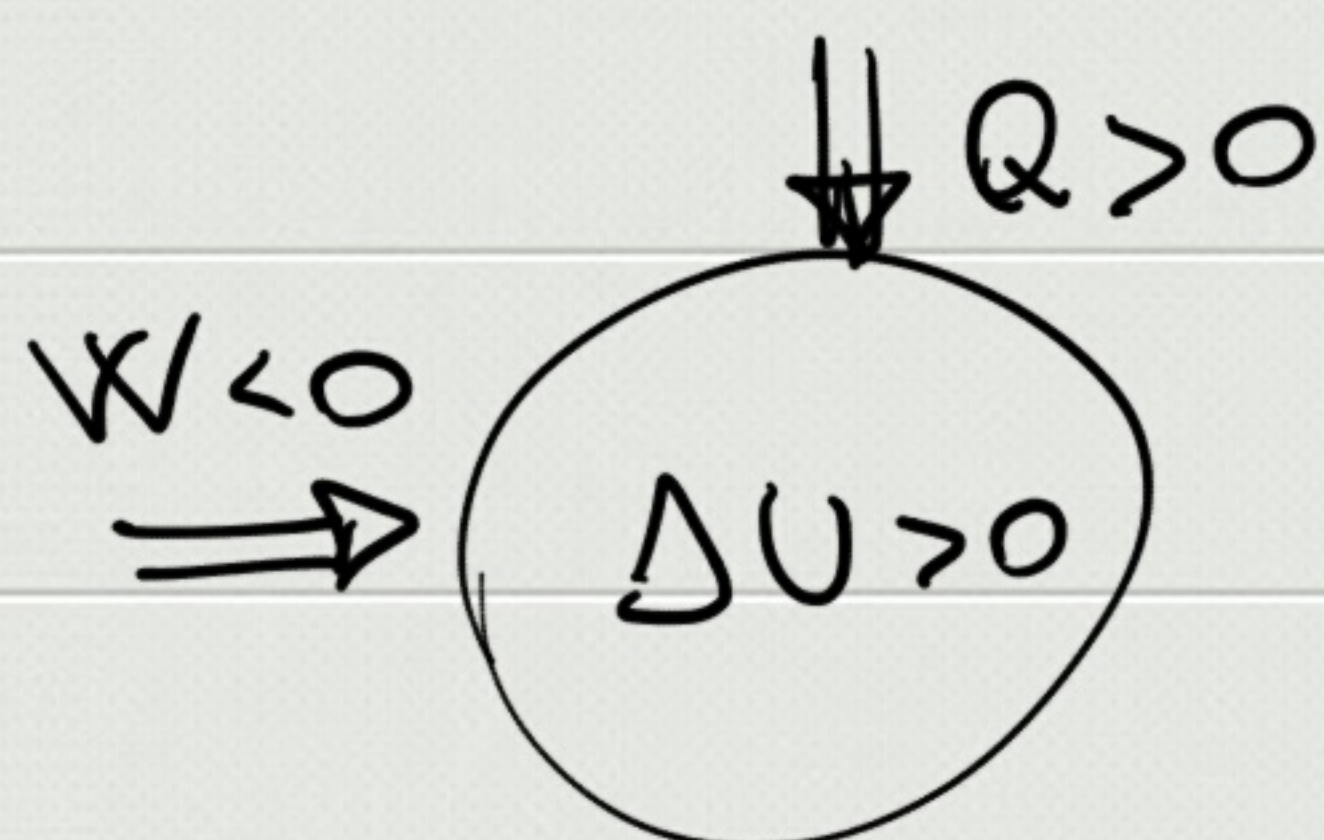
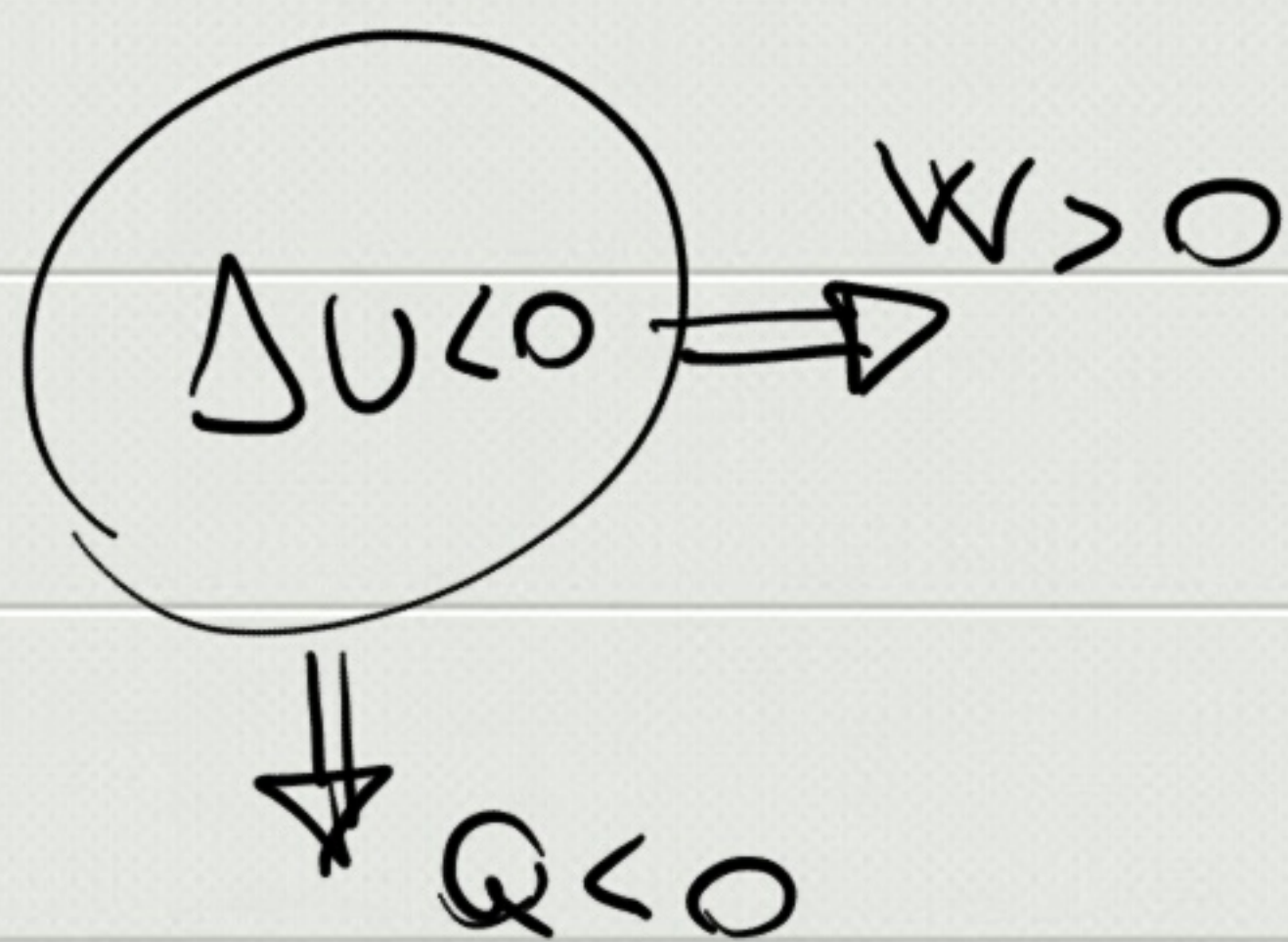
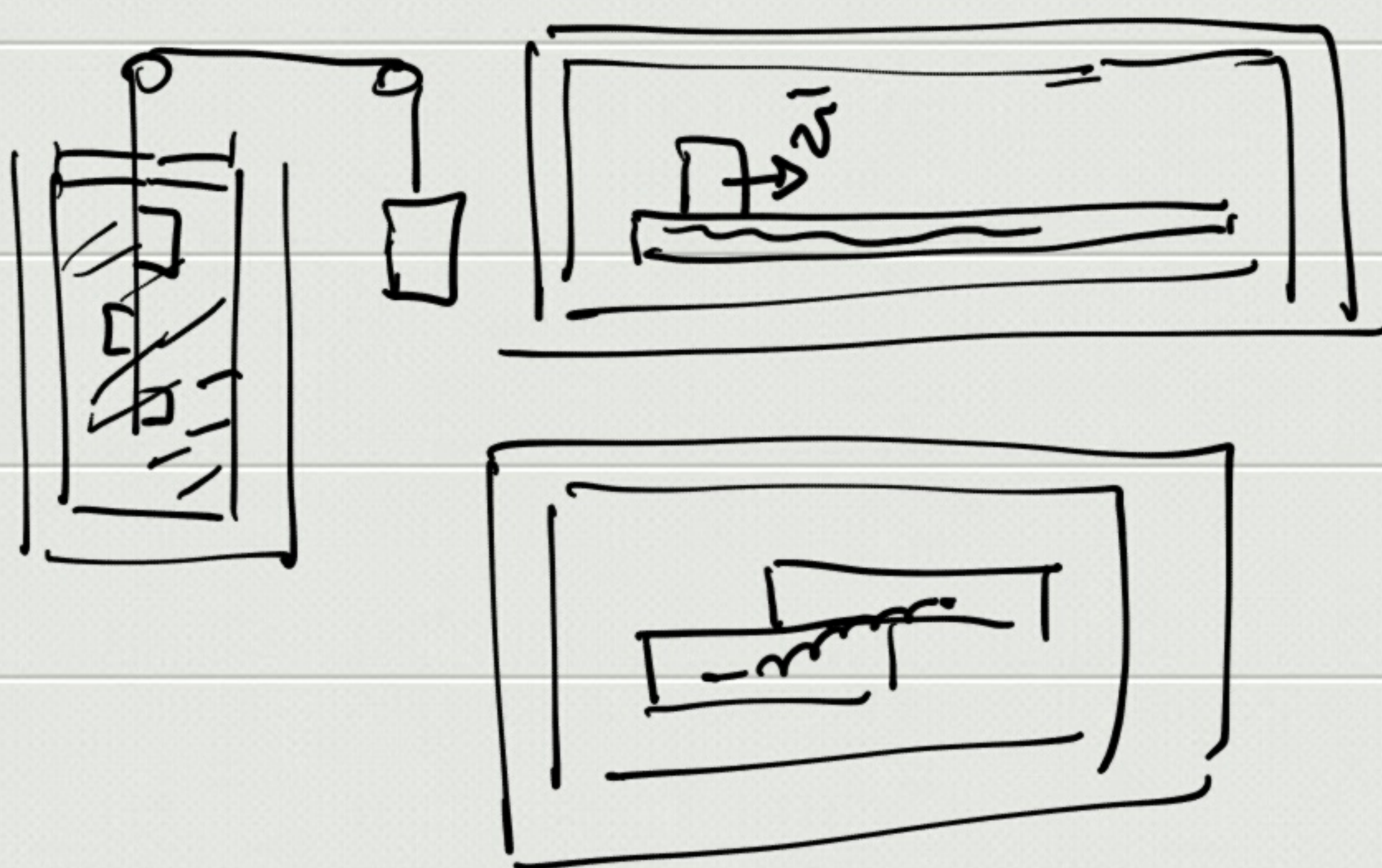
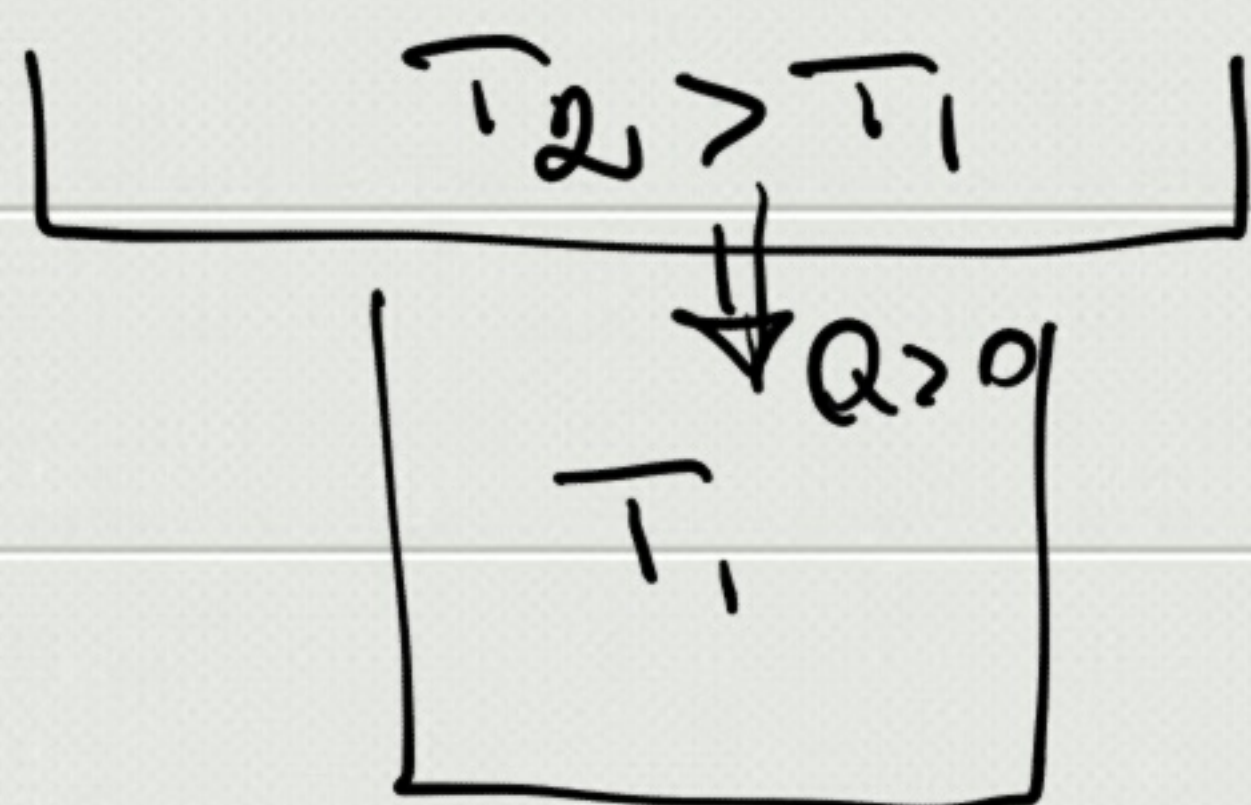


$$Q = \Delta U + W$$



$$\Delta U = Q > 0$$

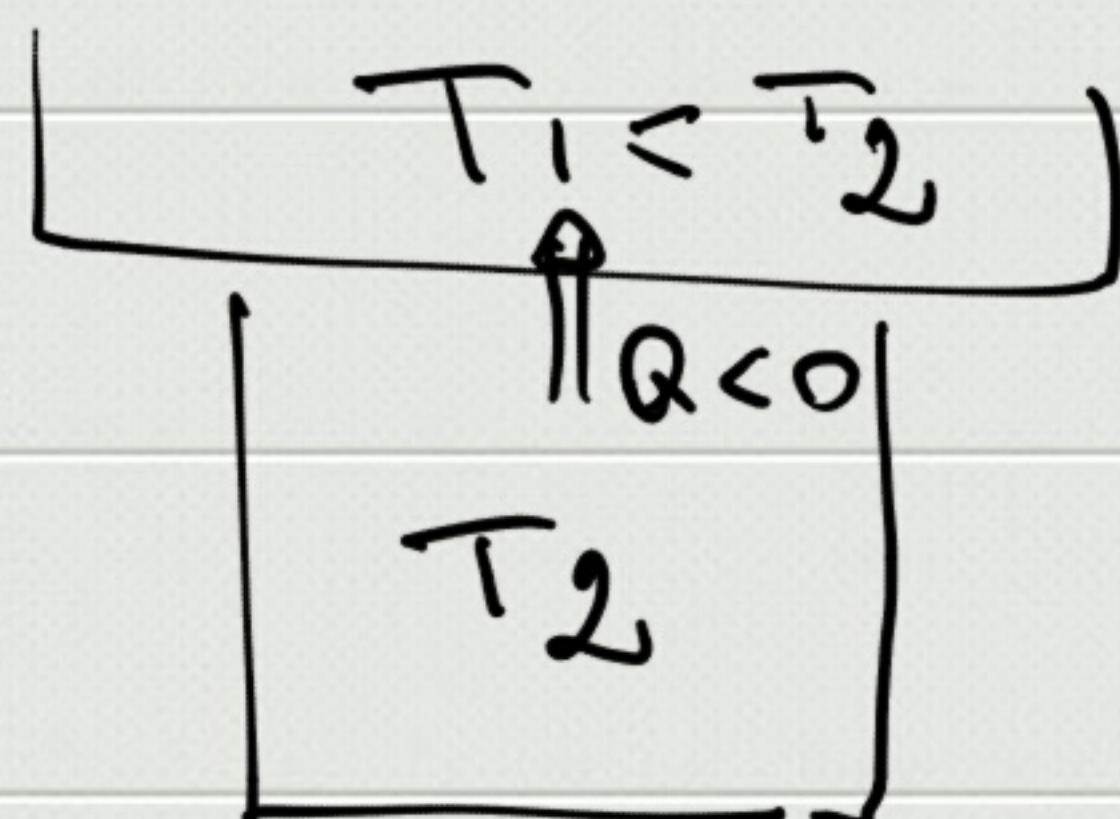
$$\Delta U = -W > 0$$



$$\Delta U = Q < 0$$

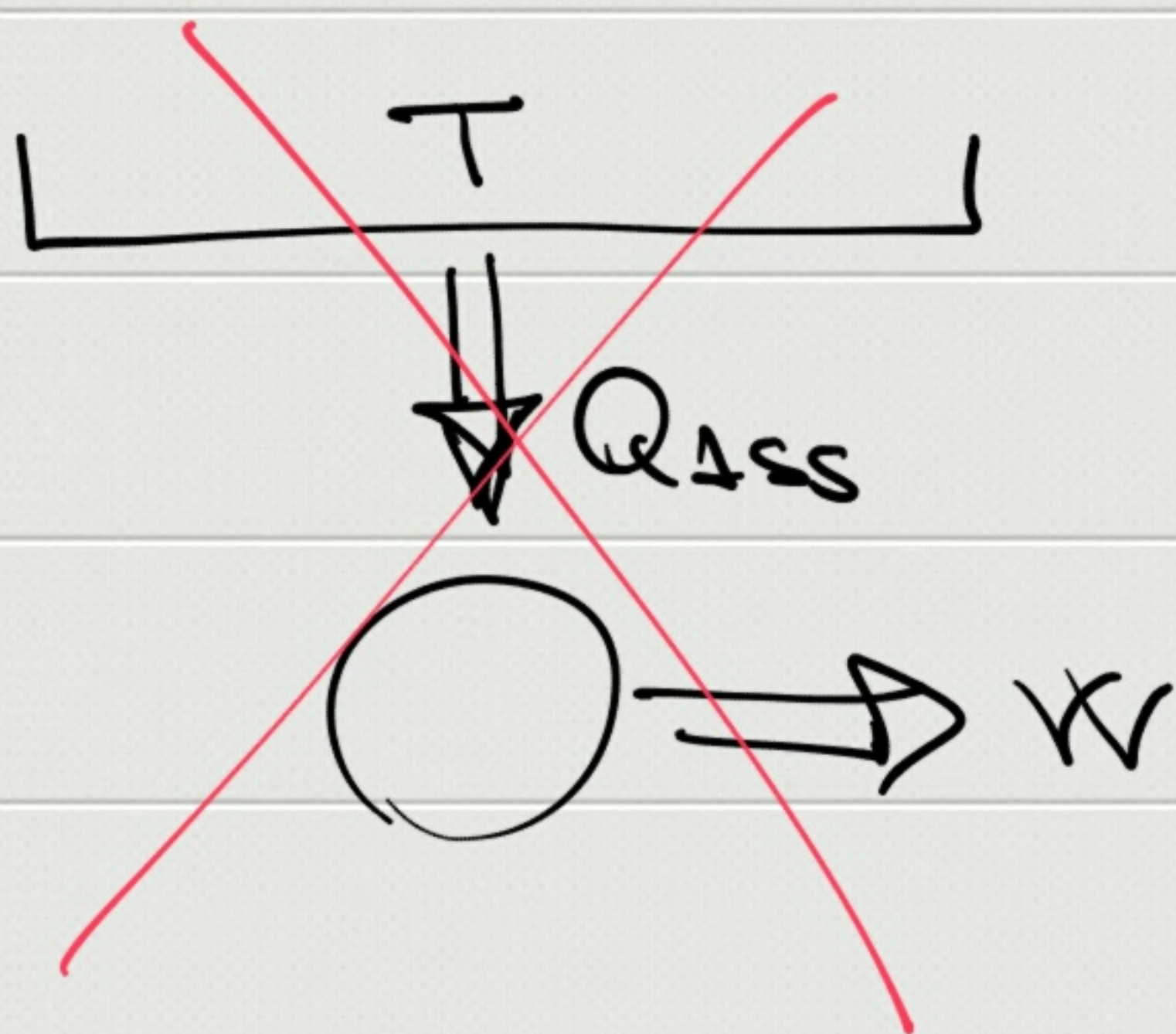
$$\Delta U = -W < 0$$

??



Enunciato di Kelvin-Planck

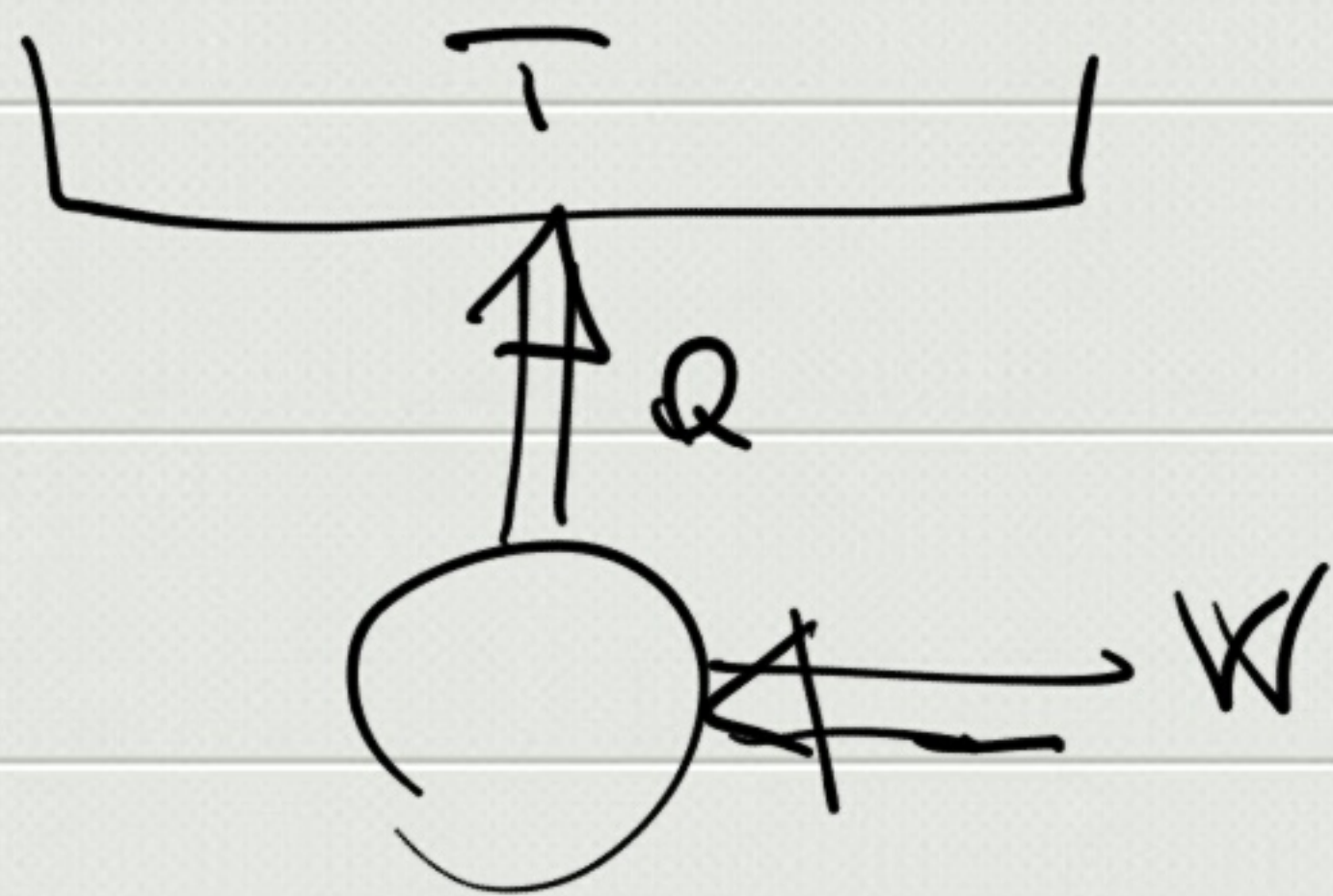
NO processo TD unico risultato $W > 0$ a
partire da un unico serbatoio Q_{ass}



$$\Delta U = 0$$

$$Q_{ass} = W > 0$$

Ciclo monoterma (1 solo serbatoio)

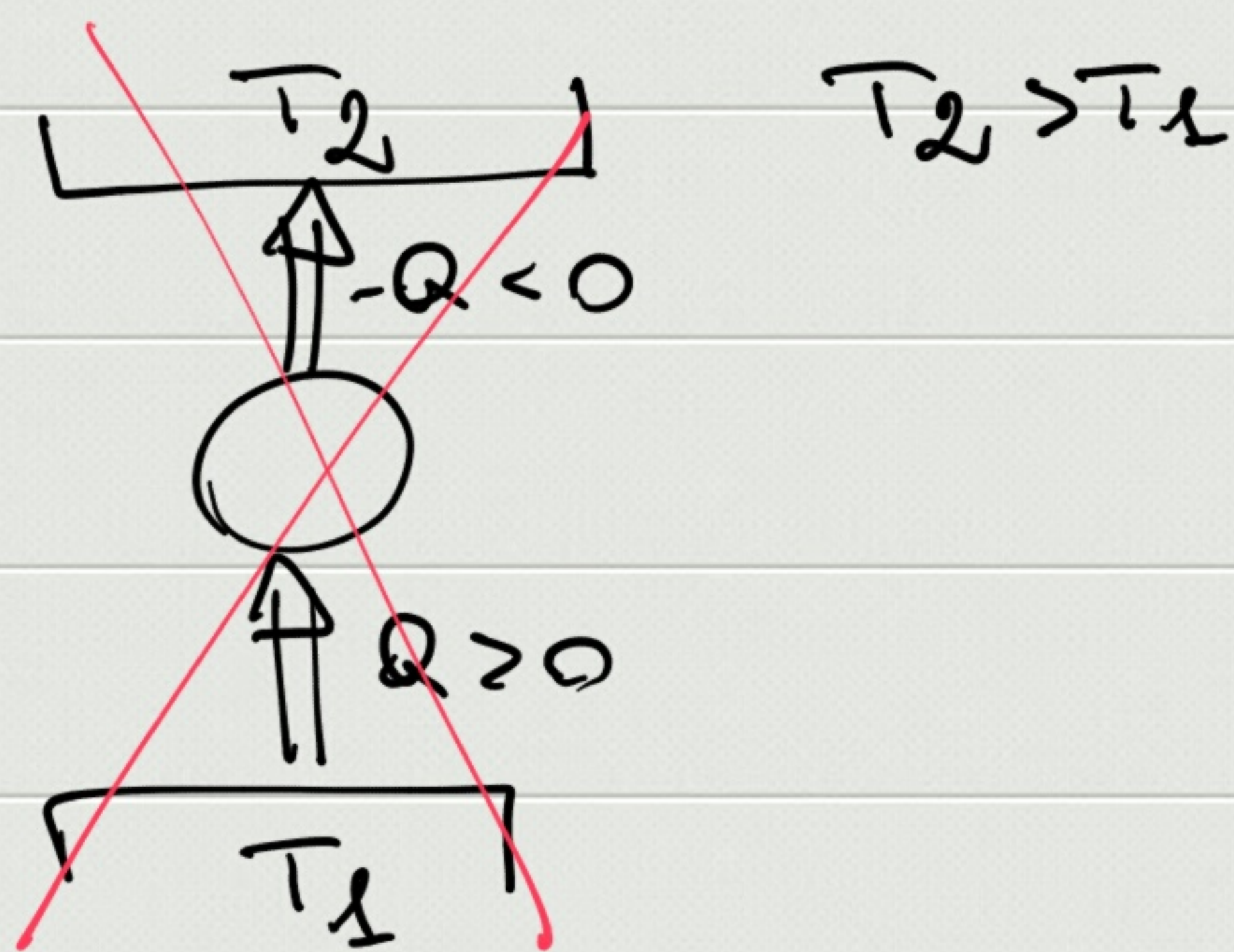


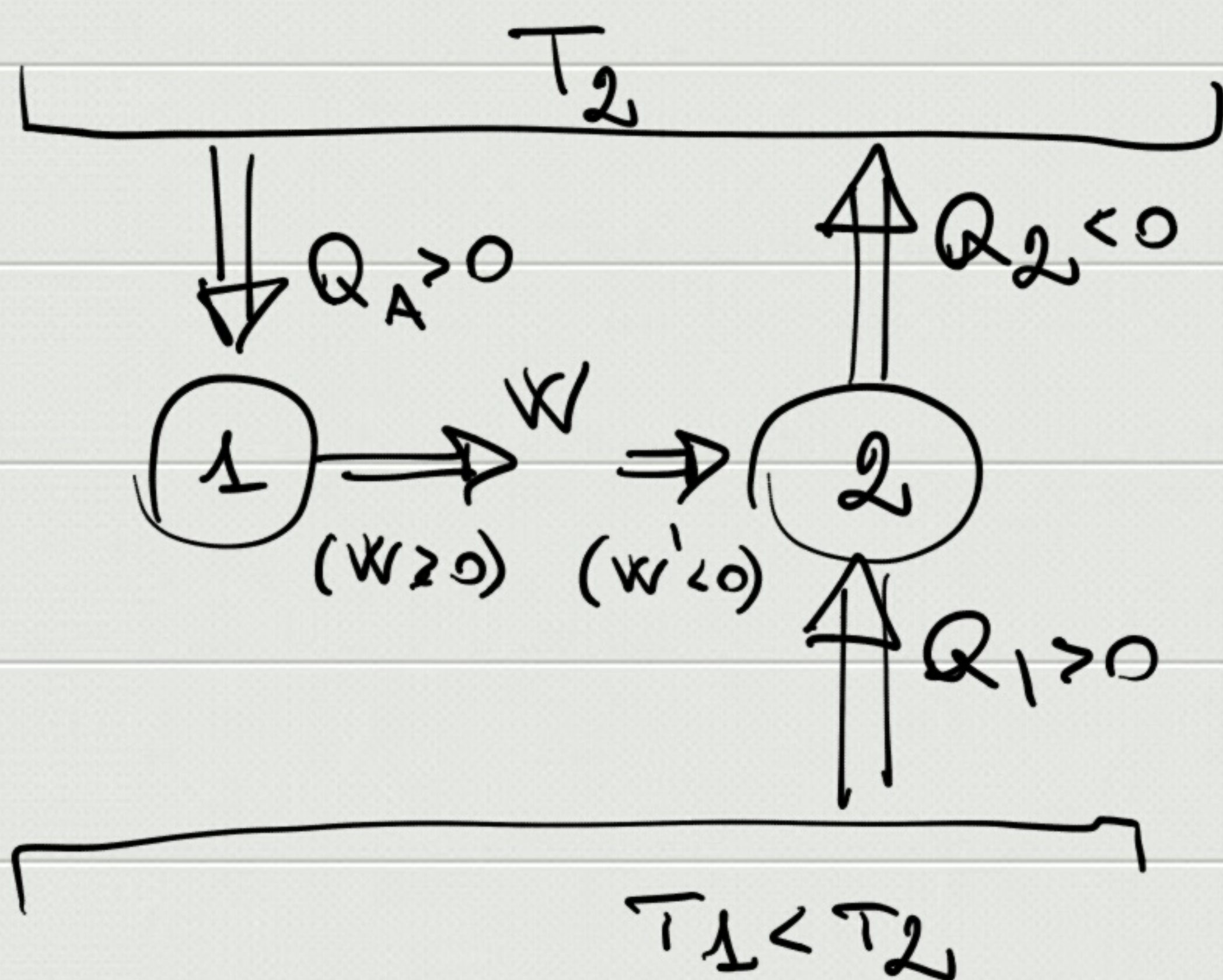
$$Q = W \leq 0$$

è anche reversibile $(Q = W \geq 0) \Rightarrow \boxed{Q = W = 0}$

Enunciato di Clausius

NO proc. TD unico risultato trasferimento
 Q da un corpo ad un altro a T maggiore

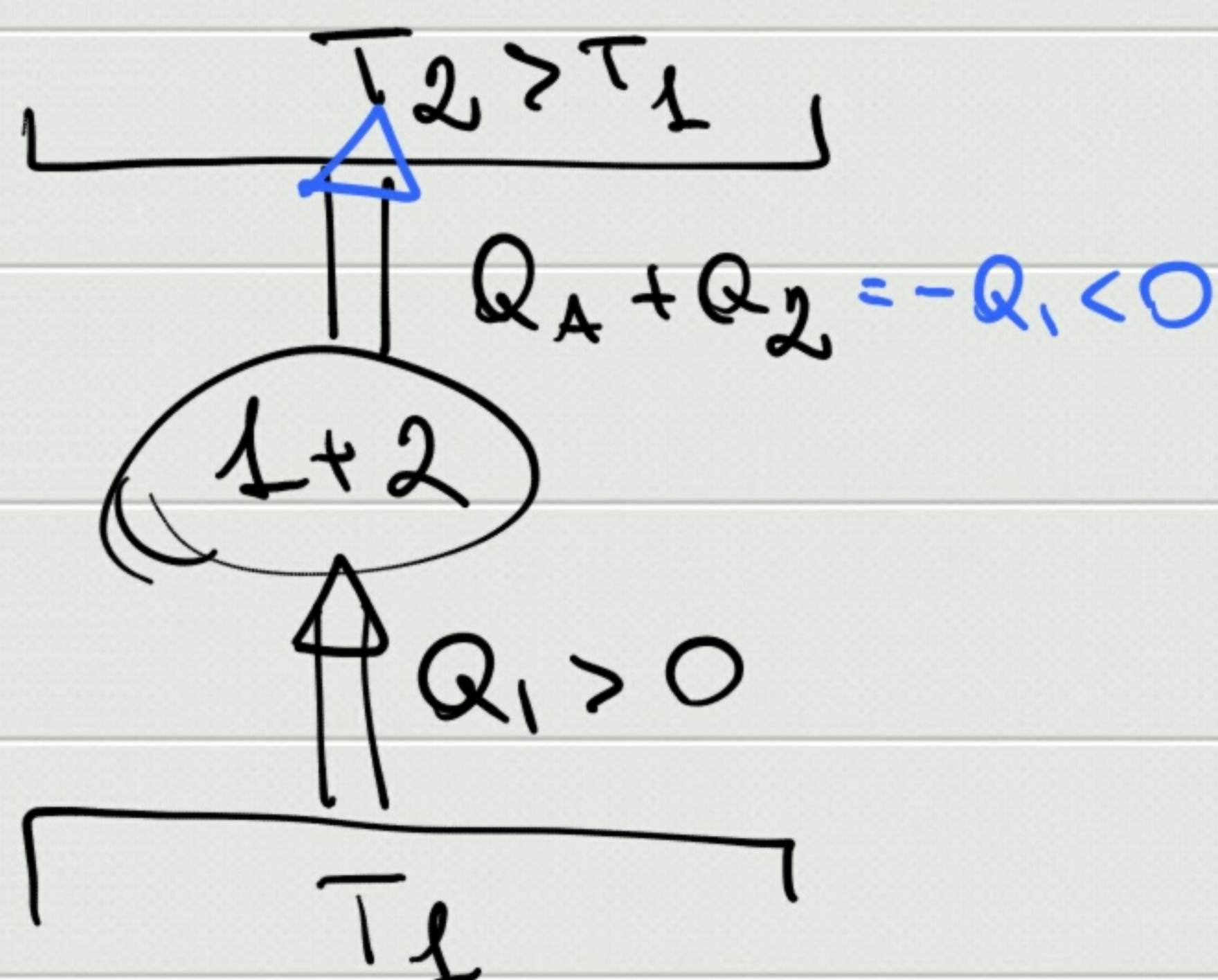




$$\textcircled{1} \quad Q_A = W > 0$$

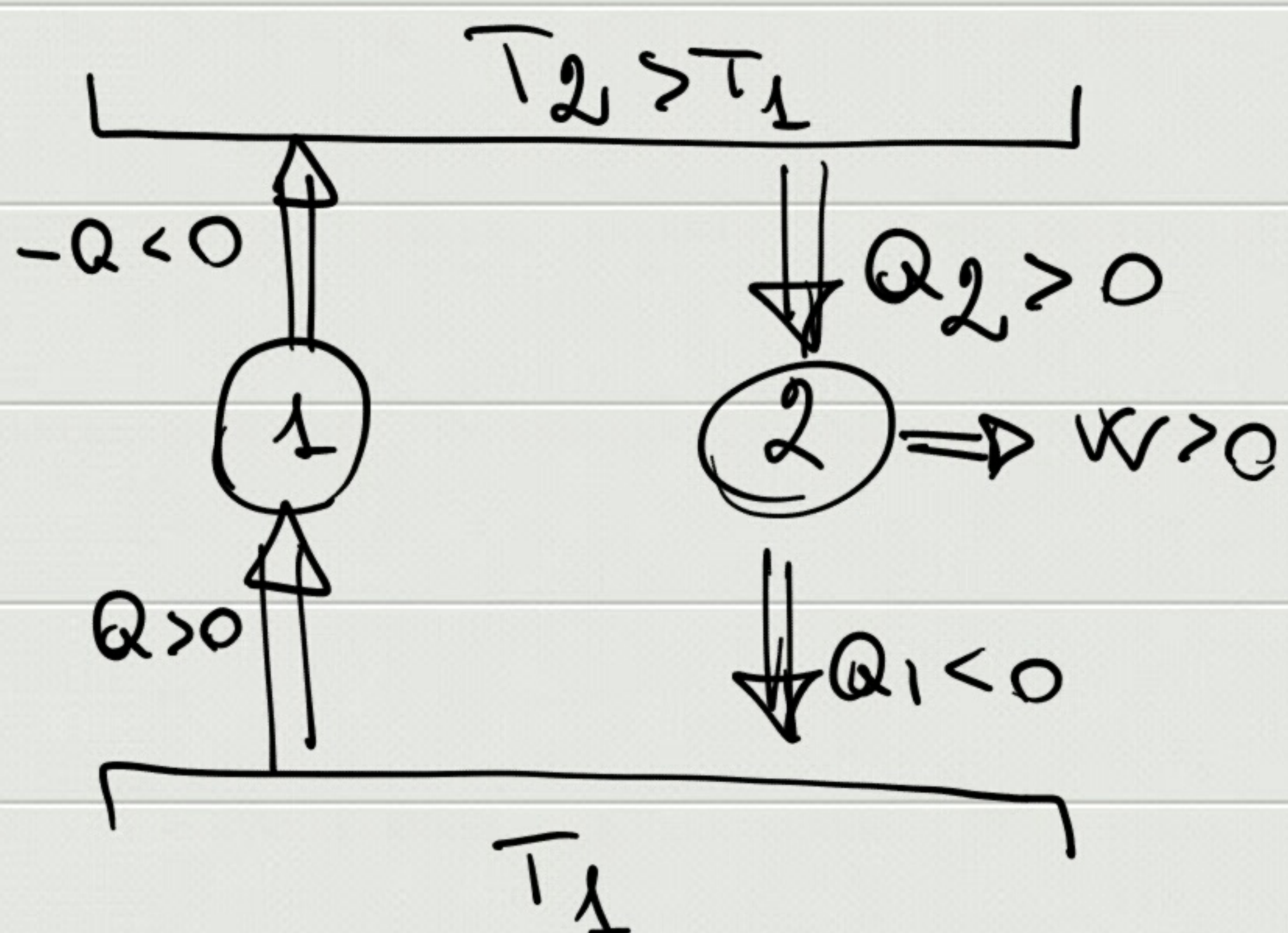
$$\textcircled{2} \quad Q_1 + Q_2 = W' < 0$$

$$W = -W'$$



$$Q_A = -(Q_1 + Q_2)$$

$$\Rightarrow Q_A + Q_2 = -Q_1 < 0$$



$$Q_1 + Q_2 = W > 0$$

$$Q_1 = -Q$$

$$\Rightarrow Q_2 - Q = W > 0$$

