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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/905,251	02/26/2018	John Douglas Steinberg	EFACT.006D1	2380

20995 7590 08/24/2020
KNOBBE MARTENS OLSON & BEAR LLP
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IRVINE, CA 92614

EXAMINER

LAU, TUNG S

ART UNIT	PAPER NUMBER
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2862

NOTIFICATION DATE	DELIVERY MODE
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08/24/2020

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

efiling@knobbe.com

jayna.cartee@knobbe.com

GOOGLE EXHIBIT 1031

<i>Notice of Abandonment</i>	Application No. 15/905,251	Applicant(s) Steinberg et al.
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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

This application is abandoned in view of:

1. ☒ Applicants failure to timely file a proper reply to the Office letter mailed on 27 September 2019.
 - (a) ☐ A reply was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply (including a total extension of time of _____ month(s)) which expired on _____.
 - (b) ☐ A proposed reply was received on _____, but it does not constitute a proper reply under 37 CFR 1.113 to the final rejection. (A proper reply under 37 CFR 1.113 to a final rejection consists only of: (1) a timely filed amendment which places the application in condition for allowance; (2) a timely filed Notice of Appeal (with appeal fee); or (3) if this is utility or plant application, a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. Note that RCEs are not permitted in design applications.)
 - (c) ☐ A reply was received on _____ but it does not constitute a proper reply, or a bona fide attempt at a proper reply, to the non-final rejection. See 37 CFR 1.85(a) and 1.111. (See explanation in box 8 below).
 - (d) ☒ No reply has been received.
2. ☐ Applicants failure to timely pay the required issue fee and publication fee, if applicable, within the statutory period of three months from the mailing date of the Notice of Allowance (PTOL-85).
 - (a) ☐ The issue fee and publication fee, if applicable, was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the statutory period for payment of the issue fee (and publication fee) set in the Notice of Allowance (PTOL-85).
 - (b) ☐ The submitted fee of \$ _____ is insufficient. A balance of \$ _____ is due.
The issue fee required by 37 CFR 1.18 is \$ _____. The publication fee, if required by 37 CFR 1.18(d), is \$ _____.
 - (c) ☐ The issue fee and publication fee, if ~~applicable~~, has not been received.
3. ☐ Applicants failure to timely file corrected drawings as required by, and within the three-month period set in, the Notice of Allowability (PTO-37).
 - (a) ☐ Proposed corrected drawings were received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply.
 - (b) ☐ No corrected drawings have been received.
4. ☐ The letter of express abandonment which is signed by the attorney or agent of record or other party authorized under 37 CFR 1.33(b). See 37 CFR 1.138(b).
5. ☐ The letter of express abandonment which is signed by an attorney or agent (acting in a representative capacity under 37 CFR 1.34) upon the filing of a continuing application.
6. ☐ The decision by the Patent Trial and Appeal Board rendered on _____ and because the period for seeking court review of the decision has expired and there are no allowed claims.
7. ☐ The dismissal of the appeal in an application having no allowed claims. (When an appeal is dismissed in an application having no allowed claims the application stands abandoned. See MPEP 1215.04 subsections I-V for an explanation of the reasons why an appeal is dismissed.)
8. ☐ The reason(s) below:

/MONIQUE BENJAMIN/

Petitions to revive under 37 CFR 1.137, or requests to withdraw the holding of abandonment under 37 CFR 1.181, should be promptly filed to minimize any negative effects on patent term.



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09/27/2019

ELECTRONIC

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Office Action Summary**Application No.**

15/905,251

Applicant(s)

Steinberg et al.

Examiner

TUNG S LAU

Art Unit

2863

AIA (FITF) Status

No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02/26/2018.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

- 5) ☒ Claim(s) 1-18 is/are pending in the application.
5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) ☐ Claim(s) ____ is/are allowed.
- 7) ☒ Claim(s) 1-18 is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☒ The drawing(s) filed on 02/26/2018 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

- a) ☐ All b) ☐ Some** c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)
Paper No(s)/Mail Date ____.
- 3) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date ____.
- 4) ☐ Other: ____.

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

Preliminary Amendment

1. Claims 1-18 are pending as the applicant filed the claims amendment on 07/25/2018.

Information Disclosure Statement

2. Numerous references listed in the Information Disclosure Statement filed on this case have been considered by the examiner (see attached PTO-1449 or PTO/SB/08A and 08B forms).
3. The numerous IDS submitted contain this case appears lengthy and complex. The examiner has considered the references to the extent reasonably expected during normal examination time. (If applicant considers there is a particular reference or teaching particularly relevant to the claimed invention it is requested from the applicant to provide a statement indicating such relevance and a clear identification of such reference).

Consideration by the examiner of the information submitted in an IDS means nothing more than considering the documents in the same manner as other documents in Office search files are considered by the examiner while conducting a search of the prior art in a proper field of search. (see MPEP 609)

"voluminous references" submitted by the applicant. In this case just over 75 references were submitted may not comply with Applicant's duty of disclosure

[T]he cloaking of a clearly relevant reference by inclusion in a long list of citations may not comply with the Applicant's duty of disclosure. *Penn Yan Boats, Inc. v. Sea Lark Boats, Inc.*, 359 F. Supp. 948 (S.D. Fla. 1972). . . . accord with dicta from *Molins PLC v. Textron, Inc.*, 48 F.3d 1172 (Fed. Cir. 1995), stating that forcing the Examiner to find "a needle in a haystack" is "probative of bad faith." *Id.* [The *Molins*] case presented a situation where the disclosure was in excess of 700 pages and contained more than fifty references.

In *Golden Valley Microwave Foods Inc. v. Weayer Popcorn Co. Inc.*, the court held the patent-in-suit unenforceable due to inequitable conduct where the patentee submitted a material reference "in a series of disclosures of less relevant prior art references, so that the examiner would be likely to ignore the entire list and permit the application to issue." 837 F. Supp. 1444, 1477 (N.D. Ind. 1992). failed to highlight to the examiner that one of the two "buried" patents disclosed a particularly relevant embodiment that covered the same subject matter as a pending claim. *Id.* at 1457, 1477.

Similarly, in *Penn Yan Boats Inc. v. Sea Lark Boats Inc.*, the patentee submitted to the USPTO a material reference as one of 13 references that were allegedly discovered in a pre-examination search. 359 F. Supp. 948, 964 (D.C. Fla. 1972), *aff'd* without op., 479 F.2d 1328 (5th Cir.1973), *cert. denied*, 414 U.S. 874 (1973).

The court found such representation to be false because the material reference did not issue until more than a year after the prosecution started and, therefore, could not have been discovered in a pre-examination search. *Id.*

The court subsequently held the patent unenforceable because "the purpose of this misrepresentation was to bury [that reference] in a long list of allegedly old prior art patents in the hope that the patent examiner ... would ignore the list and permit the [patent-in-suit] to issue." *Id.* at 965.

Best to avoid perception of concealment of information (IDS submitted to the office) that the Examiner could not have discovered on his own (*Nevro Corp. v. Boston Scientific Corp.* (N.D. Cal. 2017))

Applicant is reminded of section 2004, paragraph 13, of the MPEP.

It is desirable to avoid the submission of long lists of documents if it can be avoided. Eliminate clearly irrelevant and marginally pertinent cumulative information. If a long list is submitted, highlight those documents which have been specifically brought to applicant's attention and/or are known to be of most significance. See *Penn Yan Boats, Inc. v. Sea Lark Boats, Inc.*, 359 F. Supp. 948, 175 USPQ 260 (S.D. Fla. 1972), *aff'd*, 479 F.2d 1338, 178 USPQ 577 (5th Cir. 1973), *cert. denied*,

414 U.S. 874 (1974). But cf. *Molins PLC v. Textron Inc.*, 48 F.3d 1172, 33 USPQ2d 1823 (Fed. Cir. 1995).

Applicant(s) inundated the Examiner with a large volume of prior art that is not material and may obscure a single reference that is material and thus may be effective as improper as withholding a material reference. *Ex Parte Morning Surf Corp.*, 230 USPQ 446, and *Penn Yan Boats, Inc. v. Sea Lark Boats, Inc.*, 359 F. Supp. 948, 175 USPQ 260 (S.D. Fla. 1972).

“Significantly, an applicant’s duty of disclosure of material and information is not satisfied by presenting a patent examiner with “a mountain of largely irrelevant [material] from which he is *presumed* to have been able, with his expertise and with adequate time, to have found the critical [material]. It ignores the real world conditions under which examiners work.” *Rohm & Haas Co. v. Crystal Chemical Co.* 722 F.2d 1556, 1573 [220 USPQ 289], (Fed.Cir., 1983)

The following is an excerpt from MPEP 609:

“Although a concise explanation of the relevance of the information is not required for English language information, applicants are encouraged to provide a concise explanation of why the English-language information is being submitted and how it is understood to be relevant. Concise explanations (especially those which point out the relevant pages and lines) are helpful to the Office, particularly where documents are lengthy and complex and applicant is aware of a section that is highly relevant to patentability or where a large number of documents are submitted and applicant is aware that one or more are highly relevant to patentability.” (MPEP 609)

The examiner is aware of in view of the Federal Circuit’s decisions in *Dayco Prods., Inc. v. Total Containment, Inc.*, 329 F.3d 1358 (Fed. Cir. 2003) and *McKesson Info. Solutions, Inc. v. Bridge Med., Inc.*, 487 F.3d 897 (Fed. Cir. 2007), it is prudent to provide an examiner with citations to office actions in copending applications. Until the court or Congress acts to limit the ever-expanding scope of the meandering duty of disclosure, which now encompasses information that may be of marginal

significance, reasonable practitioners have little choice but to follow the mandate of the Federal Circuit and identify Office Actions in other applications that could later be found to be material. It may also be prudent to identify relevant foreign applications and office actions in an IDS, in view of *Therasense, Inc. v. Becton, Dickinson & Co.*, No. 2008-1511 (Fed. Cir., Jan. 25, 2010). Although the prosecution history of a foreign application cannot be used to construe patent claims, it may now render them unenforceable. The extent of disclosure required in a given case is, of course, a judgment call that depends on many factors, including the indeterminate “reasonable examiner” standard applied by the Federal Circuit.

While an actual examiner is required to follow the rules of practice, including the 1992 amendments to Rule 56 limiting the scope of “material” information, a “reasonable” examiner is not similarly bound under *Digital Control, Inc. v. Charles Mach. Works*, 437 F.3d 1309 (Fed. Cir. 2006). It is not possible, as a practical matter, to determine the scope of information that may be later be deemed material to an unreasonable “reasonable” examiner

Citation of Relevant Prior Art

4. The prior art made of record and not relied upon is considered pertinent to applicant’s disclosure. See MPEP 707.05. Although the prior art discloses several claimed limitation, for example:

Kamel et al. (US Patent Application Publication 2012/0271576) describes analyzing energy usage measures one or more parameters indicative of energy usage for a plurality of sub-circuits, where the sampling rate for the measuring is substantially continuous, and automatically transmits information related to at least one of the measured parameters at a rate that enables monitoring of current energy usage. The system further detects a significant change in a measured parameter, determines whether the significant change in the measured parameter is caused by a change in energy usage, and automatically

transmits information related to the significant change in the measured parameter caused by the change in energy usage after detecting the significant change.

Nagel et al. (US Patent 10,316,581) describes a smart window system is provided. The system includes a plurality of smart windows, each having at least one electrochromic window and a plurality of sensors. The system includes a control system coupling the plurality of smart windows and the plurality of sensors. The control system is configured to couple to a network, and configured to generate a building model that includes information regarding the plurality of smart windows and is based on information from the plurality of sensors and information from the network.

Steinberg (US Patent 9,982,905) describes reducing the usage of a ventilation system. For example, one or more of the exemplary systems comprise a thermostatic controller that has at least two settings for the delay occurring between turning the ventilation system off and then turning the system back on. One setting being for a first interval and at least a second setting for a second interval that is longer than the first interval. A processor is in communication with the thermostatic controller and is configured to evaluate one or more parameters including at least the temperature outside the structure conditioned by the ventilation system. The processor is further configured to determine whether to adopt the first interval or the second interval based upon the values of the parameters.

Steinberg et al. (US Patent 10,018,371) describes incorporating manual changes to the setpoint for a thermostatic controller into long-term programming of the thermostatic controller. For example, one or more of the exemplary systems compares the actual setpoint at a given time for the thermostatic controller to an expected setpoint for the thermostatic controller in light of the scheduled programming. A determination is then made as to whether the actual setpoint and the expected setpoint are the same or different. Furthermore, a manual change to the actual setpoint for the thermostatic controller is compared to previously recorded setpoint data for the thermostatic controller. At least one rule is then applied for the interpretation of the manual change in light of the previously recorded setpoint data.

Keeling et al. (US Patent Application Publication 2010/0211224) describes closely regulating humidity and temperature in order to maintain a comfortable, safe and healthy environment inside a building. HVAC has been described in detail in "Simplified design of HVAC systems" (William Bobenhausen--1994--Technology & Engineering). HVAC system settings are controlled by a thermostat inside a building and typically include a controller device that adjusts the temperature settings for different times of day and different days of the week. The controller device acts as a programmable interface with users of the building. Over many years there have been many improvements in the components of HVAC systems including higher efficiency systems and improved system controllers. The American Society of Heating, Refrigerating and Air-Conditioning

Engineers (ASHRAE) fulfills its mission of advancing HVAC and refrigeration to serve humanity and promote a sustainable world through research, standards writing, publishing and continuing education. ASHRAE have suggested standards (e.g., ASHRAE Standard 62.2) for ventilation and acceptable indoor air quality that requires fresh air to be ventilated into a house or building to at least a minimum level. To provide an informative background of information, ASHRAE Standard 62.2 and other information about HVAC provided by ASHRAE are hereby incorporated by reference.

Besore et al. (US Patent Application Publication 2011/0282504) describes a system that can determine the power consumption of a device without adding any additional hardware to the system beyond that which already exists, for example in demand response (DR) enabled appliances, a home energy management system (HEM) and/or a programmable communicating thermostat (PCT). For example, HVAC systems have variable power consumptions depending on many key variable parameters such as indoor temperature, outdoor temperature, cleanliness of the filter, refrigerant charge of the unit, elapsed time after the start of the cycle, cleanliness of the condenser, fan speed of the low & high side fans, voltage, etc. Since the HEM and possibly the PCT may determine the indoor temperature, outdoor temperature, cycle times, and the watts the unit is consuming in real time, a system is configured to develop a dynamic table of power consumption versus indoor & outdoor temperatures. By creating a "baseline matrix" one can continually compare readings on any given

day, knowing the inside and outside temperatures to diagnose the HVAC system and offer up notifications and/or suggestions for remedying in cases where the power consumption is "out of line" relative to the historical matrix. Likewise, the system would be able to offer notifications about the condition of the house relative to heat leakage by comparing HVAC or heating run times for equivalent weather conditions from historical stored data. The system may also be configured to "compare notes" with similar houses in a neighborhood, for example, to provide insights into energy savings tips, such as adding insulation, better windows, etc. The system may be coupled to a user display device and/or interface that can enable the user to input some basic data about the house size, age, window construction, etc. Appliance specific cost information will be available to the user through this system. Instead of the general statements like, "raising the thermostat 2 degrees saves an average of 5% during cooling months" this system can give accurate information on historical costs and can predict saving based on suggested changes to the HEM or PCT profiles.

Okamoto et al. (US Patent Application Publication 2012/0234932) describes provides a vehicular heating system comprising a passenger compartment air-conditioner with an air-conditioning unit controlling passenger compartment air-conditioning by calculating a target blowing-out temperature of said air-conditioning unit in accordance with information on the environment inside and outside of the passenger compartment and vehicle operating information, wherein a foot vent air flow of said air-conditioning unit being adjustable, and a

radiative heater which heats a foot area of a passenger, said vehicular heating system detecting foot vent heat which said foot vent air flow has and controlling said passenger compartment air-conditioner and said radiative heater in accordance with that heat. The aspect of the invention of claim 2 provides the aspect of the invention as set forth in claim 1 wherein the system controls the passenger compartment air-conditioner and the radiative heater so that a ratio between the foot vent heat which the foot vent air flow has and the electric power input to the radiative heater gives the same warmth sense level at the feet of the passenger.

Hublou et al. (US Patent Application Publication 2013/0338837) describes allocating the cost of operating an HVAC system of a multiunit structure. The HVAC system comprises at least a first component that consumes energy based on thermostatic settings in a particular unit of the multiunit structure. In addition, associated with the multiunit structure, is a second component such as a central heating and air conditioning unit. The run time associated with the first component as reported by the thermostatic controller is used as a determinant of the cost of operation of the second component.

Cheung et al. (US Patent Application Publication 2010/0262299) describes ramping setpoints on thermostats controlling HVAC systems. At least one thermostat is located inside a structure and is used to control an HVAC system in the structure. At least one remote processor is in communication with said thermostat and at least one database stores data reported by the thermostat. At

least one processor compares the outside temperature at least one location and at least one point in time to information reported to the remote processor from the thermostat. The remote processor ramps the setpoint on the thermostat so as to reduce the average spread between inside temperature and outside temperature in order to reduce energy consumption without affecting comfort. The remote processor takes into account the effect of weather conditions and occupant preferences in determining whether and when to ramp setpoints.

Scelzi et al. (US Patent Application Publication 2012/0065789) describes supply of a consumable product/energy source, such as electrical power, to a facility over time and analyzing the measurements to determine the consumption or supply of the product by one or more loads and/or sources in the facility, and to determine induced and residual heat flow through the facility's envelope. Various aspects compare the measured supply of the consumable product to a database of consumption signatures, which characterize access to the consumable product by particular users. In doing so, costs for the product may be more accurately divided between different tenants of the facility without having to install individual services or measurement equipment for each individual tenant. Operating conditions and facility characteristics, such as temperatures, load factors, insulation factors, etc., may be further considered in determining a particular user's access of the consumable product. To aid in the controlling of energy use, thermal resistance factors of the building are determined, which are based on the induced and residual heat flow through the facility. Various algorithms are used including smart agents (e.g. neural networks) to determine the consumption of

the consumable product by a particular user, to create the database of consumption signatures, and to determine the thermal resistance factors.

Steinberg et al. (US Patent Application Publication 2010/0070084) describes thermostats are used to regulate temperature for the benefit of the occupants in a given space. (Usually this means people, but it can of course also mean critical equipment, such as in a room filled with computer equipment.) In general, thermostats read temperature from the sensor located within the "four corners" of the thermostat. With a properly designed system, the thermostat may well be located such that the temperature read at the precise location of the thermostat accurately reflects the conditions where the human (or other) occupants tend to be. But there are many reasons and circumstances in which that will not be the case. A single thermostat may produce accurate readings in some circumstances but not others; it may be located in a place far from the occupants, or too far from the ductwork controlled by the thermostat, etc. In one house, for example, the thermostat may be located in a spot that receives direct sunlight on hot afternoons. This could cause the thermostat to sense that the local ambient temperature is extremely high, and as a result signal the A/C to run too long, making the rest of the home too cold, and wasting considerable energy. In another house, the thermostat may be located in a hallway without ductwork or where the nearby ducts have been closed. In such a scenario, the thermostat is

likely to (correctly) report cold temperatures in the winter, leading the heating system to overheat the rest of the house and waste considerable energy.

Taylor et al. (US Patent Application Publication 2016/0290668) describes controlling HVAC equipment mounted on a roof of a building. Alternatively, the HVAC unit could be mounted adjacent to the building, or internal to the building. The thermostat is mounted within a cabinet enclosing the HVAC equipment. The thermostat includes one or more current sensing inputs electrically connected to current transformers magnetically coupled to one or more phases of an electrical supply powering the HVAC equipment within the cabinet. The thermostat further includes one or more voltage sensing inputs configured to receive voltages indicative of the one or more phases of the electrical supply powering the HVAC equipment within the cabinet. One or more control signal outputs are configured to generate HVAC control signals that are coupled to control inputs of a controller board of the HVAC equipment. One or more temperature sensing inputs are configured to sense the temperature of a zone within the building controlled by the HVAC equipment. A central processor of the thermostat is configured to calculate real time energy use based on the voltage and current measurements. The processor is further configured to control the HVAC unit to keep the zone within the building within a temperature range based on set points stored within the thermostat and from data from the one or more temperature sensing inputs. The thermostat includes a memory for storing energy use calculations and a communications port for sending energy usage calculations to an external device.

Steinberg et al. (US Patent Application Publication 2017/0241662) describes system for calculating a value for the effective thermal mass of a building. The climate control system obtains temperature measurements from at least a first location conditioned by the climate system. One or more processors receive measurements of outside temperatures from at least one source other than the control system and compare the temperature measurements from the first location with expected temperature measurements. The expected temperature measurements are based at least in part upon past temperature measurements obtained by said HVAC control system and said outside temperature measurements. The processors then calculate one or more rates of change in temperature at said first location.

Torres et al. (US Patent Application Publication 2017/0329357) describes information about thermal loads of one or more houses. The system includes a detection interface configured to detect signal from which house data can be collected for at least one house. The house data includes at least power usage of the heating ventilation and air conditioning (HVAC) system of the house as a function of time. The detection interface also collects environmental data associated the house. An analyzer computes values of thermal loads of the house based on the house data and the environmental data by solving a stochastic thermal energy balance equation for the house using thermal load estimates. For example, the thermal load estimates may be provided by maximum a posteriori probability estimation deduced by an expectation-maximization algorithm (EMMAP). An output interface outputs an electrical signal

that includes information about the thermal loads based on the computed thermal load values. House data and environmental data for at least one house are collected and are provided as inputs to a physics model that is a stochastic thermal energy balance equation for the house. The house data is collected from a signal from the house that includes information about at least power usage of the heating ventilation and air conditioning (HVAC) system of the house as a function of time. The stochastic thermal energy balance equation is solved to obtain values for thermal loads of the house using thermal load estimates provided by maximum a posteriori probability estimation deduced by an expectation-maximization algorithm (EMMAP). An electrical signal output includes information about the thermal loads based on the calculated values of the thermal loads.

Okita et al. (US Patent Application Publication 2018/0087795) describes a thermostat attached to an HVAC system, where said thermostat is augmented by one or more of the following: an occupancy sensor, a camera, a microphone, and a speaker. The occupancy sensor may be a passive infrared sensor, but other forms of occupancy detection using a camera for motion detection, a microphone for audio level, a light sensor for brightness level, a physical motion sensor (such as a gyroscope or accelerometer), an active light sensor (such as beam interruption), radar, sonar, gas sensor (such as CO₂), other methods of detecting presence, or any combination of these may be used. The thermostat functions as a home hub, which may connect to a network with a plurality of additional devices that can include: one or more remote temperature sensors, one or more

remote humidity sensors, one or more thermostats for additional HVAC units, one or more occupancy sensors, one or more cameras, microphones, speakers, water leak sensors, door/window sensors, tilt sensors, light sensors, physical motion sensors, light fixtures and/or light bulbs, handheld remote controls (such as key fobs), alarm alerts (such as a siren or silent phone call), and alarm/security panels (for status and arming). In this embodiment, the home hub thermostat can act as a control panel for a complete security system with an appropriate set of devices.

Matsuoka et al. (US Patent Application Publication 2014/0277795) describes interface for use by a utility company for managing demand response events is disclosed. The utility portal can include a customer management module that is operable to enable a utility operator to assign at least one parameter to each energy consumer that is enrolled to participate in a demand response program. The at least one parameter includes several groups, and each utility approved energy consumer is assigned to one of the groups. The utility portal includes a scheduling module that is operable to enable the utility operator to define at least one attribute of a future demand response event. The at least one attribute including one or more of a date at which the future demand response event is to begin, a demand response event period, and one or more of the groups. The scheduling module is further operable to display the one or more groups and information associated with each group, the information includes an indication as to whether a group is available for inclusion in the future demand response event. The scheduling module is further operable to enable the utility user to

selectively include one or more of the available groups as an attribute of the future demand response event.

Hancock (US Patent Application Publication 2015/0159928) describes exhaust heat reclaim system may include a diverter valve selectively connected in fluid communication to an exhaust vent tube and an exhaust delivery tube and configured to selectively divert hot exhaust fluid discharged from an exhaust of a power generation device to at least one of the exhaust vent tube and the exhaust delivery tube. The exhaust heat reclaim system may be a component of an HVAC system and be configured to discharge hot exhaust fluid onto a heat exchanger of the HVAC system, where the heat exchanger may be configured to promote heat transfer between the hot exhaust fluid and a refrigerant flowing through the heat exchanger of the HVAC system.

Hoff (US Patent 10,339,232) describes building heating and cooling can be calculated through two practical approaches that characterize a building's thermal efficiency through empirically-measured values and readily-obtainable energy consumption data, such as available in utility bills, thereby avoiding intrusive and time-consuming analysis with specialized testing equipment. While the discussion is herein centered on building heating requirements, the same principles can be applied to an analysis of building cooling requirements. The first approach can be used to calculate annual or periodic fuel requirements. The approach requires evaluating typical monthly utility billing data and approximations of heating (or cooling) losses and gains. The second approach

can be used to calculate hourly (or interval) fuel requirements. The approach includes empirically deriving three building-specific parameters: thermal mass, thermal conductivity, and effective window area. HVAC system power rating and conversion and delivery efficiency are also parametrized. The parameters are estimated using short duration tests that last at most several days. The parameters and estimated HVAC system efficiency are used to simulate a time series of indoor building temperature. In addition, the second hourly (or interval) approach can be used to verify or explain the results from the first annual (or periodic) approach. For instance, time series results can be calculated using the second approach over the span of an entire year and compared to results determined through the first approach. Other uses of the two approaches and forms of comparison are possible.

Double Patenting

5. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-18 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-20 of a related Application No. 12/211,690 now US Patent 8,019,567, Claims 1-14 of a related Application No. 13/230,610 now US Patent 8,423,322, Claims 1-14 of a related Application No. 13/861,189 now US Patent 9,057,649. Although the conflicting claims are not identical, they are not patentably distinct from each other because the limitations of the claims in the current application are encompassed in the previous application. The latter pending application encompasses the same process as the pending application and is a slightly different version of the previous application because of the rearrangement of the claim language.

Claims 1 and 8 (15/0905,251, current case)	Claims 1, 8, and 15 (12/211,690 now US Patent 8,019,567)
1. (Currently Amended) A system for <u>calculating a value for the operational efficiency</u> of an HVAC system comprising: at least one HVAC control system associated with a first structure that receives <u>inside temperature measurements</u> from at least a first structure conditioned <u>by</u> at least one HVAC system, and receives status of said HVAC system; one or more processors that receive measurements of outside temperatures <u>and at least a second variable climatic condition</u> from at least one source other than said HVAC system and compare said temperature measurements <u>and said at least a second variable outdoor climatic</u>	1. A system for evaluating changes in the operational efficiency of an HVAC system over time comprising: at least one HVAC control system associated with a first structure that receives temperature measurements from at least a first structure conditioned by at least one HVAC system, and receives status of said HVAC system; one or more processors that receive measurements of outside temperatures from at least one source other than said HVAC system and compare said temperature measurements from said first structure, wherein said one or more processors compares the inside temperature of said first structure and the outside temperature over time to derive

~~condition from said first structure over time;~~ <u>one or more databases that store at least said temperature</u> <u>measurements and said at least a second climatic condition related to said first</u> <u>structure over time, and</u> wherein said one or more processors compares an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time. 8. (Currently Amended) A system for detecting behavior of HVAC control systems comprising: a first HVAC control system that receives <u>inside</u> temperature measurements from at least a structure conditioned by at least one HVAC system, and receives status of said HVAC system; at least a second HVAC control system that obtains <u>inside</u> temperature measurements from at least a structure conditioned by a second HVAC system, and status of said second HVAC system; <u>one or more databases that store at least said temperature</u> <u>measurements and said at least a second climatic condition related to said first</u>	an estimation for the rate of change in inside temperature of said first structure when said HVAC system is in a first state of repair; and one or more databases that store at least said temperature measurements obtained from said first structure over time, wherein said one or more processors compares an inside temperature recorded inside the first structure with said estimation for the rate of change in inside temperature of said first structure to determine whether the operational efficiency of the HVAC system has decreased over time; and wherein if said operational efficiency has decreased, said one or more processors analyzes the changes in the operational efficiency over time to suggest a cause of degradation. 8. A system for detecting and correcting for anomalous behavior in HVAC control systems comprising: a first HVAC control system that receives temperature measurements from at least a first structure conditioned by at least one HVAC system, and receives status of said HVAC system; at least a second HVAC control system that obtains temperature measurements from at least a second structure conditioned by a second HVAC system, and status of said second HVAC system; one or more processors that receive measurements of outside temperatures from at least one source other than said first and second HVAC systems and compare said temperature measurements from said first HVAC system and said second HVAC system and said outside temperature measurements over time to
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<u>structure over time, and</u> one or more processors that receive and records measurements of outside temperatures <u>and at least a second variable outdoor climatic condition</u> from at least one source other than said first and second HVAC systems and receives, records and compares said temperature measurements from said first HVAC system and said second HVAC system and said outside temperature measurements <u>and at least a second variable climatic condition</u> over time to determine the efficiency of the first HVAC system and the second HVAC system.	determine the relative efficiency of the first HVAC system and the second HVAC system; and one or more databases that store said temperatures measurements, wherein said one or more processors compares the relative efficiency of the first HVAC system and the second HVAC system to determine whether the operational efficiency of the first HVAC system has decreased over time; and wherein if said operational efficiency has decreased, said one or more processors analyzes the changes in the operational efficiency over time to suggest a cause of degradation. 15. A method for evaluating changes in the operational efficiency of an HVAC system over time comprising: storing temperature measurements from at least a first structure conditioned by an HVAC system; and comparing with one or more processors said temperature measurements from said first structure with outside temperature measurements over time to derive expected temperature measurements of a rate of change in inside temperature of said first structure when the HVAC system is in a first state of repair wherein the expected temperature measurements are based at least in part upon past temperature measurements and based at least in part on outside temperature measurements, wherein said one or more processors compares an inside temperature recorded inside the first structure with said expected temperature measurements to determine whether the operational efficiency of the HVAC system has decreased.
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Claims 1 and 8 (15/0905,251, current case)	Claims 1 and 8 (13/230,610 now US Patent 8,423,322)
1. (Currently Amended) A system for <u>calculating a value for the operational efficiency of an HVAC system comprising:</u> at least one HVAC control system associated with a first structure that receives <u>inside</u> temperature measurements from at least a first structure conditioned by at least one HVAC system, and receives status of said HVAC system; one or more processors that receive measurements of outside temperatures <u>and at least a second variable climatic condition</u> from at least one source other than said HVAC system and compare said temperature measurements <u>and said at least a second variable outdoor climatic condition</u> ~~from said first structure over time;~~ <u>one or more databases that store at least said temperature</u> <u>measurements and said at least a second climatic condition related to said first</u> <u>structure over time, and</u> wherein said one or more processors compares an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time.	1. A system for evaluating changes in the operational efficiency of an HVAC system over time comprising: at least one HVAC control system associated with a first structure that receives temperature measurements from at least a first structure conditioned by at least one HVAC system, and receives status of said HVAC system; one or more processors that receive measurements of outside temperatures from at least one source other than said HVAC system and compare said temperature measurements from said first structure, wherein said one or more processors compares the inside temperature of said first structure and the outside temperature over time; and one or more databases that store at least said temperature measurements obtained from said first structure over time, wherein said one or more processors compares an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time to determine whether the operational efficiency of the HVAC system has decreased over time. 8. A system for detecting and correcting for anomalous behavior in HVAC control systems comprising: a first HVAC control system that receives temperature measurements from at least a first structure conditioned by at least one HVAC system, and receives status of said HVAC system; at least a second

8. (Currently Amended) A system for detecting behavior of HVAC control systems comprising: a first HVAC control system that receives <u>inside</u> temperature measurements from at least a structure conditioned by at least one HVAC system, and receives status of said HVAC system; at least a second HVAC control system that obtains <u>inside</u> temperature measurements from at least a structure conditioned by a second HVAC system, and status of said second HVAC system; <u>one or more databases that store at least said temperature</u> <u>measurements and said at least a second climatic condition related to said first</u> <u>structure over time, and</u> one or more processors that receive and records measurements of outside temperatures <u>and at least a second variable outdoor climatic condition</u> from at least one source other than said first and second HVAC systems and receives, records and compares said temperature measurements from said first HVAC system and said second HVAC system and said outside temperature measurements <u>and at least a second variable climatic condition</u> over time to determine the efficiency of the first HVAC system and the second HVAC system.	HVAC control system that obtains temperature measurements from at least a second structure conditioned by a second HVAC system, and status of said second HVAC system; one or more processors that receive measurements of outside temperatures from at least one source other than said first and second HVAC systems and compare said temperature measurements from said first HVAC system and said second HVAC system and said outside temperature measurements over time to determine the relative efficiency of the first HVAC system and the second HVAC system; and one or more databases that store said temperature measurements from said first and second HVAC systems.
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Claims 1 and 8 (15/0905,251, current case)	Claims 1 and 8 (13/861,189 now US Patent 9,057,649)
1. (Currently Amended) A system for <u>calculating a value for the operational efficiency of an HVAC system comprising:</u> at least one HVAC control system associated with a first structure that receives <u>inside</u> temperature measurements from at least a first structure conditioned by at least one HVAC system, and receives status of said HVAC system; one or more processors that receive measurements of outside temperatures <u>and at least a second variable climatic condition</u> from at least one source other than said HVAC system and compare said temperature measurements <u>and said at least a second variable outdoor climatic condition</u> ~~from said first structure over time;~~ <u>one or more databases that store at least said temperature</u> <u>measurements and said at least a second climatic condition related to said first</u> <u>structure over time, and</u> wherein said one or more processors compares an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time.	1. A system for evaluating changes in the operational efficiency of an HVAC system over time comprising: at least one HVAC control system associated with a first structure that receives temperature measurements from at least a first structure conditioned by at least one HVAC system, and receives status of said HVAC system; one or more processors that receive measurements of outside temperatures from at least one source other than said HVAC system and compare said temperature measurements from said first structure over time; and one or more databases that store at least said temperature measurements obtained from said first structure over time, wherein said one or more processors compares an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time to determine whether the operational efficiency of the HVAC system has decreased over time. 8. A system for detecting behavior of HVAC control systems comprising: a first HVAC control system that receives temperature measurements from at least a structure conditioned by at least one HVAC system, and receives status of said HVAC system; at least a second HVAC control system that obtains temperature measurements from at least a structure conditioned by a second HVAC system, and status of said second

8. (Currently Amended) A system for detecting behavior of HVAC control systems comprising: a first HVAC control system that receives <u>inside</u> temperature measurements from at least a structure conditioned by at least one HVAC system, and receives status of said HVAC system; at least a second HVAC control system that obtains <u>inside</u> temperature measurements from at least a structure conditioned by a second HVAC system, and status of said second HVAC system; <u>one or more databases that store at least said temperature</u> <u>measurements and said at least a second climatic condition related to said first</u> <u>structure over time, and</u> one or more processors that receive and records measurements of outside temperatures <u>and at least a second variable outdoor climatic condition</u> from at least one source other than said first and second HVAC systems and receives, records and compares said temperature measurements from said first HVAC system and said second HVAC system and said outside temperature measurements <u>and at least a second variable climatic condition</u> over time to determine the efficiency of the first HVAC system and the second HVAC system.	HVAC system; one or more processors that receive measurements of outside temperatures from at least one source other than said first and second HVAC systems and compare said temperature measurements from said first HVAC system and said second HVAC system and said outside temperature measurements over time to determine the efficiency of the first HVAC system and the second HVAC system; and one or more databases that store said temperature measurements from said first and second HVAC systems.
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Contact information

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tung S. Lau whose telephone number is 571-272-2274, email is Tungs.Lau@uspto.gov. The examiner can normally be reached on M-F 8-5:30 EDT. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor KUNDU SUJOY, can be reached on 571-272-8586. The fax phone numbers for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/TUNG S LAU/
Primary Examiner, Art Unit 2863
Technology Center 2800
September 23, 2019

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	Examiner TUNG S LAU		Art Unit 2863	Page 1 of 2

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*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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	X	

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Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<i>Notice of References Cited</i>	Application/Control No. 15/905,251		Applicant(s)/Patent Under Reexamination Steinberg et al.	
	Examiner TUNG S LAU		Art Unit 2863	Page 2 of 2

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
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*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
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Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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	Examiner TUNG S LAU	Art Unit 2863

CPC - Searched*		
Symbol	Date	Examiner
G01K*, G01R*, G01P*, G01H*, G01F*, G01M*, G01N*, G06F*	09/23/2019	TL

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Txt class Inv.	09/23/2019	TL

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	15/905251
	Filing Date	February 26, 2018
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 1 OF 13	Attorney Docket No.	EFACT.006D1

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Examiner Signature	/TUNG S LAU/	Date Considered	09/23/2019
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	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 2 OF 13	Attorney Docket No.	EFACT.006D1

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Examiner Signature	/TUNG S LAU/	Date Considered	09/23/2019
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	Filing Date	February 26, 2018
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SHEET 3 OF 13	Attorney Docket No.	EFACT.006D1

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	64	6,400,996	06/04/2002	Hoffberg et al.	
	65	6,437,692	08/20/2002	Petite et al.	
	66	6,449,534	09/10/2002	Stewart	
	67	6,454,177	09/24/2002	Sasao et al.	
	68	6,478,233	11/12/2002	Shah	
	69	6,480,803	11/12/2002	Pierret et al.	
	70	6,483,906	11/19/2002	Lggulden et al.	
	71	6,536,675	03/25/2003	Pesko et al.	
	72	6,542,076	04/01/2003	Joao	
	73	6,549,130	04/15/2003	Joao	
	74	6,574,537	06/02/2003	Kipersztok et al.	
	75	6,580,950	06/17/2003	Johnson	
	76	6,594,825	07/15/2003	Goldschmidtli et al.	
	77	6,595,430	07/22/2003	Shah	
	78	6,598,056	07/22/2003	Hull et al.	
	79	6,619,555	09/16/2003	Rosen	
	80	6,622,097	09/16/2003	Hunter	
	81	6,622,115	09/16/2003	Brown et al.	
	82	6,622,925	09/23/2003	Carner et al.	
	83	6,622,926	09/23/2003	Sartain et al.	
	84	6,628,997	09/30/2003	Fox et al.	

Examiner Signature /TUNG S LAU/	Date Considered 09/23/2019
*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

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PTO/SB/08 Equivalent

INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	15/905251
	Filing Date	February 26, 2018
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
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SHEET 4 OF 13	Attorney Docket No.	EFACT.006D1

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	85	6,633,823	10/14/2003	Bartone et al.	
	86	6,643,567	11/04/2003	Kolk et al.	
	87	6,644,098	11/11/2003	Cardinale et al.	
	88	6,671,586	12/30/2003	Davis et al.	
	89	6,695,218	02/24/2004	Fleckenstein	
	90	6,700,224	03/02/2004	Biskup, Sr.,	
	91	6,726,113	04/27/2004	Guo	
	92	6,731,992	05/04/2004	Ziegler	
	93	6,734,806	05/11/2004	Cratsley	
	94	6,772,052	08/03/2004	Amundsen	
	95	6,785,592	08/31/2004	Smith	
	96	6,785,630	08/31/2004	Kolk	
	97	6,786,421	09/07/2004	Rosen	
	98	6,789,739	09/14/2004	Rosen	
	99	6,845,918	01/25/2005	Rotondo	
	100	6,853,959	02/08/2005	Ikeda et al.	
	101	6,868,293	03/15/2005	Schurr	
	102	6,868,319	03/15/2005	Kipersztok et al.	
	103	6,882,712	04/19/2005	Iggulden et al.	
	104	6,889,908	05/10/2005	Crippen et al.	
	105	6,891,838	05/10/2005	Petite et al.	
	106	6,912,429	06/28/2005	Bilger	
	107	6,981,383	01/03/2006	Shah et al.	
	108	6,991,029	01/31/2006	Orfield et al.	
	109	7,009,493	03/07/2006	Howard	
	110	7,031,880	04/18/2006	Seem et al.	
	111	7,039,532	05/02/2006	Hunter	
	112	7,061,393	06/13/2006	Buckingham et al.	

Examiner Signature	/TUNG S LAU/	Date Considered	09/23/2019
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	Art Unit	3744
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 5 OF 13	Attorney Docket No.	EFACT.006D1

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	113	7,089,088	08/08/2006	Terry et al.	
	114	7,130,719	10/31/2006	Ehlers et al.	
	115	7,130,832	10/31/2006	Bannai et al.	
	116	7,167,079	01/23/2007	Smyth et al.	
	117	7,187,986	03/06/2007	Johnson et al.	
	118	7,205,892	04/17/2007	Luebke et al.	
	119	7,206,670	04/17/2007	Pimputkar, et al.	
	120	7,215,746	05/08/2007	Iggulden et al.	
	121	7,216,015	05/08/2007	Poth Robert J.	
	122	7,231,424	06/11/2007	Bodin et al.	
	123	7,232,075	06/19/2007	Rosen	
	124	7,242,988	07/10/2007	Hoffberg et al.	
	125	7,260,823	08/21/2007	Schlack et al.	
	126	7,356,384	04/08/2008	Gull et al.	
	127	7,476,020	01/13/2009	Zufferey et al.	
	128	7,483,964	01/27/2009	Jackson et al.	
	129	7,590,469	09/15/2009	Grohman	
	130	7,644,869	01/12/2010	Hoglund et al.	
	131	7,702,424	04/20/2010	Cannon et al.	
	132	7,758,729	07/20/2010	DeWhitt	
	133	7,784,704	08/31/2010	Harter	
	134	7,848,900 (EFACT.005A)	12/07/2010	Steinberg et al.	
	135	7,869,904	01/11/2011	Cannon et al.	
	136	7,894,943	02/22/2011	Sloup et al.	
	137	7,908,116 (EFACT.004A)	03/15/2011	Steinberg et al.	
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	139	7,983,795	07/19/2011	Josephson et al.	

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SHEET 6 OF 13	Attorney Docket No.	EFACT.006D1

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	140	8,010,237 (EFACT.010A)	08/30/2011	Cheung Leo et al.	
	141	8,019,567 (EFACT.006A)	09/13/2011	Steinberg et al.	
	142	8,090,477 (EFACT.013A)	01/03/2012	Steinberg	
	143	8,131,497 (EFACT.005C1)	03/06/2012	Steinberg et al.	
	144	8,131,506 (EFACT.004C1)	03/06/2012	Steinberg et al.	
	145	8,180,492 (EFACT.011A)	05/15/2012	Steinberg	
	146	8,340,826 (EFACT.013C1)	12/25/2012	Steinberg et al.	
	147	8,412,488 (EFACT.004C2)	04/02/2013	Steinberg et al.	
	148	8,423,322 (EFACT.006C1)	04/16/2013	Steinberg et al.	
	149	8,428,782	04/23/2013	Imes	
	150	8,428,785	04/23/2013	Boucher et al.	
	151	8,457,797	06/04/2013	Imes et al.	
	152	8,498,753 (EFACT.009A)	07/30/2013	Steinberg et al.	
	153	8,556,188 (EFACT.012A)	10/15/2013	Steinberg	
	154	8,596,550 (EFACT.007A)	12/03/2013	Steinberg et al.	
	155	8,712,590 (EFACT.013C2)	04/29/2014	Steinberg	
	156	8,738,327 (EFACT.004C3)	05/27/2014	Steinberg, et al.	
	157	8,740,100 (EFACT.008A)	06/03/2014	Steinberg	
	158	8,751,186 (EFACT.005C3)	06/10/2014	Steinberg, et al.	
	159	8,840,033 (EFACT.012C1)	09/23/2014	Steinberg	
	160	8,850,348	09/30/2014	Fadell et al.	
	161	8,886,488 (EFACT.005C2)	11/11/2014	Steinberg, et al.	
	162	9,057,649 (EFACT.006C2)	06/16/2015	Steinberg, et al.	

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	Art Unit	3744
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SHEET 7 OF 13	Attorney Docket No.	EFACT.006D1

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	163	9,134,710 (EFACT.010C1)	09/15/2015	Cheung et al.	
	164	9,194,597 (EFACT.007C1)	11/24/2015	Steinberg, et al.	
	165	9,244,470 (EFACT.011C1)	01/26/2016	Steinberg	
	166	9,279,594 (EFACT.008C1)	03/08/2016	Steinberg	
	167	9,709,292 (EFACT.012C2)	07/18/2017	Steinberg	
	168	9,939,333 (EFACT.006C3)	04/10/2018	Steinberg et al.	
	169	9,982,905 (EFACT.008C2)	05/29/2018	Steinberg	
	170	10,018,371 (EFACT.007C2)	07/10/2018	Steinberg et al.	
	171	2001/0025349	09/27/2001	Sharood et al.	
	172	2003/0040934	02/27/2003	Skidmore et al.	
	173	2004/0065095	04/08/2004	Osborne et al.	
	174	2004/0117330	06/17/2004	Ehlers et al.	
	175	2004/0133314	07/08/2004	Ehlers et al.	
	176	2004/0176880	09/09/2004	Obradovich et al.	
	177	2005/0222889	10/06/2005	Lai et al.	
	178	2005/0288822	12/29/2005	Rayburn	
	179	2006/0045105	03/02/2006	Dobosz et al.	
	180	2006/0214014	09/28/2006	Bash et al.	
	181	2006/0283965	12/21/2006	Mueller et al.	
	182	2007/0043477	02/22/2007	Elhers et al.	
	183	2007/0045431	03/03/2007	Chapman et al.	
	184	2007/0146126	06/28/2007	Wang	
	185	2008/0083234	04/10/2008	Krebs et al.	
	186	2008/0083834	04/10/2008	Krebs et al.	
	187	2008/0198549	08/21/2008	Rasmussen et al.	
	188	2008/0281472	11/13/2008	Podgorny et al.	

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	Art Unit	3744
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SHEET 8 OF 13	Attorney Docket No.	EFACT.006D1

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	189	2009/0005070	01/01/2009	Forstall et al.	
	190	2009/0018673	01/15/2009	Dushane et al.	
	191	2009/0052859	02/26/2009	Greenberger et al.	
	192	2009/0057426	03/05/2009	Sullivan et al.	
	193	2009/0062970	03/05/2009	Forbes et al.	
	194	2009/0065596	03/12/2009	Seem et al.	
	195	2009/0099699	04/16/2009	Steinberg et al.	
	196	2009/0125151	05/14/2009	Steinberg et al.	
	197	2009/0188985	07/30/2009	Scharing et al.	
	198	2009/0240381	09/24/2009	Lane	
	199	2009/0271013	10/29/2009	Chen	
	200	2009/0281667	11/12/2009	Masui et al.	
	201	2010/0019052	01/28/2010	Yip	
	202	2010/0070086	03/18/2010	Harrod et al.	
	203	2010/0070089	03/18/2010	Harrod et al.	
	204	2010/0070093	03/18/2010	Harrod et al.	
	205	2010/0156608	06/24/2010	BAE et al.	
	206	2010/0162285	06/24/2010	Cohen et al.	
	207	2010/0211224	08/19/2010	Keeling et al.	
	208	2010/0235004	09/16/2010	Thind	
	209	2010/0289643	11/18/2010	Trundle et al.	
	210	2010/0318227	12/16/2010	Steinberg et al.	
	211	2011/0031323	02/10/2011	Nold et al.	
	212	2011/0046792	02/24/2011	Imes et al.	
	213	2011/0046798	02/24/2011	Imes et al.	
	214	2011/0046799	02/24/2011	Imes et al.	
	215	2011/0046800	02/24/2011	Imes et al.	
	216	2011/0046801	02/24/2011	Imes et al.	

Examiner Signature	/TUNG S LAU/	Date Considered	09/23/2019
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	Art Unit	3744
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SHEET 9 OF 13	Attorney Docket No.	EFACT.006D1

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	217	2011/0051823	03/03/2011	Imes et al.	
	218	2011/0054699	03/03/2011	Imes et al.	
	219	2011/0054710	03/03/2011	Imes et al.	
	220	2011/0173542	07/14/2011	Imes et al.	
	221	2011/0202185	08/18/2011	Imes et al.	
	222	2011/0214060	09/01/2011	Imes et al.	
	223	2011/0224838	09/15/2011	Imes et al.	
	224	2011/0246898	10/06/2011	Imes et al.	
	225	2011/0253796	10/20/2011	Posa et al.	
	226	2011/0290893	12/01/2011	Steinberg	
	227	2011/0307101	12/15/2011	Imes et al.	
	228	2012/0023225	01/26/2012	Imes et al.	
	229	2012/0046859	02/23/2012	Imes et al.	
	230	2012/0064923	03/15/2012	Imes et al.	
	231	2012/0065935	03/15/2012	Steinberg et al.	
	232	2012/0072033	03/22/2012	Imes et al.	
	233	2012/0086562	04/12/2012	Steinberg	
	234	2012/0093141	04/19/2012	Imes et al.	
	235	2012/0101637	04/26/2012	Imes et al.	
	236	2012/0135759	05/31/2012	Imes et al.	
	237	2012/0186774	07/26/2012	Matsuoka et al.	
	238	2012/0215725	08/23/2012	Imes et al.	
	239	2012/0221718	08/30/2012	Imes et al.	
	240	2012/0252430	10/04/2012	Imes et al.	
	241	2012/0324119	12/20/2012	Imes et al.	
	242	2013/0053054	02/28/2013	Lovitt et al.	
	243	2013/0054758	02/28/2013	Imes et al.	
	244	2013/0054863	02/28/2013	Imes et al.	

Examiner Signature	/TUNG S LAU/	Date Considered	09/23/2019
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	Art Unit	3744
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 10 OF 13	Attorney Docket No.	EFACT.006D1

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	245	2013/0060387	03/07/2013	Imes et al.	
	246	2013/0073094	03/21/2013	Knapton et al.	
	247	2013/0144453	06/06/2013	Subbloie	
	248	2013/0167035	06/27/2013	Imes et al.	
	249	2013/0173064	07/04/2013	Fadell et al.	
	250	2013/0178985	07/11/2013	Lombard et al.	
	251	2013/0226502 (EFACT.006C2)	08/29/2013	Steinberg, et al.	
	252	2013/0310989 (EFACT.009C1)	11/21/2013	Steinberg et al.	
	253	2013/0338837 (EFACT.014A)	12/19/2013	Hublou et al.	
	254	2014/0039690 (EFACT.012C1)	02/06/2014	Steinberg	
	255	2014/0058567	02/27/2014	Matsuoka et al.	
	256	2014/0229018 (EFACT.013C3)	08/20/2014	Steinberg	
	257	2014/0316581	10/26/2014	Fadell et al.	
	258	2015/0025691	01/22/2015	Fadell et al.	
	259	2015/0043615 (EFACT.004C4)	02/12/2015	Steinberg et al.	
	260	2015/0120235 (EFACT.005C4)	04/30/2015	Steinberg et al.	
	261	2015/0142180	05/21/2015	Matsuoka et al.	
	262	2016/0061474 (EFACT.010C2)	03/03/2016	Cheung et al.	
	263	2016/0097557 (EFACT.013C4)	04/07/2016	Steinberg	
	264	2016/0138822 (EFACT.011C2)	05/19/2016	Steinberg	
	265	2016/0258822	09/08/2016	Steinberg et al.	
	266	2016/0363337	12/15/2016	Steinberg et al.	
	267	2017/0241662	08/24/2017	Steinberg et al.	
	268	2017/0336090	11/23/2017	Steinberg	
	269	2018/0087793	03/29/2018	Okita et al.	
	270	2018/0087795	03/29/2018	Okita et al.	

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SHEET 11 OF 13	Attorney Docket No.	EFACT.006D1

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document Country Code-Number-Kind Code Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T ¹
	271	EP 0415747 A2	03/06/1991	Shaw et al.		
	272	EP 1102500 A2	05/23/2001	Lucent Technologies Inc.		
	273	EP 2372263 A2	05/10/2011	Mitsubishi Electric Corporation		
	274	GB 2408592 A	06/01/2005	Oswald		
	275	JP 05-189659	07/30/1993	Hitachi Bill Shisetsu Eng. KK.		
	276	JP 2010-038377	02/18/2010	Mitsubishi Heavy Ind. Ltd.		
	277	JP 2010-286218	12/24/2010	Mitsubishi Heavy Ind. Ltd.		
	278	KR 10-1994-0011902	06/22/1994	Koryo Digital Elect. Co.		
	279	KR 10-1999-0070368	09/15/1999	Samsung Electronics Co. Ltd.		
	280	KR 10-2000-0059532	10/05/2000	Dang Hae System Co.		
	281	WO 2005/098331 A1	10/20/2005	Zip Ind Aust Pty Ltd.		
	282	WO 2009/036764 A2	03/26/2009	Danfoss A/S		
	283	WO 2011/100427 A2	08/18/2011	Enphase Energy, Inc.		
	284	WO 2011/011404 A1	01/27/2011	Allure Energy, Inc.		
	285	WO 2011/149600 (EFACT.012WO)	12/01/2011	EcoFactor, Inc.		
	286	WO 2012/024534 (EFACT.013WO)	02/23/2012	EcoFactor, Inc.		
	287	WO 2013/187996	12/19/2013	EcoFactor, Inc.		

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ¹
	288	ARENS, et al., "How Ambient Intelligence Will Improve Habitability and Energy Efficiency in Buildings", 2005, research paper, Center for the Built Environment, Controls and Information Technology.	
	289	BOURHAN, et al., "Cynamic model of an HVAC system for control analysis", Elsevier 2004.	
	290	BRUSH, et al., Preheat - Controlling Home Heating with Occupancy Prediction, 2013.	

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***Examiner:** Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

T¹ - Place a check mark in this area when an English language translation is attached. ~~ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.S.L/~~

PTO/SB/08 Equivalent

INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	15/905251
	Filing Date	February 26, 2018
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 12 OF 13	Attorney Docket No.	EFACT.006D1

NON PATENT LITERATURE DOCUMENTS

Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ¹
	291	CHENG et al., "Smart Sensors Enable Smart Air Conditioning Control", Sensors 2014, ISSN 1424-8220, June 24, 2014, 25 pages.	
	292	Comverge SuperStat Flyer, prior to June 28, 2007.	
	293	Control4 Wireless Thermostat Brochure, 2006.	
	294	Cooper Power Systems Web Page, 2000-2009.	
	295	Emerson Climate Technologies, "Network Thermostat for E2 Building Controller Installation and Operation Manual", 2007.	
	296	Enernoc Web Page, 2004-2009.	
	297	Enerwise Website, 1999-2009.	
	298	GUPTA, et al., Adding GPS-Control to Traditional Thermostats: An exploration of Potential Energy Savings and Design Challenges, House_n, Massachusetts Institute of Technology, pp. 95-114, 2009.	
	299	GUNES et al., "Improving Energy Efficiency and Thermal Comfort of Smart Buildings with HVAC Systems in the Presence of Sensor Faults", IEEE, August 24-26, 2015, 6 pages.	
	300	GUPTA, et al., A Persuasive GPS-Controlled Thermostat System, MIT, 2008.	
	301	Honeywell Programmable Thermostat Owner's Guide, www.honeywell.com/yourhome, 2004.	
	302	Honeywell, "W7600/W7620 Controller Reference Manual, HW0021207, October, 1992.	
	303	JOHNSON CONTROLS, "T600HCx-3 Single-Stage Thermostats", 2006.	
	304	JOHNSON CONTROLS, Touch4 building automation system brochure, 2007.	
	305	KILICOTTE, et al., "Dynamic Controls for Energy Efficiency and Demand Response: Framework Concepts and a New Construction Study Case in New York", Proceedings of the 2006 ACEEE Summer Study of Energy Efficiency in Buildings, Pacific Grove, CA, August 13-18, 2006	
	306	KRUMM, et al., Learning Time-Based Presence Probabilities, June 2011.	
	307	LIN, et al., "Multi-Sensor Single-Actuator Control of HVAC Systems", 2002.	
	308	PIER, Southern California Edison, Demand Responsive Control of Air Conditioning via Programmable Communicating Thermostats Draft Report, February 14, 2006.	
	309	Proliphix Thermostat Brochure, prior to June 2007.	

Examiner Signature /TUNG S LAU/	Date Considered 09/23/2019
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***Examiner:** Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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PTO/SB/08 Equivalent

INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	15/905251
	Filing Date	February 26, 2018
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 13 OF 13	Attorney Docket No.	EFACT.006D1

NON PATENT LITERATURE DOCUMENTS

Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ¹
	310	RAJI, "Smart Networks for Control", IEEE Spectrum, June 1994.	
	311	SCOTT, et al., Home Heating Using GPS-Based Arrival Prediction, 2010.	
	312	SIMMINI et al., Energy Efficient Control and Fault Detection for HVAC Systems, Univ. of Padova, XXVI Series, 2014, 144 pages.	
	313	SKLAVOUNOS, "Detection of Abnormal Situations and Energy Efficiency Control in Heating Ventilation and Air Conditioning (HVAC) Systems", Brunel University thesis, September 2015, 151 pages.	
	314	WANG, et al., "Opportunities to Save Energy and Improve Comfort by Using Wireless Sensor Networks in Buildings," (2003), Center for Environmental Design Research.	
	315	WETTER, et al., A comparison of deterministic and probabilistic optimization algorithms for non-smooth simulation-based optimization, Building and Environment 39, 2004, Pages 989-999.	
	316	Written Opinion and Search Report for PCT/US2011/032537, dated 12/12/11 (our reference EFACT.012WO).	
	317	Office Action in Canadian Application No. 2800491 dated December 7, 2016 EFACT.012CA).	
	318	Search Report in European Application No. 11787067.5 dated August 14, 2017 (EFACT.012EP).	
	319	Extended Search Report for European Application No. 11818805.1 dated June 9, 2017 (EFACT.013EP).	
	320	International Search Report and Written Opinion for PCT/US2013/035726 (EFACT.014WO), dated 08/06/2013.	
	321	International Preliminary Report on Patentability in PCT/US2013/035726 dated 12/16/2014 (EFACT.014WO).	
	322	Extended Search Report for European Application No. 13804057.1 dated June 1, 2016 (EFACT.014EP).	
	323	Examination Report in Australian Application No. 2013274827 dated April 11, 2017 (EFACT.014AU).	

28738986

Examiner Signature	/TUNG S LAU/	Date Considered	09/23/2019
*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	6	"8423322".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/09/23 14:05
L3	6	"8423322".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/09/23 14:08
L4	3	"9057649".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/09/23 14:10
L5	5	"9939333".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/09/23 15:05
L6	25	(compar\$4 or calculat\$4 or determine\$4) with inside same outside with temperature with HVAC and efficiency with operation	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/09/23 15:14
L7	25	(compar\$4 or calculat\$4 or determine\$4) with inside same outside with temperature with HVAC and efficienc\$4 with operation	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/09/23 15:14
L8	108	John near3 Douglas near3 Steinberg .in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/09/23 15:22
L9	108	John near3 Douglas near3 Steinberg .in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/09/23 15:23
L10	0	John near3 Douglas near3 Steinberg .in. and hvac with inside with temperature and outdoor with climate	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/09/23 15:23
L15	21	HVAC with inside with temperature and outdoor with climate	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/09/23 15:26

L16	5	HVAC with inside with temperature and outdoor with climate and efficiency with HVAC	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/09/23 15:26
S1	11	compar\$4 with inside with outside with temperature with HVAC and efficiency with operation	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/09/23 10:04
S2	5	"20100070234"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/09/23 10:05
S3	4	"8019567".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/09/23 10:09
S4	7	"10302327".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/09/23 10:14
S5	12	(compar\$4 or calculat\$4 or determine\$4) with inside with outside with temperature with HVAC and efficiency with operation	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/09/23 10:18
S6	6	"8423322".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/09/23 10:19
S7	110	(compar\$4 or calculat\$4 or determine\$4) with inside with outside with temperature with HVAC and efficiency	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/09/23 10:59
S8	75	(compar\$4 or calculat\$4 or determine\$4) with inside with outside with temperature with HVAC and efficiency with HVAC	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/09/23 10:59

9/ 23/ 2019 3:30:26 PM
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BIB DATA SHEET

CONFIRMATION NO. 2380

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
15/905,251	02/26/2018	702	2863	EFACT.006D1
APPLICANTS EcoFactor, Inc., Redwood City, CA; /TL/				
INVENTORS John Douglas Steinberg, Millbrae, CA; Scott Douglas Hublou, Redwood City, CA; /TL/				
IPC Classification No. G01K 13/00				
** CONTINUING DATA ***** This application is a DIV of 14/731,221 06/04/2015 PAT 9939333 which is a CON of 13/861,189 04/11/2013 PAT 9057649 which is a CON of 13/230,610 09/12/2011 PAT 8423322 /TL/ which is a CON of 12/211,690 09/16/2008 PAT 8019567 which claims benefit of 60/994,011 09/17/2007				
** FOREIGN APPLICATIONS ***** None /TL/				
** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** ** SMALL ENTITY ** 03/22/2018				
Foreign Priority claimed ☐ Yes ☒ No 35 USC 119(a-d) conditions met ☐ Yes ☒ No Verified and Acknowledged <u>/TUNG S LAU/</u> Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY CA	SHEETS DRAWINGS 13	TOTAL CLAIMS 18
INDEPENDENT CLAIMS 2				
ADDRESS KNOBBE MARTENS OLSON & BEAR LLP 2040 MAIN STREET FOURTEENTH FLOOR IRVINE, CA 92614 UNITED STATES				
TITLE SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM				
FILING FEE RECEIVED 865	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit	



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/905,251	02/26/2018	John Douglas Steinberg	EFACT.006D1

CONFIRMATION NO. 2380

20995
KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

PUBLICATION NOTICE



OC000000103695978

Title:SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM

Publication No.US-2018-0321093-A1

Publication Date:11/08/2018

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

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Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 15/905,251	
APPLICATION AS FILED - PART I							
(Column 1)		(Column 2)		SMALL ENTITY		OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75		N/A	
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	330		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380		N/A	
TOTAL CLAIMS (37 CFR 1.16(j))	18	minus 20 = *	x 50 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2	minus 3 = *	x 230 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s)) If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00				
			0.00				
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))			0.00				
			TOTAL	785		TOTAL	
* If the difference in column 1 is less than zero, enter "0" in column 2.							
APPLICATION AS AMENDED - PART II							
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)
	Total (37 CFR 1.16(i))	*	Minus **	=	x =	OR	x =
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =	OR	x =
	Application Size Fee (37 CFR 1.16(s))					OR	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR	
				TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY	
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)
	Total (37 CFR 1.16(i))	*	Minus **	=	x =	OR	x =
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =	OR	x =
	Application Size Fee (37 CFR 1.16(s))					OR	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR	
				TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.							



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
15/905,251	02/26/2018	3744	865	EFACT.006D1	18	2

CONFIRMATION NO. 2380

UPDATED FILING RECEIPT



0000000101290919

20995
KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

Date Mailed: 07/31/2018

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

John Douglas Steinberg, Millbrae, CA;
Scott Douglas Hublou, Redwood City, CA;

Applicant(s)

EcoFactor, Inc., Redwood City, CA;

Power of Attorney: The patent practitioners associated with Customer Number 20995

Domestic Priority data as claimed by applicant

This application is a DIV of 14/731,221 06/04/2015 PAT 9939333
which is a CON of 13/861,189 04/11/2013 PAT 9057649
which is a CON of 13/230,610 09/12/2011 PAT 8423322
which is a CON of 12/211,690 09/16/2008 PAT 8019567
which claims benefit of 60/994,011 09/17/2007

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

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The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/905,251**

Projected Publication Date: 11/08/2018

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC
SYSTEM

Preliminary Class

236

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/905,251	02/26/2018	John Douglas Steinberg	EFACT.006D1

CONFIRMATION NO. 2380

POA ACCEPTANCE LETTER



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Date Mailed: 07/31/2018

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 07/25/2018.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/zabaha/

Please Direct All Correspondence to Customer Number 20,995

RESPONSE TO FORMALITIES NOTICE

Inventor	:	John Douglas Steinberg
App. No.	:	15/905,251
Filed	:	February 26, 2018
For	:	SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM
Art Unit	:	3744
Conf No.	:	2380

**Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450**

Dear Commissioner:

The above-captioned application was filed lacking at least one item that would advance the application to examination. Enclosed in compliance with 37 CFR 1.53(f) are the following:

- (X) Preliminary Amendment.
- (X) Rescission of Any Prior Disclaimers and Request to Revisit Art.
- (X) Power of Attorney by Applicant.
- (X) Information Disclosure Statement.

The present application qualifies for small entity status under 37 CFR § 1.27.

- (X) Fees will be paid via EFS Web. Any extension of time will be requested by payment of the appropriate extension fee.

The Commissioner is hereby authorized to charge any additional fees which may be required, now or in the future, or credit any overpayment, to Account No. 11-1410.

Dated: July 25, 2018

By: /John R. King/

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28739144

Application No.: 15/905,251
Filing Date: February 26, 2018

REMARKS

In this amendment, Applicant amended Claims 1, 3, 8, and 10 and adds new Claims 15-18.

INFORMATION DISCLOSURE STATEMENT

Submitted concurrently herewith is an Information Disclosure Statement. Applicant respectfully requests the Examiner to consider the pending claims in connection with the cited references in order to make the references of record.

OTHER APPLICATIONS OF ASSIGNEE

Applicant wishes to draw the Examiner's attention to the following applications owned by of the present application's assignee:

Inventors	Appl. No.	Filing Date	Attorney Docket No.	Title
Steinberg et al.	60/963,183 Now Expired	08/03/07	EFACT.003PR	System And Method For Using A Network Of Thermostats As Tool To Verify Peak Demand Reduction
Steinberg et al.	60/994,011 Now Expired	09/17/07	EFACT.005PR	System And Method For Calculating The Thermal Mass Of A Building
Steinberg et al.	12/183,949 Now Pat. 7,908,116	07/31/08	EFACT.004A	System And Method For Using A Network Of Thermostats As Tool To Verify Peak Demand Reduction
Steinberg et al.	12/183,990 Now Pat. 7,908,117	07/31/08	EFACT.003A	System And Method For Using A Network Of Thermostats As Tool To Verify Peak Demand Reduction
Steinberg et al.	12/211,690 Now Pat. 8,019,567	09/16/08	EFACT.006A	System And Method For Evaluating Changes In The Efficiency Of An HVAC System
Steinberg et al.	12/211,733 Now Pat. 7,848,900	09/16/08	EFACT.005A	System And Method For Calculating The Thermal Mass Of A Building
Steinberg et al.	61/215,657 Now Expired	05/08/09	EFACT.009PR	System, Method And Apparatus For Just-In-Time Conditioning Using A Thermostat

Application No.: 15/905,251
Filing Date: February 26, 2018

Inventors	Appl. No.	Filing Date	Attorney Docket No.	Title
Steinberg	61/215,816 Now Expired	05/11/09	EFACT.008PR	System, Method And Apparatus For Dynamically Variable Compressor Delay In Thermostat To Reduce Energy Consumption
Steinberg et al.	61/215,999 Now Expired	05/12/09	EFACT.007PR	System, Method And Apparatus For Identifying Manual Inputs To And Adaptive Programming Of A Thermostat
Cheung et al.	12/498,142 Now Pat. 8,010,237	07/06/09	EFACT.010A	System And Method For Using Ramped Setpoint Temperature Variation With Networked Thermostats To Improve Efficiency
Steinberg	12/502,064 Now Pat. 8,180,492	07/13/09	EFACT.011A	System And Method For Using A Networked Electronic Device As An Occupancy Sensor For An Energy Management System
Steinberg et al.	12/773,690 Now Pat. 8,498,753	05/04/10	EFACT.009A	System, Method And Apparatus For Just-In-Time Conditioning Using A Thermostat
Steinberg	12/774,580 Now Pat. 8,740,100	05/05/10	EFACT.008A	System, Method And Apparatus For Dynamically Variable Compressor Delay In Thermostat To Reduce Energy Consumption
Steinberg et al.	12/778,052 Now Pat. 8,596,550	05/11/10	EFACT.007A	System, Method And Apparatus For Identifying Manual Inputs To And Adaptive Programming Of A Thermostat
Steinberg	12/788,246 Now Pat. 8,556,188	05/26/10	EFACT.012A	System And Method For Using A Mobile Electronic Device To Optimize An Energy Management System
Steinberg	12/860,821 Now Pat. 8,090,477	08/20/10	EFACT.013A	System And Method For Optimizing Use Of Plug-In Air Conditioners And Portable Heaters
Steinberg et al.	12/959,225 Now Pat. 8,131,497	12/02/10	EFACT.005C1	System And Method For Calculating The Thermal Mass Of A Building
Steinberg et al.	13/037,162 Now Pat. 8,131,506	02/28/11	EFACT.004C1	System And Method For Using A Network Of Thermostats As Tool To Verify Peak Demand Reduction

Application No.: 15/905,251
Filing Date: February 26, 2018

Inventors	Appl. No.	Filing Date	Attorney Docket No.	Title
Cheung et al.	13/219,381 Now Pat. 9,134,710	08/26/11	EFACT.010C1	System And Method For Using Ramped Setpoint Temperature Variation With Networked Thermostats To Improve Efficiency
Steinberg et al.	13/230,610 Now Pat. 8,423,322	09/12/11	EFACT.006C1	System And Method For Evaluating Changes In The Efficiency Of An HVAC System
Steinberg	13/329,117 Now Pat. 8,340,826	12/16/11	EFACT.013C1	System And Method For Optimizing Use Of Plug-In Air Conditioners And Portable Heaters
Steinberg et al.	13/409,697 Now Pat. 8,412,488	03/01/12	EFACT.004C2	System And Method For Using A Network Of Thermostats As Tool To Verify Peak Demand Reduction
Steinberg et al.	13/409,729 Now Pat. 8,886,488	03/01/12	EFACT.005C2	System And Method For Calculating The Thermal Mass Of A Building
Steinberg	13/470,074 Now Pat. 9,244,470	05/11/12	EFACT.011C1	System And Method For Using A Wireless Device As A Sensor For An Energy Management System
Hublou et al.	13/523,697 Published As 2013/0338837	06/14/12	EFACT.014A	System And Method For Optimizing Use Of Individual HVAC Units In Multi-Unit Chiller-Based Systems
Steinberg	13/725,447 Now Pat. 8,712,590	12/21/12	EFACT.013C2	System And Method For Optimizing Use Of Plug-In Air Conditioners And Portable Heaters
Steinberg et al.	13/852,577 Now Pat. 8,738,327	03/28/13	EFACT.004C3	System And Method For Using A Network Of Thermostats As Tool To Verify Peak Demand Reduction
Steinberg et al.	13/858,710 Now Pat. 8,751,186	04/08/13	EFACT.005C3	System And Method For Calculating The Thermal Mass Of A Building
Steinberg et al.	13/861,189 Now Pat. 9,057,649	04/11/13	EFACT.006C2	System And Method For Evaluating Changes In The Efficiency Of An HVAC System
Steinberg et al.	13/952,253 Abandoned	07/26/13	EFACT.009C1	System, Method And Apparatus For Just-In-Time Conditioning Using A Thermostat
Steinberg	14/048,932 Now Pat. 8,840,033	10/08/13	EFACT.012C1	System And Method For Using A Mobile Electronic Device To Optimize An Energy Management System

Application No.: 15/905,251
Filing Date: February 26, 2018

Inventors	Appl. No.	Filing Date	Attorney Docket No.	Title
Steinberg et al.	14/082,675 Now Pat. 9,194,597	11/18/13	EFACT.007C1	System, Method And Apparatus For Identifying Manual Inputs To And Adaptive Programming Of A Thermostat
Steinberg	14/263,762 Now Pat. 9,188,994	04/28/14	EFACT.013C3	System And Method For Optimizing Use Of Plug-In Air Conditioners And Portable Heaters
Steinberg et al.	14/285,384 Abandoned	05/22/14	EFACT.004C4	System And Method For Using A Network Of Thermostats As Tool To Verify Peak Demand Reduction
Steinberg	14/292,377 Now Pat. 9,279,594	05/30/14	EFACT.008C1	System, Method And Apparatus For Dynamically Variable Compressor Delay In Thermostat To Reduce Energy Consumption
Steinberg	14/491,554 Now Pat. 9,709,292	09/19/14	EFACT.012C2	System And Method For Using A Mobile Electronic Device To Optimize An Energy Management System
Steinberg et al.	14/527,433 Published As 2015/0120235 Abandoned	10/29/14	EFACT.005C4	System And Method For Calculating The Thermal Mass Of A Building
Steinberg et al.	14/731,221 Now Pat. 9,939,333	06/04/15	EFACT.006C3	System And Method For Evaluating Changes In The Efficiency Of An HVAC System
Cheung et al.	14/842,134 Published As 2016/0061474	09/01/15	EFACT.010C2	System And Method For Using Ramped Setpoint Temperature Variation With Networked Thermostats To Improve Efficiency
Steinberg et al.	14/878,872 Published As 2016/0091219	10/08/15	EFACT.007C2	System, Method And Apparatus For Identifying Manual Inputs To And Adaptive Programming Of A Thermostat
Steinberg	14/920,063 Abandoned	10/22/15	EFACT.013C4	System And Method For Optimizing Use Of Plug-In Air Conditioners And Portable Heaters
Steinberg	15/002,791 Published As 2016/0138822	01/21/16	EFACT.011C2	System And Method For Using A Wireless Device As A Sensor For An Energy Management System

Application No.: 15/905,251
Filing Date: February 26, 2018

Inventors	Appl. No.	Filing Date	Attorney Docket No.	Title
Steinberg	15/047,352 Now Pat. 9,982,905	02/18/16	EFACT.008C2	System, Method And Apparatus For Dynamically Variable Compressor Delay In Thermostat To Reduce Energy Consumption
Steinberg et al.	15/060,226 Published As 2016/0258822 Abandoned	03/03/16	EFACT.005C5	System And Method For Calculating The Thermal Mass Of A Building
Steinberg et al.	15/097,078 Published As 2016/0363337	04/12/16	EFACT.009C2	System, Method And Apparatus For Just-In-Time Conditioning Using A Thermostat
Steinberg et al.	15/426,882 Published As 2017/0241662	02/07/17	EFACT.005C6	System And Method For Calculating The Thermal Mass Of A Building
Steinberg	15/616,719 Published As 2017/0336090	06/07/17	EFACT.012C3	System And Method For Using A Mobile Electronic Device To Optimize An Energy Management System
Okita et al.	15/707,686	09/18/17	EFACT.018A2	Message-Based Demand Response Systems And Methods
Okita et al.	15/707,735	09/18/17	EFACT.018A1	Message-Based Demand Response Systems And Methods
Okita et al.	15/707,753	09/18/17	EFACT.018A3	Occupancy Determination Using Energy Consumption Indications
Okita et al.	15/707,769	09/18/17	EFACT.019A2	Systems And Methods For Acclimatization-Based Variable Thermostat Settings
Okita et al.	15/707,829	09/18/17	EFACT.019A1	Systems And Methods For Humidity-Based Variable Thermostat Settings
Okita et al.	15/707,873	09/18/17	EFACT.019A3	Systems And Methods For Fan Delay-Based Variable Thermostat Settings
Okita et al.	15/713,318 Published As 2018/0087795	09/22/17	EFACT.017A2	Multi-Function Thermostat
Okita et al.	15/713,358 Published As 2018/0087793	09/22/17	EFACT.017A1	Multi-Function Thermostat
Steinberg et al.	15/836,688	12/08/17	EFACT.004C5	System And Method For Using A Network Of Thermostats As Tool To Verify Peak Demand Reduction

Application No.: 15/905,251
Filing Date: February 26, 2018

Inventors	Appl. No.	Filing Date	Attorney Docket No.	Title
Steinberg	15/841,039	12/13/17	EFACT.013C5	System And Method For Optimizing Use Of Plug-In Air Conditioners And Portable Heaters
Steinberg et al.	15/905,251	02/26/18	EFACT.006D1	System And Method For Evaluating Changes In The Efficiency Of An HVAC System
Steinberg	15/965,339	04/27/18	EFACT.008C3	System, Method And Apparatus For Dynamically Variable Compressor Delay In Thermostat To Reduce Energy Consumption
Steinberg et al.	15/994,532	05/31/18	EFACT.004C6	System And Method For Using A Network Of Thermostats As Tool To Verify Peak Demand Reduction

Applicant notes that cited references, office actions, responses and notices of allowance currently exist or will exist for the above-referenced matters. Applicant also understands that the Examiner has access to sophisticated online Patent Office computing systems that provide ready access to the full file histories of these matters including, for example, specifications, drawings, pending claims, cited art, office actions, responses, declarations, and notices of allowance.

Rather than submit copies these file histories, Applicant respectfully requests that the Examiner continue to review these file histories online for past, current, and future information about these matters.

Also, if the Examiner cannot readily access these file histories, the Applicant would be pleased to provide any portion of any of the file histories at any time upon specific Examiner request.

NO DISCLAIMERS OR DISAVOWALS

Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, Applicant is not conceding in this application that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application.

Applicant reserves the right to pursue at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that Applicant has made any disclaimers or disavowals of any subject matter supported by the present application.

CONCLUSION

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: July 25, 2018

By:/John R. King/
John R. King
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Registered Practitioner
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28720268

AMENDMENTS TO THE CLAIMS

Please amend Claims 1, 3, 8, and 10 as indicated below.

Please add new Claims 15-18 as indicated below.

1. (Currently Amended) A system for ~~evaluating changes in~~ calculating a value for the operational efficiency of an HVAC system ~~over time~~ comprising:

at least one HVAC control system associated with a first structure that receives inside temperature measurements from at least a first structure conditioned by at least one HVAC system, and receives status of said HVAC system;

one or more processors that receive measurements of outside temperatures and at least a second variable climatic condition from at least one source other than said HVAC system and compare said temperature measurements and said at least a second variable outdoor climatic condition ~~from said first structure over time~~;

one or more databases that store at least said temperature measurements and said at least a second climatic condition related to said first structure over time, and

wherein said one or more processors compares an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time ~~to determine whether the operational efficiency of the HVAC system has decreased over time.~~

2. (Original) A system as in claim 1 in which said processors receive measurements of outside temperatures for geographic regions such as ZIP codes from sources other than said HVAC control systems.

3. (Currently Amended) A system as in claim 1 wherein said inside temperature measurements are obtained from a programmable thermostat that communicates using a network.

4. (Original) A system as in claim 1 in which said processors communicate with said HVAC system using a network that includes an electricity meter.

5. (Original) A system as in claim 1 in which said HVAC system includes a programmable thermostat and said programmable thermostat is the sole source for current data regarding temperature inside said first structure conditioned by said HVAC system.

6. (Original) A system as in claim 1 in which said HVAC system measures inside said first structure at only one physical location.

7. (Original) A system as in claim 1 in which the status of said HVAC system includes whether said system is “on” or “off”.

8. (Currently Amended) A system for detecting behavior of HVAC control systems comprising:

a first HVAC control system that receives inside temperature measurements from at least a structure conditioned by at least one HVAC system, and receives status of said HVAC system;

at least a second HVAC control system that obtains inside temperature measurements from at least a structure conditioned by a second HVAC system, and status of said second HVAC system;

one or more databases that store at least said temperature measurements and said at least a second climatic condition related to said first structure over time, and

one or more processors that receive and records measurements of outside temperatures and at least a second variable outdoor climatic condition from at least one source other than said first and second HVAC systems and receives, records and compares said temperature measurements from said first HVAC system and said second HVAC system and said outside temperature measurements and at least a second variable climatic condition over time to determine the efficiency of the first HVAC system and the second HVAC system.

9. (Original) A system as in claim 8 in which said processors receive said outside temperature measurements for geographic regions such as ZIP codes from sources other than said HVAC control systems.

10. (Currently Amended) A system as in claim 8 wherein said inside temperature measurements are obtained from a programmable thermostat that communicates with said first HVAC control system using a network.

11. (Original) A system as in claim 8 in which said processors communicate with said first HVAC system using a network that includes an electricity meter.

12. (Original) A system as in claim 8 in which said first HVAC system includes a programmable thermostat and said programmable thermostat is the sole source for current data regarding temperature inside said location conditioned by said first HVAC system.

13. (Original) A system as in claim 8 in which said first HVAC system measures inside said first location at only one physical location.

14. (Original) A system as in claim 8 in which the status of said first HVAC system includes whether said first HVAC system is “on” or “off”.

15. (New) A system as in claim 1 in which said second variable climatic condition is relative humidity.

16. (New) A system as in claim 1 in which said first HVAC system does not independently control humidity inside said first structure.

17. (New) A system as in claim 8 in which said second variable climatic condition is relative humidity.

18. (New) A system as in claim 8 in which said first HVAC system does not independently control humidity inside said first structure.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	15/905251
	Filing Date	February 26, 2018
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 1 OF 13	Attorney Docket No.	EFACT.006D1

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	H2176	12/05/2006	Meyer et al.	
	2	12/805705	06/10/2010	Crabtree	
	3	13/470074	08/30/2012	Steinberg	
	4	13/523697	06/14/2012	Hublou et al.	
	5	13/725447	06/06/2013	Steinberg	
	6	13/729401	12/28/2012	Sloop	
	7	13/852577	03/28/2013	Steinberg et al.	
	8	13/858710	09/05/2013	Steinberg et al.	
	9	13/861189	04/11/2013	Steinberg et al.	
	10	14/082,675 (EFACT.007C1)	11/18/2003	Steinberg et al.	
	11	14/263,762	04/28/2014	Steinberg	
	12	14/285,384	05/22/2014	Steinberg, et al.	
	13	14/292,377	05/30/2014	Steinberg	
	14	14/491,554	09/19/2014	Steinberg	
	15	14/527,433	10/29/2014	Steinberg, et al.	
	16	14/731,221	06/04/2015	Steinberg, et al.	
	17	15/616,719	06/07/2017	Steinberg, et al.	
	18	D 646,990	10/18/2011	Rhodes	
	19	D 659,560	05/15/2012	Rhodes	
	20	D 673,467	01/01/2013	Lee et al.	
	21	D 705,095 (EFACT.015DA)	05/20/2014	Steinberg et al.	
	22	4,136,732	01/30/1979	Demaray et al.	
	23	4,270,693	06/02/1981	Hayes	
	24	4,341,345	07/27/1982	Hammer et al.	
	25	4,403,644	09/13/1983	Hebert	
	26	4,451,879	05/29/1984	Welch et al.	
	27	4,475,685	10/09/1984	Grimado et al.	
	28	4,655,279	04/07/1987	Harmon	

Examiner Signature	Date Considered
*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

T¹ - Place a check mark in this area when an English language Translation is attached.

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	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 2 OF 13	Attorney Docket No.	EFACT.006D1

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	29	4,674,027	06/16/1987	Beckey	
	30	4,675,828	06/23/1987	Winston	
	31	4,702,305	10/27/1987	Beckey et al.	
	32	4,702,413	10/27/1987	Beckey et al.	
	33	4,897,798	01/30/1990	Cler	
	34	5,124,502	06/23/1992	Nelson et al.	
	35	5,244,146	09/14/1993	Jefferson et al.	
	36	5,270,952	12/14/1993	Adams et al.	
	37	5,279,458	01/18/1994	Dewolf et al.	
	38	5,297,838	03/15/1994	Juravich	
	39	5,314,004	05/24/1994	Strand et al.	
	40	5,348,078	09/20/1994	Dushane et al.	
	41	5,454,511	10/03/1995	Van Ostrand et al.	
	42	5,462,225	10/31/1995	Massara et al.	
	43	5,544,036	08/06/1996	Brown et al.	
	44	5,555,927	09/17/1996	Shah	
	45	5,572,438	11/05/1996	Ehlers et al.	
	46	5,682,949	11/04/1997	Ratcliffe et al.	
	47	5,706,190	01/06/1998	Russ et al.	
	48	5,717,609	02/10/1998	Packa et al.	
	49	5,725,148	03/10/1998	Hartman	
	50	5,729,474	03/17/1998	Hildebrand et al.	
	51	5,818,347	10/06/1998	Dolan et al.	
	52	5,839,654	11/24/1998	Weber	
	53	5,977,964	11/02/1999	Williams et al.	
	54	6,079,626	06/27/2000	Hartman	
	55	6,115,713	09/05/2000	Pascucci et al.	
	56	6,145,751	11/14/2000	Ahmed	

Examiner Signature	Date Considered
*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	15/905251
	Filing Date	February 26, 2018
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 3 OF 13	Attorney Docket No.	EFACT.006D1

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	57	6,178,362	01/23/2001	Woolard et al.	
	58	6,216,956	04/17/2001	Ehlers et al.	
	59	6,223,544	05/01/2001	Seem	
	60	6,260,765	07/17/2001	Natale et al.	
	61	6,241,156	06/05/2001	Kline et al.	
	62	6,351,693	02/26/2002	Monie	
	63	6,400,956	06/02/2002	Richton	
	64	6,400,996	06/04/2002	Hoffberg et al.	
	65	6,437,692	08/20/2002	Petite et al.	
	66	6,449,534	09/10/2002	Stewart	
	67	6,454,177	09/24/2002	Sasao et al.	
	68	6,478,233	11/12/2002	Shah	
	69	6,480,803	11/12/2002	Pierret et al.	
	70	6,483,906	11/19/2002	Lggulden et al.	
	71	6,536,675	03/25/2003	Pesko et al.	
	72	6,542,076	04/01/2003	Joao	
	73	6,549,130	04/15/2003	Joao	
	74	6,574,537	06/02/2003	Kipersztok et al.	
	75	6,580,950	06/17/2003	Johnson	
	76	6,594,825	07/15/2003	Goldschmidtli et al.	
	77	6,595,430	07/22/2003	Shah	
	78	6,598,056	07/22/2003	Hull et al.	
	79	6,619,555	09/16/2003	Rosen	
	80	6,622,097	09/16/2003	Hunter	
	81	6,622,115	09/16/2003	Brown et al.	
	82	6,622,925	09/23/2003	Carner et al.	
	83	6,622,926	09/23/2003	Sartain et al.	
	84	6,628,997	09/30/2003	Fox et al.	

Examiner Signature	Date Considered
*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

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	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 4 OF 13	Attorney Docket No.	EFACT.006D1

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	85	6,633,823	10/14/2003	Bartone et al.	
	86	6,643,567	11/04/2003	Kolk et al.	
	87	6,644,098	11/11/2003	Cardinale et al.	
	88	6,671,586	12/30/2003	Davis et al.	
	89	6,695,218	02/24/2004	Fleckenstein	
	90	6,700,224	03/02/2004	Biskup, Sr.,	
	91	6,726,113	04/27/2004	Guo	
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	107	6,981,383	01/03/2006	Shah et al.	
	108	6,991,029	01/31/2006	Orfield et al.	
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U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
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	127	7,476,020	01/13/2009	Zufferey et al.	
	128	7,483,964	01/27/2009	Jackson et al.	
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U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
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U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	163	9,134,710 (EFACT.010C1)	09/15/2015	Cheung et al.	
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	165	9,244,470 (EFACT.011C1)	01/26/2016	Steinberg	
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	169	9,982,905 (EFACT.008C2)	05/29/2018	Steinberg	
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	171	2001/0025349	09/27/2001	Sharood et al.	
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	174	2004/0117330	06/17/2004	Ehlers et al.	
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	176	2004/0176880	09/09/2004	Obradovich et al.	
	177	2005/0222889	10/06/2005	Lai et al.	
	178	2005/0288822	12/29/2005	Rayburn	
	179	2006/0045105	03/02/2006	Dobosz et al.	
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	181	2006/0283965	12/21/2006	Mueller et al.	
	182	2007/0043477	02/22/2007	Elhers et al.	
	183	2007/0045431	03/03/2007	Chapman et al.	
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	185	2008/0083234	04/10/2008	Krebs et al.	
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U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
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	191	2009/0052859	02/26/2009	Greenberger et al.	
	192	2009/0057426	03/05/2009	Sullivan et al.	
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	194	2009/0065596	03/12/2009	Seem et al.	
	195	2009/0099699	04/16/2009	Steinberg et al.	
	196	2009/0125151	05/14/2009	Steinberg et al.	
	197	2009/0188985	07/30/2009	Scharing et al.	
	198	2009/0240381	09/24/2009	Lane	
	199	2009/0271013	10/29/2009	Chen	
	200	2009/0281667	11/12/2009	Masui et al.	
	201	2010/0019052	01/28/2010	Yip	
	202	2010/0070086	03/18/2010	Harrod et al.	
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	211	2011/0031323	02/10/2011	Nold et al.	
	212	2011/0046792	02/24/2011	Imes et al.	
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U.S. PATENT DOCUMENTS					
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	217	2011/0051823	03/03/2011	Imes et al.	
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	220	2011/0173542	07/14/2011	Imes et al.	
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	222	2011/0214060	09/01/2011	Imes et al.	
	223	2011/0224838	09/15/2011	Imes et al.	
	224	2011/0246898	10/06/2011	Imes et al.	
	225	2011/0253796	10/20/2011	Posa et al.	
	226	2011/0290893	12/01/2011	Steinberg	
	227	2011/0307101	12/15/2011	Imes et al.	
	228	2012/0023225	01/26/2012	Imes et al.	
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	232	2012/0072033	03/22/2012	Imes et al.	
	233	2012/0086562	04/12/2012	Steinberg	
	234	2012/0093141	04/19/2012	Imes et al.	
	235	2012/0101637	04/26/2012	Imes et al.	
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	238	2012/0215725	08/23/2012	Imes et al.	
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U.S. PATENT DOCUMENTS					
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	245	2013/0060387	03/07/2013	Imes et al.	
	246	2013/0073094	03/21/2013	Knapton et al.	
	247	2013/0144453	06/06/2013	Subbloie	
	248	2013/0167035	06/27/2013	Imes et al.	
	249	2013/0173064	07/04/2013	Fadell et al.	
	250	2013/0178985	07/11/2013	Lombard et al.	
	251	2013/0226502 (EFACT.006C2)	08/29/2013	Steinberg, et al.	
	252	2013/0310989 (EFACT.009C1)	11/21/2013	Steinberg et al.	
	253	2013/0338837 (EFACT.014A)	12/19/2013	Hublou et al.	
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	256	2014/0229018 (EFACT.013C3)	08/20/2014	Steinberg	
	257	2014/0316581	10/26/2014	Fadell et al.	
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	261	2015/0142180	05/21/2015	Matsuoka et al.	
	262	2016/0061474 (EFACT.010C2)	03/03/2016	Cheung et al.	
	263	2016/0097557 (EFACT.013C4)	04/07/2016	Steinberg	
	264	2016/0138822 (EFACT.011C2)	05/19/2016	Steinberg	
	265	2016/0258822	09/08/2016	Steinberg et al.	
	266	2016/0363337	12/15/2016	Steinberg et al.	
	267	2017/0241662	08/24/2017	Steinberg et al.	
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	269	2018/0087793	03/29/2018	Okita et al.	
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FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document Country Code-Number-Kind Code Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T ¹
	271	EP 0415747 A2	03/06/1991	Shaw et al.		
	272	EP 1102500 A2	05/23/2001	Lucent Technologies Inc.		
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	278	KR 10-1994-0011902	06/22/1994	Koryo Digital Elect. Co.		
	279	KR 10-1999-0070368	09/15/1999	Samsung Electronics Co. Ltd.		
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	283	WO 2011/100427 A2	08/18/2011	Enphase Energy, Inc.		
	284	WO 2011/011404 A1	01/27/2011	Allure Energy, Inc.		
	285	WO 2011/149600 (EFACT.012WO)	12/01/2011	EcoFactor, Inc.		
	286	WO 2012/024534 (EFACT.013WO)	02/23/2012	EcoFactor, Inc.		
	287	WO 2013/187996	12/19/2013	EcoFactor, Inc.		

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ¹
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NON PATENT LITERATURE DOCUMENTS

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	307	LIN, et al., "Multi-Sensor Single-Actuator Control of HVAC Systems", 2002.	
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	312	SIMMINI et al., Energy Efficient Control and Fault Detection for HVAC Systems, Univ. of Padova, XXVI Series, 2014, 144 pages.	
	313	SKLAVOUNOS, "Detection of Abnormal Situations and Energy Efficiency Control in Heating Ventilation and Air Conditioning (HVAC) Systems", Brunel University thesis, September 2015, 151 pages.	
	314	WANG, et al., "Opportunities to Save Energy and Improve Comfort by Using Wireless Sensor Networks in Buildings," (2003), Center for Environmental Design Research.	
	315	WETTER, et al., A comparison of deterministic and probabilistic optimization algorithms for non-smooth simulation-based optimization, Building and Environment 39, 2004, Pages 989-999.	
	316	Written Opinion and Search Report for PCT/US2011/032537, dated 12/12/11 (our reference EFACT.012WO).	
	317	Office Action in Canadian Application No. 2800491 dated December 7, 2016 EFACT.012CA).	
	318	Search Report in European Application No. 11787067.5 dated August 14, 2017 (EFACT.012EP).	
	319	Extended Search Report for European Application No. 11818805.1 dated June 9, 2017 (EFACT.013EP).	
	320	International Search Report and Written Opinion for PCT/US2013/035726 (EFACT.014WO), dated 08/06/2013.	
	321	International Preliminary Report on Patentability in PCT/US2013/035726 dated 12/16/2014 (EFACT.014WO).	
	322	Extended Search Report for European Application No. 13804057.1 dated June 1, 2016 (EFACT.014EP).	
	323	Examination Report in Australian Application No. 2013274827 dated April 11, 2017 (EFACT.014AU).	

28738986

Examiner Signature	Date Considered
*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

T¹ - Place a check mark in this area when an English language Translation is attached.

INFORMATION DISCLOSURE STATEMENT

First Inventor	: John Douglas Steinberg
App. No.	: 15/905,251
Filed	: February 26, 2018
For	: SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM
Examiner	: Unknown
Art Unit	: 3744
Conf. No.	: 2380

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

References and Listing

Pursuant to 37 CFR 1.56, an Information Disclosure Statement listing references is provided herewith. Listed references are of record in U.S. Patent Application No. 14/731,221, filed June 4, 2015, which is the parent of this continuation application, and is relied upon for an earlier filing date under 35 USC 120. Copies of the references are not submitted pursuant to 37 CFR 1.98(d).

No Disclaimers

To the extent that anything in the Information Disclosure Statement or the listed references could be construed as a disclaimer of any subject matter supported by the present application, Applicant hereby rescinds and retracts such disclaimer.

Timing of Disclosure

This Information Disclosure Statement is being filed before the receipt of a First Office Action on the merits, and presumably no fee is required.

Application No.: 15/905,251
Filing Date: February 26, 2018

If a First Office Action on the merits was mailed before the mailing date of this Statement, the Commissioner is authorized to charge the fee set forth in 37 CFR 1.17(p) to Deposit Account No. 11-1410.

Respectfully submitted,
KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: July 25, 2018

By: John R. King/
John R. King
Registration No. 34,362
Registered Practitioner
Customer No. 20,995
(949) 760-0404

28739075

Electronic Patent Application Fee Transmittal

Application Number:	15905251			
Filing Date:	26-Feb-2018			
Title of Invention:	SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM			
First Named Inventor/Applicant Name:	John Douglas Steinberg			
Filer:	John R. King/Amy Durrant			
Attorney Docket Number:	EFACT.006D1			
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	75	75
UTILITY SEARCH FEE	2111	1	330	330
UTILITY EXAMINATION FEE	2311	1	380	380
Pages:				
Claims:				
Miscellaneous-Filing:				
LATE FILING FEE FOR OATH OR DECLARATION	2051	1	80	80
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 2 months with \$0 paid	2252	1	300	300
Miscellaneous:				
Total in USD (\$)				1165

Electronic Acknowledgement Receipt

EFS ID:	33282737
Application Number:	15905251
International Application Number:	
Confirmation Number:	2380
Title of Invention:	SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM
First Named Inventor/Applicant Name:	John Douglas Steinberg
Customer Number:	20995
Filer:	John R. King/Wendi Manzanares
Filer Authorized By:	John R. King
Attorney Docket Number:	EFACT.006D1
Receipt Date:	25-JUL-2018
Filing Date:	26-FEB-2018
Time Stamp:	16:38:18
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 1165
RAM confirmation Number	072618INTEFSW16390700
Deposit Account	111410
Authorized User	Wendi Manzanares

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Response to Pre-Exam Formalities Notice	EFACT-006D1_response.pdf	37699	no	2
			cb2ae08c38236c0ff1855cc391cddf8e75b94f6c		
Warnings:					
Information:					
2		EFACT-006D1_prelamend.pdf	56738	yes	11
			e13c2f4fe5fa6777ea316fe1eb4a156422af71d6		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Applicant Arguments/Remarks Made in an Amendment		5	11	
	Claims		2	4	
	Preliminary Amendment		1	1	
Warnings:					
Information:					
3	Miscellaneous Incoming Letter	EFACT-006D1_rescission.pdf	59032	no	2
			0676bc429e089633d7a6a702c26326fd3563e7b7		
Warnings:					
Information:					
4	Power of Attorney	EFACT-006D1_POA.pdf	123176	no	2
			82c4fdb4f5c7df3b17dd6aba0c346da1356caa5c		
Warnings:					
Information:					
5		EFACT-006D1_IDS.pdf	593082	yes	15
			3340ffb3a43cb53d182c89049b44761597a54af7		
		086			

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Information Disclosure Statement (IDS) Form (SB08)	3	15
	Transmittal Letter	1	2

Warnings:

Information:

6	Fee Worksheet (SB06)	fee-info.pdf	39078	no	2
			c4ff04fd6b8db4b4194c05f6db9c358e2bcdca6		

Warnings:

Information:

Total Files Size (in bytes):			908805
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Inventor	:	John Douglas Steinberg
App. No.	:	15/905,251
Filed	:	February 26, 2018
For	:	SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM
Examiner	:	
Art Unit	:	3744
Conf. No.	:	2380

PRELIMINARY AMENDMENT**Mail Stop Amendment**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

Prior to examination of this application, Applicants respectfully submit the following amendments and comments.

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 5 of this paper.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Steinberg, et al.
App. No	:	15/905,251
Filed	:	February 26, 2018
For	:	SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM
Examiner	:	Unknown
Art Unit	:	3744

RESCISSION OF ANY PRIOR DISCLAIMERS AND REQUEST TO REVISIT ART

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

The claims of the present application are different and possibly broader in scope than any pending claims in any related application or issued claims in any related patent. In particular, in one or more parent applications, including U.S. Patent Application No. 14/731,221, filed June 4, 2015, now U.S. Patent No. 9,939,333, issued April 10, 2018; U.S. Patent Application No. 13/861,189, filed April 11, 2013, now U.S. Patent No. 9,057,649, issued June 16, 2015; U.S. Patent Application No. 13/230,610, filed on September 12, 2011, now U.S. Patent No. 8,423,322, issued on April 16, 2013; and U.S. Patent Application No. 12/211,690, filed on September 16, 2008, now U.S. Patent No. 8,019,567, issued on September 13, 2011; Applicant amended claims and received allowance over at least U.S. Patent Nos. 4,89,798; 6,789,739 and U.S. Publication No. 2005/0288822.

To the extent that any amendments or characterizations of the scope of any claim or referenced art could be construed as a disclaimer of any subject matter

Appl. No. : 15/905,251
Filed : February 26, 2018

Docket No. EFACT.006D1
Customer No. 20,995

supported by the present disclosure, Applicant hereby rescinds and retracts such disclaimer. Accordingly, the above-listed references, or other listed or referenced art may need to be re-visited. To this end, Applicant would appreciate acknowledgement of such reconsideration by Examiner initialization of at least the references listed in the attached Information Disclosure Statement Form PTO/SB/08.

In addition, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that Applicant has made any disclaimers or disavowals of any subject matter supported by the present application.

Respectfully submitted,
KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: July 25, 2018

By: /John R. King/
John R. King
Registration No. 34,362
Attorney of Record
Customer No. 20,995
(949) 760-0404

28739094

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA/82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	15/905251
Filing Date	February 26, 2018
First Named Inventor	John Douglas Steinberg
Title	SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM
Art Unit	3744
Examiner Name	Unknown
Attorney Docket Number	EFACT.006D1

SIGNATURE of Applicant or Patent Practitioner

Signature	/John R. King/	Date (Optional)	
Name	John R. King	Registration Number	34,362
Title (if Applicant is a juristic entity)	Agent for applicant		
Applicant Name (if Applicant is a juristic entity)	EcoFactor, Inc.		

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.



*Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Doc Code: PA..

Document Description: Power of Attorney

PTO/AIA/82B (07-13)

Approved for use through 11/30/2014. OMB 0651-0051

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number

Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)



I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above:

20995

OR



I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:



The address associated with the above-mentioned Customer Number

OR



The address associated with Customer Number:

OR

Firm or
Individual Name

Address

City

State

Zip

Country

Telephone

Email

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

EcoFactor, Inc.



Inventor or Joint Inventor (title not required below)



Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)



Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)



Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature

Date (Optional)

11/7/13

Name

John Douglas Steinberg

Title

EVP of Business Development

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.



Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 15/905,251				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75		N/A				
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	330		N/A				
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380		N/A				
TOTAL CLAIMS (37 CFR 1.16(j))	14	minus 20 = *	x 50 =	0.00	OR					
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2	minus 3 = *	x 230 =	0.00						
APPLICATION SIZE FEE (37 CFR 1.16(s)) If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00							
			0.00							
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))			0.00							
			TOTAL	785		TOTAL				
* If the difference in column 1 is less than zero, enter "0" in column 2.										
APPLICATION AS AMENDED - PART II										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OTHER THAN SMALL ENTITY		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=	OR	x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=	OR	x	=
	Application Size Fee (37 CFR 1.16(s))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=	OR	x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=	OR	x	=
	Application Size Fee (37 CFR 1.16(s))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.										



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
15/905,251	02/26/2018	3744	0.00	EFACT.006D1	14	2

CONFIRMATION NO. 2380

FILING RECEIPT



0000000098244968

20995
KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

Date Mailed: 03/26/2018

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

John Douglas Steinberg, Millbrae, CA;
Scott Douglas Hublou, Redwood City, CA;

Applicant(s)

EcoFactor, Inc., Redwood City, CA;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a DIV of 14/731,221 06/04/2015 PAT 9939333
which is a CON of 13/861,189 04/11/2013 PAT 9057649
which is a CON of 13/230,610 09/12/2011 PAT 8423322
which is a CON of 12/211,690 09/16/2008 PAT 8019567
which claims benefit of 60/994,011 09/17/2007

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 03/22/2018

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/905,251**

Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC
SYSTEM

Preliminary Class

236

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER
Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/905,251	02/26/2018	John Douglas Steinberg	EFACT.006D1

CONFIRMATION NO. 2380

FORMALITIES LETTER



20995
KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

Date Mailed: 03/26/2018

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
- The application search fee must be submitted.
- The application examination fee must be submitted.
- Surcharge as set forth in 37 CFR 1.16(f) must be submitted.

The surcharge is due for any one of:

- late submission of the basic filing fee, search fee, or examination fee,
- late submission of inventor's oath or declaration,
- filing an application that does not contain at least one claim on filing, or
- submission of an application filed by reference to a previously filed application.

SUMMARY OF FEES DUE:

The fee(s) required within **TWO MONTHS** from the date of this Notice to avoid abandonment is/are itemized below. Small entity discount is in effect. If applicant is qualified for micro entity status, an acceptable Certification of Micro Entity Status must be submitted to establish micro entity status. (See 37 CFR 1.29 and forms PTO/SB/15A and 15B.)

- \$ 75 basic filing fee.
- \$ 80 surcharge.
- \$ 330 search fee.
- \$ 380 examination fee.
- \$(0) previous unapplied payment amount.
- \$ 865 TOTAL FEE BALANCE DUE.

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web, including a copy of this Notice and selecting the document description "Applicant response to Pre-Exam Formalities Notice".
<https://portal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html>

For more information about EFS-Web please call the USPTO Electronic Business Center at 1-866-217-9197 or visit our website at <http://www.uspto.gov/ebc>.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/tgebre/

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	EFACT.006D1
		Application Number	
Title of Invention	SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	John	Douglas	Steinberg	
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service				
City	Millbrae	State/Province	CA	Country of Residence
				US

Mailing Address of Inventor:

Address 1	873 Hacienda Way			
Address 2				
City	Millbrae	State/Province	CA	
Postal Code	94030	Country	US	

Inventor 2 Remove				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Scott	Douglas	Hublou	
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service				
City	Redwood City	State/Province	CA	Country of Residence
				US

Mailing Address of Inventor:

Address 1	747 Lakeview Way			
Address 2				
City	Redwood City	State/Province	CA	
Postal Code	94062	Country	US	

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button.

Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	EFACT.006D1
		Application Number	
Title of Invention	SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM		

☐ An Address is being provided for the correspondence information of this application.

Customer Number	20995		
Email Address	efiling@knobbe.com	Add Email	Remove Email

Application Information:

Title of the Invention	SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM		
Attorney Docket Number	EFACT.006D1	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	13	Suggested Figure for Publication (if any)	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not be** the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	20995		

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	EFACT.006D1
		Application Number	
Title of Invention	SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending				Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
	Division of	14/731221	2015-06-04		
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14/731221	Continuation of	13/861189	2013-04-11	9057649	2015-06-16
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13/861189	Continuation of	13/230610	2011-09-12	8423322	2013-04-16
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13/230610	Continuation of	12/211690	2008-09-16	8019567	2011-09-13
Prior Application Status	Expired				Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12/211690	Claims benefit of provisional	60/994011	2007-09-17		
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.					Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ^j (if applicable)	Remove
		101		

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	EFACT.006D1
		Application Number	
Title of Invention	SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM		

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number EFACT.006D1	
	Application Number	
Title of Invention	SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

- ☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.
- ☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	EFACT.006D1
		Application Number	
Title of Invention	SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant	1	Remove
------------------	---	------------------------

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

[Clear](#)

☒ Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
---	--	----------------

Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest
---	--

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	EcoFactor, Inc.
-------------------	-----------------

Mailing Address Information For Applicant:

Address 1	1450 Veteran's Blvd., Suite 100		
Address 2			
City	Redwood City	State/Province	CA
Country	US	Postal Code	94063
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. [Add](#)

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	EFACT.006D1
		Application Number	
Title of Invention	SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM		

Assignee 1				
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.				
Remove				
If the Assignee or Non-Applicant Assignee is an Organization check here. ☐				
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information For Assignee including Non-Applicant Assignee:				
Address 1				
Address 2				
City		State/Province		
Country		Postal Code		
Phone Number		Fax Number		
Email Address				
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add				

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the **INITIAL** filing of the application and either box A or B is **not** checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/John R. King/		Date (YYYY-MM-DD)	2018-02-26
First Name	John	Last Name	King	Registration Number 34362
Additional Signature may be generated within this form by selecting the Add button. Add				

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	EFACT.006D1
		Application Number	
Title of Invention	SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM		

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM

INCORPORATION BY REFERENCE TO ANY PRIORITY APPLICATIONS

[0001] Any and all applications for which a foreign or domestic priority claim is identified in the Application Data Sheet, or any correction thereto, are hereby incorporated by reference into this application under 37 CFR 1.57.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] This invention relates to the use of thermostatic HVAC controls that are connected to a computer network. More specifically, communicating thermostats are combined with a computer network in order to evaluate changes in the operational efficiency of an HVAC system over time.

Background

[0003] Climate control systems such as heating and cooling systems for buildings (heating, ventilation and cooling, or HVAC systems) have been controlled for decades by thermostats. At the most basic level, a thermostat includes a means to allow a user to set a desired temperature, a means to sense actual temperature, and a means to signal the heating and/or cooling devices to turn on or off in order to try to change the actual temperature to equal the desired temperature. The most basic versions of thermostats use components such as a coiled bi-metallic spring to measure actual temperature and a mercury switch that opens or completes a circuit when the spring coils or uncoils with temperature changes. More recently, electronic digital thermostats have become prevalent. These thermostats use solid-state devices such as thermistors or thermal diodes to measure temperature, and

microprocessor-based circuitry to control the switch and to store and operate based upon user-determined protocols for temperature vs. time.

[0004] These programmable thermostats generally offer a very restrictive user interface, limited by the cost of the devices, the limited real estate of the small wall-mounted boxes, and the inability to take into account more than two variables: the desired temperature set by the user, and the ambient temperature sensed by the thermostat. Users can generally only set one series of commands per day, and in order to change one parameter (e.g., to change the late-night temperature) the user often has to cycle through several other parameters by repeatedly pressing one or two buttons.

[0005] Because the interface of programmable thermostats is so poor, the significant theoretical savings that are possible with them (sometimes cited as 25% of heating and cooling costs) are rarely realized. In practice, studies have found that more than 50% of users never program their thermostats at all. Significant percentages of the thermostats that are programmed are programmed sub-optimally, in part because, once programmed, people tend to not to re-invest the time needed to change the settings very often.

[0006] A second problem with standard programmable thermostats is that they represent only a small evolutionary step beyond the first, purely mechanical thermostats. Like the first thermostats, they only have two input signals – ambient temperature and the preset desired temperature. The entire advance with programmable thermostats is that they can shift between multiple present temperatures at different times.

SUMMARY OF THE INVENTION

[0007] There are many other sources of information that could be used to increase comfort, decrease energy use, or both. For example, outside temperature and humidity strongly affect subjective comfort. On a 95 degree, 90 per cent humidity day in August, when people tend to dress in lightweight clothing, a house cooled to 70 degrees will feel cool or even uncomfortably cold. On a below-freezing day in January, when people tend to wear sweaters and heavier clothes, that same

70 degree home will feel too warm. It would therefore be advantageous for a thermostat system to automatically incorporate information about external weather conditions when setting the desired temperature.

[0008] Thermostats are used to regulate temperature for the benefit of the occupants in a given space. (Usually this means people, but it can of course also mean critical equipment, such as in a room filled with computer equipment.) In general, thermostats read temperature from the sensor located within the “four corners” of the thermostat. With a properly designed system, the thermostat may well be located such that the temperature read at the precise location of the thermostat accurately reflects the conditions where the human (or other) occupants tend to be. But there are many reasons and circumstances in which that will not be the case. A single thermostat may produce accurate readings in some circumstances but not others; it may be located in a place far from the occupants, or too far from the ductwork controlled by the thermostat, etc. In one house, for example, the thermostat may be located in a spot that receives direct sunlight on hot afternoons. This could cause the thermostat to sense that the local ambient temperature is extremely high, and as a result signal the A/C to run too long, making the rest of the home too cold, and wasting considerable energy. In another house, the thermostat may be located in a hallway without ductwork or where the nearby ducts have been closed. In such a scenario, the thermostat is likely to (correctly) report cold temperatures in the winter, leading the heating system to overheat the rest of the house and waste considerable energy.

[0009] These problems can be reduced or eliminated through use of additional remote temperature sensors connected to the thermostat’s control circuitry. However, such systems require additional hardware, additional thermostat complexity, and skilled installation and configuration.

[0010] It would therefore be desirable for a thermostat system using only a single temperature sensor to take such sub-optimal installations into account and to correct for the erroneous readings generated by such thermostats.

[0011] Different structures will respond to changes in conditions such as external temperature in different ways. For example, houses built 50 or more years

ago will generally have little or no insulation, be poorly sealed, and have simple single-glazed windows. Such houses will do a very poor job of retaining internal heat in the winter and rejecting external heat in the summer. In the absence of applications of thermal measures such as heating and air conditioning, the inside temperature in such houses will tend to track outside temperatures very closely. Such houses may be said to have low thermal mass. A house built in recent years, using contemporary techniques for energy efficiency such as high levels of insulation, double-glazed windows and other techniques, will, in the absence of intervention, tend to absorb external heat and release internal heat very slowly. The newer house can be thought of as having higher thermal mass than the older house.

[0012] A conventional thermostat has no mechanism by which it might take the thermal mass of the structure into account, but thermal mass significantly affects many parameters relating to energy efficiency.

[0013] The cost to an electric utility to produce power varies over time. Indeed, the cost of production between low demand and peak demand periods can vary by as much as an order of magnitude. Traditionally, residential customers paid the same price regardless of time or the cost to produce. Thus consumers have had little financial incentive to reduce consumption during periods of high demand and high production cost. Many electric utilities are now seeking to bring various forms of variable rates to the retail energy markets. Under such schemes, consumers can reduce costs by taking into account not just how much energy they use, but when they use it.

[0014] Thus many consumers now can see real benefits from optimizing not just the total number of kilowatt-hours of electricity consumed, but also optimizing when it is used. The optimum strategy for energy use over time will vary based upon many variables, one of which is the thermal mass of the structure being heated or cooled. In a structure with high thermal mass, heating and cooling can effectively be shifted away from high cost periods to lower cost “shoulder” periods with little or no effect on comfort. If, for example, a utility charges much higher rates on hot summer afternoons, it is likely that pre-cooling a high-thermal mass structure just before the high-cost period and then shutting down the air conditioning during

the peak will allow the house to remain comfortable. But in a house with low thermal mass, the benefits of pre-cooling will quickly dissipate, and the house will rapidly become uncomfortable if the air conditioning is shut off. Thus it would be advantageous for a temperature control system to take thermal mass into account when setting desired temperatures.

[0015] Many factors affect the efficiency of HVAC systems. Some may be thought of as essentially fixed, such as the theoretical efficiency of a central air conditioner (often expressed as its SEER rating), the matching of a given system to the characteristics of a given home, the location and size of forced-air ductwork, etc. Other contributors to efficiency are more dynamic, such as clogged filters, refrigerant leaks, duct leakage and “pop-offs,” and the like.

[0016] Most of these problems are likely to manifest themselves in the form of higher energy bills. But the “signature” of each different problem can be discerned from the way in which each such problem affects the cycle times of a given HVAC system over time and relative to weather conditions and the performance of other HVAC systems in other houses. If two otherwise identical houses are located next door to each other and have gas furnaces, but one is rated at 50,000 BTUs and the other is rated at 100,000 BTUs, the cycle times for the higher-capacity furnace should be shorter than for the lower-capacity unit. If both of those same houses have identical furnaces, but one has a clogged filter, the cycle times should be longer in the house with the clogged filter. Because cycling of the HVAC system is controlled by the thermostat, those differences in cycle time would be reflected in the data sensed by and control signals generated by the thermostat. It would be advantageous for a thermostat system to be able to use that information to diagnose problems and make recommendations based upon that data.

[0017] These needs are satisfied by at least one embodiment of the invention that includes a system for calculating a value for the effective thermal mass of a building comprising: at least one HVAC control system that measures temperature at at least a first location conditioned by said HVAC system, and reporting said temperature measurements as well as the status of said HVAC control system; one or more processors that receive measurements of outside

temperatures from at least one source other than said HVAC control systems and compare said temperature measurements from said first location with expected temperature measurements wherein the expected temperature measurements are based at least in part upon past temperature measurements obtained by said HVAC control system and said outside temperature measurements; and one or more databases that store at least said temperatures measured at said first location over time; calculating one or more rates of change in temperature at said first location; and relating said calculated rates of change to said outside temperature measurements.

[0018] Another embodiment includes a system for calculating a value for the operational efficiency of an HVAC system comprising at least one HVAC control system that measures temperature at at least a first location conditioned by said HVAC system, and reporting said temperature measurements as well as the status of said HVAC control system; one or more processors that receive measurements of outside temperatures from at least one source other than said HVAC control systems and compare said temperature measurements from said first location with expected temperature measurements wherein the expected temperature measurements are based at least in part upon past temperature measurements obtained by said HVAC control system and said outside temperature measurements; and one or more databases that store at least said temperatures measured at said first location over time; calculating one or more rates of change in temperature at said first location for periods during which the status of the HVAC system is “on”; calculating one or more rates of change in temperature at said first location for periods during which the status of the HVAC system is “off”; and relating said calculated rates of change to said outside temperature measurements.

[0019] A further embodiment includes a system for evaluating changes in the operational efficiency of an HVAC system over time comprising at least one HVAC control system that measures temperature at at least a first location conditioned by said HVAC system, and reporting said temperature measurements as well as the status of said HVAC control system; one or more processors that receive measurements of outside temperatures from at least one source other than

said HVAC control systems and compare said temperature measurements from said first location with expected temperature measurements wherein the expected temperature measurements are based at least in part upon past temperature measurements obtained by said HVAC control system and said outside temperature measurements; and one or more databases that store at least said temperatures measured at said first location over time.

[0020] A further embodiment includes a system for detecting and correcting for anomalous behavior in HVAC control systems comprising a first HVAC control system that measures temperature at at least a first location conditioned by said first HVAC system, and reporting said temperature measurements as well as the status of said first HVAC control system; at least a second HVAC control system that measures temperature at at least a second location conditioned by said second HVAC system, and reporting said temperature measurements as well as the status of said second HVAC control system; one or more processors that receive measurements of outside temperatures from at least one source other than said first and second HVAC control systems and compare said temperature measurements from said first HVAC controls system and said second HVAC control system and said outside temperature measurements; and one or more databases that store said temperatures measurements.

[0021] In at least one embodiment, the invention comprises a thermostat attached to an HVAC system, a local network connecting the thermostat to a larger network such as the Internet, and one or more additional thermostats attached to the network, and a server in bi-directional communication with a plurality of such thermostats. The server logs the ambient temperature sensed by each thermostat vs. time and the signals sent by the thermostats to their HVAC systems. The server preferably also logs outside temperature and humidity data for the geographic locations for the buildings served by the connected HVAC systems. Such information is widely available from various sources that publish detailed weather information based on geographic areas such as by ZIP code. The server also stores other data affecting the load upon the system, such as specific model of HVAC system, occupancy, building characteristics, etc. Some of this data may be

supplied by the individual users of the system, while other data may come from third-party sources such as the electric and other utilities who supply energy to those users.

[0022] Combining these data sources will also allow the server to calculate the effective thermal mass of the structures conditioned by those thermostats. By combining data from multiple thermostats in a given neighborhood, the system can correct for flaws in the location of a given thermostat, and can evaluate the efficiency of a given system, as well as assist in the diagnosis of problems and malfunctions in such systems.

[0023] This and other advantages of certain embodiments of the invention are explained in the detailed description and claims that make reference to the accompanying diagrams and flowcharts.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] Figure 1 shows an example of an overall environment in which an embodiment of the invention may be used.

[0025] Figure 2 shows a high-level illustration of the architecture of a network showing the relationship between the major elements of one embodiment of the subject invention.

[0026] Figure 3 shows an embodiment of the website to be used as part of the subject invention.

[0027] Figure 4 shows a high-level schematic of the thermostat used as part of the subject invention.

[0028] Figure 5 shows one embodiment of the database structure used as part of the subject invention

[0029] Figures 6a and 6b show graphical representations of inside and outside temperatures in two different homes, one with high thermal mass and one with low thermal mass.

[0030] Figures 7a and 7b show graphical representations of inside and outside temperatures in the same homes as in Figures 6a and 6b, showing the cycling of the air conditioning systems in those houses.

[0031] Figures 8a and 8b show graphical representations of inside and outside temperatures in the same home as in Figures 6a and 7a, showing the cycling of the air conditioning on two different days in order to demonstrate the effect of a change in operating efficiency on the parameters measured by the thermostat.

[0032] Figures 9a and 9b show the effects of employing a pre-cooling strategy in two different houses.

[0033] Figures 10a and 10b show graphical representations of inside and outside temperatures in two different homes in order to demonstrate how the system can correct for erroneous readings in one house by referencing readings in another.

[0034] Figure 11 is a flowchart illustrating the steps involved in calculating the effective thermal mass of a home using the subject invention.

[0035] Figure 12 is a flowchart illustrating the steps involved in determining whether an HVAC system has developed a problem that impairs efficiency using the subject invention.

[0036] Figure 13 is a flowchart illustrating the steps involved in correcting for erroneous readings in one house by referencing readings in another using the subject invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0037] **Figure 1** shows an example of an overall environment 100 in which an embodiment of the invention may be used. The environment 100 includes an interactive communication network 102 with computers 104 connected thereto. Also connected to network 102 are one or more server computers 106, which store information and make the information available to computers 104. The network 102 allows communication between and among the computers 104 and 106.

[0038] Presently preferred network 102 comprises a collection of interconnected public and/or private networks that are linked to together by a set of standard protocols to form a distributed network. While network 102 is intended to refer to what is now commonly referred to as the Internet, it is also intended to

encompass variations which may be made in the future, including changes additions to existing standard protocols.

[0039] When a user of the subject invention wishes to access information on network 102, the buyer initiates connection from his computer 104. For example, the user invokes a browser, which executes on computer 104. The browser, in turn, establishes a communication link with network 102. Once connected to network 102, the user can direct the browser to access information on server 106.

[0040] One popular part of the Internet is the World Wide Web. The World Wide Web contains a large number of computers 104 and servers 106, which store HyperText Markup Language (HTML) documents capable of displaying graphical and textual information. HTML is a standard coding convention and set of codes for attaching presentation and linking attributes to informational content within documents.

[0041] The servers 106 that provide offerings on the World Wide Web are typically called websites. A website is often defined by an Internet address that has an associated electronic page. Generally, an electronic page is a document that organizes the presentation of text graphical images, audio and video.

[0042] In addition to the Internet, the network 102 can comprise a wide variety of interactive communication media. For example, network 102 can include local area networks, interactive television networks, telephone networks, wireless data systems, two-way cable systems, and the like.

[0043] In one embodiment, computers 104 and servers 106 are conventional computers that are equipped with communications hardware such as modem or a network interface card. The computers include processors such as those sold by Intel and AMD. Other processors may also be used, including general-purpose processors, multi-chip processors, embedded processors and the like.

[0044] Computers 104 can also be handheld and wireless devices such as personal digital assistants (PDAs), cellular telephones and other devices capable of accessing the network.

[0045] Computers 104 utilize a browser configured to interact with the World Wide Web. Such browsers may include Microsoft Explorer, Mozilla, Firefox, Opera or Safari. They may also include browsers used on handheld and wireless devices.

[0046] The storage medium may comprise any method of storing information. It may comprise random access memory (RAM), electronically erasable programmable read only memory (EEPROM), read only memory (ROM), hard disk, floppy disk, CD-ROM, optical memory, or other method of storing data.

[0047] Computers 104 and 106 may use an operating system such as Microsoft Windows, Apple Mac OS, Linux, Unix or the like.

[0048] Computers 106 may include a range of devices that provide information, sound, graphics and text, and may use a variety of operating systems and software optimized for distribution of content via networks.

[0049] **Figure 2** illustrates in further detail the architecture of the specific components connected to network 102 showing the relationship between the major elements of one embodiment of the subject invention. Attached to the network are thermostats 108 and computers 104 of various users. Connected to thermostats 108 are HVAC units 110. The HVAC units may be conventional air conditioners, heat pumps, or other devices for transferring heat into or out of a building. Each user is connected to the server 106 via wired or wireless connection such as Ethernet or a wireless protocol such as IEEE 802.11, a gateway 110 that connects the computer and thermostat to the Internet via a broadband connection such as a digital subscriber line (DSL) or other form of broadband connection to the World Wide Web. Server 106 contains the content to be served as web pages and viewed by computers 104, as well as databases containing information used by the servers.

[0050] In the currently preferred embodiment, the website 200 includes a number of components accessible to the user, as shown in **Figure 3**. Those components may include a means to enter temperature settings 202, a means to enter information about the user's home 204, a means to enter the user's electricity bills 206, means to calculate energy savings that could result from various thermostat-setting strategies 208, and means to enable and choose between

various arrangements 210 for demand reduction with their electric utility provider as intermediated by the demand reduction service provider.

[0051] **Figure 4** shows a high-level block diagram of thermostat 108 used as part of the subject invention. Thermostat 108 includes temperature sensing means 252, which may be a thermistor, thermal diode or other means commonly used in the design of electronic thermostats. It includes a microprocessor 254, memory 256, a display 258, a power source 260, a relay 262, which turns the HVAC system on and off in response to a signal from the microprocessor, and contacts by which the relay is connected to the wires that lead to the HVAC system. To allow the thermostat to communicate bi-directionally with the computer network, the thermostat also includes means 264 to connect the thermostat to a local computer or to a wireless network. Such means could be in the form of Ethernet, wireless protocols such as IEEE 802.11, IEEE 802.15.4, Bluetooth, cellular systems such as CDMA, GSM and GPRS, or other wireless protocols. The thermostat 250 may also include controls 266 allowing users to change settings directly at the thermostat, but such controls are not necessary to allow the thermostat to function.

[0052] The data used to generate the content delivered in the form of the website is stored on one or more servers 106 within one or more databases. As shown in **Figure 5**, the overall database structure 300 may include temperature database 400, thermostat settings database 500, energy bill database 600, HVAC hardware database 700, weather database 800, user database 900, transaction database 1000, product and service database 1100 and such other databases as may be needed to support these and additional features.

[0053] The website will allow users of connected thermostats 250 to create personal accounts. Each user's account will store information in database 900, which tracks various attributes relative to users of the site. Such attributes may include the make and model of the specific HVAC equipment in the user's home; the age and square footage of the home, the solar orientation of the home, the location of the thermostat in the home, the user's preferred temperature settings, whether the user is a participant in a demand reduction program, etc.

[0054] As shown in Figure 3, the website 200 will permit thermostat users to perform through the web browser substantially all of the programming functions traditionally performed directly at the physical thermostat, such as temperature set points, the time at which the thermostat should be at each set point, etc. Preferably the website will also allow users to accomplish more advanced tasks such as allow users to program in vacation settings for times when the HVAC system may be turned off or run at more economical settings, and set macros that will allow changing the settings of the temperature for all periods with a single gesture such as a mouse click.

[0055] In addition to using the system to allow better signaling and control of the HVAC system, which relies primarily on communication running from the server to the thermostat, the bi-directional communication will also allow the thermostat 108 to regularly measure and send to the server information about the temperature in the building. By comparing outside temperature, inside temperature, thermostat settings, cycling behavior of the HVAC system, and other variables, the system will be capable of numerous diagnostic and controlling functions beyond those of a standard thermostat.

[0056] For example, **Fig. 6a** shows a graph of inside temperature and outside temperature for a 24-hour period in House A, assuming no HVAC activity. House A has double-glazed windows and is well-insulated. When outside temperature 302 increases, inside temperature 304 follows, but with significant delay because of the thermal mass of the building.

[0057] **Figure 6b** shows a graph of inside temperature and outside temperature for the same 24-hour period in House B. House B is identical to House A except that it (i) is located a block away and (ii) has single-glazed windows and is poorly insulated. Because the two houses are so close to each other, outside temperature 302 is the same in Figure 6a and Figure 6b. But the lower thermal mass of House B means that the rate at which the inside temperature 306 changes in response to the changes in outside temperature is much greater.

[0058] The differences in thermal mass will affect the cycling behavior of the HVAC systems in the two houses as well. **Figure 7a** shows a graph of inside

temperature and outside temperature in House A for the same 24-hour period as shown in Figure 6a, but assuming that the air conditioning is being used to try to maintain an internal temperature of 70 degrees. Outside temperatures 302 are the same as in Figures 6a and 6b. Because of the high thermal mass of the house, the air conditioning does not need to run for very long to maintain the target temperature, as shown by shaded areas 310.

[0059] **Figure 7b** shows a graph of inside temperature 312 and outside temperature 302 for the same 24-hour period in House B, assuming use of the air conditioning as in Figure 7a. Because of the lower thermal mass of House B, the air conditioning system in House B has to run longer in order to maintain the same target temperature, as shown by shaded areas 314.

[0060] Because server 106a logs the temperature readings from inside each house (whether once per minute or over some other interval), as well as the timing and duration of air conditioning cycles, database 300 will contain a history of the thermal performance of each house. That performance data will allow the server 106a to calculate an effective thermal mass for each such structure – that is, the speed with the temperature inside a given building will change in response to changes in outside temperature and differences between inside and outside temperatures. Because the server will also log these inputs against other inputs including time of day, humidity, etc. the server will be able to predict, at any given time on any given day, the rate at which inside temperature should change for given inside and outside temperatures.

[0061] The server will also record the responses of each house to changes in outside conditions and cycling behavior over time. That will allow the server to diagnose problems as and when they develop. For example, **Figure 8a** shows a graph of outside temperature 402, inside temperature 404 and HVAC cycle times 406 in House A for a specific 24-hour period on date X. Assume that, based upon comparison of the performance of House A on date X relative to House A's historical performance, and in comparison to the performance of House A relative to other nearby houses on date X, the HVAC system in House A is presumed to be operating at normal efficiency, and that House A is in the 86th percentile as

compared to those other houses. **Figure 8b** shows a graph of outside temperature 408, inside temperature 410 and HVAC cycle times 412 in House A for the 24-hour period on date X+1. House A's HVAC system now requires significantly longer cycle times in order to try to maintain the same internal temperature. If those longer cycle times were due to higher outside temperatures, those cycle times would not indicate the existence of any problems. But because server 106 is aware of the outside temperature, the system can eliminate that possibility as an explanation for the higher cycle times. Because server 106 is aware of the cycle times in nearby houses, it can determine that, for example, on date X+1 the efficiency of House A is only in the 23rd percentile. The server will be programmed with a series of heuristics, gathered from predictive models and past experience, correlating the drop in efficiency and the time interval over which it has occurred with different possible causes. For example, a 50% drop in efficiency in one day may be correlated with a refrigerant leak, especially if followed by a further drop in efficiency on the following day. A reduction of 10% over three months may be correlated with a clogged filter. Based upon the historical data recorded by the server, the server 106 will be able to alert the homeowner that there is a problem and suggest a possible cause.

[0062] Because the system will be able to calculate effective thermal mass, it will be able to determine the cost effectiveness of strategies such as pre-cooling for specific houses under different conditions. **Figure 9a** shows a graph of outside temperature 502, inside temperature 504 and HVAC cycling times 506 in House A for a specific 24-hour period on date Y assuming that the system has used a pre-cooling strategy to avoid running the air conditioning during the afternoon, when rates are highest. Because House A has high thermal mass, the house is capable of "banking" cool, and energy consumed during off-peak hours is in effect stored, allowing the house to remain cool even when the system is turned off. Temperatures keep rising during the period the air conditioning is off, but because thermal mass is high, the rate of increase is low, and the house is still comfortable six hours later. Although the pre-cooling cycle time is relatively long, the homeowner may still benefit because the price per kilowatt during the morning pre-

cooling phase is lower than the price during the peak load period. **Figure 9b** shows a graph of the same outside temperature 502 in House B as in House A in Figure 9a for the same 24-hour period and using the same pre-cooling strategy as shown by cycling times 506. But because House B has minimal thermal mass, using additional electricity in order to pre-cool the house does not have the desired effect; inside temperature 508 warms up so fast that the cool that had been banked is quickly lost. Thus the system will recommend that House A pre-cool in order to save money, but not recommend pre-cooling for House B.

[0063] The system can also help compensate for anomalies such as measurement inaccuracies due to factors such as poor thermostat location. It is well-known that thermostats should be placed in a location that will be likely to experience “average” temperatures for the overall structure, and should be isolated from windows and other influences that could bias the temperatures they “see.” But for various reasons, not all thermostat installations fit that ideal. **Figure 10a** shows a graph of outside temperature 602, the average inside temperature for the entire house 604, and inside temperature as read by the thermostat 606 in House C for a specific 24-hour period on September 15th, assuming that the thermostat is located so that from 4PM until 5:30PM on that day the thermostat is in direct sunlight. Until the point at which the sun hits the thermostat, the average inside temperature and temperature as read by the thermostat track very closely. But when the direct sunlight hits the thermostat, the thermostat and the surrounding area can heat up, causing the internal temperature as read by the thermostat to diverge significantly from the average temperature for the rest of the house. Conventional thermostats have no way of distinguishing this circumstance from a genuinely hot day, and will both over-cool the rest of the house and waste considerable energy when it cycles the air conditioner in order to reduce the temperature as sensed by the thermostat. If the air conditioning is turned off, this phenomenon will manifest as a spike in temperature as measured by the thermostat. If the air conditioning is turned on (and has sufficient capacity to respond to the distorted temperature signal caused by the sunlight), this phenomenon will likely manifest as relatively small changes in the temperature as sensed by the thermostat, but significantly increased HVAC usage

(as well as excessively lowered temperatures in the rest of the house, but this result may not be directly measured in a single sensor environment. The subject system, in contrast, has multiple mechanisms that will allow it to correct for such distortions. First, because the subject system compares the internal readings from House C with the external temperature, it will be obvious that the rise in temperature at 4:00PM is not correlated with a corresponding change in outside temperature. Second, because the system is also monitoring the readings from the thermostat in nearby House D, which (as shown in **Figure 10b**) is exposed to the same outside temperature 602, but has no sudden rise in measured internal temperature 608 at 4:00, the system has further validation that the temperature increase is not caused by climatic conditions. And finally, because the system has monitored and recorded the temperature readings from the thermostat in House C for each previous day, and has compared the changing times of the aberration with the progression of the sun, the system can distinguish the patterns likely to indicate solar overheating from other potential causes.

[0064] Figure 11 illustrates the steps involved in calculating comparative thermal mass, or the thermal mass index. In step 1102, the server retrieves climate data related to home X. Such data may include current outside temperature, outside temperature during the preceding hours, outside humidity, wind direction and speed, whether the sun is obscured by clouds, and other factors. In step 1104, the server retrieves HVAC duty cycle data for home X. Such data may include target settings set by the thermostat in current and previous periods, the timing of switch-on and switch-off events and other data. In step 1106, the server retrieves data regarding recent temperature readings as recorded by the thermostat in home X. In step 1108, the server retrieves profile data for home X. Such data may include square footage and number of floors, when the house was built and/or renovated, the extent to which it is insulated, its address, make, model and age of its furnace and air conditioning hardware, and other data. In step 1110, the server retrieves the current inside temperature reading as transmitted by the thermostat. In step 1112, the server calculates the thermal mass index for the home under those conditions; that is, for example, it calculates the likely rate of change for internal temperature in

home X from a starting point of 70 degrees when the outside temperature is 85 degrees at 3:00PM on August 10th when the wind is blowing at 5 mph from the north and the sky is cloudy. The server accomplishes this by applying a basic algorithm that weighs each of these external variables as well as variables for various characteristics of the home itself (such as size, level of insulation, method of construction, etc.) and data from other houses and environments.

[0065] **Figure 12** illustrates the steps involved in diagnosing defects in the HVAC system for specific home X. In step 1202, the server retrieves climate data related to home X. Such data may include current outside temperature, outside temperature during the preceding hours, outside humidity, wind direction and speed, whether the sun is obscured by clouds, and other factors. In step 1204, the server retrieves HVAC duty cycle data for home X. Such data may include target settings set by the thermostat in current and previous periods, the timing of switch-on and switch-off events and other data. In step 1206, the server retrieves data regarding current and recent temperature readings as recorded by the thermostat in home X. In step 1208, the server retrieves profile data for home X. Such data may include square footage and number of floors, when the house was built and/or renovated, the extent to which it is insulated, its address, make, model and age of its furnace and air conditioning hardware, and other data. In step 1210, the server retrieves comparative data from other houses that have thermostats that also report to the server. Such data may include interior temperature readings, outside temperature for those specific locations, duty cycle data for the HVAC systems at those locations, profile data for the structures and HVAC systems in those houses and the calculated thermal mass index for those other houses. In step 1212, the server calculates the current relative efficiency of home X as compared to other homes. Those comparisons will take into account differences in size, location, age, etc in making those comparisons.

[0066] The server will also take into account that relative efficiency is not absolute, but will vary depending on conditions. For example, a house that has extensive south-facing windows is likely to experience significant solar gain. On sunny winter days, that home will appear more efficient than on cloudy winter days.

That same house will appear more efficient at times of day and year when trees or overhangs shade those windows than it will when summer sun reaches those windows. Thus the server will calculate efficiency under varying conditions.

[0067] In step 1214 the server compares the HVAC system's efficiency, corrected for the relevant conditions, to its efficiency in the past. If the current efficiency is substantially the same as the historical efficiency, the server concludes 1216 that there is no defect and the diagnostic routine ends. If the efficiency has changed, the server proceeds to compare the historical and current data against patterns of changes known to indicate specific problems. For example, in step 1218, the server compares that pattern of efficiency changes against the known pattern for a clogged air filter, which is likely to show a slow, gradual degradation over a period of weeks or even months. If the pattern of degradation matches the clogged filter paradigm, the server creates and transmits to the homeowner a message 1220 alerting the homeowner to the possible problem. If the problem does not match the clogged filter paradigm, the system compares 1222 the pattern to the known pattern for a refrigerant leak, which is likely to show a degradation over a period of a few hours to a few days. If the pattern of degradation matches the refrigerant leak paradigm, the server creates and transmits to the homeowner a message 1224 alerting the homeowner to the possible problem. If the problem does not match the refrigerant leak paradigm, the system compares 1226 the pattern to the known pattern for an open window or door, which is likely to show significant changes for relatively short periods at intervals uncorrelated with climatic patterns. If the pattern of degradation matches the open door/window paradigm, the server creates and transmits to the homeowner a message 1228 alerting the homeowner to the possible problem. If the problem does not match the refrigerant leak paradigm, the system continues to step through remaining known patterns N 1230 until either a pattern is matched 1232 or the list has been exhausted without a match 1234.

[0068] **Figure 13** illustrates the steps involved in diagnosing inaccurate thermostat readings due to improper location. In step 1302, the server retrieves climate data related to home X. Such data may include current outside

temperature, outside temperature during the preceding hours, outside humidity, wind direction and speed, whether the sun is obscured by clouds, and other factors. In step 1304, the server retrieves HVAC duty cycle data for home X. Such data may include target settings set by the thermostat in current and previous periods, the timing of switch-on and switch-off events and other data. In step 1306, the server retrieves data regarding current and recent temperature readings as recorded by the thermostat in home X. In step 1308, the server retrieves profile data for home X. Such data may include square footage and number of floors, when the house was built and/or renovated, the extent to which it is insulated, its address, make, model and age of its furnace and air conditioning hardware, and other data. In step 1310, the server retrieves comparative data from other houses that have thermostats that also report to the server. Such data may include interior temperature readings, outside temperature for those specific locations, duty cycle data for the HVAC systems at those locations, profile data for the structures and HVAC systems in those houses and the calculated thermal mass index for those other houses. In step 1312, the server calculates the expected thermostat temperature reading based upon the input data. In step 1314, the server compares the predicted and actual values. If the calculated and actual values are at least roughly equivalent, the server concludes 1316 that there is no thermostat-related anomaly. If the calculated and actual values are not roughly equivalent, the server retrieves additional historical information about past thermostat readings in step 1318. In step 1320, the server retrieves solar progression data, i.e., information regarding the times at which the sun rises and sets on the days being evaluated at the location of the house being evaluated, and the angle of the sun at that latitude, etc. In step 1322, the server compares the characteristics of the anomalies over time, to see if, for example, abnormally high readings began at 3:06 on June 5th, 3:09 on June 6th, 3:12 on June 7th, and the solar progression data suggests that at the house being analyzed, that sun would be likely to reach a given place in that house three minutes later on each of those days. If the thermostat readings do not correlate with the solar progression data, the server concludes 1324 that the sun is not causing the distortion by directly hitting the thermostat. If the thermostat readings do correlate

with solar progression, the server then calculates 1326 the predicted duration of the distortion caused by the sun. In step 1328, the server calculates the appropriate setpoint information to be used by the thermostat to maintain the desired temperature and correct for the distortion for the expected length of the event. For example, if the uncorrected setpoint during the predicted event is 72 degrees, and the sun is expected to elevate the temperature reading by eight degrees, the server will instruct the thermostat to maintain a setpoint of 80 degrees. In step 1330, the server sends the homeowner a message describing the problem.

[0069] The system installed in a subscriber's home may optionally include additional temperature sensors at different locations within the building. These additional sensors may be connected to the rest of the system via a wireless system such as 802.11 or 802.15.4, or may be connected via wires. Additional temperature and/or humidity sensors may allow increased accuracy of the system, which can in turn increase user comfort or energy savings.

[0070] While particular embodiments have been shown and described, it is apparent that changes and modifications may be made without departing from the invention in its broader aspects and, therefore, the invention may be carried out in other ways without departing from the true spirit and scope. These and other equivalents are intended to be covered by the following claims:

WHAT IS CLAIMED IS:

1. A system for evaluating changes in the operational efficiency of an HVAC system over time comprising:

at least one HVAC control system associated with a first structure that receives temperature measurements from at least a first structure conditioned by at least one HVAC system, and receives status of said HVAC system;

one or more processors that receive measurements of outside temperatures from at least one source other than said HVAC system and compare said temperature measurements from said first structure over time; and

wherein said one or more processors compares an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time to determine whether the operational efficiency of the HVAC system has decreased over time.

2. A system as in claim 1 in which said processors receive measurements of outside temperatures for geographic regions such as ZIP codes from sources other than said HVAC control systems.

3. A system as in claim 1 wherein said temperature measurements are obtained from a programmable thermostat that communicates using a network.

4. A system as in claim 1 in which said processors communicate with said HVAC system using a network that includes an electricity meter.

5. A system as in claim 1 in which said HVAC system includes a programmable thermostat and said programmable thermostat is the sole source for current data regarding temperature inside said first structure conditioned by said HVAC system.

6. A system as in claim 1 in which said HVAC system measures inside said first structure at only one physical location.

7. A system as in claim 1 in which the status of said HVAC system includes whether said system is “on” or “off”.

8. A system for detecting behavior of HVAC control systems comprising:

a first HVAC control system that receives temperature measurements from at least a structure conditioned by at least one HVAC system, and receives status of said HVAC system;

at least a second HVAC control system that obtains temperature measurements from at least a structure conditioned by a second HVAC system, and status of said second HVAC system;

one or more processors that receive and records measurements of outside temperatures from at least one source other than said first and second HVAC systems and receives, records and compares said temperature measurements from said first HVAC system and said second HVAC system and said outside temperature measurements over time to determine the efficiency of the first HVAC system and the second HVAC system.

9. A system as in claim 8 in which said processors receive said outside temperature measurements for geographic regions such as ZIP codes from sources other than said HVAC control systems.

10. A system as in claim 8 wherein said temperature measurements are obtained from a programmable thermostat that communicates with said first HVAC control system using a network.

11. A system as in claim 8 in which said processors communicate with said first HVAC system using a network that includes an electricity meter.

12. A system as in claim 8 in which said first HVAC system includes a programmable thermostat and said programmable thermostat is the sole source for current data regarding temperature inside said location conditioned by said first HVAC system.

13. A system as in claim 8 in which said first HVAC system measures inside said first location at only one physical location.

14. A system as in claim 8 in which the status of said first HVAC system includes whether said first HVAC system is “on” or “off”.

SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM

ABSTRACT OF THE DISCLOSURE

The invention comprises systems and methods for evaluating changes in the operational efficiency of an HVAC system over time. The climate control system obtains temperature measurements from at least a first location conditioned by the climate system, and status of said HVAC system. One or more processors receives measurements of outside temperatures from at least one source other than said HVAC system and compares said temperature measurements from said first location with expected temperature measurements. The expected temperature measurements are based at least in part upon past temperature measurements.

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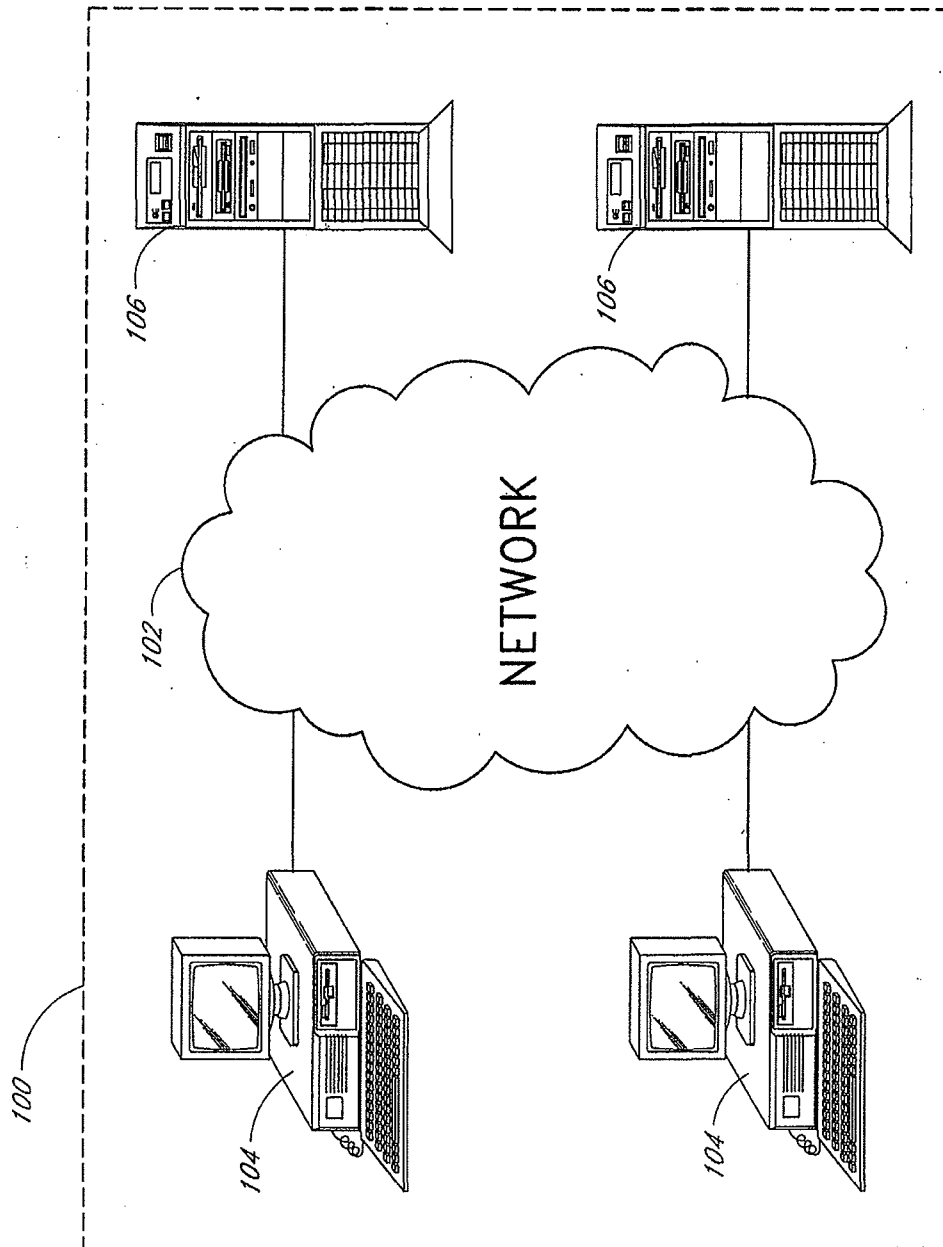
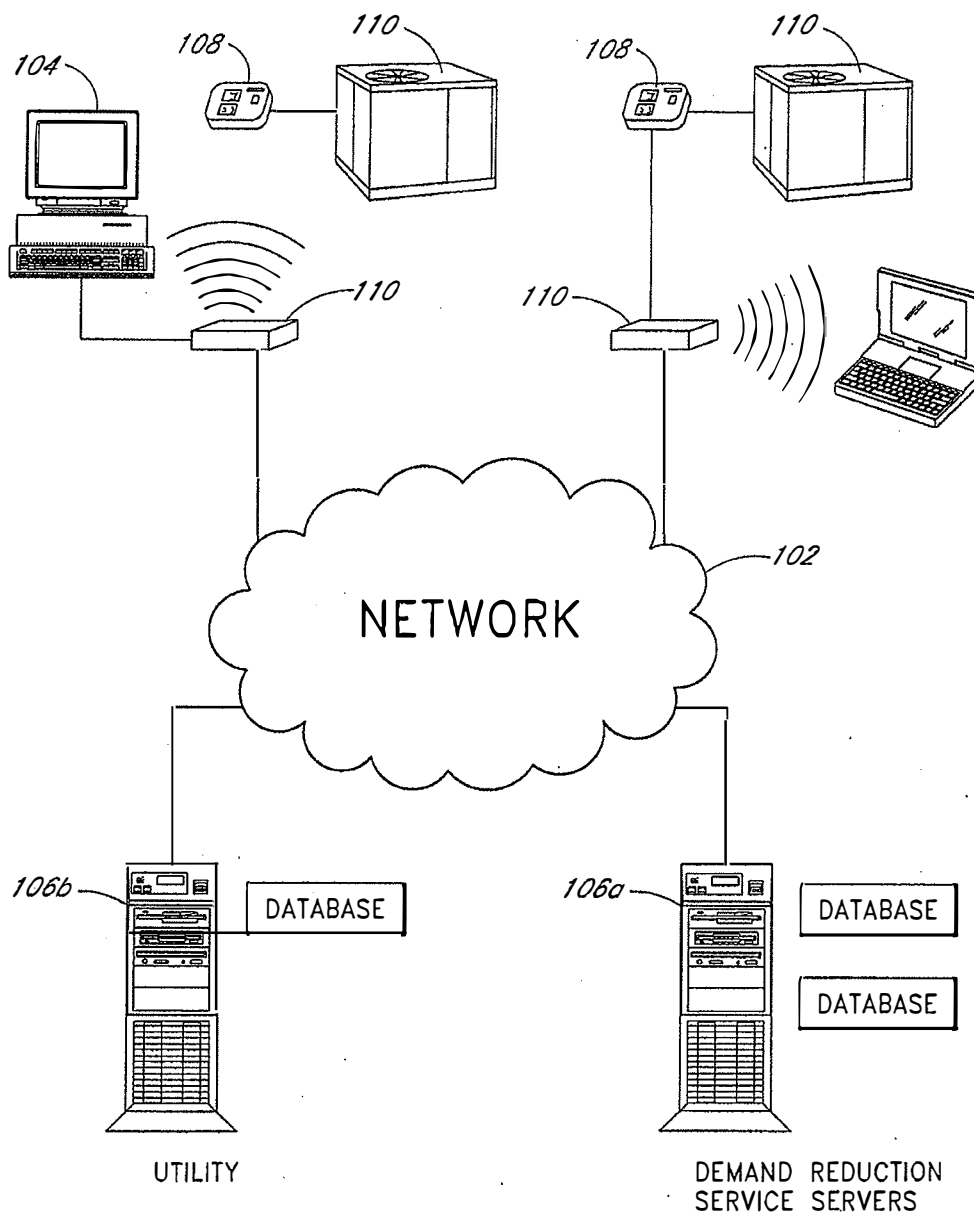


FIG. 1

*FIG. 2*

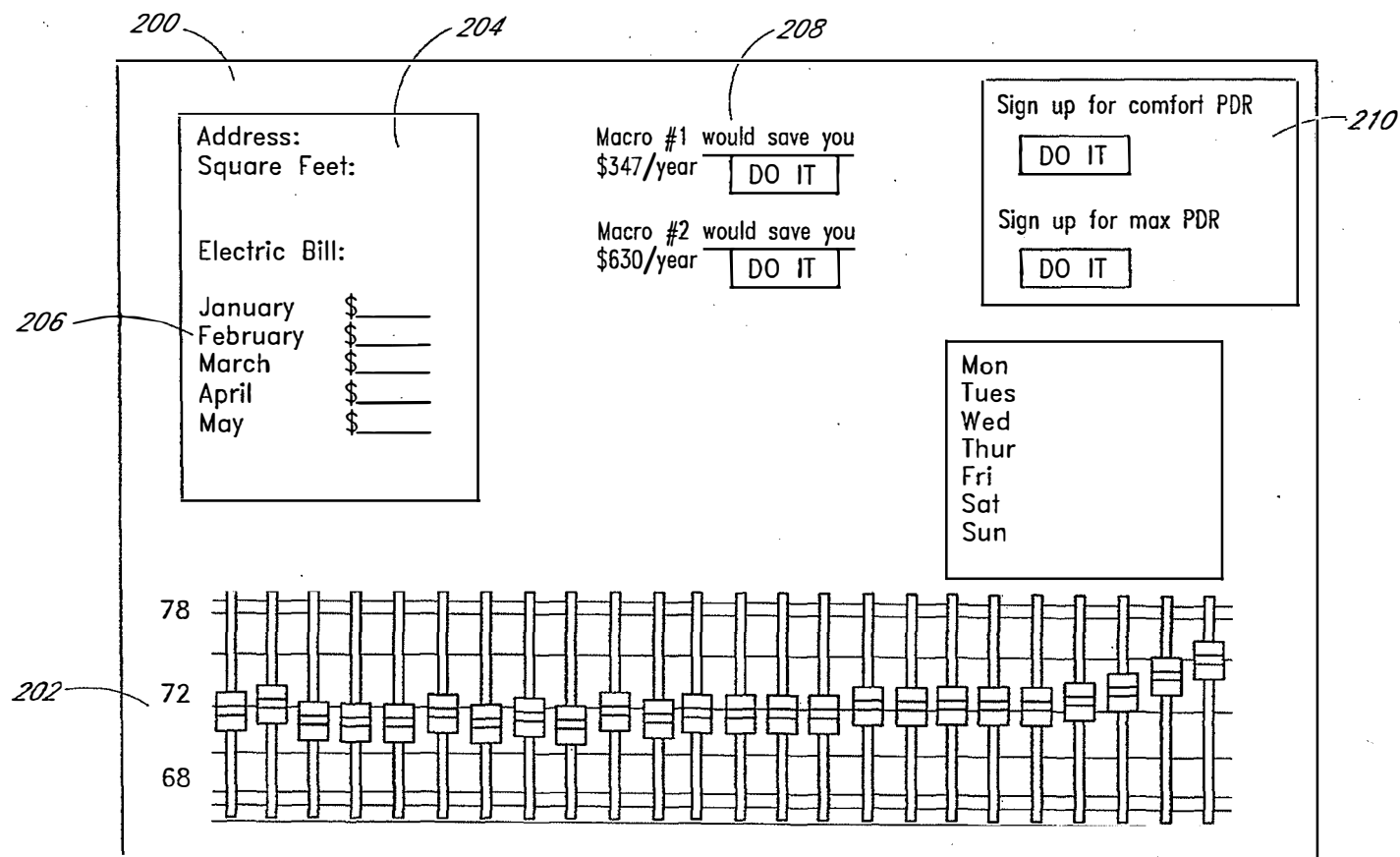


FIG. 3

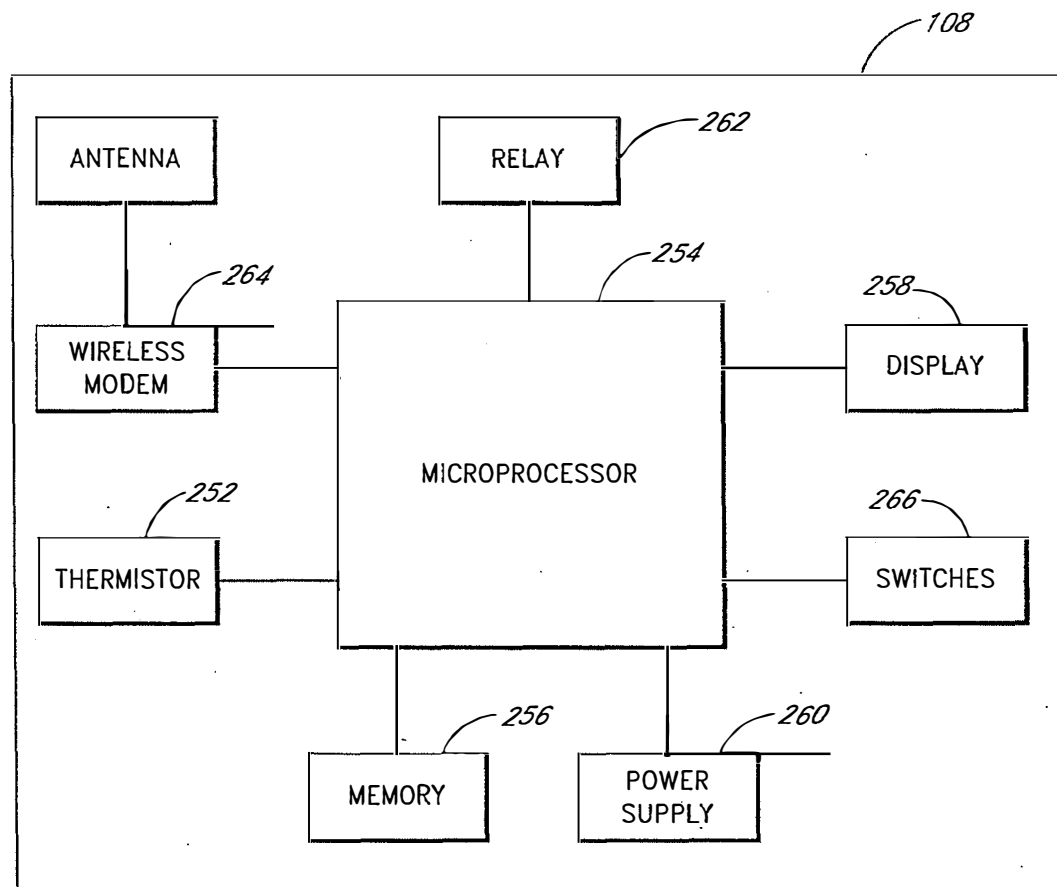


FIG. 4

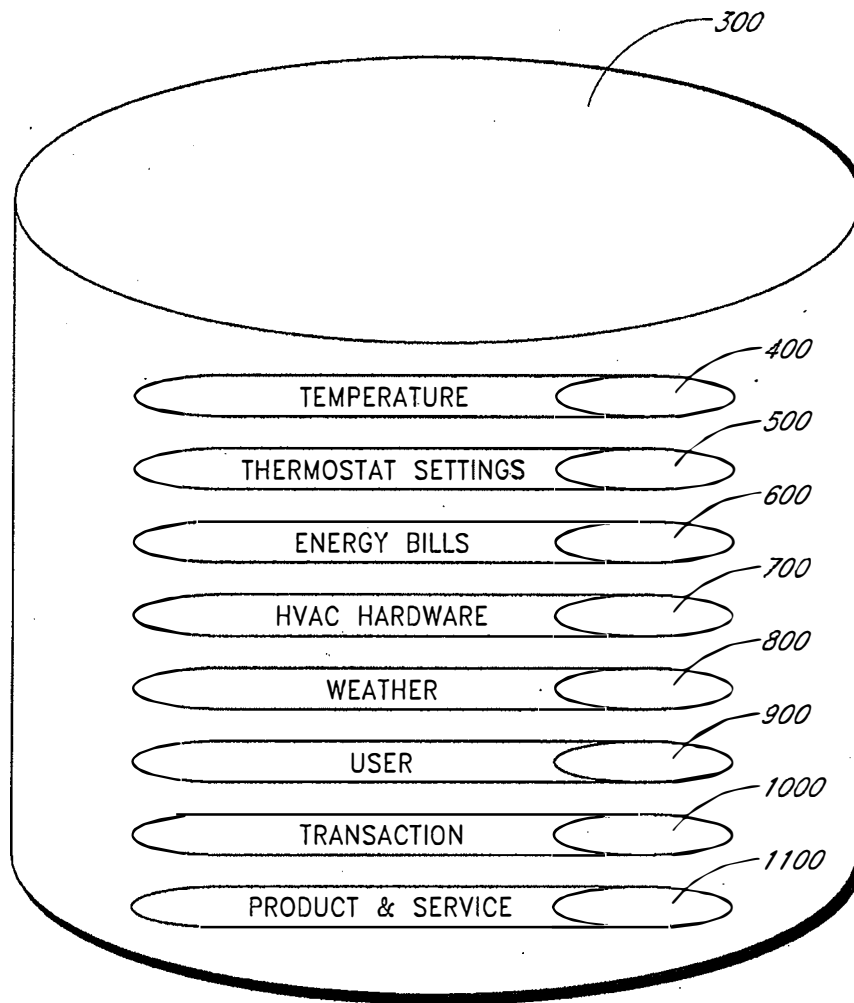


FIG. 5

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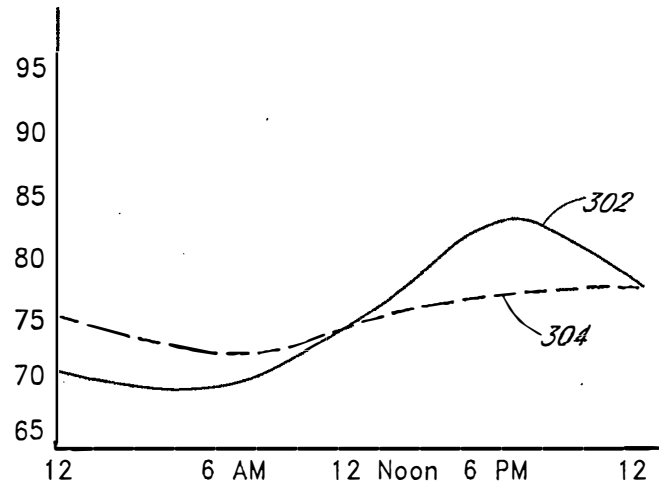


FIG. 6A

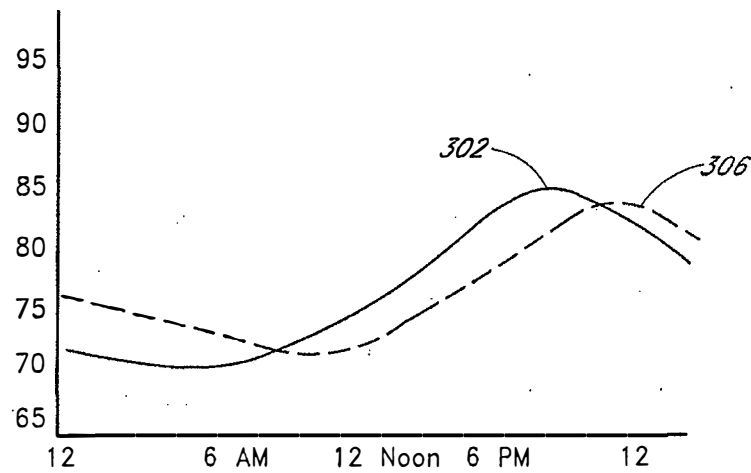


FIG. 6B

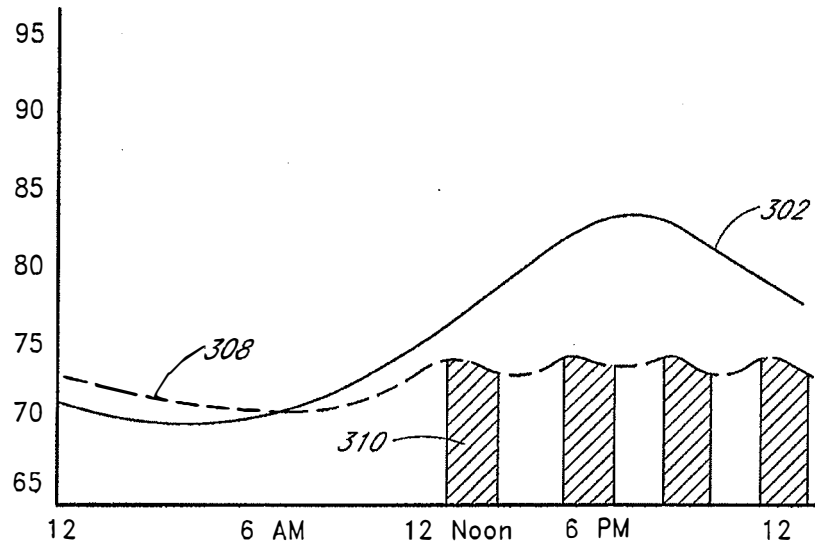


FIG. 7A

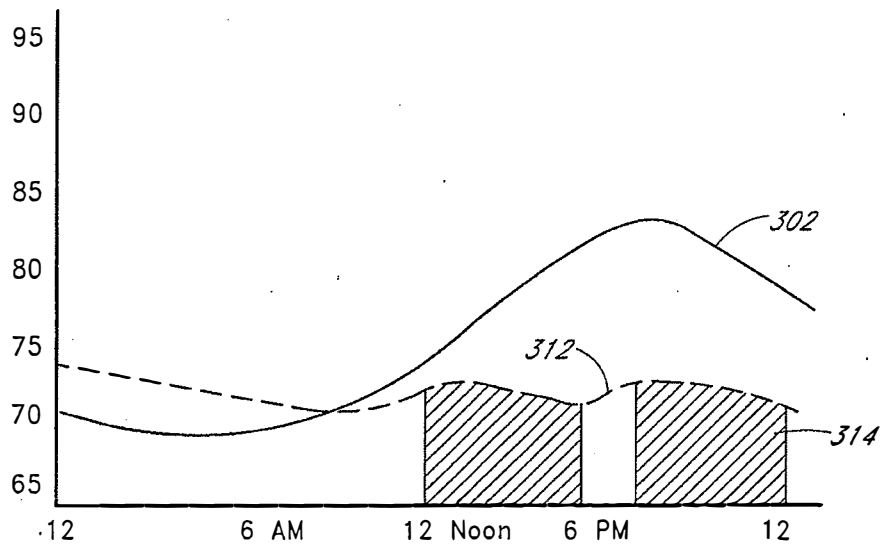


FIG. 7B

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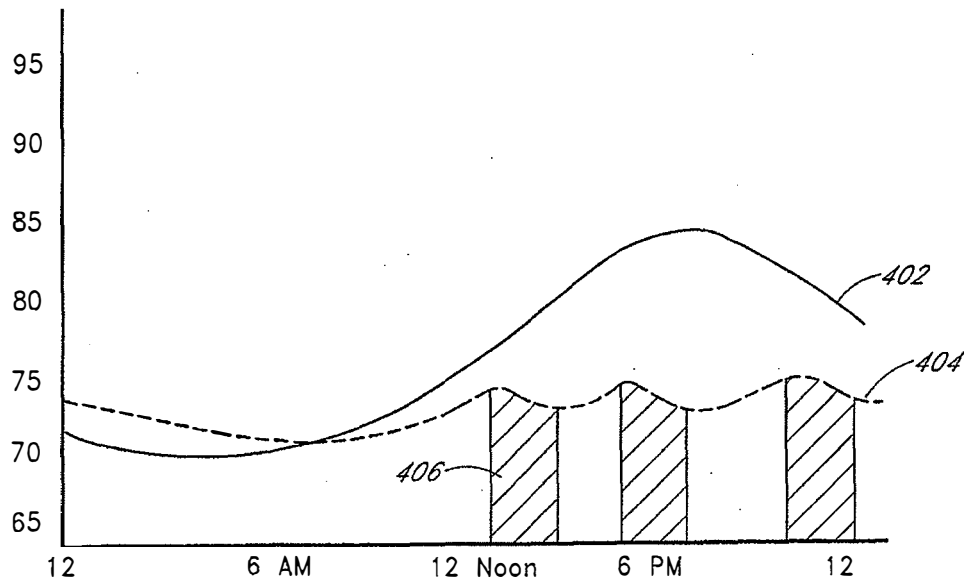


FIG. 8A

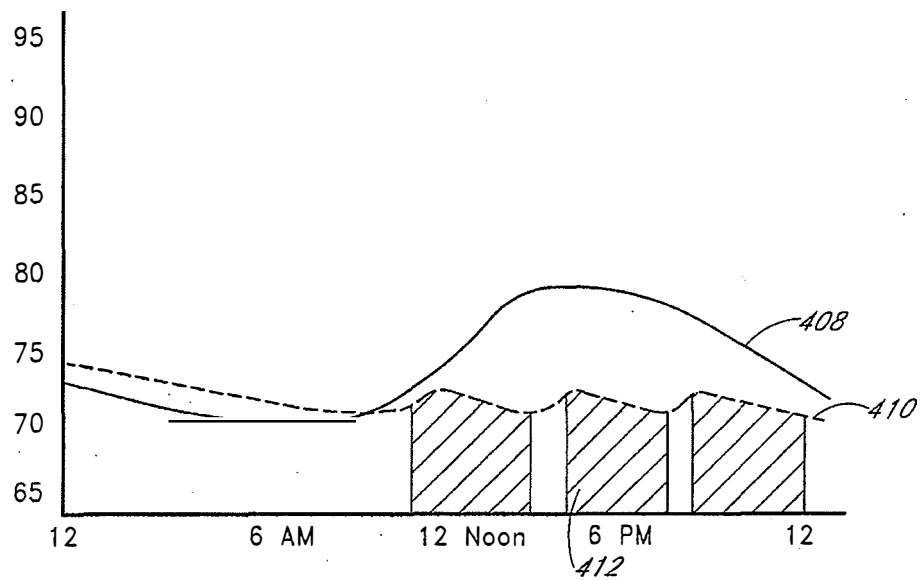


FIG. 8B

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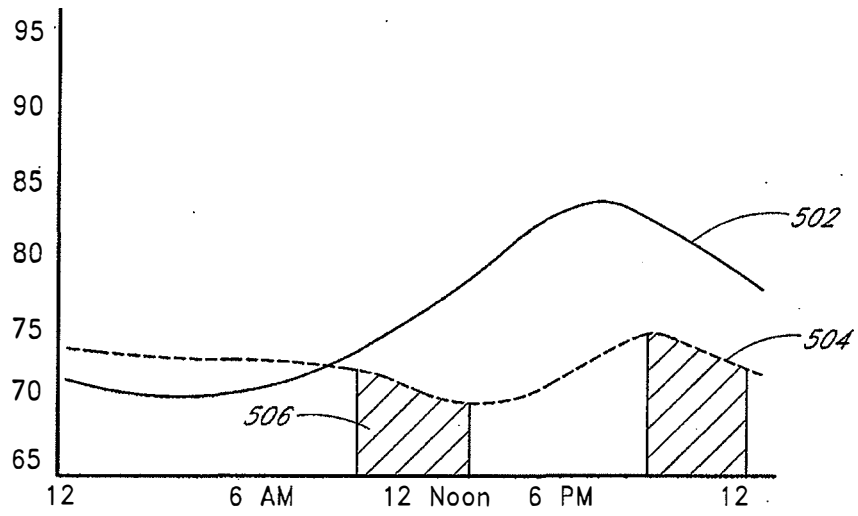


FIG. 9A

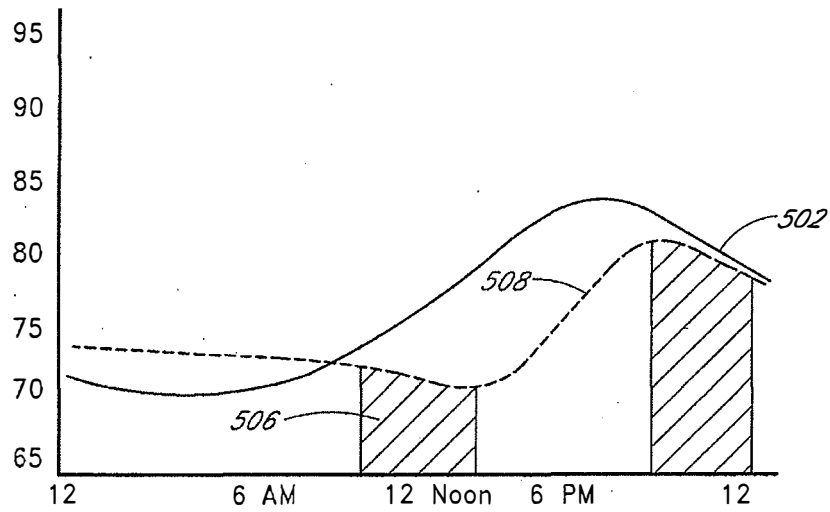


FIG. 9B

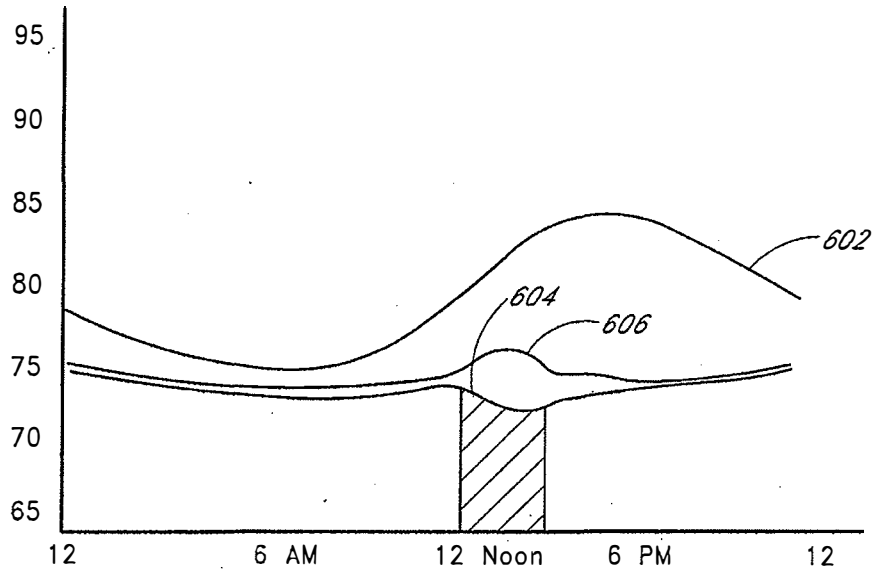


FIG. 10A

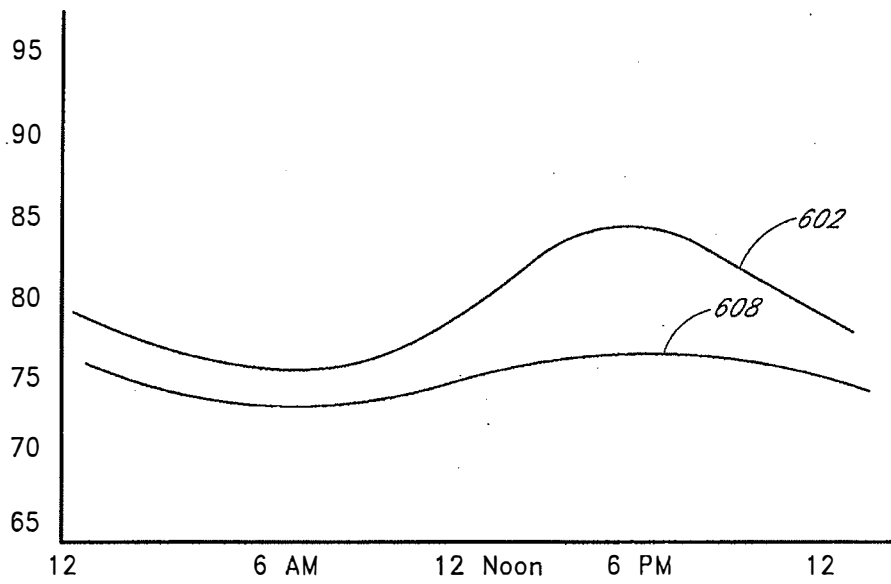
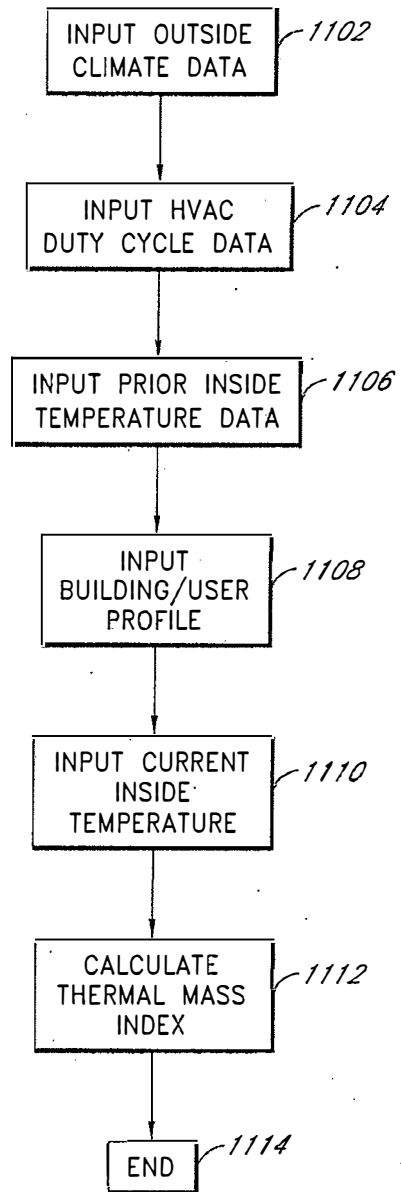


FIG. 10B

*FIG. 11*

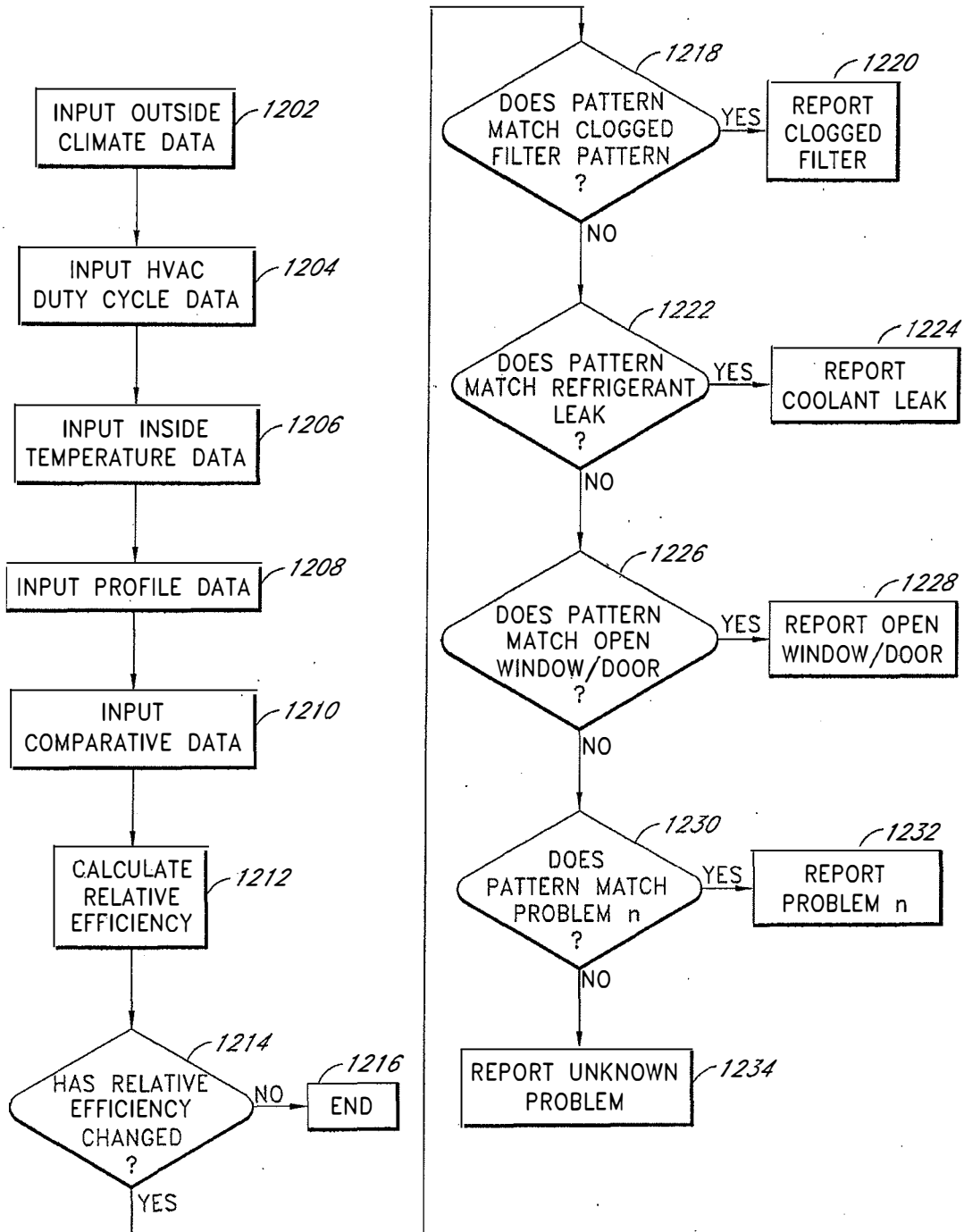


FIG. 12

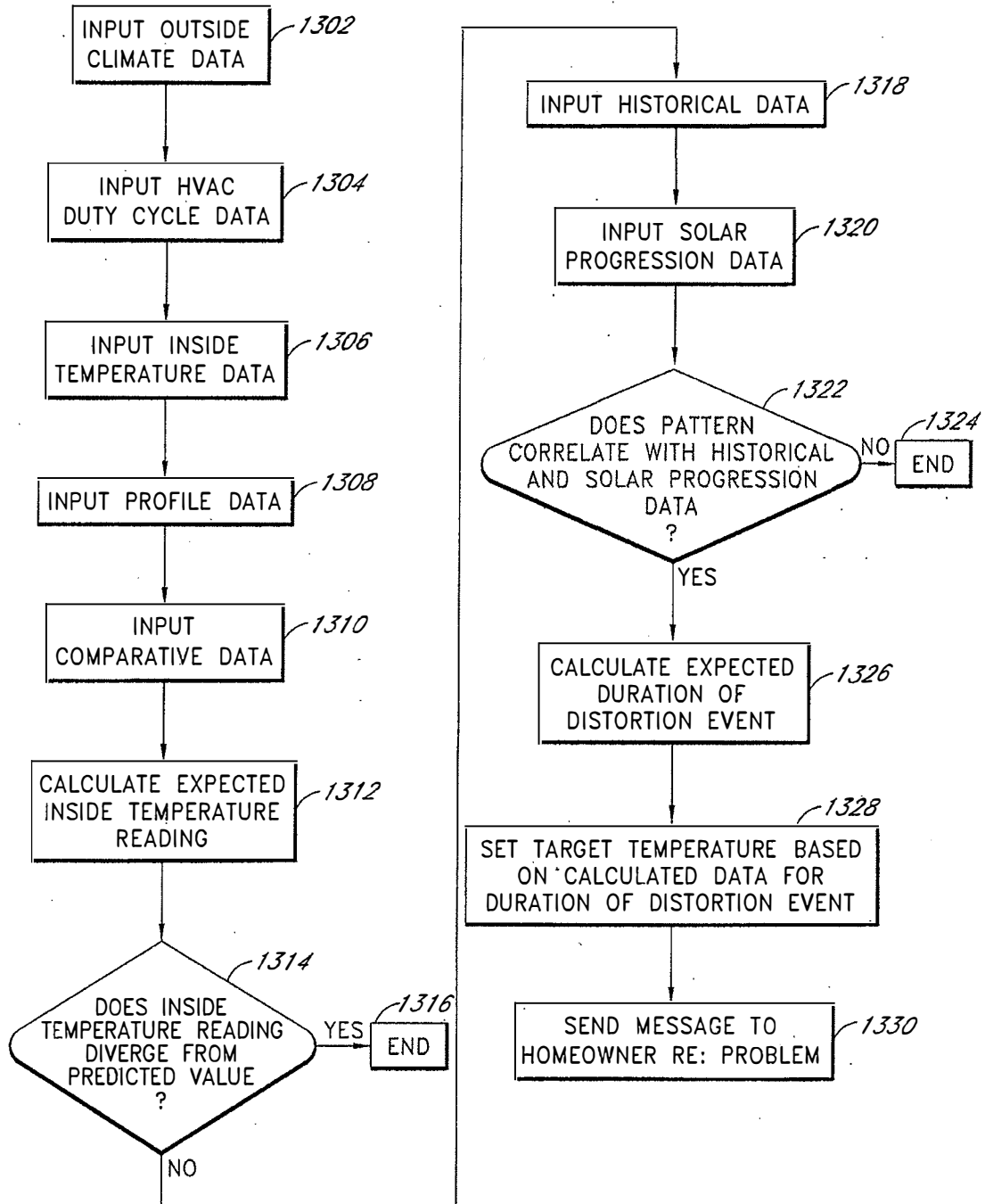


FIG. 13

**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
APPLICATION DATA SHEET (37 CFR 1.76)**

Title of Invention	SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM
As the below named inventor, I hereby declare that: This declaration is directed to: ☐ The attached application, or ☒ United States application or PCT international application number <u>13/861189</u> <u>April 11, 2013</u> filed on _____ The above-identified application was made or authorized to be made by me. I believe that I am the original inventor or an original joint inventor of a claimed invention in the application. I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both. WARNING: Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft: Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.	
LEGAL NAME OF INVENTOR Inventor: <u>John Douglas Steinberg</u> Date (Optional): <u>12/12/13</u> Signature: _____	
Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.	

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM
---------------------------	---

As the below named inventor, I hereby declare that:

This declaration is directed to: ☐ The attached application, or ☒ United States application or PCT international application number 13/861189
April 11, 2013
 filed on _____

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

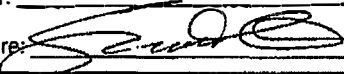
I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Scott Douglas Hublou Date (Optional): 12/12/13

Signature: 

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Electronic Acknowledgement Receipt

EFS ID:	31888496
Application Number:	15905251
International Application Number:	
Confirmation Number:	2380
Title of Invention:	SYSTEM AND METHOD FOR EVALUATING CHANGES IN THE EFFICIENCY OF AN HVAC SYSTEM
First Named Inventor/Applicant Name:	John Douglas Steinberg
Customer Number:	20995
Filer:	John R. King/Zachary Galligan
Filer Authorized By:	John R. King
Attorney Docket Number:	EFACT.006D1
Receipt Date:	26-FEB-2018
Filing Date:	
Time Stamp:	16:40:44
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	EFACT-006D1_ADS.pdf	1823428	no	9
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Warnings:

148

Information:					
2		EFACT-006D1_specification.pdf	115781	yes	25
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	Specification		1	21	
	Claims		22	24	
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3	Drawings-only black and white line drawings	EFACT-006D1_drawings.pdf	231838	no	13
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