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Method and Apparatus Continuous Contacting Tunnel Desalination

Humidification/dehumidification (HDH) is a desalination process that operates below the boiling point of water. In traditional HDH systems, two heat transfer zones are required to transfer heat from a massive flow of water. The water is used as both an internal heat source and internal heat sink. However, the requirement of two zones makes this type of HDH process energy inefficient. Dewvaporation is a specific HDH process that requires only one heat and mass transfer unit, making it more energy efficient. However, the current Dewvaporation method has flow and pressure inefficiencies due its vertical towers structure. Therefore, there is a need for a novel solution to the vertical tower approach of the Dewvaporation process.

Researchers at Arizona State University have designed a continuous contacting tunnel desalination method to improve the Dewvaporation process. This horizontal design uses air as a carrier-gas to evaporate water from saline feeds and dew to form pure water condensate. The heat needed for evaporation is supplied by the heat released by dew condensation on opposite sides of a heat transfer wall. This new design increases efficiency by eliminating the need for a feed heat exchanger and decreasing pressure-induced leaks. Additionally, the horizontal structure is easier and cheaper to maintain and construct.

Potential Applications

- Desalination
- Water Purification

Benefits and Advantages

- Improved Efficiency -
 - Air inlet and outlet allows for even distribution for improved wall coverage and energy efficiency.
 - Reduces hydraulic head pressures which caused feed leaks in bottom of the towers.
 - Wall wetting is improved by unlimited flow rates.
 - Elimination of tower-required feed heat exchanger.
- Easier Maintenance - Improved maintenance capabilities as unit has a low vertical silhouette.
- Lower Costs – Cheaper materials allows for lower manufacturing costs.

For more information about the inventor(s) and their research, please see

[Dr. James Beckman's directory webpage](#)

