

G. WESTINGHOUSE.

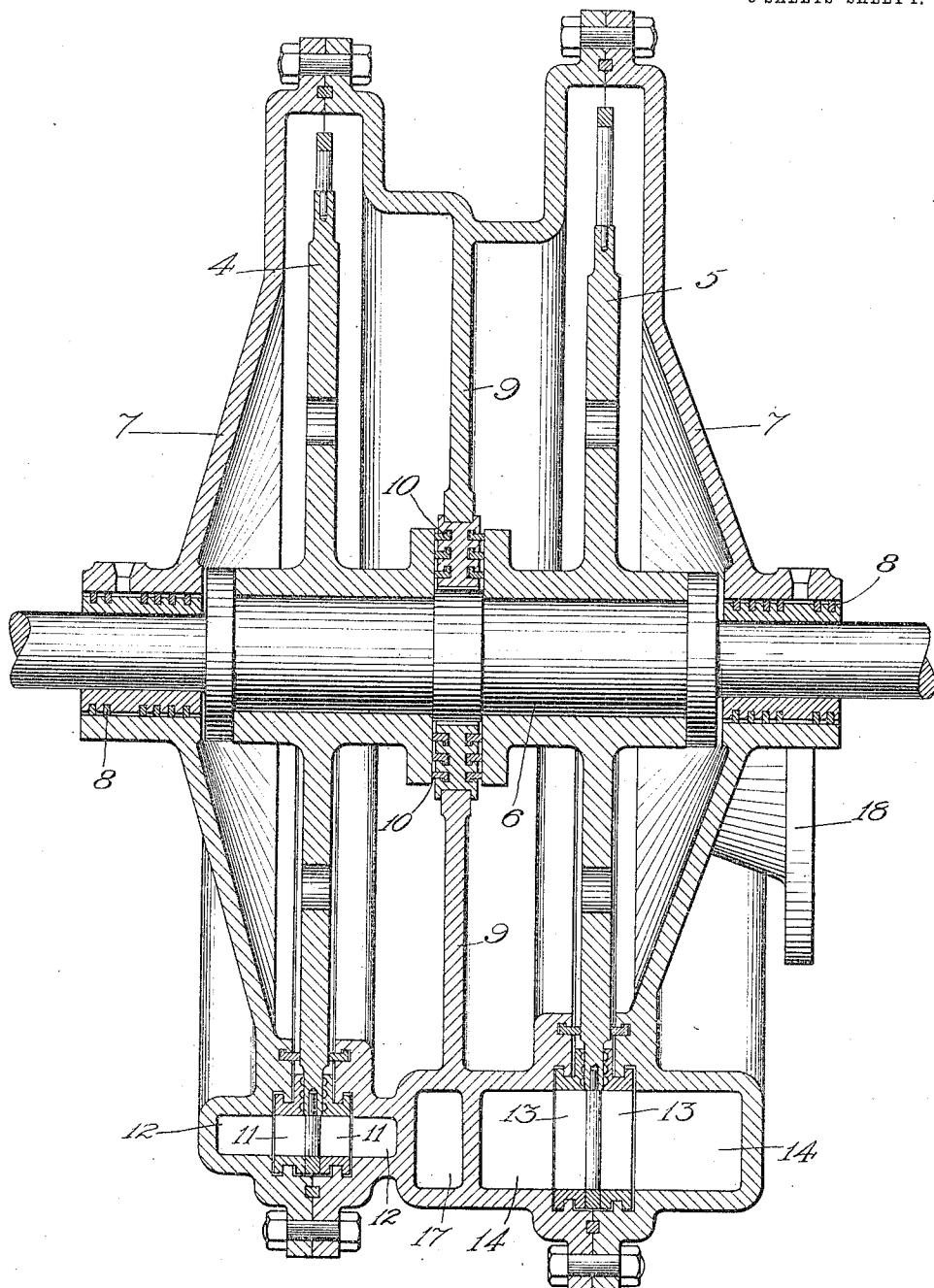
CONDENSING TURBINE.

APPLICATION FILED MAR. 6, 1909.

998,821.

Patented July 25, 1911.

3 SHEETS—SHEET 1.



WITNESSES:

*P. M. F.*  
*George Westinghouse*  
*Leol. Wallace*

Fig. 1.

BY

George Westinghouse  
HIS ATTORNEY IN FACT.

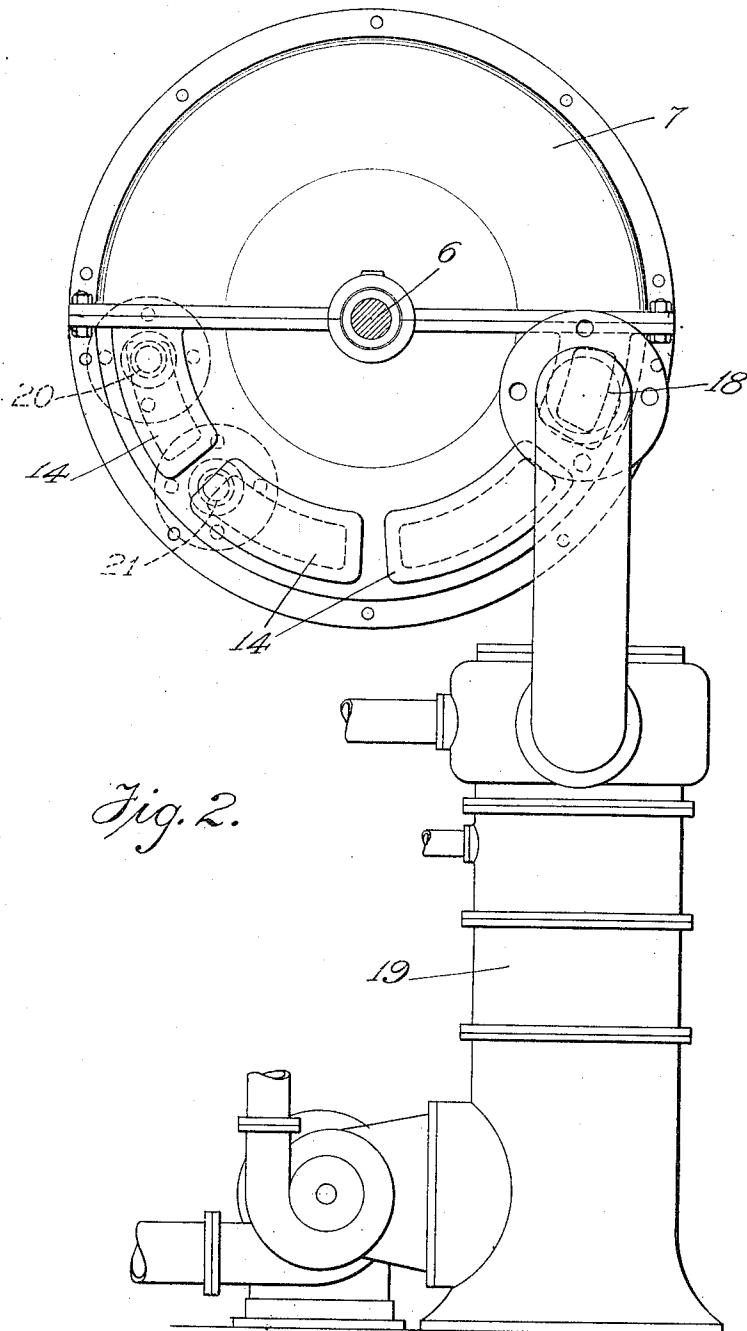
INVENTOR.

G. WESTINGHOUSE.  
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3 SHEETS—SHEET 2.



WITNESSES:

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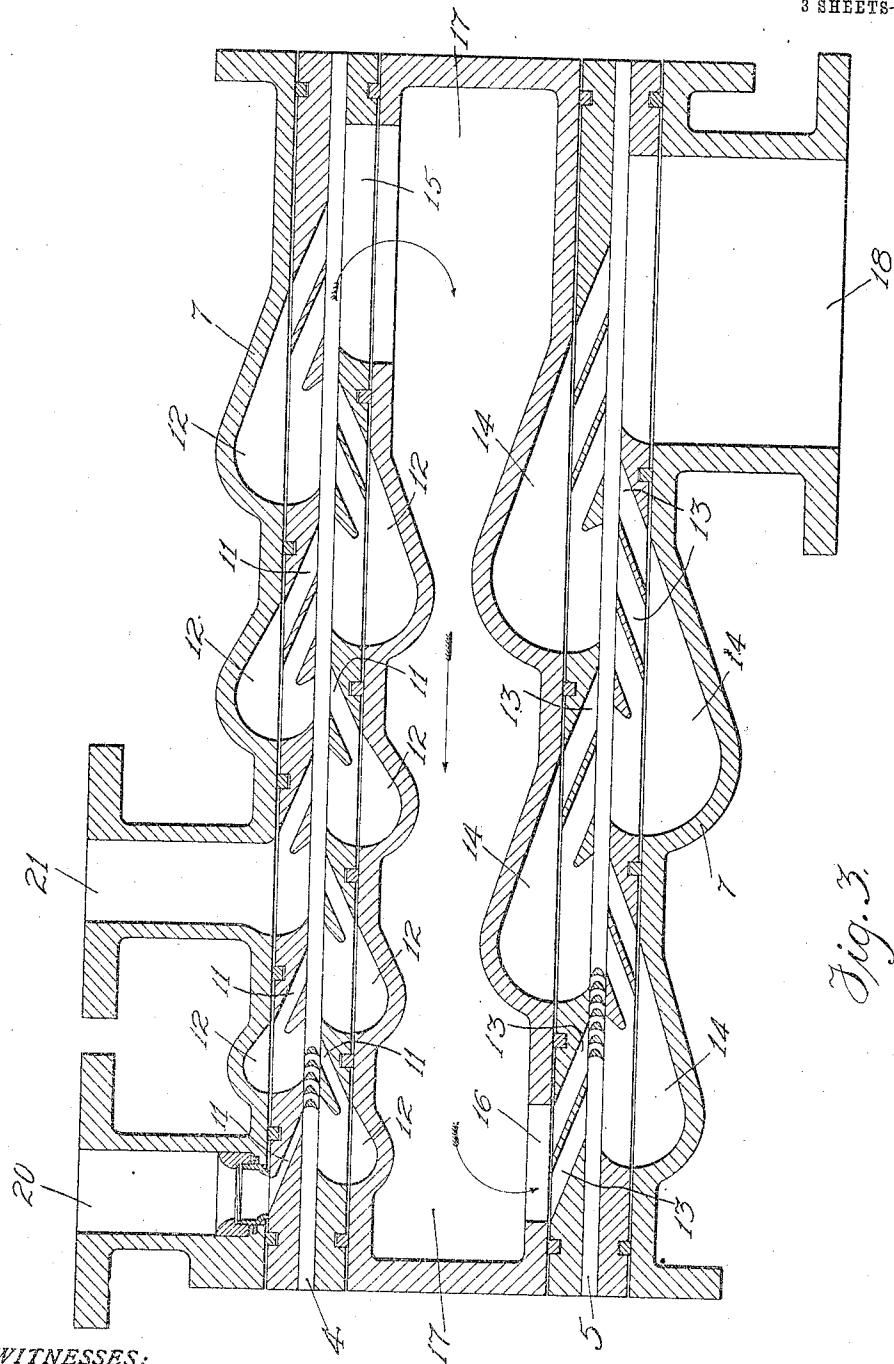
## CONDENSING TURBINE.

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3 SHEETS--SHEET 3.



*WITNESSES:*

Benj. S. S.  
Westmoreland

INVENTOR.  
BY George Westinghouse  
HIS ATTORNEY IN FACT.

HIS ATTORNEY IN FACT.

# UNITED STATES PATENT OFFICE.

GEORGE WESTINGHOUSE, OF PITTSBURG, PENNSYLVANIA.

## CONDENSING-TURBINE.

998,821.

Specification of Letters Patent. Patented July 25, 1911.

Application filed March 6, 1909. Serial No. 481,816.

*To all whom it may concern:*

Be it known that I, GEORGE WESTINGHOUSE, a citizen of the United States, and a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have made a new and useful Invention in Condensing-Turbines, of which the following is a specification.

This invention relates to elastic fluid turbines; an object being the production of a compact, efficient, relatively slow speed condensing turbine which is cheap to manufacture and maintain.

In the drawings: Figure 1 is a longitudinal section of a turbine embodying this invention; Fig. 2 is an end elevation and shows such turbine coupled up to a condensing apparatus; and Fig. 3 is a developed section showing the nozzle and blade lay-out.

The turbine illustrated comprises two re-entrant wheels with nozzles and collecting chambers therefor operating in series on steam or other elastic fluid from the same source of supply and the second of the turbines discharges into a condenser. Two running wheels 4 and 5 mounted on the same shaft 6 journaled in suitable bearings (not shown) are surrounded by a casing 7 provided with steam packing 8 through which the shaft passes.

The casing 7 is divided into halves on its horizontal axis, as is now common, and is provided with a partition or diaphragm 9 which separates the casing into two running wheel compartments. The diaphragm near the hubs of the wheels is provided with steam packing 10 to prevent leakage between the compartments. The lower half of the casing preferably carries all of the nozzles and collecting chambers for the turbine so that the upper half and the rotor can be removed without interfering with the nozzles or collecting chambers.

Any number of expansion stages for each of the wheels may be provided and in the drawings, for the sake of illustration merely, I have shown the series of nozzles 11 for the first or high-pressure wheels and 50 the collecting chambers 12 which coöp-

erate with the nozzles. In the second or low-pressure wheel, I have shown the series of nozzles 13 with the coöperating collecting chambers 14. The exhaust 15 of the first wheel as shown is led to the inlet 16 for 55 the second wheel through passage 17, and the exhaust port 18 of the second wheel is coupled to the condensing apparatus 19, which may be of any type preferred. In addition to the main inlet 20, the first wheel 60 is supplied with an overload inlet 21 for admitting live steam to the collecting chamber of one of the intermediate stages of expansion.

Leakage from stage to stage and from the 65 stages to the interior of the casing, lying inside of the blades, is prevented by the means illustrated, the same being described by me in two of my co-pending applications for Letters Patent.

Of course, if desired three or more running wheels, may be employed.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together 75 with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the apparatus shown is only illustrative and that the invention can be carried out by other 80 means.

What I claim is:

1. In a reentrant turbine, a running wheel, a casing divided into a stationary part and a cover, and fluid discharge devices located entirely in the stationary part.

2. The combination with a plurality of reentrant turbine wheels, of a casing for said wheels, divided on its horizontal axis, means dividing said casing into wheel compartments and fluid-discharging devices for said wheels located entirely in one of the halves of said casing.

3. The combination with a plurality of reentrant turbine wheels, of a casing for 95 said wheels divided on its horizontal axis, means dividing said casing into wheel compartments and fluid-discharging devices for said wheels located entirely in the lower half of said casing.

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4. In combination with a plurality of re-entrant turbine wheels mounted on the same shaft, a two-part casing for said wheels divided into wheel compartments, fluid-dis-  
5 charging devices for said wheels located in one part of said casing.

In testimony whereof, I have hereunto

subscribed my name this 23rd day of February, 1909.

GEO. WESTINGHOUSE.

Witnesses:

H. C. TENER,  
Wm. H. CAPEL.