CO_2- BASED HEAT PUMP FOR WATER PURIFICATION

TECHNOLOGY OVERVIEW

The technology is an energy efficient water purification method that can be used for large-scale commercial application. The process works by boiling the contaminated water to destroy the presence of bacterial or parasitic organisms and then instantaneously cooling it. It uses CO_2 as the heating agent as well as the refrigerant. In a heat exchanger, compressed CO_2 is used to boil water to 116 □ C, destroying any harmful bacteria. The water is then cooled in a radiator by using a fan. The liquid CO_2 is throttled to reduce its pressure and subsequently cooled to around 5□ C. This cooled CO_2 is used as a refrigerant to rapidly reduce the temperature of the water in a second heat exchanger. At the end of the process, high purity, cold drinking water is obtained which is ready for immediate consumption. The CO_2 is re-heated and compressed to convert it into heating vapor which can be used for a new cycle of water purification.

POTENTIAL FIELDS OF USE

The most direct application of the technology is in the areas of commercial and domestic water purification including residential consumption, foods and beverages industry and pharmaceuticals. The global water industry is more than a $400 billion market, not including about 1 billion people still lacking access to safe drinking water. The U.S. is the world's largest consumer for purified and bottled water; the domestic market for drinking water exceeded $1.3 billion in 2006 and is expected to surpass $2.1 billion by 2011 at a growth rate of 11%. The worldwide demand for drinking water is projected to reach $10 billion by the same year which demonstrates a huge available market for the technology.

BENEFIT ANALYSIS

The process has a number of benefits over existing water purification methods:

- Cost-effective in comparison to other methods as the device consumes less power, comparable to other household appliances.
- Increased efficiency in terms of volume of purified water produced as compared to other domestic water purifying systems.
- Eliminates the requirement of a separate refrigerator or cooling process making the output water ready for immediate consumption.
- Enhanced mobility of the system is facilitated by its small size and portable nature to be used in areas struck by natural disasters where drinking water is unavailable.
- Flexibility to be used areas lacking electricity by the use of alternative fuels like natural gas and biomass by configuring compressors to be connected directly to external heating sources.

STAGE OF DEVELOPMENT

The technology is at an advanced stage of development. It permits flexibility in configuration of design and operation parameters to alter the temperature of input/output water, power consumption and efficiency factor to meet any requirements.

FUTURE DEVELOPMENT

The invention can be developed to serve as a versatile technology in order to meet specific requirements as proposed.

LICENSING OPPORTUNITIES

The patent application for this technology has been filed. Licensing opportunities are available.

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