MOBILE HYBRID-POWERED ATMOSPHERIC WATER GENERATOR (AWG) SYSTEM

TECHNICAL FIELD

This utility model generally relates to water generation technologies, specifically atmospheric water generators (AWGs), and more particularly to mobile, hybrid-powered AWG systems with integrated IoT monitoring, multi-source energy management, and stabilized trailer-based deployment.

BACKGROUND OF THE UTILITY MODEL

Atmospheric Water Generators (AWGs) are like sophisticated dehumidifiers that purify water extracted from the air, providing a safe drinking solution by utilizing the atmosphere as a renewable source. They are beneficial for combating water scarcity and are suitable for various settings like homes, military operations, disaster relief efforts, and remote locations. These systems function by drawing in air, filtering it, cooling it to collect moisture, and then treating the water for consumption. Their efficiency is influenced by the surrounding temperature and humidity levels.

Existing atmospheric water generator systems are generally stationary, dependent on grid electricity, lack mobile deployment capability, and do not provide integrated digital monitoring systems. The Philippine environment—frequent typhoons, remote islands, and power interruptions—demands a mobile and autonomous water-generation solution.

The atmospheric water generator of the present utility model addresses these limitations by combining AWG technology, hybrid power generation, IoT monitoring, and trailer-based mobility, resulting in a system designed for disaster response, rural use, and off-grid operations.

SUMMARY OF THE UTILITY MODEL

The mobile hybrid-powered atmospheric water generator of the present utility model integrates an atmospheric water generator unit, hybrid multi-source power (solar, generator, battery), intelligent power management, stainless steel water storage, IoT monitoring, and jack stabilizers on a single, transportable trailer structure.

An object of the present utility model is to provide a mobile hybrid-powered atmospheric water generator that provides safe drinking water with the provision of sediment and pre-carbon multi-column filtration assembly, reverse osmosis filter, and ultraviolet treatment.

Another object of the present utility model is to provide a mobile hybrid-powered atmospheric water generator wherein the premature clogging of the filters is prevented with the provision of pre-filtration stage.

Another object of the present utility model is to provide a mobile hybrid-powered atmospheric water generator that can be easily mobilized for rapid deployment as the atmospheric water generator unit is installed on the mobile trailer structure.

Another object of the present utility model is to provide a mobile hybrid-powered atmospheric water generator system having a hybrid multi-source power system for reliable off-grid operation.

Other objects and advantages of the present utility model includes intelligent power management system reducing fuel consumption, an IoT-based remote monitoring and control, jack stabilizers provided on the trailer structure that enhance operational stability and water yield, and the provision of corrosion-resistant stainless steel water tank.

These, together with other objects of the utility model, along with the various features of novelty which characterize the utility model, are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the utility model, reference should be had to the accompanying drawings and descriptive manner in which there is illustrated preferred embodiment of the utility model.

BRIEF DESCRIPTIONS OF THE ACCOMPANYING DRAWINGS

To facilitate understanding, reference will be made to the figures herein described as:

Fig. 1 is a front perspective view of the mobile hybrid-powered atmospheric water generator system of the present utility model,

Fig. 2 is a rear perspective view of the mobile hybrid-powered atmospheric water generator system of Fig. 1, and

Fig. 3 shows the system configuration of the atmospheric water generator unit including the water purification system for the mobile hybrid-powered atmospheric water generator system of the present utility model.

DETAILED DESCRIPTION

Referring now to the drawings in detail, there is shown in Figs. 1 and 2 the present utility model for a mobile hybrid-powered atmospheric water generator system generally designated with reference number **100**. The mobile hybrid-powered atmospheric water generator system **100** is a mobile, self-contained atmospheric water generator (AWG) system designed to extract potable water from ambient air under varying field conditions.

As shown in Figs. 1 and 2, the mobile hybrid-powered atmospheric water generator system **100** comprises a trailer structure **102** provided with wheels having electromagnetic brake system **119**, and leg stabilizers with height adjustment jack **111**. The trailer structure **102** supports the rest of the components of the system **100**, and the provision of wheels with electromagnetic brake system **119** provides mobility for rapid deployment which makes it ideal for disaster response and rural communities, while the provision of leg stabilizers with heigh adjustment jack **111** provides enhanced operational stability and higher water yield. Preferably, trailer structure **102** is made of corrosion-resistant material.

As mentioned, the trailer structure **102** supports the rest of the system's components. These include the atmospheric water generator unit **103** that includes a water purification system **10** shown in Fig. 3, and a power management system to power said atmospheric water generator unit **103**, wherein said power management system includes a battery bank **104**, a fuel-powered generator **105** and a solar array **106**. The multiple power management system **104, 105, 106** provides flexibility of the system operation.

The system further includes a stainless-steel water storage tank **107** arranged at the front lower portion of the trailer structure **102**, an IoT-enabled

monitoring and control system **108**, and a Smart Generator Control system **109** for the fuel-powered generator **105**. The IoT-enabled monitoring and control system **108** facilitates remote diagnostics and monitoring of the system operation.

The trailer structure **102** also includes automatic electric side awnings **110**, pull-out stairs **112** arranged at the sides and the rear thereof, slide-out shelves **113**, a plurality of LED perimeter lighting **114**, a front awning type door **115**, and a rear awning type door **116**. The front and rear awning type doors **115**, **116** are supported by a plurality of assisting struts **117**. Water faucets **118** are provided on both sides of the structure in communication with the stainless-steel water storage tank **107** and positioned at an upper portion from the slide-out shelves **113**. The trailer structure **102** also includes vent louvers **120** for airflow within the atmospheric water generator unit **103**.

Fig. 3 shows the system configuration **10** of the atmospheric water generator unit **103** including the water purification system.

The water purification system integrated into the mobile hybrid-powered atmospheric water generator (AWG) system **100** comprises a multi-stage mechanical, chemical, and ultraviolet treatment assembly designed to convert condensed atmospheric moisture into potable water. The system configuration is shown in Fig. 3 is described as follows:

1. Primary Air Intake and Condensation Assembly

Atmospheric air is drawn through an air filter **11**, which removes dust, particulates, and airborne contaminants prior to entering a condenser array. The filtered air passes across a series of parallel evaporator fins **12** where water vapor

condenses. The condensed droplets are directed downward into a sink channel **13** and subsequently routed into a collection water tank **14**.

2. Collection Water Tank with Level Sensors

The collection water tank **14** is equipped with three water-level sensors, namely, a high-level switch **151**, a middle-level switch **152**, and a low-level switch **153**

These sensors enable automated operation of solenoid valves, pumps, and filtration sequences based on available water volume. Pressure sensor **P1** is installed on the tank's outlet to monitor flow readiness.

3. Solenoid-Controlled Feed Line

Water exiting the collection water tank **14** passes through a solenoid valve **16**, which regulates flow into the first filtration stages. The solenoid valve **16** automatically opens when sufficient water level and pressure are detected.

4. Pre-Filtration Stage

Water is directed to a pre-filter assembly **17** responsible for preliminary removal of coarse particles. This stage protects downstream filters from premature clogging.

5. Multi-Column Filtration Assembly

The system further includes a series of vertically arranged filtration columns consisting of: a first sediment filter **18** for removing suspended solids, rust, and silt, a pre-carbon filter **19** for adsorption of chlorine, volatile organic compounds

(VOCs), odor compounds, and organic contaminants, and a second sediment filter **20** for providing secondary particulate polishing to ensure consistent feed quality.

Pressure sensor **P2** monitors filtration resistance and provides feedback for maintenance scheduling or auto-shutdown.

6. High-Pressure Reverse Osmosis (RO) Treatment

Following the pre-filtration assembly, water is pressurized by a first water pump **WP1** and fed into a reverse osmosis (RO) filter **21**. The RO filter **21** removes dissolved solids, heavy metals, minerals, microorganisms, and impurities down to molecular scale. A flow meter downstream of the RO filter **21** measures permeate output, and pressure sensor **P3** monitors RO operating pressure to detect clogs or abnormal loading.

7. Polishing and Disinfection Stage: UV Sterilization

Permeate water exiting the RO system passes through a light-emitting diode-ultraviolet (LED-UV) lamp chamber **22** This ultraviolet treatment eliminates microbial contaminants by damaging Deoxyribonucleic Acid (DNA) structures, thereby ensuring biological safety of the final product.

8. Clean Water Storage and Delivery

After ultraviolet sterilization, water is directed into the clean water storage tank **107**. This tank **107** serves as the potable water reservoir for user access. A dedicated outlet valve **23** allows manual or automated dispensing of the purified water from the clean water storage tank **107**.

9. Recirculation and Redundant Pumping System

A second water pump, **WP2**, is integrated into the post-RO circuit to support controlled transfer, recirculation, or additional pressure boosting when required. This pump also provides redundancy to ensure continuous filtration even in the event of pump failure.

While the utility model for a mobile hybrid-powered atmospheric water generator (AWG) system **100** has been disclosed in connection with the preferred embodiment shown and described in its enabling details, various modifications, innovations and improvements thereon will become readily apparent to those skilled in the art. Accordingly, the spirit and scope of the present utility model is not limited by the foregoing embodiment but is to be understood in the broadest sense allowable by law.