

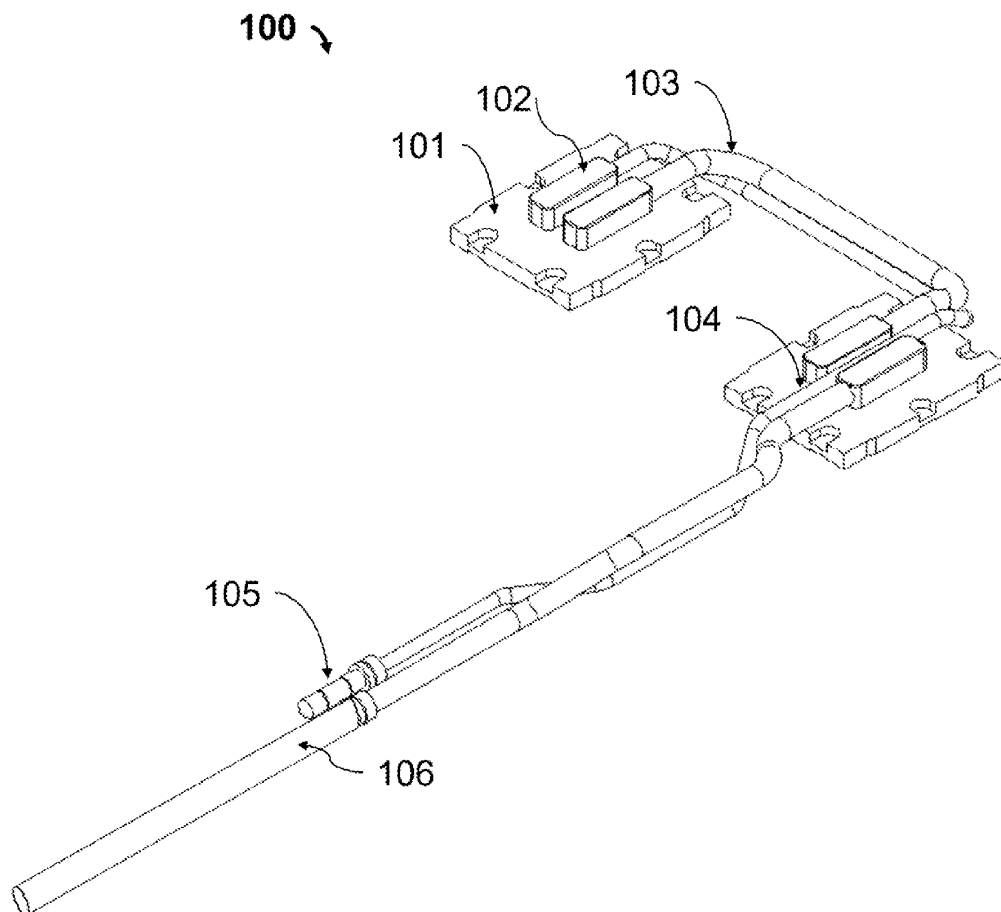


Figure 1 Example of a dual socket cold plate loop implementation comprised of formed tubing in a serial flow configuration.

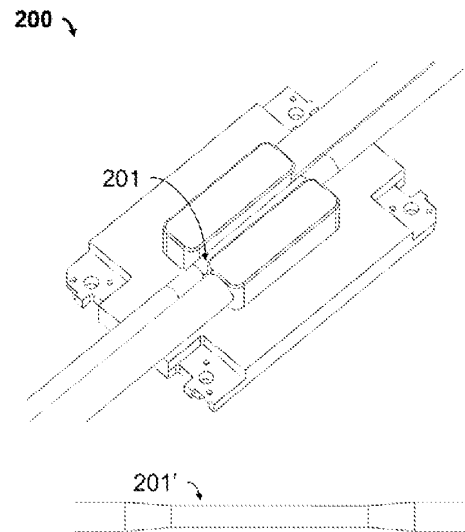


Figure 2 Implementation of a CPL tubing arrangement where the nominally circular tubing is rolled locally to a non-circular shape.

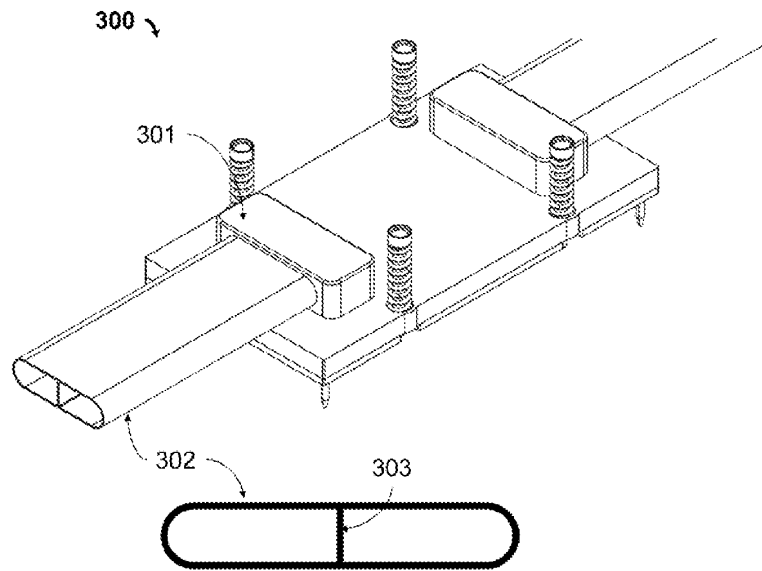


Figure 3 Implementation of flat tubing sections in the CPL.

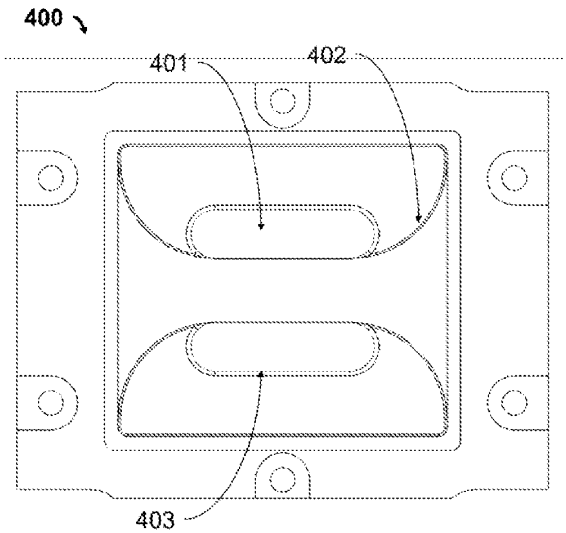


Figure 4 Implementation of manifold fluidic interface.

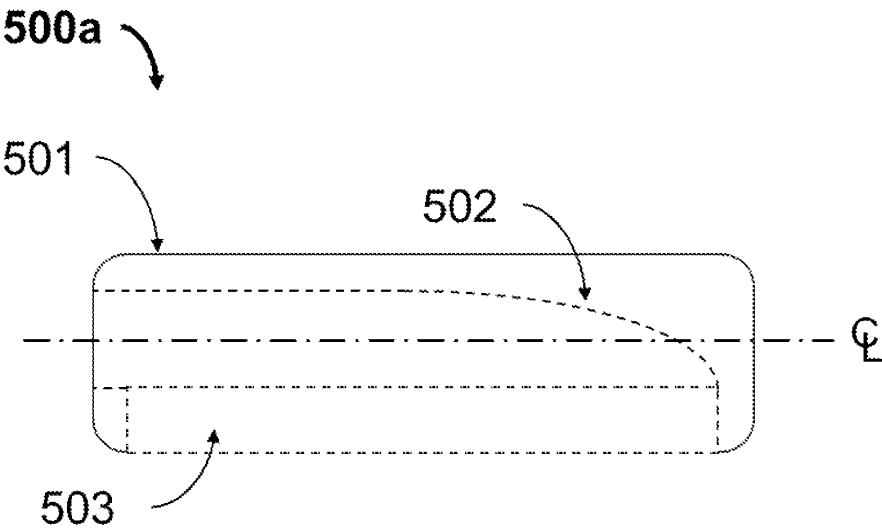


Figure 5a Low-profile elbow fitting to facilitate optimized fluidic coupling between the evaporator and tubing of the cold plate loop.

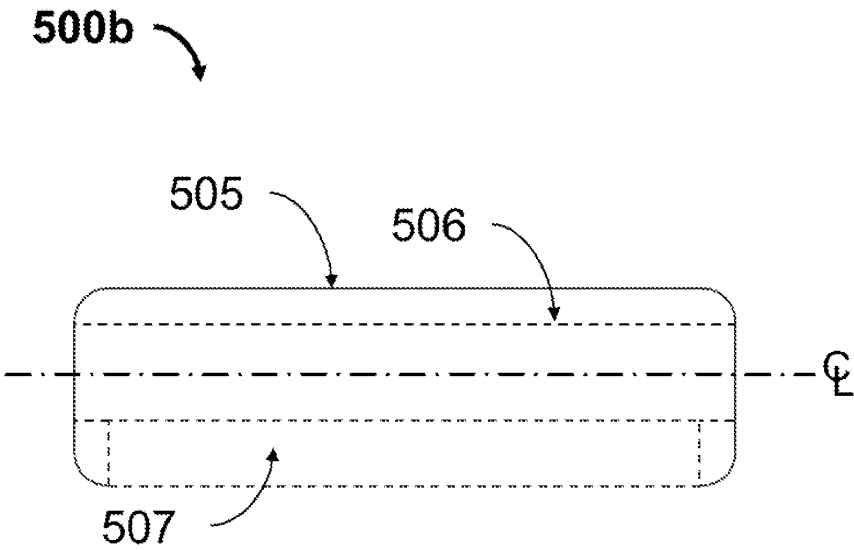


Figure 5b Low-profile tee fitting to facilitate optimized fluidic coupling between the evaporator and tubing of the cold plate loop.

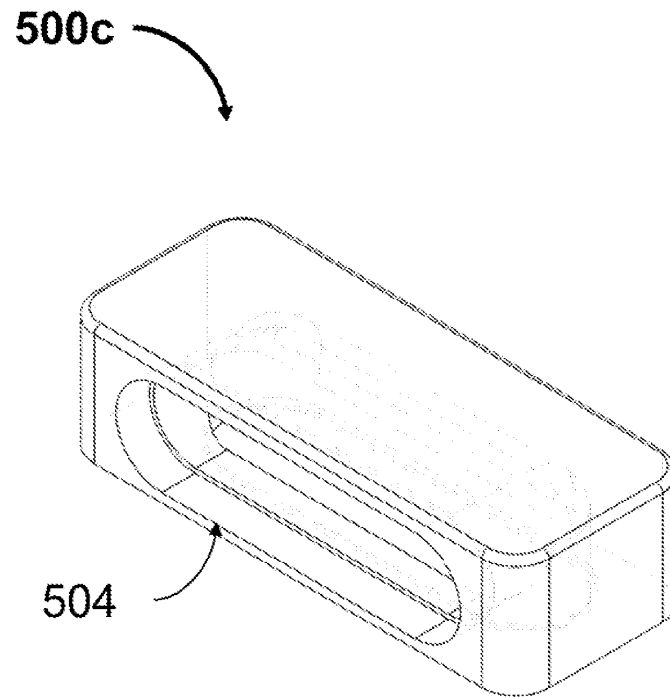


Figure 5c Low-profile fittings to facilitate optimized fluidic coupling between the evaporator and tubing of the cold plate loop.

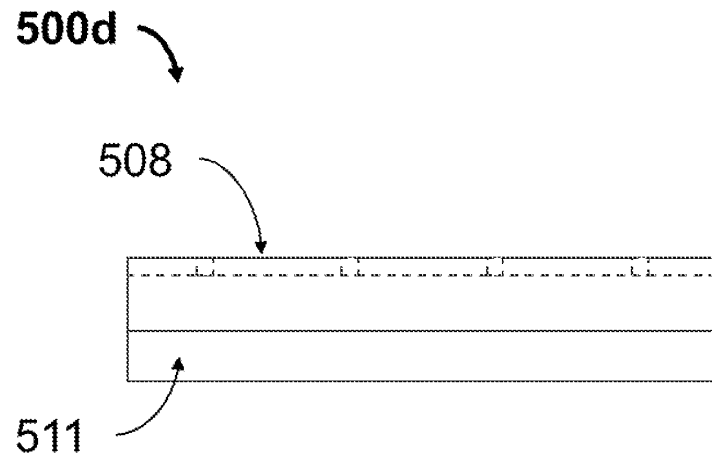


Figure 5d Low-profile fittings to facilitate optimized fluidic coupling between the evaporator and tubing of the cold plate loop.

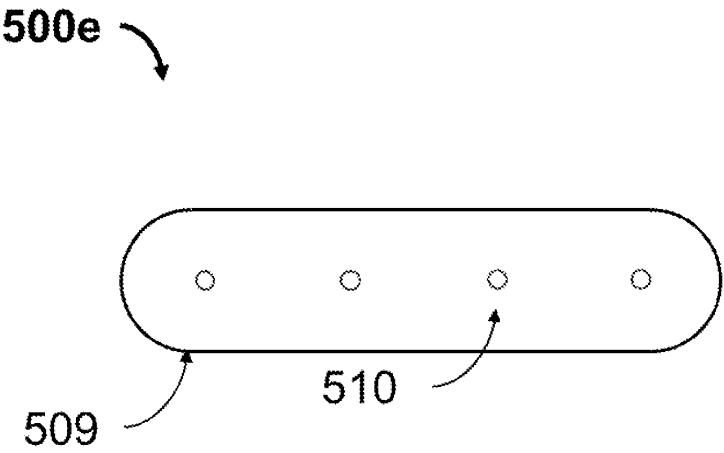


Figure 5e Low-profile fittings to facilitate optimized fluidic coupling between the evaporator and tubing of the cold plate loop.

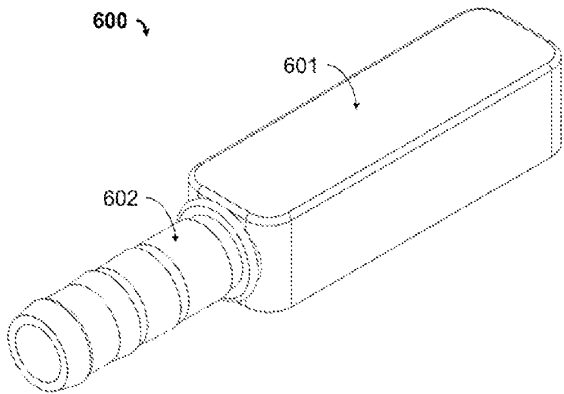


Figure 6 Additional implementation of a low-profile fitting with a barb connection for barrier tubing.

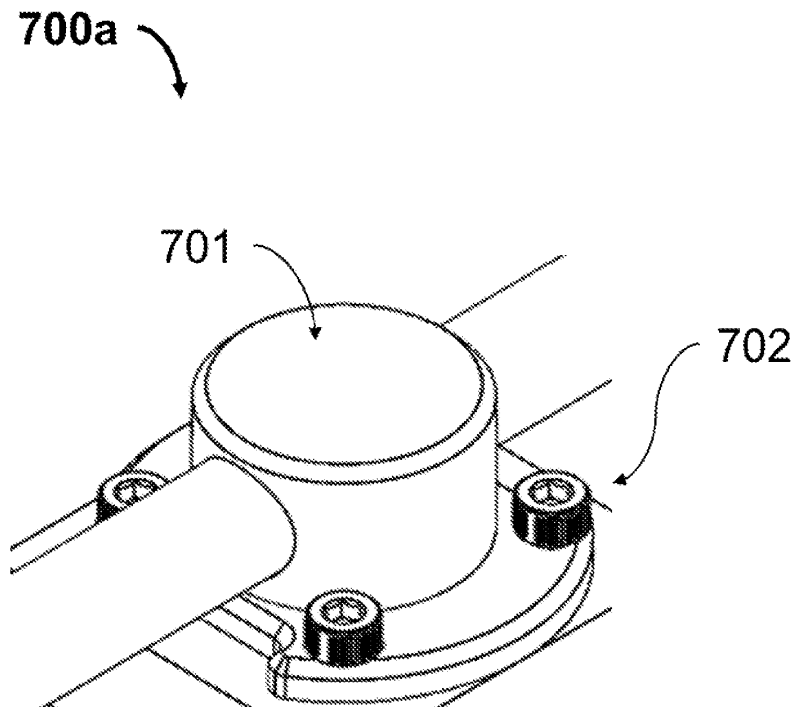


Figure 7a Additional implementation of the CPL fitting to fluidically couple to the cold plate.

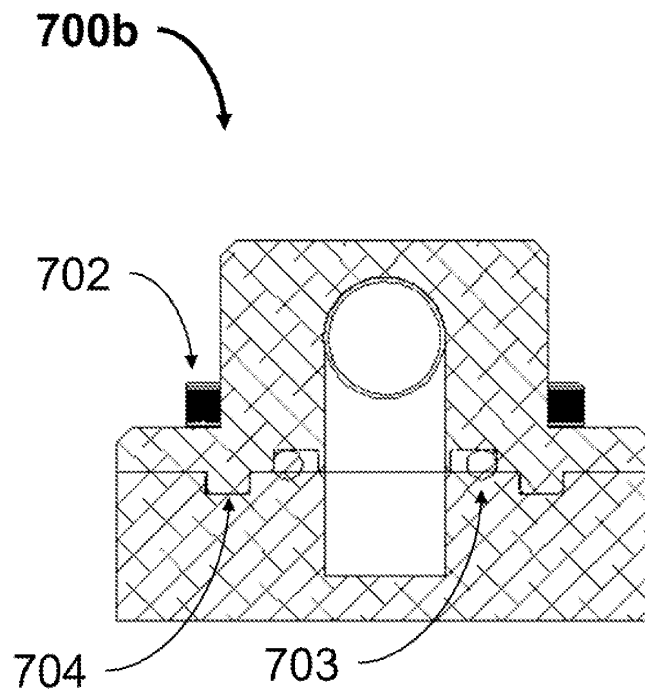


Figure 7b Additional implementation of the CPL fitting to fluidically couple to the cold plate.

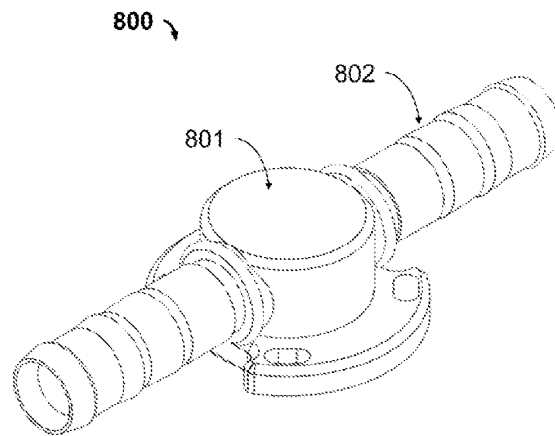


Figure 8 Additional implementation of the CPL fitting with barb connections.

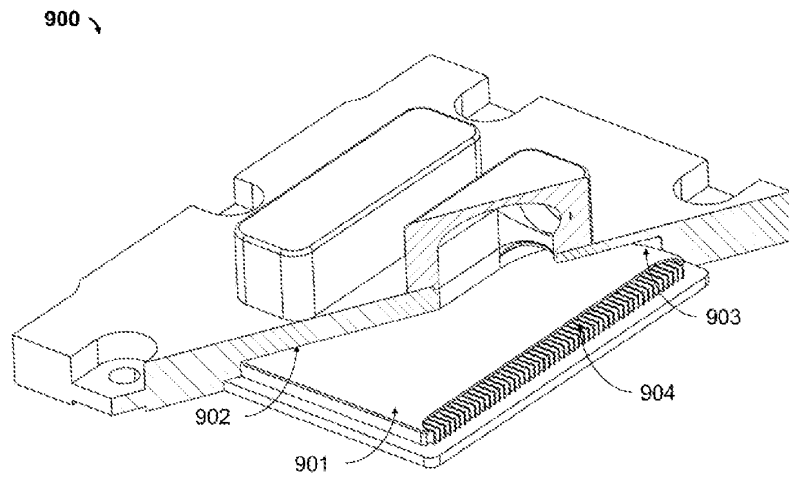


Figure 9 Thin sheet insert for flow separation and control assembled into the CPL evaporator.

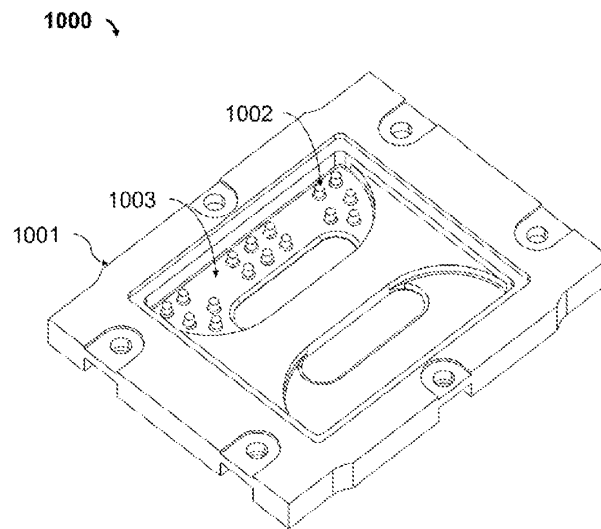


Figure 10 Cover plate defining the evaporator manifold with flow-guiding pin fins.

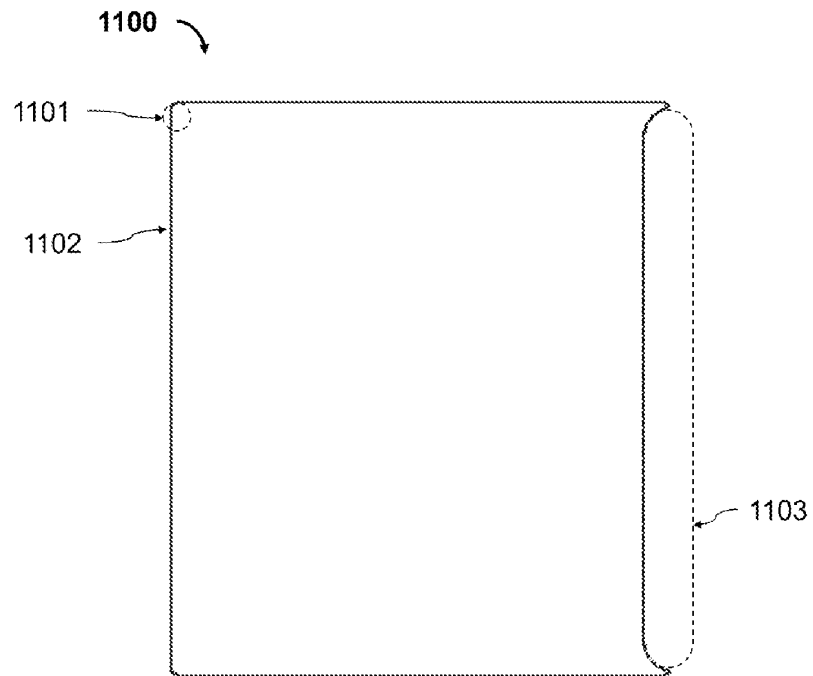


Figure 11 Thin sheet insert for separation and flow control.

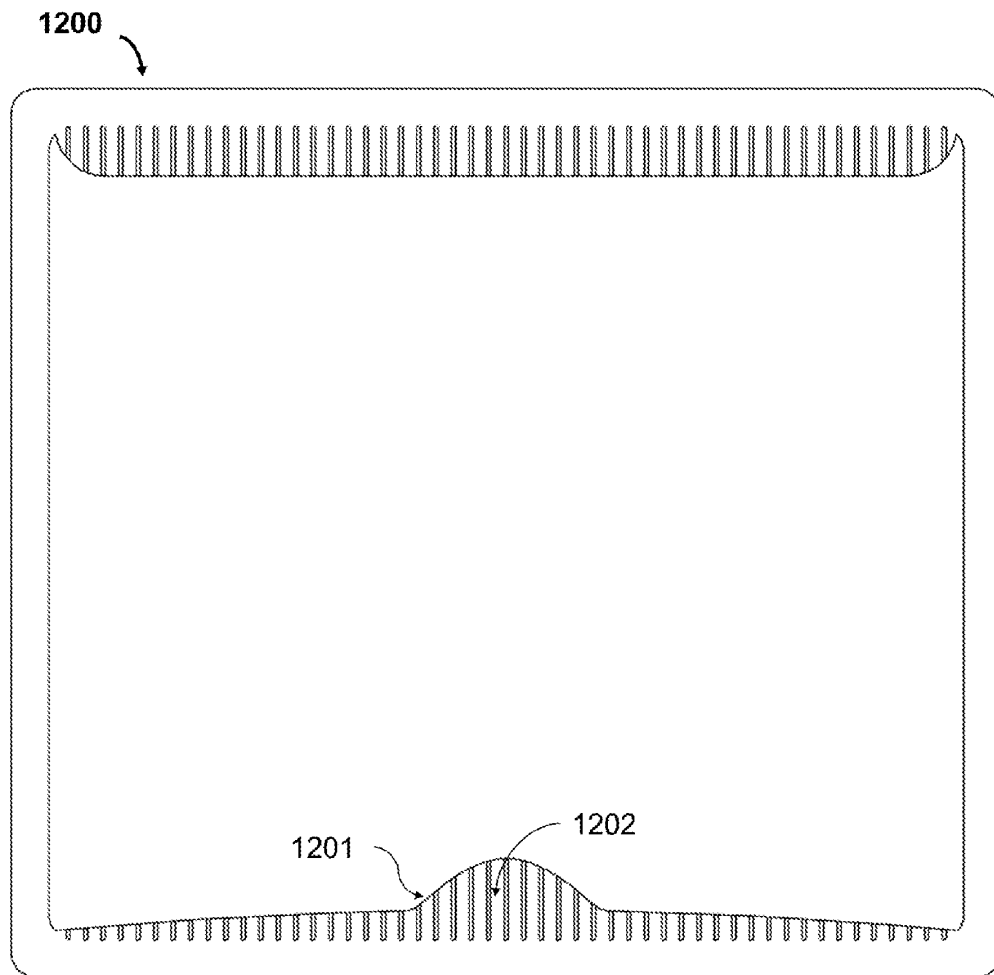


Figure 12 Additional implementation of thin sheet insert for flow separation and distribution with a non-uniform geometry in the inlet region.

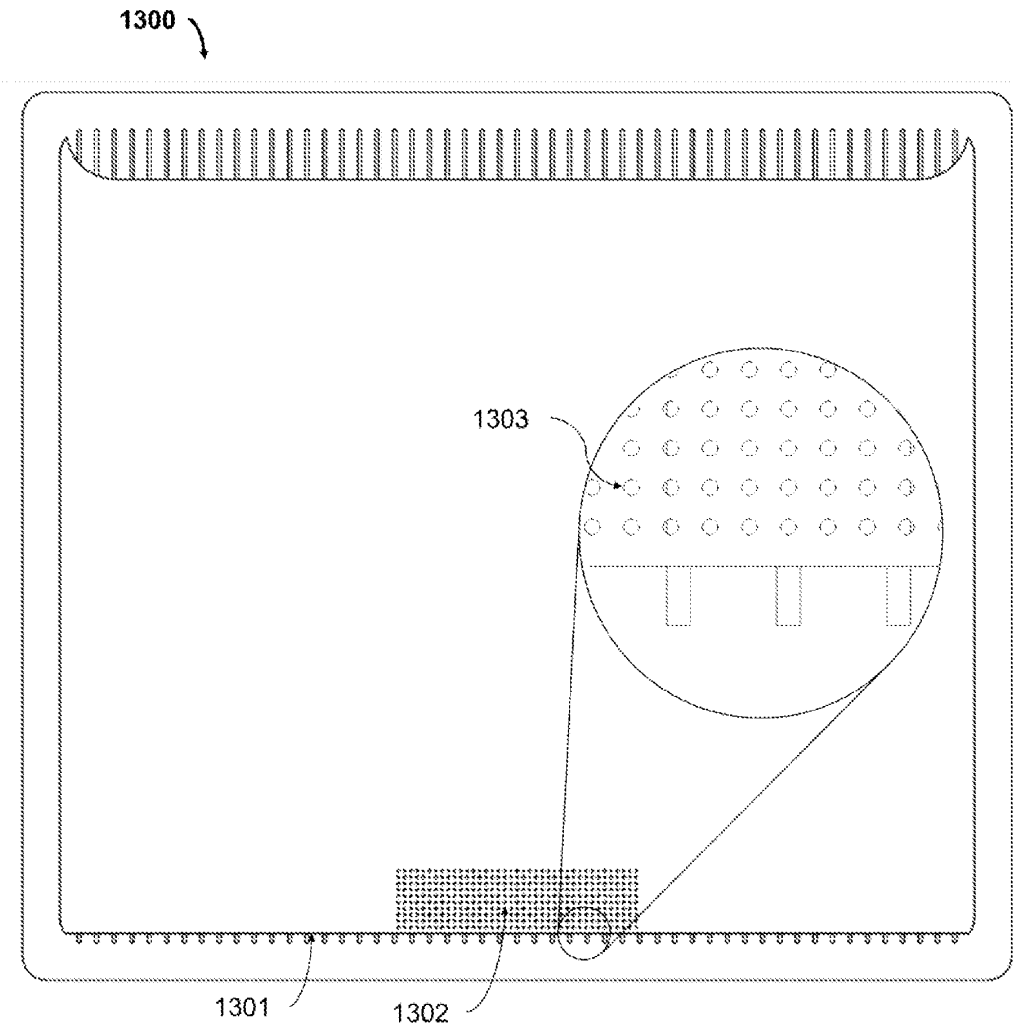


Figure 13 Additional implementation of the thin sheet insert for flow separation and distribution.

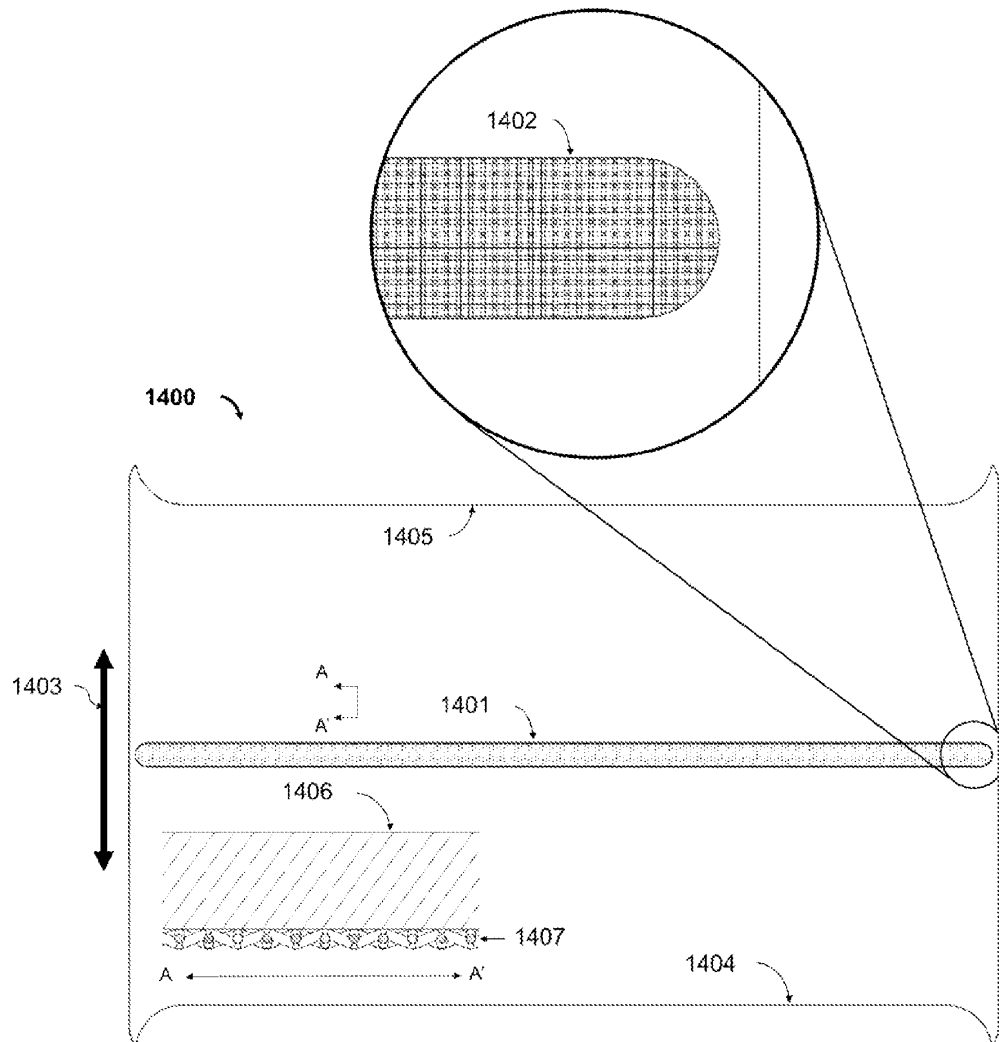


Figure 14 An implementation of a composite dense/porous, thin sheet insert for flow separation and distribution with a centralized porous inlet providing for bidirectional flow in the heat transfer section.

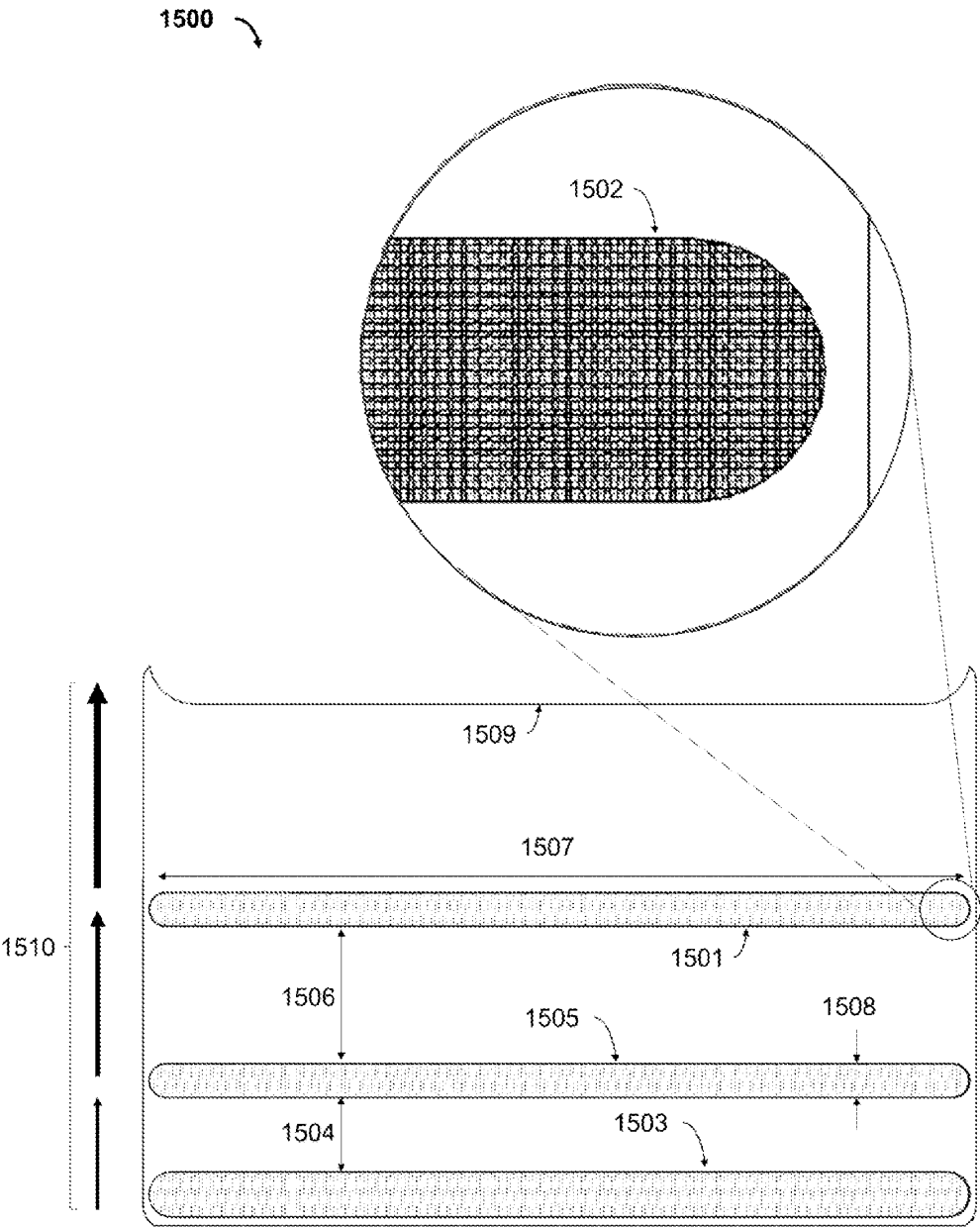


Figure 15 An implementation of a composite dense/porous, thin sheet insert for flow separation and distribution with distributed porous inlets providing for the injection of liquid flow along the flow path in the heat transfer section.

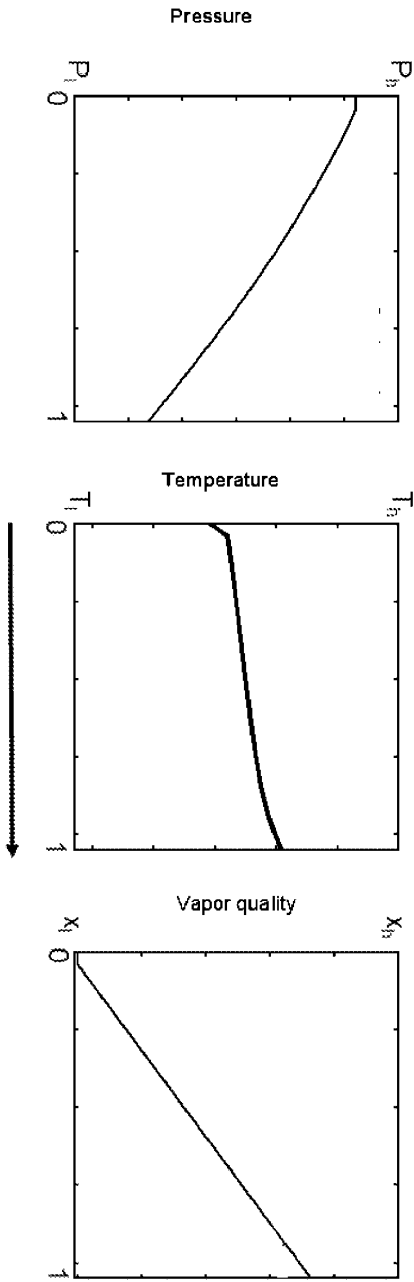


Figure 16a Evaporator simulation results showing pressure drop, evaporator base temperature and heat transfer section flow quality for a single liquid inlet design with a heat transfer section of unit length. Pressure and temperature are described in dimensionless units based on the minimum and maximum reference pressures/temperatures. Flow quality is a dimensionless measure.

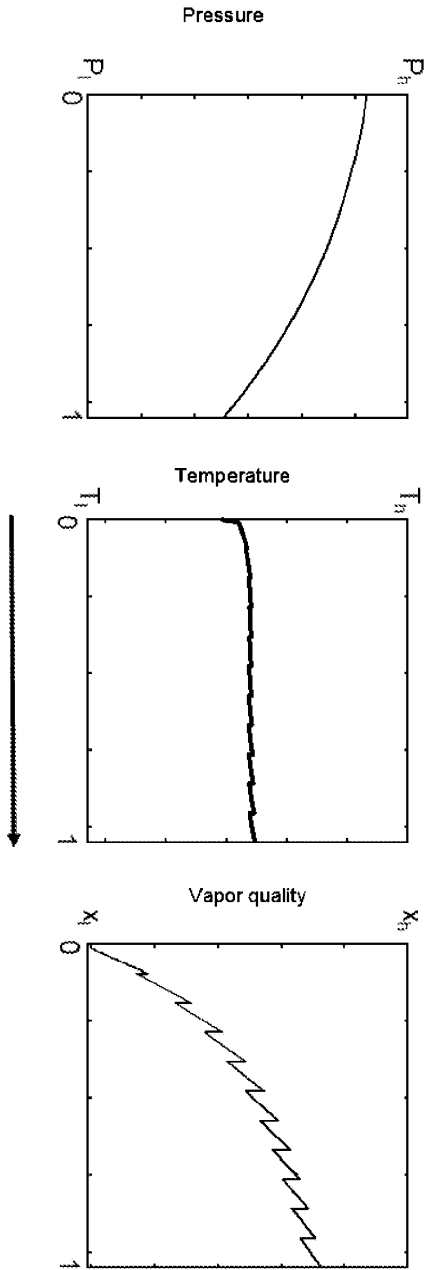


Figure 16b Evaporator simulation results showing pressure drop, evaporator base temperature and heat transfer section flow quality for a distributed liquid inlet design with a heat transfer section of unit length. Pressure and temperature are described in dimensionless units based on the minimum and maximum reference pressures/temperatures. Flow quality is a dimensionless measure.

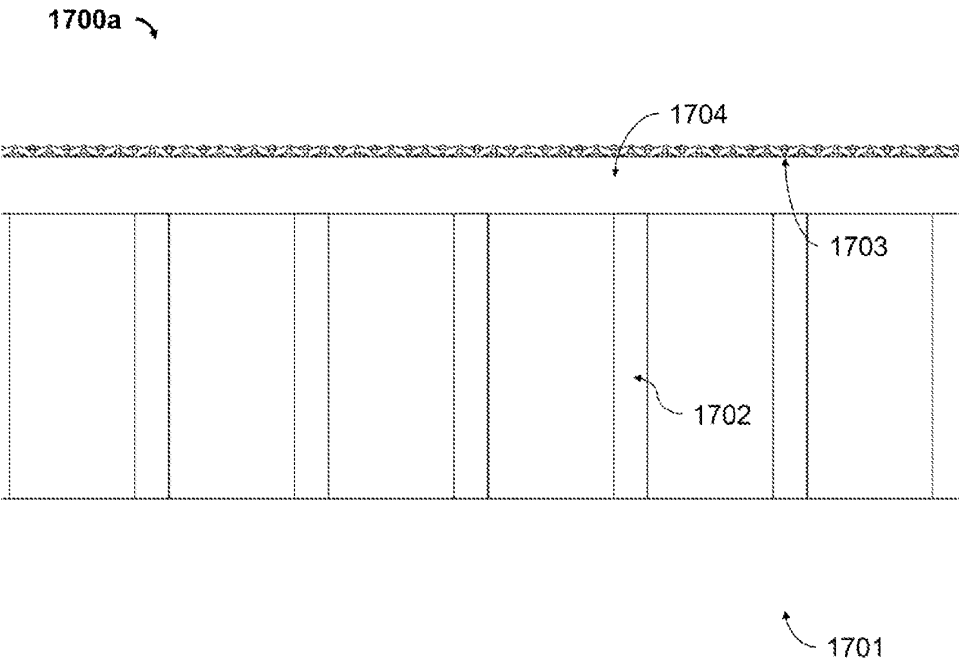


Figure 17a Schematic of the porous-layer-up configuration for the composite dense/porous, thin sheet insert interfacing to the heat transfer section of the evaporator.

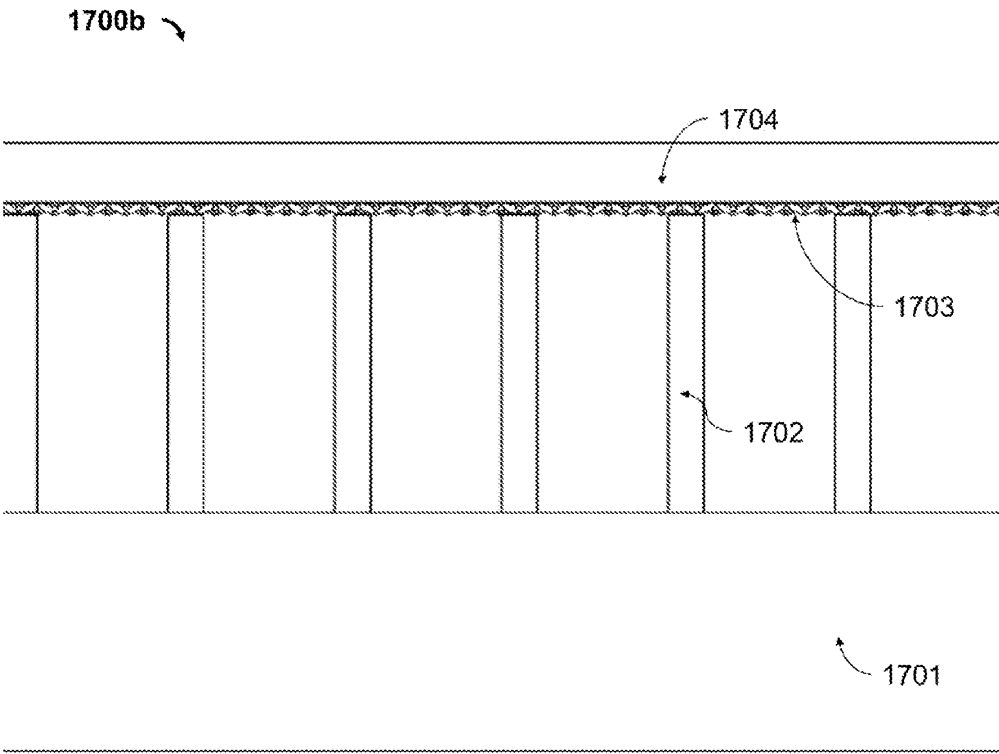


Figure 17b Schematic of the porous-layer-down configuration for the composite dense/porous, thin sheet insert interfacing to the heat transfer section of the evaporator.

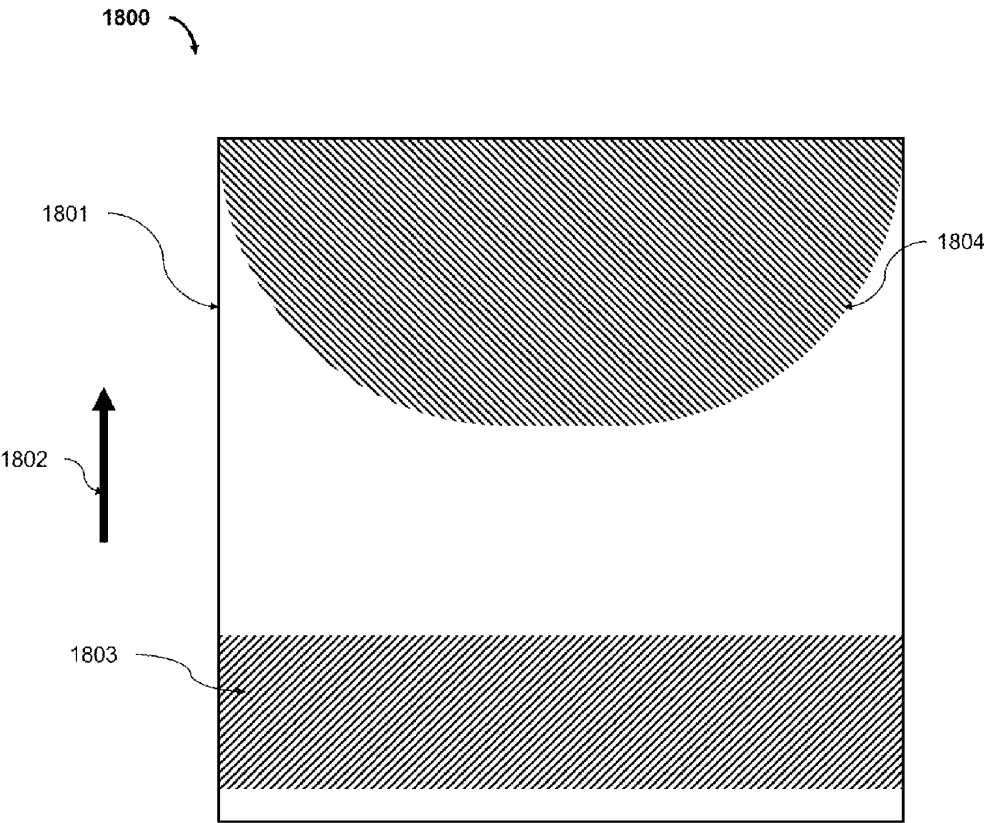


Figure 18 Schematic of the spatial distribution of surface roughness enhancement in the heat transfer section.

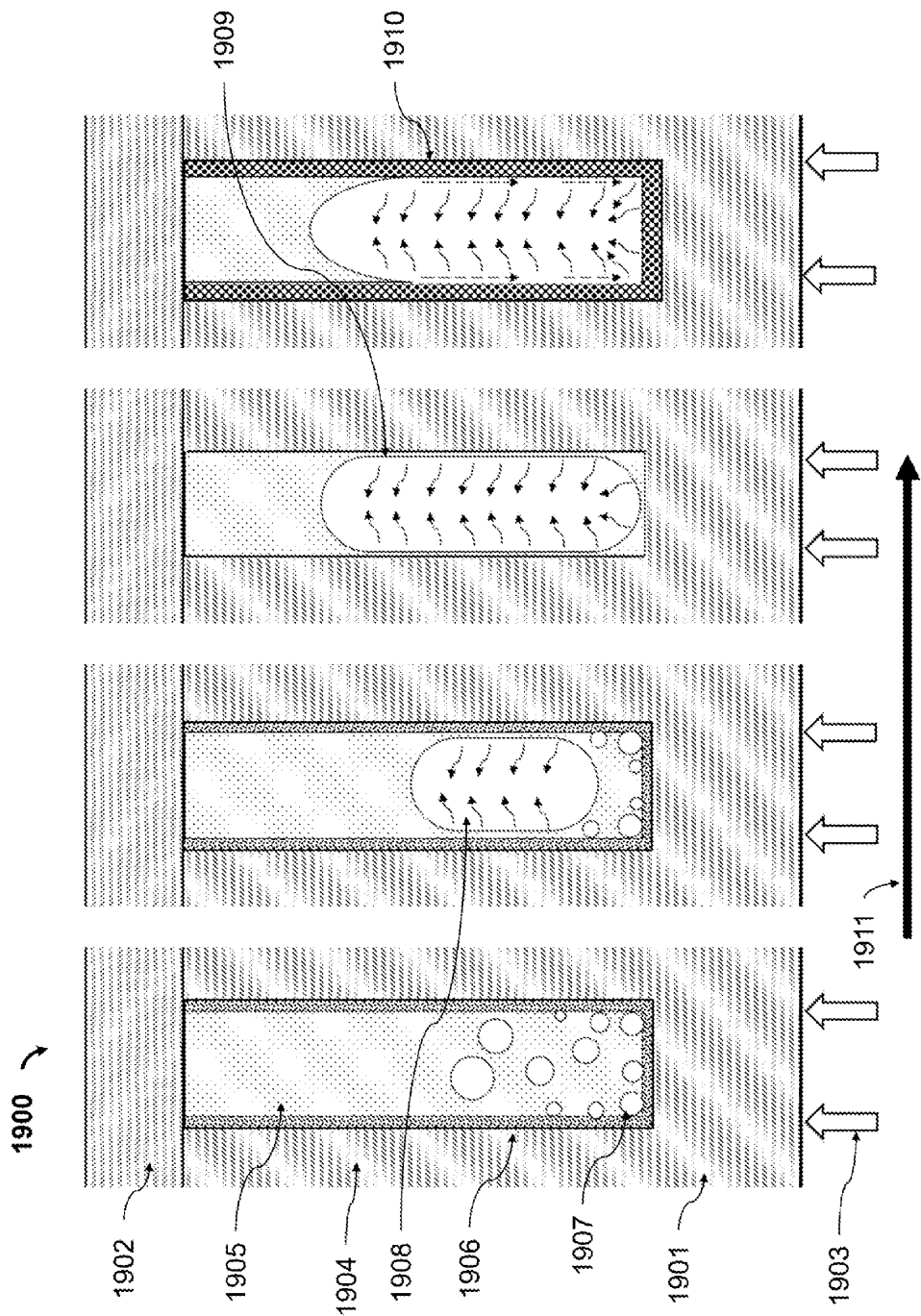


Figure 19 Cross-section schematic of the evolving two-phase flow in the spatially distributed surface roughness enhanced heat transfer section.

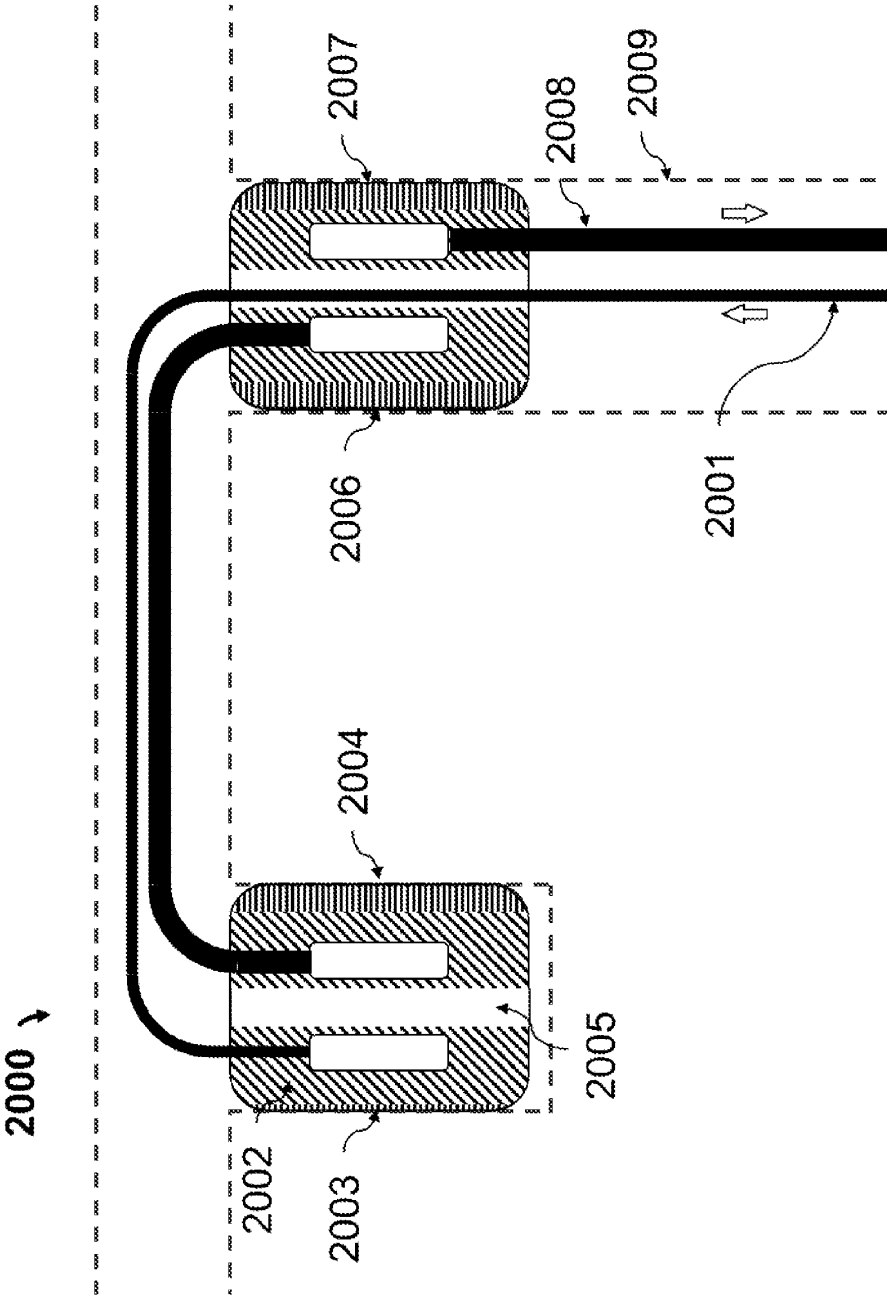


Figure 20 Schematic of a serial CPL configuration.

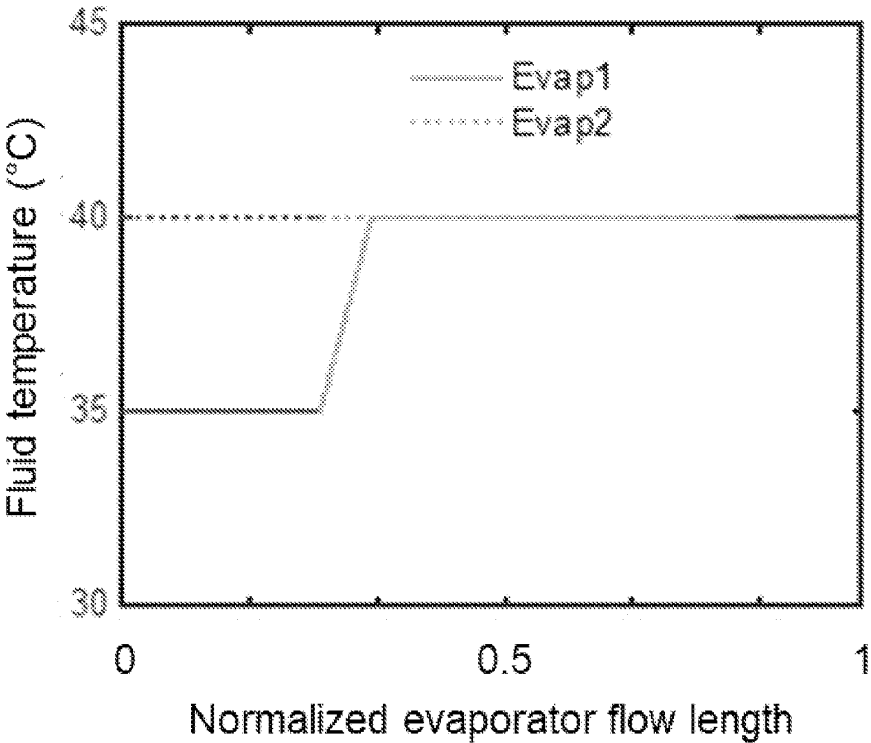


Figure 21a Serial CPL simulation results based on the layout shown in Figure with two evaporators showing the fluid temperature variation through the two evaporators. Fluid temperatures are given in degrees Celsius. Normalized flow length coordinate is the local position along the heat transfer section normalized to the overall heat transfer section length.

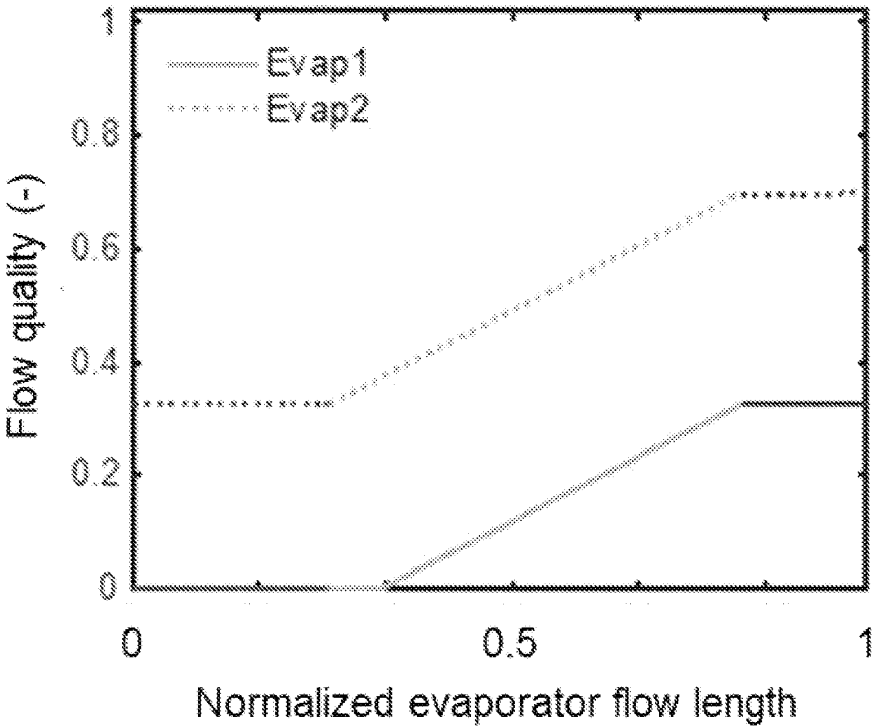


Figure 21b Serial CPL simulation results based on the layout shown in Figure with two evaporators showing the flow quality variation through the two evaporators. Flow quality is a dimensionless measure. Normalized flow length coordinate is the local position along the heat transfer section normalized to the overall heat transfer section length.

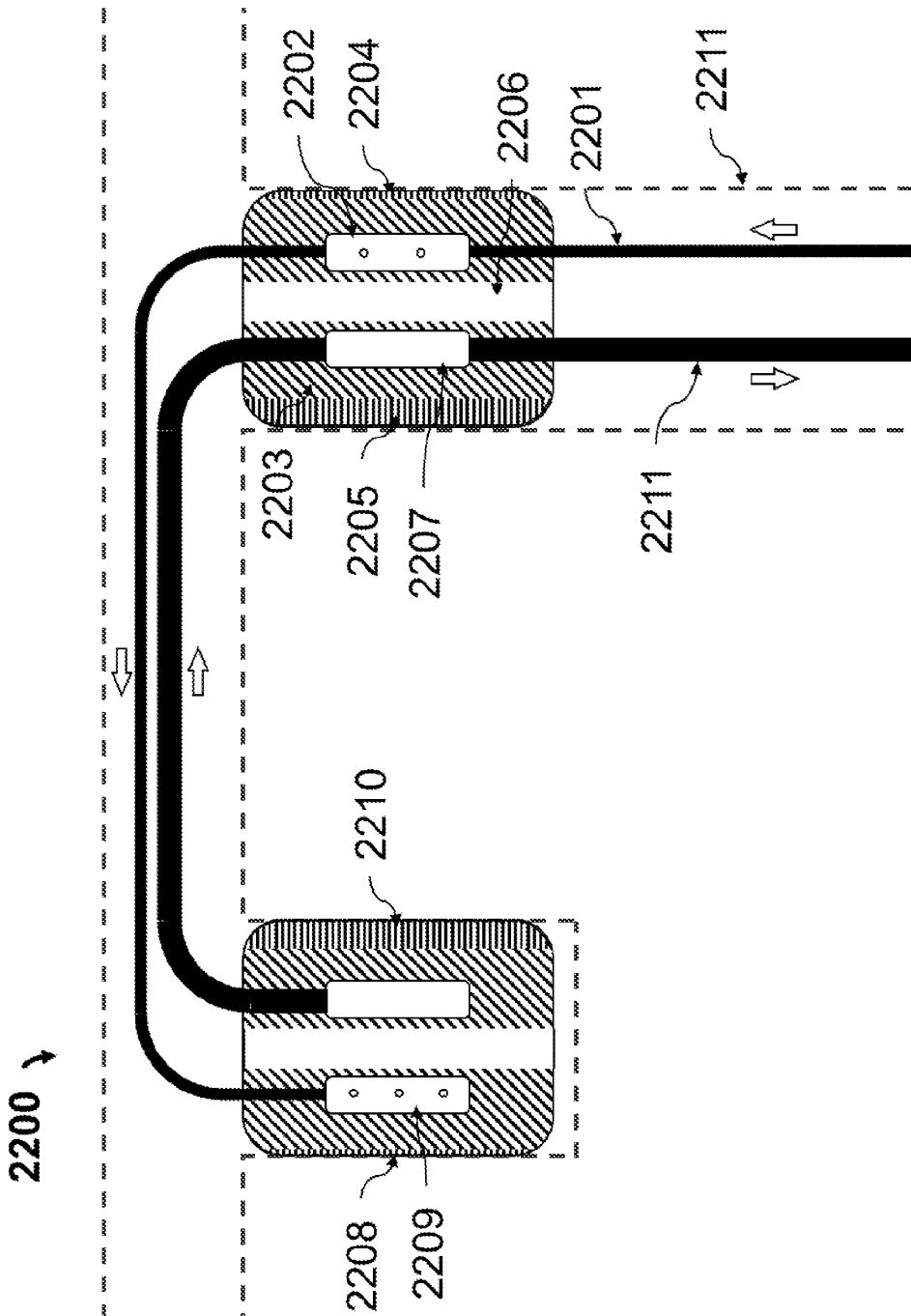


Figure 22 Schematic of a parallel CPL configuration with two evaporators.

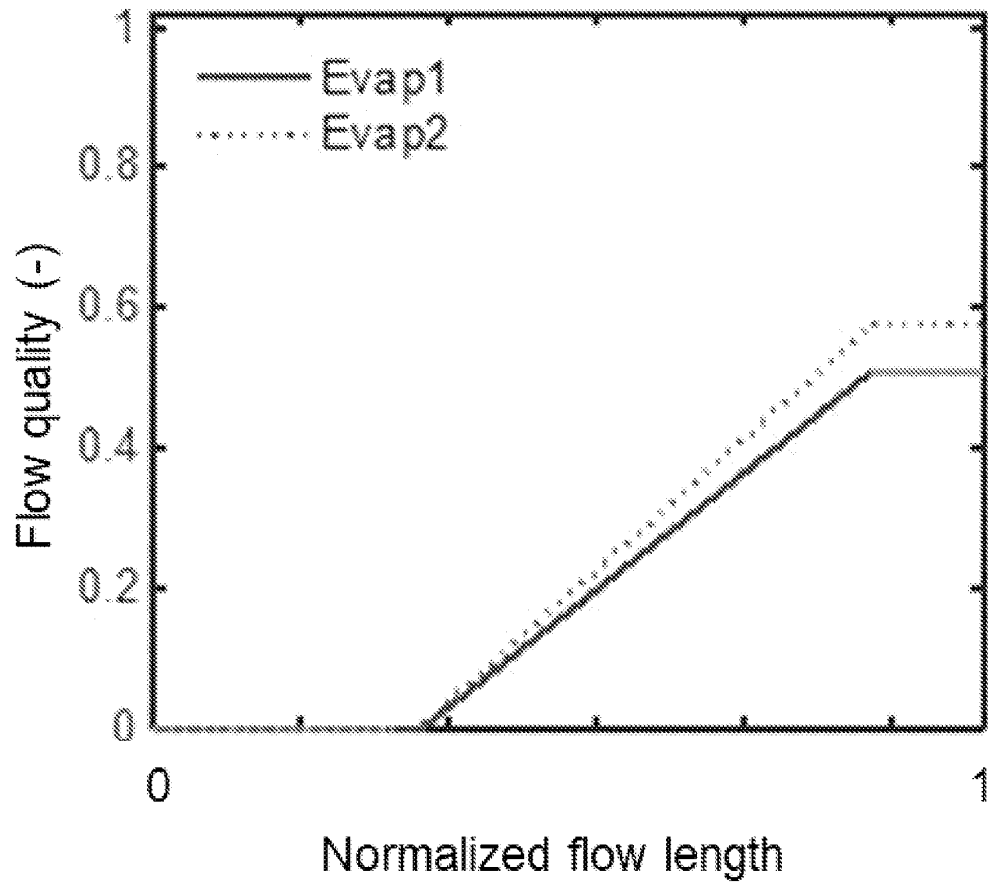


Figure 23 Parallel CPL simulation results based on the layout shown in Figure with two evaporators.

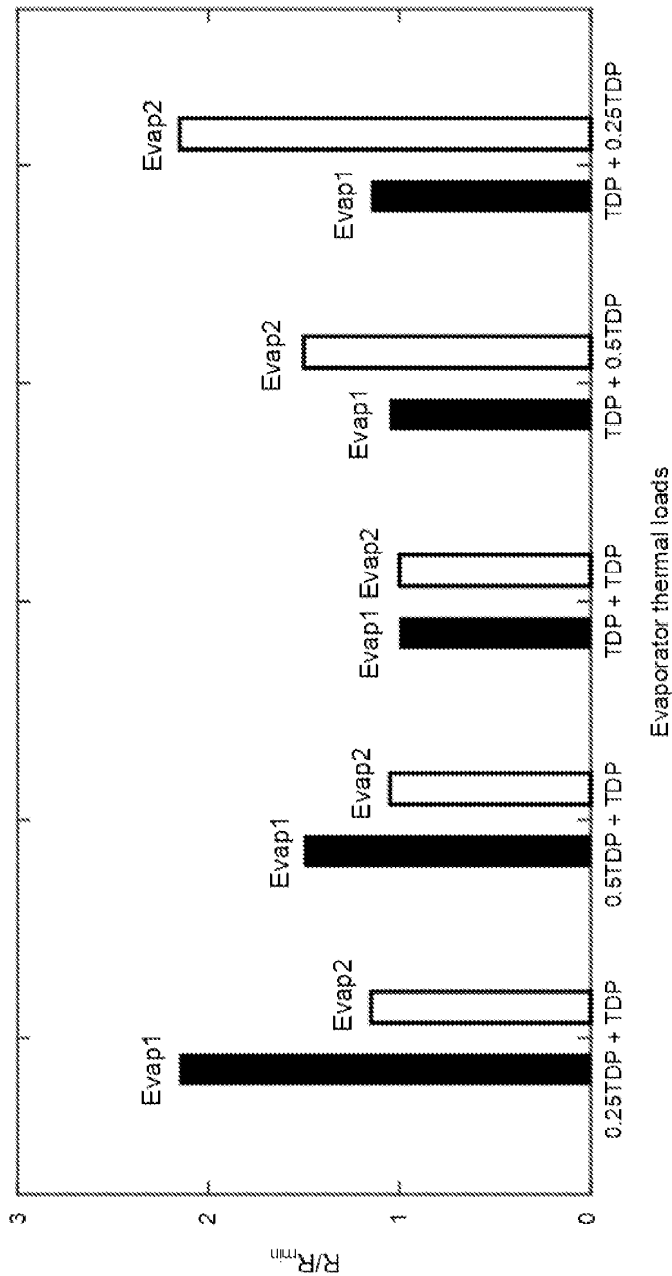


Figure 24 Parallel CPL simulation results for asymmetric heat loading based on the layout shown in Figure 22.

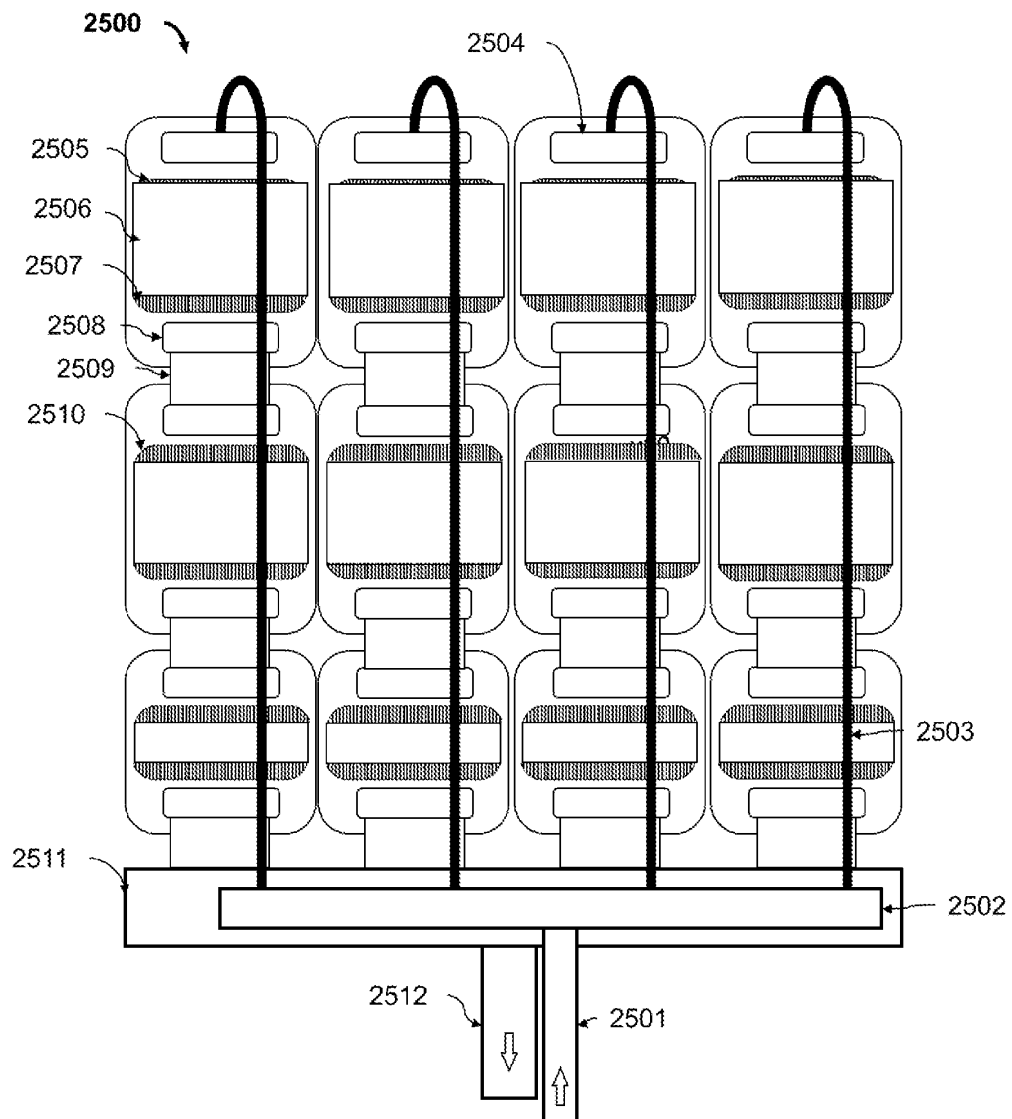


Figure 25 Parallel CPL with nested serial sections with in-server distribution manifolds.