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Two-Phase, Passive Separator-and-Filter Assembly

A separator-and-filter assembly has been developed for the separation of liquid from gas by the passive hydrophilic/hydrophobic material approach. The assembly was designed to separate and filter liquid from a mixture of hydrogen, water vapor, and water. However, it could be used to separate other gases and liquids requiring two-phase separation.

Basically, the separator-and-filter apparatus is comprised of a number of porous glass hydrophilic tubes. The tubes are in series and contain helical cores to displace the water content centrifugally to the inside diameters of the tubes with subsequent water transport through the glass pores, while the gas proceeds down the helix path and eventually passes through the hydrophobic (porous polypropylene) membrane. The quantity, lateral size, and pore size of the glass tubes are determined by the particular design requirements with regard to water rate, water quality contamination level, application endurance life, and operating differential pressure level (hydrophilic bubble point). The quantity, configuration, and size of the hydrophobic membrane depend upon the particular design requirements relative to gas rate, application endurance life, and operating differential pressure level (hydrophobic water initiation point).

The helical cores are designed for tight fit on the inside diameters of the porous tubes to minimize or eliminate any centrifugal inefficiency, i.e., mixture bypassing when clearance exists between tube inside diameter and helical outside diameters. This is accomplished either by molded rubber helical cores capable of expanding radially or by collector tape and screen.

Note:

Requests for further information may be directed to:
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Patent status:

NASA has decided not to apply for a patent.

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