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Wallace

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(54) **HYDRONIC BUILDING SYSTEMS CONTROL**

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,384,155	A	5/1968	Newton
4,071,078	A	1/1978	Padden
4,226,364	A	10/1980	Utesch
4,841,733	A	6/1989	Dussault et al.
5,261,251	A	11/1993	Galiyano

(Continued)

OTHER PUBLICATIONS

"Air Quality in the Home," Illinois Dept. of Public Health, 2012, retrieved from http://web.archive.org/web/20120615151708/http://www.idph.state.il.us/envhealth/factsheets/airquality.htm, 5 pages.

(Continued)

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(57) **ABSTRACT**

Controlling heating and cooling in a conditioned space utilizes a fluid circulating in a thermally conductive structure in fluid connection with a hydronic-to-air heat exchanger and a ground heat exchanger. Air is moved past the hydronic-to-air heat exchanger, the air having fresh air supply and stale air exhaust. Sensors located throughout the conditioned space send data to a controller. User input to the controller sets the desired set point temperature and humidity. Based upon the set point temperature and humidity and sensor data, the controller sends signals to various devices to manipulate the flow of the fluid and the air in order to achieve the desired set point temperature and humidity in the conditioned space. The temperature of the fluid is kept less than the dew point at the hydronic-to-air heat exchanger and the temperature of the fluid is kept greater than the dew point at the thermally conductive structure.

16 Claims, 7 Drawing Sheets