For the last few weeks we've discussed power cycles. Systems that utilize heat from a high temperature source to produce useful work. We last discussed the ideal Stirling cycle which can run an engine off of the heat of a furnace. If this cycle is ideal and if the flows occur at constant entropy, this would become the reversible Carnot Cycle. What would happen if we reversed the Stirling Cycle in reverse?

1→2) Reversible, isothermal expansion @ Tc.
2→3) Reversible, adiabatic compression from Tc to T₄.
3→4) Reversible, isothermal compression @ T₄.
4→1) Reversible, adiabatic expansion from T₄ to Tc.

Entropy balance from 2:

\[ \Delta S = S' - S \]

\[ \frac{Q_{in}}{T_{in}} - \frac{Q_{out}}{T_{out}} = m(S'_4 - S'_3) \]

Balance from 3→4:

\[ Q_{gen} - Q_{out} + S_{gen} + S_{stated} = 0 = \frac{Q_{in}}{T_{in}} - m(S'_4 - S'_3) \]

Really though does this happen???
Pass out rubber bands

relaxed  stretched

Which state of the rubber band

Stretched state has lower entropy than the relaxed state

Going from relaxed to stretched: $a - \text{out} + m(S_1 - S_3)$

Try it with a rubber band

Is it just friction?

Going from stretched to relaxed: $a + m(S_2 - S_1)$

Requires heat rejection @ constant

Requires heat input @ constant

This cannot be explained by friction!!!

Could this be useful for something useful?

Show Picture  Show Movies  Rubber band heat engine

Basically, that's all you need to create a refrigerator is a change in entropy,

Change in phase/state, Magnetic field, Chemical concentration