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(54) **AIR MATTRESS**

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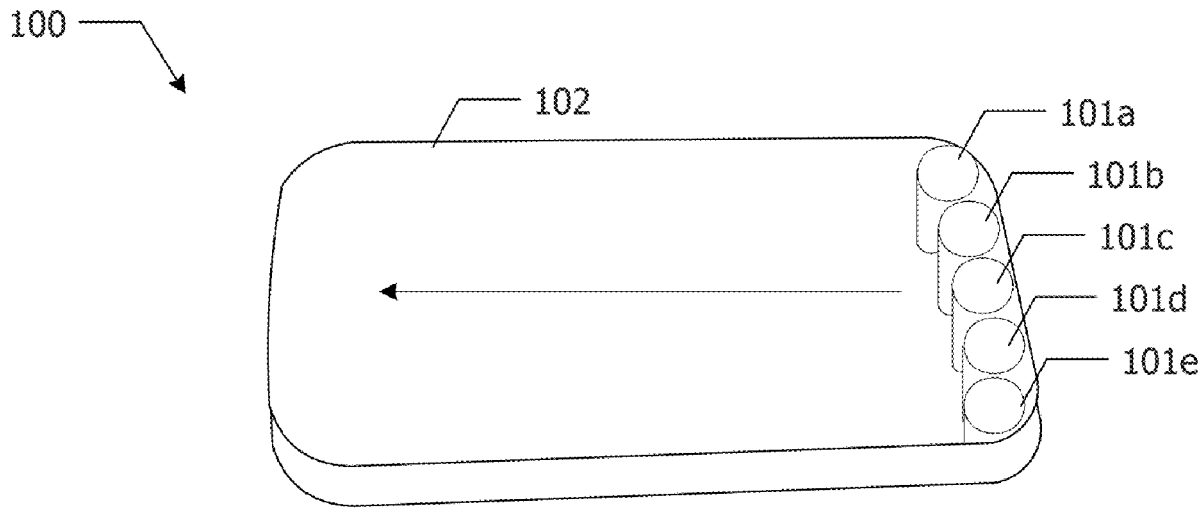
(57) **ABSTRACT**

An article of manufacture for providing an automatically adjusting air mattress according to the present invention is disclosed. The automatically adjusting air mattress includes a plurality of air chambers arranged within a mattress frame, each of the plurality of air chambers having a set air pressure contained within, a base chamber coupled within the mattress frame and below the plurality of air chambers, one or more interconnecting air lines coupling the plurality of air chambers and corresponding air valves, the air valves being coupled to a source of air pressure used to adjusted air pressure in each of the plurality of air chambers, and one or more pressure sensors coupled to the one or more corresponding air valves indicating a current air pressure with each of the plurality of air chambers, each of the one or more pressure sensors being configured to detect changes within one or more of the plurality of air chambers causing the set air pressure within each of the plurality of air chambers to be adjusted to maintain a defined arrangement of air pressure values within each of the plurality of air chambers.



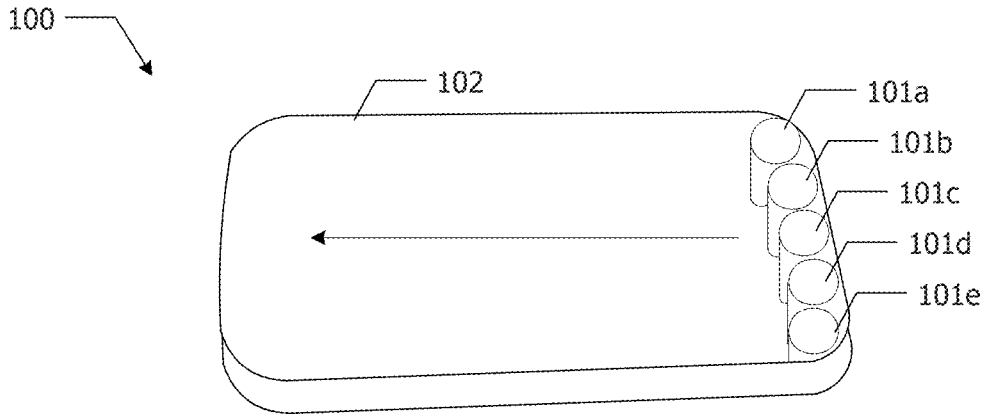

100
102
101a
101b
101c
101d
101e

FIG. 1

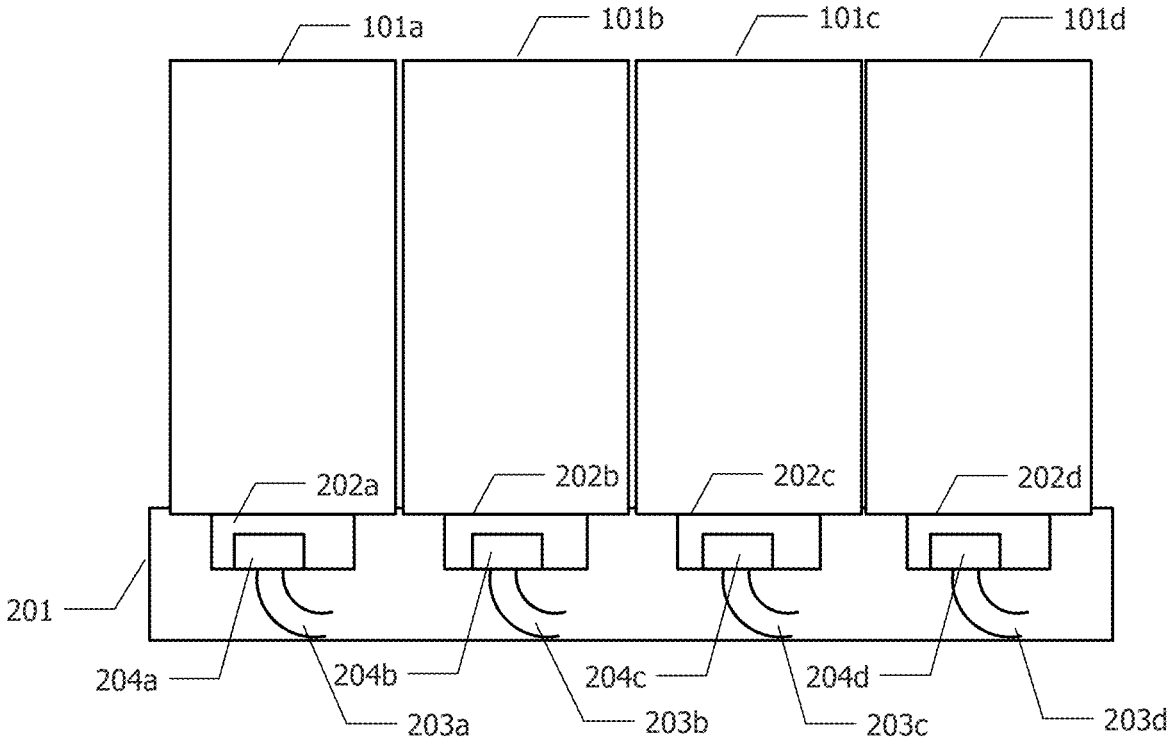

101a
101b
101c
101d
202a
202b
202c
202d
201
204a
204b
204c
204d
203a
203b
203c
203d

FIG. 2

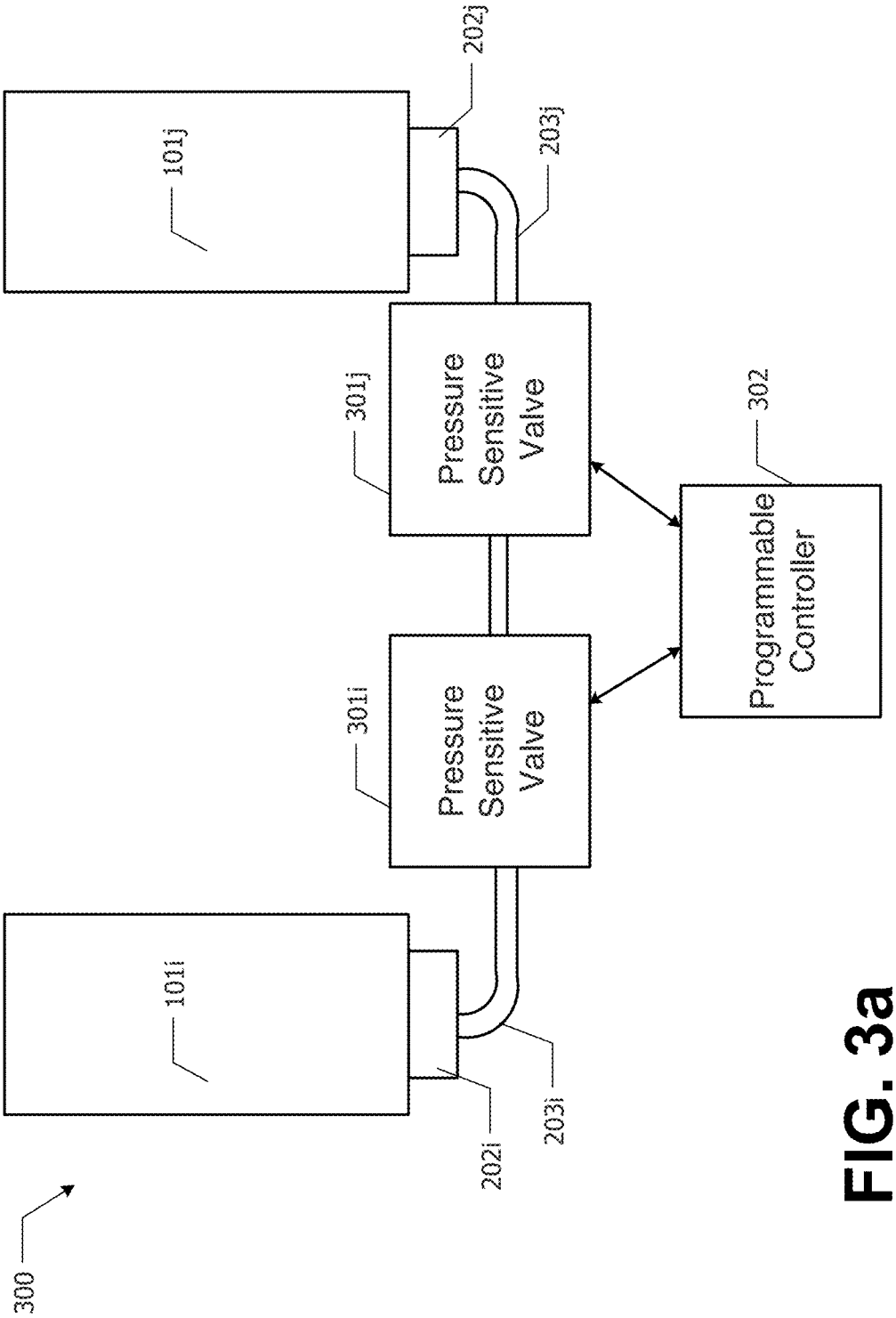

300
101i
101j
202i
202j
203i
203j
301i
301j
Pressure Sensitive Valve
Pressure Sensitive Valve
302
Programmable Controller

FIG. 3a

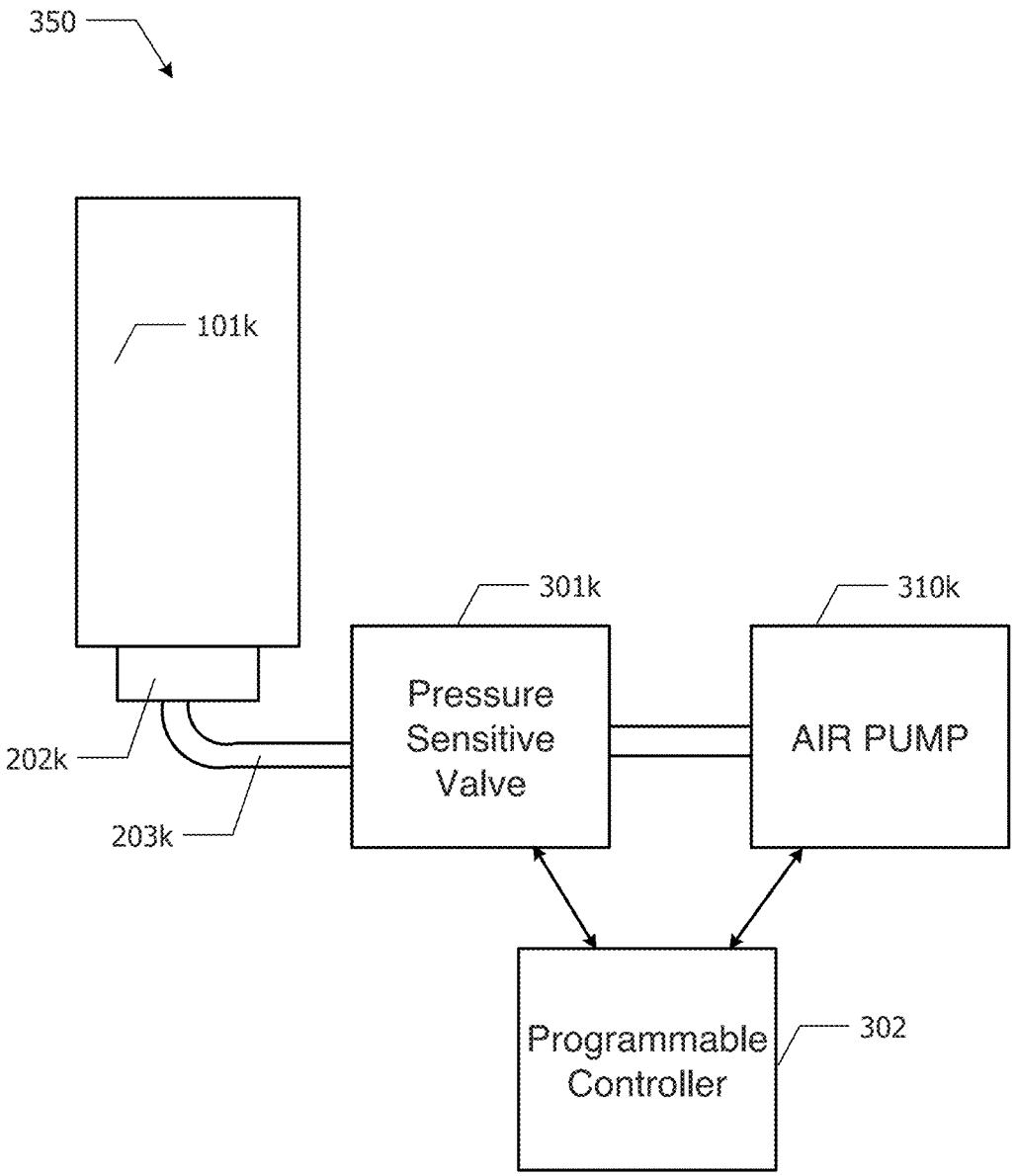

350
101k
301k
310k
Pressure Sensitive Valve
AIR PUMP
202k
203k
Programmable Controller
302

FIG. 3b

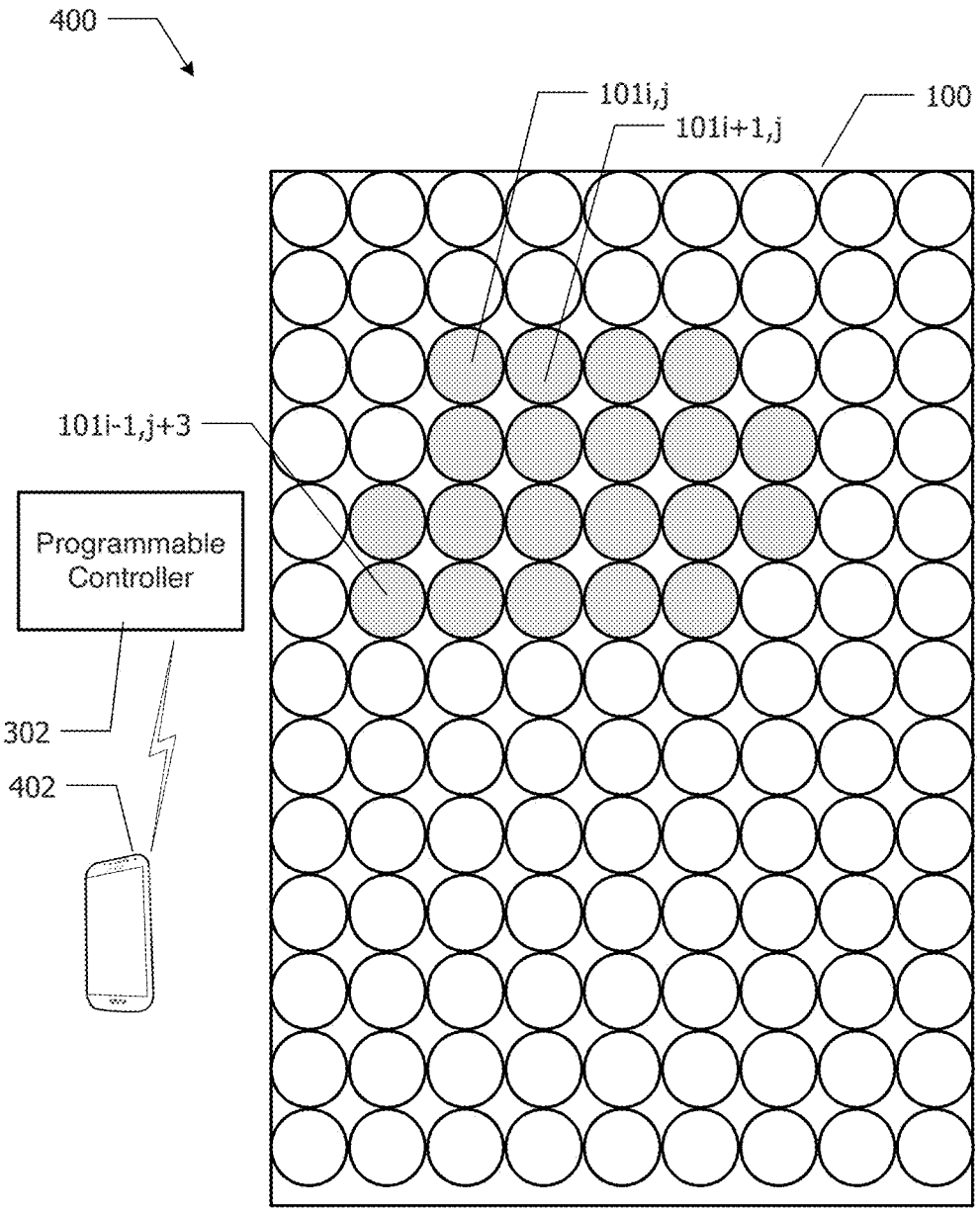

400
101i,j
101i+1,j
100
101i-1,j+3
Programmable Controller
302
402

FIG. 4

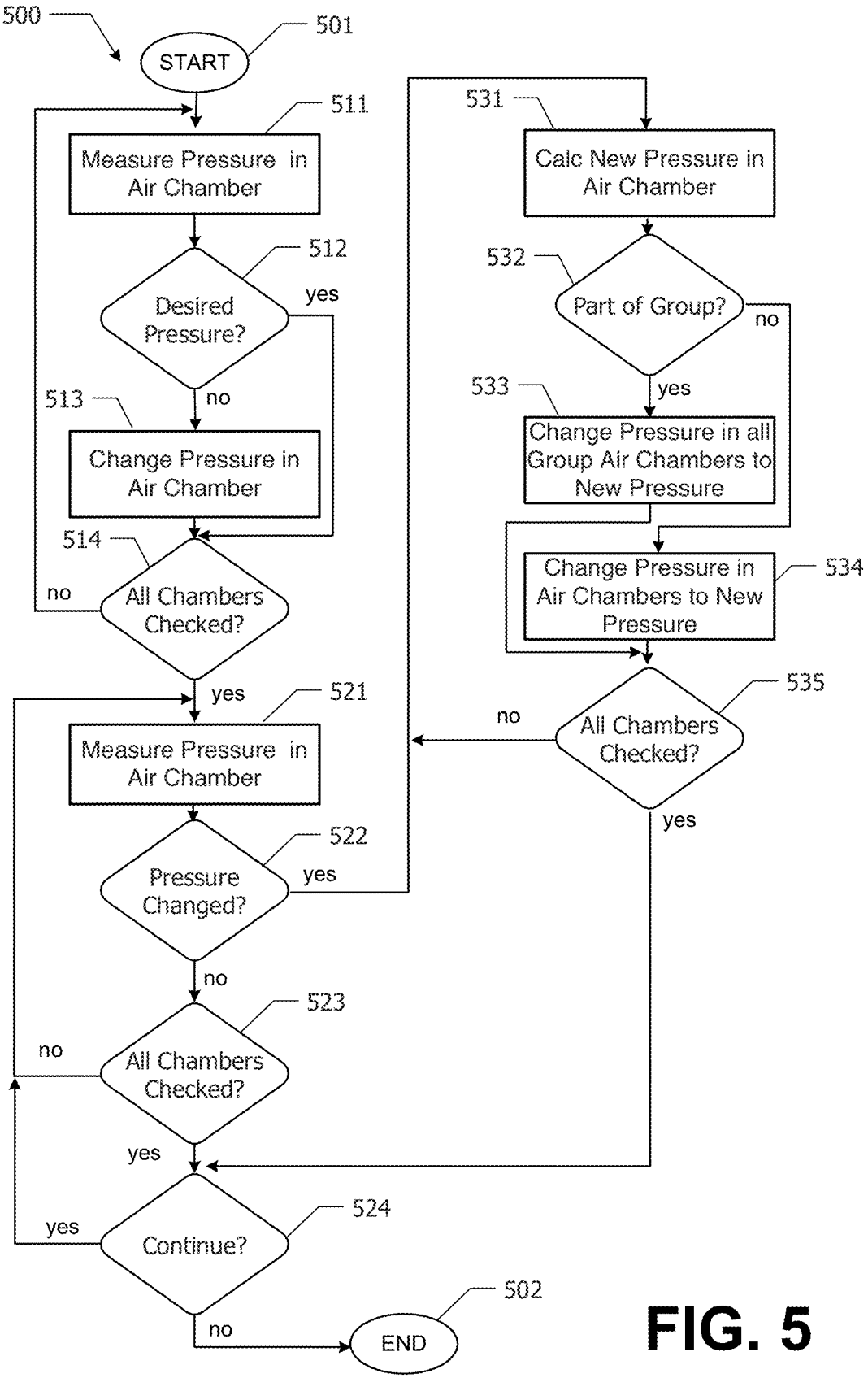

500
501
START
511
Measure Pressure in Air Chamber
512
Desired Pressure?
yes
no
513
Change Pressure in Air Chamber
514
All Chambers Checked?
no
yes
521
Measure Pressure in Air Chamber
522
Pressure Changed?
yes
no
523
All Chambers Checked?
no
yes
524
Continue?
yes
no
502
END
531
Calc New Pressure in Air Chamber
532
Part of Group?
no
yes
533
Change Pressure in all Group Air Chambers to New Pressure
534
Change Pressure in Air Chambers to New Pressure
535
All Chambers Checked?
no
yes

FIG. 5

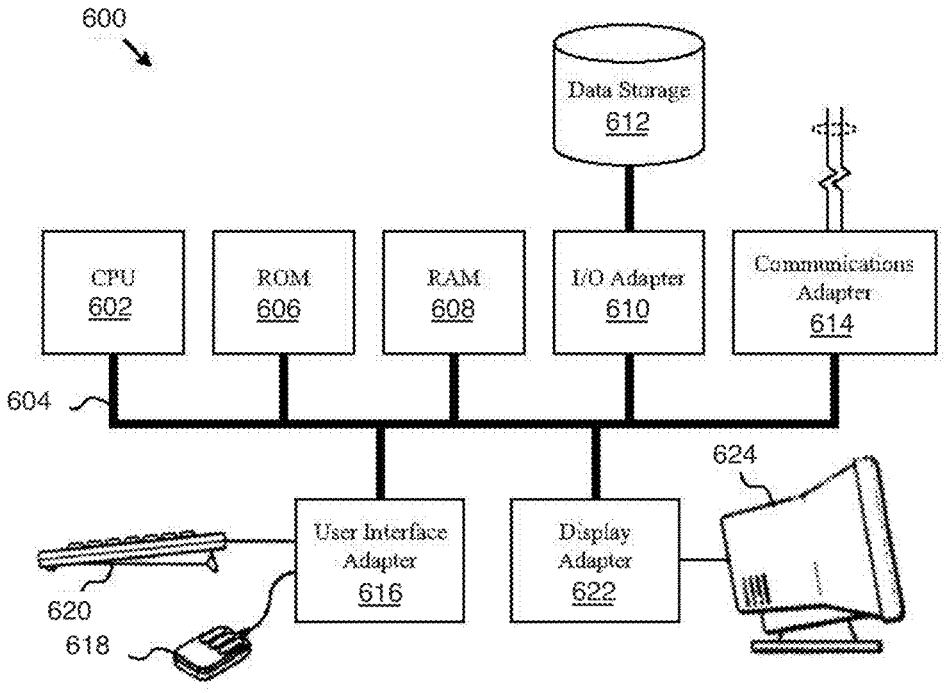

600
Data Storage
612
CPU
602
ROM
606
RAM
608
I/O Adapter
610
Communications
Adapter
614
604
624
User Interface
Adapter
616
Display
Adapter
622
620
618

FIG. 6

# AIR MATTRESS

## TECHNICAL FIELD

**[0001]** This application relates in general to an article of manufacture for providing a bedding device, and more specifically, to an article of manufacture providing an automatically adjusting air mattress.

## BACKGROUND

**[0002]** Getting a good night's sleep is critical for good health. Healthy sleep boosts brain function. And is important for mental health. According to the American Heart Association, poor-quality sleep can cause high blood pressure, cardiovascular plaque build-up, and increased cholesterol levels. Poor sleep can also lead to weight gain as you feel more tired and less energetic and compensate by eating more. Sleep deprivation can also cause an imbalance in the hormones that control hunger. The National Heart, Lung, and Blood Institute says that getting a good night's sleep improves productivity at work or school and reduces the number of errors in your work.

**[0003]** People use air mattresses for convenience when camping, hosting guests, or for temporary situations when there is no access to a traditional mattress. According to Grandview Research, which conducts industry studies, the global air mattress market was close to $128 million in 2018 and increases each year. Typically, an air mattress is less comfortable and leads to a poor night's sleep. This invention makes an air mattress more comfortable and responsive to a sleeper's movements thereby providing the benefits of a good night's sleep.

**[0004]** Therefore, a need exists for an article of manufacture for providing an automatically adjusting air mattress. The present invention attempts to address the limitations and deficiencies in prior solutions according to the principles and example embodiments disclosed herein.

## SUMMARY

**[0005]** In accordance with the present invention, the above and other problems are solved by providing an article of manufacture for an automatically adjusting air mattress according to the principles and example embodiments disclosed herein.

**[0006]** In one embodiment, the present invention is an article of manufacture for providing an automatically adjusting air mattress. The automatically adjusting air mattress includes a plurality of air chambers arranged within a mattress frame, each of the plurality of air chambers having a set air pressure contained within, a base chamber coupled within the mattress frame and below the plurality of air chambers, one or more interconnecting air lines coupling the plurality of air chambers and corresponding air valves, the air valves being coupled to a source of air pressure used to adjusted air pressure in each of the plurality of air chambers, and one or more pressure sensors coupled to the one or more corresponding air valves indicating a current air pressure with each of the plurality of air chambers, each of the one or more pressure sensors being configured to detect changes within one or more of the plurality of air chambers causing the set air pressure within each of the plurality of air chambers to be adjusted to maintain a defined arrangement of air pressure values within each of the plurality of air chambers.

**[0007]** In another aspect of the automatically adjusting air mattress, the automatically adjusting air mattress also includes a programmable controller communicatively coupled to each of the one or more corresponding air valves and each of the one or more pressure sensors, the programmable controller determines new set air pressure for each of the plurality of air chambers using current air pressure values generated by the one or more pressure sensors, and an air pump coupled to each of the one or more pressure sensors and the one or more corresponding air valves, the air pump being operated by the programmable controller.

**[0008]** In another aspect of the automatically adjusting air mattress, each of the one or more corresponding air valves and each of the one or more pressure sensors being coupled to a single air chamber.

**[0009]** In another aspect of the automatically adjusting air mattress, each of the one or more corresponding air valves and each of the one or more pressure sensors being coupled to a group of air chambers comprising two or more air chambers.

**[0010]** In another aspect of the automatically adjusting air mattress, each of the one or more pressure sensors coupled to the one or more corresponding air valves comprises a pressure-sensitive valve.

**[0011]** In another aspect of the automatically adjusting air mattress, the programmable controller is communicatively coupled to an input device for configuring the defined arrangement of air pressure values within each of the plurality of air chamber.

**[0012]** In another aspect of the automatically adjusting air mattress, the input device comprises a touch screen device coupled to the automatically adjusting air mattress.

**[0013]** In another aspect of the automatically adjusting air mattress, the input device comprises a mobile device having a program executing therein for configuring the defined arrangement of air pressure values within each of the plurality of air chamber.

**[0014]** In another aspect of the automatically adjusting air mattress, the mobile device wirelessly communicates with the programmable controller for configuring the defined arrangement of air pressure values within each of the plurality of air chamber.

**[0015]** In another aspect of the automatically adjusting air mattress, the mobile device wirelessly communicates with the programmable controller using a Bluetooth connection.

**[0016]** The foregoing has outlined rather broadly the features and technical advantages of the present invention in order that the detailed description of the invention that follows may be better understood. Additional features and advantages of the invention will be described hereinafter that form the subject of the claims of the invention.

**[0017]** It should be appreciated by those skilled in the art that the conception and specific embodiment disclosed may be readily utilized as a basis for modifying or designing other structures for carrying out the same purposes of the present invention. It should also be realized by those skilled in the art that such equivalent constructions do not depart from the spirit and scope of the invention as set forth in the appended claims. The novel features that are believed to be characteristic of the invention, both as to its organization and method of operation, together with further objects and advantages will be better understood from the following description when considered in connection with the accompanying figures. It is to be expressly understood, however,

that each of the figures is provided for the purpose of illustration and description only and is not intended as a definition of the limits of the present invention.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0018]** Referring now to the drawings in which like reference numbers represent corresponding parts throughout:

**[0019]** FIG. **1** illustrates an example embodiment of an article of manufacture providing an automatically adjusting air mattress according to the present invention.

**[0020]** FIG. **2** illustrates a cross-section of part of an article of manufacture providing an automatically adjusting air mattress according to the present invention.

**[0021]** FIG. **3***a* illustrates an example embodiment of manually interacting air chambers within an article of manufacture providing an automatically adjusting air mattress according to the present invention.

**[0022]** FIG. **3***b* illustrates an embodiment of power-controlled interacting air chambers within an article of manufacture providing an automatically adjusting air mattress according to the present invention.

**[0023]** FIG. **4** illustrates a diagram of a plurality of air chambers arranged about a section of the air mattress indicating a set of air chambers to be defined to adjusted by a user using the programmable controller.

**[0024]** FIG. **5** illustrates a flowchart for a sequence of operations performed within a programmable controller of an article of manufacture providing an automatically adjusting air mattress according to the present invention.

**[0025]** FIG. **6** illustrates a generalized schematic of a programmable processing system utilized as the various computing components described herein used to implement an embodiment of the present invention

## DETAILED DESCRIPTION

**[0026]** This application relates in general to an article of manufacture for providing a bedding device, and more specifically, to an article of manufacture providing an automatically adjusting air mattress according to the present invention.

**[0027]** Various embodiments of the present invention will be described in detail with reference to the drawings, wherein reference numerals represent like parts and assemblies throughout the several views. Reference to various embodiments does not limit the scope of the invention, which is limited only by the scope of the claims attached hereto. Additionally, any examples set forth in this specification are not intended to be limiting and merely set forth some of the many possible embodiments for the claimed invention.

**[0028]** In describing embodiments of the present invention, the following terminology will be used. The singular forms "a," "an," and "the" include plural referents unless the context clearly dictates otherwise. As used herein, a plurality of items, structural elements, compositional elements, and/or materials may be presented in a common list for convenience. However, these lists should be construed as though each member of the list is individually identified as a separate and unique member. Thus, no individual member of such a list should be construed as a de facto equivalent of any other member of the same list solely based on their presentation in a common group without indications to the contrary. As used herein, the singular forms "a," "an," and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise.

**[0029]** It further will be understood that the terms "comprises," "comprising," "includes," and "including" specify the presence of stated features, steps, or components, but do not preclude the presence or addition of one or more other features, steps or components. It also should be noted that in some alternative implementations, the functions and acts noted may occur out of the order noted in the figures. For example, two figures shown in succession may in fact be executed substantially concurrently or may sometimes be executed in the reverse order, depending upon the functionality and acts involved.

**[0030]** The terms "individual" and "user" refer to an entity, e.g., a human, using an article of manufacture providing an automatically adjusting air mattress according to the present invention. The term user herein refers to one or more users.

**[0031]** The term "invention" or "present invention" refers to the invention being applied for via the patent application with the title "Air Mattress." Invention may be used interchangeably with mattress.

**[0032]** The term "pressure-sensitive valve" refers to an air valve used to measure and control air pressure within the air chambers of the air mattress. The pressure-sensitive valve may comprise an integrated device having a sensor and connected valve, as well as a separate valve and pressure sensor working together. Except as explicitly noted, these implementations of the pressure-sensitive valve are interchangeable. Perfect, thank you.

**[0033]** In general, the present disclosure relates to an article of manufacture providing an automatically adjusting air mattress according to the present invention. To better understand the present invention, FIG. **1** illustrates an example embodiment of an article of manufacture providing an automatically adjusting air mattress according to the present invention. An air mattress **100** is shown having a plurality of air chambers **101***a-n* coupled within a mattress frame **102** that provides the overall shape of the air mattress **100**. The plurality of air chambers **101***a-n* is vertically oriented with air chambers having a size from 0.5" to 24' in height. Different sizes can be used in the same sleep system. For example, air cells may be larger at the feet and head where the user's pillow will be, so there is no need for small-sized air chambers. Small air chambers will be necessary at the hips, lumbar, and shoulder areas where more contouring is required. These air chambers can be any shape or size. The individual air chambers might be rectangular, square, pyramid shaped, or any other 3D geometric shape capable of being inflated.

**[0034]** The air chambers may be inflated to the desired pressure that causes the plurality of air chambers **101***a-n* to take shape. The plurality of air chambers **101***a-n* is interconnected to permit the air pressure within individual air chambers to be varied depending upon the weight of a user positioned on the air mattress **100**. The plurality of air chambers **101***a-n* may be manually, or power adjusted using the structures described in reference to FIGS. **3-4**. The air is manually being moved from one air chamber to the next as the user moves on the air mattress **100** in a non-powered model. In a powered model, the tube is connected to the pressure-sensitive valve, or the pressure-sensitive valve will be connected to an air pump via manifold so air can be pumped into the individual air chambers as needed. The user

will select a setting and each air chamber will vent or fill to maintain that air pressure setting as the user shifts. The sleep system will maintain perfect conformity to the user's body as it shifts positions. For example, when a balloon filled to a certain pressure is squeezed the air pressure inside the balloon rises. If a balloon with a book sitting on it is filled to a certain pressure and the book is removed, the pressure in the balloon drops. The air mattress **100** may use a similar process for each air chamber **101***a-d* or group of air chambers.

**[0035]** FIG. **2** illustrates a cross-section of part of an article of manufacture providing an automatically adjusting air mattress according to the present invention. A row of air chambers **101***a-d* is shown positioned next to each other within a portion of the air mattress **100**. The air chambers **101***a-d* are coupled on top of a base chamber **201** that provides volume under the air chambers **101***a-n* to house the interconnecting air lines **203***a-d* to each other and a source of air. Each of the interconnecting air lines **203***a-d* is coupled to pressure-sensitive air valves **202***a-d* that open and close as needed to permit air pressure to flow into and out of the corresponding air chamber **101***a-d*.

**[0036]** In a preferred embodiment, an air valve **202***a-f* and a pressure sensor **204***a-d* are coupled to an input port to each air chamber **101***a-d*, or possibly groups of air chambers, that permit each aid chamber **101***a-d* to be connected to air sources by the interconnecting air lines **203***a-d*. In this arrangement, each of the pressure sensors **204***a-d* are electrically coupled to a programmable controller as shown in FIGS. **3-4** to allow each air chamber **101***a-d* to be inflated and/or deflated as desired when a user moves on top of the air mattress **100**.

**[0037]** Each of the pressure sensors **204***a-d* alerts the programmable controller **302** when a change in air pressure occurs within a particular air chamber **101***a-d* or group of chambers. The programmable controller **302** may determine whether air needs to be pumped into or removed from the air chamber **101***a-d* indicating a change in pressure. The programmable controller **302** may determine how the air pressure is to be adjusted in each of the air chambers **101***a-d* by determining the movement of the user on the air mattress **100** by determining which of the air pressure chambers **101***a-d* have changes in pressure. The change in position of the user on the air mattress **100** may be used by the programmable controller **302** to adjust the air pressure in the air chambers **101***a-d*. For example, a change in pressure in a number of air chambers **101***a-d* at the head of the air mattress **100** may provide an indication of where a user's head has been moved from one position to another. The programmable controller **302** may determine from the user position of the user's head which, if any, of the air chambers **101***a-d* are to be further changed to maintain a particular firmness for the air mattress **100** about the user's head. Similar determinations and adjustments may be made for other locations on the air mattress **100** to support other body parts including the chest, hips, arms, legs, and related parts of the body. Each of these body parts may be adjusted independently from other body parts or may be adjusted across larger regions of the air mattress **100**.

**[0038]** In an example embodiment, the programmable controller **302** determines a new pressure to be used for various air chambers **101***a-d* using the following:

**[0039]** When air chambers are without an external force:

$$pv_1=nrt \tag{1}$$

**[0040]** where p=known pressure/set pressure

**[0041]** $v_1$=known volume ($\pi r^2 h$)

$$nrt=x \tag{2}$$

**[0042]** When air chambers have with an external force exerted:

$$(f+p)v_2 = nrt \tag{3}$$

where $p$ = set pressure

$f$ = external force

$v_2$ = unknown volume

$nrt = x$

$$\text{thus, } (f+p)v_2 = x \tag{4}$$

Solving for $\Delta = v_2 - v_1$

$$(f+p)v_2 - pv_1 \tag{5}$$

$$\text{that resolves to: } v2 = \frac{p(\pi r^2 h)}{f+p} \tag{6}$$

$$\text{Therefore } \Delta = \frac{p(\pi r^2 h)}{f+p} - \pi r^2 h \tag{7}$$

**[0043]** The programmable controller **302** may use the above equations to determine how much pressure is to be added or subtracted from every air chamber **101***a*—d, region, or group of air chambers. The programmable controller **302** may use the determined value for A to instruct the interconnecting air lines **203***a-d* to change the pressure within each air chamber or group of chambers. This calculation is repeated until all of the air chambers have been set to a new pressure value. The programmable controller **302** repeats these calculations and pressure adjustments when an external pressure in one or more air chambers is detected.

**[0044]** FIG. **3***a* illustrates an example embodiment of manually interacting air chambers within an article of manufacture providing an automatically adjusting air mattress according to the present invention. A pair of interconnected air chambers **101***i-j* is shown interconnected with pressure exchanging valves **301***i-j* that are coupled to a pressure controller **303**) in an example embodiment. The pressure exchanging valves **301***i-j* open and close as a user moves on top of these air chambers **101***i-k* to move air pressure between the air chambers based upon the force applied to the top of the air chambers by the weight of the user. As the user moves, the force caused by the user's weight will change and the air pressure within these air chambers **101***i-j* will change to compensate.

**[0045]** FIG. **3***b* illustrates an embodiment of power-controlled interacting air chambers within an article of manufacture providing an automatically adjusting air mattress according to the present invention. An air chamber **101***k* is shown from a power-controlled air mattress **350** in which the air pressure within each of the plurality of air chambers **101***a-n* is individually controlled by a programmable controller **302**. The air pressure valve **301***k* for this air chamber **101***k* is individually connected to an air pump connection **301***k* that is operated by the programmable controller **402**. The air pump connection **310***k* is coupled to one or more output ports of an air pump or similar air pressure source

(not shown). The programmable controller **302** senses the movement of the user on the air mattress via changes in pressure in the individual air chambers **350** and adjusts the air pressure within each air chamber **101***k* of the plurality of air chambers **101***a-n*. The programmable controller **302** adjusts the pressure in each air chamber **101***a-d* by opening the corresponding air pressure valve

**[0046]** A computer-controlled programmable controller **302** will be needed to control all air chambers to maintain properly selected air pressure. The "pressure-sensitive" air valve or air valve and a pressure sensor will be wired to this device. This programmable controller **302** utilizes a program so the user will be able to raise and lower an overall pressure, zones of air chamber pressure such as lower back, and individual air chamber pressure such as head and feet. A user may interact with the programmable controller **302** as shown in FIG. **4**.

**[0047]** The programmable controller **302** knows to add air pressure to an air chamber via the air pump when the pressure-sensitive valve in each air chamber shows a drop in air pressure. The programmable controller **302** also knows to vent air from an individual air chamber when the pressure-sensitive valve shows the pressure has gone up. For example, when a user rolls from laying on the back to the side, the pressure in the air chambers supporting the shoulder the user is now laying upon will go up and the control device will know to vent air pressure via the pressure-sensitive valve (air valve). On a slender person, the pressure on the air chambers at the mid-section of the user (side of the stomach) has dropped and now the device must use the air pump to fill the individual air chambers to maintain desired air pressure at the person's mid-section. The user will have the option to maintain higher pressure on areas such as the lumbar, among other areas.

**[0048]** FIG. **4** illustrates a diagram of a plurality of air chambers arranged about a section of the air mattress indicating a set of air chambers to be defined to adjusted by a user using the programmable controller. The air mattress **400** is shown having a set of air chambers **101***a-n, b-m* in which each air chamber is addressable by its location in the array of air chambers as **101***i,j*. A user may select one or more of the air chambers as an individual air chamber or a group of air chambers **401** shown highlighted in FIG. **4**. Once a group of air chambers is selected, the user may specify how these air chambers are to be inflated and adjusted.

**[0049]** The user may interact with the programmable controller **302** using a user interface of a program executing within the programmable controller **302** to select a group of air chambers and specify the pressure parameters. The user interface may be presented to the user on a touch screen device that is part of the air mattress **400** (not shown), by connecting an input device to the programmable controller **302** or using a user application on a computing device such as a mobile device or a smartphone (not shown). A smartphone **402** may wirelessly connect to the programmable controller **302** and present the user with this user interface to the programmable controller **302** using an application loaded onto the smartphone **402**. The smartphone **402** may use any supported wireless communications channel and protocol such as WiFi, Bluetooth, 3G, 4G LTE, and 5G communications.

**[0050]** FIG. **5** illustrates a flowchart for a sequence of operations performed within a programmable controller of an article of manufacture providing an automatically adjusting air mattress according to the present invention. The process or sequence of operations **500** begins **501** with an initial check of the air pressure in all of the air chambers **101***a-d*. In step **511**, air pressure is measured in one of the air chambers **101***a*. Test step **512** determines if the air pressure is currently its set pressure, and if not, the air pressure in this air chamber **101** is changed to the set pressure; otherwise, the sequence of operations **500** proceeds to test step **514** to determine whether all of the air chambers have been checked. If test step **514** determines that all of the air chambers have not been checked, the process **500** returns to step **511** to check the next air chamber; otherwise, the process proceeds to an operating state.

**[0051]** In the operating state, the process **500** determines whether a user has changed the position on the air mattress. Process **500** measures the air pressure in one air chamber in step **521**. Test step **522** determines if the pressure has changed from its prior set pressure. A change in pressure indicates that an external force has changed on this air chamber which is typically caused by the movement of the user on the air mattress. When test step **522** does not detect a change in air pressure, test step **523** determines whether all of the air chambers have been checked and if not, the process **500** returns to step **521** to check the next air chamber; otherwise, test step **524** determines whether process **500** is to continue or end **502**. When test step **524** determines that the process **500** is to continue, the process **500** returns to step **521** to perform another check of all of the air chambers.

**[0052]** Returning to test step **522**, when a change in air pressure is detected, new set pressures are calculated for all air chambers and groups of air chambers. Step **531** calculates a new set pressure for the air chamber indicating a change. Test step **532** determines whether the air chamber being processed is part of a group and if so, the set pressure of all of the air chambers that are part of the group is set to the newly calculated set pressure value in step **533**; otherwise, the set pressure of the air chambers being processed is set in step **534** to the newly calculated set pressure value. Test step **535** determines of all of the air chambers have been adjusted, and if not, the process returns to step **531** to calculate the new set value for the next air chamber or group of air chambers and the process continues until all of the air chambers have been processed and adjusted to the new set pressures. When test step **535** determines that all of the air chambers have been processed and adjusted, the process **500** continues to test step **524** to determine whether the monitoring and adjusting of the air pressures in the air chambers are to continue, as described above, or to end **502**.

**[0053]** FIG. **6** illustrates a generalized schematic of a programmable processing system utilized as the various computing components described herein used to implement an embodiment of the present invention. FIG. **6** illustrates a computer system **600** adapted according to certain embodiments of the server and/or the user interface device. The central processing unit (CPU) **602** is coupled to the system bus **604**. The CPU **602** may be a general-purpose CPU or microprocessor, graphics processing unit (GPU), and/or microcontroller. The present embodiments are not restricted by the architecture of the CPU **602** so long as the CPU **602**, whether directly or indirectly, supports the operations as described herein. The CPU **602** may execute the various logical instructions according to the present embodiments.

**[0054]** The computer system **600** also may include random access memory (RAM) **608**, which may be synchronous RAM (SRAM), dynamic RAM (DRAM), synchronous dynamic RAM (SDRAM), or the like. The computer system **600** may utilize RAM **608** to store the various data structures used by a software application. The computer system **600** may also include read-only memory (ROM) **606** which may be PROM, EPROM, EEPROM, optical storage, or the like. The ROM may store configuration information for booting the computer system **600**. The RAM **608** and the ROM **606** hold user and system data, and both the RAM **608** and the ROM **606** may be randomly accessed.

**[0055]** The computer system **600** may also include an input/output (I/O) adapter **610**, a communications adapter **614**, a user interface adapter **616**, and a display adapter **622**. The I/O adapter **610** and/or the user interface adapter **616** may, in certain embodiments, enable a user to interact with the computer system **600**. In a further embodiment, the display adapter **622** may display a graphical user interface (GUI) associated with a software- or web-based application on a display device **624**, such as a monitor or touch screen. A small LCD device (not shown) may be coupled to the air mattress **100** to show status information associated with the current conditions within the air chambers.

**[0056]** The I/O adapter **610** may couple one or more storage devices **612**, such as one or more of a hard drive, a solid-state storage device, a flash drive, a compact disc (CD) drive, a floppy disk drive, and a tape drive, to the computer system **600**. According to one embodiment, the data storage **612** may be a separate server coupled to the computer system **600** through a network connection to the I/O adapter **610**. The communications adapter **614** may be adapted to couple the computer system **600** to a network, which may be one or more of a LAN, WAN, and/or the Internet. The communications adapter **614** may also be adapted to couple the computer system **600** to other networks such as a global positioning system (GPS) or a Bluetooth network. The user interface adapter **616** couples user input devices, such as a keyboard **620**, a pointing device **618**, and/or a touch screen (not shown) to the computer system **600**. The keyboard **620** may be an on-screen keyboard displayed on a touch panel. Additional devices (not shown) such as a camera, microphone, video camera, accelerometer, compass, and or gyroscope may be coupled to the user interface adapter **616**. The display adapter **622** may be driven by the CPU **602** to control the display on the display device **824**. Any of the devices **602-622** may be physical and/or logical.

**[0057]** The applications of the present disclosure are not limited to the architecture of the computer system **600**. Rather the computer system **600** is provided as an example of one type of computing device that may be adapted to perform the functions of a server and/or the user interface device. For example, any suitable processor-based device may be utilized including, without limitation, personal data assistants (PDAs), tablet computers, smartphones, computer game consoles, and multi-processor servers. Moreover, the systems and methods of the present disclosure may be implemented on application-specific integrated circuits (ASIC), very large-scale integrated (VLSI) circuits, state machine digital logic-based circuitry, or other circuitry.

**[0058]** The embodiments described herein are implemented as logical operations performed by a computer. The logical operations of these various embodiments of the present invention are implemented (1) as a sequence of computer-implemented steps or program modules running on a computing system and/or (2) as interconnected machine modules or hardware logic within the computing system. The implementation is a matter of choice dependent on the performance requirements of the computing system implementing the invention. Accordingly, the logical operations making up the embodiments of the invention described herein can be variously referred to as operations, steps, or modules. As such, persons of ordinary skill in the art may utilize any number of suitable electronic devices and similar structures capable of executing a sequence of logical operations according to the described embodiments. For example, the computer system **600** may be virtualized for access by multiple users and/or applications.

**[0059]** Even though particular combinations of features are recited in the present application, these combinations are not intended to limit the disclosure of the invention. In fact, many of these features may be combined in ways not specifically recited in this application. In other words, any of the features mentioned in this application may be included in this new invention in any combination or combinations to allow the functionality required for the desired operations.

**[0060]** No element, act, or instruction used in the present application should be construed as critical or essential to the invention unless explicitly described as such. Further, the phrase "based on" is intended to mean "based, at least in part, on" unless explicitly stated otherwise.

What is claimed is:

**1**. An article of manufacture providing an automatically adjusting air mattress according to the present invention, the automatically adjusting air mattress comprises:

a plurality of air chambers arranged within a mattress frame, each of the plurality of air chambers having a set air pressure contained within;

a base chamber coupled within the mattress frame and below the plurality of air chambers;

one or more interconnecting air lines coupling the plurality of air chambers and corresponding air valves, the air valves being coupled to a source of air pressure used to adjusted air pressure in each of the plurality of air chambers; and

one or more pressure sensors coupled to the one or more corresponding air valves indicating a current air pressure with each of the plurality of air chambers, each of the one or more pressure sensors being configured to detect changes within one or more of the plurality of air chambers causing the set air pressure within each of the plurality of air chambers to be adjusted to maintain a defined arrangement of air pressure values within each of the plurality of air chambers.

**2**. The automatically adjusting air mattress according to claim **1**, wherein the automatically adjusting air mattress further comprises:

a programmable controller communicatively coupled to each of the one or more corresponding air valves and each of the one or more pressure sensors, the programmable controller determines new set air pressure for each of the plurality of air chambers using current air pressure values generated by the one or more pressure sensors; and

an air pump coupled to each of the one or more pressure sensors and the one or more corresponding air valves, the air pump being operated by the programmable controller.

3. The automatically adjusting air mattress according to claim 2, wherein each of the one or more corresponding air valves and each of the one or more pressure sensors being coupled to a single air chamber.

4. The automatically adjusting air mattress according to claim 2, wherein each of the one or more corresponding air valves and each of the one or more pressure sensors being coupled to a group of air chambers comprising two or more air chambers.

5. The automatically adjusting air mattress according to claim 1, wherein each of the one or more pressure sensors coupled to the one or more corresponding air valves comprises a pressure-sensitive valve.

6. The automatically adjusting air mattress according to claim 2, wherein the programmable controller is communicatively coupled to an input device for configuring the defined arrangement of air pressure values within each of the plurality of air chamber.

7. The automatically adjusting air mattress according to claim 6, wherein the input device comprises a touch screen device coupled to the automatically adjusting air mattress.

8. The automatically adjusting air mattress according to claim 6, wherein the input device comprises a mobile device having a program executing therein for configuring the defined arrangement of air pressure values within each of the plurality of air chamber.

9. The automatically adjusting air mattress according to claim 8, wherein the mobile device wirelessly communicates with the programmable controller for configuring the defined arrangement of air pressure values within each of the plurality of air chamber.

10. The automatically adjusting air mattress according to claim 9, wherein the mobile device wirelessly communicates with the programmable controller using a Bluetooth connection.

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