Tumble Dryer with Thermoelectric Heat Pump in Combination with Internal Heat Exchanger
Technology #13956

Applications

Domestic tumble dryers that employ compression heat pumps rather than electric resistance heat pumps are more energy efficient. The device replaces existing heat pumps in domestic convection tumble dryers.

Problem Addressed

Existing heat pumps have been rising in popularity in convection tumble dryers due to their energy efficiency and the consequent reduced environmental impact. Since refrigerants used to support conventional heat pumps in dryers have a negative impact on the environment, there is a growing interest in alternative, eco-friendly systems. This technology removes the use of harmful refrigerants and provides a thermoelectric heat pump as an efficient alternative. Future generations of tumble dryers equipped with this technology in combination with an internal heat exchanger will become an efficient alternative to conventional tumble dryer systems.

Technology

This invention proposes a thermoelectrical heat pump and internal heat exchanger as an alternative to the evaporator and condenser in conventional compression dryers. This thermoelectric heat pump includes one or more thermoelectric modules that are sandwiched between fine heat exchangers. Both the hot and cold sides are in direct contact with a fine heat exchanger. This allows for heating/cooling of the two fluids passing through the heat exchanger and provides heat recovery by using one fluid flow to preheat the other. This can be carried out in cross flow, counter flow, or concurrent flow configurations depending on the assembly of the components. The substitution of a compression heat pump by a thermoelectric heat pump leads to a tumble drying system that has no moving parts and longer system life. The lack of harmful refrigerants used in the system and silent operation make this technology a commercially viable product.

Advantages

- Operates without harmful refrigerant (environmentally-friendly)
- No moving parts allows for silent operation and longer system life
- Commercially viable

Categories For This Invention:

Energy
Energy Efficiency
Thermoelectricity

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Publications:
Modeling of a New Recuperative Thermoelectric Cycle for a Tumble Dryer
Elsevier. Volume 55, Issues 5–6,
February 2012, Pages 1536–1543

External Links:
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