

B. WOLFF.
ELASTIC FLUID TURBINE.
APPLICATION FILED AUG. 12, 1910

987,336.

Patented Mar. 21, 1911.

Fig. 1.

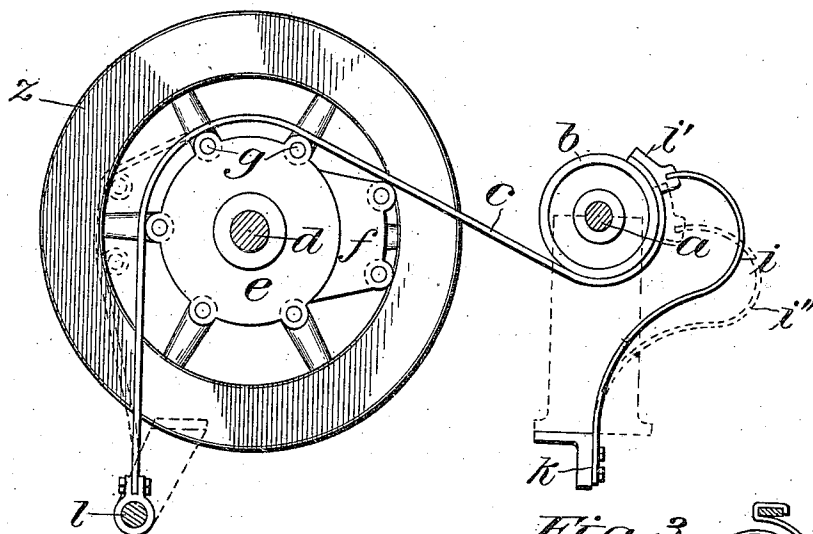


Fig. 3.

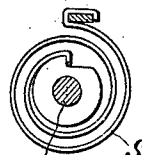


Fig. 2.

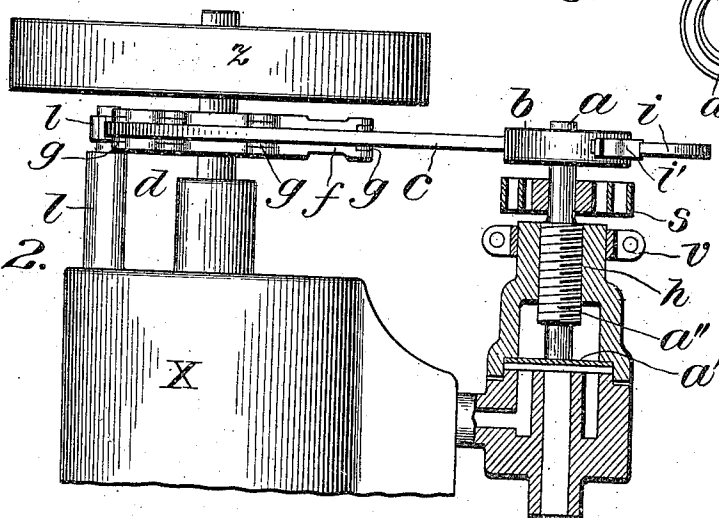
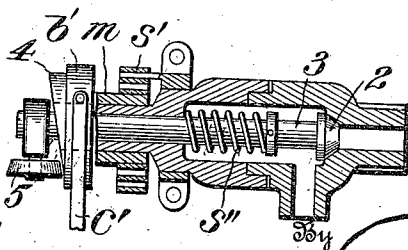


Fig. 4.



Witnesses

C. Walker,

Alex. Leach

Inventor

Berthold Wolff

Alfred S. Sowell
Attorneys

UNITED STATES PATENT OFFICE.

BERTHOLD WOLFF, OF BERLIN, GERMANY.

ELASTIC-FLUID TURBINE.

987,336.

Specification of Letters Patent. Patented Mar. 21, 1911.

Application filed August 12, 1910. Serial No. 576,868.

To all whom it may concern:

Be it known that I, BERTHOLD WOLFF, a subject of the German Empire, residing at Berlin W., in Germany, have invented a certain new and useful Improvement in Elastic-Fluid Turbines, of which the following is a specification.

This invention relates to turbines actuated by elastic fluid, for example steam or carbon dioxide, and its object is to provide a simple device for operating the fluid supply valve so that the actuation of said valve for alternate supply and cut off is independent of the direction in which the turbine shaft is rotating.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is an elevation of the valve gear, Fig. 2 a plan-view thereof, partly in section, and Fig. 3 a sectional view of a detail of the gear. Fig. 4 is a sectional plan-view showing a modification of part of the valve gear.

Referring in the first place to Figs. 1 to 3, a represents part of the turbine casing, z the fly-wheel, and d the turbine shaft. A cam e fixed to the shaft d has rollers g mounted at its circumference and at the outer angles of the boss f formed upon said circumference.

c is a band or strap of flexible steel, one end of which is attached to a holder l fixed to the turbine frame.

a is the spindle of the diaphragm valve a^1 which controls the supply to the turbine. The spindle a is screw-threaded at a^{11} and works in an internally screw-threaded sleeve h , so that by rotating the spindle through a moderate angle in one direction (clockwise, as viewed in Fig. 1) the spindle is axially moved so as to open the valve a^1 . The spiral spring s , which has one end attached to a collar on the spindle a , tends to hold the spindle in the position in which the valve a^1 is closed, this action being assisted by a plate spring i , which has one end fixed at i^1 to a pulley b on the spindle, and the other end fixed to a stationary holder k . By rotation of the spindle a for opening the valve a^1 the spring i is flexed as indicated by the dotted line i^{11} in Fig. 1. The band c passes from holder l over the cam e , and is attached at the other end to the pulley b .

When the shaft d of the turbine rotates in either direction, the boss f of the cam e is thrust against the band c during each revo-

lution of the shaft, and causes the band to exert a pull by which the spindle a is rotated to open the valve a^1 , the latter being closed again by springs s and i when the boss f has cleared the band c .

In the modification shown in Fig. 4 the supply valve 2 is operated by means of a smooth, axially movable spindle 3, which passes loosely through the eye of a pulley b^1 fixed to a rotatable sleeve m . To this pulley b^1 is fixed one end of a flexible band c^1 , the latter being operated by a cam on the turbine, as described with reference to Figs. 1 and 2. A cam 4 is integral with the pulley b^1 , and when the latter is rotated by the pull of the band c^1 , the cam 4 works against an abutment wheel 5 carried by the spindle 3, and pushes the latter to the left, so that the valve 2 is opened. The pulley is then restored to normal position by the spring s^1 , and the valve is closed by spring s^{11} .

The valve gear described works efficiently and noiselessly at high fluid-pressures (such as 50 or 100 atmospheres) and at two or three thousand revolutions per minute. No alteration of the gear is required on reversal of the rotation of the turbine shaft.

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

1. In an elastic fluid turbine the combination with a fluid supply valve of a flexible band, a stationary holder for one end of said band, means operatively connecting the other end of said band to said valve, and a cam operatively connected to the turbine shaft and positioned to exert an intermittent thrust on said band, producing a tractive effort which moves the valve.

2. In an elastic fluid turbine the combination with a fluid supply valve of a flexible band, a stationary holder for one end of said band, means operatively connecting the other end of said band to said valve, a cam operatively connected to the turbine shaft, and anti-friction rollers mounted at the periphery of said cam, said cam being positioned to exert an intermittent thrust on said band, producing a tractive effort which moves the valve.

3. In an elastic fluid turbine the combination with a fluid supply valve of a flexible band, a stationary holder for one end of said band, means operatively connecting the other end of said band to said valve, a cam operatively connected to the turbine shaft,

and positioned to exert an intermittent thrust on said band, producing a tractive effort which moves the valve, and means for restoring the valve to its previous position after the valve movement due to said cam.

4. In an elastic fluid turbine the combination with a fluid supply valve having an axially movable spindle of a pulley, a flexible band having one of its ends attached to said pulley, a stationary holder for the other end of said band, means whereby rotation of said pulley by pulling said band produces axial movement of the spindle, and a cam positioned to exert an intermittent thrust on said band, producing a tractive effort which axially moves the spindle.

5. In a reversible elastic fluid turbine the combination with a fluid supply valve of a flexible band, a stationary holder for one end of said band, means operatively connecting the other end of said band to said valve, and a cam operatively connected to the turbine shaft and positioned to exert an intermittent thrust on said band during rotation of said shaft in either direction, producing a tractive effort which moves the valve.

In witness whereof I have signed this specification in the presence of two witnesses.

BERTHOLD WOLFF.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
