UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

WILLOW TECHNOLOGIES, LLC,
Petitioner,

v.

JOHNSON CONTROLS TECHNOLOGY COMPANY,
Patent Owner.

Case No. IPR2023-_____

U.S. PATENT NO. 10,055,114

PETITION FOR *INTER PARTES* REVIEW

TABLE OF CONTENTS

I. INTRODUCTION 1

II. OVERVIEW OF CHALLENGE AND RELIEF REQUESTED 4

A. 37 C.F.R. §42.104(b)(1): Claims for Which IPR Is Requested 4

B. 37 C.F.R. §42.104(b)(2): Grounds for Challenge 4

C. 37 C.F.R. §42.104(b)(3): Claim Construction 6

D. 37 C.F.R. §42.104(b)(4): How the Claims Are Unpatentable 6

E. 37 C.F.R. §42.104(b)(5): Evidence Supporting Challenge 6

III. OVERVIEW OF THE '114 Patent 6

A. Specification and Claims 7

B. Prosecution History 10

IV. PERSON OF ORDINARY SKILL IN THE ART 10

V. SUMMARY OF THE PRIOR ART 11

A. Mills (Ex. 1004) 11

B. Hedley (Ex. 1006) 13

VI. SPECIFIC GROUNDS FOR PETITION 17

A. GROUND I: Mills (Ex. 1004) 17

1. Claim 1 17

2. Claim 7 39

3. Claim 8 44

4. Claim 11 46

5. Claim 15 47

6. Claim 16 52

7. Claim 17 54

B. GROUND II: Hedley (Ex. 1006) 55

1. Claim 1 55

2. Claim 7 68

3. Claim 8 74

4. Claim 11 78

5. Claim 15 79

6. Claim 16 82

7. Claim 17 84

C. Ground III: Hedley (Ex. 1006) and Hedley's File History (Ex. 1005) 85

1. Claim 7 86

2. Claim 8 91

D. GROUND IV: Mills (Ex. 1004) and Hedley's File History (Ex. 1005) 96

1. Claim 8 96

VII. NO FACTORS JUSTIFY DISCRETIONARY DENIAL 99

VIII. MANDATORY NOTICES UNDER 37 C.F.R. §42.8(a)(1) 101

A. 37 C.F.R. § 42.8(b)(1): Real Party-in-Interest 101

B. 37 C.F.R. §42.8(b)(2): Related Matters 101

C. 37 C.F.R. §§ 42.8(b)(3) and (4): Counsel and Service Information 102

IX. PAYMENT OF FEES UNDER 37 C.F.R. §42.103 102

X. CERTIFICATION OF GROUNDS FOR STANDING 103

XI. CONCLUSION 103

TABLE OF AUTHORITIES

Cases

Page(s)

Abbott Diabetes Care Inc. v. DexCom, Inc.,
IPR2022-00913, Paper 14 (P.T.A.B. Nov. 3, 2022).....5

Apple Inc. v. Fintiv, Inc.,
IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020).....101, 102

Bruckelmyer v. Ground Heaters, Inc.,
445 F.3d 1374 (Fed. Cir. 2006) 4, 15, 86

Duodecad IT Svcs. Luxembourg v. WAG Acquisition, LLC,
IPR2015-01036, Paper 17 (P.T.A.B. Oct. 20, 2016).....5, 87

KSR Int'l Co. v. Teleflex Inc.,
550 U.S. 398 (2007).....5

Nokia of Am. Corp. v. TQ Delta, LLC,
IPR2022-00656, Paper 14 (P.T.A.B. Nov. 7, 2022).....102

Samsung Elec. Co., Ltd. v. MemoryWeb, LLC,
IPR2022-00221, Paper 10, 9-10 (P.T.A.B. Aug. 1, 2022) 102

Statutes

35 U.S.C. §§102(a)(1) and 102(a)(2).....4

35 U.S.C. § 314(a) 102

35 U.S.C. §315(e)(1).....105

Other Authorities

37 C.F.R. §1.68 6

37 C.F.R. §42.8(a)(1).....103

37 C.F.R. §42.8(b)(1).....103

37 C.F.R. §42.8(b)(2).....103

37 C.F.R. §42.8(b)(3).....104

37 C.F.R. §42.8(b)(4).....104

37 C.F.R. §42.10(b) 104

37 C.F.R. §42.15(a)(1).....104

37 C.F.R. §42.103 104

37 C.F.R. §42.104(b)(1).....4

37 C.F.R. §42.104(b)(2).....4

37 C.F.R. §42.104(b)(3).....6

37 C.F.R. §42.104(b)(4).....6

37 C.F.R. §42.104(b)(5).....6

LIST OF EXHIBITS

Exhibit No.	Description
1001	United States Patent No. 10,055,114 ("'114 Patent")
1002	*Curriculum Vitae* of Dr. Patrick Hillberg
1003	Declaration of Dr. Patrick Hillberg
1004	U.S. Patent Application Publication 2013/0262035 ("Mills")
1005	File History of Hedley, US 12/776,159 ("Hedley File History")
1006	U.S. Patent Application Publication 2010/0286937 ("Hedley")
1007	File History of U.S. Patent No. 10,055,114
1008	Plaintiff's Supplemental Responses and Objections to Willow Technology USA, Inc.'s First Set of Interrogatories

I. INTRODUCTION

The ’114 Patent claims getting data from equipment (*e.g.*, temperature sensor), making charts (*e.g.*, temperature over time), and presenting them to the user (*e.g.*, displaying on a screen). These concepts are familiar to anyone having seen a weather chart including past temperature information on an evening news program. And they were especially familiar to persons of skill in the art addressing information and control systems used in buildings, the focus of the ’114 Patent. Simply put, it was not an invention in 2016 (*i.e.,* alleged priority date) to chart data from equipment using a computer. This is reflected in the prior art presented in this Petition, which renders the Challenged Claims unpatentable.

The Challenged Claims resulted from a breakdown in the examination process. First, Patent Owner obfuscated the claims using technical jargon that added nothing over the prior art: “building equipment” to provide “raw data samples,” “data collector” to transform the “raw data” to “raw data timeseries” (*e.g.*, temperature per minute), a “platform service” to created “optimized” timeseries (*e.g.*, “condensed versions of the raw timeseries data,” such as temperature per hour) a “timeseries database” to store timeseries, and an “energy management application” with a “dashboard” and “widget” to display the timeseries. Second, these claims received no substantive examination. Rather, the examiner immediately issued a notice of allowance without a single office action. The reasons for allowance were

boilerplate, merely paraphrasing the entire independent claims as not being taught by the prior art.

But the prior art already discloses that in the Challenged Claims. The first ground of this Petition is based on Mills (Ex. 1004), entitled "Updating Rollup Streams In Response To Time Series Of Measurement Data." Mills teaches collecting raw data from building equipment and processing this raw data to generate "rollup" or optimized data as claimed:

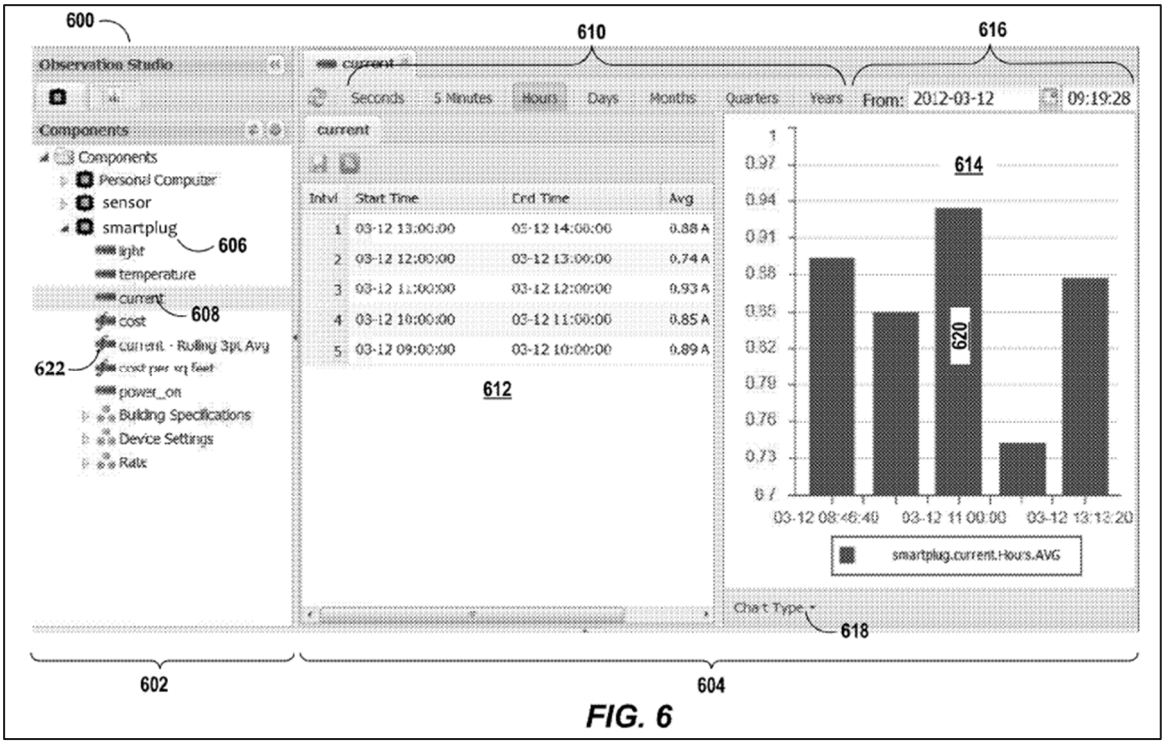


FIG. 6

Ex. 1004, Fig. 6.

The second ground is based on Hedley (Ex. 1006), entitled "Building Energy Consumption Analysis System." Hedley likewise teaches collecting and processing data from building equipment as claimed:

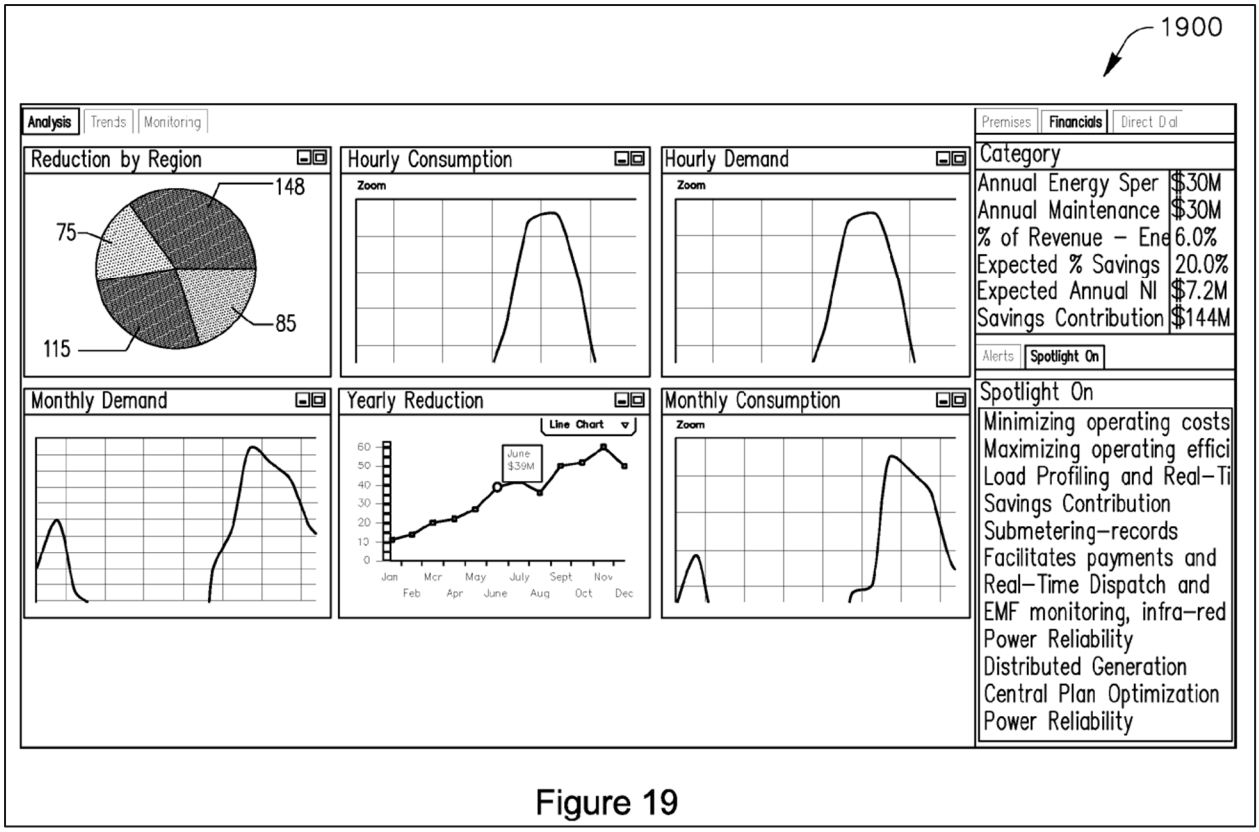


Figure 19

Ex. 1006, Fig. 19.

The third and fourth grounds are based on Hedley including Hedley's original application and Mills in combination with Hedley's original application, respectively. The file wrapper of Hedley (Ex. 1005) includes originally filed drawings which clearly describe the subject matter of certain dependent claims.

None of the grounds raised in this petition were addressed during the effectively cursory prosecution of the '114 Patent, nor was the asserted prior art of record. Between the basic, non-inventive claims of the '114 Patent, the new and invalidating prior art relied on in this Petition, and the unreliable prosecution before

the examiner, this Petition presents a textbook case for *inter partes* review. Institution is warranted.

II. OVERVIEW OF CHALLENGE AND RELIEF REQUESTED

A. 37 C.F.R. §42.104(b)(1): Claims for Which IPR Is Requested

Petitioner challenges the patentability of claims 1, 7, 8, 11, 15, 16, and 17 (the "Challenged Claims") of the '114 Patent and requests that they be canceled.

B. 37 C.F.R. §42.104(b)(2): Grounds for Challenge

The claims are challenged based on the following references. The '114 Patent is subject to AIA law, as the patent purports to claim priority to January 22, 2016.

- **Mills (Ex. 1004):** Mills is a U.S. patent application which was published on October 3, 2013. Accordingly, Mills qualifies as prior art under at least 35 U.S.C. §§102(a)(1) and 102(a)(2).

- **Hedley (Ex. 1006):** Hedley is a U.S. patent application which was published on November 11, 2010. Accordingly, Hedley qualifies as prior art under at least 35 U.S.C. §§102(a)(1) and 102(a)(2). The file wrapper of Hedley (Ex. 1005) contains additional figures that also constitute prior art under 35 U.S.C. §§102(a)(1) and 102(a)(2).[1]

[1] *See Bruckelmyer v. Ground Heaters, Inc.*, 445 F.3d 1374, 1378-80 (Fed. Cir. 2006) (holding that figures appearing in a patent's file history but removed from the issued

Ground	Basis	Claims	Proposed Statutory Rejection
I	§103	1, 7, 8, 11, 15, 16, and 17	Obvious over Mills in view of the level of ordinary skill in the art.[2]
II	§103	1, 7, 8, 11, 15, 16, and 17	Obvious over Hedley in view of the level of ordinary skill in the art.
III	§103	7, 8	Obvious over Hedley (including Hedley's original application) in view of the level of ordinary skill in the art.
IV	§103	8	Obvious over Mills and Hedley's original application in view of the level of ordinary skill in the art.

patent, even for foreign patents, constitute prior art); *Duodecad IT Svcs. Luxembourg v. WAG Acquisition, LLC*, IPR2015-01036, Paper 17, at 18–19 (P.T.A.B. Oct. 20, 2016) (recognizing that file histories are "available as prior art against the challenged claims" in *inter partes* review).

[2] When analyzing whether claims would have been obvious, it must always be from the perspective of a skilled artisan and one must consider knowledge generally available to one of ordinary skill in the art. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). However, the Grounds herein expressly refer to the knowledge of a person of ordinary skill in the art for the sake of completeness. *See Abbott Diabetes Care Inc. v. DexCom, Inc.*, IPR2022-00913, Paper 14, at 9 n.1 (P.T.A.B. Nov. 3, 2022).

C. 37 C.F.R. §42.104(b)(3): Claim Construction

For purposes of this Petition, all terms should be given their plain and ordinary meaning. 37 C.F.R. §42.104(b)(3). Petitioner reserves the right to later address the construction of any claim terms, if necessary.

D. 37 C.F.R. §42.104(b)(4): How the Claims Are Unpatentable

A detailed explanation of how the Challenged Claims are unpatentable is provided below in §VI.

E. 37 C.F.R. §42.104(b)(5): Evidence Supporting Challenge

A list of exhibits is provided at the beginning of this Petition. The relevance of this evidence and the specific portions supporting the challenge is provided below in §VI. Willow submits the declaration of Dr. Patrick Hillberg (Ex. 1003) in support of this Petition. 37 C.F.R. §1.68.

III. OVERVIEW OF THE '114 PATENT

The '114 Patent issued on August 21, 2018 from U.S. Application No. 15/408,404 filed January 17, 2017. Ex. 1001, Cover. The '114 Patent purports to claim priority to a variety of applications, the earliest of which is provisional application 62/286,273, filed on January 22, 2016. For purposes of this Petition only, Willow applies the alleged January 22, 2016 priority date.

A. Specification and Claims

The '114 Patent "relates generally to the field of building management systems." Ex. 1001, 1:18-19. In this regard, Claim 1 relates to timeseries and a series of components for translating data into a graphical visualization. *Id.*, Claim 1.

According the '114 Patent, "[e]ach sample of the timeseries data can include a timestamp and a data value." *Id.*, Claim 1, 1:29-30. For example, a timeseries may be a series of times and temperatures as shown below:

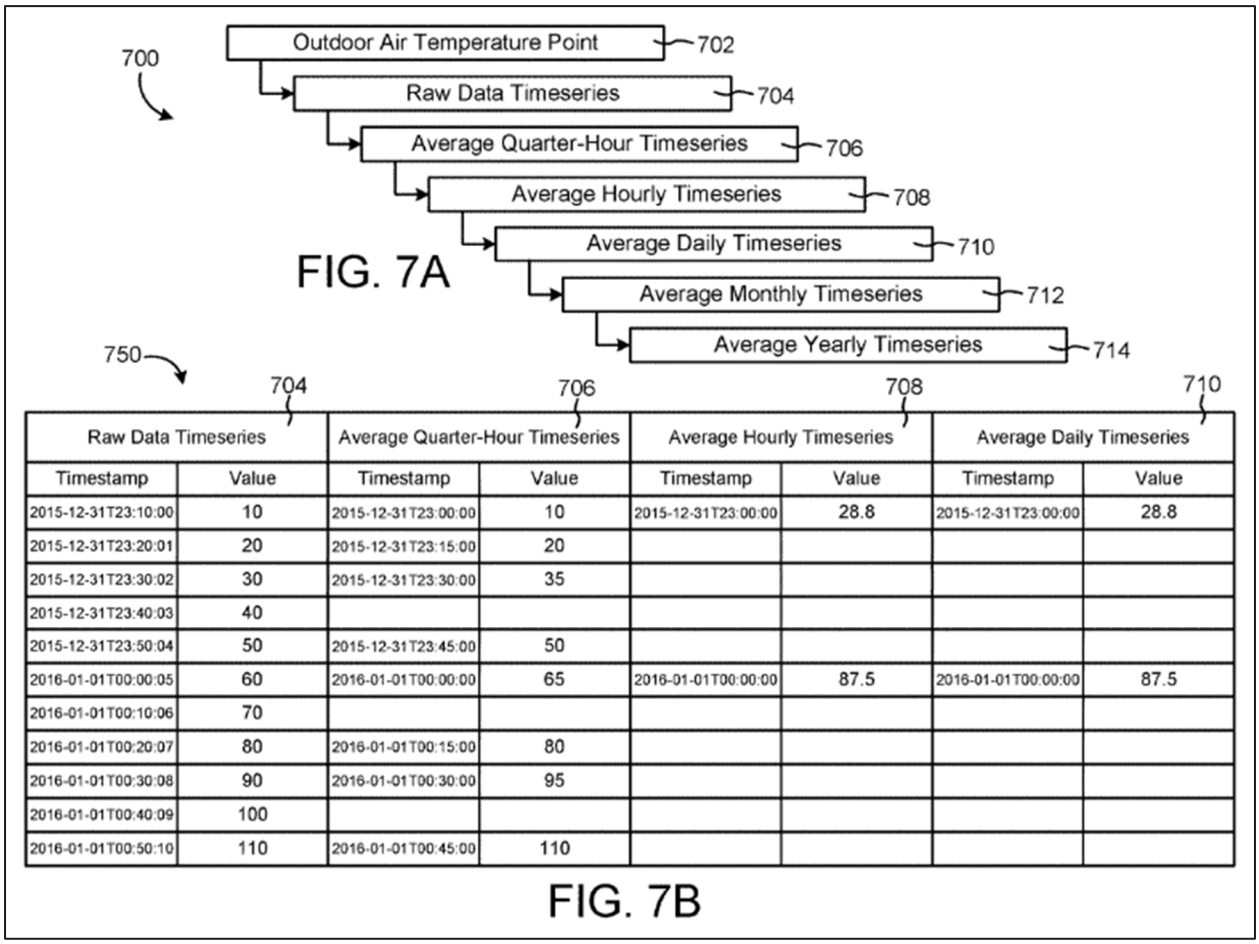


FIG. 7A

750

704		706		708		710	
Raw Data Timeseries		Average Quarter-Hour Timeseries		Average Hourly Timeseries		Average Daily Timeseries	
Timestamp	Value	Timestamp	Value	Timestamp	Value	Timestamp	Value
2015-12-31T23:10:00	10	2015-12-31T23:00:00	10	2015-12-31T23:00:00	28.8	2015-12-31T23:00:00	28.8
2015-12-31T23:20:01	20	2015-12-31T23:15:00	20				
2015-12-31T23:30:02	30	2015-12-31T23:30:00	35				
2015-12-31T23:40:03	40						
2015-12-31T23:50:04	50	2015-12-31T23:45:00	50				
2016-01-01T00:00:05	60	2016-01-01T00:00:00	65	2016-01-01T00:00:00	87.5	2016-01-01T00:00:00	87.5
2016-01-01T00:10:06	70						
2016-01-01T00:20:07	80	2016-01-01T00:15:00	80				
2016-01-01T00:30:08	90	2016-01-01T00:30:00	95				
2016-01-01T00:40:09	100						
2016-01-01T00:50:10	110	2016-01-01T00:45:00	110				

FIG. 7B

Ex. 1001, Fig. 7B.

Claim 1 goes on to recite "raw data timeseries" and "optimized data timeseries." Ex. 1001, Claim 1. As shown below, the "raw data timeseries" (yellow) comprises various times and temperatures, while multiple "optimized data timeseries" (blue) comprise various times and average temperatures. *Id.*, 23:35-24:45, Figs. 7A, 7B. In this regard, the "optimized data timeseries" is simply a "data rollup[]" or condensed version of the raw data timeseries. *Id.*, 20:53-55.

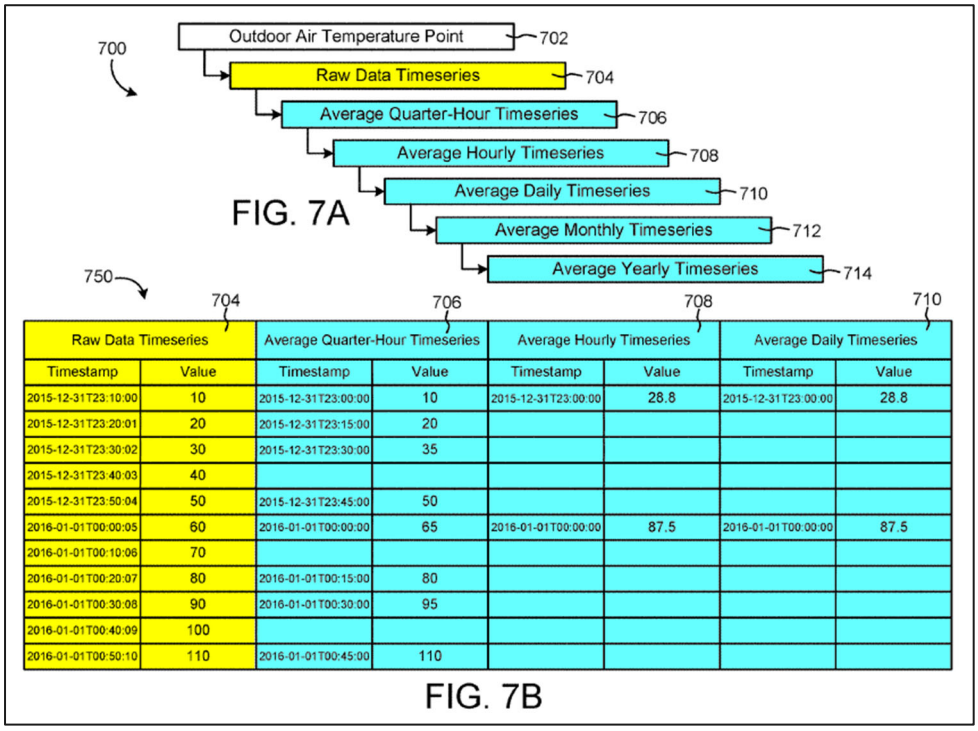


FIG. 7A

750

704		706		708		710	
Raw Data Timeseries		Average Quarter-Hour Timeseries		Average Hourly Timeseries		Average Daily Timeseries	
Timestamp	Value	Timestamp	Value	Timestamp	Value	Timestamp	Value
2015-12-31T23:10:00	10	2015-12-31T23:00:00	10	2015-12-31T23:00:00	28.8	2015-12-31T23:00:00	28.8
2015-12-31T23:20:01	20	2015-12-31T23:15:00	20				
2015-12-31T23:30:02	30	2015-12-31T23:30:00	35				
2015-12-31T23:40:03	40						
2015-12-31T23:50:04	50	2015-12-31T23:45:00	50				
2016-01-01T00:00:05	60	2016-01-01T00:00:00	65	2016-01-01T00:00:00	87.5	2016-01-01T00:00:00	87.5
2016-01-01T00:10:06	70						
2016-01-01T00:20:07	80	2016-01-01T00:15:00	80				
2016-01-01T00:30:08	90	2016-01-01T00:30:00	95				
2016-01-01T00:40:09	100						
2016-01-01T00:50:10	110	2016-01-01T00:45:00	110				

FIG. 7B

Id., Figs. 7A and 7B (color added).

The '114 Patent goes on to exemplify "optimized timeseries data" as including "e.g., data rollup timeseries, virtual point timeseries, fault detection timeseries, etc." Ex. 1001, 7:12-14. Furthermore, optimized timeseries can be timeseries produced by basic arithmetic. For example, "[v]irtual points can be calculated by applying any

of a variety of mathematical operations (e.g., addition, subtraction, multiplication, division, etc.) or functions (e.g., average value, maximum value, minimum value, thermodynamic functions, linear functions, nonlinear functions, etc.) to the actual data points represented by the timeseries data…. The virtual data points can be stored as optimized timeseries data." *Id.*, 21:1-17.

Based on these "raw data timeseries" and "optimized data timeseries," Claim 1 simply recites receiving data, generating a timeseries, generating a revised timeseries, storing timeseries, and displaying a chart to a user. Ex. 1001, Claim 1. In general, "building equipment" provides "raw data samples" to a "data collector." *Id.* The "data collector" generates "raw data timeseries" and provides them to "one or more data platform services." *Id.* The "data platform services" generates "optimized data timeseries." *Id.* Claim 1 goes on to recite "a timeseries database" to store the timeseries and an "energy management application" to generate a "dashboard comprising a widget," where the "widget is configured to display a graphical visualization of the plurality of timeseries" along with a user interface. *Id.* Additional details of Claim 1 may be found in the prior art mappings further below.

The other Challenged Claims add little else. Claim 7 depends from Claim 1 and relates to storing and visualizing a plurality of timeseries. Ex. 1001, Claim 7. Claim 8 depends from Claim 7 and relates to color coding line charts based on units of measure. *Id.*, Claim 8. Independent claim 11 and dependent claim 17 are simply

method versions of independent Claim 1 and dependent Claim 7. Ex. 1001, Claims 11, 17. Claims 15 and 16 depend from Claim 11 and recite various types of widgets (charting, visualization, display, time or date, weather) and charts (line, area, column, bar, stacked, pie) respectively. *Id.*, Claims 15, 16.

B. Prosecution History

The prosecution did not address the grounds raised in this Petition. Ex. 1007. As discussed above, the examiner immediately allowed the claims without a single office action. *Id.* The notice of allowance was boilerplate, paraphrasing the entirety of the independent claims without any substantive analysis. *Id.*

IV. PERSON OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art ("POSITA") at the time of the '114 Patent would have at least a bachelor's degree in computer science or a related field, and at least three years of experience in the field of information and control systems used in buildings. Additional work experience may compensate for less educational experience, and vice versa.[3] Ex. 1003, ¶27.

[3] Patent Owner has taken the position that a POSITA would have "at least a bachelor's degree in computer science and/or engineering, or electrical engineering, or a closely related scientific field such as mathematics, and two years of work experience with digital twin and/or entity modeling software. Alternatively, any lack

V. SUMMARY OF THE PRIOR ART

A. Mills (Ex. 1004)

Mills is a U.S. patent application published October 3, 2013 and entitled "Updating Rollup Streams In Response To Time Series Of Measurement Data." Ex. 1004, Cover. It relates to the generation of timeseries from measurement data, including one timeseries "having a time intervals corresponding to the time series of measurement data" and second timeseries "configured as a first rollup stream having time intervals each including a fixed plurality of the time intervals of the base stream." *Id.*, Abstract. As illustrated below, the first timeseries (yellow) may record data in seconds, while the second rollup timeseries (blue) records data in hours:[4]

---

of experience could be remedied with additional education (e.g., a Master's degree), and likewise, a lack of education can be remedied with additional work experience (e.g., 6-8 years)." Ex. 1008, 11. The analysis in this petition is unchanged regardless of which of these definitions applies.

[4] The second rollup may also be in days (202), months (203), or years (204).

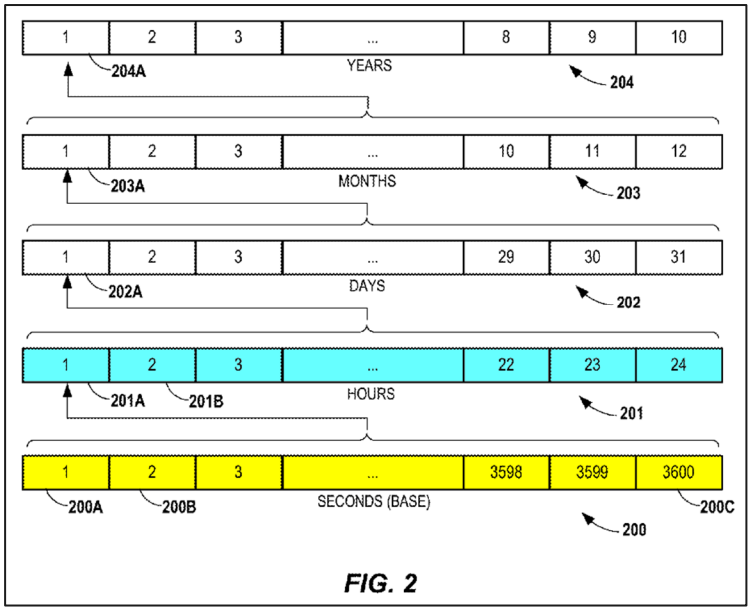


FIG. 2

Ex. 1004, Fig. 2 (color added). This is further illustrated, for example, in Figures 8A-8C, 9A, 9B, 10A, 10B, and 11.

Furthermore, Mills provides a user interface for switching between the various timeseries. In Figures 6 and 7 below, the user can switch between the different timeseries options (red box):

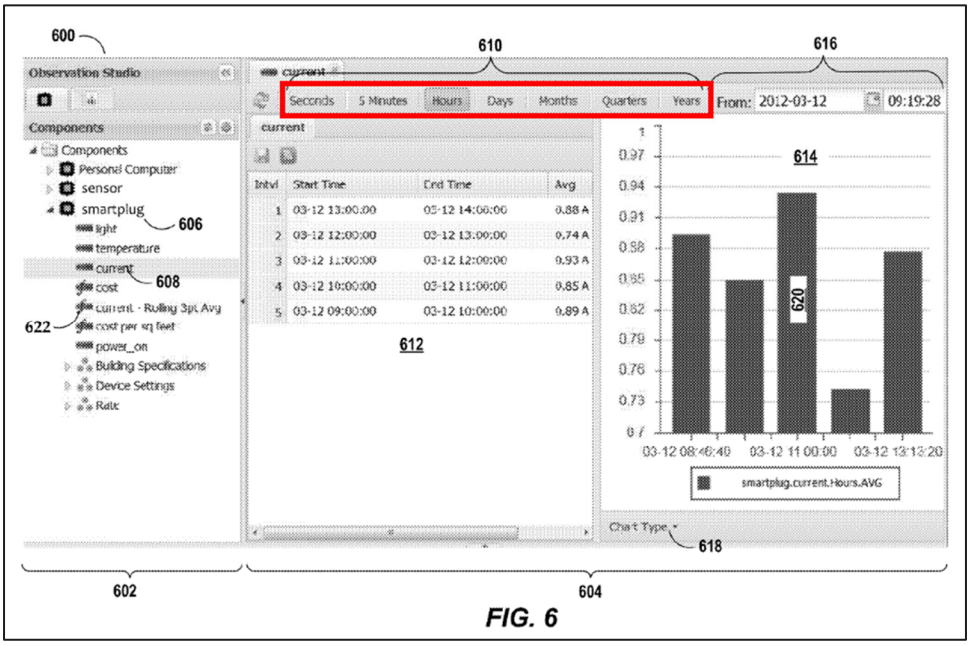


FIG. 6

Ex. 1004, Fig. 6 (color added).

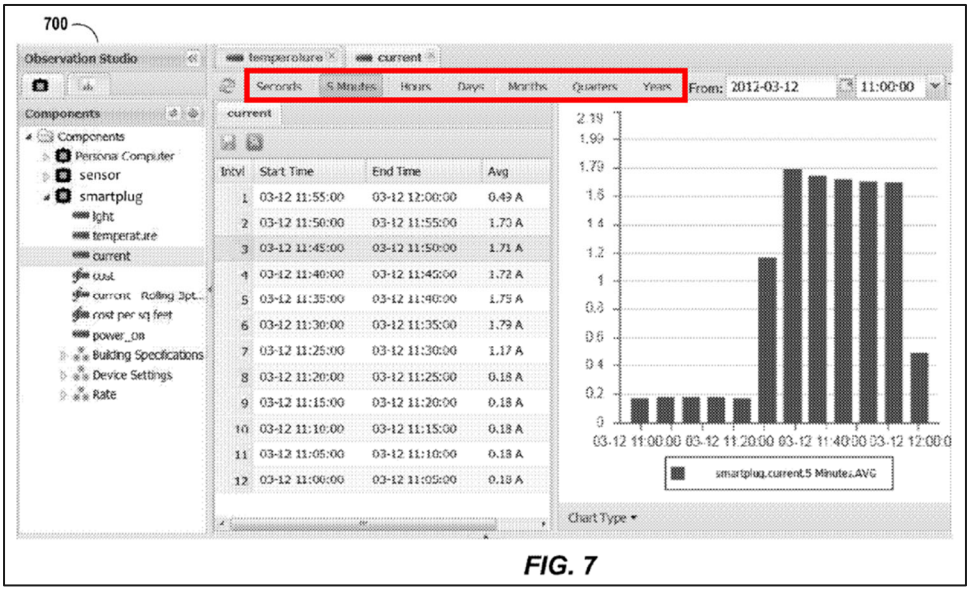
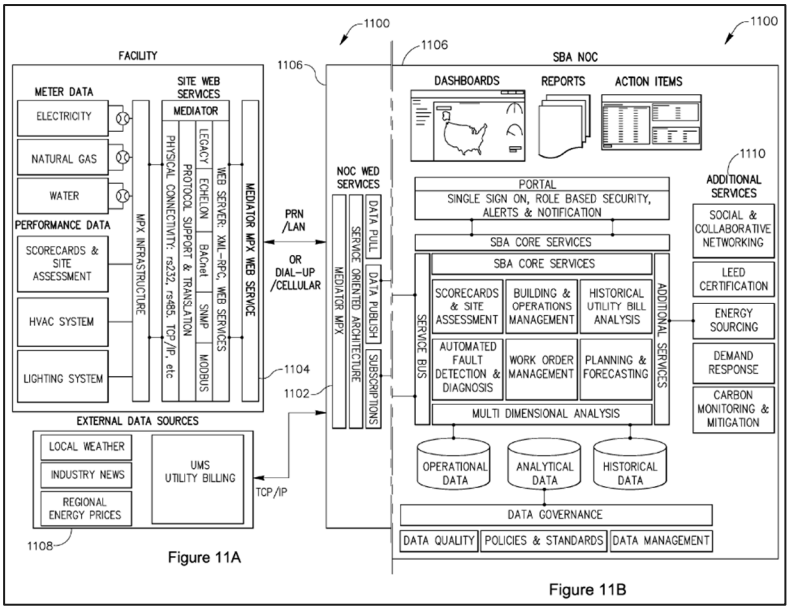


FIG. 7

Id., Fig. 7 (color added).

B. Hedley (Ex. 1006)

Hedley is a U.S. patent application published November 11, 2010 and entitled "Building Energy Consumption Analysis System." Ex. 1006, Cover. It "relates to obtaining and analyzing building energy data…. engaging in an energy analysis to determine analysis results, and optionally responsively controlling building systems, such as lighting, heating, air-conditioning, and other energy consuming systems." *Id.*, [0003]. An example of such a system is illustrated below:



Id., Figs. 11A and 11B (rejoining figure divided over two pages).

In this regard, Hedley discusses collecting data from meters, generating timeseries from the data, generating additional timeseries, and displaying them to the user. Ex. 1006, [0028]-[0033], [0083]-[0086], [0106], [0156]. [0179]-[0181], [0487], Figs. 18-20, 21A, 21B, 22A, 22B, 23. For example using Figure 19 below, Hedley's system collects energy consumption data, generates a timeseries (*e.g.*, hourly), generates an additional timeseries (monthly), and displays them to the user via an interactive dashboard as shown in yellow. *Id.*, Fig. 19. This is also true of demand data, as shown in blue.

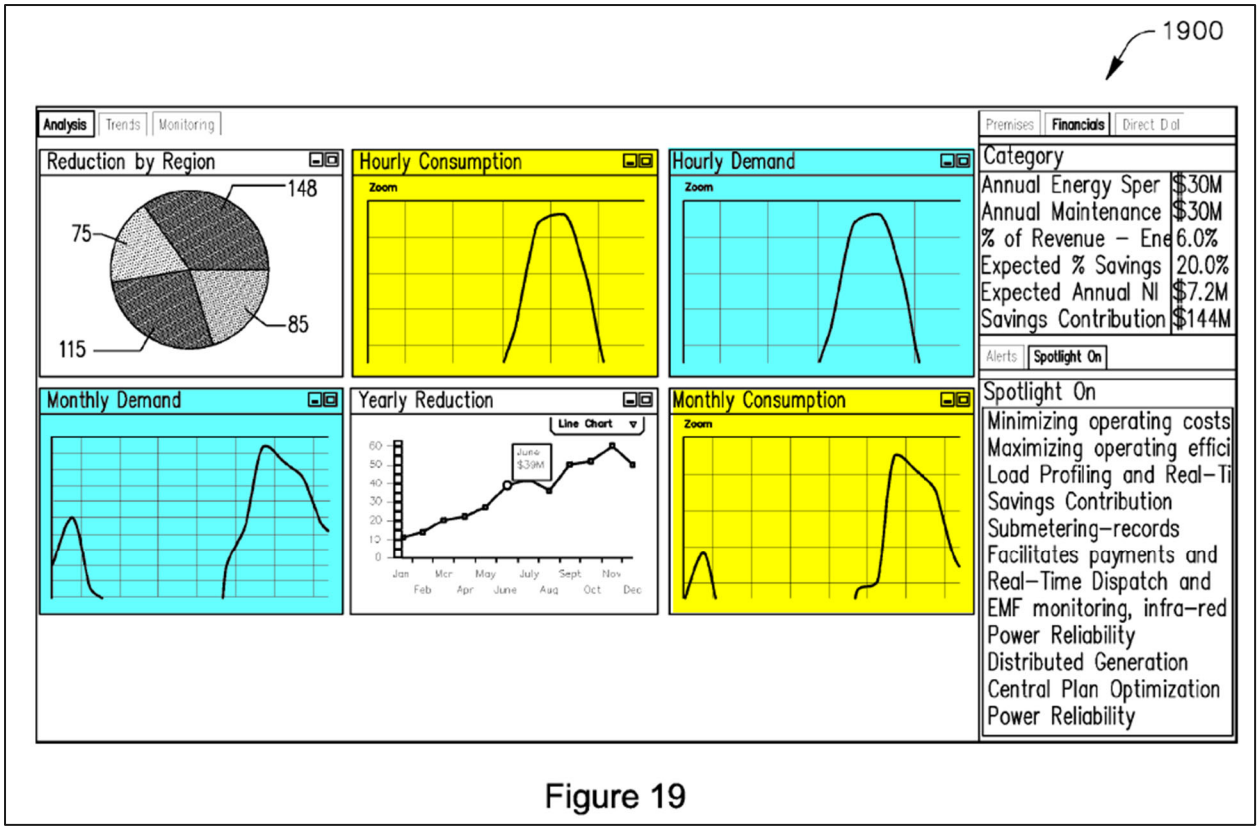
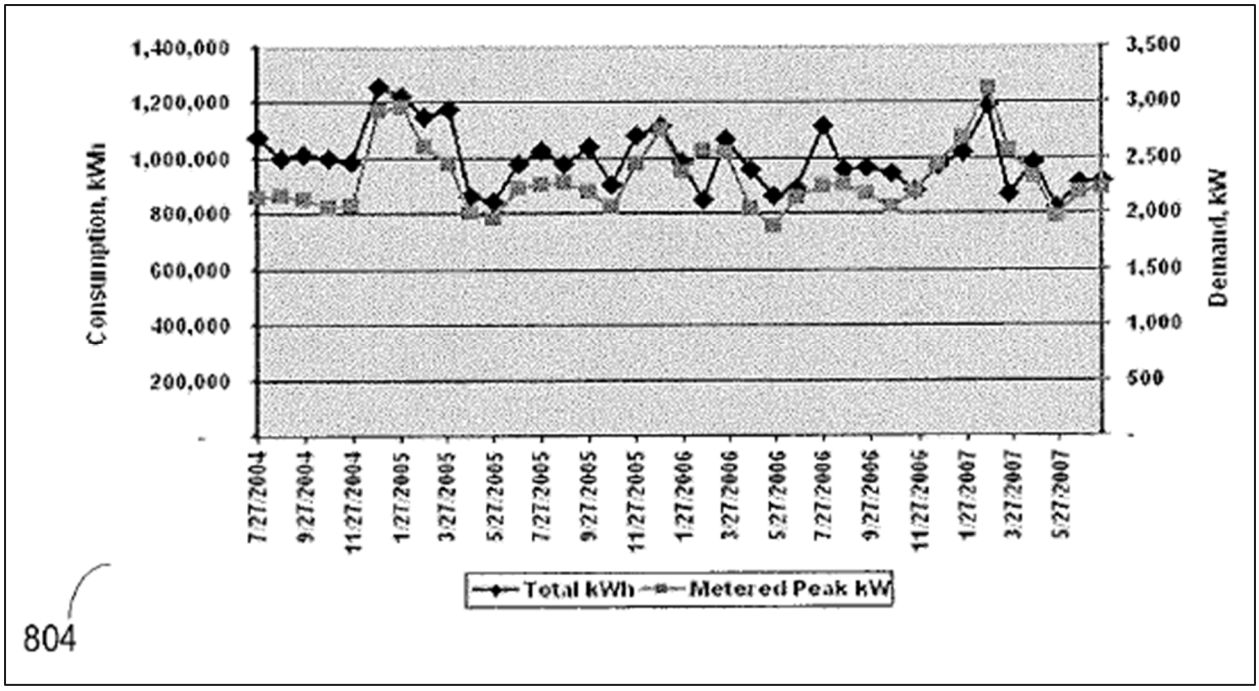


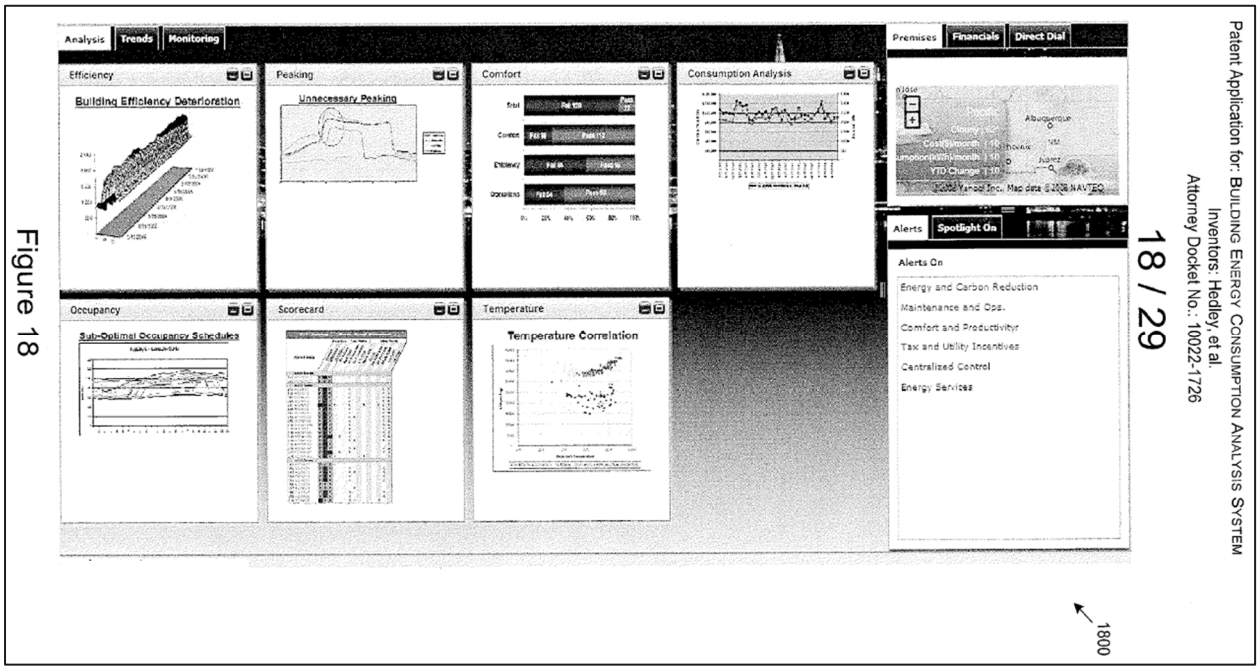
Figure 19

Id., Fig. 19 (color added).

When Hedley was originally filed, the applicant included a number of drawings. Ex. 1005 at 05/07/2010 Drawings. Following a formalities notice, applicants filed alternative drawings which ultimately published with Hedley. Ex. 1005; Ex. 1006. However, the originally filed drawings constitute prior art. *See Bruckelmyer v. Ground Heaters, Inc.*, 445 F.3d 1374, 1378-80 (Fed. Cir. 2006) (figures appearing in Canadian patent's file history, but removed from the issued patent, constitute prior art). Those figures depict additional detail, such as the below which colors the kWh timeseries line in black and the kW timeseries line in a lighter color:



Ex. 1005 at 05/07/2010 Drawings. This also appears in the Consumption Analysis Window in the interface:



Id.

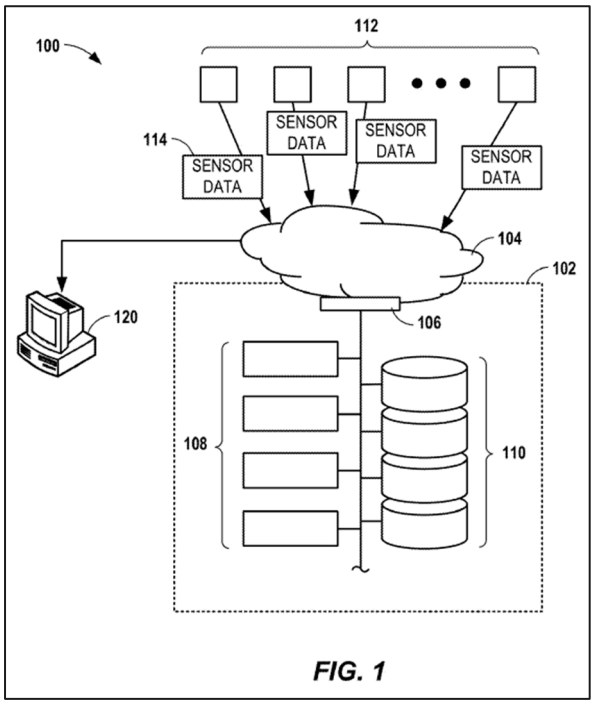
VI. SPECIFIC GROUNDS FOR PETITION

A. GROUND I: Mills (Ex. 1004)

1. Claim 1

a. 1. A building energy management system comprising:

To the extent that the preamble is limiting, Mills teaches it. Ex. 1003, ¶43. Mills discloses system 100, which "involves collecting data from a plurality of source devices 112." Ex. 1004, [0025]. "For example, an electricity meter might record usage every minute." *Id.*, [0028].



Ex. 1004, Fig. 1.

Mills goes on to describe collection from "physical devices such as utility meters, smart plugs, sensors (temperature, accelerometer, etc.)" *Id.*, [0041]. Furthermore, Mills describes "a user interface that facilitates viewing collected data"

including "a control selection that allows user selection of data and other content." *Id.*, [0077]. For example, "the electrical current measurement stream 608 of a 'smartplug'":

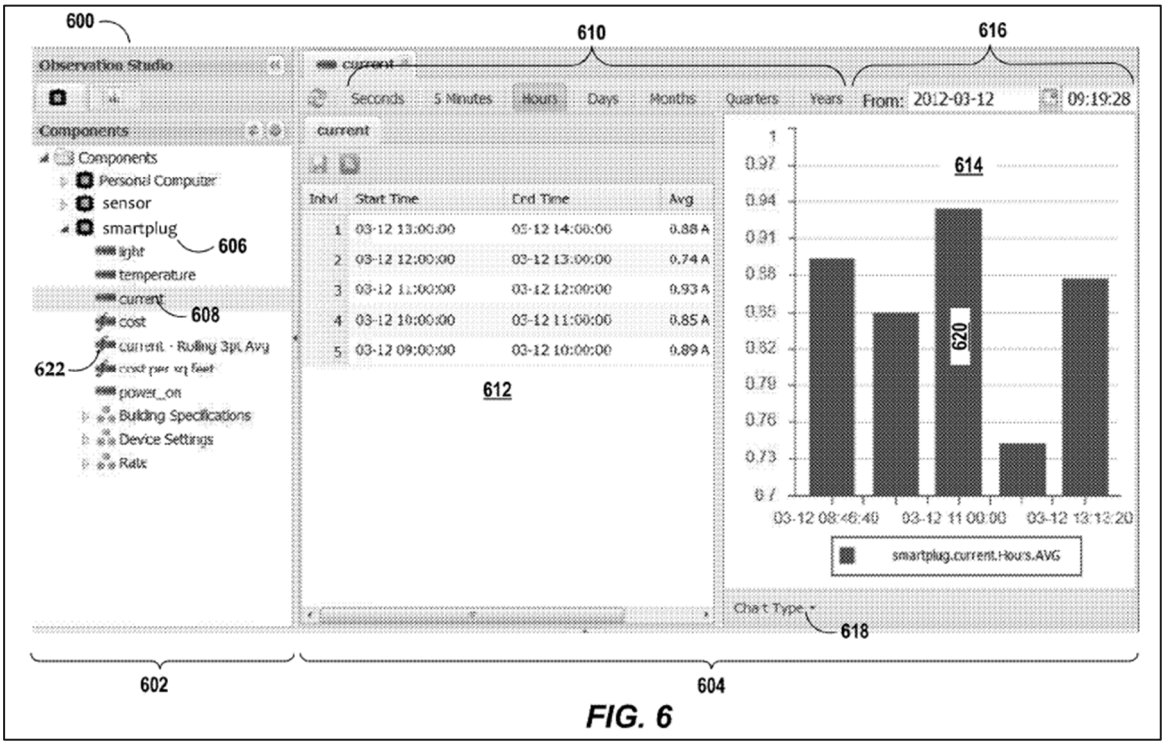


FIG. 6

Id., Fig. 6. As shown on the left, this example interface also provides "Building Specifications." *Id.*

A POSITA would recognize Mills' system for collecting such energy data from meters, processing it, and providing it via a user interface as a building energy management system. Ex. 1003, ¶46.

b. building equipment operable to monitor and control a variable in the building energy management system and configured to provide raw data samples of a data point associated with the variable;

Mills discloses this element. Ex. 1003, ¶47. For example, Mills' "smart plug"[5] constitutes building equipment operable to monitor and control a variable (*e.g.*, electricity) in the building energy management system. Ex. 1004, [0041]; Ex. 1003, ¶47. In general, Mills' system is illustrated in Figure 1 with multiple source devices 112 providing sensor data (*i.e.* raw data samples of a data point associated with the variable) via network 104. Ex. 1004, Fig. 1, [0024]-[0025].

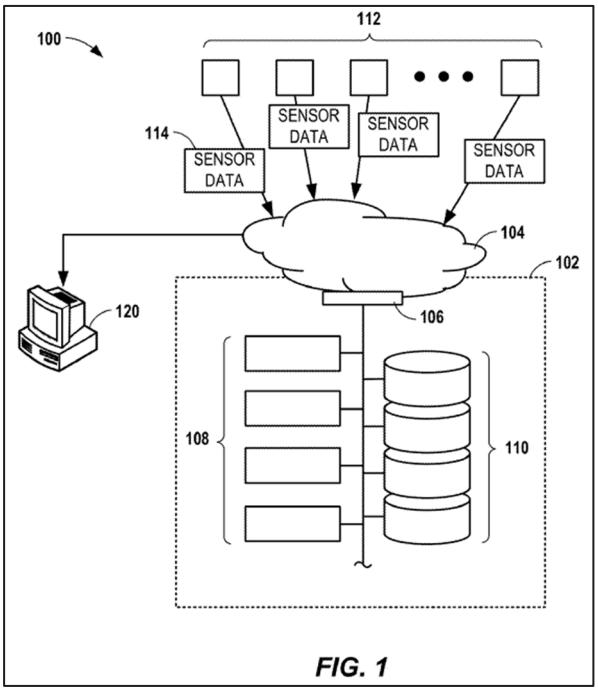


FIG. 1

[5] A smart plug is power outlet incorporating a remote-controlled switch. Ex. 1003, ¶47, n.2.

Ex. 1004, Fig. 1. As shown in Figure 6, the smart plug 606 is providing electrical current (amperage) data to the system. *Id.*, Fig. 6, [0077]-[0078]. The smart plug 606 is also providing data on the status of the remote-controlled switch included in the smart plug ("power_on"). *Id.*; Ex. 1003, ¶48.

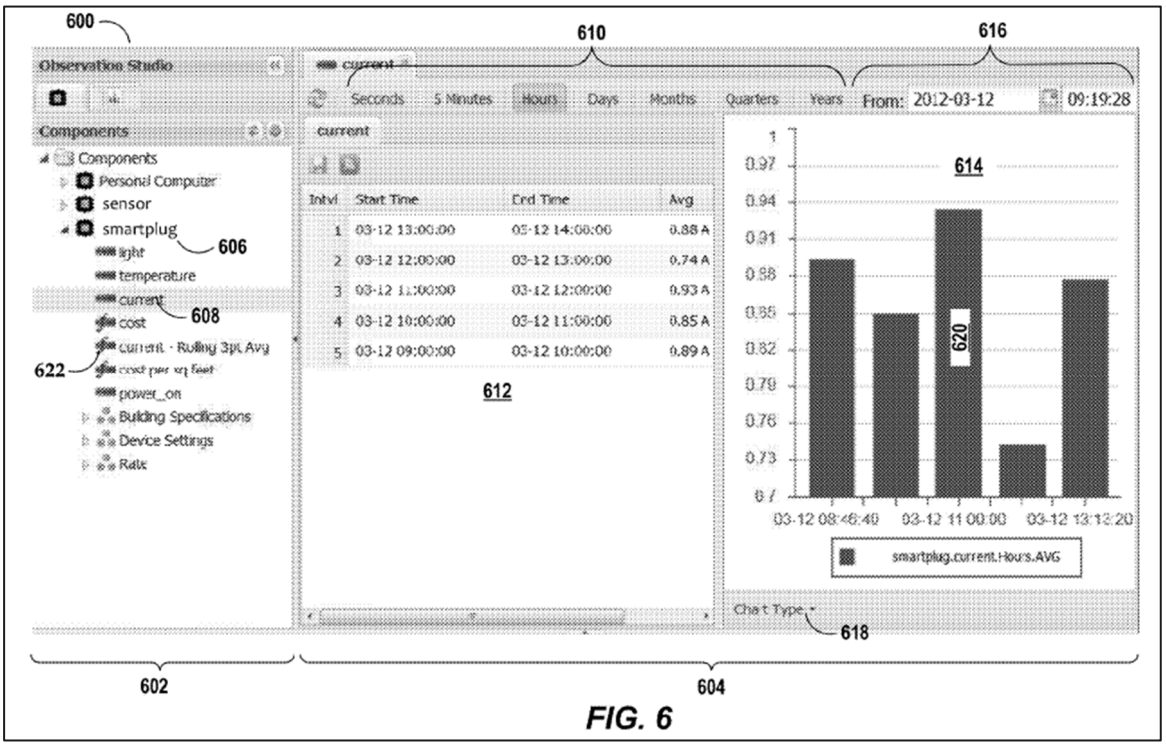


FIG. 6

Ex. 1004, Fig. 6.

This is also illustrated in Figure 4. As shown, "the device 408 may begin measuring 432 data and uploading 434 data as time series of data with granularity of the base interval." Ex. 1004, [0057], Fig. 4. Accordingly, Mills teaches building equipment operable to monitor and control a variable in the building energy management system (*e.g.*, device 408, such as a smart plug) and configured to

provide raw data samples of a data point associated with the variable (*e.g.*, data 432 or 434). Ex. 1003, ¶49.

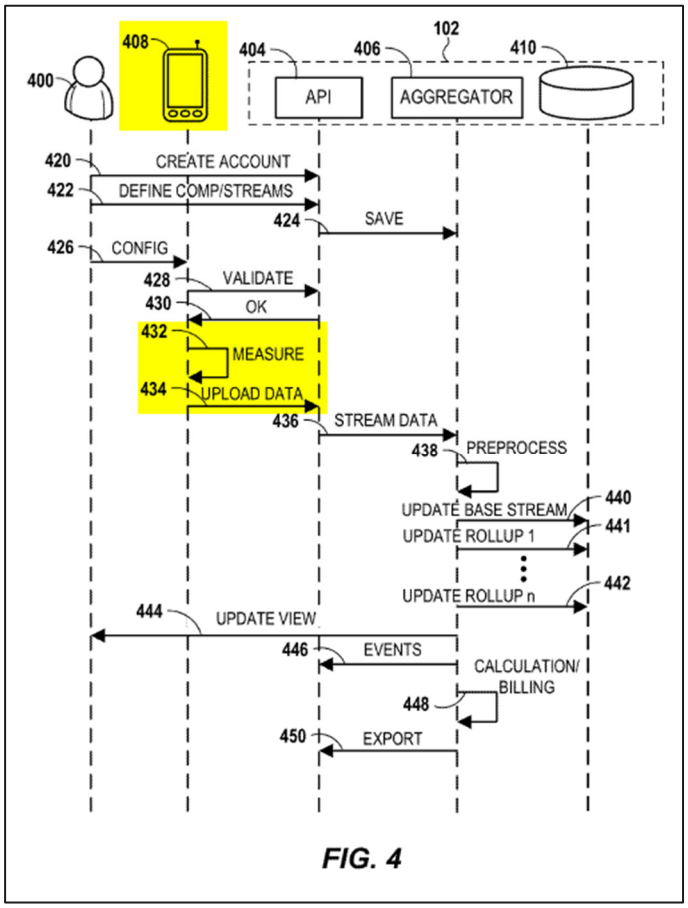
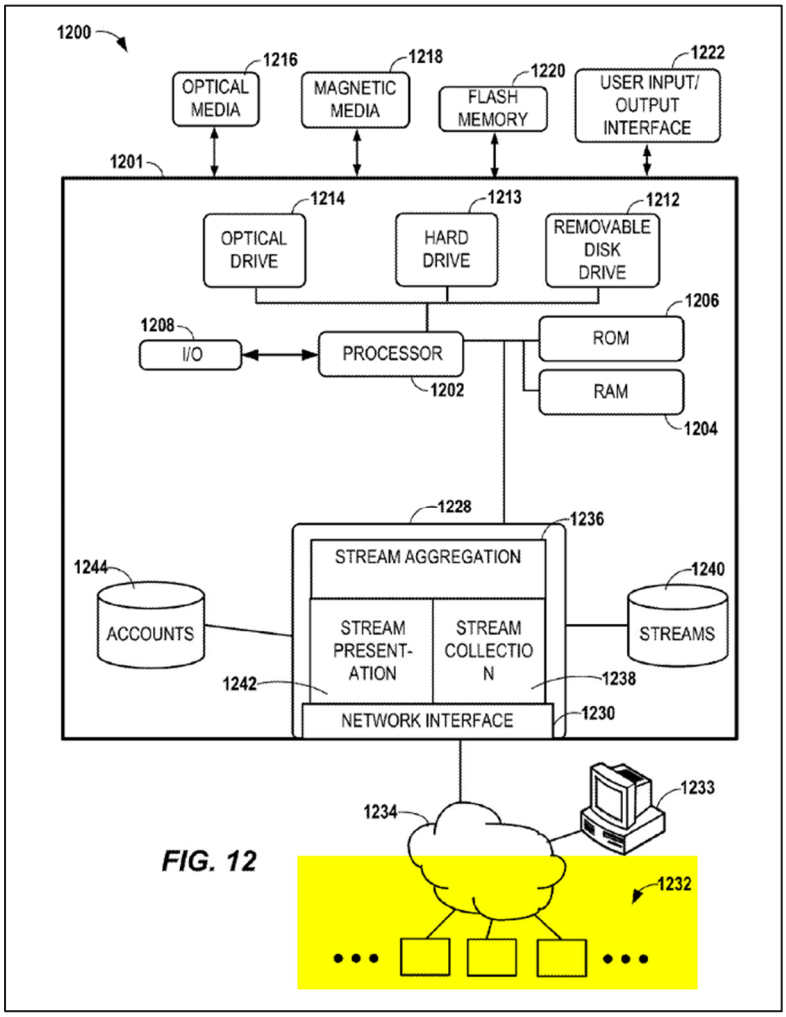


FIG. 4

Ex. 1004, Fig. 4 (color added).

This is also illustrated in Figure 12, where "[t]he network interface 1230 and stream collection module 1238 may, individually or in combination, receive time series data measured from actual or virtual devices residing on and/or operating on source devices 1232." Ex. 1004, Fig. 12, [0105]-[0106]. Accordingly, Mills teaches building equipment operable to monitor and control a variable in the building energy management system (*e.g.*, source devices 1232, such as smart plugs) and configured

to provide raw data samples of a data point associated with the variable (*e.g.*, time series data measured from actual or virtual devices residing on and/or operating on source devices 1232). Ex. 1003, ¶50.



Ex. 1004, Fig. 12 (color added).

c. a data collector configured to collect the raw data samples from the building equipment and generate a raw data timeseries comprising a plurality of the raw data samples;

Mills discloses this element. Ex. 1003, ¶51. "One function of the illustrated system 100 involves collecting data from a plurality of source devices 112. The

source devices 112 gather data (e.g., sensor data 114) and repeatedly send the data 114 to the service 102." Ex. 1004, [0025]. For example, "[t]he system 100 provides a real-time mechanism for aggregating device generated data into user defined cycles. For purposes of the current discussion, the term 'stream' is used to describe a time series of data that may either be received from source devices 112 or created from other streams. A 'base stream' is formed based on a repeated transmittal of data 114 to the service 102 from a source device 112." *Id.*, [0029]. Mills describes an Application Programming Interface (API) that facilitates this "addition of data 114" from the sensors. *Id.*, [0032]. Figure 2 provides an example of a base stream (yellow):

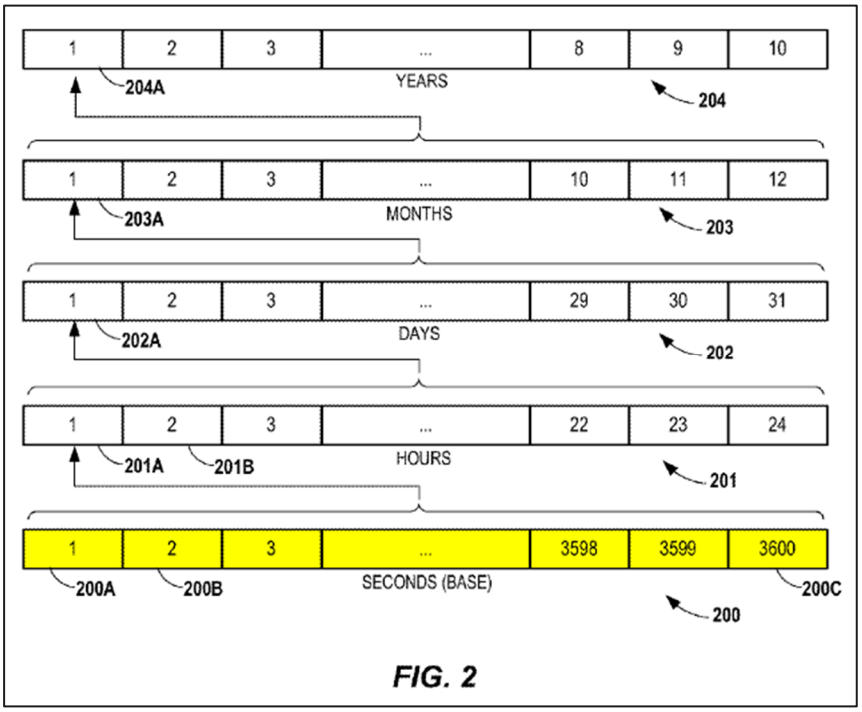


FIG. 2

Ex. 1004, Fig. 2 (color added).

Accordingly, Mills teaches a data collector (*e.g.*, service 102, including API functions for data collection) configured to collect the raw data samples from the building equipment (*e.g.*, smart plugs) and generate a raw data timeseries (*e.g.*, base streams) comprising a plurality of the raw data samples (*e.g.*, data from a source device, such as electrical current values from a smart plug). Ex. 1003, ¶52.

This is also illustrated in Figure 4. As shown, "the device 408 may begin measuring 432 data and uploading 434 data as time series of data with granularity of the base interval." Ex. 1004, [0057], Fig. 4. "The uploaded data 434 may be sent to aggregator component 406 for preprocessing 438 the data to conform to the base cycle definition. The aggregator 406 then stores 440 the values into a database 410, placing the values into appropriate intervals of the base stream as defined by the base cycle." *Id.*, [0059]. Accordingly, Mills teaches a data collector (*e.g.*, service 102, including API and aggregator functionality involved in receiving the data and generating the raw data timeseries 440) configured to collect the raw data samples (*e.g.*, data 434) from the building equipment (*e.g.*, device 408, such as a smart plug) and generate a raw data timeseries (*e.g.*, updating base stream 440) comprising a plurality of the raw data samples (*e.g.*, data 434). Ex. 1003, ¶53.

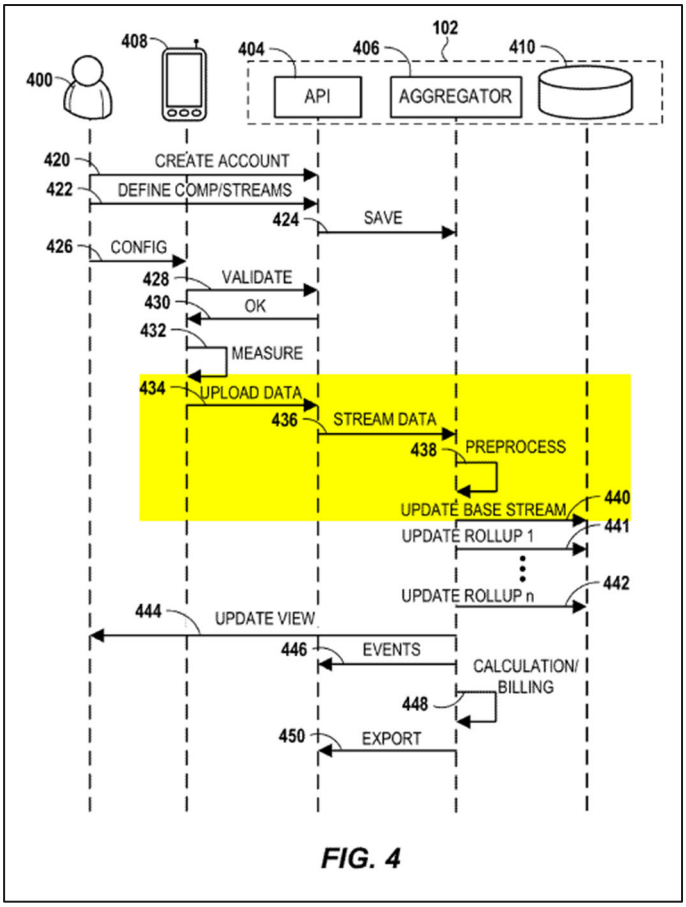


FIG. 4

Ex. 1004, Fig. 4.

This is also illustrated in Figure 12, where "[t]he network interface 1230 and stream collection module 1238 may, individually or in combination, receive time series data measured from actual or virtual devices residing on and/or operating on source devices 1232. This data is also passed to a stream aggregation module 1236 that operates to form base and rollup streams as described herein." Ex. 1004, Fig. 12, [0105]-[0106]. Accordingly, Mills teaches a data collector (*e.g.*, network interface 1230, stream collection module 1238, and stream aggregation module 1236 functionality involved in receiving data and generating base streams) configured to

collect the raw data samples (*e.g.*, time series data[6]) from the building equipment and generate a raw data timeseries (*e.g.*, base stream) comprising a plurality of the raw data samples. Ex. 1003, ¶54.

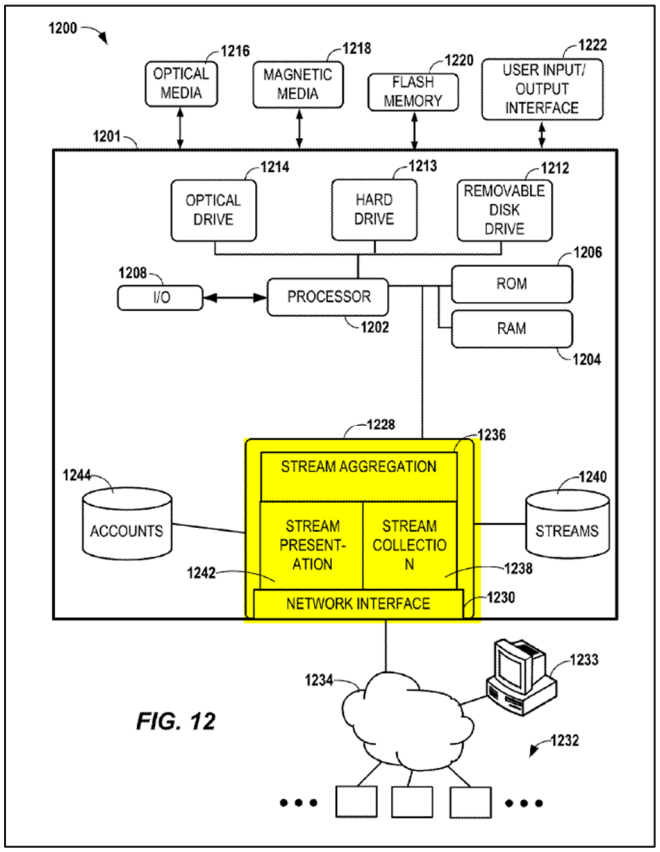


FIG. 12

[6] In Mills, "the term 'stream' is used to describe a time series of data that may either be received from source devices 112 or created from other streams." Ex. 1004, [0029]. Thus, the time series data received from the data sources is converted into a stream, wherein Mills' "time series of data" refers to the sequence of raw data measurements and "stream" corresponds to the '114 Patent's claimed timeseries. Ex. 1003, ¶54, n.3.

Ex. 1004, Fig. 12 (color added).

Figure 3 shows the object oriented data structure of streams. Ex. 1004, Fig. 3, [0038]; Ex. 1003, ¶55. For example, "[d]ata 304 that originates from the source device is uploaded to the base cycle 302C of stream 302." Ex. 1004, Fig. 3, [0039]-[0040]. "[A] stream 302 represents a collection (e.g., list 302A) of time series data. Here the data values stored in the list 302A are represented as a class 304 that includes at least two members, a timestamp 304A and data 304B." *Id.* This further illustrates how the timeseries comprises timestamps and values.

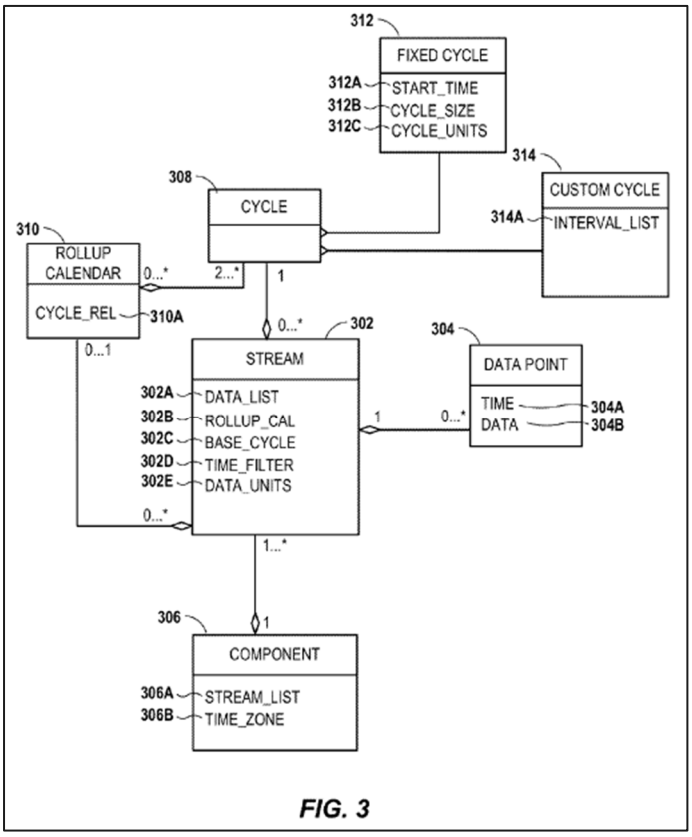


FIG. 3

Ex. 1004, Fig. 3.

d. one or more data platform services configured to generate one or more optimized data timeseries from the raw data timeseries;

Mills discloses this element. Ex. 1003, ¶56. Continuing the discussion above (§VI.B.1.c), the base stream constitutes a raw data timeseries. Mills further teaches the creation of optimized data timeseries (*e.g.*, rollup stream) from the raw data timeseries (*e.g.*, base stream). For example, "[t]he system 100 provides a real-time mechanism for aggregating device generated data into user defined cycles. For purposes of the current discussion, the term 'stream' is used to describe a time series of data that may either be received from source devices 112 ***or created from other streams***."[7] Ex. 1004, [0029]. A "[]rollup[] … generally refers to a stream created from one or more other streams." *Id.*, [0031]. For example, "'application' of data to a stream may involve any type of operation or function (e.g., sum, average, minimum, maximum, etc.) that is applied to aggregate data within an element of the respective streams." *Id.*, [0034]. "[A] one-measurement-per-second stream [*i.e.*, base stream] may be rolled up to a stream having with granularity of minutes, hours, days, etc. [*i.e.*, rollup stream]." *Id.*, [0031]. These rollup operations may be carried out via an Application Programming Interface (API), where "[r]ollups can be used to present useful summary information that is highly customizable and that can be

[7] All emphasis in this Petition added unless otherwise noted.

monitored in near-real-time." *Id.*, [0032]; *see also id.*, [0049]-[0063]. Figure 2 provides an example of rollup streams (blue) versus the base stream (yellow):

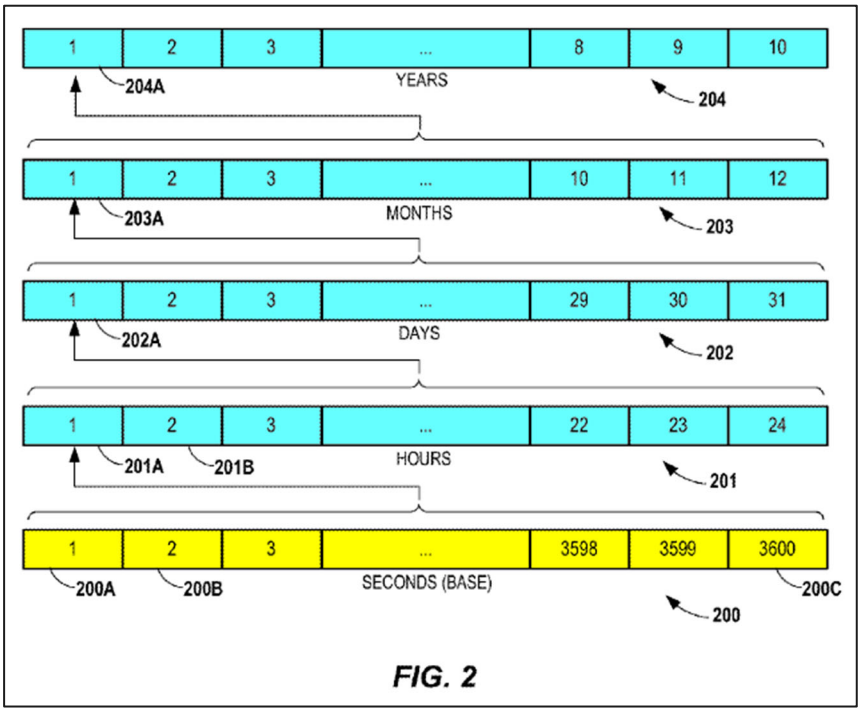


FIG. 2

Id., Fig. 2 (color added).

Accordingly, Mills teaches one or more data platform services (*e.g.*, service 102, including API functions for generating rollup streams) configured to generate one or more optimized data timeseries (*e.g.*, rollup streams) from the raw data timeseries (*e.g.*, base streams). Ex. 1003, ¶57.

This is also illustrated in Figure 4. Continuing the discussion above (§VI.B.1.c), Mills teaches generating the raw data timeseries and storing it in the database in operation 440 (updating base stream). Ex. 1004, [0059]. Furthermore, "[b]ase cycle intervals are rolled-up into rollup streams" and updated as shown in

440-442. *Id.*, [0063]. Accordingly, Mills teaches one or more data platform services (*e.g.*, service 102, including API and aggregator functionality involved in rolling up base streams into rollup streams) configured to generate one or more optimized data timeseries (*e.g.*, rollup streams) from the raw data timeseries (*e.g.*, base streams). Ex. 1003, ¶58.

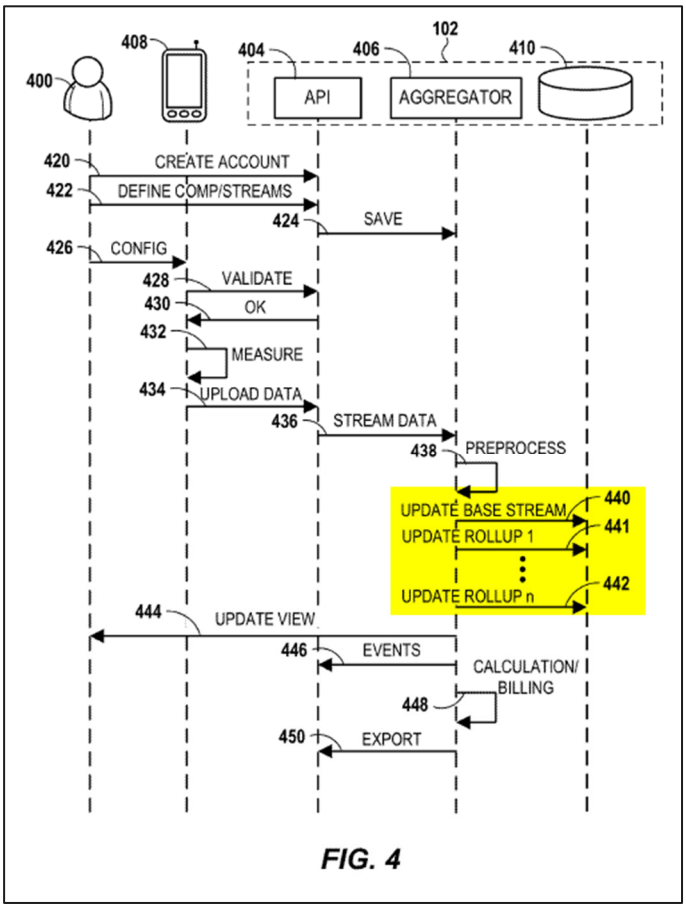
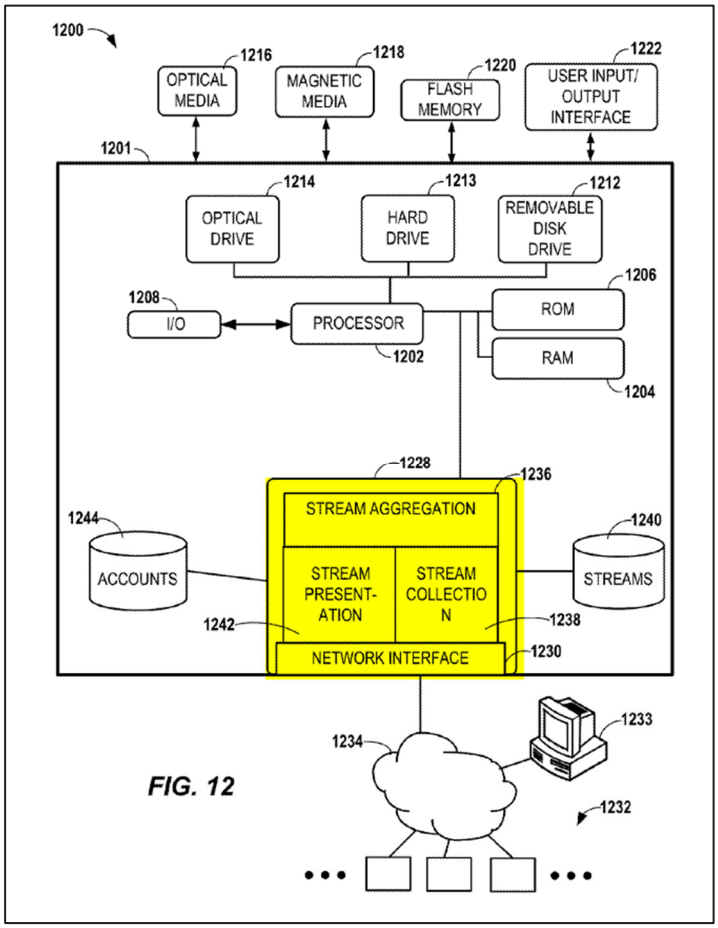


FIG. 4

Ex. 1004, Fig. 4.

This is also illustrated in Figure 12, where "a stream aggregation module 1236 … operates to form … rollup streams as described herein." *Id.*, Fig. 12, [0105]-[0106]. Accordingly, Mills teaches one or more data platform services (*e.g.*, stream

aggregation module 1236 functionality involved in generating rollup streams) configured to generate one or more optimized data timeseries (*e.g.*, rollup streams) from the raw data timeseries (*e.g.*, base streams). Ex. 1003, ¶59.



Ex. 1004, Fig. 12 (color added).

Figure 3 shows the object oriented data structure of streams. *Id.*, Fig. 3, [0038]; Ex. 1003, ¶60. For example, "a stream object 302 is used to access both a base stream and rollup streams associated with a source device." Ex. 1004, [0040]. "The rollup calendar 302B also defines all rollup streams, which are updated in response to the same data event that causes updates to the base stream." *Id.*

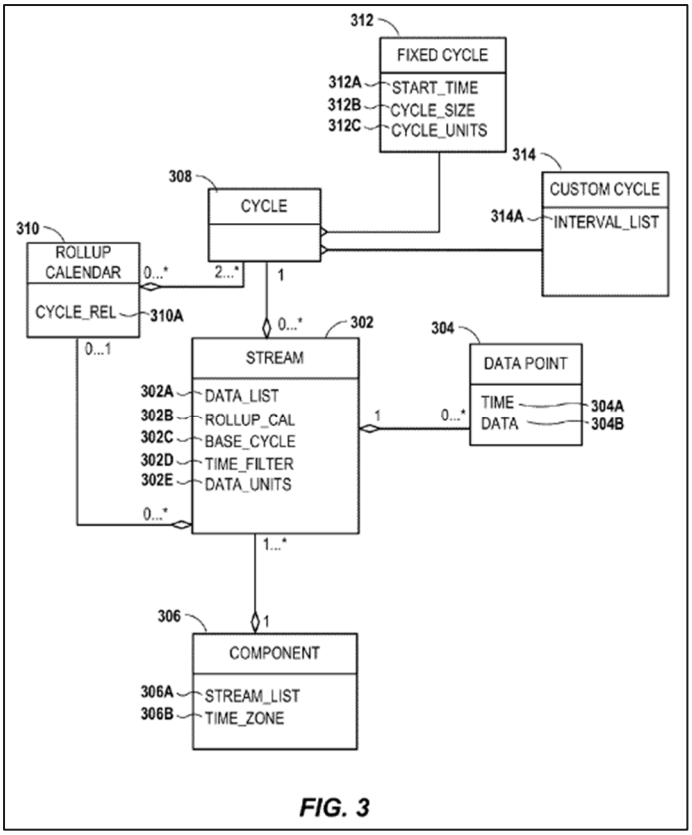


FIG. 3

Ex. 1004, Fig. 3.

e. a timeseries database configured to store a plurality of timeseries associated with the data point, the plurality of timeseries comprising the raw data timeseries and the one or more optimized data timeseries; and

Mills discloses this element. Ex. 1003, ¶61. Continuing the discussion above (§§VI.A.1.c-VI.A.1.d), Mills discloses a "data repository stores the data as streams, which includes collections of time series data." Ex. 1004, [0023]. For example, the time series data are "associated with at least one source device that generates the data (e.g., via sensor measurements)" and are "assigned to at least one stream based on a granularity of the time, and may be assigned to multiple streams of different time granularity in a single transaction." *Id.*

This is further illustrated in Figure 4, where database 410 stores the base stream (*i.e.*, raw data timeseries) and rollup streams (*i.e.*, optimized data timeseries). *Id.*, [0059]-[0060], Fig. 4. Accordingly, Mills teaches a timeseries database (*e.g.*, "data repository" or database 410) configured to store a plurality of timeseries associated with the data point (*e.g.*, base stream and rollup stream), the plurality of timeseries comprising the raw data timeseries (*i.e.*, base stream) and the one or more optimized data timeseries (*i.e.*, rollup stream). Ex. 1003, ¶62.

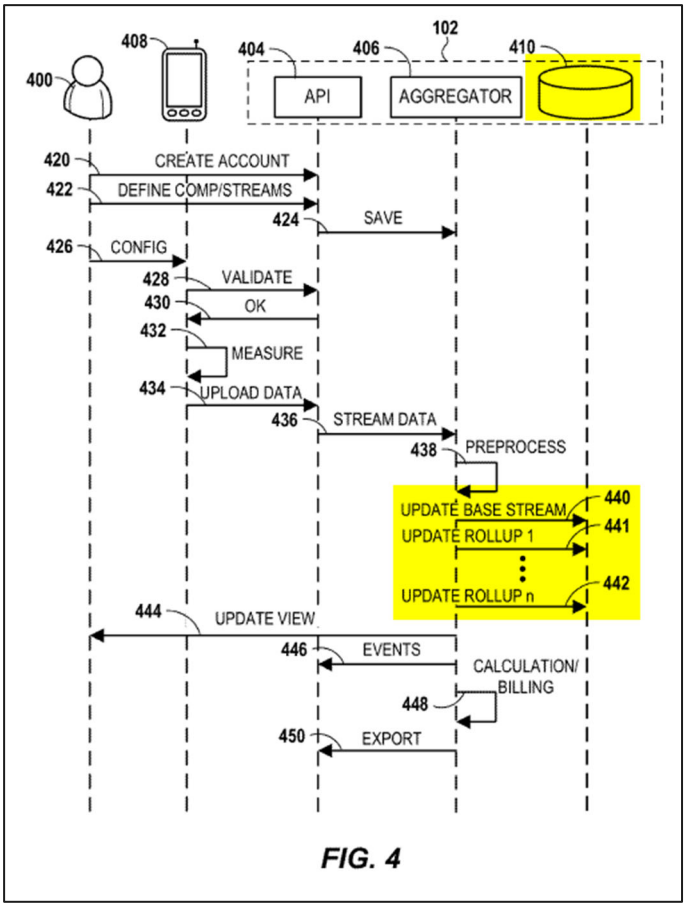
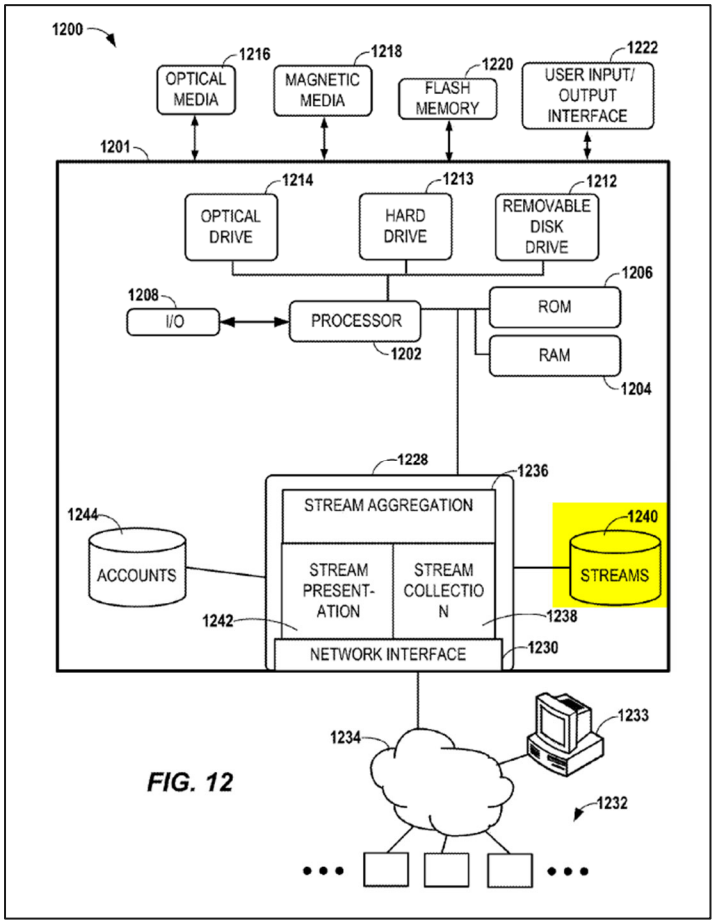


FIG. 4

Ex. 1004, Fig. 4.

This is also illustrated in Figure 12, which includes "a database interface for storing measured and rollup data in a streams database 1240." Ex. 1004, Fig. 12, [0105]-[0106]. Accordingly, Mills teaches a timeseries database (*e.g.*, streams database 1240) configured to store a plurality of timeseries associated with the data point (*e.g.*, base streams and rollup streams), the plurality of timeseries comprising the raw data timeseries (*e.g.*, base streams) and the one or more optimized data timeseries (*e.g.*, rollup streams). Ex. 1003, ¶63.



Ex. 1004, Fig. 12 (color added).

Figure 3 shows the object oriented database structure for storing the streams (*i.e.*, timeseries). Ex. 1004, Fig. 3, [0038]; Ex. 1003, ¶64. For example, "a stream object 302 is used to access both a base stream and rollup streams associated with a source device." Ex. 1004, [0040].

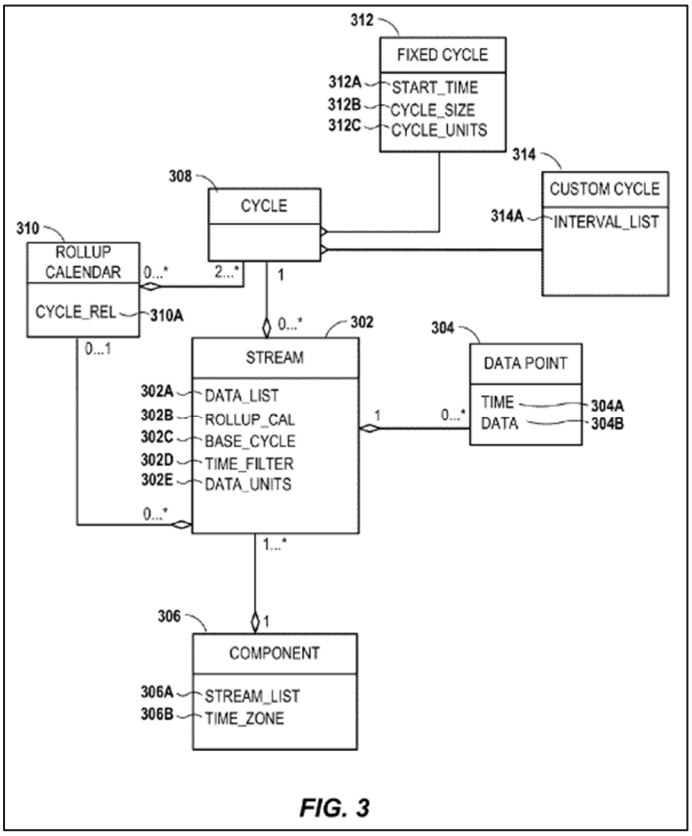


FIG. 3

Ex. 1004, Fig. 3.

f. an energy management application configured to generate an ad hoc dashboard comprising a widget and to associate the widget with the data point, wherein the widget is configured to display a graphical visualization of the plurality of timeseries associated with the data point and comprises interactive user interface options for switching between the plurality of timeseries associated with the data point.

Mills discloses this element. Ex. 1003, ¶65. Figures 6 and 7 depict an energy management application configured to generate an ad hoc dashboard comprising a widget and to associate the widget with the data point. Ex. 1004, [0037], [0077]-[0081]. Mills describes "near real time viewing of rolled up streams" and functionality to view rollups "in a live dashboard graph," "have alerts set on" the rollups, and use rollups "in derived stream calculations." *Id.*, [0037]. For example, the current tab widget (red) displays graphical visualizations (*e.g.*, bar graphs, blue) of the plurality of timeseries (*e.g.*, base and rollups, green) associated with the data point (*e.g.*, electrical current from a smartplug), where the interface comprises interactive user interface options for switching between the plurality of timeseries associated with the data point (*e.g.*, buttons for base and rollup selection, green):

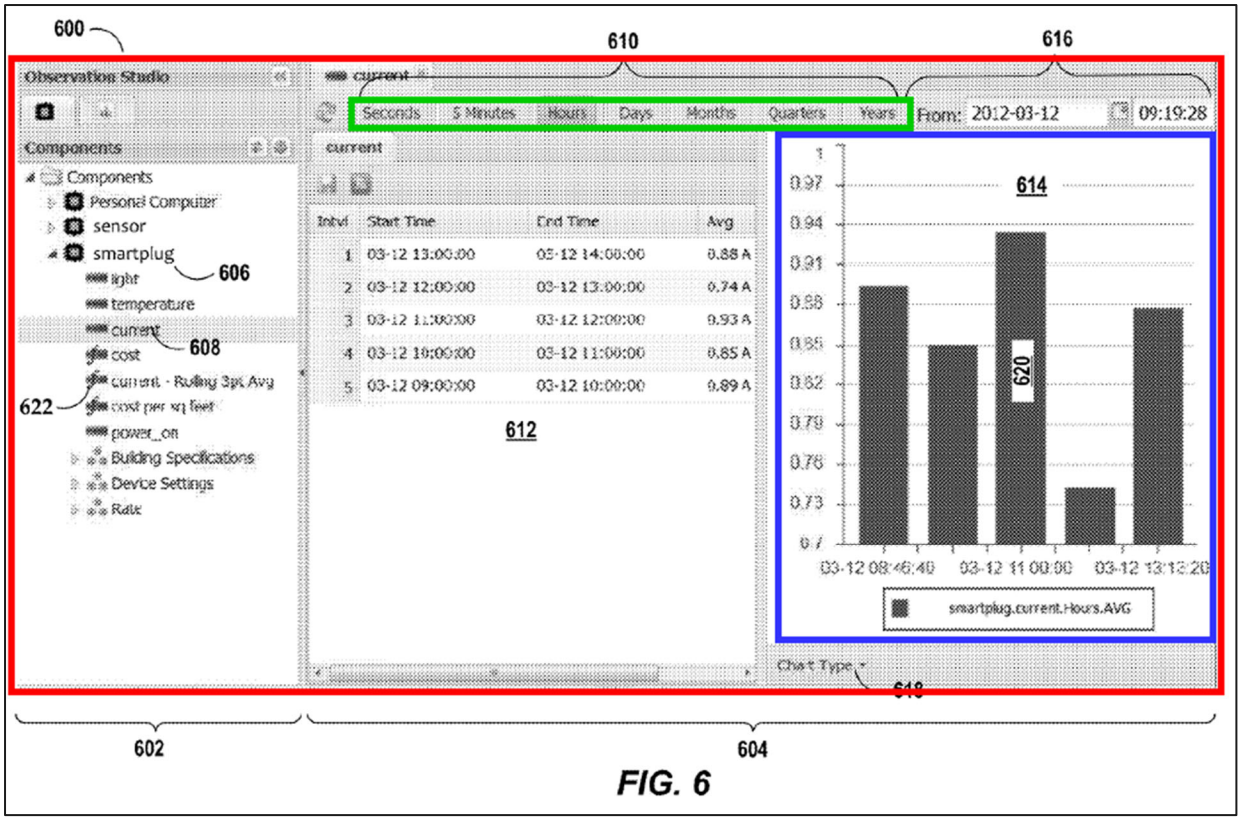


FIG. 6

Ex. 1004, Fig. 6 (color added).

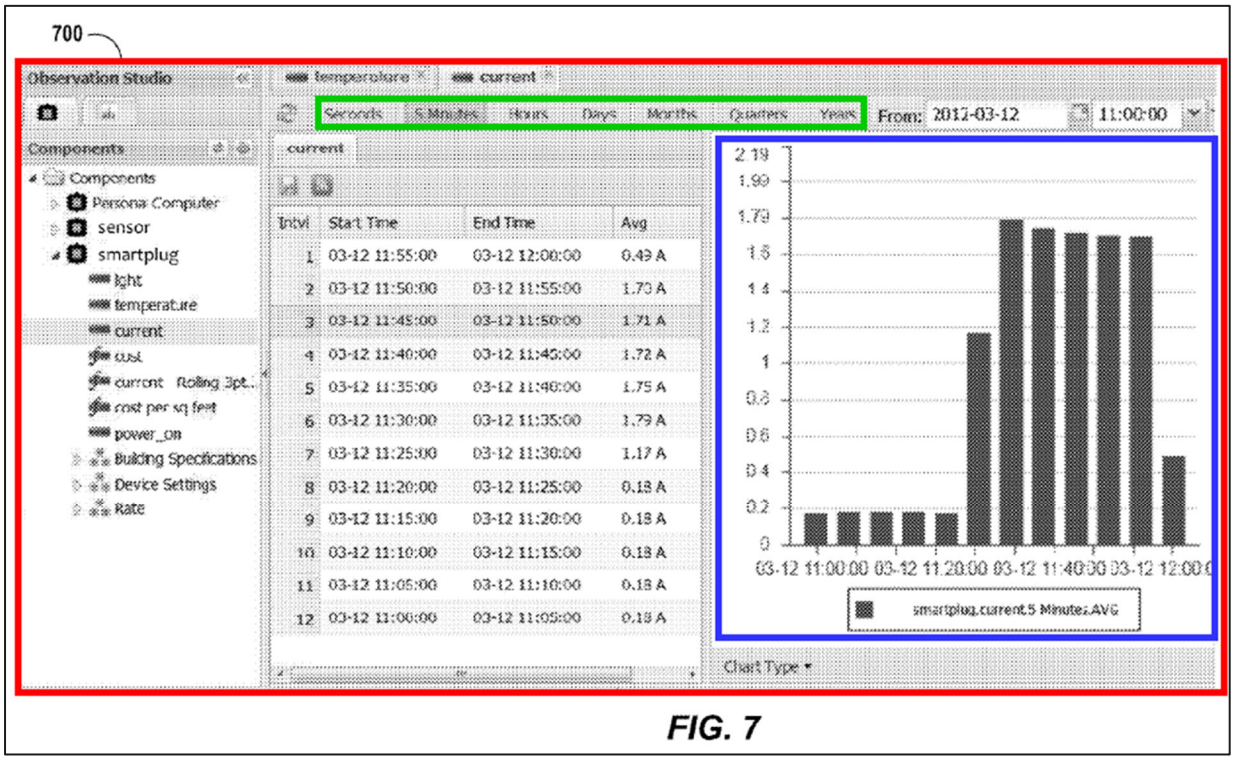


FIG. 7

Id., Fig. 7 (color added). As indicated in green above, "a row 610 of controls allows selecting a base or rollup stream for display based on time cycle associated with the stream. The leftmost of the controls 610 (labeled 'Seconds') selects the base stream in this example. The remaining buttons 610 select a rollup stream." *Id.*, [0078]. The associated data is graphically visualized in "list area 612 and graph area 614." *Id.*, [0078]-[0080].

This is further illustrated in Figure 4, where user 400 "defines 422 a component, stream, cycles and (optionally) a rollup calendar. The user 400 creates a component with a stream that describe[s] the attributes of a source device 408 that will be uploading data into the service 102." *Id.*, [0053]. The user-defined base cycles/streams and rollup cycles/streams "can be assigned (associated) with the source device 408 using the same stream configuration operation 422." *Id.*, [0054]. When the source device provides a data upload (434) and the the base stream and rollup streams are updated (440-442), "a view update 444 may also be sent to the user 400" and this view update causes "changes in graphical representation of the data (e.g., chart, graph, meter, numerical readout) for the base and/or all rollup streams." *Id.*, [0061]; *see also id.*, [0052]-[0063]. Referring to Figures 6 and 7, discussed above, the widget containing graphical visualizations (*e.g.*, bar graphs) for the base and rollup streams is updated according to the view update sequence shown in Figure 4 below. Ex. 1003, ¶67.

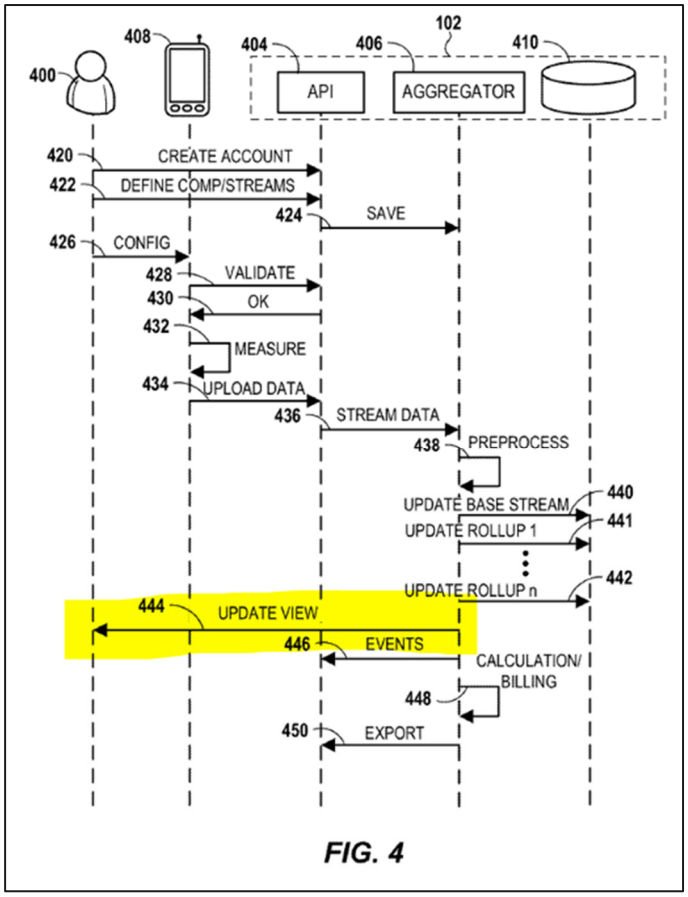


FIG. 4

Ex. 1004, Fig. 4 (color added).

2. Claim 7

a. 7. The building energy management system of claim 1, wherein:

See §VI.A.1.a, *supra*.

b. the timeseries database is configured to store a plurality of timeseries associated with a plurality of different data points;

Mills discloses this element. Ex. 1003, ¶69. As discussed above (§§VI.A.1.b, VI.A.1.c), the system collects data from multiple source devices (*e.g.*, 112 in Fig. 1, 408 in Fig. 4, 1232 in Fig. 12). Accordingly, Mills teaches collecting data and

generating timeseries (*e.g.*, base and rollup) associated with a plurality of different data points (*e.g.*, these different source devices). Ex. 1003, ¶69. And as discussed above (§VI.A.1.e), these plurality of timeseries associated with a plurality of different data points are stored in the timeseries database (*e.g.*, storage units 110 in Fig. 1, database 410 in Fig. 4, streams database 1240 in Fig. 12). Ex. 1003, ¶69.

c. the ad hoc dashboard is configured to associate the widget with each of the plurality of timeseries associated with the plurality of different data points; and

Mills discloses this element. Ex. 1003, ¶70. As discussed above (§VI.A.1.f), Mills teaches an ad hoc dashboard comprising a widget (*e.g.*, the current tab widget, shown in red). In addition, it teaches a control selection (purple) to associate the widget with each of the plurality of timeseries associated with the plurality of different data points (*e.g.*, by selecting the different components). Ex. 1004, [0077]-[0081]. For example, "[t]he screen 600 is divided into two sections 602, 604. The left section 602 is a control selection that allows user selection of data and other content. In this view, section 602 provides a selectable hierarchy [of] components and streams that the user has currently configured. From these components, the electrical current measurement stream 608 of a 'smartplug' component 606 is selected. The measurements from the stream 608 are displayed in section 604." *Id.*, [0077].

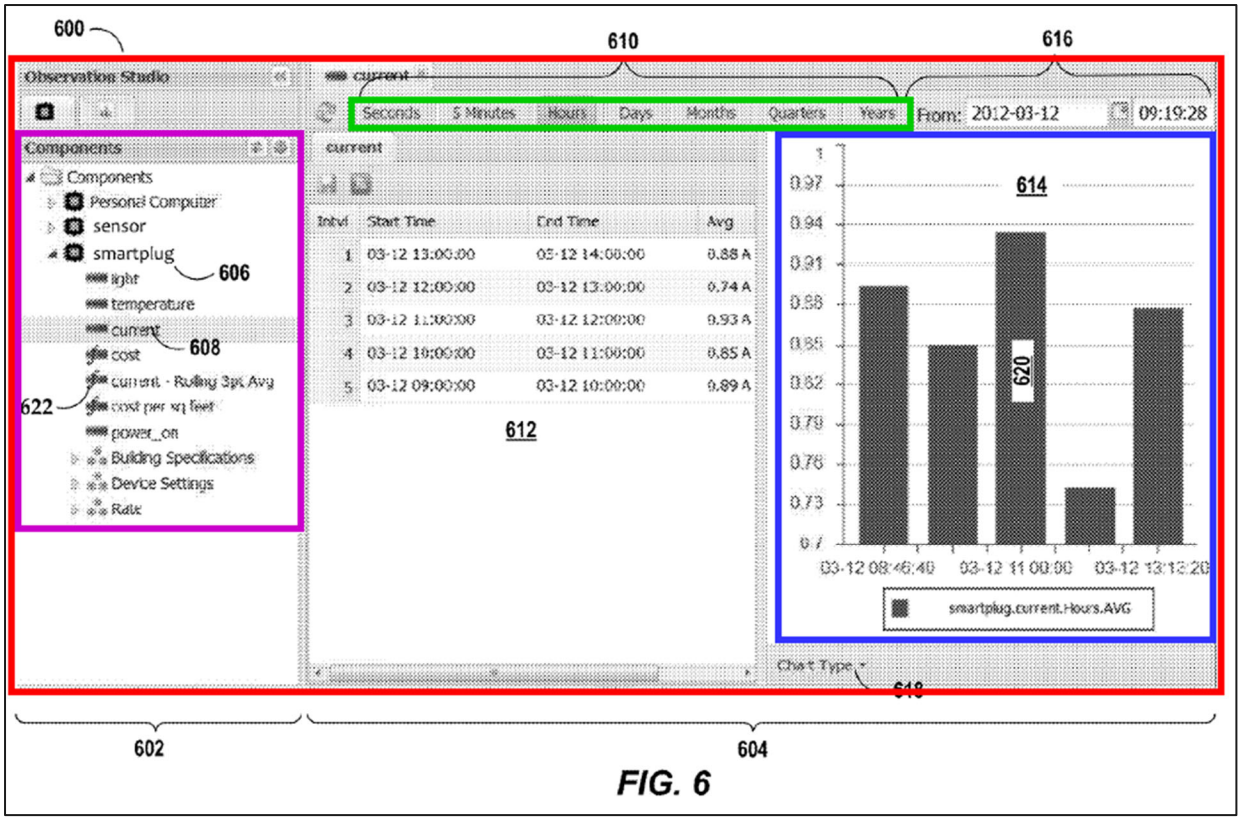


FIG. 6

Ex. 1004, Fig. 6 (color added).

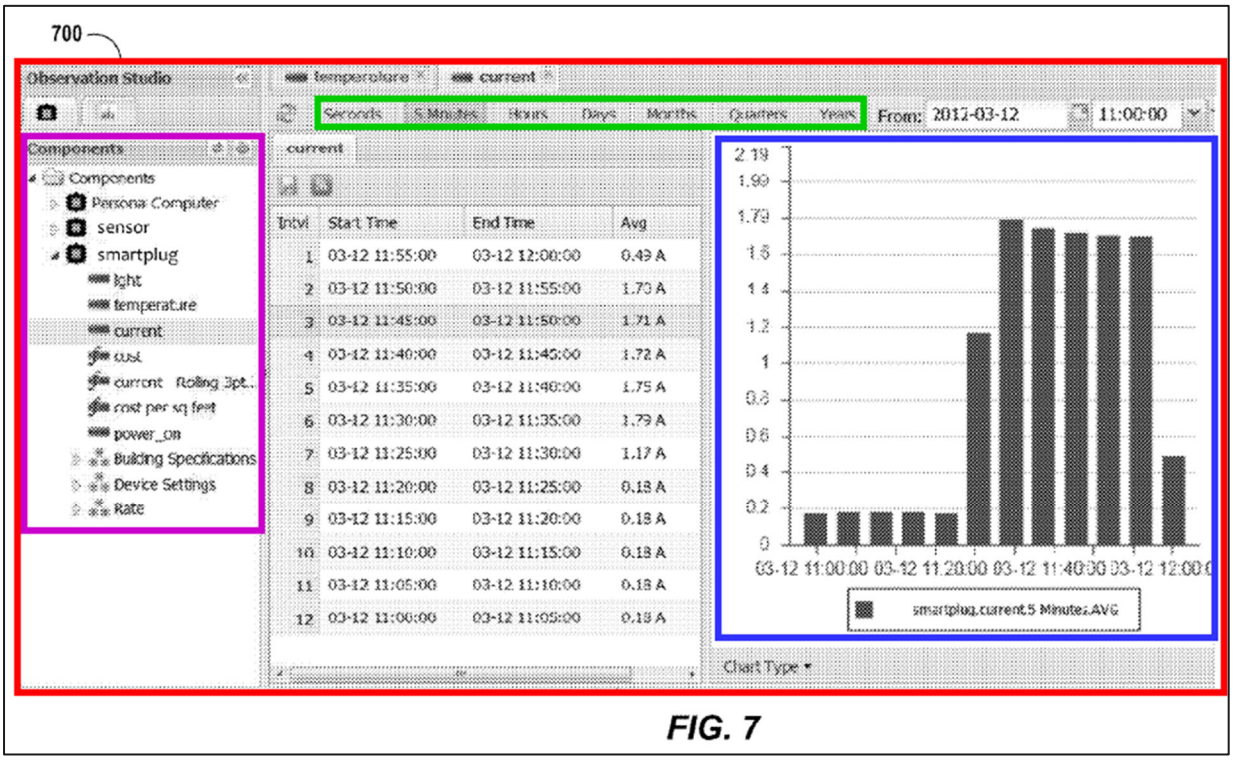


FIG. 7

Id., Fig. 7 (color added).

As discussed above (§VI.A.1.f), Mills also describes the data upload, stream update, and view update processes illustrated in Figure 4. Mills also describes that "multiple components and streams can be uploaded at one time and processed in batch." *Id.*, [0057].

d. the widget is configured to display a graphical visualization of each of the plurality of timeseries associated with the widget.

Mills discloses this element. Ex. 1003, ¶72. As discussed above (§§VI.A.1.f, VI.A.2.c), the widget is configured to display a graphical visualization (*e.g.*, bar chart) of each of the plurality of timeseries associated with the widget. For example, the user may select a particular component (purple) and display the timeseries (blue):



FIG. 6

Ex. 1004, Fig. 6 (color added).

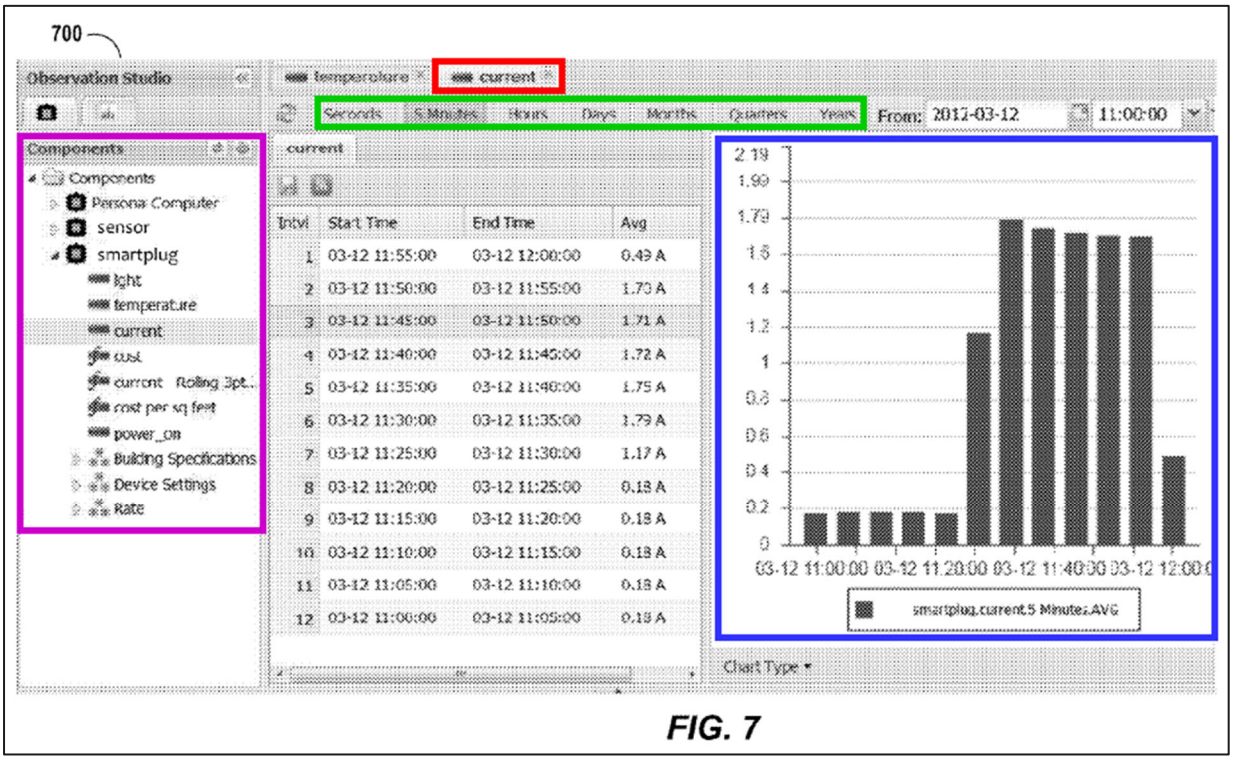


FIG. 7

Id., Fig. 7 (color added).

3. Claim 8

a. 8. The building energy management system of claim 7, wherein the widget is configured to:

See §VI.A.2, *supra*.

b. determine a unit of measure for each of the plurality of timeseries associated with the widget;

Mills discloses this element. Ex. 1003, ¶74. For example, Figures 6 and 7 show the unit of measure for electrical current is amps (denoted by the symbol "A") next to each of the values in the center table. Ex. 1004, Figs. 6, 7; Ex. 1003, ¶74. Further, Figure 3 describes the class definitions that apply to each stream including "data unit 302E." Ex. 1004, Fig. 3, [0038]-[0039]. A POSITA would have understood that Mills' system determines the unit of measure indicated in 302E of the stream definition and uses this unit of measure when displaying the stream in the widget. Ex. 1003, ¶74.

c. generate a line chart comprising a plurality of lines, each of the plurality of lines corresponding to one or the plurality of timeseries associated with the widget;

Mills renders this element obvious. Ex. 1003, ¶75. Continuing the discussion above (§VI.A.3.b), the graphical visualization shown in Mills Figures 6 and 7 is a bar chart. However, Mills Figures 6 and 7 provide a "Chart Type" option (618) to change the chart type. Specifically, "[c]ontrol 618 in area 614 facilitates changing the type of graph or chart displayed (*e.g.*, bar graph, pie chart, etc.)." Ex. 1004,

[0078]. A POSITA would have considered the well-known line graph to be an obvious choice. Ex. 1003, ¶75. A POSITA also would have considered it obvious to display a plurality of lines, each of the plurality of lines corresponding to one of the streams. *Id.* Whether to include a single stream on the line chart, resulting in a simple display, or to include multiple streams on a single chart, resulting in a more comprehensive display, is merely a design choice. *Id.* Further, Figures 6 and 7 imply that multiple lines may be displayed because the display section (604) includes a legend below the chart. Ex. 1004, Figs. 6 and 7. A POSITA would have understood that such a legend is often used to differentiate between multiple sets of data on a single chart. Ex. 1003, ¶75.

d. assign a common color to each of the plurality of lines corresponding to timeseries with the same unit of measure; and

Mills renders this element obvious. Ex. 1003, ¶76. Continuing the discussion above (§VI.A.3.c), it would have been obvious to assign a common color to each of the plurality of lines corresponding to timeseries with the same unit of measure. *Id.* Indeed, graphically displaying similar data using a common color scheme is old and well known, even to a layperson. A POSITA would have been motivated to assign a common color to lines with the same unit of measure to make the chart easier to understand, here visually indicating a similarity between the streams. *Id.* Such a color selection is an obvious design choice. *Id.*

e. assign different colors to each of the plurality of lines corresponding to timeseries with different units of measure.

Continuing the discussion above (§§VI.A.3.c, VI.A.3.d), it would have been obvious to assign different colors to each of the plurality of lines corresponding to timeseries with different units of measure. Ex. 1003, ¶77. A POSITA would have also been motivated to assign a different color to lines with different unit of measure to make the chart easier to understand, here visually indicating a difference between the streams. *Id.* Such a color selection is an obvious design choice. *Id.*

4. Claim 11

Claim 11 is the method counterpart to claim 1, and is taught by Mills for the same reasons. *See* §VI.A.1; Ex. 1003, ¶78.

a. 11. A method for generating an ad hoc dashboard in a building energy management system, the method comprising:

Mills discloses this element. Ex. 1003, ¶79; §§VI.A.1.a, VI.A.1.f, *supra*.

b. operating building equipment to monitor and control a variable in the building energy management system;

See §VI.A.1.b, *supra*.

c. collecting raw data samples of a data point associated with the variable from the building equipment;

See §§VI.A.1.b, VI.A.1.c, *supra*.

d. generating a raw data timeseries comprising a plurality of the raw data samples;

See §VI.A.1.c, *supra*.

e. generating one or more optimized data timeseries from the raw data timeseries;

See §VI.A.1.d, *supra*.

f. storing a plurality of timeseries associated with the data point in a timeseries database, the plurality of timeseries comprising the raw data timeseries and the one or more optimized data timeseries; and

See §VI.A.1.e, *supra*.

g. generating an ad hoc dashboard comprising a widget associated with the data point, wherein the widget is configured to display a graphical visualization of the plurality of timeseries associated with the data point and comprises interactive user interface options for switching between the plurality of timeseries associated with the data point.

See §VI.A.1.f, *supra*.

5. Claim 15

a. 15. The method of claim 11, further comprising

See §VI.A.4, *supra*.

b. presenting, via the ad hoc dashboard, a widget creation interface comprising a plurality of selectable widget types, each of the widget types corresponding to a different type of widget the ad hoc dashboard is configured to create,

Mills discloses this element. Ex. 1003, ¶87. For example, Figures 6 and 7 of illustrate "a user interface that facilitates viewing collected data." Ex. 1004, [0077].

This interface allows for sections to be customized according to user inputs including "section 602 [that] is a control selection that allows user selection of data and other content" (shown in purple), "row 610 of controls [that] allows selecting a base or rollup stream for display based on time cycle associated with the stream" (shown in green), and "time controls 616," which includes "time and data selector[s]" (shown in yellow). *Id.*, [0077]-[0081]. Mills describes a stream definition process in which the user establishes a number of parameters and configures the devices to properly communicate with the service. *Id.*, [0053]-[0057]. Based on the user inputs, the interface creates a widget (the current tab with its display section 604) that includes a "list area 612" (shown in orange) and a "graph area 614" (shown in blue). *Id.*, [0079]-[0081], Figs. 6, 7. The widget displays the specific stream (according to the input in controls 610) for the specific device (according to the input in control selection 602) for the specific time (according to the time and data selectors in time controls 616.) *Id.*, [0077]-[0081].

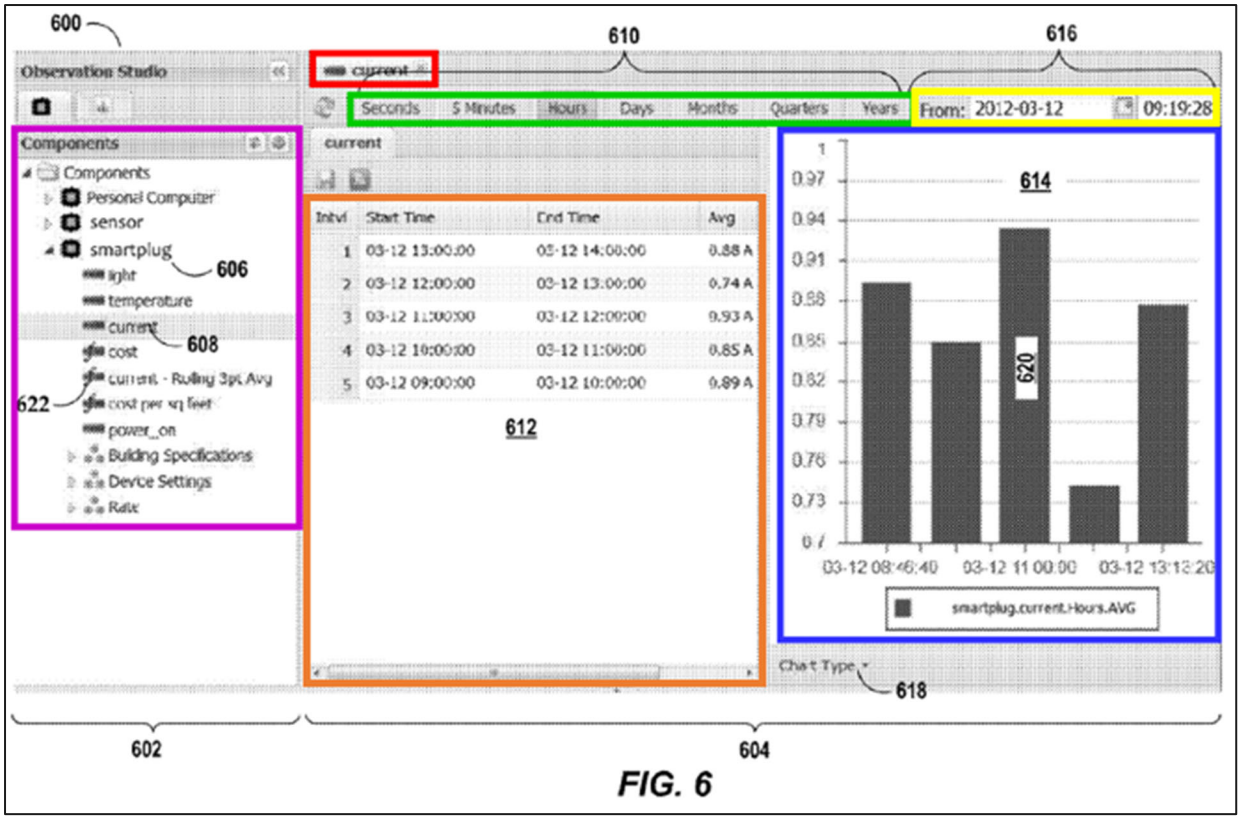


FIG. 6

Id., Fig. 6 (color added).



FIG. 7

Id., Fig. 7 (color added).

c. the widget types comprising at least one of: a charting widget; a data visualization widget; a display widget; a time or date widget; and a weather information widget.

Mills discloses this element. Ex. 1003, ¶88. Continuing the discussion above (§VI.A.5.b), the widget created and displayed in Mills' user interface provides for charts, data visualization, and display of information with various time periods and granularity. To illustrate using Figure 6, the list area 612 (shown in orange) displays information including "Start Time," "End Time," and "Avg" for each "Intvl," and the graph area 614 (shown in blue) charts, visualizes data, and displays information in a bar chart or other chart type format. Thus, the current tab widget in Figure 6 is at least a display widget (as evidenced by the list of information being displayed in list area 614 and the chart being displayed in graph area 614), a charting widget (as evidenced by the chart in graph area 614), and a data visualization widget (as evidenced by the chart in graph area 614). Ex. 1003, ¶88. To further illustrate using Figure 7, the current tab widget in Figure 7 is also at least a display widget, a charting widget, and a data visualization widget, with a different time frame ("11:00:00" as shown in yellow) and a different time granularity ("5 Minutes" as shown in green) than those shown in Figure 6 ("9:19:28" in yellow and "Hours" in green). *Id.*

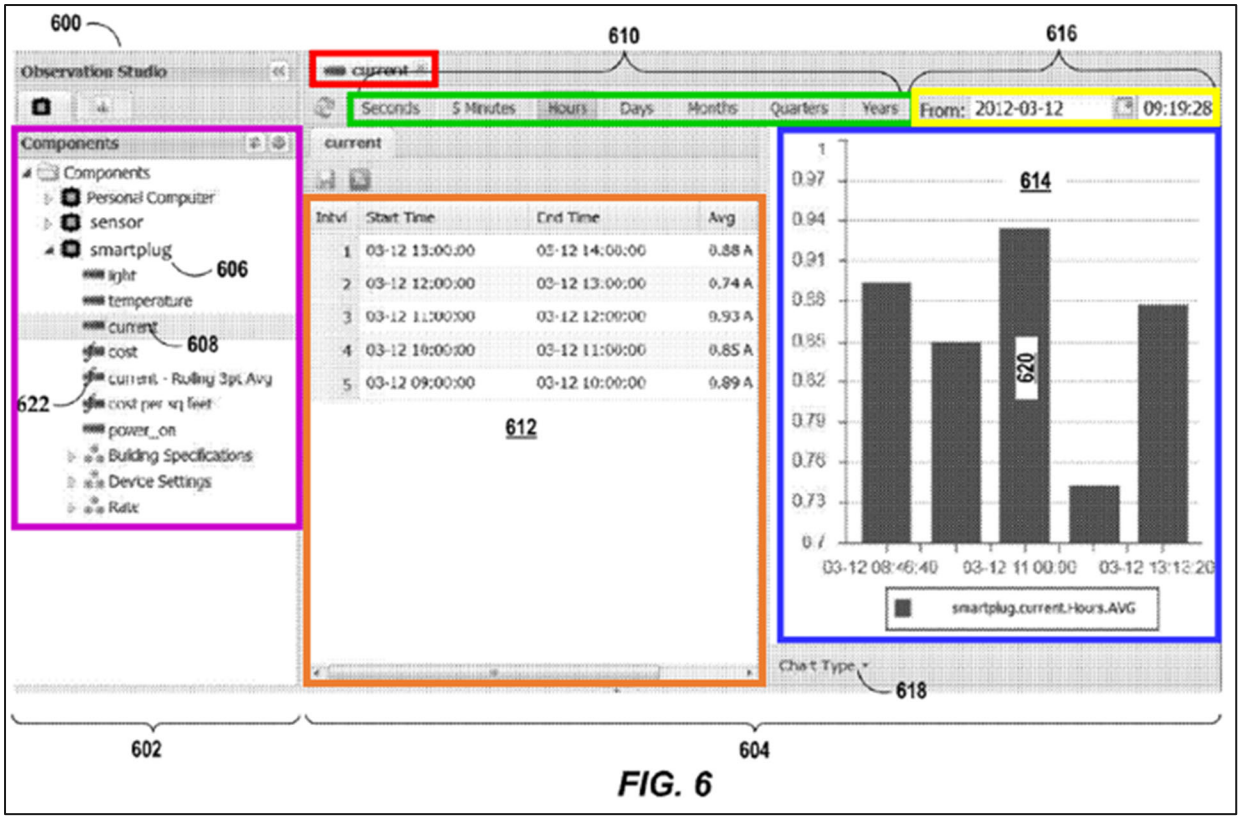


FIG. 6

Ex. 1004, Fig. 6 (color added).



FIG. 7

Id., Fig. 7 (color added).

6. Claim 16

a. 16. The method of claim 11, further comprising

See §VI.A.4, *supra*.

b. displaying, in the widget, a chart of the plurality of timeseries associated with the data point, the chart comprising at least one of:

Mills discloses this element. Ex. 1003, ¶90. Continuing the discussion above (§VI.A.1.f), Mills teaches a widget (red) for displaying graphical visualization of the plurality of timeseries associated with the data point in the form of a bar chart (blue). Ex. 1004, [0037]. [0077]-[0081], Figs. 6-7. While Figures 6 and 7 display a bar chart, (blue) the user may view other charts by selecting among the base and rollup timeseries (green). *Id.*

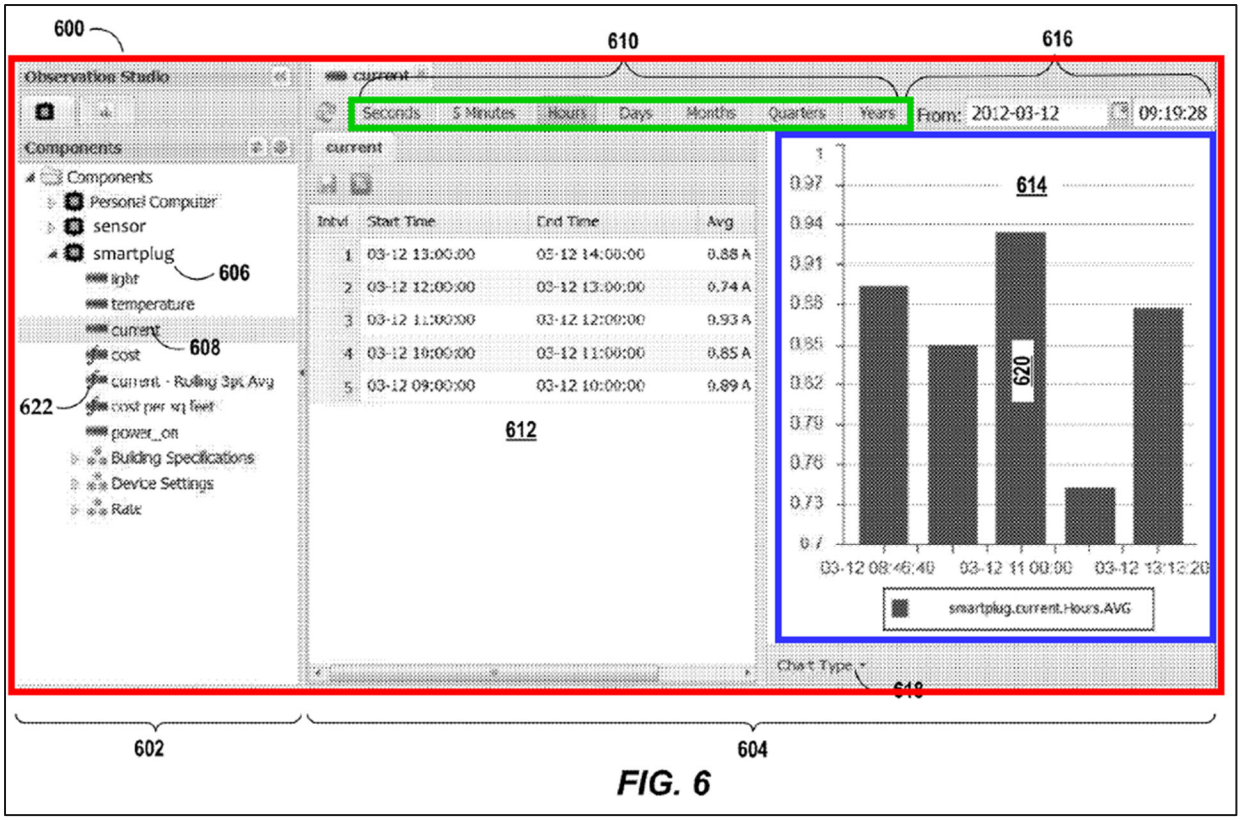


FIG. 6

Id., Fig. 6 (color added).

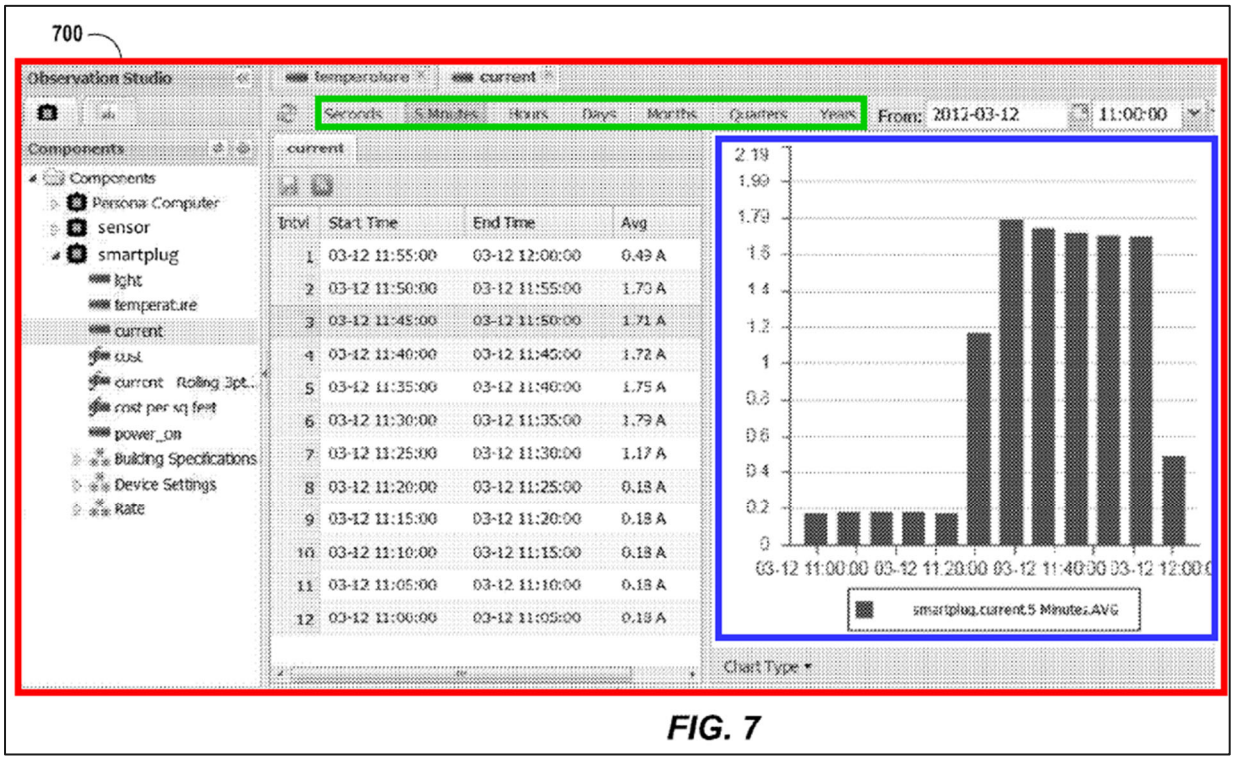


FIG. 7

Id., Fig. 7 (color added).

It would have been obvious to display multiple such bar charts in a single window to provide a comprehensive view of various data. Ex. 1003, ¶91. Indeed, this is contemplated in Figures 6 and 7 with a legend below the bar chart, which implies the use of multiple different bar charts. Ex. 1004, Figs. 6 and 7.

c. a line chart; an area chart; a column chart; a bar chart; a stacked chart; and a pie chart.

Mills discloses this element. Ex. 1003, ¶92. Continuing the discussion above (§VI.A.6.b), Figures 6 and 7 depict a bar chart (blue). Ex. 1004, Figs. 6 and 7.

7. Claim 17

Claim 17 is the method counterpart to claim 7, and is taught by Mills for the same reasons. *See* §VI.A.2; Ex. 1003, ¶93.

a. 17. The method of claim 11, further comprising:

See §VI.A.4, *supra*.

b. storing a plurality of timeseries associated with a plurality of different data points in the timeseries database;

See §VI.A.2.b, *supra*.

c. associating the widget with each of the plurality of timeseries associated with the plurality of different data points; and

See §VI.A.2.c, *supra*.

d. displaying, in the widget, a graphical visualization of each of the plurality of timeseries associated with the widget.

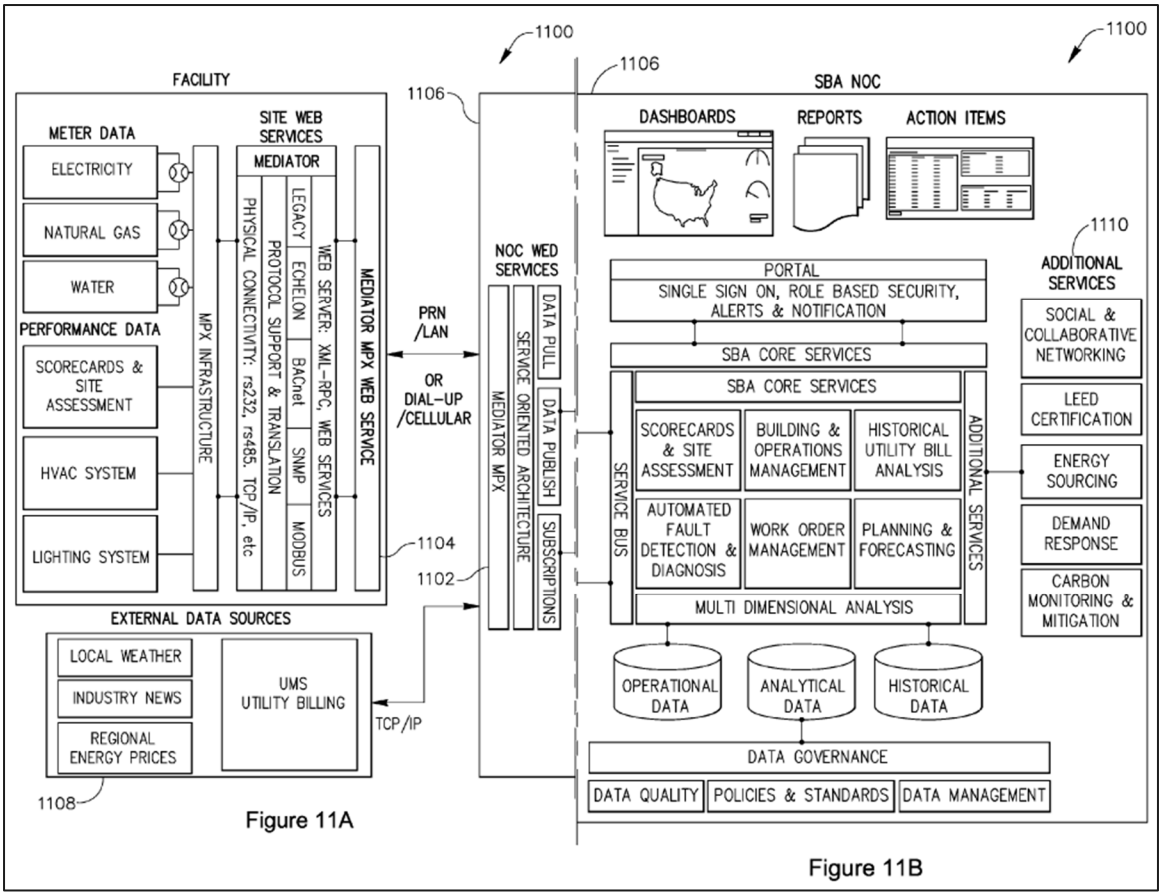
See §VI.A.2.d, *supra*.

B. GROUND II: Hedley (Ex. 1006)

1. Claim 1

a. 1. A building energy management system comprising:

To the extent that the preamble is limiting, Hedley teaches it. Ex. 1003, ¶99. Hedley is entitled "Building Energy Consumption Analysis System" and "relates to obtaining and analyzing building energy data…and optionally responsively controlling building systems, such as lighting, heating, air-conditioning, and other energy consuming systems." Ex. 1006, Cover, [0003]. For example:



Ex. 1006, Figs. 11A and 11B (rejoining figure divided over two pages).

b. building equipment operable to monitor and control a variable in the building energy management system and configured to provide raw data samples of a data point associated with the variable;

Hedley discloses this element. Ex. 1003, ¶100. Hedley teaches building equipment (e.g., mediator 1102) operable to monitor and control a variable (e.g., electricity consumption) in the building energy management system, as claimed. For example, Hedley teaches that the "mediator 1102 provides for ***bi-directional (read/write) capability*** with any integrated system. This facilitates for 24/7 continuous optimized control of the systems connected to it…. An example Web

service would be an Automated Demand Response (ADR) notice and pricing level signal from Constellation New Energy (CNE) triggering the ***mediator 1102 on board logic and control to automatically shed electrical loads*** by turning off non essential lighting and changing set points on chilled water and HVAC zones." Ex. 1006, [0086].

Hedley further discloses that the building equipment is configured to provide raw data samples (e.g., extracted data) of a data point associated with the variable (e.g., energy consumption), as claimed. For example, Hedley teaches that the "mediator 1102 communicates the data it collects to the System Network Operations Center (NOC) 1106," for instance, raw data samples associated with, or "about energy consumption," and "utility data from each of the meters and sub-meters in a building." *Id.*, [0076, 0083]. Indeed, Hedley explains that the "mediator 1102 extracts data from each building system and piece of equipment in the building," and that data is associated with the energy consumed by "each building system and piece of equipment in the building." *Id.*, [0084]; *see also id.* at Fig. 11 (reproduced above); Abstract, [0003], [0041], [0082]-[0083], [0085], [0096]-[0100], [0124]-[0130], [1140], [0272], [0331]-[0032], [0493]; Ex. 1003, ¶101.

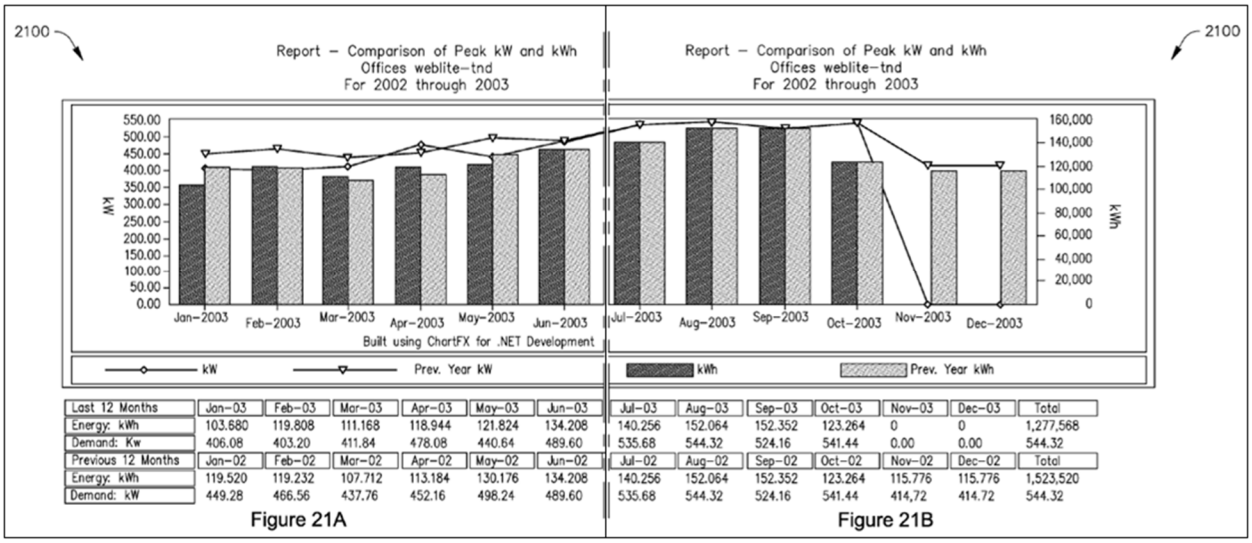
c. a data collector configured to collect the raw data samples from the building equipment and generate a raw data timeseries comprising a plurality of the raw data samples;

Hedley discloses this element. Ex. 1003, ¶102. Hedley teaches a data collector (e.g., portion of mediator 1102 providing integration, collection, and logging) configured to collect the raw data samples from the building equipment (as described above; *see* §VI.B.1.b). For example, Hedley explains that after the "mediator 1102 extracts data from each building system and piece of equipment in the building," Ex. 1006, [0084], it then "***integrates, collects, logs***, and exports information into the EEMS data repository," *id.*, [0106]. Indeed, Hedley explains that it "tracks data points" and "store[s] this information with a ***timestamp***." *Id.*, [0100]. In other words, the functional block of mediator 1102 that "integrates, collects, logs and exports" is a data collector that collects raw data samples (or "extract[ed] data from each building system"). Ex. 1003, ¶102. Further, the data "log[s]" created by the functional block logs data by creating a raw data timeseries comprising a plurality of the raw data samples. *Id*. Indeed, Hedley explains that its EEMS that receives "export[ed] information" from the mediator "normalize[s]" raw data timeseries from disparate systems "on a ***time basis***," i.e., by "***align[ing] data*** from different sources with ***a uniform time coding system*** so that values can be normalized to whatever interval the EEMS user chooses to display." Ex. 1006,

[0108]. As such, the functional block of "mediator 1102 [that] integrates, collects, logs and exports information" is a data collector, as claimed. *Id.*, [0106].

d. one or more data platform services configured to generate one or more optimized data timeseries from the raw data timeseries;

Hedley discloses this element. Ex. 1003, ¶103. Hedley teaches using data platform services to generate optimized data timeseries from the raw data timeseries. For example, Hedley teaches collecting energy data in 15-minute intervals, and explains that "[t]he energy data … may be collected at any desired interval (e.g., every 15 minutes, 30 minutes, 60 minutes, or other interval), ***with the data subjected to any desired mathematical treatment (e.g., averaging of the data, or discarding outlier data) to obtain the energy data for a given date.***" Ex. 1006, [0500]. For example, Figures 21A/21B depict kW and kWh values on a monthly basis, which constitute an optimized data timeseries. Ex. 1003, ¶103.



Ex. 1006, Figs. 21A and 21B.

As another example, Figure 19 depicts hourly and monthly demand timeseries (yellow) and hourly and monthly consumption timeseries (blue). In each case, the hourly and monthly timeseries constitute optimized data timeseries (*e.g.*, condensed) relative to the raw data timeseries. Ex. 1003, ¶104.

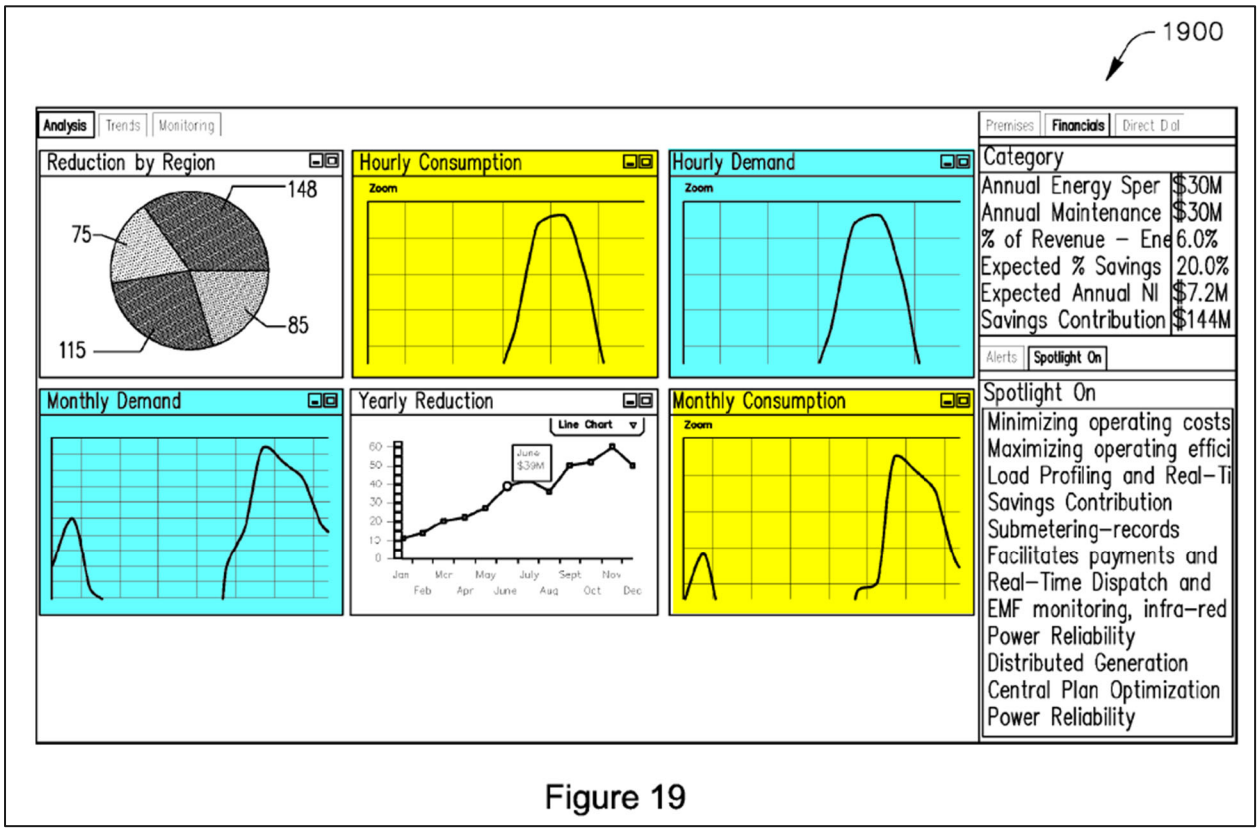


Figure 19

Ex. 1006, Fig. 19 (color added). Additional examples of timeseries are shown throughout Figures 18, 20, 22A and 22B, 23, and 27.

e. a timeseries database configured to store a plurality of timeseries associated with the data point, the plurality of timeseries comprising the raw data timeseries and the one or more optimized data timeseries; and

Hedley discloses this element. Ex. 1003, ¶105. Hedley teaches that the raw data timeseries created by "mediator 1102 [that] integrates, collects, logs" raw data is the "***export[ed] information into the EEMS data repository***." Ex. 1006, [0106]. Additionally, Hedley teaches that the timeseries database also stores one or more optimized data timeseries, for example, "[t]he EEMS will store and manage the ***calculation results in the same way*** as other interval data points, including viewing, reporting and further analysis, or even as a factor in another calculation." *Id.*, [0156].

Figure 25 provides additional support, where Hedley explains that an "energy database 2514 may store any data that the machine 2500 processes." Ex. 1006, [0494], Fig. 25. "As examples, the energy database 2514 may store sensor samples 2516 (*e.g.*, samples of energy consumption or performance of building energy consuming devices), energy metrics 2518 (*e.g.*, measured or computed metrics, optionally based on energy KPIs), utility bill data 2520 (*e.g.*, cost per unit energy, energy consumed, total cost, and date), weather data 2522 (*e.g.*, temperature ranges, dates, expected temperature or temperature variations at any desired interval), or other data that helps the machine 2500 analyze energy consumption, cost, or history." *Id.*; Ex. 1003, ¶106.

As such, Hedley teaches a timeseries database (e.g., "EEMS data repository" or "energy database 2514") configured to store a plurality of timeseries associated with the data point, the plurality of timeseries comprising the raw data timeseries and one or more optimized data timeseries. Ex. 1003, ¶107.

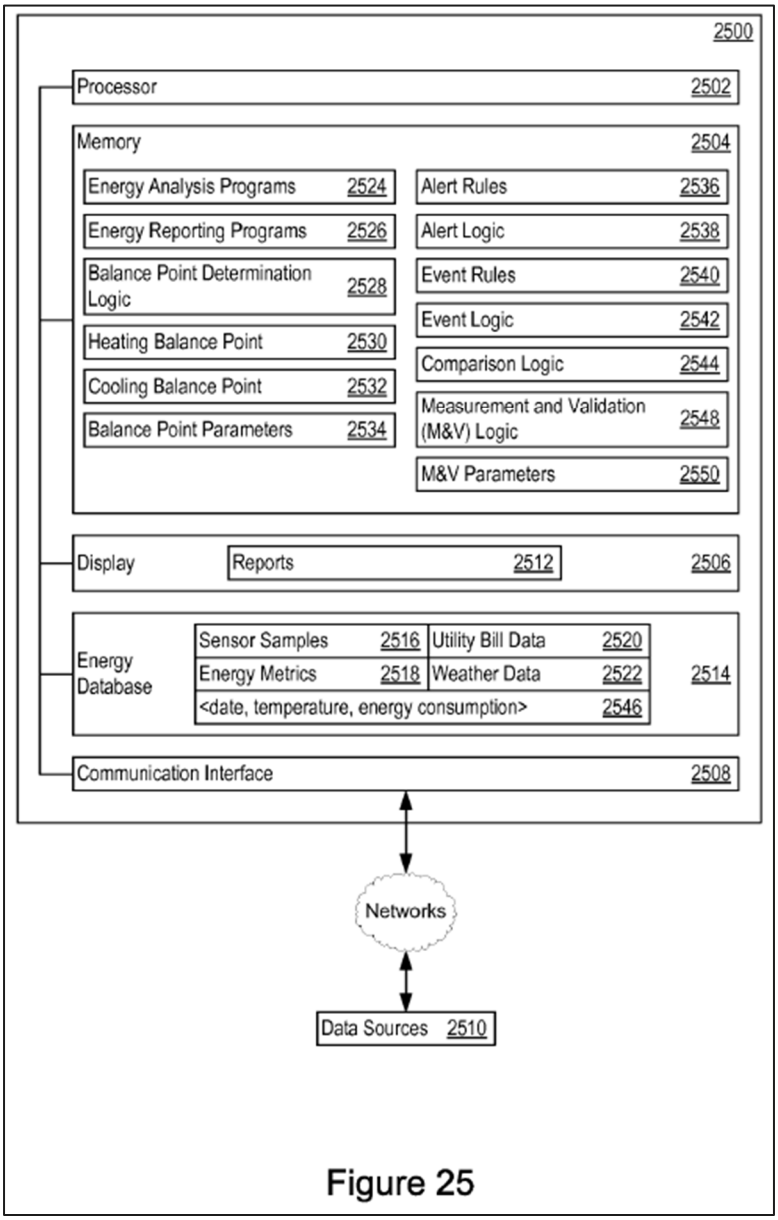


Figure 25

Ex. 1006, Fig. 25.

f. an energy management application configured to generate an ad hoc dashboard comprising a widget and to associate the widget with the data point, wherein the widget is configured to display a graphical visualization of the plurality of timeseries associated with the data point and comprises interactive user interface options for switching between the plurality of timeseries associated with the data point.

Hedley discloses this element. Ex. 1003, ¶108. As an initial matter, Hedley is entitled "Building Energy Consumption Analysis System" and "relates to obtaining and analyzing building energy data … and optionally responsively controlling building systems, such as lighting, heating, air-conditioning, and other energy consuming systems." Ex. 1006, Cover, [0003]. Thus, Hedley's describes an energy management application as claimed. This is further confirmed by the energy management focus of the application, as discussed below.

Hedley discloses generating an ad hoc dashboard comprising a widget as claimed. Ex. 1006, [0082], [0085], [0107]-[0108], [0178]-[0180], [0183]-[0184], [0197]-[0201], [0228]-[0229], [0238], [0482], [0495], [0503], [0506]-[0507], [0515]-[0516], [0522]-[0523], Figs. 18-20, 21A, 21B, 22A, 22B, 23. For example, "[t]he system user interface (UI) is a rich internet application (RIA) that provides an interactive framework for viewing dashboards and reports." *Id.*, [0179]. Figures 18-23 show "dashboard screenshots… that the system may generate." *Id.*, [0028]-[0033]. "The EEMS dashboard has three main views: trends, real-time monitoring, and analysis. Each has a set of customizable dashboard elements relevant to the

specific view. The user can select the data elements he/she wishes to analyze on their dashboard dynamically by clicking on a list of available elements and dragging the element to the frame." *Id.*, [0180]. Furthermore, "[t]he EEMS has the ability to tailor the list of dashboard elements for each user based on their profile and privilege." *Id.*, [0181]; Ex. 1003, ¶109.

Referring to Figure 19, which "shows a dashboard screenshot for an analytics reporting screen 1900 that the system may generate," there is an analysis widget associated with the energy usage data point. Ex. 1006, [0487], Fig. 19. For example, it contains hourly and monthly demand timeseries (yellow) associated with the demand data point, as well as hourly and monthly consumption timeseries (blue) associated with the consumption data point as discussed above (§VI.B.1.d).[8] Accordingly, the widget is configured to display a graphical visualization of the plurality of timeseries associated with the data point (*e.g.*, these demand and consumption timeseries). Ex. 1003, ¶110.

[8] For background, consumption is measured in kWh and demand is measured in kW. Ex. 1003, ¶110, n.4; Ex. 1006, [0139], [0535].

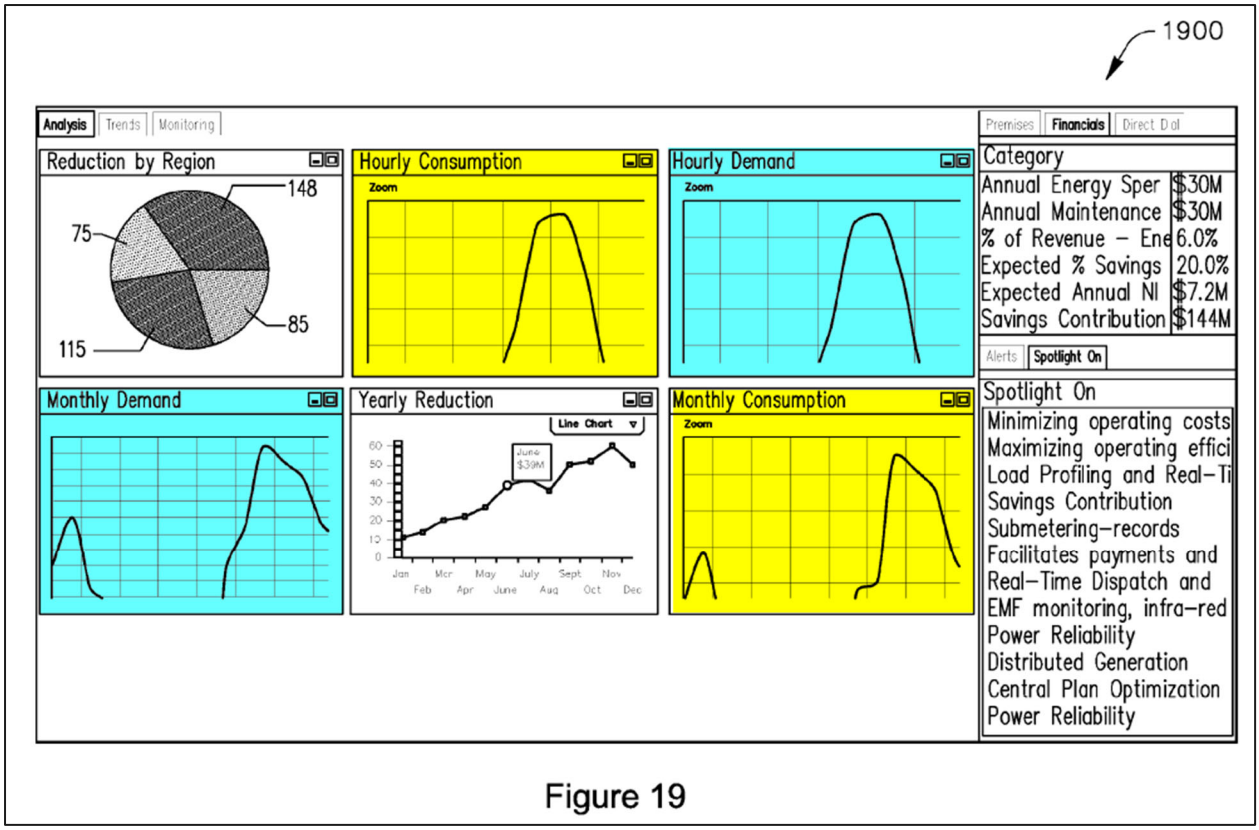


Figure 19

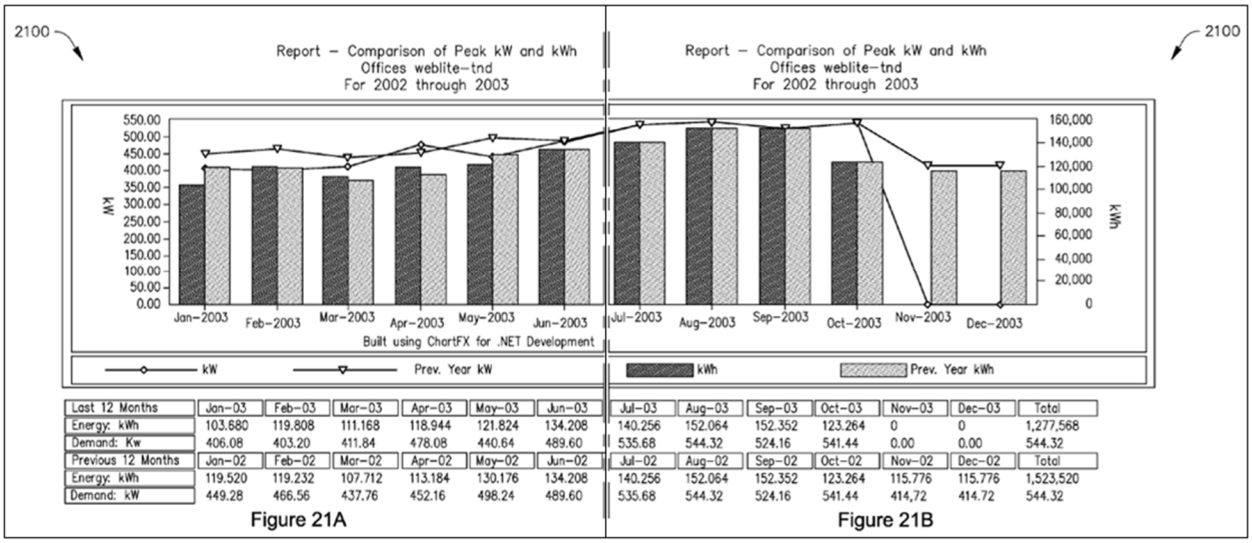
Ex. 1006, Fig. 19 (color added).

Furthermore, the analysis widget comprises interactive user interface options for switching between the plurality of timeseries associated with the data point. *Id.*, Fig. 19; Ex. 1003, ¶111. For example, "[e]ach dashboard element will have a collapsed and expanded view. By clicking on an individual element, the element will expand to a larger view. In certain cases, the expanded view will permit user interaction. Examples of user interactions include (but are not limited to) increasing the time axis on interval or meter data, entering new dates, browsing to view data on a specific machine or system." Ex. 1006, [0185]. This is also shown in Figure 19 above, where each child window for the various timeseries (shown in yellow and

blue) have minimization and expansion buttons in the top right. *Id.*, Fig. 19; Ex. 1003, ¶111.

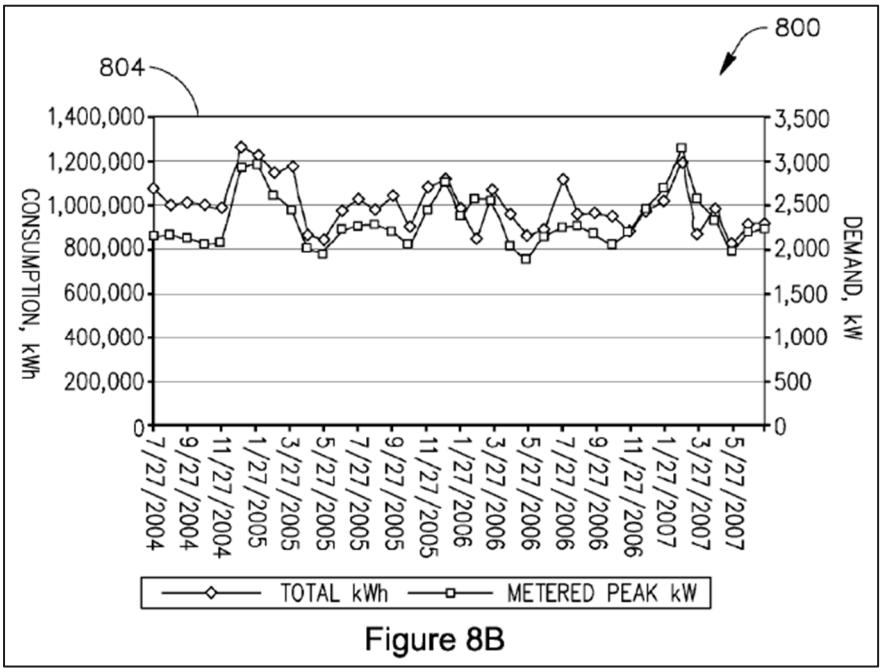
Figure 21[9] additionally depicts "a dashboard screenshot for a monitoring reporting screen 2100 of historical energy comparison that the system may generate." Ex. 1006, [0489]. As can be seen, this ad hoc dashboard for comparing peak kW and kWh usage for an office by month between years is generated by a widget (*i.e.*, the system component that generated the graph). Ex. 1003, ¶112. For example, "[t]he system 100 may further leverage Microsoft (TM) Dynamics to… generating dashboards of KPIs [key performance indicators]." Ex. 1006, [0055]. And as can be seen, the widget is configured to display a graphical visualization of the plurality of timeseries (*e.g.*, kW in 2002 and 2003, or alternatively kWh in 2002 and 2003) associated with the data point (*e.g.*, kW or alternatively kWh data points) and comprises interactive user interface options for switching between the plurality of timeseries associated with the data point (*e.g.*, each dashboard has "customizable dashboard elements" and "increasing the time axis on interval or meter data, entering new dates, browsing to view data on a specific machine or system"). *Id.*, [0180]-[0181], [0185].

[9] Figure 21 is comprised of Figures 21A and 21B, where Figure 21A is the left side of Figure 21 and Figure 21B is the right side of Figure 21.



Last 12 Months	Jan–03	Feb–03	Mar–03	Apr–03	May–03	Jun–03	Jul–03	Aug–03	Sep–03	Oct–03	Nov–03	Dec–03	Total
Energy: kWh	103.680	119.808	111.168	118.944	121.824	134.208	140.256	152.064	152.352	123.264	0	0	1,277,568
Demand: Kw	406.08	403.20	411.84	478.08	440.64	489.60	535.68	544.32	524.16	541.44	0.00	0.00	544.32
Previous 12 Months	Jan–02	Feb–02	Mar–02	Apr–02	May–02	Jun–02	Jul–02	Aug–02	Sep–02	Oct–02	Nov–02	Dec–02	Total
Energy: kWh	119.520	119.232	107.712	113.184	130.176	134.208	140.256	152.064	152.352	123.264	115.776	115.776	1,523,520
Demand: kW	449.28	466.56	437.76	452.16	498.24	489.60	535.68	544.32	524.16	541.44	414.72	414.72	544.32

Ex. 1006, Figs. 21A and 21B. Hedley provides additional reports similar to Figure 21, such as Figure 8B:



Furthermore, "the system EEMS supports real-time access to facility metering data via the mediator 1102 HTML and XML (AJAX) Web page dashboards and Graphical User Interfaces (GUI)." Ex. 1006, [0106]. "This includes the ability to

embed a Flash-based widget that can chart local log data." *Id.*, [0463]-[0470]; Ex. 1003, ¶114.

Accordingly, Hedley teaches an energy management application configured to generate an ad hoc dashboard (*e.g.*, "dashboard") comprising a widget (*e.g.*, generated graph(s)) and to associate the widget with the data point (*e.g.*, energy measurements), wherein the widget is configured to display a graphical visualization of the plurality of timeseries (*e.g.*, various energy timeseries) associated with the data point (*e.g.*, energy measurements) and comprises interactive user interface options for switching between the plurality of timeseries associated with the data point (*e.g.*, user ability to select and manipulate the timeseries). Ex. 1003, ¶115.

2. Claim 7

a. 7. The building energy management system of claim 1, wherein:

See §VI.B.1, *supra*.

b. the timeseries database is configured to store a plurality of timeseries associated with a plurality of different data points;

Hedley discloses this element. Ex. 1003, ¶117. As discussed above (§VI.B.1.c), the system collects data from multiple building systems. For example, "[t]he mediator 1102 extracts data from ***each*** building system and piece of equipment in the building. This data is tracked over time to observe subtle features in the way the equipment works and the building operates as a whole." Ex. 1006,

[0084]. Accordingly, there are a plurality of different data points (e.g., energy readings from different systems).

As discussed above (§VI.B.1.e), the timeseries from these datapoints are stored in the timeseries database. For example, "[t]he mediator 1102 integrates, collects, logs and ***exports information into the EEMS data repository***." *Id.*, [0106]. As to the optimized data timeseries (§VI.B.1.d), "[t]he system 100 creates and displays a virtually unlimited number of calculations of almost any complexity. The EEMS will store and manage the ***calculation results in the same way as other interval data points***, including viewing, reporting and further analysis, or even as a factor in another calculation." *Id.*, [0156]; Ex. 1003, ¶118.

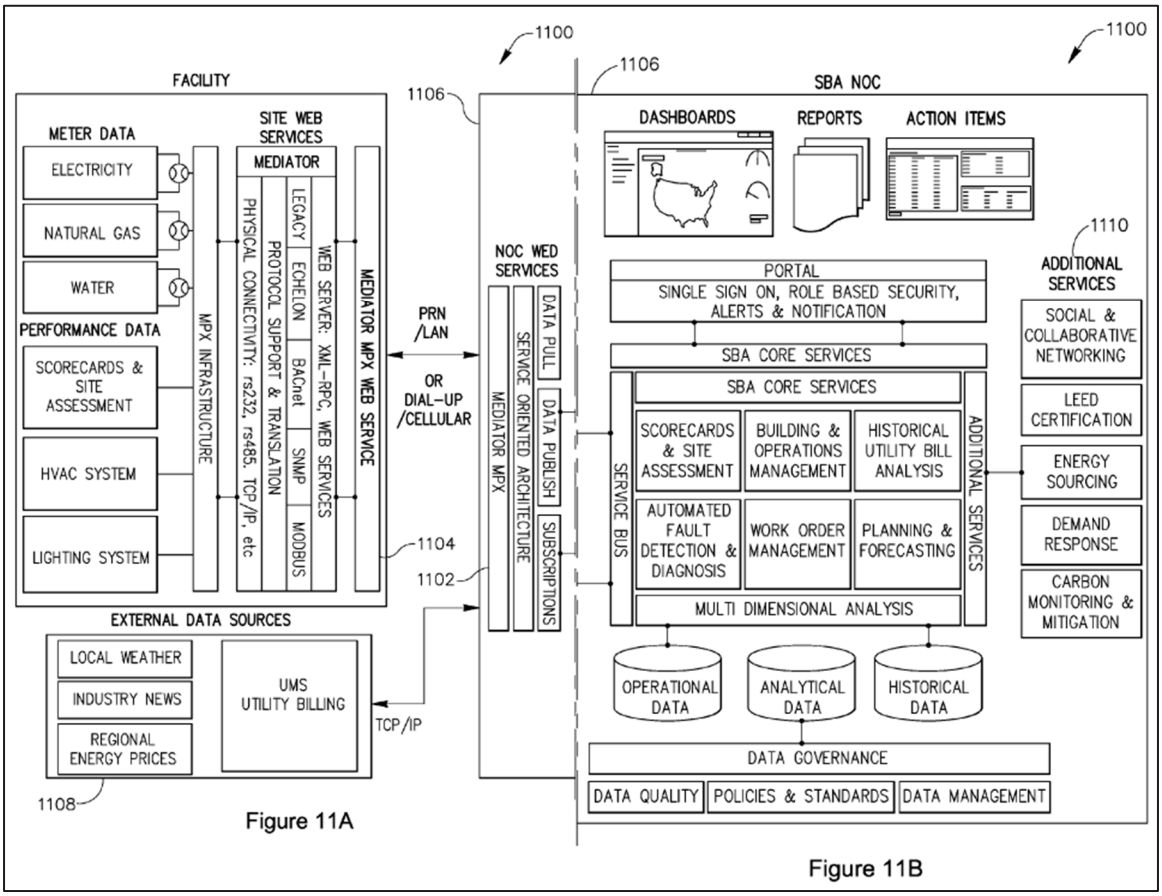
This is further illustrated by the below table, which shows the plurality of different data points collected, the frequency of reading, and the frequency of reporting to the system (*e.g.*, raw data timeseries) for storage in the EEMS:

Company EEMS Requirements			System Solution Data
Categories	Type/Unit	Requested Frequency	Reading Frequency
Electrical	kW, kWh	15 minutes	real-time
Natural Gas	CCF	15 minutes	real-time
Water	gal.	15 minutes	real-time
Steam	lbs., mmbtu, F degree, psi and mmbtu	15 minutes	real-time
Chillers	kW, tons of cooling, F degree, flow rates	15 minutes	real-time
Boilers	Fuel use, steam/hot water production, auxiliary load (pumps, blowers and fans)	n/s	real-time
Room/Zone Temperatures	F degree	n/s	real-time
Indoor/outdoor Temperatures	F degree	n/s	real-time
Load Consumption	Peak demand, date/time of peak consumption, etc.	n/s	real-time
Power Outage Information	date/time and restoration	n/s	real-time
Instantaneous Demands	watts, vars, volts, amps, kVA power, factor, etc.	n/s	real-time

-continued

Company EEMS Requirements			System Solution Data
Categories	Type/Unit	Requested Frequency	Reading Frequency
UMS data	Utility data	daily	daily
eFMS data	Facilities inventory information & energy related projects	as needed	as needed
MTSC data	Maintenance Contact Information	monthly	monthly

Ex. 1006, [0139]; Ex. 1003, ¶119. Figure 11 below similarly shows how multiple different systems (e.g., electricity, natural gas, water) are metered for data feed:



Ex. 1006, Figs. 11A and 11B (rejoining figure divided over two pages); Ex. 1003, ¶120.

c. the ad hoc dashboard is configured to associate the widget with each of the plurality of timeseries associated with the plurality of different data points; and

Hedley discloses this element. Ex. 1003, ¶121. For example, Hedley teaches that "[t]he user can select the data elements he/she wishes to analyze on their dashboard dynamically by clicking on a list of available elements and dragging the element to the frame. This will allow comparison of similar equipment or facilities, for example." Ex. 1006, [0180]. Thus, the ad hoc dashboard is configured to associate the widget (e.g., the analysis widget) with each of the plurality of timeseries associated with the plurality of data points (e.g., by adding different elements to the frame). Ex. 1003, ¶121. This is illustrated in Figure 18, which contains a plurality of timeseries associated with the plurality of data points. For example, the "Consumption Analysis" pane contains consumption and demand timeseries associated with an energy datapoint, while the "Occupancy" pane displays an occupancy timeseries associated with an occupancy datapoint, the "Peaking" pane displays energy timeseries associated with an energy datapoint, and the "Efficiency" pane displays an efficiency timeseries associated with an efficiency datapoint. Ex. 1006, Fig. 18; Ex. 1003, ¶121.

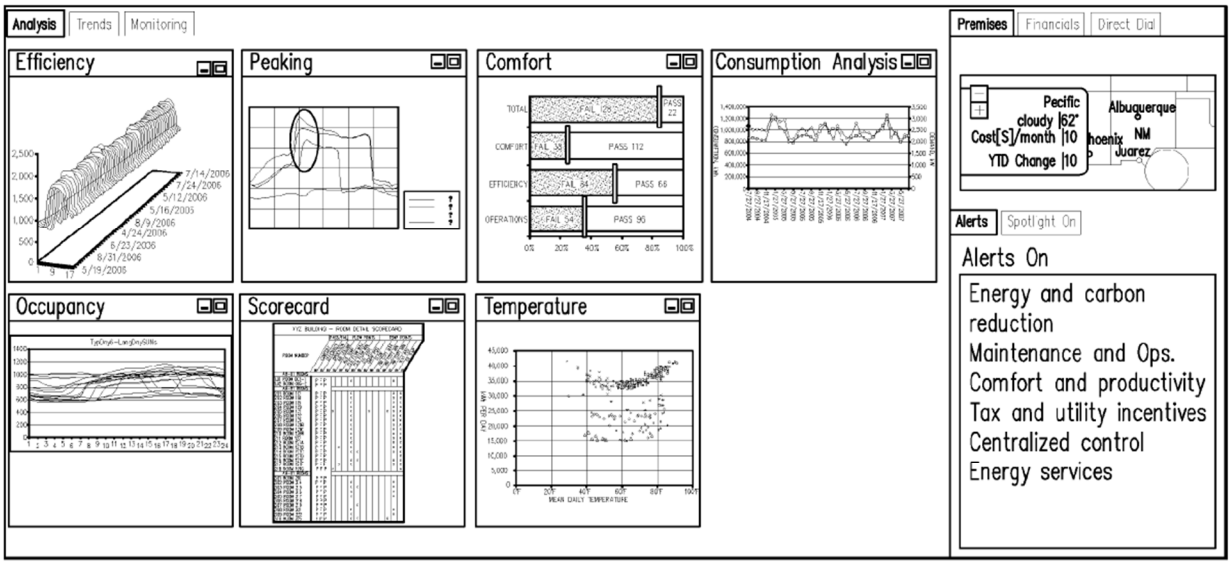


Figure 18

Ex. 1006, Fig. 18.

d. the widget is configured to display a graphical visualization of each of the plurality of timeseries associated with the widget.

Hedley discloses this element. Ex. 1003, ¶122. As discussed above (§§VI.B.1.f, VI.B.2.c), the widget is configured to display a graphical visualization (e.g., chart) of each of the plurality of timeseries associated with the widget. For example, "[t]he user can select the data elements he/she wishes to analyze on their dashboard dynamically by clicking on a list of available elements and dragging the element to the frame. This will allow comparison of similar equipment or facilities, for example." Ex. 1006, [0180]. This is shown, for example, in Figure 19 (e.g. consumption, yellow, and demand, blue timeseries associated with the widget):

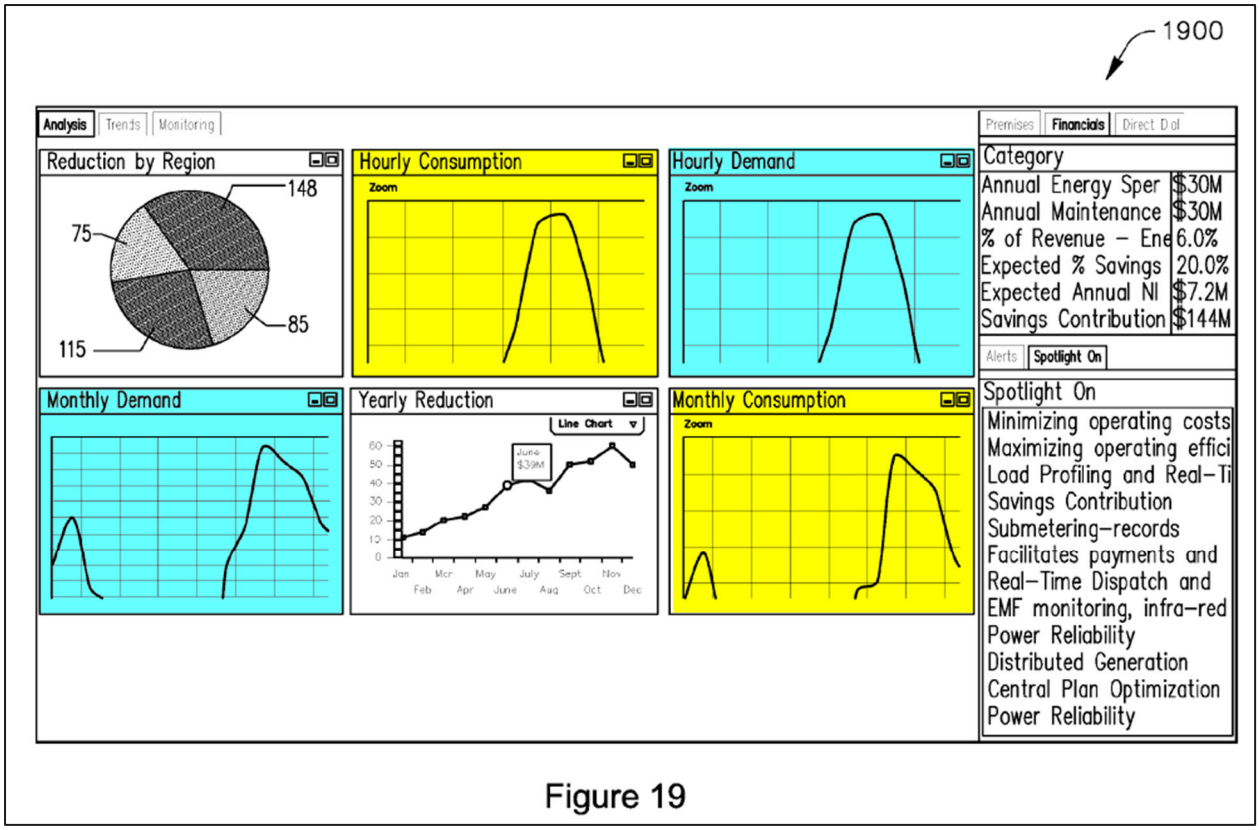


Figure 19

Ex. 1006, Fig. 19 (color added).

This is also shown in Figure 18, with multiple timeseries associated with the widget displayed (*e.g.,* Efficiency, Consumption, Occupancy):

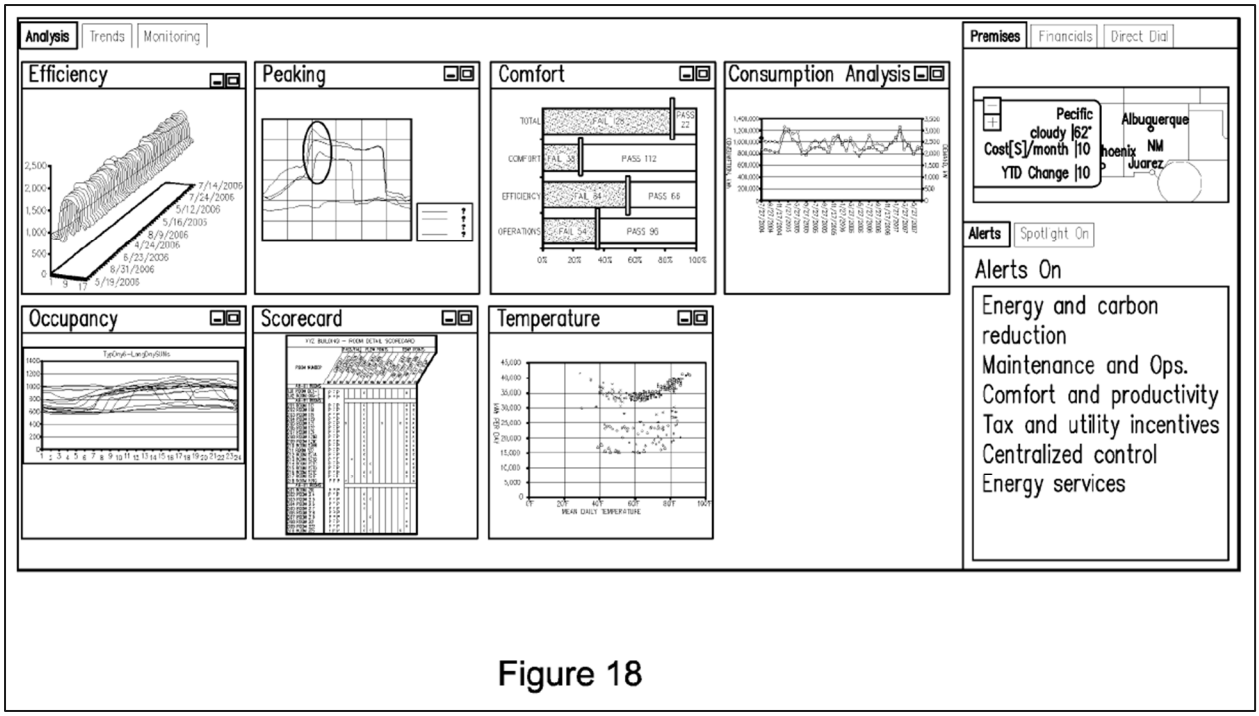


Figure 18

Ex. 1006, Fig. 18; Ex. 1003, ¶123.

3. Claim 8

a. 8. The building energy management system of claim 7, wherein the widget is configured to:

See §VI.B.2, *supra*.

b. determine a unit of measure for each of the plurality of timeseries associated with the widget;

Hedley discloses this element. Ex. 1003, ¶125. Figure 8B, for example, reflects the association of the widget with each of the plurality of timeseries (total kWh and peak kW timeseries). Ex. 1006, Fig. 8B, *see also id.*, Fig. 18. As shown, the widget determines a unit of measure for each timeseries (kWh and kW):

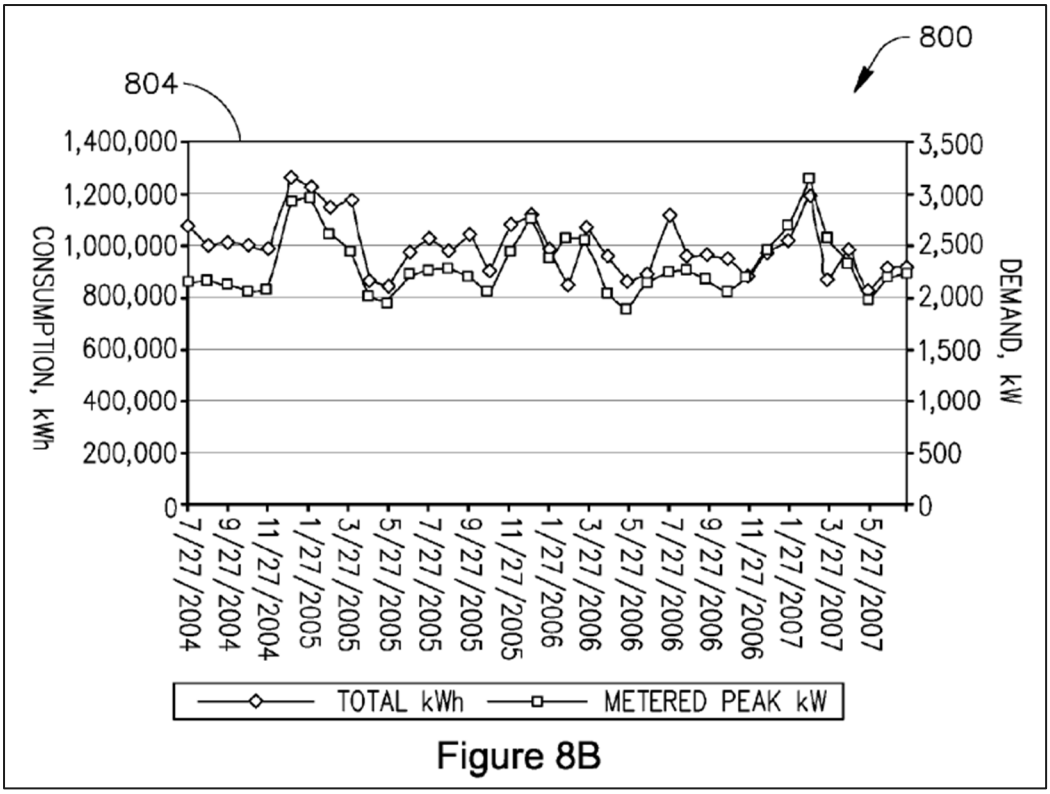


Figure 8B

Ex. 1006, Fig. 8B.

c. generate a line chart comprising a plurality of lines, each of the plurality of lines corresponding to one or the plurality of timeseries associated with the widget;

Hedley discloses this element. Ex. 1003, ¶126. Continuing the discussion above (§VI.B.3.b), the widget generates a line chart comprising a plurality of lines (*e.g.*, total kWh line and peak kW line), each of the plurality of lines corresponding to one or the plurality of timeseries (total kWh and peak kW timeseries) associated with the widget. This is illustrated in Hedley's Figure 8B:

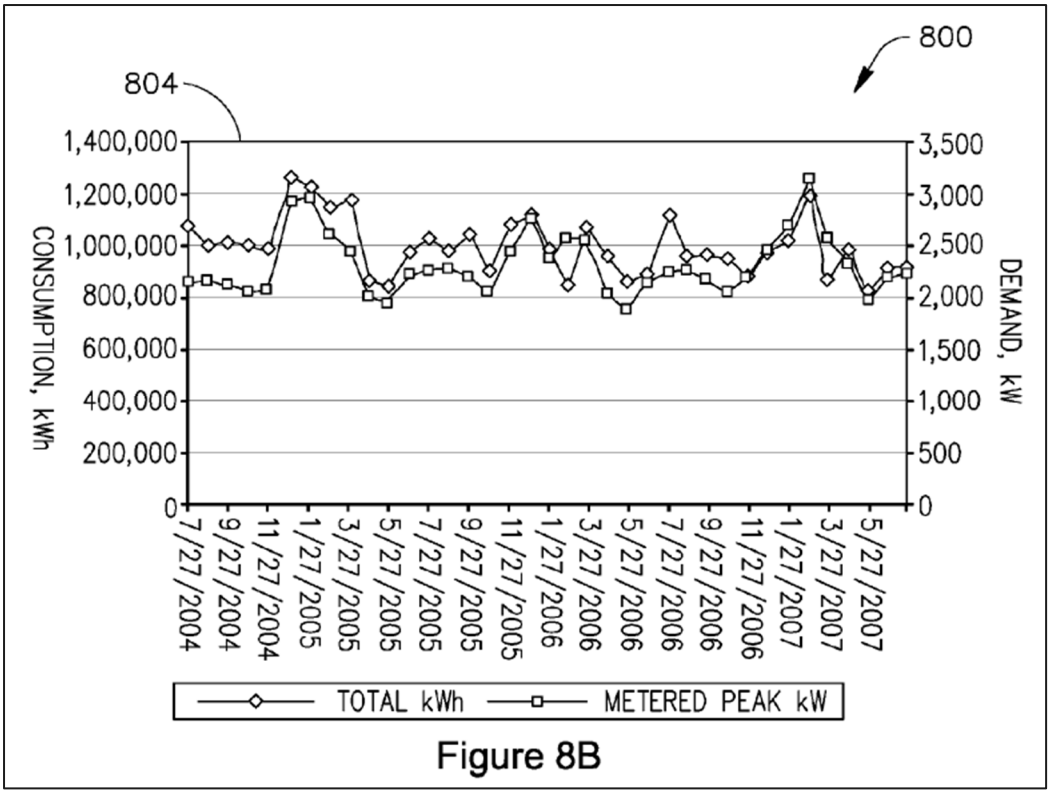


Figure 8B

Ex. 1006, Fig. 8B; *see also id.*, Fig. 18.

d. assign a common color to each of the plurality of lines corresponding to timeseries with the same unit of measure; and

Hedley renders this element obvious. Ex. 1003, ¶127. Continuing the discussion above (§VI.B.3.c), it would have been obvious to a POSITA to assign a common color to each of the plurality of lines corresponding to timeseries with the same unit of measure at the time of the claimed invention. Ex. 1003, ¶127. As shown, for example, in Figure 8B, Hedley marked the kWh line using small diamonds and the kW line using small squares. Ex. 1006, Fig. 8B. Thus, while the lines are tracked, they are potentially difficult to read as drawn in Figure 8B. Ex. 1003, ¶127. A POSITA would be motivated to assign a common color to lines with the same unit

of measure to make the chart easier to understand. *Id.* Such a color selection is an obvious design choice. *Id.* Indeed, Hedley recognized the benefits of color more generally, noting the ability to "configure the look and feel of the end-user application" and "choose colors." Ex. 1006, [0481]; Ex. 1003, ¶127.

e. assign different colors to each of the plurality of lines corresponding to timeseries with different units of measure.

Continuing the discussion above (§§VI.B.3.c, VI.B.3.d), it would have been obvious to a POSITA to assign a different color to each of the plurality of lines corresponding to timeseries with different units of measure at the time of the claimed invention. Ex. 1003, ¶128. Figure 8B, for example, used different symbols for the kWh (diamonds) and kW (square) lines. Ex. 1006, Fig. 8B. But these small marks are potentially difficult to read and therefore differentiate between the kWh and kW lines. Ex. 1003, ¶128. A POSITA would be motivated to assign different colors to each of the plurality of lines corresponding to timeseries with different units of measure to make the chart easier to understand. *Id.* Such a color selection is an obvious design choice. *Id.* And again, Hedley already generally teaches the benefit of configuring "the look and feel of the end-user application" with "color" choice. Ex. 1006, [0481].

4. Claim 11

Claim 11 is the method counterpart to claim 1, and is taught by Hedley for the same reasons. *See* §VI.B.1; Ex. 1003, ¶129.

a. 11. A method for generating an ad hoc dashboard in a building energy management system, the method comprising:

Hedley discloses this element. Ex. 1003, ¶130; §§VI.B.1.a, VI.B.1.f, *supra*.

b. operating building equipment to monitor and control a variable in the building energy management system;

See §VI.B.1.b, *supra*.

c. collecting raw data samples of a data point associated with the variable from the building equipment;

See §VI.B.1.b, VI.B.1.c, *supra*.

d. generating a raw data timeseries comprising a plurality of the raw data samples;

See §VI.B.1.c, *supra*.

e. generating one or more optimized data timeseries from the raw data timeseries;

See §VI.B.1.d, *supra*.

f. storing a plurality of timeseries associated with the data point in a timeseries database, the plurality of timeseries comprising the raw data timeseries and the one or more optimized data timeseries; and

See §VI.B.1.e, *supra*.

g. generating an ad hoc dashboard comprising a widget associated with the data point, wherein the widget is configured to display a graphical visualization of the plurality of timeseries associated with the data point and comprises interactive user interface options for switching between the plurality of timeseries associated with the data point.

See §VI.B.1.f, *supra*.

5. Claim 15

a. 15. The method of claim 11, further comprising

See §VI.B.4, *supra*.

b. presenting, via the ad hoc dashboard, a widget creation interface comprising a plurality of selectable widget types, each of the widget types corresponding to a different type of widget the ad hoc dashboard is configured to create,

Hedley discloses this element. Ex. 1003, ¶138. For example, "[t]he EEMS dashboard has three main views: trends, real-time monitoring, and analysis. Each has a set of customizable dashboard elements relevant to the specific view. The user can select the data elements he/she wishes to analyze on their dashboard dynamically by clicking on a list of available elements and dragging the element to the frame." Ex. 1006, [0180]. Furthermore, "[t]he EEMS has the ability to tailor the list of dashboard elements for each user based on their profile and privilege." *Id.*, [0181].

c. the widget types comprising at least one of: a charting widget; a data visualization widget; a display widget; a time or date widget; and a weather information widget.

Hedley discloses this element. Ex. 1003, ¶139. Continuing the discussion above (§VI.B.1.f), the widget provides for charts, data visualization, and display of information. To illustrate using Figure 19, which "shows a dashboard screenshot for an analytics reporting screen 1900 that the system may generate," there is a customized analysis widget associated with the energy usage data point. Ex. 1006, [0487], Fig. 19. As can be seen, this is at least a charting widget (as evidenced by the charts), a data visualization widget (as evidenced by the visualization provided by charting), and a display widget (as evidenced by displaying the charts). Ex. 1003, ¶139.

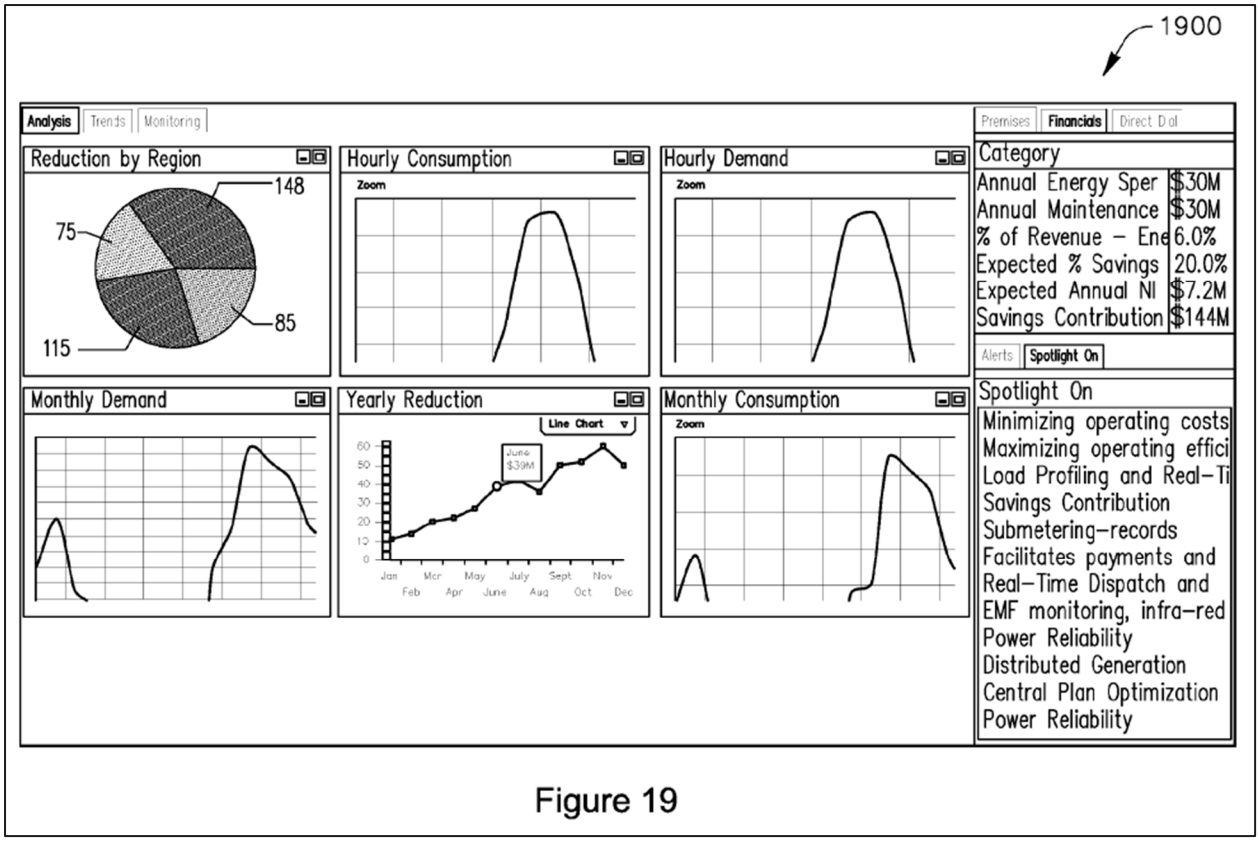


Figure 19

Ex. 1006, Fig. 19.

In addition, "[e]ach dashboard element will have a collapsed and expanded view. By clicking on an individual element, the element will expand to a larger view. In certain cases, the expanded view will permit user interaction. Examples of user interactions include (but are not limited to) increasing the time axis on interval or meter data, entering new dates, browsing to view data on a specific machine or system." *Id.*, [0185].

Furthermore, Hedley also teaches a weather information widget, as shown below in yellow indicating cloudy and 62°. Ex. 1006, Fig. 18, [0162]; Ex. 1003, ¶141.

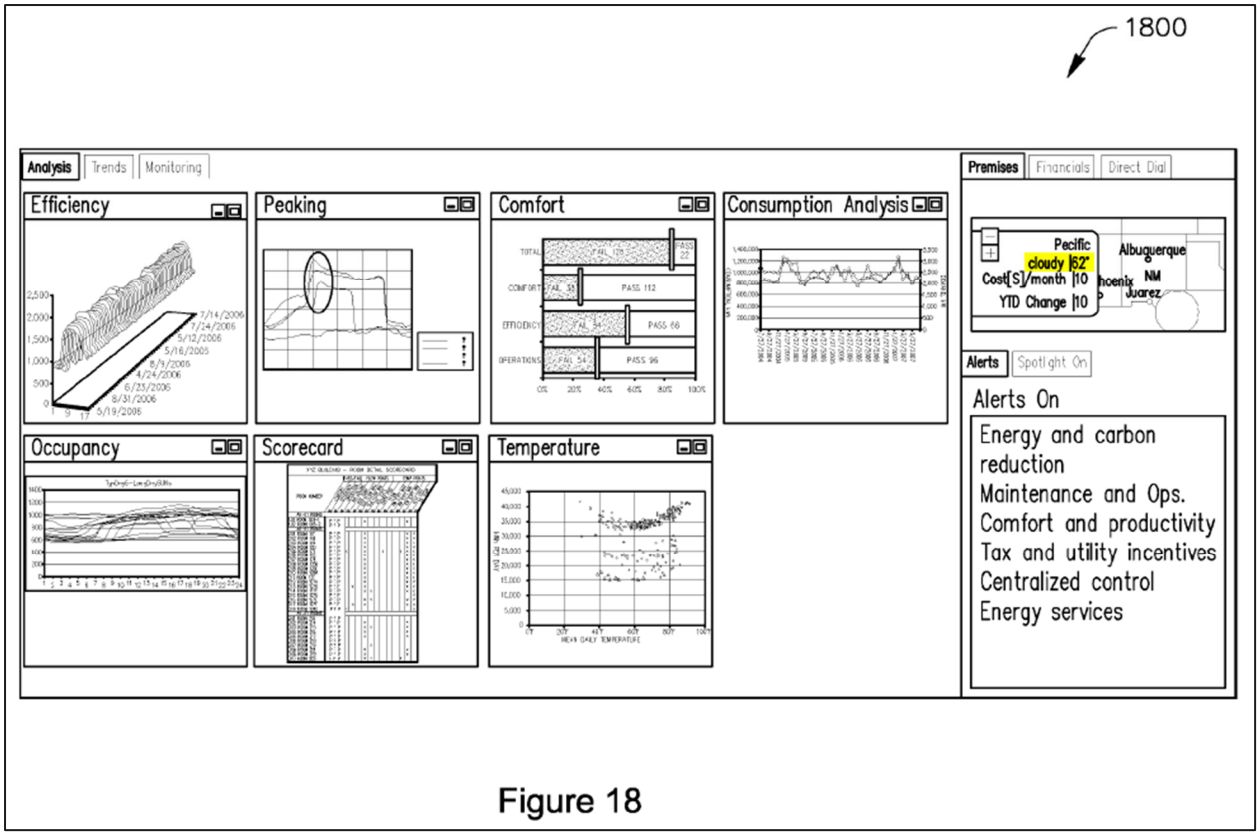


Figure 18

Ex. 1006, Fig. 18 (color added).

6. Claim 16

a. 16. The method of claim 11, further comprising

See §VI.B.4, *supra*.

b. displaying, in the widget, a chart of the plurality of timeseries associated with the data point, the chart comprising at least one of:

Hedley discloses this element. Ex. 1003, ¶143. Continuing the discussion above (§VI.B.1.f), Hedley teaches displaying, in the widget (*e.g.*, the analysis widget), a chart of the plurality of timeseries associated with the data point. For example, the consumption timeseries below (yellow) are both associated with the

consumption datapoint and the demand timeseries (blue) are both associated with the demand data point.

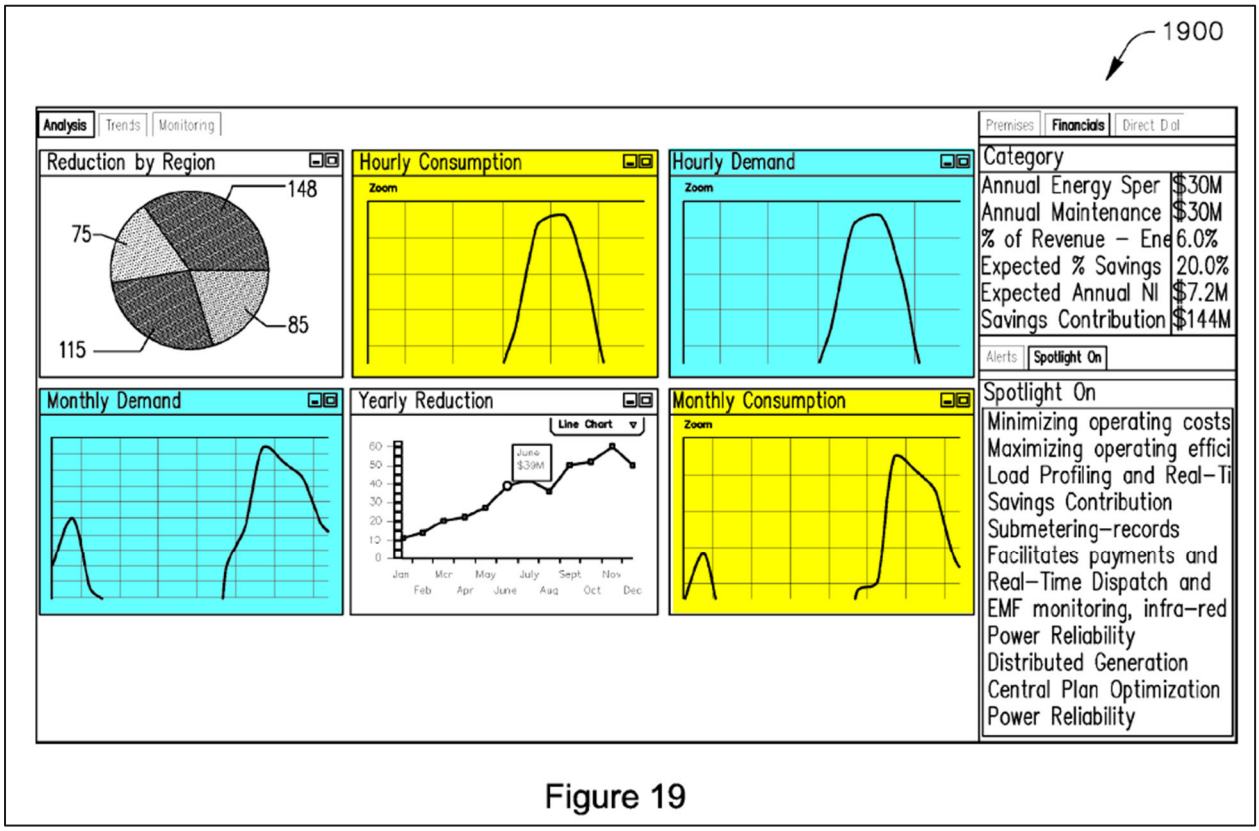


Figure 19

Ex. 1006, Fig. 19 (color added).

c. a line chart; an area chart; a column chart; a bar chart; a stacked chart; and a pie chart.

Hedley discloses this element. Ex. 1003, ¶144. Continuing the discussion above (§VI.B.6.b), the timeseries charts below (yellow and blue) are line charts.

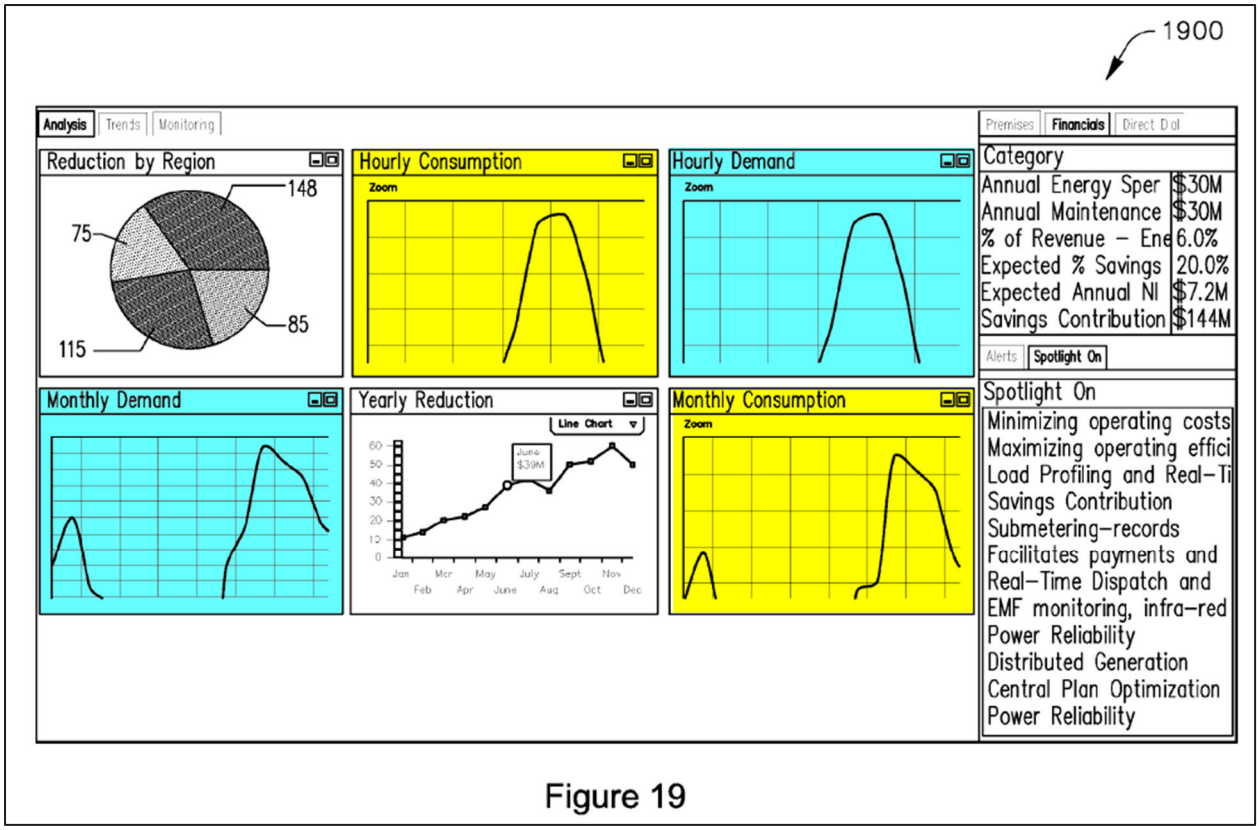


Figure 19

Ex. 1006, Fig. 19 (color added).

7. Claim 17

Claim 17 is the method counterpart to claim 7, and is taught by Hedley for the same reasons. *See* §VI.B.2; Ex. 1003, ¶145.

a. 17. The method of claim 11, further comprising:

See §VI.B.4, *supra*.

b. storing a plurality of timeseries associated with a plurality of different data points in the timeseries database;

See §VI.B.2.b, *supra*.

c. associating the widget with each of the plurality of timeseries associated with the plurality of different data points; and

See §VI.B.2.c, *supra*.

d. displaying, in the widget, a graphical visualization of each of the plurality of timeseries associated with the widget.

See §VI.B.2.d, *supra*.

C. Ground III: Hedley (Ex. 1006) and Hedley's File History (Ex. 1005)

Hedley's file history is properly viewed as part of the Hedley prior art reference. *See Bruckelmyer*, 445 F.3d 1374. To the extent a combination is nonetheless required, this Ground addresses it. It would have been obvious for a POSITA reading Hedley to incorporate the teachings provided in Hedley's file wrapper.

To the extent that Patent Owner contends that Hedley's file wrapper is not properly relied upon in this Petition, it is well established that "it does not matter that [the figures from the file history] do not appear in the [prior art patent] because no reasonable trier of fact could find that there was not sufficient disclosure in the patent to allow one skilled in the art to locate the figures contained in the application." *See Bruckelmyer*, 445 F.3d at 1380 (Fed. Cir. 2006). That rule applies here given that the face of Hedley identifies "Appl. No: 12/776,159." As a published application, the application would have been published by the U.S. Patent Office via public PAIR or otherwise available for inspection. In fact, by the alleged priority

date of January 22, 2016, a POSITA could readily access the Hedley file history from public PAIR indexed using Hedley's application or publication number. As such, the disclosures in Hedley's are "available as prior art against the challenged claims." *Duodecad*, IPR2015-01036, Paper 17, at 18–19.

1. Claim 7

a. 7. The building energy management system of claim 1, wherein:

See §VI.B.1, *supra*.

b. the timeseries database is configured to store a plurality of timeseries associated with a plurality of different data points;

See §VI.B.2.b, *supra*.

c. the ad hoc dashboard is configured to associate the widget with each of the plurality of timeseries associated with the plurality of different data points; and

Hedley discloses this element. Ex. 1003, ¶153. For example, "[t]he user can select the data elements he/she wishes to analyze on their dashboard dynamically by clicking on a list of available elements and dragging the element to the frame. This will allow comparison of similar equipment or facilities, for example." Ex. 1006, [0180]. Thus, the ad hoc dashboard is configured to associate the widget (*e.g.*, the analysis widget) with each of the plurality of timeseries associated with the plurality of data points (*e.g.*, by adding different elements to the frame). Ex. 1003, ¶153. This is illustrated in Figure 18, which contains a plurality of timeseries associated with

the plurality of data points. For example, the "Consumption Analysis" pane contains consumption and demand timeseries associated with an energy datapoint, while the "Occupancy" pane displays an occupancy timeseries associated with an occupancy datapoint, the "Peaking" pane displays energy timeseries associated with an energy datapoint, and the "Efficiency" pane displays an efficiency timeseries associated with an efficiency datapoint. Ex. 1006, Fig. 18; Ex. 1003, ¶153.

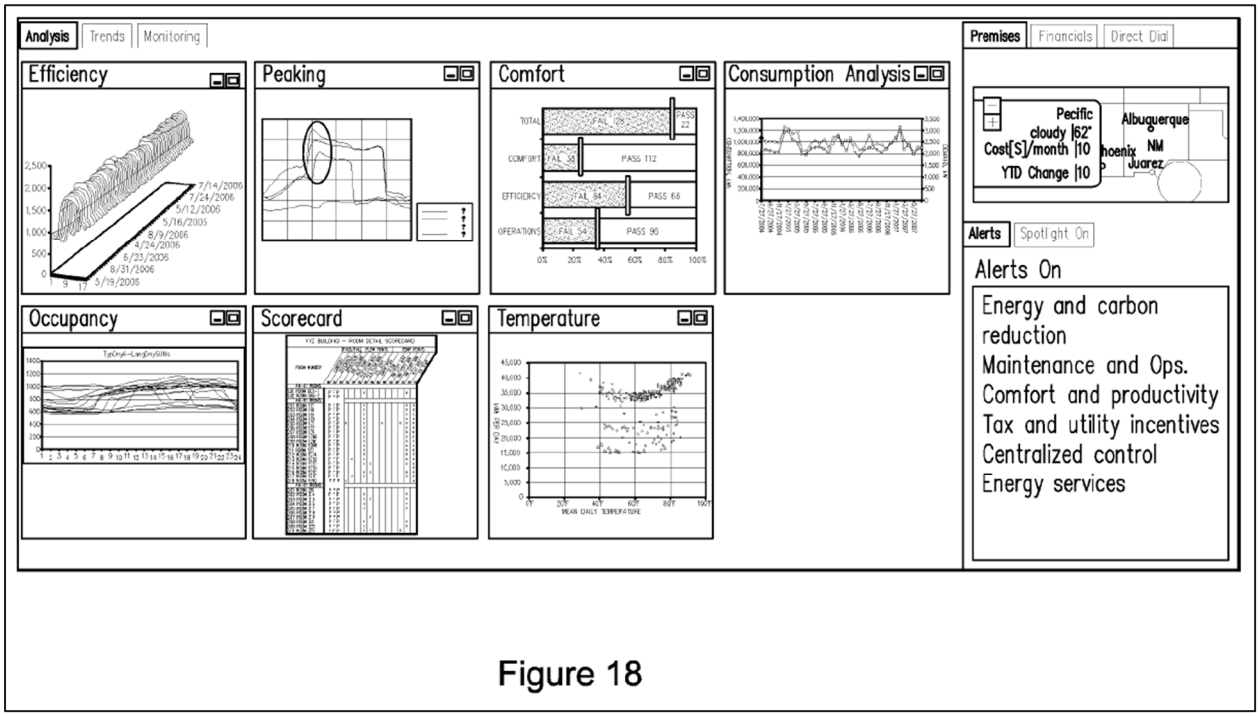
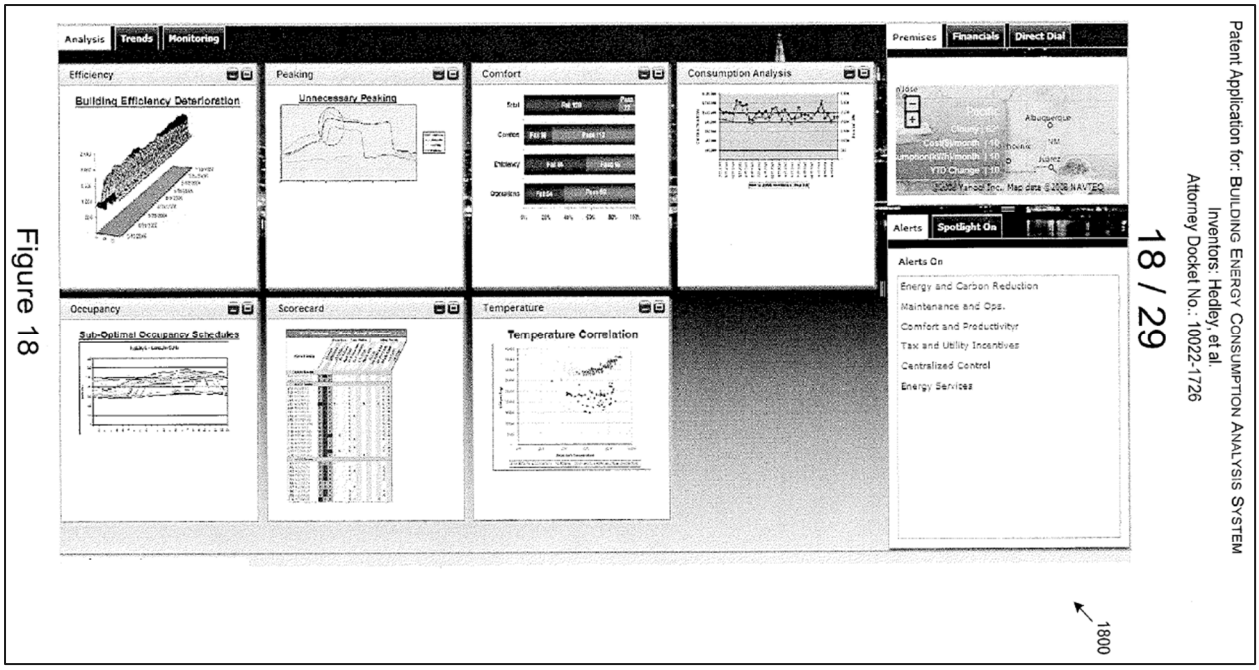


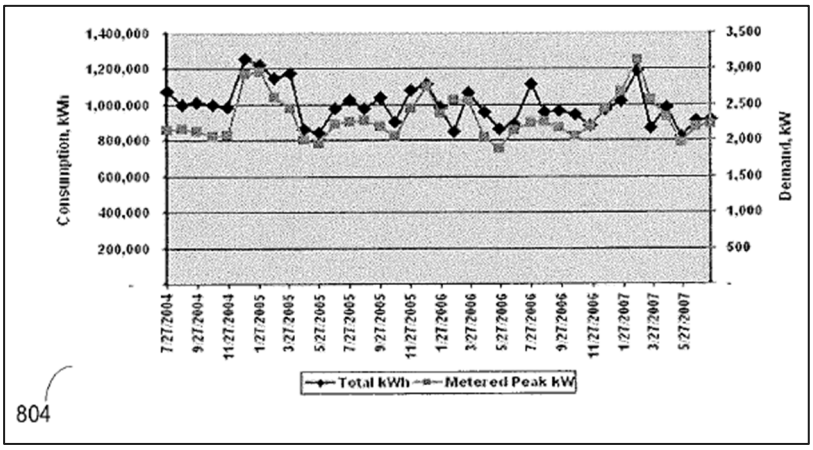
Figure 18

Ex. 1006, Fig. 18.

The application for Hedley originally contained figures with additional information, which were later substituted with replacement figures following a formalities notice. Ex. 1005; Ex. 1003, ¶154. Continuing the Figure 18 example above, the file history provides the following enhanced views:



Ex. 1005 at 05/07/2010 Drawings.



Id.

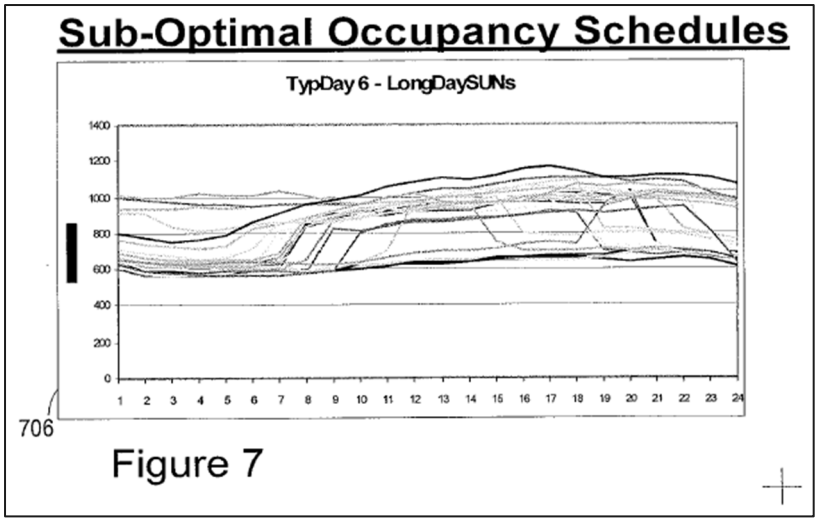
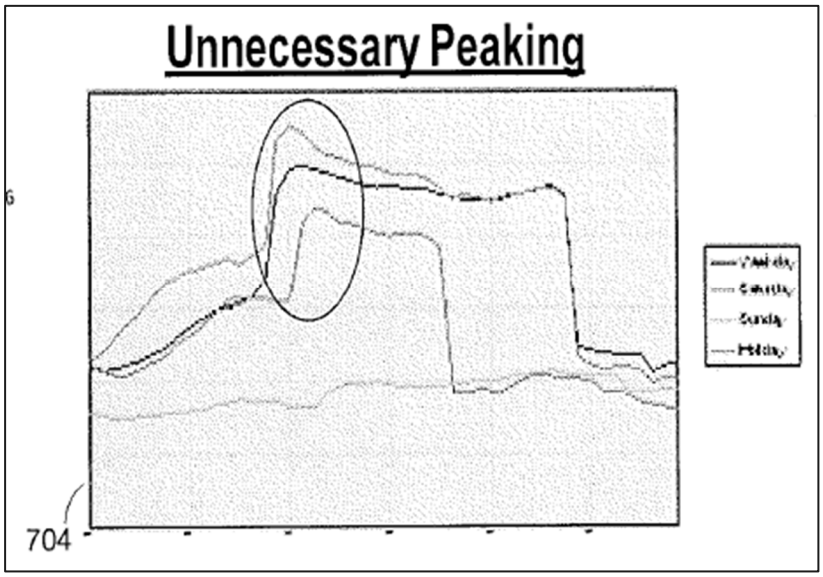
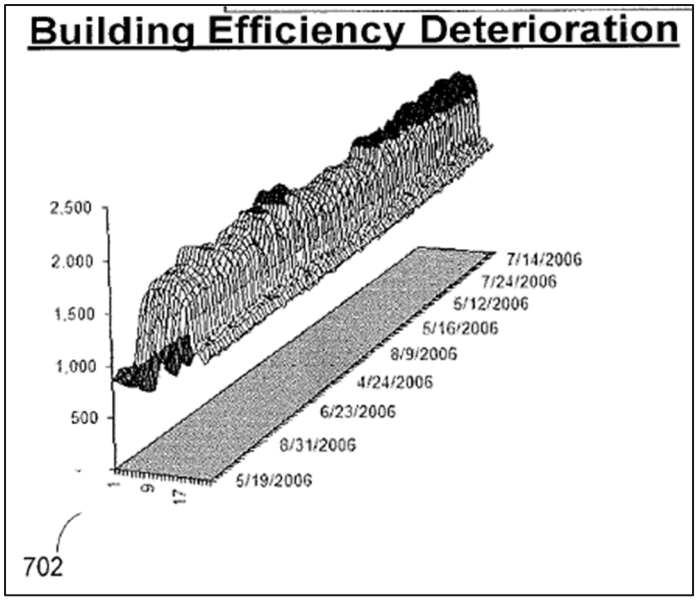


Figure 7

Id.



Id.



Id.

d. the widget is configured to display a graphical visualization of each of the plurality of timeseries associated with the widget.

Hedley discloses this element. Ex. 1003, ¶155. As discussed above (§VI.C.1.c), the widget is configured to display a graphical visualization (*e.g.*, chart) of each of the plurality of timeseries associated with the widget. For example, "[t]he user can select the data elements he/she wishes to analyze on their dashboard dynamically by clicking on a list of available elements and dragging the element to the frame. This will allow comparison of similar equipment or facilities, for example." Ex. 1006, [0180]. This is shown, for example, in Figure 18 and the enhanced images from the file history as shown above in §VI.C.1.c.

2. Claim 8

a. 8. The building energy management system of claim 7, wherein the widget is configured to:

See §VI.C.1, *supra*.

b. determine a unit of measure for each of the plurality of timeseries associated with the widget;

Hedley discloses this element. Ex. 1003, ¶157. Take the case of Figure 8B, which reflects the association of the widget with each of the plurality of timeseries (total kWh and peak kW timeseries). Ex. 1006, Fig. 8B. As shown, the widget determines a unit of measure for each timeseries (kWh and kW):

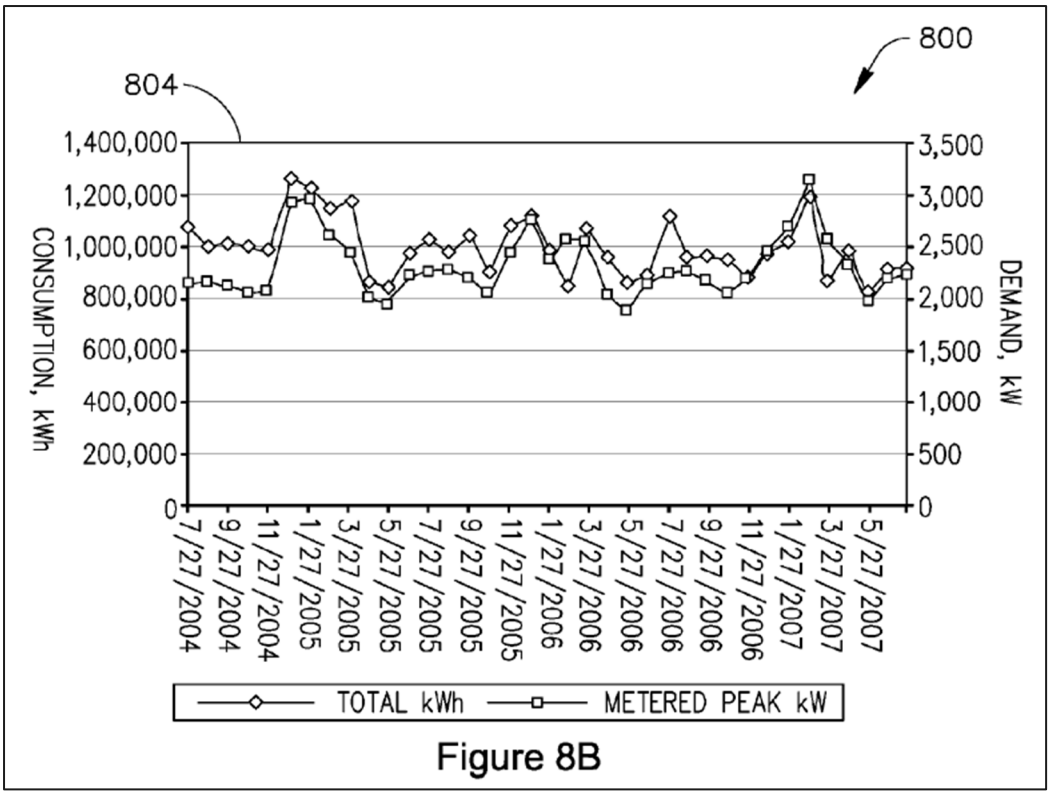
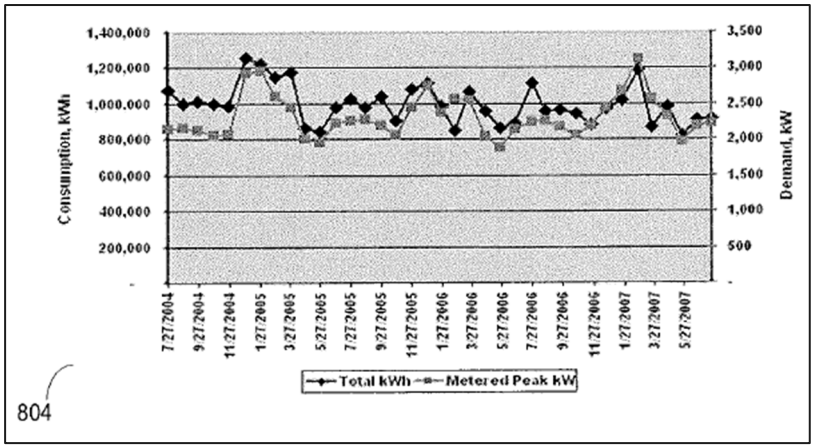


Figure 8B

Ex. 1006, Fig. 8B. This is also shown in the enhanced version from Hedley's file history, reproduced below. Ex. 1005 at 05/07/2010 Drawings.



Id.

c. generate a line chart comprising a plurality of lines, each of the plurality of lines corresponding to one or the plurality of timeseries associated with the widget;

Hedley discloses this element. Ex. 1003, ¶159. Continuing the discussion above (§VI.C.2.b), the widget generates a line chart comprising a plurality of lines (*e.g.*, total kWh line and peak kW line), each of the plurality of lines corresponding to one or the plurality of timeseries (total kWh and peak kW timeseries) associated with the widget. This is illustrated in Hedley's Figure 8B and the enhanced version from Hedley's file history:

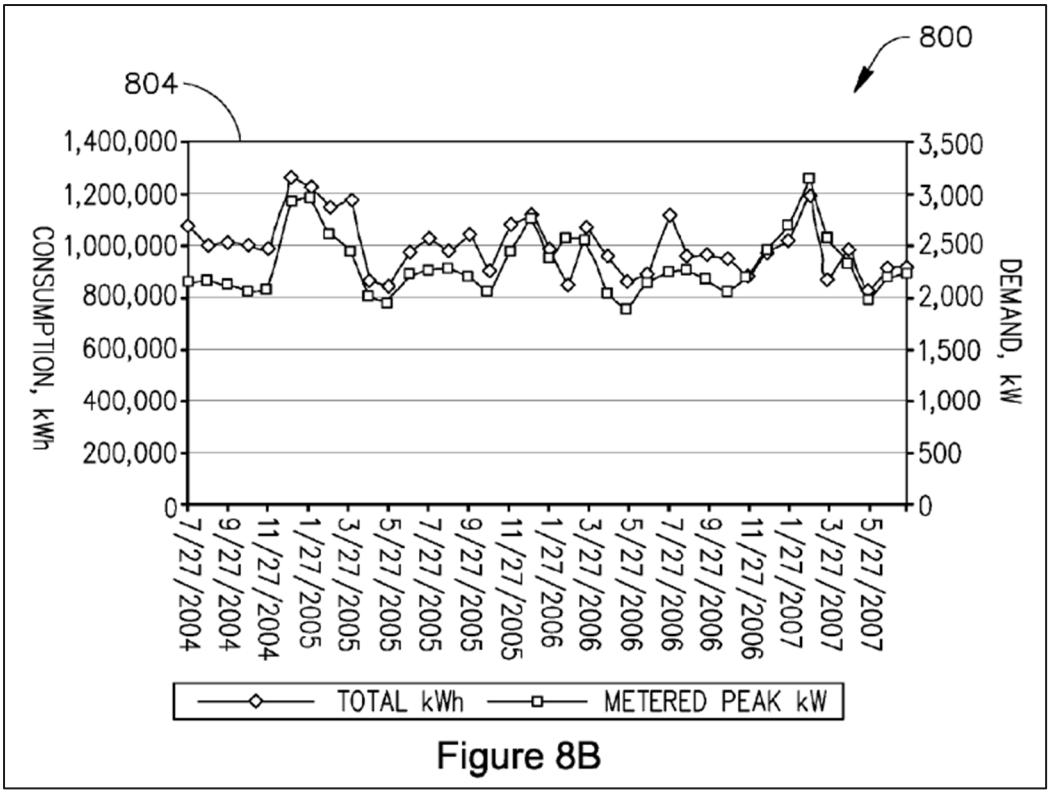
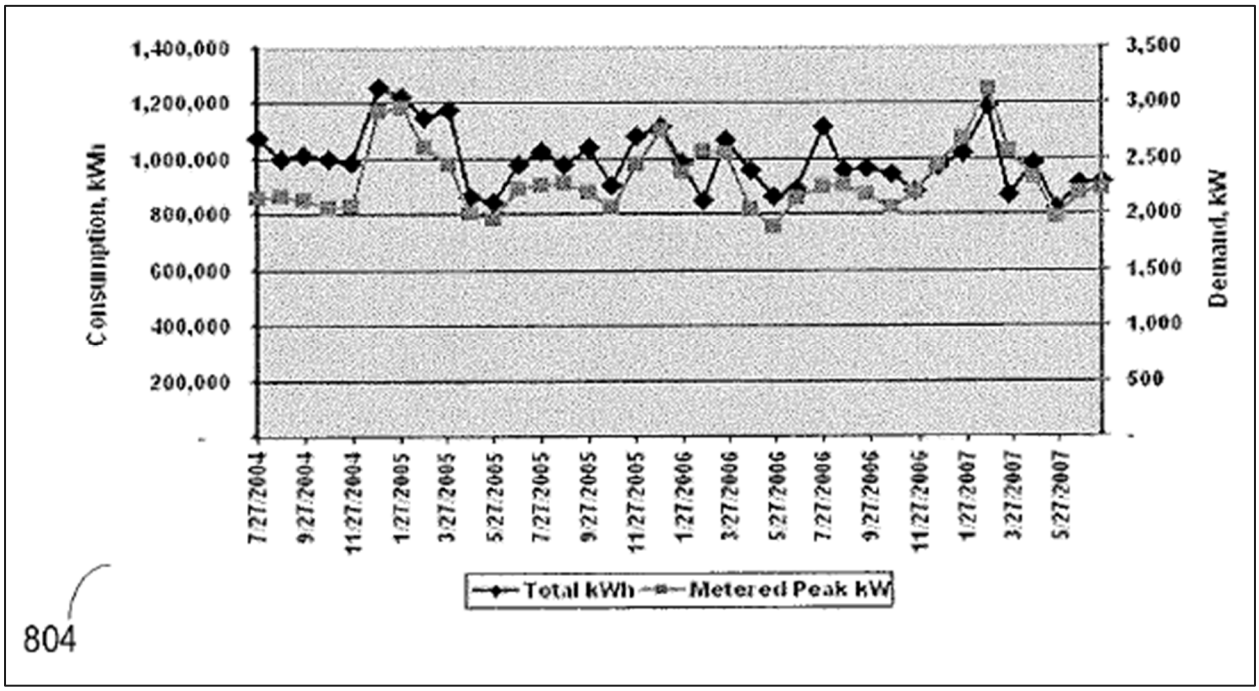


Figure 8B

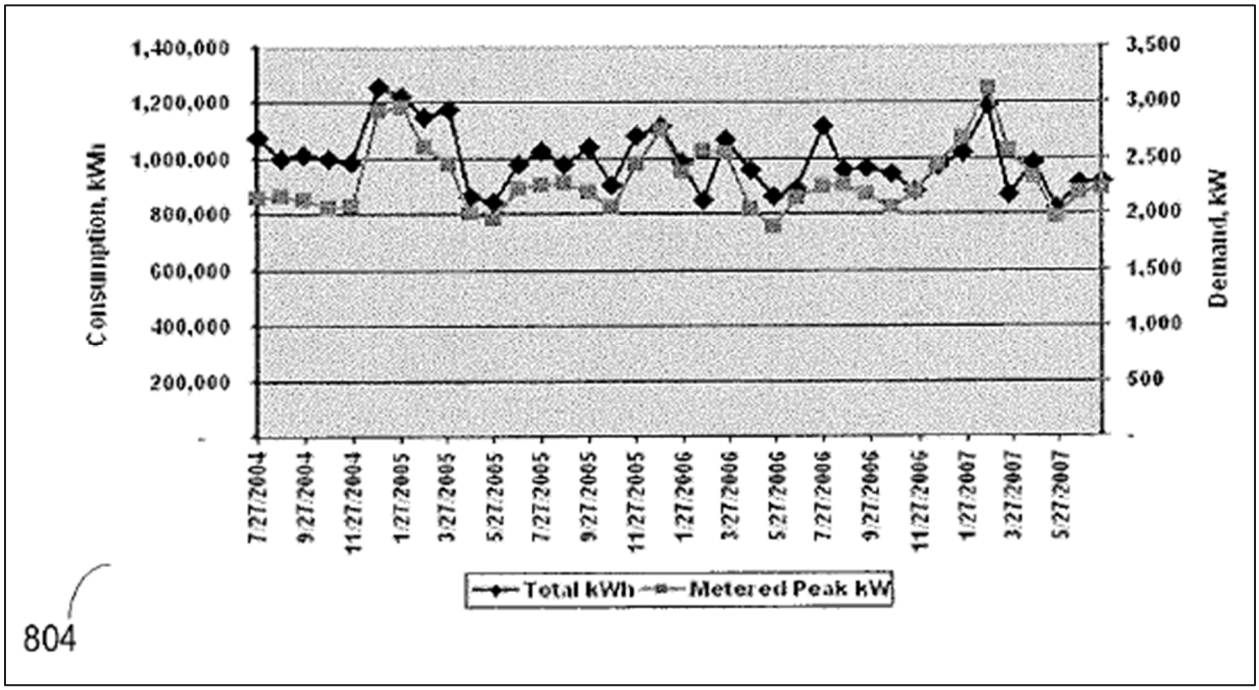
Ex. 1006, Fig. 8B.



Ex. 1005 at 05/07/2010 Drawings.

d. assign a common color to each of the plurality of lines corresponding to timeseries with the same unit of measure; and

Hedley discloses this element. Ex. 1003, ¶160. Continuing the discussion above (§VI.C.2.c), Hedley teaches assigning a common color to each of the plurality of lines corresponding to timeseries with the same unit of measure. As shown in the enhanced file history image, the kWh line is assigned a dark color:



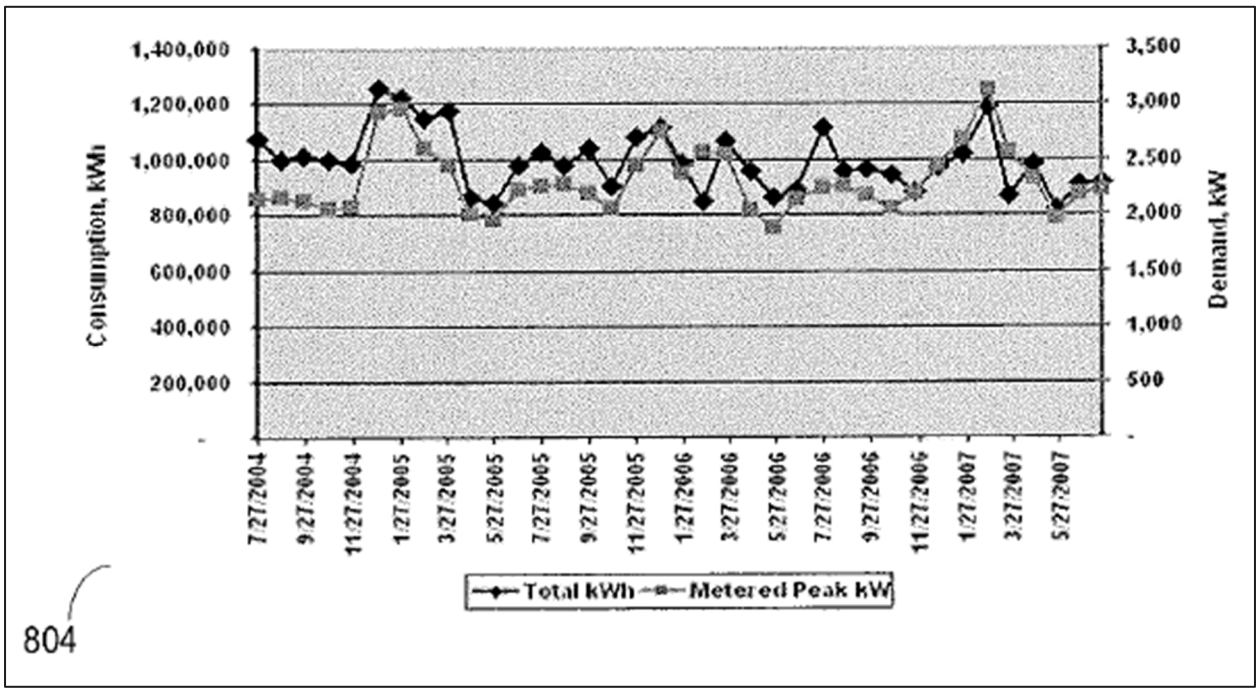
Ex. 1005 at 05/07/2010 Drawings.

It would also have been obvious to a POSITA to assign a common color to each of the plurality of lines corresponding to timeseries with the same unit of measure. Ex. 1003, ¶161. A POSITA would be motivated to assign a common color to lines with the same unit of measure to make the chart easier to understand. *Id.* Such a color selection is an obvious design choice. *Id.* Indeed, this is especially true

given the enhanced Figure 8 image in Hedley's file history shown above teaching the use of coloring according to unit. *Id.*

e. assign different colors to each of the plurality of lines corresponding to timeseries with different units of measure.

Continuing the discussion above (§§VI.C.2.c, VI.C.2.d), Headley teaches assigning different colors to each of the plurality of lines corresponding to timeseries with different units of measure. Ex. 1003, ¶162. As shown in the enhanced file history image, the kWh line is assigned a dark color while the kW like is assigned a light color:



Ex. 1005 at 05/07/2010 Drawings.

It was also obvious to assign a common color to each of the plurality of lines corresponding to timeseries with the same unit of measure. Ex. 1003, ¶163. A

POSITA would be motivated to assign a different color to lines with different units of measure to make the chart easier to understand. *Id.* Such a color selection is an obvious design choice. *Id.* Indeed, this is especially true given the enhanced Figure 8 image in Hedley's file history shown above teaching the use of coloring according to unit. *Id.*

D. GROUND IV: Mills (Ex. 1004) and Hedley's File History (Ex. 1005)

1. Claim 8

a. 8. The building energy management system of claim 7, wherein the widget is configured to:

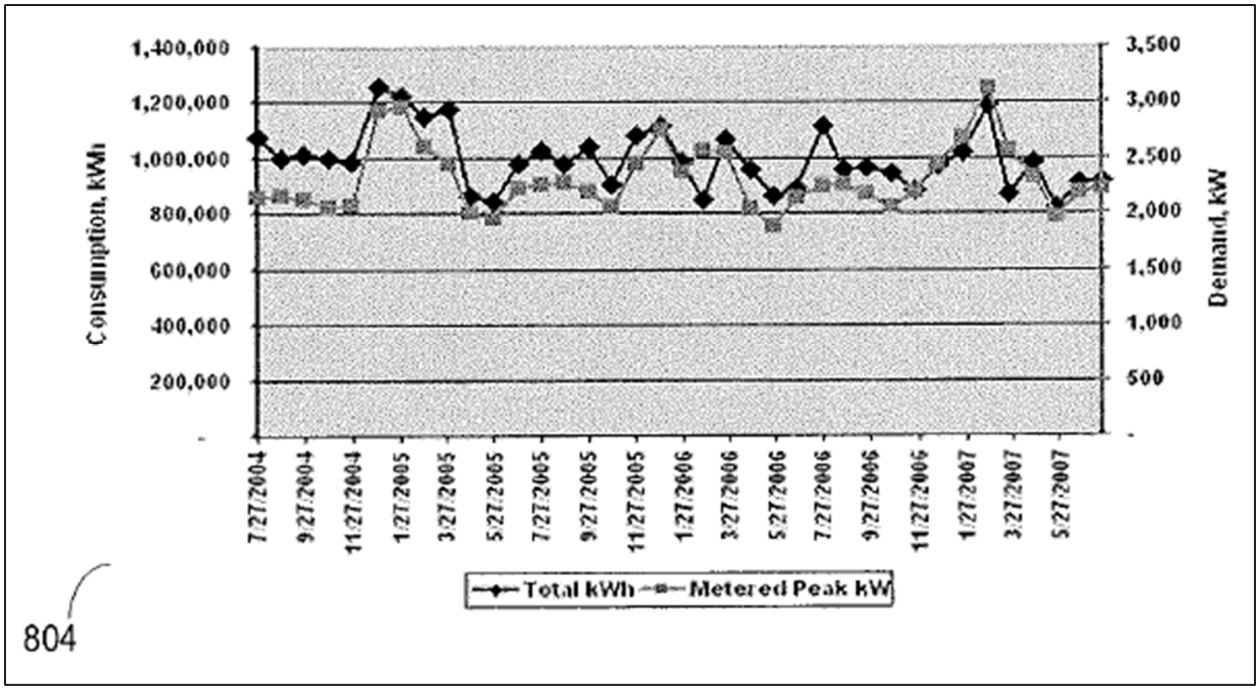
Mills discloses this element. *See* §§VI.A.2, VI.A.3.a, *supra*.

b. determine a unit of measure for each of the plurality of timeseries associated with the widget;

Mills discloses this element. *See* §VI.A.3.b, *supra*.

c. generate a line chart comprising a plurality of lines, each of the plurality of lines corresponding to one or the plurality of timeseries associated with the widget;

Mills (Ex. 1004) in view of the Hedley file history (Ex. 1005) renders this element obvious. Ex. 1003, ¶167. In addition to Mills teaching other chart types, of which a line chart is an obvious choice, the Hedley file history also expressly teaches line charts. For example, the Hedley file history teaches a line graph for displaying energy data:



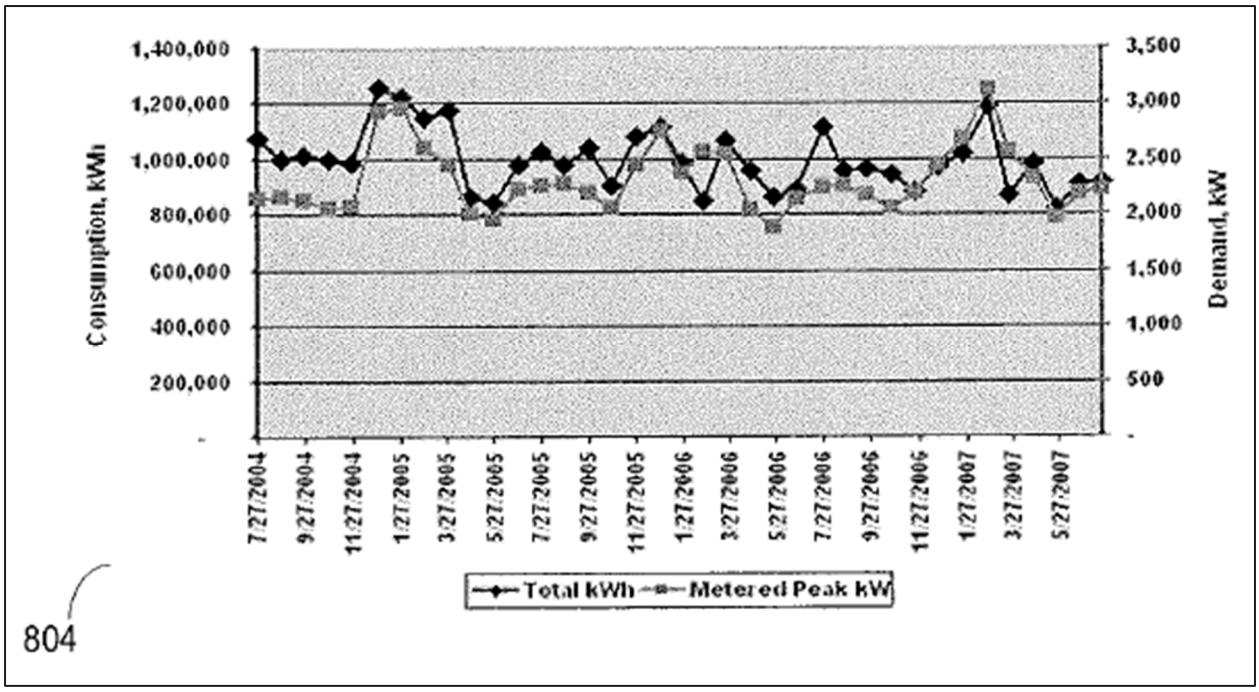
Ex. 1005 at 05/07/2010 Drawings.

A POSITA would have considered this display, depicting a line chart comprising a plurality of lines, each of the plurality of lines corresponding to one or the plurality of timeseries associated with the widget, as an obvious choice to implement in Mills display section. Ex. 1003, ¶168. This combination reflects the simple substitution of one known element (bar chart depicting a timeseries) for another (line graph depicting a plurality of timeseries) with predictable results (line graph depicting a plurality of timeseries). *Id.* It is also the use of one known technique (line graph depicting a plurality of timeseries) to improve a known device (Mills' bar chart) ready for improvement, as the bar chart provides more limited information than taught by Hedley's file history. *Id.* And as discussed above in Grounds II and III, Hedley's file history directly teaches the use of this line graph

depicting a plurality of timeseries, which constitutes an express teaching, suggestion, and motivation.

d. assign a common color to each of the plurality of lines corresponding to timeseries with the same unit of measure; and

Mills in view of the Hedley file history renders this element obvious. Ex. 1003, ¶169. In addition to Mills' teaching, the Hedley file history also teaches this color assignment. For example, the Hedley file history figure below depicts a line chart with the kWh timeseries in black and the kW timeseries in a lighter color:

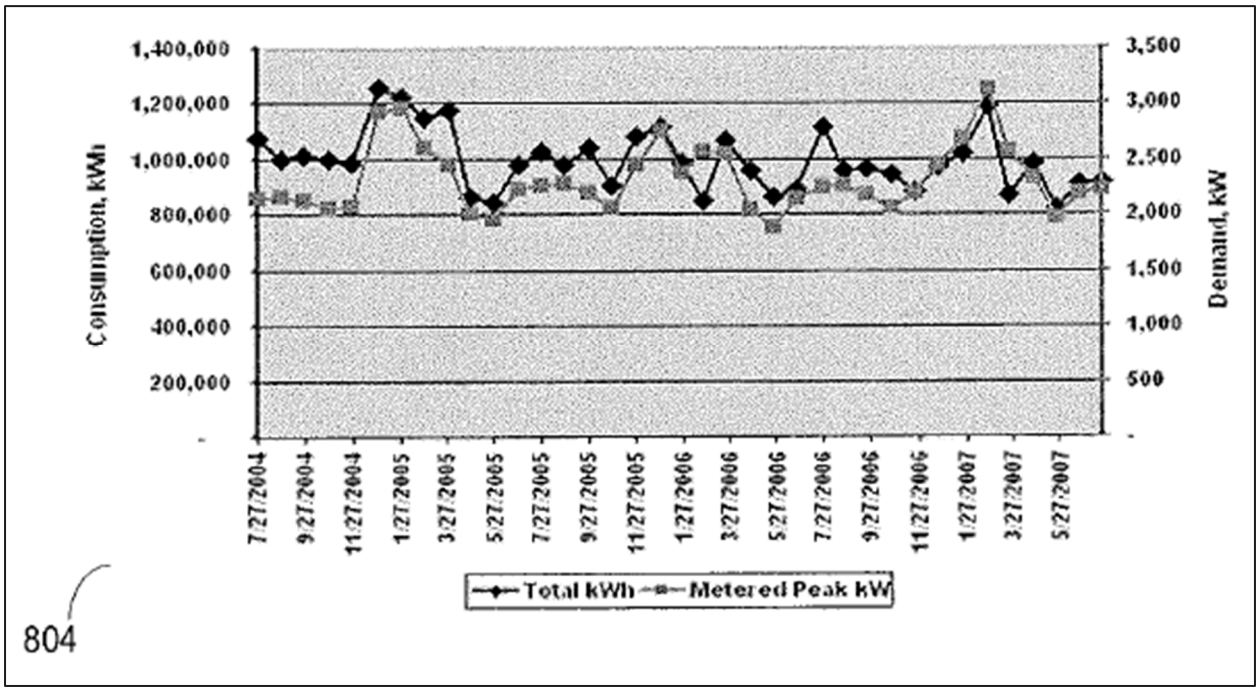


Ex. 1005 at 05/07/2010 Drawings.

A POSITA would have found it obvious to assign the same black color to all timeseries with the kWh unit of measure and to assign the lighter color to all timeseries with the kW unit of measure. Ex. 1003, ¶170.

e. assign different colors to each of the plurality of lines corresponding to timeseries with different units of measure.

Mills in view of the Hedley file history renders this element obvious. Ex. 1003, ¶171. In addition to Mills' teaching, the Hedley file history also expressly teaches this color assignment. For example, the Hedley file history figure below depicts such an arrangement, with the kWh timeseries in black and the kW timeseries in a lighter color:



Ex. 1005 at 05/07/2010 Drawings.

VII. NO FACTORS JUSTIFY DISCRETIONARY DENIAL

Patent Owner filed a complaint alleging infringement of the '114 Patent, along with eight other patents, on December 22, 2021 in Delaware. *See* Case No. 1:21-cv-01796-MN (D. Del. December 22, 2021) ("Delaware Litigation"). Patent Owner

then filed a separate complaint alleging infringement of four additional patents on June 29, 2022 in Texas. *See* Case No. 2:22-CV-00243-JRG-RSP (June 29, 2022) ("Texas Litigation"). Patent Owner played a shell game of assertions, at one point adding several of the patents (including the '114 Patent) from the Delaware Litigation to the Texas Litigation. Following several amended complaints and extensions requested by Patent Owner between both cases, it consolidated its two actions into the Delaware Litigation, identified just over half of its asserted patents (including the '114 Patent) for actual litigation on September 13, 2022, and finally served its initial infringement contentions specifically asserting the Challenged Claims on September 30, 2022. In response, Petitioner diligently filed this Petition shortly thereafter challenging those asserted claims.[10] A trial date has not been set by the court in the Delaware Litigation, and the case is still in its infancy. No *Fintiv* factor justifies discretionary denial of this Petition. *See Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020).

Further, discretionary denial would be inappropriate in this case because the Grounds in this Petition present "evidence [that], if unrebutted in trial, would plainly

[10] The unpatentability positions herein are based, in part, on Patent Owner's apparent positions in the co-pending litigation. Nothing herein should be taken as an endorsement of those positions in the co-pending litigation.

lead to a conclusion that one or more claims are unpatentable by a preponderance of evidence." *Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation*, Memorandum of Director Katherine K. Vidal (June 21, 2022).[11] Each of Mills and Hedley render obvious every Challenged Claim, as detailed above, and thus provide "compelling evidence of unpatentability." *Nokia of Am. Corp. v. TQ Delta, LLC*, IPR2022-00656, Paper 14, at 9 (P.T.A.B. Nov. 7, 2022); *Samsung Elec. Co., Ltd. v. MemoryWeb, LLC*, IPR2022-00221, Paper 10, 9-10 (P.T.A.B. Aug. 1, 2022). Accordingly, and for this additional reason, the Board should not exercise its discretion to deny institution under 35 U.S.C. § 314(a).

VIII. MANDATORY NOTICES UNDER 37 C.F.R. §42.8(A)(1)

A. 37 C.F.R. § 42.8(b)(1): Real Party-in-Interest

Willow Technologies LLC, Willow Technology Operations Pty Limited, Willow Technology USA, Inc., and Willow Technology Corporation Limited are the real parties-in-interest.

B. 37 C.F.R. §42.8(b)(2): Related Matters

This case may affect, or be affected by, decisions in the proceedings in the

[11] Available at: https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf.

Delaware Litigation discussed above.

C. 37 C.F.R. §§ 42.8(b)(3) and (4): Counsel and Service Information

Lead Counsel	Back-Up Counsel
Russell E. Levine, P.C. Reg. No. 32,153 russell.levine@kirkland.com Postal and Hand-Delivery Address: Kirkland & Ellis LLP 300 North LaSalle Chicago, IL 60654 Telephone: (312) 862-2000	Tareq M. Alosh Reg. No. 80,524 tareq.alosh@kirkland.com Postal and Hand-Delivery Address: Kirkland & Ellis LLP 300 North LaSalle Chicago, IL 60654 Telephone: (312) 862-2000 David Dyer (Reg. No. 76,545) david.dyer@kirkland.com Postal and Hand-Delivery Address: KIRKLAND & ELLIS LLP 401 Congress Avenue Austin, TX 78701 Telephone: (512) 678-9100 Facsimile: (512) 678-9101

Petitioner Willow concurrently submits a Power of Attorney, 37 C.F.R. § 42.10(b), and consents to electronic service directed to the following email address: Willow_PTAB@kirkland.com.

IX. PAYMENT OF FEES UNDER 37 C.F.R. §42.103

The undersigned authorizes the Office to charge the fee set forth in 37 C.F.R. § 42.15(a)(1) for this Petition to Deposit Account No. 506092. The undersigned further authorizes payment for any additional fees that may be due in connection with this Petition to be charged to the above-referenced deposit account.

X. CERTIFICATION OF GROUNDS FOR STANDING

Petitioner certifies that the ’114 Patent is available for IPR and that Petitioner is not barred or estopped from requesting an IPR challenging the claims on the grounds identified in this Petition. Petitioner certifies: (1) Petitioner is not the owner of the ’114 Patent; (2) Petitioner (or any real party-in-interest) has not filed a civil action challenging the validity of any claim of the ‘114 Patent; (3) Petitioner files this Petition within one year of the date it was served with a complaint asserting infringement of the ’114 Patent; (4) estoppel provisions of 35 U.S.C. §315(e)(1) do not prohibit this IPR; and (5) this Petition is filed after the ’114 Patent was granted.

XI. CONCLUSION

Petitioner Willow requests institution of IPR and cancellation of the Challenged Claims.

Date: December 13, 2022

Respectfully submitted,

/s/ Russell E. Levine

Russell E. Levine, P.C. (Reg. No. 32,153)
Tareq M. Alosh (Reg. No. 80,524)
KIRKLAND & ELLIS LLP
300 North LaSalle Street
Chicago, Illinois 60654
(312) 862-2000

David Dyer (Reg. No. 76,545)
KIRKLAND & ELLIS LLP
401 Congress Avenue
Austin, TX 78701
(512) 678-9100

Willow_PTAB@kirkland.com

Attorneys for Petitioner

CERTIFICATE OF COMPLIANCE

This Petition complies with the type-volume limitations as mandated in 37 C.F.R. § 42.24, totaling 13,360 words. Counsel has relied upon the word count feature provided by Microsoft Word.

/s/ Russell E. Levine
Russell E. Levine, P.C.

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6(e)(4)(i) *et seq.* and 42.105(b), the undersigned certifies that a copy of the foregoing document with the accompanying Exhibits listed in Petitioner's Exhibit List was caused to be served by Federal Express, costs prepaid, to Patent Owner at the following address of record:

Foley & Lardner LLP
3000 K Street NW
Suite 600
Washington, DC 20007-5109

A copy was also served via electronic mail and FTP on the attorneys of record in the following related matters:

Case No. 21-1796 (D. Del. Sep. 13, 2022)

/s/ Russell E. Levine
Russell E. Levine, P.C.