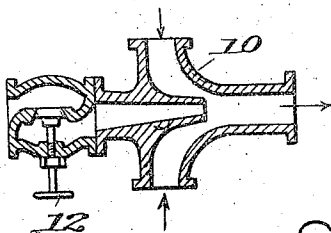


Fig. 3.



Witnesses:

Marcus L. Byng.
J. Ellis Allen.

Inventor:

Georg Forner.

by *Wm. H. Davis.*
Att'y.

UNITED STATES PATENT OFFICE.

GEORG FORNER, OF BERLIN, GERMANY, ASSIGNOR TO GENERAL ELECTRIC COMPANY,
A CORPORATION OF NEW YORK.

ELASTIC-FLUID TURBINE.

1,061,737.

Specification of Letters Patent.

Patented May 13, 1913.

Application filed December 30, 1911. Serial No. 668,719.

To all whom it may concern:

Be it known that I, GEORG FORNER, a subject of the King of Prussia, residing at Berlin, Germany, 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 more especially to those of the reaction type, and has for its object to provide a simple and effective means for receiving and conveying the steam that leaks through the packings or stuffing boxes, back into the turbine or some part thereof. When the steam is allowed to escape to the atmosphere either directly or indirectly through long pipes as is customary with reaction turbines, such steam is lost as is also the latent heat thereof. The escaping steam also causes condensation of steam on the turbine casing.

In the accompanying drawing which is illustrative of my invention, Figure 1 is a view in side elevation of a turbine showing a live steam ejector means for reducing leakage; Fig. 2 is a similar view of a modified form of the invention showing a stage pressure ejector means for reducing leakage, and Fig. 3 is a detailed view showing a typical form of ejector.

3 indicates a multi-stage reaction turbine of any suitable type and construction. My invention is, however, applicable to turbines operating on the impulse plan, as the Curtis for example.

4 indicates the shaft that carries the rotor of the turbine. At the point where it projects through the casing 5 stuffing or packing boxes 6 and 7 are provided. Connected to the chambered parts of the boxes are pipes 8 and 9. These pipes are connected to the casing of an ejector 10 of any suitable type. The live steam for operating the ejector is received from the main 11 admitting steam to the turbine, and is subject to the control of throttle valve 12. The exhaust steam from the ejector, together with the steam and water collected from the packing boxes, is discharged into the exhaust conduit 13 of the turbine. This may be the final exhaust of the turbine or only the exhaust of one part, in which case the steam from the ejector is made to do useful work in those parts of the turbine operating at lower pressure. It is evident that the suction effect

of the ejector will draw leakage steam from the packing boxes. By properly adjusting the valve 12 either by hand or automatically, the suction effect of the ejector may be made just sufficient to prevent steam leaking out of the packing and air from entering. In other words, a balance is effected. The amount of live steam consumed in this manner will be relatively small.

In Fig. 2 is shown a slight modification wherein the steam for the ejector 10 is derived from a multi-cellular packing 14 on the high pressure end of the turbine, said steam being conveyed by the pipe 15 under control of a hand or automatic valve 16. The exhaust from the ejector passes into the exhaust conduit 13 or into some low pressure stage from which point it performs useful work in the turbine. Leakage from the packings is conveyed by the pipes 8 and 9 to the ejector, said pipes being united in the coupling 17. In this case as before the suction effect of the ejector is so regulated, as by adjusting the valve 16, that the outflow of steam from the stuffing box is avoided as much as possible. This arrangement has the advantage that no live steam is required for the operation of the ejector, any steam that enters the pipe 15 has of necessity leaked past some portion of the packing.

It will be seen that the ejector constitutes a pump for drawing off leakage steam from the packings, and that the amount so drawn off is just sufficient to prevent steam from escaping from the packing on the one hand and the entrance of air on the other. The control is ideal in its simplicity, and as the steam flow is small the cost is small. Since the control is so complete it becomes unnecessary to take down or inspect the packings as often as formerly.

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. An elastic-fluid turbine having a shaft and a packing therefor, an ejector that is

connected to a chamber in the packing, a means for supplying fluid to the ejector, and a conduit for conveying the said fluid and leakage into the exhaust conduit of the turbine.

5 2. An elastic-fluid turbine having a shaft and packings therefor, an ejector that is common to and receives the leakage steam from the packings, means for supplying
10 steam to the ejector to operate it, a regulating means therefor, and a pipe that conveys fluid from the ejector to a point of low pressure in the turbine.

3. An elastic-fluid turbine having a shaft

and a packing therefor, an ejector, a pipe 15 that conveys leakage from the packing to the ejector, a pipe that conveys fluid from said packing but of higher pressure to the ejector for actuating it, and a valve for controlling the passage of fluid through the 20 last named pipe.

In witness whereof, I have hereunto set my hand this ninth day of December, 1911.

GEORG FORNER.

Witnesses:

ERICH UBERLÉE,
LUDWIG CUBELIC.