[tex140] Reversible heat exchange

Consider a rigid, insulating box with two compartments of volumes V_1 and V_2 separated by an internal wall. Each compartment contains N atoms of a monatomic classical ideal gas $[pV = Nk_BT, C_V = \frac{3}{2}Nk_B]$ in equilibrium at the same pressure.

(a) Find the maximum work, $\Delta W(T_1, T_2, N)$, that can be extracted from this system by any means that keep the box rigid and insulating.

(b) Design a reversible process that employs the internal wall, which is movable by an external agent in a controlled manner and which can be switched between heat-conducting and insulating modes.

Solution: