

Petition for *Inter Partes* Review of U.S. Patent No. 7,031,880

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. 7,031,880

PETITION FOR *INTER PARTES* REVIEW

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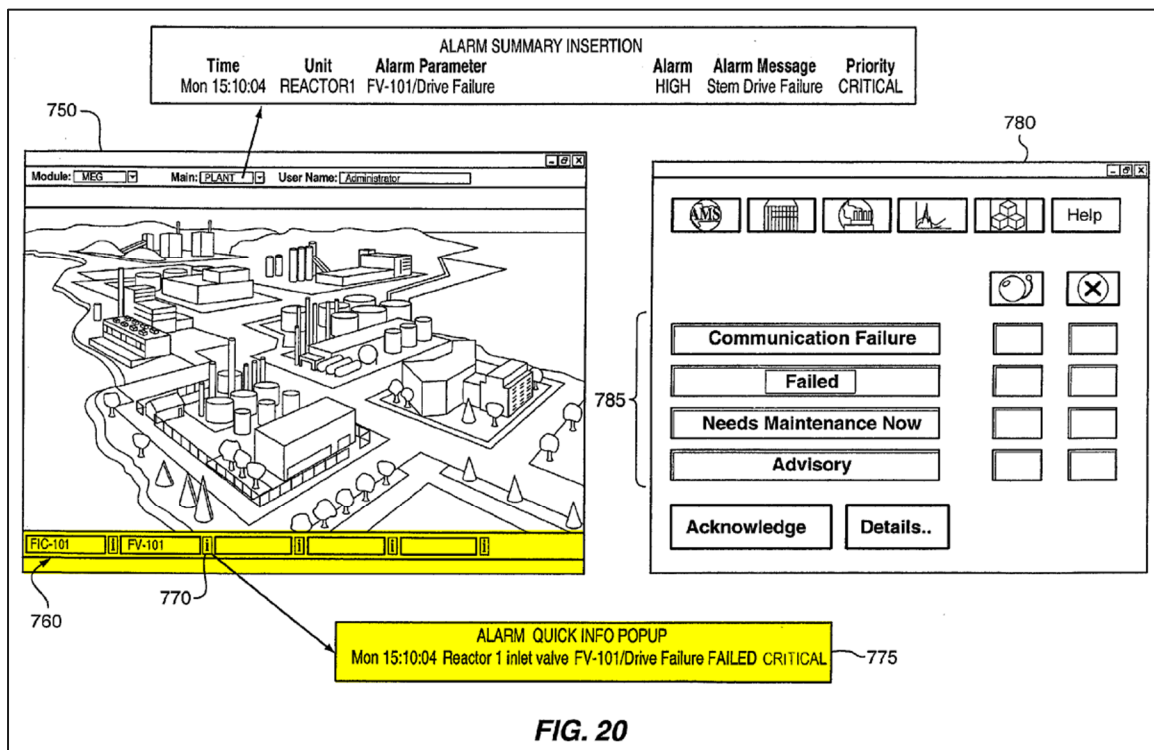
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LIST OF EXHIBITS

Exhibit No.	Description
1001	United States Patent No. 7,031,880 (“’880 Patent”)
1002	<i>Curriculum Vitae</i> of Dr. Patrick Hillberg
1003	Declaration of Dr. Patrick Hillberg
1004	U.S. Patent Application Publication US 2002/0123864 (“Eryurek”)
1005	U.S. Patent Application Publication US 2003/0005486 (“Ridolfo”)
1006	File History of U.S. Patent No. 7,031,880
1007	Plaintiff’s Supplemental Responses and Objections to Willow Technology USA, Inc.’s First Set of Interrogatories
1008	<i>Calvert Cliffs Nuclear Power Plant</i> , The Virtual Nuclear Tourist, Jan. 11, 2006, available at http://www.nucleartourist.com/us/calvert.htm .

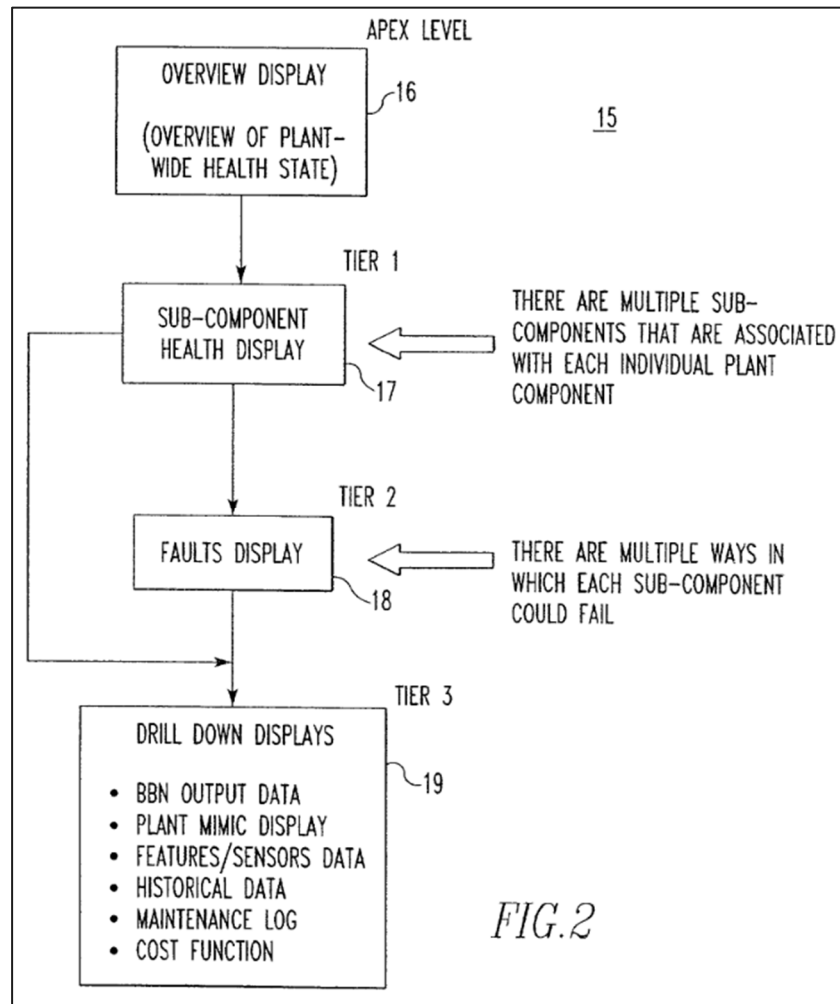
I. INTRODUCTION

The '880 Patent claims a user interface for “analyzing performance of control applications in an environmental control network,” including “receiving... [a] performance indicator, “identifying... degraded performance using a first view” and “obtaining additional information... using a second view.” Ex. 1001, Claim 1. Stripped of language posing as a patentable invention, the '880 Patent generically claims one view that tells you something is broken and another view that gives you more information. But such systems were well-known in the art. For example, Eryurek (Ex. 1004) teaches just such a display where “each of the alarms within [a] banner 760 may also include an information button 770, which may be selected by a user to generate a pop-up window 775 containing more detailed information”:



Ex. 1004, [0133], Fig. 20 (color added).

Likewise, Ridolfo (Ex. 1005) also teaches a hierarchy of views to allow a user to “drill down” on the health of components:



Ex. 1005, Fig. 2.

A POSITA would have immediately recognized that there was nothing patentable in the Challenged Claims at the time that Patent Owner made its purported “invention.” The Challenged Claims were allowed based on an apparent breakdown in the examination process. The examiner *never* issued a prior art rejection for the

Challenged Claims, which sailed from the filing to issuance. The prior art presented in this petition was not of record, let alone addressed, by the examiner. Between the basic claims of the '880 Patent, the invalidating prior art relied on in this Petition, and the altogether lacking examination of the Challenged Claims, this Petition presents a textbook case for *inter partes* review. The Board should institute and cancel the Challenged Claims.

II. OVERVIEW OF CHALLENGE AND RELIEF REQUESTED

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

Petitioner challenges the patentability of claims 1, 4, 15, 21, 24, 37, 39, 42, and 53 (the “Challenged Claims”) of the '880 Patent and requests that they be canceled.

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

The claims are challenged based on the following references. The '880 Patent is subject to pre-AIA law, as the patent purports to claim priority to May 7, 2004 and issued April 18, 2006.

- **Eryurek (Ex. 1004):** Eryurek is a U.S. patent application which published September 5, 2002. Accordingly, Eryurek qualifies as prior art under at least pre-AIA 35 U.S.C. §§102(a), (b), and (e).

- **Ridolfo (Ex. 1005):** Ridolfo is a U.S. patent application which published January 2, 2003. Accordingly, Ridolfo qualifies as prior art under at least pre-AIA 35 U.S.C. §§102(a), (b), and (e).

Ground	Basis	Claims	Proposed Statutory Rejection
I	§103	1, 4, 15, 21, 24, 37, 39, 42, 53	Obvious over Eryurek in view of the level of ordinary skill in the art. ¹
II	§103	1, 4, 15, 21, 24, 37, 39, 42, 53	Obvious over Ridolfo in view of the level of ordinary skill in the art.

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

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

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

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

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

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

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

III. OVERVIEW OF THE '880 PATENT

The '880 Patent issued on April 18, 2006 from U.S. Application No. 10/841,107 filed May 7, 2004. Ex. 1001, Cover. The '880 Patent does not claim priority to an earlier application. For purposes of this Petition only, Willow applies the alleged May 7, 2004 priority date.

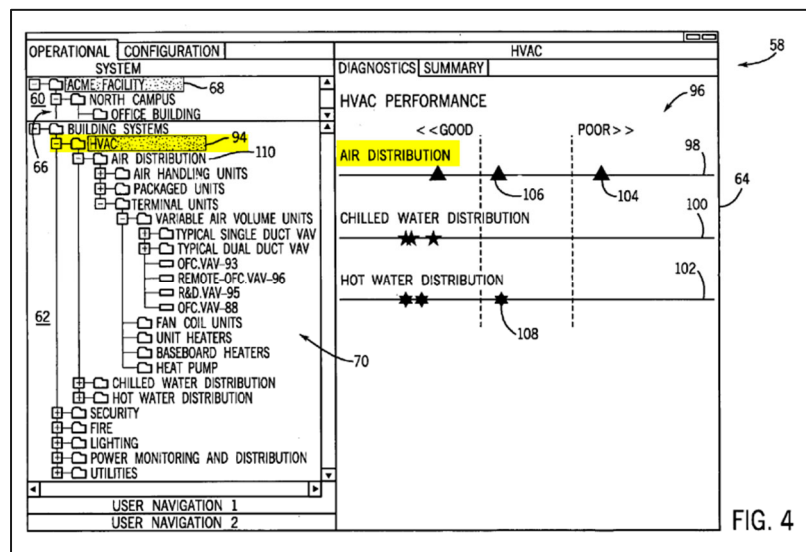
A. Specification and Claims

The '880 Patent relates to performance monitoring in an environmental control network. Ex. 1001, Abstract. In this regard, the Challenged Claims relate to various views that the system may provide a user. This includes “displaying performance indicators for the control applications using a first view that allows at least one control application exhibiting degraded performance to be identified” and “displaying performance indicators using a second view that provides additional details regarding the performance of the at least one control application.” *Id.*, Claim

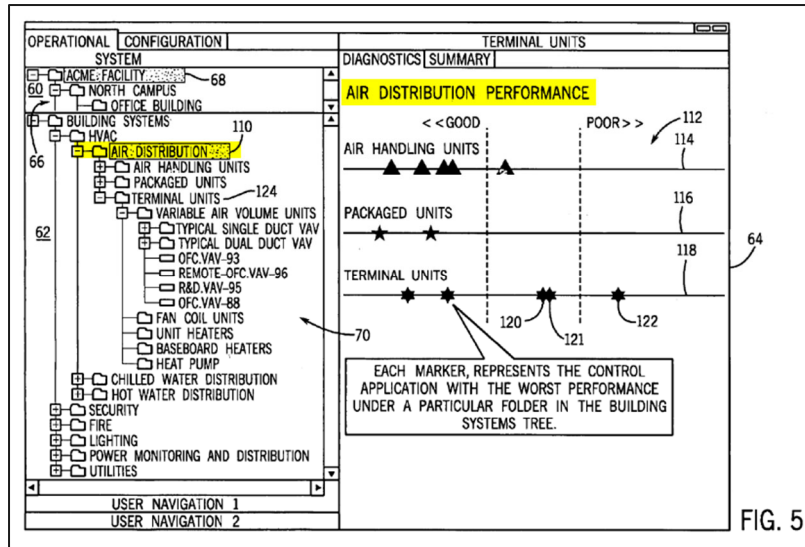
21. The other challenged independent claims (1 and 39) are similar, providing method variations of apparatus Claim 21. Dependent claims add little else, including:

- A “summary view” and “more detailed view” (Claims 4, 24, 42)
- A “mechanical view” (Claims 15, 53)
- A “control diagram view” (Claim 37)

For example, a user can view a HVAC system in Figure 4, see a problem with the air distribution system, and then use the tree on the left to navigate to more information about the air distribution system in Figure 5:



Ex. 1001, Fig. 4 (color added).



Id., Fig. 5 (color added).

B. Prosecution History

The prosecution did not address the Grounds raised in this petition. Ex. 1006. As discussed above, the examiner never rejected the Challenged Claims, instead indicating the claims allowable in a first office action. *Id.* Moreover, the examiner provided no explanation for why the challenged claims were allowed. *Id.* The prior art raised in this Petition was not addressed, let alone made of record. *Id.* Accordingly, the Grounds presented in this Petition have not been addressed by the USPTO.

IV. PERSON OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art (“POSITA”) at the time of the ’880 Patent would have at least a bachelor’s degree in computer science or a related field, and at least three years of experience in the field of information and control systems used

in buildings. Additional work experience may compensate for less educational experience, and vice versa.² Ex. 1003, ¶¶26-29.

V. SUMMARY OF THE PRIOR ART

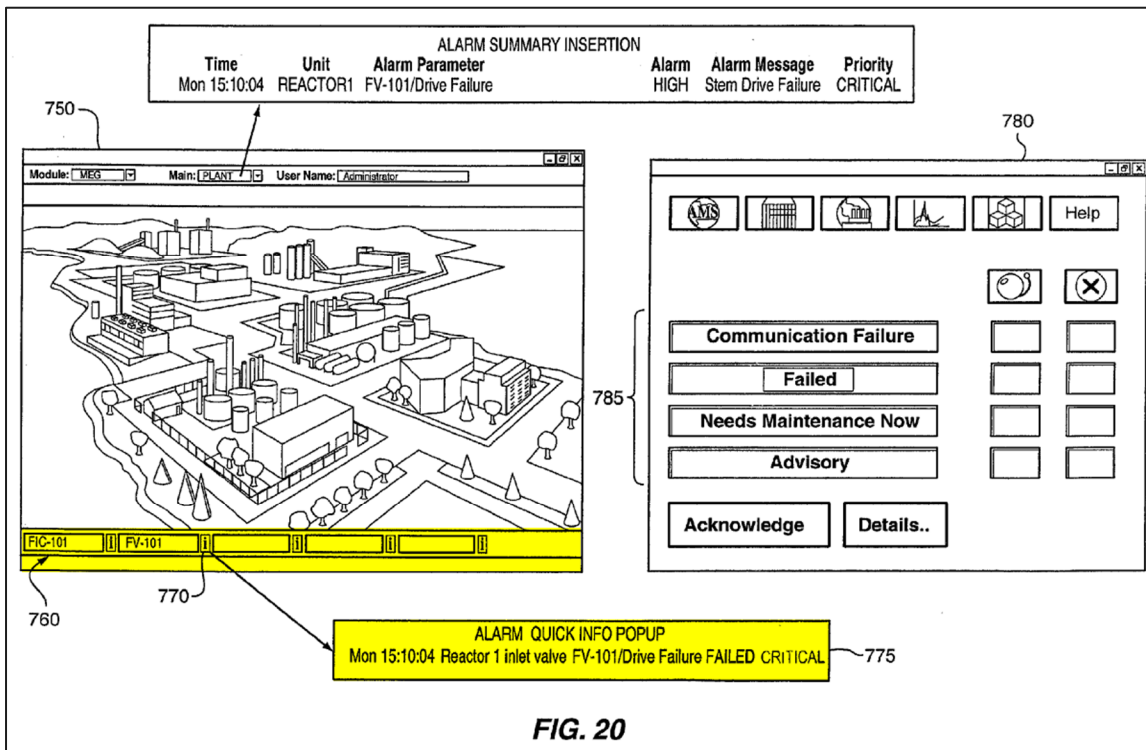
A. Eryurek (Ex. 1004)

Eryurek, is a U.S. patent application published September 5, 2002 and entitled “Remote Analysis of Process Control Plant Data.” Ex. 1004, Cover. It relates “to process control systems within process plants and, more particularly, to the use of asset or process analysis tools by a remote processing facility to analyze process control plant data.” *Id.*, [0002]. In this regard, Eryurek provides a system with data collection and presentation capabilities to allow a user to drill down on problems. For example, Figure 20 depicts a high level view where “each of the alarms within

² Patent Owner has taken the position that a POSITA would have “at least a bachelor’s degree in computer science and/or engineering, or electrical engineering, or a closely related scientific field such as mathematics, and two years of work experience with digital twin and/or entity modeling software.

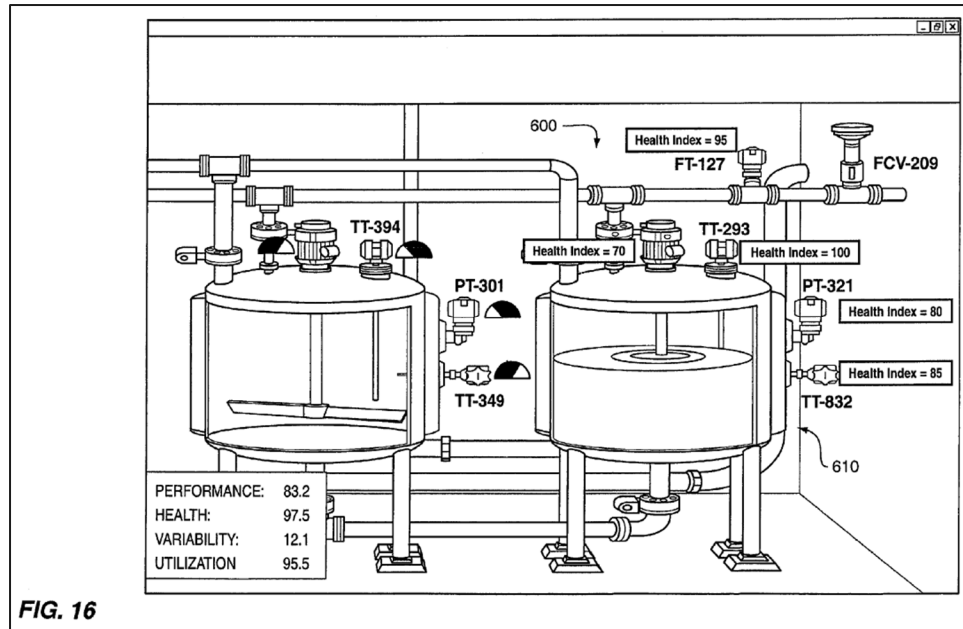
Alternatively, any lack of experience could be remedied with additional education (e.g., a Master’s degree), and likewise, a lack of education can be remedied with additional work experience (e.g., 6-8 years).” Ex. 1007, 11. The analysis in this petition is unchanged regardless of which of these definitions applies.

the banner 760 may also include an information button 770, which may be selected by a user to generate a pop-up window 775 containing more detailed information[:]"

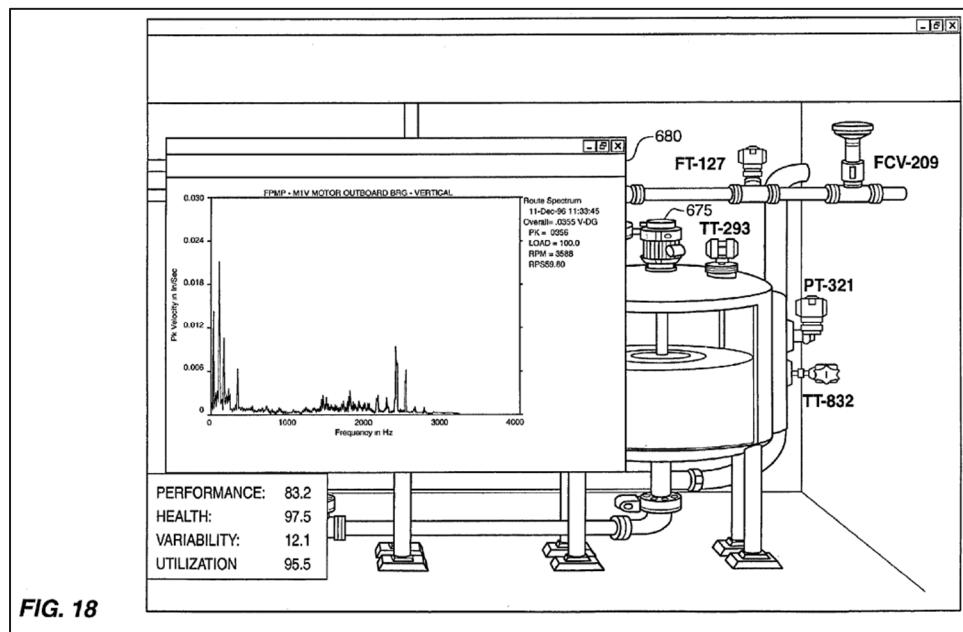


Id., [0133], Fig. 20 (color added).

Likewise, Eryurek provides a number of additional views for drilling down on the details of the various systems. For example, Figures 16 and 18 provide an overview and more detailed view of a process area within a plant. *Id.*, [0031], [0033].



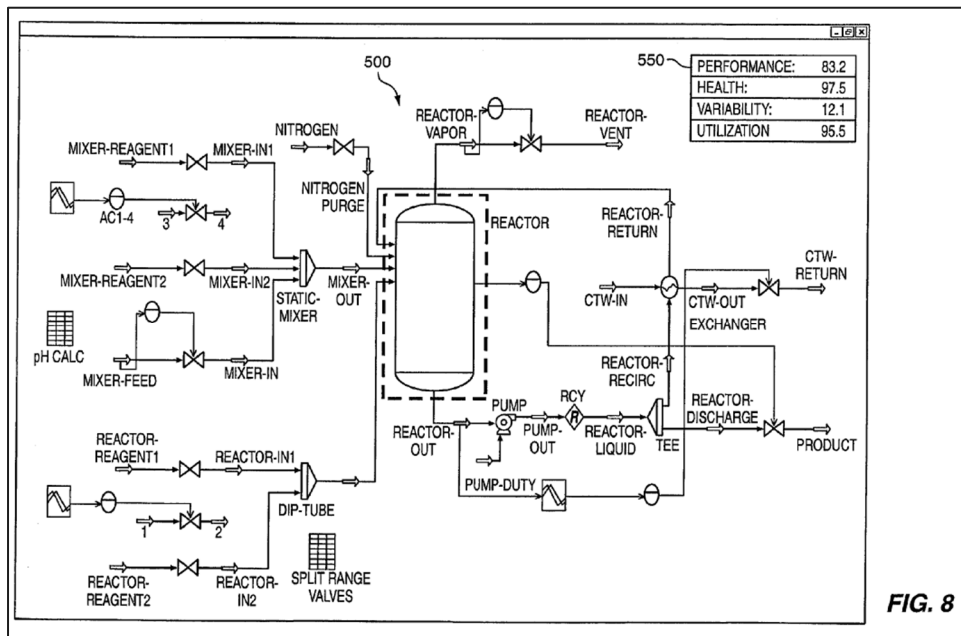
Id., Fig. 16.



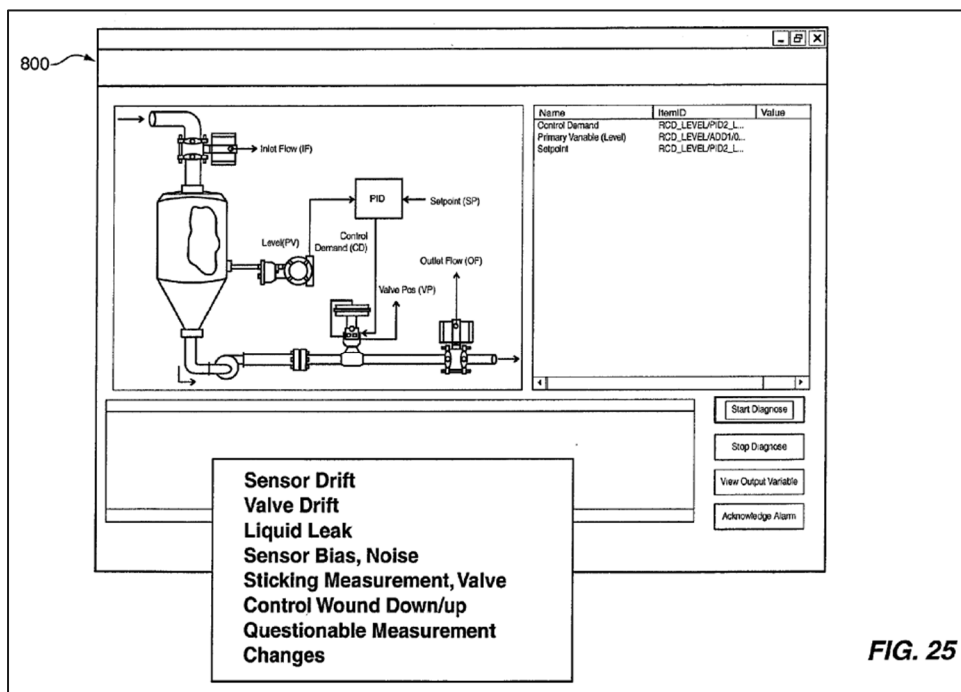
Id., Fig. 18.

Furthermore, Figure 8 provides a view of “a plurality of devices such as, for example, valves, pumps, temperature transmitters, etc.” and “lines arrows, and any

other indicia to represent logical and physical interconnections between the various devices.” Ex. 1004, [0113], Fig. 8.

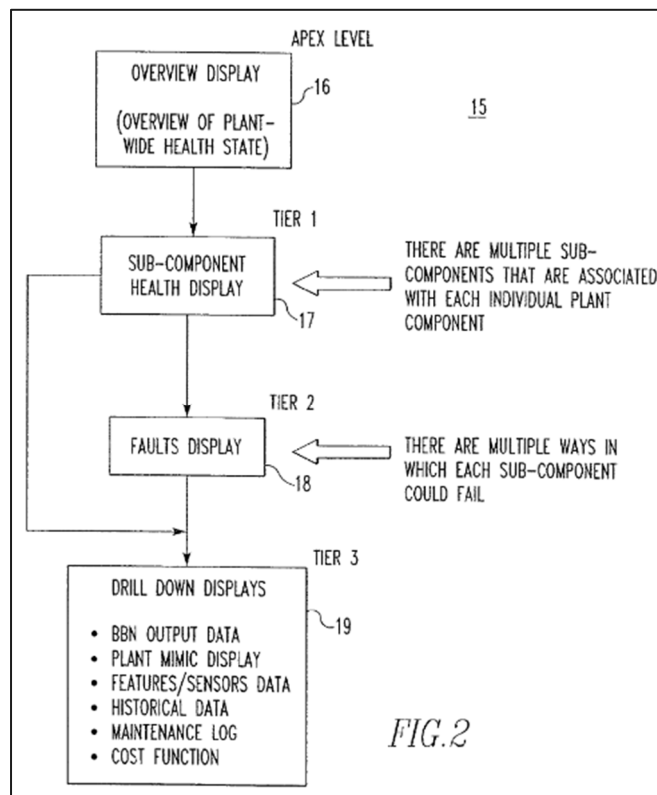


In addition, Figure 25 provides view of a system setup, including a setpoint, PID, and various other control elements. *Id.*, [0135], Fig. 25.



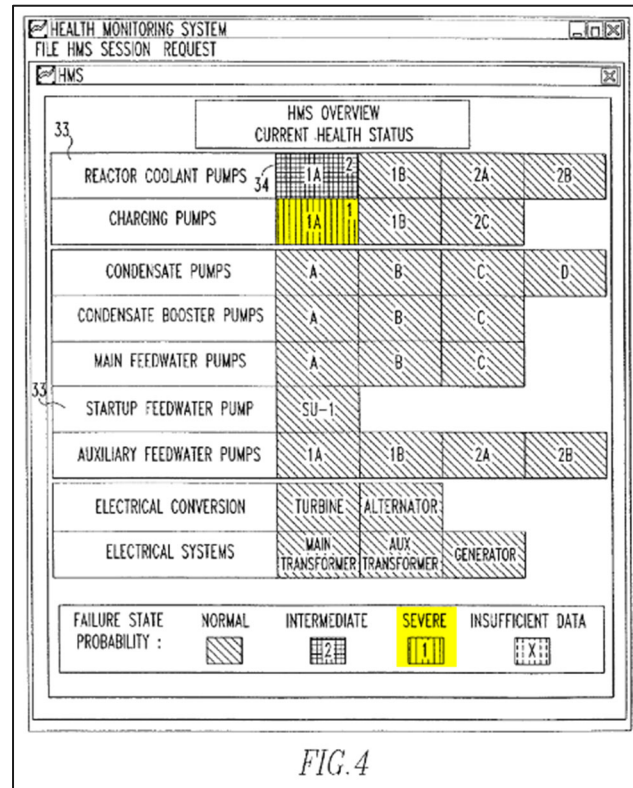
B. Ridolfo (Ex. 1005)

Ridolfo, is a U.S. patent application published January 2, 2003 and entitled “Health monitoring display system for a complex plant.” Ex. 1005, Cover. It relates to “[a] three-tier hierarchy of displays provide details on the health status of the components and systems displayed on the enterprise wide level display in a manner that supports a logical drill down to the health status of sub-components on Tier 1 to expected faults of the sub-components on Tier 2 to specific information relative to expected sub-component failures on Tier 3.” *Id.*, Abstract. This structure is illustrated in Figure 2:

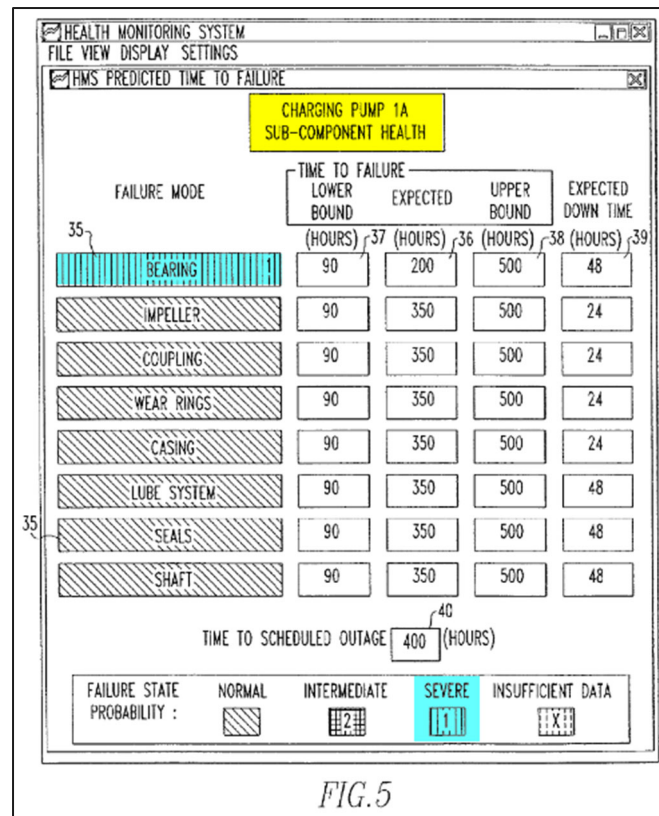


Id., Fig. 2.

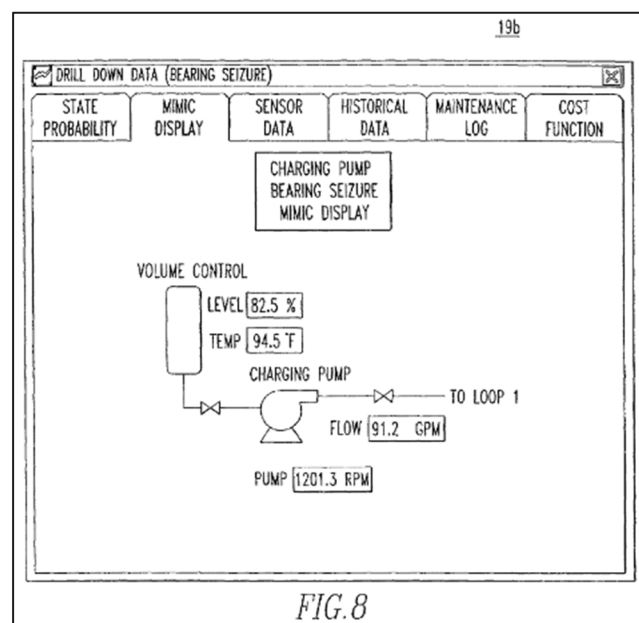
For example, Figure 4 depicts a summary view with Charging Pump 1A listed in a Severe health state. Ex. 1005, Fig. 4, [0104]-[0108].



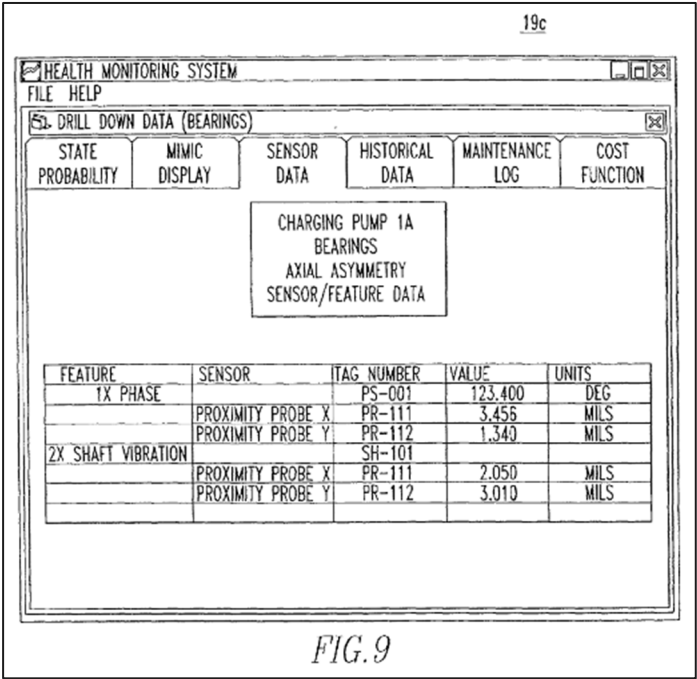
Id., Fig. 4 (color added). The user may then select Charging Pump 1A to drill down on the cause of the health problem, here the bearings. *Id.*, Figs. 4, 5, [0104]-[0112].



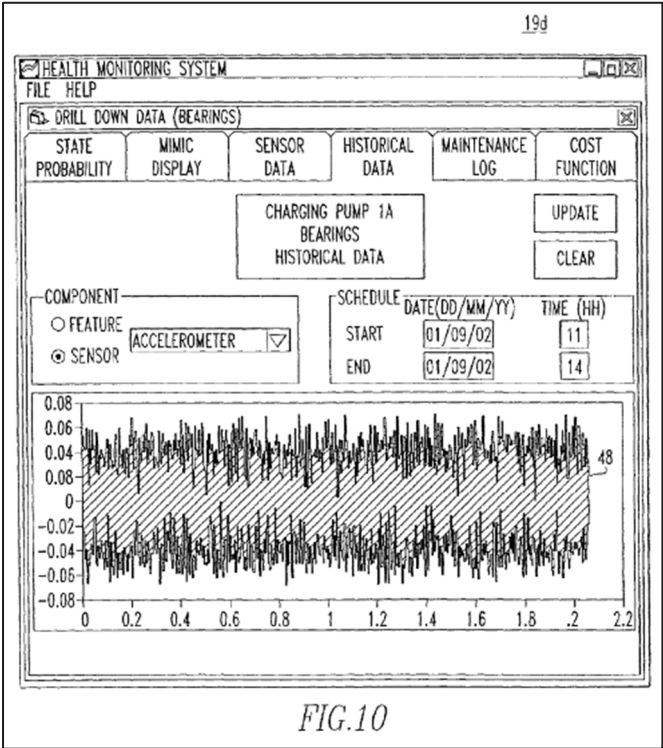
Id., Fig. 5 (color added). Similarly, Ridolfo provides additional views with additional information. *Id.*, Figs. 8-10.



Id., Fig. 8.



Id., Fig. 9.



Id., Fig. 10.

VI. SPECIFIC GROUNDS FOR PETITION

A. GROUND I: Eryurek (Ex. 1004)

1. Claim 1

- a. 1. A method for analyzing performance of control applications in an environmental control network, comprising:

To the extent that the preamble is limiting, Eryurek teaches it. Ex. 1003, ¶¶42-44. For example, Eryurek is directed to “a system and method for analyzing a process [that] collects process data within a process control plant and transmits the collected process data to a remote data processing facility. The remote data processing facility may analyze the process data to generate analysis data using one of a plurality asset or process analysis tools stored within a database of the remote data processing facility.” Ex. 1004, [0014]-[0015]. Thus, Eryurek is directed to remotely analyzing the performance of control applications in a plant. Ex. 1003, ¶42.

Eryurek also teaches these control applications are in an environmental control network, for example, controlling the environmental conditions within a tank, reactor, boiler, or furnace. *Id.*, [0074], [0099], [0104], [0129]-[0130], Figs. 4, 8, 16, 18, 20, 25; Ex. 1003, ¶43. The '880 Patent itself describes that the “environmental control network may be employed to control temperature, fluid flow, humidity, lighting, *boilers*, chillers, power, security and *similar systems* in the internal environment.” Ex. 1001, 1:16-22. Indeed, the '880 Patent broadly states that

“[t]he controlled environment may be a room, hallway, building, a portion thereof, or *any other internal environment*.” *Id.*, 5:64-66.³

In any event, it would also have been obvious to apply the teachings of Eryurek to a more narrowly defined “environmental control network.” Ex. 1003, ¶44. Eryurek relates “to process control systems within process plants and, more particularly, to the use of asset or process analysis tools by a remote processing facility to analyze process control plant data.” Ex. 1004, [0002]. These general teachings are applicable to numerous environmental control systems, including the most narrowly defined systems that may be described in the ’880 Patent. Note that, for example, the functionality depicted in Figures 4, 8, 16, 18, 20, and 25 of Eryurek reflect the same functionality seen in the ’880 Patent, including monitoring and controlling various parameters (e.g., temperature, flow rate) of systems within a facility. Finally, the ’880 Patent also states that the “environmental control network may be employed to control temperature, fluid flow, humidity, lighting, boilers, chillers, power, security and similar systems in the internal environment.” Ex. 1001, 1:16-22. Similarly, Eryurek describes its “process control systems” as including “field devices” that control similar parameters including “sensors (e.g., *temperature*, pressure and *flow rate sensors*). Ex. 1004, [0003]. A POSITA would have found it

³ All emphasis in this Petition added unless otherwise noted.

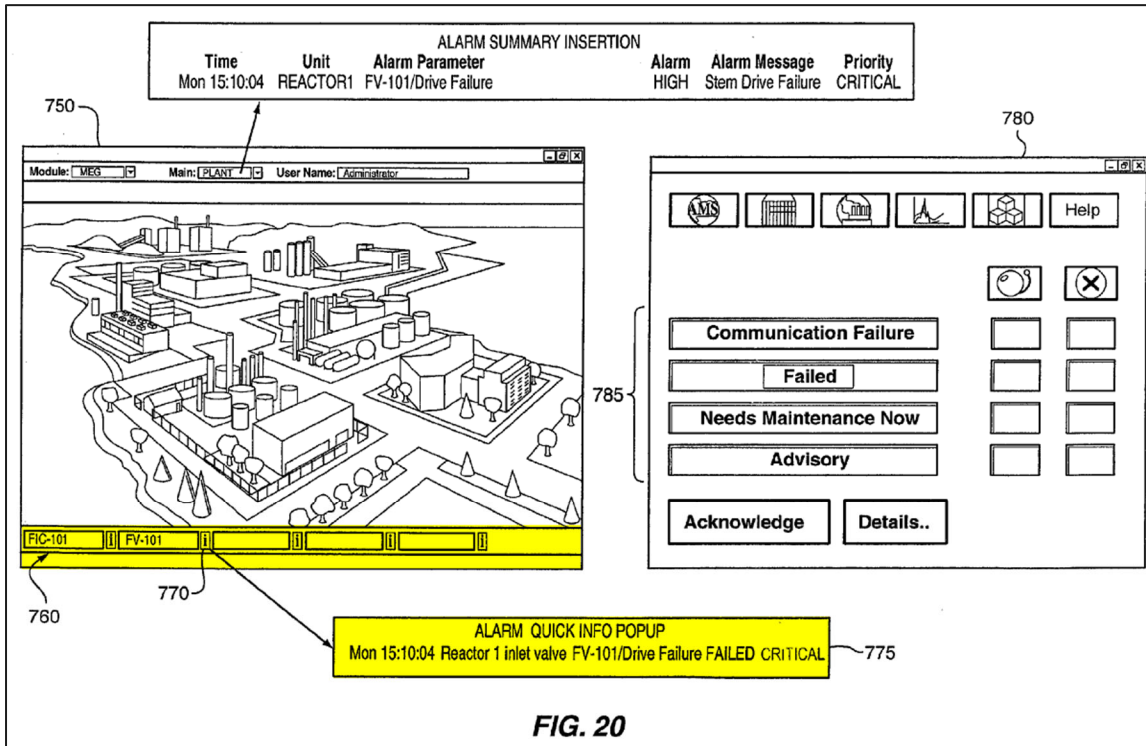
obvious that these similar components would be implemented in the same way whether they were components of an environmental control network or, as described by Eryurek, a “process control” system.

- b. receiving at least one performance indicator for each control application;

Eryurek teaches this element. Ex. 1003, ¶¶45-47. For example, Eryurek is directed to “a system and method for analyzing a process [that] ***collects process data within a process control plant*** and ***transmits the collected process data*** to a remote data processing facility. The remote data processing facility may analyze the process data to generate analysis data using one of a plurality asset or process analysis tools stored within a database of the remote data processing facility.” Ex. 1004, [0014]-[0015]. Thus, the received process data reflects receiving at least one performance indicator for each control application.

Furthermore, Eryurek teaches field devices to collect data and pass this to process controllers. For example, “[f]ield devices, which may be, for example valves, valve positioners, switches, transmitters, and sensors (e.g., temperature, pressure and flow rate sensors), perform functions within the process such as opening or closing valves and measuring process parameters. The process controller receives signals indicative of process measurements or process variables made by or associated with the field devices and/or other information pertaining to the field devices.” *Id.*, [0003]. Then, “[p]rocess control operators also receive process

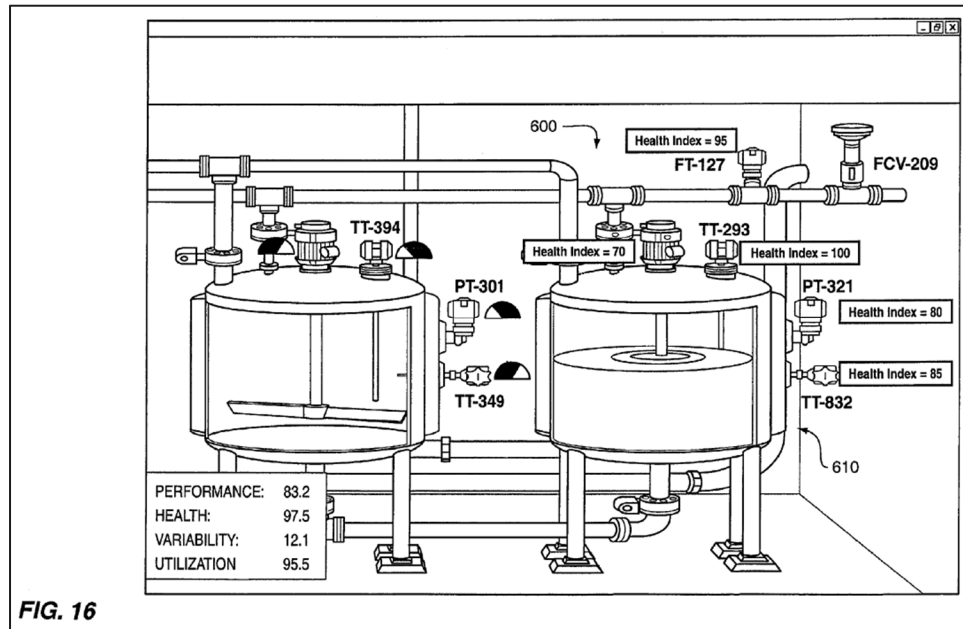
variable information from the process via one or more process controllers which provide information to the operators about the operation of the process, including alarms generated within the process. This information may be provided to the process control operator via a standard user interface.” *Id.*, [0006]. This is illustrated in Figure 20, where the received performance indicator is presented to the user (as an alarm flag in a first view, 760, and then with more details in a second view, 775). *Id.*, [0133].



Id., Fig. 20 (color added).

As another example, Eryurek provides an overview of a system in Figures 16 and 18 with a number of sensed parameters. Ex. 1004, [0129]-[0130], [0132], Figs. 16, 18. This reflects a number of performance indicators (*e.g.*, health indices, shown

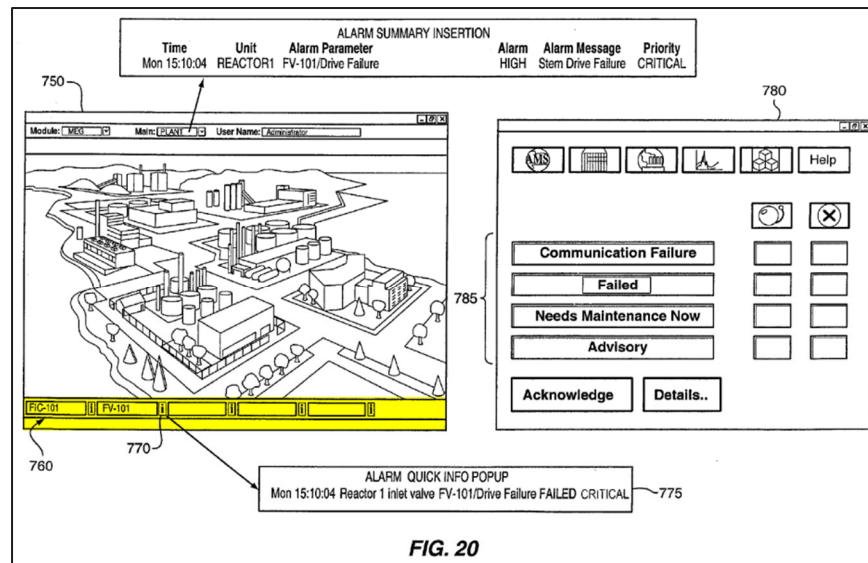
in boxes, and meters, shown as half-circles) that are received from the control applications. *Id.*; Ex. 1003, ¶47.



Ex. 1004, Fig. 16.

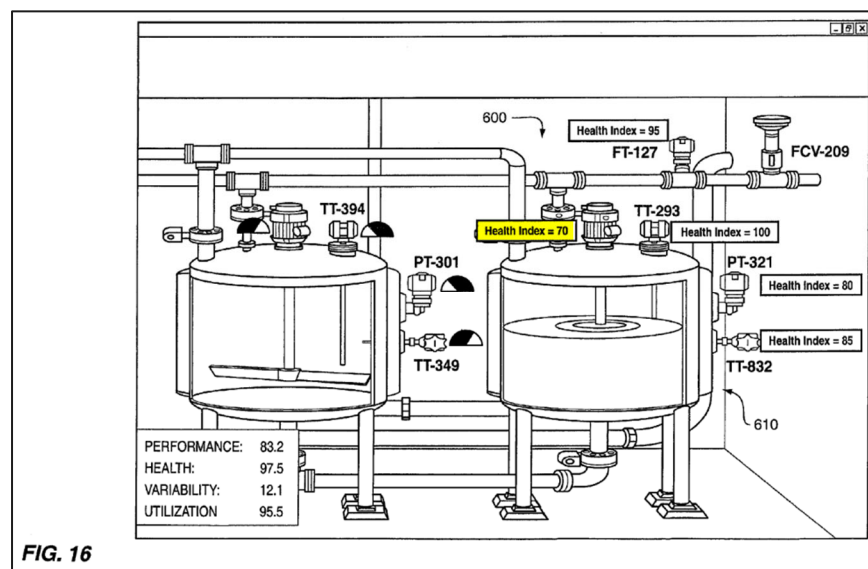
- c. identifying at least one control application experiencing degraded performance using a first view of the performance indicators; and

Eryurek teaches this element. Ex. 1003, ¶¶48-49. Continuing the discussion above (§VI.A.1.b), the user interface in Figure 20 identifies at least one control application experiencing degraded performance (*e.g.*, FV-101). Ex. 1004, [0133], Fig. 20. This identification uses a first view of the performance indicators (*e.g.*, alarm banner 760). *Id.*

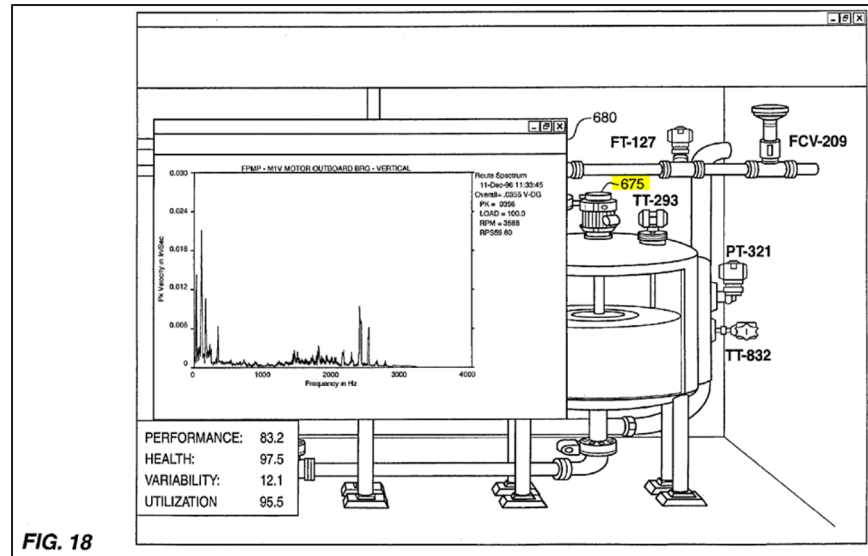


Id., Fig. 20 (color added).

Furthermore, the user interface in Figures 16 and 18 identifies at least one control application experiencing degraded performance (*e.g.*, motor 675, labeled in Figure 18) with a lower health index. Ex. 1004, [0129]-[0130], [0132], Figs. 16, 18. Figure 16 reflects the claimed first view of the performance indicators:



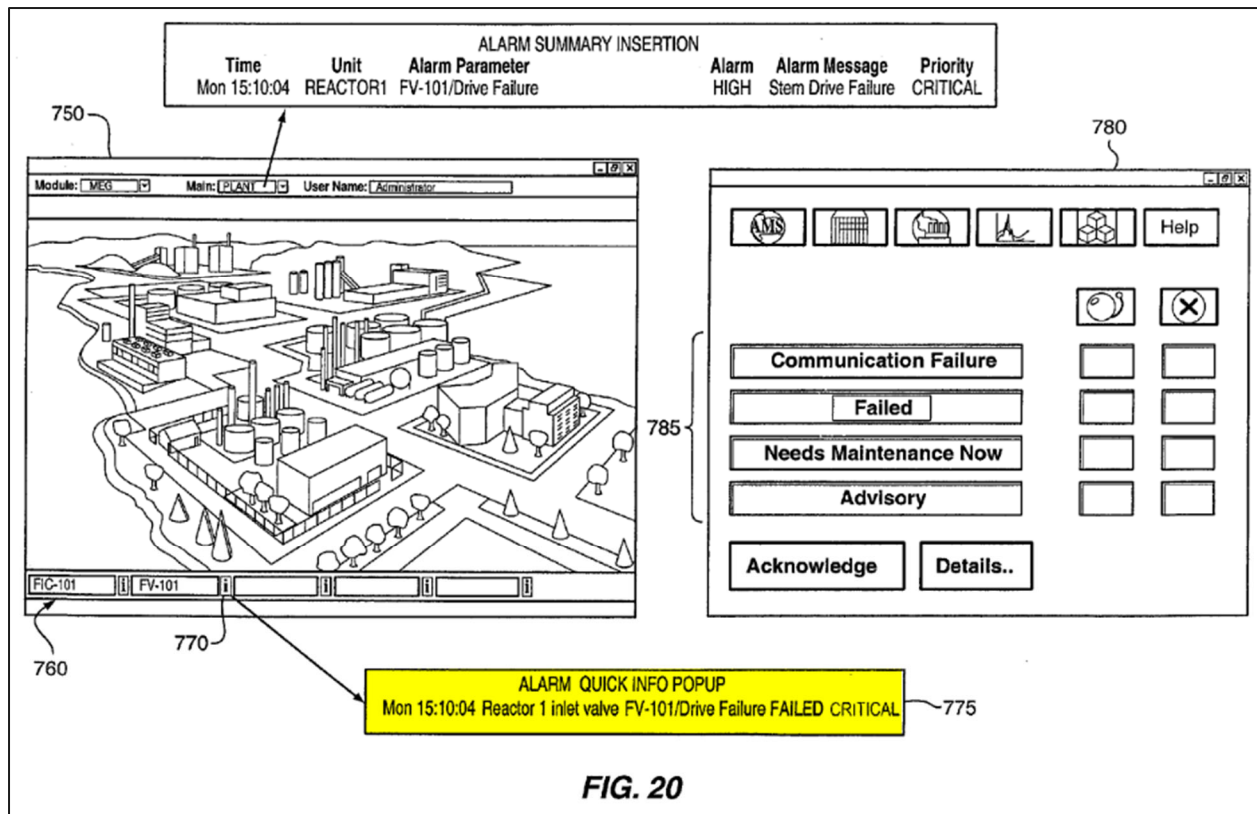
Id., Fig. 16 (color added).



Id., Fig. 18 (color added).

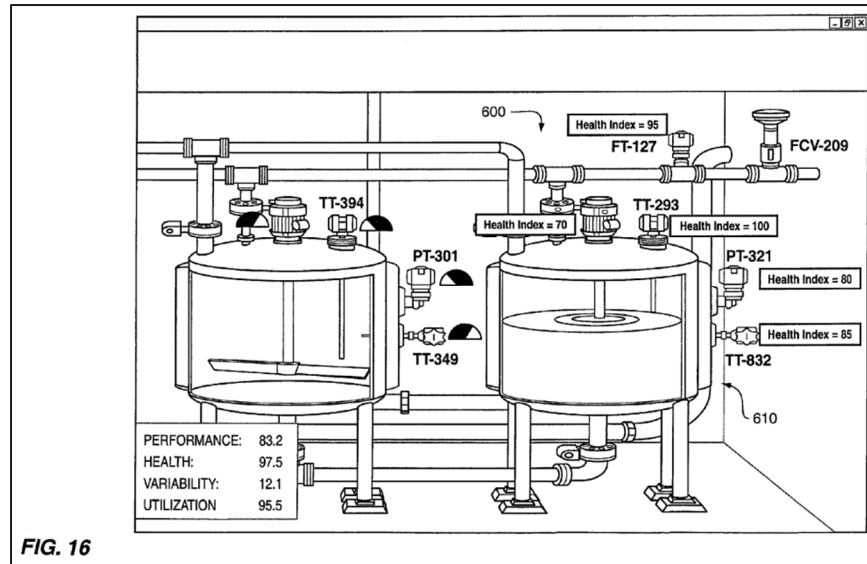
- d. obtaining additional information regarding the at least one control application using a second view of the performance indicators.

Eryurek teaches this element. Ex. 1003, ¶¶50-51. Continuing the discussion above (§§VI.A.1.b, VI.A.1.c), the user interface in Figure 20 provides additional information regarding the at least one control application (*e.g.*, FV-101) using a second view of the performance indicators (*e.g.*, popup 775). Ex. 1004, [0133], Fig. 20. Indeed, Eryurek explains “each of the alarms within the banner 760 may also include an information button 770, which may be selected by a user to generate a pop-up window 775 containing more detailed information relating to that particular alarm.” *Id.*

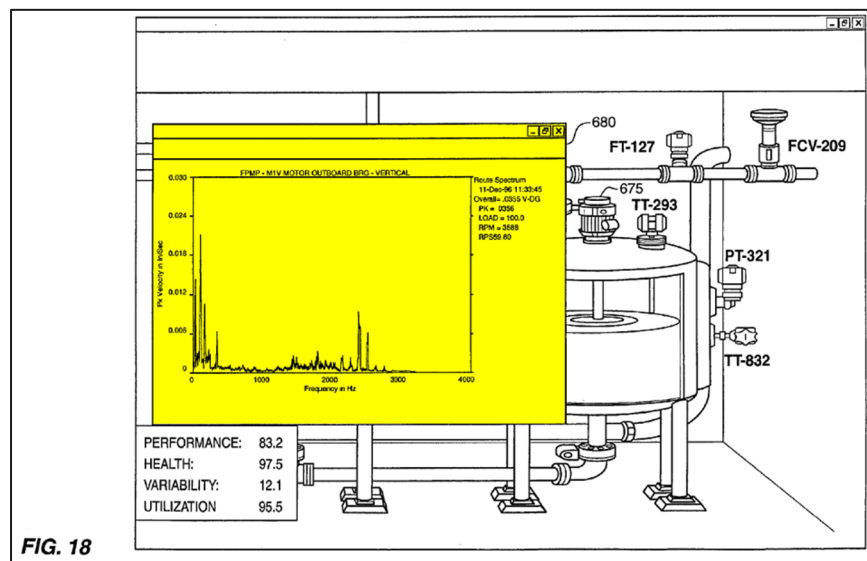


Id., Fig. 20 (color added).

Furthermore, the user interface in Figures 16 and 18 obtains additional information (*e.g.*, vibration analysis) regarding the at least one control application (*e.g.*, motor 675) using a second view of the performance indicators (*e.g.*, Fig. 18's vibration analysis window shown in yellow below). Ex. 1004, [0129]-[0130], [0132], Figs. 16, 18. Indeed, Eryurek explains "[a] user may request such a pop-up window in response to an abnormally high or an abnormally low index value for the unit affected by the motor 675 and/or may request the window if an index value associated with the motor is indicative of a possible problem." *Id.*, [0132].



Id., Fig. 16.



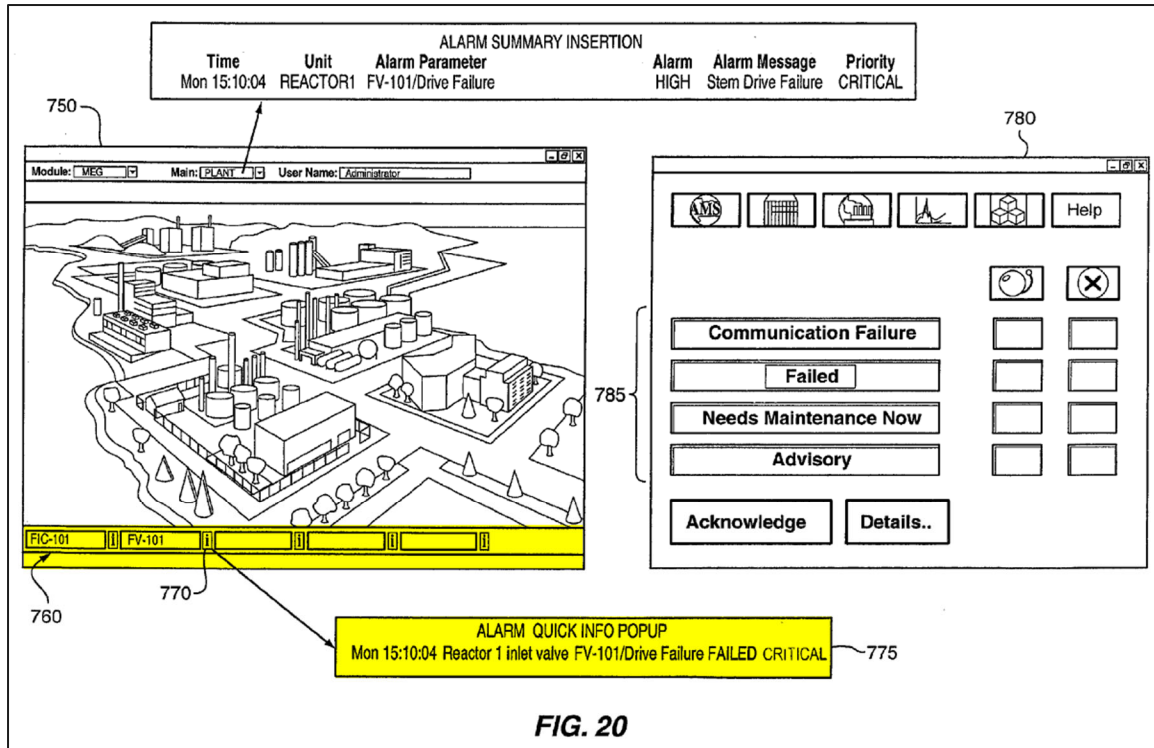
Id., Fig. 18 (color added).

2. Claim 4

- a. 4. The method of claim 1, wherein the first view is a summary view of the performance indicators and the second view is a more detailed view of the performance indicators.

Eryurek teaches this element. Ex. 1003, ¶¶52-43. Continuing the discussion above (§VI.A.1), banner 760 constitutes a first view of the performance indicators which is a summary view of the performance indicators. Ex. 1004, [0133], Fig. 20. Furthermore, popup window 775 is a second view which is a more detailed view of the performance indicators. Indeed, Eryurek explains “[a] high level graphical view 750 of the plant 10 may include an alarm banner 760 having one or more pending alarms” and “each of the alarms within the banner 760 may also include an information button 770, which may be selected by a user to generate a pop-up window 775 containing more detailed information relating to that particular alarm.”

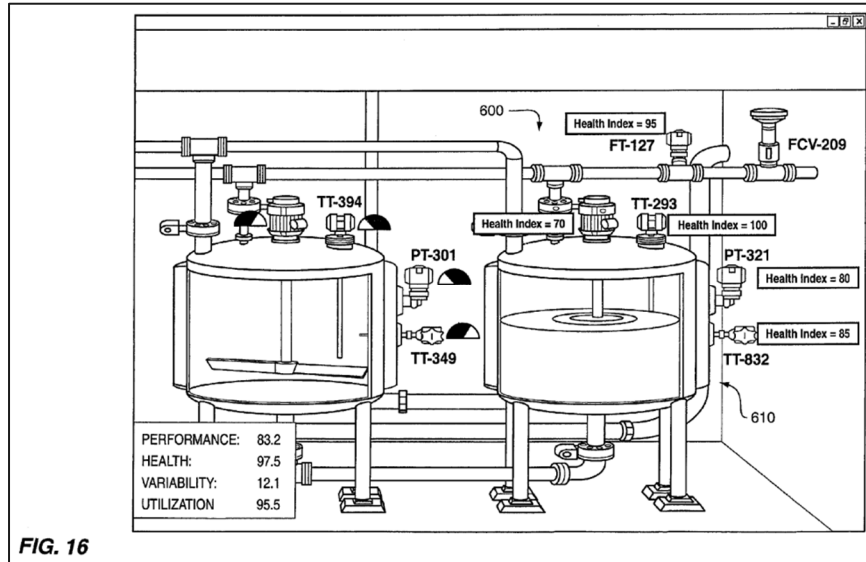
Id.



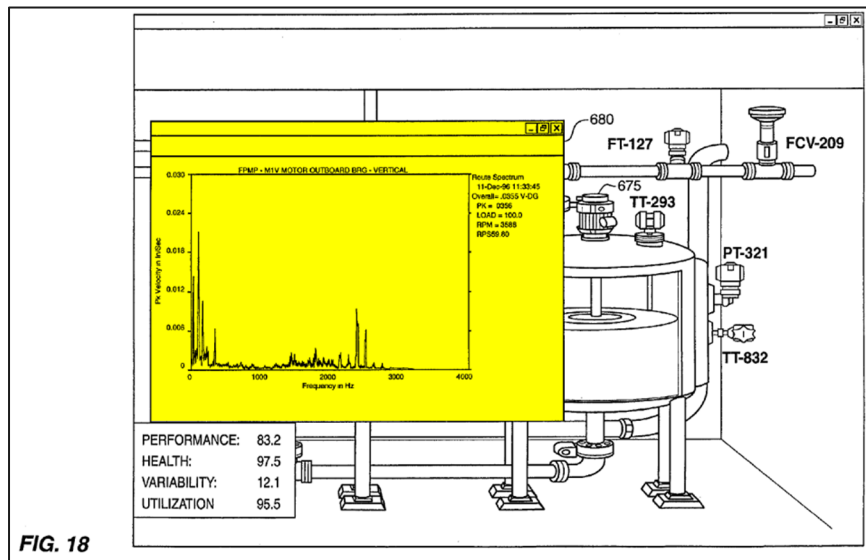
Id., Fig. 20 (color added).

In addition, Figures 16 and 18 depict the claimed first and second views respectively. For example, “FIG. 16 is an exemplary graphical display that may be provided by a graphical user interface to enable a user to analyze the operational status and performance of a process area within a plant” and “FIG. 18 is an exemplary depiction of a display that may be provided by a graphical user interface to enable a user to perform a more detailed analysis of data used to generate one or more indexes for a device.” Ex. 1004, [0031], [0033], Figs. 16, 18. Thus, Figure 16 is a first view which is a summary view of the performance indicators, and the vibration analysis window (yellow) in Figure 18 is a second view is a more detailed

view of the performance indicators. *Id.*, [0129]-[0130], [0132], Figs. 16, 18; Ex. 1003, ¶53.



Ex. 1004, Fig. 16.



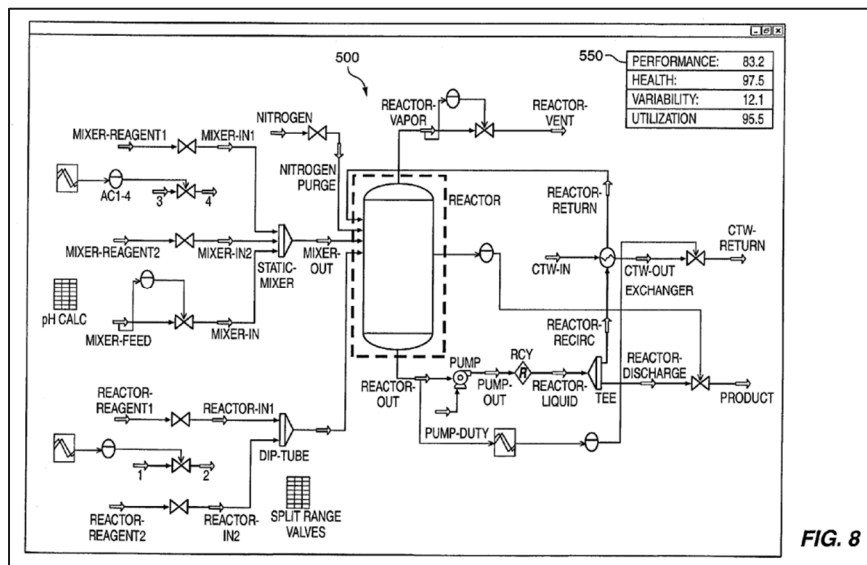
Id., Fig. 18 (color added).

3. Claim 15

- a. 15. The method of claim 1, further including displaying a mechanical view of the environmental control network.

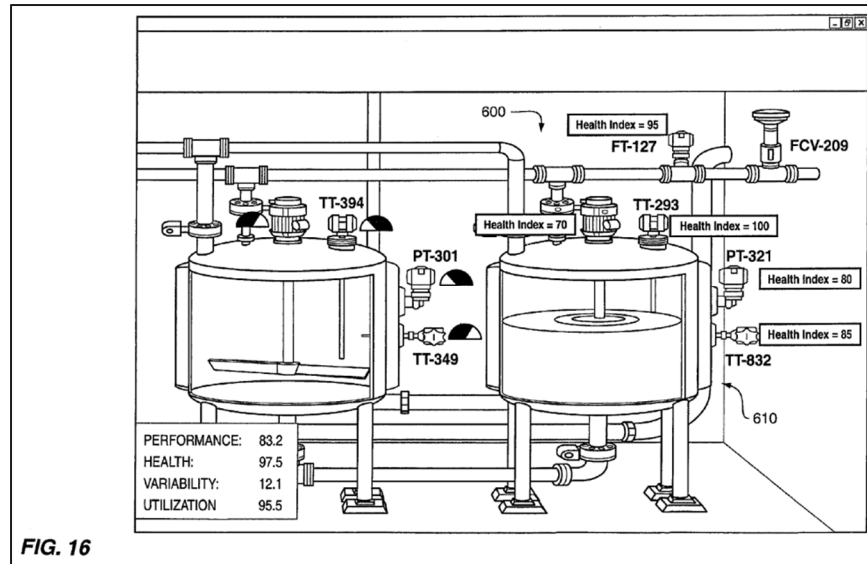
Eryurek teaches this element. Ex. 1003, ¶¶54-58. Continuing the discussion above (§VI.A.1), the user interface displays a mechanical view. This is illustrated, for example, in Figures 8, 16, and 25. Ex. 1004, [0023], [0031], [0038]. Each of these views comprise a mechanical system layout. Ex. 1003, ¶54.

For example, Figure 8 depicts “a plurality of devices such as, for example, valves, pumps, temperature transmitters, etc.” and “include[s] lines arrows, and any other indicia to represent logical and physical interconnections between the various devices.” Ex. 1004, [0113], Fig. 8; Ex. 1003, ¶55.



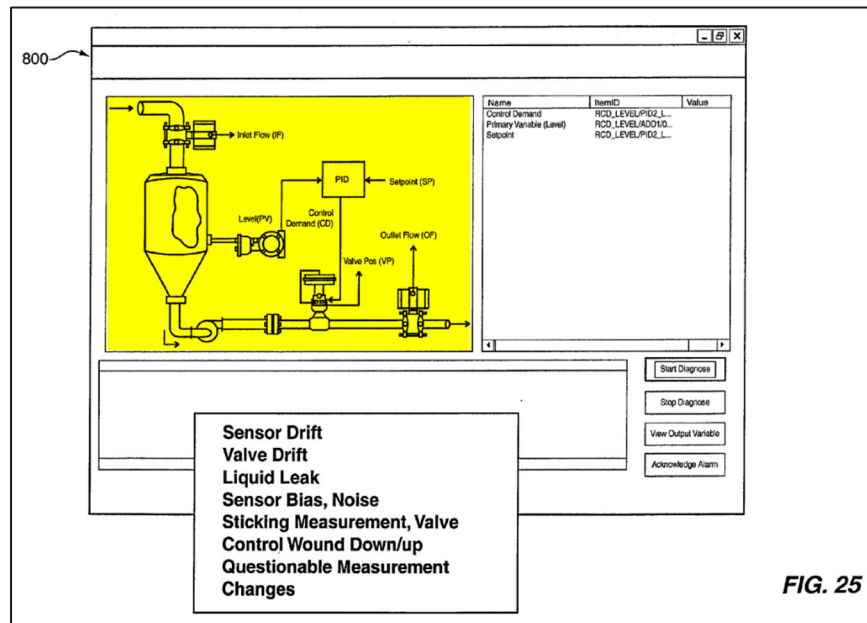
Ex. 1004, Fig. 8.

Likewise, Figure 16 “depict[s] the physical equipment (and the interconnections therebetween).” Ex. 1004, [0129], Fig. 16; Ex. 1003, ¶56.



Ex. 1004, Fig. 16.

In addition, Figure 25 depicts various mechanical equipment (yellow) and their mechanical relationships. Ex. 1004, Fig. 25; Ex. 1003, ¶57.



Ex. 1004, Fig. 25 (color added).

As discussed above (§VI.A.1.a), these views are of an environmental control network (*e.g.*, controlling the environment in reactors, tanks, boilers, furnaces, *etc.*). Moreover, applying Eryurek to environmental control networks would have been obvious to a POSITA at the time of the claimed invention. *See* §VI.A.1.a *supra*.

4. Claim 21

- a. 21. A computer program product for analyzing performance of control applications in an environmental control network, the program product in combination with and embodied on a computer-readable medium and comprising machine-readable program code for causing, when executed, one or more machines to perform the following method steps:

To the extent that the preamble is limiting, Eryurek teaches it. Ex. 1003, ¶¶59-60. As discussed above (§VI.A.1.a), Eryurek teaches a method for analyzing performance of control applications in an environmental control network. Moreover, applying Eryurek to environmental control networks would have been obvious to a POSITA at the time of the claimed invention. *See* §VI.A.1.a *supra*.

Eryurek's disclosures are performed using a computer program product. Ex. 1003, ¶60. For example, Eryurek discloses "[w]hen implemented in software, the software routine may be stored in any computer readable memory." Ex. 1004, [0159]. "Likewise, this software may be delivered to a user or a process control plant via any known or desired delivery method including, for example, on a computer readable disk or other transportable computer storage mechanism or over a

communication channel such as a telephone line, the internet, etc.” *Id.* Thus, Eryurek discloses a computer program product (*e.g.*, software) for analyzing performance of control applications in an environmental control network (as discussed above, §VI.A.1.a), the program product in combination with and embodied on a computer-readable medium (*e.g.*, computer readable memory) and comprising machine-readable program code (*e.g.*, software or software routine) for causing, when executed, one or more machines to perform Eryurek’s teachings. Ex. 1003, ¶60.

- b. displaying performance indicators for the control applications using a first view that allows at least one control application exhibiting degraded performance to be identified; and

Eryurek teaches this element. Ex. 1003, ¶61. This is the same first view functionality discussed above for Claim 1, where the user interface displays performance indicators for the control applications using a first view that allows at least one control application exhibiting degraded performance to be identified. *See* §VI.A.1.c *supra*.

- c. displaying performance indicators using a second view that provides additional details regarding the performance of the at least one control application.

Eryurek teaches this element. Ex. 1003, ¶62. This is the same second view functionality discussed above for Claim 1, where the user interface displays performance indicators using a second view that provides additional details

regarding the performance of the at least one control application. See §VI.A.1.d *supra*.

5. Claim 24

- a. 24. The program product of claim 21, wherein the first view is a summary view of the performance indicators and the second view is a more detailed view of the performance indicators.

Eryurek teaches this element. Ex. 1003, ¶63. As discussed above (§VI.A.2), the first view is a summary view of the performance indicators and the second view is a more detailed view of the performance indicators.

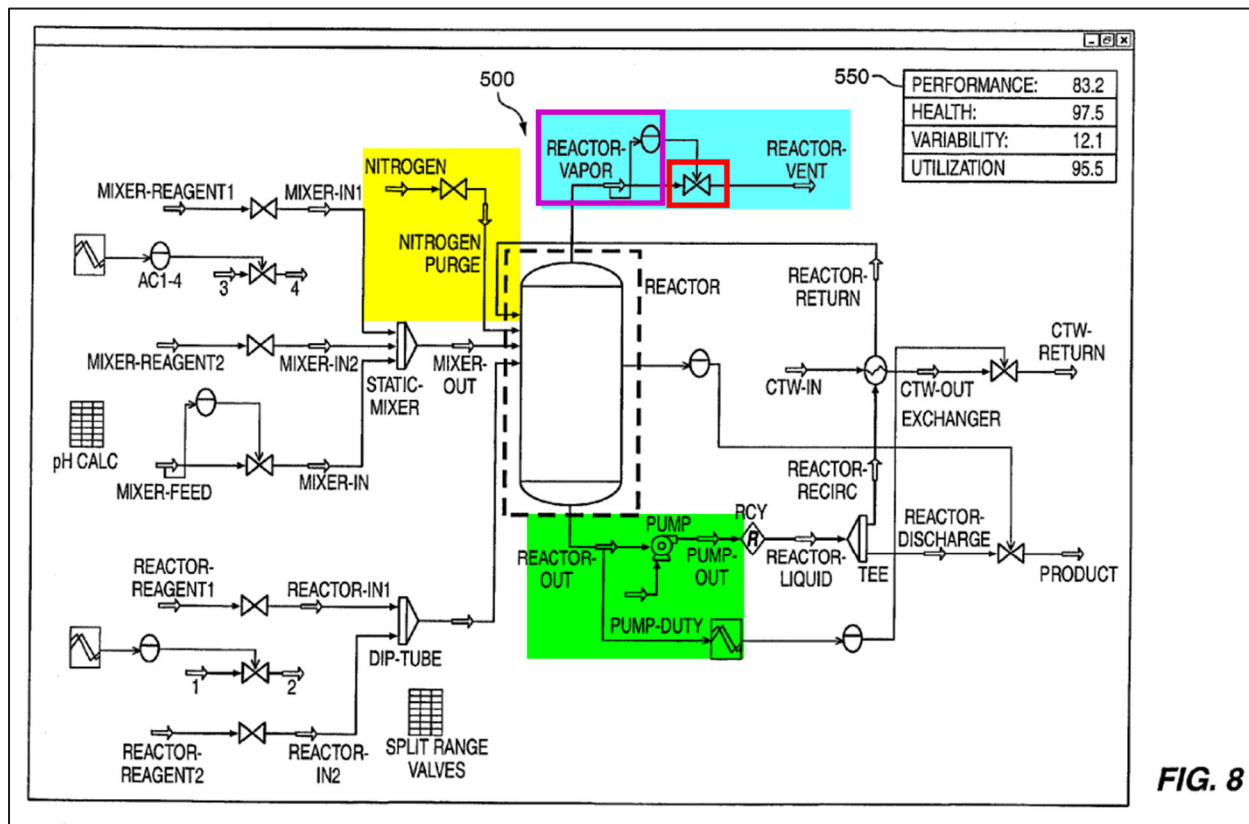
6. Claim 37

- a. 37. The program product of claim 21, the program code causes a control diagram view of the environmental control network to be displayed.

Eryurek teaches this element. Ex. 1003, ¶¶64-68. Continuing the discussion above (§§VI.A.1, VI.A.4), Eryurek teaches program code to display various views. Some of these views displayed by the user interface comprise a control diagram view. This is illustrated, for example, in Figures 8, 16, and 25. Ex. 1004, [0023], [0031], [0038]. Each of these views comprise a control diagram view. Ex. 1003, ¶64.

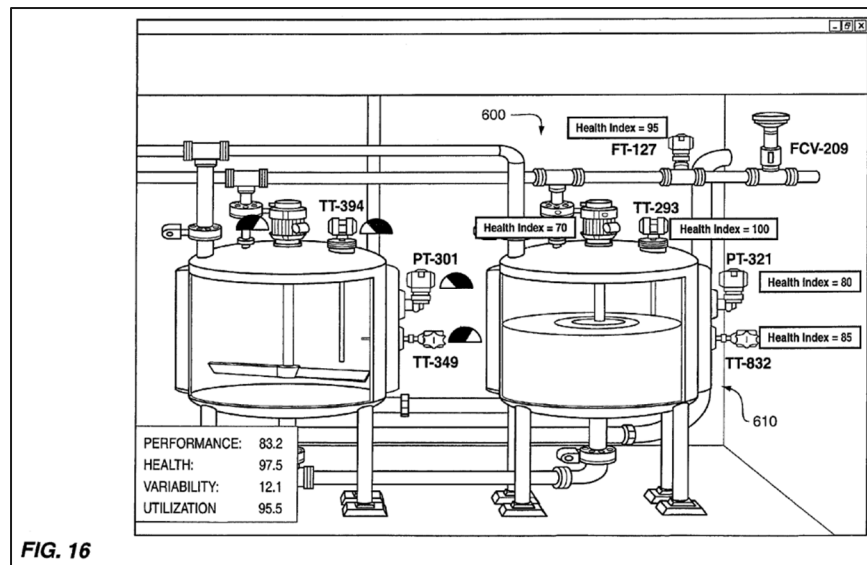
For example, Figure 8 depicts a “process control system” including various valves and other control features. Ex. 1004, [0113], Fig. 8; Ex. 1003, ¶65. To illustrate using the diagram below, Figure 8 includes (a) a control valve system (yellow) for purging the reactor with nitrogen (an environmental control), (b) a

venting control (blue) including a venting valve (red) coupled to a controller (purple) for venting the reactor based on vapor (another environmental control), and (c) a pump control (green) for draining liquid from the reactor (another environmental control). Ex. 1003, ¶65.



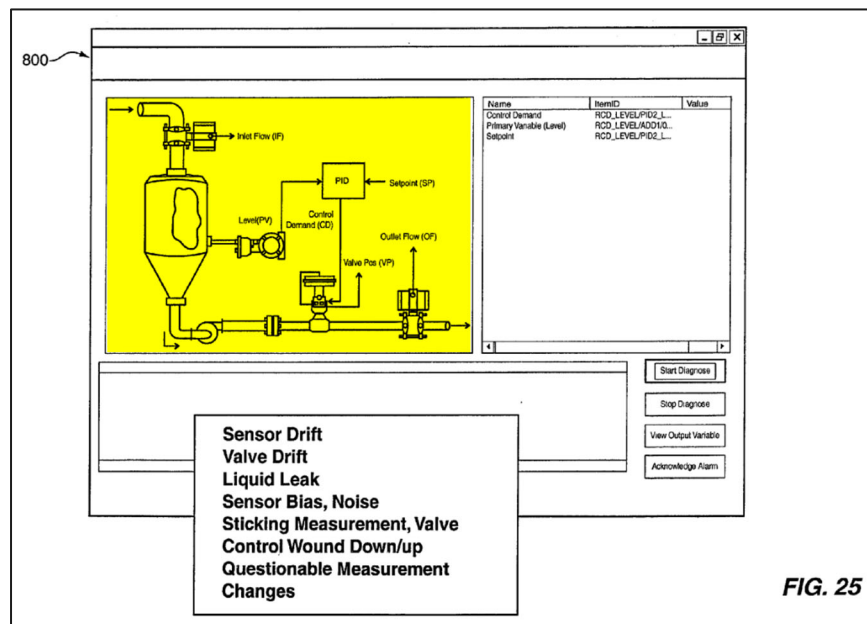
Ex. 1004, Fig. 8 (color added).

Likewise, Figure 16 “depict[s] the physical equipment (and the interconnections therebetween),” which again includes various control elements such as motors and valves. Ex. 1003, ¶66.



Ex. 1004, Fig. 16.

In addition, Figure 25 depicts various mechanical equipment (yellow), including a PID controller using data from a tank level sensor to control a valve based on a setpoint. Ex. 1004, Fig. 25; Ex. 1003, ¶167.



Ex. 1004, Fig. 25 (color added).

As discussed above (§VI.A.1.a), these views are of an environmental control network (*e.g.*, controlling the environment in reactors, tanks, boilers, furnaces, *etc.*). Moreover, applying Eryurek to environmental control networks would have been obvious to a POSITA at the time of the claimed invention. *See* §VI.A.1.a *supra*.

7. Claim 39

- a. 39. A method for diagnosing performance of control applications in an environmental control network, comprising:

To the extent that the preamble is limiting, Eryurek teaches it. Ex. 1003, ¶¶69-70. As discussed above (§VI.A.1.a), Eryurek teaches a method for analyzing performance of control applications in an environmental control network. This analysis is in furtherance of diagnosing issues, as taught by Eryurek. In describing the background of control process systems, Eryurek explained, “[t]hese process control operators may use available tools for diagnosing and correcting process control problems within a process control system, including, for example, auto-tuners, loop analyzers, neural network systems, *etc.*” Ex. 1004, [0006].

Furthermore, “a user may request device status information from a pop-up window such as the pop-up window 780 shown in FIG. 20. This detailed status information may provide one or more possible diagnoses of problems that may be responsible for the alarm condition (*i.e.*, failed communication, failed device, needs maintenance now, advisory, *etc.*).” *Id.*, [0134]. “FIGS. 21-24 are exemplary

depictions of displays that may be provided by the GUI in response to a user's further investigation of an alarm, alert or any other event associated with, for example, a device.” *Id.* For example, “in FIG. 24, a user may request detailed help from any status window. This detailed help may provide step by step instructions to guide the user or some other person in rectifying the problem diagnosed by the system.” *Id.*

- b. receiving at least one performance indicator for each control application;

See §VI.A.1.b supra.

- c. identifying at least one control application exhibiting degraded performance using a first view of the performance indicators; and

See §VI.A.1.c supra.

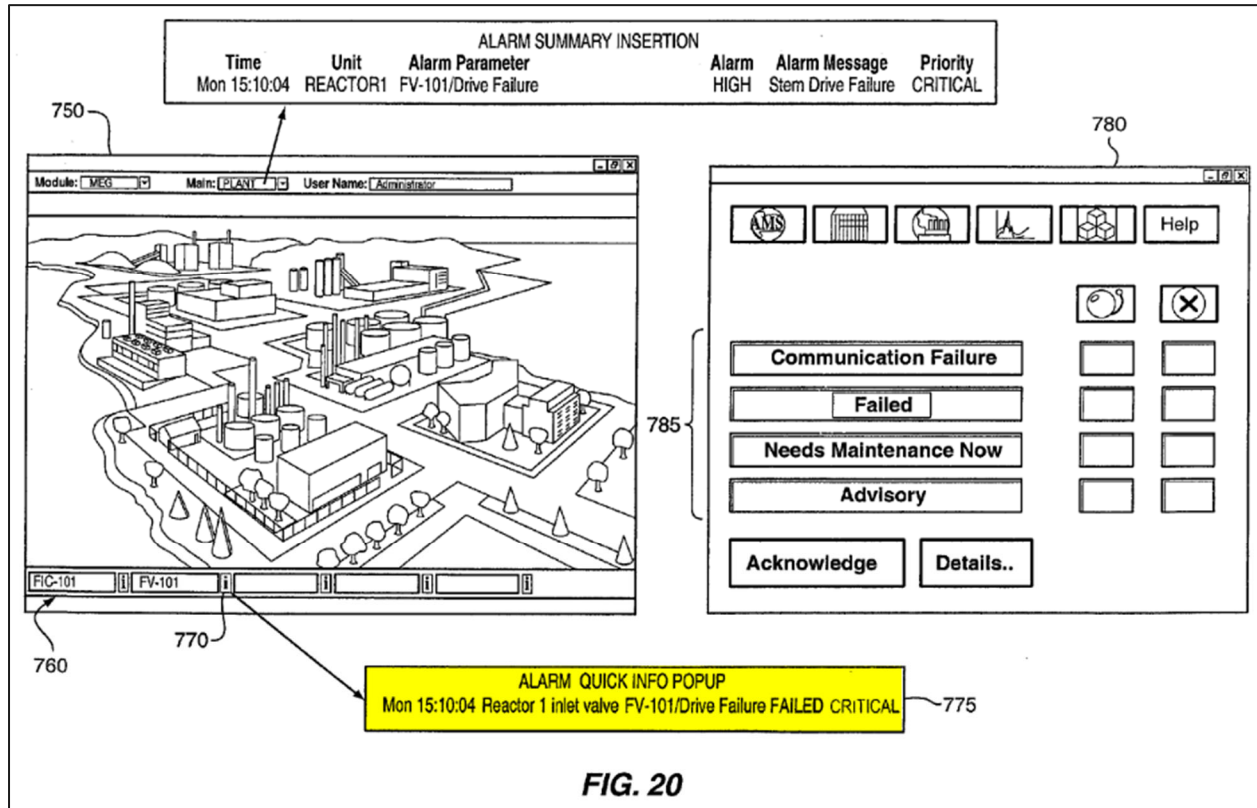
- d. obtaining additional information regarding the at least one control application using a second view of the performance indicators,

See §VI.A.1.d supra.

- e. the second view providing additional information on the at least one control application to permit a diagnosis of a possible cause of the degraded performance.

Eryurek teaches this element. Ex. 1003, ¶¶74-75. Continuing with the discussion above (§VI.A.1.d), each of the second views provides additional information on the at least one control application to permit a diagnosis of a possible cause of the degraded performance. For example, “a user may request device status information from a *pop-up window* such as the pop-up window 780 shown in FIG.

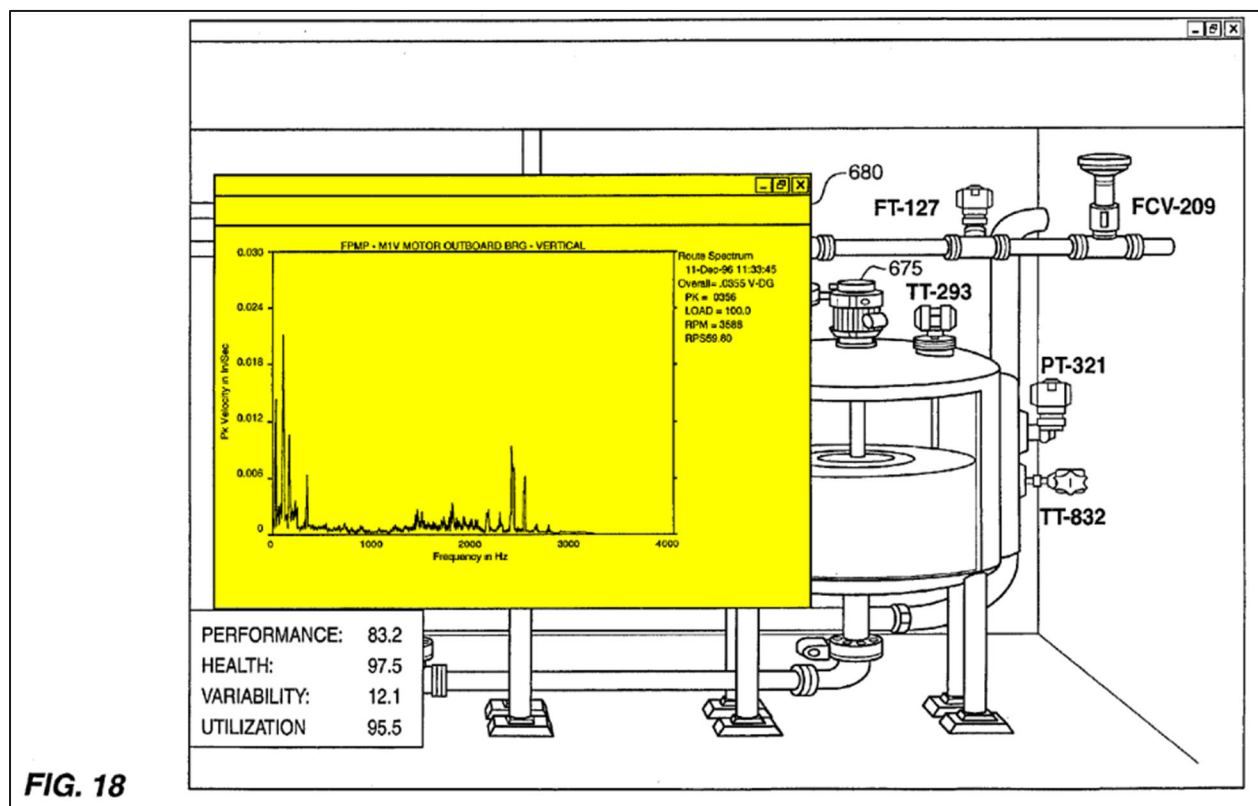
20. *This detailed status information may provide one or more possible diagnoses of problems* that may be responsible for the alarm condition (i.e., failed communication, failed device, needs maintenance now, advisory, etc.).” Ex. 1004, [0134]. The popup window 775 is thus a second view providing additional information on the process control application (e.g., FV-101) which is exhibiting degraded performance (e.g., alarm state) to permit a diagnosis of a possible cause of the degraded performance (e.g., “possible diagnoses of problems”). Ex. 1003, ¶74.



Ex. 1004, Fig. 20 (color added).

And as discussed above (§VI.A.1.d), Figure 18’s vibration analysis window (yellow) is a second view of the performance indicators. Ex. 1004, [0129]-[0130],

[0132], Figs. 16, 18. “A user may request such a pop-up window in response to an abnormally high or an abnormally low index value for the unit affected by the motor 675 and/or may request the window if an index value associated with the motor is indicative of a possible problem.” *Id.*, [0132]. A POSITA would have recognized the reason to look at a vibration diagram in response to an abnormal state is to diagnose the problem. Ex. 1003, ¶75. In fact, Eryurek explains using the vibration analysis to diagnose problems (*e.g.*, imbalance, misalignment, looseness, bearing wear). Ex. 1004, Figs. 28-31, [0132], [0139].



Id., Fig. 18 (color added).

8. Claim 42

- a. 42. The method of claim 39, wherein the first view is a summary view of the performance indicators and the second view is a more detailed view of the performance indicators.

See §VI.A.2.a supra.

9. Claim 53

- a. 53. The method of claim 39, further including displaying a mechanical view of the environmental control network.

See §VI.A.3.a supra.

B. GROUND II: Ridolfo (Ex. 1005)

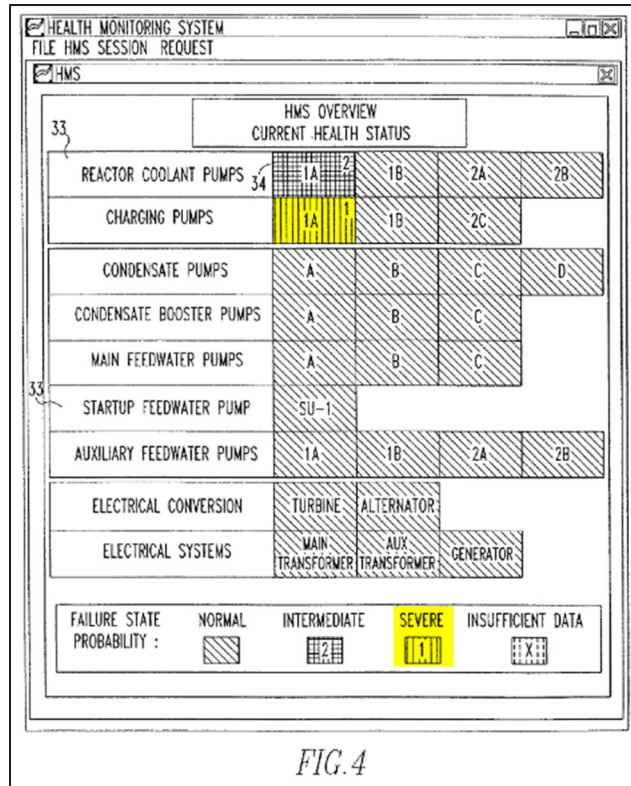
1. Claim 1

- a. 1. A method for analyzing performance of control applications in an environmental control network, comprising:

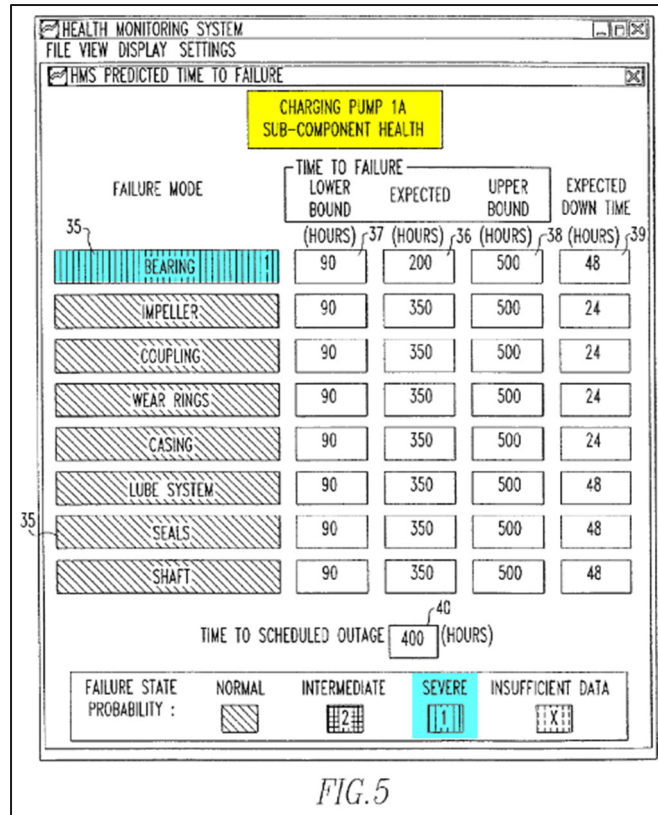
To the extent that the preamble is limiting, Ridolfo teaches it. Ex. 1003, ¶¶79-82. “A three-tier hierarchy of displays provide details on the health status of the components and systems displayed on the enterprise wide level display in a manner that supports a logical drill down to the health status of sub-components on Tier 1 to expected faults of the sub-components on Tier 2 to specific information relative to expected sub-component failures on Tier 3.” Ex. 1005, Abstract.

For example, Ridolfo teaches an overview (with capability to drill down) on various systems. For example, “FIG. 4 illustrates the interactive display 16 for the Apex-level overall (plant-wide) health status page. ... Each plant component or

system 33 that is being monitored for health status is indicated on the display by a uniquely identified box. The corresponding health status 34 for each component is designated on the display via color-coding of its corresponding box and by use of a numeric designator that is placed within a corner of the box.” *Id.*, [0104]. The ’880 Patent provides an example of a control application as “an HVAC control loop controlling some HVAC process variable such as temperature or pressure [that] is designed to maintain the process variable at a setpoint.” Ex. 1001, 5:38-43. Similarly, the Charging Pump 1A includes a control application controlling variables of the Pump’s operation (i.e., health status). Ex. 1003, ¶80. For example, Charging Pump 1A is in a severe health state as shown in Figure 4, while the additional detail in Figure 5 indicates a problem with the bearings of the Charging Pump. Ex. 1005, Fig. 4, [0104]-[0112]; Ex. 1003, ¶80.



Ex. 1005, Fig. 4 (color added).



Id., Fig. 5 (color added).

Ridolfo also teaches the method as applied to an environmental control network. In particular, Ridolfo teaches environmental systems associated with controlling the environment inside a nuclear reactor by, for example, coolant and charging pumps.⁴ *Id.*, [0059]; Ex. 1003, ¶81. The '880 Patent itself is broad, stating “[t]he controlled environment may be a room, hallway, building, a portion thereof,

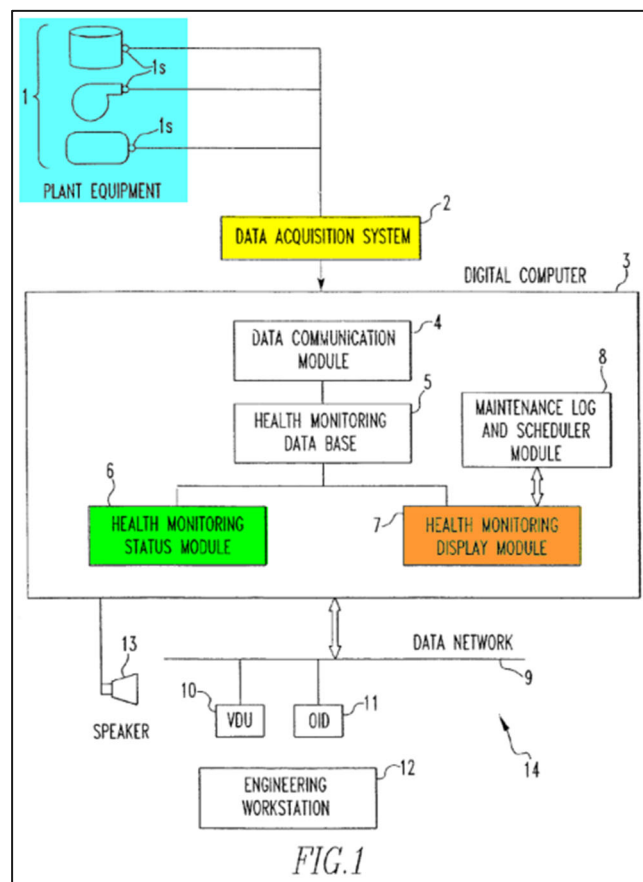
⁴ Coolant and charging pumps are used in a reactor environmental systems. *See* Ex. 1008.

or *any other internal environment*.” Ex. 1001, 5:64-66. A nuclear reactor is a building (or portion of a building) and an internal environment. Ex. 1003, ¶81.

Furthermore, Ridolfo also teaches “[t]he exemplary complex plant to which the Health Monitoring Display System is applied is a nuclear power plant. However, it will be apparent that the invention has application to other types of complex plants.” Ex. 1005, [0059]. A POSITA would have found it obvious to apply Ridolfo’s teachings to an environmental control network. Ridolfo relates to a tiered hierarchy for health status, allowing a user to have a broad overview and drill down into systems with degraded performance. Ex. 1005, Abstract. These teachings are applicable to environmental control systems generally. Ex. 1003, ¶82. For example, the ’880 Patent states that the “environmental control network may be employed to control *temperature, fluid flow*, humidity, lighting, boilers, chillers, power, security and similar systems in the internal environment.” Ex. 1001, 1:16-22. Similarly, Ridolfo describes its “Health Monitoring Display System” as including “Sensors” that “record plant and plant process parameters (such as *temperatures, flow rates*, pressures, radiation levels, valve positions, pump rotation speeds, vibration levels, acoustic signatures, etc.).” Ex. 1005, [0027]. A POSITA would have found it obvious that these similar components would be implemented in the same way whether they were components of an environmental control network or a Health Monitoring Display System. Ex. 1003, ¶82.

- b. receiving at least one performance indicator for each control application;

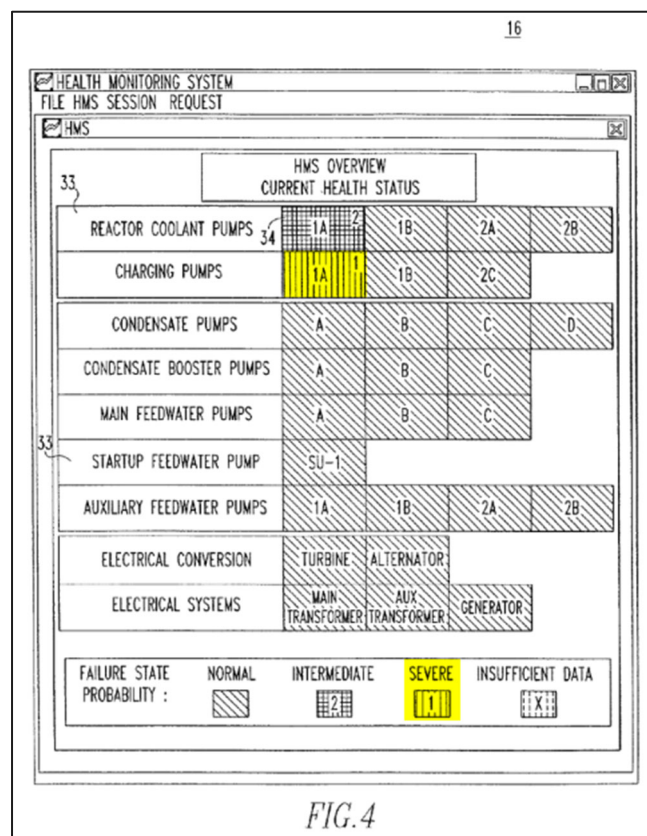
Ridolfo teaches this element. Ex. 1003, ¶¶83. For example, Ridolfo teaches a Data Acquisition System (yellow) to receive data from sensors located on plant equipment (blue), which is used by the Health Monitoring Status Module (green) to determine a health of a system (*i.e.*, control application), wherein the Health Monitoring Display Module (orange) then presents that health status to the user. Ex. 1005, [0027]-[0042], Fig. 1. The health status passed to the Health Monitoring Display Module constitutes receiving at least one performance indicator for each control application. Ex. 1003, ¶¶83.



Ex. 1005, Fig. 1 (color added).

- c. identifying at least one control application experiencing degraded performance using a first view of the performance indicators; and

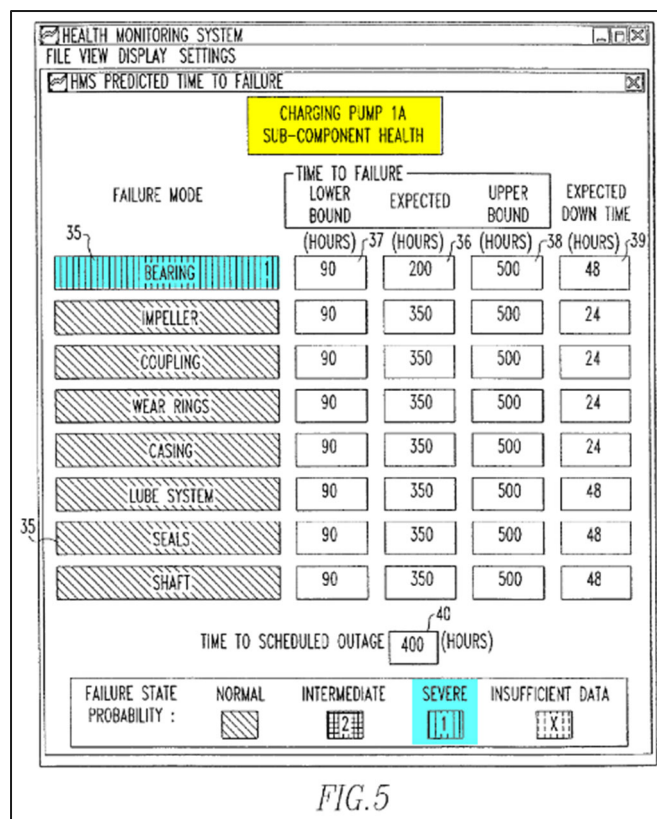
Ridolfo teaches this element. Ex. 1003, ¶84. Continuing the discussion above (§VI.B.1.b), the Health Monitoring Display Module displays the health status determined by the Health Monitoring Status Module. Ex. 1005, [0027]-[0042], Fig. 1. As illustrated in Figure 4, the user interface provided by the Health Monitoring Display Module identifies at least one control application experiencing degraded performance using a first view of the performance indicators (the apex view). *Id.*, [0104]-[0108].



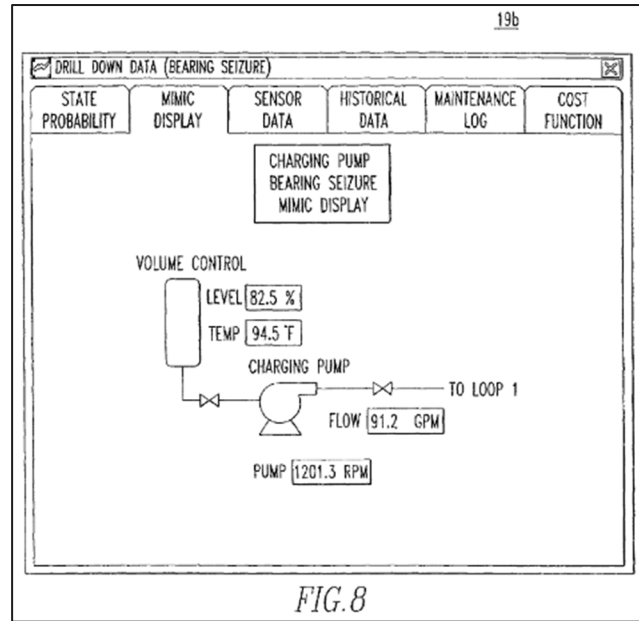
Id., Fig. 4.

- d. obtaining additional information regarding the at least one control application using a second view of the performance indicators.

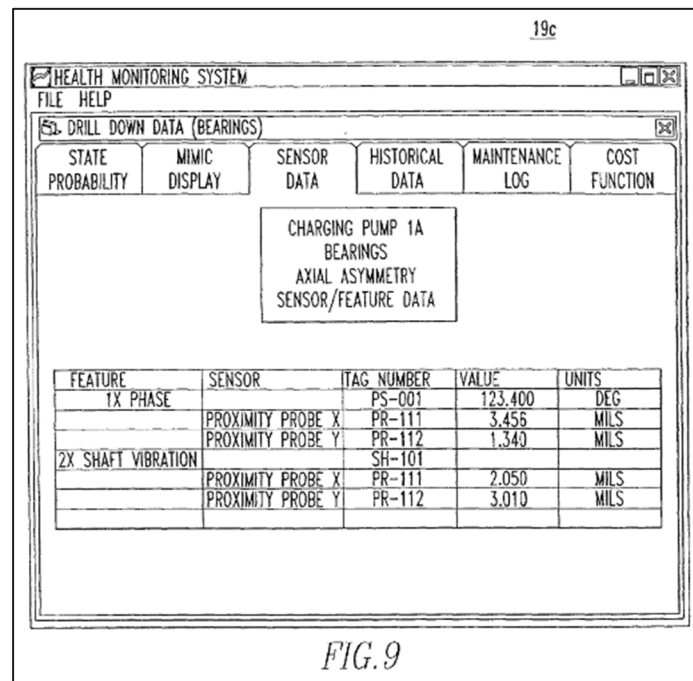
Ridolfo teaches this element. Ex. 1003, ¶¶85-87. Continuing the discussion above (§VI.B.1.c), the user interface allows the user to select the Charging Pumps and drill down to additional screens with additional information regarding the degraded performance. Ex. 1005, [0104]-[0112]. For example, one screen (Fig. 5) provides information indicating a problem with the bearings.



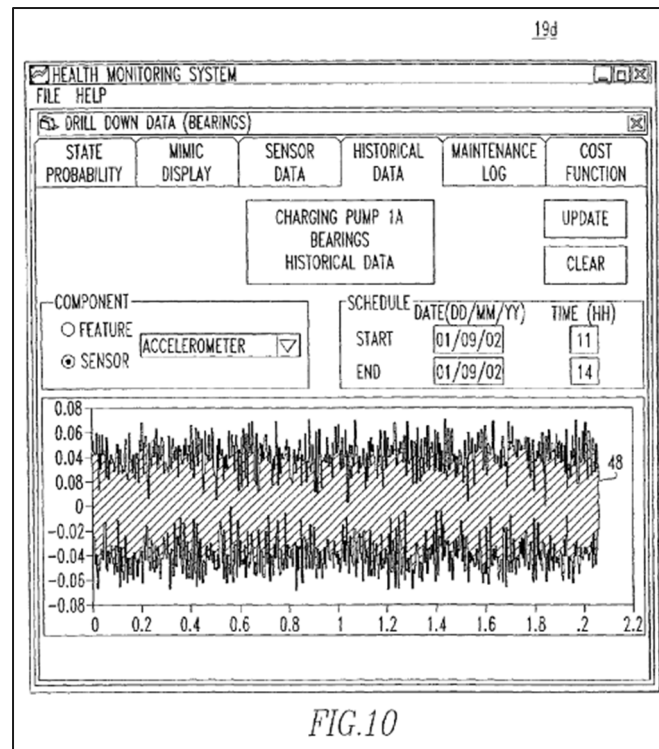
Id., Fig. 5 (color added). Likewise, even more information is available through other screens (*e.g.*, Figs. 8-10).



Id., Fig. 8.



Id., Fig. 9.



Id., Fig. 10.

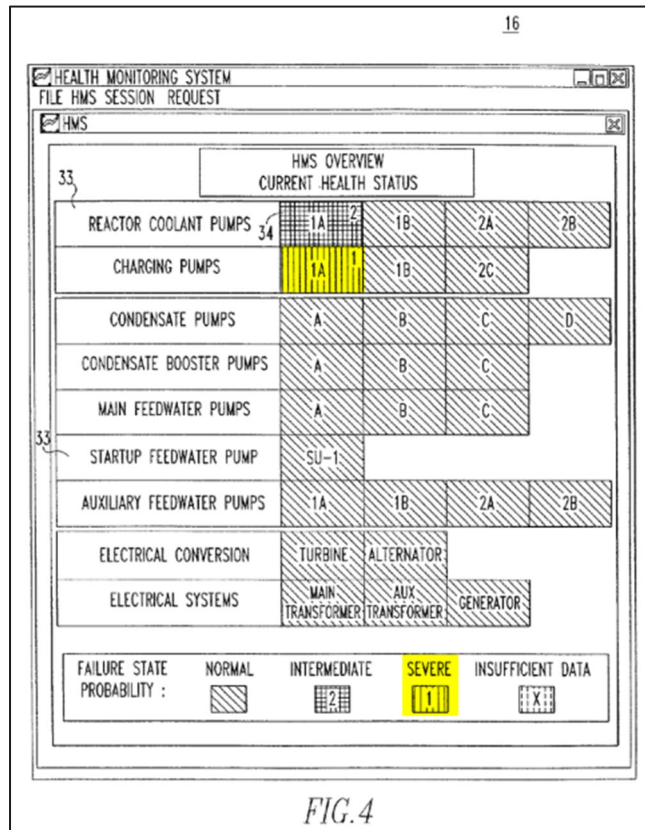
Accordingly, the user interface allows the user to obtain additional information regarding the at least one control application using a second view (*e.g.*, Figs. 5, 8, 9, or 10) of the performance indicators. Ex. 1003, ¶¶85-87.

2. Claim 4

- a. 4. The method of claim 1, wherein the first view is a summary view of the performance indicators and the second view is a more detailed view of the performance indicators.

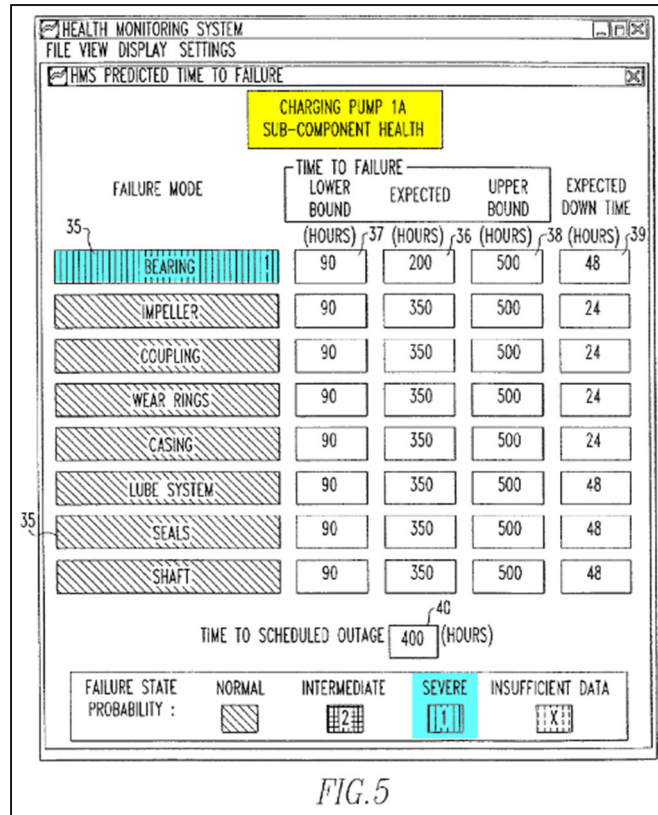
Ridolfo teaches this element. Ex. 1003, ¶¶88-91. Continuing the discussion above (§§VI.B.1.c, VI.B.1.d), the first view (*e.g.*, Fig. 4) is a summary view of the performance indicators while the second view (*e.g.*, Figs. 5, 8, 9, or 10) is a more detailed view of the performance indicators. Ex. 1003, ¶88.

Ridolfo explains “[t]he format and design of the overall health status summary page (Apex display) allows the enterprise level health status to be quickly ascertained” where Figure 4 (first view) depicts the “the Apex-level overall (plant-wide) health status page.” Ex. 1005, [0104]-[0112], [0135].



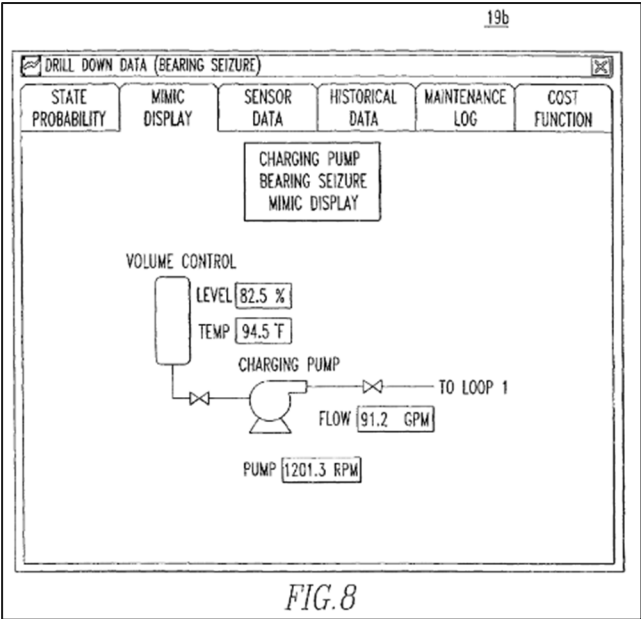
Id., Fig. 4 (color added).

Likewise, Figure 5 (second view) is a more detailed view of the performance indicators (*e.g.*, Charging Pump 1A’s bearings in a severe health state). *Id.*, [0104]-[0112], Figs. 4-5.

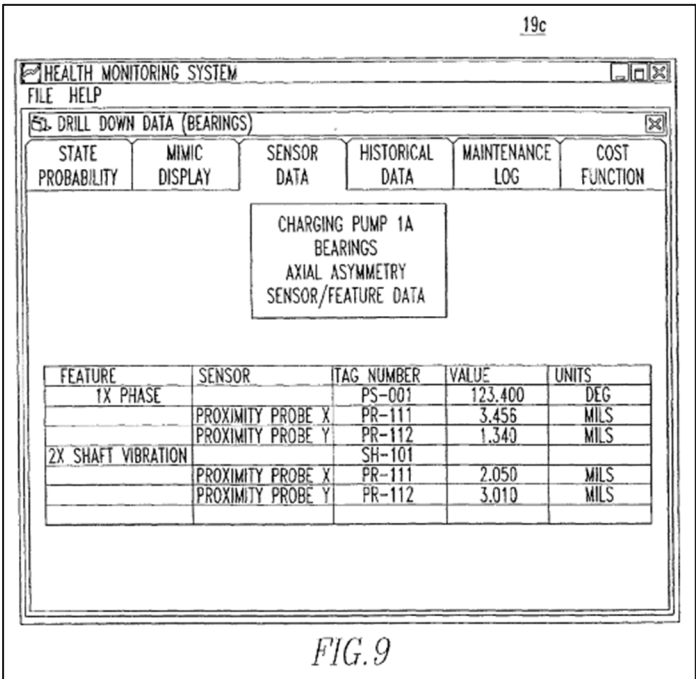


Id., Fig. 5 (color added).

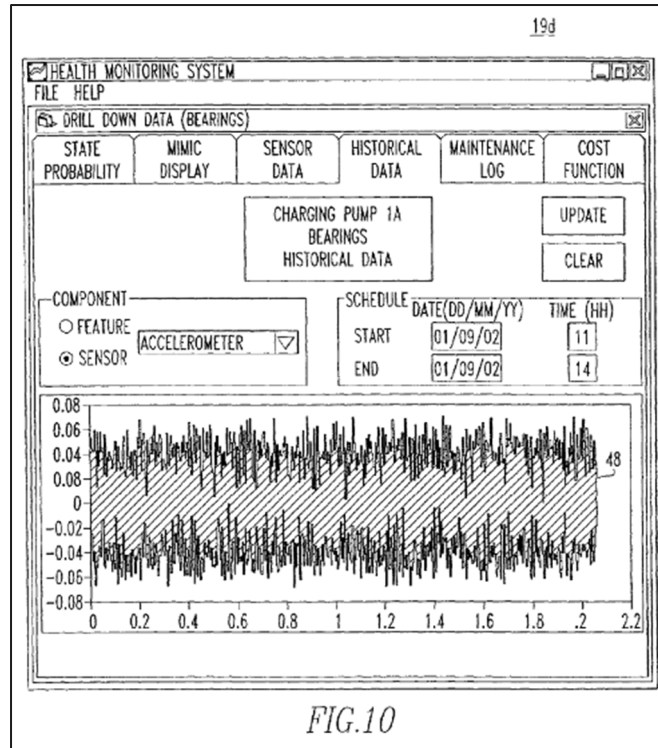
Similarly, additional second views (*e.g.* Figs. 8-10) “suppl[y] detailed low-level data which is used for analysis, diagnostics and repair planning purposes.” *Id.*, [0113], Figs. 8-10. Accordingly, Figs. 8-10 each represent second views which are more detailed view of the performance indicators. Ex. 1003, ¶¶90-91.



Ex. 1005, Fig. 8.



Id., Fig. 9.

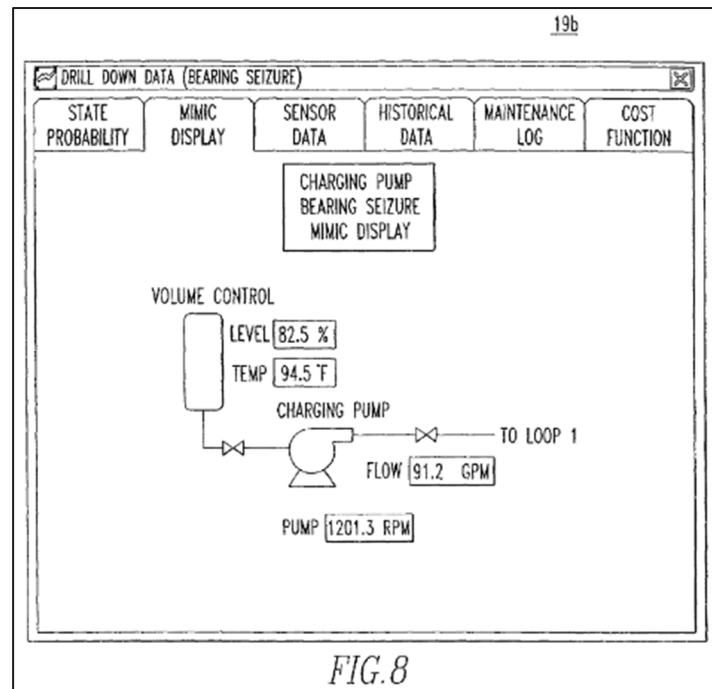


Id., Fig. 10.

3. Claim 15

- a. 15. The method of claim 1, further including displaying a mechanical view of the environmental control network.

Ridolfo teaches this element. Ex. 1003, ¶92. Continuing the discussion above (§VI.B.1), the user interface displays a mechanical view. This is illustrated, for example, in the mechanical system layout of Figure 8. Ex. 1005, [0021], [0117]. As can be seen, Figure 8 shows the mechanical arrangement of components (*e.g.*, a tank connected to a charging pump to a loop) of the environmental control network (*e.g.*, the network controlling the reactor environment). Ex. 1003, ¶92.



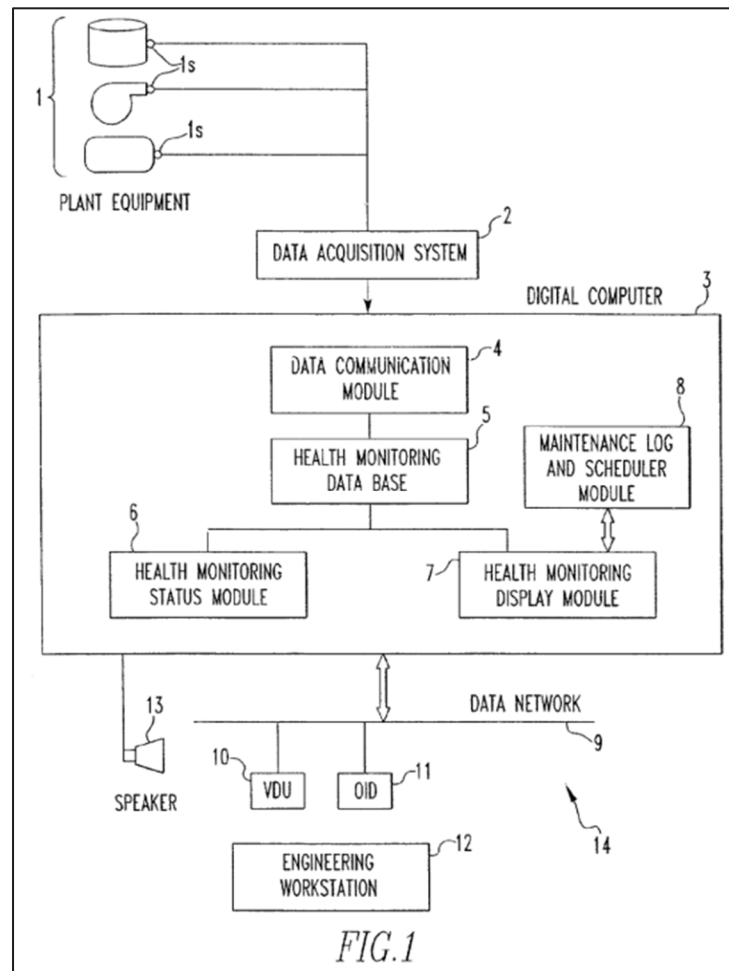
Ex. 1005, Fig. 8.

4. Claim 21

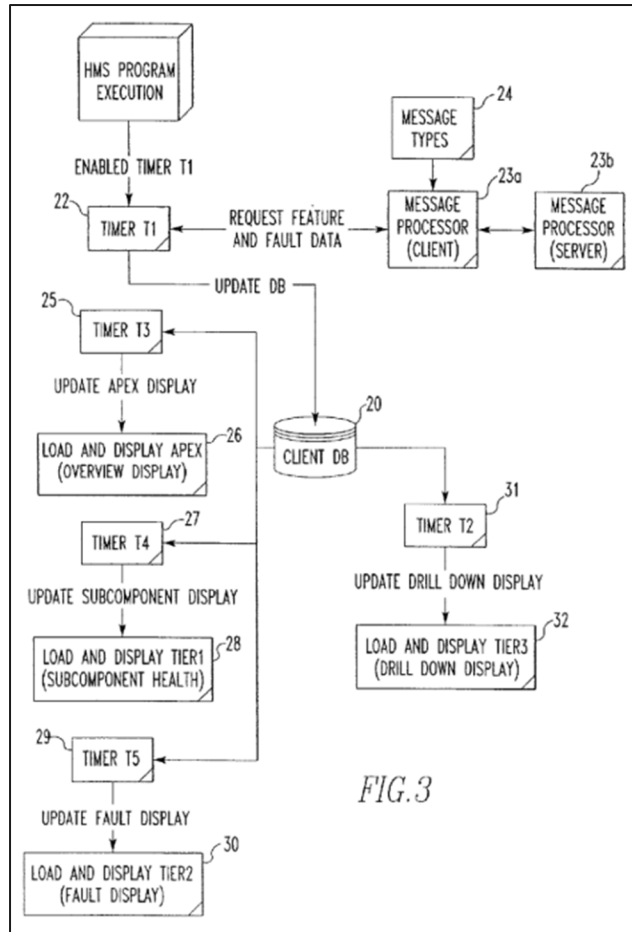
- a. 21. A computer program product for analyzing performance of control applications in an environmental control network, the program product in combination with and embodied on a computer-readable medium and comprising machine-readable program code for causing, when executed, one or more machines to perform the following method steps:

To the extent that the preamble is limiting, Ridolfo teaches it. Ex. 1003, ¶¶93-96. As discussed above (§VI.B.1.a), Ridolfo teaches a method for analyzing performance of control applications in an environmental control network. Moreover, applying Ridolfo to environmental control networks would have been obvious to a POSITA at the time of the claimed invention. *See* §VI.B.1.a *supra*.

Ridolfo's disclosures are performed using a computer program product. Ex. 1003, ¶¶94. For example, Ridolfo discloses a "digital computer" with "Video Display Units" and "Operator Input Devices" at "Engineering Workstations." Ex. 1005, [0027]-[0035], Fig. 1. Ridolfo provides extensive discussions of software modules to perform Ridolfo's teachings. *Id.*, *passim.*, *e.g.*, [0027]-[0035], Fig. 3.



Id., Fig. 1.



Id., Fig. 3.

Thus, Ridolfo discloses a computer program product (*e.g.*, software) for analyzing performance of control applications in an environmental control network (as discussed above, §VI.B.1.a), the program product in combination with and embodied on a computer-readable medium (*e.g.*, computer) and comprising machine-readable program code (*e.g.*, software on a computer) for causing, when executed, one or more machines to perform Ridolfo's teachings. Ex. 1003, ¶95.

To the extent Patent Owner argues that Ridolfo does not sufficiently teach a computer program product for performing Ridolfo's teachings, the program product

in combination with and embodied on a computer-readable medium and comprising machine-readable program code for causing, when executed, one or more machines to perform Ridolfo's teachings, a POSITA would have found this element obvious, at the time of the claimed invention. Ex. 1003, ¶96. Because Ridolfo teaches software for performing its functions, a POSITA would have considered it obvious the software is a computer program product. *Id.* Furthermore, a POSITA would have recognized that computers (*e.g.*, the computer and workstations of Ridolfo) comprise a computer-readable medium for storing machine-readable program code to perform operations (*i.e.*, software running on a computer). *Id.* Simply put, it is not an invention to run software on a computer. *Id.*

- b. displaying performance indicators for the control applications using a first view that allows at least one control application exhibiting degraded performance to be identified; and

Ridolfo teaches this element. Ex. 1003, ¶97. This is the same first view functionality discussed above for Claim 1, where the user interface displays performance indicators for the control applications using a first view that allows at least one control application exhibiting degraded performance to be identified. *See* §VI.B.1.c *supra*.

- c. displaying performance indicators using a second view that provides additional details regarding the performance of the at least one control application.

Ridolfo teaches this element. Ex. 1003, ¶98. This is the same second view functionality discussed above for Claim 1, where the user interface displays performance indicators using a second view that provides additional details regarding the performance of the at least one control application. *See* §VI.B.1.d *supra*.

5. Claim 24

- a. 24. The program product of claim 21, wherein the first view is a summary view of the performance indicators and the second view is a more detailed view of the performance indicators.

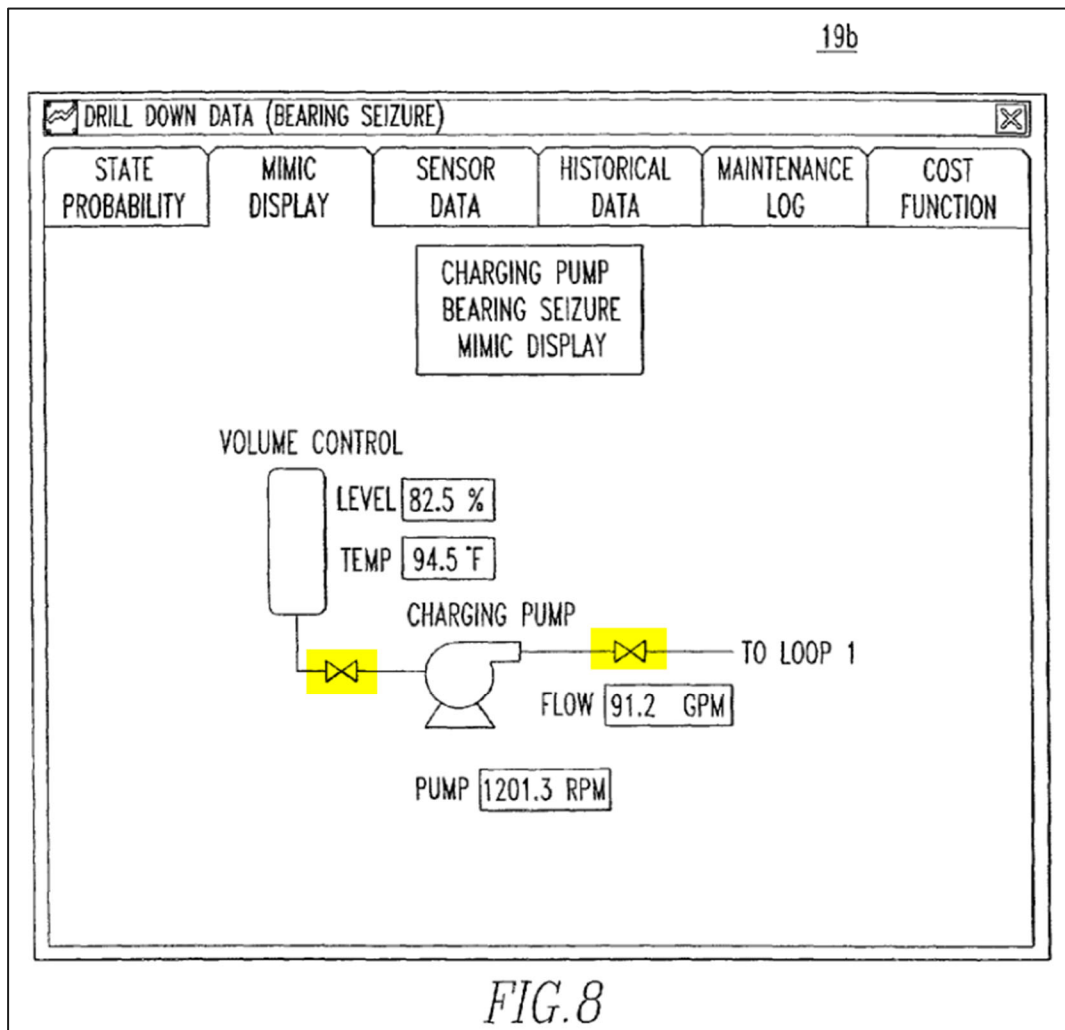
Ridolfo teaches this element. Ex. 1003, ¶99. As discussed above (§**Error! Reference source not found.**), the first view is a summary view of the performance indicators and each of the second views is a more detailed view of the performance indicators.

6. Claim 37

- a. 37. The program product of claim 21, the program code causes a control diagram view of the environmental control network to be displayed.

Ridolfo teaches this element. Ex. 1003, ¶¶100-101. Continuing the discussion above (§§VI.B.1, VI.B.4), Ridolfo teaches program code to display various views. Some of these views displayed by the user interface comprise a control diagram

view, as illustrated in Figure 8. Ex. 1005, [0021], [0117]. As can be seen, the control diagram view includes various control components and their relations, such as valves (yellow) between the tank and charging pump and between the charging pump and loop. Ex. 1003, ¶100.



Ex. 1005, Fig. 8 (color added).

As discussed above (§VI.B.1.a), this view is of an environmental control network (e.g., cooling system for a reactor). Moreover, applying Ridolfo to

environmental control networks would have been obvious to a POSITA at the time of the claimed invention. *See* §VI.B.1.a *supra*.

7. Claim 39

- a. 39. A method for diagnosing performance of control applications in an environmental control network, comprising:

To the extent that the preamble is limiting, Ridolfo teaches it. Ex. 1003, ¶102. As discussed above (§VI.B.1.a), Ridolfo teaches a method for analyzing performance of control applications in an environmental control network. This analysis is in furtherance of diagnosing issues, as taught by Ridolfo. Ex. 1003, ¶102. For example, Ridolfo teaches a multi-tiered display where the upper level flags a problem (*e.g.* charging pumps in a severe health state) and lower levels are “used for analysis, diagnostics and repair planning purposes.” Ex. 1005, [0091]; *see also id.*, [0113], [0128], [0130], [0141], Fig. 2. Ridolfo describes numerous techniques that may be involved in the “incipient failure detection function” including “Trend Analysis,” “Pattern Recognition,” “Correlation Techniques,” “Data Comparison,” and other analyses. *Id.*, [0042]-[0083]. These techniques and analyses are ways of diagnosing the performance of the system. Ex. 1003, ¶102.

- b. receiving at least one performance indicator for each control application;

See §VI.B.1.b *supra*.

- c. identifying at least one control application exhibiting degraded performance using a first view of the performance indicators; and

See §VI.B.1.c supra.

- d. obtaining additional information regarding the at least one control application using a second view of the performance indicators,

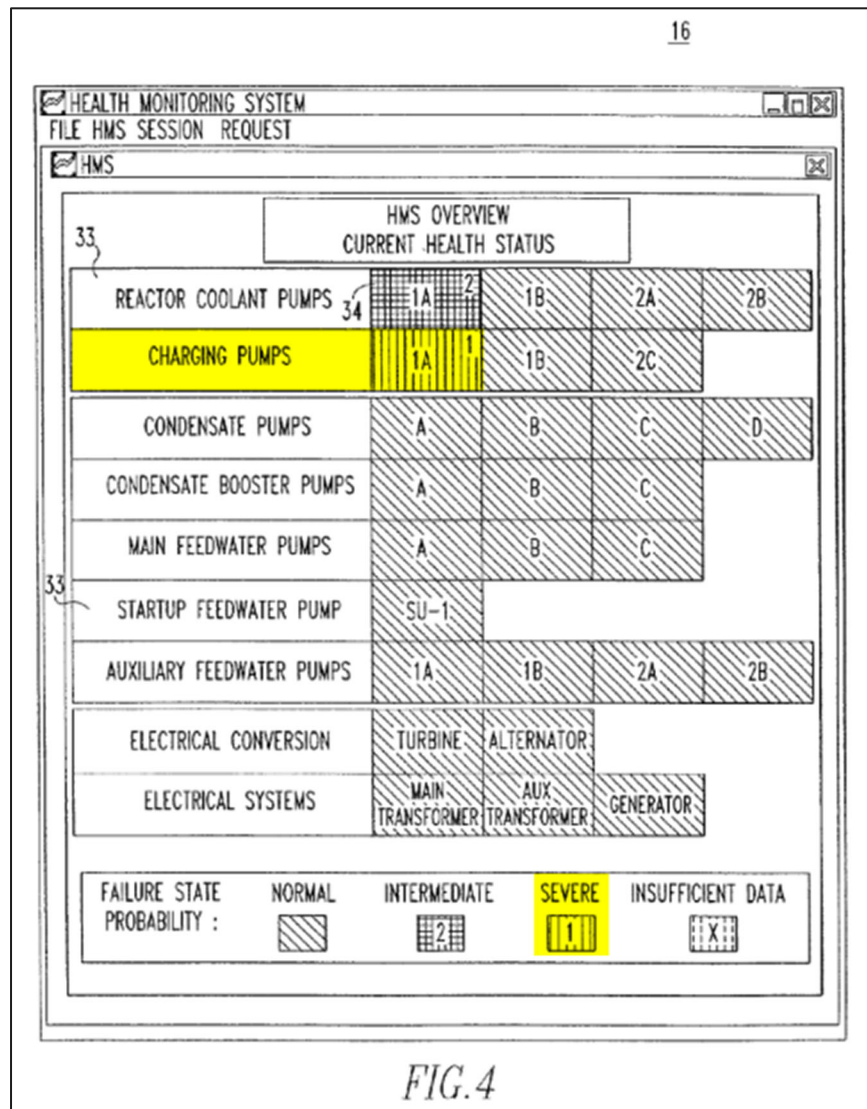
See §VI.B.1.d supra.

- e. the second view providing additional information on the at least one control application to permit a diagnosis of a possible cause of the degraded performance.

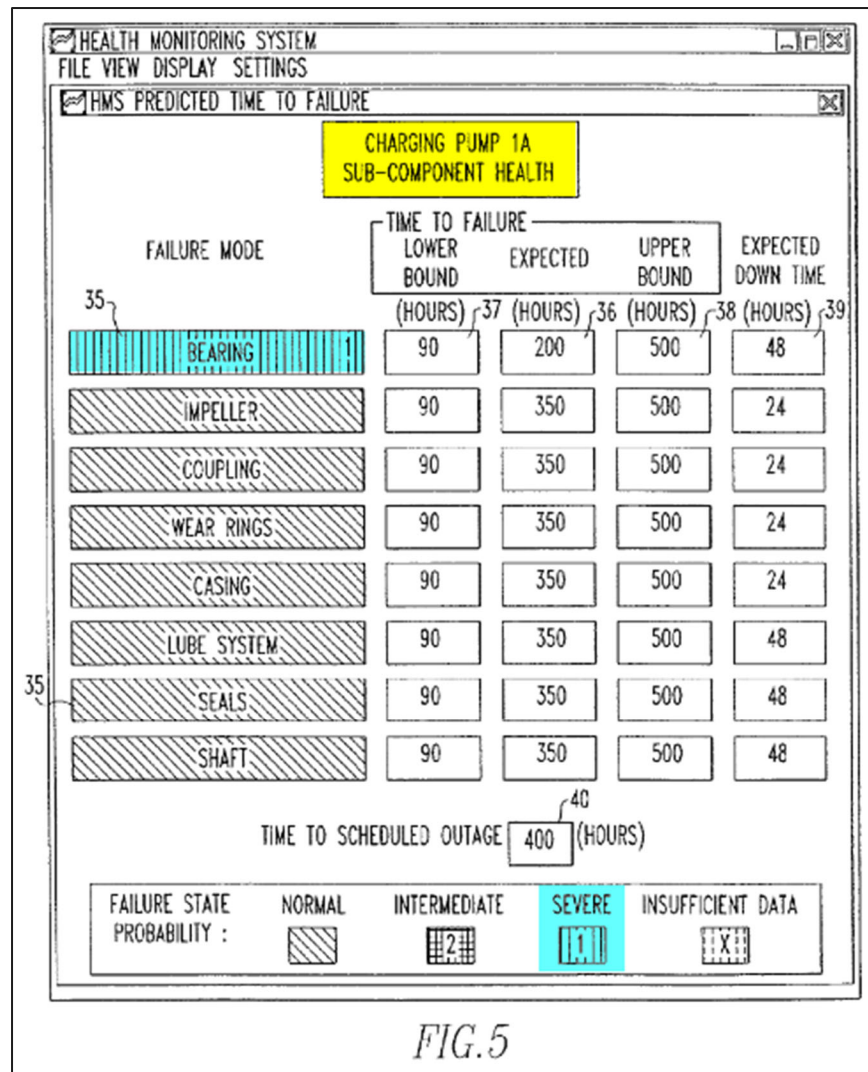
Ridolfo teaches this element. Ex. 1003, ¶¶106-107 As discussed above (§VI.B.1.d), Ridolfo teaches obtaining additional information regarding the at least one control application using a second view of the performance indicators. Ridolfo further explains a multi-tiered display where the upper level flags a problem (*e.g.* charging pumps in a severe health state) and lower levels are “used for analysis, diagnostics and repair planning purposes.” Ex. 1005, [0091]; *see also id.*, [0113], [0128], [0130], [0141], Fig. 2. As discussed above (§VI.B.7.a), Ridolfo teaches numerous techniques and analyses, the results of which are displayed in these lower levels of displays. *Id.*, [0042]-[0083].

Indeed, the point of being able to drill down on systems experiencing degraded performance is to diagnose the possible cause of the degraded performance. Ex. 1003, ¶107. For example, the Figure 4 (first view) indicates Charging Pump 1A is experiencing degraded performance, while Figure 5 (second

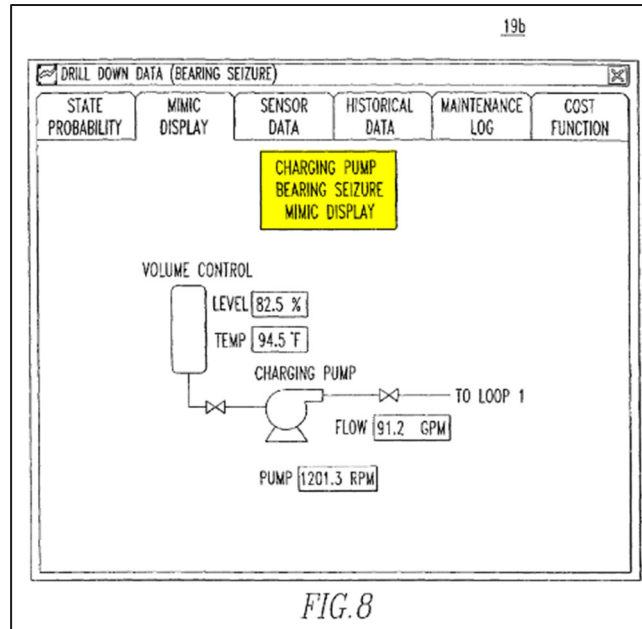
view) permits a diagnosis of a possible cause of the degraded performance (*e.g.*, Charging Pump 1A's bearings in a severe health state). Ex. 1005, [0104]-[0112], Figs. 4-5. Similarly, additional second views (*e.g.* Figs. 8-10) "suppl[y] detailed low-level data which is used for analysis, diagnostics and repair planning purposes." *Id.*, [0113], Figs. 8-10.



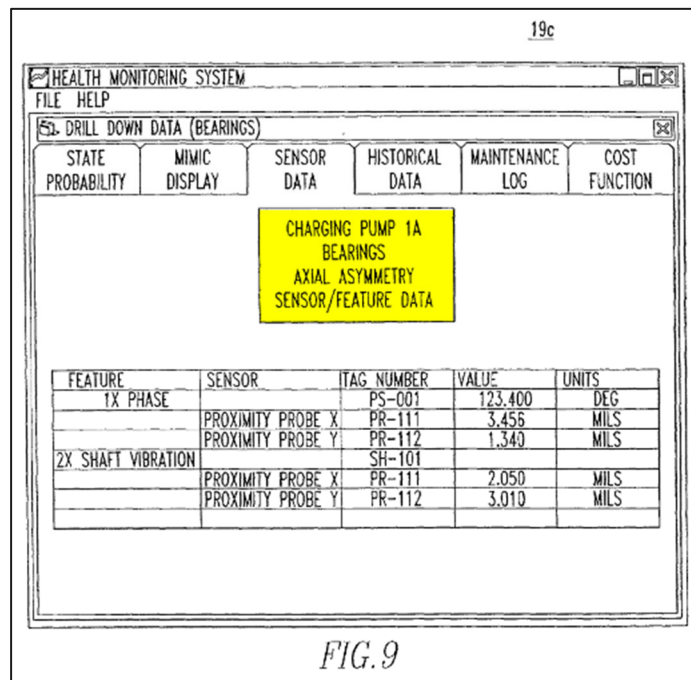
Id., Fig. 4 (color added).



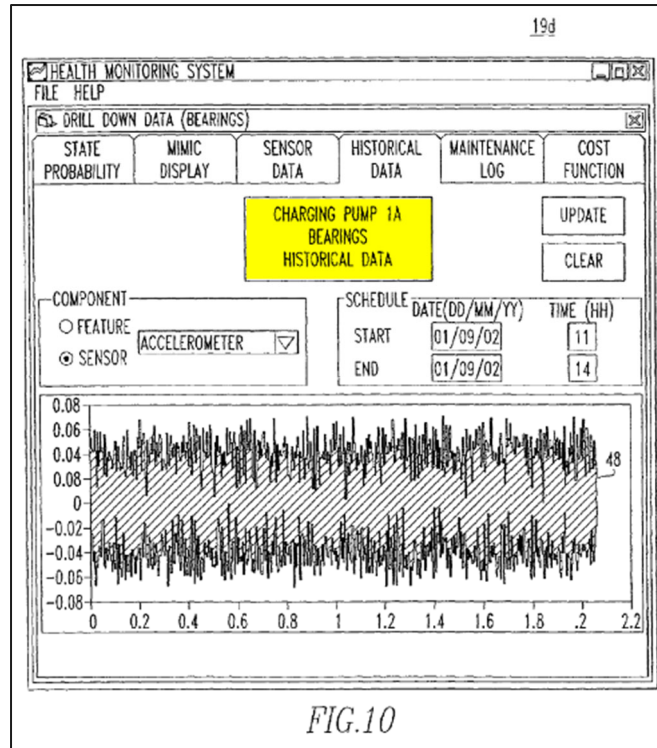
Id., Fig. 5 (color added).



Id., Fig. 8 (color added).



Id., Fig. 9 (color added).



Id., Fig. 10 (color added).

8. Claim 42

- a. 42. The method of claim 39, wherein the first view is a summary view of the performance indicators and the second view is a more detailed view of the performance indicators.

See §VI.B.2.a supra.

9. Claim 53

- a. 53. The method of claim 39, further including displaying a mechanical view of the environmental control network.

See §VI.B.3.a supra.

VII. NO FACTORS JUSTIFY DISCRETIONARY DENIAL

Patent Owner filed a complaint alleging infringement of the '880 Patent, along with eight other patents, on December 22, 2021 in Delaware. *See* Case No. 1:21-cv-

01796-MN (D. Del. December 22, 2021) (“Delaware Litigation”). Patent Owner then filed a separate complaint alleging infringement of four additional patents on June 29, 2022 in Texas. *See* Case No. 2:22-CV-00243-JRG-RSP (June 29, 2022) (“Texas Litigation”). Patent Owner played a shell game of assertions, at one point adding several of the patents from the Delaware Litigation to the Texas Litigation. Following several amended complaints and extensions requested by Patent Owner between both cases, it consolidated its two actions into the Delaware Litigation, identified just over half of its asserted patents (including the ’880 Patent) for actual litigation on September 13, 2022, and finally served its initial infringement contentions specifically asserting the Challenged Claims on September 30, 2022. In response, Petitioner diligently filed this Petition shortly thereafter challenging those asserted claims.⁵ A trial date has not been set by the court in the Delaware Litigation, and the case is still in its infancy. No *Fintiv* factor justifies discretionary denial of this Petition. *See Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020).

⁵ The unpatentability positions herein are based, in part, on Patent Owner’s apparent positions in the co-pending litigation. Nothing herein should be taken as an endorsement of those positions in the co-pending litigation.

Further, discretionary denial would be inappropriate in this case because the Grounds in this Petition present “evidence [that], if unrebutted in trial, would plainly lead to the conclusion that one or more claims are unpatentable by the preponderance of evidence.” *Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation*, Memorandum of Director Katherine K. Vidal (June 21, 2022).⁶ Each of Eryurek and Ridolfo render obvious every Challenged Claim, as detailed above, and thus provide “compelling evidence of unpatentability.” *Nokia of Am. v. TQ Delta, LLC*, IPR2022-006556, Paper 14, at 9 (P.T.A.B. Nov. 7, 2022); *Samsung Elec. Co., Ltd. v. MemoryWeb, LLC*, IPR2022-00221, Paper 10, 9-10 (P.T.A.B. Aug. 1, 2022). Accordingly, and for this additional reason, the Board should not exercise its discretion to deny institution under 35 U.S.C. § 314(a).

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

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

Willow Technologies LLC, Willow Technology Operations Pty Limited, Willow Technology USA, Inc., and Willow Technology Corporation Limited are

⁶ Available at:

https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf.

the real parties-in-interest.

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

This case may affect, or be affected by, decisions in the proceedings in the Delaware Litigation discussed above.

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

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

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

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

X. CERTIFICATION OF GROUNDS FOR STANDING

Petitioner certifies that the '880 Patent is available for IPR and that Petitioner is not barred or estopped from requesting an IPR challenging the claims on the grounds identified in this Petition. Petitioner certifies: (1) Petitioner is not the owner of the '880 Patent; (2) Petitioner (or any real party-in-interest) has not filed a civil action challenging the validity of any claim of the '880 Patent; (3) Petitioner files this Petition within one year of the date it was served with a complaint asserting infringement of the '880 Patent; (4) estoppel provisions of 35 U.S.C. §315(e)(1) do not prohibit this IPR; and (5) this Petition is filed after the '880 Patent was granted.

XI. CONCLUSION

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

Petition for *Inter Partes* Review of U.S. Patent No. 7,031,880

Date: December 13, 2022

Respectfully submitted,

/s/ Russell E. Levine

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CERTIFICATE OF COMPLIANCE

This Petition complies with the type-volume limitations as mandated in 37 C.F.R. § 42.24, totaling 7,820 words. Counsel has relied upon the word count feature provided by Microsoft Word.

/s/ Russell E. Levine

Russell E. Levine, P.C.

CERTIFICATE OF SERVICE

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

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

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

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

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