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McAlister

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(54) **APPARATUSES AND METHODS FOR STORING AND/OR FILTERING A SUBSTANCE**

USPC 95/90, 95, 96, 106, 115, 148; 502/526; 206/0.7

See application file for complete search history.

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(56) **References Cited**

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U.S. PATENT DOCUMENTS

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1,753,809 A 4/1930 Short
3,404,061 A 10/1968 Shade et al.

(Continued)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

FOREIGN PATENT DOCUMENTS

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EP 0025858 A1 4/1981
EP 0056717 A2 7/1982

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(Continued)

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OTHER PUBLICATIONS

Dash, J.C. "Two-Dimensional Matter." Scientific American. May 1973. pp. 30-40.

(Continued)

Related U.S. Application Data

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(Continued)

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(51) **Int. Cl.**

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(57) **ABSTRACT**

Apparatuses, systems, and methods for loading and/or unloading a substance into or from a sorption media. A substance is presented at an edge of the sorption media, which comprises parallel layers of a sorption material. To load (i.e., via absorption and/or adsorption) the substance into the sorption media, heat is transferred away from the sorption media, a loading voltage is applied to the sorption media, and/or a pressure is increased relative to the sorption media. To unload the substance from the sorption media, heat is transferred into the sorption media, a voltage of an opposite polarity from the loading voltage is applied to the sorption media, and/or a pressure is decreased relative to the sorption media. In some embodiments, the sorption media includes surface structures that may load molecules of the substance.

(52) **U.S. Cl.**

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20 Claims, 8 Drawing Sheets

