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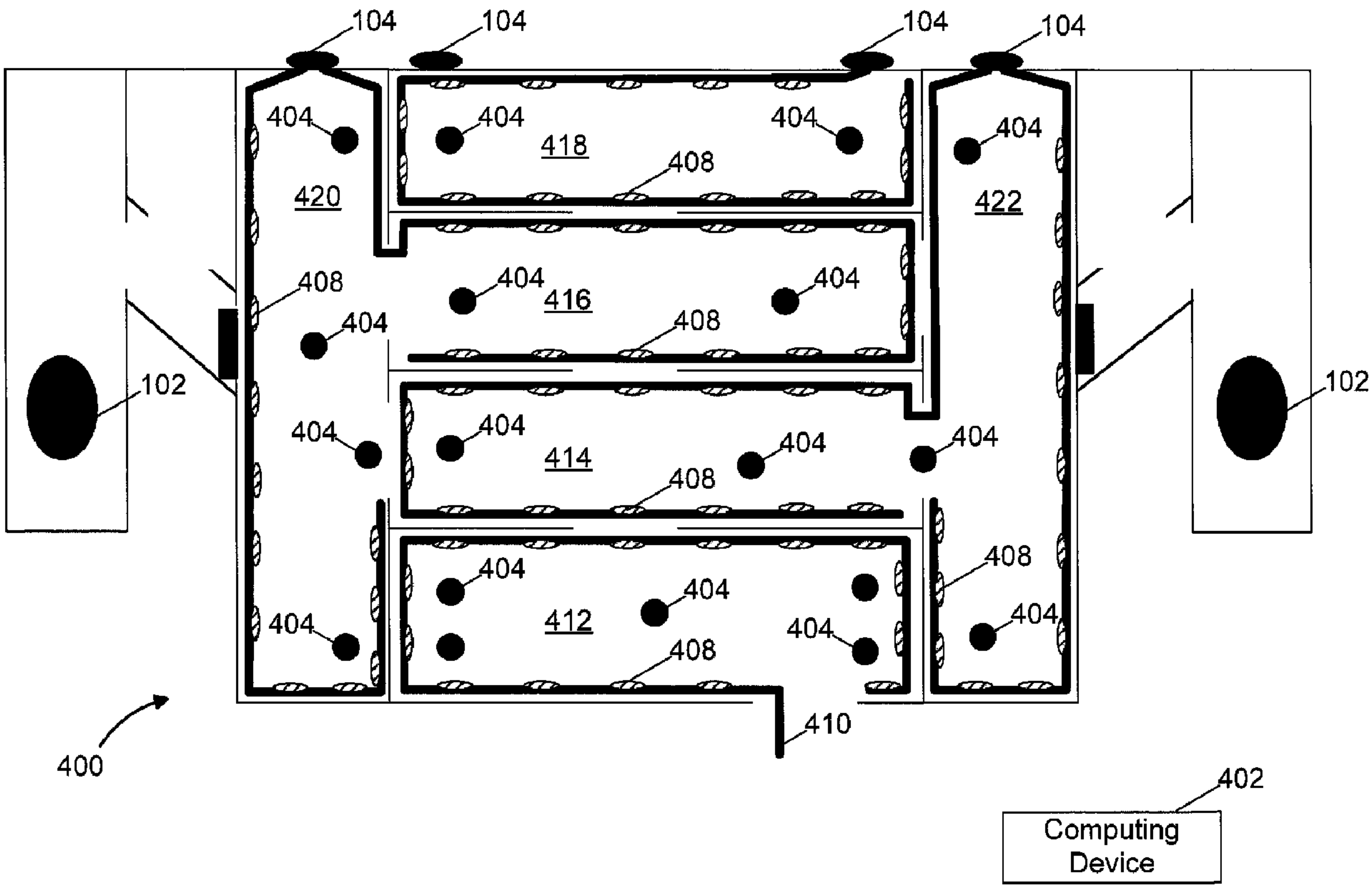
(54) **Titre : MECANISMES ET METHODES DE CONTROLE D'UN ENVIRONNEMENT DE RESERVOIR DE CARBURANT**
(54) **Title: SYSTEMS AND METHODS FOR CONTROLLING A FUEL TANK ENVIRONMENT**



(57) **Abrégé/Abstract:**
A system for controlling an environment within a fuel tank is provided. The system includes a conduit with a plurality of vents, wherein the conduit defines a path through the fuel tank, and wherein the conduit is configured to direct a flow of air along the path and out the plurality of vents.

ABSTRACT

A system for controlling an environment within a fuel tank is provided. The system includes a conduit with a plurality of vents, wherein the conduit defines a path through the fuel tank, and wherein the conduit is configured to direct a flow of air along the path and out the plurality of vents.

SYSTEMS AND METHODS FOR CONTROLLING A FUEL TANK ENVIRONMENT

BACKGROUND

The subject matter described herein generally relates to controlling an environment of a fuel tank and, more particularly, to systems and methods for curing a sealant within a fuel tank of an aircraft.

During an assembly of a fuel tank of an aircraft, a sealant is applied within an interior of the fuel tank to seal the fuel tank and keep it from leaking. After a sealant is applied, the sealant must be cured before the assembly of the fuel tank is complete. Two of the main factors that affect the curing process are temperature and relative humidity (RH) within the fuel tank. Generally speaking, as the temperature and/or RH increase, the time it takes to cure a sealant decreases. As a result, curing times of a sealant may vary based on time of year and/or factory environment. For example, during summer, a sealant may take up to **10**% longer than normal to cure due to low RH and uneven air distribution. During winter, a sealant may take up to twice as long to cure due to low temperatures, low RH, and uneven air distribution.

However, while the sealant is curing within the fuel tank, mechanics may be required to work for extended periods of time inside the fuel tank. Thus, for the safety of the mechanics working therein, the environment of the fuel tank must be monitored such that the temperature and/or RH are maintained at acceptable levels. For example, if the temperature within the fuel tank exceeds **79**° F, the mechanics are required to exit the fuel tank for safety purposes. Thus, while the sealant may cure more quickly as the temperature increases, the mechanics are unable to continue working in an environment that is above **79**° F.

Further, chemicals such as isopropanol (IPA) and methyl propyl ketone (MPK) used during the assembly of a fuel tank require the fuel tank to be heavily ventilated in order to create an environment inside the fuel tank that is suitable/safe for mechanics working therein. However, current systems and methods of ventilating a fuel tank create large variances in temperature, RH levels, and air circulation throughout the fuel tank. As a result, curing times of a sealant are non-uniform throughout the fuel tank and dead spots created by poor circulation enable a pooling effect of volatile organic compounds (VOCs). This not only creates discomfort for the mechanics working within the fuel tank, but can lead to such a dangerous environment that prohibits the mechanics to work within the fuel tank.

Therefore, there is a need in the field of curing sealants within fuel tanks for a system and method that control an environment of a fuel tank such that a curing time of a sealant, a mechanics discomfort, VOC pooling, and variances between temperature/RH levels throughout the fuel tank are reduced.

BRIEF DESCRIPTION

In one aspect, a system for controlling an environment within a fuel tank is provided. The system includes a conduit with a plurality of vents, wherein the conduit defines a path through the fuel tank, and wherein the conduit is configured to direct a flow of air along the path and out the plurality of vents. The system also includes at least one sensor configured to measure at least one of temperature and relative humidity within the fuel tank; and a controller comprising a processor programmed to receive, from the at least one sensor, a current measure of at least one of temperature and relative humidity within the fuel tank. The fuel tank may be an aircraft fuel tank.

In another aspect, a method for controlling an environment within a fuel tank is provided. The method includes receiving a current measure of a temperature and/or a relative humidity within the fuel tank, and increasing or decreasing one or measure of a temperature and/or a relative humidity within the fuel tank, and increasing or decreasing one or more of a temperature of a flow of air and a humidity within the flow of air directed through a plurality of vents along a conduit that defines a path through the fuel tank.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure **1** is an illustrative example of a path of an airflow through a fuel tank using known ventilation systems and methods.

Figure **2** is a block diagram illustrating an exemplary system for use in controlling an environment of a fuel tank.

Figure **3** is a flow diagram depicting a method of controlling an environment of a fuel tank.

Figures **4** is an illustrative example of a fuel tank using ventilation systems and methods described herein.

Figure **5** provides actual environmental data captured throughout various locations within a fuel tank.

Figure **6** illustrates actual curing times of sealants throughout various locations within a fuel tank based on the data shown in Figure **5**.

Figure **7** illustrates calculated curing times of sealants throughout various locations within a fuel tank based on embodiments of the present disclosure.

DETAILED DESCRIPTION

While embodiments of the disclosure are illustrated and described herein with reference to controlling an environment within a fuel tank, and more specifically, to more of a temperature of a flow of air and a humidity within the flow of air directed through a plurality of vents along a conduit that defines a path through the fuel tank.

In yet another aspect, one or more non-transitory computer readable media storing thereon processor-executable instructions for controlling an environment within a fuel tank is provided. The instructions, when executed by a processor, cause the processor to perform the steps of receiving a current measure of a temperature and/or a relative humidity within the fuel tank, and increasing or decreasing one or more of a temperature of a flow of air and a humidity within the flow of air directed through a plurality of vents along a conduit that defines a path through the fuel tank.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure **1** is an illustrative example of a path of an airflow through a fuel tank using known ventilation systems and methods.

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Figure **3** is a flow diagram depicting a method of controlling an environment of a fuel tank.

Figures **4** is an illustrative example of a fuel tank using ventilation systems and methods described herein.

Figure **5** provides actual environmental data captured throughout various locations within a fuel tank.

Figure **6** illustrates actual curing times of sealants throughout various locations within a fuel tank based on the data shown in Figure **5**.

Figure **7** illustrates calculated curing times of sealants throughout various locations within a fuel tank based on embodiments of the present disclosure.

DETAILED DESCRIPTION

While embodiments of the disclosure are illustrated and described herein with reference to controlling an environment within a fuel tank, and more specifically, to systems and methods for curing a sealant within a fuel tank of an aircraft, aspects of the disclosure are operable with any system that performs the functionality illustrated and described herein, or its equivalent.

With reference to Figure **1**, current systems and methods for venting a fuel tank **100** utilize two **10**" ducts **102** located in an outboard section of fuel tank **100** and four **4**" ducts **104** located in a forward section of fuel tank **100**. This enables "new air" to be blown into fuel tank **100** while "old air" is being pushed out of ducts **102** and **104**. During the assembly of fuel tank **100**, a sealant (not shown) is applied within an interior of fuel tank **100** in order to keep fuel tank **100** from leaking. However, in order to enable the sealant to cure properly, the temperature and relative humidity (RH) within fuel tank **100** must be controlled. For example, a sealant such as an A**2** type sealant or a B**2** type sealant require an environment of **77**°F and **50**% RH to enable curing within **72** hours and **24** hours, respectively. However, due to high velocities (e.g., **5**,**000** fps) of an airflow **106** entering fuel tank **100** at opening **108**, along with static/fixed temperatures of airflow **106**, static/fixed RH of airflow **106**, and a design of fuel tank **100**, hot spots (e.g., **85**°F at **108** in Figure **1**) and cold spots (e.g., **65**°F at **110** in Figure **1**) develop throughout fuel tank **100**. This not only affects a curing of the sealant and a comfort level for the mechanics working within fuel tank **100**, but also causes a pooling effect of volatile organic compounds (VOCs) which forms dead spots **110** (e.g., areas created as a result of poor circulation as airflow **106** takes the path of least resistance), creating a potentially dangerous environment.

With reference now to Figure **2**, a block diagram illustrating an exemplary system **200** for use in controlling an environment of a fuel tank **202** in accordance with the embodiments of the present disclosure will now be described. While system **200** is described herein as being associated with fuel tank **202** of an aircraft, system **200** is applicable with numerous other environments and/or configurations, such as a sewage management system and fuel tanks of marine vessels.

System **200** includes a computing device (e.g., controller) **204**, a processor **206** for executing instructions, and a memory device **208**. Computing device **204** may operate in a networked environment using logical connections to one or more remote computers. Although described in connection with an exemplary computing system environment, embodiments of the present disclosure are operational with numerous other general purpose or special purpose computing system environments or configurations. Examples of well-known computing systems, environments, and/or configurations that may be suitable for use with aspects of the present disclosure include, but are not limited to, personal computers, server computers, hand-held or laptop devices, multiprocessor systems, microprocessor-based systems, programmable consumer electronics, mobile telephones, network PCs, minicomputers, mainframe computers, distributed computing environments that include any of the above systems or devices, and the like.

Processor **206** may include a processing unit, such as, without limitation, an integrated circuit (IC), an application specific integrated circuit (ASIC), a microcomputer, a programmable logic controller (PLC), and/or any other programmable circuit. Processor **206** may include multiple processing units (e.g., in a multi-core configuration). Computing device **204** is configurable to perform the operations/processes (e.g., process **300** described below) described herein by programming processor **206** with appropriate instructions. For example, processor **206** may be programmed by encoding an operation as one or more executable instructions and providing the executable instructions to processor **206** in memory device **208** that is coupled to processor **206**.

In some embodiments, executable instructions are stored in memory device **208**. Memory device **208** is any device allowing information, such as executable instructions and/or other data, to be stored and retrieved. For example, memory device **208** may store computer readable instructions for determining one or more of the following: temperature levels, humidity levels, and a level of velocity for a flow of air. In addition, memory device **208** may be configured to store historic fuel tank environment data, such as temperature and RH data from defined locations within a plurality of fuel tanks and/or any other data suitable for use with the methods described herein. In one embodiment, processor **206** and memory device **208** may be remote from computing device **204**. In another embodiment, the data and the computer-executable instructions may be stored in a cloud service, a database, or other memory area accessible by computing device **204**. Such embodiments reduce the computational and storage burden on computing device **204**.

In some embodiments, computing device **204** includes at least one presentation device **210** for presenting information to a user. Presentation device **210** is any component capable of conveying information to a user. Presentation device **210** may include, without limitation, a display device (e.g., a liquid crystal display (LCD), organic light emitting diode (OLED) display, or "electronic ink" display) and/or an audio output device (e.g., a speaker or headphones). In some embodiments, presentation device **210** includes an output adapter, such as a video adapter and/or an audio adapter. An output adapter is operatively coupled to processor **206** and configured to be operatively coupled to an output device, such as a display device or an audio output device.

In some embodiments, computing device **204** includes an input device **212** for receiving input from a user. Input device **212** may include, for example, a keyboard, a pointing device, a mouse, a stylus, a touch sensitive panel (e.g., a touch pad or a touch screen), a position detector, and/or an audio input device. A single component, such as a touch screen, may function as both an output device of presentation device **210** and input device **212**. Computing device **204** also includes a communication interface **214**, which is configured to be communicatively coupled to sensors **216** and airflow system **218** via, for example, network **220**. Network **220** may include, without limitation, the Internet, a local area network (LAN), a wide area network (WAN), a wireless LAN (WLAN), a mesh network, and/or a virtual private network (VPN).

Sensors **216** provide computing device **204** with readings of one or more of the following: temperature, RH, and wind/air velocities within fuel tank **202** throughout fuel tank **202**. Sensors **216** may provide these readings/information in real time, periodically (e.g., every minute, every five minutes, or every hour), or upon request. A computing device **204** utilizes the information received from sensors **202** to adjust a temperature level of an airflow, a humidity level of the airflow, an amount of air in the airflow, and a velocity of the airflow provided by a conduit **222** coupled to airflow system **216**. Further, computing device **204** may adjust an amount/velocity of the airflow, a temperature of the airflow, or a humidity level of the airflow based on an identified time (e.g., a desired time) to cure a sealant and/or a rate at which air within fuel tank **202** is being pulled out of fuel tank **202** through one or more vents on an exterior wall of the fuel tank. In one embodiment, a plurality of conduits **222** are provided within fuel tank **202**. More specifically, a manifold (not shown) may connect a plurality of conduits **222** such that each bay/portion of fuel tank **202** may have a separate conduit **222**. In one embodiment, conduit **222** is made from, for example, plastic, rubber, or other flexible type of tubing material that may prevent chafing and/or increase portability. Conduit **222** includes a plurality of micro vents **230** that enable the airflow to be directed into fuel tank **202** by a path created by conduit **222**. In one embodiment, micro vents **230** are made from, for example, plastic. Further, micro vents **230** may have the ability to adjust for calibration or fine tuning of system **200**. In addition, sensors **202** may be placed on an exterior or an interior of micro vents **230** to measure the temperature, the RH, and/or velocity of the airflow as it exits micro vents **230** or air ducts located on an exterior wall of fuel tank **202**.

To enable computing device **204** to adjust a temperature level of the airflow, a humidity level of the airflow, an amount of air in the airflow, and a velocity of the airflow, airflow system **218** includes an airflow component **224**, a temperature component **226**, and/or humidity component **228**. For example, airflow component includes a combination of air handlers and blowers to create defined amounts of air/velocity as needed. Further, temperature component (such as a thermocouple) may be used to heat or cool the air in the airflow. In addition, humidity component **228** provides water/moister to the airflow such that a defined RH level can be achieved within the airflow and therefore within fuel tank **202**.

With reference now to Figures **3** and **4**, a method **300** for curing a sealant within a fuel tank **400** of an aircraft is provided. While method **300** is described herein as being performed within fuel tank **400** of an aircraft, method **300** is applicable with numerous other environments and/or configurations, such as a sewage management system and fuel tanks of marine vessels.

Method **300** begins at **302** whereby computing device **402** receives, from at least one sensor **404** configured to measure temperature and relative humidity within fuel tank **400**, a current measure of a temperature and/or a RH within fuel tank **400**. In one embodiment, each sensor **404** can measure both temperature and RH, or in another embodiment, a first sensor **404** measures temperature and a second sensor **404** measures RH. In addition, each sensor **404** may be placed throughout an interior of fuel tank **400** in order to measure temperature and RH at defined locations within fuel tank **400**. At **304**, computing device **402** identifies a time to cure a sealant within fuel tank **400**. For example, a user may select a time allotted in an assembly of fuel tank **400** for curing the sealant. As such, a user may provide computing device **402** with a time for curing and as a result, computing device **402** establishes an environment (e.g., a temperature and RH) needed to achieve curing during the selected time. In one embodiment, instead of providing a time, the temperature and RH levels may be provided to computing device **402**.

At **306**, computing device **402** increases or decreases one or more of a temperature of an airflow and a humidity level within the airflow that is directed through a plurality of vents **408** along a conduit **410** that defines a path through fuel tank **400**. For example, as temperature readings are provided by sensor **402**, computing device **402** may increase a temperature of the airflow if a temperature within fuel tank **400** is below a temperature threshold level, or computing device **402** may decrease a temperature of the airflow if a temperature within fuel tank **400** is above a temperature threshold level. Further, as RH readings are provided by sensor **402**, computing device **402** may increase a moisture level within the airflow if a RH level within fuel tank **400** is below a RH threshold level, or computing device **402** may decrease a moister level of the airflow if a RH level within fuel tank **400** is above a RH threshold level.

In one embodiment, a current level of VOCs within fuel tank **400** is also received by computing device **402** from sensor **402**. For example, computing device **402** may increase a velocity of the airflow when the current level of the VOCs exceeds a VOC threshold level in a particular area of fuel tank **400**. By increasing the velocity of the airflow, VOCs can be purged from the system or reduced below the VOC threshold level. In one embodiment, the VOC threshold level is based on a chemical being measured. Further, the VOC may be a percentage (e.g., **10**%) of an exposure limit of a particular chemical set by, for example, the Occupational Health and Safety Administration (OSHA). In another embodiment, the VOC threshold is about **20** ppm.

In addition, computing device **402** may trigger an alarm that provides a notification that a level of VOCs within fuel tank **400** has exceeded the VOC threshold level, which notifies a user that the environment within fuel tank **400** is unsafe.

In another embodiment, since mechanics work for extended periods of time inside fuel tank **400** during an assembly of fuel tank **400**, computing device **402** identifies a number of humans (e.g., mechanics) within fuel tank **400** in order to create a safe/suitable environment for the mechanics working therein. For example, since chemicals such as isopropanol (IPA) and methyl propyl ketone (MPK) are used during the assembly, enabling mechanics to continue work within fuel tank **400** involves heavily ventilating fuel tank **400** in order to create an environment that is safe/suitable for the mechanics. Further, to lower a tact time for curing a sealant, a temperature and/or RH within fuel tank **400** may be increased. Thus, to enable the temperature and RH to increase while still maintaining a comfortable/safe environment for mechanics within fuel tank **400**, vents **400** may be strategically placed such that the airflow is blowing on each mechanic, which lowers a perceived temperature and allows for elevated baseline temperatures that aid in the curing process. Thus, in one embodiment, computing device **402** increases a velocity of the airflow and/or decreases a temperature of the airflow based on a number of humans/mechanics that are or will be within fuel tank **400** to enable a perceived temperature or an actual temperature within fuel tank **400** to be at or below a safe temperature threshold level, for example, at or below **79**°F. In addition, computing device **402** takes into consideration body heat given off by each of the mechanics within fuel tank **400**. As such, a temperature and RH within fuel tank **400** is dynamically adjusted in real time in order to account for the excess heat from, for example, body heat, based on a number of mechanics within fuel tank **400**.

In one embodiment, if it is determined that a human is not within fuel tank **400**, computing device **402** may increase a temperature within fuel tank **400** to a maximum temperature threshold (e.g., a temperature that optimizes curing, such as from about **140**°F to about **250**°F) and increase an RH within fuel tank **400** to a maximum RH threshold (e.g., a RH that optimizes curing, such as from about **70**% RH to about **90**% RH). As described in further detail below with respect to Figures **5-7**, elevating the temperature and the RH, a curing process of a sealant can be cut at least in half, for example, from **72** hours to **36** hours.

In another embodiment, fuel tank **400** includes a plurality of bays, for example, bay **412**, bay **414**, bay **416**, bay **418**, bay **420**, and bay **422**. Thus, each bay may be considered to have its own environment separate from other bays. As such, access to each bay may be sealed off from other bays during the assembly process using, for example, bulkhead covers. Thus, if bay **418** does not have a mechanic working therein, computing device **402** may increase a temperature within bay **418** to a maximum temperature threshold and increase an RH within bay **418** to a maximum RH threshold, while maintaining an environment within bays **412**, **414**, **416**, **420**, and **422** at safe/comfortable level for a mechanic to work therein.

In one embodiment, prior to providing conduit **410** within fuel tank **400**, historic data may be accessed, analyzed, and/or provided to a virtual simulation that emulates method **300** being applied within fuel tank **400**. Historic fuel tank environment data includes historic temperature levels, historic RH levels, historic VOC levels, and historic airflow velocity levels at defined locations within a plurality of fuel tanks. The collection of this data along with the virtual simulation provides an ability to optimize a placement of conduit **410** and vents **408** throughout fuel tank **400** as areas of most concern or that have been problematic in the past may be addressed by the dynamic placement of conduit **410**. Further, a temperature level of the airflow, an RH level of the airflow, and/or a velocity level of the airflow may also be optimized based on the historic data/virtual simulation.

With reference now to Figures **5**, actual data (temperature, RH, and air velocity) acquired from a BMS**5-45** fuel tank (fuel tank **500**) using conventional systems/methods is provided (see, for example, the system shown in Figure **1**). As shown in Figure **5**, the air entering fuel tank **500** adjacent to vent **502** is **67**°F, has an RH of **71**% and has a velocity of **6**K fps; the air entering fuel tank **500** adjacent to vent **504** is **68**°F, has an RH of **67**% and has a velocity of **3**K fps; the air entering fuel tank **500** adjacent to vent **506** is **70**°F, has an RH of **70**% and has a velocity of **3.5**K fps; the air entering fuel tank **500** adjacent to vent **508** is **68**°F, has an RH of **70**% and has a velocity of **3.5**K fps; the air entering fuel tank **500** adjacent to vent **510** is **68**°F, has an RH of **70**% and has a velocity of **4**K fps; and the air entering fuel tank **500** adjacent to vent **512** is **67**°F, has an RH of **71**% and has a velocity of **6**K fps. Figure **5** also provides environmental data that was acquired at other locations throughout fuel tank **500**. However, as shown in Figure **5**, using conventional systems/methods, the temperature, RH, and velocity of the air flowing through fuel tank **500** is very inconsistent, with temperatures ranging from **67**°F to **73**°F, RH levels ranging from **61**% RH to **71**% RH, and air velocity ranging from **8**fps to **6**K fps.

Figure **6** provides actual cure times of a Class A**2** sealant and a Class B**2** sealant applied within fuel tank **500** under the conditions provided in Figure **5**. In the exemplary data provided, a Class A**2** sealant is expected to cure within **72** hours if the environment is at **77**°F with **50**% RH. Further, a Class B**2** sealant is expected to cure within **24** hours if the environment is at **77**°F with **50**% RH. However, as a result of the varying temperatures and RH levels throughout fuel tank **500** (as shown in Figure **5**), the amount of time it takes the Class A**2** sealant and the Class B**2** sealant to cure varies by **12** hours, respectively, throughout fuel tank **500**.

With reference now to Figure **7**, cure times of the Class A**2** sealant and the Class B**2** sealant utilizing embodiments of the present disclosure, for example, the system shown in Figure **4**, are provided. The cure times shown in Figure **7** are based on an airflow temperature of **140**°F with **60**% RH provided throughout fuel tank **500** using a plurality of conduits (e.g., conduit **410**) and vents **408**, shown in Figure **4**. As shown in Figure **7**, the cure times for the Class A**2** sealant and the Class B**2** sealant are consistent throughout fuel tank **500** (e.g., **36** hours for Class A**2** sealant and **12** hours for Class B**2** sealant). Furthermore, Figure **7** also illustrates the change/delta of time for curing the Class A**2** sealant and the Class B**2** sealant at various locations throughout fuel tank **500** when compared to the cure times shown in Figure **6** using conventional systems/methods. For example, as shown in Figure **7**, the cure times for the Class A**2** sealant and the Class B**2** sealant have been reduced by **50**% to almost **60**% utilizing the systems and methods of the present disclosure, when compared to the cure times of the Class A**2** sealant and the Class B**2** sealant utilizing conventional systems and methods, for example, shown in Figures **1**, **5**, and **6**.

The examples used herein are illustrative only, and are not meant to be limited to the elements of those examples. The above-described embodiments provide efficient systems and methods for enabling controlled air flow, providing predictable sealant cure times, eliminating VOC pooling, reducing perceived temperatures, and/or managing hot/cold spots during an assembly of a fuel tank. However, the systems and methods described herein are not limited to the specific embodiments described herein, but rather, components of the system and/or steps of the methods may be utilized independently and separately from other components and/or steps described herein. For example, the system may also be used in combination with other systems and methods, and is not limited to practice with only fuel tanks and methods as described herein. Rather, the exemplary embodiment can be implemented and utilized in connection with many other assembly/sealant/ventilation applications or anywhere a need exists to control environment by adjusting/monitoring one or more of temperature, RH, and airflow.

Although specific features of various embodiments of the invention may be shown in some drawings and not in others, this is for convenience only. In accordance with the principles of the invention, any feature of a drawing may be referenced and/or claimed in combination with any feature of any other drawing.

This written description uses examples to disclose the invention, including the best mode, and also to enable any person skilled in the art to practice the invention, including making and using any devices or systems and performing any incorporated methods. The patentable scope of the invention is defined by the claims, and may include other examples that occur to those skilled in the art. Such other examples are intended to be within the scope of the claims if they have structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal language of the claims.

EMBODIMENTS IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A system for controlling an environment within a fuel tank, the system comprising:

a conduit comprising a plurality of vents, the conduit defining a path through the fuel tank, the conduit configured to direct a flow of air along the path and out the plurality of vents;

at least one sensor configured to measure at least one of temperature and relative humidity within the fuel tank; and

a controller comprising a processor programmed to receive, from the at least one sensor, a current measure of at least one of temperature and relative humidity within the fuel tank.

2. The system of Claim **1**, wherein the fuel tank is an aircraft fuel tank.

3. The system of Claim **1** or **2**, wherein the processor is further programmed to:

identify a time to cure a sealant within the fuel tank; and

based on the identified time, increase or decrease one or more of the following: a temperature of the flow of air, and a humidity within the flow of air.

4. The system of any one of Claims **1** to **3**, wherein the at least one sensor is further configured to measure a level of volatile organic compounds within the fuel tank, and wherein the processor is further programmed to increase a velocity of the flow of air when the level of the volatile organic compounds exceeds a threshold level.

5. The system of any one of Claims **1** – **4**, wherein the processor is further programmed to adjust a velocity of the flow of air based on the identified time and/or a rate at which air within the fuel tank is being pulled out of the fuel tank through one or more vents on an exterior wall of the fuel tank.

6. The system of any one of Claims **1** – **5**, wherein the processor is further programmed to:

identify a number of humans within the fuel tank; and

increase a velocity of the flow of air and/or decrease the temperature of the flow of air based on the number of humans within the fuel tank to enable the temperature to be at or below a safe temperature threshold.

7. The system of any one of Claims **1** – **6**, wherein the processor is further programmed to:

determine that a human is not within the fuel tank;

increase the temperature within the fuel tank to a maximum temperature threshold; and

increase the relative humidity within the fuel tank to a maximum relative humidity threshold.

8. The system of any one of Claims **1** – **7**, wherein the processor is further programmed to:

receive historic fuel tank environment data, the historic fuel tank environment data comprising temperature and relative humidity data from defined locations within a plurality of fuel tanks; and

define the path of the conduit based on the historic fuel tank environment data.

9. The system of Claim **8**, wherein the processor is further programmed to determine positions along the conduit for each of the plurality of vents based on the historic fuel tank environment data and a location of a sealant within the fuel tank.

10. A method for controlling an environment within a fuel tank, the method comprising:

receiving a current measure of a temperature and/or a relative humidity within the fuel tank; and

increasing or decreasing one or more of a temperature of a flow of air and a humidity within the flow of air directed through a plurality of vents along a conduit that defines a path through the fuel tank.

11. The method of Claim **10**, further comprising:

identifying a time to cure a sealant within the fuel tank; and

based on the identified time, increasing or decreasing one or more of a temperature of a flow of air and a humidity within the flow of air directed through a plurality of vents along a conduit that defines a path through the fuel tank.

12. The method of Claim **11**, further comprising adjusting a velocity of the flow of air based on the identified time and/or a rate at which air within the fuel tank is being pulled out of the fuel tank through one or more vents on an exterior wall of the fuel tank.

13. The method of Claim **10**, further comprising:

receiving, from at least one sensor, a current level of volatile organic compounds within the fuel tank; and

increasing a velocity of the flow of air when the current level of the volatile organic compounds exceeds a threshold level.

14. The method of Claim **10**, further comprising:

identifying a number of humans within the fuel tank; and

increasing a velocity of the flow of air and/or decrease the temperature of the flow of air based on the number of humans within the fuel tank to enable the temperature to be at or below a safe temperature threshold.

15. The method of Claim **10**, further comprising:

receiving historic fuel tank environment data, the historic fuel tank environment data comprising temperature and relative humidity data from defined locations within a plurality of fuel tanks; and defining the path of the conduit based on the historic fuel tank environment data.

16. The method of Claim **15**, further comprising determining positions along the conduit for each of the plurality of vents based on the historic fuel tank environment data and a location of a sealant within the fuel tank.

17. The method of Claim **10**, further comprising:

determining that a human is not within the fuel tank;

increasing the temperature within the fuel tank to a maximum temperature threshold; and

increasing the relative humidity within the fuel tank to a maximum humidity threshold.

18. One or more non-transitory computer readable media storing thereon processor-executable instructions for controlling an environment within a fuel tank, the instructions when executed by a processor causing the processor to perform the steps of:

receiving a current measure of a temperature and/or a relative humidity within the fuel tank; and

increasing or decreasing one or more of a temperature of a flow of air and a humidity within the flow of air directed through a plurality of vents along a conduit that defines a path through the fuel tank.

19. The non-transitory computer-readable media of Claim **18**, wherein the instructions further cause the processor to perform the steps of:

identifying a time to cure a sealant within the fuel tank; and

based on the identified time, increasing or decreasing one or more of a temperature of a flow of air and a humidity within the flow of air directed through a plurality of vents along a conduit that defines a path through the fuel tank.

20. The non-transitory computer-readable media of any one of Claims **18** or **19**, wherein the instructions further cause the processor to perform the steps of:

receiving, from at least one sensor, a current level of volatile organic compounds within the fuel tank; and

increasing a velocity of the flow of air when the current level of the volatile organic compounds exceeds a threshold level.

21. The non-transitory computer-readable media of any one of Claims **18** – **20**, wherein the instructions further cause the processor to perform the steps of:

identifying a number of humans within the fuel tank; and

increasing a velocity of the flow of air and/or decrease the temperature of the flow of air based on the number of humans within the fuel tank to enable the temperature to be at or below a safe temperature threshold.

22. The non-transitory computer-readable media of any one of Claims **18** – **21**, wherein the instructions further cause the processor to perform the steps of:

receiving historic fuel tank environment data, the historic fuel tank environment data comprising temperature and relative humidity data from defined locations within a plurality of fuel tanks;

defining the path of the conduit based on the historic fuel tank environment data; and

determining positions along the conduit for each of the plurality of vents based on the historic fuel tank environment data and a location of a sealant within the fuel tank.

23. The non-transitory computer-readable media of any one of Claims **18** – **22**, wherein the instructions further cause the processor to perform the steps of:

determining that a human is not within the fuel tank;

increasing the temperature within the fuel tank to a maximum temperature threshold; and

increasing the relative humidity within the fuel tank to a maximum humidity threshold.

24. The non-transitory computer-readable media of any one of Claims **18** – **23**, wherein the fuel tank is an aircraft fuel tank.

25. The method of any one of Claims **10** - **17**, wherein the fuel tank is an aircraft fuel tank.

(PRIOR ART)

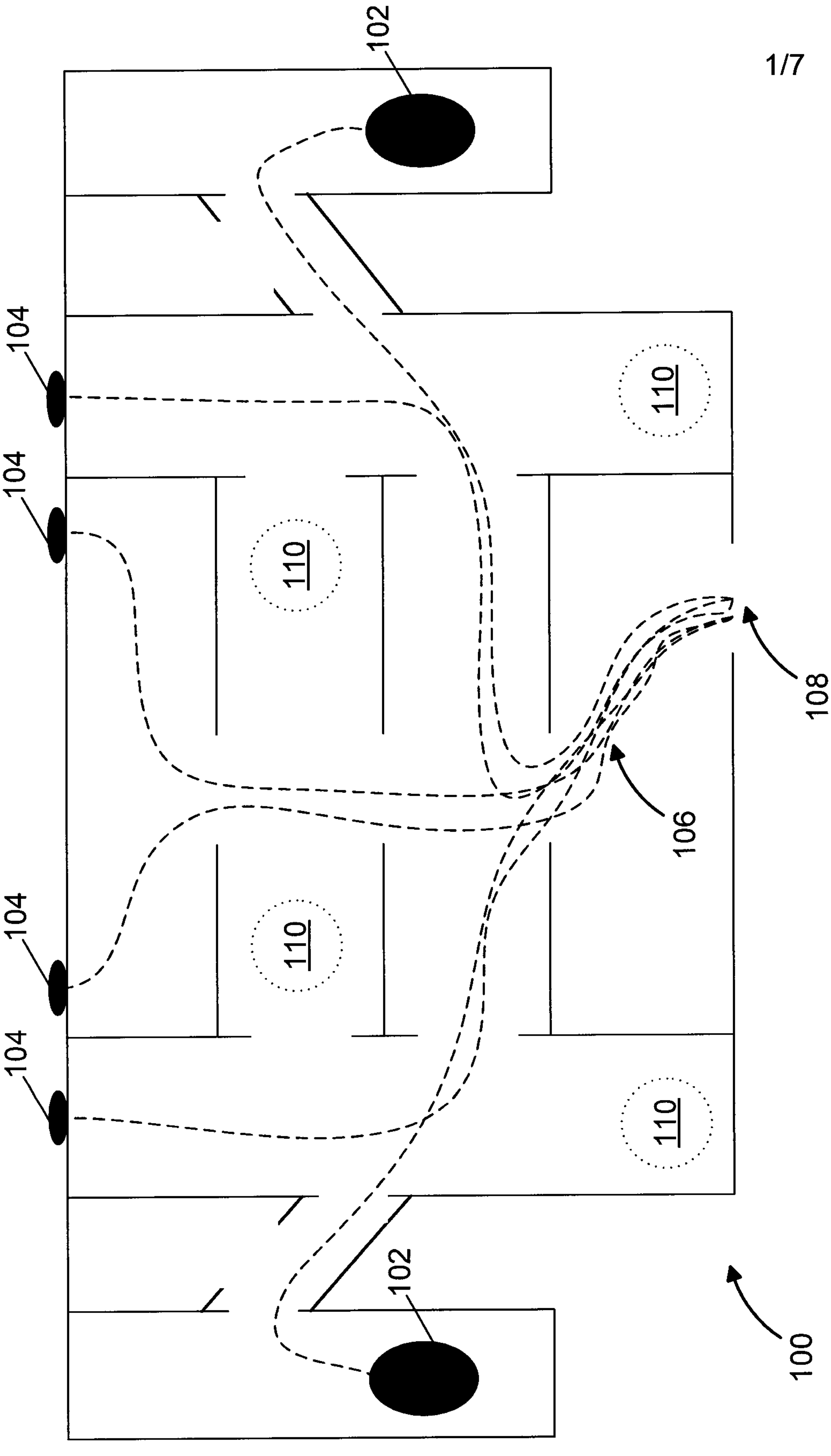
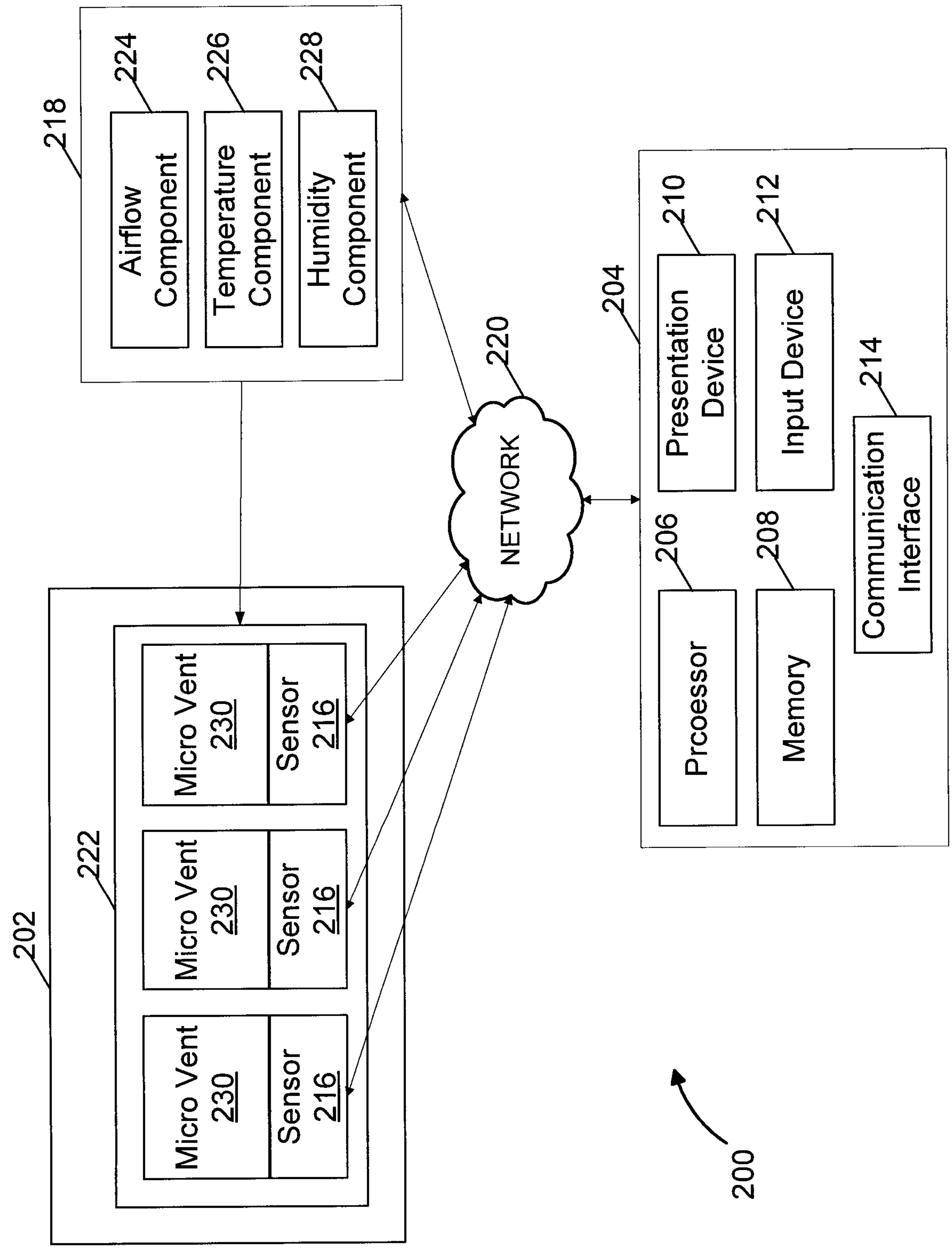


FIG. 1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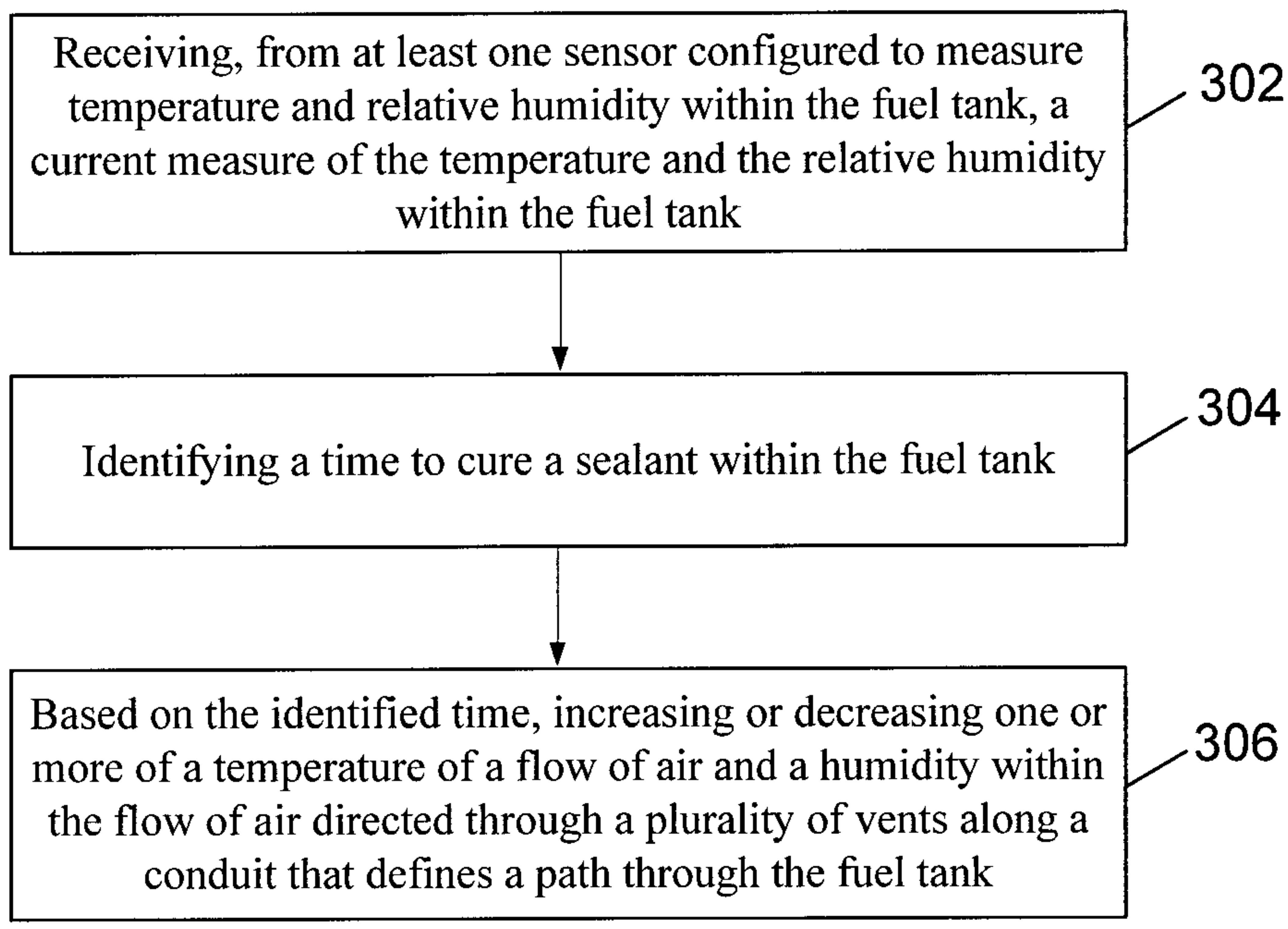
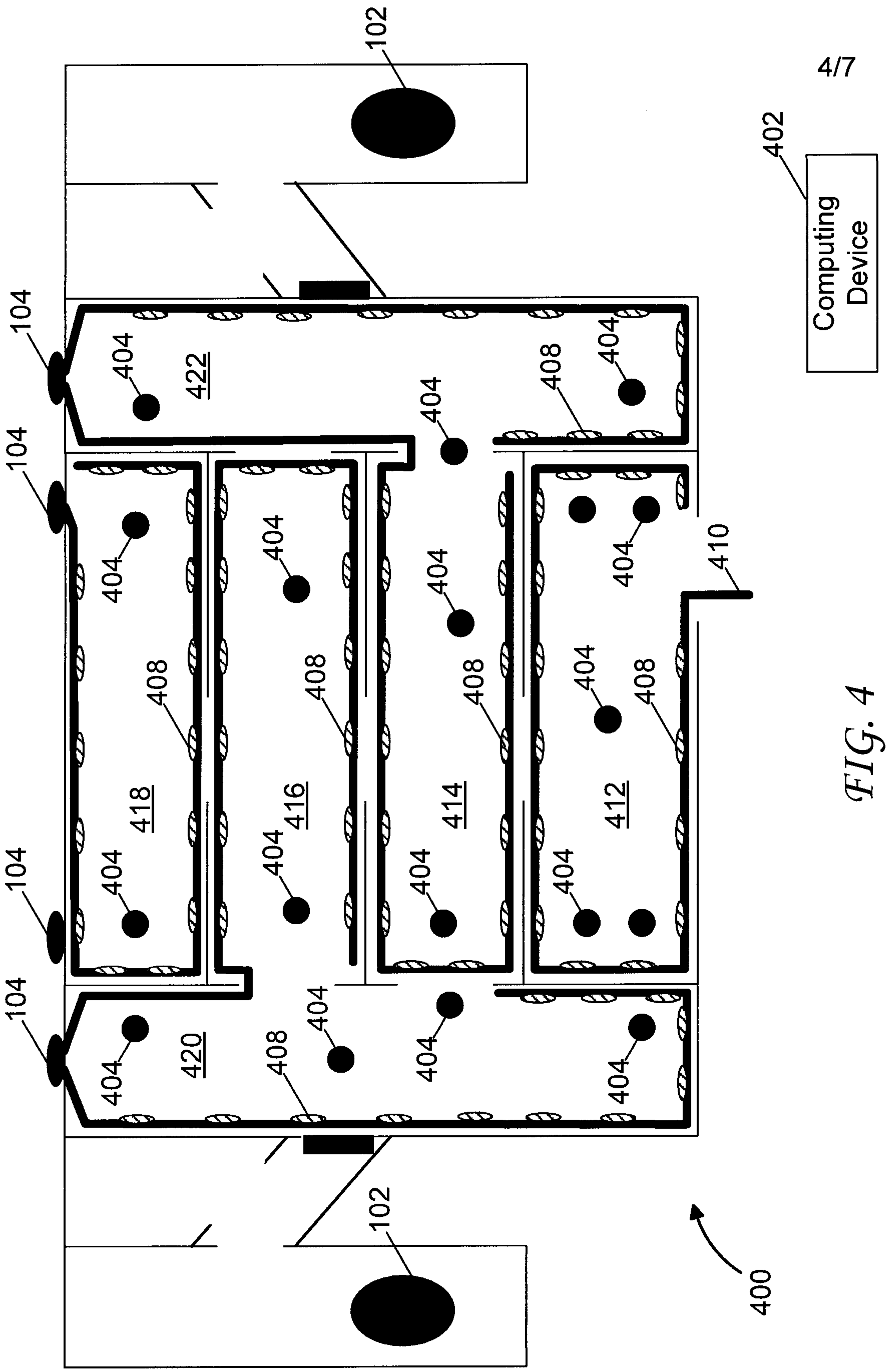
Airflow Component
226
Temperature Component
228
Humidity Component
220
NETWORK
204
210
Presentation Device
212
Input Device
214
Communication Interface
206
Prcoessor
208
Memory
202
222
Micro Vent 230
Sensor 216
Micro Vent 230
Sensor 216
Micro Vent 230
Sensor 216
200

FIG. 2

FIG. 3


Receiving, from at least one sensor configured to measure temperature and relative humidity within the fuel tank, a current measure of the temperature and the relative humidity within the fuel tank
302
Identifying a time to cure a sealant within the fuel tank
304
Based on the identified time, increasing or decreasing one or more of a temperature of a flow of air and a humidity within the flow of air directed through a plurality of vents along a conduit that defines a path through the fuel tank
306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Computing Device
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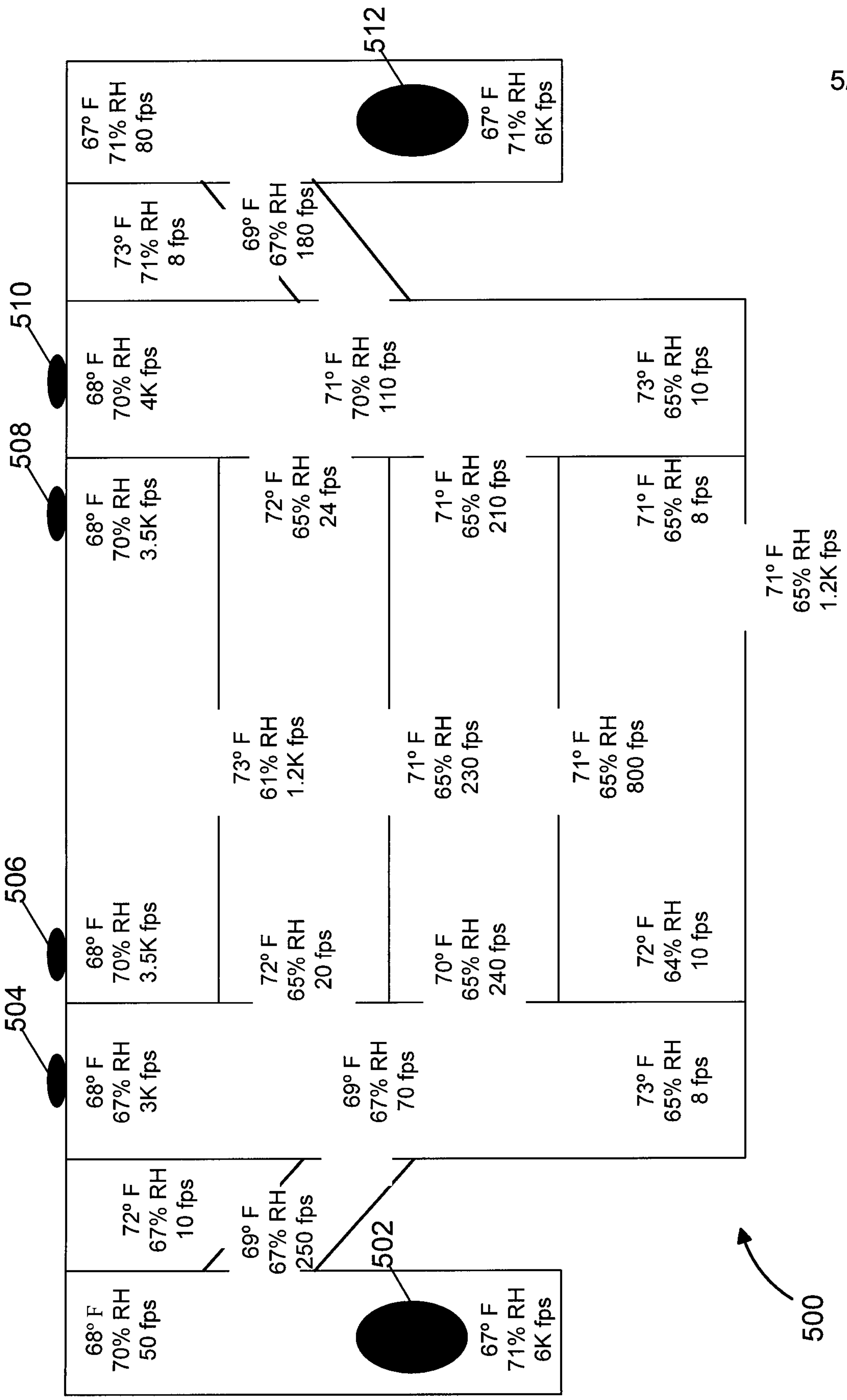
422
400

FIG. 4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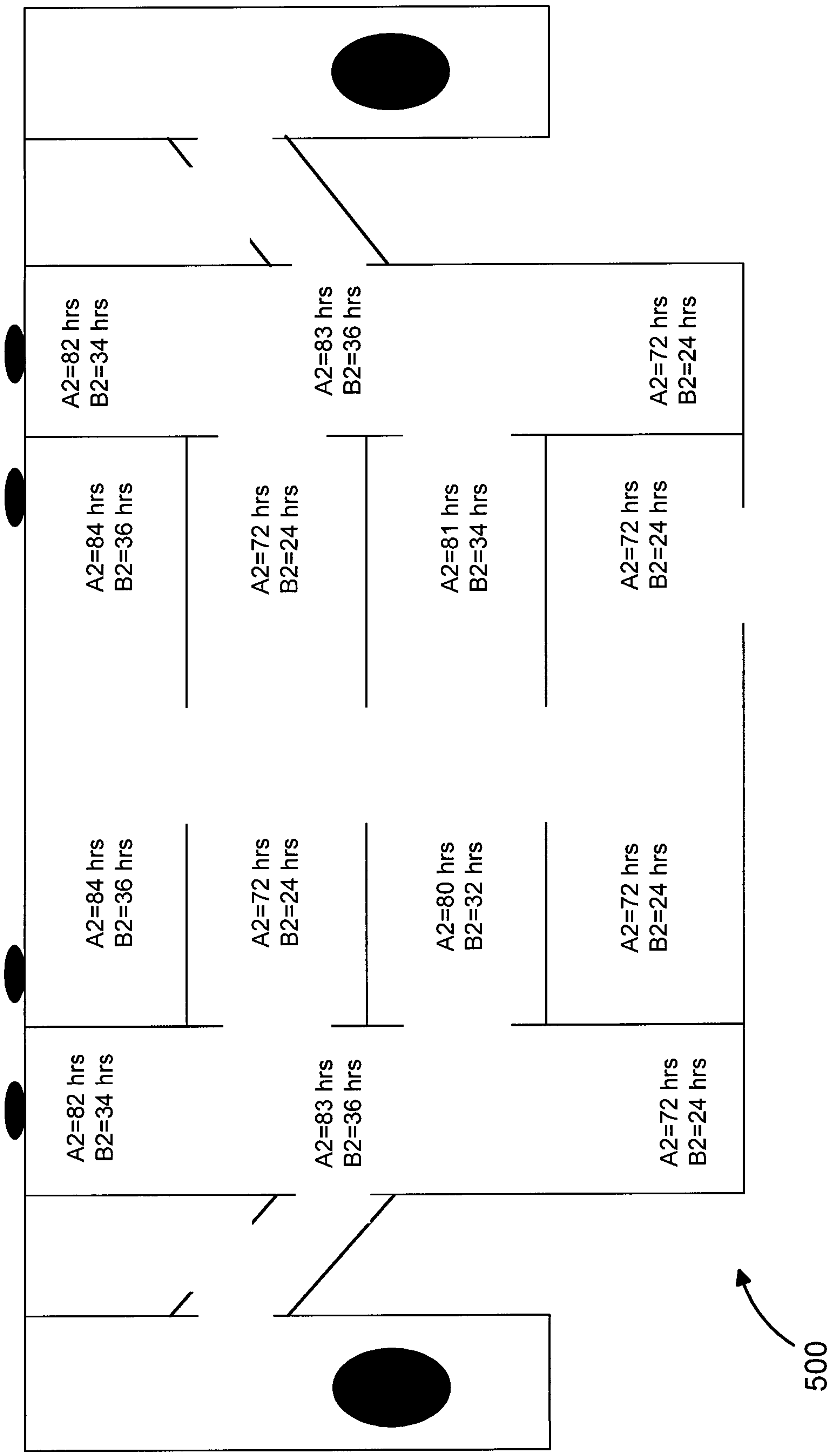
67° F 71% RH 6K fps
73° F 71% RH 8 fps
69° F 67% RH 180 fps
510
68° F 70% RH 4K fps
71° F 70% RH 110 fps
73° F 65% RH 10 fps
508
68° F 70% RH 3.5K fps
72° F 65% RH 24 fps
71° F 65% RH 210 fps
71° F 65% RH 8 fps
71° F 65% RH 1.2K fps
73° F 61% RH 1.2K fps
71° F 65% RH 230 fps
71° F 65% RH 800 fps
506
68° F 70% RH 3.5K fps
72° F 65% RH 20 fps
70° F 65% RH 240 fps
72° F 64% RH 10 fps
504
68° F 67% RH 3K fps
69° F 67% RH 70 fps
73° F 65% RH 8 fps
72° F 67% RH 10 fps
69° F 67% RH 250 fps
502
68° F 70% RH 50 fps
67° F 71% RH 6K fps
500

FIG. 5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B2=36 hrs
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A2=81 hrs
B2=34 hrs
A2=72 hrs
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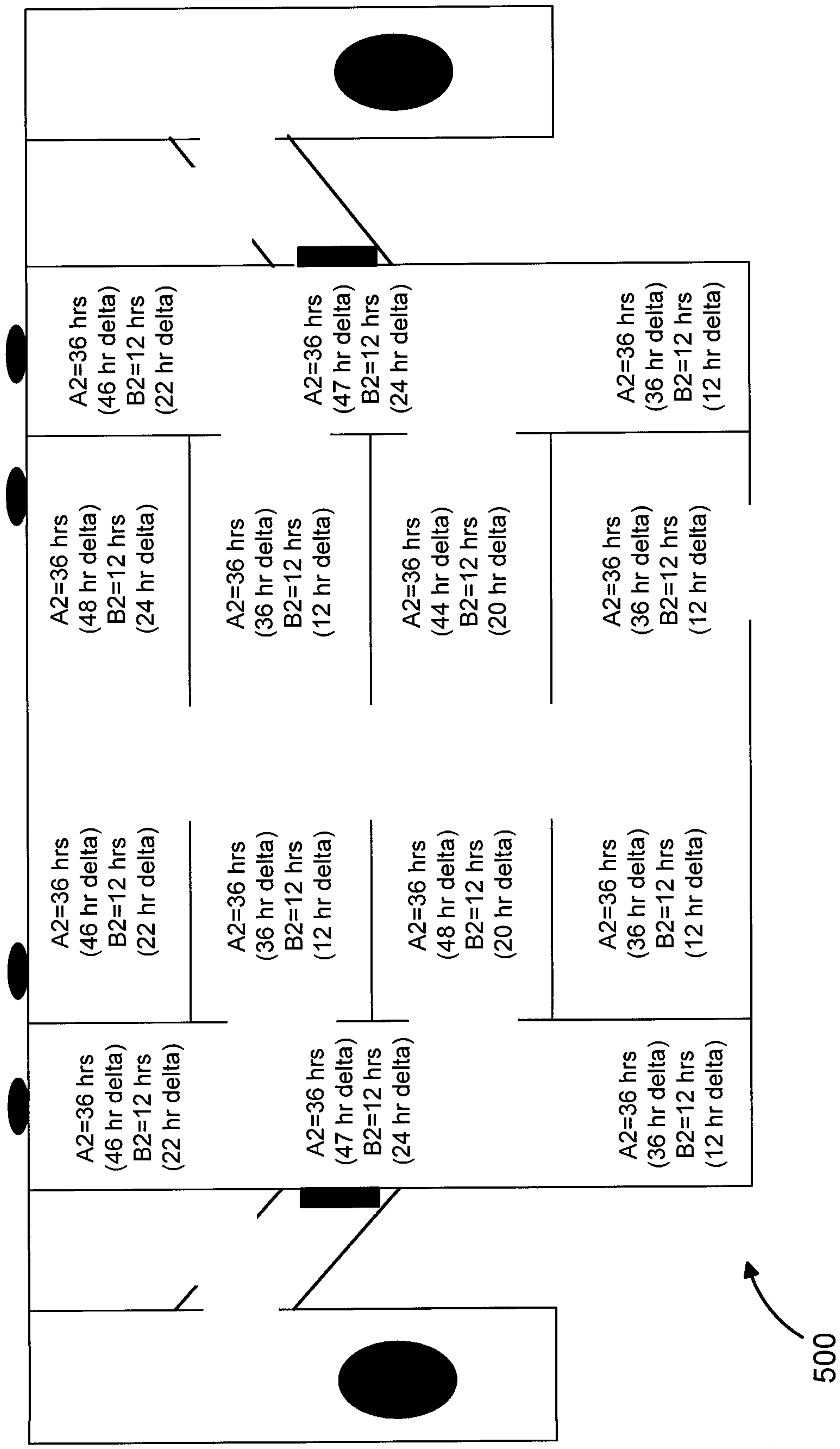
B2=24 hrs
A2=72 hrs
B2=24 hrs
A2=72 hrs
B2=24 hrs
500

FIG. 6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(22 hr delta)
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(24 hr delta)
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(36 hr delta)
B2=12 hrs
(12 hr delta)
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(48 hr delta)
B2=12 hrs
(24 hr delta)
A2=36 hrs
(36 hr delta)
B2=12 hrs
(12 hr delta)
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(44 hr delta)
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A2=36 hrs
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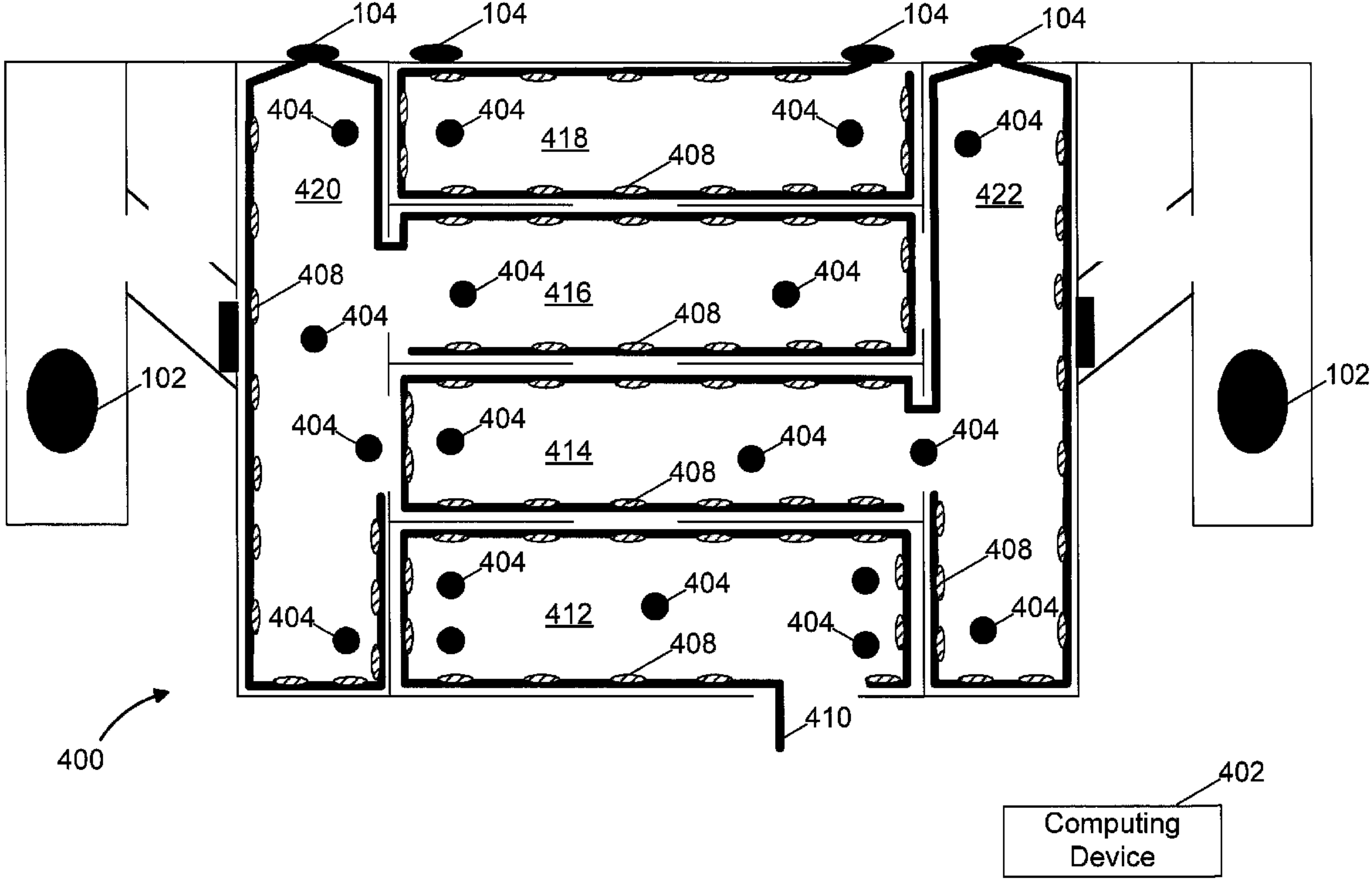
B2=12 hrs
(12 hr delta)
500

FIG. 7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412
404
404
408
410
400
402
Computing
Device