

G. BELLUZZO.
ELASTIC FLUID TURBINE.
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961,067.

Patented June 7, 1910.

Fig. 1.

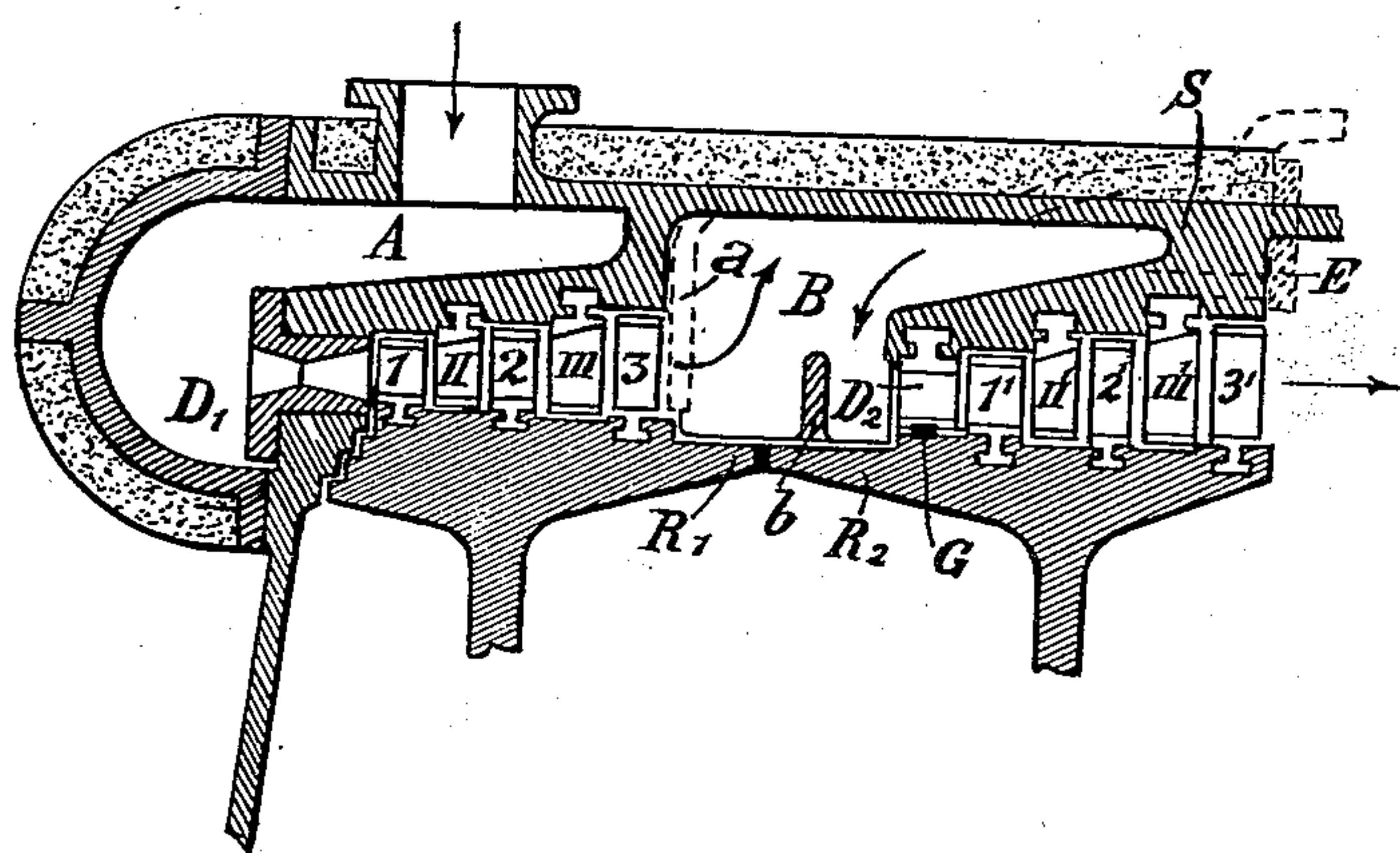


Fig. 2.

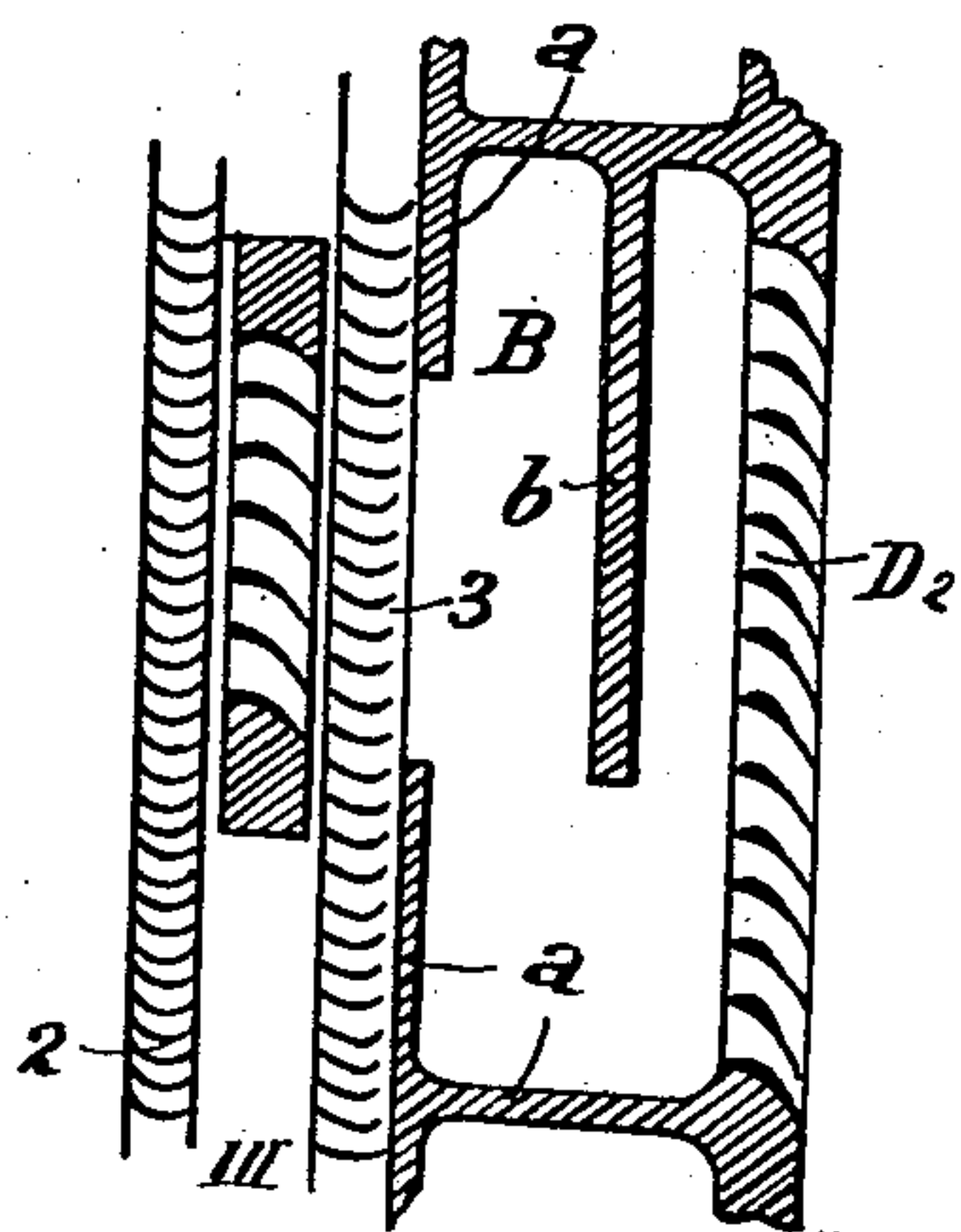


Fig. 3.

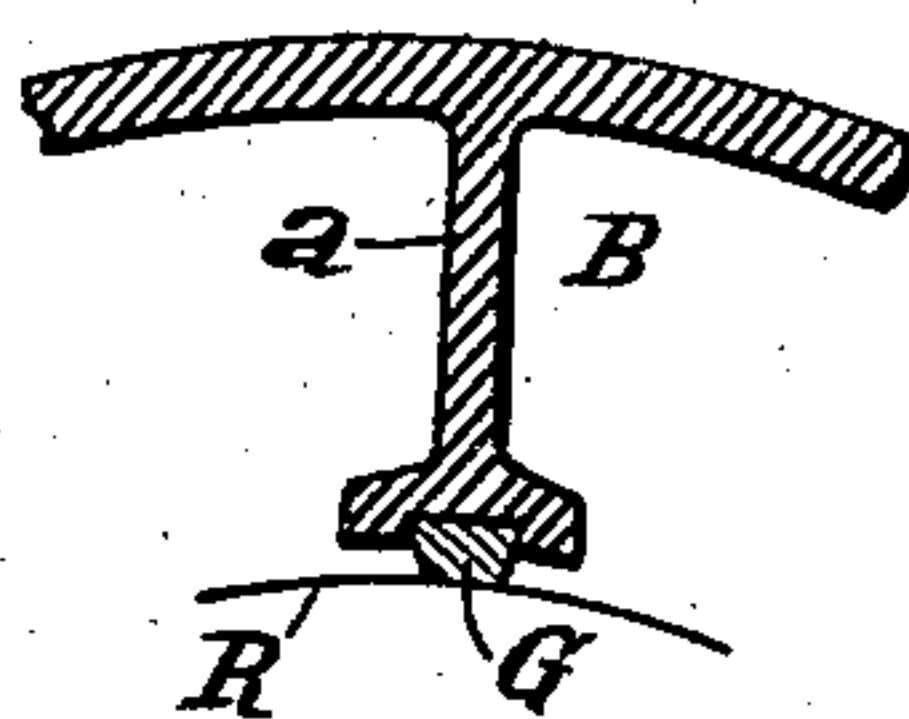
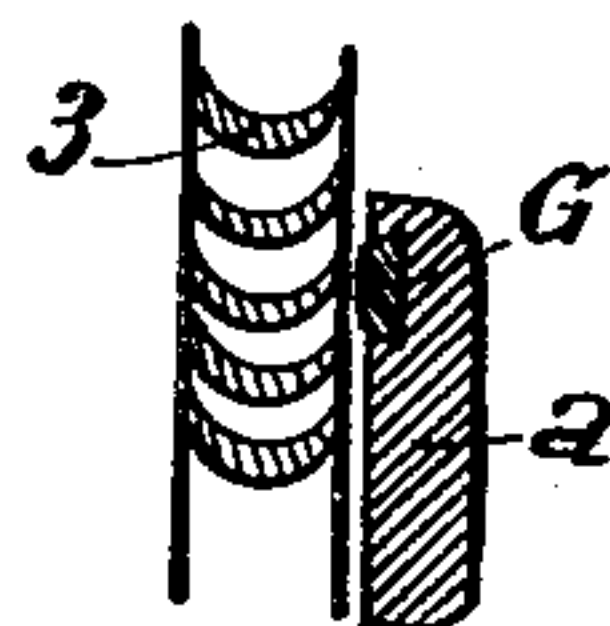


Fig. 4.



Witnesses:

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GIUSEPPE BELLUZZO, OF MILAN, ITALY.

ELASTIC-FLUID TURBINE.

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Specification of Letters Patent.

Patented June 7, 1910.

Application filed March 18, 1907. Serial No. 363,052.

To all whom it may concern:

Be it known that I, GIUSEPPE BELLUZZO, mechanical engineer, a citizen of Italy, residing at Milan, Kingdom of Italy, No. 1 Via Paolo Frisi, have invented new and useful Improvements in Elastic-Fluid Turbines, of which the following is a specification.

This invention relates to new and useful improvements in steam turbines and more especially to improvements in turbines of that type which form the subject of my U. S. Patent No. 814,423, granted March 6, 1906, in which alternately arranged stationary steam guide members and running wheels are employed, the members and the wheels being of successively increased diameter, on account of the successively increased radial dimensions of their respective vanes. The invention is, however, applicable to other types of partial impulse turbines.

The object of the invention is to provide a turbine construction of increased efficiency and simpler structural details and accordingly the invention proposes means whereby the diameters of the guide members and the running wheels may be comparatively reduced by reducing the comparative radial dimensions of the vanes of said members and wheels and at the same time whereby the guide members and wheels may be preheated to a temperature greater than that of the steam passing through them.

To accomplish this object the invention resides more particularly in disposing the wheels and their corresponding guide members in dissociated series, the angular dispositions of which vary by successive increments and between which chambers are provided wherein the fluid issuing from the last running wheel of one series may, by impact, be compressed before it reaches the first running wheel of the next series. The wheels and guide members with relation to one another are of successively increased diameter and the vanes of the wheels and guide members of one series are of relatively greater radial dimensions than the vanes of the corresponding wheels and guide members of a series in advance thereof but they are of materially smaller radial dimensions than would be the case if all the vanes of the wheels and guide members were of successively greater radial dimensions by proportionate increments. In other words, the

vanes of the first guide member or of the first running wheel of one series will be of less diameter than the vanes of the last running wheel of the series in advance thereof although, considered as entireties, the series vary in angular disposition by successive increments.

In the accompanying drawings Figure 1 is an axial section, Fig. 2 a partial development, Fig. 3 a partial section perpendicular to the axis of the turbine, and Fig. 4 a detail of Fig. 2.

For the purpose of reducing the radial dimension of the vanes or blades of the last running wheels, the disposition shown in the drawing is applied. The steam, which arrives from A and expands in the nozzle D¹ and in the successive steam guide members II and III, discharges in a chamber B, escaping from the last one of the running wheels (1, 2, 3) mounted upon R₁, viz. from the 3rd. There the speed of the steam, which has abandoned the wheel 3, is by impact transformed into pressure again. The steam successively expands in the guide members D₂, II¹, III¹ which, taking up a larger angle on the circumference than that occupied by the first series II III, allows of lowering as much as convenient the height of the running vanes as well as of the stationary ones. The walls *a a* prevent the steam from escaping from the chamber B, the same with a small play being made steam tight by graphite packing G (Figs. 1, 3 and 4) (see U. S. application Serial Number 348,289). The wall *b* in its turn prevents the steam leaving the wheel 3 from flowing directly into the passages of the guide wheel D₂ and serves to deflect the steam into the inward pocket-like portion of the chamber whereby two important functions are subserved, the one being to heat the walls of the chamber and therewith the guide members (which may be integral with or fitted into said walls) and the other being to provide for the steam "backing up" in said pocket and by impact, being compressed so as to have the proper expansion in the next series of guide members and wheels through which it flows from the chamber B. The wall *b* also serves to prevent the sucking action of each successive series of wheels from being directly transmitted to the steam in the wheels of the corresponding preceding series. This assures of the passage of the steam to the first guide members of each

series in parallel jets and without any whirling motion whereby the desired and advantageous angles of delivery are maintained.

With the above mentioned disposition also the advantage is obtained that the admission steam at A contributes to keep warm the guide members II and III, while the steam at B gives up its heat to the guide members II¹ and III¹. The same arrangement can also be made use of when not only one chamber B, but two, three, or more analogous chambers are inserted between the admission and the exhaust.

If the turbine is to discharge into the atmosphere, the steam from the chamber B can escape through the passages S shown in dotted lines without further expanding in the successive wheels, provided that the cover E is taken off (Fig. 1).

Having now described my invention and how the same is to be carried out, what I claim is:

1. In a turbine of the type set forth, in combination, a casing, two series of alternately arranged guide members and running wheels therein, the casing being provided between the series with a chamber which has an inwardly extending pocket portion and which has a baffle wall in advance of the

pocket portion, the guide members of the second series being secured to the inner wall of the pocket portion.

2. In a turbine of the type set forth, in combination, a casing, two spaced series of alternately arranged guide members and running wheels therein, the vanes of the wheels and members of each series varying in radial dimension by successive increments and the vanes of the members and the wheels of the second series being of greater radial dimensions than the vanes of the correspondingly located members and wheels of the first series, the vanes of the first member of the second series being of smaller radial dimension than the vanes of the last wheel of the first series, the casing having a chamber between the series constructed to provide for the compression therein, by impact, of the steam issuing from the first series prior to its passage to the second series.

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

GIUSEPPE BELLUZZO.

Witnesses:

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ENRICO VARONELLI.