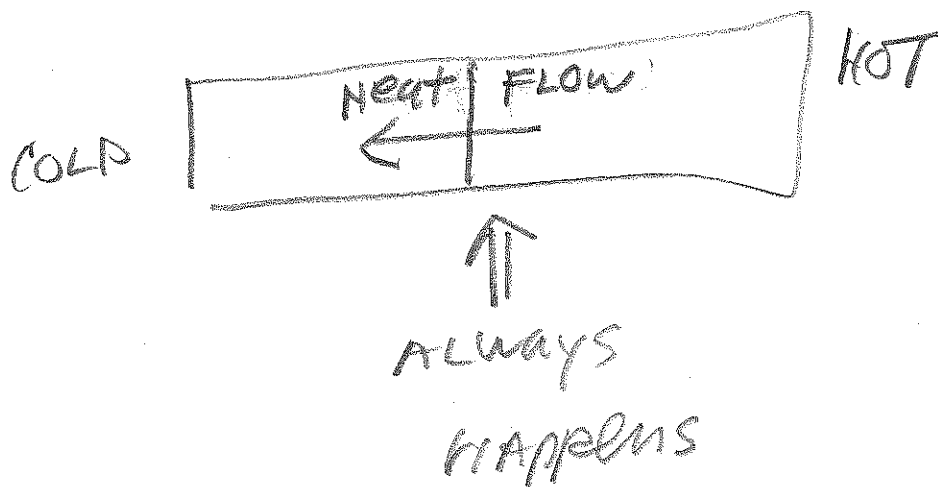
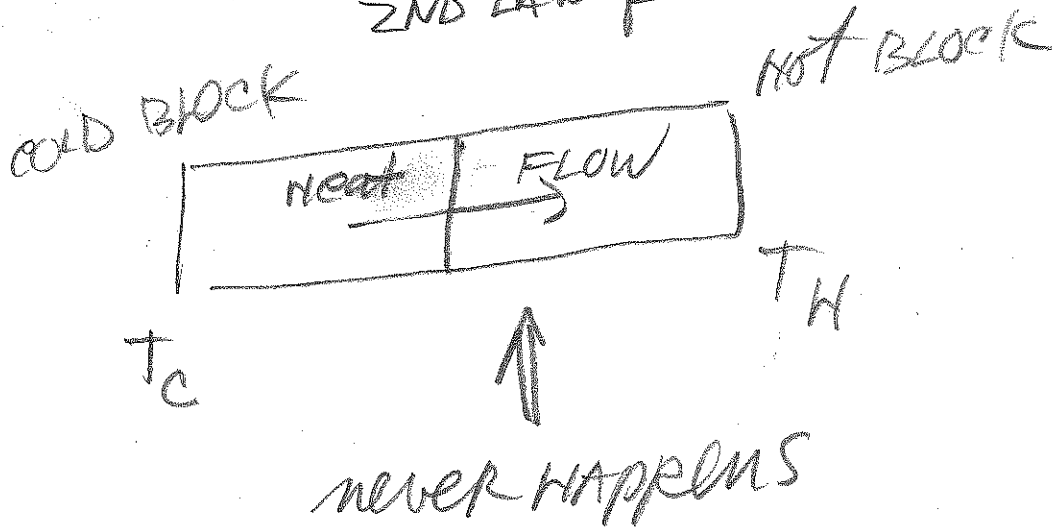


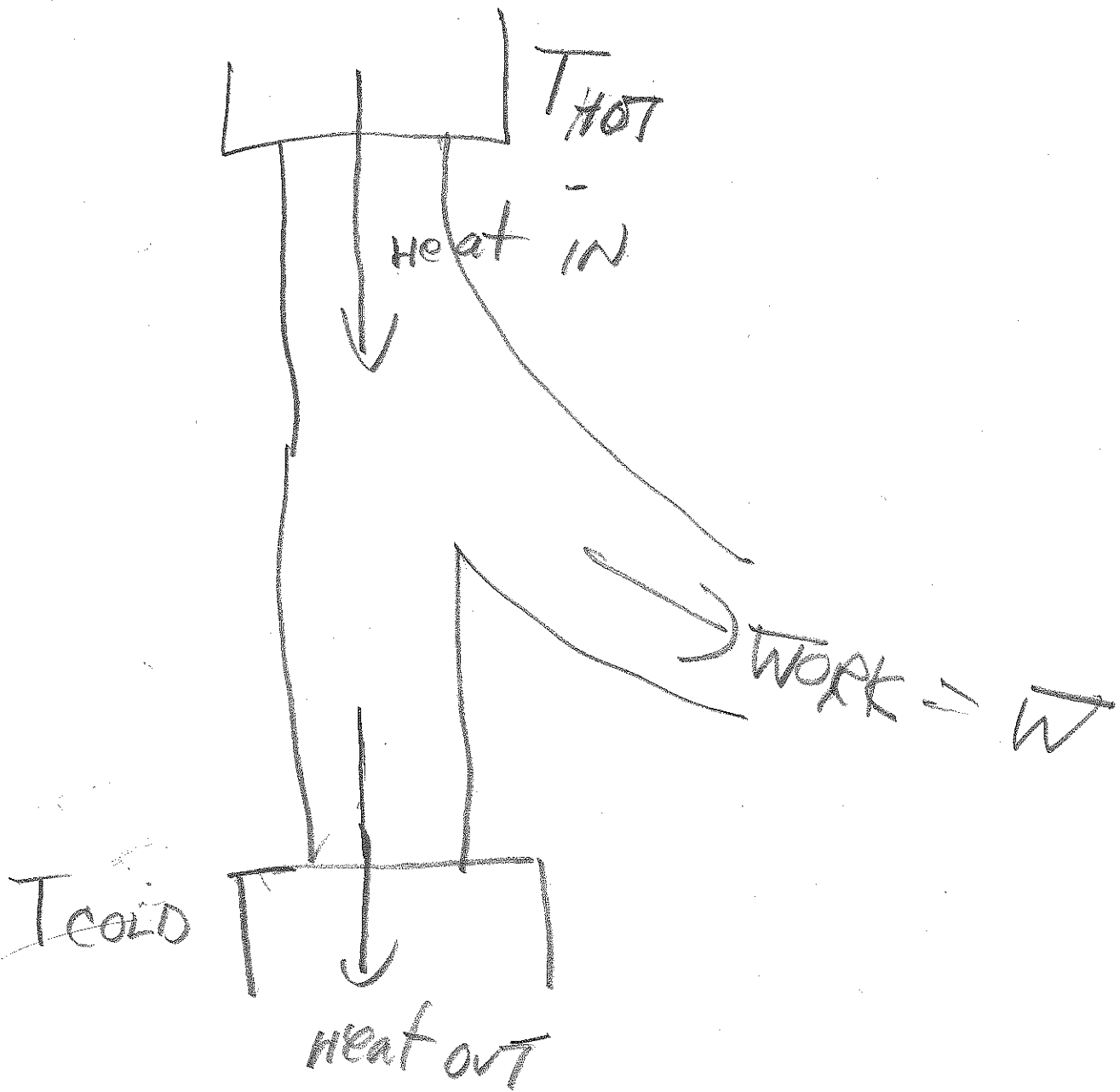
11-4-13

CH20 THERMOS
2ND LAW OF THERMODYNAMICS



Heat engines exploit
the natural heat FLOW
direction TO DO WORK.

Engine schematic



$$\text{heat in} = \text{heat out} + W$$

$$Q_{in} = Q_{out} + W$$

efficiency ϵ :

$$\epsilon = \frac{W}{Q_H}$$
$$= 1 - \frac{|Q_C|}{|Q_H|}$$

steam engine example:

STEAM ENGINE!

HOT STEAM ABOVE COOLER
STEAM ACROSS TURBINE BLADE
PRODUCES A NET FORCE
DOWNWARD
THAT ROTATES
TURBINE BLADES.

