

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

**DECLARATION OF PATRICK HILLBERG, PH.D.
IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW**

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DECLARATION OF PATRICK HILLBERG, PH.D.

1. I, Patrick Hillberg, make this declaration in connection with the proceedings identified above.

2. I have been retained on behalf of Petitioner Willow Technology Corporation Limited to offer my expert opinions in connection with the above-captioned proceeding relating to U.S. Patent 10,055,114 (the “’114 Patent”).

3. I am being compensated for my time in connection with this *inter partes* review (IPR) at my standard consulting rate. No part of my compensation depends on the outcome of this proceeding.

4. I have been asked to provide my opinions as to whether claims 1, 7, 8, 11, 15, 16, and 17 (the “Challenged Claims”) of the ’114 Patent are invalid to a person having ordinary skill in the art at the time of the alleged invention.

5. In preparing this declaration, I have reviewed the ’114 Patent (Ex. 1001), the file history of the ’114 Patent (Ex. 1007), various pieces of prior art (Exs. 1004-1006), and all other materials referenced in this declaration.

6. In forming the opinions expressed in this declaration, I relied upon my education, training, knowledge, and experience in the art, and have considered the viewpoint of an ordinary artisan at the time of the invention.

I. BACKGROUND AND QUALIFICATIONS

7. I summarize in this section my educational background, career history, and other relevant qualifications. My full resume is attached as Exhibit A to this declaration.

8. I earned a Bachelor of Science in Computer Science from Michigan Technological University in 1984. I earned a Master of Science in Engineering in Industrial and Systems Engineering from the University of Michigan in 1989. I earned a Ph.D. in Systems Engineering from Oakland University in 2004.

9. I have been a Software Developer in Factory Automation Systems, specializing in Robotics and Machine Vision Systems from 1984 to 2001. At this point in my career, I devoted my efforts to my Ph.D. dissertation, titled “Opportunistic Preventive Maintenance” (2004). This work contemplated a digital reliability twin of a factory assembly line, collecting data from factory controllers (PLCs) to program artificial intelligence to recognize gaps in production flow and improve throughput. Following this, I was a data modeling architect, a solutions architect, and a sales lead for academic and workforce development.

10. From the time I completed my bachelor’s degree in 1984, I worked for the companies Automatix, Synthetic Vision Systems, Trellis Software, and FANUC Robotics, primarily as a software developer for robotic and vision systems. From 2004 to 2010 I was a data architect for Dassault Systemes DELMIA brand,

developing software to ingest and retrieve data in their PLM database. From 2011 to 2017 I was a Solution Architect for Siemens PLM division, leading teams in the implementation of large-scale engineering databases. From 2017 to 2019 I was the Academic and Workforce Development Lead for Siemens PLM, where my role was to help schools in teaching advanced engineering and manufacturing software.

11. During my tenure with FANUC, Dassault, Siemens, and Oakland University, I developed significant experience in many aspects relating to software development in automation, controls, and digital twin technology.

12. Since 2012, I have held the role of Adjunct Assistant Professor at Oakland University School of Engineering and Computer Science, where I teach the course “Product Lifecycle Management.” I am semi-retired and now professionally devote my time to teaching, mentoring, academic writing, and occasional consulting.

13. My continued involvement in the art of Digital Twins and Product Lifecycles is due primarily to teaching, academic writing, mentoring, and consulting.

II. LEGAL STANDARDS

14. I am not a lawyer or legal expert, and I do not offer any opinions regarding applicable legal standards. Below, I set forth my understanding of the law

as it has been explained to me, and I have applied this understanding in forming my opinions in this declaration.

A. Priority Date and Prior Art

15. I am informed that for these proceedings, the prior art to the challenged patent includes patents and printed publications in the relevant art that predate the priority date of the patent.

16. The '114 Patent issued on August 21, 2018, from U.S. Application No. 15/408,404, filed January 17, 2017. Ex. 1001 at Cover.

17. The '114 Patent claims 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 proceeding, I have been asked to consider January 22, 2016 as the priority date of the '114 Patent. I offer no opinions in this declaration as to whether that priority date is correct.

B. Claim Interpretation

18. I understand that in construing or interpreting a patent claim, the words of the claim are generally given their ordinary and customary meaning, which is the meaning that words would have had to a person of ordinary skill in the art in question at the time of the invention. The person of ordinary skill in the art is deemed to read the claim term in the context of not only the particular claim in which the disputed term appears, but also in the context of the entire patent, including the other claims

and the specification, as well as the prosecution history of the patent. For purposes of this proceeding, I understand the claim terms of the '114 Patent to have their ordinary and accustomed meaning.

C. Anticipation

19. To invalidate a patent claim as anticipated in the context of IPR, the petitioner bears the burden of showing by a preponderance of the evidence that a single prior art reference discloses every element required by the claim.

20. An element need not be expressly disclosed if it is inherent in the prior art, but the allegedly inherent characteristic must necessarily flow from the teachings of the applied prior art—in other words, the fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic.

D. Obviousness

21. To invalidate a patent claim as obvious in the context of an IPR proceeding, the petitioner bears the burden of showing by a preponderance of the evidence that the differences between the invention and the prior art are such that the subject matter as a whole would have been obvious to a person of ordinary skill in the art to which the subject matter pertains at the time the claimed invention was made. Factors relevant to the determination of obviousness include (1) the scope and content of the prior art, (2) the level of ordinary skill in the art at the time of the

invention, (3) differences between the claimed invention and the prior art, and (4) “secondary considerations” or objective evidence of obviousness or nonobviousness.

22. I am informed that some non-exclusive rationales that may support a conclusion of obviousness include:

- Combining prior art elements according to known methods to yield predictable results;
- Simple substitution of one known element for another to obtain predictable results;
- Use of known technique to improve similar devices (methods, or products) in the same way;
- Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
- "Obvious to try" – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
- Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art;

- Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

23. **Reason to Combine.** Obviousness can be established by showing that a person of ordinary skill in the art would have combined or modified the teachings of the prior art to produce the claimed invention and would have had a reasonable expectation of success in achieving the claimed subject matter. There is no requirement that the prior art provide an express teaching, suggestion, or motivation to combine elements of the prior art, but a determination of obviousness requires more than showing that each element of a patent claim was independently known in the prior art. Rather, the petitioner in an IPR must identify some apparent reason why a person of ordinary skill in the art would have combined the elements or concepts from the prior art in the same way as in the claimed invention when considered as a whole. The motivation to combine may be implicit and may be found in the knowledge of a person of ordinary skill in the art, from the nature of the problem to be solved, market demand, or common sense.

24. **Hindsight.** A determination regarding obviousness must be based on the knowledge possessed by a person of ordinary skill in the art at the time when the invention was made, and one should not consider in hindsight what is known today or what is learned from the teachings of the patent. Thus, it is inappropriate to use

hindsight reconstruction of references to reach the claimed invention without any explanations as to how or why the references would be combined to produce the claimed invention.

25. **Analogous Art.** An obviousness analysis cannot be based on nonanalogous art. The rationale behind this rule is that when art is directed to a different purpose than a claimed invention, an inventor would have less motivation or occasion to consider it. Art is analogous when it is from the same field of endeavor as the claimed invention, or if the art is not from the same field of endeavor, when it is reasonably pertinent to the particular problem faced by the inventor. To be “reasonably pertinent,” art must “logically commend itself” to an inventor’s attention in considering his problem.

III. PERSON OF ORDINARY SKILL IN THE ART

26. I have been advised that there are multiple factors relevant to determining a person having a level of ordinary skill in the pertinent art, including the educational level of active workers in the field at the time of the alleged invention, the sophistication of the technology, the type of problems encountered in the art, and the prior art solutions to those problems.

27. I believe that the level of ordinary skill in the art relevant to the ’114 Patent would have both relevant education and several years of experience. Specifically, a person of ordinary skill in the art would have at least a bachelor’s

degree in computer science or a related field, and at least three years of experience in in the field of information and control systems used in buildings. Additional work experience may compensate for less educational experience, and vice versa.

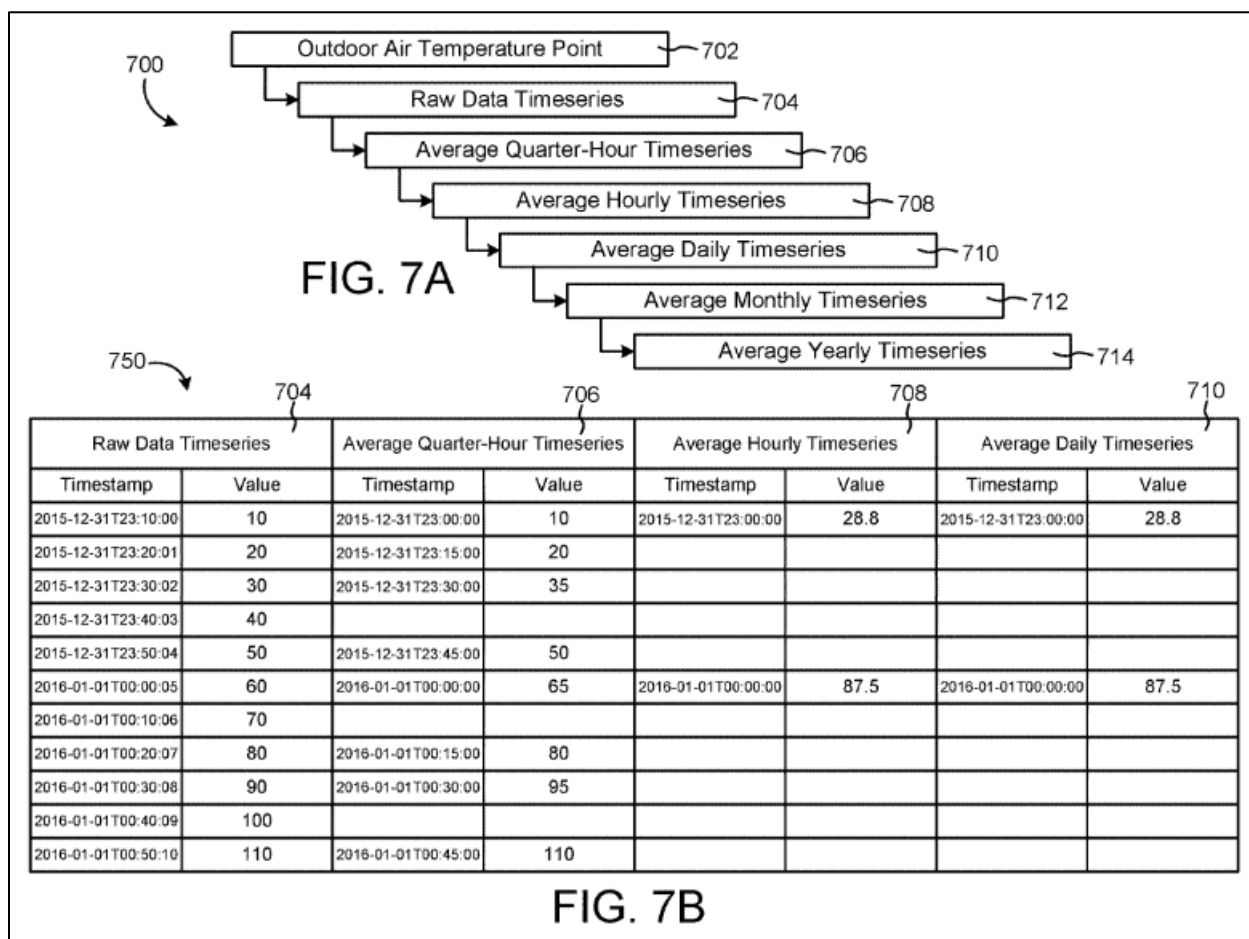
28. I am informed that Patent Owner has, in other proceedings, asserted a person of ordinary skill in the art would have at least a bachelor's degree in computer science and/or engineering, or electrical engineering, or a closely related scientific field such as mathematics, and two years of work experience with digital twin and/or entity modeling software. I also understand Patent Owner asserted that, alternatively, any lack 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).

29. Though I believe my definition of the ordinary artisan is more accurate, the opinions I offer here would not change based on either definition. Based on either level of ordinary skill, I have been qualified as at least a person of ordinary skill in the art since well before 2016, and each of my opinions set forth in this declaration are presented from the standpoint of one skilled in the art. Thus, where I specify in the analysis below that I am rendering my opinion, it should be understood that my opinion is from the perspective of a person having the level of ordinary skill in the art that I have described at the time of the invention.

IV. OVERVIEW OF THE '114 PATENT

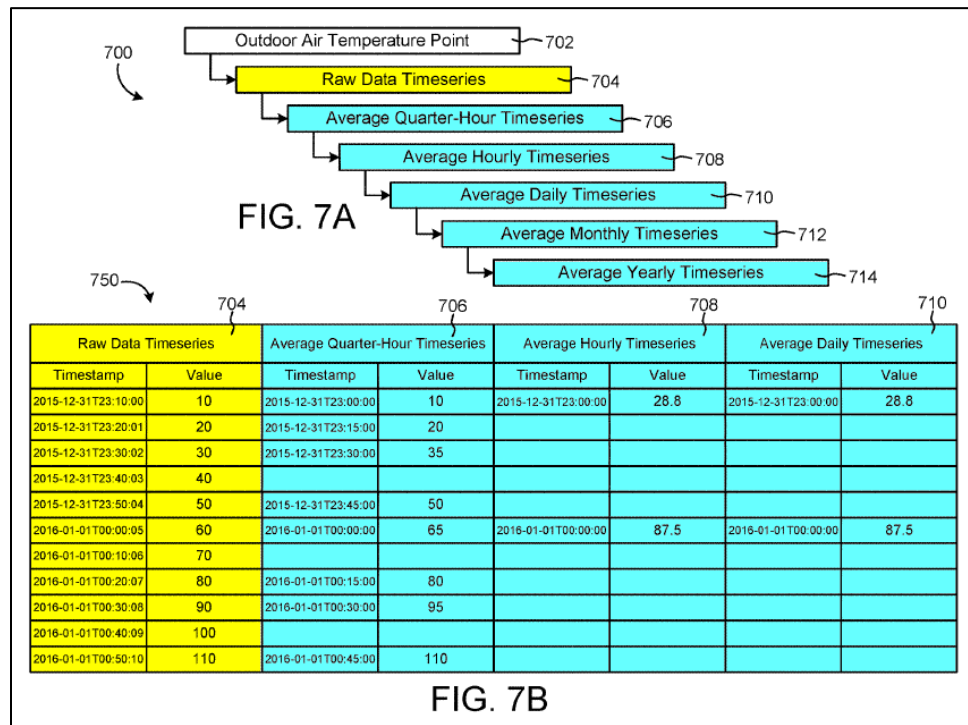
30. The '114 Patent states that it “relates generally to the field of building management systems.” Ex. 1001, 1:18-19. Claim 1 of the 114 Patent recites elements concerning timeseries and a series of components for translating data into a graphical visualization. *Id.*, Claim 1.

31. 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:



Id., Fig. 7B.

32. Claim 1 continues with “raw data timeseries” and “optimized data timeseries.” Ex. 1001, Claim 1. As shown in the ’114 Patent (see 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 a “data rollup[]” or condensed version of the raw data timeseries. *Id.*, 20:53-55.



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

33. The ’114 Patent states that the “optimized timeseries data” includes, “e.g., data rollup timeseries, virtual point timeseries, fault detection timeseries, etc.” Ex. 1001, 7:12-14. Additionally, the ’114 Patent describes creating optimized timeseries 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.

34. Claim 1 recites elements based on these “raw data timeseries” and “optimized data timeseries,” and generically 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 are shown in the prior art, as I discuss in detail below.

35. The other Challenged Claims recite little more. 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

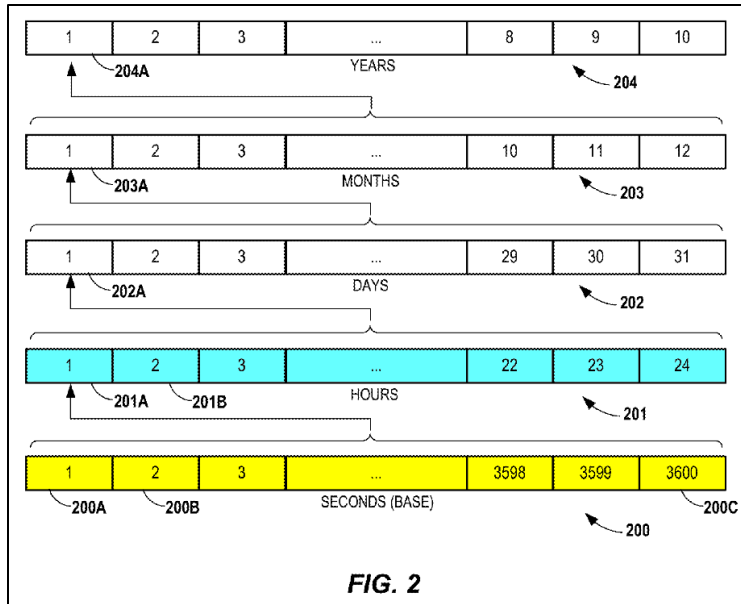
on units of measure. *Id.*, Claim 8. Independent claim 11 and dependent claim 17 are method analogs of independent claim 1 and dependent claim 7. Ex. 1001, Claims 11, 17. Claims 15 and 16 depend from claim 11 and recite various types of widgets (charting, visualization, display, time or date, weather) and charts (line, area, column, bar, stacked, pie) respectively. *Id.*, Claims 15, 16.

V. OVERVIEW OF THE PRIOR ART

A. Mills (Ex. 1004)

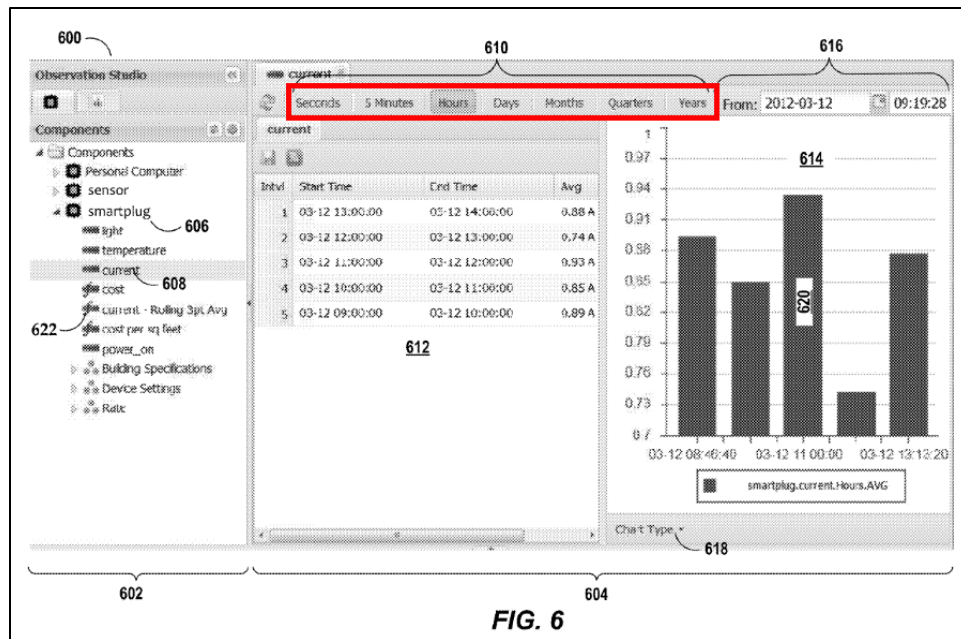
36. Mills is a U.S. patent application published October 3, 2013 and entitled “Updating Rollup Streams In Response To Time Series Of Measurement Data.” Ex. 1004, Cover. It describes the generation of timeseries from measurement data, including one timeseries “having a time intervals corresponding to 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 shown below, the first timeseries (yellow) may record data in seconds, while the second rollup timeseries (blue) records data in hours:¹

¹ The second rollup may also be in days (202), months (203), or years (204).

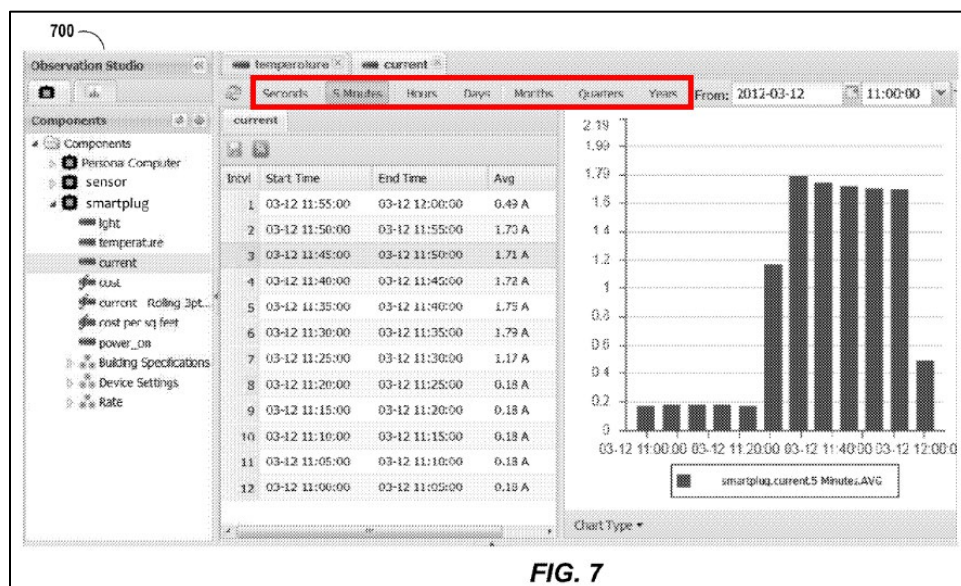


Id., Fig. 2 (color added). Figures 8A-8C, 9A, 9B, 10A, 10B, and 11, for example, show additional depictions of this timeseries data.

37. Mills also describes 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):



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

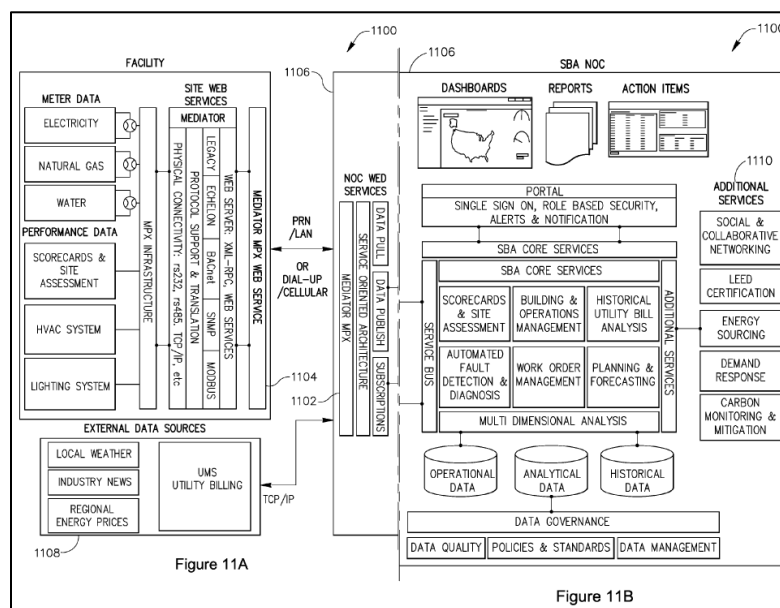


Id., Fig. 7 (color added).

B. Hedley (Ex. 1006)

38. Hedley is a U.S. patent application published November 11, 2010 and entitled “Building Energy Consumption Analysis System.” Ex. 1006, Cover. It states

that 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).

39. 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 reproduced 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).

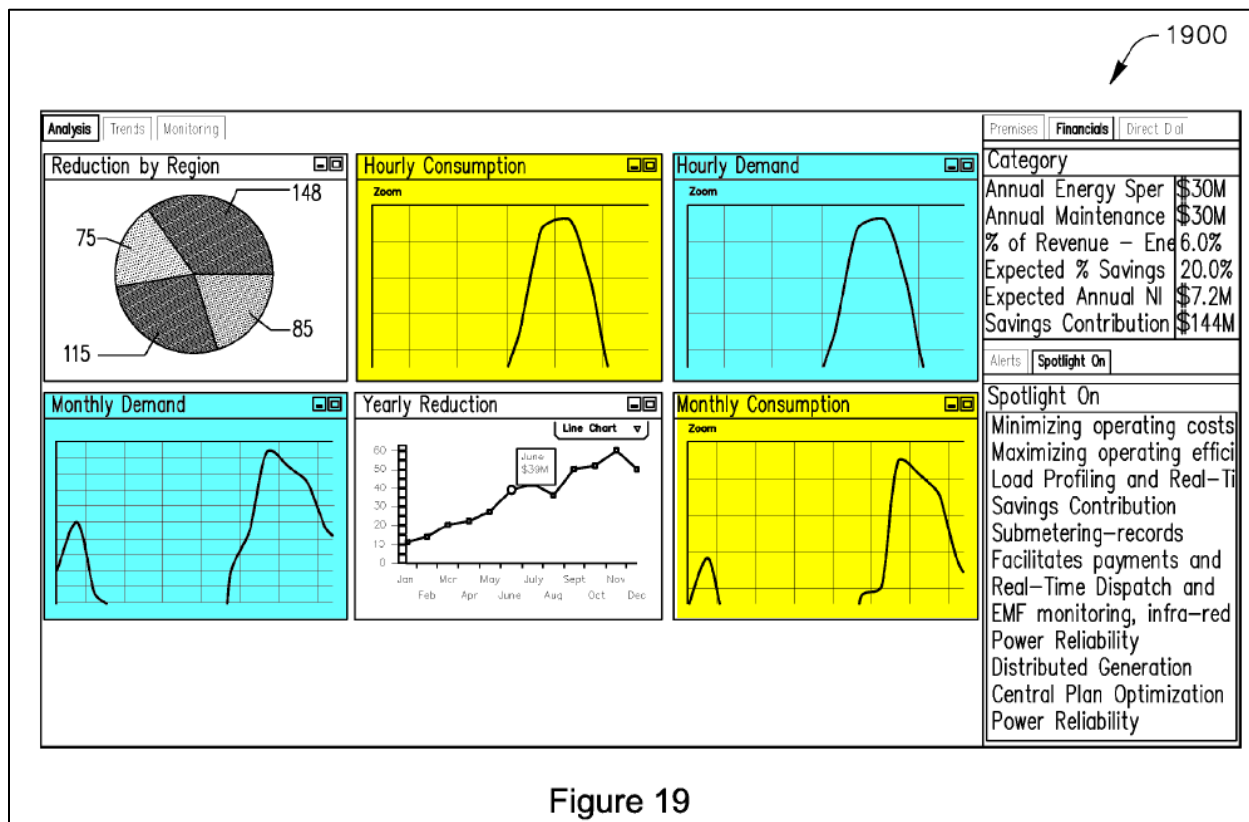
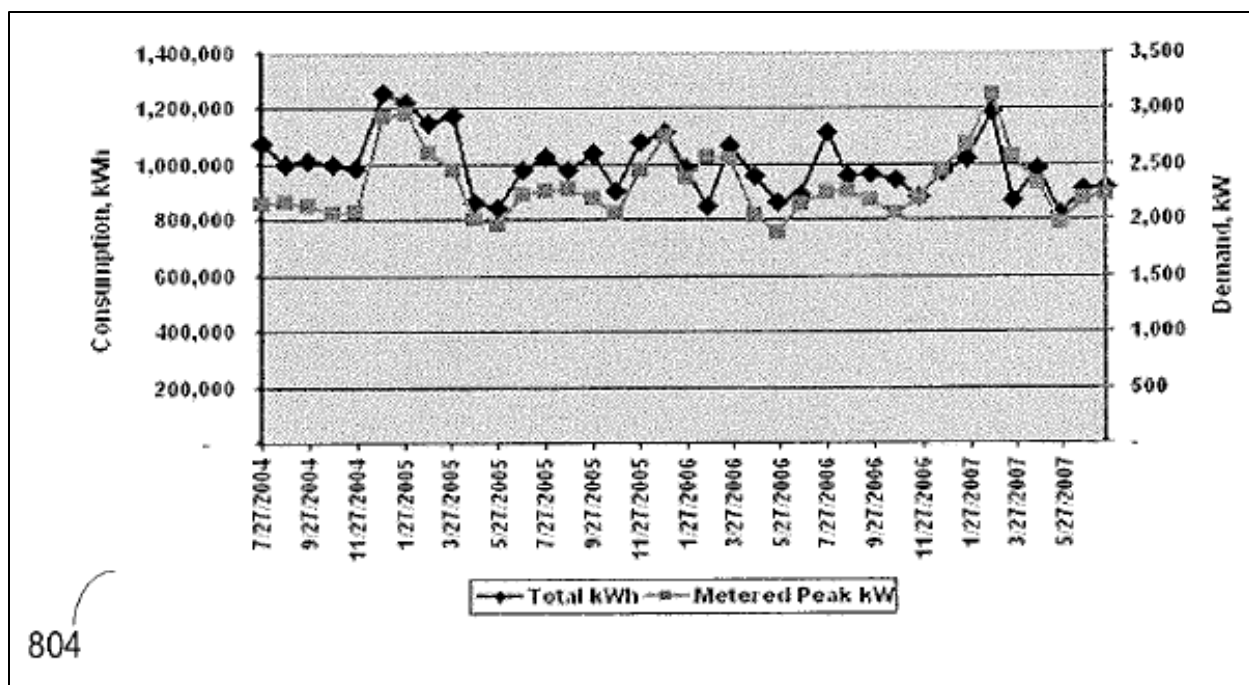


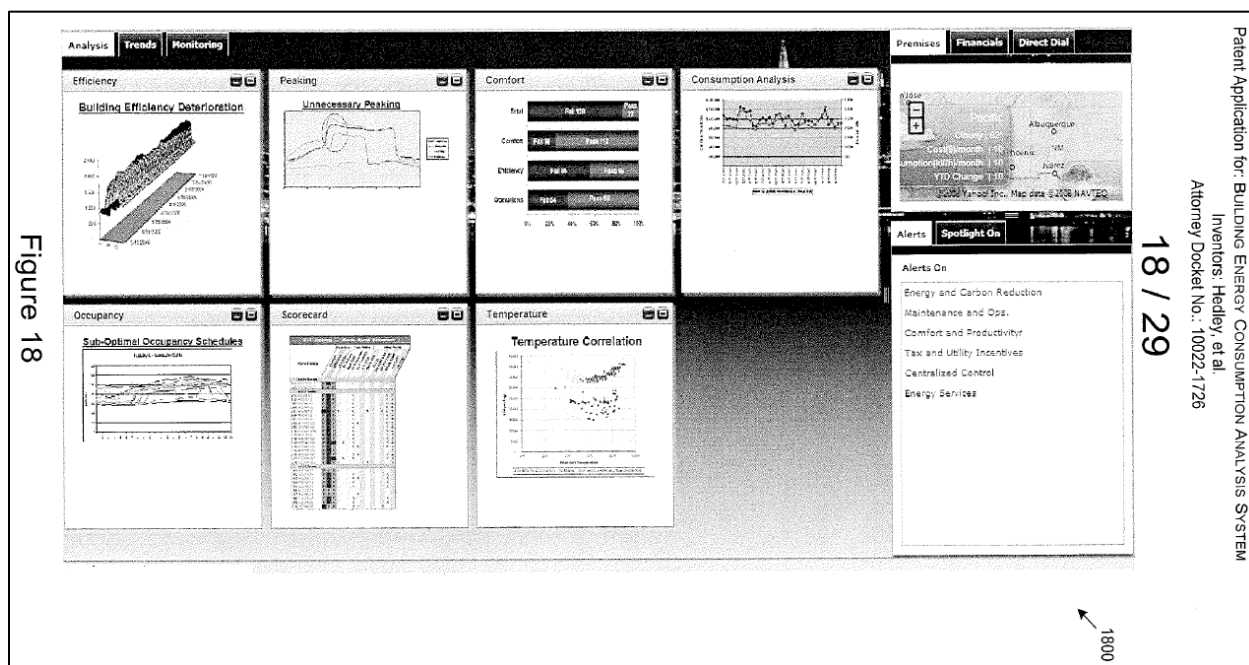
Figure 19

Id., Fig. 19 (color added).

40. In reviewing the file history of Hedley, I note that Hedley includes a number of drawings. Ex. 1005 at 05/07/2010 Drawings. Those figures depict additional details not appearing directly on the publication of Hedley, such as the below which colors the kWh timeseries line in black and the kW timeseries line in a lighter color:



Id. This plot also appears in the Consumption Analysis Window in the interface:



Id.

VI. THE CHALLENGED CLAIMS ARE UNPATENTABLE

41. It is my opinion that a person of ordinary skill in the art would have considered all of the Challenged Claims of the '114 Patent unpatentable, over either Mills, Hedley (alone and in combination with the drawings in its file history), and/or Mills and Hedley together. I explain my opinions in detail below, on a claim-by-claim basis.

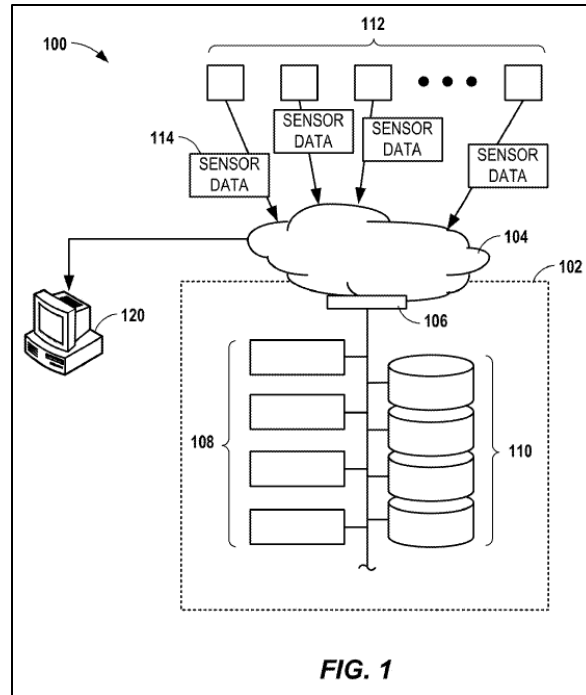
A. The Challenged Claims are Obvious over Mills in View of the Level of Skill in the Art

42. It is my opinion that Mills renders obvious claims 1, 7, 8, 11, 15, 16, and 17 of the '114 Patent.

1. Claim 1

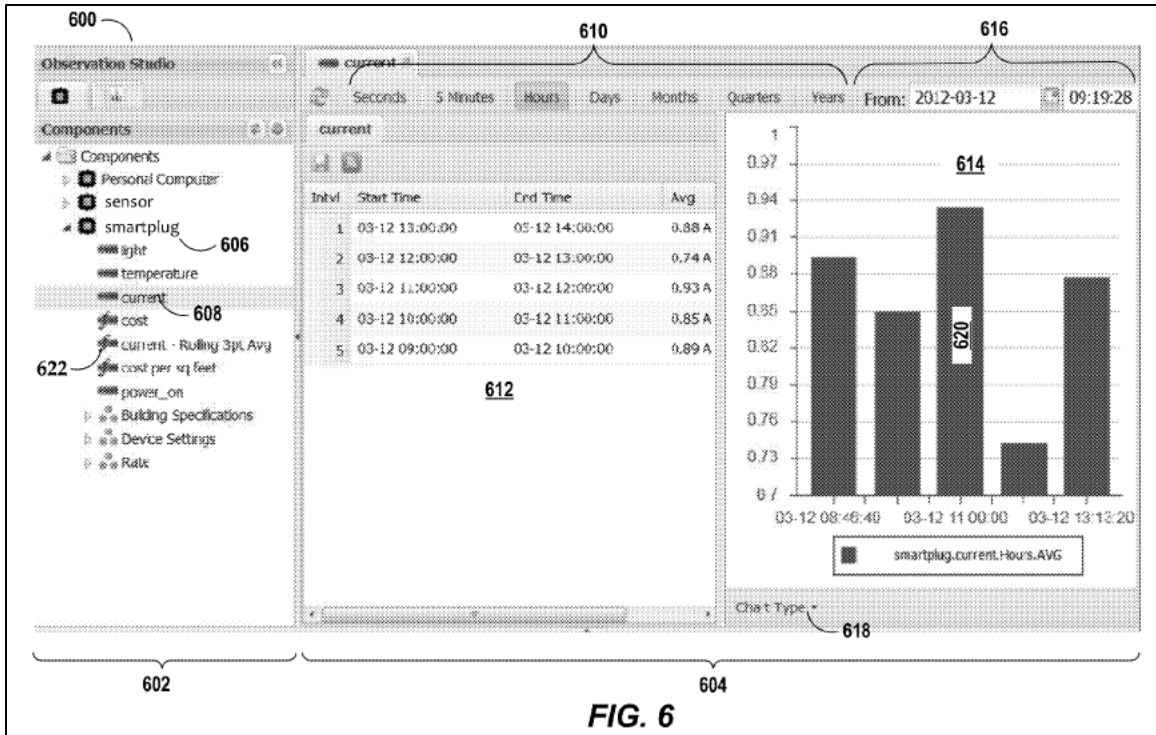
a. “1. A building energy management system comprising:”

43. Mills discloses this element. Mills discloses a system 100 that “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].



Id., Fig. 1.

44. Mills further describes collection from “physical devices such as utility meters, smart plugs, sensors (temperature, accelerometer, etc.)”Ex. 1004, [0041]. Mills also 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’”:



Id., Fig. 6.

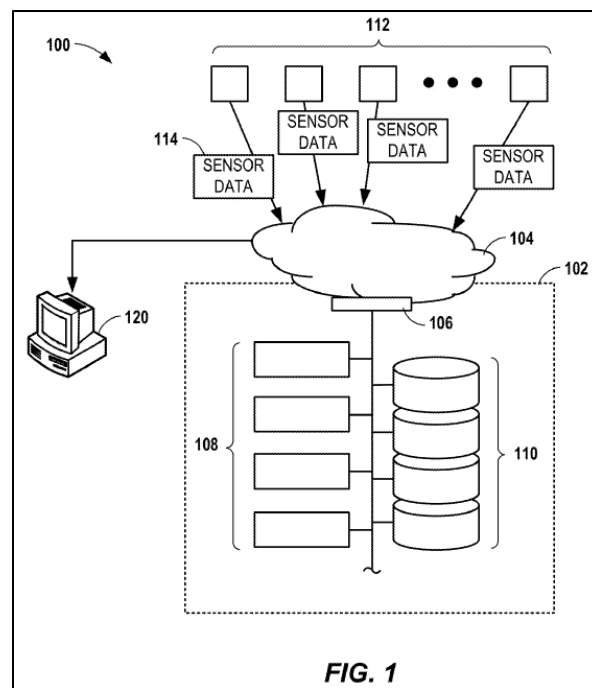
45. As shown on the left, this example interface also provides “Building Specifications.” Ex. 1004, Fig. 6

46. A POSITA would recognize Mills’ system is for collecting energy data from meters, processing data, and providing data via a user interface as a building energy management system.

- 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;”

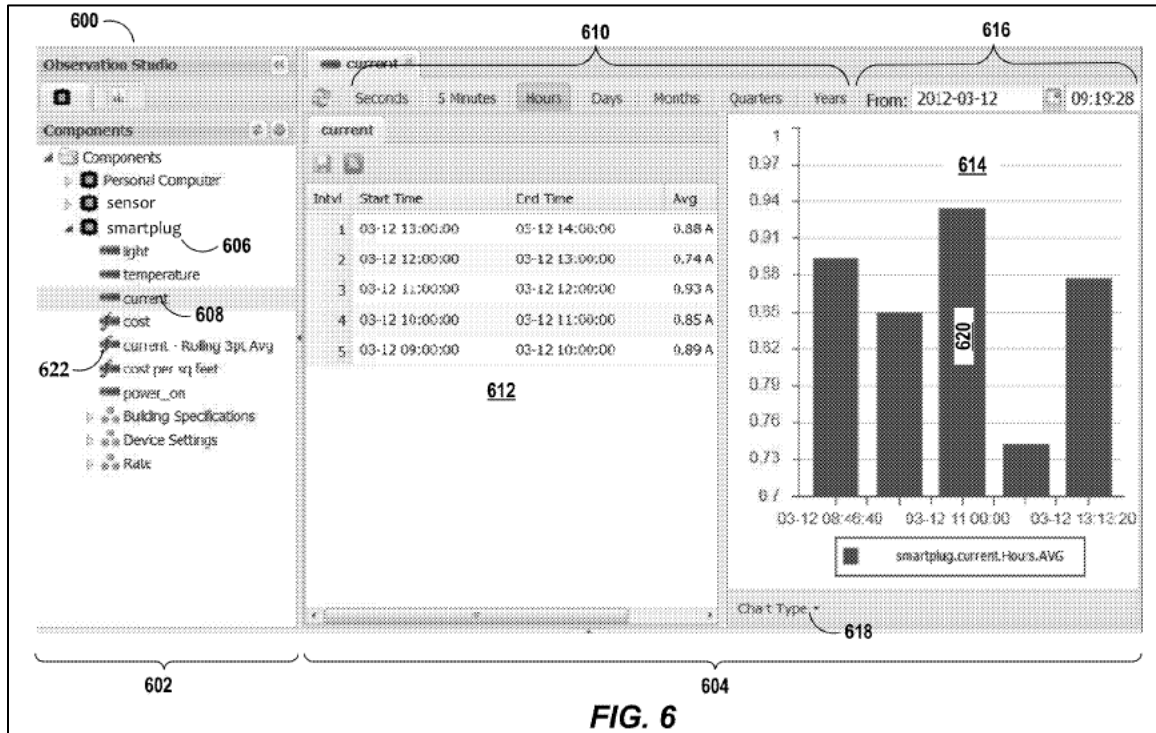
47. Mills discloses this element. For example, Mills’ “smart plug”² is building equipment operable to monitor and control a variable (*e.g.*, electricity) in the building energy management system. Ex. 1004, [0041]. In general, Mills’ system is illustrated in Figure 1 with multiple source devices 112 providing sensor data (*i.e.* raw data samples of a data point associated with the variable) via network 104. *Id.*, Fig. 1, [0024]-[0025].



Id., Fig. 1.

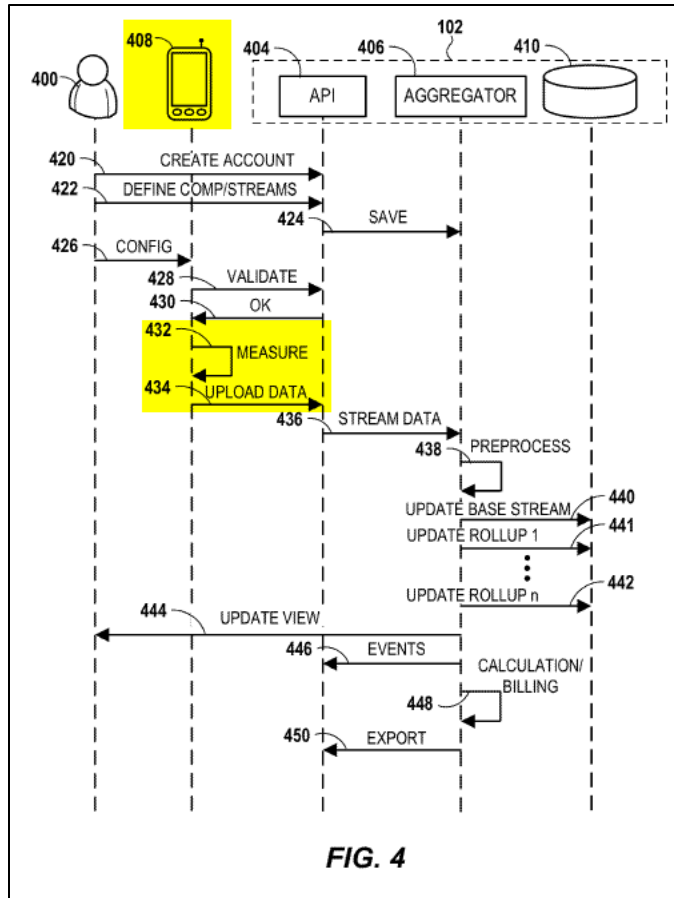
² A smart plug is a power outlet incorporating a remote-controlled switch.

48. As shown in Figure 6, the smart plug 606 provides electrical current (amperage) data to the system. Ex. 1004, Fig. 6, [0077]-[0078]. The smart plug 606 also provides data on the status of the remote-controlled switch included in the smart plug (e.g., “power_on”). *Id.*



Id., Fig. 6.

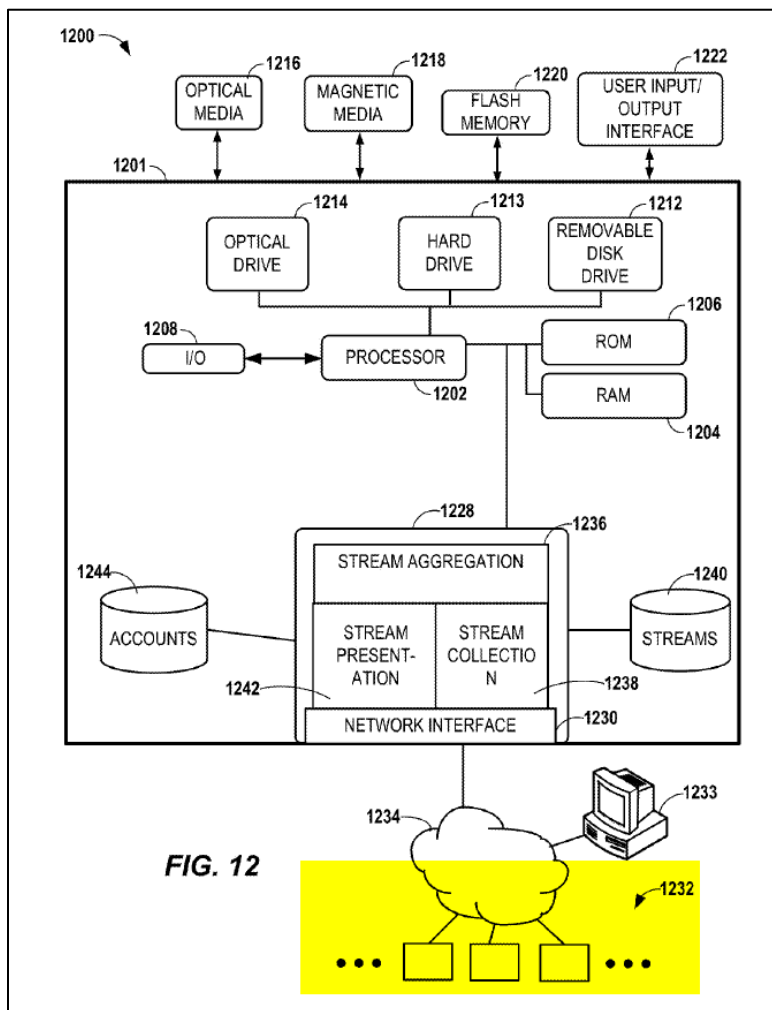
49. Further, Figure 4 illustrates that “the device 408 may begin measuring 432 data and uploading 434 data as time series of data with granularity of the base interval.” Ex. 1004, [0057], Fig. 4. As such, Mills discloses building equipment operable to monitor and control a variable in the building energy 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).



Id., Fig. 4 (color added).

50. Figure 12 of Mills also shows that “[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]. As such, Mills discloses 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).

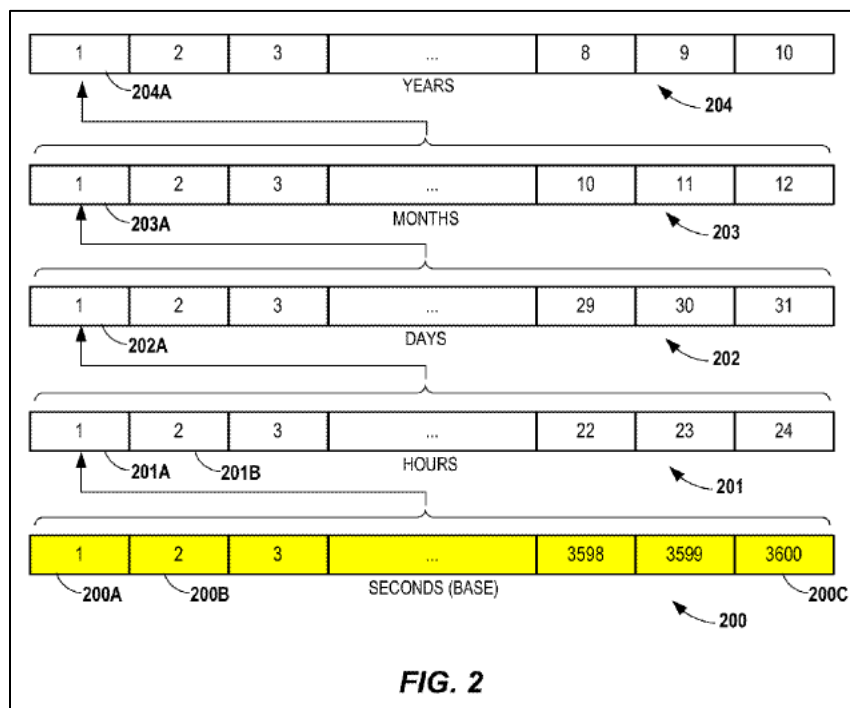


Id., Fig. 12 (color added).

- 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;”

51. Mills discloses this element. “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):

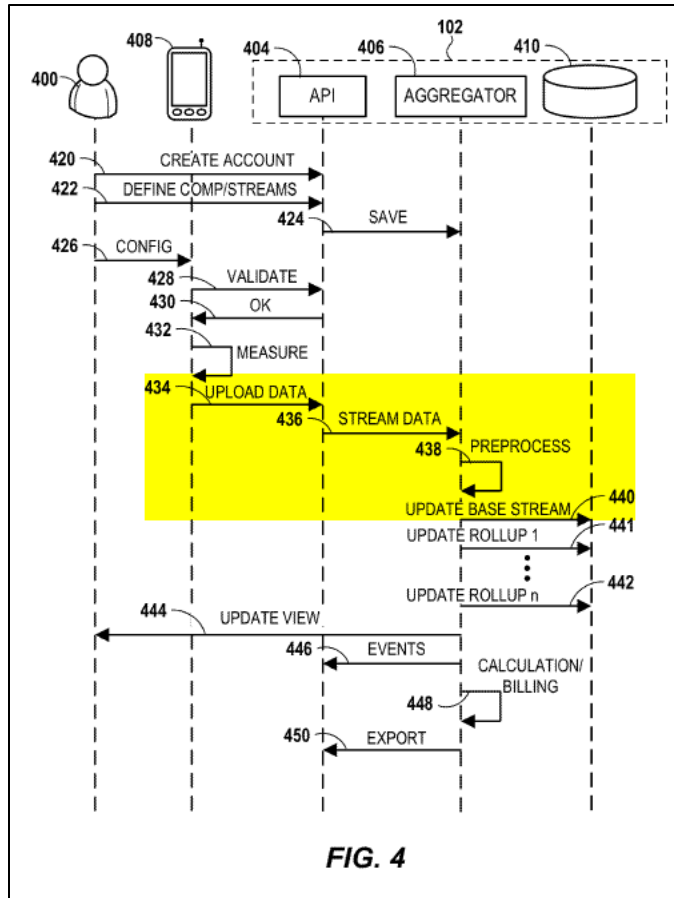


Id., Fig. 2 (color added).

52. Accordingly, Mills discloses 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).

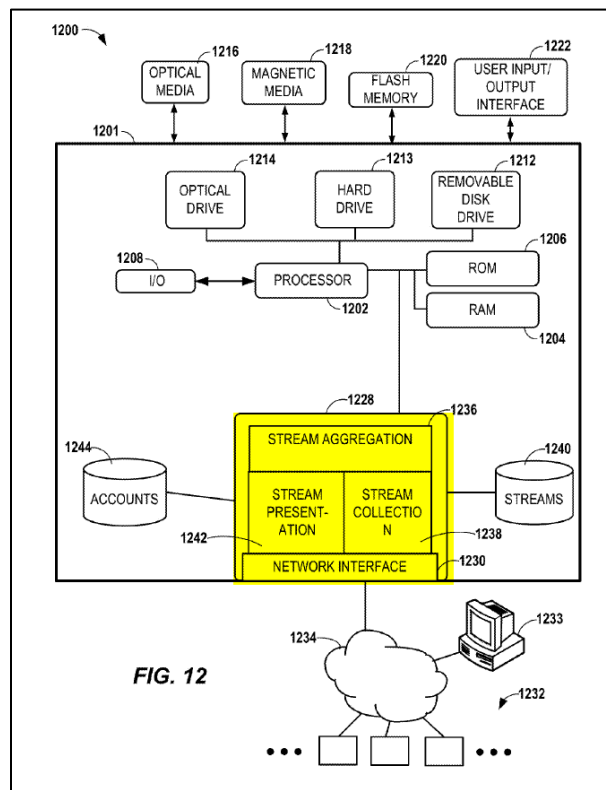
53. Further, Figure 4 shows that “the device 408 may begin measuring 432 data and uploading 434 data as time series of data with granularity of the base interval.” Ex. 1004, [0057], Fig. 4. “The uploaded data 434 may be sent to aggregator component 406 for preprocessing 438 the data to conform to the 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]. As such, Mills discloses 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).



Id., Fig. 4.

54. In addition, Figure 12 shows that “[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]. As such, Mills discloses 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

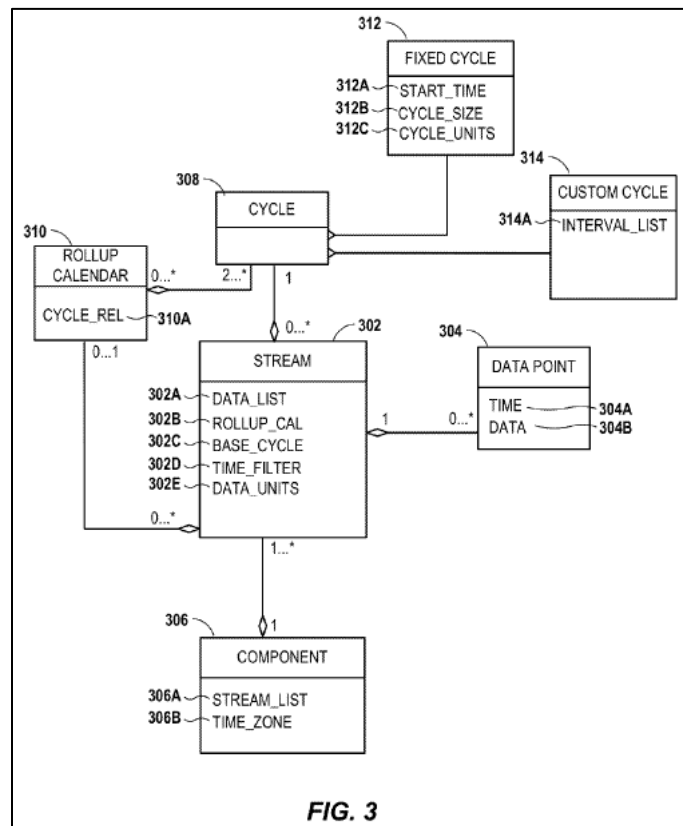
collect the raw data samples (*e.g.*, time series data³) from the building equipment and generate a raw data timeseries (*e.g.*, base stream) comprising a plurality of the raw data samples.



³ 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]. Therefore, the time series data received from the data sources is converted into a stream, and Mills’ “time series of data” refers to the sequence of raw data measurements and “stream” corresponds to the ’114 Patent’s claimed timeseries.

Id., Fig. 12 (color added).

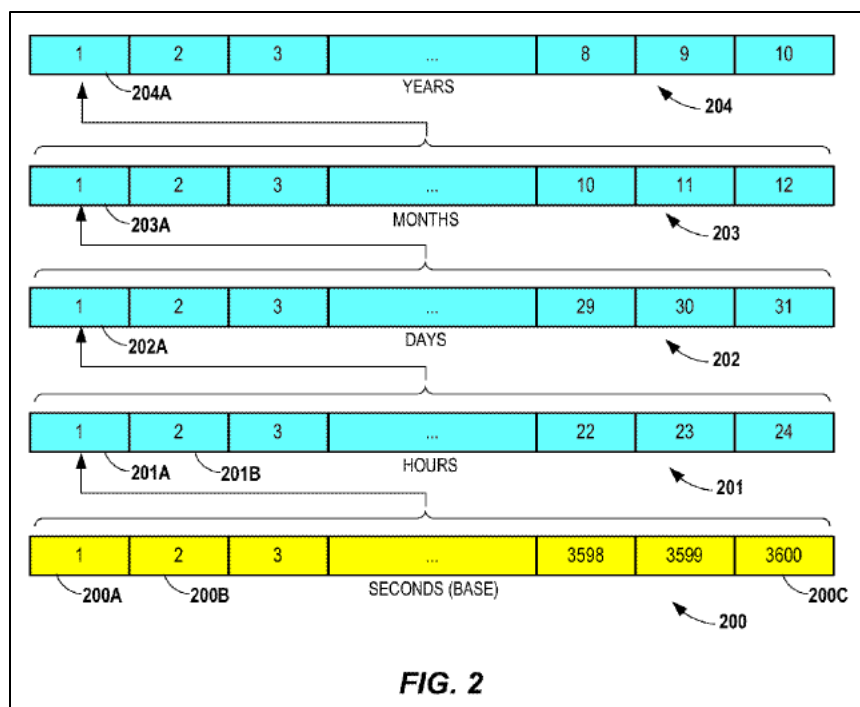
55. Figure 3 shows the object-oriented data structure of streams. Ex. 1004, Fig. 3, [0038]. For example, Mills explains that “[d]ata 304 that originates from the source device is uploaded to the base cycle 302C of stream 302.” *Id.*, Fig. 3, [0039]-[0040]. “[A] stream 302 represents a collection (e.g., 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 description illustrates how the timeseries includes timestamps and values.



Id., Fig. 3.

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

56. Mills discloses this element. Continuing the discussion above (§VI.B.1.c), the base stream constitutes a raw data timeseries. Mills describes 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.*” Ex. 1004, [0029]. A “[r]ollup[] ... 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 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):

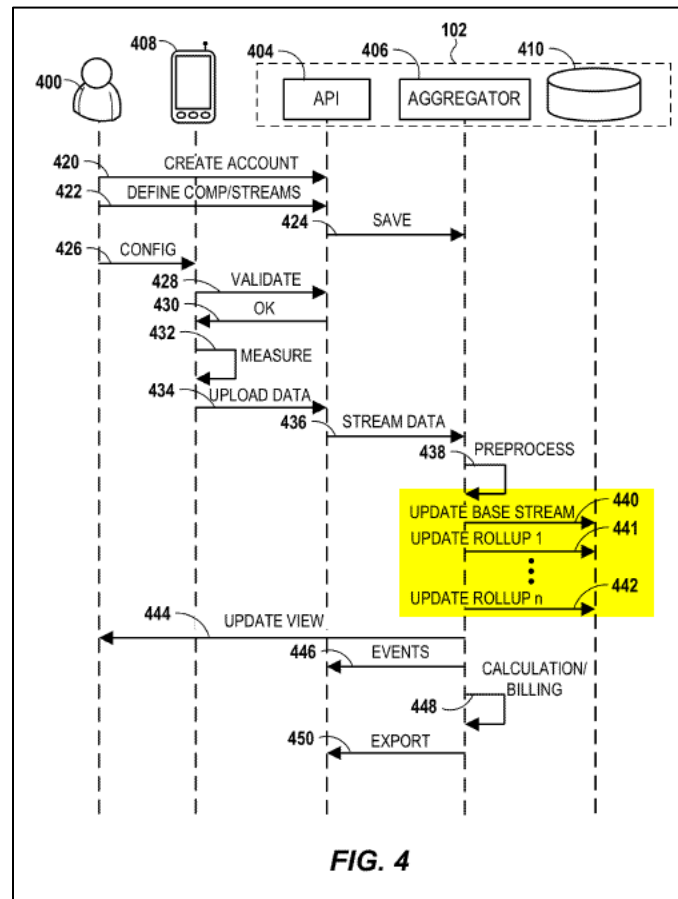


Id., Fig. 2 (color added).

57. Therefore, Mills discloses 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).

58. This element is also shown in Figure 4. Continuing the discussion above (§VI.B.1.c), Mills describes generating the raw data timeseries and storing it in the database in operation 440 (updating base stream). Ex. 1004, [0059]. Mills explains that “[b]ase cycle intervals are rolled-up into rollup streams” and updated as shown in 440-442. *Id.*, [0063]. As such, Mills discloses one or more data platform services (*e.g.*, service 102, including API and aggregator functionality involved in

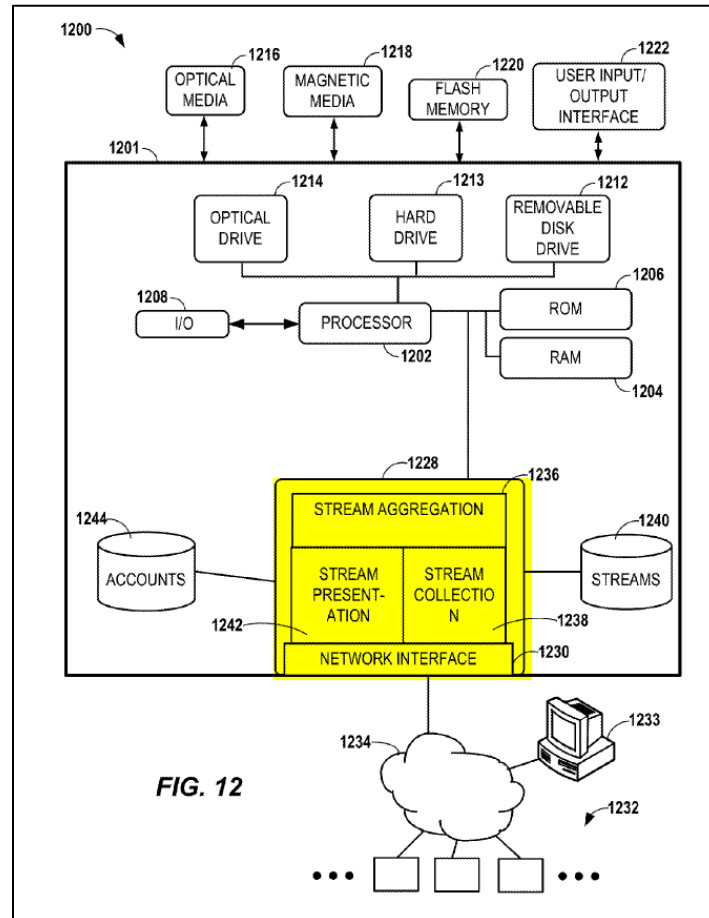
rolling up base streams into rollup streams) configured to generate one or more optimized data timeseries (e.g., rollup streams) from the raw data timeseries (e.g., base streams).



Id., Fig. 4.

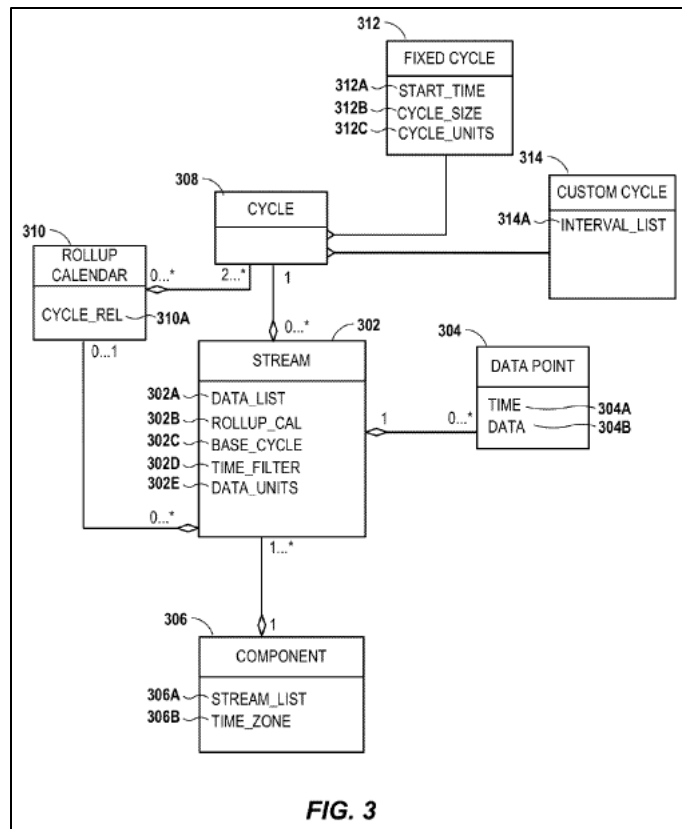
59. In addition, Mills describes in relation to Figure 12 that “a stream aggregation module 1236 ... operates to form ... rollup streams as described herein.” Ex. 1004, Fig. 12, [0105]-[0106]. As such, Mills discloses one or more data platform services (e.g., stream aggregation module 1236 functionality 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).



Id., Fig. 12 (color added).

60. Figure 3 shows the object-oriented data structure of streams. Ex. 1004, Fig. 3, [0038]. For example, “a stream object 302 is used to access both a base stream and rollup streams associated with a source device.” *Id.*, [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.*

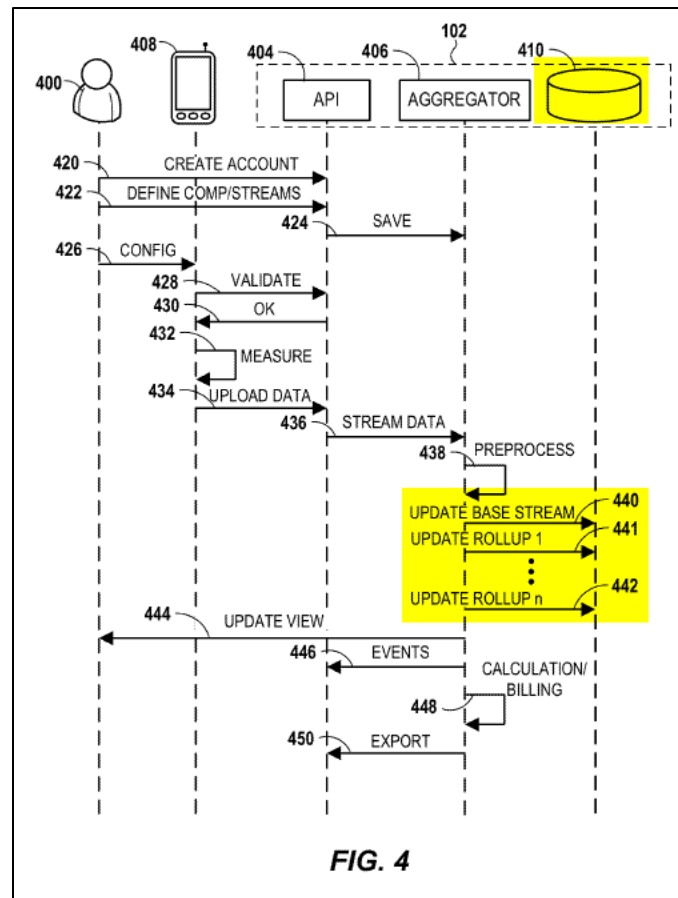


Id., Fig. 3.

- 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”

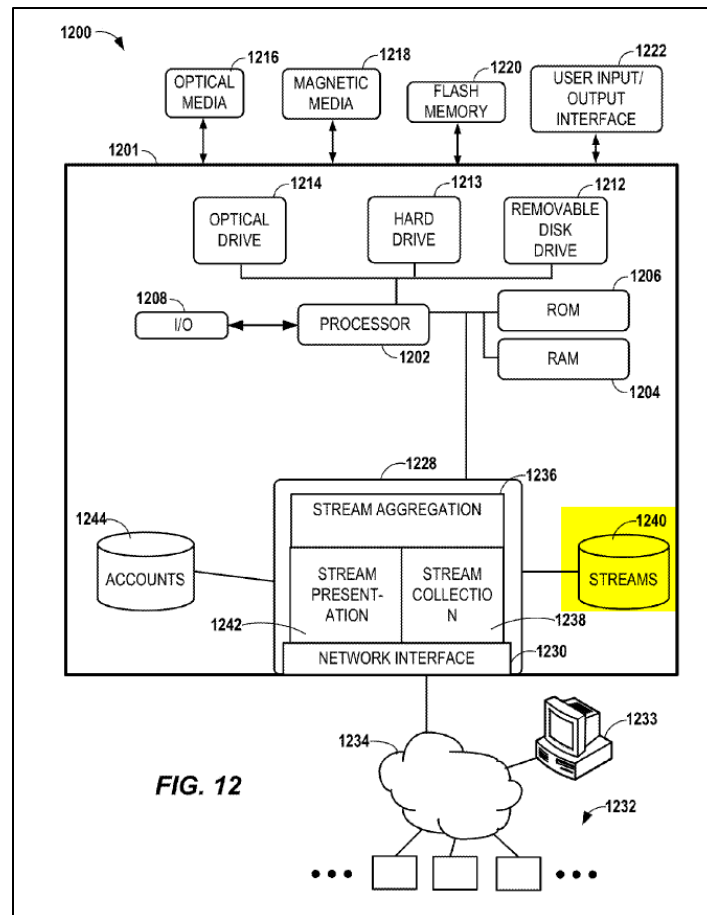
61. Mills discloses this element. Continuing the discussion above (§§VI.A.1.c-VI.A.1.d), Mills discloses a “data repository stores the data as streams, which includes collections of time series data.” Ex. 1004, [0023]. For example, the time series data are “associated with at least one source device 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.*

62. As shown in Figure 4, database 410 stores the base stream (*i.e.*, raw data timeseries) and rollup streams (*i.e.*, optimized data timeseries). Ex. 1004, [0059]-[0060], Fig. 4. As such, Mills discloses 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).



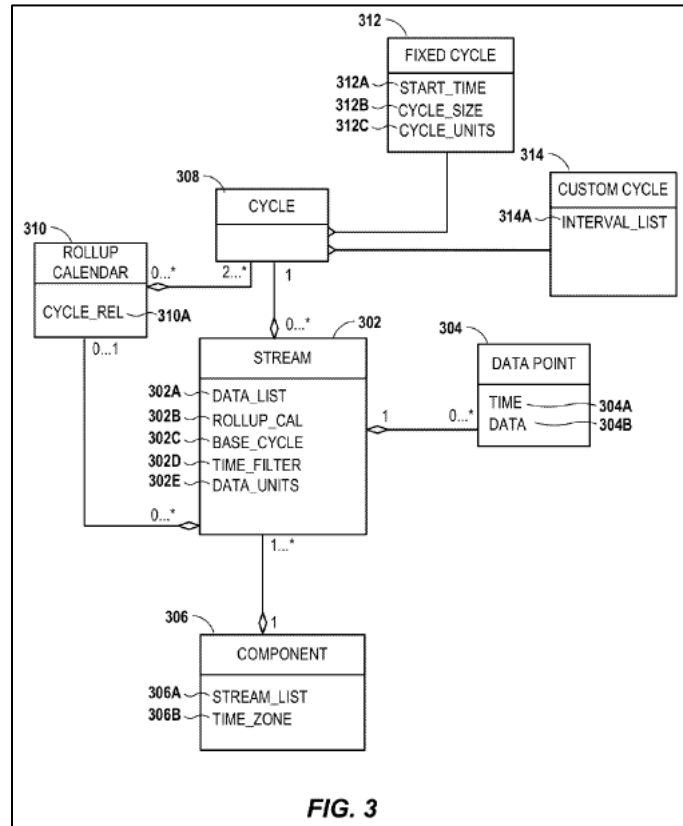
Id., Fig. 4.

63. Mills also describes that Figure 12 includes “a database interface for storing measured and rollup data in a streams database 1240.” Ex. 1004, Fig. 12, [0105]-[0106]. As such, Mills discloses 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).



Id., Fig. 12 (color added).

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

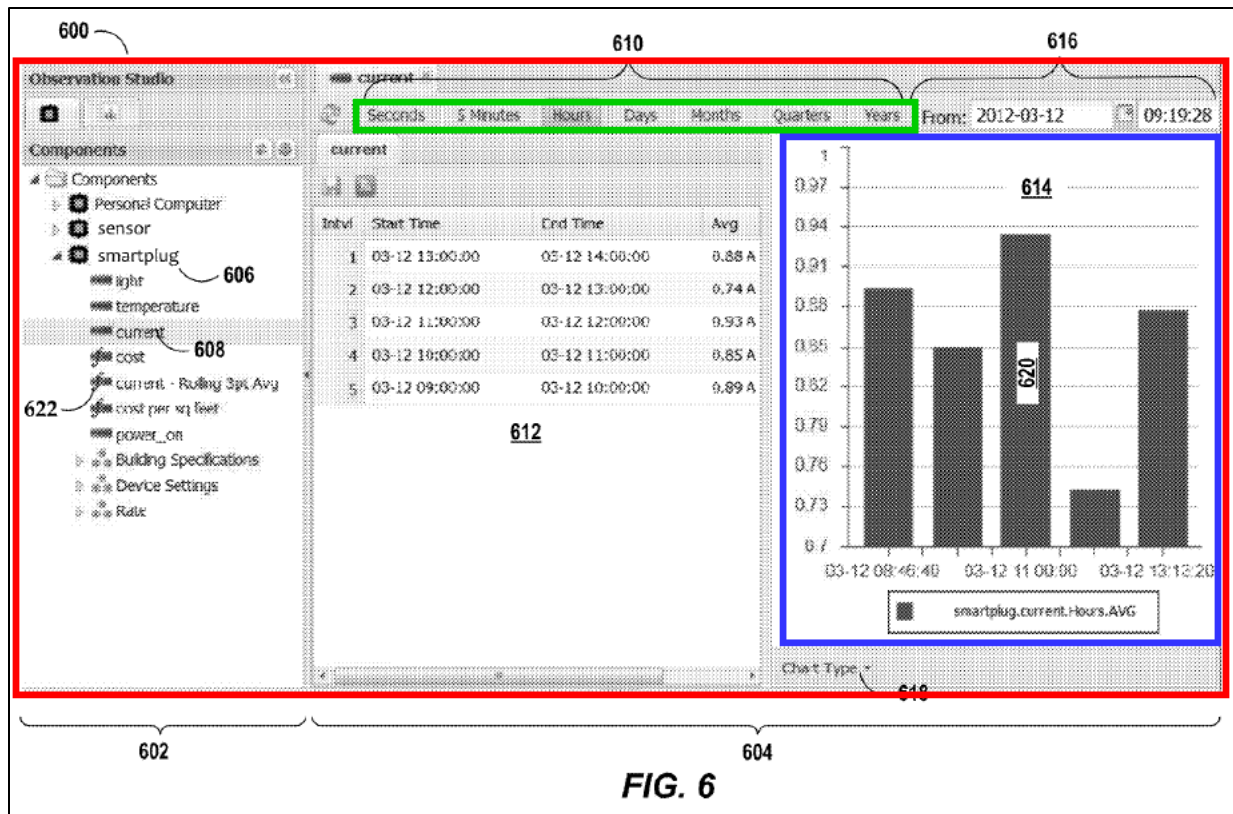


Id., Fig. 3.

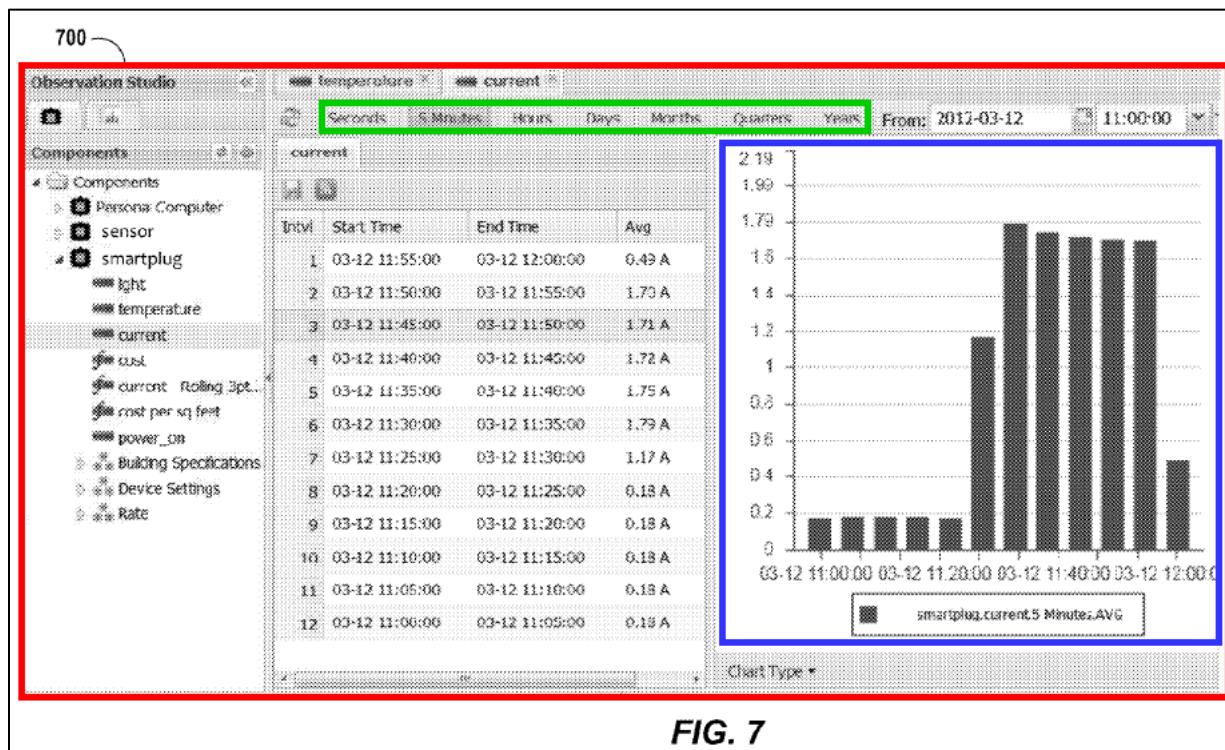
- f. “an energy management application configured to generate an ad hoc dashboard comprising a widget and to associate the widget with the data point, wherein the widget is configured to display a graphical visualization of the plurality of timeseries associated with the data point and comprises interactive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

switching between the plurality of timeseries associated with the data point.”

65. Mills discloses this element. Figures 6 and 7 show an energy management application configured to generate an ad hoc dashboard including a widget and associating the widget with the data point. Ex. 1004, [0037], [0077]-[0081]. Mills describes “near real time viewing of rolled up streams” and functionality of viewing rollups “in a live dashboard graph,” “hav[ing] alerts set on” the rollups, and using 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):



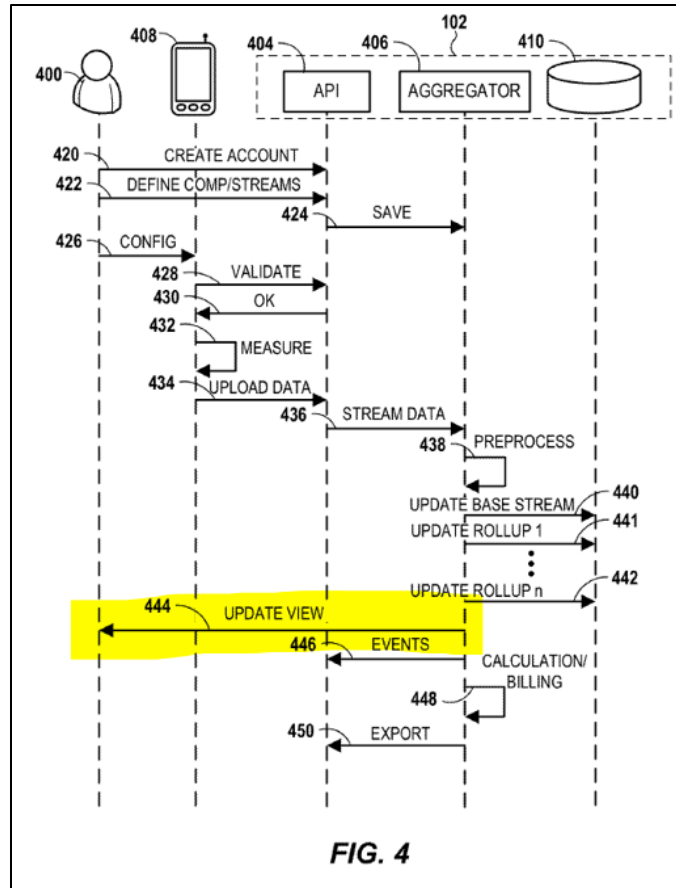
Id., Fig. 6 (color added).



Id., Fig. 7 (color added).

66. As highlighted by the green box 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.” Ex. 1004, [0078]. The associated data is graphically visualized in “list area 612 and graph area 614.” *Id.*, [0078]-[0080].

67. Further, in relation to Figure 4, Mills explains that a 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.” Ex. 1004, [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, 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.



Id., Fig. 4 (color added).

2. Claim 7

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

68. *See* §VI.A.1.a.

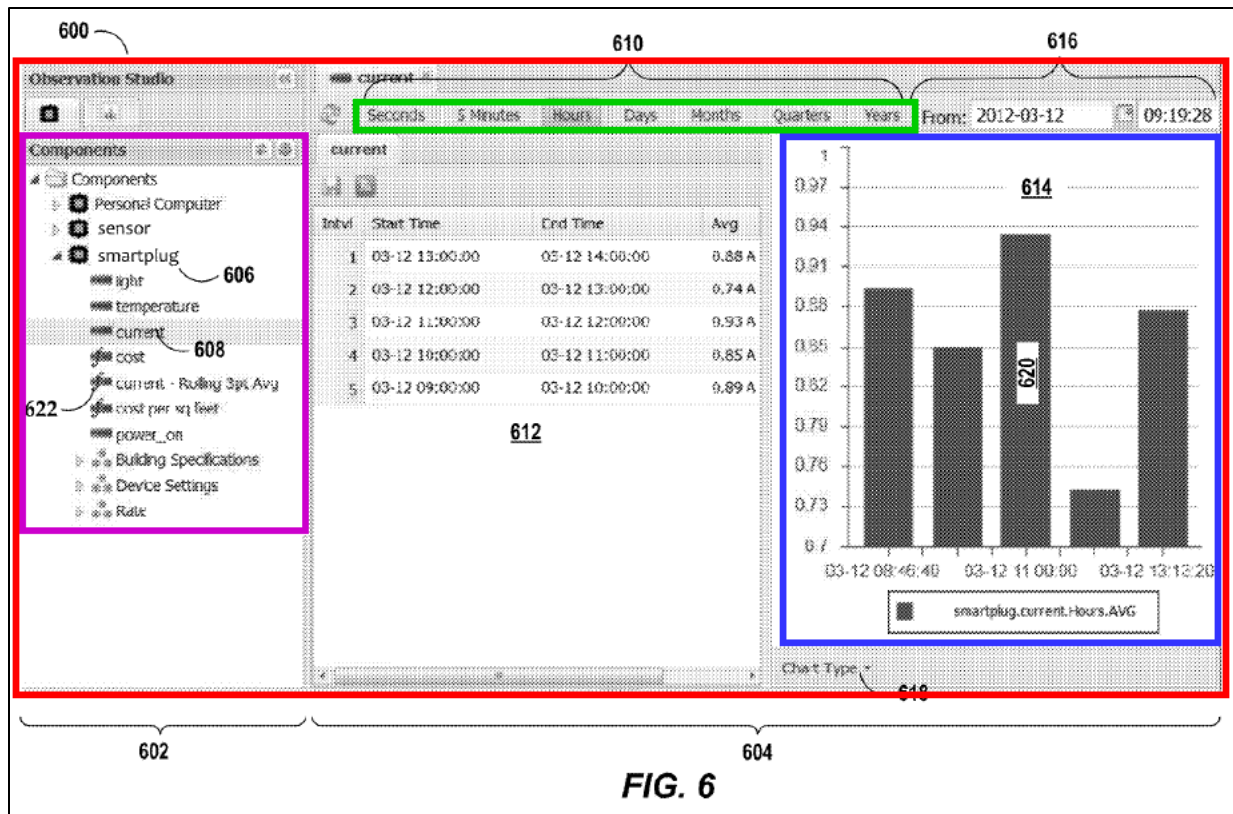
- b. “the timeseries database is configured to store a plurality of timeseries associated with a plurality of different data points;”

69. Mills discloses this element. 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). As such, Mills discloses collecting data and

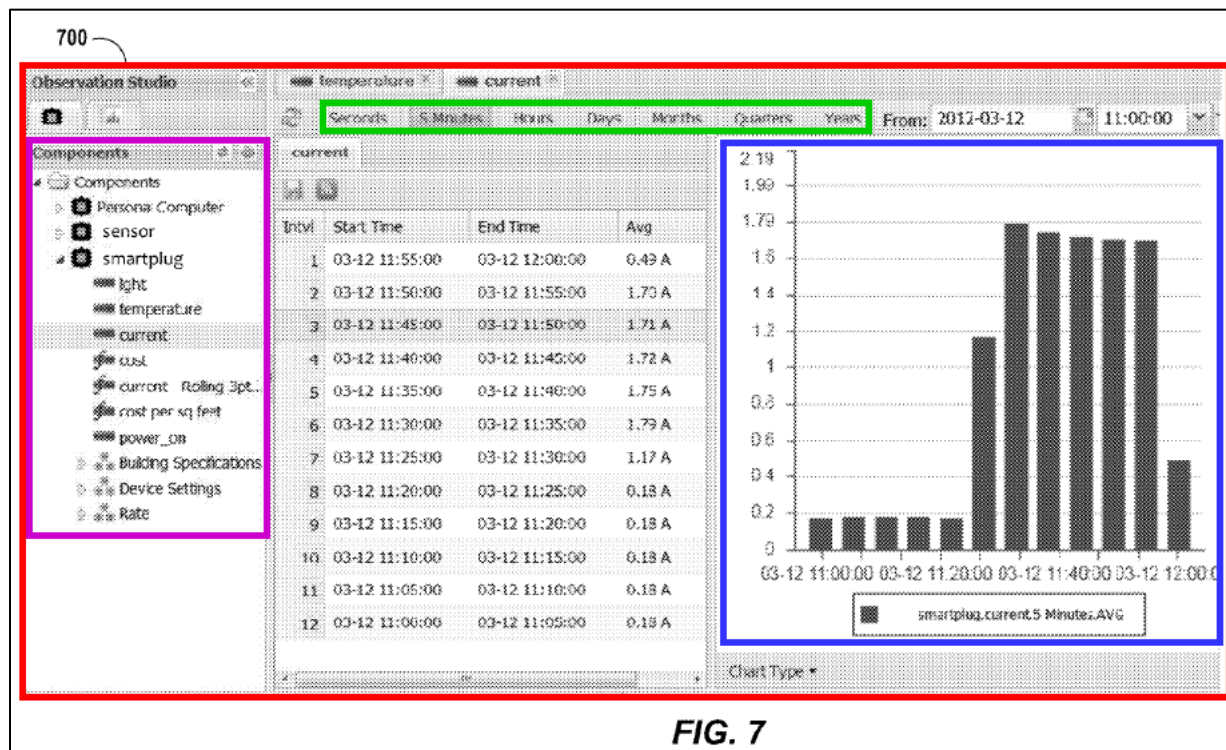
generating timeseries (*e.g.*, base and rollup) associated with a plurality of different data points (*e.g.*, the different source devices). In addition, as discussed above (§VI.A.1.e), these plurality of timeseries associated with a plurality of different data points are stored in the timeseries database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

- 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”

70. Mills discloses this element. As discussed above (§VI.A.1.f), Mills discloses an ad hoc dashboard comprising a widget (*e.g.*, the current tab widget, shown in red below). In addition, Mills describes 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].



Id., Fig. 6 (color added).

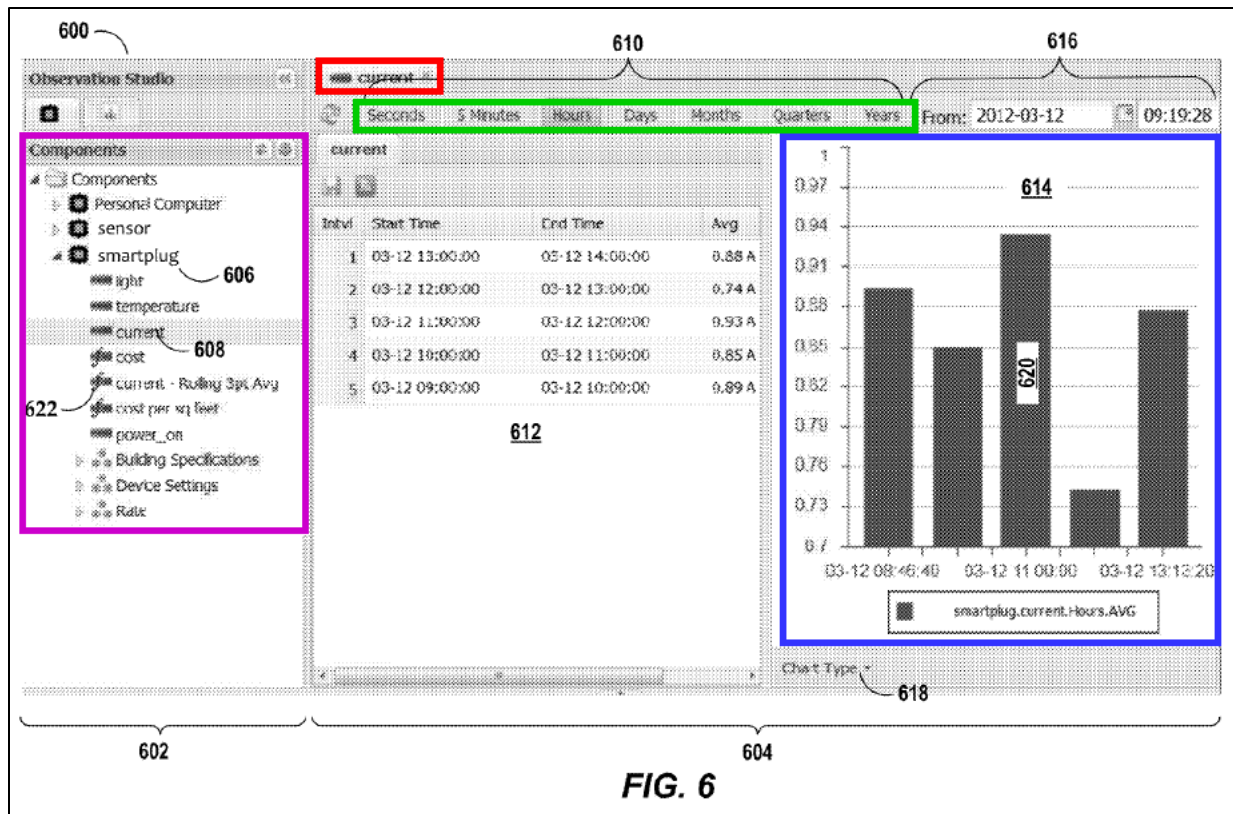


Id., Fig. 7 (color added).

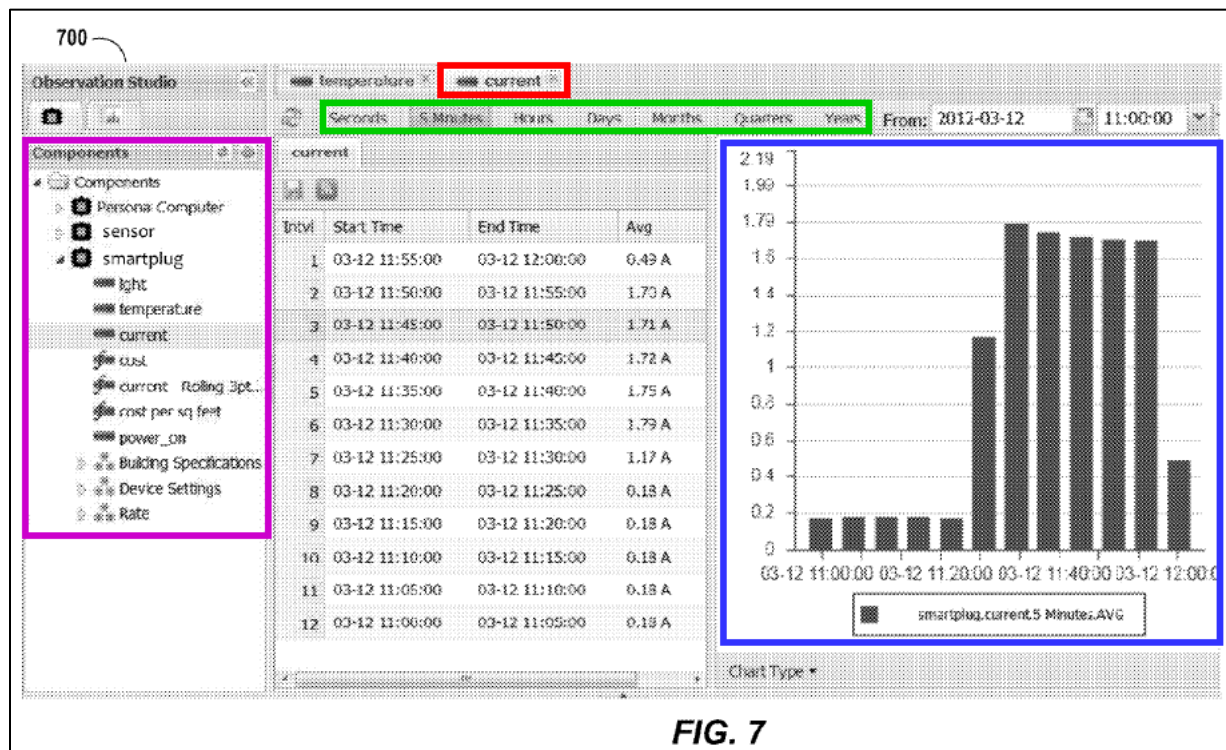
71. As discussed above (§VI.A.1.f), Mills also explains the data upload, stream update, and view update processes illustrated in Figure 4. Mills also describes that “multiple components and streams can be uploaded at one time and processed in batch.” Ex. 1004, [0057].

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

72. Mills discloses this element. 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):



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



Id., Fig. 7 (color added).

3. Claim 8

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

73. *See* §VI.A.2.

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

74. Mills discloses this element. 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. Further, Figure 3 describes class definitions that apply to each stream, including “data unit 302E.” *Id.*, Fig. 3, [0038]-[0039]. A POSITA would readily appreciate 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.

- 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;”

75. It is my opinion that Mills renders this element obvious. 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 type of chart. 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 and variation of a “bar chart, pie chart, etc.” for visualizing data. 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. 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 that would have been considered obvious to a POSITA. I note that Figures 6 and 7 imply that multiple lines may be displayed because the display section (604) includes a legend below the chart. *Id.*, Figs. 6 and 7. A POSITA would have readily understood that a legend is typically used to differentiate between multiple sets of data on a single chart.

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

76. It is my opinion that Mills renders this element obvious. Continuing the discussion above (§VI.A.3.c), I believe that 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. Graphically displaying similar data using a common color scheme is well known. 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 by visually indicating a similarity between the streams. I consider that a color selection would have been an obvious design choice to a POSITA.

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

77. Continuing the discussion above (§§VI.A.3.c, VI.A.3.d), it would have been obvious to a POSITA at the time of the claimed invention to assign different colors to each of the plurality of lines corresponding to timeseries with different units of measure. A POSITA would have been motivated to assign a different color to lines with different unit of measure to make the chart easier to understand, by visually indicating a difference between the streams. I consider such a color selection to be an obvious design choice to a POSITA.

4. Claim 11

78. Claim 11 is the method counterpart to claim 1, and is disclosed by Mills for the same reasons I note above. *See* §VI.A.1.

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

79. Mills discloses this element. *See* §§VI.A.1.a, VI.A.1.f.

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

80. *See* §VI.A.1.b.

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

81. *See* §§VI.A.1.b, VI.A.1.c.

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

82. *See* §VI.A.1.c.

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

83. *See* §VI.A.1.d.

- 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”

84. *See* §VI.A.1.e.

- 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.”

85. *See* §VI.A.1.f.

5. Claim 15

- a. “15. The method of claim 11, further comprising”

86. *See* §VI.A.4.

- 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,”

87. Mills discloses this element. For example, Figures 6 and 7 of Mills show “a user interface that facilitates viewing collected data.” Ex. 1004, [0077]. The

interface permits sections to be customized according to a user's input, including "section 602 [that] is a control selection that allows user selection of data and other content" (shown in purple below), "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 below), and "time controls 616," which includes "time and data selector[s]" (shown in yellow below). *Id.*, [0077]-[0081]. Mills provides a stream-definition process in which the user chooses 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 that includes a "list area 612" (shown in orange below) and a "graph area 614" (shown in blue below). *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].

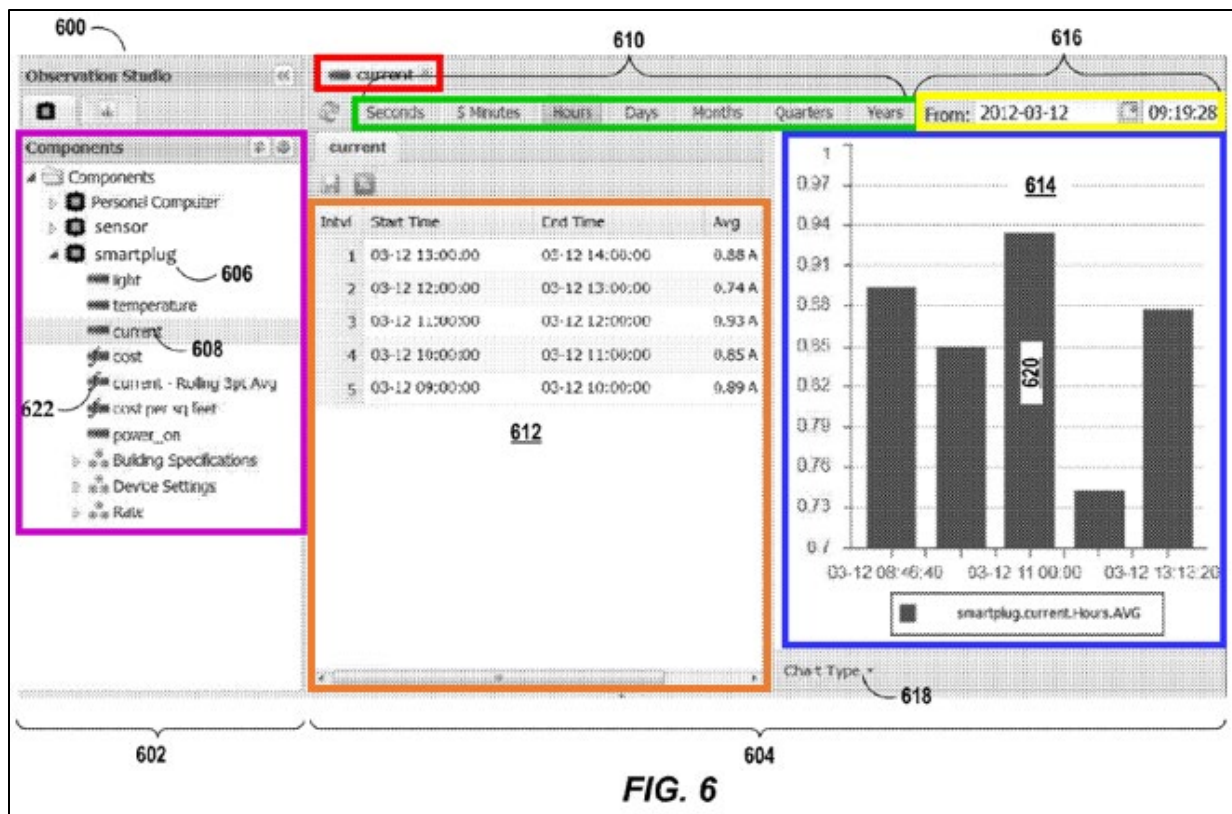


FIG. 6

Id., Fig. 6 (color added).

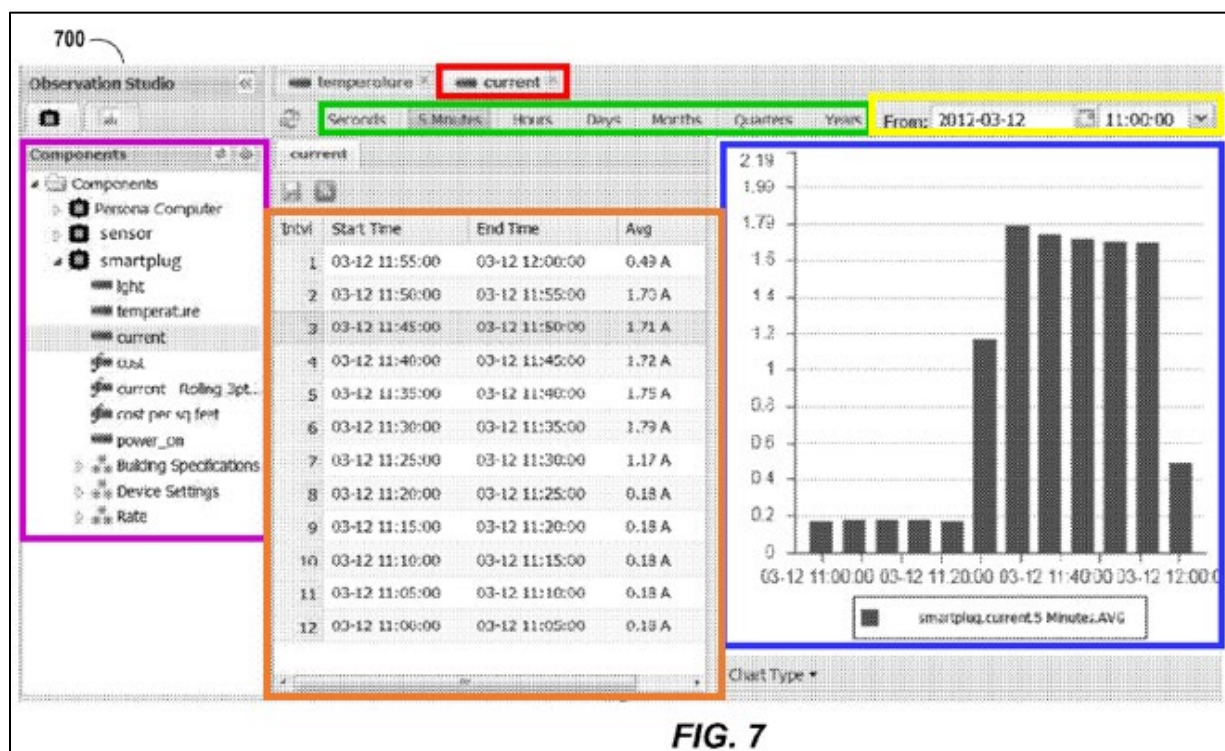
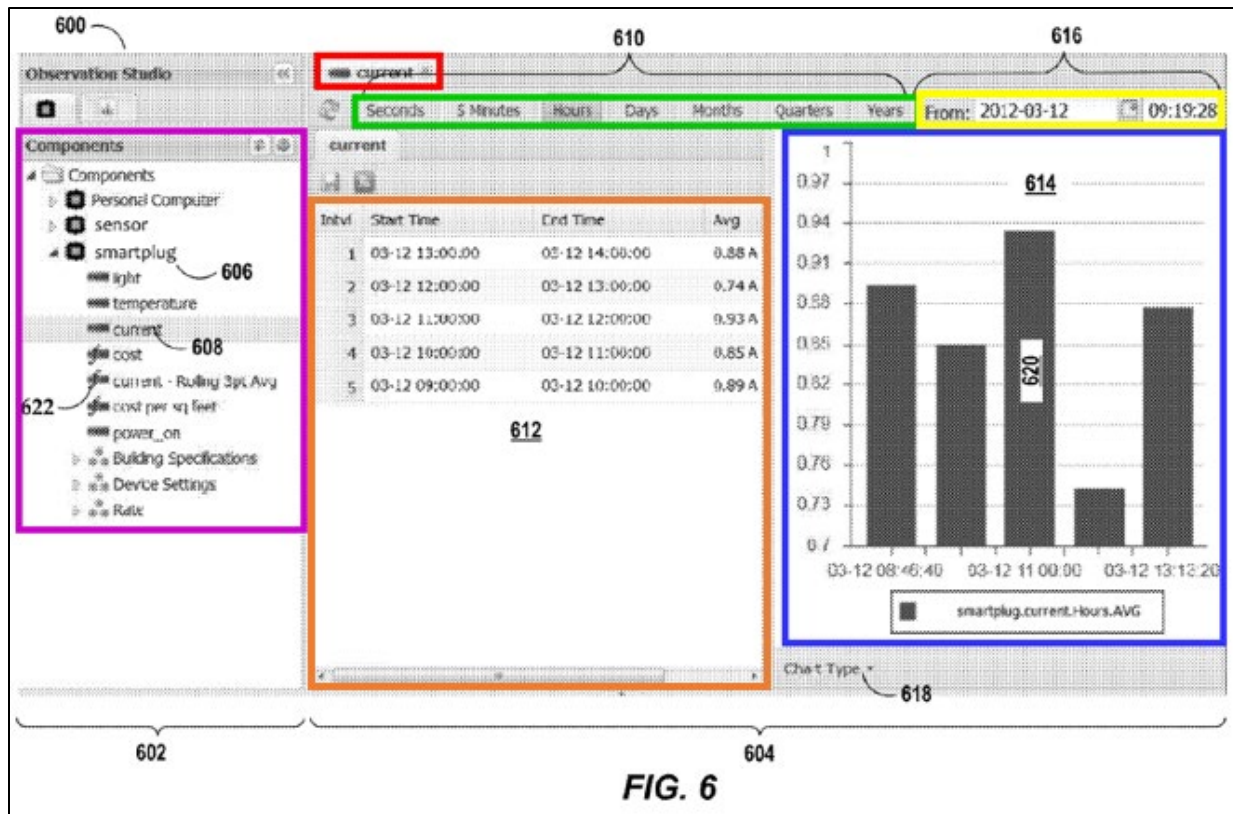


FIG. 7

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.”

88. Mills discloses this element. Continuing the discussion above (§VI.A.5.b), the widget created and displayed in Mills’ user interface permits charting, data visualization, and display of information with various time periods and granularity. Referring to Figure 6, the list area 612 (shown in orange below) displays information including “Start Time,” “End Time,” and “Avg” for each “Intvl,” and the graph area 614 (shown in blue below) charts, visualizes data, and displays information in a bar chart or other chart type format. As such, the current tab widget in Figure 6 is at least a display widget (note the list of information being displayed in list area 614 and the chart being displayed in graph area 614), a charting widget (note the chart in graph area 614), and a data visualization widget (note the chart in graph area 614). Further, considering Figure 7, the current tab widget 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).



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



Id., Fig. 7 (color added).

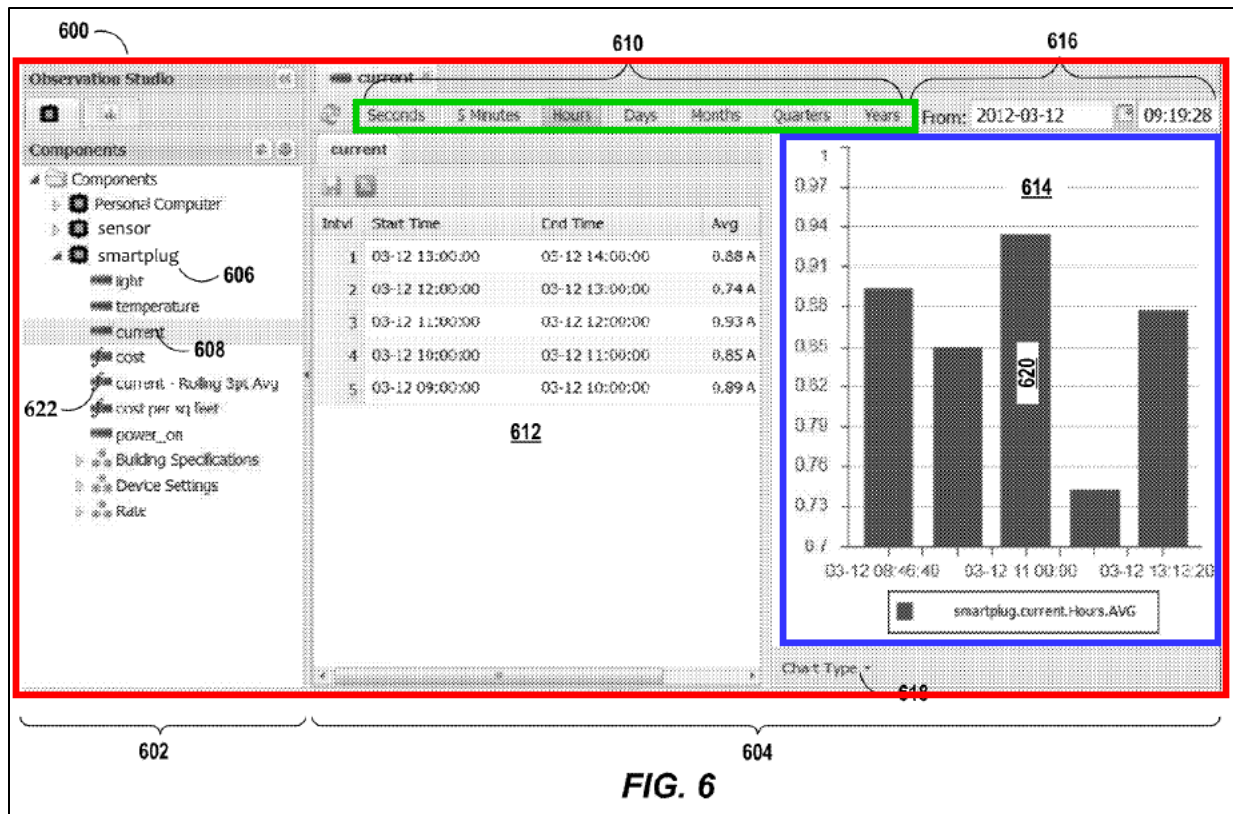
6. Claim 16

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

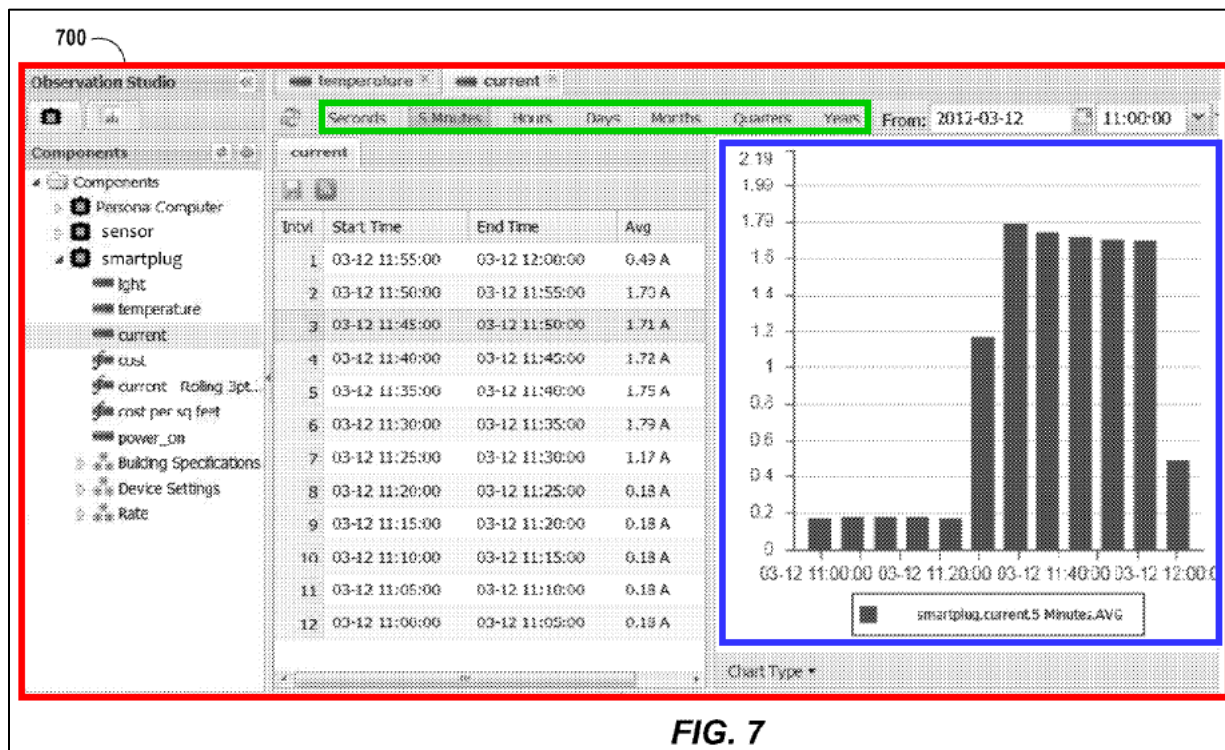
89. *See* §VI.A.4.

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

90. Mills discloses this element. Continuing the discussion above (§VI.A.1.f), Mills discloses 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.*



Id., Fig. 6 (color added).



Id., Fig. 7 (color added).

91. I believe that it would have been obvious to a POSITA, at the time of the claimed invention, to display multiple such bar charts in a single window to provide a single, comprehensive view of various data. In fact, I consider this element to be suggested by Figures 6 and 7, given that a legend is provided below the bar chart, which suggests 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.”

92. Mills discloses this element. 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

93. Claim 17 is the method counterpart to claim 7, and is disclosed by Mills for the same reasons I note above. *See* §VI.A.2.

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

94. *See* §VI.A.4.

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

95. *See* §VI.A.2.b.

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

96. *See* §VI.A.2.c.

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

97. *See* §VI.A.2.d.

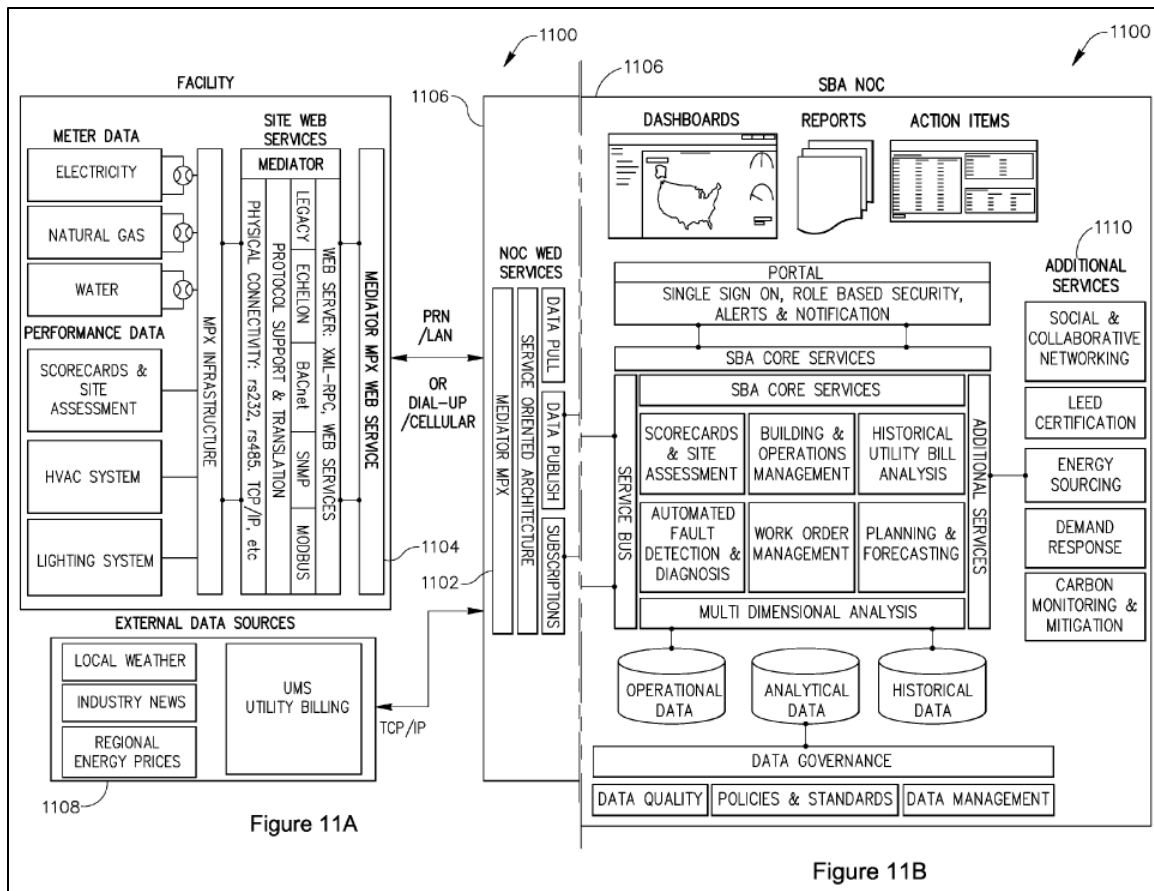
B. The Challenged Claims are Obvious over Hedley in View of the Level of Skill in the Art

98. It is my opinion that Hedley also renders obvious claims 1, 7, 8, 11, 15, 16, and 17 of the '114 Patent.

1. Claim 1

- a. “1. A building energy management system comprising:”

99. Hedley discloses this element. 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:



Id., 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;”

100. Hedley discloses this element. Hedley discloses 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 explains 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].

101. 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). For example, Hedley describes 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.” Ex. 1006, [0076], [0083]. 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].

- 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;”

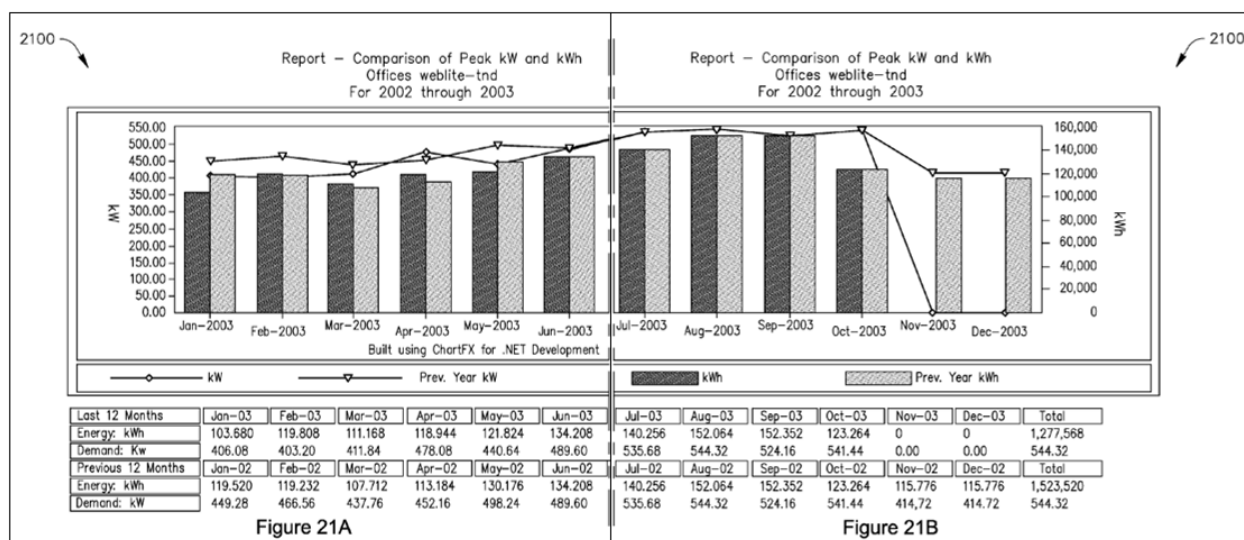
102. Hedley discloses this element. Hedley discloses a data collector (e.g., portion of mediator 1102 providing integration, collection, and logging) configured

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 at [0084], it then “*integrates, collects, logs*, and exports information into the EEMS data repository,” *id.* at [0106]. In fact, Hedley explains that it “tracks data points” and “store[s] this information with a *timestamp*.” *Id.* at [0100]. Put differently, 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”). 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. 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.” *Id.* at [0108]. As such, the functional block of “mediator 1102 [that] integrates, collects, logs and exports information” is a data collector, as claimed. *Id.* at [0106].

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

103. Hedley discloses this element. Hedley discloses using data platform services to generate optimized data timeseries from the raw data timeseries. For

example, Hedley describes 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 at [0500]. For example, Figures 21A/21B depict kW and kWh values on a monthly basis, which constitute an optimized data timeseries.



Id. at Figs. 21A and 21B.

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

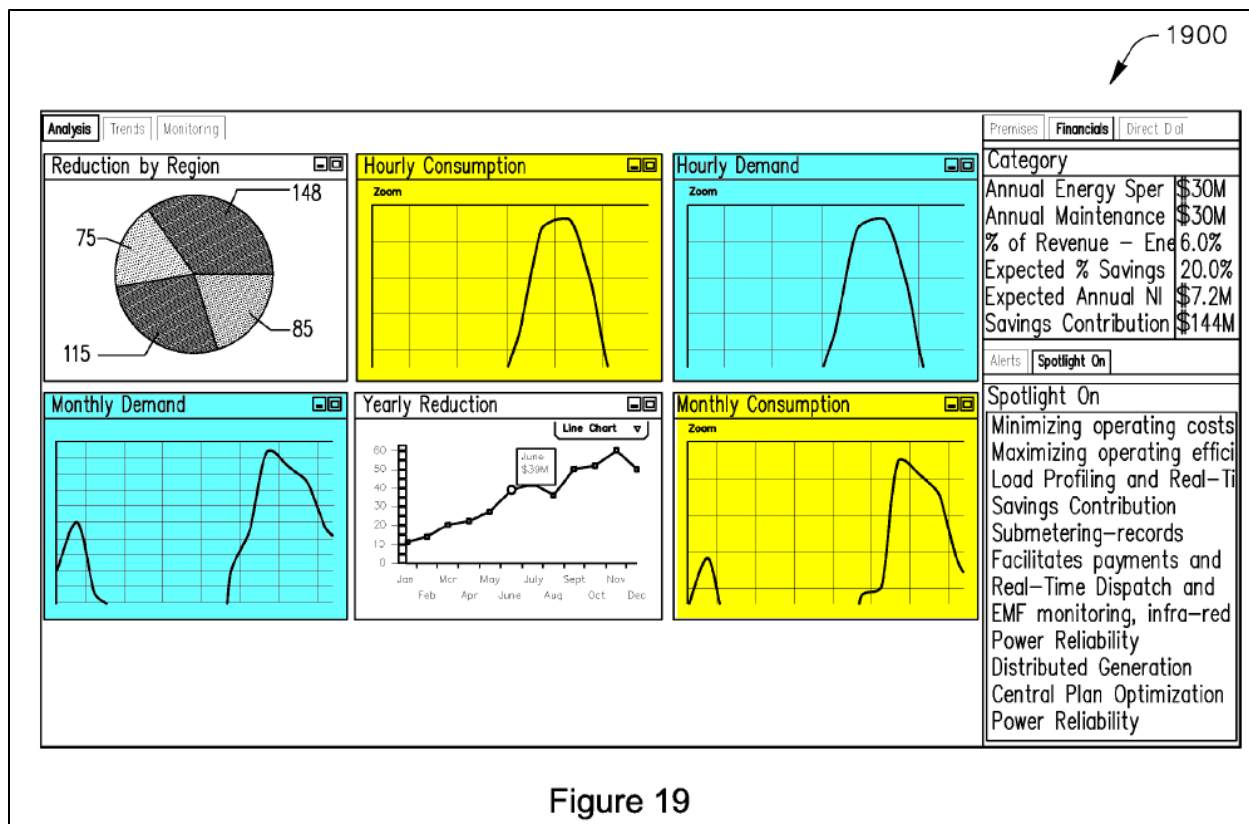


Figure 19

Ex. 1006 at 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”

105. Hedley discloses this element. Hedley describes 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 at [0106]. Additionally, Hedley explains 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.* at [0156].

106. Figure 25 additionally shows that an “energy database 2514 may store any data that the machine 2500 processes.” Ex. 1006 at [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.*

107. Accordingly, Hedley discloses 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.

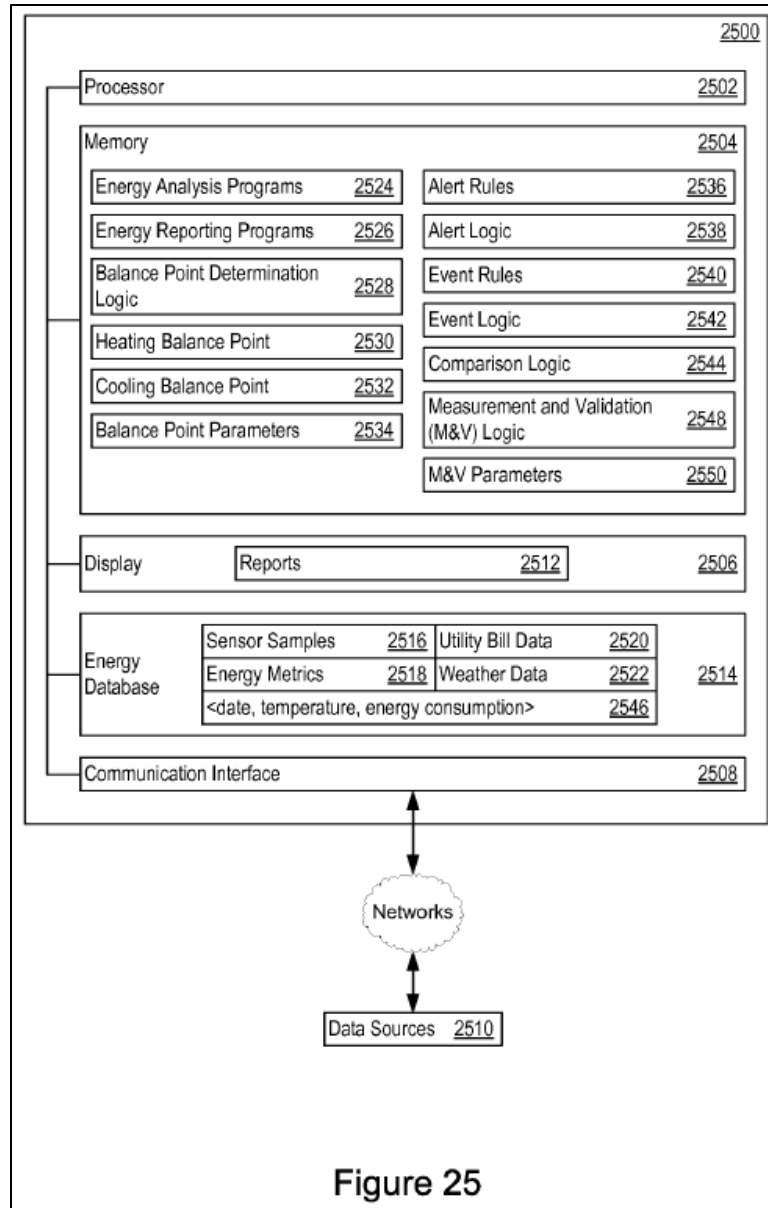


Figure 25

Ex. 1006 at 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.”

108. Hedley discloses this element. 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 at Cover, [0003]. Accordingly, Hedley’s describes an energy management application as claimed. This is further confirmed by the energy management focus of the application, as discussed below.

109. Hedley discloses generating an ad hoc dashboard including a widget as claimed. Ex. 1006 at [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.* at [0179]. Figures 18-23 show “dashboard screenshots... that the system may generate.” *Id.* at [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.* at [0180]. Additionally, “[t]he EEMS has the ability to

tailor the list of dashboard elements for each user based on their profile and privilege.” *Id.* at [0181].

110. To illustrate using 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 at [0487], Fig. 19. For example, Figure 19 contains hourly and monthly demand timeseries (yellow, below) associated with the demand data point, as well as hourly and monthly consumption timeseries (blue, below) associated with the consumption data point as discussed above (§VI.B.1.d).⁴ 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).

⁴ Consumption is measured in kWh and demand is measured in kW.

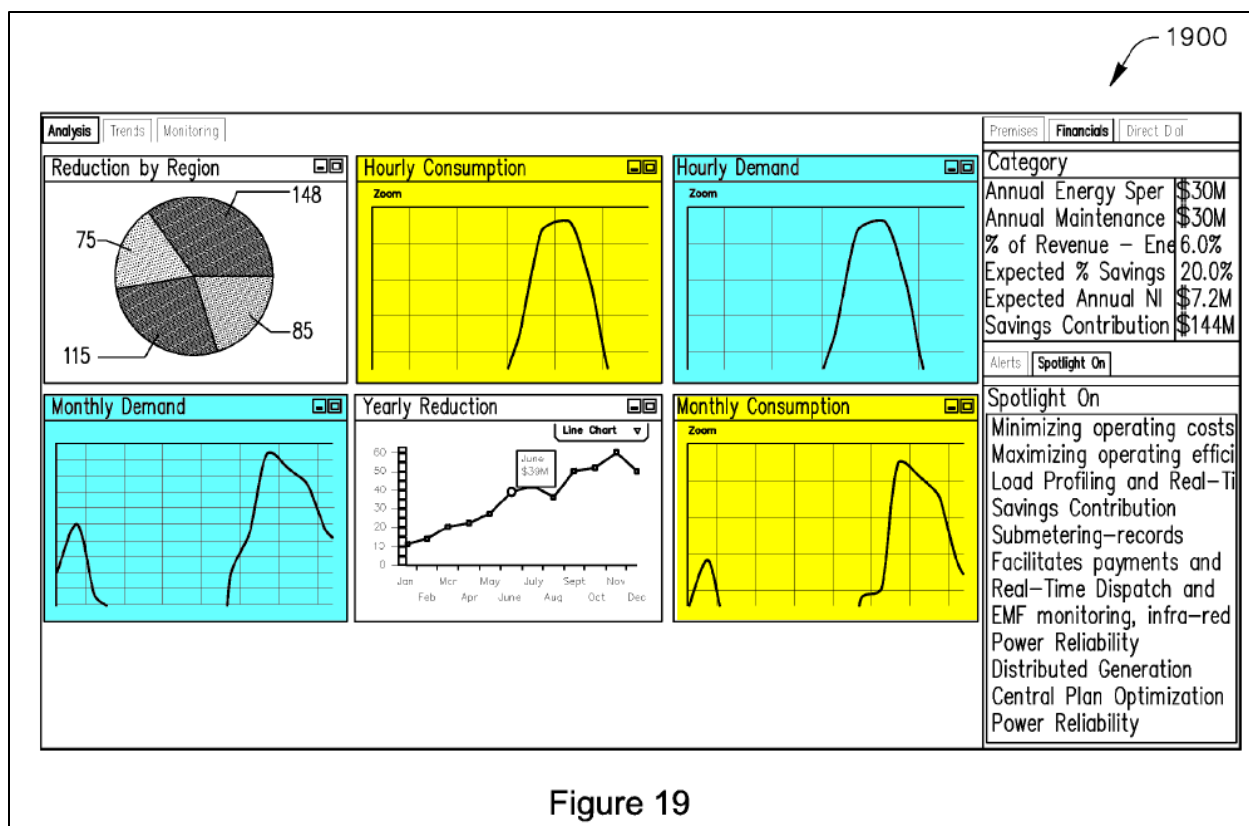


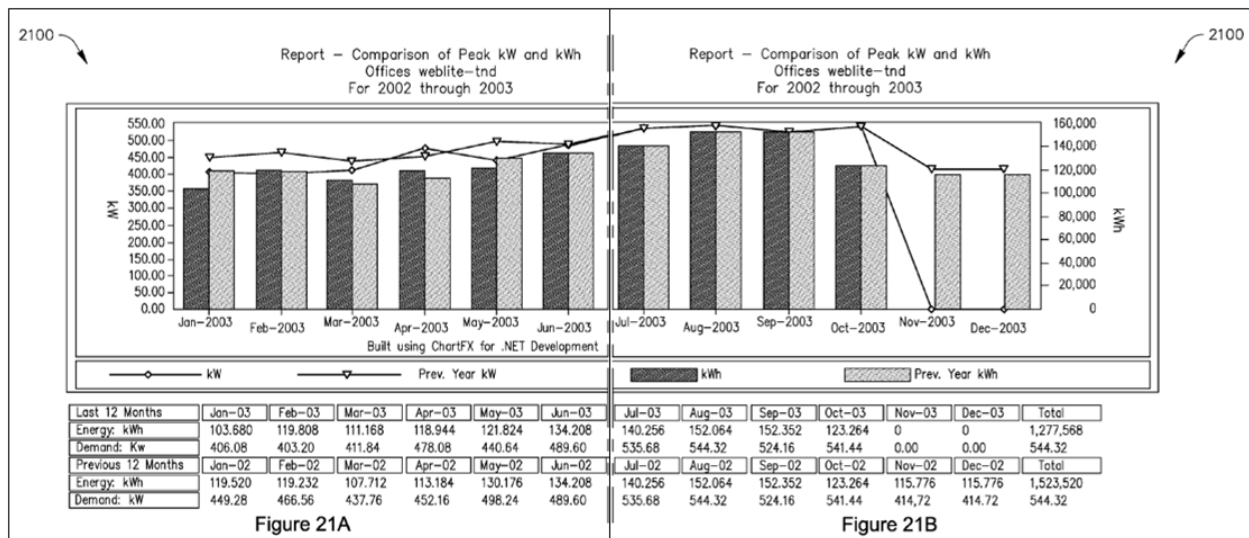
Figure 19

Id. at, Fig. 19 (color added).

111. In addition, the analysis widget includes interactive user interface options for switching between the plurality of timeseries associated with the data point. Ex. 1006 at, Fig. 19. 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.” *Id.* at [0185]. This is also shown in Figure 19 above,

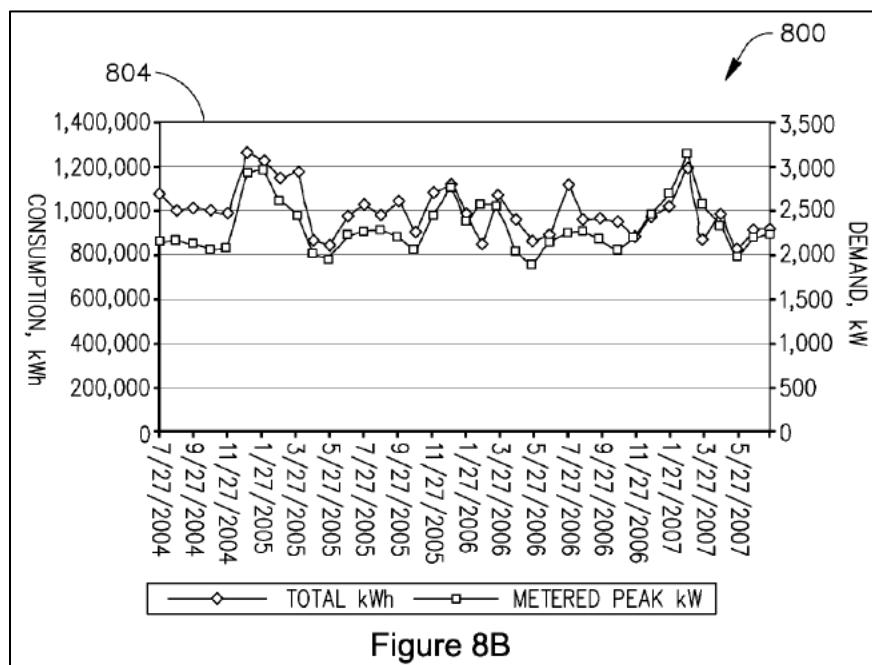
where each sub-window for the various timeseries (shown in yellow and blue) have minimization and expansion buttons in the top right. *Id.* at Fig. 19.

112. Figure 21 similarly shows “a dashboard screenshot for a monitoring reporting screen 2100 of historical energy comparison that the system may generate.” Ex. 1006 at [0489]. As shown, 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). For example, “[t]he system 100 may further leverage Microsoft (TM) Dynamics to... generating dashboards of KPIs [key performance indicators].” *Id.* at [0055]. Further, 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 includes 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.* at [0180]-[0181], [0185].



Id. at Figs. 21A and 21B.

113. Hedley provides additional reports similar to that in Figure 21, such as that shown in Figure 8B:



114. Additionally, “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.” Ex. 1006 at [0463]-[0470].

115. Accordingly, Hedley discloses 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).

2. Claim 7

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

116. *See* §VI.B.1.

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

117. Hedley discloses this element. 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 at [0084]. Accordingly, there are a plurality of different data points (e.g., energy readings from different systems).

118. As discussed above (§VI.B.1.c), 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.*” Ex. 1006 at [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.* at [0156].

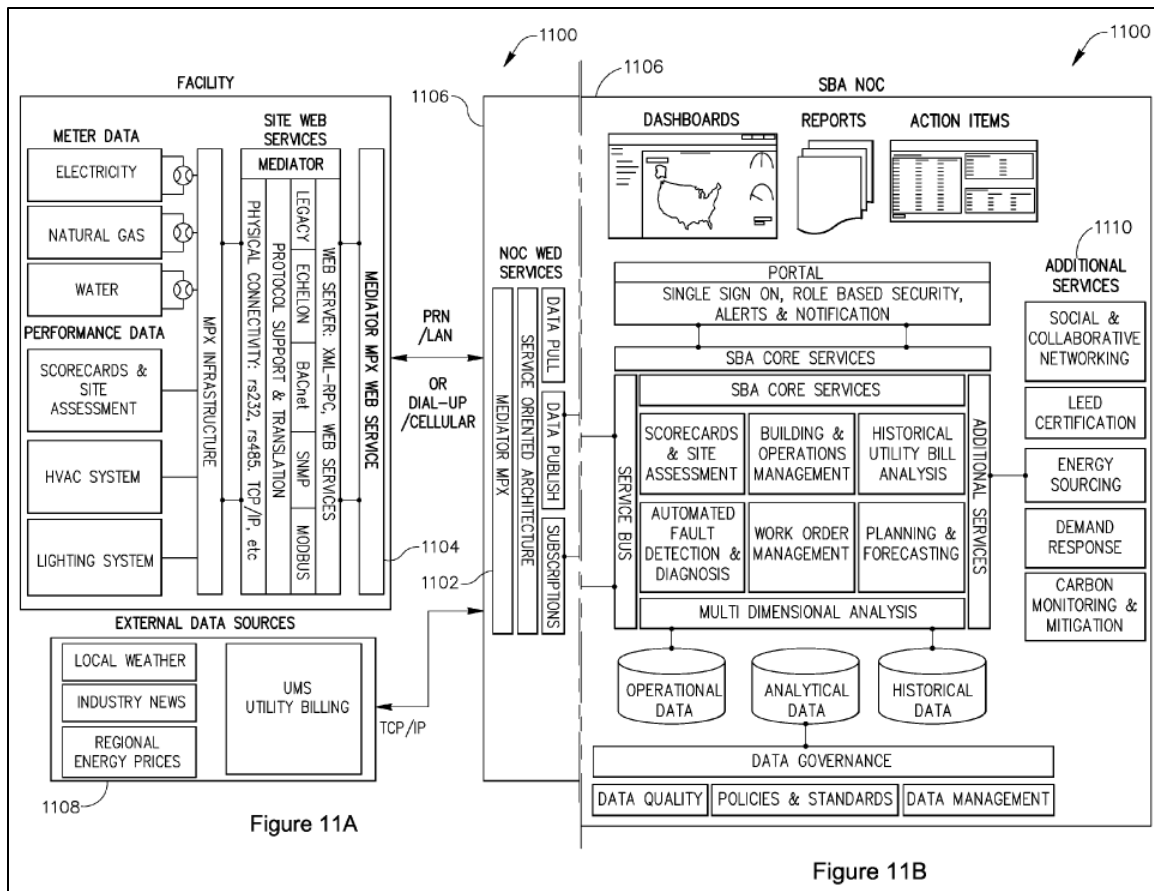
119. This is further depicted by Hedley in the below table, which shows the plurality of different data points collected, the frequency of reading, and the frequency of reporting to the system (e.g., raw data timeseries) for storage in the EEMS:

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 at [0139].

120. Figure 11 below similarly shows how multiple different systems (e.g., electricity, natural gas, water) are metered for data feed:

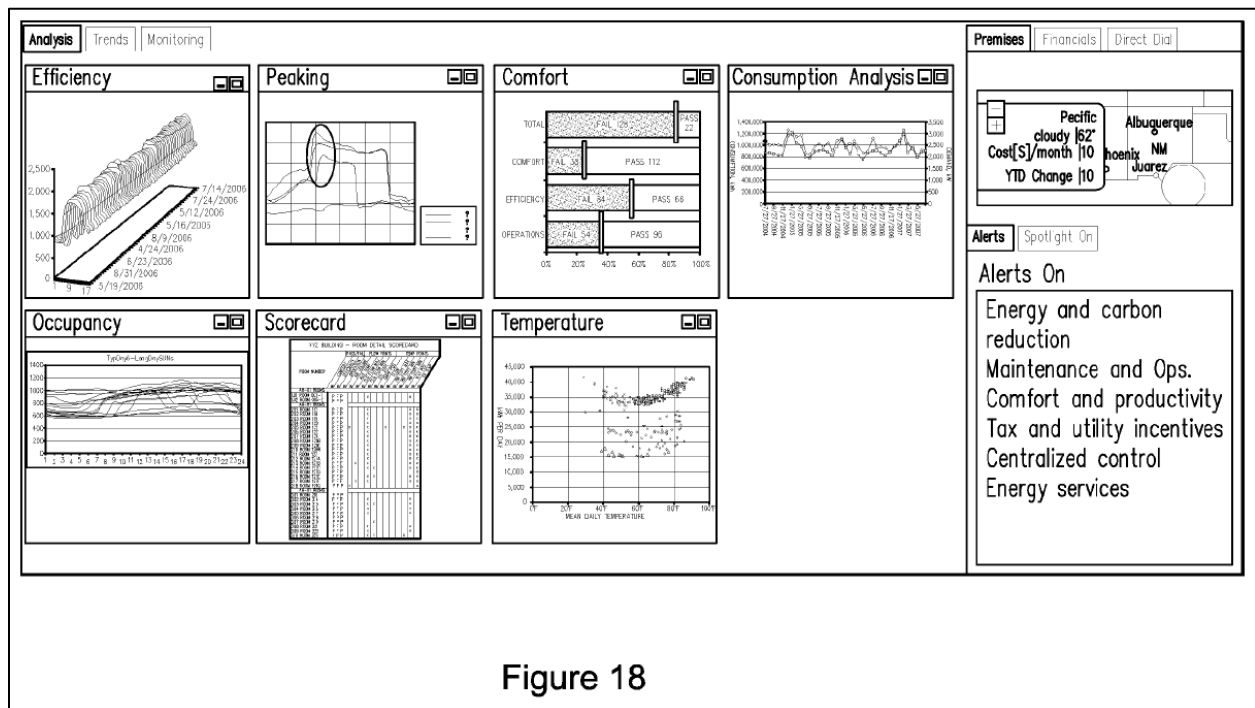


Ex. 1006, Figs. 11A and 11B (rejoining figure divided over two pages).

- 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”

121. Hedley discloses this element. For example, Hedley discloses 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 at [0180]. Accordingly, 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). 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. *Id.* at 1006, Fig. 18.



Id. at Fig. 18.

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

122. Hedley discloses this element. As discussed above (§§VI.B.1.f, VI.B.2.c), Hedley’s 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 at [0180]. This is shown, for example, in Figure 19 (e.g. consumption, yellow, and demand, blue timeseries associated with the widget):

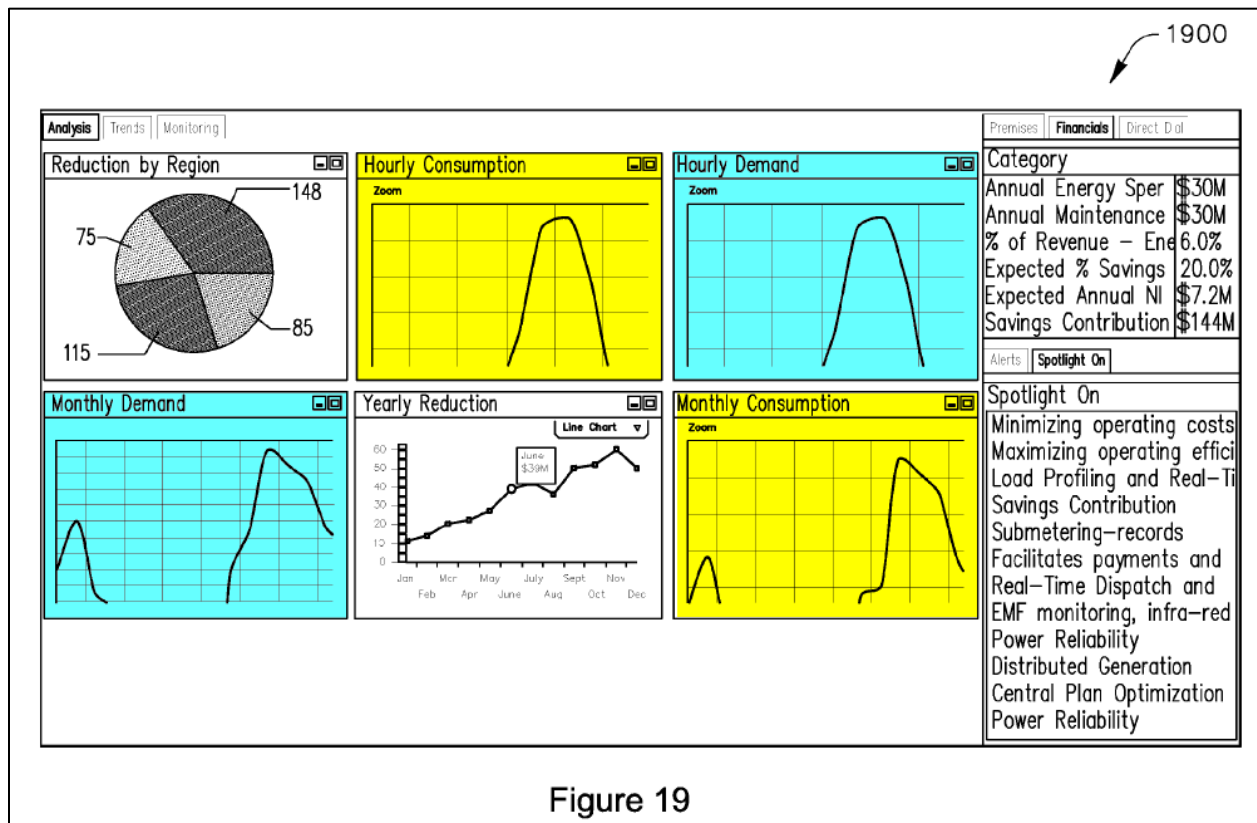


Figure 19

Id. at Fig. 19 (color added).

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

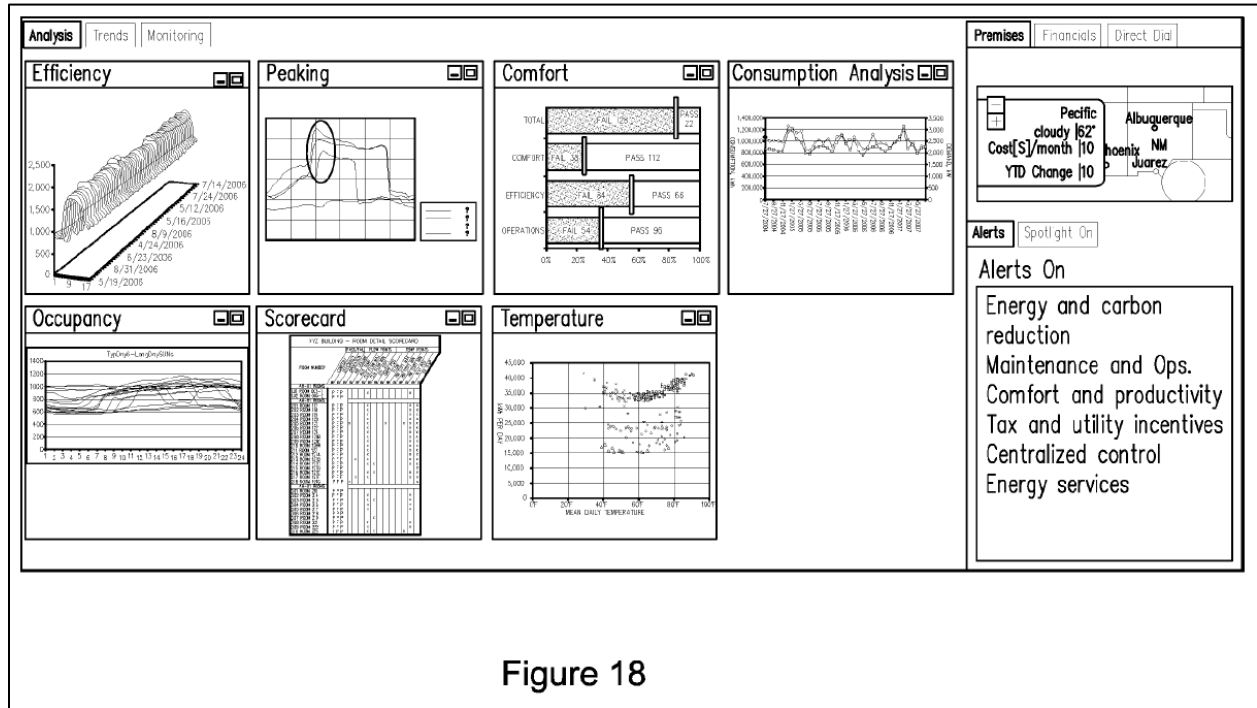


Figure 18

Ex. 1006 at Fig. 18.

3. Claim 8

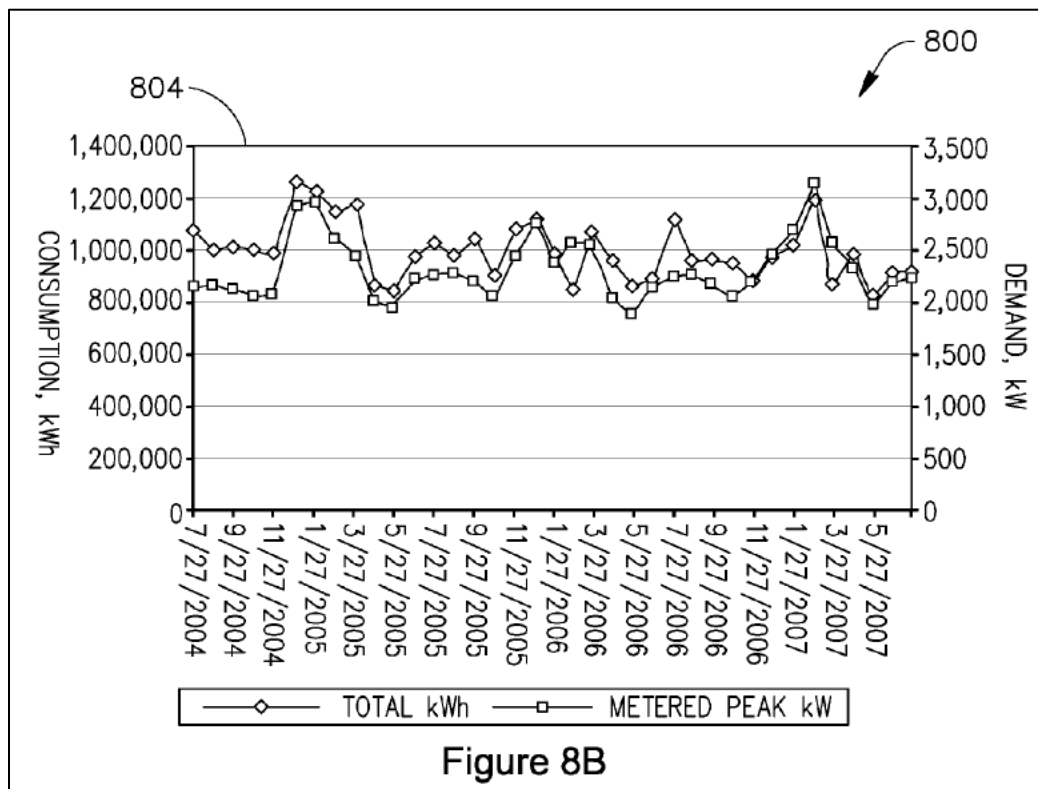
- a. “8. The building energy management system of claim 7, wherein the widget is configured to:”

124. *See* §VI.B.2.

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

125. Hedley discloses this element. Figure 8B, for example, reflects the association of the widget with each of the plurality of timeseries (total kWh and peak

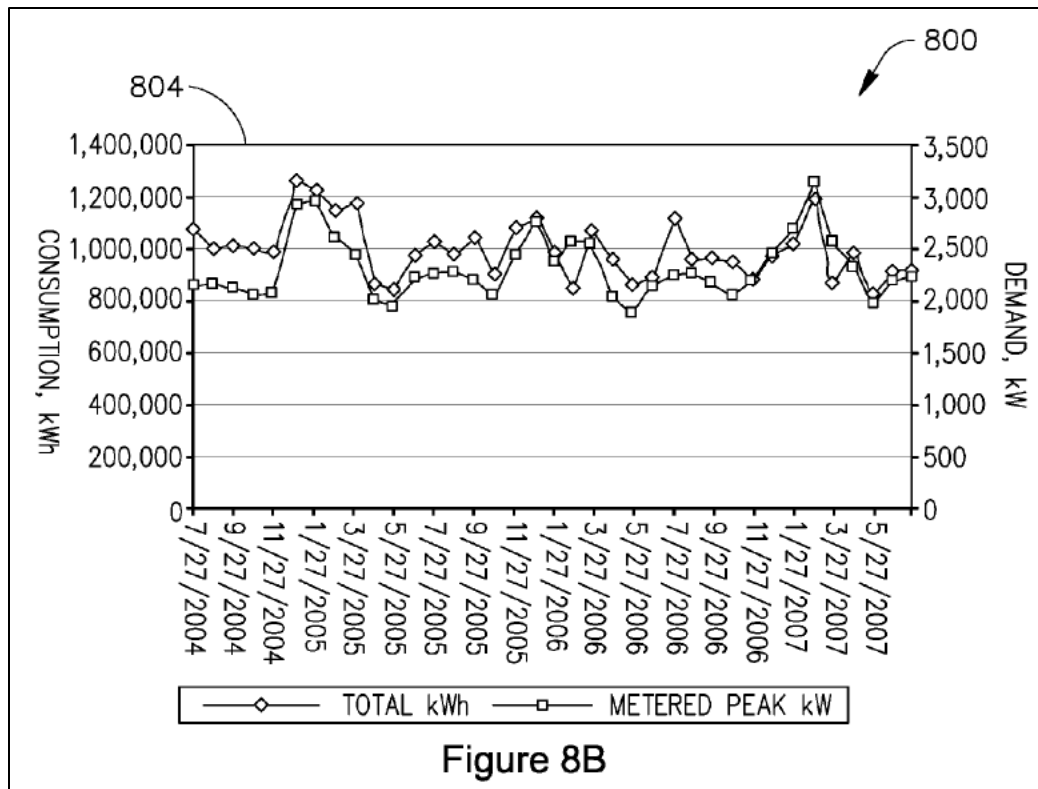
kW timeseries). Ex. 1006 at Fig. 8B, *see also id.* at Fig. 18. As shown, the widget determines a unit of measure for each timeseries (kWh and kW):



Id. at 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;”

126. Hedley discloses this element. 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 Figure 8B:



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

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

127. It is my opinion that Hedley renders this element obvious. 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. As shown, for example, in Figure 8B, Hedley marks the kWh line using small diamonds and the kW line using small squares. Ex. 1006 at Fig. 8B. Hedley thus suggests differentiating between its lines, and although the lines are tracked, they are potentially difficult to read as depicted in Figure 8B. 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. Such a color selection is, in my opinion, an obvious design choice to a POSITA. In fact, Hedley recognizes the benefits of color more generally, noting the ability to “configure the look and feel of the end-user application” and “choose colors.” *Id.* at 1006, [0481].

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

128. 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. As I already noted, Figure 8B, for example, uses different symbols for the kWh (diamonds) and kW (square) lines for differentiation. Ex. 1006 at Fig. 8B. But these small marks may be potentially difficult to read between the kWh and kW lines. A POSITA would have been 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. Again, such a color selection is an obvious design choice. And again, Hedley already generally discloses the benefit of configuring “the look and feel of the end-user application” with “color” choice. *Id.* at [0481].

4. Claim 11

129. Claim 11 is the method counterpart to claim 1, and is disclosed by Hedley for the same reasons I note above. *See* §VI.B.1.

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

130. Hedley discloses this element. *See* §§VI.B.1.a, VI.B.1.f.

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

131. *See* §VI.B.1.b.

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

132. *See* §VI.B.1.b, VI.B.1.c.

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

133. *See* §VI.B.1.c.

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

134. *See* §VI.B.1.d.

- 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”

135. *See* §VI.B.1.e.

- 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.”

136. See §VI.B.1.f.

5. Claim 15

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

137. See §VI.B.4.

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,”

138. Hedley discloses this element. 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 at [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.* at [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.”

139. Hedley discloses this element. Continuing the discussion above (§VI.B.1.f), the widget permits charting, 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 at [0487], Fig. 19. As illustrated, this is at least a charting widget (note the charts), a data visualization widget (note the visualization provided by charting), and a display widget (note the display of the charts).

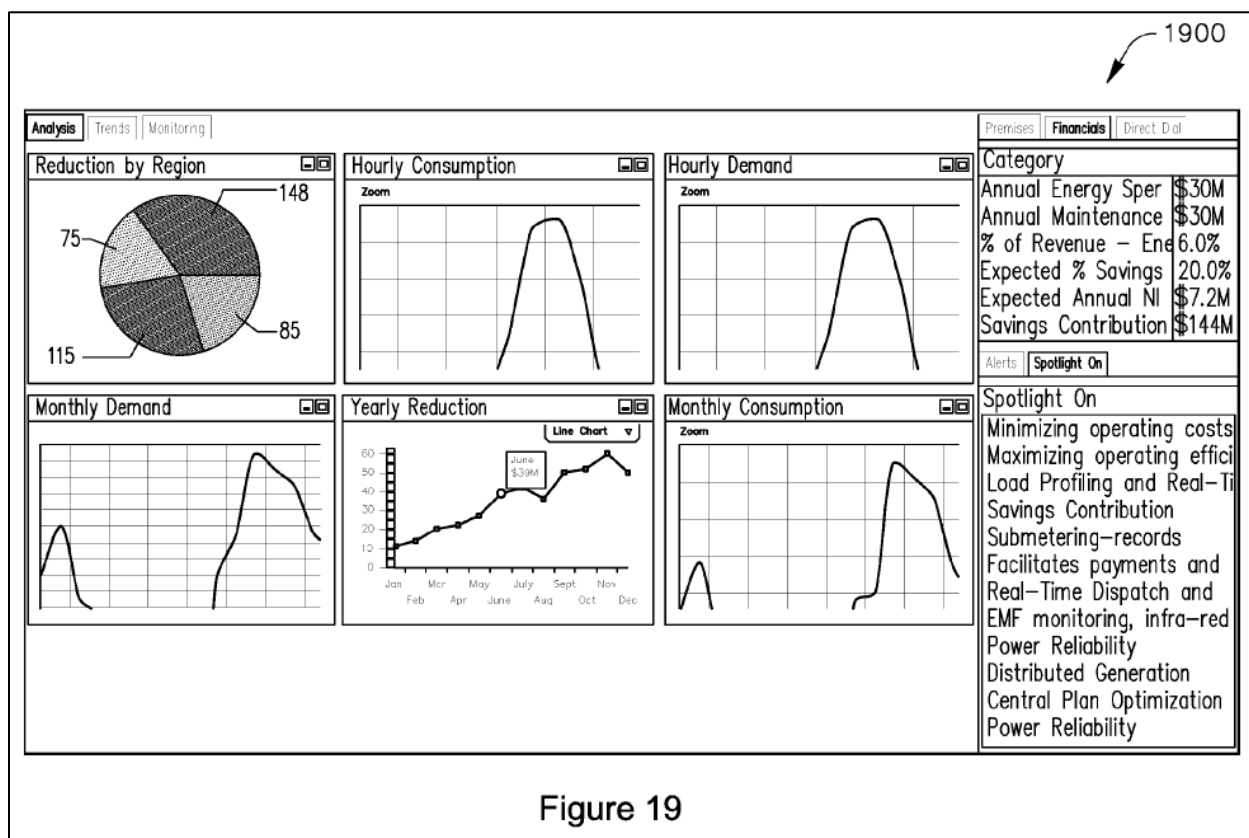


Figure 19

Id. at Fig. 19.

140. 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.” Ex. 1006 at [0185].

141. Furthermore, Hedley also discloses a weather information widget, as shown below in yellow indicating “cloudy” and “62°.” Ex. 1006 at Fig. 18, [0162].

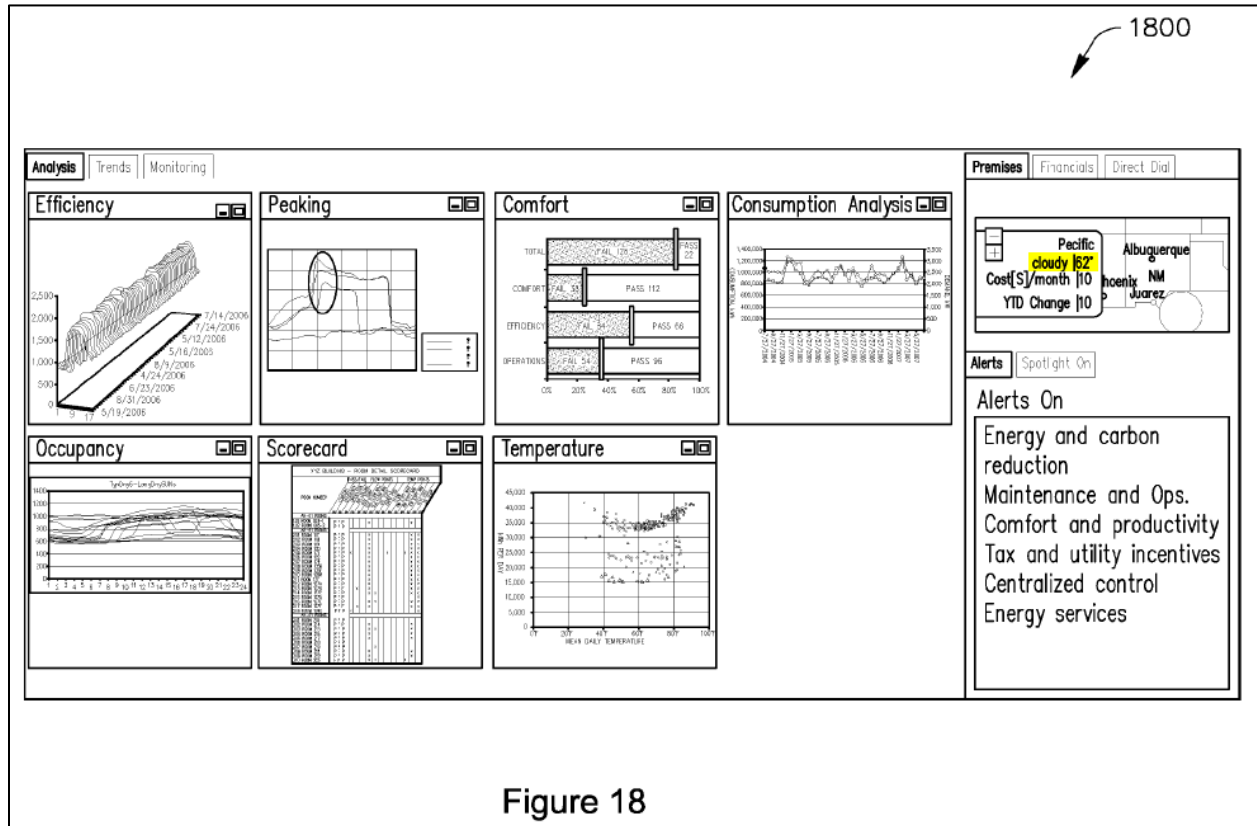


Figure 18

Id. at Fig. 18 (color added).

6. Claim 16

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

142. *See* §VI.B.4.

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

143. Hedley discloses this element. Continuing the discussion above (§VI.B.1.f), Hedley discloses 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.

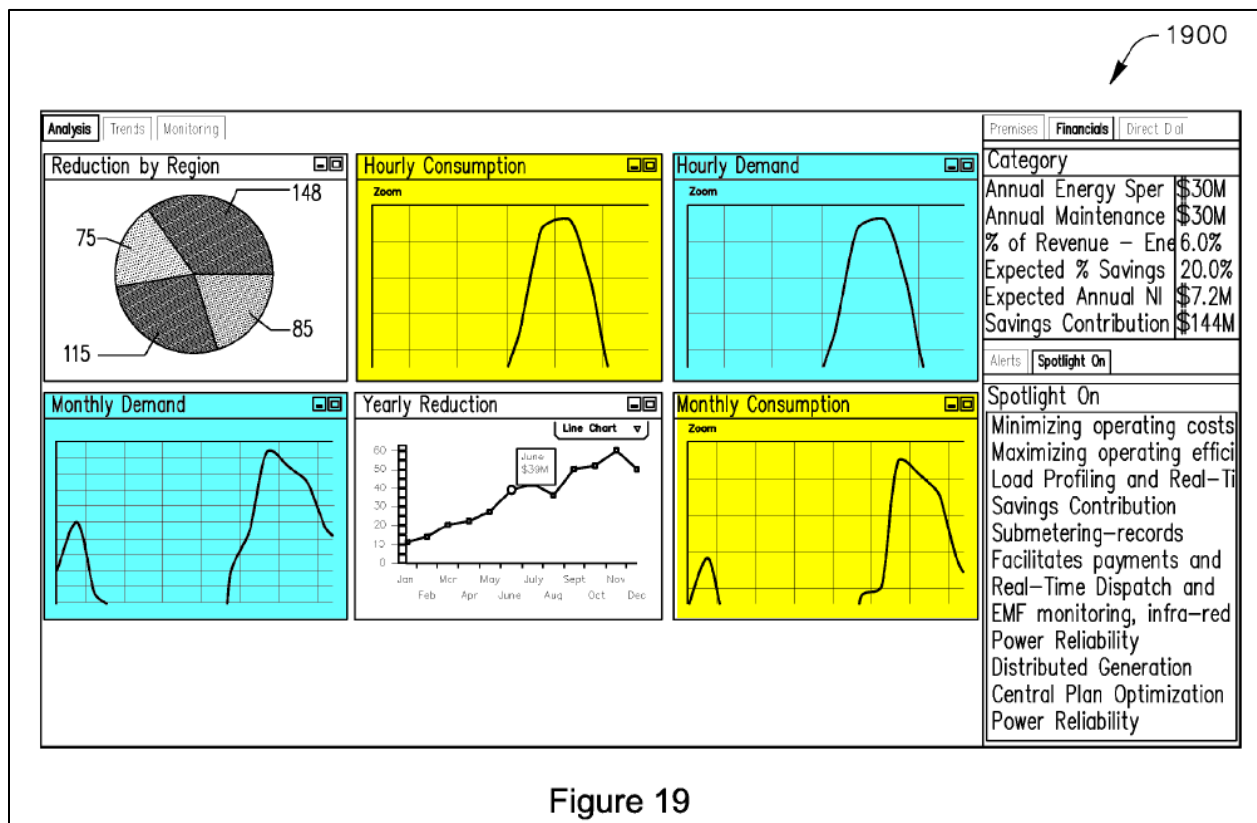
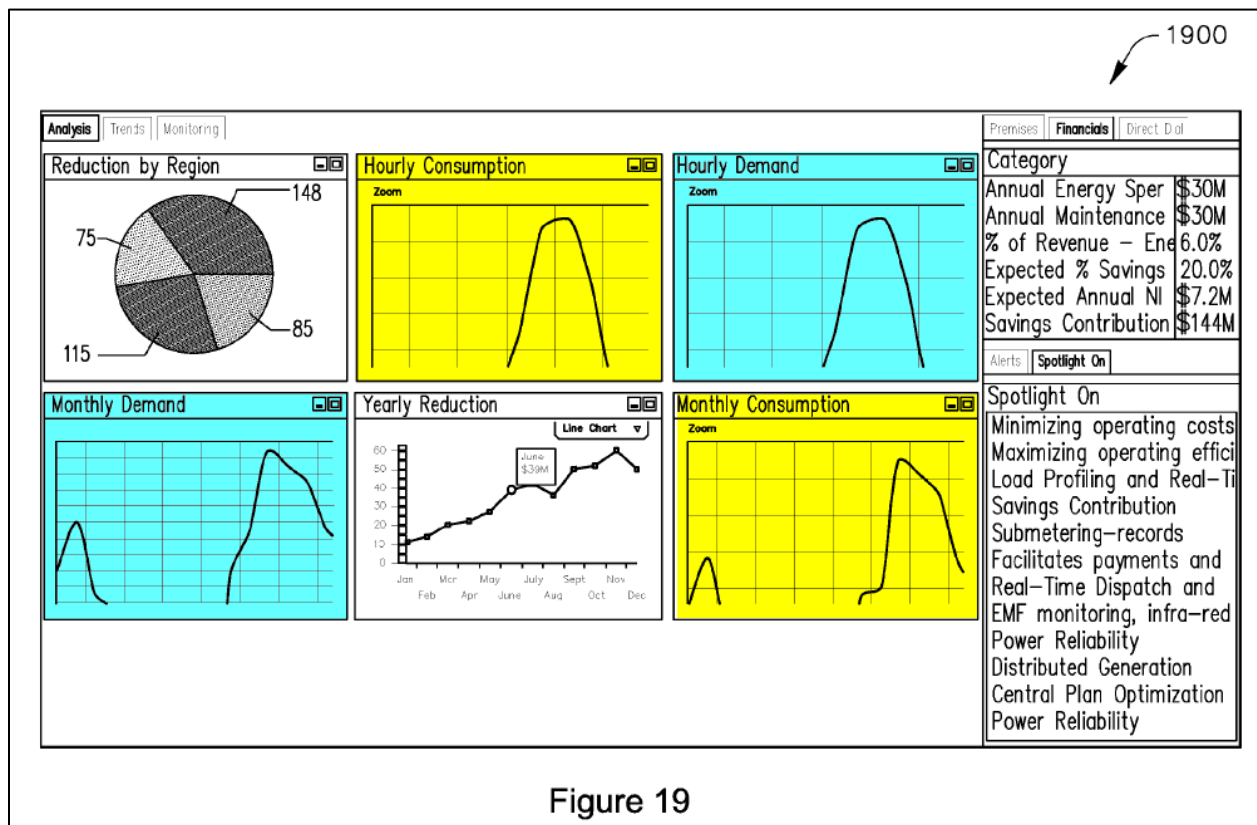


Figure 19

Id. at Fig. 19 (color added).

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

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



Id. at Fig. 19 (color added).

7. Claim 17

145. Claim 17 is the method counterpart to claim 7, and is disclosed by Hedley for the same reasons I note above. *See* §VI.B.2.

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

146. *See* §VI.B.4.

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

147. *See* §VI.B.2.b.

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

148. *See* §VI.B.2.c.

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

149. *See* §VI.B.2.d, *supra*.

C. The Challenged Claims are Obvious over Hedley and Hedley’s File History

150. It is my opinion that Hedley and figures provided in the file history of Hedley’s application render Claims 7 and 8, in the alternative, obvious.

1. Claim 7

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

151. *See* §VI.B.1.

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

152. *See* §VI.B.2.b.

- 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”

153. Hedley discloses this element. 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. 1006at [0180]. Accordingly, 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). 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. *Id.* at Fig. 18.

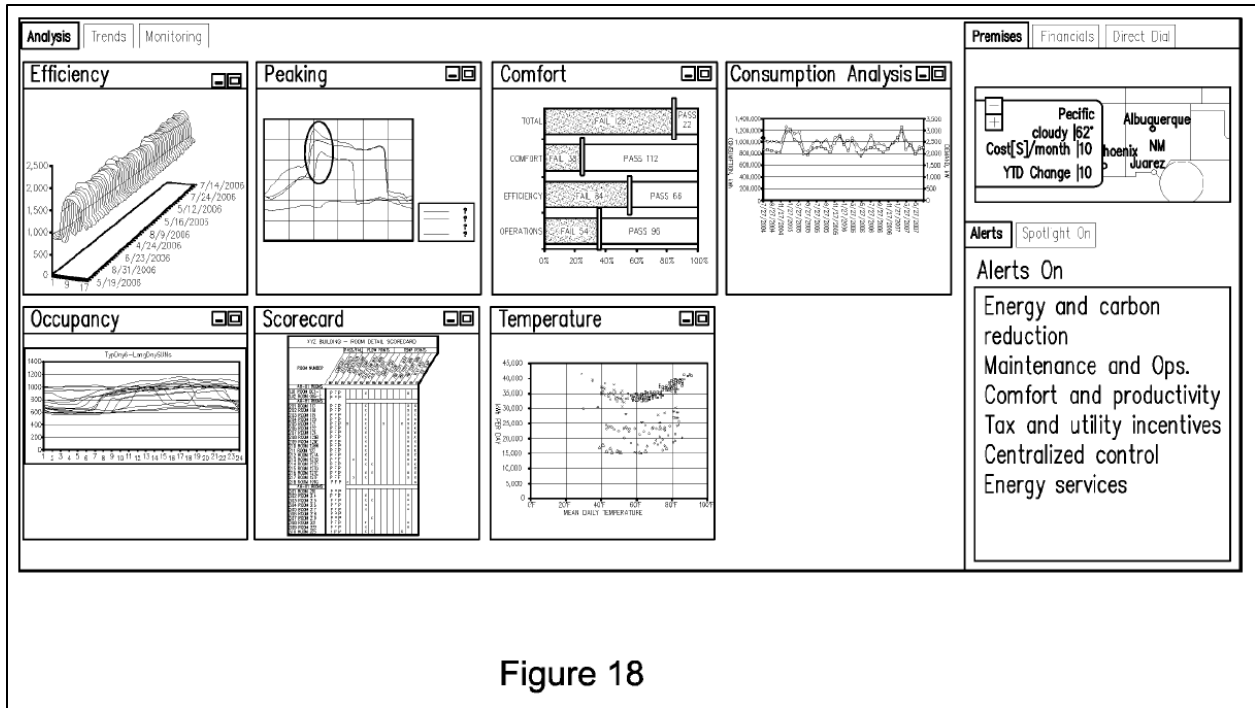


Figure 18

154. Additionally, the application for Hedley originally contained figures with additional information. Ex. 1005. Continuing the Figure 18 example above, the file history includes the following enhanced views:

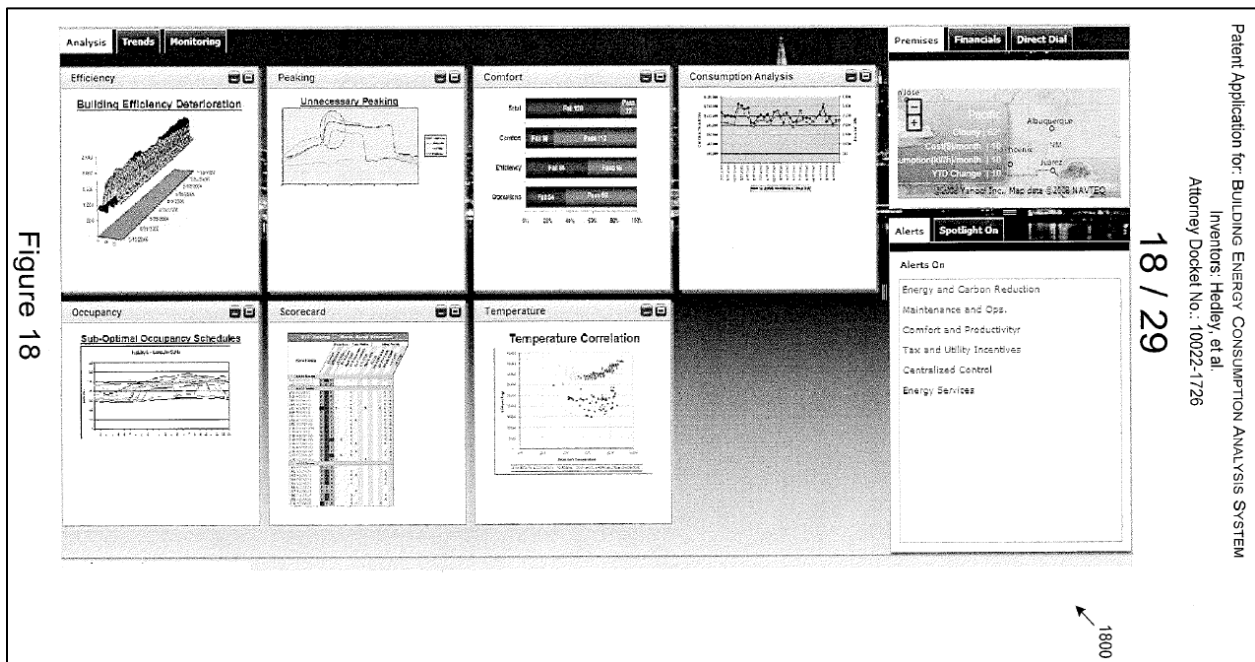
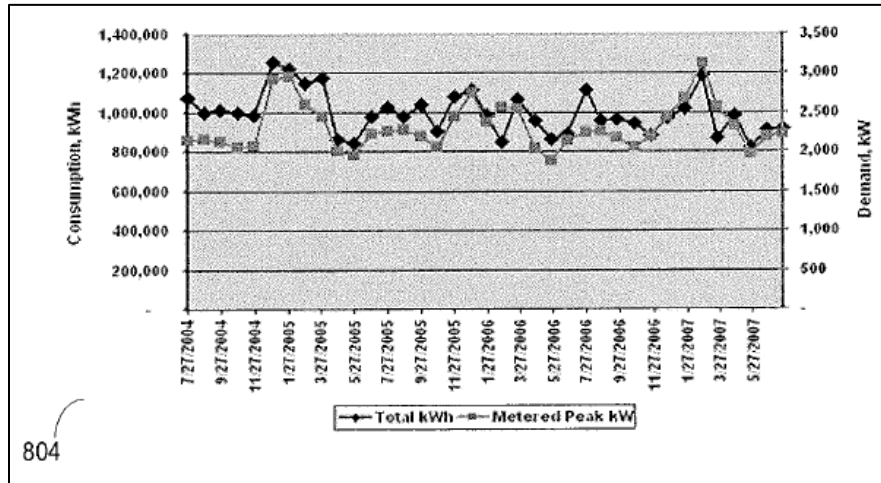


Figure 18

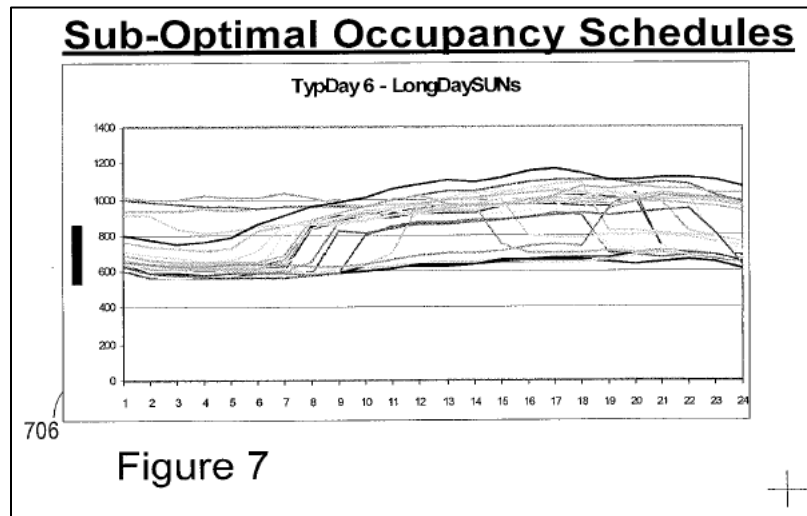
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Patent Application for: BUILDING ENERGY CONSUMPTION ANALYSIS SYSTEM
Inventors: Hedley, et al.
Attorney Docket No.: 10022-1726

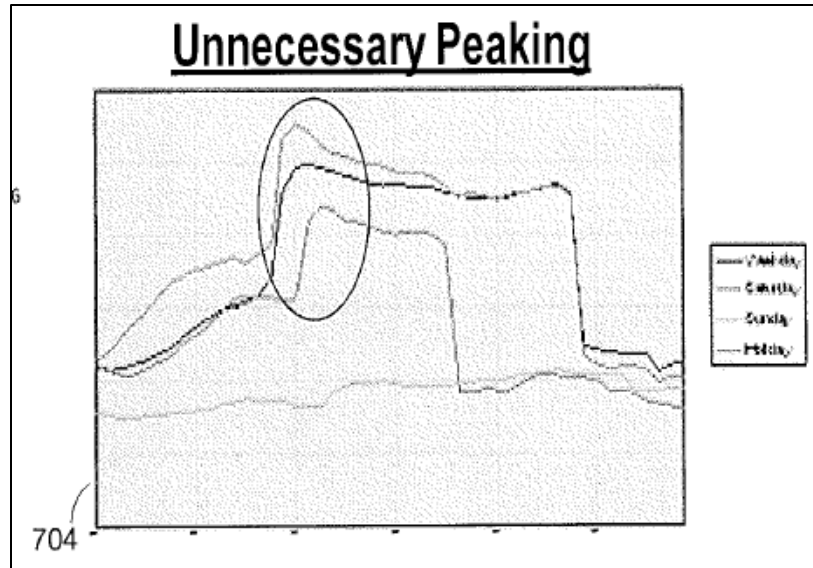
Id. at 05/07/2010 Drawings.



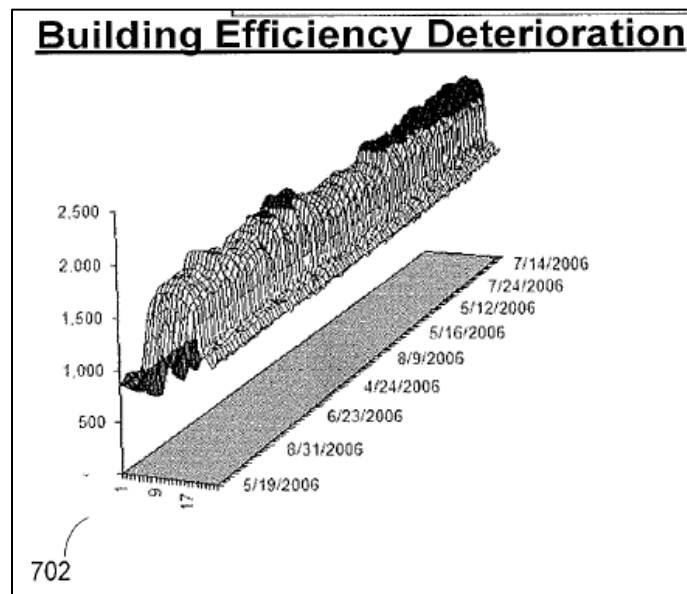
Id.



Id.



Id.



Id.

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

155. Hedley discloses this element. 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 at [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.

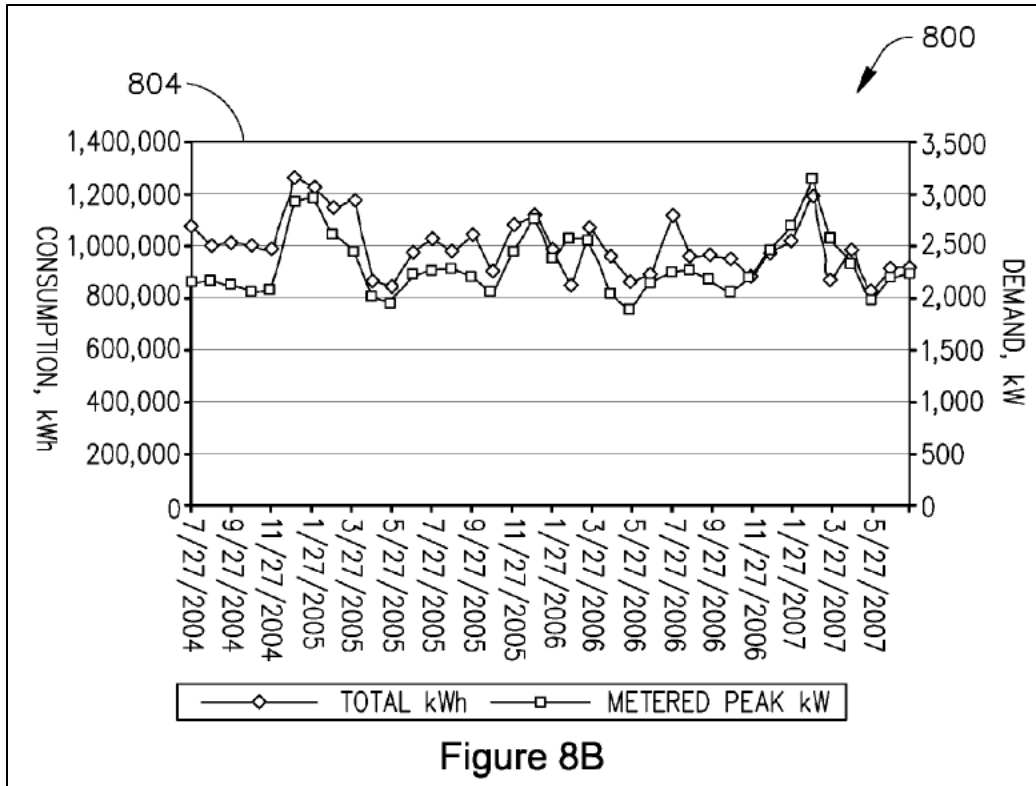
2. Claim 8

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

156. *See* §VI.C.1.

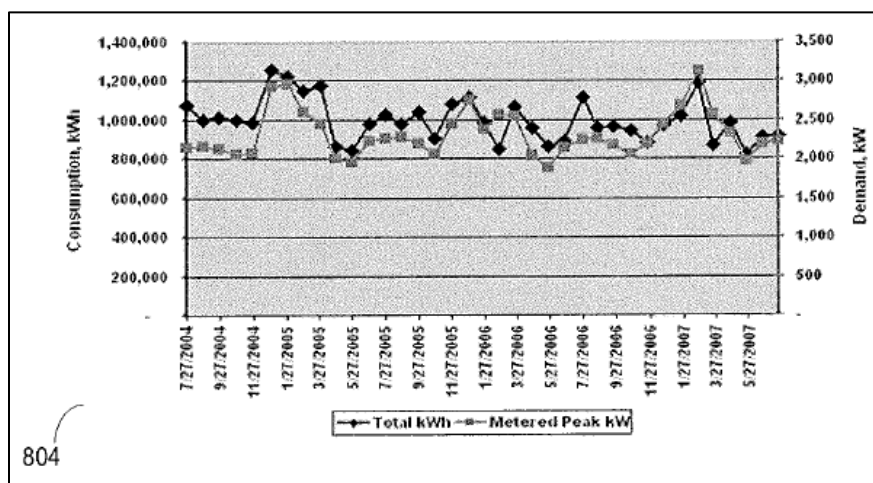
- b. “determine a unit of measure for each of the plurality of timeseries associated with the widget;”

157. Hedley discloses this element. 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 at Fig. 8B. As depicted, the widget determines a unit of measure for each timeseries (kWh and kW):



Id. at Fig. 8B.

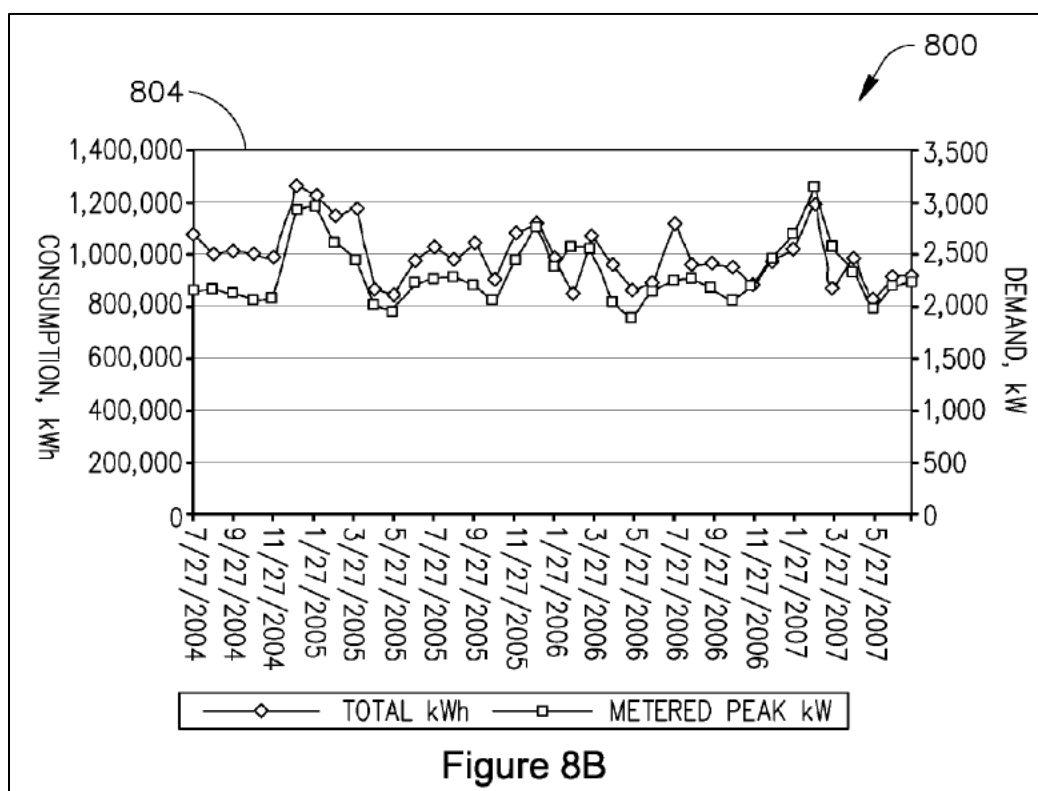
158. This is also shown in the enhanced version from Hedley's file history, reproduced below. Ex. 1005 at 05/07/2010 Drawings.



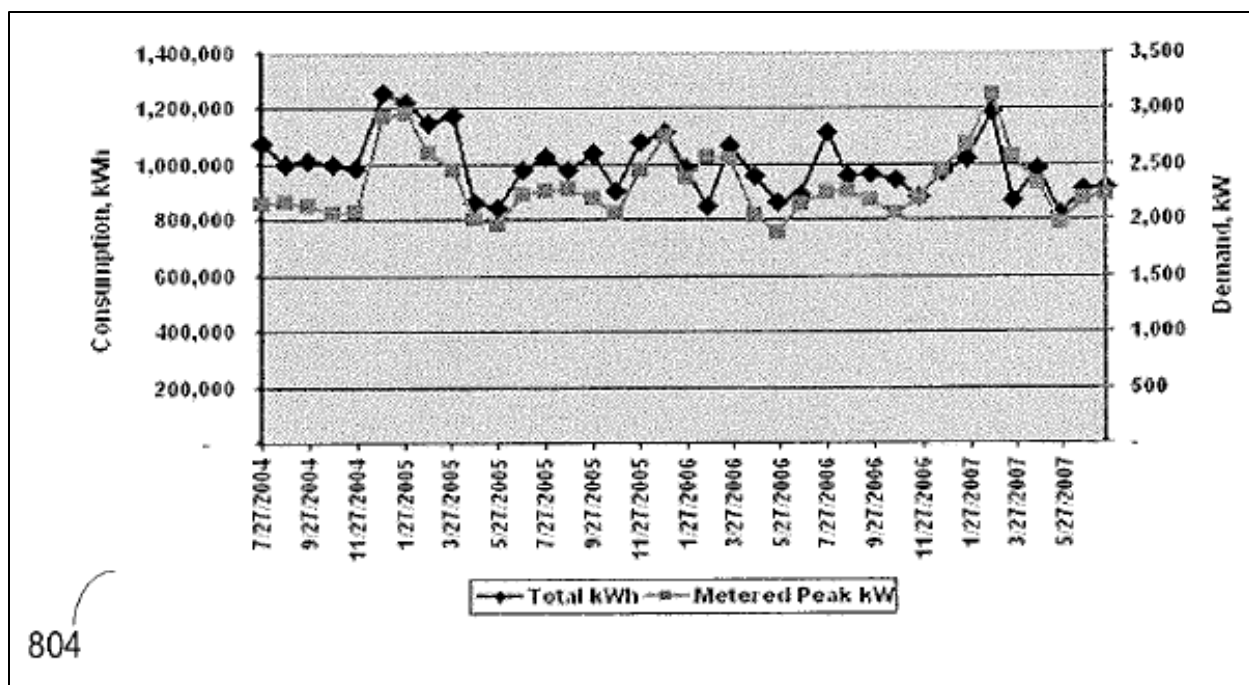
Id.

- 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;”

159. Hedley discloses this element. 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:



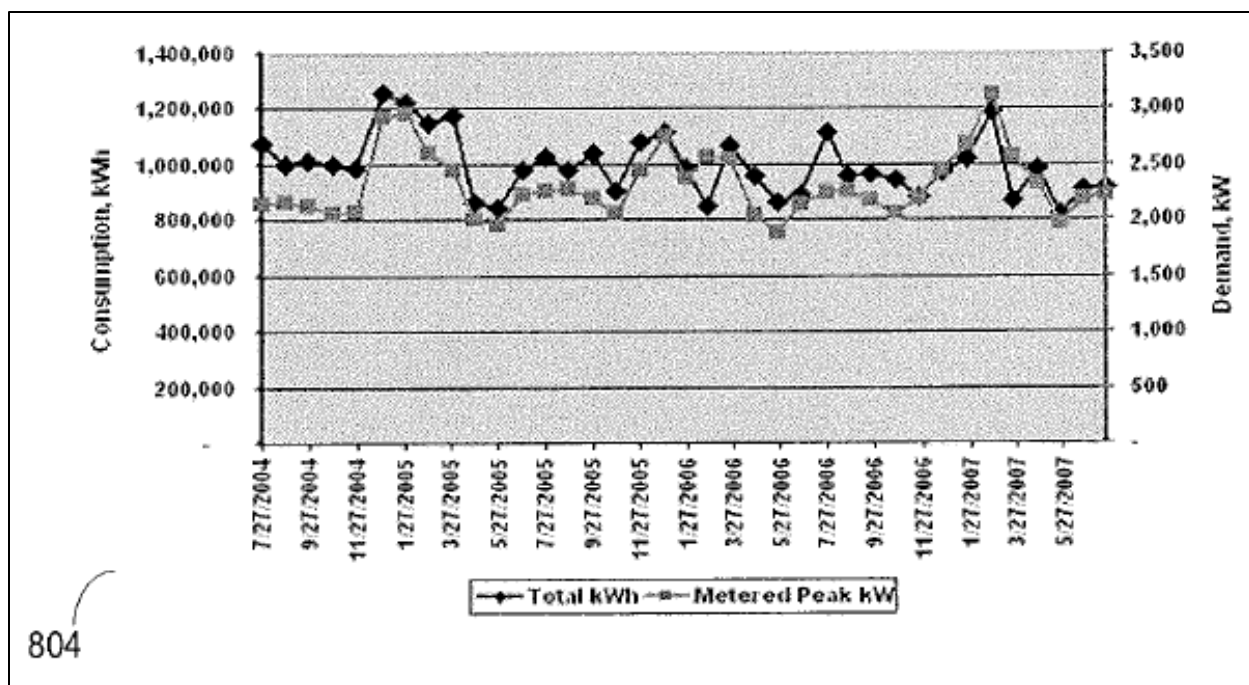
Ex. 1006, Fig. 8B.



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”

160. Continuing the discussion above (§VI.C.2.c), Hedley discloses 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:



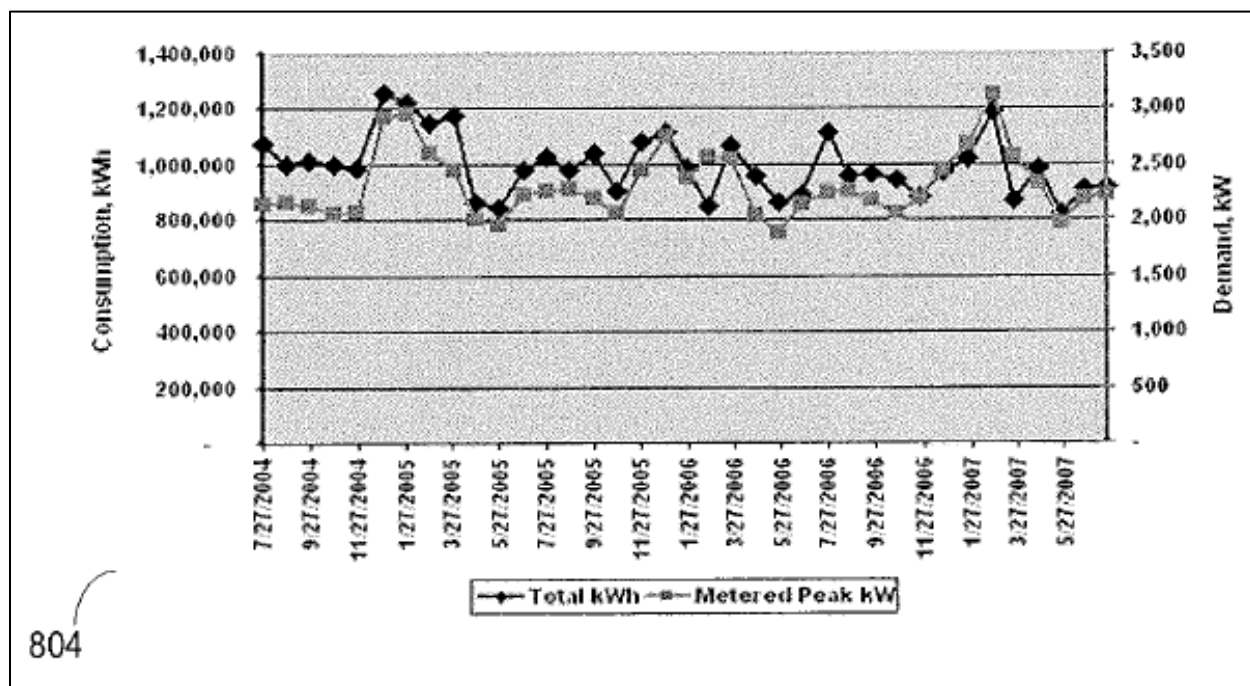
Ex. 1005 at 05/07/2010 Drawings.

161. It is my opinion that it would have also been obvious to a POSITA, at the time of the claimed invention, to assign a common color to each of the plurality of lines corresponding to timeseries with the same unit of measure. 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. Such a color selection is an obvious design choice. I find this to be especially true given the enhanced Figure 8 image in Hedley's file history (shown above) depicts the use of coloring according to unit.

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

162. Continuing the discussion above (§§VI.C.2.c, VI.C.2.d), Hedley discloses assigning different colors to each of the plurality of lines corresponding to

timeseries with different units of measure. 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.

163. It is my opinion that it also would have been obvious to a POSITA, at the time of the claimed invention, to assign a different color to each of the plurality of lines corresponding to timeseries with different units of measure. A POSITA would have been motivated to assign a different color to lines with different units of measure to make the chart easier to understand. Such a color selection is an obvious design choice. I find this to be especially true given the enhanced Figure 8 image in Hedley's file history (shown above) depicts the use of coloring according to unit.

D. The Challenged Claims are Obvious over Mills and Hedley's File History

164. It is my opinion that Mills and figures provided in the file history of Hedley's application renders Claim 8, in the alternative, obvious.

1. Claim 8

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

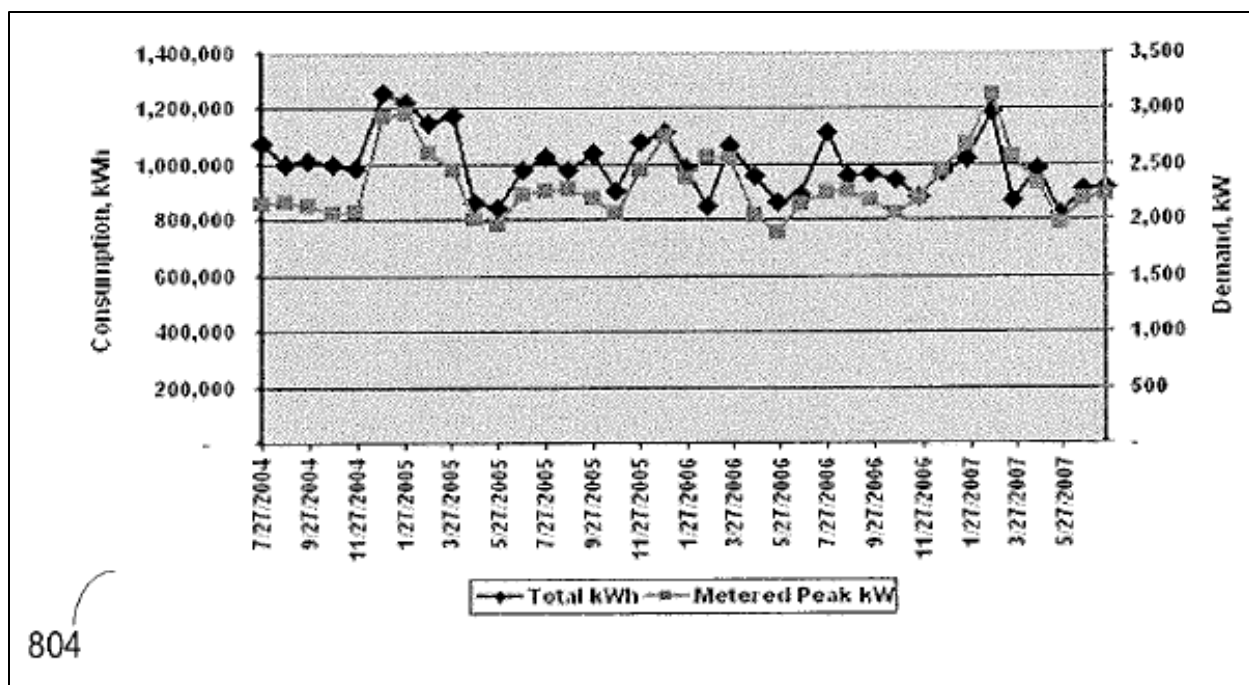
165. Mills discloses this element. *See* §§VI.A.2, VI.A.3.a.

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

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

- 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;"

167. It is my opinion that Mills in view of the Hedley file history renders this element obvious. In addition to Mills describing other chart types, of which a line chart is an obvious choice, the Hedley file history also discloses line charts. For example, the Hedley file history discloses a line graph for displaying energy data:



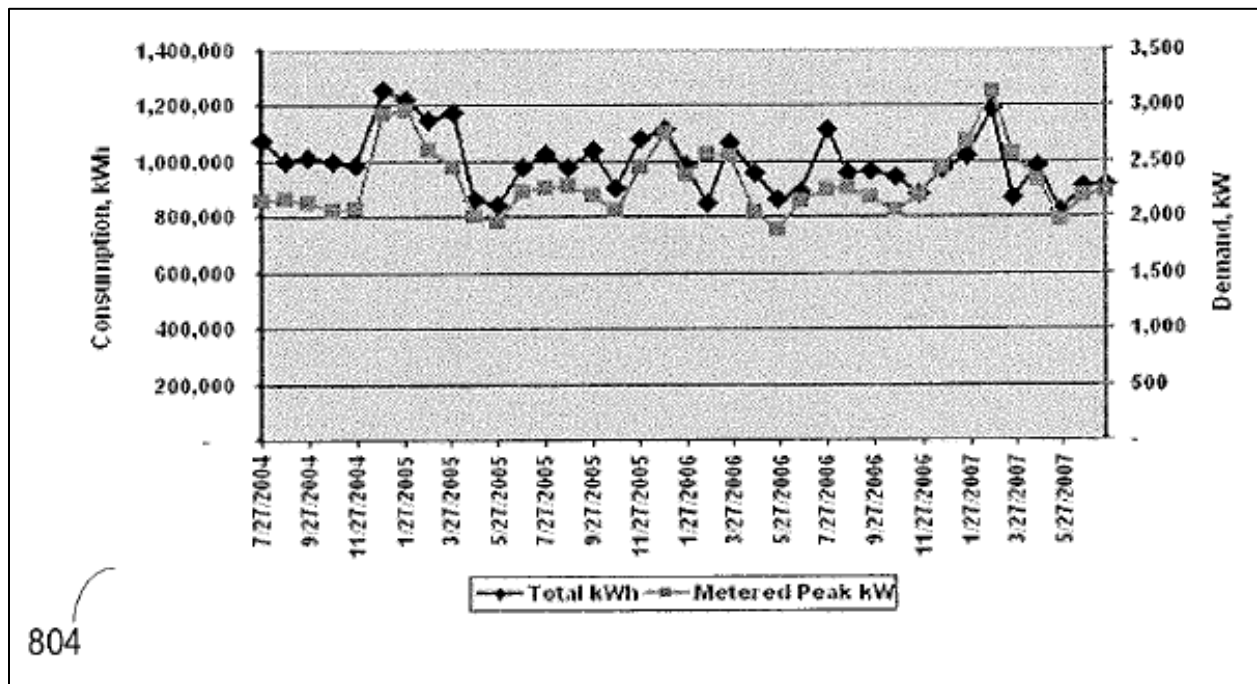
Ex. 1005 at 05/07/2010 Drawings.

168. 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. This combination would be a 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). It would also be 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 the charting provided in Hedley's file history. Further, as discussed above in Grounds II and III, Hedley's file history directly discloses 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”

169. It is my opinion that Mills and the Hedley file history render this element obvious. In addition to Mills’ similar disclosure, the Hedley file history also describes the claimed 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:

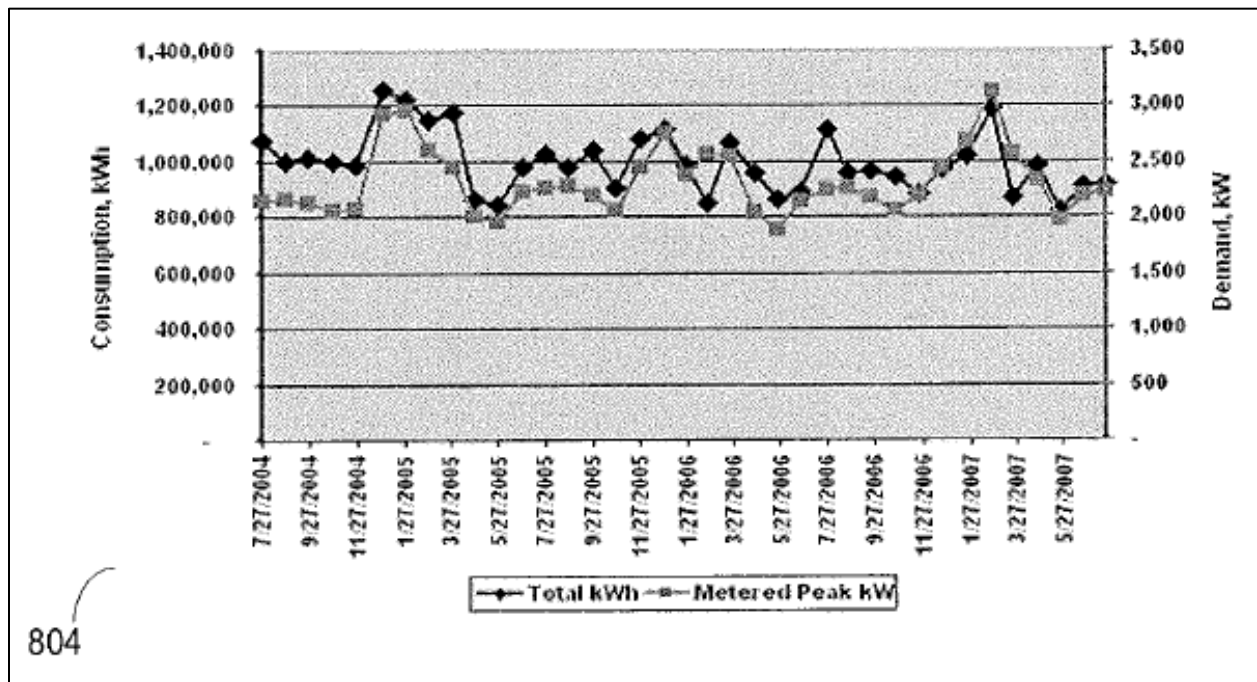


Ex. 1005 at 05/07/2010 Drawings.

170. A POSITA would have found it obvious to assign the same black color to all timeseries with a kWh unit of measure and to assign the lighter color to all timeseries with the kW unit of measure, for the purpose of easy data differentiation.

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

171. It is my opinion that Mills and the Hedley file history render this element obvious. In addition to Mills’ disclosure of color coding, the Hedley file history also describes the claimed 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.

172. A POSITA would have found it obvious to assign the same black color to all timeseries with a kWh unit of measure and to assign the lighter color to all timeseries with the kW unit of measure, for the purpose of easy data differentiation.

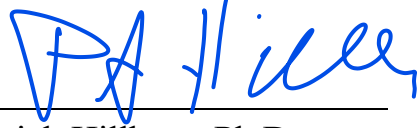
VII. CONCLUSION

Based on the above, it is my opinion that the Challenged Claims of the '114 Patent are invalid and unpatentable. Each of the claims was known and/or obvious over the prior art, and a POSITA would have readily appreciated that the claims were not inventive.

I hereby declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct, and that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true. I understand that willful false statements are punishable by fine or imprisonment or both. *See* 18 U.S.C. § 1001.

Date: December 13, 2022

Respectfully submitted,

/s/ 
Patrick Hillberg, Ph.D.