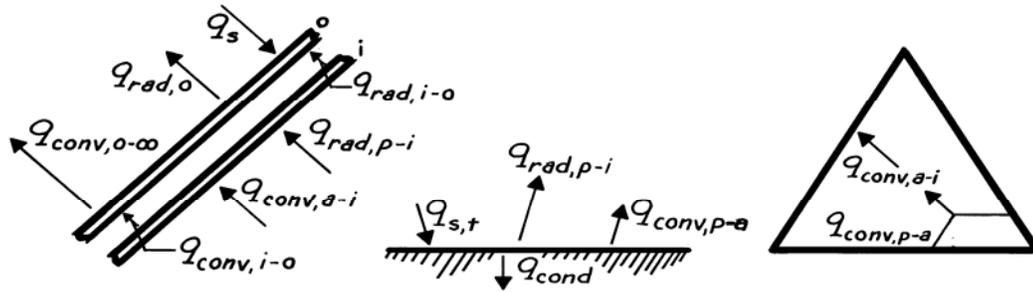


### PROBLEM 1.87(c)

**KNOWN:** Configuration of a solar collector used to heat air for agricultural applications.

**FIND:** Relevant heat transfer processes.

**SCHEMATIC:**



Assume the temperature of the absorber plates exceeds the ambient air temperature. At the *cover plates*, the relevant processes are:

- $q_{\text{conv},a-i}$  Convection from inside air to inner surface,
- $q_{\text{rad},p-i}$  Net radiation transfer from absorber plates to inner surface,
- $q_{\text{conv},i-o}$  Convection across airspace between covers,
- $q_{\text{rad},i-o}$  Net radiation transfer from inner to outer cover,
- $q_{\text{conv},o-\infty}$  Convection from outer cover to ambient air,
- $q_{\text{rad},o}$  Net radiation transfer from outer cover to surroundings, and
- $q_s$  Incident solar radiation.

Additional processes relevant to the *absorber plates* and *airspace* are:

- $q_{s,t}$  Solar radiation transmitted by cover plates,
- $q_{\text{conv},p-a}$  Convection from absorber plates to inside air, and
- $q_{\text{cond}}$  Conduction through insulation.