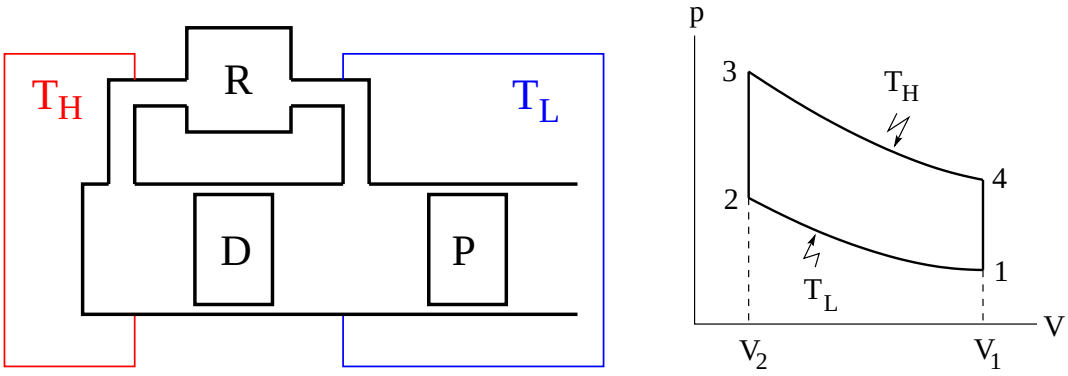
Stirling engine [tln76]

The Stirling engine is an external combustion engine. It isolates the working fluid from the heat source. Combustion is better controlled than in internal combustion engines.



Piston P expands gas at high temperature T_H and compresses gas at low temperature T_L.

Displacer D moves gas between regions of high temperature T_H and low temperature T_L through the regenerator.

Regenerator R acts as a heat exchanger. It stores heat when hot gas flows from left to right and releases heat when colder gas flows from right to left.

Idealized Stirling cycle

1-2: Isothermal compression at temperature T_L.
Displacer stationary at left. Piston moving left.

2-3: Isochoric heating up at volume V_2.
Piston stationary at left. Displacer moving right.

3-4: Isothermal expansion at temperature T_H.
Displacer and piston moving right.

4-1: Isochoric cooling down at volume V_1.
Piston stationary at right. Displacer moving left.

Note: Some of the heat is recycled in the regenerator. This amount should not be counted in the expression $\eta = \Delta W_{out}/\Delta Q_{in}$ of the efficiency.