

(12) **United States Patent**
Virskus

(10) **Patent No.:** US 9,519,297 B1
(45) **Date of Patent:** Dec. 13, 2016

(54) **DYNAMIC DIFFERENTIAL ENERGY CONTROL OF HYDRONIC HEATING OR COOLING SYSTEMS**

(76) Inventor: **Vytautas K. Virskus**, Mason, MI (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1004 days.

(21) Appl. No.: **13/208,603**

(22) Filed: **Aug. 12, 2011**

Related U.S. Application Data

(60) Provisional application No. 61/374,304, filed on Aug. 17, 2010.

(51) **Int. Cl.**
F24F 11/06 (2006.01)
G05D 23/19 (2006.01)

(52) **U.S. Cl.**
CPC *G05D 23/1927* (2013.01)

(58) **Field of Classification Search**
CPC G05D 23/00; G05D 23/1902; G05D 23/1927; G05D 23/222; G05D 7/00
USPC 165/244, 247, 218, 287, 293, 297
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,371,315 A 2/1983 Shikasko
4,574,870 A * 3/1986 Weitman 165/292

5,651,264 A 7/1997 Lo et al.
5,707,007 A 1/1998 Fiedrich
5,963,458 A 10/1999 Cascia
6,629,423 B1 * 10/2003 Hirooka et al. 62/208
7,044,213 B2 * 5/2006 Chang et al. 165/263
2003/0019221 A1 * 1/2003 Rossi et al. 62/127
2007/0074863 A1 * 4/2007 Ichinose et al. 165/247

* cited by examiner

Primary Examiner — Travis Ruby

(74) *Attorney, Agent, or Firm* — Brooks Kushman P.C.

(57) **ABSTRACT**

A system and method for controlling a building system includes a supply temperature sensor upstream of a thermal load, a return temperature sensor downstream of the thermal load, and a controller. The controller is configured to calculate an actual thermal energy difference from the supply and return temperature sensors. The controller is configured to control a flow rate of a pump such that the measured thermal energy difference is equal to a desired thermal energy difference for the system, and the measured thermal energy difference is constant for a time interval. A system and method for controlling a building system includes determining a desired thermal energy difference for a load, measuring a supply and return temperature of the load, and reducing the system flow rate such that a valve controlling the load flow rate is at an at partially open condition when the return temperature of the load is the desired return temperature.

19 Claims, 6 Drawing Sheets

