205

ABSTRACT

Coolant vapor pressure is used to generate a push force to adjust the azimuth angle of a solar panel without using a dedicated power supply.
Fig. 1. Prior Art
Fig. 2. Prior Art

Solar Panel 205

Gear Set 107

Control Unit 12

Power Supply 13
Fig. 4.

- Solar Panel 205
- Spring cylinder 206
- Control unit 22
- Coolant can 207
- Electric valve 203
SOLAR PANEL WITH A COOLANT VAPOR PRESSURE DRIVING SYSTEM

RELATED APPLICATIONS

[0001] The present application is based on, and claims priority from Taiwan Application Serial Number 096140493, filed Oct. 29, 2007, the entire disclosure of which is incorporated by reference herein.

TECHNICAL FIELD

[0002] This disclosure relates to a sun tracking system for a solar panel that collects and converts solar energy into electricity or heat. More specifically, this disclosure relates to a sun tracking system with a coolant vapor pressure driving system to adjust the azimuth angle of the solar panel without using a dedicated power supply.

BACKGROUND

FIGS. 1-2 Prior Art

[0003] FIG. 1 shows a solar panel 205 having a conventional sun tracking system. The tracking system comprises four photo sensors 101, 102, 103, 104 encircled by a sleeve 120. The four sensors are located in the center of the top surface of the solar panel 205. Photoelectric units 108 for collecting and converting solar energy into electricity are distributed on the top surface of the solar panel 205. The sleeve 120 has an opening for receiving the sun light. The direction and/or movement of the sun is detected through the light intensity sensed by each of the four photo sensors.

[0004] When the sun is above the solar panel 105, the light rays from the sun irradiate directly onto the solar panel 105, each of the four photo sensors is presumed to receive equal heat strength, or light intensity, from the sun. However, when the sun shifts sideways, e.g., left as shown in FIG. 1, the light rays below R1 are hindered by the sleeve wall and prevented from reaching some or all of the photo sensors 101, 102, 103, 104. A shadow is produced within the sleeve under R1, the shadow will cover wholly or partially some or all of the photo sensors, and hence, the light intensities sensed by the photo sensors are different from one another. FIG. 1 shows that sensor 101 is fully covered by the shadow, and sensors 102, 103, 104 are partially covered by the shadow.

[0005] The light intensity sensed by each of the photo sensors is transferred to a control unit 12. The control unit 12 is coupled to a rotation mechanism 14, the rotation mechanism 14 has a gear set 107 to rotate the solar panel 205 to adjust the azimuth angle according to a predetermined rule following the information received from the control unit 12 so that the solar panel 205 moves synchronously with the movement of the sun to receive a relatively optimal amount of solar energy. A power supply 13 is coupled to the rotation mechanism 14 for running the gear set 107.

[0006] FIG. 2 shows a block diagram of the prior art device.

[0007] A solar panel 205 is coupled to a gear set 107, the gear set adjusts the azimuth angle of the solar panel 205 following instructions from a control unit 12, a power supply 13 provides the energy needed for running the gear set 107.

[0008] The drawback of the prior art shown in FIGS. 1-2 is that a power supply 13 for running the gear set is needed. Such a power consumption mechanism is a detrimental disadvantage to a power generating system, especially for a solar panel system which, due to such a power supply, exhibits relatively lower photo-elec-rivity conversion efficiency.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. 1 shows a prior art device.
[0010] FIG. 2 shows a block diagram of the prior art device.
[0011] FIG. 3 shows a first embodiment of this invention.
[0012] FIG. 4 shows a block diagram according to embodiments of this invention.
[0013] FIG. 5 shows a second embodiment of this invention.

DETAILED DESCRIPTION

[0014] Embodiments of this invention disclose a driving system using coolant vapor pressure energized by the environmental temperature and without using a dedicated power supply to adjust the azimuth angle of a solar panel. In the day time, the environmental temperature increases and the coolant vapor pressure increases to generate a push force. In the night time, the environmental temperature decreases and the coolant vapor pressure decreases, a pull force is generated through a coupled spring cylinder.

[0015] FIG. 3 shows a first embodiment of this invention.
[0016] A solar panel 205 is mounted on the top of a support 209 erected from the ground 100. A spring cylinder 206 is coupled to the solar panel 205 through a connecting rod 23. The spring cylinder 206 has an expansion chamber 21 inside, which expands against a spring 25. A piston 26 is arranged on the top end of the shaft 24, the bottom end of the shaft 24 is fixed to a post 208. The cylinder 206 moves up and down along the shaft 24. The spring 25 is positioned between the piston 26 at the top of the shaft 24 and the bottom wall of the cylinder 206 to push the cylinder 206 downward relative to the piston 26. The expansion chamber 21 expands to push the cylinder 206 upward relative to the piston 26 when a fluid, e.g., coolant vapor, enters the expansion chamber 21.

[0017] A coolant tank 207 is coupled to the expansion chamber 21 through a pipe 202, to provide a higher vapor pressure when the environmental temperature increases, and a lower vapor pressure when the environmental temperature decreases. The coolant vapor expands and enters the expansion chamber 21 when the environmental temperature increases, e.g., in the day time. The coolant vapor contracts and withdraws from the expansion chamber 21, under the pushing action of the spring cylinder 206, going back most to the coolant tank 207 when the environmental temperature decreases, e.g., in the night time. A control unit 22 controls, e.g., turns on or off, the flow of the coolant vapor between the coolant tank 207 and the expansion chamber 22 according to predetermined conditions.

[0018] An electric valve 203 is coupled between the pipe 202 and the expansion chamber 21 for controlling, e.g., turning on or off, the flow of the coolant vapor. A pressure valve 201 is coupled as a flow regulator between the coolant tank 207 and the pipe 202 to adjust the flow pressure of the coolant vapor.

[0019] FIG. 4 shows a block diagram of embodiments of this invention.

[0020] A solar panel 205 is coupled to a spring cylinder 206, the spring cylinder 206 is controlled by a control unit 22. The spring cylinder 206 pushes the solar panel 205 when the environmental temperature increases and the spring cylinder 206 pulls the solar panel 205 when the environmental tem-
perature decreases. The push/pull force is generated from the expansion/contraction of a coolant vapor supplied by a coolant tank 207. The spring cylinder 206 is coupled to the coolant tank 207. An electric valve 203 is coupled to the control unit 22 to follow instructions from the control unit 22 to turn on/off the flow of the coolant vapor which is regulated by the pressure valve 201.

[0021] FIG. 5 shows a second embodiment of this invention.

[0022] The embodiment is similar to that shown in FIG. 3, the only difference being that the spring cylinder 206 is reverse-arranged. Referring to FIG. 5, the spring cylinder 206 has a shaft 24 which is coupled to a solar panel 205 on its top. A piston 26 is on the bottom end of the shaft 24. A spring 25 pushes the shaft 24 downward relative to the cylinder 206. The expansion chamber 21 is on the bottom of the spring cylinder 206. When the expansion chamber 21 expands to push the piston 26, the shaft 24 moves upward. The push/pull forces are used to adjust the azimuth angle of the solar panel 205. The other elements operate with the same principle as described with respect to the structure of FIG. 3.

[0023] While several embodiments have been described by way of example, it will be apparent to those skilled in the art that various modifications may be made in the embodiments without departing from the spirit of the present invention. Such modifications are all within the scope of the present invention, as defined by the appended claims.

What is claimed is:
1. A solar panel with a coolant vapor pressure driving system, comprising:
a spring cylinder, coupled to move the solar panel and having an expansion chamber;
a coolant tank, coupled to the expansion chamber for giving a higher vapor pressure when the temperature increases; and, for giving a lower vapor pressure when the temperature decreases; and,
a control unit, coupled to the coolant tank, for controlling the flow of the coolant vapor between the coolant tank and the expansion chamber according to predetermined conditions.

2. A solar panel with a coolant vapor pressure driving system as claimed in claim 1, wherein said flow of the coolant vapor is to let the vapor go back to the coolant tank.

3. A solar panel with a coolant vapor pressure driving system as claimed in claim 1, further comprising: a pressure valve, coupled between the coolant tank and the expansion chamber as a flow regulator for the flow of the coolant vapor.

4. A solar panel with a coolant vapor pressure driving system as claimed in claim 1, wherein said flow of the coolant vapor is to let the vapor enter the expansion chamber.

5. A solar panel with a coolant vapor pressure driving system as claimed in claim 1, wherein said flow of the coolant vapor is to let the vapor go back to the coolant tank.

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