S. W. RUSHMORE.

CONTROLLING DEVICE FOR TURBINES.

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1,212,816. Patented Jan. 16, 1917.

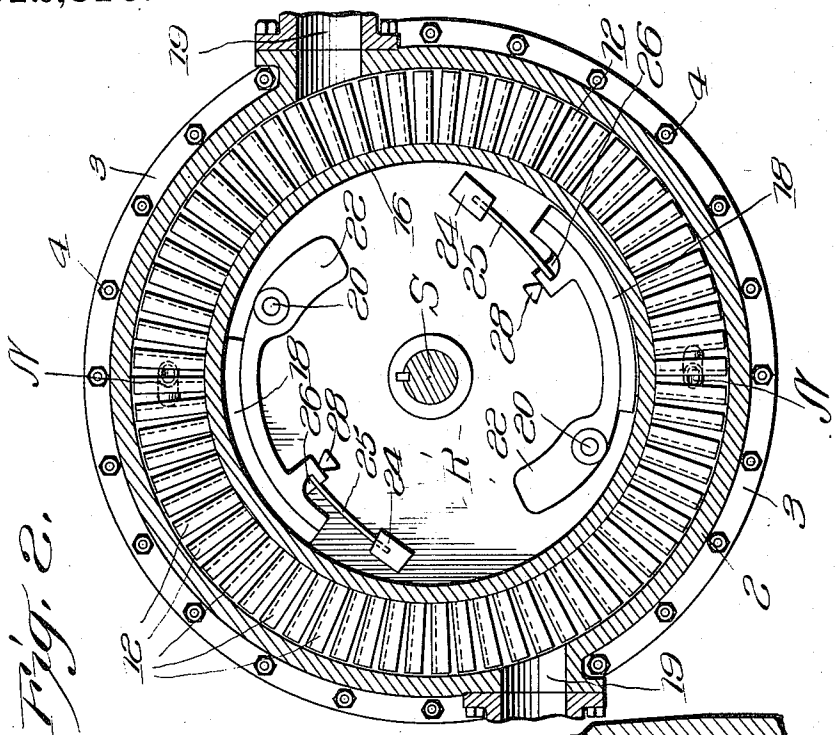


Fig. 2.

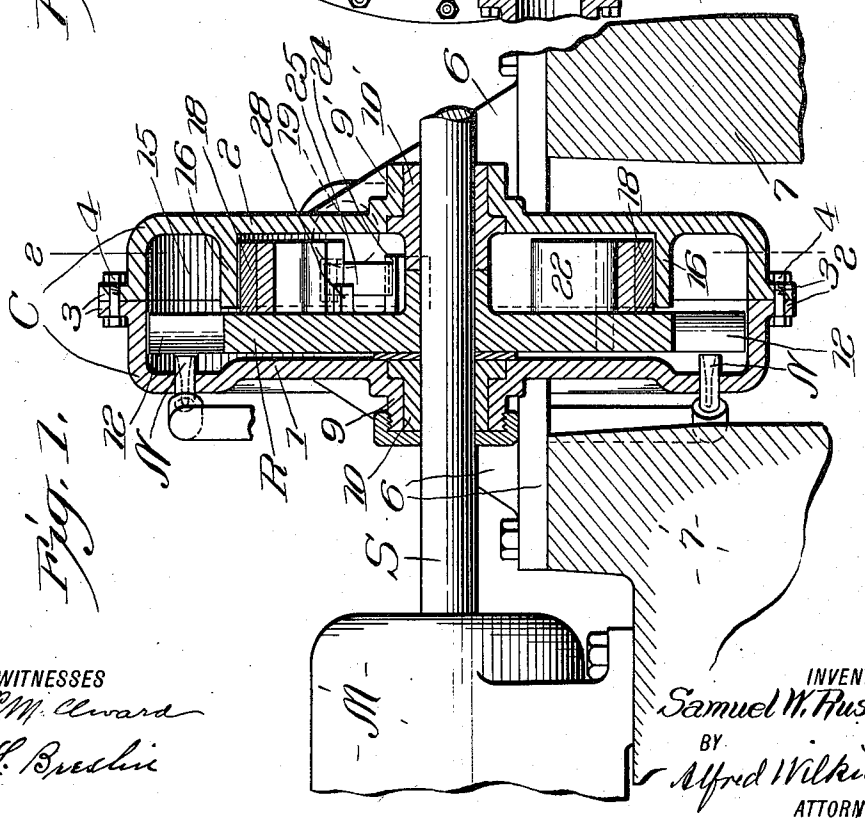


Fig. 1.

WITNESSES

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CONTROLLING DEVICE FOR TURBINES.

1,212,816. Specification of Letters Patent. Patented Jan. 16, 1917.

Application filed September 28, 1911. Serial No. 651,819.

To all whom it may concern:

Be it known that I, SAMUEL W. RUSHMORE, a citizen of the United States, residing at Plainfield, in the county of Union and State of New Jersey, have invented new and useful Improvements in Controlling Devices for Turbines, of which the following is a specification.

This invention relates to controlling means for steam turbines and is particularly useful with machines of small size, such as used to drive dynamos for operating headlights on locomotives.

Electric headlights of the arc type have been used to some extent, but their application has been greatly restricted by reason of the large first cost and excessive cost of operation and repair, while on most railways the electric arc light has been found too blinding, for instance to signal-men and engineers on trains coming from the opposite direction.

Attempts have been made to employ headlights fitted with the modern, high power, metal filament, incandescent lamps, but it has been found difficult properly to control the speed of the turbines suitable for the extremely small amount of energy demanded by such lamps, particularly as such lamps require extremely close voltage regulation.

It has been found to be impracticable to control the speed of the very small turbines operating on very high steam pressure by means of the usual centrifugal governors operating a throttle valve, as such governors require closer attention than can be given upon a locomotive, and the high pressure steam soon wears away the valve seats, thus permitting the speed to become excessive. Furthermore such governors are costly and require a large amount of space in relation to the size of the turbine.

In my turbine I employ a centrifugal governor device which does not control the steam supply, but acts as a brake to apply a load when the speed tends to become excessive. I place the rubbing parts of the brake device within the turbine casing where the exhaust steam acts as a lubricant to prevent excessive wear and also acts to carry away the heat generated by the friction.

Although under my arrangement the steam consumption remains constant at all times, regardless of the amount of energy delivered by the dynamo, the waste is negligible, as the turbine will be operated only when the headlight is to be lighted, and the size of the steam nozzle will be adjusted to pass only about the quantity of steam required to do the work.

A single stage turbine directed to a simple and compact embodiment of my invention is shown in the accompanying drawing in which the reference numerals of this description are applied to the corresponding parts in both of the figures of which—

Figure 1 is a longitudinal, vertical, sectional view and Fig. 2 a cross sectional view taken on line 2—2 of Fig. 1.

In the drawing the usual casing C is composed of the right and left castings 1 and 2, flanged at 3 for the securing bolts 4 and having formed integral therewith the pedestal 6, resting on a suitable base 7. Said casing is formed with the bearing flanges 9—9′, fitted with bushings 10—10′ for the shaft S journaled therein. Keyed on said shaft within the casing is the usual rotor, or bucket-wheel, R, to which power is communicated through the action of steam, from the usual nozzles N, acting on the vanes, or buckets, 12 arranged on the periphery of the rotor R. M indicates the generator mounted on and driven by the shaft S.

Preferably within that part of the casing which forms the exhaust chamber indicated at 15, I provide an annular braking flange 16 having an inner, peripheral, braking surface to be engaged by centrifugal brake shoes 18. By thus arranging the brake within the casing, the parts are subjected to the action of the steam in its passage to the exhaust ports 19, whereby a constant lubrication of the friction surfaces and absorption by the steam of the heat generated by friction will follow.

As here shown the brake shoes 18 of my invention desirably may be pivoted at 20 on the rotor, R, to be forced directly by centrifugal action into braking contact with the flange 16, thus controlling the speed. The forming of the brake-shoes with counterbalance weights 22 as shown permits the brake-shoes to be of substantial proportions to employ the maximum braking area while confining the centrifugal action within the proper limits to accord therewith. Supported in lugs 24 on the rotor are the shoe-retracting springs 25 in engagement with notches 26 in the shoes normally to hold said shoes in retracted position and to in-

sure disengagement at low speeds. This retraction is limited by stop-lugs 28 on the rotor.

The structure and arrangement here described is strong, simple and durable, and of great value in making possible the use of incandescent lamps on locomotives.

Having described my invention, I claim:

1. In combination, a stationary member having a braking surface, a rotary member, a braking element pivotally connected to the rotary member and having a brake shoe in juxtaposition to said braking surface, whereby the centrifugal force of the rotary member will apply the brake shoe to said braking surface with more or less pressure depending upon the speed of rotation of the rotary member, and a counterweight arranged to partly offset the centrifugal effect of said brake shoe.

2. A turbine including a stationary member having a braking surface, a rotary blade carrying member, and a braking element pivotally connected to the rotary member and having a brake shoe in juxtaposition to said braking surface, whereby the centrifugal force of the rotary member will apply the brake shoe to said braking surface with more or less pressure depending upon the speed of rotation of the rotary member, and a weight carried by said braking element to limit its braking action.

3. In a turbine, a stationary casing having a braking surface, and a steam inlet and a steam outlet, a rotary blade carrying member within said casing, and a braking element pivotally connected to the rotary member in the path of the steam and having a brake shoe in juxtaposition to said braking surfaces whereby the centrifugal force of the rotary member will apply the brake shoe to said braking surface and whereby the steam passing to the outlet will lubricate the braking surfaces.

4. In a controlling device for turbines, a casing inclosing a steam chamber, a rotary member arranged in said chamber, an annular braking flange within the chamber, centrifugally acting brake-shoes pivotally carried on the rotary member to engage said flange when the speed becomes excessive, said brake-shoes having an enlarged braking area, counter-balance weights carried by the shoes to limit their centrifugal action, stop-lugs on the rotor and retractile springs normally to hold the shoes in retracted position in engagement with the lugs, said parts being arranged to permit the access of the steam to the braking parts thereby to be subjected to the action thereof.

5. A controlling device for turbines and the like having a stationary member, a rotary member, centrifugally acting brake-shoes carried by said rotary member frictionally to engage said stationary member, said brake-shoes having an enlarged braking area, counter-weights to oppose the centrifugal action of said shoes in order to limit the braking and retractile springs normally to hold the shoes in retracted position.

6. In combination a casing having a fluid inlet and a fluid outlet, a rotary member within said casing, a stationary member within said casing, and centrifugally acting brake shoes carried by said rotary member for frictionally engaging said stationary member when the speed of said rotary member exceeds a pretermined limit, the passage of fluid through said casing serving to dissipate the heat generated by the friction and to lubricate the friction surfaces.

7. A controlling device for turbines and the like, including a casing having a steam chamber, a rotary member within said chamber and carrying a plurality of centrifugally actuated braking parts and said casing carrying a fixed surface with which said parts may engage as the speed of said rotary member exceeds a predetermined limit, and said casing having a steam inlet and a steam outlet whereby the passage of steam through said casing may dissipate the heat generated by the friction of said parts on said surface.

8. A power absorbing braking governor including a stationary member presenting a braking surface, a rotary member and a braking element carried by said rotary member and having a brake shoe juxtaposed to said braking surface whereby the centrifugal force of the rotary member will apply the brake shoe to said braking surface with more or less pressure, depending upon the speed of rotation of the rotary member, and a counterweight connected to said brake shoe and subjected to the action of centrifugal force to partly counteract the effect of centrifugal force on said brake shoe.

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

SAMUEL W. RUSHMORE.

Witnesses:
V. N. De Lamater,
E. W. Poinier.