A portable solar energy collecting device includes a container configured with an accommodating space therein and including a transparent housing. The transparent housing is formed with a vacuum chamber defined between the inner and outer surrounding walls and surrounding the accommodating space. A heat-absorbing unit is disposed in the accommodating space in the container, absorbs solar energy when the housing is irradiated by solar radiation, and converts the solar energy into thermal energy that is accumulated in the accommodating space in the container.
PORTABLE SOLAR ENERGY COLLECTING DEVICE

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority of Taiwanese Application No. 98139494, filed on Nov. 20, 2009.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention
[0003] The invention relates to a thermal collecting device, more particularly to a portable solar energy collecting device.

[0004] 2. Description of the Related Art
[0005] FIG. 1 illustrates a conventional thermal engine disclosed in U.S. Pat. No. 6,779,341 and including a first pneumatic cylinder 11, a second pneumatic cylinder 12, a fluid pipe 15 intercommunicating fluidly the first and second pneumatic cylinders 11, 12, and a flywheel assembly 13 coupled to the first and second pneumatic cylinders 11, 12. Thermal energy from a thermal energy source 2 is applied to a cylinder body 111 of the first pneumatic cylinder 11 to result in an expansion stroke of the first pneumatic cylinder 11 and rotation of the flywheel assembly 13. The expansion stroke of the first pneumatic cylinder 11 also results in a compression stroke of the second pneumatic cylinder 12. When the first pneumatic cylinder 11 reaches the end of the expansion stroke, the presence of the fluid pipe 15, temperature of working gas in the first pneumatic cylinder 11 is reduced, while temperature of working gas in the second pneumatic cylinder 12 is increased, thereby resulting in an expansion stroke of the second pneumatic cylinder 12 and in continued rotation of the flywheel assembly 13. Similarly, the expansion stroke of the second pneumatic cylinder 12 results in a compression stroke of the first pneumatic cylinder 11. Accordingly, continuous rotation of the flywheel assembly 13 is achieved such that kinetic energy is generated from thermal energy and that the kinetic energy is converted into electrical energy by an electric generator 14.

[0006] In such a configuration, a mechanical power output generated by the conventional thermal engine 1 depends on the thermal energy generated by the thermal energy source 2. When the thermal energy is generated from solar energy or terrestrial heat, unstable supply of the thermal energy to the first pneumatic cylinder 11 may occur. When the thermal energy is generated by fuel combustion, in order to ensure stable supply of the thermal energy to the first pneumatic cylinder 11, continuous supply of fuel is necessary, thereby resulting in relatively high costs.

SUMMARY OF THE INVENTION

[0007] Therefore, an object of the present invention is to provide a portable solar energy collecting device that can overcome the aforesaid drawbacks of the prior art.

[0008] According to the present invention, a portable solar energy collecting device comprises:

[0009] a container configured with an accommodating space therein and including a transparent housing, the transparent housing including an inner surrounding wall and an outer surrounding wall, and being formed with a vacuum chamber defined between the inner and outer surrounding walls and surrounding the accommodating space; and

[0010] a heat-absorbing unit disposed in the accommodating space in the container, absorbing solar energy when the transparent housing is irradiated by solar radiation and converting the solar energy into thermal energy that is accumulated in the accommodating space in the container.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Other features and advantages of the present invention will become apparent in the following detailed description of the preferred embodiment with reference to the accompanying drawings, of which:

[0012] FIG. 1 is a partly sectional, schematic top view showing a conventional thermal engine disclosed in U.S. Pat. No. 6,779,341;

[0013] FIG. 2 is a perspective view showing the preferred embodiment of a portable solar energy collecting device according to the present invention; and

[0014] FIG. 3 is a schematic sectional view showing the preferred embodiment when used with a condenser.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0015] Referring to FIGS. 2 and 3, the preferred embodiment of a portable solar energy collecting device according to the present invention is shown to include a container 3, and a heat absorbing unit 4.

[0016] The container 3 is configured with an accommodating space 30 therein. In this embodiment, the container 3 includes a transparent housing 31 and a cap body 32.

[0017] The housing 31 includes an inner surrounding wall 313, and an outer surrounding wall 311, and is formed with a vacuum chamber 33 defined between the inner and outer surrounding walls 313, 311 and surrounding the accommodating space 30. The housing 31 further includes a partition wall 312 disposed in the vacuum chamber 33 so that the vacuum chamber 33 is divided by the partition wall 312 into first and second chamber portions 331, 332. The housing 31 is further formed with an opening 310. In this embodiment, the housing 31 is made of a heat-isolating material, such as glass and quartz.

[0018] The cap body 32 covers sealingly the opening 310 in the housing 31 and cooperates with the housing 31 to define the accommodating space 30.

[0019] The heat-absorbing unit 4 is disposed in the accommodating space 30 in the container 3. In this embodiment, the heat-absorbing unit 4 includes a heat-absorbing member 41 made of high carbon steel and attached on an inner surface 313 of the inner surrounding wall 313 of the housing 31 of the container 3. The heat-absorbing member 41 absorbs solar energy when the housing 31 is irradiated by solar radiation. Preferably, a condenser 2, such as a Fresnel lens, is provided so as to condense sunlight onto the heat-absorbing member 41, as indicated by dotted-line arrows in FIG. 3. As a result, the temperature of the heat-absorbing member 41 can rise to about 350° C. when the heat-absorbing member 41 is irradiated by solar radiation. Thus, the heat-absorbing member 41 converts the solar energy into thermal energy that is accumulated in the accommodating space 30 in the container 3.

[0020] It is noted that, due to the presence of the vacuum chamber 33, i.e., the first and second chamber portions 331, 332, heat dissipation from the container 3 can be minimized, thereby effectively collecting the solar energy absorbed by the heat-absorbing member 41.

[0021] In actual use, after detachment of the cap body 32 from the housing 31, thermal energy accumulated in the
accommodating space 30 in the container 3 can be supplied to a thermal engine (not shown) when a pneumatic cylinder of the thermal engine is disposed in the accommodating space 30 such that the thermal engine is driven to generate kinetic energy. Therefore, when a number of the solar energy collecting devices of the present invention are applied, stable supply of thermal energy to the thermal engine at relatively low costs can be attained. Furthermore, the portable solar energy collecting device of the present invention can serve as a portable thermal source, thereby resulting in convenience during use.

While the present invention has been described in connection with what is considered the most practical and preferred embodiment, it is understood that this invention is not limited to the disclosed embodiment but is intended to cover various arrangements included within the spirit and scope of the broadest interpretation so as to encompass all such modifications and equivalent arrangements.

What is claimed is:

1. A portable solar energy collecting device comprising:
   a container configured with an accommodating space therein and including a transparent housing, said transparent housing including an inner surrounding wall and an outer surrounding wall, and being formed with a vacuum chamber defined between said inner and outer surrounding walls and surrounding said accommodating space; and
   a heat-absorbing unit disposed in said accommodating space in said container, absorbing solar energy when said transparent housing is irradiated by solar radiation and converting the solar energy into thermal energy that is accumulated in said accommodating space in said container.

2. The portable solar energy collecting device as claimed in claim 1, wherein said transparent housing of said container further includes a partition wall disposed in said vacuum chamber so that said vacuum chamber is divided by said partition wall into first and second chamber portions.

3. The portable solar energy collecting device as claimed in claim 1, wherein said transparent housing is made of a transparent heat-isolating material.

4. The portable solar energy collecting device as claimed in claim 3, wherein the transparent heat-isolating material is one of glass and quartz.

5. The portable solar energy collecting device as claimed in claim 1, wherein:
   said transparent housing of said container is formed with an opening; and
   said container further includes a cap body covering said opening in said transparent housing and cooperating with said transparent housing to define said accommodating space.

6. The portable solar energy collecting device as claimed in claim 5, wherein said heat-absorbing unit includes a heat-absorbing member attached on an inner surface of said inner surrounding wall of said transparent housing.

7. The portable solar energy collecting device as claimed in claim 6, wherein said heat-absorbing member is made of high carbon steel.

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