

CLAIMS:

1. Apparatus for heating a fluid using solar energy, the apparatus comprising:
 - (i) a fluid source,
 - (ii) a first chamber comprising a fluid inlet configured to allow substantially one-way movement of a fluid from the fluid source to the first chamber,
 - (iii) a second chamber comprising a fluid outlet configured to allow the controlled movement of a fluid internal the second chamber to a further chamber or external the apparatus, and
 - (iv) a fluid connection between the first and second chambers configured to allow substantially one-way movement of a fluid from the first chamber to the second chamber,

wherein each of the first and second chambers is substantially fluid tight and configured as a solar collector to heat a fluid therein, and the apparatus is configured such that in use and under even incident solar radiation a fluid is heated in each of the first and second chambers and upon thermal expansion of the fluid, the fluid is moved in a controlled manner substantially one-way from the first chamber to the second chamber, and from the second chamber to a further chamber or external the apparatus,

and wherein when the second chamber commences reception of fluid from the first chamber, the second chamber has already supplied fluid to a further chamber or external the apparatus,

and wherein by the movement of fluid from the first chamber to the second chamber, the first chamber donates a portion of the heat energy held by the fluid therein to the second chamber, the second chamber becoming enriched in heat energy by the gain of fluid and the first chamber becoming deprived in energy by the loss of fluid such that the second chamber contains fluid that is hotter than the first chamber.

2. The apparatus of claim 1, wherein the outlet of the second chamber is configured to allow substantially one-way movement of a fluid from the second chamber to a further chamber or external the second chamber.
3. The apparatus of claim 1 or claim 2, wherein the fluid outlet of the second chamber is configured to be controllable by a human user or a processor functioning under software instructions.

4. The apparatus of any one of claims 1 to 3, wherein the fluid outlet of the second chamber is configured to intrinsically control movement of a fluid from the first chamber to external the second chamber.
5. The apparatus of any one of claims 1 to 4, comprising one or more sensors configured to sense any one or more of: the pressure of a fluid within the first chamber (or a proxy thereof), the temperature of a fluid within the first chamber (or a proxy thereof), the pressure of a fluid within the second chamber (or a proxy thereof), the temperature of a fluid within the second chamber (or a proxy thereof), the temperature of a fluid external the apparatus (or a proxy thereof) and the pressure of a fluid external the apparatus (or a proxy thereof), wherein the sensor is in operable connection with fluid outlet of the second chamber such that upon the one or more sensors sensing one or more predetermined temperature(s) and/or pressure(s) the outlet moves from a first fluid flow state to a second fluid flow state.
6. The apparatus of claim 5, wherein the first or second fluid flow state is independently zero fluid flow, maximum fluid flow or an intermediate fluid flow.
7. The apparatus of any one of claims 1 to 6, wherein the first and second chambers are configured to contain a fluid under pressure
8. The apparatus of any one of claims 1 to 7, wherein the first and the second chambers are each configured to heat a fluid internal thereto either via incidence of solar radiation on a chamber wall or incidence of solar radiation on a radiation absorber within the chamber.
9. The apparatus of any one of claims 1 to 8, comprising a solar radiation absorber internal each of the first and second chambers, and wherein each of the first and second chambers comprises a wall or a wall portion allowing incoming solar radiation to pass internal the chamber and incide on the solar radiation absorber.
10. The apparatus of claim 9, wherein the solar radiation absorber has a convoluted surface so as to increase surface area available to receive incident solar radiation.
11. The apparatus of any one of claims 1 to 10, wherein the first and second chambers are thermally isolated from (i) each other, and (ii) the environment.
12. The apparatus of any one of claims 1 to 11, comprising a fluid within the first and second chambers.
13. The apparatus of claim 12, wherein the fluid is a gas (such as air) or a liquid (such as water or other flowable heat transfer medium).

14. The apparatus of any one of claims 1 to 13, configured such that after being exposed to solar radiation such that a fluid in the first and second chamber are heated and pressurized to a supra-atmospheric pressure, and when a portion of the heated fluid in the second chamber is allowed to exit therefrom via the fluid outlet of the second chamber, fluid remaining in the second chamber is heated by the solar radiation at a rate faster than fluid in the first chamber.
15. The apparatus of any one of claims 1 to 14, comprising one or more intermediate chambers disposed between the first and second chambers to form a chain of chambers defining a fluid path from the first chamber of the chain to the last chamber of the chain, each of the intermediate chambers being in a fluid connection with an adjacent chamber of the chain by way of a fluid connection configured to allow substantially one-way movement of a fluid sequentially from the first chamber to the chain of intermediate chambers, and from the chain of intermediate chambers to the second chamber.
16. The apparatus of claim 15, wherein any or all of the one or more intermediate chambers has a feature as defined for the first or second chamber in any one of claims 1 to 14.
17. The apparatus of claim 16, wherein the first and second chamber, and any intermediate chamber (where present) are shaped and/or dimensioned so as to be substantially identical to each other.
18. A system for heating a fluid, the system comprising a fluid source in fluid connection with the fluid inlet of the first chamber of the apparatus of any one of claims 1 to 17.
19. The system of claim 18, wherein the heated fluid is drawn from the outlet of the second chamber and used directly, or used indirectly in which case the system further comprises a heat exchanger and the system configured such that a heated fluid drawn from the outlet of the second chamber is conveyed to the heat exchanger and used to heat a second fluid in contact therewith.
20. A system for performing work, the system comprising a first sub-system being the apparatus of any one of claims 1 to 17 and a second sub-system being a work output component configured to directly or indirectly utilize thermal energy or kinetic energy present in a fluid that has exited the outlet of the second chamber.
21. A method for heating a fluid using solar energy, the method comprising the steps of:
- (i) supplying an input fluid,
 - (ii) dividing the input fluid into a first fluid body and a second fluid body such that the first and second fluid body can achieve and maintain temperatures different to each other and also different to the environment, the division of the first and second fluid bodies being such that

movement of fluid from the first to second fluid body is possible, but movement from the second to the first fluid body is impossible,

(iii) heating the first and second fluid bodies using solar radiation for a period such that each of the first and second fluid bodies achieves an elevated temperature,

(iv) removing fluid from the second fluid body while preventing any movement of fluid from the first fluid body to the second fluid body, and

(v) further heating the first and second fluid bodies using solar radiation for a period such that the second fluid body achieves a higher temperature than the first fluid body.

22. The method of claim 21, comprising the step of moving a volume of fluid from the second fluid after the second fluid body achieves a higher temperature than the first fluid body, or allowing a volume of fluid to be moved from the second fluid after the second fluid body achieves a higher temperature than the first fluid body.

23. The method of claim 22, comprising the steps of:
moving a volume of fluid from the first fluid body to the second fluid body or allowing a volume of fluid to be moved from the first fluid body to the second fluid body; and
moving a volume of input fluid into the first fluid body; or allowing a volume of input fluid to be moved into the first fluid body.

24. The method of claim 23, wherein the volumes of fluid moved are such that the volume of fluid in each of the first and second fluid bodies is substantially unchanged.

25. The method of any one of claims 21 to 24, wherein the step of dividing is achieved by disposing the first and second fluid bodies in the first and second chambers respectively of the apparatus of any one of claims 1 to 17.