Nov. 10, 1936. A. FLADELAND 2,060,414

TURBINE

Original Filed June 15, 1932

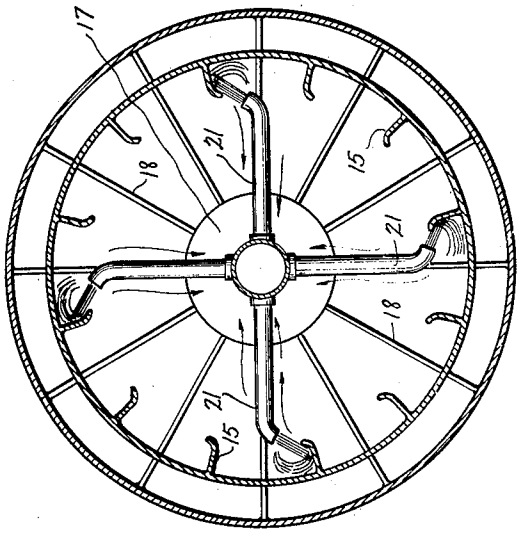

Fig. 2

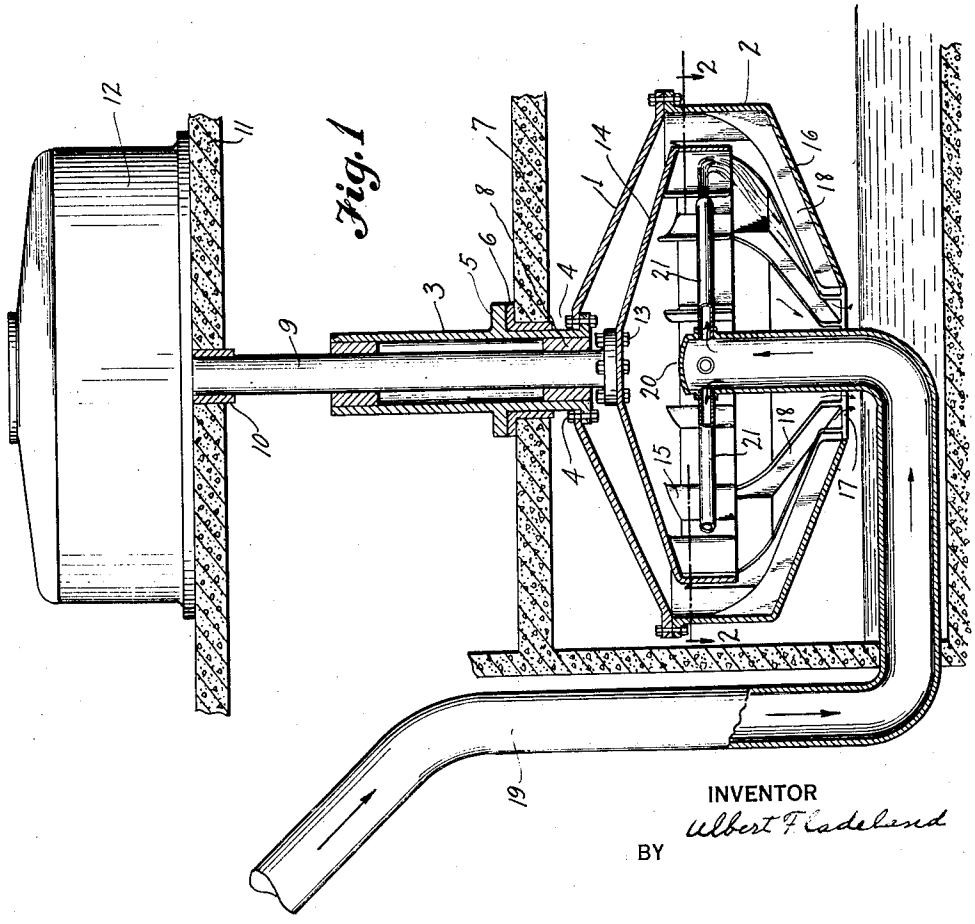

Fig. 1

INVENTOR
Albert Fladeland

BY

Patented Nov. 10, 1936 2,060,414

UNITED STATES PATENT OFFICE

2,060,414

TURBINE

Albert Fladeland, Kitsap County, Wash.

Refile of application Serial No. 617,322, June 15, 1932. This application September 18, 1935, Serial No. 41,182

3 Claims. (Cl. 253—173)

This application is a refile for my abandoned application Serial No. 617,322 filed June 15, 1932.

This invention relates to improvements in turbines and has for its principal object to provide a device of this character that will convert hydraulic energy into rotary, mechanical or electrical energy with a minimum of loss due to friction and incomplete utilization of hydraulic energy.

An important feature of the invention is that it combines a primary high speed rotor, with a secondary slow speed rotor, rotating concentrically in the same direction and wherein the floor of the outer shell or secondary rotor is conical and slopes toward an opening in the center. A dual turbine wherein the casing or outer shell of the primary high speed turbine is a secondary slow speed turbine, having a floor sloping inwardly toward an opening in the center and vanes projected upwardly from the floor of the vessel. Fluid having acted on the vanes of the primary high speed rotor still has energy. To utilize the remaining energy the secondary turbine has a conical floor sloping toward an opening in the center. Fluid having acted on the primary rotor drops into the secondary slow speed rotor and having acted on the vanes of the slow speed rotor it gravitates toward the opening in the center but due to the fact that as it gravitates toward the center the distance it travels in a declining circle becomes less with each rotation of the vessel. Therefore, it will be seen that the fluid will continue to impinge on the vanes of the outer vessel until it drops through the opening in the center.

I accomplish these and other objects by the peculiar combination and arrangement of the parts and by the development and use of the principle of the declining circle as will be more clearly explained in the following specification shown in the accompanying drawing and finally pointed out in the appended claims.

In the drawing:

Fig. 1 is a vertical section of my device.

Fig. 2 is a section upon the line 2—2 of Fig. 1.

Referring now more particularly to the drawing, reference numeral 1 indicates an outer casing or shell. The top portion of this outer shell is conical in shape and has a vertical wall or edge as shown at 2. This outer shell is secured to a sleeve 3 as by bolts 4. The sleeve having a thrust collar 5 which bears against tubular casting 6, which in turn passes through a fixed wall 7, so that the sleeve 3 is free to revolve within the tubular casting 6. At the top and bottom of the sleeve are spacing collars 8 and revolubly passed through the collars 8 is a shaft 9 which revolubly passes through a bearing 10 in a wall 11. 12 generally indicates a generator with which the shaft 9 is connected. Secured to the lower end of the shaft 9 by bolts 13 is an inner shell 14, secured to the inner peripheral surface of which are vanes 15, preferably curved at their free extremities as shown in Fig. 2. The floor 16 of the outer shell 1 slants downwardly, and has an opening 17 at the bottom. Along this floor are vanes 18. 19 is an inlet tube or penstock for fluid under pressure, the tube 19 being closed at 20. Extending radially from the upturned end of the tube 19 are pipes 21 curved at their outer extremities as shown.

The method of operation is as follows: The water enters the penstock 19 and flows in the path indicated by the arrows until it reaches the closed top 20 of the penstock, whence the flow is outwardly through the tubes 21 where it is discharged against the vanes 15, thus causing the inner shell 14 to rotate in contra-clockwise direction, Fig. 2. After the water has thus acted upon the vanes of the primary rotor it is acted on by gravity and drops down into the secondary slow speed rotor causing it to rotate in the same direction as the primary rotor, as the fluid gravitates toward the opening in the center of the secondary rotor or shell 1 the distance it travels with each rotation of the vessel decreases. Therefore the fluid continues to impinge on the vanes 18 of the secondary rotor until it drops through the opening in the center.

The water may either flow through the penstock by gravity or may be accelerated by external means such as hydraulic or other pressure devices of any approved form.

Since I have shown and described an inner and an outer shell, both mounted for independent rotative movement, it is obvious that any approved power transmission means may connect the sleeve 3 with any desired load, and that upon the rotation of the outer shell, power resultant upon such rotation will be delivered to such desired load, in addition to and independent of the power delivered as a result of the rotation of the inner shell.

I mount the dual turbine in a horizontal position so that the water after having impinged on the vanes of the primary turbine will fall to the floor of the secondary turbine and impinge on the vanes of the secondary turbine, causing it to rotate in the same direction as the primary turbine but at a slower rate of revolutions per minute. The water having acted on the vanes of the

primary turbine still has momentum and power to do work. To convert the remaining momentum of the water into rotary motion a secondary slow speed turbine is provided. This secondary turbine is so constructed that the water first impinges on the vanes at the outer portion of the turbine, the water having imparted motive power to the secondary turbine at a point furthest from the center of the vessel, has lost velocity and can no longer act on the vanes of the vessel unless the radius of the circle in which the water travels with the rotating vessel is reduced. I accomplish this with the development and use of the principle of the declining circle, that is, with each rotation of the vessel the water must be closer to the center in order to continue to act on the vanes of the vessel. I provide the secondary turbine with a floor sloping inwardly toward an opening in the center so that the water may gravitate toward the center of the rotating vessel in order that the distance it travels with each rotation of the vessel may be automatically reduced. I further provide the inwardly slanting floor of the secondary turbine with vanes projecting upwardly in order that the water may continue to act on the vanes of the vessel as it gravitates in a declining circular spiral until it drops through the opening in the center, at which point it will have lost nearly all of its momentum, having imparted its energy to the turbine.

While I have shown and described a particular form of embodiment of my invention, I am aware that many minor changes will readily suggest themselves to those skilled in the art without departing from the spirit and scope of my invention. I, therefore, desire to avoid being limited to the particular form of embodiment which I have shown and described.

I claim:

1. In the device of the class described the combination of an inner and an outer vessel, each vessel mounted for independent rotation in the same direction and about the same center, the outer vessel having a floor inwardly slanting toward an opening in the center of the floor, vanes projecting inwardly from the inner vessel, vanes projecting inwardly from the floor of the outer vessel, a penstock passed upwardly through the said opening and having its terminal closed, a series of pipes extending radially from the end of the penstock whereby water under pressure passes through the penstock and pipes, and impinges against the vanes and finally is discharged through the said opening in the outer vessel.

2. In a device of the class described the combination of an inner and an outer vessel, each vessel mounted for independent rotation in the same direction and about the same center, the outer vessel having a slanting floor, there being an opening through the center of the floor, vanes projecting inwardly from the inner vessel, a penstock passed upwardly through the said opening and having its terminal closed, a pipe extending radially from the end of the penstock whereby water under pressure passes through the penstock and pipes, and impinges against the vanes and finally is discharged through the said opening in the outer vessel.

3. In a device of the class described the combination of an inner and an outer vessel, each vessel mounted for independent rotation in the same direction and about the same center, the outer vessel having a floor slanting towards the center, there being an opening at said center, vanes projecting inwardly from both vessels, a penstock passed upwardly through the said opening and having its terminal closed, pipe means extending radially from the end portion of the penstock, whereby water under pressure passes through the penstock and pipe means and impinges against the vanes, and finally is discharged through the said opening in the outer vessel.

ALBERT FLADELAND.