CLAIMS

1. A spiral turbine comprising a disk turning on its center axis with a plurality of enclosed spiral channels for the spiral flow of gas along the channels; each of said spiral channels comprising:

increasing radii that increase exponentially as the turn angle of the radii; and

decreasing bore area as the turn angle of the radii.

2. An expander turbine based on the spiral turbine of claim 1 with;

spiral turbine turning in one direction around the center axis of the turbine; and

a gas flowing from the inside to the outside of the disk in the opposite direction of the turn direction of the spiral turbine; with the gas releasing its pressure energy into work to turn the disk by pressing against the outer perimeter of the spiral channels.

3. A compressor turbine based on the spiral turbine of claim 1 with;

spiral turbine turning in one direction around the center axis of the turbine; and

a gas flowing from the outside to the inside of the disk in the same direction of the turn direction of the spiral turbine; with the gas being pressed by outer perimeter of the spiral channels, turning work by the spiral turbine into pressure energy of the gas as that gas slows down in the spiral channel of increasing bore area towards the center of the disk.

4. An application of turbine heat engine using the expander turbine of claim 2 and compressor turbine of claim 3, comprising:

the said compressor turbine pressurizes air from outside towards the inside of the turbine heat engine;

a central combustion chamber burns a fuel that heats up the compressed gas;

the said expander turbine that turns the heat energy of pressurized gas into work as hot pressurized air loses pressure and heat energy into work as that gas flows from inside to outside; and

a coaxial polygon electricity generator that converts work into electricity which can also be used as an electric motor to prime air compression prior to combustion.

5. An application of turbine heat pump using the expander turbine of claim 2 and compressor turbine of claim 3, comprising:

the said compressor turbine pressurizes air from outside towards the inside of the turbine heat pump that pressurizes and heats up that air;

a heat exchanger that takes heat out of the air heated by the said compressor, cooling down the pressurized air;

the said expander turbine that recovers the pressure energy of the cooled compressed air, furthering lowering the temperature of the compressed air as the pressure of that air works on the turbine; and

a coaxial polygon electric motor that uses electricity to compensate for the deficit of work done by the compressor turbine and expander turbine.

6. An application of water desalination device using the compressor turbine of claim 3, comprising:

a heat source that heats up water to be purified;

a water column that reduces water pressure at the top of the column, causing that water to boil at lower than normal boiling temperature;

the said compressor turbine that increases pressure of steam at the top of the column, causing that steam to condense as water, yielding heat of compression and heat of condensation;

a heat exchanger column inside the said water column that uses that heat of compression and heat of condensation to boil more impure water;

a polygon electric motor that is coaxial with the compressor turbine to compress and condense low pressure steam.

7. The said heat source of claim 6, comprising:

a conical surface that focus on the water column of claim 5, with focus along the axis of the water column, with the conical surface tracking the sun in both its azimuth and elevation.

8. The said heat source of claim 6, comprising:

a plurality of solar water heaters with reflective and vacuum insulated glass tubes.