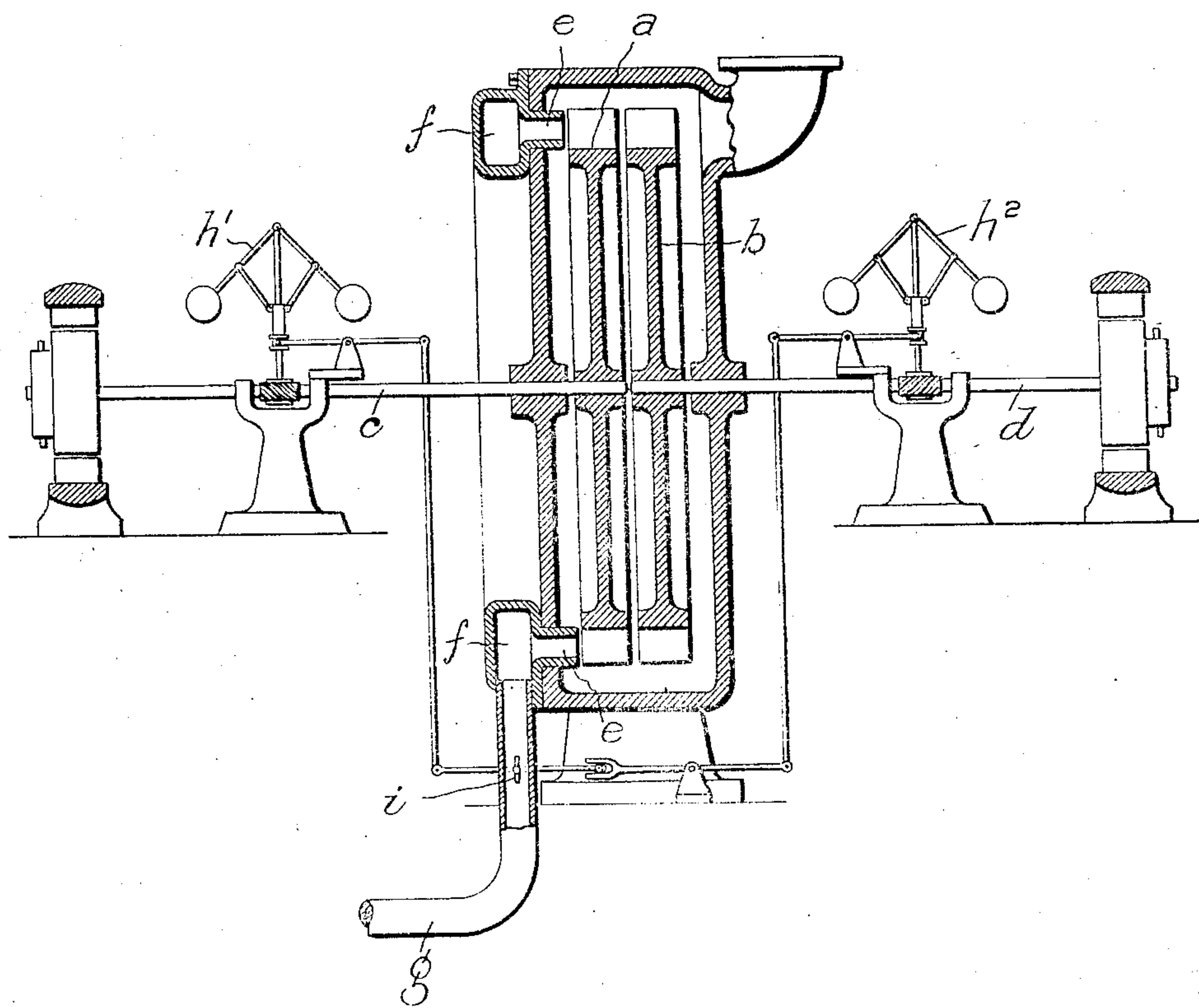


No. 822,316.

PATENTED JUNE 5, 1906.

J. STUMPF.
STEAM TURBINE.
APPLICATION FILED SEPT. 8, 1903.



Witnesses:

Benjamin B. Hull
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Inventor:

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UNITED STATES PATENT OFFICE.

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

STEAM-TURBINE.

No. 822,316.

Specification of Letters Patent.

Patented June 5, 1906.

Application filed September 8, 1903. Serial No. 172,134.

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 means for regulating such turbines in which the steam is utilized in several steps—that is to say, in which the first turbine-wheel is actuated by fresh steam, while the second one is actuated by the exhaust-steam of the first one, and so on until the energy of the motive fluid is abstracted.

The invention is advantageously applicable to turbine-wheels rotating in opposite directions, in which turbine the driving medium flows upon the first turbine-wheel and passes from this first turbine-wheel directly to the second one. Such turbines can be advantageously used for driving several screw-propellers, dynamo-machines, and the like.

Turbines of the kind described have hitherto been regulated by connecting a governor with the primary turbine-wheel, which governor influences the admission of the fresh steam. In case, however, the single turbine-wheels drive different independent machines the effect of this governor is not sufficient. If, for instance, one of the secondary wheels is not loaded, the remaining wheels will not be influenced. For instance, in case of a turbine with two turbine-wheels rotating in opposite directions the primary wheel will not be influenced at all, by reason of the fact that the secondary wheel is not loaded. In consequence of this it follows that the absence of load on the secondary wheel will not influence the admission of the steam. A racing of the secondary wheel is therefore possible without the primary wheel being influenced at all. This, for instance, will take place in case two dynamo-machines are driven by the turbine and a short circuit occurs in the dynamo-machine connected to the primary wheel or in the circuit supplied thereby. In order to avoid this disadvantage, I provide my present invention, which consists in providing each turbine-

wheel with a governor which influences the steam admission.

The invention is carried into effect advantageously in such a way that the governor of the primary turbine-wheel governs the steam-admission in the normal state of the turbine and that a governor is arranged for the secondary turbine-wheel, which governor diminishes the steam admission or cuts the same off as soon as the number of revolutions of the secondary turbine-wheel surpasses certain limits.

The invention may also be carried into effect by means of one governor, in which case both turbine-wheels must actuate this governor, which may be effected, for instance, by inserting a differential gearing which acts in such a way that only that turbine-wheel which has the greatest number of revolutions acts upon the governor.

In many cases it will be sufficient that by the second or third turbine-wheel no real regulation of the turbine is effected, but that in case of the racing of these turbine-wheels means are provided by means of which a steam admission is wholly or partly cut off. This may be attained by connecting the turbine with a quickly-closing valve which acts if a certain number of revolutions is surpassed.

In order to make my invention more clear, I refer to the accompanying drawing, which is a scheme showing my invention applied to a turbine with two turbine-wheels rotating in opposite directions.

a and *b* are the turbine-wheels, fixed to the ends of the shafts *c* and *d*. The turbine-wheel *a* is impinged upon by the steam guided upon the same through the nozzles *e*. This steam flows through the vanes of the turbine-wheel *a* immediately into the vanes of the turbine-wheel *b*. It will be clear that the vanes must be situated in opposite directions and that the turbine-wheels, consequently rotate in opposite directions. The nozzles *e* are connected to a common annular channel *f*, connected to the steam-admission pipe *g*.

i is a throttle-valve situated in the steam-admission pipe. Upon the shafts *c* and *d* governors *h'* *h*² are respectively arranged, which governors are connected to the throttle-valve *i*.

It will be understood that the invention cannot only be applied to turbines with turbine-wheels rotating in opposite directions, but that the invention may be applied to all turbines with several turbine-wheels which work independently from one another. If the secondary turbine-wheel is only connected with a cut-off valve for the steam admission, this cut-off valve may be actuated in any convenient manner—as, for instance, in case of driving dynamo-machines the cut-off valve may be actuated by the increasing of the current, in pumps or ventilators by the increasing of the pressure or in the like manner.

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 a plurality of turbine-wheels, means for admitting steam to said turbine, and governor mechanism for governing the steam admission actuated by each turbine-wheel, substantially as described.
2. In a steam or gas turbine, the combination of several turbine-wheels adapted to act upon separate machines, means for admitting steam to said turbine, means for regulating the admission of said steam, and governing means actuated by each turbine-

wheel for controlling the regulating means, substantially as described.

3. In a steam or gas turbine, the combination of a plurality of turbine-wheels, means for admitting steam to the primary wheel, and a governor for each wheel adapted to govern the admission of steam to said primary wheel, substantially as described.

4. In a steam or gas turbine, the combination of a plurality of turbine-wheels adapted to act on separate machines, means for admitting steam to the primary wheel, a governor for each turbine-wheel, a valve for controlling the steam admission, and connections between the governors and said valve, substantially as described.

5. In an elastic-fluid turbine, the combination of bucket-wheels mounted on separate shafts and driving independent loads, a governing mechanism controlling the admission of motive fluid to the wheels, and connections between the independent shafts and the governing mechanism for actuating the latter.

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.