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SYSTEM OF POWER GENERATION WITH UNDER WATER PRESSURE OF AIR

BACKGROUND OF THE INVENTION

A volume of a cubic meter of water weighs one ton so that water flowing downward from a high elevation to a lower level can provide a very high pressure which can be utilized to generate hydroelectric power such as from a water dam. However, once it has reached the lower level, it can no longer be utilized, since it can not flow backward to the high elevation. The present invention provides a system which generates a water flow upward to create a cost free high pressure air in the system. It temporarily stores energy in water pressure by using it to compress a volume of air. The compressed air is subsequently injected into a low pressure environment such that it would recover to its original uncompressed state. The recovery inherently release the compressed energy which can be utilized to turn a generator or the propeller mounted on a power generator shaft to provide electric power output. The released energy may also be utilized to enable a fire truck in providing a high pressure water stream in fire extinguishing particularly for fire in a tall building, or for other applications in which a high pressure is required. The system thus generates green energy which does not produce any harmful matters to the environment and has valuable economical benefits.

SUMMARY OF THE INVENTION

The principal object of the present invention is to provide an electric power generation system by installing a pressure transmitter having a tall compression chamber immersed in a great depth under a large body of water. As water pressure is calculated with the mass by acceleration due to gravity multiply by its weight, velocity and height (namely depth of the water), and since mass, weight and acceleration are constant, the water pressure at any depth is solely dependent on the depth under the water, which determines the capacity of the system. Therefore, in order to obtain maximum power generation capacity, it would ordinarily be necessary to fabricate the system of the present invention several hundred feet under water. However, since human workers are unable to survive and work in such deep location under water, I have installed pressure transmitters on the floor of the body of water located above an underground operating chamber for the workers. A plurality of pressure transmitters surround

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a central operating tube. Each pressure transmitter operates in a repeating cycle of steps of first filling the compression chamber with air, then inputting water from the body of water to compress the air to a high pressure compressed air, followed by injecting the compressed air mixed with water into an expansion chamber to rotate a turbine coupled to an electric generator to generate electric power. The water in the compression chamber is then drained to an underground collection pool while a subsequent volume of air is inputted into the compression chamber. The subsequent volume of air is then compressed to high pressure compressed air which is injected into the expansion chamber with mixed water to rotate the turbine and the electric generator. The plurality of pressure transmitters are operated in the same manner to rotate the turbine and the electric generator in turn. It may also be directly utilized to provide the high pressure for delivering fire extinguishing water in fire-fighting for a tall building.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a vertical partial sectional front elevation view of an exemplary embodiment of the under water system of the present invention having two pressure transmitters.

Figure 2 is a partial sectional front elevation view of the underground installations including the power generator, the water storage tank, water extracting device, and air supply system, located below the pressure transmitters.

Figure 3 is a vertical partial sectional overall front elevation view of the system of the present invention.

Figure 4 is a top elevation view of the system of the present invention along section line x-x of Figure 3 showing an exemplary embodiment having eight pressure transmitters surrounding a sky tube for injecting high pressure air to rotate the turbine.

Figure 5 shows sectional side elevation view along various sections of the back flow biasing tube of the system of the present invention for raising the high pressure water and air to a high elevation.

Figure 6 shows cross sectional side elevation views of the upper section of the sky

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tube.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the drawings, the items indicated by the reference numerals are as follows:

- 5 1. Water: it is stored in a high-rise structure.
2. Pressure transmitter: it utilizes water pressure for compressing air to store pressure
in the compressed air.
3. Lower check valve: it is located at the lower portion of the pressure transmitter.
4. Oil conducting pipe: it is for delivering oil to the reciprocating pneumatic pump for
10 operating the check valves up and down.
5. Channel which is located between the compression chamber and the turbine.
6. Pneumatic pump for operating the upper check valve open or close.
7. Downward draining pipe.
8. Lower pressure oil pump for operating the lower check valve open or close.
- 15 9. Reciprocating rod.
10. Elongated pipe extending from bottom of water to the water upper surface for
raising water with high pressure air upward to cause water bottom high pressure for turning
the turbine and in turn rotating the power generator.
11. Turbine for turning the main rotary shaft to rotate the power generator.
- 20 12. Main rotary shaft.
13. High strength leak-proof bearing.
14. Reciprocation of pressure oil pump tube.
15. Compression chamber of pressure transmitter, utilizing high pressure from water to
produce valuable compressed air without cost and can subsequently release its stored energy.
- 25 16. Inlet port to the pressure transmitter to recycle water to the pressure transmitter.
17. 1.5 high air pressure, higher than pressure in the compression chamber for
increasing the flowing speed in the compression chamber.
18. As shown in cross sections 31, 32 or 33 in Figures 5 and 6, a plurality of reversible

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water flow preventing diaphragm valves are located in a transverse manner in the sky tube 30 so that it acts like a capillary tube with water entering from the bottom of the tube rising inherently upwards in the tube inherently..

19. Check valve.

5 20. Water pipes for drawing water upwards to drain through the elongated pipe 10.

21. Electric power generator.

22. Immersible water pump operative for drawing water from the compression chamber to drain upwards through the water pipes 20.

10 23. Low capacity compressor: used for increasing velocity of the air for inputting to the compression chamber.

24. Air storage tank.

25. Rotary shaft support bearing.

15 26. Water pump motor: Every time prior to injecting compressed air, a portion of the water in the compression chamber must be extracted to provide a space for air. However, the amount of water extracted must be returned into the pressure transmitter to maintain the water volume in the high-rise water.

27. Floor of the ground.

28. Spent water storage pool.

29. Water upper surface.

20 30. Sky tube: a tube for releasing water pressure with pressured air. It has capillary characteristics within the tube. Water rises upward in the tube because the density of the mixture of compressed air and water is lighter than stored water in the high-rise water..

31. Construction of the trumpet-shaped diaphragm of the capillary tube.

32. A characteristic of the capillary tube.

25 33. Other characteristics of the capillary tube.

The operation of the pressure transmitters are electrically controlled such as by a computer located in a control room situated in a lower storey chamber in the high-rise water under water. The computer regulates the operation of the two check valves 19, the inlet port

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16, and the immersible water pump 22 to create alternate low and high pressure environments within the pressure transmitters so as to provide compressed air with high pressure for expelling water.

The computer automatically executes the following sequential operation steps of the pressure transmitter:

1. Close the upper and lower check valves and the three open and shut ports;
2. Open the water inlet port at the bottom of the pressure transmitter, and open the upper and lower check valves, so that water enters into the pressure transmitter to fill the pressure transmitter chamber partially to about 5 meters

high;

3. Close both the upper and lower check valves;
4. Open the water release port and the air inlet port until within 15 meters of the pressure transmitter chamber is filled with 5 meters of water and 10 meters of air;

5. Close the water release port and the air inlet port so that the compression chamber is completely isolated from any outside pressure;

6. Open the water inlet port and the lower check valve such that the high pressure water at the great depth enters the compression chamber to compress the air therein to a smaller volume to become a high pressure air;

7. Open the upper check valve to inject the high pressure air with pressured water to rotate the turbine which, in turn, rotate the power generator for generating the electric power. The high pressure air is sequentially injected into the turbine chamber from the plurality of pressure transmitters for rotating the turbine;

8. Actuate the water pump to draw the water from the compression chamber to drain upward through the elongated pipe 10. If the pressure transmitter is installed in the water storage pool of a water dam, the water may be drained to a lower level of the water dam with a low pressure drain pipe ;

9. Again close all the check valves and water inlet and outlet ports of the pressure transmitter after having completed steps 1 to 9; and

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10. Repeat steps 1 to 9 this pressure transmitter to provide power generation. Thus, all pressure transmitters are sequentially operated in this manner to provide green power generation from the system.

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What is claimed is:

1. A power generation method comprising,

immersing a plurality of pressure transmitters vertically in a body of deep water of a great depth, and each pressure transmitter having a tall compression chamber therein,

providing an initial predetermined amount of air in an upper portion of said compression chamber,

inputting water from a bottom of said compression chamber from said deep water of a great depth into said compression chamber whereby the volume of said air in said compression chamber is highly compressed by the high pressure inherently existing in the weight of the large volume of water in the great depth into a high pressure compressed air having a high pressure energy,

injecting said high pressure compressed air into an expansion chamber having a turbine whereby said high pressure compressed air expanding back into an uncompressed state and releasing the high pressure energy in an exploding manner to rotate said turbine in said expansion chamber, and in turn, turning an electric generator coupled to said turbine for generating electric power in a first stage, said compression chamber being filled with incoming water after said high pressure compressed air has been injected into said expansion chamber,

refilling said compression chamber with air by drawing water from said compression chamber with an immersible pump and conveying the drawn out water into an elongated pipe extending upwards from said expansion chamber whereby due to differentiation of density of water mixed with air in said elongated pipe and water in said deep water, incoming air rushing through the expansion chamber to cause the turbine to rotate and in turn rotate the electric generator to provide further electric power output in a second stage,

said pressure transmitter including a lower check valve located at said bottom of said compression chamber, and an upper check valve being located between said compression chamber and said expansion chamber, said lower check valve being opened for inputting said water into said compression chamber while said upper check valve is closed, and said upper check valve is opened to inject said high pressure compressed air mixed with water into said expansion chamber while said lower check valve is closed, and

each pressure transmitter being provided with a water draining port communicating with an underground water collection pool located below a water bed of said body of deep water, and an air inlet port communicating with an air space in said water collection pool,

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said water draining port being opened with both said upper check valve and said lower check valve being closed following injection of said compressed air mixed with water into said expansion chamber, for releasing water from said compression chamber into said water collection pool while said air inlet port is opened to admit air from said air space of said water collection pool into said compression chamber to fill said upper portion of said compression chamber with a further volume of air.

2. A power generation method according to Claim 1 including repeating steps according to Claim 1 to compressed said further volume of air in said compression chamber to create a subsequent high pressure compressed air, and releasing said subsequent high pressure compressed air mixed with water into said expansion chamber to rotate said turbine and, in turn, rotating said electric generator for generating electric power.

3. A power generating method according to Claim 2 operating said plurality of pressure transmitters in the same manner to rotate said turbine for rotating said electric generator for providing continuous electric power.

4. A power generating method according to Claim 1 wherein said pressure transmitters are immersed in a body of deep water including sea, lake, and water well located in a desert, or a mountain, or in a water dam selectively.

5. A power generating method according to Claim 1 including providing an operating chamber located under said water bed and above said underground water collection pool for providing a safe working area not subject to high water pressure of said body of deep water.

6. A power generating method according to Claim 1 including installing said pressure transmitter in a hydro water dam and operated to increase greatly the amount of electric power output of the hydro dam, and water drained from said pressure transmitter being directed to a drain pipe located at the lower level of said hydro dam.

7. A power generating method according to Claim 1 including installing said pressure transmitter in a ship for providing propelling power for the ship.

8. A power generating method according to Claim 1 for obtaining a continuous operation in creating energy from water without relying on outer energy.

9. A power generating method according to Claim 1 for obtaining an important characteristic of the present invention in utilizing air as a medium to absorb energy existing in a heavy volume of water, and then releasing the energy from the water to rising upwards to provide continuous clean energy output.

10. A power generating method according to Claim 1 wherein the physical dimensions of

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various mechanical components are governed by requirement of the output energy.

11. A power generating method according to Claim 1 including the characteristic of prior to drawing air into said compression chamber, water in the compression chamber being drawn out with a water pump to the elongated pipe extending above the compression chamber.

12. A power generating method according to Claim 1 including draining water from the compression chamber through a drain pipe to a lower level of a hydro water dam to increase the water resource and the energy output of the hydro dam.

13. A power generating method according to Claim 1 wherein generally in order to inject the air from ground into water, the air needs to be compressed by an air compressor until the pressure of the air exceeds the water pressure, and the compressor is able to inhale the air from ground without relying on outer energy, and this air is compressed by the high-pressure water current, and absorbs the gravity of water, then becoming the high-pressure air, whereby the high-pressure air is used to rush the turbine generator which can produce the electric energy. These are important characteristics of the present invention.

14. A power generating method according to Claim 1 in which the air is conducted by a pipe into the compression chamber from above the water surface, and equipment of said power generation is erectable in an artificial body of water on land to provide the electric power in a selected site on land.

15. A power generating method according to Claim 1 in which the weight of water and fluid pressure are utilized to create a reciprocating piston action.

16. A power generating method according to Claim 1 in which a water-proof working chamber for workers and equipment is built under the sea, lake, water dam, or water storage pool to avoid water pressure, and an elevator is usable for workers to enter or leave the chamber.