HYDRAULIC TURBINE AND METHOD
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Filed Nov. 13, 1969, Ser. No. 876,525
Int. Cl. F03b 1/04
U.S. Cl. 60—51
6 Claims

ABSTRACT OF THE DISCLOSURE

A steam powered hydraulic turbine having closed circuits for the steam system and for the hydraulic liquid system in which the turbine includes a liquid receiving chamber having a drain, a reaction rotor in the chamber, rotate about an axis when propelled by a liquid emitting nozzle on the rotor, a first liquid container having a liquid outlet conduit to the rotor for providing liquid under pressure thereto, a second liquid container having a liquid entrance conduit from the chamber drain for receiving liquid emitted by the rotor nozzle, a source of steam and a steam conduit from the source to the first liquid container above the liquid level therein to apply steam pressure to the first container liquid to force it to and through the nozzle thereby to develop a torque in the rotor.

A method of generating power with a steam operated hydraulic turbine.

One of the features of this invention is to provide an improved steam powered hydraulic turbine having closed conduit systems for both the steam and the hydraulic liquid in which steam pressure forces liquid to and through a reaction rotor having a liquid emitting nozzle means for producing a reaction torque in the rotor, a chamber in which the rotor is located for receiving the emitted liquid, a first liquid container receiving steam to force the liquid therefrom to the rotor and a second liquid container receiving the emitted liquid from the rotor so that the turbine can be operated continuously by switching from one container to the other so that each serves alternately as a source for the liquid under steam pressure and a receiver for the emitted liquid after it has left the torque generating rotor.

Another feature of the invention is to provide a method of generating power utilizing steam pressure on a container liquid to force it through a torque producing nozzle and collecting the projected liquid so it in its turn can be subjected to steam pressure for forcing it through the torque producing nozzle.

Other features and advantages of the invention will be apparent from the following description of one embodiment thereof taken in conjunction with the accompanying drawings. Of the drawings:

FIG. 1 is a semi-schematic view of a steam powered hydraulic turbine embodying the invention.
FIG. 2 is a detail plan view of the reaction rotor having a pair of spaced nozzles for rotating the rotor and thereby developing torque.

In the embodiment disclosed in the drawings the steam powered hydraulic turbine having the closed fluid system comprises a liquid receiving enclosed chamber 10 having a bottom drain 12.

Located in the chamber 10 and substantially centrally thereof for rotation about a central axis is a reaction rotor 13 that has a pair of spaced oppositely located nozzles 14 from which pressure liquid such as water is emitted in opposite directions as indicated by the arrows 15 in FIG. 2. The reaction of the force of the emitted liquid 15 sets up a turning torque in the rotor as indicated by the arrows 16 in FIGS. 1 and 2.

The rotor 13 is mounted on a centrally located vertical pipe 17 which extends through the closed top 18 of the chamber 10 and is rotatably mounted as indicated by the connection 19 at its upper end. This pipe 17 which is rotated about its vertical central axis by the reaction rotor 13 develops the torque which can be used to perform useful work as indicated by the meshing gears 20 and 21 with the gear 20 mounted on the pipe 17 for rotation therewith and the gear 21 mounted on a shaft 22 by means of which the power is transmitted.

The turbine system has a first liquid container 23 that is enclosed and which is provided with a liquid outlet conduit 24 that leads to the rotor by way of a valve A25 and the rotatable pipe 17 on which the rotor 13 is mounted.

The system also includes an enclosed second liquid container 26 that has a liquid entrance conduit 27 from the chamber drain 12 by way of a conduit 28 leading through a second valve B29.

There is also provided a source of steam illustrated by the steam generator 30 and steam from the generator is directed by way of a valve C31 and conduits 32 and 33 to the first liquid container 23.

With the turbine as described and with the fluid flow indicated by the arrows steam flows from the generator 30 through the conduits 32 and 33 and valve C to the top of the first liquid container 23 above the liquid level 34 therein. This steam pressure on the liquid forces the liquid through the conduit 24 and valve A25 into the rotor 13 where it is ejected under this steam force through the power nozzles 14.

This flow through the nozzles 14 causes a reaction rotation of the pipe 17 to drive the power take-off shaft 22 through the gears 20 and 21. The emitted liquid from the nozzles 14 is directed by gravity flow over the sloped bottom 35 of the chamber 10 into and through the drain 12, conduit 28 and valve B29 and then through the conduit 27 into the second liquid container 26.

Actually, in the illustrated embodiment there is provided a third container 36 in the system with this container being supplied with emitted liquid through a conduit 37 by way of the valve B29. Thus, in the illustrated system, liquid forced from the container 23 by the steam pressure therein, as described, is returned simultaneously to liquid tanks 26 and 36 as indicated by the arrows 42.

The three valves A, B and C indicated at 25, 29 and 31 are all synchronized so that the liquid conduit 38 from B valve 29 to the top of container 23 is closed when conduits 27 and 37 from this valve are open. At the same time, valve A opens conduit 24 from the bottom of tank 23 while maintaining conduit 39 from the bottom of container 26 and conduit 40 from the bottom of container 36 closed. The system will then operate as described. Control valves of these types and operating means therefore are quite old and well known. Examples of these are illustrated in U.S. Pat. 2,145,540 issued Jan. 31, 1939.

After the steam pressure as directed by C valve 31 through conduit 33 has exhausted liquid in the container 23 valves A, B and C shift to direct steam from valve C through conduit 41 to the top of the next container 26 which in the meantime has become filled with liquid. Simultaneously, valve A opens conduit 39 leading from container 26 to the rotor 13 and valve B closes liquid conduit 27 while opening conduit 38 and maintaining conduit 37 open so that as steam pressure empties container 26 the liquid emitted by the rotating rotor 13 flows through conduits 38 and 37 into the other two containers 23 and 36.

With the continuing steam pressure as soon as container 26 has been emptied of liquid in driving the rotor 13 as described the synchronized valves A, B and C again shift so that steam pressure is applied to the top of the con-
In this manner torque is generated continuously by steam pressure through the hydraulic reaction turbine with each liquid container being utilized in turn as a source of steam pressurized liquid and the other two containers at the same time receiving the emitted or exhaust liquid.

As will be noted, both the steam system portions of the device and the liquid system portions of the device are enclosed so that the entire unit may be made quite compact and is usable in structures where space is at a premium.

Having described my invention as related to the embodiment shown in the accompanying drawings, it is my intention that the invention be not limited by any of the details of description, unless otherwise specified.

I claim:

1. A steam powered hydraulic turbine having a closed fluid system, comprising: a liquid receiving enclosed chamber having a drain; a reaction rotor in said chamber rotatable continuously about an axis and having a liquid emitting nozzle means spaced from said axis for producing a reaction torque in said rotor; an enclosed first liquid container having a liquid outlet conduit therefrom to said rotor; an enclosed second liquid container having a liquid entrance conduit from said chamber drain for receiving liquid emitted by said rotor nozzle; a source of steam; and a steam conduit from said source to said first liquid container above the liquid level therein to apply steam pressure to the liquid in the first container to force liquid from said first container to and through said nozzle thereby to develop said torque.

2. The turbine of claim 1 wherein there are provided valve means A for directing liquid selectively from each of said first and second containers to said rotor, and valve means B for simultaneously directing liquid selectively from said chamber to each of said first and second containers, said valve means A directing liquid from the first container to the rotor while valve means B is directing liquid from said chamber to the second container, and vice versa.

3. The turbine of claim 2 wherein there are provided valve means C for directing steam pressure selectively to each of the first and second containers while valve means A is directing liquid from the corresponding container.

4. The turbine of claim 1 wherein there is provided an enclosed third liquid container, valve means A for directing liquid selectively from each of said first, second and third containers to said rotor, and valve means B for simultaneously directing liquid selectively from said chamber to the other pair of first, second and third chambers.

5. The turbine of claim 4 wherein there are provided valve means C for directing steam pressure selectively to each of the first, second and third containers while valve means A is directing liquid from the corresponding container.

6. The method of generating power comprising: applying steam pressure to a liquid in a first enclosed container and directing the liquid continuously to and from a torque producing nozzle, collecting the projected liquid in a second enclosed container, then applying steam pressure to the collected liquid in the second container after a selected amount of liquid has been collected therein and directing the liquid to and from said nozzle, and simultaneously collecting the projected liquid in the first container.

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U.S. Cl. X.R.

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