No. 810,667. PATENTED JAN. 23, 1906.

P. C. OSCANYAN.

ELASTIC FLUID TURBINE.

APPLICATION FILED JULY 10, 1905.

2 SHEETS—SHEET 1.

Fig. 2.

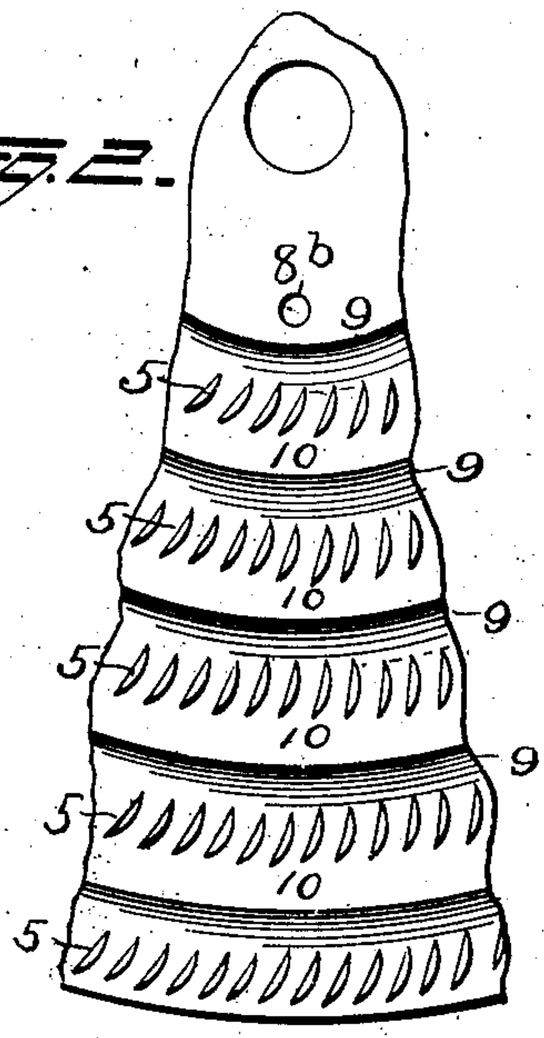



Fig. 1.

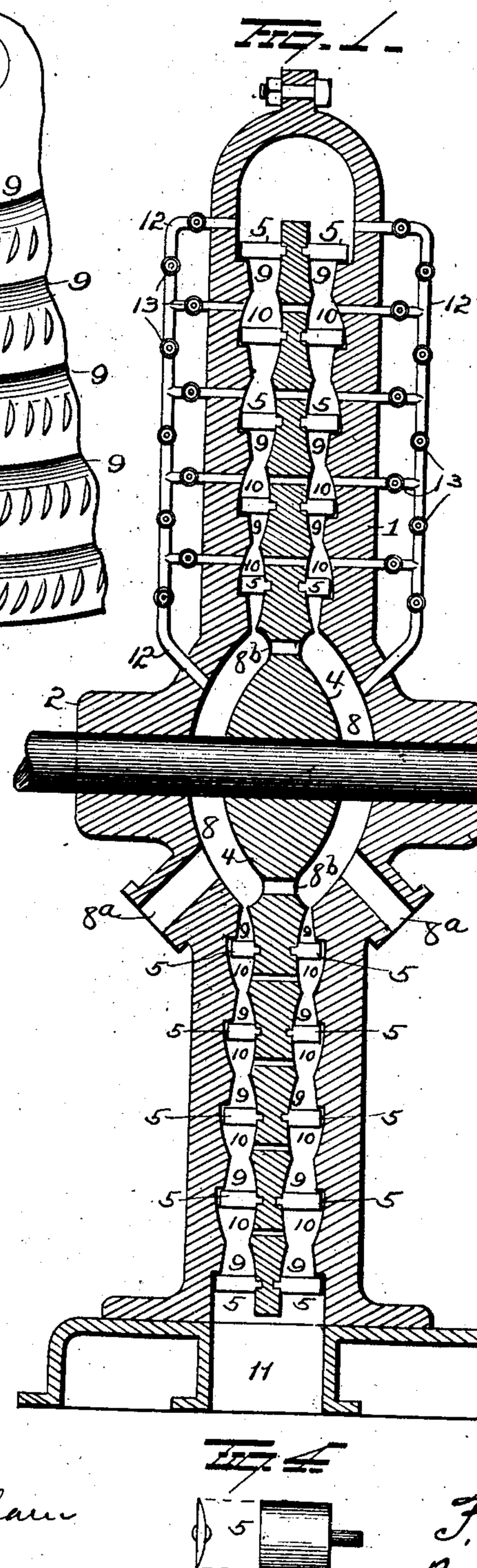



Fig. 5.

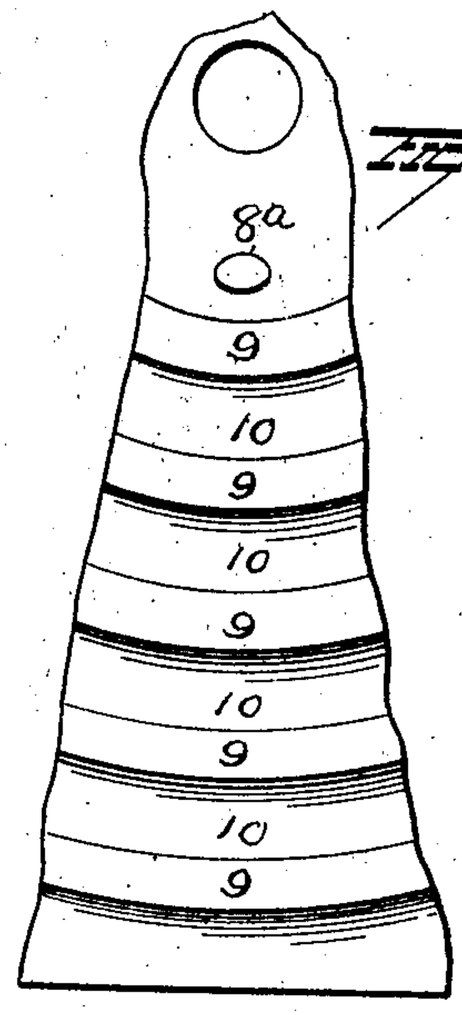



Fig. 4.




WITNESSES

E. L. Nottingham

G. F. Downing

INVENTOR

P. C. Oscanyan

By H. A. Seymour

Attorney

No. 810,667. PATENTED JAN. 23, 1906.

P. C. OSCANYAN.

ELASTIC FLUID TURBINE.

APPLICATION FILED JULY 10, 1905.

2 SHEETS—SHEET 2.

FIG. 5.

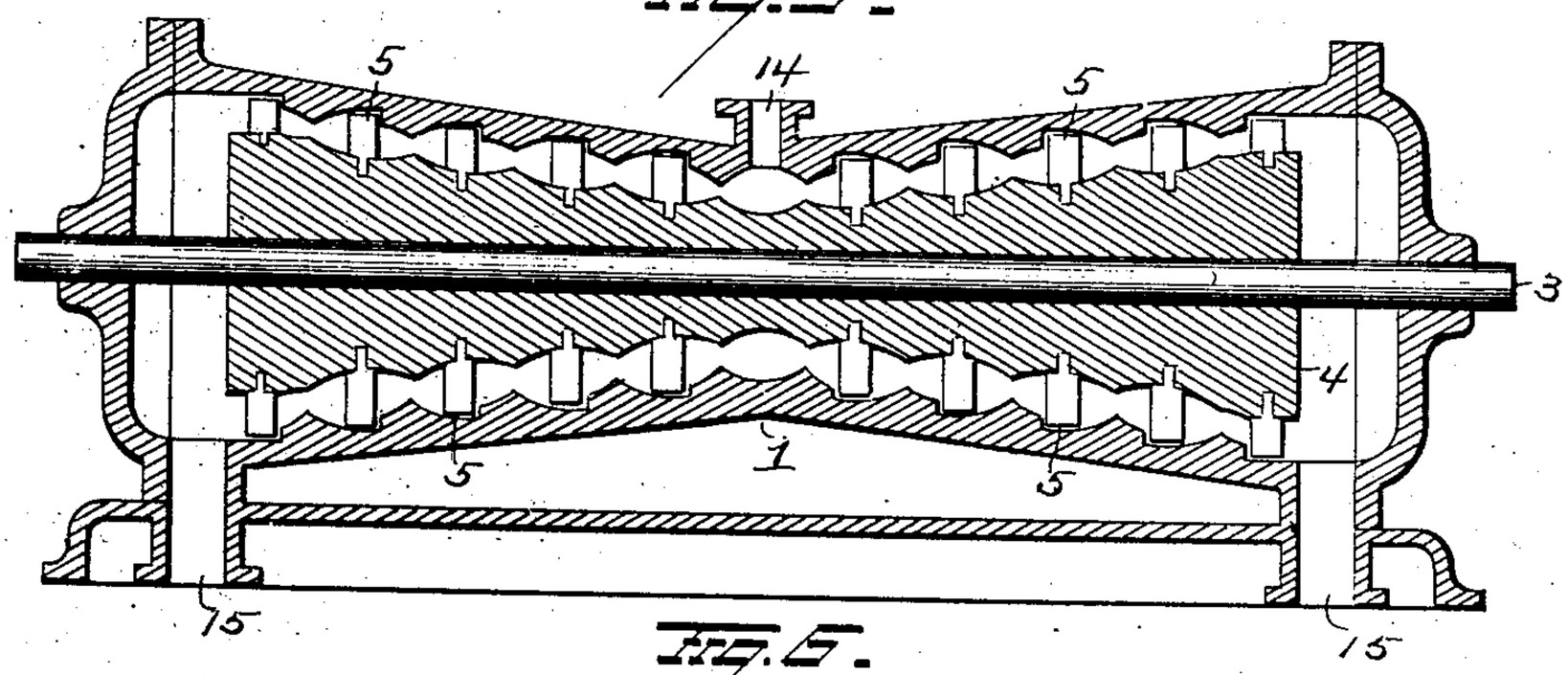



FIG. 6.

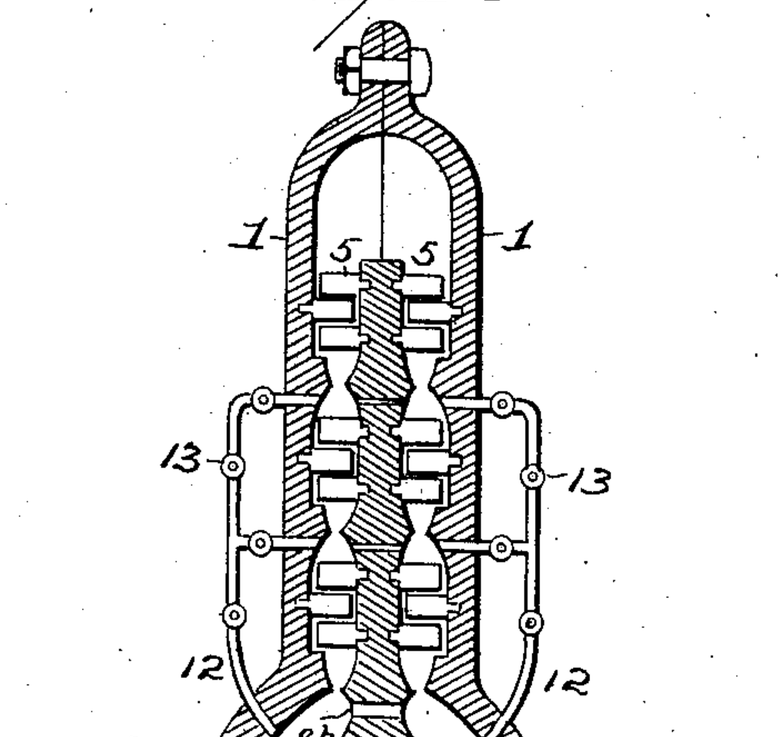



FIG. 8.

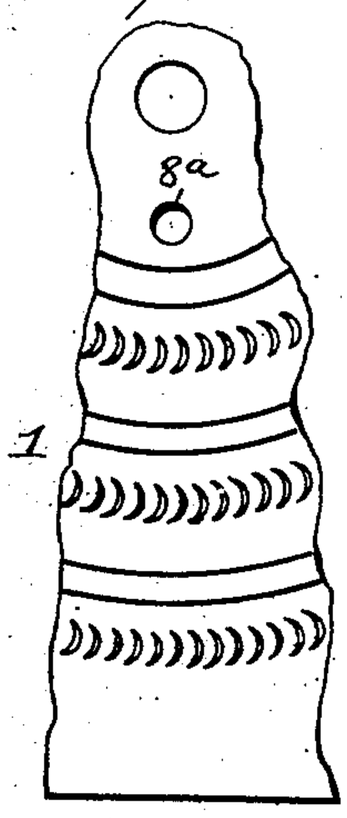
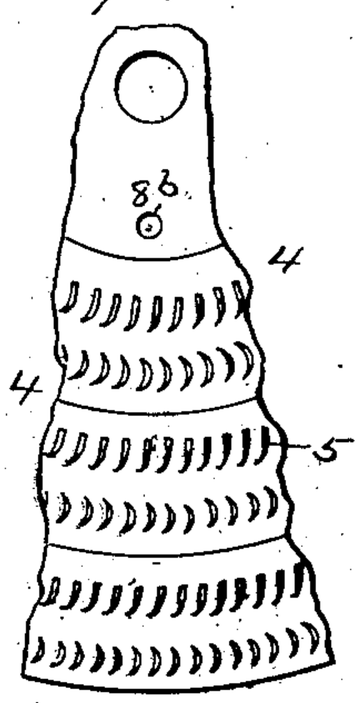



FIG. 7.




WITNESSES

E. L. Nottingham

G. F. Downing

INVENTOR

P. C. Oscanyan

By H. A. Seymour

Attorney

# UNITED STATES PATENT OFFICE.

PAUL C. OSCANYAN, OF NEWARK, NEW JERSEY, ASSIGNOR OF ONE-FOURTH TO THE ADAMS BAGNALL ELECTRIC COMPANY, OF CLEVELAND, OHIO, AND ONE-FOURTH TO GEORGE A. THOMSON, OF SOMERVILLE, NEW JERSEY.

## ELASTIC-FLUID TURBINE.

No. 810,667. Specification of Letters Patent. Patented Jan. 23, 1906.

Application filed July 10, 1905. Serial No. 269,034.

*To all whom it may concern:*

Be it known that I, PAUL C. OSCANYAN, a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Elastic-Fluid Turbines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to elastic-fluid turbines, the object of the invention being to provide a turbine of the class having a radial flow of fluid or horizontal flow, with several annular chambers for transforming pressure into kinetic energy and a single series of buckets or vanes at the outlet of each chamber for absorbing the kinetic energy.

A further object is to provide means for regulating the pressure of the elastic fluid in each annular chamber, and, further, to provide a port or hole in the rotary element of the radial-flow type to equalize the pressure on both sides of said rotary member, and, finally, to provide a turbine having a minimum number of parts and simple construction, and at the same time to provide a turbine having the highest possible efficiency.

With this object in view the invention consists of certain novel features of construction, combinations, and arrangements of parts, as will be more fully hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in vertical cross-section, illustrating my improvements. Fig. 2 is a fragmentary face view of the rotary element. Fig. 3 is a fragmentary face view of the stationary element. Fig. 4 shows an enlarged view of the buckets, which may be constructed in either of the forms shown. Fig. 5 is a longitudinal section illustrating a modification. Fig. 6 is a vertical cross-section illustrating a modification where two series of moving buckets and one set of stationary buckets are utilized to absorb the kinetic energy developed by each annular chamber. Fig. 7 is a fragmentary face view of the rotating element. Fig. 8 is a fragmentary face view of the stationary element.

Referring to Fig. 1, 1 represents a casing having central bearings 2 for a shaft 3, on which is secured my improved rotating element 4, mounted in the casing. This rotary element 4 is of circular form and is provided at intervals on both sides with series of buckets 5, there being five series of these buckets shown, although a greater or lesser number may be employed, if desired. The rotary element 4 and the casing 1 are so shaped as to form inlet compartments or chambers 8 at the center of the turbine around shaft 3, and inlets $8^a$ are provided in the casing to admit steam thereto. Ports or holes $8^b$ are provided for exactly equalizing the pressure of both sides of the rotary element. The casing sides and the rotary element are so shaped as to form in advance of each series of buckets or vanes on the rotating element annular chambers 9 for transforming pressure into kinetic energy and annular receiving-chambers 10, each transforming-chamber, series of vanes, and receiving-chamber constituting a unit, which is duplicated, each unit from the axis outward increasing in area in proportion to the volume of the elastic fluid as it is expanded from pressure into kinetic energy, the elastic fluid finally exhausting through outlet 11. Each of the receiving-chambers 10 is connected by pipes 12 with inlet-chambers 8, and cocks 13 are provided in said pipes to regulate the supply or pressure to and from the transforming-chambers and are also used to properly balance the pressure of the elastic fluid throughout the turbine.

The operation of my improvements is as follows: Steam is admitted at the inlets $8^a$ $8^a$ to the annular chambers 8 on each side of the rotating element at a pressure of, say, one hundred and fifty pounds. It is then adiabatically expanded in the first annular chamber 9 to, say, one hundred pounds, and the kinetic energy developed is impinged upon the row of buckets or vanes at the outlet of the chamber, causing a rotary motion to be imparted to the rotating element, and thereby to the shaft. The steam then enters the receiving-chamber and is further expanded into kinetic energy in the next annular chamber and absorbed as before. These processes are repeated throughout the turbine until it is finally exhausted at 11.

In the modification shown in Fig. 5 my invention is disclosed upon a horizontal-flow turbine, in which steam enters at 14 and exhausts at 15. The kinetic energy is developed

and absorbed in the same manner as in the preferred form of my invention, as will be readily understood.

In the modification Fig. 6 is illustrated a form where it is desirable to expand the elastic fluid to a greater velocity than can be absorbed economically by one set of buckets, this form having a series of stationary buckets for redirecting the unabsorbed kinetic energy received from the first series to the last series in each unit or stage.

Various other changes might be resorted to in the relative arrangement of parts shown and described without departing from the spirit and scope of my invention. Hence I would have it understood that I do not wish to confine myself to the exact construction shown and described; but,

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an elastic-fluid turbine, a combination of a rotary element and a series of annular chambers, each chamber being constructed to transform pressure into kinetic energy and discharge it against a single row of buckets upon the rotary element.

2. In an elastic-fluid turbine, the combination of a rotary element, several rows of buckets on said rotating element, and annular chambers formed between the stationary and rotary members on opposite sides of each series of buckets, said chambers being constructed to transform pressure into kinetic energy and compel the buckets to absorb the kinetic energy developed by said chambers.

3. In a turbine, the combination of a rotary element having several rows of buckets, a stationary element, and said elements so constructed as to form annular chambers between them constructed to transform pressure into kinetic energy between each series of buckets.

4. A radial-flow turbine, the combination of a rotary element, several rows of buckets on said rotating element and annular chambers formed between the stationary and rotary members on opposite sides of each series of buckets, said chambers being constructed to transform pressure into kinetic energy and compel the buckets to absorb the kinetic energy developed by said chambers.

5. In a radial-flow turbine, the combination of a rotating element, several series of buckets thereon and a stationary element forming a series of concentric annular chambers for transforming pressure into kinetic energy between said series of buckets, said chambers increasing in area from the axis to the periphery of the rotating element.

6. In an elastic-fluid turbine, the combination of a series of annular chambers designed to transform pressure into kinetic energy, each chamber discharging against a single row of buckets and each chamber having a by-pass for adjusting the pressure therein.

7. In a radial-flow turbine the combination of a series of annular chambers designed to transform pressure into kinetic energy, each chamber discharging against a single row of buckets, and each chamber having a by-pass for adjusting the pressure therein.

8. In an elastic-fluid turbine the combination of annular chambers formed between the stationary and rotary members for transforming pressure into kinetic energy, discharging into receiving-chambers of approximately the same pressure and buckets to absorb the kinetic energy.

9. In an elastic-fluid turbine the combination of an alternate series of annular chambers formed between the stationary and rotary members constructed to transform pressure into kinetic energy, and receiving-chambers and buckets to absorb the kinetic energy.

10. In a radial-flow turbine the combination of an alternate series of annular chambers formed between the stationary and rotary members constructed to transform pressure into kinetic energy, and receiving-chambers and buckets to absorb the kinetic energy.

11. The combination of an elastic-fluid turbine in which the rotating and stationary elements form chambers constructed to transform pressure into kinetic energy, and receiving-chambers and buckets to absorb the kinetic energy.

12. The combination of a radial-flow turbine in which the rotating and stationary elements form chambers constructed to transform pressure into kinetic energy, and receiving-chambers and buckets to absorb the kinetic energy.

13. In an elastic-fluid turbine the combination of a rotary member with several series of buckets mounted thereon, constructed so that each series of buckets rotates in a chamber formed between the stationary and rotary members and receiving direct impact of the elastic fluid from annular chambers formed between the stationary and rotary members constructed to transform pressure into kinetic energy.

14. In a radial-flow turbine the combination of a rotary member with several series of buckets mounted thereon, constructed so that each series of buckets rotates in a chamber formed between the stationary and rotary members and reciving direct impact of the elastic fluid from chambers formed between the stationary and rotary members constructed to transform pressure into kinetic energy.

15. In an elastic-fluid turbine the combination of a rotary member with several series of buckets constructed so that each series of buckets rotates in a chamber formed between the stationary and rotary members and receiving direct impact of the elastic fluid from an annular chamber formed between the stationary and rotary members constructed to transform pressure into kinetic energy.

16. In a radial-flow turbine the combination

of a rotary member with several series of buckets constructed so that each series of buckets rotates in a chamber formed between the stationary and rotary members and receiving direct impact of the elastic fluid from an annular chamber formed between the stationary and rotary members constructed to transform pressure into kinetic energy.

17. In an elastic-fluid turbine, the combination of a rotary element, having buckets and a port or hole for equalizing the pressure on both sides, and a series of annular chambers constructed to adiabatically expand the elastic fluid.

18. In a turbine, the combination of a rotating element having a port or hole for equalizing the pressure on both sides, and a series of buckets on said rotating element, and annular chambers on opposite sides of the buckets constructed to adiabatically expand the elastic fluid and compel the buckets to absorb the kinetic energy developed by said chambers.

19. In a turbine, the combination of a rotating element, having a port or hole for equalizing the pressure on both sides, a stationary element, and said elements so constructed as to form annular chambers to adiabatically expand the elastic fluid.

20. In a radial-flow turbine, the combination of a stationary element, a rotary element having buckets and a port or hole for equalizing the pressure on both sides, and both elements constructed to form between them annular chambers to adiabatically expand the elastic fluid.

21. In a radial-flow turbine, the combination of a casing, and a shaft therein, of a rotary element having a port or hole for equalizing the pressure on both sides, in the casing secured on the shaft, several series of buckets on both sides of the rotary element, and said rotary element and casing so constructed as to form annular chambers at each series of buckets to adiabatically expand the elastic fluid.

22. In a radial-flow turbine, the combination of a rotating element having buckets and a port or hole for equalizing the pressure on both sides, and stationary elements forming a series of annular chambers for the adiabatic expansion of steam, said chambers increasing in area from the axis to the periphery of the rotating element.

23. In a turbine, the combination of buckets and two independent sets of annular chambers for transforming pressure into kinetic energy, formed between the stationary and rotary members, annular receiving-chambers and means for equalizing pressure between any annular receiving-chamber on one side and the corresponding annular receiving-chamber of the other side.

24. In a radial-flow turbine the combination of a rotary member balanced against pressure by means of a port or hole in said rotary member, each side of said stationary and rotating member forming a series of annular chambers constructed to adiabatically expand the elastic fluid.

25. In a radial-flow turbine, the combination of a balanced rotary member, having a port or hole in said rotary member, vanes or buckets on each side of said rotary member, and a stationary member on each side of said rotary member constructed to form a series of annular chambers for the adiabatic expansion of the elastic fluid.

26. In a radial-flow turbine, the combination of a rotating member having buckets and a port or hole for equalizing the pressure on both sides, and a stationary element forming a series of annular chambers constructed to adiabatically expand the elastic fluid, each chamber having a by-pass by which the pressure therein may be adjusted.

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

PAUL C. OSCANYAN.

Witnesses:
C. F. SMITH,
E. M. KING.