No. 760,037. PATENTED MAY 17, 1904.

J. STUMPF.

STEAM TURBINE.

APPLICATION FILED SEPT. 8, 1903.

NO MODEL.

Fig. 1.

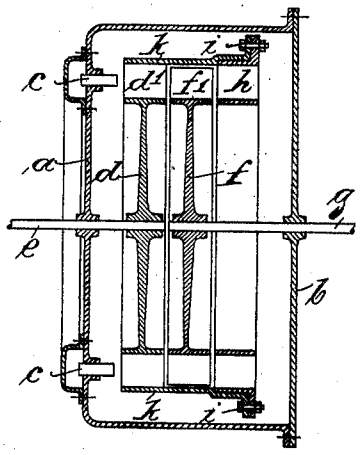


Fig. 2.

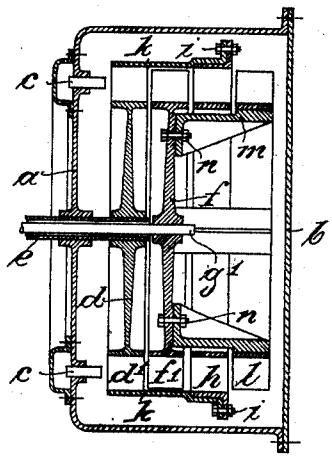
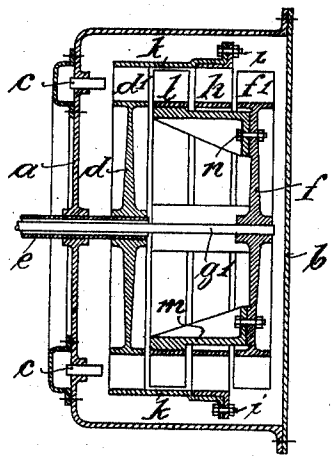


Fig. 3.



Witnesses:
Paul Wollenberg.
Emil Kayser.

Inventor:
Johann Stumpf.
by Pierce & Heffler
Attorney.

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No. 760,037. Patented May 17, 1904.

UNITED STATES PATENT OFFICE.

JOHANN STUMPF, OF CHARLOTTENBURG, GERMANY, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

STEAM-TURBINE.

SPECIFICATION forming part of Letters Patent No. 760,037, dated May 17, 1904.

Application filed September 8, 1903. Serial No. 172,246. (No model.)

To all whom it may concern:

Be it known that I, JOHANN STUMPF, a subject of the King of Prussia, German Emperor, and a resident of 27 Rankestrasse, Charlottenburg, near Berlin, Kingdom of Prussia, German Empire, have invented certain new and useful Improvements in Steam or Gas Turbines, of which the following is an exact specification.

My invention relates to improvements in steam or gas turbines, and more especially to turbines with several turbine-wheels rotating in opposite direction.

The purpose of my invention consists in providing a construction by means of which it is attained that all parts of the turbine can easily be reached without the whole turbine-casing being divided in two parts.

In order to make my invention more clear, I refer to the accompanying drawings, in which—

Figure 1 shows a turbine with three vane-rims constructed according to my invention. Fig. 2 shows a turbine with four vane-rims, and Fig. 3 shows a modification of the construction shown in Fig. 2.

In the drawings, *a* is the turbine-casing. *b* is the cover of the same,

c represents the steam-admission nozzles.

d is a turbine-wheel fixed to the shaft *e*. *f* is a second turbine-wheel fixed to the shaft *g*.

h is a vane-rim fixed, by means of screws *i*, to an arm *k*, fixed to the vane-rim *d'* of the turbine-wheel *d*.

The steam enters through the nozzles *c* and flows through the vanes *d'*, thereby rotating the turbine-wheel *d*. The steam leaving the vanes *d'* flows into the vanes *f'* of the turbine-wheel *f*, thereby rotating the turbine-wheel *f* in a direction opposite to the direction in which the turbine-wheel *d* rotates. After leaving the vanes *f'* the steam enters into the vanes *h*, thereby rotating the vane-rim *h* in the same direction in which the vane-rim *d'* rotates. By the vane-rim *h* being rigidly connected to the vane-rim *d'* the effect of the turbine-wheel *d* is increased. In case the turbine shall be dismounted the cover *b* is taken off, whereafter the vane-rim *h* can be loosened and taken off by loosening the screws *i*.

In the construction shown in Fig. 2 a fourth vane-rim *l* is provided, which vane-rim *l* is connected, by means of the arm *m*, to the turbine-wheel *f*. This vane-rim *l* can also be taken off after removing the screws *n*.

It will be seen from the drawings that the turbine-wheel *d* may be fixed to a tubular shaft *e*, in which the shaft *g'* is situated. In this case the turbine-cover *b* can still more easily be taken off on account of no shaft passing through the same.

In the modification shown in Fig. 3 the turbine-wheel *f* is not situated directly at the side of the turbine-wheel *d;* but the vane-rims *h* and *l* are situated between the turbine-wheels *d* and *f*.

It will be understood that the construction may be modified in different ways—as, for instance, the nozzles may be situated on either or on both sides of the vane-rim systems. It will also be understood that the vane-rims may be connected to the turbine-wheels in any other convenient manner, the idea of the invention consisting in connecting the vane-rims, which are not directly fixed to the turbine-wheel rim in that way, to the turbine-wheel, so that they can be removed for the purpose of dismounting the turbine or for repairs.

Having thus fully described the nature of this invention, what I desire to secure by Letters Patent of the United States is—

1. In a steam or gas turbine, the combination of two turbine-wheels rotating in opposite directions, means for supplying steam to the primary wheel, two turbine vane-rims the first one of which is situated at the side of the secondary wheel and is removably fixed to the primary wheel, and the second one of which is situated at the side of the first one and is removably fixed to the secondary wheel, substantially as described and for the purpose set forth.

2. In a steam or gas turbine, the combination of two systems of vane-rims rotating in opposite directions, the rims of one system being situated between the rims of the other

system, and arms for removably connecting the last rims of each system to a turbine-wheel, substantially as described and for the purpose set forth.

3. In a steam or gas turbine, the combination of two turbine-wheels rotating in opposite directions, a casing for said wheels having a removable head, a hollow shaft for one wheel journaled in the opposite head, a shaft for the second wheel journaled in said hollow shaft additional vane-rims removably secured to said turbine-wheels on the side adjacent said removable head, and arms for securing said rims, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHANN STUMPF.

Witnesses:
HENRY HASPER,
WOLDEMAR HAUPT.