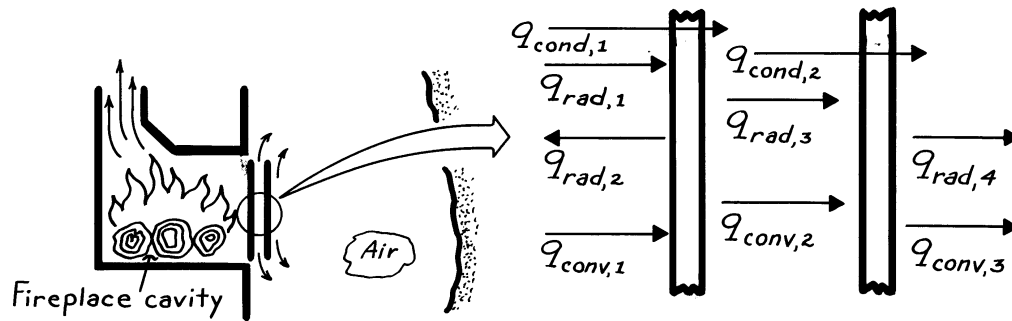


### PROBLEM 1.62(f)

**KNOWN:** Fireplace cavity is separated from room air by two glass plates, open at both ends.

**FIND:** Relevant heat transfer processes.

**SCHEMATIC:**



The relevant heat transfer processes associated with the double-glazed, glass fire screen are:

- |              |   |
|--------------|---|
| $q_{rad,1}$  | Radiation from flames and cavity wall, portions of which are absorbed and transmitted by the two panes, |
| $q_{rad,2}$  | Emission from inner surface of inner pane to cavity,  |
| $q_{rad,3}$  | Net radiation exchange between outer surface of inner pane and inner surface of outer pane,             |
| $q_{rad,4}$  | Net radiation exchange between outer surface of outer pane and walls of room,                           |
| $q_{conv,1}$ | Convection between cavity gases and inner pane,   |
| $q_{conv,2}$ | Convection across air space between panes,  |
| $q_{conv,3}$ | Convection from outer surface to room air,  |
| $q_{cond,1}$ | Conduction across inner pane, and   |
| $q_{cond,2}$ | Conduction across outer pane.   |

**COMMENTS:** (1) Much of the luminous portion of the flame radiation is transmitted to the room interior.

(2) All convection processes are buoyancy driven (free convection).